DEPARTMENT OF THE NAVY
NAVAL WEAPONS SUPPORT CENTER
CRANE, INDIANA 47522-5000

IN REPLY REFER TO:
5090/H11.9
0924

0 4 MAR 1991

U.S. Environmental Protection Agency
Region V
Attn: Ms. Carol Witt-Smith (5HR-13)
230 South Dearborn Street
Chicago, IL 60604

1-11-1991

Dear Ms. Witt-Smith:

Submitted for review is the Draft Geology, Hydrology and Phase II Ground-water Quality Assessment Report of the Dye Burial Grounds, Solid Waste Management Unit (SWMU) # 02/11. The requirement for submittal of this report was set forth in the Corrective Actions portion of the Hazardous Waste Part B Permit issued to Naval Weapons Support Center Crane (NWSCC) in January 1990.

NWSCC point of contact is Mr. Jim Hunsicker, Code 0924, telephone 812-854-3233. The Northern Division, Naval Facilities Engineering Command (NORTHNAVFACENGCOM) point of contact is Mr. Byron Brant, Code 1423/BB, telephone 215-897-6280.

Sincerely,

J.W. HAYS
Commander, CEC, USN
Public Works Officer
By direction of the
Commanding Officer

Encl:
(1) Draft Geology, Hydrology and Phase II Ground-water Quality Assessment Report of the Dye Burial Grounds, Solid Waste Management Unit (SWMU) # 02/11.
(2) Certification Statement

Copy to:
NORTHNAVFACENGCOM, Philadelphia (Code 1423/BB) (w/o encl)
COMNAVSEASYSCON (SEA 6541) (w/o encl)
USAE-WES, BILL MURPHY (GG-YH) (w/o encl)
1422/JC

ENCLOSURES

Enclosure (2) - Certification Statement is unavailable.

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DRAFT

Geology, Hydrology and Phase II Ground-Water Quality Assessment of the Dye Burial Grounds Naval Weapons Support Center Crane, Indiana

by

William L. Murphy

Geotechnical Laboratory

January, 1991

Prepared for Department of the Navy
Northern Division
Naval Facilities Engineering Command
Philadelphia, Pennsylvania

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PREFACE

This study was performed at the Naval Weapons Support Center (NWSC) Crane, Indiana during the period 9 Dec 1987 to 2 Sept 1988 by the US Army Engineer Waterways Experiment Station (WES), Vicksburg, Mississippi for the Northern Division, Naval Facilities Engineering Command (NAVFAC), Philadelphia, Pennsylvania. The work was performed under authority provided by NAVCOMPT Document Nos. N62472-87P000010 dated 10 Sept 1987, Amendment No. 1 to that document dated 22 Dec 1987, and N62472-88MP00009 dated 3 May 1988. The funds were made available through the Department of the Navy's Installation Restoration Program, Defense Environmental Restoration Account (DERA).

The field geology and well installation and development were performed by Richard W. Hunt of the Engineering Geology Branch, WES. Field support was provided by the drilling crew under supervision of Mr. Mark Vispi, Chief, In Situ Evaluations Branch, WES. Project management was performed by William L. Murphy of the Engineering Geology Branch. The ground-water sampling and analysis were performed by personnel of the Environmental Engineering Division, WES, and the WES Analytical Laboratory Group, which is directed by Ms. Ann Strong. The report was written by Mr. Murphy.

Environmental Director at NWSC during the study was James Hunsicker. Robert Magee and David Smith were Navy Project Managers at Northern Division. Further review of the work and of the draft report were provided by Mr. Jeffrey Ciocco of Northern Division. Direct supervision was provided at WES by Dr. Lawson M. Smith, Chief, Engineering Geology Branch. Additional supervision was provided by Dr. A. G. Franklin, Chief, Earthquake Engineering and Geosciences Division, WES, and Mr. Richard E. Fini, Head, Restoration Technical Section, Northern Division.
The study was conducted under the general supervision of Dr. William F. Marcuson III, Chief, Geotechnical Lab (GL).

COL Larry B. Fulton, EN, and COL Dwayne G. Lee, EN were Commander and Director of WES during the study and report preparation period. Dr. Robert W.

Whalin was Technical Director.

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EXECUTIVE SUMMARY

This report documents a field and laboratory study conducted at the Dye Burial Grounds (DBG) of the Naval Weapons Support Center (NWSC) Crane, Indiana during the period December 1987 to September 1988. The field investigation consisted of monitoring well installation, geologic and hydrologic mapping, and ground-water sampling and analysis for a Remedial Investigation (RI) Phase II hydrogeologic and ground-water quality assessment of the Dye Burial Grounds. The objective of the RI is to verify the presence of toxic and hazardous materials, confirm the source of contamination, and determiine the general site hydrogeology.

Twelve monitoring well clusters (33 wells) were installed at the DBG in four aquifers. The aquifers were, in ascending order, the Beech Creek limestone, the Golconda-Haney limestone, the lower part of the Mansfield formation (sandstone) and the upper part of the Mansfield (sandstone). Well screens were set at depths ranging from 16 to 184 ft. The deep boring of each well cluster was continuously cored for geologic and hydrologic information. Eight shallow wells had been previously installed at the site.

The DBG consists of three contiguous trenches approximately 10 ft wide by 6 ft deep by 50 feet long reportedly filled with dye-contaminated debris and covered with soil. Hydrogeologic analysis of field data indicates that ground water is contained in and flows primarily in interconnected joints in the rock aquifers. The primary direction of ground-water flow in the uppermost aquifer is to the northwest and southeast but the aquifer is limited in extent. Ground water in the lower three aquifers flows primarily to the southwest toward Little Sulphur Creek. Surface runoff is to the south, west and southwest.

Analysis of one round of water samples from 23 selected wells detected low quantities of various compounds including organic compounds, metals and sulphates. Five compounds tested were above drinking water or other interim health standard in at least one well. They were beryllium, selenium, nickel, chloroform and sulfates. Tested contaminants were found in all 23 wells sampled representing all four aquifers. Nickel, zinc and sulphates were the

most persistent and most highly concentrated compounds detected. No "indicator" compounds (uniquely traceable to buried materials at the DBG) were identified. The Golconda-Haney and the overlying Mansfield sandstone aquifers are isolated from other NWSC activities by topographic incision around the DBG. Contamination in those aquifers must be considered to originate at the DBG. The lowermost aquifer, the Beech Creek, has potential hydraulic access to other areas within the NWSC.

Off-site migration of surface and ground water from the DBG is primarily to the south and southwest. Additional sampling and installation of a few additional wells are recommended to confirm the presence, extent and direction of migration, if any, of ground water contaminants in the DBG area. A source location Interim Measure using geophysical methods is recommended to define the perimeter of the trenches at the DBG.

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

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

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Geology, Hydrogeology, and Phase II Ground-Water Quality Assessment of the Dye Burial Grounds Naval Weapons Support Center Crane, Indiana

PART I: INTRODUCTION

Background

1. An initial assessment study (IAS) was conducted at the Crane Naval Weapons Support Center (NWSC), Crane, Indiana in 1981 to identify and assess sites of potential threat to health or the environment by contamination from past hazardous materials operations (Eakes, 1983). The Dye Burial Grounds (DBG), located in Section 21, T5N, R3W was one of fourteen sites identified as warranting further assessment by a Remedial Investigation (RI). The RI and the IAS are part of the Installation Restoration (IR) program designed to identify contamination of Navy lands resulting from past operations and to institute corrective measures, as needed. The IR program consists of three phases: (1) Preliminary Assessment/Site Investigation (PA/SI), (2) Remedial Investigation/Feasibility Study (RI/FS), and (3) Remedial Design/Remedial Action (RD/RA). This document is submitted as the Hydrogeologic Report and Phase II ground-water quality assessment of the RI.

2. The IAS study team reported that an estimated 50,000 lbs of various dyes and dye-contaminated materials were deposited into open trenches at the DBG from 1952 until 1964. Three main trenches were about 10 feet wide, 6 feet deep and 50 feet long. Deposited materials included magnesium, boxes and rags contaminated with dyes and about 60 drums of dyes.

3. Subsequent investigations at selected sites provided further information on conditions at the DBG (Dunbar, 1982). Eight exploratory borings and wells were placed near the dye burial area to depths as great as 70 ft. The eight wells provided preliminary data on water table elevations and direction of ground water flow in the uppermost aquifer. The surface soil at the DBG was classified in the laboratory as a CL clay (Unified Soil Classification System, USCS, classification) with a laboratory-determined

permeability of 10^{-5} to 10^{-8} cm/sec.

4. The eight DBG wells were sampled by Crane personnel or their contractors periodically from 1982 to 1986. Parameters detected in sampled water were primarily metals, fluoride, chloride, bromide and iodide, sulphate, TOC, phenols, pH and conductivity. Concentrations of the metals barium, cadmium and selenium were above drinking water standards in some of the wells.

5. The work by Dunbar (1982) was general in scope and insufficient to describe the geology and hydrogeology at the DBG adequately for RI requirements. The RI reported herein expanded on Dunbar's work by installing additional wells to greater depths to include deeper aquifers. Geologic and hydrologic data obtained in the study of the Ammunition Burning Ground (ABG) (Hunt, 1988) adjacent to the DBG were applied to the DBG study.

Objectives.

6. The objective of the RI of the Dye Burial Grounds is to determine whether or not specific toxic or hazardous materials have contaminated the environment at the site. The study consists of field investigations including monitoring well installation, sampling, determination of surface and ground water flow patterns, geologic/hydrologic mapping, analysis for chemical contaminants, and preparation of hydrogeological and contaminant concentration maps and profiles. Recommendations will be made concerning contamination abatement actions to be conducted subsequently.

7. Objectives of the RI include establishing the presence of specific toxic and hazardous materials, confirming the suspected source of contamination, and determining general site hydrogeology including vertical distribution of aquifers. Sufficient monitoring wells were installed, exploratory borings emplaced, and other investigative methods used to define site boundary conditions and evaluate the contamination, hydrogeology, health and safety status of the DBG. The work reported herein occurred between Dec 1987 and Jun 1988.

Study Area Location.

8. The NWSC Crane is located in southwest Indiana approximately 75 miles southwest of Indianapolis and 71 miles northwest of Louisville, Kentucky (Figure 1). The DBG is located in the eastern portion of the NWSC as shown in Figure 2. Site topography and boring locations are presented in Plate 1. Plate 1 includes the locations of the original eight DBG borings and wells (02-01 through 02-08), the borings and wells emplaced for the DBG RI (02C09 through 02C20) and four wells emplaced earlier for the investigation of the adjacent ABG (03C04, 03C05, 03C17 and 03C28). Coordinates on the map border are Indiana state coordinates, in feet. Figure 3 shows well locations at a larger scale. The "seep" is an area of ground water intercepting the ground surface and was sampled in the ground water monitoring program.

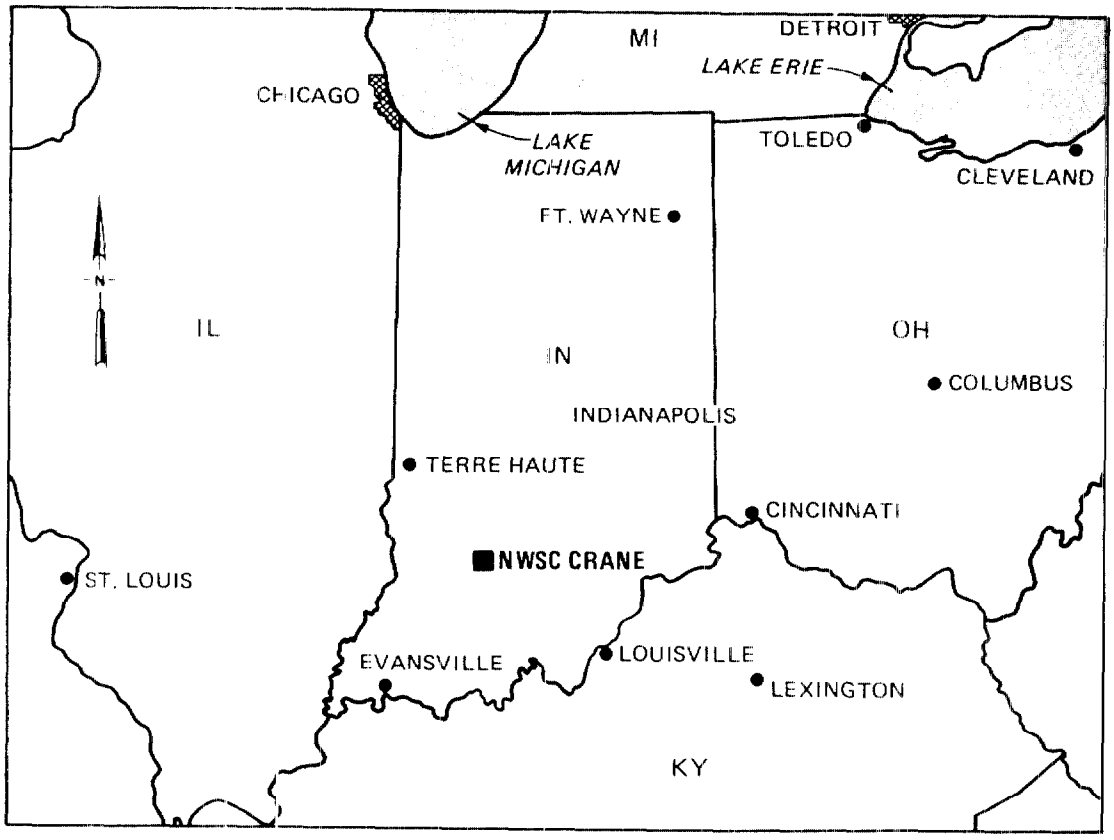


Figure 1. Location of NWSC Crane.

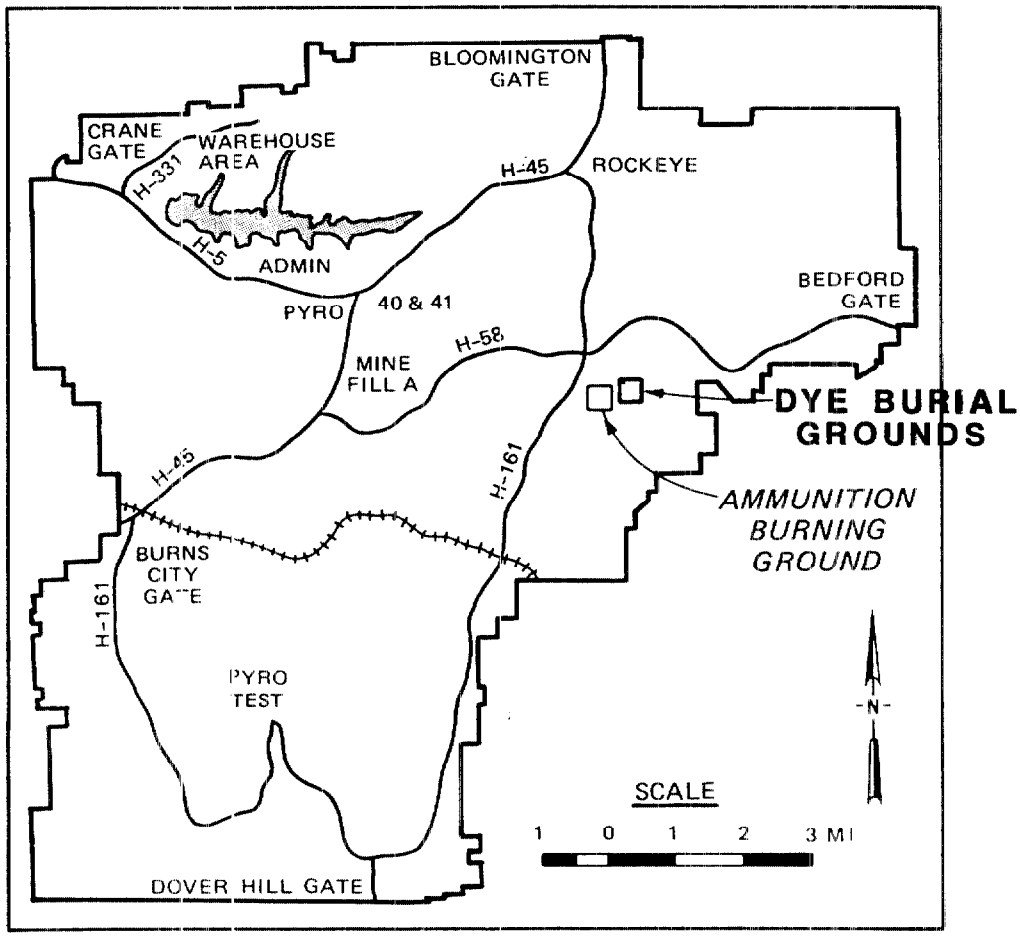


Figure 2. Location of the Dye Burial Grounds (DBG).

PART II. HYDROGEOLOGIC INVESTIGATION

Drilling and Sampling and Well Installation.

9. The eight wells previously emplaced at the Dye Burial Grounds (wells 02-01 through 02-08, Figures 2 and 3) were drilled with auger and rock bit except for well 02-02, which was cored. Seven of the well screens were placed within the upper aquifer zones in the Pennsylvanian Mansfield Formation, which extends to a depth of 30 to 60 feet beneath the dye burial area. The screen for well 02-03 was placed in the Hardinsburg shale underlying the Mansfield Formation. Previous work at the adjacent Ammunition Burning Ground (Hunt, 1988) indicated the need to screen two other aquifers below the upper zone. Clarification of the subsurface geology at the DBG required emplacement of several additional core borings. Accordingly, an additional 12 well sites were selected and a total of 33 additional wells installed. Wells were installed in the Beech Creek Limestone, the Golconda/Haney Limestone (both of Mississippian age), the lower part of the Mansfield Formation sandstone and in the upper part of the Mansfield where the formation is divided by a wedge of shale. The deepest screen was set at a depth of 184 ft in well 02C12. The deepest boring at each well site was cored to obtain sufficient geologic information. Other well borings at each site were augered or drilled with a rock bit. Table 1 presents data for the monitoring wells at the DBG. Wells emplaced for this investigation are designated by 02C... followed by the well number. The new wells (02C09-02C20) are in clusters of two or three wells. The deepest well of each cluster was cored and is designated by a number only. The other wells of a cluster are designated by a number followed by "P2" or "P3".

Drilling and Sampling.

10. Prior to the start of drilling and between set-ups 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 set-up, the soil zone

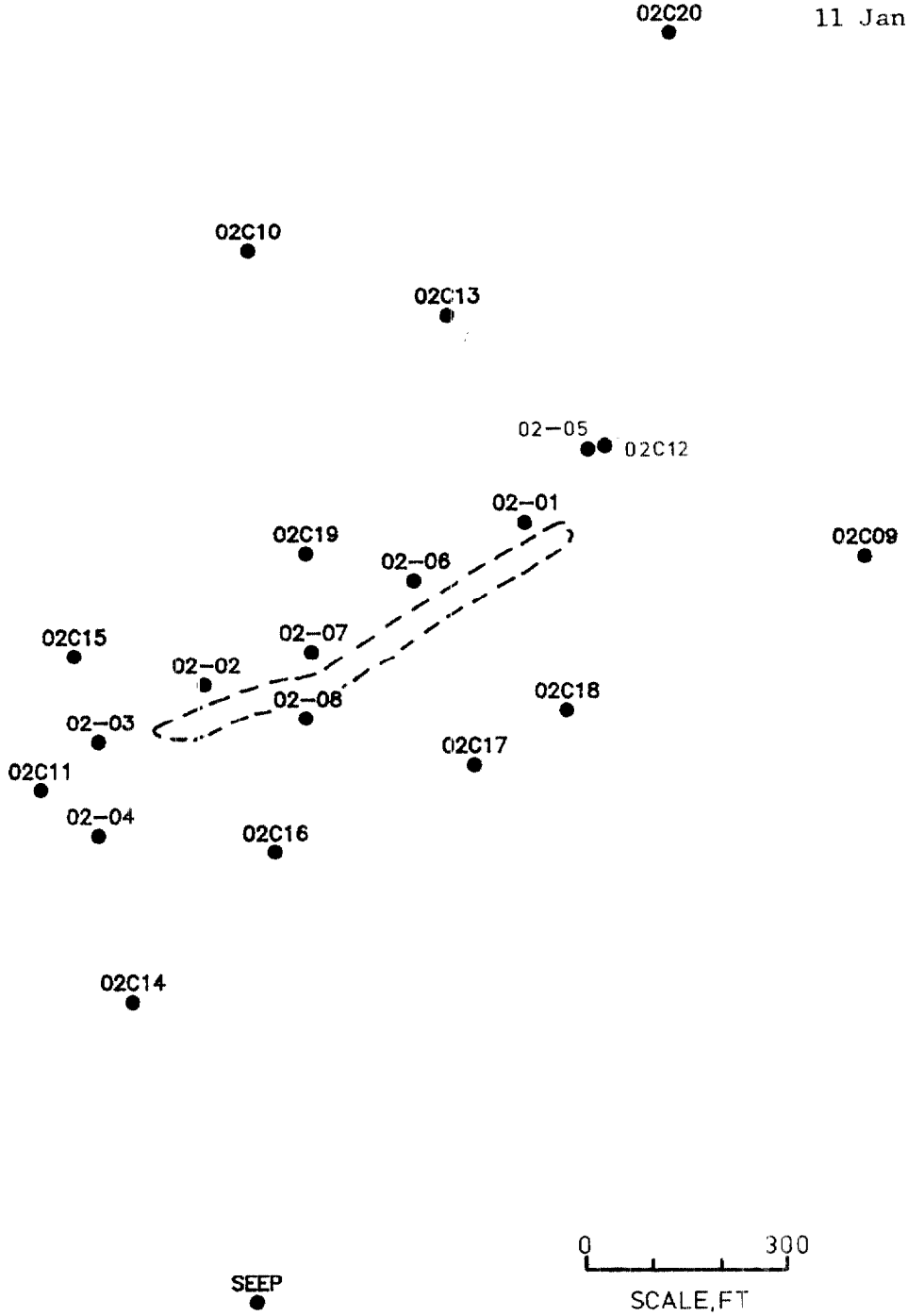


Figure 3. DBG well location detail. Dashed line is approximate location of buried trenches.

in each of the core borings was sampled with a 7-in. diameter folding auger to refusal. If the depth to refusal was less than approximately 11 ft (the depth needed to start coring with the HQ wireline 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 wireline system. The core samples were placed, in order of removal, into plywood boxes for future reference, and detailed geologic logs were prepared. Copies of the field boring logs are presented as Appendix A.

11. The drill cuttings were removed by circulating clean water in a steel mud pan sealed around the boring top. 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" diameter casing in the upper zone, followed by 4" diameter casing in the middle zone. The 4" casing was grouted up through the previously set 6" casing. Where there was no upper aquifer, the 6" 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.

12. 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 hours using a 2-1/2-in. diameter, 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.

13. Two-inch diameter PVC pipe was used for the screens and risers of the monitoring wells. The PVC screens have three vertical columns of horizontal slots .020-inch wide and spaced approximately a quarter of an inch apart. The riser pipe extends upward to approximately 2.5 ft above the ground surface. The bottoms of the well screens have non-slotted PVC 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. diameter steel pipes with lockable caps and are grouted 3-1/2 ft inside the 4-in. and 6-in. diameter PVC surface casing. Typical well installations are shown diagramatically in Figure 4.

14. Once the pipe system was installed in the boring, the screened section and the entire aquifer zone were packed with a siliceous sand filter material (purchased in prepackaged bags and guaranteed clean by seller). 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 in order to obtain a good seal above the aquifer and to prevent clogging of the aquifer by annular grout. A 3- to 5-ft thickness of bentonite pellets was poured in from the top to secure a seal above the filter pack in each well. The bentonite was allowed to set 30 minutes to 1 hour 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 diameter pipe.

Well development.

15. The procedure for developing the wells consisted of bailing well water, alternating with periods of surging. The surge tool consisted of an

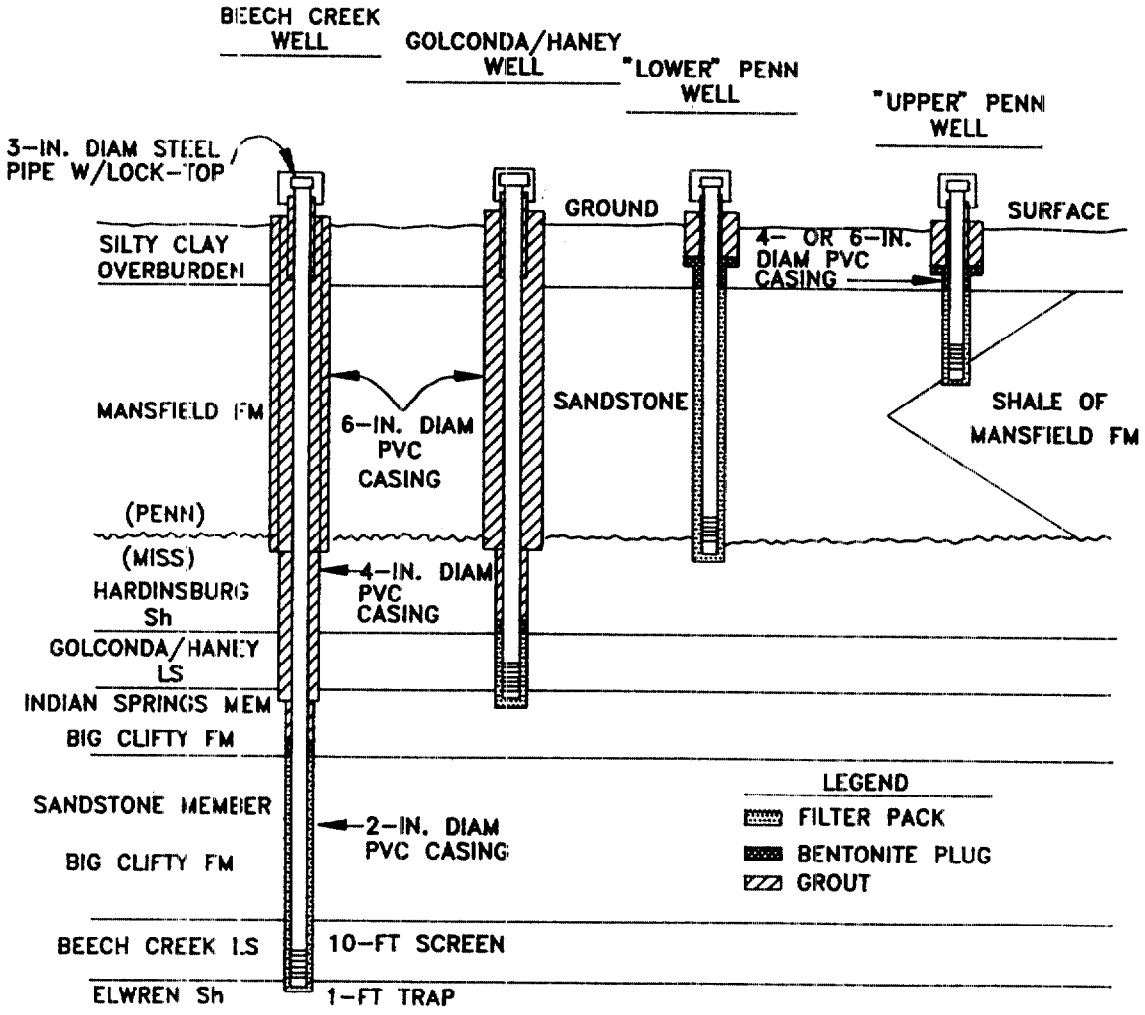


Figure 4. Typical well installation for the Dye Burial Grounds.

18-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 1/8-in.-diam stainless steel cable and pulled briskly up and down in the slotted zone 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 same stainless steel cable used for surging was used to lower and raise a 1-1/8-in. diameter, 5 ft long stainless steel bailer. To increase speed and efficiency of the bailing operation, a frame was constructed on a small trailer in conjunction with a portable wireline winch to run the tools in and out of the wells. The wells were bailed until the water became clear. The developing tools were flushed with clean water between each well setup.

Site Surveying.

16. The U.S. Army Engineer District, Louisville Surveying Branch provided horizontal and vertical control for all DBG wells. A global positioning system (GPS) was used to provide Indiana state plane coordinates which allowed plotting of site and well positions on the 7.5 minute U.S. topographic quadrangles covering the DBG study area. The base map for Figure 2 (site location map) was constructed from the Williams and Indian Springs 7.5 min. quadrangles. The relatively new GPS system provides positioning of points in remote areas by sighting on target satellites. All elevations are referred to the National Geodetic Vertical Datum (NGVD) of 1927. Table 2 presents horizontal (northings and eastings) and vertical survey data for the DBG.

Geology and Hydrogeology of the DBG.

Regional setting.

17. 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 are shown in relationship to the state of Indiana in Figure 5. 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 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.

18. Geologic time periods extending from the Pennsylvanian through the Cambrian (nearly all of the Paleozoic Era) are represented in the sedimentary sequence underlying the region. Total accumulations of the sedimentary rocks range from 3500 ft thick across the Kankakee and Cincinnati Arches to over 13,000 ft thick near 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.

19. The NWSC lies in the eastern flank 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 6. Mississippian rocks of the Chester Series are extensively exposed in the valley walls and hollows along

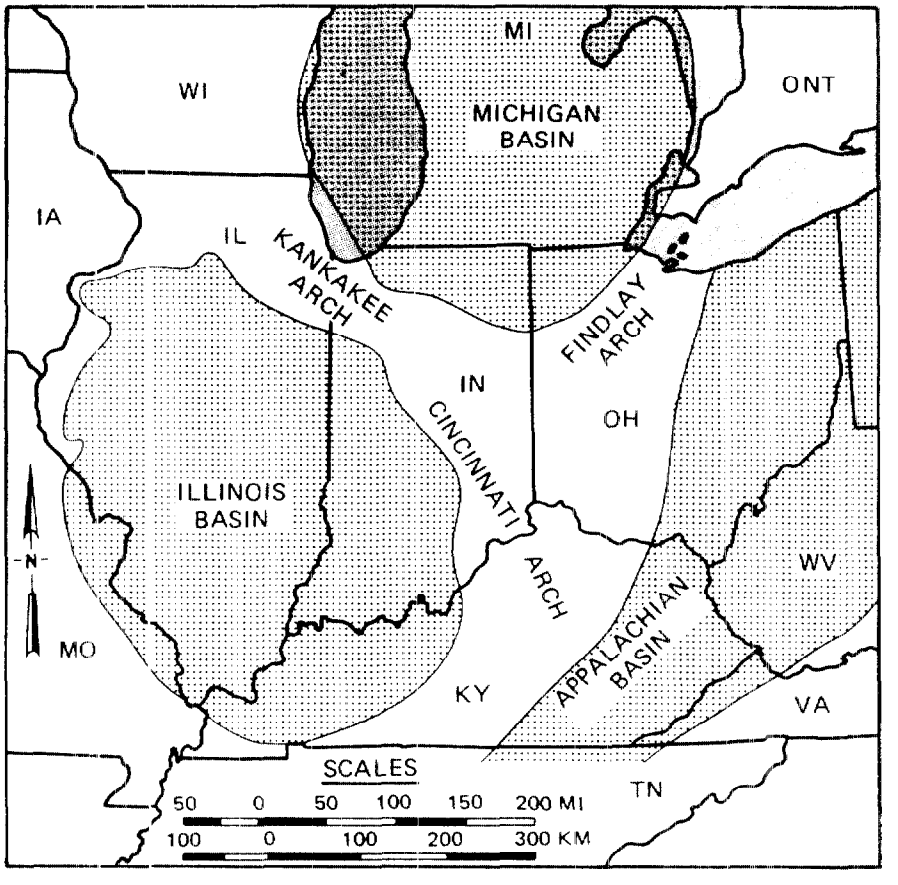


Figure 5. Major structural provinces of midwestern United States (Carpenter et al. 1975).

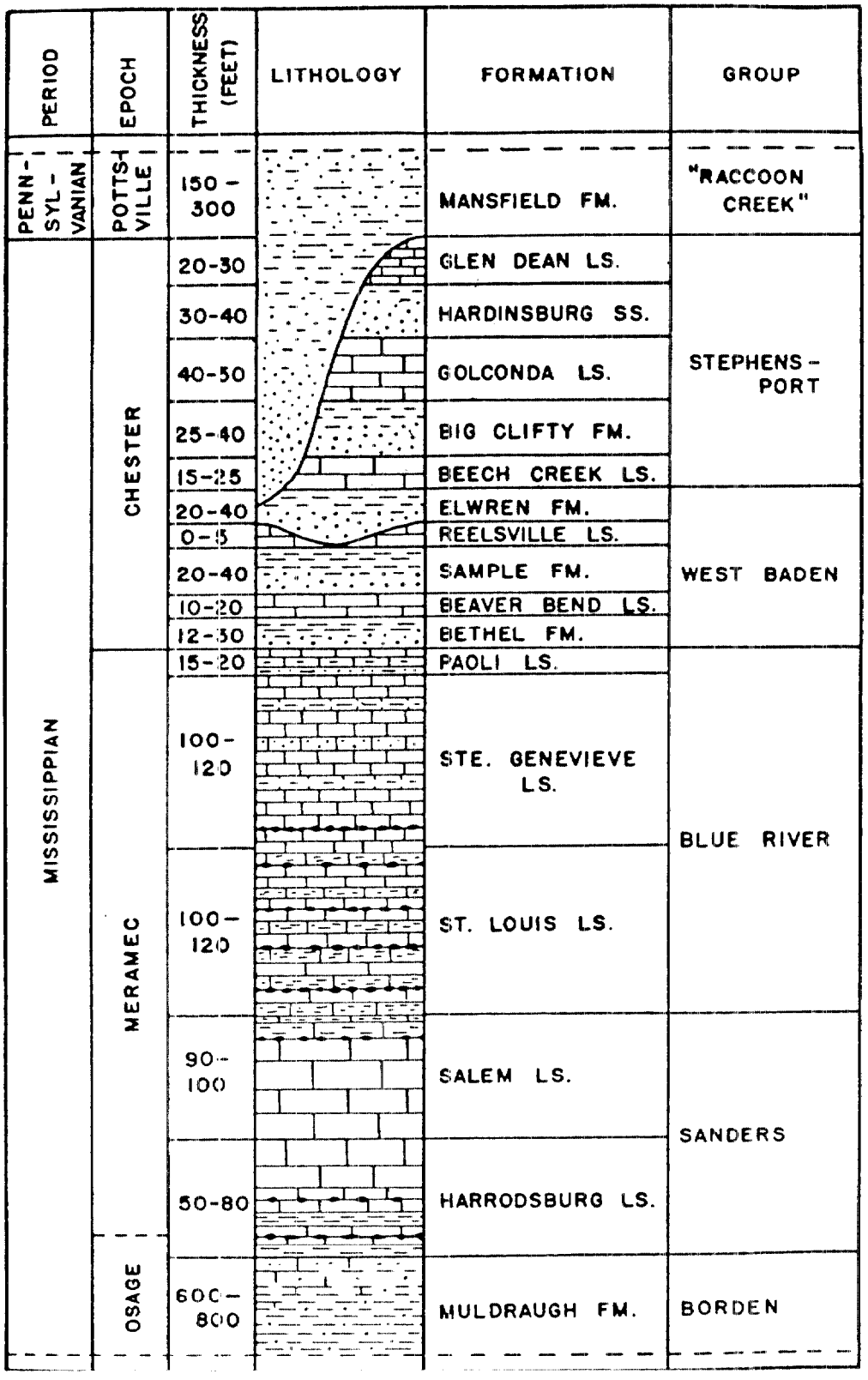


Figure 6. Stratigraphic column of rock units encountered at NWSC (Palmer 1969).

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 an unconformity where erosional processes extending over a long period of time removed upper portions of the Chester Series prior to Pottsville deposition. Local relief along the unconformity may be as much as 150 ft in some areas.

20. Two faults or proposed faults have been mapped in the NWSC general area. The closest mapped major fault, known as the Mt. Carmel fault, trends NW-SE and passes approximately 20 miles east of the NWSC. A possible fault trending approximately N-S has been mapped in a railroad cut on NWSC property in Sec 31, T5N, R3W as shown in Figure 7 (Ault et al. 1985). The NWSC fault is inferred from an apparent 30 ft displacement of Mississippian Glen Dean Limestone above strata of the Pennsylvanian Mansfield Formation.

21. The physiographic divisions of the state of Indiana, the limits of Pleistocene glaciation and the location of the NWSC are shown in Figure 8. The NWSC lies in an unglaciated area of the Crawford Upland, a rugged dissected plateau bounded 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. 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

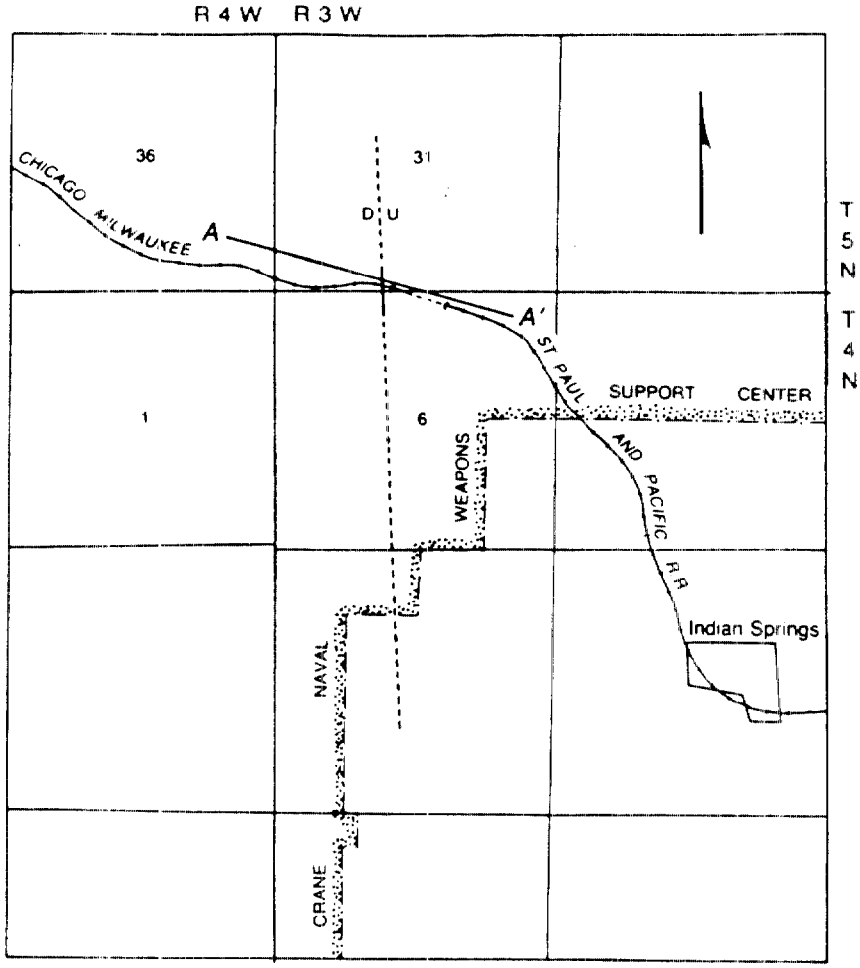


Figure 7. Location of inferred fault in NWSC (Ault et al. 1985).

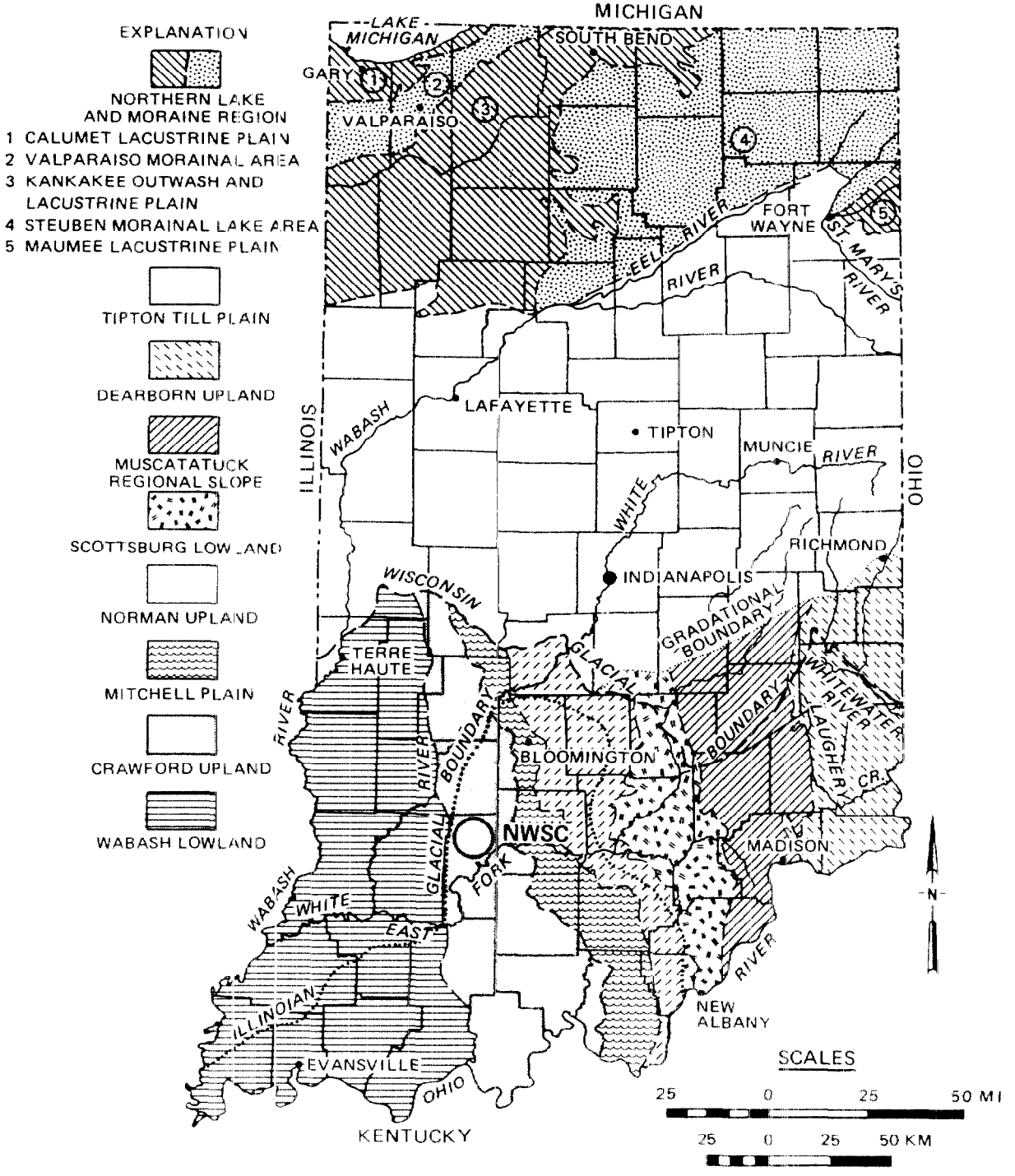


Figure 8. Physiographic division of the State of Indiana (Perry and Smith 1958).

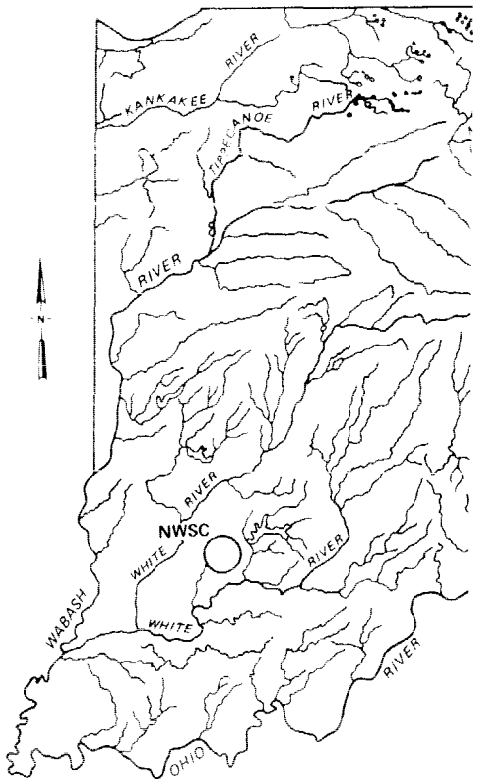
found in the eastern portion of the NWSC. The Crawford Upland grades into the Wabash Lowland near the western NWSC boundary. Elevations on the Crawford Upland at the NWSC range from less than 500 ft msl to greater than 850 ft msl. Relief on the upland varies from about 100 ft to 350 ft, with higher elevations and greater relief occurring generally in the eastern part of the NWSC. Surface drainage in the upland is to the south and southwest.

22. The surface drainage along major streams in Indiana is shown in Figure 9. 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 9. The DBG site is located in Basin III, near the headwaters of Little Sulphur Creek.

23. 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 (Figure 8), aquifers are essentially isolated from each other vertically by interlayered shale units which act as aquicludes. 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 re-entering a lower aquifer exposed downstream.

Physiography of the DBG study area.

24. A topographic map of the DBG study area is presented in Plate 1. The map was prepared by combining the Indian Springs and Williams, USGS 7-1/2 min. quadrangles and photographically enlarging them to a scale of 1 in. = 500



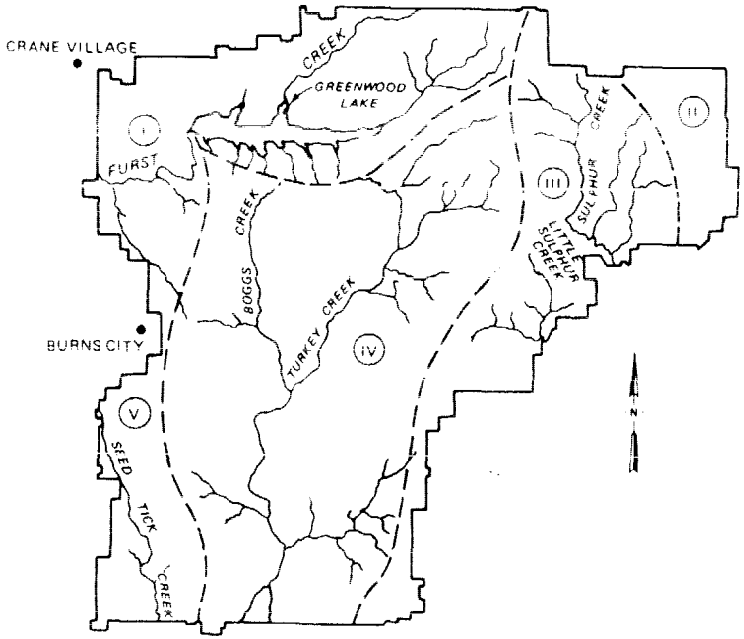


Figure 9. The stream system in Indiana (left, Indiana Academy of Science 1966) and surface drainage at the NWSC Crane (right, Chesapeake Division Naval Facilities Command).

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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. The DBG site is within an area described by Hunt, 1988 and characterized by valleys showing strong east-west, southwest, and southeast trends. The overall drainage pattern is presumably a result of preferential erosion along joints in the rock. 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.

25. The DBG lies 500 to 1000 ft SW of the crest of a NNW-trending ridge separating Sulphur Creek from Little Sulphur Creek. Principle surface drainage from the site is to the south and southwest into Little Sulphur Creek, which is the primary drainage way for the adjacent ABG. Maximum elevation near the DBG is approximately 775 ft at the ridge crest NE of the site. The catchment area for surface drainage into the DBG is small because of the site's position near the crest of the drainage divide. The positions of the drainage divide and the principle drainage ways in the DBG area are shown in Figure 10. The double-dashed line is the divide; the bold solid lines with arrows locate the drainage ways. To the west of the DBG, Little Sulphur Creek continues south and crosses the NWSC boundary about 1-3/4 miles south of the 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.

Stratigraphy.

26. 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). Refer to Figure 6 to review the stratigraphic column in the NWSC area.

a. **Raccoon Creek Group (Pennsylvanian)**

Mansfield Formation. The Mansfield Formation caps the hills and

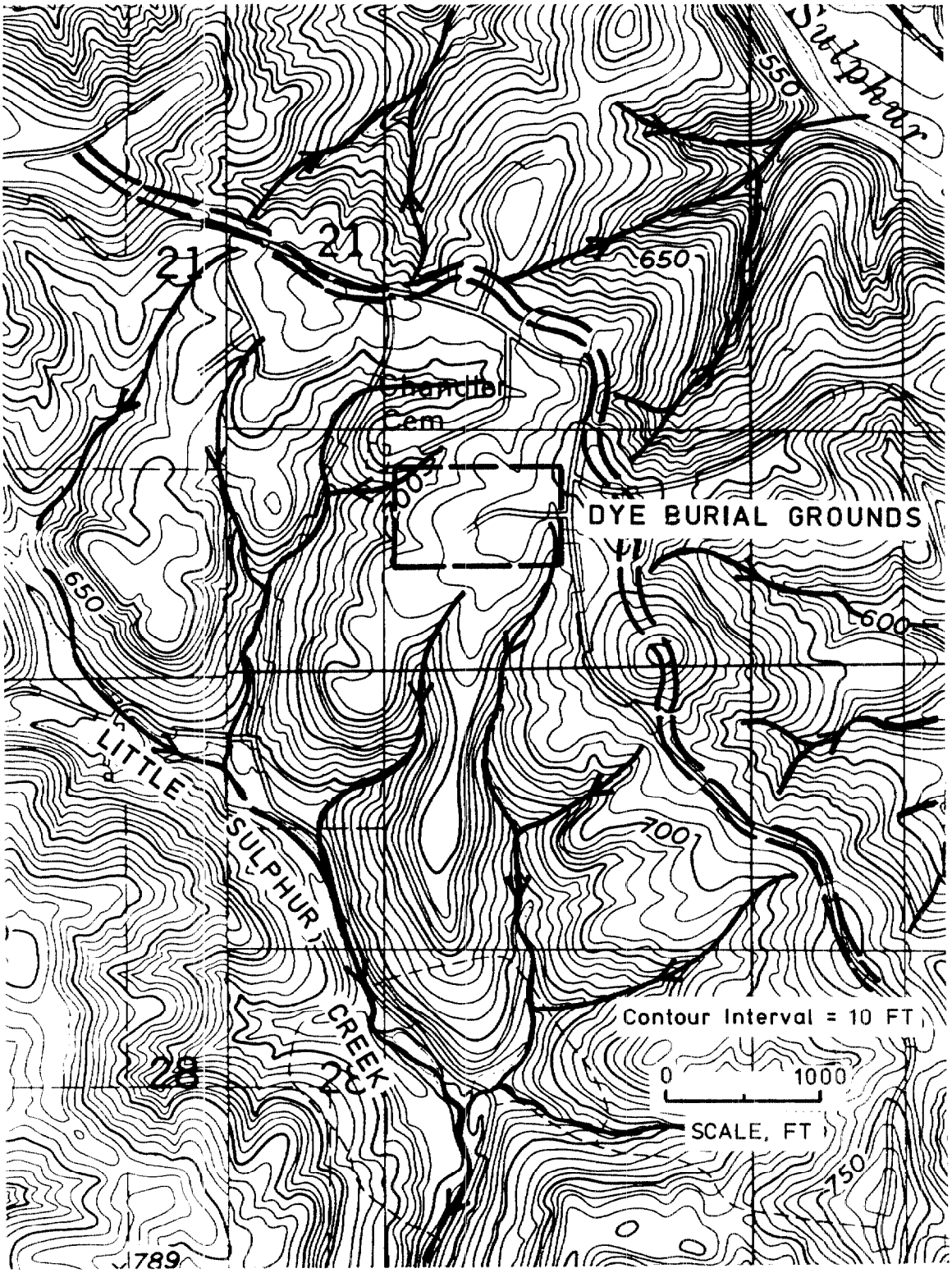


Figure 10. Surface drainage at the DBG.

ridges in the study area and varies from 0 to 65 ft thick in the core borings. The dye burial grounds are situated entirely within the Mansfield. 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. A two to three foot thick conglomeratic sandstone was also logged in the core borings of the DBG study. The various beds tend to rapidly "lens out" laterally. The Mansfield is covered by 5 to 15 ft of silty clay soil throughout the DBG area. The sandstone of the Mansfield contained numerous bedding plane joints as noted in the core logs at the DBG.

The Mansfield forms the upper two aquifers for the DBG study. A wedge of shale that thickens to the east and thins and disappears through erosion to the west separates the Mansfield sandstones into an upper and a lower aquifer on the eastern side of the dye burial area. The contact between the Pennsylvanian units and the underlying Mississippian is an unconformity (represented by a wavy contact line on subsequent geologic cross sections.)

b. **Stephensport Group (Mississippian)**

(1) Hardinsburg Formation. The Hardinsburg occurred immediately below the Mississippian-Pennsylvanian unconformity in all of the DBG borings and is relatively uniform in thickness. The greatest thickness of 28.6 ft was encountered in well 02C18. 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 Hardinsburg Formation is an aquiclude between the Mansfield sandstone and the underlying Golconda/Haney Limestone.

(2) Golconda/Haney formation. Several years ago the name for this formation was changed from the Golconda to the Haney. However, to facilitate cross reference to earlier reports both names are used in this report. The thickness in borings emplaced for the DBG study varies from 2.9 ft in well

02C09 to 18.4 ft in well 02C14. 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. A 1/2 to 2 ft thick shale bed occurs near the middle of the formation in many borings. The Golconda/Haney forms the middle aquifer of the study area. Core logs for DBG wells penetrating the Golconda/Haney recorded joints, many open, in the formation.

(3) 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- to 24-ft thick bed of dark gray, thinly bedded, platey to fissile, carbonaceous, locally fossiliferous shale. 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.

The lower member of the Big Clifty Formation consists of approximately 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 and the underlying Beech Creek Limestone form the lower (deepest) aquifer for the DBG study. Numerous joints were identified in some of the cores taken from the Big Clifty Formation.

(5) Beech Creek Formation. The Beech Creek consists of fossiliferous, very hard and dense limestone that ranges from 19 to 23 ft thick in DBG wells. Six wells were screened in the Beech Creek at the DBG. 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 low-angle (bedding?) joints throughout and occasional intersecting high-angle joints near the base of the formation. The Beech Creek Limestone and the overlying sandstone of the Big Clifty Formation together represent the lower aquifer of the DBG site. The

Beech Creek encountered in many of the borings emplaced in the ABG was cavernous as a result of solution-forming activities of ground water flowing through wide joints in areas where the formation was incised by valley cutting. No solution/collapse features were reported from drilling action or sample loss in the Beech Creek at the DBG (there were indications of solution-widened joints and bedding planes, however). Presumably the DBG's position atop a ridge has prevented formation of solution/collapse cavities in the underlying Beech Creek.

c. **West Baden Group (Mississippian)**

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 ABG-DBG study area. Ground water can be seen flowing freely along the top of the Elwren and forms springs at those locations. Spring C in the valley of Little Sulphur Creek south of the DBG (Plate 1) emanates from the Beech Creek-Elwren contact zone. The Elwren was the deepest formation penetrated in DBG borings. Six borings bottomed in the Elwren.

Surface Geology.

27. The general distribution of surface rocks within the DBG study area is shown on the geologic map of Plate 2. Plate 2 is at the same scale as the topographic map of Plate 1. Data to construct the geologic map was obtained from field reconnaissance of a few outcrops of formation contacts but primarily by projection of contacts in geologic cross sections constructed for the DBG study from borings. Contacts mappable from outcrops are indicated on the map (for example, the "top of Beech Creek Ls..." at the east end of section BB). The cross sections are presented later in this report. A layer of residual and other soil up to 10 ft thick covers the uppermost geologic unit on the ridge crests and is somewhat thinner or absent on steep slopes.

The outcrop pattern on the geologic map reflects headward erosion of drainage in the area, and is representative of the surface geomorphology. The geologic contacts between units are subparallel to the topographic contours and are indicative of relatively flat-lying bedding planes. A map showing distribution of geologic units in the general study area of the ABG and DBG is presented in Plate 3 (Hunt, 1988).

28. Pennsylvanian sandstones and shales of the Mansfield Formation cap the ridge on which the DBG is sited, and progressively older Mississippian sediments of the Stephensport and West Baden Groups are exposed downward into the valleys (see Figure 6). The contact between the Pennsylvanian and Mississippian sediments is an unconformity, marked by evidence of an extended period of surface erosion prior to the deposition of Mansfield Formation sediments. A prominent seep south of the DBG (Plates 1 and 2) is at or near the unconformity and forms an outlet for ground water in the Pennsylvanian sandstone aquifer. Springs C (Plate 1) and E (Plates 1 and 2) are flowing springs draining the Beech Creek Formation. Spring C was sampled for the DBG study (see Part III).

29. 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.

Subsurface Geology.

30. Stratigraphy and structure. The subsurface geology of the DBG is illustrated in a series of geologic cross sections AA through FF (Plates 4 through 9). The locations of the cross sections are shown on Plate 2. The cross sections were constructed from data obtained in the core and auger borings emplaced for the DBG and ABG studies, augmented by data from outcrops on the hill slopes. The cross sections graphically portray the stratigraphic and hydrogeologic factors that influence ground-water conditions beneath the

DBG. Sections AA through DD are at scales of 1 inch = 40 ft vertically, 1 inch = 500 ft horizontally; sections EE and FF, representing the immediate burial trench area, are at scales 1 inch = 20 ft vertically and 1 inch = 100 ft horizontally. The cross sections include ground-water profiles for the several aquifers and the 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 profiles shown on the cross sections. *Analysis of the ground-water data is presented under the heading "Hydrogeology" in Part II and in "Results of Sampling and Analysis" in Part III.

31. Cross section AA (Plate 4) runs diagonally across the DBG from SW to NE, from well 03C05 beyond well 02C20 to an outcrop of the Beaver Bend limestone in Sulphur Creek (the Beaver Bend comprises a lower aquifer that was not penetrated in the DBG study). The section trends approximately in the direction of dip of the Mississippian units. Figure 11 is a structural contour map for the top of the Elwren Shale (base of the Beech Creek Limestone) at the DBG and shows the general SW dip of the contact. The relative uniformity in lithology and thickness of the Mississippian sediments contrasts with the variable lithology and non-uniform thicknesses of sandstone and shale units in the Pennsylvanian Mansfield Formation. Solution and collapse cavities in the Big Clifty-Beech Creek are illustrated on the west end of the section in well 03C05 (an ABG well). Solution/collapse features are generally absent in wells drilled at the DBG because incision by creek cutting has not occurred as it has in Little Sulphur Creek west of the site. The sandstone of the Mansfield Formation is relatively thick and continuous west and south of the DBG site proper but is divided into upper and lower sandstone sequences near the site and east of the site by the occurrence of lenses and beds of shale.

32. Cross section BB (Plate 5) runs diagonally across the DBG study area from the NW to the SE from well 03C17 through 02C09 to an outcrop of the Beech Creek Limestone in the Sulphur Creek valley. The section illustrates

the influence of a wedge of shale in the Mansfield Formation which comprises the entire thickness of Mansfield in well 02C09 on the east but thins rapidly toward the NW to only a few feet in well 02C13. The presence of the shale wedge effectively separates the Mansfield into upper and lower aquifer zones locally near the site, as discussed for section AA, above. Section BB displays a slight flexure in the Mississippian units and a thinning of the Golconda/Haney Limestone in well 02C09. The flexure is also apparent in the structural contour map of Figure 11 (well 02C12). The local flexure and general dip of the beds probably influences ground-water flow in the aquifers beneath the DBG, as discussed below under the section entitled "Hydrogeology".

33. Cross section CC (Plate 6) runs across the site from SSW to N from the valley of Little Sulphur Creek just west of the burial trenches through 02C10 to Spring E and an outcrop of Beech Creek Limestone north of the site. Notable features on this section are the solution/collapse zone in the valley of Little Sulphur Creek and the preponderance of sandstone and corresponding scarcity of shale in the Pennsylvanian Mansfield Formation, which is typical of the Mansfield on the west side of the DBG. Note in sections AA and CC and on the geologic map of Plate 2 that the Mansfield Formation and the Golconda/Haney Limestone are "daylighted" by valley incision around the flanks of the DBG. The Beech Creek is daylighted on the east and northeast and to the southwest in Little Sulphur Creek farther south. Daylighting of these aquifers is significant in ground-water quality monitoring because free drainage of the aquifers is provided.

34. Cross section DD (Plate 7) runs roughly EW just south of the DBG site along a line of wells from 03C04 to 02C09. It further illustrates the thinning of the Mansfield shale wedge to the west.

35. Cross sections EE (Plate 8) and FF (Plate 9) are large scale sections providing more detail of subsurface conditions parallel to the trenches (EE) and across (FF) the trenches. A survey using geophysical techniques to delineate the horizontal and vertical boundaries of the buried trenches has been proposed.

36. <u>Lithology of subsurface geologic units.</u> Detailed logs of borings

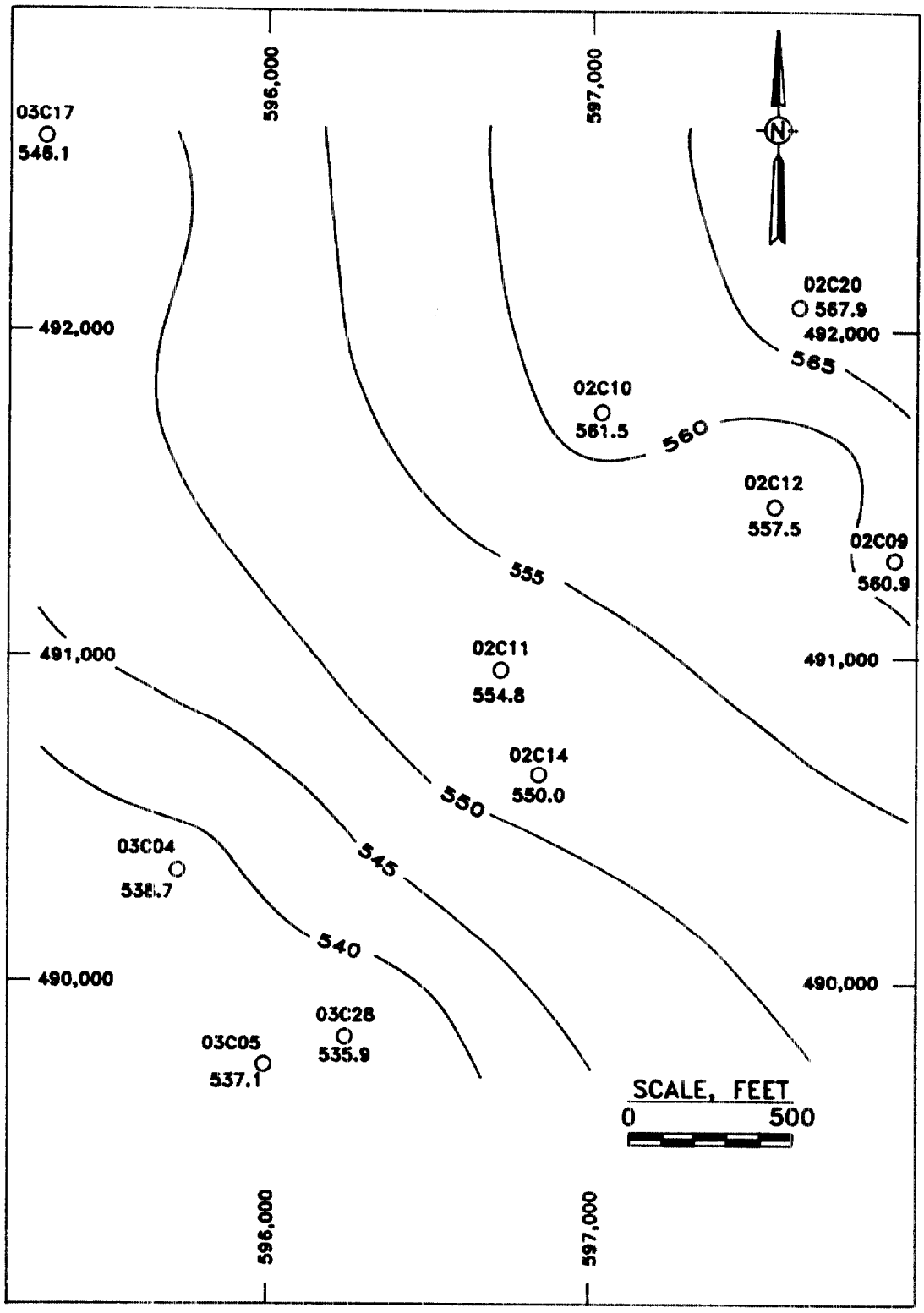


Figure 11. Structural contour map, top of Elwren shale, Dye Burial Grounds.

for the deep wells of each cluster at the DBG describe the lithology of the geologic units sampled. These paragraphs provide additional detail on the lithology of the geologic formations that comprise the aquifers beneath the DBG. The Pennsylvanian Mansfield sandstone at the DBG generally is a fine grained, hard, thick-bedded sandstone with shaley lenses and partings. A one to six-ft thick conglomeratic zone was logged in many of the borings near the middle of the sandstone. The conglomeratic zone was often fragmented and sometimes resulted in core loss. In borings near the center and east portions of the site, clayshale, claystone, shale and siltstone beds occur above and below the conglomeratic zone within the Mansfield. The sandstone of the Mansfield produced enough water to warrant installation of wells. The intervening shales and other fine-grained units in the middle and east of the site are sufficiently impermeable to serve as aquicludes between the upper and lower sandstone aquifers of the Mansfield. The permeability of the sandstone may derive from the numerous bedding plane joints and shale partings logged in the core. The variability in lithology and thickness of the fine grained units between borings in the Mansfield makes correlation across the site difficult. Correlation lines between borings as depicted on the cross sections are reasonable based on available core data. Data from additional borings that may be emplaced at the DBG may revise interpretations of the complex Pennsylvanian stratigraphy. The base of the Mansfield Formation is between elevations 666.8 and 678.8 in borings at the DBG.

37. The general characteristics of the Golconda/Haney Limestone were described earlier. Permeability of the formation is apparently a result of flow through numerous joints which have been widened by solution. Joints in the limestone were numerous in many of the DBG borings. Many joints were stained or oxidized. The core log for one boring (02C15) noted a 0.35 ft void within the limestone through which drilling water return was lost. The base of the Golconda/Haney Limestone is between elevations 629.5 and 647.0 in borings at the DBG. Both horizontal and high-angle (70-80 degree) joints were logged in Golconda/Haney cores.

38. Permeability of the Beech Creek Formation is believed to be a result of flow through solution-widened joints. Joints were numerous in the

core of many of the Beech Creek borings. A zone of oxidation of the rock was noted near the top of the zone of saturation in two of the six Beech Creek borings (02C09, 02C11) indicating occasional aeration of the zone by a fluctuating water level. The lower portion of the overlying Big Clifty sandstone is considered part of (in hydraulic connection with) the Beech Creek aquifer, as described in Hunt, 1988). The Big Clifty is a jointed sandstone. The base of the Beech Creek Limestone is between elevations 550.0 and 567.9 in borings at the DBG.

Hydrogeology of the DBG.

39. The summer and fall of 1988 were abnormally dry in much of the United States including the Crane, Indiana area. Water levels in wells declined steadily during and after emplacement of the wells at the DBG. Aquifer characteristics described herein therefore may not reflect normal conditions. Continued monitoring of water levels and water quality in conditions of normal precipitation could alter the shape of water table contours and concentrations of contaminants in wells.

40. Surface runoff from the DBG is rapid, leaving the site in drainage channels which head at the edge of the ridge as shown on Plate 1 and in Figure 9. Field reconnaissance in the DBG study area revealed one area of ground water seepage other than the major springs which had been previously mapped in the area. The DBG "seep" is at the elevation of the projected Pennsylvanian-Mississippian unconformity, the base of the Mansfield Formation. The position of the seep is shown on Plates 1 and 2 and on the geologic cross section CC, Plate 6. The seep is presumed to drain the Mansfield Formation and was used as a water quality monitoring station for the "lower" Penn. aquifer.

41. Four ground-water zones in three distinct aquifers were identified in borings at the DBG. In descending order the aquifers are the Pennsylvanian sandstone, the Golconda/Haney Limestone and the Beech Creek Limestone (including the lower part of the Big Clifty sandstone). The Pennsylvanian sandstone (the Mansfield Formation) is divided into upper and lower aquifers by an eastward thickening shale as described above and illustrated in cross section BB (Plate 5). The two Mansfield Formation aquifers are designated

"upper" Penn. and "lower" Penn. in this report.

42. The analysis of geologic and hydrologic data from borings, wells and outcrops at and near the DBG indicates that ground water in the rock aquifers is contained in and flows primarily in interconnected joints. The hydraulic conductivity or transmissivity of the jointed rock to water is, therefore, a result of secondary, or fracture, porosity rather than primary porosity characteristic of granular soil or rock. Joints and other discontinuities such as bedding planes logged in cores at the DBG were tight to as much as 0.35 ft (0.1m or 10 cm) in width. White (1988) presents a classification of porosities of rock aquifers (Figure 12) and a description of aquifer properties for the various porosity types (Table 3). Widths of open discontinuities logged at the DBG range from "joint and bedding plane parting" to "solutionally widened fracture" of Figure 12. As Table 3 indicates, the flow regime for the system would be expected to deviate from Darcian flow and, for the larger openings, approach conduit flow. Subsequently scheduled field measurements of aquifer transmissivities, storage and seepage velocity should be designed to accommodate the potential anisotropy and inhomogeneity inherent in fracture flow and conduit systems. Table 1 includes water levels for DBG wells measured on 30 August and on 14 October, 1988. Water table (piezometric surface) profiles are included on the geologic cross sections in Plates 4 through 9. The hydrology of the aquifers is discussed in the following paragraphs.

43. Beech Creek aquifer. The Big Clifty-Beech Creek aquifer (termed the Beech Creek aquifer in this report) is the deepest aquifer monitored for the DBG study. The Big Clifty and Beech Creek are separated from the Golconda/Haney aquifer above by the Indian Springs shale, which is approximately 22 ft thick at the DBG. The Indian Springs is considered an aquiclude. The piezometric surface in the Beech Creek aquifer is 80 to 120 ft lower in elevation than that in the Golconda/Haney (for example, see Section CC, Plate 6 and Section EE, Plate 8). The two aquifers are considered not to be hydraulically connected at the DBG. The Beech Creek is designated aquifer number 1 on Plates 4 through 9.

44. The top of the zone of potential saturation (the top of the

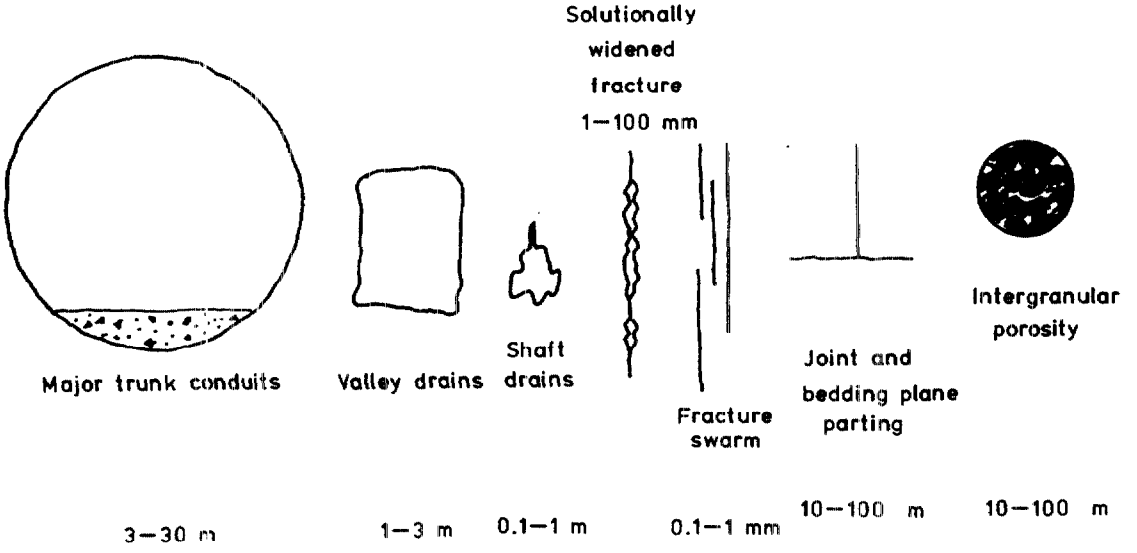


Figure 12. Classification scheme for porosities of rock aquifers (White 1988)

aquifer) in the Beech Creek aquifer is considered to be in the Big Clifty. The cross sections (Plates 4 through 9) show that the piezometric surface is generally within the Beech Creek Limestone and is therefore unconfined at the DBG for the period of water level measurement. The piezometric surface in the Beech Creek was between 565 and 575 ft at the DBG. Investigations at the ABG (Hunt 1988) showed that the Elwren Shale forms a barrier at the base of the aquifer and causes ground water to move laterally through the Beech Creek. Local base level for the Beech Creek aquifer near the DBG is probably the level of ground water flowing down the trend of Little Sulphur Creek in solution channel conduits as shown on the left side of Section CC, Plate 6. Spring "E" to the north (Plate 6) taps the Beech Creek aquifer but the extent of its drawdown of the piezometric surface cannot be determined without placing additional wells north of 03C10 (see Plate 1).

45. Table 1 lists water levels measured in DBG wells for two dates in 1988. Earlier readings were made but the aquifers had been disturbed by well development activities and bailing operations. The Aug 30 date is considered the earliest reliable measurement date. Ground water elevation contour maps were constructed for the DBG wells for the 30 Aug, 1988 date. Figure 13 is the contour map for the six wells in the Beech Creek aquifer. The contour interval is one foot. The general flow direction is to the southwest toward Little Sulphur Creek. The southwest flow direction is also generally downdip (see Figure 11). Well 03C12 registered an anomalously low water level on the 30 Aug. date when compared with the other five wells. Table 1 shows that from the 30 August date to the 14 October date the level in 03C12 changed by 3.1 ft while the levels in the other five wells showed no change or a maximum of 0.5 ft. The level in 03C12 was disregarded in plotting the water level contours for Figure 13. The piezometric gradient ranges from 0.0078 ft/ft to 0.0033 ft/ft.

46. The Beech Creek is considered to be protected from direct vertical infiltration of waters from the DBG burial site by the shale units above the Big Clifty sandstone. The Big Clifty sandstone and Beech Creek Limestone are exposed, except for a veneer of surface soils, on the flanks of the hills and ridges surrounding the DBG, as illustrated in Plates 4, 5 and 6. The higher

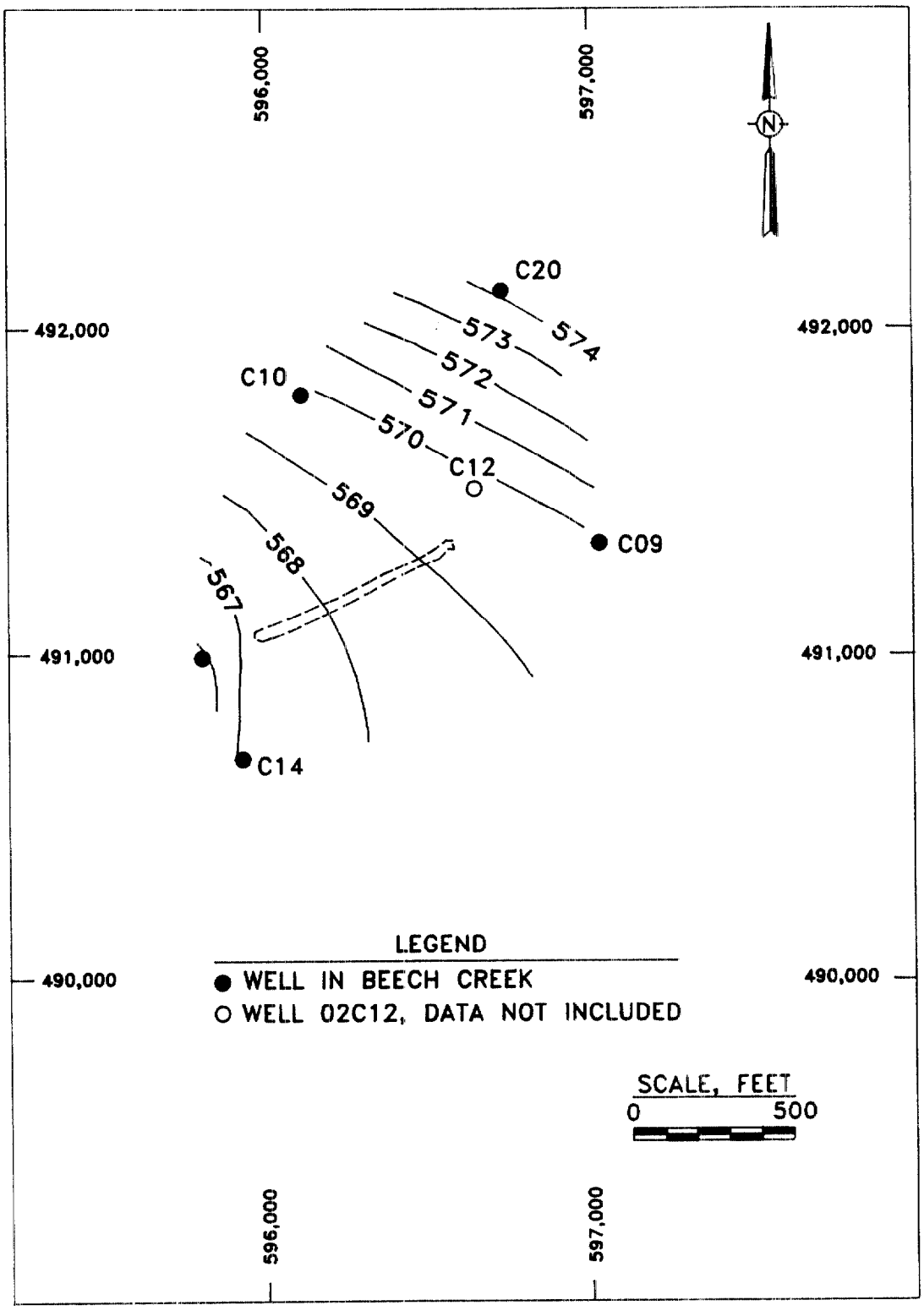


Figure 13. Contours on piezometric surface in Beech Creek aquifer for 30 Aug, 1988.

aquifers (the Pennsylvanian and Golconda/Haney) are daylighted around the DBG and potentially can return waters which have contacted the dye burial trenches to the ground surface. The seep mentioned earlier and shown on Plate 2 and in Plate 6 is an example of ground water from higher aquifers draining onto a lower ground surface elevation. Potentially, such water could reenter the Beech Creek aquifer system at its outcrop on the slope below. Other sources of infiltration of water into the Beech Creek aquifer are in recharge areas generally north (upgradient) of the DBG elsewhere on the NWSC reservation.

47. Golconda/Haney aquifer. Measured water levels in the Golconda/Haney Limestone at the DBG differed considerably from well to well. The variability is evident in ground-water profiles in the cross sections of Plates 4 through 9. A pattern emerges when the ground-water levels are plotted as contours as shown in Figure 14. The contour interval is 5 ft. Contour troughs, or preferred ground-water flow paths, trend WNW and NE from a low at well 03C16. General flow direction is southwest and southeast from highs at wells 03C10 and 03C14. Preferential flow within the Golconda/Haney is believed to be in zones of increased joint frequency or of joints and bedding planes widened by solution. Figure 15 is a structure contour map of the base of the Golconda-Haney. A structural trough exists in the Golconda/Haney at the DBG (solid contours of Figure 15). The axis of the trough, however, is not coincident with ground-water flow troughs mapped in Figure 14. The ground-water contours (dashed lines) are superimposed on the structure contours in Figure 15. The ground water and structural troughs are parallel and it is probable that flow occurs in joints preferentially widened in response to formation of the structure. The effect of preferential flow along the trends indicated in Figure 14 potentially would be to direct seepage of DBG vicinity ground waters in a more southerly direction (from well 03C16) than the general SW flow direction of the Beech Creek and "lower" Penn. aquifers. Water seeping from the slopes south of the DBG, at elevations below the basal Pennsylvanian level, was noted, but not mapped, in field reconnaissance but could not be attributed to a particular horizon such as the Golconda/Haney. Additional wells south of the DBG would be necessary to trace

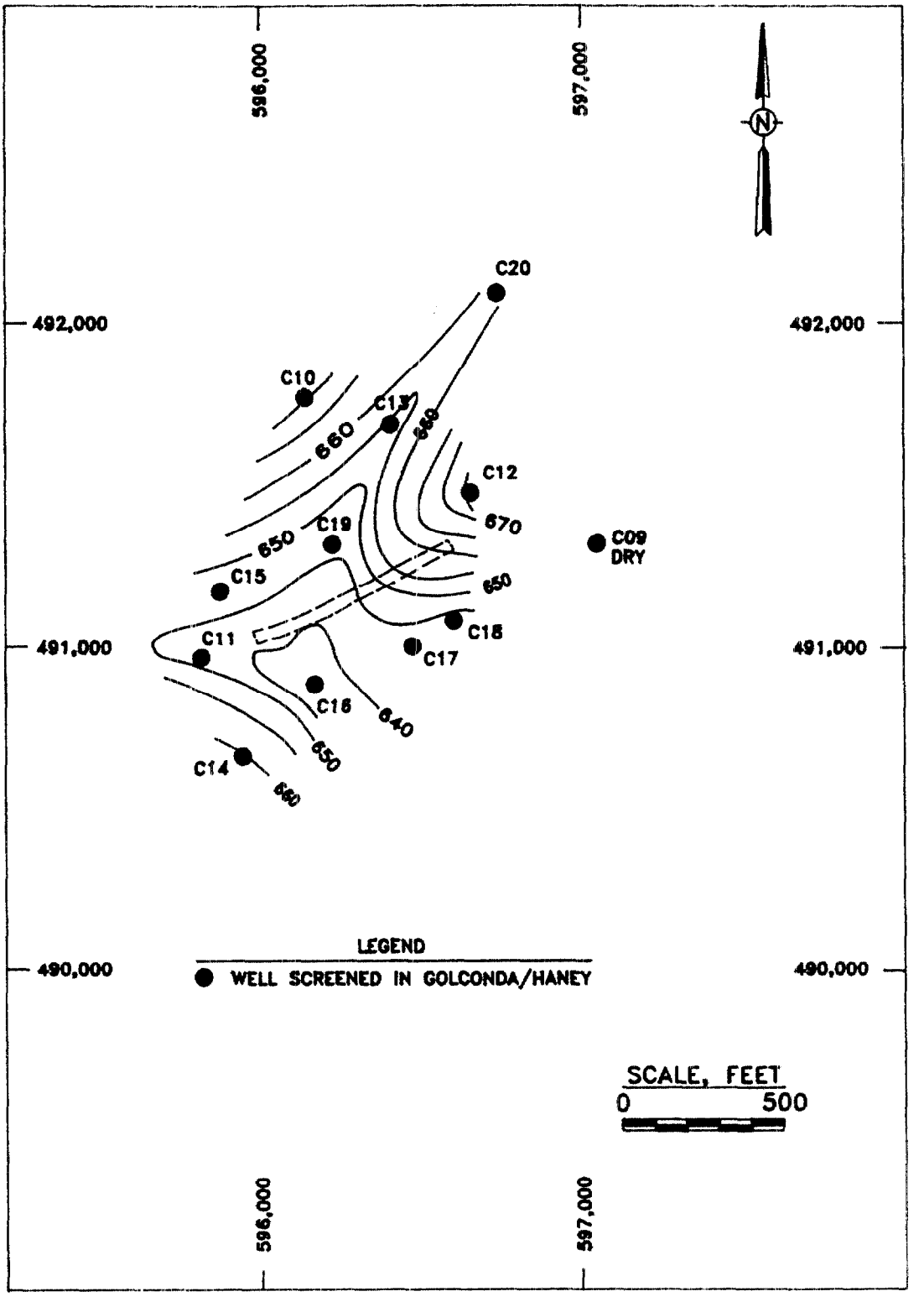
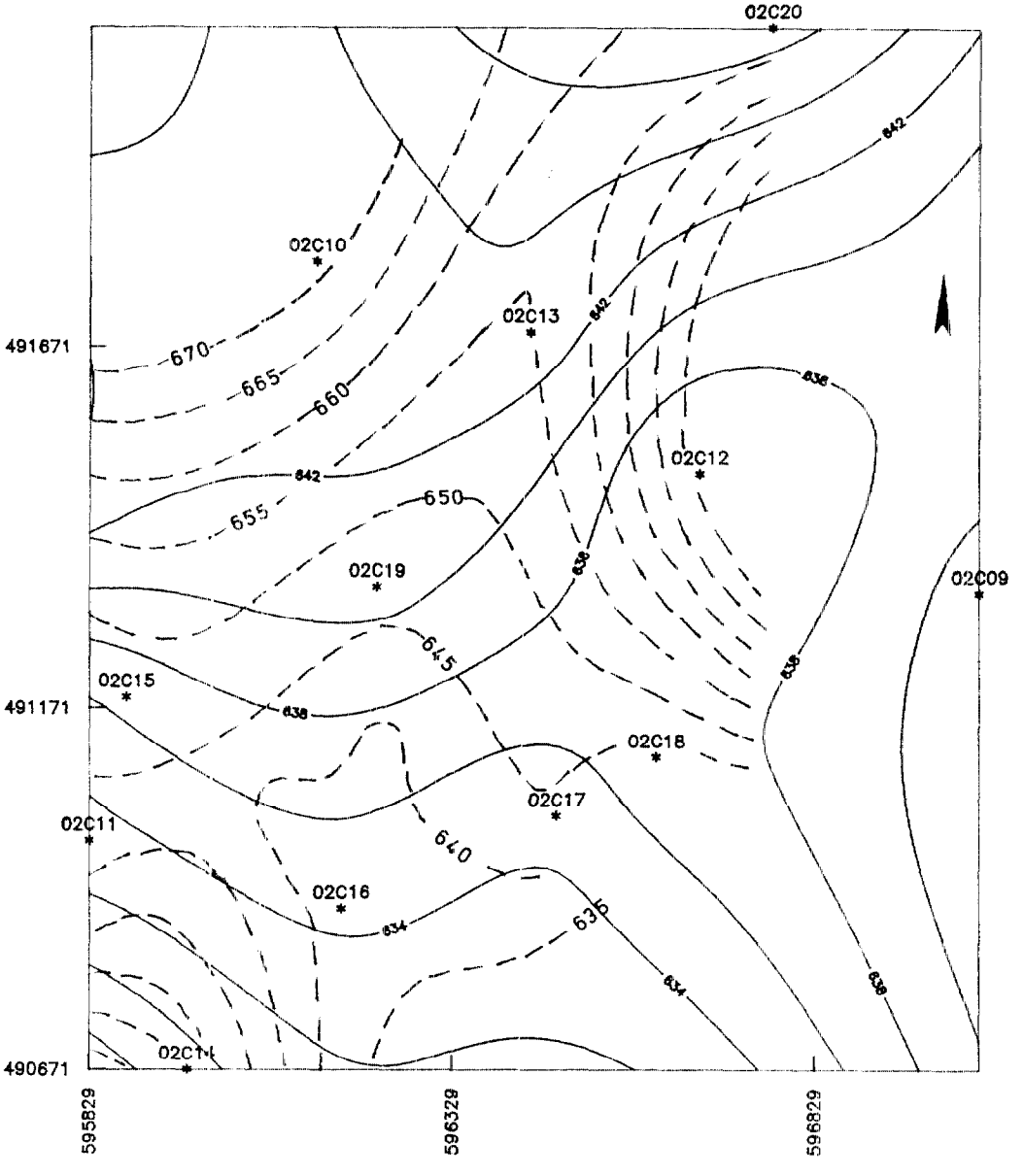


Figure 14. Contours on piezometric surface in Golconda-Haney aquifer for 30 Aug, 1988.



Solid lines - Structure contours on base of Golconda-Haney

Dashed lines - Ground-water contours in Golconda-Haney

Figure 15. Structural contour map (solid lines) of base of Golconda-Haney limestone and superimposed ground-water contours (dashed) in Golconda-Haney, Dye Burial Grounds.

the existence of the flow troughs beyond the plotted area of Figure 14. The Golconda/Haney is designated aquifer number 2 on Plates 4 through 9.

48. Ground water levels for the Golconda/Haney Limestone were artesian on Aug 30 except in some of the wells defining the troughs, in which the water level was below the top of the limestone (for example, well 02C19 in Plate 4, wells 02C11 and 02C15 in Plate 6, and wells 02C16 and 02C17 in Plate 7). The apparent drawdown of the piezometric surface in part of the Golconda/Haney is another indication of ground-water flow along preferred paths, presumably in and along solution-widened joints and bedding planes. Piezometric levels in the Golconda/Haney were between 637 and 671 ft. elevation on 30 August, 1988. The piezometric gradient ranges from about 0.0676 to about 0.0188 ft/ft.

49. The Golconda-Haney is separated from the Pennsylvanian aquifers above by the Hardinsburg shale, which is up to 28 ft thick in the DBG study area. Piezometric levels in the Golconda/Haney respond independently of levels in the Pennsylvanian aquifers, indicating the Hardinsburg serves as an aquiclude to vertical infiltration. However, contaminant levels in sampled Golconda/Haney wells at the DBG suggest contaminants from the DBG may be accessible to the Golconda/Haney either through vertical infiltration or by re-entry on exposed slopes.

50. <u>"Lower" Pennsylvanian aquifer.</u> The "lower" Penn. aquifer at the DBG is in the Mansfield sandstone. The level of the water table in wells screened in the "lower" Penn. was between 678 and 696 ft elevation on 30 August, 1988. Contours on the water table of 30 August are presented in Figure 16. The general flow direction is to the south/southwest. The piezometric level in well 02C20 was high, and artesian, relative to the level in other wells (see the profile in Plate 4). The apparent gradient from well 02C20 to wells 02C10 and 02C13 is approximately .0275 ft/ft. The gradient elsewhere in the aquifer varies from .0027 to .0093 ft/ft. The "lower" Penn. aquifer is designated aquifer number 3 on Plates 4 through 9.

51. The "lower" Penn. aquifer is open to infiltration from surface waters at the DBG on the western side of the burial ground. Over much of the area, however, a wedge of shale which thickens considerably eastward overlies the lower sandstone aquifer. The cross sections of Plates 4 through 9 show

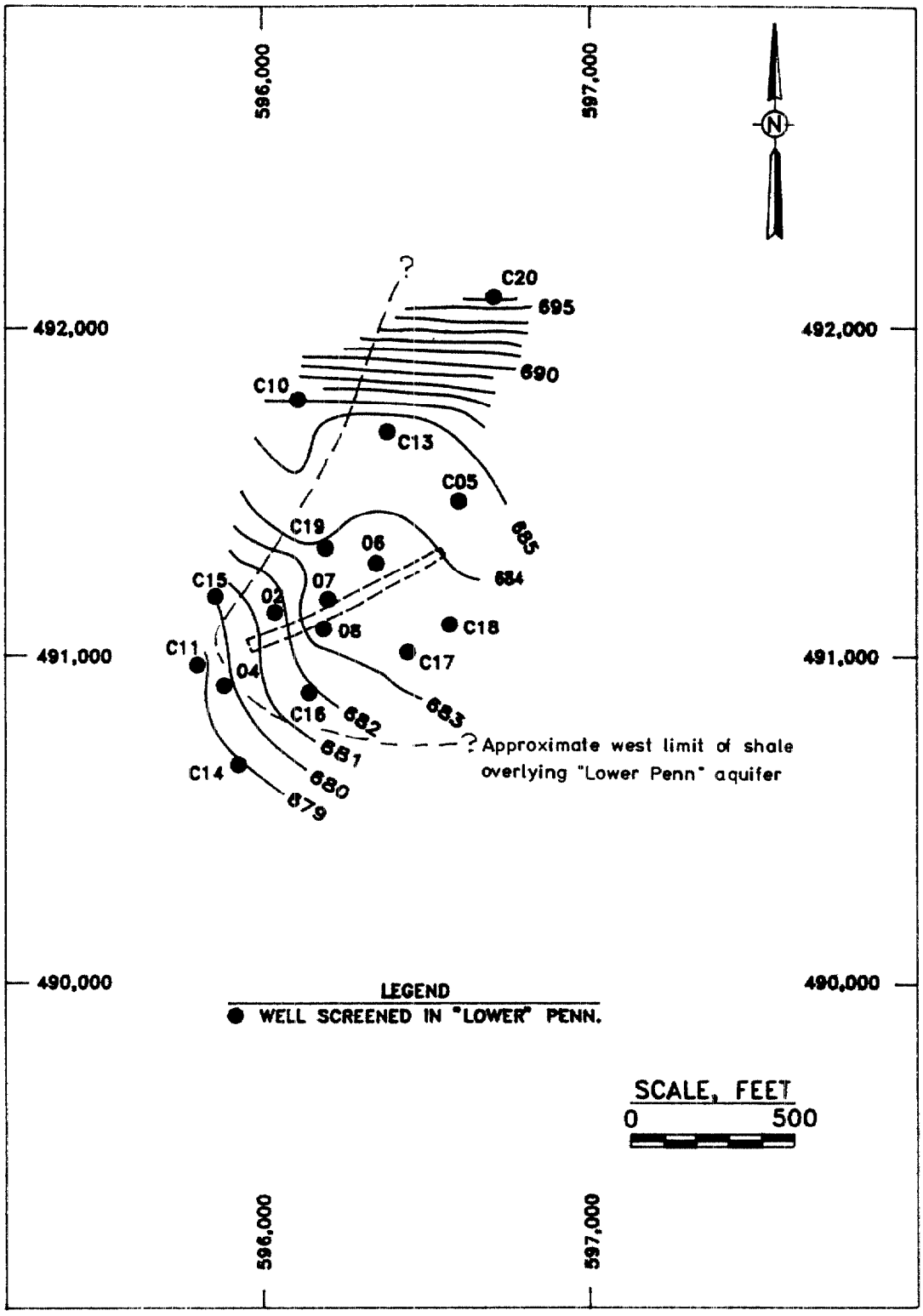


Figure 16. Contours on water table in "lower" Pennsylvanian aquifer for 30 Aug, 1988.

the distribution and variable thickness of the shale beneath the DBG. The west limit of the shale overlying the lower aquifer was estimated from boring information and is shown dashed on the ground water contour map of Figure 16. The thick shale wedge on the east end of the site isolates the upper sandstone of the Mansfield from the lower sandstone and creates a perched water table, the "upper" Penn. aquifer. Infiltrating water from the dye burial trenches has access to both the "upper" and the "lower" Penn. aquifers after penetrating the soil overburden beneath the trenches.

52. "Upper" Pennsylvanian aquifer. The "upper" Penn. aquifer is in sandstone of the Mansfield Formation. Data from wells emplaced at the DBG indicate that the aquifer is perched and limited in extent. Figure 17 is a contour map of the water levels measured on 30 August, 1988. The estimated extent of the aquifer is shown as a dashed line on Figure 17. The eastern boundary of the aquifer (east of well 02C12) is not well defined because there are no wells there. Water levels for August 30 ranged from 713 ft to 720 ft elevation. Two wells (02C17P3 and 02C19P3) were dry. Cross sections AA (Plate 4), BB (Plate 5), DD (Plate 7), EE (Plate 8) and FF (Plate 9) show the general position and shape of the "upper" Penn. aquifer. The "upper" Penn. aquifer is designated aquifer number 4 on Plates 4 through 9.

53. Ground water contours (Figure 17) illustrate that the "upper" Penn aquifer has potential to carry water to the north-northwest and to the south-southeast, in contrast to the general south-southwest flow in the deeper aquifers at the DBG. The distance to which ground water and contaminants can be transported within the aquifer, however, is limited by the small extent of the perched zone. There is some question concerning extent of the aquifer to the east. Recharge to the aquifer appears to cause a mound at the eastern end of the dye burial trenches, as shown by the water contours. The water table gradient is approximately 0.0211 ft/ft to the north and 0.0100 ft/ft to the south.

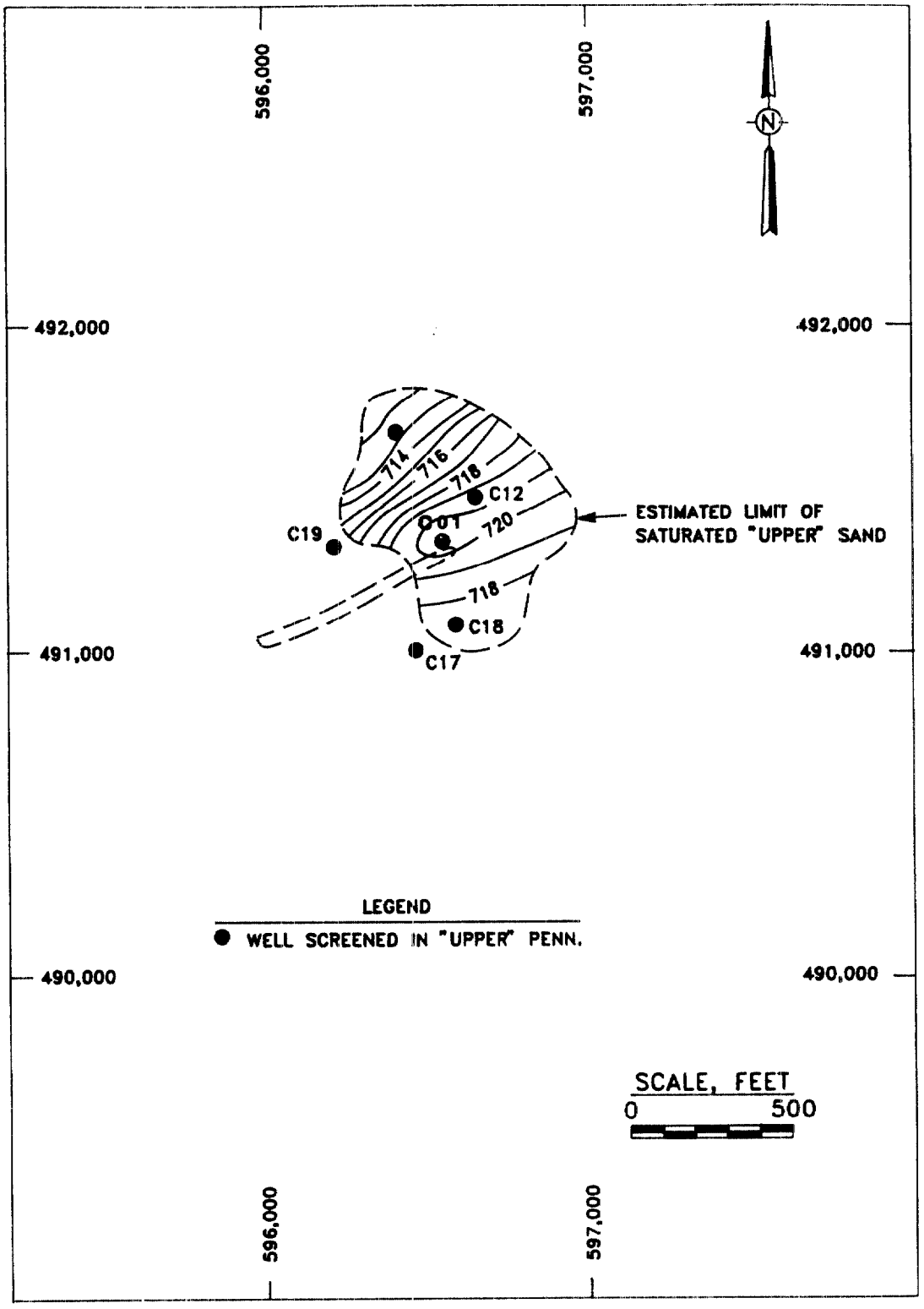


Figure 17. Contours on water table in "upper" Pennsylvanian aquifer for 30 Aug, 1988.

PART III. CONTAMINANT SAMPLING PROCEDURES AND RESULTS

Sampling Procedures.

54. Field sampling and laboratory analytical procedures were specified in the Project Operations Plan submitted for RI work at Crane and in the Plan of Action submitted to NAVFAC on 19 Nov, 1987 specifically for work at the DBG. The specified procedures were followed for sampling at the DBG. Samples were obtained from 23 ground-water monitoring wells, from the seep south of the DBG, and from Spring C in the valley of Little Sulphur Creek. Soil (sediment) samples were obtained from the vicinity of the seep. Samples of a yellow powder thought to be a dye were obtained from the surfaces of limestone paving material near the dye burial trenches. Sampling took place during the week of 27 June, 1988. Personnel of the WES Environmental Laboratory, Water Supply and Waste Treatment Group, conducted the sampling. The WES Analytical Lab Group analyzed the samples.

55. An attempt was made to remove three well volumes of water from each well before ground-water samples were obtained. Low-yield wells were sampled after evacuation of one well volume if recovery took more than two hours. The wells were purged with a stainless steel bailer. A teflon bailer was used to take the samples. The bailers were cleaned with acetone and rinsed with distilled water before sampling and purging each well. All of the wells emplaced at the DBG were not sampled for this phase of the confirmation study. The objective of this first sampling round was to obtain a representative sampling of the four aquifer zones. Additionally, wells 02C18P3, 02C19, -19P2 and -19P3, and 02C20, -20P2 and -20P3 had not been completed long enough at sampling time and so were not sampled. Three wells were sampled in the "upper" Penn. aquifer, 10 wells and the seep in the "lower" Penn., 8 wells in the Golconda/Haney, and 2 wells in the Beech Creek. The two sampled Beech Creek wells, 02C11 and 02C14 are downgradient of the burial trenches. Spring C, in Little Sulphur Creek valley, also emanates from the Beech Creek Formation. The wells sampled and the aquifers they represent are listed in

Table 4.

56. Three priority pollutant groups were analyzed for: metals, volatile organics, and Base/Neutrals, Acid extractables (BNA). Total Organic Carbon (TOC), conductivity, salinity and pH were also determined. Table 5 summarizes the sample types. PCB/Pesticides were not tested for directly, as explained below.

Results of Sample Analysis

57. All samples were returned to the WES Analytical Lab Group (ALG) for analysis.

58. Analysis of the yellow powder obtained from the paving material yielded high content of sulfur and lead. Traces of other metals and organics were also detected in the powder. Laboratory data are presented in Appendix B. Results of the well water sample analyses are summarized in Tables 6 through 10. Measurements of conductivity, salinity, pH and HNu[1] readings are listed in Table 6. Detectable concentrations of volatile organic compounds are listed in Table 7, detectable BNA concentrations in Table 8, nitrogen compound concentrations in Table 9, and metals, TOC, chloride and sulfate concentrations in Table 10. The tables also show the detection limits and the drinking water standards (if available) for each parameter. A gas chromatograph/mass spectrometer (GC/MS) scan did not indicate the presence of any PCB's or pesticides. A blank in a column indicates the compound was not detected in a specified well. "SP-C" denotes Spring C. A soil sample was obtained from the area near the seep, analyzed, and the results presented as "seep, soil" or "seep, sediment".

Overview of results.

59. Compounds from every group for which analyses were performed were detected in all four DBG aquifers. Generally, concentrations of analyzed

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[1]HNu - Trade name of a photoionization device used in the field to measure the concentration of organic vapors.

parameters were below drinking water or other health standards for all but five parameters. Those five parameters above standard were the metals beryllium, selenium and nickel, the organic compound chloroform, and sulfate. Total Nitrogen was above drinking water standards in one well (02C14P02). There are no drinking water standards for nickel or chloroform, so levels were compared to the Human Health Criterion for Toxicity (Federal Register 45:79318 and 46:40919). However, proposed maximum concentration levels (MCL) for drinking water for nickel (Federal Register, July 25, 1990) are also compared. Several metals were detected in many wells as shown in Table 9. Only a few of the many organic compounds tested for were detected. Drinking water standards for detected organics were not available at the time of analysis. Analysis of the various groups are detailed below. Graphs and histograms of selected parameters were prepared to allow comparison of concentrations for sampled wells and for the different aquifers. Figures 18-22 show average concentrations for each aquifer, Figures 23-30 show concentrations for the various well clusters in each aquifer, and Figures 31-34 show concentrations above drinking water or other health standard for the appropriate compounds.

Results for various parameter groups.

60. Metals. Detected metals are listed in Table 9. Other metals tested for but not detected were mercury (Hg), silver (Ag) and tellurium (Te). The average metals concentration by aquifer is depicted in the graphs of Figures 18 and 19. For other than sodium (Na), highest concentrations were detected in the metals nickel (Ni), zinc (Zn) and arsenic (As). Nickel concentrations are unexpectedly high for the DBG samples in general, and especially in the upper two aquifers (the Pennsylvanian Mansfield sandstone). Figure 18 shows that average nickel concentrations decrease consistently with depth. Zinc shows a similar trend. Nickel concentrations were above the human health criterion for toxicity or for proposed MCL in many wells especially in the "lower" Penn. aquifer, with two occurrences above standard in the Golconda/Haney aquifer (Figures 27 and 31). Nickel and sodium were the most persistent metals detected in DBG samples, occurring in detectable quantities in all tested wells. Selenium, Figures 28 and 32, occurred in

concentrations above drinking water standard in two Golconda/Haney wells and in one Beech Creek (deep aquifer) well.

61. No trends in concentration with depth are evident in the other metals detected (see Figures 18 and 19). Certain compounds, including arsenic, cadmium and selenium, are reported to occur naturally in relatively high concentrations in the shales and coals of the Pennsylvanian sediments in Indiana (Sinclair, personal communication), and may help explain the relatively constant levels of these metals in the four aquifers (Figures 18 and 19). Lead (Pb) occurred in concentrations approaching the drinking water standard in well 02C11 in the Beech Creek aquifer. As discussed later in this report, it is difficult to identify a unique source for some compounds in the Beech Creek, which is overlain by aquicludes but exposed in valley cuts over much of the eastern portion of the NWSC facility. The occurrence of lead in the Beech Creek beneath the DBG is a case in point. That is, it cannot be said that the lead detected in the DBG Beech Creek necessarily originated in the dye burial grounds.

62. Sulfates. Sulfates were present in all aquifers at the DBG and above drinking water standards in many wells. The drinking water standard for sulfate suggested by the Texas Department of Health was 300 ppm. Proposed MCL is 400 or 500 ppm (Federal Register, July 25, 1990). Sulfate concentrations for all wells are depicted in Figure 30 and for those wells above drinking water standards in Figure 33. A slight trend to decrease in concentration with depth is evident in Figure 20.

63. Organic compounds. Seven organic compounds were detected in ground water at the DBG. They were 1,4-dichlorobenzene (PDCLBE), butyl-benzylphthalate (BUBPHT), bis-2-ethylhexylphthalate (ETHEPH), di-N-octylphthalate (DIOPHT), methylene chloride (MECl), chloroform (CHCl3), and acetone (the abbreviations for the organics are laboratory abbreviations and are included here only to correspond to labeling on the graphs accompanying the report). Chloroform was present in concentrations above the human health criterion (0.006 ppb) in eight wells (see Figure 34). Figure 21 portrays the average concentration of detected organics in each aquifer. The relatively high readings for acetone may have resulted from the field procedure of

washing the bailer with acetone before sampling each well. The bailer was rinsed with distilled water but some acetone may have remained.

64. Before sampling each well, organic vapors in the well headspace were measured using a photoionization detector (an HNu model). The detector registered readings for organic vapors in some wells in the Golconda/Haney aquifer as indicated in Table 6. In all instances for which vapors were registered, the readings diminished within minutes after the casing cap was removed. The HNu readings are an indication of the presence of volatile organic compounds in the headspace of the wells and may be indicative of volatile organic ground-water quality as seen in Tables 6 and 7.

65. Nitrate (as N). Nitrate concentrations were below drinking water standards for all tested wells. Highest levels, greater than 1 ppm, were measured in the Golconda/Haney aquifer of well clusters 02C11, 02C15 and 02C16. Figure 35 depicts nitrate concentrations in DBG wells for the June 1988 sampling.

Results of Spring C sample analyses.

66. Spring C, located in the valley of Little Sulphur Creek (Plate 1), drains the Beech Creek aquifer. Because Spring C issues from the east slope of the valley, it potentially draws ground water from the Beech Creek aquifer beneath the DBG. Samples were collected from a clear pool in the spring on a sand and gravel bed, a few feet from the spring opening. Table 11 shows detected levels of selected compounds in Spring C and in DBG wells 02C11 and 02C14, the two Beech Creek wells sampled at the DBG. No organic compounds were detected in the Spring C samples. There is no apparent relationship between contaminant levels in the wells and contaminant levels in Spring C. No parameters have been identified that could be considered specific to the DBG. Spring C is believed to issue ground water originating both at the ABG (Hunt, 1988) and the DBG. Any contaminants found in Spring C cannot be uniquely assigned to a source either at the DBG or the ABG.

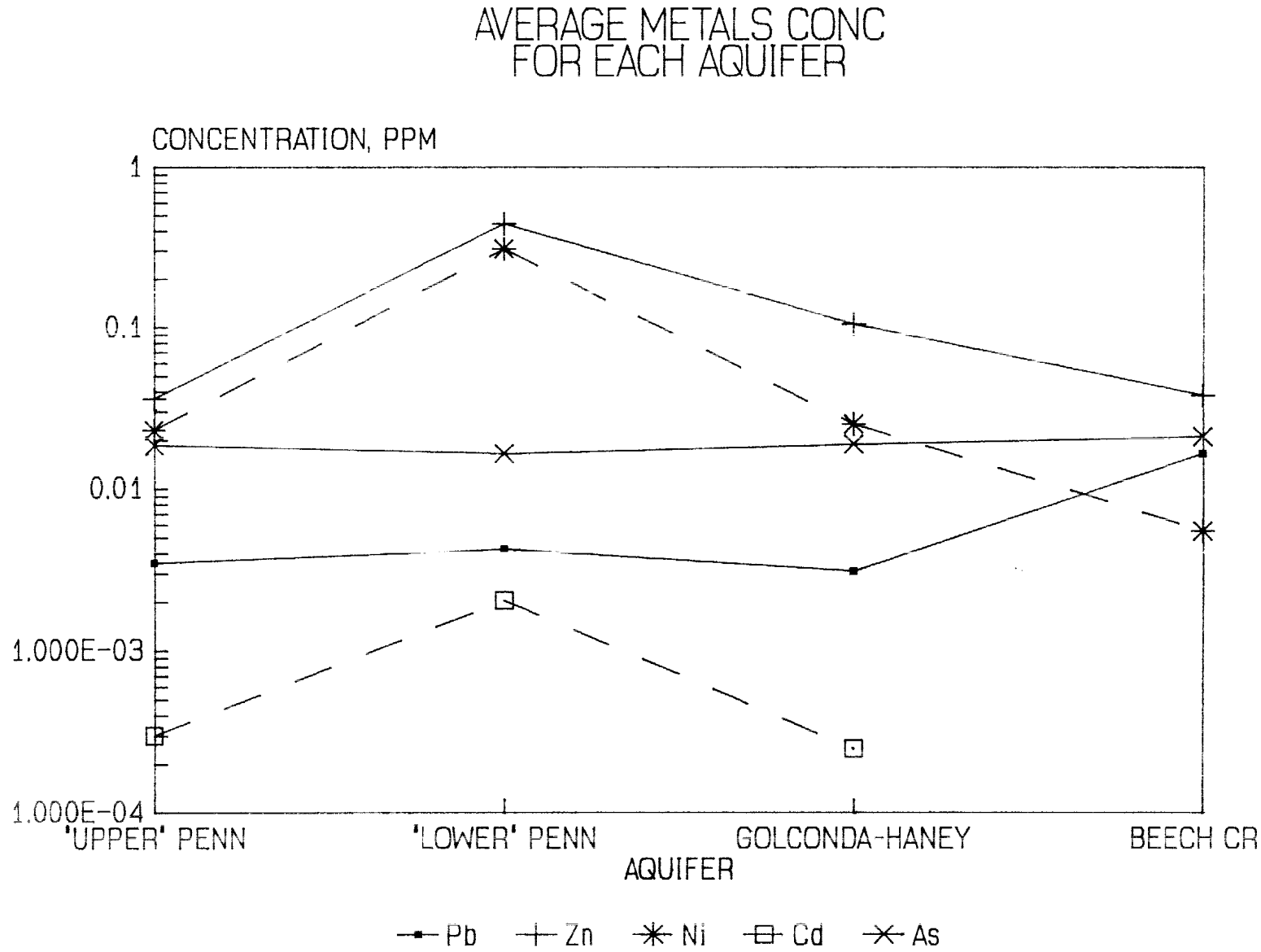

Figure 18. Average concentration of detected metals by aquifer for the DBG.

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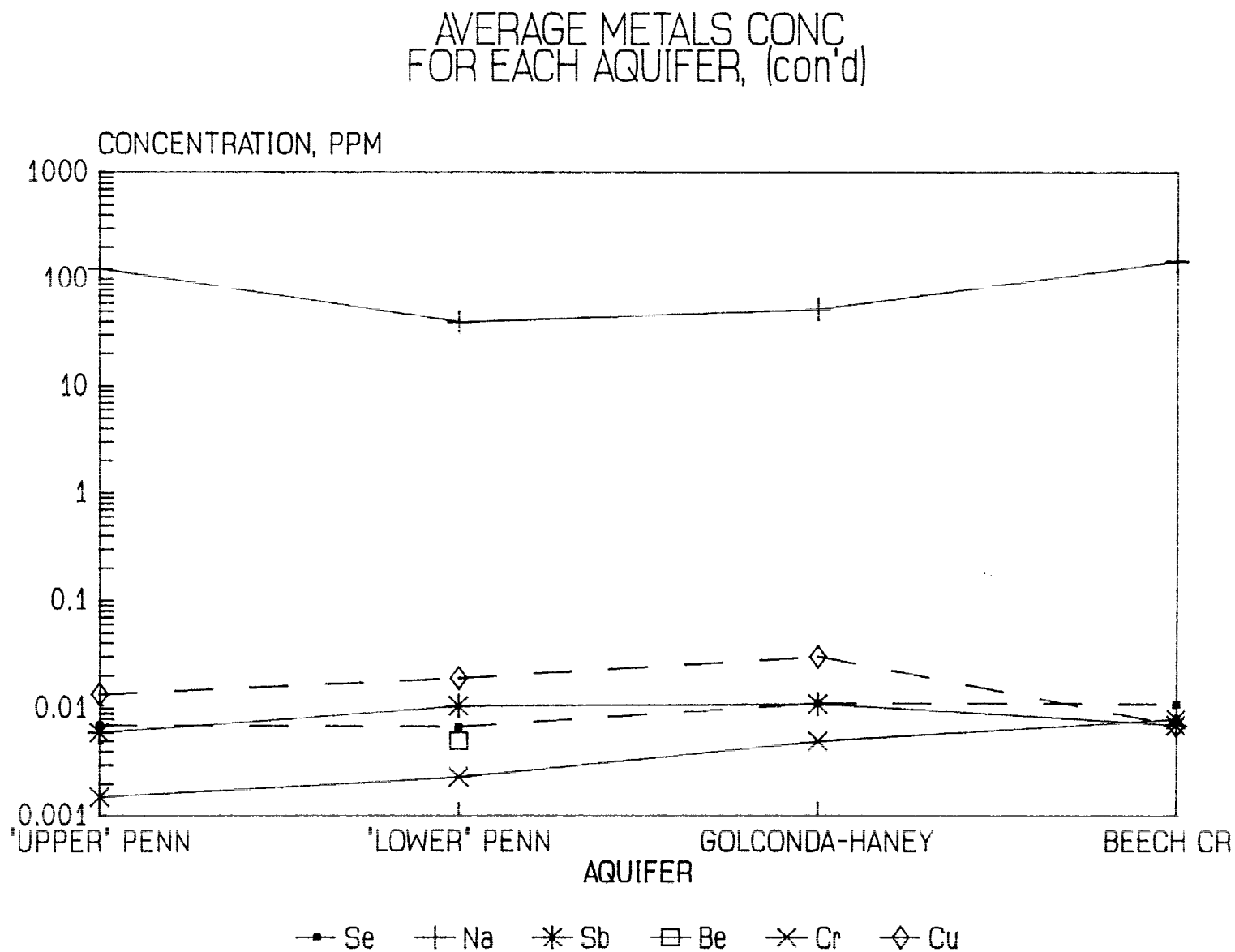

Figure 19. Average concentrations of detected metals by aquifer for the DBG (con'd).

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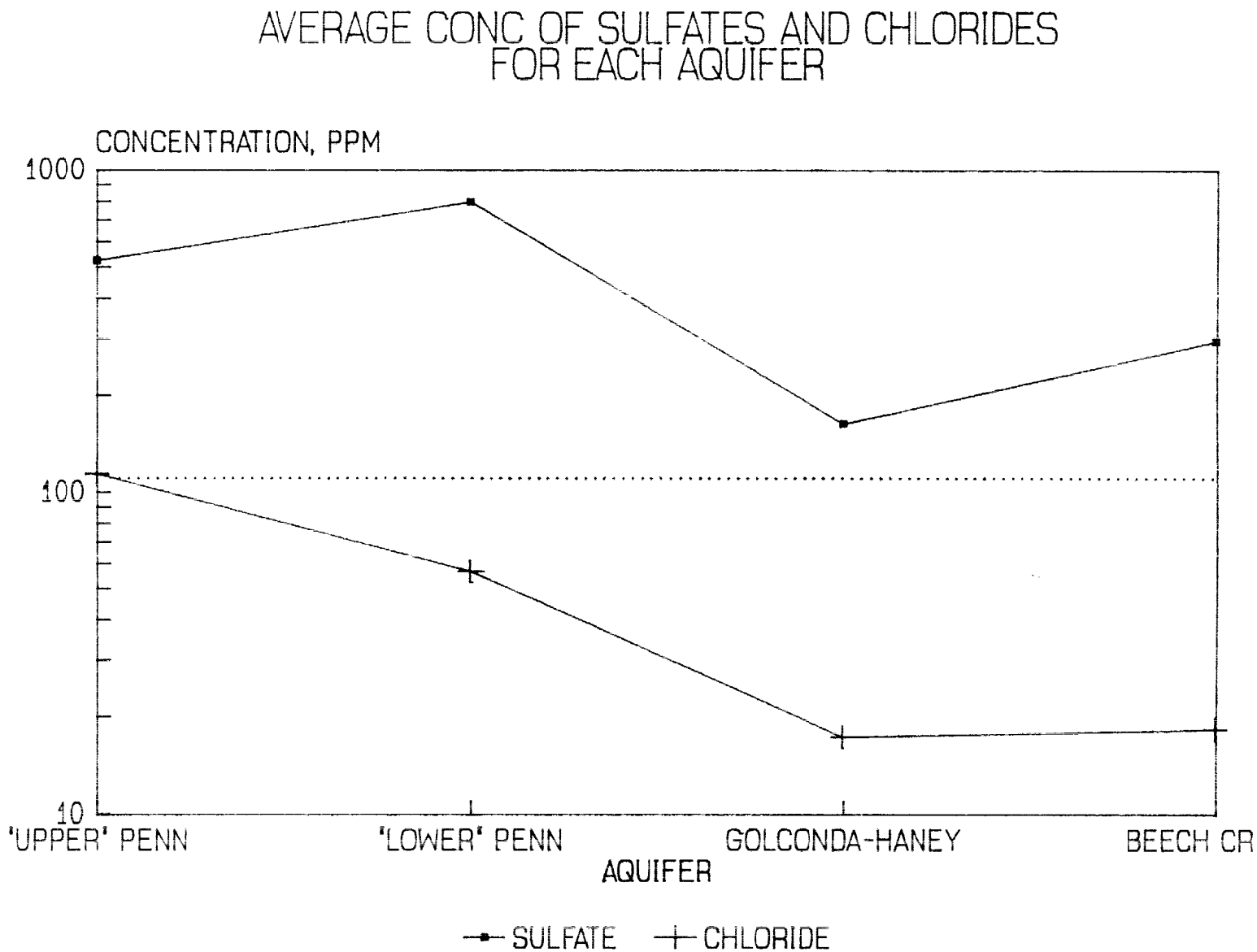

Figure 20. Average concentration of sulfates and chlorides by aquifer for the DBG.

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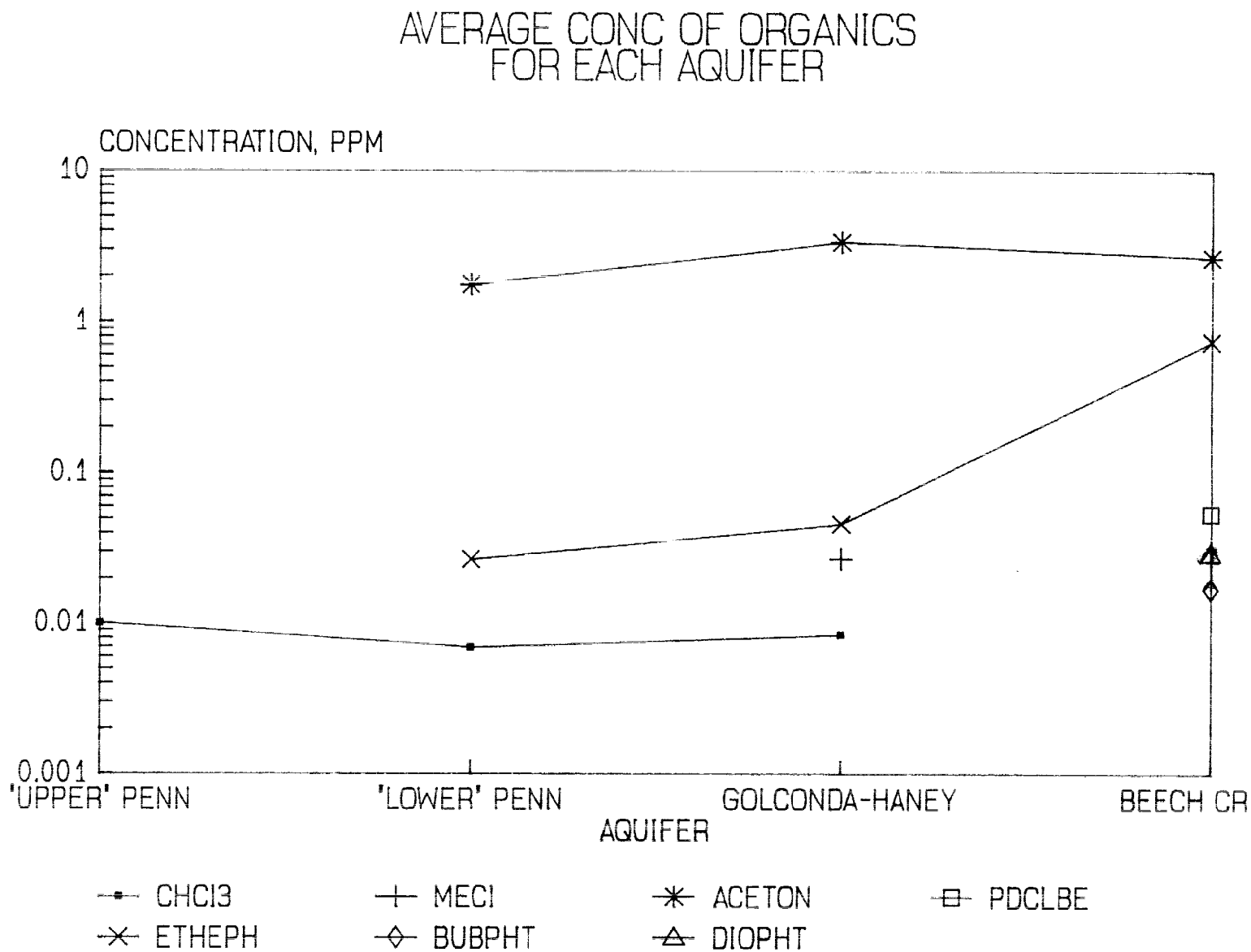

Figure 21. Average concentrations of detected organic compounds by aquifer for the DBG.

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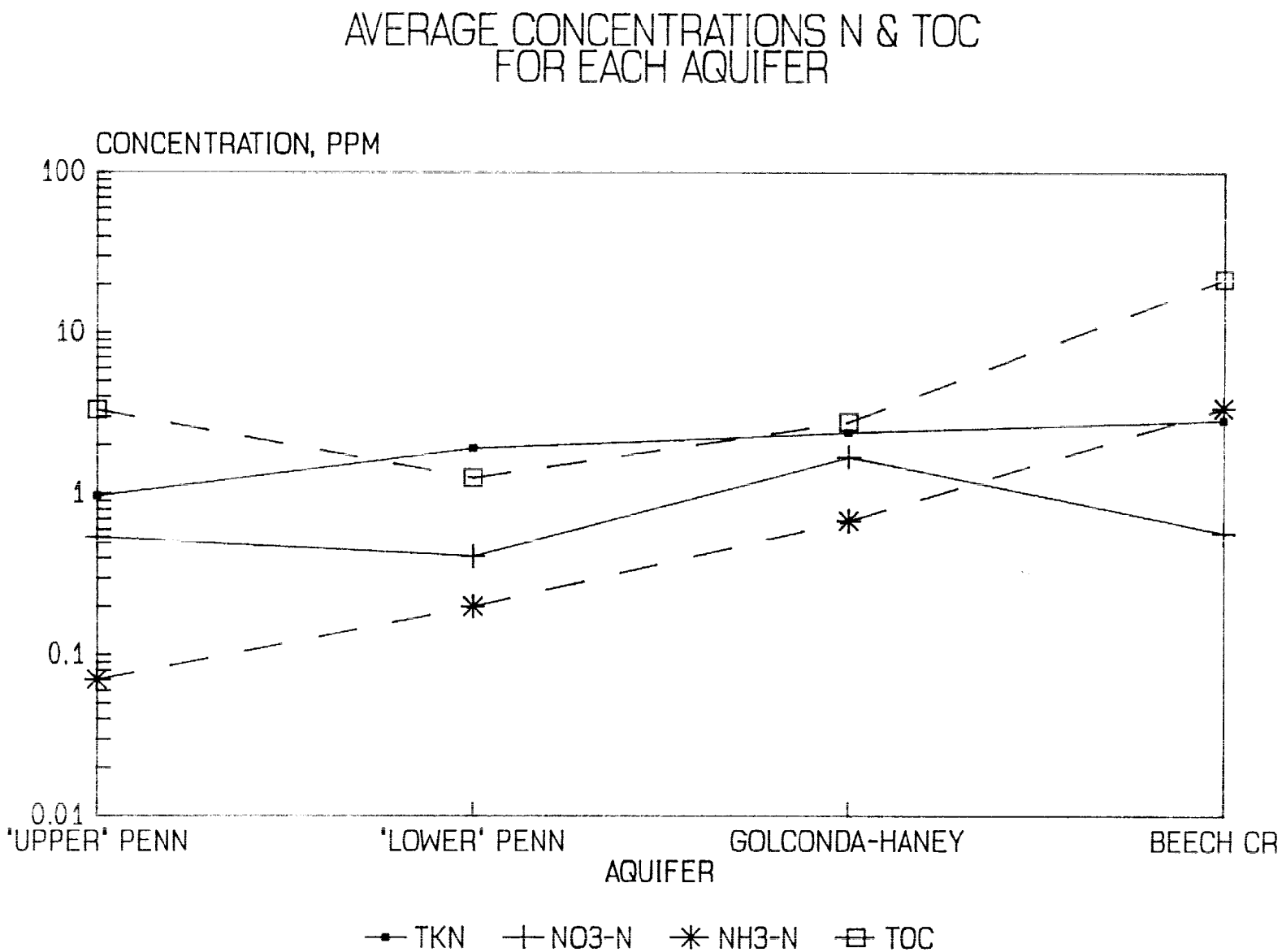

Figure 22. Average concentrations of nitrogen (as N) and TOC by aquifer for the DBG.

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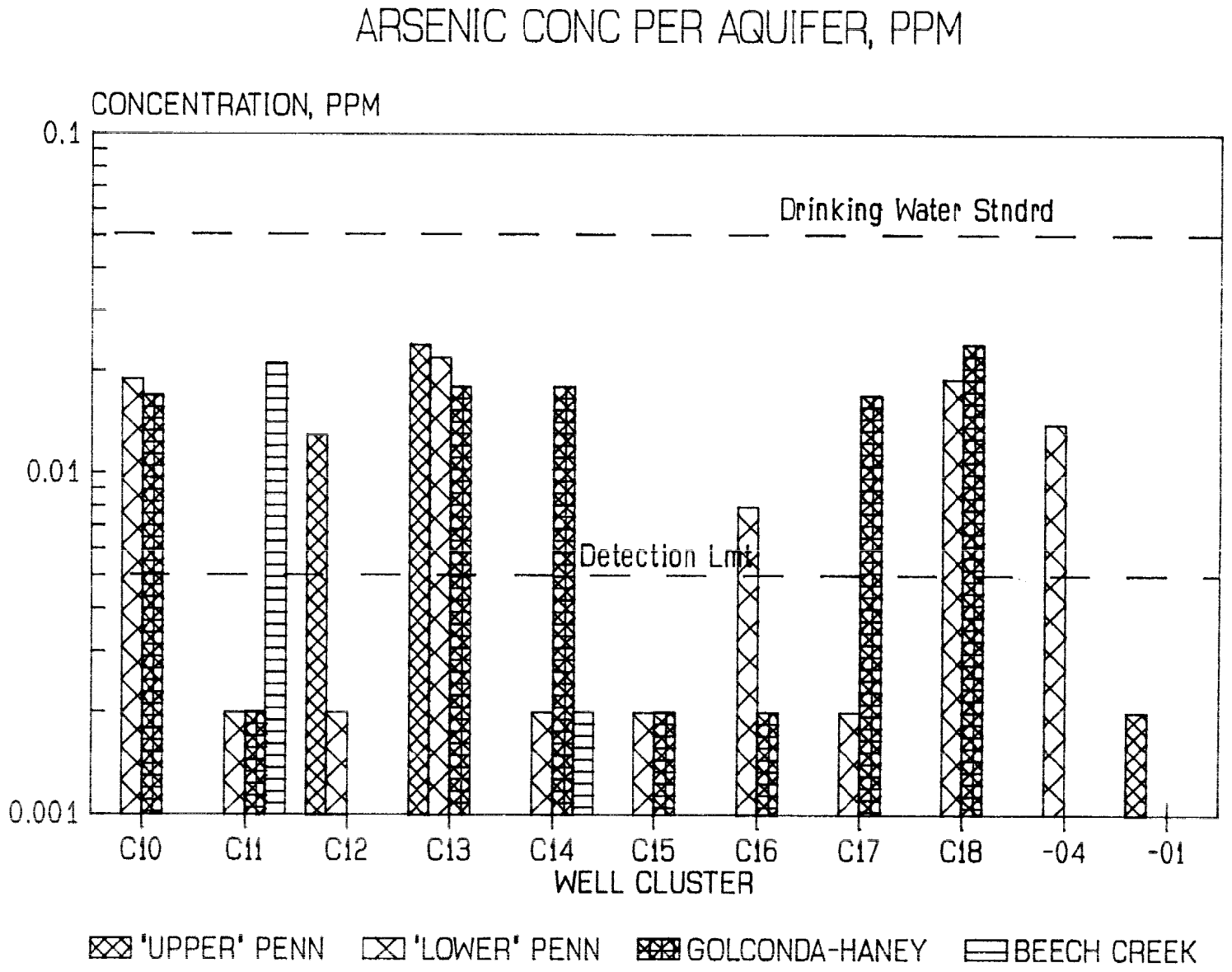

Figure 23. Arsenic concentration by well cluster and by aquifer for the DBG.

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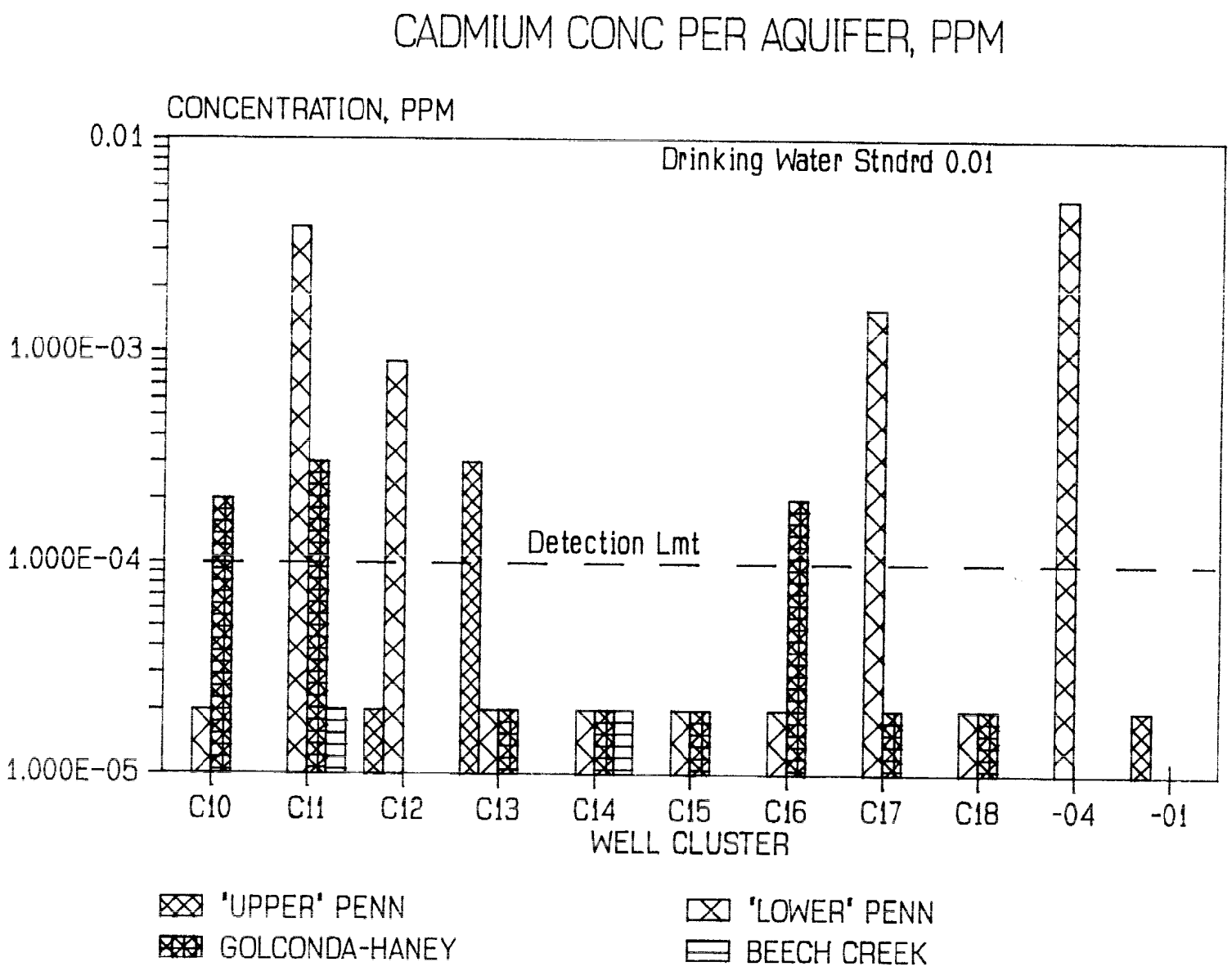

Figure 24. Cadmium concentration by well cluster and by aquifer for the DBG.

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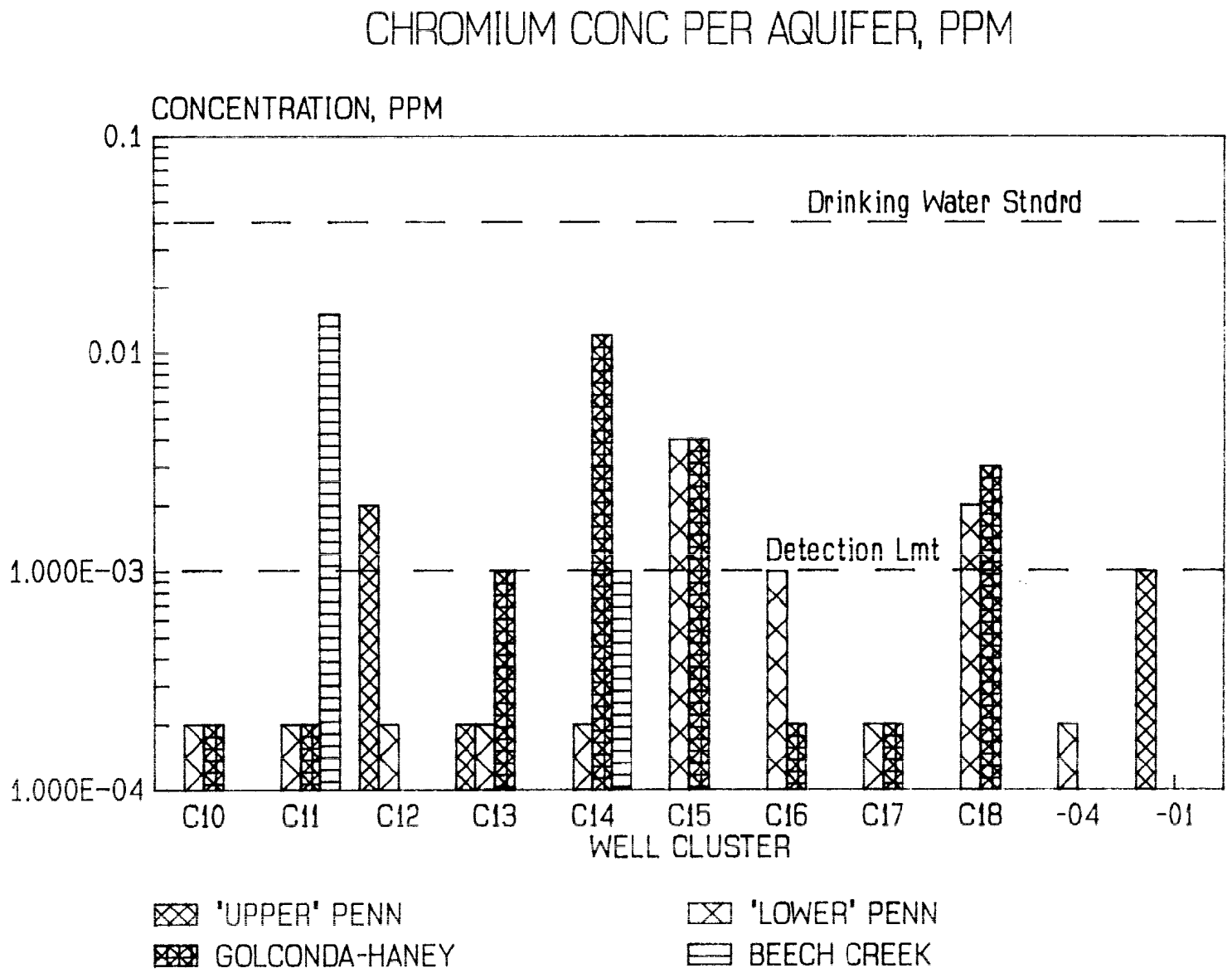

Figure 25. Chromium concentration by well cluster and by aquifer for the DBG.

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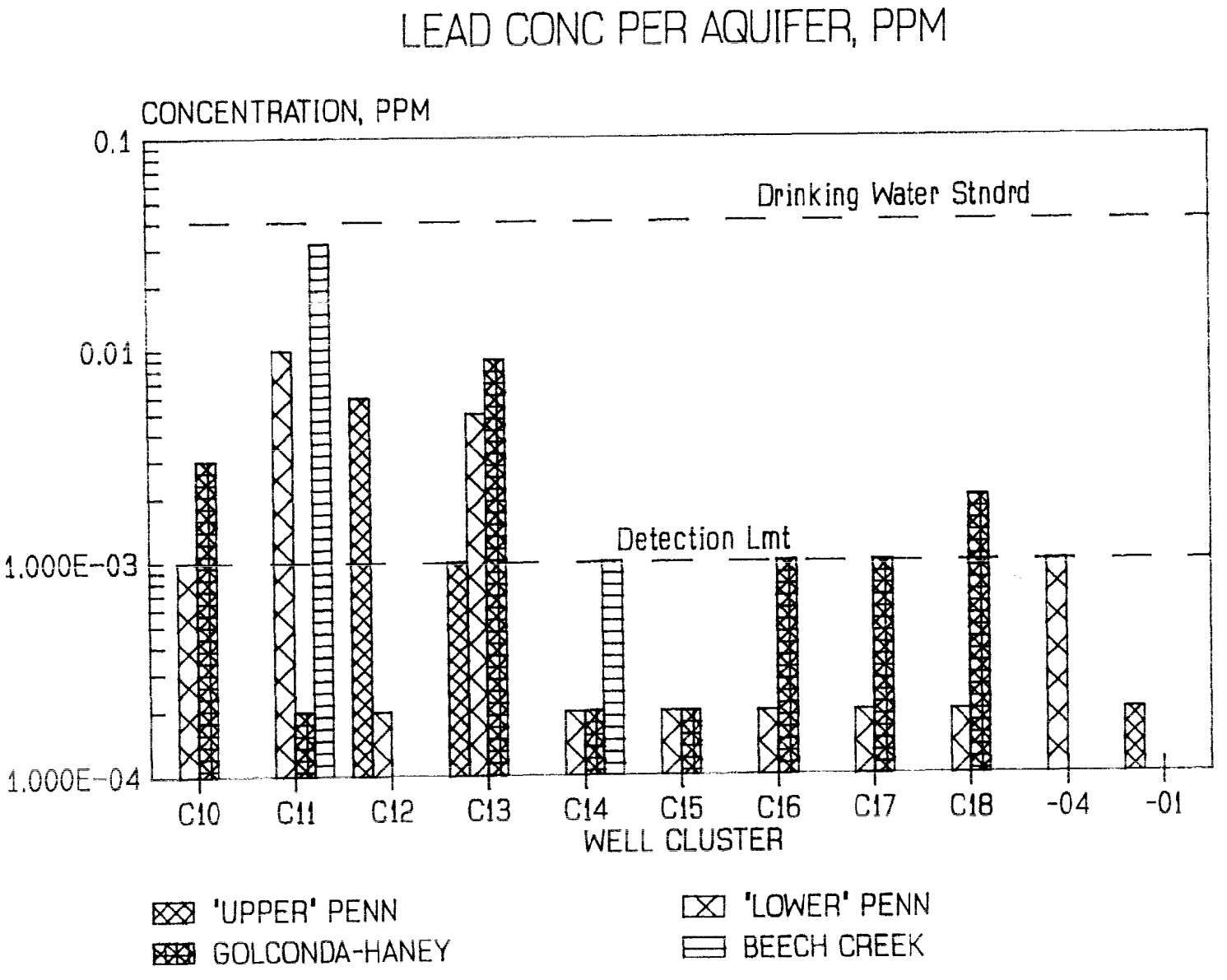

Figure 26. Lead concentration by well cluster and by aquifer for the DBG.

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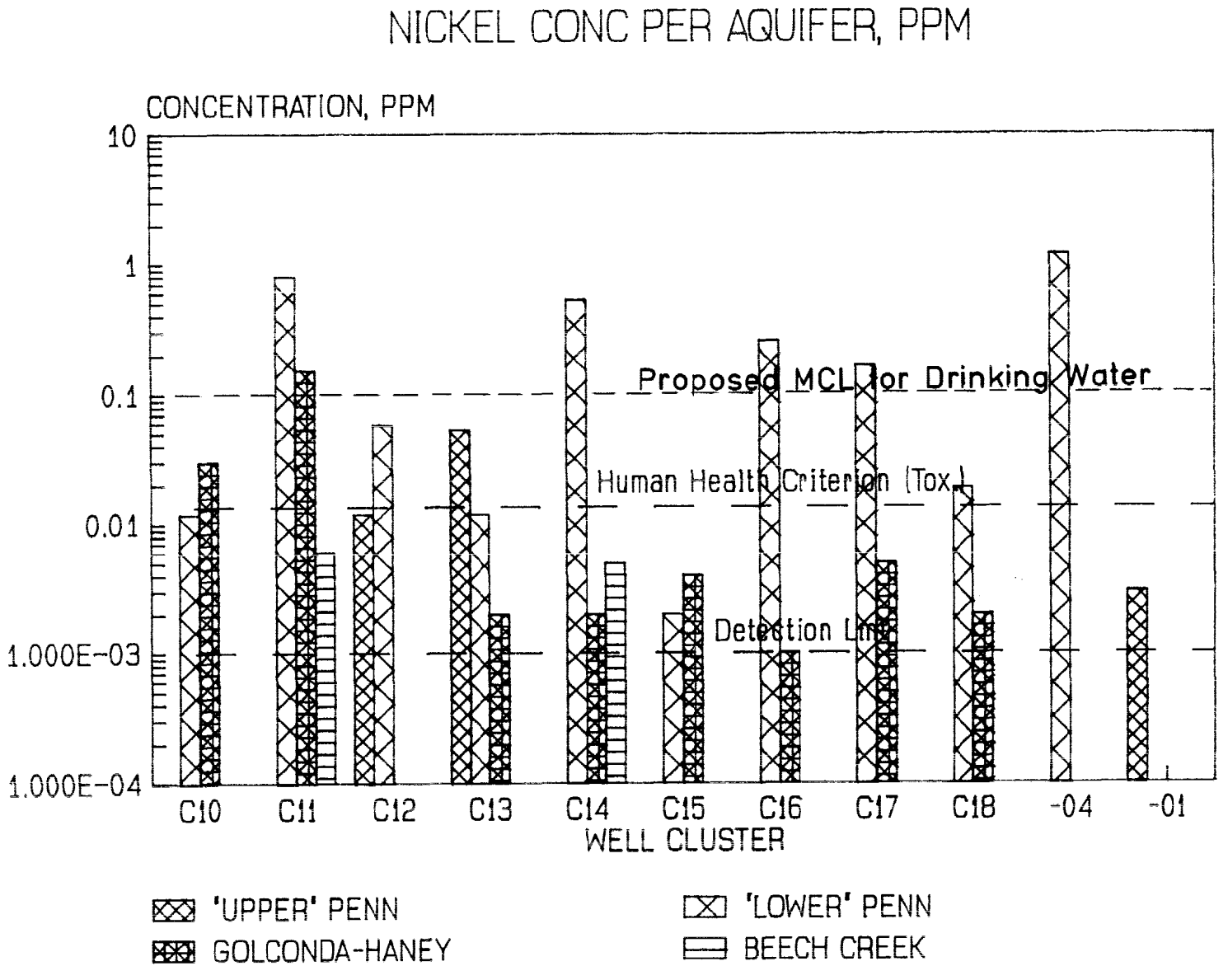

Figure 27. Nickel concentration by well cluster and by aquifer for the DBG.

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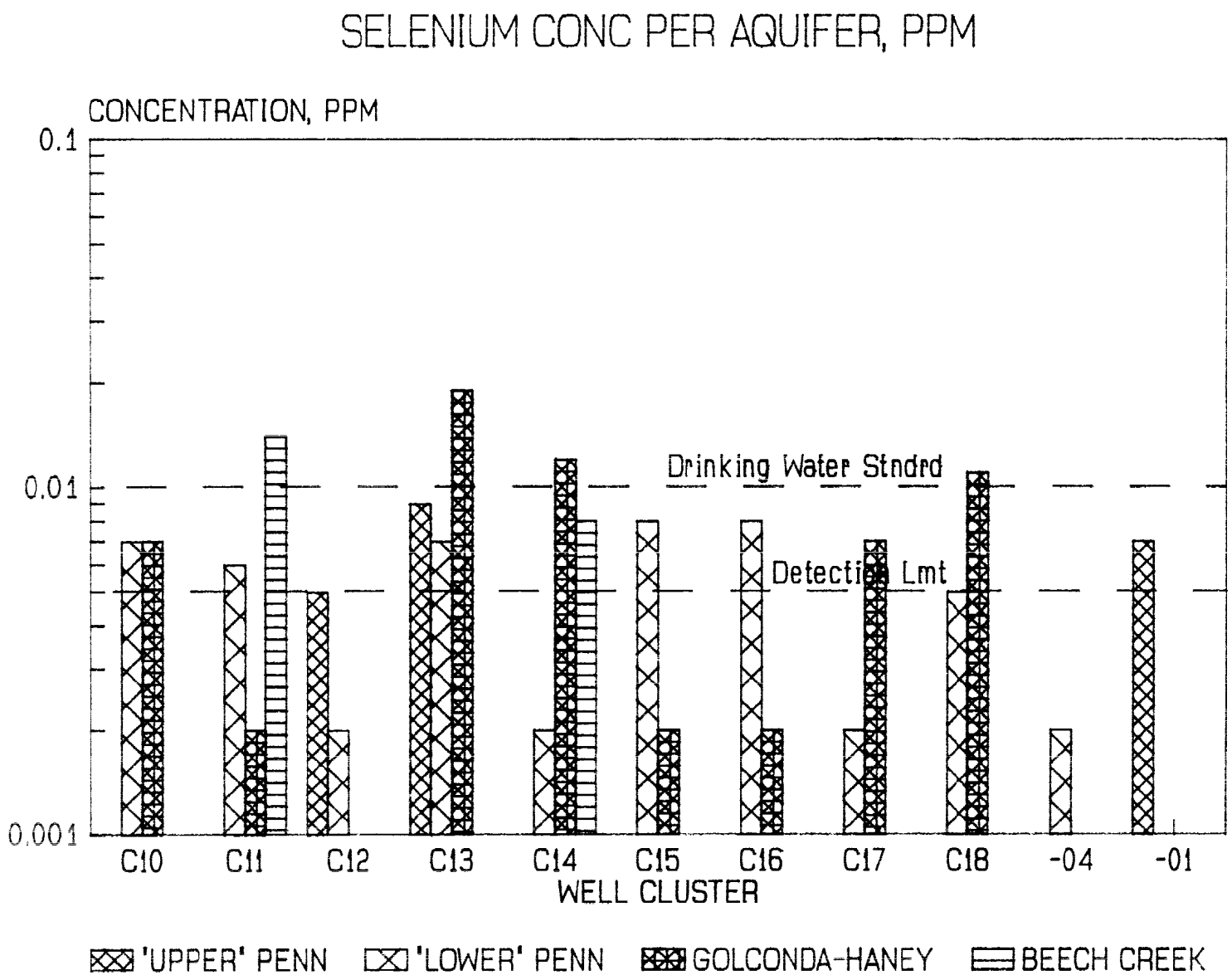

Figure 28. Selenium concentration by well and by aquifer for the DBG.

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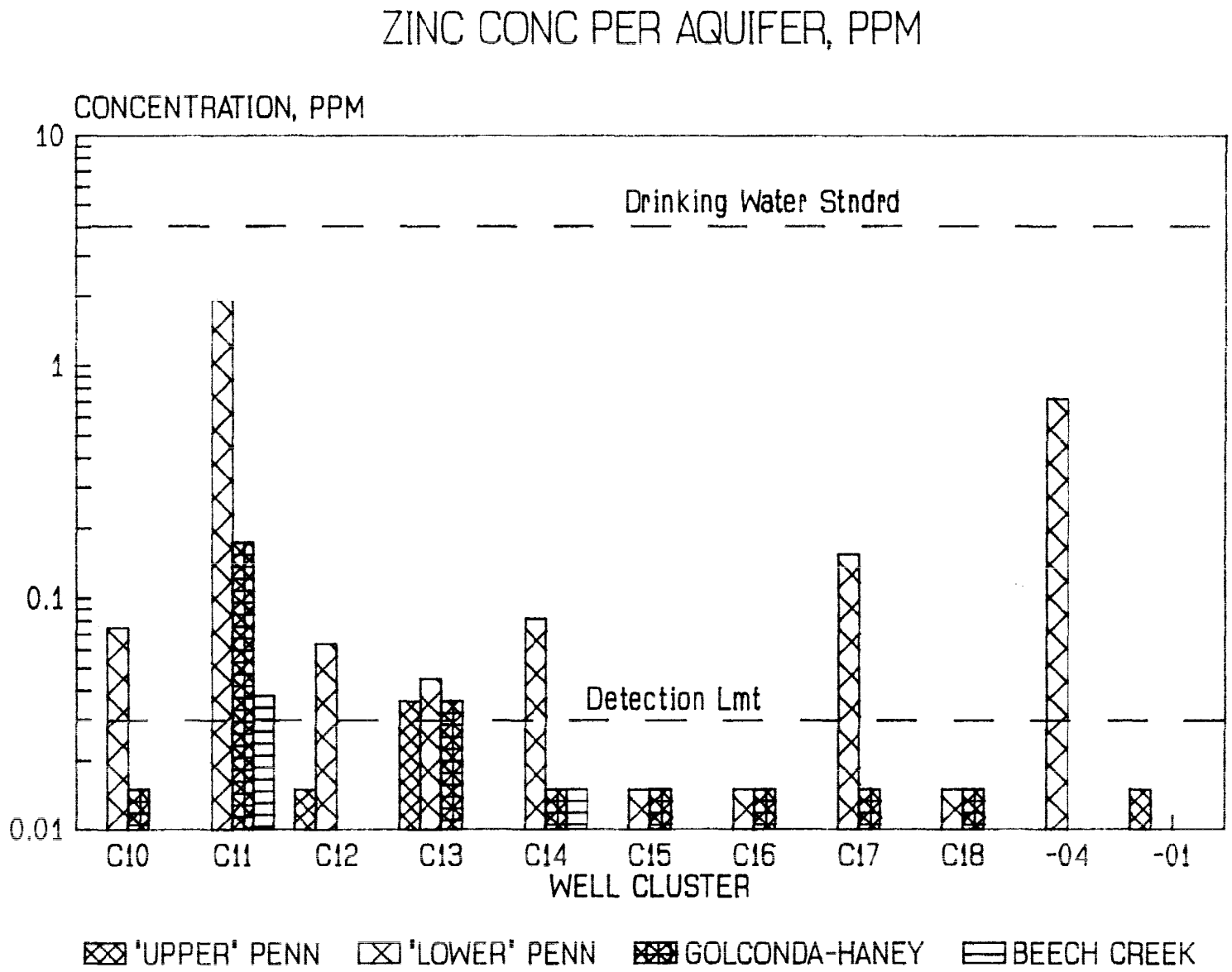

Figure 29. Zinc concentration by well cluster and by aquifer for the DBG.

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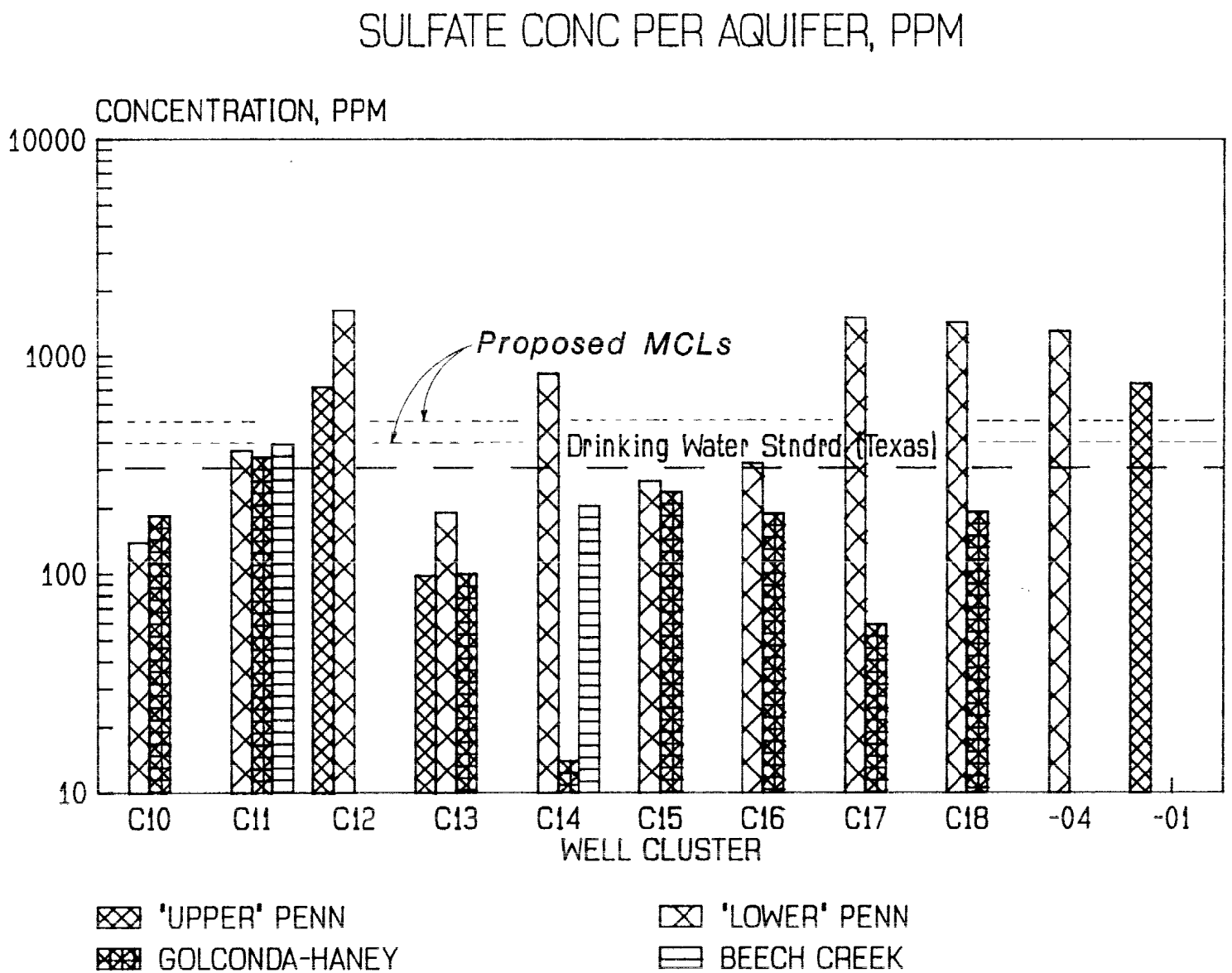

Figure 30. Sulfate concentration by well cluster and by aquifer for the DBG.

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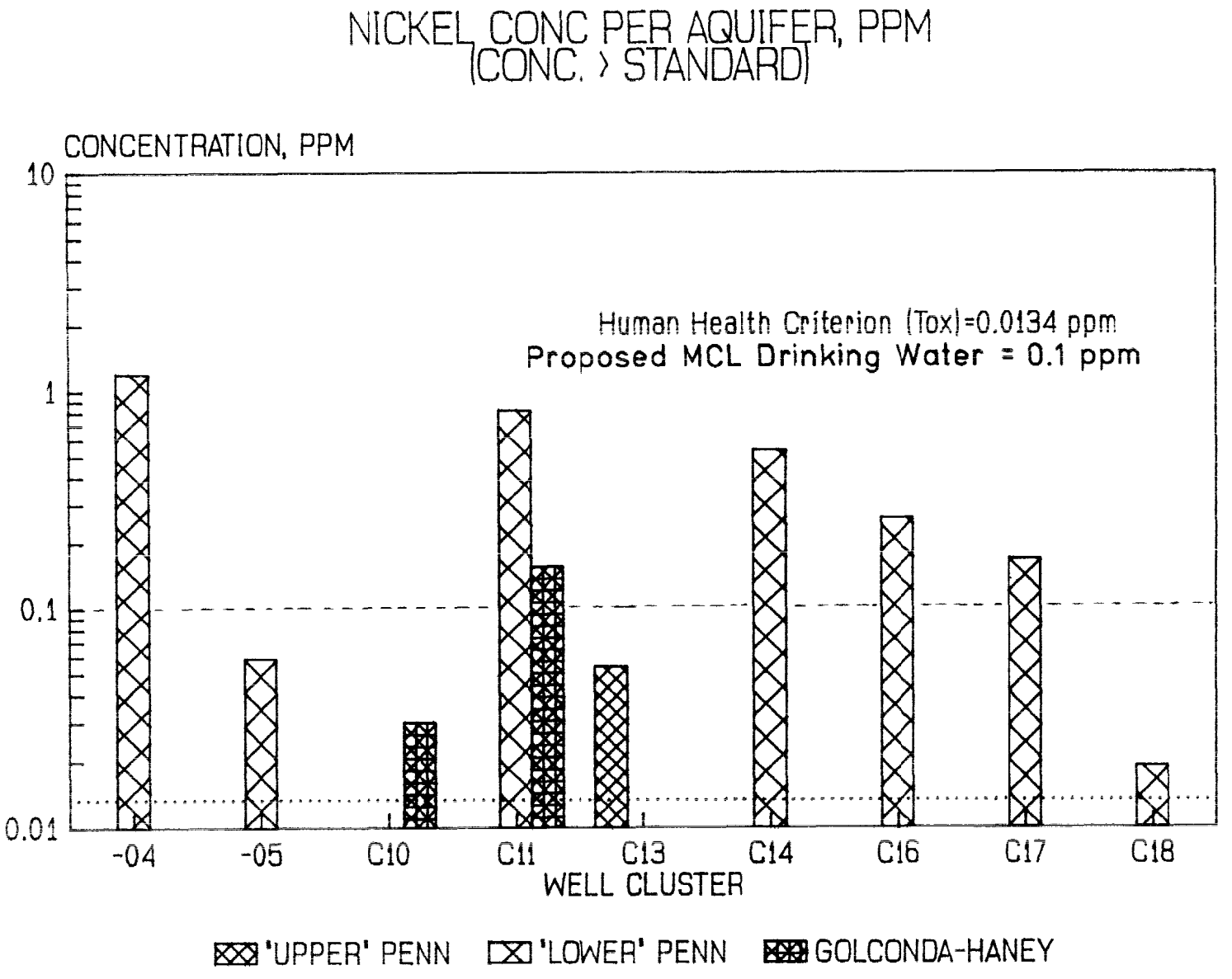

Figure 31. Concentrations of nickel for those wells above standard, DBG.

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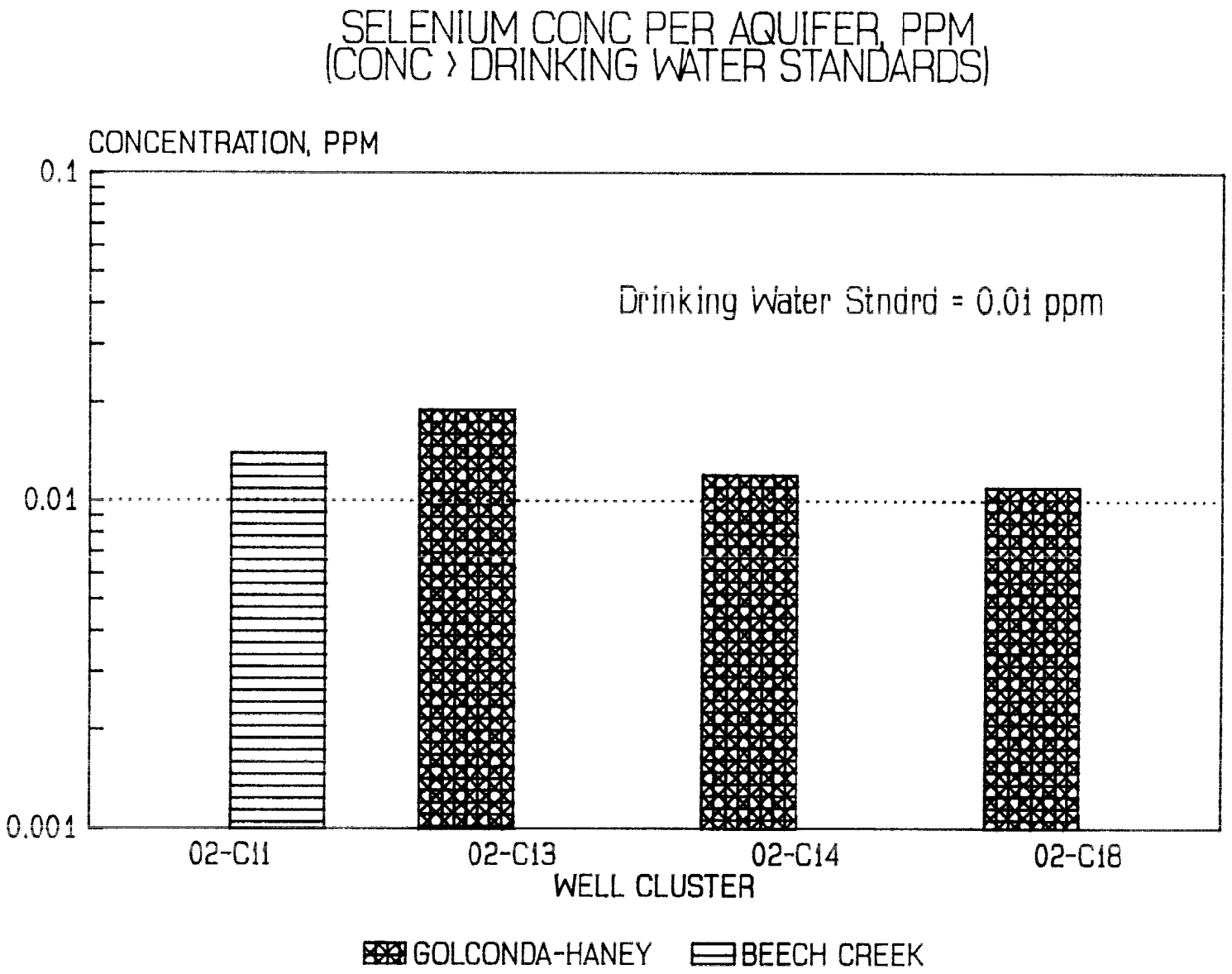

Figure 32. Concentrations of selenium for those wells above standard, DBG.

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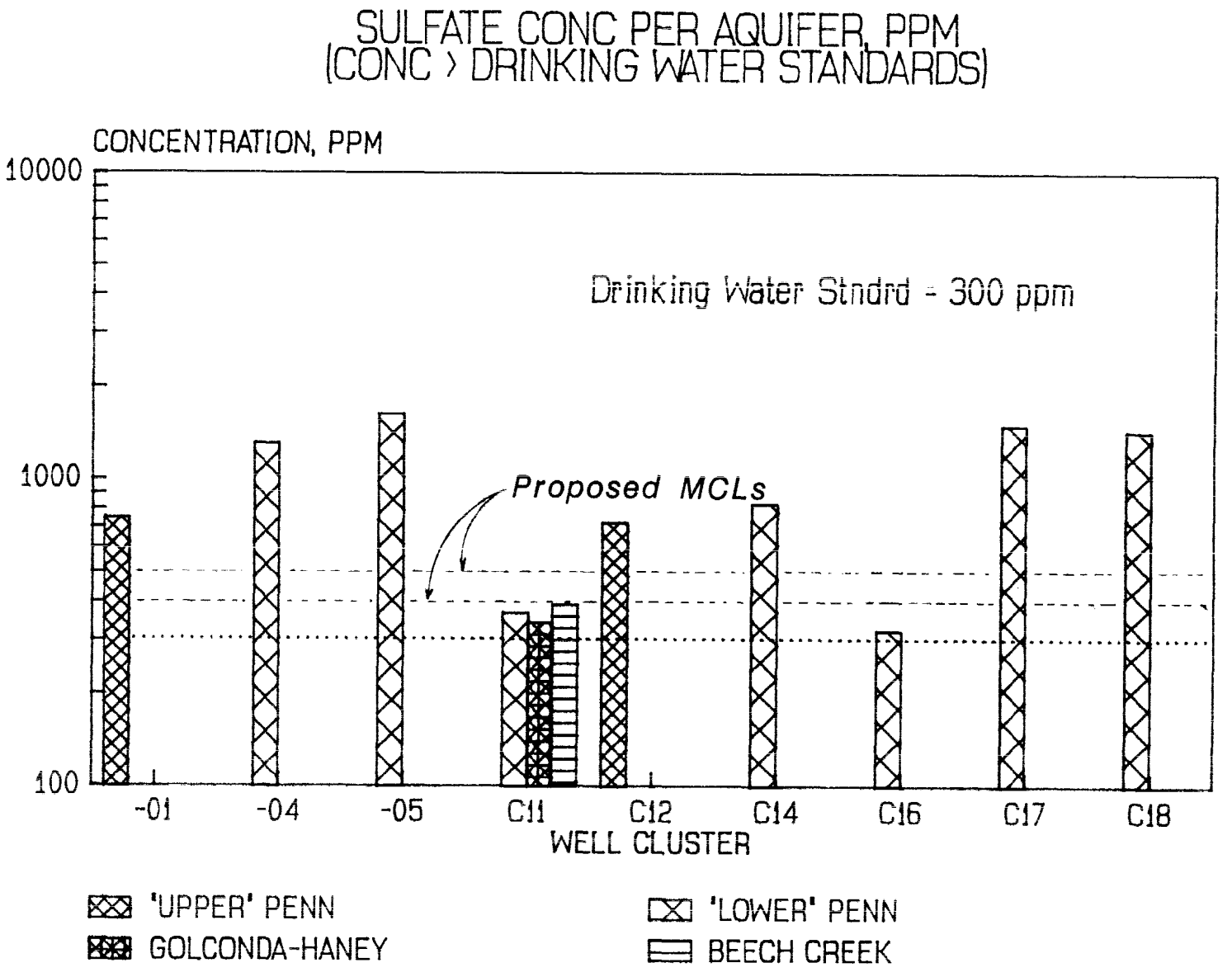

Figure 33. Concentrations of sulfate for those wells above standard, DBG.

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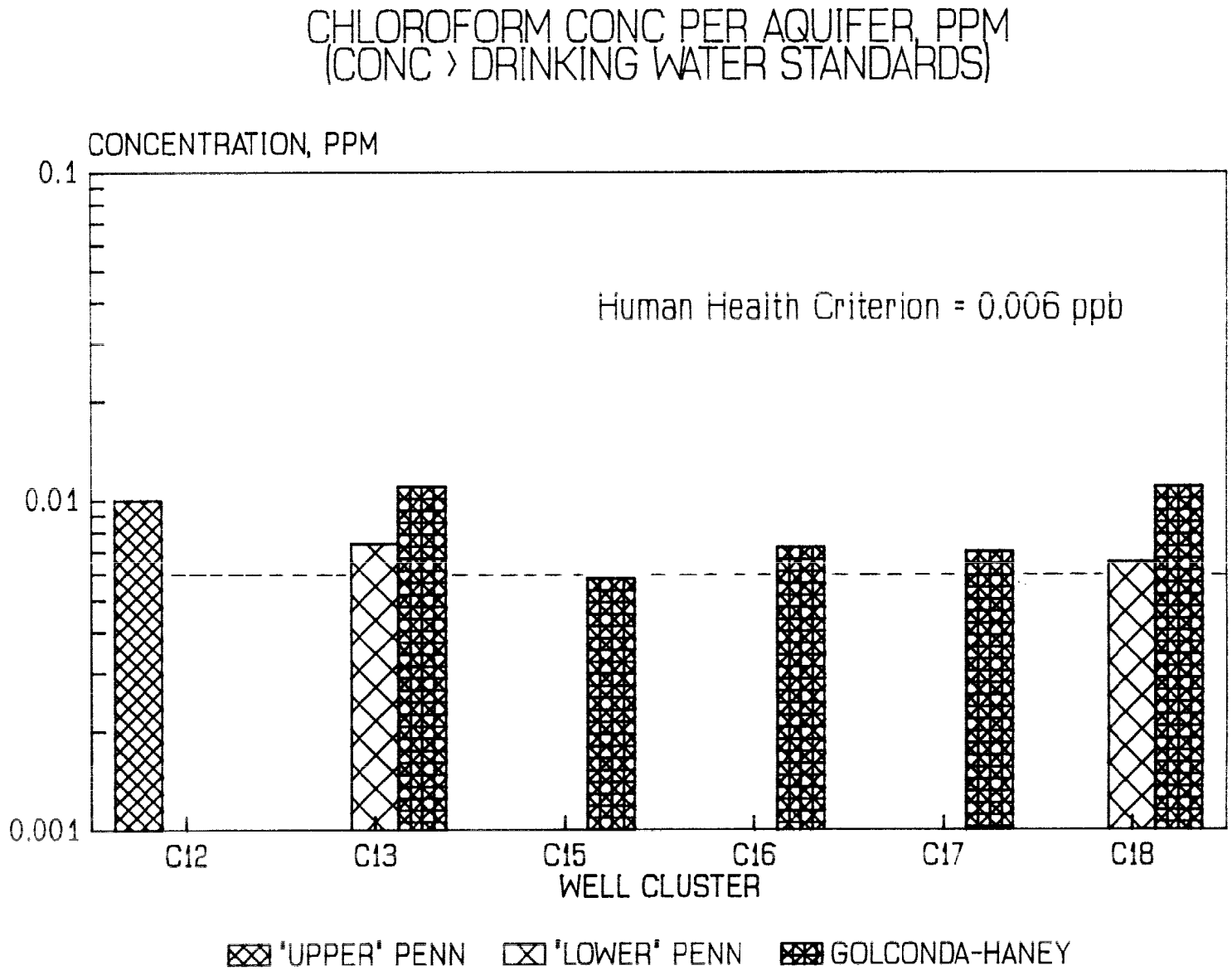

Figure 34. Concentrations of chloroform for those wells above standard, DBG.

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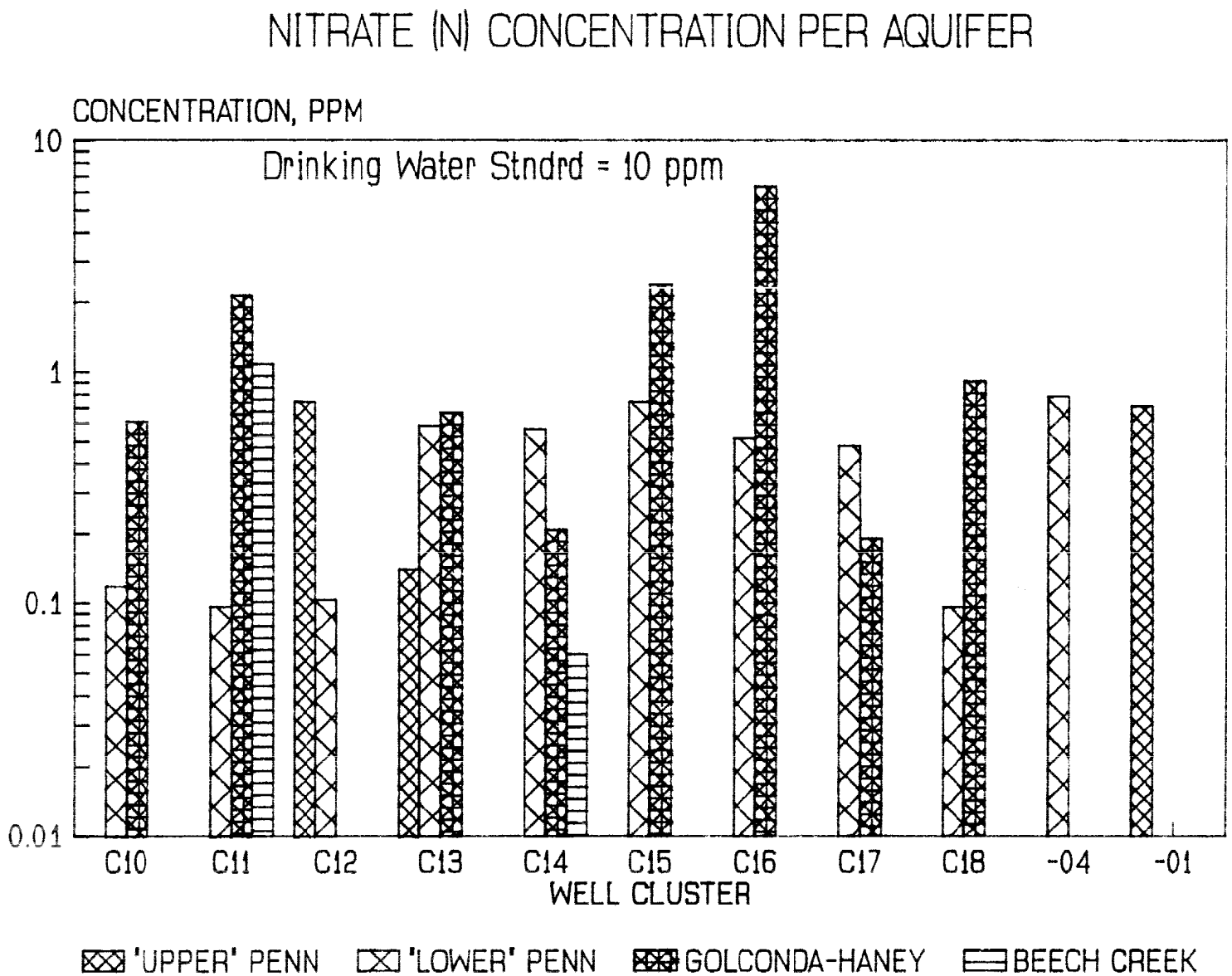

Figure 35. Concentrations of nitrates per well cluster and per aquifer for the DBG.

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PART IV. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.

Summary and conclusions of DBG Remedial Investigation, Phase II Release Assessment

67. Four aquifers were identified and monitored at the Dye Burial Grounds. The lowermost aquifer is in the Big Clifty sandstone, Beech Creek Limestone, the next higher aquifer is in the Golconda/Haney Limestone, and the uppermost aquifers are in the Pennsylvanian Mansfield sandstone. The uppermost aquifers are identified as the "lower" and the "upper" Pennsylvanian aquifers because they are separated beneath much of the DBG by a shale aquiclude of variable thickness. The uppermost aquifers are hydraulically connected in the western part of the DBG. The Golconda/Haney and Beech Creek aquifers are separated from the Pennsylvanian aquifers by shale units. Piezometric levels in the lower two aquifers are different and indicate that the aquifers are not hydraulically connected.

68. Surface drainage from the DBG is primarily to the south, west and southwest into Little Sulphur Creek. The local drainage divide lies to the east of the DBG. Ground water in the Beech Creek, the Golconda/Haney, and the "lower" Penn. aquifers flows generally in a south-southwest direction beneath the DBG. The "upper" aquifer can drain to the north-northwest and to the south-southeast but is limited in extent. All but the Beech Creek aquifer are daylighted by valley cutting within a short distance of the dye burial area and potentially drain onto the surface. The Golconda/Haney is, for example, subject to recharge from runoff from the upper aquifers through its exposure on the flanks of the ridge on which the DBG is sited. Well data for the DBG suggest that all aquifers drain ultimately to the valley of Little Sulphur Creek with little or no drainage directly into Sulphur Creek to the east.

69. Varying concentrations of priority pollutant contaminants were detected in all 23 wells sampled at the DBG, in the seep, and in Spring C, but not uniformly (contaminants found in one well or aquifer did not necessarily occur in another). Neither PCB's nor pesticide compounds were tested for. Nickel, zinc and sodium were the most persistent and most highly concentrated

metals detected. Other metals occurring were arsenic, antimony, beryllium, cadmium, chromium, copper, lead and selenium. Mercury, silver and tellurium were not detected in any samples. Sulfates were detected in all wells and were above standards in many wells. Seven organic compounds were detected. The compound chloroform was above standard in eight wells. High HNu readings in the headspace of some Golconda/Haney aquifer wells further indicates the presence of volatile organics in those wells. The presence of acetone in samples may have resulted from cleaning the bailer with acetone during sampling.

70. Five compounds tested were above drinking water or other health standard in at least one well. They were the metals beryllium, selenium (drinking water standards) and nickel (human health criterion for toxicity, and proposed MCL), chloroform and sulfates. Previous (1982-86) limited sampling and analysis at the DBG (see PART I, paragraph 4) yielded concentrations above standard for barium, cadmium and selenium. Barium was not among the metals analyzed for in the 1988 sampling program. Cadmium was below standards and selenium was again above standards in 1988.

71. The source of the contaminants in the deeper aquifers beneath the DBG is difficult to determine because of the proximity of the site to other NWSC facilities that may contribute to contamination of surface and ground waters. Additional sampling will have to be performed in the Phase III study to verify the presence and distribution of contaminants identified in the first round. Sources of contaminants in the Big Clifty-Beech Creek aquifer system are particularly difficult to assess because that aquifer extends laterally to other sites and is exposed less to valley incision and accompanying drainage than the higher aquifers. Additionally, an indicator parameter unique to the DBG burial trenches has yet to be identified. The Golconda/Haney and "lower" and "upper" Pennsylvanian aquifers are essentially isolated from other sites because of their elevation relative to the topography of the DBG ridge and their having been daylighted by valley incision on the flanks of the ridge. The Golconda/Haney and higher aquifers at the DBG must therefore be considered to be contaminated by downward seeping waters from the dye burial area (high levels of some metals may be attributed

to natural background levels in the Pennsylvanian sediments). Well cluster 02C20 is located upgradient from the DBG (Figures 11-13) and is recommended as a background well (subject to subsequent sampling and analysis of well 02C20).

72. Off-site migration of contaminated surface and ground waters occurs primarily in a south-southwest direction toward Little Sulphur Creek. Little Sulphur Creek has been previously suggested as a primary migration route for waters from the ABG adjacent to the DBG. ABG contaminant migration is currently being addressed in other studies. Monitoring of the wells currently emplaced at the DBG has indicated little if any potential for migration eastwardly toward Sulphur Creek and the eastern NWSC boundary. An additional cluster well approximately one-half mile south-southeast along the main ridge would help assess potential DBG contaminant migration in that direction. Additional surface and near surface soil samples east of the DBG in the outcrop area of the Pennsylvanian-Mississippian contact and the Golconda/Haney Limestone in the drainage gully along cross section BB would help verify the conclusion that contaminants have not migrated eastward.

Recommendations.

73. Wells at the DBG should be sampled again for contaminant groups that were detected in the June, 1988 sampling. The Phase III Release Characterization of the DBG will include five consecutive rounds of sampling, the first round to sample for Appendix IX, in all DBG wells (The Appendix IX is a list of hazardous constituents required by USEPA to be screened at hazardous waste treatment, storage or disposal facilities by the operators of the facilities. See Federal Register, 1987). The metal barium should be analyzed for since it was detected in DBG samples earlier.

74. Further attempt should be made to identify parameters uniquely indicative of compounds present at the DBG or breakdown products of those compounds. Attempts should focus on discussion with Crane personnel familiar with dye chemistry and on GC/MS libraries of indicator compounds associated with the dyes.

75. One additional well cluster should be emplaced on the ridge line southeast of the DBG approximately 2500 ft from the burial trenches. A well (03C34) has already been emplaced in the Beech Creek aquifer approximately 4000 ft SE of the DBG near the ridge road. Additional wells should be installed in the Pennsylvanian and Golconda/Haney aquifers, if water producing zones exist, immediately near well 02C09 to replace the "dry" well in the Golconda/Haney and to ensure monitoring of any SE component of flow.

76. Surface and near surface soil samples should be obtained in the drainage gully east of the drainage divide along cross section BB. Samples should be taken near the Pennsylvanian-Mississippian contact, in the Golconda/Haney outcrop area, and at the Beech Creek outcrop near elevation 590. Soil samples will help reveal any unexpected migration of DBG contaminants to the east toward Sulphur Creek and the NWSC boundary.

77. The DBG investigation should proceed to the Phase III Release Characterization to include the above recommendations. Additionally, quarterly sampling should be started to fulfill Permit requirements. Northern Division, Crane and WES should develop the list of compounds and parameters to be monitored in the quarterly sampling program. A source location Interim Measure should be conducted using geophysical techniques including magnetometer, metal detection or other remote sensing technique to better define the perimeter of the dye burial trenches at the DBG. Precise trench location will be needed if the trench contents are determined to require removal or if capping or sealing of the burial area is determined necessary.

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TABLE 1. Dye Burial Grounds Monitoring Well Data

Well No.	Elev, Top Riser (ft)	Screened Interval (ft)	Date Scrn Set	Formation Screened	Water El 08/30/88	Water El 10/14/88
02-01	740.85	713.05-722.60	08/26/81	Upper Penn	720.45	720.35
02-02	727.67	675.40-685.00	09/02/81	Lower Penn	681.47	681.27
02-03	722.38	659.09-668.20	09/03/81	Hardinsburg	677.58	676.38
02-04	719.02	670.92-680.12	09/04/81	Lower Penn	679.82	679.82
02-05	741.28	678.60-688.08	09/05/81	Lower Penn	684.08	683.68
02-06	738.67	675.96-685.26	09/23/81	Lower Penn	683.87	683.67
02-07	730.86	676.86-685.10	09/24/81	Lower Penn	683.56	683.26
02-08	732.22	674.45-683.35	09/25/81	Lower Penn	683.12	682.92
02C09	740.36	561.35-571.35	01/23/88	Beech Creek	569.86	570.36
02C09P2	740.66	641.16-646.16	01/26/88	Golc./Haney	Blocked	Blocked
02C10	716.47	561.97-571.97	02/13/88	Beech Creek	569.77	569.57
02C10P2	716.39	642.39-652.39	02/16/88	Golc./Haney	671.67	672.77
02C10P3	716.36	677.16-682.16		Lower Penn	686.16	685.76
02C11	715.31	554.81-564.81	02/29/88	Beech Creek	565.81	565.81
02C11P2	715.36	633.06-643.06	03/02/88	Golc./Haney	643.36	642.86
02C11P3	715.66	671.86-676.86	03/05/88	Lower Penn	678.36	678.26
02C12	741.57	557.47-567.47	03/14/88	Beech Creek	567.37	570.47
02C12P2	741.82	636.12-646.12	03/21/88	Golc./Haney	677.32	685.92
02C12P3	741.83	705.33-710.33	03/18/88	Upper Penn	719.23	719.23
02C13	725.11	643.31-653.31	03/28/88	Golc./Haney	654.81	654.01
02C13P2	724.78	678.28-688.28	03/29/88	Lower Penn	684.08	683.78
02C13P3	725.51	703.01-708.01	03/30/88	Upper Penn	712.81	712.41
02C14	716.40	550.00-560.00	04/13/88	Beech Creek	567.20	567.30
02C14P2	716.43	629.53-639.53	04/15/88	Golc./Haney	661.23	663.03
02C14P3	716.26	666.66-676.66	04/19/88	Lower Penn	678.56	678.56
02C15	715.88	637.08-647.08	05/10/88	Golc./Haney	647.68	647.38
02C15P2	715.77	674.07-684.07	05/11/88	Lower Penn	679.87	679.97
02C16	725.36	634.26-644.26	05/16/88	Golc./Haney	637.56	640.06
02C16P2	725.18	669.18-679.18	05/17/88	Lower Penn	681.68	681.88
02C17	732.96	634.36-644.36	05/23/88	Golc./Haney	644.06	643.56
02C17P2	732.84	670.64-680.64	05/26/88	Lower Penn	683.54	683.24
02C17P3	733.38	705.28-710.28	05/27/88	Upper Penn	DRY	DRY
02C18	737.31	636.51-646.51	06/06/88	Golc./Haney	643.41	646.41
02C18P2	737.24	672.34-682.34	06/07/88	Lower Penn	683.94	683.54
02C18P3	737.45	716.95-721.95	06/07/88	Upper Penn	717.25	717.25
02C19	733.35	640.65-650.65	06/14/88	Golc./Haney	646.45	646.55
02C19P2	733.28	675.18-685.18	06/15/88	Lower Penn	683.98	683.78
02C19P3	733.63	715.43-720.43	06/16/88	Upper Penn	DRY	DRY
02C20	715.06	570.36-580.3	06/29/88	Beech Creek	574.26	574.36
02C20P2	714.92	646.42-656.42	06/22/88	Golc./Haney	655.62	655.52
02C20P3	714.78	674.28-684.28	06/23/88	Lower Penn	696.38	696.08

TABLE 2. Horizontal and vertical data for the DBG.

Well No.	Northing (nearest ft)	Easting (nearest ft)	Elev. Top of Riser ft.
02-01	491,383	596,550	740.85
02-02	491,143	596,074	727.67
02-03	491,058	595,916	722.38
02-04	490,919	595,915	719.02
02-05	491,491	596,645	741.28
02-06	491,297	596,385	738.67
02-07	491,191	596,233	730.86
02-08	491,092	596,224	732.22
02C09	491,331	597,056	740.36
02C10	491,789	596,142	716.47
02C11	490,987	595,829	715.31
02C12	491,496	596,670	741.57
02C13	491,692	596,436	725.11
02C14	490,671	595,964	716.40
02C15	491,186	595,880	715.88
02C16	490,893	596,177	725.36
02C17	491,022	596,473	732.96
02C18	491,103	596,611	737.31
02C19	491,338	596,225	733.35
02C20	492,114	596,769	715.06

Note: Northings and eastings are Indiana West Zone State Plane Coords.

Table 3. Aquifer properties for types of porosity

	Primary porosity	Fracture porosity	Conduit porosity
Physical situation	Intergranular pores	Concentrations of joints and fractures	Open channels and pipes of various sizes and shapes
Homogeneity	Usually isotropic	Usually anisotropic because of fracture spacing and preferred orientations	Usually highly anisotropic
Flow regime	Laminar D'Arcy flow	Laminar May deviate from D'Arcy flow	Turbulent Non-d'Arcy flow
Water table	Well-defined water table surface	Irregular surface	Behaves as subsurface drains, which may be at, above, or below adjacent water table
Response to short-term events	Slow	Moderate	Rapid

Table 4. Wells sampled at the DBG June 27-31, 1988.

Well No.	Aquifer Represented	Well No.	Aquifer Represented
02-02	"upper" Penn.	02C13P3	"upper" Penn.
02-04	"lower" Penn.	02C14	Beech Creek
02-05	"lower" Penn.	02C14P2	Golconda/Haney
02C10P2	Golconda/Haney	02C14P3	"lower" Penn.
02C10P3	"lower" Penn	02C15	Golconda/Haney
02C11	Beech Creek	02C15P2	"lower" Penn.
02C11P2	Golconda/Hane	02C16	Golconda/Haney
02C11P3	"lower" Penn.	02C16P2	"lower" Penn.
02C12P3	"upper" Penn.	02C17	Golconda/Haney
02C13	Golconda/Haney	02C17P2	"lower" Penn.
02C13P2	"lower" Penn.	02C18	Golconda/Haney
		02C18P2	"lower" Penn.

Table 5. Summary of Sample Types Collected at the DBG.

Sample	Filtered (F) or Nonfiltered (N)	Acid Preservative
Priority pollutant metals	F	Nitric
Priority pollutant VOA's	N	none
Priority pollutant PCB/Pest.	N	none
Priority pollutant BNA's	N	none
TOC	F	Hydrochloric

Table 6. Conductivity, salinity and pH values

Well No.	Conductivity (umhos)	pH	Salinity (ppt)	HNu (ppm)
02C11P03	1400	4.40	1.0	0.0
02C11P02	1200	6.85	1.0	0.0
02C11	1650	10.60	1.0	0.0
02C14P03	1500	6.5	1.5	0.0
02C14	75	7.2	0.5	0.0
02C14P02	5000	11.70	3.5	0.0
02C15	300	8.55	0.5	0.0
02C15P02	750	10.90	0.5	0.0
02C16	700	10.30	0.5	0.0
02C16P02	700	8.90	1.0	0.0
02C17P02	1900	6.00	2.0	0.0
02C17	600	6.95	0.5	0.0
02C18	400	8.95	0.5	6.5
02C18P02	1750	6.50	1.5	2.0
02C12P03	1600	6.45	1.0	0.0
02C05	2900	6.20	2.0	0.0
02C10P02	650	6.95	0.5	26.0
02C10P03	450	6.40	0.5	0.0
02C13P03	350	5.70	0.5	0.0
02C13	300	9.35	0.5	14.0
02C13P02	800	6.85	0.5	0.0
02-04	1650	7.50	1.0	0.0

Table 7. Detected VOC Concentrations in mg/l.

	Methylene Chloride	Chloroform	Acetone
Detection Limit (mg/l)	0.005	0.005	0.1
Drinking Water Standard (mg/l)	None Listed	0.00019 (cancer risk factor)	None Listed
Well Number			
02C12P03		0.01	
02C13		0.011	1.91
02C18P02		0.0065	3.5
02C17		0.007	
SP-C			
02-04			0.104
0210CP02			1.74
02C13P03			
02C10P03			
02C13P02		0.0074	
02C18	0.027	0.011	
02C14P02			7.84
02C14			
02C16P02			
02C15P02			2.7
02C11P02			
02C11P03			
02C11			2.67
02-01			
02C15		0.0058	3.72
02C14P02			0.7
02C17P02			

Table 7. (con'd)

	Methylene Chloride	Chloroform	Acetone
Detection Limit (mg/l)	0.005	0.005	0.1
Drinking Water Standard (mg/l)	None Listed	0.00019 (cancer risk factor)	None Listed
02C16		0.0072	1.71
02-05			

Table 8. Detected BNA Concentrations in mg/l.

	1,4-Dichloro-benzene	Butylbenzyl-phthalate	Bis-(2-ethylhexyl) phthalate	Di-N-Octyl-phthalate
Det Limit (mg/l)	0.011	0.011	0.011	0.011
Drink. Wat. Stndrd (mg/l)	0.4	None Listed	15	None Listed
Well Number				
02C10P02			0.024	
02C13P02				
02C10P03				
02C13P02			0.012	
02C18			0.023	
02C14P02				
02C14			0.032	
02C16P02			0.01	
02C15P02			0.043	
02C11P02		0.013	0.091	
02C11P03			0.048	
DBG Seep	0.035			0.014
02C11	0.054	0.017	1.46	0.029
02-01				
02C17P02			0.02	
02-05				

Table 9. Detected Nitrogen Compound Concentrations in mg/l.

	Total Kjeldahl nitrogen	Nitrate nitrogen	Ammonia Nitrogen
Detection Limit (mg/l)	0.01	0.01	0.01
Drinking Water Standard (mg/l)	10	Not Listed	Not Listed
Well Number			
02C12P03	1.97	0.752	0.121
02C13	0.586	0.668	0.268
02C18P02	2.26	0.096	0.481
02C17	0.947	0.19	0.289
SP-C	0.108	0.222	0.035
02-04	0.404	0.784	0.086
02C10P02	2.61	0.612	0.156
02C13P03	0.434	0.141	0.062
02C10P03	0.155	0.119	0.051
02C13P02	8.9	0.588	0.545
02C18	2.4	0.908	1.44
02C14P02	22.04	0.208	1.94
02C14	0.339	0.06	3.42
02C16P02	0.934	0.519	0.049
02C15P02	0.687	0.747	0.129
02C11P02	1.07	2.15	
02C11P03	3.42	0.097	0.092
02C11	5.4	1.08	3.42
02-01	0.503	0.715	0.028
02C15	1.73	2.4	0.222
02C14P03	0.773	0.569	0.05

Table 9. (con'd)

	Total Kjeldahl nitrogen	Nitrate nitrogen	Ammonia Nitrogen
02C17P02	0.907	0.48	0.225
02C16	7.78	6.34	0.437
02-05	0.685	0.104	0.358

Table 10. Detected Metals, Anions and TOC Concentrations in mg/l.

	Sb	As	Be	Cd	Cr	Cu	Pb
Det Lim (mg/l)	0.005	0.005	0.005	0.001	0.001	0.001	0.001
DW St. (mg/l)	0.146	0.05	Not Listed	.01	.05	Not Listed	.05
Well No.							
02C12P03	0.006	0.013			0.002	0.026	0.006
02C13		0.018			0.001	0.103	0.009
02C18P02	0.01	0.019			0.002	0.014	
02C17		0.017				0.001	0.001
SP-C		0.014		0.0001			0.002
02-04		0.014		0.0053		0.001	0.001
02C10P02	0.011	0.017		0.0002		0.042	0.003
02C13P03		0.024		0.0003		0.001	0.001
02C10P03		0.019					0.001
02C13P02	0.011	0.022				0.086	0.005
02C18		0.024			0.003	0.002	0.002
02C14P02		0.018			0.012	0.001	0.026
02C14					0.001		0.001
02C16P02		0.008			0.001		
02C15P02					0.004	0.001	
02C11P02				0.0003			
02C11P03			0.005	0.0039		0.005	0.01
02C11	0.007	0.021			0.015	0.007	0.032
02-01					0.001		
02C15					0.004		
02C14P03							
02C17P02				0.0016		0.007	

Table 10. (con'd)

	Sb	As	Be	Cd	Cr	Cu	Pb
02C16				0.0002			0.001
02-05				0.0009			
DBG Seep							
Blank 1						0.001	
Blank 2				0.0004			
Seep-soil		6.28	1.2	0.219	27.8	8.67	18.9

Table 10 (con'd).

	Ni	Se	Zn	Na	TOC	Cl	SO4
Det Lmt (mg/l)	0.001	0.005	0.03	0.1	1.0	5	1
DW Lmt (mg/l)	Not Listed	0.01	5	Not Listed	Not Listed	Not Listed	Not Listed
Well No.							
02C12P03	0.012	0.005		133	2.3	84.4	726
02C13	0.002	0.019	0.036	24	2.5	11.2	100
02C18P02	0.019	0.005		33.3		28.4	1438
02C17	0.005	0.007		40.7		6.7	59
SP-C	0.001	0.007		6.1			41
02-04	1.2		0.722	44.9		69.9	1312
02C10P02	0.03	0.007		31.7		27.3	185
02C13P03	0.054	0.009	0.036	27.4		32.1	99
02C10P03	0.012	0.007	0.075	22.6		9	140
02C13P02	0.012	0.007	0.045	25.8	1.3	21.6	192
02C18	0.002	0.011		47.3	1.7	9.5	192
02C14P02	0.002	0.012		99.6	4.4	9.2	13.7
02C14	0.005	0.008		57.4			205
02C16P02	0.259	0.008		23.2		46.9	323
02C15P02	0.002	0.008		25.8	1.2	12	267
02C11P02	0.155		0.174	48.8	1.1	48.2	342
02C11P03	0.817	0.006	1.95	54.1		50.5	369
02C11	0.006	0.014	0.038	240	21.8	18.4	392
02-01	0.003	0.007		214	4.3	226	750
02C15	0.004			32.8	4.4	12.2	237
02C14P03	0.535		0.082	36.2		89.6	836
02C17P02	0.168		0.155	71.1	1.2	163	1504

Table 10. (con'd)

	Ni	Se	Zn	Na	TOC	Cl	SO4
02C16	0.001			95.4	7	14.5	189
02-05	0.059		0.064	58.9	1.3	78.6	1635
DBG-SEEP			5.05	40.3	15.9		
Blank 1	0.001	0.005		0.441			
Blank 2	0.003	0.007		0.171			
Seep-soil	131	0.8	139		34350		

Table 11. Levels (ppm) of Selected Compounds in Spring C and DBG Beech Creek Wells.

Compound	Spring C	Well 02C11	Well 02C14
As	0.014	0.021	ND
Cd	0.0001	ND	ND
Cr	ND	0.015	0.001
Pb	0.002	0.032	0.001
Ni	0.001	0.006	0.005
Se	0.007	0.014	0.005
Zn	ND	0.038	ND
SO4	41	392	205
NO3-N	0.222	1.080	0.060

IN5 170 023 498
11 Jan, 1991

Appendix A. Logs of Borings at the Dye Burial Grounds

BORING LOG
FIELD DATA

Project NWSC Groundwater Study Site Crane, IN Date 26 Aug 81
Location Dye Burial Grounds Job No. 441-G150.11GR21/22
Drill Rig Failing Inspector J. Dunbar Operator C. Drake Surface El 738.66 Boring No. WES-2-1-81

SAMPLE NUMBER	DATE TAKEN 1981	STRATUM FROM	STRATUM TO	DRIVE FROM	DRIVE TO	SAMPLE FROM	SAMPLE TO	TYPE OF SAMPLER	Hyd. Press.	Cont.	CLASSIFICATION AND REMARKS
1A	26 Aug	0.0		0.0	0.5	0.0	0.92	3" Shelby Tube	0	Jar	Clay (CL): Brown in color, soft,
1				0.5	1.0	0.92	1.87		0	S.T.	low plasticity, & slight organic
				1.0	1.5				10		matter.
				1.5	2.0				30		Sample length: 1.97 ft
			6.0	2.0	2.5				100		
				0.0	5.0	-------		7" Folding Auger	------		Cleanout
2A	26 Aug	6.0	7.17	5.0	5.5	5.0	6.0	3" Fixed Piston Sampler	0	Jar	Sandy silt (SM) & sandstone frag-
2				5.5	6.0	6.0	6.95		20	S.T.	ments: brown in color, slightly
				6.0	6.5				380		sticky, & contains 25% weathered
				6.5	7.0				700		sandstone. Sandstone is light
				7.0	7.17				800		brown to grey in color, uniform,
											fine-grained, dry, & friable.
											Sample length: 1.95 ft

WES FORM 1 74 819 EDITION OF NOV 1971 MAY BE USED

Sheet 1 of 2 She

NO. Extra jar sample made for NWSC

BORING LOG
FIELD DATA

Project _____ Site _____ Date _____
Location _____ Job No. _____
Drill Rig _____ Inspector _____ Operator _____ Surface El _____ Boring No. WES-2-1-81

SAMPLE NUMBER	DATE TAKEN	STRATUM FROM	STRATUM TO	DRIVE FROM	DRIVE TO	SAMPLE FROM	SAMPLE TO	TYPE OF SAMPLER			CLASSIFICATION AND REMARKS
	26 Aug	7.17	11.5	5.0	7.17	--------		7" Folding Auger	--------		Cleanout: weathered sandstone starts at 7.17 ft
	26 Aug	11.5	30.0	7.17	30.0	--------		5-5/8" Rock Bit	--------		Hard sandstone at 11.5 ft. Water at approximately 20 ft. Cleanout to 10 ft below water, blew hole dry of water & cuttings. Installed well screen.

WES FORM JAN 74 819 EDITION OF NOV 1971 MAY BE USED

Sheet 2 of 2 Sheets

BORING LOG
FIELD DATA

Project NWSC Groundwater Study Site Crane, IN Date 26 Aug 81
Location Dye Burial Grounds Job No. 441-G150.11GR21/22
Drill Rig Failing Inspector J. Dunbar Operator C. Drake Surface El 725.46 Boring No. WES-2-2-81

SAMPLE NUMBER	DATE TAKEN	STRATUM FROM	STRATUM TO	DRIVE FROM	DRIVE TO	SAMPLE FROM	SAMPLE TO	TYPE OF SAMPLER	Hyd. Press.	Cont.	CLASSIFICATION AND REMARKS
1	26 Aug	0.0		0.0	0.5	0.0	1.65	3" Shelby Tube	40	S.T.	Silt (ML): brown in color, soft,
1A				0.5	1.0	1.65	2.5		75	Jar	slightly sticky, dry, & contains
				1.0	1.5				140		organic matter.
				1.5	2.0				180		Sample length: 2.5 ft
			5.0	2.0	2.5				230		
				0.0	5.0	----------		7" Folding Auger	------		Cleanout
2A	26 Aug	5.0		5.0	5.5	5.0	6.05	3" Fixed Piston Sampler	40	Jar	Silt (ML) & weathered sandstone:
				5.5	6.0				700		brown to brownish white in color
			6.05	6.0	6.05				800		& dry. Sandstone is fine-grained,
											uniform, & friable. Slight dry
											green film found on soil sample.
											Sample length: —
	26 Aug	6.05		5.0	6.1	----------		5-5/8" Rock Bit	------		Cleanout

WES FORM 1 74 819 EDITION OF NOV 1971 MAY BE USED

Sheet 1 of 8 Sheets

NOTES Extra jar sample made for NWSC

BORING LOG
FIELD DATA

Project _____ Site _____ Date _____
Location _____ Job No. _____
Drill Rig _____ Inspector _____ Operator _____ Surface El _____ Boring No. WES-2-2-81

SAMPLE NUMBER	DATE TAKEN	STRATUM FROM	STRATUM TO	DRIVE FROM	DRIVE TO	SAMPLE FROM	SAMPLE TO	TYPE OF SAMPLER			CLASSIFICATION AND REMARKS
	26 Aug	6.05		6.1	6.7	----------	----------	3" Pitcher Sam.	200	--	Fragments of weathered sandstone
											Continued on Eng Form 1836, page 3.
											Will use 4x5-1/2 in. core barrel.

WES FORM JAN 74 819 EDITION OF NOV 1971 MAY BE USED

Sheet 2 of 8 Sheets

Hole No. WES-2-2-81

DRILLING LOG	DIVISION U.S. Navy	INSTALLATION NWSC, Crane, Indiana	SHEET 3 OF 8 SHEETS

1. PROJECT NWSC Groundwater Study	10. SIZE AND TYPE OF BIT 4x5-1/2 in. diamond
2. LOCATION (Coordinates or Station) Dye Burial Grounds	11. DATUM FOR ELEVATION SHOWN (TBM or MSL) MSL
3. DRILLING AGENCY CEWES	12. MANUFACTURER'S DESIGNATION OF DRILL Failing 1500
4. HOLE NO. (As shown on drawing title and file number) WES-2-2-81	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED zero; UNDISTURBED two
5. NAME OF DRILLER C. Drake	14. TOTAL NUMBER CORE BOXES zero
6. DIRECTION OF HOLE [X] VERTICAL [ ] INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
	16. DATE HOLE: STARTED 26 August 81; COMPLETED 2 September 81
7. THICKNESS OF OVERBURDEN 6.1 ft	17. ELEVATION TOP OF HOLE 725.46 ft
8. DEPTH DRILLED INTO ROCK 48.4 ft	18. TOTAL CORE RECOVERY FOR BORING 87.8%
9. TOTAL DEPTH OF HOLE 54.5 ft	19. SIGNATURE OF INSPECTOR Capt. P. Dunn

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
725.46	0.0					
724.46	1.0					
723.46	2.0					
722.46	3.0		See page one for overburden information.			
721.46	4.0					
720.46	5.0					
719.46	6.0					
718.46	7.0		No recovery - highly weathered sandstone			26 August 1981 Run 1 Rec 4.3' Lons 0.8' Gain- time 50 min Hyd press 100 psi water press - Rec 70± Bit Action Smooth Water ret Brown Remarks
717.46	8.0		½" clay seam-soft			
716.46	9.0		½" clay seam-soft Sandstone	81.4%	--	
715.46	10.0					

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PROJECT | HOLE NO.

Hole NoWES -2-2-81

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
	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
715.46	10.0		Sandstone: see below			
714.46	11.0		Run 1			27 August 1981
713.46	12.0		closed break			NL - Run 2 Began 9:15 Rec 3.65' End 10:20 Loss - Time 65 min Gain - Drl time 40 min Hyd press 100-120 psi Water press - RPM 75± Drl Action Smooth Water rot Brown
712.46	13.0		Sandstone interbedded with seams of clay, siltstone, limonite, lignite, and peat. Core ranges in color from shades of brown, orange and red to various shades of grey. Grain size is uniform and ranges from very fine to fine with quartz grains predominating. Material is dry, friable, and weathered. Bedding is distinct with thickness ranging from ¼ in. to 8 in. maximum.			
711.46	14.0					Bit blocked off.
710.46	15.0			100%	--	
			Run 2			
			fractured			
709.46	16.0					Run 3 Began 10:40 Rec 4.15' End 11:10 Loss - Time 30 min Gain - Drl time 30 min Hyd press 100-200 psi Water press - RPM 75± Drl Action Smooth Water rot Brown
708.46	17.0		Sandstone: same	100%	--	
707.46	18.0		closed break			Remarks -
706.46	19.0					
			Run 3			
705.46	20.0		No recovery			

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

PROJECT | HOLE NO.

Hole No. WES-2-2-81

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
	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
705.46	20.0		Run 4			WL - Run 4 Began 12:05 Rec 0.0' End 12:30 Lost 0.6' Time 25 min Gain - Drl time 25 min Hyd press 100-120 psi Water press - RPM 50 ± Drl Action Smooth Water ret -
704.46	21.0		No recovery			
703.46	22.0		-fractured siltsone Siltstone: brown, dry, and breaks very easily.	62.0%	--	Remarks Bit blocked off.
702.46	23.0					WL - Run 5 Began 12:50 Rec 3.1' End 1:45 Lost 1.9' Time 55 min Gain - Drl time 50 min Hyd press 100-200 psi Water press - RPM 50-75 ± Drl Action Semi-rough Water ret -
701.46	24.0		Sandstone with lignite: same			Remarks -
700.46	25.0		Run 5			
			-fractured Run 6	100.0%	--	WL - Run 6 Began 2:05 Rec ≈0.6' End 2:30 Lost - Time 25 min Gain - Drl time 20 min Hyd press 200 psi Water press - RPM 50 ± Drl Action Rough Water ret -
699.46	26.0		Limonite with pyrite and chalcopyrite: red, blue, black in color, very hard, and has high specific gravity.			
			No recovery	0.0%	--	
698.46	27.0		Run 7			Remarks -
697.46	28.0		fractured sandstone and clay	69.0%	--	WL - Run 7 Began 2:50 Rec 0.0' End 3:15 Lost 1.6' Time 25 min Gain - Drl time 15 min Hyd press 200 psi Water press - RPM 50 ± Drl Action Rough Water ret -
696.46	29.0		Sandstone: same			
695.46	30.0		Run 8			Remarks: Bit blocked off

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

PROJECT | HOLE NO.

Hole No. WES-2-2-81

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
695.46	30.0		fractured			WL - Run 8 Began 3:30 Rec 2.0' End 4:15 Loss 0.9' Time 45 min Gain - Drl time 40 min Hyd press 150 psi Water press - RPM 50± Drl Action Very rough Water ret -
694.46	31.0		Sandstone: same except very hard.	83.0%	--	
			clay/silt: grey and soft Run 9			
693.46	32.0		From 32.0 to 32.25 - grey sandstone			Remarks Bit blocked off.
692.46	33.0		Sandstone interbedded with seams of grey shale(1/32 to 1/2 in.). Sandstone is grey to orange brown in color, hard, and fine-grained.			WL - Run 9 Began 4:20 Rec 1.7' End 4:40 Loss 0.35' Time 20 min Gain - Drl time 20 min Hyd press 200 psi Water press - RPM 50-100 ± Drl Action Smooth Water ret -
691.46	34.0		Sandstone from 34.0 to 35.0 is dark grey in color.			
			Sandstone from 35.0 to 37.8 is light brown to orange brown and contains no shale seams.			Remarks Bit blocked off. 28 August 1981
690.46	35.0					WL - Run 10 Began 9:26 Rec 4.85' End 11:06 Loss Time 100 min Gain - Drl time 90 min Hyd press 80-100 Water press - RPM 35 ± Drl Action Smooth Water ret -
689.46	36.0			100.0%	--	
			Run 10			
688.46	37.0					Remarks -
			fractured			WL - Run 11 Began 11:20 Rec 4.2' End 1:30 Loss - Time 130 min Gain - Drl time 120 min Hyd press 100-150 psi Water press - RPM 35 ± Drl Action Smooth Water ret -
687.46	38.0			100.0%	--	
686.46	39.0		1/16 in. lignite			
			Sandstone and shale: orange brown sandstone from 1/16 to 3 in. and grey shale from 1/16 to 1 in. thickness.			Remarks -
685.46	40.0		fractured			

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PROJECT | HOLE NO.

Hole No. W-3-2-2-81

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
685.46	40.0					Switched over to water coring due to long drill times. Lost water at 27 ft - sandstone is too fractured for drilling mud to prevent water loss. Will drop casing into hole after reaming hole out with 6-3/4 in. rock bit for 6-1/2 in. casing. Bottom of casing is at 39.0 ft.
			3/4 in. shale seam	100.0%	--	
684.46	41.0		Run 11			
683.46	42.0		fractured			
			Sandstone with interbedded shale seams. Sandstone is various shades of brown, uniform, fine-grained, and quartz grains predominating.			
682.46	43.0					29 August 1981
681.46	44.0		Run 12			WL - Began 11:30 End 12:15 Time 45 min Drl time 45 min Hyd press 150 psi Water press- RPM 50± Drl Action Smooth Water ret Brown Remarks- Run 12 Rec 2.95' Lost - Gain -
680.46	45.0		Sandstone: same			
			From 45.5 to 48.2 alternating grey sandstone and shale with brown sandstone. Bedding thickness averages between 1/16 to 1/2 in. Sandstone is fine-grained and moderately friable and core breaks occur in shale seams.			
679.46	46.0					
678.46	47.0			100.0%	--	[illegible] 12:45 [illegible] 1:35 [illegible] 50 min [illegible] 50 min [illegible] 150 psi [illegible] 50± [illegible] Action Smooth Water ret Brown Remarks - Run 13 Rec 4.2' Lost - Gain -
677.46	48.0		Run 13			
			machine/mechanical fracture Brown sandstone			
676.46	49.0					
			From 49.0 to 51.1 ft grey to dark grey shale(70%) interbedded with fine-grained, grey sandstone(30%).			
675.46	50.0					

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

Hole No. WES-2-2-81

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
675.46	50.0		Shale(70%) with interbedded sandstone(30%)			NL- Run 14 Began 2:00 Rec 4.5' End 3:40 Loss 1.0' Time 90 min Gain - Drl time 90 min Hyd press 300 psi Water press - RPM 70 Drl Action Smooth Water retBrown Remarks-
674.46	51.0		0.15 ft dark grey shale			
			Shale: green in color, uniform, brittle, and soft.			
673.46	52.0			81.8%	--	
			Highly fractured - possibly mechanical/ machine fractured.			
672.46	53.0					
			Run 14			
			Recovered core to approximately 53.5 ft.			
671.46	54.0					
			End depth is 54.5 ft			
670.46	55.0		Blew hole dry of all water. Ran air for approximately one hour to remove water. Will monitor in morning to see if water is coming in. Water level rose to 43.0 ft overnight. Blew hole and installed well screen.			

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PROJECT HOLE NO.

BORING LOG
FIELD DATA

Project NWSC Groundwater Study Site Crane, IN Date 3 Sep 81
Location Dye Burial Grounds Job No. 441-G150.11GR21/22
Drill Rig Failing Inspector J. Dunbar Operator C. Drake Surface El 720.02 Boring No. WES-2-3-81

SAMPLE NUMBER	DATE TAKEN 1981	STRATUM FROM	STRATUM TO	DRIVE FROM	DRIVE TO	SAMPLE FROM	SAMPLE TO	TYPE OF SAMPLER	Hyd. Press.	Cont.	CLASSIFICATION AND REMARKS
1	3 Sep	0.0		0.0	0.5	0.0	1.15	3" Shelby Tube	0	S.T.	Clay (CL): Brown in color, dry,
1A				0.5	1.0	1.15	1.45		20	Jar	crumbles easily, & contains frag-
				1.0	1.5				150		ments of weathered sandstone.
				1.5	2.0				300		Sample length: 1.45 ft
			2.5	2.0	2.5				350		Tube damaged in push.
				0.0	5.0	----------		7" Folding Auger	-------		Cleanout: assumed change at 2.5'
2A	3 Sep	2.5	5.65	50.	5.65	5.0	5.65	3" Pitcher Sampler	700	Jar	Clayey sand (SC) & fragments of
											sandstone: brown in color, dry,
											friable, uniform, & very fine-grained.
	3 Sep			5.0	66.2	----------		5-5/8" Rock Bit	-------		Cleanout: possible moisture at
											19.4 ft. Drilling indicates 0.2
											to 0.4 ft cavity at this depth.
											Checked hole for water and negative
											results. Removed small root from rock bit.

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Sheet 1 of 2 She

NOTE: Extra jar sample made for NWSC

BORING LOG
FIELD DATA

Project _____ Site _____ Date _____
Location _____ Job No. _____
Drill Rig _____ Inspector _____ Operator _____ Surface El _____ Boring No. WES-2-3-81

SAMPLE NUMBER	DATE TAKEN	STRATUM		DRIVE		SAMPLE		TYPE OF SAMPLER			CLASSIFICATION AND REMARKS
		FROM	TO	FROM	TO	FROM	TO				
		5.65	43.7								Sandstone: brown, fine-grained
		43.7	54.7								Shale: grey/green color
		54.7	64.2								Sandstone: red/purple, fine-grained
											Limestone: grey, very hard
		64.2	66.2								
											Water level overnight rose to
											55.8 ft. Suspect water coming in
											at 54.7 ft. Blew hole dry and in-
											stalled well screen.

WES FORM JAN 74 819 EDITION OF NOV 1971 MAY BE USED

Sheet 2 of 2 Sheets

BORING LOG
FIELD DATA

Project NWSC Groundwater Study Site Crane, IN Date 4 Sep 81
Location Dye Burial Grounds Job No. 441-G150.11GR21/22
Drill Rig Failing Inspector J. Dunbar Operator C. Drake Surface El 716.66 Boring No. WES-2-4-81

SAMPLE NUMBER	DATE TAKEN 1981	STRATUM FROM	STRATUM TO	DRIVE FROM	DRIVE TO	SAMPLE FROM	SAMPLE TO	TYPE OF SAMPLER	Hyd. Press.	Cont.	CLASSIFICATION AND REMARKS
1	4 Sep	0.0		0.0	0.5	0.0	2.2	3" Shelby Tube	20	S.T.	Silt (ML): brown to grey, no
1A				0.5	1.0	2.2	2.5		20	Jar	cohesion, dry, very uniform in
				1.0	1.5				70		grain size, texture, & composition
				1.5	2.0				150		Sample length: 2.5 ft
			3.75	2.0	2.5				300		
				0.0	5.0	----------		7" Folding Auger	----------		Cleanout
2A	4 Sep	3.75		5.0	5.5	5.0	5.65	3" Fixed Piston Samp.	150	Jar	Silt (ML) & fragments of sand-
			5.65	5.5	5.65				700		stone: silt is same as above.
											Sandstone is friable, fine-
											grained, light brown in color.
	4 Sep	5.65	41.5	5.0	31.0	----------		5-5/8" Rock Bit	----------		Sandstone: brown & fine-grained
	5 Sep	41.5	43.0	31.0	50.5	----------		5-5/8" Rock Bit	----------		Shale: green, soft & weathered
		43.0	50.5								Shale: green & hard

WES FORM 74 819 EDITION OF NOV 1971 MAY BE USED Sheet 1 of 2 She

NO Extra jar sample made for NWSC

BORING LOG
FIELD DATA

Project _____ Site _____ Date _____
Location _____ Job No. _____
Drill Rig _____ Inspector _____ Operator _____ Surface El _____ Boring No. WES-2-4-81

SAMPLE NUMBER	DATE TAKEN	STRATUM		DRIVE		SAMPLE		TYPE OF SAMPLER			CLASSIFICATION AND REMARKS
		FROM	TO	FROM	TO	FROM	TO				
											Encountered water at 40.5 ft.
											Drilled 10.0 ft below water.
											Blew cuttings & water from hole.
											Installed well screen.

WES FORM JAN 74 819 EDITION OF NOV 1971 MAY BE USED

BORING LOG
FIELD DATA

Project NWSC Groundwater Study Site Crane, IN Date 5 Sep 81
Location Dye Burial Grounds Job No. 441-G150.11GR21/22
Drill Rig Failing Inspector J. Dunbar Operator C. Drake Surface El 739.24 Boring No. WES-2-5-81

SAMPLE NUMBER	DATE TAKEN 1981	STRATUM FROM	STRATUM TO	DRIVE FROM	DRIVE TO	SAMPLE FROM	SAMPLE TO	TYPE OF SAMPLER	Hyd. Press.	Cont.	CLASSIFICATION AND REMARKS
1	5 Sep	0.0		0.0	0.5	0.0	1.55	3" Shelby Tube	20	S.T.	Clay (CL): brown in color, soft,
1A				0.5	1.0	1.55	1.90		20	Jar	dry, moderately cohesive, & con-
				1.0	1.5				50		tains organic matter.
				1.5	2.0				150		Sample length: 1.9 ft
				2.0	2.5				300		
				0.0	5.0	------	------	7" Folding Auger	------	------	Cleanout
2	5 Sep			5.0	5.5	5.0	6.1	3" Fixed Piston Sam.	100	S.T.	Clay (CL) & sandstone: clay same
2A				5.5	6.0	6.1	6.45		350	Jar	as above. Sandstone is red in
			6.45	6.0	6.45				750		color, very friable, & fine-grained.
											Sample length: 1.45 ft
	5 Sep	6.45	28.0	5.0	68.8	------	------	5-5/8" Rock Bit	------	------	Sandstone: red to brown, fine-
		28.0	68.8								grained. Alternating small seams
											of sandstone, shale, & limestone.
											Slightly moist at 30 ft but no water.

WE RM 74 819 EDITION OF NOV 1971 MAY BE USED Sheet 1 of 2 Sh
NC Extra jar sample was made for NWSC

BORING LOG
FIELD DATA

Project _____ Site _____ Date _____
Location _____ Job No. _____
Drill Rig _____ Inspector _____ Operator _____ Surface El _____ Boring No. WES-2-5-81

SAMPLE NUMBER	DATE TAKEN	STRATUM		DRIVE		SAMPLE		TYPE OF SAMPLER			CLASSIFICATION AND REMARKS
		FROM	TO	FROM	TO	FROM	TO				
											Water level rose overnight to
											55.8 ft. Blew hole of water &
											cuttings. Installed well screen.

WES FORM JAN 74 819 EDITION OF NOV 1971 MAY BE USED

Sheet 2 of 2 Sheets

BORING LOG
FIELD DATA

Project NWSC Groundwater Study Site Crane, IN Date 23 Sep 81
Location Dye Burial Grounds Job No. 441-G150.11GR21/22
Drill Rig Failing Inspector J. Dunbar Operator C. Drake Surface El 736.58 Boring No. WES-2-6-81

SAMPLE NUMBER	DATE TAKEN 1981	STRATUM FROM	STRATUM TO	DRIVE FROM	DRIVE TO	SAMPLE FROM	SAMPLE TO	TYPE OF SAMPLER	Hyd. Press.	Cont.	CLASSIFICATION AND REMARKS
1	23 Sep	0.0		0.0	0.5	0.0	2.2	3" Shelby Tube	0	S.T.	Clay (CL) - brown to grey in color,
1A				0.5	1.0	2.2	2.45		0	Jar	dry, little cohesion, material
				1.0	1.5				10		disturbed by dozer.
				1.5	2.0				100		Sample length: 2.45 ft
				2.0	2.5				140		
1B	23 Sep			0.0	5.0	0.0	5.0	7" Folding Auger	--	Jar	Cleanout: Sample for NWSC -
											material same as above
2	23 Sep			5.0	5.5	5.0	6.33	3" Fixed Piston Sam.	0	S.T.	Clay (CL): same as above.
2A				5.5	6.0	6.33	6.55		20	Jar	Sample length: 1.55 ft
				6.0	6.55				550		
2B	23 Sep		9.0	5.0	9.0	5.0	9.0	7" Folding Auger		Jar	Cleanout: Sample for NWSC -
											material same as above

WE FORM 174 819 EDITION OF NOV 1971 MAY BE USED

BORING LOG
FIELD DATA

Project _____ Site _____ Date _____
Location _____ Job No. _____
Drill Rig _____ Inspector _____ Operator _____ Surface El _____ Boring No. WES-2-6-81

SAMPLE NUMBER	DATE TAKEN	STRATUM		DRIVE		SAMPLE		TYPE OF SAMPLER			CLASSIFICATION AND REMARKS
		FROM	TO	FROM	TO	FROM	TO				
	23 Sep	9.0	64.0	9.0	50.0	----	----	5-5/8" Rock Bit	----	----	Sandstone & interbedded shale:
											weathered, brown & dark grey in
											color, soft spot at 37 ft.
											Monitored hole for water at 50 ft
											for 40 min. & negative results.
	23 Sep	64.0	70.63	50.0	70.63	----	----	5-5/8" Rock Bit	----	----	Continued drilling & between 55
											& 60 ft encountered water.
											Shale: dark grey

WES FORM JAN 74 819 EDITION OF NOV 1971 MAY BE USED

Sheet 2 of 2 Sheets

BORING LOG
FIELD DATA

Project NWSC Groundwater Study Site Crane, IN Date 24 Sep 81
Location Dye Burial Grounds Job No. 441-G150.11GR21/22
Drill Rig Failing Inspector J. Dunbar Operator C. Drake Surface El 728.73 Boring No. WES-2-7-81

SAMPLE NUMBER	DATE TAKEN 1981	STRATUM FROM	STRATUM TO	DRIVE FROM	DRIVE TO	SAMPLE FROM	SAMPLE TO	TYPE OF SAMPLER	Hyd. Press.	Cont	CLASSIFICATION AND REMARKS
1	24 Sep	0.0		0.0	0.5	0.0	2.0	3" Shelby Tube	0	S.T.	Sandy silt (SM): brown, dry, hard,
1A				0.5	1.0	2.0	2.15		0	Jar	& contains 5% very fine gravel.
				1.0	1.5				0		Possible dozer fill.
				1.5	2.0				20		Sample length: 2.15 ft
			4.0	2.0	2.5				100		
1B	24 Sep			0.0	5.0	0.0	5.0	7" Folding Auger		Jar	Cleanout: Material same as above.
											Sample for NWSC.
	24 Sep	4.0	9.0	5.0	40.0	------	------	5-5/8" Rock Bit	------	------	Sandstone: brown, weathered
		9.0	51.2								Sandstone & interbedded dark grey
											shale. Sandstone is brown, tan,
											grey & white, hardness varies from
											soft to very hard.
											Slight damp area at 31.3 ft. Drilled
											to 40 ft and monitored hole for
											60 min. with negative results.

WES FORM 74 819 EDITION OF NOV 1971 MAY BE USED

Sheet 1 of 2 She

BORING LOG
FIELD DATA

Project _____ Site _____ Date _____
Location _____ Job No. _____
Drill Rig _____ Inspector _____ Operator _____ Surface El _____ Boring No. WES-2-7-81

SAMPLE NUMBER	DATE TAKEN	STRATUM FROM	STRATUM TO	DRIVE FROM	DRIVE TO	SAMPLE FROM	SAMPLE TO	TYPE OF SAMPLER			CLASSIFICATION AND REMARKS
	24 Sep	51.2	57.3	40.0	57.3	------	------	5-5/8" Rock Bit	------		Water at approximately 46 ft.
											Material changes to dark gray
											shale with interbedded sandstone
											at 51.2 ft.
											Blew hole of water & cuttings.
											Installed well.

WES FORM JAN 74 819 EDITION OF NOV 1971 MAY BE USED

Sheet 2 of 2 Sheets

BORING LOG
FIELD DATA

Project NWSC Groundwater Study Site Crane, IN Date 25 Sep 81
Location Dye Burial Grounds Job No. 441-G150.11GR21/22
Drill Rig Failing Inspector J. Dunbar Operator C. Drake Surface El 730.29 Boring No. WES-2-8-81

SAMPLE NUMBER	DATE TAKEN 1981	STRATUM FROM	STRATUM TO	DRIVE FROM	DRIVE TO	SAMPLE FROM	SAMPLE TO	TYPE OF SAMPLER	Hyd. Press.	Cont.	CLASSIFICATION AND REMARKS
1	25 Sep	0.0		0.0	0.5	0.0	2.25	3" Shelby Tube	0	S.T.	Silty clay (CL): light brown-brown
1A				0.5	1.0	2.25	2.45		0	Jar	in color, dry, moderate cohesion,
				1.0	1.5				0		uniform, slightly stiff.
				1.5	2.0				40		Sample length: 2.45 ft
				2.0	2.5				60		
1B	25 Sep			0.0	5.0	0.0	5.0	7" Folding Auger		Jar	Cleanout: Sample for NWSC -
											material same as above.
2	25 Sep			5.0	5.5	5.0	6.69	3" Fixed Piston Sam.	0	S.T.	Silty clay (CL): lt. brown to
2A				5.5	6.0	6.69	6.84		10	Jar	brown, dry, stiff, moderate co-
				6.0	6.5				180		hesion, uniform.
				6.5	6.84				800		Sample length: 1.84 ft
1B	25 Sep		6.84	5.0	6.84	5.0	6.84	7" Folding Auger		Jar	Cleanout: sample for NWSC -
											material same as above

WES FORM 819 EDITION OF NOV 1971 MAY BE USED

Hole No. WFS-2-20C-88

DRILLING LOG

DIVISION	US Navy
INSTALLATION	NWSC Grand Ind.
SHEET	1 OF 15 SHEETS
1. PROJECT	Hydrogeologic Studies, OBS
2. LOCATION (Coordinates or Station)	
3. DRILLING AGENCY	WFS
4. HOLE NO. (As shown on drawing title and file number)	2-20C
5. NAME OF DRILLER	Dan Taylor
6. DIRECTION OF HOLE	☑ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	8.0'
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	145.7'
10. SIZE AND TYPE OF BIT	H.O. wireline
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	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 6/16/88 ; COMPLETED 6/21/88
17. ELEVATION TOP OF HOLE	712.56
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, y tan (Residual soil)			0.0 to 17.1 - Auger
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8		Clayshale y tan Br (wea shale)			
	9					
	10					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-20C-88

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) 2-20C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		Clayshale (cont.)			
	11					
	12					
	13		Shale, dGr-blk, thbd, platey, carbonaceous (12.5-20.0')			
	14		Hor. Bedding			
	15					
	16					
	17			17.1		
				[illegible]		Started Coring w/ HQ Wireline
	18					
	19			6.4 / 6.6		
				-0.2		
	20					

ENG FORM [illegible] PROJECT

Hole No. WES-2-20C-88

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) 2-20C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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/slst, Gr, hd			
			Sandstone, conglomeritic highly oxidized w/ 1/in crusting			
	21	0 1 90 5				
	22					
		0	Shaley sandstone, 1-d Gr, th bd w/ Blk sh pts, burrowed?, oil stain seeping from pores			
	23	e (oxid)		23.6 / 23.7		Pull depth
	24					
	25					
	26					
	27			10.1 / 10.0		
	28		Gradational	+0.1		
			Predominately 1 Gr SS lens w/ Blk sh pts, 1 jammed burrowed(?) ~ hor bd, (no oil stain)			
	29					
	30					

ENG FORM 1836 — PROJECT — HOLE NO.

Hole No. 2-202

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) 2-202	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURB
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		Sandstone, lGr+Br, Conglomeritic, th bd, highly oxidized			
	32					
	33		Sandstone, m Gr, th bd-mass, w/occ to num Blk carbonaceous sh pts + th lens, f-m grn, ~ hor bd, oil stain seeping from pores.	33.7 Run 3		
	34					
	35					
	36			6.5		
	37		Sandstone conglomerate m-d gr Br, highly oxd	6.9		PENN
			(Base of Mansfield fm)	-0.4		~ 37.7' MISS
	38		(Hardinsburg fm) Claystone/siltstone, m Gn, mass, hd			
	39					
	40					

ENG FORM 1836 PROJECT HOLE NO.

Hole No. 2-20C

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) 2-20C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		(cont.)			Set 6" PVC Casing to 40.6'
				40.6		
				Run 4		6/17/88
	41					
				2.0 / 2.9		
	42			-0.9		
	43		Shale, Blk, th bd. platey - flakey	43.5		
				Run 5		
	44					
	45					
				4.8 / 5.6		
	46			-0.8		
	47					
	48					
	49			49.1		
				Run 6		
	50					

ENG FORM 1836 PROJECT

Hole No. Z-202

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) Z-202	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURB
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		Sh (cont.)			
	51			2.6 / 4.4		Ground core away during drilling
	52			-1.8		
	53			53.5		
				Run 7		
	54					
	55					
	56					
	57			6.6 / 7.2		
	58		Base of Hardinsburg 58.0' Top of Golconda/Haney	-0.6		
			limestone, grBr, mass f-m crystalline, fossiliferous, vlid, vdm	-0.2		
	59	70 60				
	60					

Hole No. 2-20C

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) 2-20C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			60.3		pull depth
		60/	sh	60.7		
				Run 8		
	61		Shaley Limestone			
		(sh)	Gr th bd w/sh pts			
	62					
	63			5.4 / 5.0		
				+0.4		
	64		Limestone, crystalline (as above)			
	65					
		7'	sh			
			Base of Golconda/Tonoy	65.7		
			Top of Indian springs (65.6') (Big Clifty fm)	Run 9		
	66		Shale, blk, th bd, platey, carbonaceous, occ pyrite nodules,			
	67					
	68			2.0 / 4.0		ground core away during drilling
				-2.0		
	69					Reamed hole & set 4" PVC casing to 69.7' 6/21/88
				69.7 Run 10		
	70					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. 2-20C

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 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) 2-20C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			3.6/3.8		
	72			-0.2		
	73			73.5 Run 11		
	74					
	75			2.6/3.0 -0.4		
	76			76.5 Run 12		
	77					
	78					
	79			6.6/7.0 -0.4		
	80					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. 2-20c

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) 2-20c	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			83.5		
	84	90°	Shaley Ls, mGr, th. bd bd platy Ls w/sh pts. Jt rough & irregular, stain	Run 13		
	85		Base of Indian Springs			
	86		Top of Eg cliffy ss (ES.1) Sandstone, Buff-y Tan, mass, vf-f grained, occ olive ~~shale pts~~ ~~in top~~, rippled, oxidized, friable			
	87			10.0 / 10.0		
	88					
	89					
	90					

ENG FORM 1021 PROJECT

Hole No. Z-20C

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) Z-20C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURB
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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 4		
	94					
	95					
	96	5				
	97	90		97 / 9.0		
	98			0.1		
	99					
	100					

ENG FORM 1836 PROJECT

Hole No. 2-20C

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) 2-20C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — 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
	100		sandstone (cont.)			
	101					
	102					
	103			103.2 / ~~103.3~~		Rapid drill
				Run 15		
	104					
	105					
	106					
	107			10.1 / 10.0		
				+0.1		
	108					
	109					
	110					

ENG FORM 1836 PROJECT

Hole No. 2-20C

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) 2-20C	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
	110		SS (cont.)			
	111	10				
	112					
	113			113.3 Run 16		
	114					
	115					
	116					
	117			10.1 / 10.2		
	118					
	119					
	120					

ENG FORM

Hole No. 2-20C

DRILLING LOG	DIVISION	INSTALLATION	SHEET 13 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) 2-20C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		Base of Big Cliff SS (123.2)			
			Top of Beech Creek Ls	123.5		Note: After Completion of Run 16, to a depth of 123.5', core BL. hung in hole; Attempts to remove failed. Move over ~10' + drilled second boring down to 145.7' with a R.R. Bit. Determined thickness of Beech Creek Ls by drilling characteristics.
	124		Limestone, m gr Br, Crystalline, fossiliferous, v hd, v den.			
	125					
				R,		
	126			R.		
				Bit		
	127					
	128					
	129					
	130					

ENG. FORM 1836 — PROJECT

Hole No. 2-20c

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) 2-20c	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		Limestone (cont.)			
	131					
	132					
	133					
	134					
	135			R. R. B.t		
	136					
	137					
	138					
	139					
	140					

ENG FORM 1836 — PROJECT — HOLE NO.

Hole No. Z-20C

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) Z-20C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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)			
				R.		
	141			R.		
				B.f		
	142					
	143					
	144					
			Base of Beech Creek - 144.7'			
	145		Elwira fm shale			
	146		Bot. Depth 145.7'			

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WES-2-20C-88

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 — UNDISTU
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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-2-20C-88			Date well screen was set: 6/29/88
715.06			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			50.0 Bentonite			
			55.0 Sand			
			80.0			
			Bentonite Pellets			
			85.0			
						PVC Screen + Riser
			Filter Pack			
			134.7			
			Well Screen			
			144.7			
			Trap			
			145.7			
			145.7 Boring Depth			

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

Hole No. WES-2-202-89

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-2-202P2-88			Date well screen was set: 6/22/88
714.92			+2.5			
			0.0' Ground surface			
			Grout mixture			water level just Prior to setting screen –
			50.0			
			Bentonite Pellets			
			53.0			PVC Risor & screen
			Filter Pack			
			56.0			
			Well Screen			
			66.0			
			Trap			
			67.0			
			67.0 Boring Depth			

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

Hole No. WES-2-20C-88

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 — UNDISTUR
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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-2-20CP3-88			Date well screen was set: 6/23/88
714.78			+2.5'			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen –
			15.0			
			Bentonite Pellets			
			20.0			PVC Screen + Ri
			Filter Pack			
			28.0			
			Well Screen			
			38.0			
			Trap			
			39.0			
			39.0 Boring Depth			

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

Hole No. WES-2-9C-88

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC, Crane Ind.	SHEET 1 OF 18 SHEETS

1. PROJECT: Hydrogeologic Studies
2. LOCATION (Coordinates or Station): Dye Burial Ground
3. DRILLING AGENCY: WES
4. HOLE NO. (As shown on drawing title and file number): WES-2-9C-88
5. NAME OF DRILLER: Black, Harrison + Don taylor
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: 178.0'
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 12/9/87; COMPLETED 1/23/88
17. ELEVATION TOP OF HOLE: 737.83
18. TOTAL CORE RECOVERY FOR BORING: 40.36 T.O.C. %
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, sandy, Br - yBr, moist in top 1½', firm			Drilled w/a 8" dia. flight auger from 0.0 to 10.8'.
	1		Note: Site of boring is a former timber log loading area. Upper materials appear to be partially fill.			Set 6" dia. PVC surface casing to 10.8'. Cleaned hole to 11.2' w/ 5½" dia. R.R. Bit.
	2					Started coring w/ HQ wireline at 11.2 ft.
	3					
	4					
	5		Silty Shale, m olive Gr + tan, th bd, w/ sdy pts + lens, flakey, mod hard			
	6					
	7					
	8					
	9					
	10					

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

Hole No. WES-2-90-88

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)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTU
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		Silty shale (cont)			
	11			11.2		
				Run 1		
	12					
	13					
	14					
				6.9 / 6.9		
	15					
	16					
	17					
	18			18.1		
				Run 2		
	19					
				5.3 / 5.3		
	20					

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

Hole No. WES-2-9C-8E

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 OF 18 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		Silty shale, (cont.) grades to mGr below ~ 20 ft.			
	21					
	22					
	23			23.4 / Run 3		
	24					
			Siltstone, mGr, th bd,			
	25					
	26					
	27					
				9.8 / 10.0		
	28		- soft clayey	>0.2		
			Shale, Blk-vdGr, th bd-mass, carbonaceous, indurated, platey			
	29					
	30					

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

Hole No. WCS-2-9[illegible]

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)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTU
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		Shale (cont.)			
	31					
	32					Note: oil formed on water in mud pan while drilling in this shale unit.
	33			33.2 / 33.4	Pull	
				Run 4		
	34					
	35					
	36					
	37			10.2 / 10.0		
	38			10.2		
	39					
	40					

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

Hole No. WES-2-9C-83

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)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			43.4		
				Run 5		
	44					
	45					
	46					
	47			9.7 / 10.0		
	48			~~0.3~~ 0.0		
	49					
	50					

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

Hole No. WES-2-98-38

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)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — 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
	50		Shale (cont.)			
	51					
	52					
	53			53.1		Pull depth
				53.4		
				Run 6		
	54					
	55					
	56			10.2 / 10.0		
	57			~~70.2~~ +0.3		
	58					
	59					
	60					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-RC-2

DRILLING LOG	DIVISION	INSTALLATION	SHEET 7 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
	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		Shale (cont.) grades to dGr & becomes silty toward bot.			
	61					
	62		Alternating v fine Gr sandstone lens & pts.			
	63			63.3 / 63.1 Run 7		Pull depth
	64					
	65		Conglomeritic shaley sandstone, m-dGr carbonaceous			
	66		Silty-Sandy shale w/occ SS lens, th bd, hd, dGr			
	67			10.1 / 10.0 / 10.1		
	68		Base of Penn sediments 68.4 ft.			
			Top of miss sediments (Hardinsburg fm)			- unconformity
	69		Shale, dGn, mass, hd blocky, occ claystone inclus.			
	70					

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

Hole No. WES-2-90-6

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)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTU
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			73.4 / Run 8		
	74					
	75		Shale (grades from above) v dk gr, thin bd, carbonaceous, occ dk olive siltstone/claystone nodules, indurated, platey-blocky.			
	76			5.2 / 5.2		
	77					
	78			78.6 / Run 9		
	79					
	80					

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

Hole No. WES-2-RC-8

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)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			4.8 / 4.8		
	82					
	83			83.4		
				Run 10		
	84					
	85					
	86			9.9 / 10.0		
	87			-0.1		
	88					
	89					
	90					

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

Hole No. WES-2-9.88

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		Shale: (cont.)			
	91					
	92					
	93		(93.6') (Base of Hardinsburg fm)	93.4 / Run 11		
	94		(Top of Golconda / Haney fm) Limestone, dGr-grBr, m-c granular, v lid, v dense, fossiliferous, shaley pts in top zone			
	95					
	96		(Base of Golconda / Haney)			96.5' (641.33)
	97		(Top of Big Clifty fm) (Indian Springs Mem.) Shale, vdGr-Blk, th bd, carbonaceous, indurated, platey	9.0 / 10.0		
	98			10.0		
	99					oil film on pan from this shale zone
	100					

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

Hole No. WES-Z-PC-03

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)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — 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
	100		Shale (cont.)			
	101					
	102					
	103			103.4		
				Run 12		
	104			2.7 / 2.7		Reamed hole + set 4" PVC casing to 105.0'
	105					
	106			106.1		
				Run 13		
	107					Jan 21, 1988 Started backcoring
	108					
	109			6.9 / 7.0		
				>0.1		
	110					

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

Hole No. WES-2-9C-82

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) 2-9C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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					
	112					
	113			113.0 / 113.1		pull depth
			- Ls lens	Run 14		
	114					
	115					
	116					
	117		olive Gr + mass in bot. 2.0'	9.7 / 9.6		
	118			+0.1		
			(Base of Intra-Coal Mem.)			
	119		(Top of Big Mill Cy 35 - 118.7) Sandstone, olive Gr-Tan, th bd - mass v fine grained, oxidized, friable, shallow ripples, Shale cts in Top 4.0'			
	120					

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

Hole No. WES-2-9C-DB

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) 2-9C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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					
				122.7 / Run 15		
	123					
	124					
	125					
	126			10.0 / 10.0		
	127					
	128					
	129					
	130					

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

Hole No. WES-2-9C-68

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)	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTL
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
	130		SS (cont.)			
	131					
	132					
				132.7 / Run 16		
	133					
	134					
	135					
	136			10.0 / 10.0		
	137					
	138					
	139					
	140					

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

Hole No. WES-2-9C-88

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) 2-9C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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					
				142.7		
				Run 17		
	143					
	144					
	145					
	146			10.1 / 10.1		
	147					
	148					
	149					
	150					

Hole No. WES-2-9C-BE

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) 2-9C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUI
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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					
				152.8		
				Run 18		
	153					
			Highly oxidized in bot 5-6'.			
	154					
	155					Note: did not lose drill water
	156			10.1 / 10.1		
			Conglomeritic in bot 0.1'.			
	157		(Base of Big Clifty SS)			
			(Top of Beech Creek Fm - 157.4')			
	158		Limestone, 1-m grBr, m crystalline, fossiliferous, v hd, v clen. occ Stylolites.			
	159		oxidized in top zone and along jts.			
	160					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-9C-28

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) 2-9C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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					
				162.9		
	163			Run 19		
	164					
	165					
	166					
				10.1 / 10.1		
	167					
	168					
	169					
	170					

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

Hole No. WES-2-9C-4B

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) Z-9C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTD
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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					
	172					
	173			173.0 Run 20		
	174					
	175			5.0 / 5.0		
	176					
	177		(Base of Beech Creek - 177.0') (Top of Clinton Fm) Shale: dGn, mass, Blocky	178.0		
	178		Bot depth - 178.0'			
	180					

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

Hole No. WES-2-9C-88

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-2-9C-88 (Beech Creek Ls)			Date well screen was set: 1/23/87
			+2.5			
737.83			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen – 156.6'
			115.0			
			Bentonite Pellets			
			118.0			
			Filter Pack			Teflon Pipe – 152.0 to 178.0'
			167.0			
			Well Screen			
			177.0			
			Trap			
			178.0			
			178.0 Boring Depth			

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

Hole No. WES-2-9CP2-

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 — UNDIST
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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-2-9CP2-88 (Golconda/Hamy/Ls			Date well screen was set: 1/26/87
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			82.0			
			Bentonite Pellets			
			85.0			
			Filter Pack			Teflon pipe – 86.5 to 97.5'
			91.5			
			Well Screen			
			96.5			
			Trap			
			97.5			
			97.5 Boring Depth			

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

Hole No. WES-2-10C

DRILLING LOG	DIVISION: 15 Navy	INSTALLATION: NWSC Crane Ind	SHEET 1 OF 16 SHEETS

1. PROJECT: Hydrogeologic Station
2. LOCATION (Coordinates or Station): Pao Burn Grounds (DEG)
3. DRILLING AGENCY: WES
4. HOLE NO. (As shown on drawing title and file number): 2-10C
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: 153.5
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 2/5/88 COMPLETED 2/13/88
17. ELEVATION TOP OF HOLE
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, y Tan + olive firm in top to soft + wet in bot. (Road construction fill)			Drilled w/ 7" flight auger from 0.0 to 17.8'
	1					
	2					
	3					
	4					
	5					
	6					
	7		Silty Clay, yel tan w/ sandy lens, soft + saturated in top 2 ft, v moist to wet below upper 2 ft, (Residual soil)			
	8					
	9					
	10					

ENG FORM 1836 MAR 7? PREVIOUS EDITIONS ARE OBSOLETE. PROJECT | HOLE NO.

Hole No. WES-2-10C-99

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 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) 2-10C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		Silty clay (cont.)			
	11					
	12					
	13					
	14					
	15					
	16					
	17					Grouted in 6" dia. PVC casing to a depth of 17.8'
			Top Rock	17.8		Refusal to auger
	18		Conglomerate, sub-rounded to rounded SS + Sh pebbles set in SS matrix, 1-m Gr occ. carbonaceous inclus, hd, friable.	Run 1		Started coring with HQ wireline rigging.
	19					
			Sandstone, lGr w/num Blk shale wavy partings + thin lenses			
	20					

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

Hole No. WES-7-10C-99

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) 2-10C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — 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
	20		fine grained, hd slightly to non-friable			
	21					
				4.7/4.7		
	22					
	23					
				23.5 Run 2		
	24					
	25					
	26					
				9.2/9.2		
	27					
	28					
	29					
	30					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-7-102-38

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) Z-10C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTU
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					
	32			32.7 / Run 3		
	33					
	34					
	35					
	36			6.2 / 9.9		
	37		Shale, vdGr th bd, num lGr ss pts	3.7		Penn Sediments — 37.3' miss Sediments
	38		(Hardinsburg fm) Shale, dGn, mass, blocky-crumbly, hd occ s'sides			Core loss was due to samp dropping from bl + being ground away.
	39					
	40					

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

Hole No. WES-240C-88

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 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) 2-10C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — 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
	40		Shale (cont.)			
	41					
	42		(th bd, d Gn Gr in part)			
				42.6 Run 4		
	43					
	44					
				3.0 / 4.4		
	45		45.0 - ~49.0' d br Red claystone / Shale mottled into d Gn shale.	-1.4		
	46					
	47			47.0 Run 5		
	48					
	49		Shale, vdGr-Blk, th bd, platy-fissile, hd			
	50					

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

Hole No. WES-2-10C-8E

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET 6 OF 16 SHEETS	
1. PROJECT	
2. LOCATION (Coordinates or Station)	
3. DRILLING AGENCY	
4. HOLE NO. (As shown on drawing title and file number)	Z-10C
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 / UNDISTU
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					
	51			5.8 / 6.5		
	52			-0.7		
	53			53.5		
				Run 6		2/10/88
	54					
	55					
	56			9.8 / 10.0		
	57					
			olive + sli oxidized in bot ft	-0.2		
	58		Base of Hardinsburg - 58.2			
			Top of Golconda/Haney Limestone, mgrBr, m-c crystalline, sli fossiliferous, v hard, v dense, occ stylolites.			
	59					
	60					

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

Hole No. WFS-2-10C-68

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) 2-10C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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.)			
		0				
	61					
	62					
		5				
	63					
				63.5		
				Run 7		
	64					
			shale, Blk, th bd,			
	65					
			LS (as above)			
	66		shale (as above)			
		20	LS (as above.			
				8.0		
	67			10.0		
				2.0		
	68			1.7		
		0				
	69					LS shows oxidation
	70					

ENG FORM 1836 MAR 7 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

Hole No. 2WES-2-107-88

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) 2-160	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTU
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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)			
			Fe stained open jt			
	71					
			Base of Golconda / Haney			
			Top of Indian Spgs. - 71.5 (Big Clifty fm)			
	72		Shale, vdGr-Blk, th bd, platey-flakey, hard, occ fossils, occ s'sides.			ground core away between 71.5 + 73.1
	73			73.2		Pull depth
				73.5		
				Run 8		
	74					
				3.5 / 3.2		
	75					
				70.3'		
	76					
				76.7		Reamed hole to set 4" PVC casing to 76.7'
				Run 9		
	77					2/12/88
	78					
	79			5.2 / 6.8		
				1.6		
	80					

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

Hole No. WFS-2-10C-83

DRILLING LOG	DIVISION	INSTALLATION	SHEET 9 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) 2-10C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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					
				83.5 / Run 10		
	84					
	85					
	86					
				8.3 / 8.5		
	87					
				-0.2		
	88					
	89					
	90					

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

Hole No. WFS-2-10C-89

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 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) 2-10C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			92.0 Run 11		
	93					
	94		Shale turns to olive gray + sli oxidized in bot 2'.			
			Base of Indian Spgs			
	95		Top of Big Cliffy SS - 94.8'			
			Sandstone 1-m olive tan, thn bd-mass, olive Gr shale pts in top few feet v fine grained shallow ripples friable.	6.8 / 7.2		
	96			-0.1 -0.2		
	97					
	98					
	99			99.0 99.2 Run 12		Pull depth
	100					

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

Hole No. WES-2-10C-E.9

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) 2-10C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — 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
	100		SS, (Cont)			
	101			4.5/4.3		
	102			40.2		
	103			103.5 Run 13		
	104					
	105					
	106					
	107			9.8/10.0		
	108			40.2		
	109					
	110					

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

Hole No. WES-2-10C-88

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) 2-10C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
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		SS (cont.)			
	111					
	112					
	113					
				113.3 / 113.5		Full depth
				Run 14		
	114					
	115					
	116					
				10.2 / 10.0		
	117					
				+0.2		
	118	0				
	119					
	120					

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

Hole No. WES-2-10C-B2

DRILLING LOG	DIVISION	INSTALLATION	SHEET 13 OF 16 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number) 2-10C
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		SS (cont.)			
	121					
	122					
	123	0		123.5 / Run 15		
	124	70				2/13/88
	125					
	126					
	127	0		10.0 / 10.0		
	128	0				
	129	0				
	130					

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

Hole No. WFS-2-10C-88

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) 2-10C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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	10				
	131					
	132	0				
		30	Tan clay & lim along contact st, exudes			Base of Big Clifty fm — 132.4
			(Top of Beech Creek)			
	133		Limestone, mgrBr, m-c crystalline, v hd, v den, occ stylolites, fossiliferous			
		0		133.5 / Run 16		
	134	10				
	135	5	lim & clay coating			
	136	5	shn			
	137			10.0 / 10.0		
	138	5 / 0	lim (tan) / shn			
	139					
		5	clay (tan) sealing			
	140					

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

Hole No. WES-2-10C-09

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) 2-10C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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	clay coating			
	142	0	clay coating			
		0	" "			
	143		Ls changes to dGr below ~142.0' w/occ to num wavely blk shaley pts.	143.5 Run 17		
	144	5				
	145	0 5	stn			
	146	0		9.4/10.0		
	147	10				
	148	0				
	149	0				
	150		Pough [illegible] No stn Bottom posted w/[illegible]			

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

Hole No. WES-2-10C-R9

DRILLING LOG	DIVISION	INSTALLATION	SHEET 16 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) 2-10C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURB
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		(inclus of Elwren sh in bot 0.2')			
		0	Base Beach Creek LS 152.5'			
			Top Elwren fm			
	153		shale, dGn, mass	152.9		Pull depth
						core left in boring
				153.5		
			Bot Depth - 153.5'			
	154					
	155					
	156					
	157					
	158					
	159					
	160					

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

Hole No. WES-2-10C-88

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
	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-2-10C-88			Date well screen was set: 2/13/88
			+2.5'			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen –
			90.0			
			Bentonite Pellets			
			94.0			
			Filter Pack			
			142.0			
			Well Screen			
			152.0			
			Trap			
			153.0			
			153.5 Boring Depth			

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

Hole No. WES-2-10CP2-1

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-2-10C P2-88			Date well screen was set: 2/16/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			52.0			
			Bentonite Pellets			
			55.0			
			Filter Pack			
			61.5			
			Well Screen			
			71.5			
			Trap			
			72.5			
			72.5 Boring Depth			

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

Hole No. WES-2-11C-88

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC, Crane Ind	SHEET 1 OF 17 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): 2-11C
5. NAME OF DRILLER: Dan Taylor
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 9.5
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 16.10'
10. SIZE AND TYPE OF BIT: HQ wire line
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: UNDISTURB:
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 2/19/88 COMPLETED 2/29/88
17. ELEVATION TOP OF HOLE:
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, ytan, sdy, soft in top to firm w/depth			0.0 to 9.5 - Auger
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
			Top Wea 5.5 - 9.5'	9.5		
	10					9.5 - 11.3 - R.R.B.t.

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-11C-88

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) 2-11C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTURBED:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED: — COMPLETED:
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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, y-rusty tan, th bd, fine, occ thin gr wavey Sh lens + pts (spaced ½" to 8" apart), highly oxidized to ~ 35.5'			
	11			11.3 / Run 1		2/20/88 Started Coring w/ HQ wireline at 11.3'
	12					
	13					
	14		numerous breaks or Jts(?) along bedding			
	15					
	16			6.3 / 10.0		
	17					
	18			~~3.7~~ / -3.6		
	19					
	20					

ENG FORM 1836 PROJECT

Hole No. WES-2-11C-B8

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) 2-11C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			21.3 / Run 2		21.2 Pull depth
	22					
	23					
	24					
	25			10.1 / 10.0		
	26			+0.1		
	27					
	28					
	29					
	30					

ENG FORM 1836 PROJECT

Hole No. WFS-2-110-58

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) 2-110	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			31.3 Run 3		
	32					
	33					
	34					
	35			10.0/10.0		
	36		SS changes to m Gr (35.5 to 41.3)			
	37					
			oxidized, gr.			
	38		Increase in sh lens below 37.7' (spaced 1/8" to 1/4" or thinly laminated)			
	39		becomes more shaley w/depth			
	40					

ENG FORM 1836 PROJECT

Hole No. WFS-Z-11C-88

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) 2-11C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURB
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		Base Penn sediments	41.3		unconformity - 41.3'
			Top Miss sediments (Hardinsburg fm)	Run 4		
	42		shale, m-d Gn, mass, crumbly, w/ zones of dr Br mottled claystone			
	43					
	44			7.0		
	45					
	46					
	47					Reamed Hole + set 6" dia PVC Casing to 45.0'
	48			48.0' Run 5		2/23/88
	49					
	50					

ENG FORM 1024 — PROJECT — HOLE NO.

Hole No. 2-11C

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) 2-11C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			2.8/4.7 -1.9		Core dropped in hole & Ground away on next Run. (Core loss)
	52					
	53			53.0 Run 6		
	54		Sh, changes to dGr, th bd, flakey, hd.			
	55					
	56			7.7/9.3		
	57			~~-1.6~~ -1.4		(Core loss) - ground away
	58					
	59					
	60					

ENG FORM 1836 PROJECT

Hole No. 2-11C

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) 2-11C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR.
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		sh (cont)			
	61					
	62		Color change: to olive gr in bot 2.0'	62.1 / 62.3 Run 7		Pull depth
			(Base Hardinsburg fm - 62.9')			
	63		(Top Golconda / Haney) Limestone, mgrBr, m-c crystalline, vhd, v den.			
	64					
			Ls is th bd, w/alter. olive sh lens			
	65					
	66			10.4 / 10.2		
			Ls (crystalline, as above), fossiliferous			Lost all water return at 67.3'
	67		clay lens	+0.2		
	68					
			Jts show solutioning + staining			
	69					
	70					

ENG FORM 1836 PROJECT HOLE NO.

Hole No. 2-11C

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET 8 OF 17 SHEETS	
1. PROJECT	
2. LOCATION (Coordinates or Station)	
3. DRILLING AGENCY	
4. HOLE NO. (As shown on drawing title and file number)	2-11C
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		LS (cont.)			
	71					
	72			72.5 Run 8		– Flange
	73		oxidized clay			
	74			2.7 / 2.9		
				-0.2		
	75		Solutioning & stn along Jts.	75.4 Run 9		Short pull due to running out of drill water.
	76		shaley LS, highly wea + clayey, olive tan			2/24/08
	77		Solutioning & clayey tan stn along Jts.	4.3 / 4.4		
	78		not as bad in lower 2' of LS.	-0.1		
	79					
	80		Base Galenda / Honey Top Big Clifty Fm	79.8 Run 10		Blocked

ENG FORM 1836 PROJECT HOLE NO.

Hole No. 2-11C

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) 2-11C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURB
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
	80		(Indian Springs mem) Shale, Blk, th bd, flaky, num carbonaceous specks + flakes along bd, mod hd, occ pyrite nodules.			2/25/88 (had to do some repairs on rig)
	81					
	82			2.3 / 5.2		(Core loss) ground away
	83					
	84					Reamed hole + set 4" dia PVC casing (through the upper 6" casing) to a depth of 85.0!
	85			85.0 Run 11		
	86					2/27/88
	87			7.3 / 7.8		
	88			-0.5		
	89					
	90					

ENG FORM 1836 PROJECT

Hole No. 2-11C

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 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) 2-11C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — 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
	90		Shale (Cont.)			
	91					
	92					
				92.8		
	93			Run 12		
	94					
	95					
	96					
				9.5		
				10.0		
	97					
			LS, mGr. Coarse granular vbd, vden			
				~~0.5~~		
	98		Shale olive Gr, massive, crumbly, rounded siltstone [illegible]	-0.4		
	99					
			Base Indian Spr. Mem.			99.7'
	100		Top Big Clifty SS			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. 2-11C

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) 2-11C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURB
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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, shaley, m Gr Gn, th bd w/shaley pts. hd, platy.			
	101					
	102					
			Sandstone, l olive tan, th bd, v fine, rippled, oxidized, friable.	102.7 / 102.8 Run 13		Pull depth
	103					
	104	0				
	105	0				
		0				
		0				
	106			10.0 / 10.0		
	107	0				
	108	0				
	109					
	110					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. 2-11C

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) 2-11C	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
	110		SS (cont.)			
						Losing ~ 25% water return
	111					
	112					
				112.7 / 112.8		Pull depth
	113			Run 14		
			(Not Jointed)			
	114					
	115					
				10.1 / 10.0		
	116					
				10.1		
	117					
	118					
	119					
		0				
	120					

ENG FORM 1836 PROJECT

Hole No. 2-11C

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) 2-11C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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 (Mont)			
	121					
	122	80/100				
		5		122.8		
	123			Run 15		
		0				
		1	broiled			
		0				
	124					
	125					
	126					
		5		9.7/10.0		
		5/20/5				
	127			-0.3		Lost all water return at ~127.0'
				-0.1		
	128					
		20	clm			
	127	60/100	broiled			
		15				
	130					

ENG FORM 1836 PROJECT

Hole No. 2-11C

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) 2-11C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — 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
	130		55 (cont.)			
	131	5	stn			
	132					
				132.6 / 132.8		Pull depth
	133			Run 16		
		0				
		5				
	134	0				
		0		3.3 / 3.2		
		0		Tot 1		
	135					
		0				
	136	0		136.0		135.9 - Pull depth Ran out of drill water 2/29/88
		5		Run 17		
	137	stn				
		0	(Base Big Clifty Fm - 137.4') (Top Beech Creek Fm)			
	138	0	Limestone, m gr Br, mass, m crystalline, fossiliferous, v hd, v den, occ stylolites.	6.9 / 6.8		
	139			Tot 1		
	140					

ENG FORM 1836 PROJECT

Hole No. Z-11C

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) Z-11C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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)			
		70	open, stn w/lim			
		5				
	141	90				
		0				
	142					
				142.8 / Run 18		
	143					
		0	- Tan clay seam			
	144	0	stn			
		5				
		0	stn			
	145					
	146					
				9.9 / 10.0		
	147					
		5	stn			
				-0.1		
	148	0	stn (base of oxidation 148.0')			
		0				
		0	stn			
	149	0	LS (as above) but alk Gr. finely crystalline, occ shaley pts.			
	150					

ENG FORM 1021 PROJECT HOLE NO.

Hole No. 2-11C

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) 2-11C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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)			
		0				
	151					
		0	clay in st			
	152					
		0				
				152.8		
	153	0		Run 19		
	154					
		0	sh			
	155					
				7.5 / 8.2		
	156					
				0.7		
	157					
	158		Base Beech Creek Ls. Top Elwren Sh - 158.0'			
			Shale, dGn, mass hard.			
	159					
	160					

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

Hole No. 6B-2-11C-00

DRILLING LOG	DIVISION	INSTALLATION	SHEET 17 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) 2-11C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			160.3		Full depth
	161		Bot. Depth- 161.0'			
	162					

ENG FORM 1836 — PROJECT — HOLE NO.

Hole No. WES-2-11C-88

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-2-11C-88			Date well screen was set: 2/29/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen –
			95.0			
			Bentonite Pellets			
			100.0			
			Filter Pack			PVC Screen + Riser
			148.0			
			Well Screen			
			158.0			
			Trap			
			159.0			
			161.1 Boring Depth			

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

Hole No. WES-2-11C-88

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 — UNDISTU
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
			Well No: WES-2-11CP2-88			Date well screen was set: 3/2/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen –
			58.0			
			Bentonite Pellets			
			63.0			
						PVC Screen + Riser
			Filter Pack			
			69.8			
			Well Screen			
			79.8			
			Trap			
			80.8			
			80.2 Boring Depth			

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

Hole No. WES-2-11C-83

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-2-11CP3-88			Date well screen was set: 3/5/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			8.0			
			Bentonite Pellets			
			13.0			PVC Screen + Risor
			Filter Pack			
			36.3			
			Well Screen			
			41.3			
			Trap			
			42.3			
			42.3 Boring Depth			

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

Hole No. WES-2-12C-89

DRILLING LOG	DIVISION US Navy	INSTALLATION Nwsc, Crane Ind.	SHEET 1 OF 19 SHEETS

1. PROJECT Hydrogeologic Studies, DBG	10. SIZE AND TYPE OF BIT HQ wireline
2. LOCATION (Coordinates or Station)	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) 2-12C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
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 3/7/88 — COMPLETED 3/14/88
7. THICKNESS OF OVERBURDEN 8.5	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 18.7	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		Silty clay (CL), y tan w/Gr mottling, mass, mod firm, moist, fine sdy toward bot.			Took split spoon samples of soils from 0.0 to 9.4' (refusal)
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9		Siltstone sdy, lGr, th bd, v firm - hard altr shaley lms "			Set 8" dia PVC casing to 9.4'
	10				RR 8.4	

ENG FORM 1836 | PROJECT | HOLE NO.

Hole No. WFS-2-12C-88

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) 2-12C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		Siltstone (cont.)	10.4		R.R. bit to 10.4'
				Run 1		Started Coring w/HQ wireline
	11					
	12					
	13			5.2/5.4		
	14			-0.2'		
	15			15.8		
	16			Run 2		
	17		Sandstone, l tan-buff, th bd, occ l Gr sh lens + pts, occ carbon inclus, oxidized, f grain, Friable			
	18			5.5/5.8'		
	19			-0.3'		Numerous bd lts lim stn
	20					

ENG FORM 1836 PROJECT

Hole No. WES-2-12C-88

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 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) 2-12C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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	U				
				21.6' / Run 3		
	22		Jts mostly along bedding			3/8/88
	23					
	24					
		90		10.1 / 10.2		
	25					
	26			8.1		
	27					
		20	silty-shaley v fine SS. 1 Gr.			
	28					
	29		SS is d rBr, highly oxidized, num carbonaceous inclus.			
	30					

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

Hole No. WES-2-12C-89

DRILLING LOG	DIVISION	INSTALLATION	SHEET 4 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) 2-12C	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
	30		SS (cont.)			
	31					
			Sandstone, m Gr+Br, Conglomeritic, oxidized, Carbonaceous inclus, hd	31.7' 31.8 Run 4		Pull depth
	32					
	33		sandstone/siltstone, v fine, dGr Br, v hd (siderite?)			
	34		Shale, v dGr, thin bd, flaky, blocky, occ. high angle 5 sides, Carbonaceous	6.2 / 6.1 ±0.1		
	35					
	36					
	37					Grouted in 6" dia PVC Casing to 37.9'
	38			37.9' Run 5		3/9/88
	39			4.4 / 5.6		
	40					

ENG FORM 1836 PROJECT

Hole No. WFS-2-12C-99

DRILLING LOG	DIVISION	INSTALLATION	SHEET 5 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) 2-12C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			~~43.5~~ Run 6		
	44					
	45					
	46					
	47			10.4 / 9.5		
				~~0.9'~~		
	48		Sandstone, 1-m Gr, th bd, mass, f grained occ shale pts, occ carbonaceous pts + inclus.			
	49					
	50					

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WES-2-12C-88

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) 2-12C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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					
			Sh lens increase below 52.0'			
	53			53.0 / Run 7		
	54					
	55					
	56			10.1 / 10.3		
	57			-0.2		
	58					
	59					
	60					

ENG FORM 1836 PROJECT

Hole No. WES-2-12C-98

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) 2-12C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
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
	60		SS (cont.)			
	61					
	62					
	63			63.3 Run 8		
	64					
	65					
	66					
			(mansfield fm)			Penn.
						66.7' (unconformity)
			(Hardinsburg fm)			miss
	67		Shale, dGn, mass, crumbly, num s'sides hd	8.5/10.1		
	68			-1.6'		
	69					
	70					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WFS-2-12C-83

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 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) 2-12C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — 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
	70		Sh (cont.)			
	71					
	72					
	73			73.4		
				Run 9		
	74					
	75					
	76					
	77			10.0 / 10.1		
	78			-0.1 / 0.0		
	79					
	80					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-Z-12C-80

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) 2-12C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
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
	80		Sh (cont)			
			changes to dGr,			
			thin bd below ~78.0'			
	81					
	82					
				83.4 / 83.5		Full depth
				Run 10		
	83					
	84					
	85					
				8.9 / 9.7		
	86					
				~~tdx~~		
	87					
	88					
	89					
	90					

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WES-2-12C-99

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) 2-12C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		Sh (cont.)			
	91					
	92		(Base of Hardinsburg)	92.2		
			(Top of Golconda/Haney)	Run 11		92.3' 3/10/88
	93		Limestone, shaley, dGr, th bd w/alter liney sh lens, hd, fossiliferous			
	94					
	95					
	96			10.1 / 10.2		
	97			-0.1		
	98					
	99		Limestone, lgr Br, m-c crystalline, mass, v hd, v den, fossiliferous			No Sts.
	100					

ENG FORM 1836 PROJECT HOLE NO.

Hole No. UIFS-2-12C-88

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) 2-12C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
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
	100		Ls (cont.)			
		0				very little opening along jts (bedding)
	101					
		0				
	102					
				102.4 / Run 12		
	103	0	(Base of Golconda/Haney) (Top of Indian Sprs)			103.2'
			Shale, Blk, th bd, platey, carbonaceous, hd			
	104					
	105					
				6.5 / 6.6		
	106					
				-0.1		
	107					
	108					
	109			109.0 / Run 13		Set 4" PVC Casing (through the upper 6" Casing) down to 109.0' 3/14/88
	110					

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WES-2-120-88

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		Sh, cont.			
	111					
	112			4.1 / 4.6		
				-0.6		
				-0.4		
	113					
				113.5		end depth
				113.7		
				Run 14		
	114					
	115					
				4.4 / 4.2		
	116					
				+0.2		
	117					
			alter. thin 1Gr SS lens in tot core	117.9		
	118			Run 15		
	119					
	120					

ENG FORM 1836 PROJECT

Hole No. WES-2-120-83

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		Sh is olive Gr in bot 2.0'.	5.8 / 5.8		
	122					
			Base of Indian springs (122.7)			
	123		Top of Big Cliffy ss lytan, v fine, th bd, rippled hd, friable, oxidized	123.7 / Run 16		
	124					
	125					
	126					
	127			10.0 / 10.0		
	128					
	129					
	130					

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

PROJECT | HOLE NO.

Hole No. WES-2-12C-84

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
	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
	140		SS (cont)			
		10				
	141					
		5				
	142	5				
		5				
	143					
				143.7		
				Run 18		
	144					
	145					
		0				
		5				
	146					
	147	0		10.0		
				10.0		
	148	0				
		0				
		0				
	149					
	150	0				

ENG FORM 1836 PROJECT

Hole No. UFS-2-12C-B3

DRILLING LOG	DIVISION	INSTALLATION	SHEET 16 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 | UNDISTUR
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		SS (Cont.)			
	151					
	152					
		10				
		10				
	153					
				153.7 / Run 19		
	154	10 / 60				
		0 / 70 / 0	Stn			
	155		heated			
	156					
	157			9.4 / 10.0		
	158		Base of Basalt, SS.			
		0	Top of Beach Spec. LS - 158.2'			
		0	Limestone, 1-m Gr, m crystalline, fossiliferous, v hd, v den, occ			
	159		styolites, oxidized along most jts in upper zone.	>0.6 -0.2		
		0				
	160					

ENG FORM 2026 PROJECT

Hole No. WES-2-12C-89

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		Ls (cont)			
	161	0				
	162	5				
	163			162.8		Pull depth
				163.7		
	164	5		Run 20		
	165					
	166	0				
		0	Lts are stained w/Fim			
	167	0				
		90		10.2		
		0		9.9		
	168	0	Ls changes to dGr, w/few wavy shaley pts.			
		0		10.3		
			Base of oxidation	10.4		
	169					
		0				
	170					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WFS-2-120-89

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 — UNDISTUR
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
	170		LS (cont.)			
	171					
		0				
	172					
		0	lim stn clay jts.			
		0				
	173					
				173.6 Run 21		173.5 Pull depth
	174					
	175					
	176					
	177	0	olive clay	10.2 / 10.1		
	178			10.1		
	179					
		0				
	180					

ENG FORM 1021 PROJECT HOLE NO.

Hole No. WFS-2-12C-88

DRILLING LOG	DIVISION	INSTALLATION	SHEET 19 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
	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
	180		Ls (Point)			
	181	90°	Base of Beech Creek Ls			
			Top of Ellwren Shale - 181.6'			Tight Contact
	182		Shale, Gn, mass, hd			
	183			183.7		
	184		Bot. Depth - 183.7'			

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WES-2-12C-B3

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 — UNDIST
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-2-12C P2-B3			Date well screen was set: 3/18/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			13.0			
			Bentonite Pellets			
			16.0			PVC Riser + Screen
			Filter Pack			
			29.0			
			Well Screen			
			34.0			
			Trap			
			35.0			
			35.0 Boring Depth			

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE

PROJECT | HOLE NO.

Hole No. WES-2-12C-88

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-2-12C P2-88			Date well screen was set: 3/21/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen –
			82.0			
			Bentonite Pellets			
			87.0			
						PVC Screen + Riser
			Filter Pack			
						(Set 4" PVC Casing to ~ 38.0')
			93.2			
			Well Screen			
			103.2			
			Trap			
			104.2			
			104.2 Boring Depth			

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

Hole No. WES-2-12C-88

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-2-12C-88			Date well screen was set: 3/14/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			118.0			
			Bentonite Pellets			
			122.7			
						PVC Screen + Riser
			Filter Pack			
			171.6			
			Well Screen			
			181.6			
			Trap			
			182.6			
			183.7 Boring Depth			

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

Hole No. WES-2-13C-88

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC Crane Ind	SHEET 1 OF 9 SHEETS

1. PROJECT Hydrogeologic Studies, IDBG	10. SIZE AND TYPE OF BIT HQ Wireline
2. LOCATION (Coordinates or Station)	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) 2-13C	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 3/28/88 — COMPLETED 3/28/88
7. THICKNESS OF OVERBURDEN 12.0	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 83.3'	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		Silty Clay, y tan, with numerous highly oxidized sandstone frags + blocks. (Residual Soil Zone)			Augered from 0.0 to 3.7'. Ran a 2' long NX core bl from 3.7 to 13.2' but only rec. a total of 1.5' of core (wea. SS).
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

ENG FORM 1836 | PROJECT | HOLE NO.

Hole No. WES-2-13C-39

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) 2-13C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURB
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		Silty Clay & SS (Cont.)			
	11					
	12		TOP Sound Rock 12.0'			
			Sandstone, yBr to m gr Br, f-c grained, th bd, carbonaceous inclus			
	13			13.2		
				Run 1		Started Coring w/ HQ Wireline
			Sh pbs			
	14					
			swirled bedding			
	15					
	16		Conglomeritic			
	17			9.7 / 10.1		
			abundant carbonaceous inclus			
	18			-0.4'		
	19		Conglomeritic			
	20		v fine ss/slst, hd (siderite)? (20.0)			

ENG FORM 1836 — PROJECT — HOLE NO.

Hole No. WES-2-13-CB

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) 2-13C	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		Shale, Blk, th bd, hd Carbonaceous			
	21					
	22					
	23	++ ++ ++	Coal, Blk, blocky	23.3 / Run 2		
	24		Sandstone/siltstone, v fine, m Gr mass, (no apparent bedding,			
	25					
	26					
	27			10.0 / 10.0		
	28					
	29		Shaley			
	30					

ENG FORM 1836 — PROJECT — HOLE NO.

Hole No. WES-2-13C-89

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET 4 OF 9 SHEETS	
1. PROJECT	
2. LOCATION (Coordinates or Station)	
3. DRILLING AGENCY	
4. HOLE NO. (As shown on drawing title and file number)	2-13C
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		Sandstone, l-m Gr, th bd, with thin Blk Sh wavey lens + pots spaced 1/8" to 6" apart. hd, occ Gn sh streaks,			
	31					
			Ht'ing is along bd.			
	32					
	33			33.3		
				Run 3		
	34					
			oxidized - rusty Br			
	35					
	36					
	37			9.9/10.0		
	38			0.1		
	39					
	40					

ENG FORM 1836 PROJECT

Hole No. WES-2-13C-55

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET 5 OF 9 SHEETS	
1. PROJECT	
2. LOCATION (Coordinates or Station)	
3. DRILLING AGENCY	
4. HOLE NO. (As shown on drawing title and file number)	2-13C
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		SS (Cont.)			
	41					
	42					
	43		Sh lens increase in bot 1½'	43.3 Run 4		
			Base of Penn sediments			
	44		Top of miss " (Hardinsburg fm)			
	45		Shale Gn, mass, crumbly, w/zones of d rBr claystone mottled inclus, hd.			
	46			3.5 / 6.7		
	47			3.2		Core ground away during drilling
	48					
	49					Set 4" PVC Casing to 50.0'
	50			50.0		

ENG FORM 1836 PROJECT

Hole No. WES-2-13C-83

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) 2-13C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR.
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		Sh (cont)	Run 5		3/28/83
	51					
				2.7 / 3.3		
	52			-0.6		
	53			53.3		
				Run 6		
	54					
	55					
	56			5.6 / 9.7		
				-4.1		ground Core away during drilling
	57					
	58					
	59					
	60					

ENG FORM 1836 PROJECT

Hole No. WFF-2-13C-88

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) 2-13C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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					
	63			63.0 Run 7		
	64					
	65					
	66			10.3 / 10.3		
	67					
	68					
	69					
			Base of Hardinsburg - 69.5			
	70		Top of Galena / Hanover Shale, Limestone - limey	shale		

ENG FORM

Hole No. WES-2-13C-88

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)	2-13C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED / UNDISTUR
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		dGr, th bd, fossiliferous			
	71					
	72	0	Crystaline Limestone, 1-m gr Br, m-c, v hd, v den			
	73	0		73.3 / Run 8		
	74	10				
		0				
	75					
	76		shale	10.0 / 10.0		
	77					
	78					
	79	0	(Base of Colorado / Hame) (Top of Indian Springs) Shale, Blk, th bd, platey, carbonaceous hd.			71.3
	80					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-P-17C-28

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) 2-13C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — 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
	80		Shale (cont.			
	81					
	82					
	83			83.3		
			Bot. Depth - 83.3'			
	84					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-130-88

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
	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-2-130P3			Date well screen was set: 3/30/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen –
			7.0			
			Bentonite Pellets			
			8.0			PVC Screen + Riser
			Filter Pack			
			15.0			
			Well Screen			
			20.0 (No. Trap)			
			20.0			
			20.0 Boring Depth			

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

Hole No. WES-2-13CP2-88

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-2-13CP2-88			Date well screen was set: 3/29/88
			+2.5			
			0.0' Ground surface			
			Grout			
			10.0			Water level just Prior to setting screen –
			~~Grout mixture~~ Sand			
			20.0			
			Bentonite Pellets			
			25.0			
						PVC Screen + Riser
			Filter Pack			
			34.0			
			Well Screen			
			44.0			
			Trap			
			45.0			
			45.0 Boring Depth			

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

Hole No. WES-2-130-88

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 — UNDISTUR
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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-2-130-88			Date well screen was set: 3/28/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			62.0			
			Bentonite Pellets			
			65.0			
						PVC Screen + Riser
			Filter Pack			
			69.3			
			Well Screen			
			79.3			
			Trap			
			80.3			
			83.3 Boring Depth			

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

Hole No. WES-2-14C-8

DRILLING LOG	DIVISION U.S. Navy	INSTALLATION NWSC Crane Ind	SHEET 1 OF 17 SHEETS

1. PROJECT Hydroacoustic Station, DBC	10. SIZE AND TYPE OF BIT HQ Wireline
2. LOCATION (Coordinates or Station)	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) 2-14C	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 8.4	16. DATE HOLE — STARTED 4/7/88 — COMPLETED 4/13/88
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE 167.2	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR Geologist Richard Wilhum

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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, soft, wet (Rain)			Ran 8" flight Auger from 0.0 to 8.4'
	1					
	2					
	3					
	4					
	5					
	6		Silty-Sandy clay (CL) y Br, v firm, dry			
	7					Set 8" dia PVC Surface casing
	8					Top of Rock-8.4'
	9		Sandstone? (as below)			Ran R.R. Bit to 11.5'
	10					

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

Hole No. WFS-2-14-99

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) 2-14C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED: — UNDISTUR:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED: — COMPLETED:
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			11.5		
	12		Sandstone, ytan, fine, highly oxidized and weathered, num wavy olive shale (clay) thin lens + pts, occ carbonaceous inclus.	Run1		Started coring w/ HQ wireline at 11.5'
	13					
	14					
	15					
	16			6.3 / 8.8		
	17			-1.5 -1.4		
	18					
	19		Core loss zone? (Probably conglomeritic)			
	20					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT | HOLE NO.

Hole No. WFS-2-14C-88

DRILLING LOG	DIVISION	INSTALLATION	SHEET 3 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
	20			20.2 / 20.3		Pull depth
			Sandstone (cont.)	Run 2		
			reduction in sh pts below ~20.0', oxidized, Friable, cross bd,			
	21					
			(Jointing is apparently confined to bedding planes.)			
	22			4.1 / 4.0		
				+0.1		
	23					
	24					
				24.3		
				Run 3		
	25					
	26					
				9.6 / 9.9		
	27					
				~~-0.3~~ -0.2		
	28					
	29					
	30					

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

Hole No. WFS-2-HC-88

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 — UNDISTU
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					
	32					
	33					
	34			34.2		34.1 - Rill depth
	35			9.8/10.0		
	36			+0.1 -0.2		
	37					
	38					
	39		Base of oxidation ≈ 39.0'			
	40					

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

Hole No. WES-2-14C-85

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
	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		SS (Cont.)			
			(Below ~ 38.0' there are num thin blk. uneq. shale lens & pts.)			
	41					
	42					
	43					
	44			43.9 / 44.2 Run 5		Pull depth
	45					
	46			4.2 / 3.9 +0.3		
	47		Base of PENN - 47.1'			
			Top of MISS (Hardinsburg Fm)			
	48		Shale, Gn w/rBr mottling, mass, hd	48.1 Run 6		
	49			2.1 / 3.4 — 1.3		
	50					

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

Hole No. WES-2-141-RC

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: — UNDISTUR:
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED: — COMPLETED:
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		Sh (cont.)			
	51			51.5' Run 7		Reamed hole + set 6" dia PVC casing to 51.5'. Grouted casing into shale zone. Pumped only 15 gal grout mix in bot portion of hole. Put sand around upper zone of casing. (4/9/88)
	52					
	53					
	54			3.4 / 4.9		
	55			-1.5		
	56			56.4' Run 8		
	57					Shale ground away during coring operations
	58			5.6 / 8.0		
	59			-2.4		
	60					

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

Hole No. WES-2-1/3-45

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		Sh (Cont.)			
	61					
	62					
	63					
			dGr ; th bd in bot zone			
	64			64.4		
				Run 9		
	65					
	66		Base of Hardinsburg - 66.0			
		0	Top of Golconda / Haney			
		20	Limestone, l-mgrBr, th bd, m-c crystalline, occ blk thin shale lens + pts, fossiliferous, v hd, v den	10.0 / 10.0		
	67	0				
		0				
	68					
		0				
	69	0				
	70					

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

Hole No. WES-2-114-82

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 — UNDISTU
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		LS (cont.)			
	71	0				
		5	Shale, Blk, th bd			
	72	5				
	73		Limestone, similar to above, but no Sh pts, mass, occ Stylolites, v hd, v den.			
		0				
	74			74.4		
				Run 10		
	75					
		0				
	76					
		0				
	77			10.0/10.0		
	78					
	79					
		0				
	80					

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

Hole No. WES-2-14-55

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	60	LS (cont.)			
			– stn + wea along st.			
	81					
	82					
	83					
		0				
	84					
		0	Base of Coleanda / Haney	84.4		
			Top of Indian Spgs.	Run 11		
	85		Shale, Blk, th bd, platy, indurated, carbonaceous			
	86					
	87			6.6 / 6.7		
	88			-0.1		
	89					
	90					

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

Hole No. WEF-2-149.99

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 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 — UNDISTU
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
	90		Sh (cont.)			Reamed hole & ran 4" PVC casing to 91.0. Grouted lower portion of casing into shale. Back filled upper zone around casing w/sand. (4/12/88)
	91			91.1 / Run 12		
	92					
				2.8 / 3.3		
	93			-0.5		
	94			94.4 / Run 13		
	95					
	96					
	97			9.0 / 9.4		
	98			-0.4		
	99					
	100					

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

Hole No. WES-2-14C-89

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET 11 OF 17 SHEETS	
1. PROJECT	
2. LOCATION (Coordinates or Station)	
3. DRILLING AGENCY	
4. HOLE NO. (As shown on drawing title and file number)	2-14C
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		Sh, (Cont.)			
	101					Losing ~25% of water return below 101.0'
	102		Limestone, Gr, th bd Shaley			
	103		Shale, olive Gr, mass.			
				103.8		
	104			Run 14		
	105					
			LS concretions in bot ft.			
	106		(106.0') Top of Big Clifty SS -			
	107		Sandstone, l olive Gn, th bd, w/alter thin silty-shaley pts cross bd v fine, oxidized.	10.1/10.1		
	108					
	109					
	110					

ENG FORM 1836 PROJECT

Hole No. WES-7-142-88

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) 2-14C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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.)			Losing ~ 50% of water return below 110.0'.
	111					
	112		gradational Change Sandstone, 1-m olive Tan, mass, rippled, v fine, sli friable, hd, oxidized.			
	113			113.9 Run 15		
	114					
	115					
	116					
	117			10.1 / 10.1		
	118					
	119					
	120					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-14-88

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) Z-14C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — 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
	120		SS (cont)			
	121					
	122					
	123					
	124			124.0 Run 16		
	125					
	126					Lost all water return at ~126.0?
	127			10.0 / 10.0		
	128					
	129					
	130					

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WES-2-14C-RC

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) 2-14C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURB
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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)			
		0				
		0				
	131	60				
		0				
	132					
		20				
		20				
	133	20				
		20				
	134	20		134.0		
		20		Run 17		
	135					
		30				
		90				
	136	50				
		0				
	137			9.9		
		0		10.0		
		10				
	138	10		-0.1		
		20				
		0				
		0				
	139					
		0				
	140	0				

ENG FORM 1836 PROJECT

Hole No. WFS-2-14-C.SE

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) 2-14C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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.)			
		0				
		0				
		0				
	141					
		0				
		0				
	142					
		0				
		12				
	143					
		12				
		0		143.9 / 144.0		Full depth
	144			Run 18		
		0				
		0	clay + ii lines at contact			
		0				
	145	0	Base of Big Cliff Fm - 1450'			
			Top of Beech Creek Fm.			
			Limestone, l-m gr Br, m-c crystaline, mass, fossiliferous, vhd, vden, occ stylolites			
	146	12				
	147			10.1 / 10.0		
	148	0		+0.1		
	149					
	150					

ENG FORM 1836 PROJECT

Hole No. WES-C-740-55

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) 2-14C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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					
		0				
		0				
	153					
		0				
	154	0		154.0 / Run 19		12/13/88
		0				
	155		LS changes to dGr + has zones of wavy shaley pts.			
	156	10				
		5				
		10				
	157	10				Started getting back ~ 25% to 40% of water return.
		0				
	158	5		9.9 / 10.0		
		0				
	159			0.1		
		0				
	160	0				

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-14C-9.8

DRILLING LOG	DIVISION	INSTALLATION	SHEET 17 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) 2-14C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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					
			Base of Beach Rock			
	162					
	163					
			Top of Eluvion – 163.9	164.0		
	164			Run 20		
			Shale, dGn, mass hd			
	165			2.9/3.2		
	166			-0.3		
	167			167.2		
			Bottom Depth 167.2 ft.			
	168					

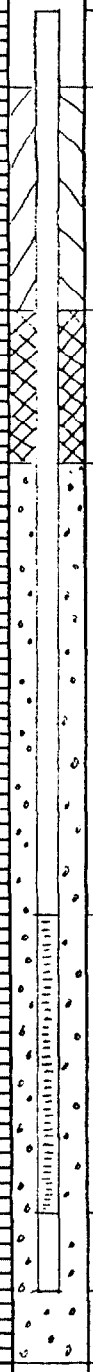
ENG FORM 1836 PROJECT

Hole No. WES-2-14C-88

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 — UNDISTU
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
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-2-14CP3-88			Date well screen was set: 4/19/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			7.0			
			Bentonite Pellets			
			10.0			PVC Screen & Rsr.
			Filter Pack			
			37.1			
			Well Screen			
			47.1			
			Trap			
			48.1			
			Boring Depth			



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

Hole No. WES-2-14C-88

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-2-14C P2-88			Date well screen was set: 4/15/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			62.0			
			Bentonite Pellets			
			66.0			
						PVC Screen + Riser
			Filter Pack			
			74.4			
			Well Screen			
			84.4			
			Trap			
			85.4			
			85.4 Boring Depth			

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

Hole No. WES-2-14C-88

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 — UNDISTUR
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-2-14C-88			Date well screen was set: 4/13/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen –
			101.0			
			Bentonite Pellets			
			106.0			
						PVC Riser + Screen
			Filter Pack			
			153.9			
			Well Screen			
			163.7			
			Trap			
			164.9			
			167.2 Boring Depth			

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WES-2-15C-B3

DRILLING LOG	DIVISION U.S. Navy	INSTALLATION Crane NWSC	SHEET 1 OF 8 SHEETS

1. PROJECT Hydrogeology of DBG	10. SIZE AND TYPE OF BIT HQ Wireline
2. LOCATION (Coordinates or Station)	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) 2-15C	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 5/6/88; COMPLETED 5/10/88
7. THICKNESS OF OVERBURDEN 5.0'	17. ELEVATION TOP OF HOLE
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING %
9. TOTAL DEPTH OF HOLE 80.2'	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), yellow-Br, soft, v moist,			0.0 - 5.0' drilled w/a 7" flite-Auger.
	1					
	2					
	3					
	4					
	5		Top of Rock - ~5.0'			Set 6" PVC Surface Casing to 5.0'
			Sandstone, ?			Ran R.R Bit to 11.0'
	6		(R.R. Bit - No Spls from 5.0 - 11.0'			
	7					
	8					
	9					
	10					

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WFS-2-15C-8

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)	2-15C
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 / UNDISTURB
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), Cont.			
				11.0' Run 1		
	11		Claystone, y tan firm, oxidized, silty			Started coring at 11.0' w/ H.Q. wire line.
	12					
	13		Sandstone, l y tan-Buff, th bd, v fine, occ d olive Gr th shale lens + pts, oxidized, lim inclus, hd	3.2/5.7		
	14					
				2.5		
	15		Conglomeritic Zone? (Core loss)			
	16		rBr Fe Crusting			
				16.7 Run 2		
	17					
	18			5.0/5.9		
	19			0.9		
	20					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-15C-BB

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) 2-15C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		silty clay (highly wea sh (core loss interval)			
	22			22.6 / Run 3		
	23					
	24					
	25					
	26			10.0 / 10.0		
	27					
	28					
	29					
	30					

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WES-2-15C-88

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) 2-15C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURB
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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	SS, cont.			
		0				
	31		random sh inclus			
		4				
	32	0				
				32.6		
			SS is 1 Buff-Gr, slight oxidation	Run 4		
	33	0				
		0				
	34	0				
		0				
		20				
		10				
	35	0				
		0				
	36		SS has num alter thin Blk shale wavey lens + pts.	9.2/10.0		
		0				
	37			-0.8		
	38	0				
	39	0	Mansfield fm - 39.2'			Penn Sediments
			Hardinsburg fm -			Miss "
	40					

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

Hole No. WES-2-15C-88

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) 2-15C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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, Gn, mass, Crumbly, soft to hd, occ drBr Claystone mottled in shale.			
	41					
				41.8		- Full depth
	42					
				42.6		Reamed Hole w/6" RR bit and set 4" PVC casing to 42.6' (only grouted the bot. ~10' of casing)
				Run 5		
	43					
	44					5/9/88
	45					
				1.0/5.6		
	46			-4.6		— Note: Ground washed away core spl in Run 5 during drilling.
	47					
	48			48.2		
				Run 6		
			v hd fragmented Ls inclus.			
	49					
	50					

ENG FORM 1836 PROJECT

Hole No. WES-2-15C-88

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) 2-15C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURB
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			4.4 / 4.4		
	52		Shale changes to dGr, th bd, platey-fissile, hd, occ carbonaceous streaks.	52.6	Run 7	
	53					
	54					
	55					
	56			9.6 / 10.0		
				>0.4		
	57					
	58					
	59	10 / 20	Base of Haidusburg - 59.0'			
		5	Top of Coldenda / Haiwy Limestone, 1-m grBr, mass, coarse crystaline, fossiliferous rhd, yellow			
	60	0				

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-15C-88

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) 2-15C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — 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.)			
		20				
	61					
		15				
		0	Ls, has num dolive Gr sh lens			
	62	0		62.2		Full depth (assumed due to void in Run 8) core loss in Run 7.
		0		62.6		
				Run 8		
	63	5	- void ?			
		0	Limestone changes to m grBr, f-m crystaline	2.7 / 2.7		Lost all drill water return at ~63.5' (void at same depth)
	64	0				
	65	0		65.3		
				Run 9		
		0				
	66	0				
	67			7.3 / 7.3		
	68	0				
	69					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-15C-88

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) 2-15C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURB
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			72.6 Run 10		9/10/88
	73		sh			
	74			3.7/3.7		
	75					
	76		shaley Base of Golconda / Haney Top of Indian Springs	76.3 Run 11		Blocked
	77		Shale, blk th bd, platy, hd, carbonaceous			
	78			3.9/3.9		
	79					
	80		Bot. Depth - 80.2'	80.2'		

ENG FORM

Hole No. WES-2-15C-82

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
	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-2-15CR2-82			Date well screen was set: 5/11/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			3.0			
			Bentonite Pellets			
			6.0			PVC Screen & Riser
			Filter Pack			
			29.2			
			Well Screen			
			39.2			
			Trap			
			40.2			
			40.2 Boring Depth			

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

Hole No. WES-2-15C-88

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 — UNDISTD.
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-2-15C-88			Date well screen was set: 5/10/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			53.0			
			Bentonite Pellets			
			56.0			
						PVC Screen + Riser
			Filter Pack			
			66.3			
			Well Screen			
			76.3			
			Trap			
			77.3			
			80.2 Boring Depth			

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

Hole No. WES-2-16C-88

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

1. PROJECT	Hydrogeologic Studies, OB6
2. LOCATION (Coordinates or Station)	
3. DRILLING AGENCY	WES
4. HOLE NO. (As shown on drawing title and file number)	2-16C
5. NAME OF DRILLER	Dan Taylor
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	91.3'
10. SIZE AND TYPE OF BIT	HQ wireline
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	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 5/12/88 COMPLETED 5/16/88
17. ELEVATION TOP OF HOLE	
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, Br-yTan, soft-mod, firm, moist (Residual Soil)			0.0-5.0' - Auger
	1					
	2					
	3					
	4					set PVC Surface Casing to 5.0'
	5		TOP RK - 5.0'	5.0'		
			Sandstone, yTan, th bd, highly oxidized, friable, occ lim castings, occ thin clay lens (wea sh)			5.0 to 10.0 - R.P. 2.7
	6					
	7					
	8					
	9					started coring w/HQ at 10ft.
	10			10.0		

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-16C-88

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) 2-16C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURB
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
	10		Sandstone (cont.)	Run 1		
		5				
		2				
	11	5				
		15				
		30				
	12			4.4 / 4.6		
		0				
		10				
	13			-0.2		
		20				
		0				
	14		Lim stn along jts, most jts are along bd.			
		0				
		2		14.6		
				Run 2		
	15	10				
		10				
		2				
	16					
		10				
	17	0		8.2 / 8.5		
			Clayshale, y Tan, highly oxidized, sdy			
	18	10		-0.3		
		0				
	19					
		0				
		0				
	20					

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

Hole No. WFS-2-16C-82

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) 2-16C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		Sandstone,			
	22					
	23			23.1 Run3		
	24					
	25					
	26		Sandstone + clay? (2.0' core loss in this zone) highly oxidized ss is d br Red, fragmented (Probable wea conglomerate) Note (Red color in this zone could be dye?)	8.0 / 10.0		Caving during drilling between 25.5 + 28.3
	27			2.0		Lost ~ 50% of water return at ~ 26.6
	28		Sandstone, y Tan, cross bd, f grained, oxidized, friable, occ clay pts (wea sh)			
	29					
	30					

ENG FORM 1836 PROJECT

Hole No. WES-2-16C-88

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) 2-16C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		55 (cont.)			
		0				
	31	0				
		0				
	32	0				
	33			33.1		
		0		Run 4		
		0				
	34	0				
		0				
	35	19				
		0				
		0				
		0				
	36			8.5		
				8.5		
	37	5				
	38	0				
	39					
		0				
	40					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-16C-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) 2-16C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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.)			
				41.6 / Run 5		
	41					
	42					
	43					
	44					
	45		SS below 44.2' is unoxidized, lGr w/increase in dk Gr sh pts (spaced 1/4" to 2" apart) Core breaks easily along sh pts.	10.2 / 10.2		
	46					
	47					
	48					
	49					
	50					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-16C-89

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) 2-16C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			51.8		
	52			Run 6		5/13/88
	53					PENN
			(Base of Mansfield fm - 53.5') (Hardinsburg fm)			MISS
	54		Shale, Gn, mass, w/ zones of Gn + dl br Red mottled claystone	5.3/5.8		Losing ~30% of water return
	55			-0.5		
	56					
	57			57.6		Reamed hole to 57.6' and set 4" PVC Casing to 57.6'.
	58			Run 7		Grouted casing in bot zone and back filled to surface w/ sand
	59			2.4/5.5'		5/16/88
	60			-3.1'		← Ground core away during drilling

ENG FORM 1836

Hole No. WES-2-16C-88

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) 2-16C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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.)			
						100% water return after setting casing.
	61					
	62					
	63			63.1 / Run 8		
	64					
	65					
	66					
	67			7.8 / 10.0		
				-2.2		Ground core away during drilling.
	68					
	69					
	70					

ENG FORM 1836 PROJECT

Hole No. WES-2-16C-88

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) 2-16C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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 is dgnGr + th bd in bot. 4'			
	71					
	72					
	73			73.1 / Run 9		
	74		(Base of Hardinsburg - 74.0') (Top of Golconda/Haney)			
			Limestone, mgrBr, m-c crystalline, fossiliferous, v hd, v den.			
	75					
	76					
				9.7 / 10.0		
	77					
				0.3		
	78					
	79		Shale, Blk, th bd, hd			
	80					

ENG FORM

Hole No. WES-2-16C-88

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) 2-16C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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, crystaline (as above)			
	81		- Lim stn			
	82		(Ls is oxidized between 80.0 + 83.9')			
	83			83.1 Run 10		
	84		Lim stn; Shaley Limestone dGr, th bd			
	85					
	86		Limestone, mgrBr, Crystaline (as above)			
	87					
	88		(Base of Colorado/Harney - 88.6') (Top of Indian Springs)			
	89		Shale, Blk, th bd Carbonaceous, platey-flakey, hd, one fossils.			
	90					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WFS-2-16C-8

DRILLING LOG	DIVISION	INSTALLATION	SHEET 10 OF 10 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number) 2-16C
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					
	91					
	92		Bottom Depth - 91.3'			

ENG FORM 1836 PROJECT

Hole No. WES-2-16C-88

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
	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-2-16C-88			Date well screen was set: 5/16/88
			+2.15			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen –
			70.0'			
			Bentonite Pellets			
			73.0			
			Filter Pack			PVC Riser + Screen
			78.6			
			Well Screen			
			88.6			
			Trap			
			89.6			
			91.3 Boring Depth			

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

Hole No. WES-2-16CP2

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 — UNDISTU
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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-2-16CP2-88			Date well screen was set: 5/17/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen –
			7.0'			
			Bentonite Pellets			
			10.0			
			Filter Pack			PVC Screen + Riser
			43.5			
			Well Screen			
			53.5			
			Trap			
			54.5			
			54.5' Boring Depth			

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

Hole No. WES-2-17C-8

DRILLING LOG	DIVISION U.S. Navy	INSTALLATION NWSC, Crane Inc.	SHEET 1 OF 10 SHEETS

1. PROJECT Hydrogeologic Studies, DBG	10. SIZE AND TYPE OF BIT HQ wireline
2. LOCATION (Coordinates or Station)	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) 2-17C	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 7.2'	16. DATE HOLE — STARTED 5/19/88 — COMPLETED 5/23/88
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE 10.0'	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, y tan-Br, soft - mod firm, moist to dry w/ depth.			0.0-7.2' - Auger
	1					
	2					
	3					
	4					
	5					
	6					
	7		Top Rock - 7.2'			
	8		Sandstone, y Tan, th bd, v fine-fine, highly oxidized, occ to num wavey clay (wea sh) pts, occ Lim castings, hd			7.2'-10.0' - R.R. Bit
	9		Shaley in some zones			Started Coring w/ HQ wireline at 10.0'
	10			10.0		

ENG FORM 1836

Hole No. WES-2-172-88

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) 2-172	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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.)	Run 1		5/20/88
		0				
		10				
	11					
		0				
	12	0				
		0				
		0				
	13	0	Sts are lim stn + mostly along bd			
		0				
		0				
	14	0				
		9.6				
		0				
		0		9.6		
	15			10.2		
		0				
				-0.6		
	16	5				
		0				
	17	5				
		5				
		0				
	18	10				
		10				
	19	0				
		5				
		25				
	20	0				

ENG FORM 1836 — PROJECT

Hole No. WES-2-17-88

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) 2-17c	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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	SS (cont.)	20.2		
		0		Run 2		
		0				
		5				
	21	0	SS is m-c grained w/ dk br Red banding, Conglomeritic			
		5		2.7 / 2.9		
		0				
	22	0		-0.2 -0.1		
		0				
	23	0		23.0 / 23.7		Full depth
		5		Run 3		
		0				
		10				
	24	0				
		0				
		20				
		0				
	25	2				
		0				
	26	0	Clayshale, Buff-Br, th bd, mod soft, highly wea, w/num vfine ss/slst pts. hor banding	8.1 / 8.0		
	27	0				
		0		+0.1		
	28					
	29	0				
	30					

ENG FORM 1836

Hole No. WES-2-17C-08

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) 2-17C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		Claystone (cont.)			
	31			31.1 Run 4		Lost all water return at ~31.0'
	32		Highly wea Conglomerate zone ?, Lost most of core during drilling, SS & Clay ?, fragmented, highly oxidized			
	33			1.2/5.6		Soft drilling
	34			4.4		Caving in zone between 31.1 + 35.7 during drilling.
	35					
	36		Claystone, m-d Gr, th bd, silty-sdy, blocky, num small Carbonaceous inclus.	36.7 Run 5		
	37					
	38			2.6/3.0		
				0.4		
	39		Sandstone, Buff-y Br, th bd, f grained, hd, occ shale pts.	39.7 Run 6		
	40					

ENG FORM 1836

Hole No. WIES-2-17C-82

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) 2-17C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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.)			
	41			3.4/3.4		
	42					
	43		highly oxidized, rusty Br	43.1 Run 7		
	44					
	45			2.9/3.4 -0.5		
	46			46.5 Run 8		
	47					
	48			6.4/6.6		
	49		Sandstone, similar to above but 1-m Gr unoxidized, w/ num	-0.1		
	50					

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WES-2-17C-88

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) 2-17C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
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		dGr wavy shale pts.			
	51		Core breaks easily along sh pts			
	52					
	53			53.0 / 53.1 Run 9		Full depth
	54					
	55					
			Lim sdn			
	56			6.7 / 6.6		
	57			70.1		Losing all water return.
	58					
	59					
			(Base of Mansfield fm)	59.7		PENN
	60		(Hardinsburg fm)	Run 10		59.7 MISS

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WES-2-17C-85

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)	2-17C
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		Shale, Gn, mass. hd, crumbly			
	61					Note: Hole was caving between 31 + 35'. Had to drill down 6" steel casing past this zone too set 4" PVC to bot. Then removed steel casing.
				2.0/3.4		
	62			-1.4		
	63			63.1		
			Claystone, Gn + dbr Red, mottled, hard, fractured, sbcty			
	64					Reamed Hole to 65.9 w 5 7/8" dia R.R. Bit + set 4" PVC Casing. Casing Grouted in bot zone and back filled w/sand to surface.
	65					
				65.9		
	66			Run 11		5/23/88
	67					
	68			5.4		
				7.2		
	69			-1.8		Ground core away during drilling
	70					

ENG FORM 1836 PROJECT

Hole No. WFS-2-17C-B3

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) 2-17C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		Claystone, (cont.)			
	71					100% water return after setting casing.
	72		Shale, dGr, th bd, platey-flakey, hd, slightly carbonaceous			
	73			73.1 Run 12		
	74					
	75					
	76			4.5 / 5.8		Ground core away during drilling
	77			1.3		
	78					
	79			78.9 Run 13		
	80					

ENG FORM 1071 PROJECT

Hole No. WES-2-17C-88

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) 2-17C	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
	80		Shale (cont.)			
	81			4.0/4.2		
	82			-0.2		
	83			83.1		
	84					
	85		Base of Hardinsburg - 85.0' Top of Golconda/Hanley			Losing 25-50% of water return below 2 84'
	86		Limestone, m gr Br, m Crystaline, mass, fossiliferous, v hd, v dense	9.5/10.0		
	87		Lim stn	-0.5		
	88					
	89		Shaley Limestone th bd, d Gr, fossils			
	90					

ENG FORM 1836 PROJECT

Hole No. WFS-2-17-88

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) 2-17C	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		Shaley Ls (cont.)			
		0	Lim stn			
	91		Limey Shale, d Gr			
	92		Limestone, m gr Br. Crystaline (as above)			
	93			93.1 / Runs		
			Just touched Jt; Lim stn			
	94	10				
	95					
	96		Base of Cokorda Hiong, 96.1'			
			Top of Indian Springs	7.0 / 7.0		
	97		Shale, Blk, th bd, Carbonaceous, hd			
	98					
	99					
	100			100.1		Bot. Depth - 100.1'

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-17C-88

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
	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-2-17C-88			Date well screen was set: 5/23/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen –
			78.0			
			Bentonite Pellets			
			83.0			
			Filter Pack			PVC Screen + Riser
			86.1			
			Well Screen			
			96.1			
			Trap			
			97.1			
			100.1 Boring Depth			

Hole No. WES-2-17CP2-88

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 — UNDISTU
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
			Well No.: WES-2-17CP2-88			Date well screen was set: 5/26/88
			+2.5			
			0.0' Ground surface			
			Grout			
			9.0			Water level just Prior to setting screen –
			~~Grout mixture~~ Sand			
			35.0			
			Bentonite Pellets			
			38.0			PVC Riser + Screen
			Filter Pack			
			49.7			
			Well Screen			
			59.7			
			Trap			
			60.7			
			60.7 Boring Depth			

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

Hole No. WES-2-17C-88

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-2-17CP3-88			Date well screen was set: 5/27/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting Screen –
			5.0			
			Bentonite Pellets			
			7.0			PVC Screen + Riser
			Filter Pack			
			20.6			
			Well Screen			
			25.6			
			~~Trap~~ No trap			
			25.6			
			25.6 Boring Depth			

Hole No. WES-2-188-8

DRILLING LOG	DIVISION US Navy	INSTALLATION NWSC Crane Ind.	SHEET 1 OF 11 SHEETS

1. PROJECT: Hydrogeologic Studies, NWS
2. LOCATION (Coordinates or Station):
3. DRILLING AGENCY: WES
4. HOLE NO. (As shown on drawing title and file number):
5. NAME OF DRILLER: Dan Taylor
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 5.4'
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 10.1'
10. SIZE AND TYPE OF BIT: HQ Wireline
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): 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 6/2/88 COMPLETED 6/6/88
17. ELEVATION TOP OF HOLE:
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, Br-yBr, soft - mod firm w/depth, moist (Residual Soil)			0.0-5.4 - Auger
	1					
	2					
	3					
	4					
	5					
	6		Sandstone, y tan, th bd, occ wea shale pts, fine grained, highly oxidized, hard.			5.4-10.1 - R.R.B.t
	7					
	8					
	9					
	10					

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WFC-2-18A-06

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) 2-18C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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.)	10.1 Run 1		Coring w/HQ wireline
	11	10				
		20		2.0		
		20		3.0		
	12	30 10		-1.0		
		0	Jts have lim stn + are mostly along bd.			
		10				
	13	10		13.1 Run 2		
		0				
		20				
		0				
	14	0				
		30				
		0				
	15	10				
		20				
	16			9.4		
		0		10.0		
		20				
	17	0		-0.6		
			Siltstone/claystone, y Tan + olive Gr in top zone to lGr, carbonaceous, occ SS zones oxidized	-0.4		
	18	0				
		25				
	19					
		10				
	20					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WFS-2-18-08

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) 2-18C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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, y Br, + Gr, Conglomeritic, carbon inclus.			
	21		swirled bd, soft rk 1-m Gr w/oxidized Br zones			
	22					
	23		mass, 1-m Gr, soft rk	22.9 / 23.1 Run 3		Pull depth
	24					
	25		SS, lim crusted, conglo			
			swirled bd, lim crusting			
	26					
	27		SS, conglo, carbon inclus, lim crusting	10.2 / 10.0		
			mass, m Gr, carbon inclus	+0.2		
	28		lim (illed)			
			Gradational change			
	29		Clay shale, d olive Gr, th bd, uncr, lim stn along jts			
	30					

ENG FORM 1021 PROJECT HOLE NO.

Hole No. WES-2-18C-58

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) 2-18C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — 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	50	Lim clayShale (cont.)			Sls lim stin + tight
	31	50	Lim			
	32	10				
		10				
	33	60	Sandstone, yBr, th bd, f grained, highly oxidized, occ wea shale pts. hd. (Red-Br + fragmented in top 1-1½'.)	33.1 / Run 4		
		0				
	34	45				
		0				
	35	0				
	36	0				
	37	0		9.3 / 10.0		
		0				
	38	0		-0.7		
		0				
	39	0				
	40					

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WES-2-18C-25

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) 2-18c	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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	5	55 (Cont.)			
		0				
	41	10				
		0				
		70				
	42	0				
		0				
		90				
	43	120	highly oxidized, rusty Br.	43.1		
		0		Run 5		
		85				
	44	0				
	45					
		5				
	46					
			closely spaced sh pts in bot 1½ ft	10.0 / 10.0		
	47	0	Gradational Change			
			Sandstone, lGr, thbd w/ many silt shale pts spaced ¼" to 6" apart, f grained, hd.			
	48					
	49					
	50					

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

Hole No. WES-2-180-88

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) 2-180	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		Core breaks easily along shaley pts.			
	53			53.1 / Run 6		
	54					
	55					
	56					
	57			9.3 / 10.0		
	58			0.7		
	59					
	60					

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WFS-2-18C-88

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) 2-18C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		SS grades to a fine granular LS(?) in bot 1-1½'.			
	62		Base of Mansfield Fm.			PENN 62.4' MISS.
			Hardinsburg fm			
	63		Shale, Gn, mass hd, crumbly	63.1 Run 7		
	64					
	65					
	66					
	67					6/3/88 Reamed hole to 6¾" dia and set 4" P.V.C. Casing to 68.1'. Grouted in bot portion of Casing.
	68			68.1 Run 8		
	69					6/7/88
	70			1.9/3.9 -2.0'		— Core ground away.

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WES-2-18C-85

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) 2-18C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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		Claystone, Gn + dbr Red, mottled, mass, hd, Fractured.			
	72			72.0 Run 9		
	73					
	74					
	75		Shale dGr th bd Platey-flakey (Zone between 74.9 + 82.2 was ground away during drilling)			
	76			2.9 / 7.3		
	77			7.3		Core bl blocked at ~74.9' + ground lower core away.
	78					
	79					
	80					

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WES-7-18-88

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) 7-18C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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			82.2		
				Run 10		
				1.1 / 1.2 (-0.1)		
	83			83.4		
				Run 11		
	84					
	85					
	86					
				7.0 / 8.8		
	87		occ dgrBr lime/siltstone nodules in bot 3-4'			
	88			(1.8')		
	89					
	90					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-18C-89

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) 2-18C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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					
	91	75	Base of Hardinsburg - 91.0' Top of Golconda/Honey Limestone, l-mgrBr, m-c crystalline, fossiliferous, v hd, v dens.			
	92			92.2 Run 12		
	93		Shaley, th bd Ls			
	94	15				
	95	20		6.0/6.1		No good water Sts in G/H Ls
	96			-0.1		
	97					
	98	5	Base of Golconda/Honey Top of Indian springs Shale, blk, th bd platey, carbonaceous, hard.	98.3 Run 13		
	99			2.6/2.9		
	100			-0.3		

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-10-83

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) 2-18C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
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

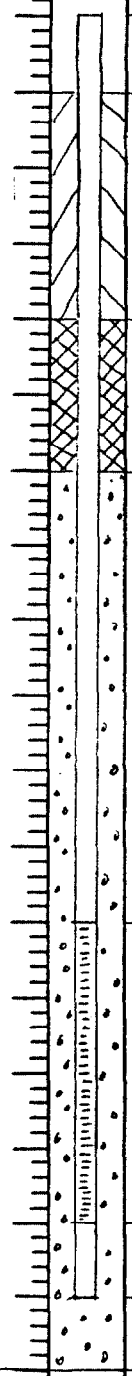
ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	100					
	101			101.2		
			Bot Depth 101.2'			
	102					

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-2-18C-88			Date well screen was set: 6/6/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			75.0			
			Bentonite Pellets			
			80.0			PVC Screen + Riser
			Filter Pack			
			88.3			
			Well Screen			
			98.3			
			Trap			
			99.3			
			101.2 Boring Depth			



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

PROJECT | HOLE NO.

Hole No. (WES-2-18C-P2-88)

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 — UNDISTD.
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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-2-18C P2-88			Date well screen was set: 6/7/88
			+2.5			
			0.0' — Ground surface			
			Grout			
			5.0			Water level just Prior to setting screen —
			~~Grout mixture~~			
			Sand			
			26.0			
			Bentonite Pellets			
			31.0			
						PVC Screen & Riser
			Filter Pack			
			52.4			
			Well Screen			
			62.4			
			Trap			
			63.4			
			63.4 Boring Depth			

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

Hole No. WES-2-18P3-88

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-2-18P3-88			Date well screen was set: 6/7/88
			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			4.0			
			Bentonite Pellets			
			5.0			PVC Screen + Riser
			Filter Pack			
			13.0			
			Well Screen			
			18.0			
			Trap			
			18.5			
			18.5 Boring Depth			

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

Hole No. WES-2-19C-BS

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

1. PROJECT: Hydrogeologic Studies, DBG.
2. LOCATION (Coordinates or Station): V
3. DRILLING AGENCY: WES
4. HOLE NO. (As shown on drawing title and file number): 2-19C
5. NAME OF DRILLER: Dan Taylor
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 4.7'
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 93.0'
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: UNDISTURB.
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 6/8/88 COMPLETED 6/14/88
17. ELEVATION TOP OF HOLE: 730.85
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, y tan-Br, soft - mod soft, v moist. (Residual Soil)			0.0 - 4.7 - Auger
	1					
	2					
	3					
	4					Set Surface casing (PVC) to 4.7'
			Top of Rock - 4.7'	4.7		
	5		Sandstone Buff-y tan, vf-f grained, thbd (cross bd), occ th clay lens (wea sh), highly oxidized, occ Lim castings.			4.7 - 10.0 - R.R. Bit
	6					
	7		numerous bedding pls.			
	8					
	9					
	10			10.0		

ENG FORM 1836 PROJECT

Hole No. WES-2-190-83

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) 2-190	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED / COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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.)	Run 1		10.0' - Started Coring w/HQ wireline.
	11					
	12					
	13					
	14		Conglomeritic, highly oxidized	10.3/10.4 -0.1		
	15					
	16		Siltstone, sandy Buff-Tan, oxidized mod soft, rk, moss			Losing ~ 20-25% of drill water.
	17					
	18		Rusty Br, Lim nastings, sdy			
	19					
	20					

ENG FORM 1836 PROJECT

Hole No. W1-5-2-192-B3

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET 3 OF 10 SHEETS	
1. PROJECT	
2. LOCATION (Coordinates or Station)	
3. DRILLING AGENCY	
4. HOLE NO. (As shown on drawing title and file number)	2-192
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 / UNDISTUR
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		siltstone (cont.)			
		0		20.4 Run 2		
	21	5				
	22	10				
		13				
	23	10				
	24	0				
		0	Clay Shale 1 olive Gr + Buff, 4th bd, oxidation along sts, highly wea, soft rk.	8.5 / 10.3		
	25	10				
		0				
		10				
	26	50				
		20		1.8		
		20				
	27	12				
		15				
	28					
			Sandstone + Clay? (core loss in this zone) highly oxidized, fragmented (Probable wea Conglomerate)			small amount of caving during drilling between 28.4 + 32.9
	29					
	30					

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WES-Z-19C-85

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 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) Z-19C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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					
				30.7 Run 3		
	31					
	32		Bot ft grades into th bd ss below			
	33		Sandstone, + Shale laminated l+d Gr bd, hd			
	34					
	35		Sandstone, y Tan, th bd-mass, f grained, occ clay lens (wea sh), (clay lens decrease w/depth), oxidized, hd	8.9/10.0		still losing ~20% of drill water
	36			-1.1		
	37		Jts along bedding, ~ hor.			
	38					
	39					
	40					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT

Hole No. WES-2-19C-65

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) 2-19C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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					
			Gradational change			
	43		Sandstone, y ton-Buff, w/ wavey sh pts spaced 1/4 to 2" apart, f grained,	4.7 / 4.7		
	44		alter oxidized + lGr unoxidized zones to a depth of 49'; unoxidized + Gr below 49'.			
	45		Breaks easily along sh pts., hd	45.4 / Run 5		
	46					
	47					
	48			8.0 / 8.0		
	49					
	50					

ENG FORM 1836 PROJECT

Hole No. WFS-2-19C-88

DRILLING LOG

DIVISION	
INSTALLATION	
SHEET 6 OF 10 SHEETS	
1. PROJECT	
2. LOCATION (Coordinates or Station)	
3. DRILLING AGENCY	
4. HOLE NO. (As shown on drawing title and file number)	2-19C
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		SS (cont.)			
	51					
	52					
	53			53.4 / Run 6		
	54			2.2 / 2.2		
	55		Bot ft grades to Blk sh w/ 1 Gr SS lens.			
			(Base of Mansfield fm)	55.6		PENN, 55.6'
			(Hardinsburg fm)	Run 7		MISS
	56		Shale, Gn, mass, soft-mod hd, crumbly.			
	57			2.8 / 3.8		
	58			1.0		Reamed hole & set 4" PVC casing to 59.4'. Grouted bot zone of casing.
	59			59.4 / Run 8		6/14/88
	60					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. 6ES-2-19C-ES

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) 2-19C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTUR
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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.)			Got back all water return
	61			0.8 / 4.8		Ground core away during drilling.
	62			-4.0		
	63			63.2 / Run 9		
	64			1.8 / 2.4		
				-0.6		
	65		clayston + Gn + dbr Red, mass, hd blocky fracturing (mottled)	65.6 / Run 10		
	66					
	67			3.9 / 7.6		Ground core away during drilling
	68			-3.7'		
	69					
	70					

ENG FORM 1836 PROJECT

Hole No. WFS-2-19C-65

DRILLING LOG	DIVISION	INSTALLATION	SHEET 8 OF 10 SHEETS

1. PROJECT
2. LOCATION (Coordinates or Station)
3. DRILLING AGENCY
4. HOLE NO. (As shown on drawing title and file number): 2-19C
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		Claystone (cont.)			
	71					
	72					
	73			23.2 Run 11		
			Shale, dGr, th bd, platey-flakey, hd.			
	74					
	75					
	76			9.5 / 10.0		
	77					
	78			>0.5		
		10	(Base of Hardinsburg - 78.7')			
	79	10.0 / 5	(Top of Golconda / Haney) Limestone, l-m grBr, m-c crystaline, fossiliferous, v hd, v dens.			
	80					

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE PROJECT HOLE NO.

Hole No. WES-2-19C-B4

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) 2-19C	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN — DISTURBED — UNDISTURBED
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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					
	82			82.7		Full depth
	83			83.2		
				Run 12		
	84	10 79 30 70 20				
	85		Shale, blk, thbd			
	86					
	87		Shale, blk - hbd	10.3 / 9.8		
	88	0 0		+0.5		
	89	0 0				
	90					

ENG FORM 1836 PROJECT

Hole No. 11FS-2-190-08

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) 2-19C	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		Base of Colorado/Harvey - 90.2			
			Top of Indian Springs			
			Shale, Blk, thin bd, carbonaceous, platey, hard, occ. fossils			
	91					
	92					
	93			93.0		
			Bot depth - 93.0'			

ENG FORM 1836 PROJECT HOLE NO.

Hole No. WES-2-19C-88

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 | UNDISTUR
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-2-19C-88			Date well screen was set: 6/14/88
733.35			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			72.0			
			Bentonite Pellets			
			75.0			PVC screen + Riser
			Filter Pack			
			80.2			
			Well Screen			
			90.2			
			Trap			
			91.2			
			93.0' Boring Depth			

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

Hole No. WES-2-19C-88

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
733.28			Well No. WES-2-19C P2-88			Date well screen was set: 6/15/88
			+2.5			
			0.0' Ground surface			
			Grout			
			4.0'			Water level just Prior to setting screen –
			~~Grout mixture~~			
			Sand			
			20.0			
			Bentonite Pellets			
			27.0			
						PVC Screen + Riser
			Filter Pack			
			45.6'			
			Well Screen			
			55.6			
			Trap			
			56.6			
			56.6' Boring Depth			

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

Hole No. WES-2-19CP3-88

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 — UNDISTU
5. NAME OF DRILLER	14. TOTAL NUMBER CORE BOXES
6. DIRECTION OF HOLE ☐ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER
7. THICKNESS OF OVERBURDEN	16. DATE HOLE — STARTED — COMPLETED
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE
9. TOTAL DEPTH OF HOLE	18. TOTAL CORE RECOVERY FOR BORING %
	19. SIGNATURE OF INSPECTOR

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION 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-2-19CP3-88			Date well screen was set: 6/16/88
733.63			+2.5			
			0.0' Ground surface			
			Grout mixture			Water level just Prior to setting screen –
			4.0			
			Bentonite Pellets			
			5.0			
						PVC Screen + Riser
			Filter Pack			
			10.7			
			Well Screen			
			15.7			
			Trap			
			16.7			
			16.7 Boring Depth			

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

IN5 170 023 498
11 Jan, 1991

Appendix B. Laboratory Chemical Analysis Results

Volatile Organics (Water)

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 1	2	3	4	5	6	7	8	9	ROW
		ANALYSIS..	72	73	74	75	76	77	78	79	80	
		PPM.....	CLME	BRME	VICL	CLET	MECL	DCLETE	11DCE	+DICLE	CHCL3	
99531	2-12CP3	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	0.010	
		%REC	*	*	*	*	*	*	*	*	*	1
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99532	2-13C	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	0.011	
		%REC	*	*	*	*	*	*	*	*	*	2
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99533	2-18CP2	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	0.0065	
		%REC	*	*	*	*	*	*	*	*	*	3
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99534	2-17C	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	0.007	
		%REC	*	*	*	*	*	*	*	*	*	4
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99535	SP-C	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	*	*	*	*	*	5
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99536	2-04	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	80	*	131.5	131.5	92	6
		DUPL	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99537	2-10CP2	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	*	*	*	*	*	7
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99538	2-13CP3	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	*	*	*	*	*	8
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	

-	CHLOROMETHANE	BRME	BROMOMETHANE	VICL	VINYL CHLORIDE
CLET	CHLOROETHANE	MECL	METHYLENE CHLORIDE	DCLETE	1 1-DICHLOROETHENE
11DCE	1 1-DICHLOROETHANE	+DICLE	TRANS-1 2-DICHLOROETHENE	CHCL3	CHLOROFORM

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	1	2	3	4	5	6	7	8	9	ROW
		ANALYSIS..	72	73	74	75	76	77	78	79	80	
		PPM.....	CLME	BRME	VICL	CLET	MECL	DCLETE	11DCE	+DICLE	CHCL3	
99539	2-10-CP3	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										9
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99540	2-13CP2	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	0.0074	
		%REC										10
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99541	2-18C	CONC	<0.010	<0.010	<0.010	<0.010	0.027	<0.005	<0.005	<0.005	0.011	
		%REC										11
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99542	2-14CP2	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										12
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	089582	
99543	2-14C	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										13
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99544	2-16CP2	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										14
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99545	2-15CP2	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										15
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99546	2/11CP2	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC						96.8		92.35	107.7	16
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	

CLME	CHLOROMETHANE	BRME	BROMOMETHANE	VICL	VINYL CHLORIDE
CLET	CHLOROETHANE	MECL	METHYLENE CHLORIDE	DCLETE	1 1-DICHLOROETHENE
11DCE	1 1-DICHLOROETHANE	+DICLE	TRANS-1 2-DICHLOROETHENE	CHCL3	CHLOROFORM

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	1	2	3	4	5	6	7	8	9	ROW
		ANALYSIS..	72	73	74	75	76	77	78	79	80	
		PPM.....	CLME	BRME	VICL	CLET	MECL	DCLETE	11DCE	+DICLE	CHCL3	
99547	2-11CP3	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	*	*	*	*	*	17
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99548	DBG-SEEP-W	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	*	*	*	*	*	18
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99549	2/11C	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	*	*	*	*	*	19
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99550	02-01	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	*	*	*	*	*	20
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99551	2-15C	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	0.0058	
		%REC	*	*	*	*	*	*	*	*	*	21
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99552	2-14CP2	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	*	*	*	*	*	22
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99553	2-17CP2	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	*	*	*	*	*	23
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99554	2-16C	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	0.0072	
		%REC	*	*	*	*	*	*	*	*	*	24
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	

[illegible]	CHLOROMETHANE	BRME	BROMOMETHANE	VICL	VINYL CHLORIDE
CLET	CHLOROETHANE	MECL	METHYLENE CHLORIDE	DCLETE	1 1-DICHLOROETHENE
11DCE	1 1-DICHLOROETHANE	+DICLE	TRANS-1 2-DICHLOROETHENE	CHCL3	CHLOROFORM

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531

REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	1	2	3	4	5	6	7	8	9	ROW
		ANALYSIS..	72	73	74	75	76	77	78	79	80	
		PPM.....	CLME	BRME	VICL	CLET	MECL	DCLETE	11DCE	+DICLE	CHCL3	
99555	2-05	CONC	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC							103.5	100.5	115.5	25
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	

CLME	CHLOROMETHANE	BRME	BROMOMETHANE	VICL	VINYL CHLORIDE
CLET	CHLOROETHANE	MECL	METHYLENE CHLORIDE	DCLETE	1 1-DICHLOROETHENE
11DCE	1 1-DICHLOROETHANE	+DICLE	TRANS-1 2-DICHLOROETHENE	CHCL3	CHLOROFORM

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	10	11	12	13	14	15	16	17	18	ROW
		ANALYSIS..	81	82	83	84	85	86	87	88	89	
		PPM.....	12DCE	111TCA	C CL 4	BRCL2M	DICLPR	+CLPRE	TCE	DBRCLM	CCLPRE	
99531	2-12CP3	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	*	*	*	*	*	1
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99532	2-13C	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	*	*	*	*	*	2
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99533	2-18CP2	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	*	*	*	*	*	3
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99534	2-17C	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	*	*	*	*	*	4
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99535	SP-C	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	*	*	*	*	*	5
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99536	2-04	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	93	93	92.5	134.95	113.75	145.5128*	112.6	90.5	50.81967*	6
		DUPL	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99537	2-10CP2	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	*	*	*	*	*	7
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99538	2-13CP3	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	*	*	*	*	*	*	*	*	*	8
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	

CE	1 2-DICHLOROETHANE	111TCA	1 1 1-TRICHLOROETHANE	C CL 4	CARBON TETRACHLORIDE
BRCL2M	BROMODICHLOROMETHANE	DICLPR	1 2 DICHLOROPROPANE	+CLPRE	TRANS-1 3-DICHLOROPROPENE
TCE	TRICHLOROETHENE	DBRCLM	DIBROMOCHLOROMETHANE	CCLPRE	CIS-1 3-DICHLOROPROPENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 10	11	12	13	14	15	16	17	18	ROW
			ANALYSIS.. 81	82	83	84	85	86	87	88	89	
			PPM..... 12DCE	111TCA	C CL 4	BRCL2M	DICLPR	+CLPRE	TCE	DBRCLM	CCLPRE	
99539	2-10-CP3	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										9
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99540	2-13CP2	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										10
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99541	2-18C	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										11
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99542	2-14CP2	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										12
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	089582	
99543	2-14C	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										13
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99544	2-16CP2	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										14
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99545	2-15CP2	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										15
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99546	2/11CP2	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	73.15	105.2		78.95	81.6		89.35	96.25		16
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	

12DCE	1 2-DICHLOROETHANE	111TCA	1 1 1-TRICHLOROETHANE	C CL 4	CARBON TETRACHLORIDE
BRCL2M	BROMODICHLOROMETHANE	DICLPR	1 2 DICHLOROPROPANE	+CLPRE	TRANS-1 3-DICHLOROPROPENE
TCE	TRICHLOROETHENE	DBRCLM	DIBROMOCHLOROMETHANE	CCLPRE	CIS-1 3-DICHLOROPROPENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 10	11	12	13	14	15	16	17	18	ROW
			ANALYSIS.. 81	82	83	84	85	86	87	88	89	
			PPM..... 12DCE	111TCA	C CL 4	BRCL2M	DICLPR	+CLPRE	TCE	DBRCLM	CCLPRE	
99547	2-11CP3	CONC	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	
		%REC	*	*	*	*	*	*	*	*	*	17
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99548	DBG-SEEP-W	CONC	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	
		%REC	*	*	*	*	*	*	*	*	*	18
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99549	2/11C	CONC	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	
		%REC	*	*	*	*	*	*	*	*	*	19
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99550	02-01	CONC	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	
		%REC	*	*	*	*	*	*	*	*	*	20
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99551	2-15C	CONC	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	
		%REC	*	*	*	*	*	*	*	*	*	21
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99552	2-14CP2	CONC	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	
		%REC	*	*	*	*	*	*	*	*	*	22
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99553	2-17CP2	CONC	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	
		%REC	*	*	*	*	*	*	*	*	*	23
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99554	2-16C	CONC	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	
		%REC	*	*	*	*	*	*	*	*	*	24
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	

CE	1 2-DICHLOROETHANE	111TCA	1 1 1-TRICHLOROETHANE	C CL 4	CARBON TETRACHLORIDE
BRCL2M	BROMODICHLOROMETHANE	DICLPR	1 2 DICHLOROPROPANE	+CLPRE	TRANS-1 3-DICHLOROPROPENE
TCE	TRICHLOROETHENE	DBRCLM	DIBROMOCHLOROMETHANE	CCLPRE	CIS-1 3-DICHLOROPROPENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

	COLUMN....	10	11	12	13	14	15	16	17	18
_	ANALYSIS..	81	82	83	84	85	86	87	88	89
B : DENOTES PPB	PPM.....	12DCE	111TCA	C CL 4	BRCL2M	DICLPR	+CLPRE	TCE	DBRCLM	CCLPRE

LAB ID	PROJECT ID											ROW
99555	2-05	CONC	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC	108	102.5	104	99.5	101		109	95	75	25
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	

12DCE	1 2-DICHLOROETHANE	111TCA	1 1 1-TRICHLOROETHANE	C CL 4	CARBON TETRACHLORIDE
BRCL2M	BROMODICHLOROMETHANE	DICLPR	1 2 DICHLOROPROPANE	+CLPRE	TRANS-1 3-DICHLOROPROPENE
TCE	TRICHLOROETHENE	DBRCLM	DIBROMOCHLOROMETHANE	CCLPRE	CIS-1 3-DICHLOROPROPENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	19	20	21	22	23	24	25	26	27	ROW
		ANALYSIS..	90	91	92	93	94	95	96	97	98	
		PPM.....	112TCA	BENZEN	CLETRE	CHBR3	TCLETA	TCLETE	TOLUEN	CLBEN	ETBEN	
99531	2-12CP3	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										1
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99532	2-13C	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										2
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99533	2-18CP2	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										3
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99534	2-17C	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										4
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99535	SP-C	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										5
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99536	2-04	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC		76	94.1	96			58	105.5	105.5	6
		DUPL	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99537	2-10CP2	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										7
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99538	2-13CP3	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										8
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	

.CA	1 1 2-TRICHLOROETHANE	BENZEN	BENZENE	CLETRE	2-CHLOROETHYLVINYLETHER
CHBR3	BROMOFORM	TCLETA	1 1 2 2-TETRACHLOROETHANE	TCLETE	TETRACHLOROETHENE
TOLUEN	TOLUENE	CLBEN	CHLOROBENZENE	ETBEN	ETHYLBENZENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 19	20	21	22	23	24	25	26	27	ROW
			ANALYSIS.. 90	91	92	93	94	95	96	97	98	
			PPM..... 112TCA	BENZEN	CLETRE	CHBR3	TCLETA	TCLETE	TOLUEN	CLBEN	ETBEN	
99539	2-10-CP3	CONC	<0.005 *	<0.005 *	<0.010 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	
		%REC	*	*	*	*	*	*	*	*	*	9
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99540	2-13CP2	CONC	<0.005 *	<0.005 *	<0.010 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	
		%REC	*	*	*	*	*	*	*	*	*	10
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99541	2-18C	CONC	<0.005 *	<0.005 *	<0.010 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	
		%REC	*	*	*	*	*	*	*	*	*	11
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99542	2-14CP2	CONC	<0.005 *	<0.005 *	<0.010 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	
		%REC	*	*	*	*	*	*	*	*	*	12
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	0895821	
99543	2-14C	CONC	<0.005 *	<0.005 *	<0.010 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	
		%REC	*	*	*	*	*	*	*	*	*	13
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99544	2-16CP2	CONC	<0.005 *	<0.005 *	<0.010 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	
		%REC	*	*	*	*	*	*	*	*	*	14
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99545	2-15CP2	CONC	<0.005 *	<0.005 *	<0.010 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	
		%REC	*	*	*	*	*	*	*	*	*	15
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99546	2/11CP2	CONC	<0.005 *	<0.005 *	<0.010 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	<0.005 *	
		%REC	*	* 103	* 93.9	* 91.45	* 92.1	* 122.5	* 100.3	* 96.75	*	16
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	

112TCA 1 1 2-TRICHLOROETHANE
BENZEN BENZENE
CLETRE 2-CHLOROETHYLVINYLETHER
CHBR3 BROMOFORM
TCLETA 1 1 2 2-TETRACHLOROETHANE
TCLETE TETRACHLOROETHENE
TOLUEN TOLUENE
CLBEN CHLOROBENZENE
ETBEN ETHYLBENZENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	19	20	21	22	23	24	25	26	27	ROW
		ANALYSIS..	90	91	92	93	94	95	96	97	98	
		PPM.....	112TCA	BENZEN	CLETRE	CHBR3	TCLETA	TCLETE	TOLUEN	CLBEN	ETBEN	
99547	2-11CP3	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										17
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99548	DBG-SEEP-W	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										18
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99549	2/11C	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										19
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99550	02-01	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										20
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99551	2-15C	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										21
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99552	2-14CP2	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										22
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99553	2-17CP2	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										23
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99554	2-16C	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC										24
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	

.CA 1 1 2-TRICHLOROETHANE
CHBR3 BROMOFORM
TOLUEN TOLUENE
BENZEN BENZENE
TCLETA 1 1 2 2-TETRACHLOROETHANE
CLBEN CHLOROBENZENE
CLETRE 2-CHLOROETHYLVINYLETHER
TCLETE TETRACHLOROETHENE
ETBEN ETHYLBENZENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531

REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	19	20	21	22	23	24	25	26	27	ROW
		ANALYSIS..	90	91	92	93	94	95	96	97	98	
		PPM.....	112TCA	BENZEN	CLETRE	CHBR3	TCLETA	TCLETE	TOLUEN	CLBEN	ETBEN	
99555	2-05	CONC	<0.005	<0.005	<0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
		%REC		112.5	96	92.5	104.5		97		100.5	25
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	

112TCA	1 1 2-TRICHLOROETHANE	BENZEN	BENZENE	CLETRE	2-CHLOROETHYLVINYLETHER
CHBR3	BROMOFORM	TCLETA	1 1 2 2-TETRACHLOROETHANE	TCLETE	TETRACHLOROETHENE
TOLUEN	TOLUENE	CLBEN	CHLOROBENZENE	ETBEN	ETHYLBENZENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	28	29	30	31	32	33	34	35	36	ROW
		ANALYSIS..	99	100	156	157	158	159	160	161	162	
		PPM.....	ACRO	ACRY	ACETON	BUTANO	CS2	2HEXAN	4ME2PE	STYREN	VINACE	
99531	2-12CP3	CONC	<0.10	<0.10	<0.10	<0.10	<0.005	<0.05	<0.05	<0.005	<0.05	
		%REC										1
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99532	2-13C	CONC	<0.10	<0.10	1.91	<0.10	<0.005	<0.05	<0.05	<0.005	<0.05	
		%REC										2
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99533	2-18CP2	CONC	<0.10	<0.10	3.5	<0.10	<0.005	<0.05	<0.05	<0.005	<0.05	
		%REC										3
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99534	2-17C	CONC	<0.10	<0.10	<0.10	<0.10	<0.005	<0.05	<0.05	<0.005	<0.05	
		%REC										4
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99535	SP-C	CONC	<0.10	<0.10	<0.10	<0.10	<0.005	<0.05	<0.05	<0.005	<0.05	
		%REC										5
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99536	2-04	CONC	<0.10	<0.10	0.104	<0.10	<0.005	<0.05	<0.05	<0.005	<0.05	
		%REC										6
		DUPL	<0.10	<0.10	<0.10	<0.10	<0.005	<0.05	<0.05	<0.005	<0.05	
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99537	2-10CP2	CONC	<0.10	<0.10	1.74	<0.10	<0.005	<0.05	<0.05	<0.005	<0.05	
		%REC										7
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	
99538	2-13CP3	CONC	<0.10	<0.10	<0.10	<0.10	<0.005	<0.05	<0.05	<0.005	<0.05	
		%REC										8
		DUPL										
		OID	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	08958214	

J	ACROLEIN	ACRY	ACRYLONITRILE	ACETON	ACETONE
BUTANO	2-BUTANONE	CS2	CARBONDISULFIDE	2HEXAN	2-HEXANONE
4ME2PE	4-METHYL-2-PENTANONE	STYREN	STYRENE	VINACE	VINYL ACETATE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 28	29	30	31	32	33	34	35	36	ROW
			ANALYSIS.. 99	100	156	157	158	159	160	161	162	
			PPM..... ACRO	ACRY	ACETON	BUTANO	CS2	2HEXAN	4ME2PE	STYREN	VINACE	
99539	2-10-CP3	CONC	<0.10 *	<0.10 *	<0.10 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
		%REC	*	*	*	*	*	*	*	*	*	9
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99540	2-13CP2	CONC	<0.10 *	<0.10 *	<0.10 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
		%REC	*	*	*	*	*	*	*	*	*	10
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99541	2-18C	CONC	<0.10 *	<0.10 *	<0.10 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
		%REC	*	*	*	*	*	*	*	*	*	11
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99542	2-14CP2	CONC	<0.10 *	<0.10 *	7.84 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
		%REC	*	*	*	*	*	*	*	*	*	12
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	089582	
99543	2-14C	CONC	<0.10 *	<0.10 *	<0.10 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
		%REC	*	*	*	*	*	*	*	*	*	13
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99544	2-16CP2	CONC	<0.10 *	<0.10 *	<0.10 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
		%REC	*	*	*	*	*	*	*	*	*	14
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99545	2-15CP2	CONC	<0.10 *	<0.10 *	2.7 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
		%REC	*	*	*	*	*	*	*	*	*	15
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99546	2/11CP2	CONC	<0.10 *	<0.10 *	<0.10 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
		%REC	*	*	*	*	*	*	*	*	*	16
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	

ACRO	ACROLEIN	ACRY	ACRYLONITRILE	ACETON	ACETONE
BUTANO	2-BUTANONE	CS2	CARBONDISULFIDE	2HEXAN	2-HEXANONE
4ME2PE	4-METHYL-2-PENTANONE	STYREN	STYRENE	VINACE	VINYL ACETATE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	28	29	30	31	32	33	34	35	36	ROW
		ANALYSIS..	99	100	156	157	158	159	160	161	162	
		PPM.....	ACRO	ACRY	ACETON	BUTANO	CS2	2HEXAN	4ME2PE	STYREN	VINACE	
99547	2-11CP3	CONC	<0.10 *	<0.10 *	<0.10 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
		%REC	*	*	*	*	*	*	*	*	*	17
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99548	DBG-SEEP-W	CONC	<0.10 *	<0.10 *	<0.10 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
		%REC	*	*	*	*	*	*	*	*	*	18
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99549	2/11C	CONC	<0.10 *	<0.10 *	2.67 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
		%REC	*	*	*	*	*	*	*	*	*	19
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99550	02-01	CONC	<0.10 *	<0.10 *	<0.10 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
		%REC	*	*	*	*	*	*	*	*	*	20
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99551	2-15C	CONC	<0.10 *	<0.10 *	3.72 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
		%REC	*	*	*	*	*	*	*	*	*	21
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99552	2-14CP2	CONC	<0.10 *	<0.10 *	0.70 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
		%REC	*	*	*	*	*	*	*	*	*	22
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99553	2-17CP2	CONC	<0.10 *	<0.10 *	<0.10 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
		%REC	*	*	*	*	*	*	*	*	*	23
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	
99554	2-16C	CONC	<0.10 *	<0.10 *	1.71 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
		%REC	*	*	*	*	*	*	*	*	*	24
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	

ACRO	ACROLEIN	ACRY	ACRYLONITRILE	ACETON	ACETONE
BUTANO	2-BUTANONE	CS2	CARBONDISULFIDE	2HEXAN	2-HEXANONE
4ME2PE	4-METHYL-2-PENTANONE	STYREN	STYRENE	VINACE	VINYL ACETATE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531

REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN....	28	29	30	31	32	33	34	35	36	ROW
			ANALYSIS..	99	100	156	157	158	159	160	161	162	
			PPM.....	ACRO	ACRY	ACETON	BUTANO	CS2	2HEXAN	4ME2PE	STYREN	VINACE	
99555	2-05		CONC	<0.10 *	<0.10 *	<0.10 *	<0.10 *	<0.005 *	<0.05 *	<0.05 *	<0.005 *	<0.05 *	
			%REC	*	*	*	*	*	*	*	*	*	25
			DUPL	*	*	*	*	*	*	*	*	*	
			OID	03958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	08958214*	

ACRO	ACROLEIN	ACRY	ACRYLONITRILE	ACETON	ACETONE
BUTANO	2-BUTANONE	CS2	CARBONDISULFIDE	2HEXAN	2-HEXANONE
4ME2PE	4-METHYL-2-PENTANONE	STYREN	STYRENE	VINACE	VINYL ACETATE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 37	38	39	40	ROW
			ANALYSIS.. 163	164	165	166	
			PPM..... T-XYL	12ED4	TOL-D8	BFB	
99531	2-12CP3	CONC	<0.005 *	96.3% *	92.7% *	96.4% *	
		%REC	*	*	*	*	1
		DUPL	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	
99532	2-13C	CONC	<0.005 *	100% *	99.5% *	103% *	
		%REC	*	*	*	*	2
		DUPL	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	
99533	2-18CP2	CONC	<0.005 *	103% *	123% *	97.6% *	
		%REC	*	*	*	*	3
		DUPL	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	
99534	2-17C	CONC	<0.005 *	102% *	103% *	95.8% *	
		%REC	*	*	*	*	4
		DUPL	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	
99535	SP-C	CONC	<0.005 *	92.0% *	75.0% *	131% *	
		%REC	*	*	*	*	5
		DUPL	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	
99536	2-04	CONC	<0.005 *	105% *	99.7% *	90% *	
		%REC	*	*	*	*	6
		DUPL	<0.005 *	99.3% *	104% *	89.2% *	
		OID	08958214*	08958214*	08958214*	08958214*	
99537	2-10CP2	CONC	<0.005 *	103% *	109% *	94.7% *	
		%REC	*	*	*	*	7
		DUPL	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	
99538	2-13CP3	CONC	<0.005 *	93.8% *	109% *	87.9% *	
		%REC	*	*	*	*	8
		DUPL	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	

L T-XYLENE 12ED4 1 2-DICHLOROETHANE-D4 TOL-D8 TOLUENE-D8
BFB 4-BROMOFLUOROBENZENE

JOB DESCRIPTION:*CRANE - ZAPPI
REPORT DATE:17 Feb 89

RD8G093E1170001
RECEIPT DATE:05 Jul 88

JOB FILE:A:99531
EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 37	38	39	40	ROW
			ANALYSIS.. 163	164	165	166	
			PPM..... T-XYL	12ED4	TOL-D8	BFB	
99539	2-10-CP3	CONC	<0.005	98.5%	103%	90.3%	9
		%REC					
		DUPL					
		OID	08958214	08958214	08958214	08958214	
99540	2-13CP2	CONC	<0.005	96.6%	117%	91.7%	10
		%REC					
		DUPL					
		OID	08958214	08958214	08958214	08958214	
99541	2-18C	CONC	<0.005	92.4%	107%	110%	11
		%REC					
		DUPL					
		OID	08958214	08958214	08958214	08958214	
99542	2-14CP2	CONC	<0.005	112%	87.6%	113%	12
		%REC					
		DUPL					
		OID	08958214	08958214	08958214	08958214	
99543	2-14C	CONC	<0.005	106%	92.6%	124%	13
		%REC					
		DUPL					
		OID	08958214	08958214	08958214	08958214	
99544	2-16CP2	CONC	<0.005	106%	83.8%	97.4%	14
		%REC					
		DUPL					
		OID	08958214	08958214	08958214	08958214	
99545	2-15CP2	CONC	<0.005	85.1%	80.8%	102%	15
		%REC					
		DUPL					
		OID	08958214	08958214	08958214	08958214	
99546	2/11CP2	CONC	<0.005	104%	100%	80.2%	16
		%REC					
		DUPL					
		OID	08958214	08958214	08958214	08958214	

T-XYL T-XYLENE 12ED4 1 2-DICHLOROETHANE-D4 TOL-D8 TOLUENE-D8
BFB 4-BROMOFLUOROBENZENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 37	38	39	40	ROW
			ANALYSIS.. 163	164	165	166	
			PPM..... T-XYL	12ED4	TOL-D8	BFB	
99547	2-11CP3	CONC	<0.005 *	99.1% *	130% *	104% *	
		%REC	*	*	*	*	17
		DUPL	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	
99548	DBG-SEEP-W	CONC	<0.005 *	98.8% *	92.6% *	96.6% *	
		%REC	*	*	*	*	18
		DUPL	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	
99549	2/11C	CONC	<0.005 *	100% *	105% *	104% *	
		%REC	*	*	*	*	19
		DUPL	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	
99550	02-01	CONC	<0.005 *	97.7% *	99.8% *	107% *	
		%REC	*	*	*	*	20
		DUPL	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	
99551	2-15C	CONC	<0.005 *	97.4% *	100% *	97.2% *	
		%REC	*	*	*	*	21
		DUPL	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	
99552	2-14CP2	CONC	<0.005 *	100% *	102% *	103% *	
		%REC	*	*	*	*	22
		DUPL	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	
99553	2-17CP2	CONC	<0.005 *	101% *	92.4% *	94.0% *	
		%REC	*	*	*	*	23
		DUPL	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	
99554	2-16C	CONC	<0.005 *	102% *	95.8% *	94.0% *	
		%REC	*	*	*	*	24
		DUPL	*	*	*	*	
		OID	08958214*	08958214*	08958214*	08958214*	

T-XYLENE 12ED4 1 2-DICHLOROETHANE-D4 TOL-D8 TOLUENE-D8
BFB 4-BROMOFLUOROBENZENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99531
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:05 Aug 88

	COLUMN....	37	38	39	40	
_	ANALYSIS..	163	164	165	166	
B : DENOTES PPB	PPM.....	T-XYL	12ED4	TOL-D8	BFB	
LAB ID PROJECT ID						ROW
99555 2-05	CONC	<0.005	* 97.7%	* 92.0%	* 97.4% *	
	%REC	*	*	*	*	25
	DUPL	*	*	*	*	
	OID	08958214*	08958214*	08958214*	08958214*	

T-XYL T-XYLENE 12ED4 1 2-DICHLOROETHANE-D4 TOL-D8 TOLUENE-D8
BFB 4-BROMOFLUOROBENZENE

Volatile Organics (Sediment)

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 SEDIMENT JOB FILE:A:99628
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:26 Aug 88

	COLUMN....	1	2	3	4	5	6	7	8	9	
_	ANALYSIS..	72	73	74	75	76	77	78	79	80	
B : DENOTES PPB	PPM.....	CLME	BRME	VICL	CLET	MECL	DCLETE	11DCE	+DICLE	CHCL3	
LAB ID PROJECT ID											ROW
99628 DBG SEEP S	CONC	<0.050 *	<0.050 *	<0.050 *	<0.050 *	<0.025 *	<0.025 *	<0.025 *	<0.025 *	<0.025 *	
	%REC	*	*	*	*	*	*	*	*	*	1
	DUPL	*	*	*	*	*	*	*	*	*	
	OID	08938245*	08938245*	08938245*	08938245*	08938245*	08938245*	08938245*	08938245*	08938245*	

CLME	CHLOROMETHANE	BRME	BROMOMETHANE	VICL	VINYL CHLORIDE
CLET	CHLOROETHANE	MECL	METHYLENE CHLORIDE	DCLETE	1 1-DICHLOROETHENE
11DCE	1 1-DICHLOROETHANE	+DICLE	TRANS-1 2-DICHLOROETHENE	CHCL3	CHLOROFORM

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 SEDIMENT JOB FILE:A:99628
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:26 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN....	10	11	12	13	14	15	16	17	18	ROW
			ANALYSIS..	81	82	83	84	85	86	87	88	89	
			PPM.....	12DCE	111TCA	C CL 4	BRCL2M	DICLPR	+CLPRE	TCE	DBRCLM	CCLPRE	
99628	DBG SEEP S		CONC	<0.025 *	<0.025 *	<0.025 *	<0.025 *	<0.025 *	<0.025 *	<0.025 *	<0.025 *	<0.025 *	
			%REC	*	*	*	*	*	*	*	*	*	1
			DUPL	*	*	*	*	*	*	*	*	*	
			OID	03938245*	08938245*	08938245*	08938245*	08938245*	08938245*	08938245*	08938245*	08938245*	

12DCE	1 2-DICHLOROETHANE	111TCA	1 1 1-TRICHLOROETHANE	C CL 4	CARBON TETRACHLORIDE
BRCL2M	BROMODICHLOROMETHANE	DICLPR	1 2 DICHLOROPROPANE	+CLPRE	TRANS-1 3-DICHLOROPROPENE
TCE	TRICHLOROETHENE	DBRCLM	DIBROMOCHLOROMETHANE	CCLPRE	CIS-1 3-DICHLOROPROPENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 SEDIMENT JOB FILE:A:99628
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:26 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	19	20	21	22	23	24	25	26	27	ROW
		ANALYSIS..	90	91	92	93	94	95	96	97	98	
		PPM.....	112TCA	BENZEN	CLETRE	CHBR3	TCLETA	TCLETE	TOLUEN	CLBEN	ETBEN	
99628	DBG SEEP S	CONC	<0.025 *	<0.025 *	<0.050 *	<0.025 *	<0.025 *	<0.025 *	<0.025 *	<0.025 *	<0.025 *	
		%REC	*	*	*	*	*	*	*	*	*	1
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08938245*	08938245*	08938245*	08938245*	08938245*	08938245*	08938245*	08938245*	08938245*	

112TCA	1 1 2-TRICHLOROETHANE	BENZEN	BENZENE	CLETRE	2-CHLOROETHYLVINYLETHER
CHBR3	BROMOFORM	TCLETA	1 1 2 2-TETRACHLOROETHANE	TCLETE	TETRACHLOROETHENE
TOLUEN	TOLUENE	CLBEN	CHLOROBENZENE	ETBEN	ETHYLBENZENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 SEDIMENT JOB FILE:A:99628
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:26 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	28	29	30	31	32	33	34	35	36	ROW
		ANALYSIS..	99	100	156	157	158	159	160	161	162	
		PPM.....	ACRO	ACRY	ACETON	BUTANO	CS2	2HEXAN	4ME2PE	STYREN	VINACE	
99628	DBG SEEP S	CONC	<0.50 *	<0.50 *	<0.50 *	<0.50 *	<0.025 *	<0.25 *	<0.25 *	<0.025 *	<0.25 *	
		%REC	*	*	*	*	*	*	*	*	*	1
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08938245*	08938245*	08938245*	08938245*	08938245*	08938245*	08938245*	08938245*	08938245*	

ACRO	ACROLEIN	ACRY	ACRYLONITRILE	ACETON	ACETONE
BUTANO	2-BUTANONE	CS2	CARBONDISULFIDE	2HEXAN	2-HEXANONE
4ME2PE	4-METHYL-2-PENTANONE	STYREN	STYRENE	VINACE	VINYL ACETATE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 SEDIMENT JOB FILE:A:99628
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:26 Aug 88

	COLUMN....	37	38	39	40	
_	ANALYSIS..	163	164	165	166	
B : DENOTES PPB	PPM.....	T-XYL	12ED4	TOL-D8	BFB	
LAB ID PROJECT ID						ROW
99628 DBG SEEP S	CONC	<0.025 *	87.0% *	78.4% *	84.4% *	
	%REC	*	*	*	*	1
	DUPL	*	*	*	*	
	OID	08938245*	08938245*	08938245*	08938245*	

T-XYL T-XYLENE 12ED4 1 2-DICHLOROETHANE-D4 TOL-D8 TOLUENE-D8
BFB 4-BROMOFLUOROBENZENE

Base/Neutrals, Acid Extractables (BNAs) (Water)

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	1	2	3	4	5	6	7	8	9	ROW
		ANALYSIS..	61	62	63	64	65	66	67	68	69	
		PPM.....	PHENOL	CLPHEN	2NIPHE	DMEPHE	DCLPHE	CLMEPH	TCLPHE	DNIPHE	4NIPHE	
99556	2-12CP3	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.020 *	<0.010 *	<0.050 *	<0.050 *	
		%REC	*	*	*	*	*	*	*	*	*	1
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99557	2-13C	CONC	<0.030 *	<0.030 *	<0.030 *	<0.030 *	<0.030 *	<0.060 *	<0.030 *	<0.15 *	<0.15 *	
		%REC	*	24.3 *	52.1 *	73.8 *	80.1 *	95.8 *	79.1 *	121.85 *	*	2
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99558	2-18CP2	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.020 *	<0.010 *	<0.050 *	<0.050 *	
		%REC	*	*	*	*	*	*	*	*	*	3
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99559	2-17C	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.020 *	<0.010 *	<0.050 *	<0.050 *	
		%REC	*	*	*	*	*	*	*	*	*	4
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	089582	
99560	SP-C	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.020 *	<0.010 *	<0.050 *	<0.050 *	
		%REC	*	*	*	*	*	*	*	*	*	5
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99561	2-04	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.020 *	<0.010 *	<0.050 *	<0.050 *	
		%REC	*	*	*	*	*	*	*	*	*	6
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99562	2-10CP2	CONC	<0.023 *	<0.023 *	<0.023 *	<0.023 *	<0.023 *	<0.046 *	<0.023 *	<0.115 *	<0.115 *	
		%REC	*	*	*	*	*	*	*	*	*	7
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99563	2-13CP3	CONC	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.022 *	<0.011 *	<0.055 *	<0.055 *	
		%REC	*	*	*	*	*	*	*	*	*	8
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	

PHENOL PHENOL
DMEPHE 2 4-DIMETHYLPHENOL
TCLPHE 2 4 6-TRICHLOROPHENOL
CLPHEN 2-CHLOROPHENOL
DCLPHE 2 4-DICHLOROPHENOL
DNIPHE 2 4 DINITROPHENOL
2NIPHE 2-NITROPHENOL
CLMEPH 4-CHLORO-3-METHYLPHENOL
4NIPHE 4-NITROPHENOL

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID		1 PHENOL	2 CLPHEN	3 2NIPHE	4 DMEPHE	5 DCLPHE	6 CLMEPH	7 TCLPHE	8 DNIPHE	9 4NIPHE	ROW
		COLUMN....	1	2	3	4	5	6	7	8	9	
		ANALYSIS..	61	62	63	64	65	66	67	68	69	
		PPM.....										
99564	2-10CP3	CONC	<0.011	<0.011	<0.011	<0.011	<0.011	<0.022	<0.011	<0.055	<0.055	
		%REC		75.77808	76.91919							9
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99565	2-13CP2	CONC	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.050	<0.050	
		%REC										10
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99566	2-18C	CONC	<0.017	<0.017	<0.017	<00.017	<0.017	<0.034	<0.017	<0.085	<0.085	
		%REC										11
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99567	2-14CP2	CONC	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.050	<0.050	
		%REC										12
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99568	2-14C	CONC	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.050	<0.050	
		%REC										13
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99569	2-16CP2	CONC	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.050	<0.050	
		%REC										14
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99570	2-15CP2	CONC	<0.014	<0.014	<0.014	<0.014	<0.014	<0.028	<0.014	<0.070	<0.070	
		%REC										15
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99571	2/11CP2	CONC	<0.013	<0.013	<0.013	<0.013	<0.013	<0.026	<0.013	<0.065	<0.065	
		%REC										16
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	

..NOL	PHENOL	CLPHEN	2-CHLOROPHENOL	2NIPHE	2-NITROPHENOL
DMEPHE	2 4-DIMETHYLPHENOL	DCLPHE	2 4-DICHLOROPHENOL	CLMEPH	4-CHLORO-3-METHYLPHENOL
TCLPHE	2 4 6-TRICHLOROPHENOL	DNIPHE	2 4 DINITROPHENOL	4NIPHE	4-NITROPHENOL

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	1	2	3	4	5	6	7	8	9	ROW
		ANALYSIS..	61	62	63	64	65	66	67	68	69	
		PPM.....	PHENOL	CLPHEN	2NIPHE	DMEPHE	DCLPHE	CLMEPH	TCLPHE	DNIPHE	4NIPHE	
99572	2-11CP3	CONC	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	<0.010	<0.050	<0.050	
		%REC	31.7	65.6	76.2	83	77.1	72	82.9	108.05		17
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99573	DBG-SEEP-W	CONC	<0.011	<0.011	<0.011	<0.011	<0.011	<0.022	<0.011	<0.055	<0.055	
		%REC										18
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99574	2/11C	CONC	<0.013	<0.013	<0.013	<0.013	<0.013	<0.026	<0.013	<0.065	<0.065	
		%REC										19
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99575	02-01	CONC	<0.011	<0.011	<0.011	<0.011	<0.011	<0.022	<0.011	<0.055	<0.055	
		%REC										20
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	089582	
99576	2-17CP2	CONC	<0.011	<0.011	<0.011	<0.011	<0.011	<0.022	<0.011	<0.055	<0.055	
		%REC										21
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99577	2-05	CONC	<0.012	<0.012	<0.012	<0.012	<0.012	<0.024	<0.012	<0.060	<0.060	
		%REC										22
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	

PHENOL PHENOL
DMEPHE 2 4-DIMETHYLPHENOL
TCLPHE 2 4 6-TRICHLOROPHENOL
CLPHEN 2-CHLOROPHENOL
DCLPHE 2 4-DICHLOROPHENOL
DNIPHE 2 4 DINITROPHENOL
2NIPHE 2-NITROPHENOL
CLMEPH 4-CHLORO-3-METHYLPHENOL
4NIPHE 4-NITROPHENOL

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	10	11	12	13	14	15	16	17	18	ROW
		ANALYSIS..	70	71	101	102	103	104	105	106	107	
		PPM.....	MDNPHE	PCLPHE	NDMEAM	CLISOE	NDRPAM	NIBEN	ISOPHO	CLETME	26DNT	
99556	2-12CP3	CONC	<0.050 *	<0.050 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	1
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99557	2-13C	CONC	<0.15 *	<0.15 *	<0.030 *	<0.030 *	<0.030 *	<0.030 *	<0.030 *	<0.030 *	<0.030 *	
		%REC	94.4 *	97.6 *	*	*	*	*	*	*	*	2
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99558	2-18CP2	CONC	<0.050 *	<0.050 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	3
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99559	2-17C	CONC	<0.050 *	<0.050 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	4
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99560	SP-C	CONC	<0.050 *	<0.050 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	5
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99561	2-04	CONC	<0.050 *	<0.050 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	6
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99562	2-10CP2	CONC	<0.115 *	<0.115 *	<0.023 *	<0.023 *	<0.023 *	<0.023 *	<0.023 *	<0.023 *	<0.023 *	
		%REC	*	*	*	*	*	*	*	*	*	7
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99563	2-13CP3	CONC	<0.055 *	<0.055 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	*	*	*	*	*	*	*	8
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	

HE	2-MTHYL-4 6-DINITROPHENOL	PCLPHE	PENTACHLOROPHENOL	NDMEAM	N-NITROSODIMETHYLAMINE
CLISOE	BIS(2-CHLOROISOPROPYL)ETHER	NDRPAM	N-NITROSO-DI-N-PROPYLAMINE	NIBEN	NITROBENZENE
ISOPHO	ISOPHORONE	CLETME	BIS(2-CHLOROETHOXY)METHANE	26DNT	2 6-DINITROTOLUENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	10	11	12	13	14	15	16	17	18	ROW
		ANALYSIS..	70	71	101	102	103	104	105	106	107	
		PPM.....	MDNPHE	PCLPHE	NDMEAM	CLISOE	NDRPAM	NIBEN	ISOPHO	CLETME	26DNT	
99564	2-10CP3	CONC	<0.055 *	<0.055 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	*	*	*	72.5 *	*	*	*	9
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99565	2-13CP2	CONC	<0.050 *	<0.050 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	10
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99566	2-18C	CONC	<0.085 *	<0.085 *	<0.017 *	<0.017 *	<0.017 *	<0.017 *	<0.017 *	<0.017 *	<0.017 *	
		%REC	*	*	*	*	*	*	*	*	*	11
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99567	2-14CP2	CONC	<0.050 *	<0.050 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	12
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	089582	
99568	2-14C	CONC	<0.050 *	<0.050 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	13
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99569	2-16CP2	CONC	<0.050 *	<0.050 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	14
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99570	2-15CP2	CONC	<0.070 *	<0.070 *	<0.014 *	<0.014 *	<0.014 *	<0.014 *	<0.014 *	<0.014 *	<0.014 *	
		%REC	*	*	*	*	*	*	*	*	*	15
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99571	2/11CP2	CONC	<0.065 *	<0.065 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	
		%REC	*	*	*	*	*	*	*	*	*	16
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	

MDNPHE	2-MTHYL-4 6-DINITROPHENOL	PCLPHE	PENTACHLOROPHENOL	NDMEAM	N-NITROSODIMETHYLAMINE
CLISOE	BIS(2-CHLOROISOPROPYL)ETHER	NDRPAM	N-NITROSO-DI-N-PROPYLAMINE	NIBEN	NITROBENZENE
ISOPHO	ISOPHORONE	CLETME	BIS(2-CHLOROETHOXY)METHANE	26DNT	2 6-DINITROTOLUENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	10	11	12	13	14	15	16	17	18	ROW
		ANALYSIS..	70	71	101	102	103	104	105	106	107	
		PPM.....	MDNPHE	PCLPHE	NDMEAM	CLISOE	NDRPAM	NIBEN	ISOPHO	CLETME	26DNT	
99572	2-11CP3	CONC	<0.050	<0.050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
		%REC		104.5		67.37501		71.75		59.625	88.87499	17
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99573	DBG-SEEP-W	CONC	<0.055	<0.055	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	
		%REC										18
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99574	2/11C	CONC	<0.065	<0.065	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	
		%REC										19
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99575	02-01	CONC	<0.055	<0.055	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	
		%REC										20
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99576	2-17CP2	CONC	<0.055	<0.055	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	
		%REC										21
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99577	2-05	CONC	<0.060	<0.060	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	
		%REC										22
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	

MDNPHE	2-MTHYL-4 6-DINITROPHENOL	PCLPHE	PENTACHLOROPHENOL	NDMEAM	N-NITROSODIMETHYLAMINE
CLISOE	BIS(2-CHLOROISOPROPYL)ETHER	NDRPAM	N-NITROSO-DI-N-PROPYLAMINE	NIBEN	NITROBENZENE
ISOPHO	ISOPHORONE	CLETME	BIS(2-CHLOROETHOXY)METHANE	26DNT	2 6-DINITROTOLUENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN....	19	20	21	22	23	24	25	26	27	ROW
			ANALYSIS..	108	109	110	111	112	113	114	115	116	
			PPM.....	24DNT	DPHHYD	BENZID	DCLBEZ	BCLETE	MDCLBE	PDCLBE	ODCLBE	HCLETA	
99556	2-12CP3		CONC	<0.010	<0.010	<0.050	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	
			%REC										1
			DUPL										
			OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99557	2-13C		CONC	<0.030	<0.030	<0.15	<0.060	<0.030	<0.030	<0.030	<0.030	<0.030	
			%REC										2
			DUPL										
			OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99558	2-18CP2		CONC	<0.010	<0.010	<0.050	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	
			%REC										3
			DUPL										
			OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99559	2-17C		CONC	<0.010	<0.010	<0.050	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	
			%REC										4
			DUPL										
			OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	089582	
99560	SP-C		CONC	<0.010	<0.010	<0.050	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	
			%REC										5
			DUPL										
			OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99561	2-04		CONC	<0.010	<0.010	<0.050	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	
			%REC										6
			DUPL										
			OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99562	2-10CP2		CONC	<0.023	<0.023	<0.115	<0.046	<0.023	<0.023	<0.023	<0.023	<0.023	
			%REC										7
			DUPL										
			OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99563	2-13CP3		CONC	<0.011	<0.011	<0.055	<0.022	<0.011	<0.011	<0.011	<0.011	<0.011	
			%REC										8
			DUPL										
			OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	

24DNT 2 4-DINITROTOLUENE
DPHHYD 1 2-DIPHENYLHYDRAZINE
BENZID BENZIDINE
DCLBEZ 3 3'DICHLOROBENZIDINE
BCLETE BIS(2-CHLOROETHYL)ETHER
MDCLBE 1 3-DICHLOROBENZENE
PDCLBE 1 4-DICHLOROBENZENE
ODCLBE 1 2-DICHLOROBENZENE
HCLETA HEXACHLOROETHANE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID		19	20	21	22	23	24	25	26	27	ROW
		ANALYSIS..	108	109	110	111	112	113	114	115	116	
		PPM.....	24DNT	DPHHYD	BENZID	DCLBEZ	BCLETE	MDCLBE	PDCLBE	ODCLBE	HCLETA	
99564	2-10CP3	CONC	<0.011 *	<0.011 *	<0.055 *	<0.022 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	
		%REC	91.69231*	*	*	*	*	37.7551 *	*	*	*	9
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99565	2-13CP2	CONC	<0.010 *	<0.010 *	<0.050 *	<0.020 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	10
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99566	2-18C	CONC	<0.017 *	<0.017 *	<0.085 *	<0.034 *	<0.017 *	<0.017 *	<0.017 *	<0.017 *	<0.017 *	
		%REC	*	*	*	*	*	*	*	*	*	11
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99567	2-14CP2	CONC	<0.010 *	<0.010 *	<0.050 *	<0.020 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	12
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99568	2-14C	CONC	<0.010 *	<0.010 *	<0.050 *	<0.020 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	13
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99569	2-16CP2	CONC	<0.010 *	<0.010 *	<0.050 *	<0.020 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	14
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99570	2-15CP2	CONC	<0.014 *	<0.014 *	<0.070 *	<0.028 *	<0.014 *	<0.014 *	<0.014 *	<0.014 *	<0.014 *	
		%REC	*	*	*	*	*	*	*	*	*	15
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99571	2/11CP2	CONC	<0.013 *	<0.013 *	<0.065 *	<0.026 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	
		%REC	*	*	*	*	*	*	*	*	*	16
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	

NT	2 4-DINITROTOLUENE	DPHHYD	1 2-DIPHENYLHYDRAZINE	BENZID	BENZIDINE
DCLBEZ	3 3'DICHLOROBENZIDINE	BCLETE	BIS(2-CHLOROETHYL)ETHER	MDCLBE	1 3-DICHLOROBENZENE
PDCLBE	1 4-DICHLOROBENZENE	ODCLBE	1 2-DICHLOROBENZENE	HCLETA	HEXACHLOROETHANE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	19	20	21	22	23	24	25	26	27	ROW
		ANALYSIS..	108	109	110	111	112	113	114	115	116	
		PPM.....	24DNT	DPHHYD	BENZID	DCLBEZ	BCLETE	MDCLBE	PDCLBE	ODCLBE	HCLETA	
99572	2-11CP3	CONC	<0.010	<0.010	<0.050	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	
		%REC	95.25	39.65885	26.6	96.2						17
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99573	DBG-SEEP-W	CONC	<0.011	<0.011	<0.055	<0.022	<0.011	<0.011	0.035	<0.011	<0.011	
		%REC										18
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99574	2/11C	CONC	<0.013	<0.013	<0.065	<0.026	<0.013	<0.013	0.054	<0.013	<0.013	
		%REC										19
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99575	02-01	CONC	<0.011	<0.011	<0.055	<0.022	<0.011	<0.011	<0.011	<0.011	<0.011	
		%REC										20
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	089582	
99576	2-17CP2	CONC	<0.011	<0.011	<0.055	<0.022	<0.011	<0.011	<0.011	<0.011	<0.011	
		%REC										21
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99577	2-05	CONC	<0.012	<0.012	<0.060	<0.024	<0.012	<0.012	<0.012	<0.012	<0.012	
		%REC										22
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	

24DNT 2 4-DINITROTOLUENE
DPHHYD 1 2-DIPHENYLHYDRAZINE
BENZID BENZIDINE
DCLBEZ 3 3'DICHLOROBENZIDINE
BCLETE BIS(2-CHLOROETHYL)ETHER
MDCLBE 1 3-DICHLOROBENZENE
PDCLBE 1 4-DICHLOROBENZENE
ODCLBE 1 2-DICHLOROBENZENE
HCLETA HEXACHLOROETHANE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	28	29	30	31	32	33	34	35	36	ROW
		ANALYSIS..	117	118	119	120	121	122	123	124	125	
		PPM.....	TCLBEN	NAPHTH	HCLBU	HCLEPD	CLNAPH	ACENAY	DMEPHT	ACENAP	FLUORE	
99556	2-12CP3	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	1
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99557	2-13C	CONC	<0.030 *	<0.030 *	<0.030 *	<0.030 *	<0.030 *	<0.030 *	<0.030 *	<0.030 *	<0.030 *	
		%REC	59 *	68.25 *	56.75 *	72 *	92.25 *	85.25 *	90 *	85 *	88.25 *	2
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08938208*	08938208*	08958208*	08958208*	08938208*	
99558	2-18CP2	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	3
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99559	2-17C	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	4
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99560	SP-C	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	5
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99561	2-04	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	6
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99562	2-10CP2	CONC	<0.023 *	<0.023 *	<0.023 *	<0.023 *	<0.023 *	<0.023 *	<0.023 *	<0.023 *	<0.023 *	
		%REC	*	*	*	*	*	*	*	*	*	7
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99563	2-13CP3	CONC	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	*	*	*	*	*	*	*	8
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	

JEN	1 2 4-TRICHLOROBENZENE	NAPHTH	NAPHTHALENE	HCLBU	HEXACHLOROBUTADIENE
HCLEPD	HEXACHLOROCYCLOPENTADIENE	CLNAPH	2-CHLORONAPHTHALENE	ACENAY	ACENAPHTHYLENE
DMEPHT	DIMETHYL PHTHALATE	ACENAP	ACENAPHTHENE	FLUORE	FLUORENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	28	29	30	31	32	33	34	35	36	ROW
		ANALYSIS..	117	118	119	120	121	122	123	124	125	
		PPM.....	TCLBEN	NAPHTH	HCLBU	HCLEPD	CLNAPH	ACENAY	DMEPHT	ACENAP	FLUORE	
99564	2-10CP3	CONC	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	30.52464*	*	62.55924*	*	*	64.84687*	*	9
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99565	2-13CP2	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	10
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99566	2-18C	CONC	<0.017 *	<0.017 *	<0.017 *	<0.017 *	<0.017 *	<0.017 *	<0.017 *	<0.017 *	<0.017 *	
		%REC	*	*	*	*	*	*	*	*	*	11
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99567	2-14CP2	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	12
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	089582C	
99568	2-14C	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	13
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99569	2-16CP2	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	14
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99570	2-15CP2	CONC	<0.014 *	<0.014 *	<0.014 *	<0.014 *	<0.014 *	<0.014 *	<0.014 *	<0.014 *	<0.014 *	
		%REC	*	*	*	*	*	*	*	*	*	15
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99571	2/11CP2	CONC	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	
		%REC	*	*	*	*	*	*	*	*	*	16
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	

TCLBEN 1 2 4-TRICHLOROBENZENE NAPHTH NAPHTHALENE HCLBU HEXACHLOROBUTADIENE
HCLEPD HEXACHLOROCYCLOPENTADIENE CLNAPH 2-CHLORONAPHTHALENE ACENAY ACENAPHTHYLENE
DMEPHT DIMETHYL PHTHALATE ACENAP ACENAPHTHENE FLUORE FLUORENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 28	29	30	31	32	33	34	35	36	ROW
			ANALYSIS.. 117	118	119	120	121	122	123	124	125	
			PPM..... TCLBEN	NAPHTH	HCLBU	HCLEPD	CLNAPH	ACENAY	DMEPHT	ACENAP	FLUORE	
99572	2-11CP3	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	17
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99573	DBG-SEEP-W	CONC	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	*	*	*	*	*	*	*	18
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99574	2/11C	CONC	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	
		%REC	*	*	*	*	*	*	*	*	*	19
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99575	02-01	CONC	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	*	*	*	*	*	*	*	20
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99576	2-17CP2	CONC	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	*	*	*	*	*	*	*	21
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99577	2-05	CONC	<0.012 *	<0.012 *	<0.012 *	<0.012 *	<0.012 *	<0.012 *	<0.012 *	<0.012 *	<0.012 *	
		%REC	*	*	*	*	*	*	*	*	*	22
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	

TCLBEN	1 2 4-TRICHLOROBENZENE	NAPHTH	NAPHTHALENE	HCLBU	HEXACHLOROBUTADIENE
HCLEPD	HEXACHLOROCYCLOPENTADIENE	CLNAPH	2-CHLORONAPHTHALENE	ACENAY	ACENAPHTHYLENE
DMEPHT	DIMETHYL PHTHALATE	ACENAP	ACENAPHTHENE	FLUORE	FLUORENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	37	38	39	40	41	42	43	44	45	ROW
		ANALYSIS..	126	127	128	129	130	131	132	133	134	
		PPM.....	DETPHT	CPPETH	NDIPAM	BRPHPE	HCLBEN	PHENAN	ANTRAC	BUPHTH	FANTHE	
99556	2-12CP3	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	1
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99557	2-13C	CONC	<0.030 *	<0.030 *	<0.030 *	<0.030 *	<0.030 *	<0.030 *	<0.030 *	<0.030 *	<0.030 *	
		%REC	87.74999*	83.75 *	79.25 *	82.25001*	82.75 *	73 *	87 *	83.75 *	85 *	2
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99558	2-18CP2	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	3
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99559	2-17C	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	4
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	089582	
99560	SP-C	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	5
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99561	2-04	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	6
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99562	2-10CP2	CONC	<0.023 *	<0.023 *	<0.023 *	<0.023 *	<0.023 *	<0.023 *	<0.023 *	<0.023 *	<0.023 *	
		%REC	*	*	*	*	*	*	*	*	*	7
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99563	2-13CP3	CONC	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	*	*	*	*	*	*	*	8
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	

DETPHT DIETHYL PHTHALATE
CPPETH 4-CHLOROPHENYL PHENYL ETHER
NDIPAM N-NITROSODIPHENYL AMINE
BRPHPE 4-BROMOPHENYL ETHER
HCLBEN HEXACHLOROBENZENE
PHENAN PHENANTHRENE
ANTRAC ANTHRACENE
BUPHTH DIBUTYLPHTHALATE
FANTHE FLUORANTHENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
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LAB ID	PROJECT ID	COLUMN....	37	38	39	40	41	42	43	44	45	ROW
		ANALYSIS..	126	127	128	129	130	131	132	133	134	
		PPM.....	DETPHT	CPPETH	NDIPAM	BRPHPE	HCLBEN	PHENAN	ANTRAC	BUPHTH	FANTHE	
99564	2-10CP3	CONC	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	*	*	*	*	*	*	*	9
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99565	2-13CP2	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	10
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99566	2-18C	CONC	<0.017 *	<0.017 *	<0.017 *	<0.017 *	<0.017 *	<0.017 *	<0.017 *	<0.017 *	<0.017 *	
		%REC	*	*	*	*	*	*	*	*	*	11
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99567	2-14CP2	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	12
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99568	2-14C	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	13
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99569	2-16CP2	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	14
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99570	2-15CP2	CONC	<0.014 *	<0.014 *	<0.014 *	<0.014 *	<0.014 *	<0.014 *	<0.014 *	<0.014 *	<0.014 *	
		%REC	*	*	*	*	*	*	*	*	*	15
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99571	2/11CP2	CONC	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	
		%REC	*	*	*	*	*	*	*	*	*	16
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	

HT	DIETHYL PHTHALATE	CPPETH	4-CHLOROPHENYL PHENYL ETHER	NDIPAM	N-NITROSODIPHENYL AMINE
BRPHPE	4-BROMOPHENYL ETHER	HCLBEN	HEXACHLOROBENZENE	PHENAN	PHENANTHRENE
ANTRAC	ANTHRACENE	BUPHTH	DIBUTYLPHTHALATE	FANTHE	FLUORANTHENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	37	38	39	40	41	42	43	44	45	ROW
		ANALYSIS..	126	127	128	129	130	131	132	133	134	
		PPM.....	DETPHT	CPPETH	NDIPAM	BRPHPE	HCLBEN	PHENAN	ANTRAC	BUPHTH	FANTHE	
99572	2-11CP3	CONC	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	*	*	*	*	*	*	17
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99573	DBG-SEEP-W	CONC	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	*	*	*	*	*	*	*	18
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99574	2/11C	CONC	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	<0.013 *	
		%REC	*	*	*	*	*	*	*	*	*	19
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99575	02-01	CONC	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	*	*	*	*	*	*	*	20
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	089582	
99576	2-17CP2	CONC	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	*	*	*	*	*	*	*	21
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	
99577	2-05	CONC	<0.012 *	<0.012 *	<0.012 *	<0.012 *	<0.012 *	<0.012 *	<0.012 *	<0.012 *	<0.012 *	
		%REC	*	*	*	*	*	*	*	*	*	22
		DUPL	*	*	*	*	*	*	*	*	*	
		OID	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	08958208*	

DETPHT	DIETHYL PHTHALATE	CPPETH	4-CHLOROPHENYL PHENYL ETHER	NDIPAM	N-NITROSODIPHENYL AMINE
BRPHPE	4-BROMOPHENYL ETHER	HCLBEN	HEXACHLOROBENZENE	PHENAN	PHENANTHRENE
ANTRAC	ANTHRACENE	BUPHTH	DIBUTYLPHTHALATE	FANTHE	FLUORANTHENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	46	47	48	49	50	51	52	53	54	ROW
		ANALYSIS..	135	136	137	138	139	140	141	142	143	
		PPM.....	PYRENE	BUBPHT	CHRYSE	BAANTH	ETHEPH	DIOPHT	BEHFLU	BEKFLU	BEZPYR	
99556	2-12CP3	CONC	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
		%REC										1
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99557	2-13C	CONC	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	
		%REC	81.25	91		94.75001	34.5	73.5		75.25	69.75	2
		DUPL										
		OID	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	08958208	
99558	2-18CP2	CONC	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
		%REC										3
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99559	2-17C	CONC	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
		%REC										4
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99560	SP-C	CONC	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
		%REC										5
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99561	2-04	CONC	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
		%REC										6
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99562	2-10CP2	CONC	<0.023	<0.023	<0.023	<0.023	0.024	<0.023	<0.023	<0.023	<0.023	
		%REC										7
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99563	2-13CP3	CONC	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	
		%REC										8
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	

NE	PYRENE	BUBPHT	BUTYLBENZYLPHTHALATE	CHRYSE	CHRYSENE
BAANTH	BENZO(A)ANTHRACENE	ETHEPH	BIS(2-ETHYLHEXYL)PHTHALATE	DIOPHT	DI-N-OCTYLPHTHALATE
BEHFLU	BENZO(B)FLUORANTHENE	BEKFLU	BENZO(K)FLUORANTHENE	BEZPYR	BENZO(A)PYRENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	46	47	48	49	50	51	52	53	54	ROW
		ANALYSIS..	135	136	137	138	139	140	141	142	143	
		PPM.....	PYRENE	BUBPHT	CHRYSE	BAANTH	ETHEPH	DIOPHT	BEHFLU	BEKFLU	BEZPYR	
99564	2-10CP3	CONC	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	
		%REC					50.9804		96.92307		73.58491	9
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99565	2-13CP2	CONC	<0.010	<0.010	<0.010	<0.010	0.012	<0.010	<0.010	<0.010	<0.010	
		%REC										10
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99566	2-18C	CONC	<0.017	<0.017	<0.017	<0.017	0.023	<0.017	<0.017	<0.017	<0.017	
		%REC										11
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99567	2-14CP2	CONC	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
		%REC										12
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	089587	
99568	2-14C	CONC	<0.010	<0.010	<0.010	<0.010	0.032	<0.010	<0.010	<0.010	<0.010	
		%REC										13
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99569	2-16CP2	CONC	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	<0.010	<0.010	<0.010	
		%REC										14
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99570	2-15CP2	CONC	<0.014	<0.014	<0.014	<0.014	0.043	<0.014	<0.014	<0.014	<0.014	
		%REC										15
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99571	2/11CP2	CONC	<0.013	0.013	<0.013	<0.013	0.091	<0.013	<0.013	<0.013	<0.013	
		%REC										16
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	

PYRENE	PYRENE	BUBPHT	BUTYLBENZYLPHTHALATE	CHRYSE	CHRYSENE
BAANTH	BENZO(A)ANTHRACENE	ETHEPH	BIS(2-ETHYLHEXYL)PHTHALATE	DIOPHT	DI-N-OCTYLPHTHALATE
BEHFLU	BENZO(B)FLUORANTHENE	BEKFLU	BENZO(K)FLUORANTHENE	BEZPYR	BENZO(A)PYRENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	46	47	48	49	50	51	52	53	54	ROW
		ANALYSIS..	135	136	137	138	139	140	141	142	143	
		PPM.....	PYRENE	BUBPHT	CHRYSE	BAANTH	ETHEPH	DIOPHT	BEHFLU	BEKFLU	BEZPYR	
99572	2-11CP3	CONC	<0.010	<0.010	<0.010	<0.010	0.048	<0.010	<0.010	<0.010	<0.010	
		%REC							111			17
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99573	DBG-SEEP-W	CONC	<0.011	<0.011	<0.011	<0.011	<0.011	0.014	<0.011	<0.011	<0.011	
		%REC										18
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99574	2/11C	CONC	<0.013	0.017	<0.013	<0.013	1.46	0.029	<0.013	<0.013	<0.013	
		%REC										19
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99575	02-01	CONC	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	
		%REC										20
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99576	2-17CP2	CONC	<0.011	<0.011	<0.011	<0.011	0.020	<0.011	<0.011	<0.011	<0.011	
		%REC										21
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	
99577	2-05	CONC	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	
		%REC										22
		DUPL										
		OID	08958208	08958208	08958208	08938208	08958208	08958208	08958208	08958208	08958208	

PYRENE	PYRENE	BUBPHT	BUTYLBENZYLPHTHALATE	CHRYSE	CHRYSENE
BAANTH	BENZO(A)ANTHRACENE	ETHEPH	BIS(2-ETHYLHEXYL)PHTHALATE	DIOPHT	DI-N-OCTYLPHTHALATE
BEHFLU	BENZO(B)FLUORANTHENE	BEKFLU	BENZO(K)FLUORANTHENE	BEZPYR	BENZO(A)PYRENE

JOB DESCRIPTION:*CRANE - ZAPPI
REPORT DATE:17 Feb 89

RD8G093E1170001
RECEIPT DATE:05 Jul 88

JOB FILE:A:99556
EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 55	56	57	ROW
			ANALYSIS.. 144	145	146	
			PPM..... INDPYR	BEAANT	BEPERY	
99556	2-12CP3	CONC	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	1
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99557	2-13C	CONC	<0.030 *	<0.030 *	<0.030 *	
		%REC	*	*	*	2
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99558	2-18CP2	CONC	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	3
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99559	2-17C	CONC	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	4
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99560	SP-C	CONC	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	5
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99561	2-04	CONC	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	6
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99562	2-10CP2	CONC	<0.023 *	<0.023 *	<0.023 *	
		%REC	*	*	*	7
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99563	2-13CP3	CONC	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	*	8
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	

INDPYR INDENO(1 2 3-C D)PYRENE BEAANT DIBENZO(A H)ANTHRACENE BEPERY BENZO(G H I)PERYLENE

JOB DESCRIPTION:*CRANE - ZAPPI
REPORT DATE:17 Feb 89

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RECEIPT DATE:05 Jul 88

JOB FILE:A:99556
EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 55	56	57	ROW
			ANALYSIS.. 144	145	146	
			PPM..... INDPYR	BEAANT	BEPERY	
99564	2-10CP3	CONC	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	*	9
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99565	2-13CP2	CONC	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	10
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99566	2-18C	CONC	<0.017 *	<0.017 *	<0.017 *	
		%REC	*	*	*	11
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99567	2-14CP2	CONC	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	12
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99568	2-14C	CONC	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	13
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99569	2-16CP2	CONC	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	14
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99570	2-15CP2	CONC	<0.014 *	<0.014 *	<0.014 *	
		%REC	*	*	*	15
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99571	2/11CP2	CONC	<0.013 *	<0.013 *	<0.013 *	
		%REC	*	*	*	16
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	

IR INDENO(1 2 3-C D)PYRENE BEAANT DIBENZO(A H)ANTHRACENE BEPERY BENZO(G H I)PERYLENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 JOB FILE:A:99556
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 55	56	57	ROW
			ANALYSIS.. 144	145	146	
			PPM..... INDPYR	BEAANT	BEPERY	
99572	2-11CP3	CONC	<0.010 *	<0.010 *	<0.010 *	
		%REC	*	*	*	17
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99573	DBG-SEEP-W	CONC	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	*	18
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99574	2/11C	CONC	<0.013 *	<0.013 *	<0.013 *	
		%REC	*	*	*	19
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99575	02-01	CONC	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	*	20
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99576	2-17CP2	CONC	<0.011 *	<0.011 *	<0.011 *	
		%REC	*	*	*	21
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	
99577	2-05	CONC	<0.012 *	<0.012 *	<0.012 *	
		%REC	*	*	*	22
		DUPL	*	*	*	
		OID	08958208*	08958208*	08958245*	

INDPYR INDENO(1 2 3-C D)PYRENE BEAANT DIBENZO(A H)ANTHRACENE BEPERY BENZO(G H I)PERYLENE

Base/Neutrals, Acid Extractables (BNAs) (Sediment)

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 SEDIMENT JOB FILE:A:99630
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	1	2	3	4	5	6	7	8	9	ROW
		ANALYSIS..	61	62	63	64	65	66	67	68	69	
		PPM.....	PHENOL	CLPHEN	2NIPHE	DMEPHE	DCLPHE	CLMEPH	TCLPHE	DNIPHE	4NIPHE	
99630	DBG SEEP-S	CONC	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<1.7 *	<0.85 *	<4.2 *	<4.2 *	
		%REC	19 *	22 *	23.4 *	53.7 *	56 *	63.7 *	72.7 *	62.5 *	69.4 *	1
		DUPL	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<1.7 *	<0.85 *	<4.2 *	<4.2 *	
		OID	08958242*	08958242*	08958242*	08958242*	08958242*	08958242*	08958242*	08958242*	08958242*	

PHENOL PHENOL
DMEPHE 2 4-DIMETHYLPHENOL
TCLPHE 2 4 6-TRICHLOROPHENOL
CLPHEN 2-CHLOROPHENOL
DCLPHE 2 4-DICHLOROPHENOL
DNIPHE 2 4 DINITROPHENOL
2NIPHE 2-NITROPHENOL
CLMEPH 4-CHLORO-3-METHYLPHENOL
4NIPHE 4-NITROPHENOL

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 SEDIMENT JOB FILE:A:99630
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	10	11	12	13	14	15	16	17	18	ROW
		ANALYSIS..	70	71	101	102	103	104	105	106	107	
		PPM.....	MDNPHE	PCLPHE	NDMEAM	CLISOE	NDRPAM	NIBEN	ISOPHO	CLETME	26DNT	
99630	DBG SEEP-S	CONC	<4.2	<4.2	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	
		%REC		112.5			28.875	22.375	44.25	29.375	80.625	1
		DUPL	<4.2	<4.2	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	
		OID	08958242	08958242	08958242	08958242	08958242	08958242	08958242	08958242	08958242	

MDNPHE	2-MTHYL-4 6-DINITROPHENOL	PCLPHE	PENTACHLOROPHENOL	NDMEAM	N-NITROSODIMETHYLAMINE
CLISOE	BIS(2-CHLOROISOPROPYL)ETHER	NDRPAM	N-NITROSO-DI-N-PROPYLAMINE	NIBEN	NITROBENZENE
ISOPHO	ISOPHORONE	CLETME	BIS(2-CHLOROETHOXY)METHANE	26DNT	2 6-DINITROTOLUENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 SEDIMENT JOB FILE:A:99630
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	19	20	21	22	23	24	25	26	27	ROW
		ANALYSIS..	108	109	110	111	112	113	114	115	116	
		PPM.....	24DNT	DPHHYD	BENZID	DCLBEZ	BCLETE	MDCLBE	PDCLBE	ODCLBE	HCLETA	
99630	DBG SEEP-S	CONC	<0.85 *	<0.85 *	<4.2 *	<1.7 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	
		%REC	79.87501*	74.94669*	*	*	*	*	*	*	*	1
		DUPL	<0.85 *	<0.85 *	<4.2 *	<1.7 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	
		OID	08958242*	08958242*	08958242*	08958242*	08958242*	08958242*	08958242*	08958242*	08958242*	

24DNT	2 4-DINITROTOLUENE	DPHHYD	1 2-DIPHENYLHYDRAZINE	BENZID	BENZIDINE
DCLBEZ	3 3'DICHLOROBENZIDINE	BCLETE	BIS(2-CHLOROETHYL)ETHER	MDCLBE	1 3-DICHLOROBENZENE
PDCLBE	1 4-DICHLOROBENZENE	ODCLBE	1 2-DICHLOROBENZENE	HCLETA	HEXACHLOROETHANE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 SEDIMENT JOB FILE:A:99630
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	28	29	30	31	32	33	34	35	36	ROW
		ANALYSIS..	117	118	119	120	121	122	123	124	125	
		PPM.....	TCLBEN	NAPHTH	HCLBU	HCLEPD	CLNAPH	ACENAY	DMEPHT	ACENAP	FLUORE	
99630	DBG SEEP-S	CONC	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	
		%REC	*	*	*	*	*	*	*	*	*	1
		DUPL	<0.85 *	<0.85 *	<0.85 *	<0.885 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	
		OID	08958242*	08958242*	08958242*	08958242*	08958242*	08958242*	08958242*	08958242*	08958242*	

TCLBEN	1 2 4-TRICHLOROBENZENE	NAPHTH	NAPHTHALENE	HCLBU	HEXACHLOROBUTADIENE
HCLEPD	HEXACHLOROCYCLOPENTADIENE	CLNAPH	2-CHLORONAPHTHALENE	ACENAY	ACENAPHTHYLENE
DMEPHT	DIMETHYL PHTHALATE	ACENAP	ACENAPHTHENE	FLUORE	FLUORENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 SEDIMENT JOB FILE:A:99630
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN....	37	38	39	40	41	42	43	44	45	ROW
			ANALYSIS..	126	127	128	129	130	131	132	133	134	
			PPM.....	DETPHT	CPPETH	NDIPAM	BRPHPE	HCLBEN	PHENAN	ANTRAC	BUPHTH	FANTHE	
99630	DBG SEEP-S		CONC	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	
			%REC	*	*	*	*	*	*	*	*	*	1
			DUPL	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	<0.85 *	
			OID	08958242*	08958242*	08958242*	08958242*	08958242*	08958242*	08958242*	08958242*	08958242*	

DETPHT	DIETHYL PHTHALATE	CPPETH	4-CHLOROPHENYL PHENYL ETHER	NDIPAM	N-NITROSODIPHENYL AMINE
BRPHPE	4-BROMOPHENYL ETHER	HCLBEN	HEXACHLOROBENZENE	PHENAN	PHENANTHRENE
ANTRAC	ANTHRACENE	BUPHTH	DIBUTYLPHTHALATE	FANTHE	FLUORANTHENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 SEDIMENT JOB FILE:A:99630
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN....	46	47	48	49	50	51	52	53	54	ROW
			ANALYSIS..	135	136	137	138	139	140	141	142	143	
			PPM.....	PYRENE	BUBPHT	CHRYSE	BAANTH	ETHEPH	DIOPHT	BEHFLU	BEKFLU	BEZPYR	
99630	DBG SEEP-S		CONC	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	
			%REC							116			1
			DUPL	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	
			OID	08958242	08958242	08958242	08958242	08958242	08958242	08958242	08958242	08958242	

PYRENE	PYRENE	BUBPHT	BUTYLBENZYLPHTHALATE	CHRYSE	CHRYSENE
BAANTH	BENZO(A)ANTHRACENE	ETHEPH	BIS(2-ETHYLHEXYL)PHTHALATE	DIOPHT	DI-N-OCTYLPHTHALATE
BEHFLU	BENZO(B)FLUORANTHENE	BEKFLU	BENZO(K)FLUORANTHENE	BEZPYR	BENZO(A)PYRENE

JOB DESCRIPTION:*CRANE - ZAPPI RD8G093E1170001 SEDIMENT JOB FILE:A:99630
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:02 Sep 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN....	55	56	57	ROW
			ANALYSIS..	144	145	146	
			PPM.....	INDPYR	BEAANT	BEPERY	
99630	DBG SEEP-S		CONC	<0.85 *	<0.85 *	<0.85 *	
			%REC	*	*	*	1
			DUPL	<0.85 *	<0.85 *	<0.85 *	
			OID	08958242*	08958242*	08958242*	

INDPYR INDENO(1 2 3-C D)PYRENE BEAANT DIBENZO(A H)ANTHRACENE BEPERY BENZO(G H I)PERYLENE

Sulfates/Chlorides

JOB DESCRIPTION:CRANE - ZAPPI
REPORT DATE:17 Feb 89

RD8G093E1170001
RECEIPT DATE:05 Jul 88

JOB FILE:A:99602
EST. COMP. DATE:26 Aug 88

_
B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	1	2	ROW
		ANALYSIS..	148	149	
		PPM.....	SO-4	CL	
99602	2-12CP3	CONC	726	84.4	1
		%REC	109.894	101.7032	
		DUPL	722	77.2	
		OID	49408199	49408189	
99603	2-13C	CONC	100	11.2	2
		%REC			
		DUPL			
		OID	49408199	49408199	
99604	2-18CP2	CONC	1438	28.4	3
		%REC			
		DUPL			
		OID	49408199	49408199	
99605	2-17C	CONC	59	6.7	4
		%REC			
		DUPL			
		OID	49408199	49408199	
99606	SP-C	CONC	41	<5.0	5
		%REC			
		DUPL			
		OID	49408199	49408199	
99607	2-04	CONC	1312	69.9	6
		%REC			
		DUPL			
		OID	49408199	49408189	
99608	2-10CP2	CONC	185	27.3	7
		%REC			
		DUPL			
		OID	49408199	49408199	
99609	2-13CP3	CONC	99	32.1	8
		%REC			
		DUPL			
		OID	49408199	49408199	

SO-4 SULFATE CL CHLORIDES

JOB DESCRIPTION:CRANE - ZAPPI
REPORT DATE:17 Feb 89

RD8G093E1170001
RECEIPT DATE:05 Jul 88

JOB FILE:A:99602
EST. COMP. DATE:26 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 1	2	ROW
			ANALYSIS.. 148	149	
			PPM..... SO-4	CL	
99610	2-10CP3	CONC	140 *	9.0 *	
		%REC	102.924 *	108.4 *	9
		DUPL	145 *	11.0 *	
		OID	49408199*	49408199*	
99611	2-13CP2	CONC	192 *	21.6 *	
		%REC	*	*	10
		DUPL	*	*	
		OID	49408199*	49408199*	
99612	2-18C	CONC	192 *	9.5 *	
		%REC	*	*	11
		DUPL	*	*	
		OID	49408199*	49408199*	
99613	2-14CP2	CONC	13.7 *	9.2 *	
		%REC	*	*	12
		DUPL	*	*	
		OID	49408199*	49408199*	
99614	2-14C	CONC	205 *	<5.0 *	
		%REC	*	*	13
		DUPL	*	*	
		OID	49408199*	49408199*	
99615	2-16CP2	CONC	323 *	46.9 *	
		%REC	*	*	14
		DUPL	*	*	
		OID	49408199*	49408199*	
99616	2-15CP2	CONC	267 *	12.0 *	
		%REC	*	*	15
		DUPL	*	*	
		OID	49408199*	49408199*	
99617	2-11CP2	CONC	342 *	48.2 *	
		%REC	*	*	16
		DUPL	*	*	
		OID	49408199*	49408199*	

4 SULFATE CL CHLORIDES

JOB DESCRIPTION:CRANE - ZAPPI
REPORT DATE:17 Feb 89

RD8G093E1170001
RECEIPT DATE:05 Jul 88

JOB FILE:A:99602
EST. COMP. DATE:26 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 1	2	ROW
			ANALYSIS.. 148	149	
			PPM..... SO-4	CL	
99618	2/11CP3	CONC	369 *	50.5 *	
		%REC	110.6383*	103.0435*	17
		DUPL	361 *	53.3 *	
		OID	49408199*	49408199*	
99619	2/11C	CONC	392 *	18.4 *	
		%REC	*	*	18
		DUPL	*	*	
		OID	49408199*	49408199*	
99620	02-01	CONC	750 *	226.4 *	
		%REC	*	*	19
		DUPL	*	*	
		OID	49408199*	49408199*	
99621	2-15C	CONC	237 *	12.2 *	
		%REC	*	*	20
		DUPL	*	*	
		OID	49408199*	49408199*	
99622	2-14CP3	CONC	836 *	89.6 *	
		%REC	*	*	21
		DUPL	*	*	
		OID	49408199*	49408199*	
99623	2-17CP2	CONC	1504 *	162.8 *	
		%REC	*	*	22
		DUPL	*	*	
		OID	49408199*	49408199*	
99624	2-16C	CONC	189 *	14.5 *	
		%REC	*	*	23
		DUPL	*	*	
		OID	49408199*	49408199*	
99625	2-05	CONC	1635 *	78.6 *	
		%REC	*	*	24
		DUPL	*	*	
		OID	49408199*	49408199*	

SO-4 SULFATE CL CHLORIDES

Metals (Water)

JOB DESCRIPTION:CRANE - ZAPPI RD8G093E1170001 HNO3 JOB FILE:A:99477
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:12 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	1	2	3	4	5	6	7	8	9	ROW
		ANALYSIS..	1	2	4	5	6	7	9	10	11	
		PPM.....	SB	AS	BE	CD	CR	CU	PB	HG	NI	
99477	2-12CP3	CONC	0.006	0.013	<0.005	<0.0001	0.002	0.026	0.006	<0.0008	0.012	
		%REC	93.99999	108	98.6	92	100	95	105	98	100	1
		DUPL	0.005	0.018	<0.005	<0.0001	0.001	0.027	0.005	<0.0020	0.011	
		OID	20308224	20308252	01208217	20558223	20558223	20558222	20558209	09658202	20558280	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99478	2-13C	CONC	<0.005	0.018	<0.005	<0.0001	0.001	0.103	0.009	<0.0008	0.002	
		%REC										2
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	01208217	20558209	09658202	20558280	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99479	2-18-CP2	CONC	0.010	0.019	<0.005	<0.0001	0.002	0.014	<0.001	<0.0008	0.019	
		%REC										3
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	20558222	20558209	09658202	20558280	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99480	2-17C	CONC	<0.005	0.017	<0.005	<0.0001	<0.001	0.001	0.001	<0.0008	0.005	
		%REC										4
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	20558222	20558209	09658202	2055828	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUT.	
99481	SP-C	CONC	<0.005	0.014	<0.005	0.0001	<0.001	<0.001	0.002	<0.0008	0.001	
		%REC										5
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	20558222	20558209	09658202	20558280	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99482	2-04	CONC	<0.005	0.014	<0.005	0.0053	<0.001	0.001	0.001	<0.0008	1.20	
		%REC										6
		DUPL										
		OID	20308224	20308252	01208217	20558298	20558223	20558222	20558209	09658202	01208217	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99483	2-10CP2	CONC	0.011	0.017	<0.005	0.0002	<0.001	0.042	0.003	<0.0008	0.030	
		%REC										7
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	01208217	20558209	09658202	01208217	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99484	2-13CP3	CONC	<0.005	0.024	<0.005	0.0003	<0.001	0.001	0.001	<0.0008	0.054	
		%REC										8
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	20558222	20558209	09658202	01208217	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	

SB	ANTIMONY	AS	ARSENIC	BE	BERYLLIUM
CD	CADMIUM	CR	CHROMIUM	CU	COPPER
PB	LEAD	HG	MERCURY	NI	NICKEL

JOB DESCRIPTION:CRANE - ZAPPI RD8G093E1170001 HNO3 JOB FILE:A:99477
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:12 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 1	2	3	4	5	6	7	8	9	ROW
			ANALYSIS.. 1	2	4	5	6	7	9	10	11	
			PPM..... SB	AS	BE	CD	CR	CU	PB	HG	NI	
99485	2-10CP3	CONC	<0.005	0.019	<0.005	<0.0001	<0.001	<0.001	0.001	<0.0008	0.012	
		%REC	93.99999	100	97.39999	88	90	90	105	105	105	9
		DUPL	<0.005	0.019	<0.005	<0.0001	<0.001	<0.001	0.002	<0.0020	0.012	
		OID	20308224	20308252	01208217	20558223	20558223	20558222	20558209	09658202	20558280	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99486	2-13CP2	CONC	0.011	0.022	<0.005	<0.0001	<0.001	0.086	0.005	<0.0008	0.012	
		%REC										10
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	01208216	20558209	09658202	20558280	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99487	2-18C	CONC	<0.005	0.024	<0.005	<0.0001	0.003	0.002	0.002	<0.0008	0.002	
		%REC										11
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	01208216	20558209	09658202	20558280	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99488	2-14CP2	CONC	<0.005	0.018	<0.005	<0.0001	0.012	0.001	0.026	<0.0008	0.002	
		%REC										12
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	01208216	20558209	09658202	20558280	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99489	2-14C	CONC	<0.005	<0.005	<0.005	<0.0001	0.001	<0.001	0.001	<0.0008	0.005	
		%REC										13
		DUPL										
		OID	20308224	20308252	01208217	20558298	20558223	01208216	20558209	09658202	20558280	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99490	2-16CP2	CONC	<0.005	0.008	<0.005	<0.0001	0.001	<0.001	<0.001	<0.0008	0.259	
		%REC										14
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	01208216	20558209	09658202	01208217	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99491	2-15CP2	CONC	<0.005	<0.005	<0.005	<0.0001	0.004	0.001	<0.001	<0.0008	0.002	
		%REC										15
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	01208216	20558209	09658202	20558280	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99492	2-11CP2	CONC	<0.005	<0.005	<0.005	0.0003	<0.001	<0.001	<0.001	<0.0008	0.155	
		%REC								110		16
		DUPL								<0.0020		
		OID	20308224	20308252	01208217	20558223	20558223	01208216	20558209	09658202	01208217	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	

	ANTIMONY	AS	ARSENIC	BE	BERYLLIUM
CD	CADMIUM	CR	CHROMIUM	CU	COPPER
PB	LEAD	HG	MERCURY	NI	NICKEL

JOB DESCRIPTION:CRANE - ZAPPI RD8G093E1170001 HNO3 JOB FILE:A:99477
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:12 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 1	2	3	4	5	6	7	8	9	ROW
			ANALYSIS.. 1	2	4	5	6	7	9	10	11	
			PPM..... SB	AS	BE	CD	CR	CU	PB	HG	NI	
99493	2-11CP3	CONC	<0.005	<0.005	0.005	0.0039	<0.001	0.005	0.010	<0.0008	0.817	
		%REC	102	102	99.8	90	95	90	95		101	17
		DUPL	<0.005	<0.005	0.008	0.0037	<0.001	0.005	0.011		0.816	
		OID	20308224	20308252	01208217	20558223	20558223	01208216	20558209	09658202	01208217	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99494	DBG-SEEP-N	CONC	<0.005	0.049	0.023	0.0011	0.006	0.046	0.053	<0.0008	0.885	
		%REC										18
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	01208218	20558209	09658202	01208217	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99495	2/11C	CONC	0.007	0.021	<0.005	<0.0001	0.015	0.007	0.032	<0.0020	0.006	
		%REC										19
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	20558222	20558209	09658202	20558280	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99496	02-01	CONC	<0.005	<0.005	<0.005	<0.0001	0.001	<0.001	<0.001	<0.0008	0.003	
		%REC										20
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	20558222	20558209	09658202	205582	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99497	BK-1	CONC	<0.005	<0.005	<0.005	<0.0001	<0.001	0.001	<0.001	<0.0008	0.001	
		%REC										21
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	20558222	20558209	09658202	20558280	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99498	B2	CONC	<0.005	<0.005	<0.005	0.0004	<0.001	<0.001	<0.001	<0.0008	0.003	
		%REC										22
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	20558222	20558209	09658202	20558280	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99499	2-15C	CONC	<0.005	<0.005	<0.005	<0.0001	0.004	<0.001	<0.001	<0.0008	0.004	
		%REC										23
		DUPL										
		OID	20308224	20308252	01208217	20558223	20558223	20558222	20558209	09658202	20558280	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99500	2-14CP3	CONC	<0.005	<0.005	<0.005	<0.0001	<0.001	<0.001	<0.001	<0.0008	0.535	
		%REC								104		24
		DUPL								<0.0020		
		OID	20308224	20308252	01208217	20558223	20558223	20558222	20558209	09658202	01208218	
						HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUT	

SB	ANTIMONY	AS	ARSENIC	BE	BERYLLIUM
CD	CADMIUM	CR	CHROMIUM	CU	COPPER
PB	LEAD	HG	MERCURY	NI	NICKEL

JOB DESCRIPTION:CRANE - ZAPPI RD8G093E1170001 HNO3 JOB FILE:A:99477
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:12 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN....	1	2	3	4	5	6	7	8	9	ROW
			ANALYSIS..	1	2	4	5	6	7	9	10	11	
			PPM.....	SB	AS	BE	CD	CR	CU	PB	HG	NI	
99501	2-17CP2		CONC	<0.005	<0.005	<0.005	0.0016	<0.001	0.007	<0.001	<0.0008	0.168	
			%REC	93.99999	92	93.2	88	105	100	96		103	25
			DUPL	<0.005	<0.005	<0.005	0.0014	<0.001	0.006	<0.001		0.160	
			OID	20308224	20308252	01208217	20558270	20558223	20558222	20558209	09658202	01208218	
							HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99502	2-16C		CONC	<0.005	<0.005	<0.005	0.0002	<0.001	<0.001	0.001	<0.0008	0.001	
			%REC										26
			DUPL										
			OID	20308224	20308252	01208217	20558270	20558223	20558222	20558209	09658202	20558280	
							HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	
99503	2-05		CONC	<0.005	<0.005	<0.005	0.0009	<0.001	<0.001	<0.001	<0.0008	0.059	
			%REC										27
			DUPL										
			OID	20308224	20308252	01208217	20558270	20558223	20558222	20558209	09658202	01208218	
							HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	

SB	ANTIMONY	AS	ARSENIC	BE	BERYLLIUM
CD	CADMIUM	CR	CHROMIUM	CU	COPPER
PB	LEAD	HG	MERCURY	NI	NICKEL

JOB DESCRIPTION:CRANE - ZAPPI RD8G093E1170001 HN03 JOB FILE:A:99477
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:12 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 10	11	12	13	14	ROW
			ANALYSIS.. 12	13	14	15	26	
			PPM..... SE	AG	TL	ZN	NA	
99477	2-12CP3	CONC	0.005	<0.001	<0.001	<0.030	133	
		%REC	106	105	90	106	101	1
		DUPL	0.005	<0.001	<0.001	<0.030	134	
		OID	20308252	20558259 HGA AUTH	20558265 HGA AUTH	01208216	01208224	
99478	2-13C	CONC	0.019	<0.001	<0.001	0.036	24.0	
		%REC						2
		DUPL						
		OID	20308252	20558259 HGA AUTH	20558265 HGA AUTH	01208216	01208224	
99479	2-18-CP2	CONC	0.005	<0.001	<0.001	<0.030	33.3	
		%REC						3
		DUPL						
		OID	20308252	20558259 HGA AUTH	20558265 HGA AUTH	01208216	01208224	
99480	2-17C	CONC	0.007	<0.001	<0.001	<0.030	40.7	
		%REC						4
		DUPL						
		OID	20308252	20558259 HGA AUTH	20558265 HGA AUTH	01208216	01208224	
99481	SP-C	CONC	0.007	<0.001	<0.001	<0.030	6.10	
		%REC						5
		DUPL					6.43	
		OID	20308252	20558259 HGA AUTH	20558265 HGA AUTH	01208216	01208224	
99482	2-04	CONC	<0.005	<0.001	<0.001	0.722	44.9	
		%REC						6
		DUPL						
		OID	20308252	20558259 HGA AUTH	20558265 HGA AUTH	01208216	01208224	
99483	2-10CP2	CONC	0.007	<0.001	<0.001	<0.030	31.7	
		%REC						7
		DUPL						
		OID	20308252	20558259 HGA AUTH	20558265 HGA AUTH	01208216	01208224	
99484	2-13CP3	CONC	0.009	<0.001	<0.001	0.036	27.4	
		%REC						8
		DUPL						
		OID	20308252	20558259 HGA AUTH	20558265 HGA AUTH	01208216	01208224	

SE SELENIUM AG SILVER TL THALLIUM
ZN ZINC NA SODIUM

JOB DESCRIPTION:CRANE - ZAPPI RD8G093E1170001 HNO3 JOB FILE:A:99477
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:12 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN....	10	11	12	13	14	ROW
			ANALYSIS..	12	13	14	15	26	
			PPM.....	SE	AG	TL	ZN	NA	
99485	2-10CP3	CONC		0.007	<0.001	<0.001	0.075	22.6	
		%REC		88	105	90	101	104	9
		DUPL		0.007	<0.001	<0.001	0.096	21.6	
		OID		20308252	20558259	20558265	01208216	01208224	
					HGA AUTH	HGA AUTH			
99486	2-13CP2	CONC		0.007	<0.001	<0.001	0.045	25.8	
		%REC							10
		DUPL							
		OID		20308252	20558259	20558265	01208216	01208224	
					HGA AUTH	HGA AUTH			
99487	2-18C	CONC		0.011	<0.001	<0.001	<0.030	47.3	
		%REC							11
		DUPL							
		OID		20308252	20558259	20558265	01208216	01208224	
					HGA AUTH	HGA AUTH			
99488	2-14CP2	CONC		0.012	<0.001	<0.001	<0.030	99.6	
		%REC							12
		DUPL							
		OID		20308252	20558259	20558265	01208216	01208224	
					HGA AUTH	HGA AUTH			
99489	2-14C	CONC		0.008	<0.001	<0.001	<0.030	57.4	
		%REC							13
		DUPL							
		OID		20308252	20558259	20558265	01208216	01208224	
					HGA AUTH	HGA AUTH			
99490	2-16CP2	CONC		0.008	<0.001	<0.001	<0.030	23.2	
		%REC							14
		DUPL							
		OID		20308252	20558259	20558265	01208216	01208224	
					HGA AUTH	HGA AUTH			
99491	2-15CP2	CONC		0.008	<0.001	<0.001	<0.030	25.8	
		%REC							15
		DUPL							
		OID		20308252	20558259	20558265	01208216	01208224	
					HGA AUTH	HGA AUTH			
99492	2-11CP2	CONC		<0.005	<0.001	<0.001	0.174	48.8	
		%REC							16
		DUPL							
		OID		20308252	20558259	20558265	01208216	01208224	
					HGA AUTH	HGA AUTH			

SE SELENIUM AG SILVER TL THALLIUM
ZN ZINC NA SODIUM

JOB DESCRIPTION:CRANE - ZAPPI RD8G093E1170001 HNO3 JOB FILE:A:99477
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:12 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 10	11	12	13	14	ROW
			ANALYSIS.. 12	13	14	15	26	
			PPM..... SE	AG	TL	ZN	NA	
99493	2-11CP3	CONC	0.006 *	<0.001 *	<0.001 *	1.95 *	54.1 *	
		%REC	90 *	90 *	95 *	107 *	99.6 *	17
		DUPL	0.007 *	<0.001 *	<0.001 *	1.95 *	53.4 *	
		OID	20308252*	20558259*	20558265*	01208216*	01208224*	
				HGA AUTH	HGA AUTH			
99494	DBG-SEEP-N	CONC	<0.005 *	<0.001 *	<0.001 *	5.05 *	40.3 *	
		%REC	*	*	*	*	*	18
		DUPL	*	*	*	*	*	
		OID	20308252*	20558259*	20558265*	01208216*	01208224*	
				HGA AUTH	HGA AUTH			
99495	2/11C	CONC	0.014 *	<0.001 *	<0.001 *	0.038 *	240 *	
		%REC	*	*	*	*	*	19
		DUPL	*	*	*	*	246 *	
		OID	20308252*	20558259*	20558265*	01208216*	01208224*	
				HGA AUTH	HGA AUTH			
99496	02-01	CONC	0.007 *	<0.001 *	<0.001 *	<0.030 *	214 *	
		%REC	*	*	*	*	*	20
		DUPL	*	*	*	*	*	
		OID	20308252*	20558259*	20558265*	01208216*	01208224*	
				HGA AUTH	HGA AUTH			
99497	BK-1	CONC	0.005 *	<0.001 *	<0.001 *	<0.030 *	0.441 *	
		%REC	*	*	*	*	*	21
		DUPL	*	*	*	*	*	
		OID	20308252*	20558259*	20558265*	01208216*	01208224*	
				HGA AUTH	HGA AUTH			
99498	B2	CONC	0.007 *	<0.001 *	<0.001 *	<0.030 *	0.171 *	
		%REC	*	*	*	*	*	22
		DUPL	*	*	*	*	*	
		OID	20308252*	20558259*	20558265*	01208216*	01208224*	
				HGA AUTH	HGA AUTH			
99499	2-15C	CONC	<0.005 *	<0.001 *	<0.001 *	<0.030 *	32.8 *	
		%REC	*	*	*	*	*	23
		DUPL	*	*	*	*	*	
		OID	20308252*	20558259*	20558265*	01208216*	01208224*	
				HGA AUTH	HGA AUTH			
99500	2-14CP3	CONC	<0.005 *	<0.001 *	<0.001 *	0.082 *	36.2 *	
		%REC	*	*	*	*	*	24
		DUPL	*	*	*	*	*	
		OID	20308252*	20558259*	20558265*	01208216*	01208224*	
				HGA AUTH	HGA AUTH			

SE SELENIUM AG SILVER TL THALLIUM
ZN ZINC NA SODIUM

JOB DESCRIPTION:CRANE - ZAPPI RD8G093E1170001 HNO3 JOB FILE:A:99477
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:12 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN....	10	11	12	13	14	ROW
			ANALYSIS..	12	13	14	15	26	
			PPM.....	SE	AG	TL	ZN	NA	
99501	2-17CP2		CONC	<0.005	<0.001	<0.001	0.155	71.1	
			%REC	100	100	100	98.7	100	25
			DUPL	<0.005	<0.001	<0.001	0.130	71.6	
			OID	20308252	20558259	20558265	01208216	01208224	
					HGA AUTH	HGA AUTH			
99502	2-16C		CONC	<0.005	<0.001	<0.001	<0.030	95.4	
			%REC						26
			DUPL						
			OID	20308252	20558259	20558265	01208216	01208226	
					HGA AUTH	HGA AUTH			
99503	2-05		CONC	<0.005	<0.001	<0.001	0.064	58.9	
			%REC						27
			DUPL						
			OID	20308252	20558259	20558265	01208216	01208224	
					HGA AUTH	HGA AUTH			

SE SELENIUM AG SILVER TL THALLIUM
ZN ZINC NA SODIUM

Metals (Sediment)

********** ENVIRONMENTAL LABORATORY ANALYTICAL LABORATORY GROUP DATA REPORTING SHEET (SHEET 1 OF 2) **********

JOB DESCRIPTION:CRANE - ZAPPI RD8G093E1170001 SEDIMENT JOB FILE:A:99627

REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:26 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN....	1	2	3	4	5	6	7	8	9	ROW
			ANALYSIS..	1	2	4	5	6	7	9	10	11	
			PPM.....	SB	AS	BE	CD	CR	CU	PB	HG	NI	
99627	DBG SEEP S		CONC	<0.50	* 6.28	* 1.20	* 0.219	* 27.8	* 8.67	* 18.9	* <0.100	* 131	*
			%REC	100	* 104	* 107	* 92	* 111	* 108	* 95	* 86	* 104	* 1
			DUPL	<0.50	* 7.08	* 1.40	* 0.209	* 25.1	* 8.17	* 17.4	* <0.100	* 125	*
			OID	20308293*	20308290*	01208264*	20558270*	01208265*	01208265*	20558277*	09658216*	01208265*	
							HGA AUTH	HGA AUTH	HGA AUTH	HGA AUTH		HGA AUTH	

SB	ANTIMONY	AS	ARSENIC	BE	BERYLLIUM
CD	CADMIUM	CR	CHROMIUM	CU	COPPER
PB	LEAD	HG	MERCURY	NI	NICKEL

JOB DESCRIPTION:CRANE - ZAPPI
REPORT DATE:17 Feb 89

RD8G093E1170001 SEDIMENT
RECEIPT DATE:05 Jul 88

JOB FILE:A:99627
EST. COMP. DATE:26 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN....	10	11	12	13	ROW
			ANALYSIS..	12	13	14	15	
			PPM.....	SE	AG	TL	ZN	
99627	DBG SEEP S	CONC		0.80 *	<0.10 *	<0.10 *	139 *	
		%REC		100 *	95 *	100 *	109 *	1
		DUPL		0.80 *	<0.10 *	<0.10 *	139 *	
		OID		20308285*	20558294*	20558293*	01208265*	
					HGA AUTH	HGA AUTH		

SE SELENIUM
AG SILVER
TL THALLIUM
ZN ZINC

Nitrogen Compounds

JOB DESCRIPTION:CRANE - ZAPPI RD8G093E1170001 H2SO4 JOB FILE:A:99578
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:26 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 1	2	3	4	ROW
			ANALYSIS.. 27	30	31	32	
			PPM..... TKN	NO2-N	NO3-N	NH3-N	
99578	2-12CP3	CONC	1.97 *	<0.010 *	0.752 *	0.121 *	
		%REC	*	68 *	103.0928*	102.1544*	1
		DUPL	*	<0.010 *	0.788 *	0.106 *	
		OID	01408259*	49408204*	49408204*	49408221*	
99579	2-13C	CONC	0.586 *	<0.010 *	0.668 *	0.268 *	
		%REC	*	*	*	*	2
		DUPL	*	*	*	*	
		OID	01408259*	49408204*	49408204*	49408221*	
99580	2-18CP2	CONC	2.26 *	<0.010 *	0.096 *	0.481 *	
		%REC	93.5 *	*	*	*	3
		DUPL	2.36 *	*	*	*	
		OID	01408259*	49408204*	49408204*	49408221*	
99581	2-17C	CONC	0.947 *	<0.010 *	0.190 *	0.289 *	
		%REC	*	*	*	*	4
		DUPL	*	*	*	*	
		OID	01408259*	49408204*	49408204*	49408221*	
99582	SP-C	CONC	0.108 *	<0.010 *	0.222 *	0.035 *	
		%REC	*	*	*	*	5
		DUPL	*	*	*	*	
		OID	01408259*	49408204*	49408204*	49408221*	
99583	2-04	CONC	0.404 *	<0.010 *	0.784 *	0.086 *	
		%REC	*	*	*	*	6
		DUPL	*	*	*	*	
		OID	01408259*	49408204*	49408204*	49408221*	
99584	2-10CP2	CONC	2.61 *	<0.010 *	0.612 *	0.156 *	
		%REC	*	*	*	*	7
		DUPL	*	*	*	*	
		OID	01408259*	49408204*	49408204*	49408221*	
99585	2-13CP3	CONC	0.434 *	<0.010 *	0.141 *	0.062 *	
		%REC	*	*	*	*	8
		DUPL	*	*	*	*	
		OID	01408259*	49408204*	49408204*	49408221*	

TKN TOTAL KJELDAHL NITROGEN NO2-N NITRITE NITROGEN NO3-N NITRATE NITROGEN
NH3-N AMMONIA NITROGEN

JOB DESCRIPTION:CRANE - ZAPPI RD8G093E1170001 H2SO4 JOB FILE:A:99578
REPORT DATE:17 Feb 89 RECEIPT DATE:05 Jul 88 EST. COMP. DATE:26 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID	COLUMN....	1	2	3	4	ROW
		ANALYSIS..	27	30	31	32	
		PPM.....	TKN	NO2-N	NO3-N	NH3-N	
99586	2-10CP3	CONC	0.155	<0.010	0.119	0.051	
		%REC		114	98.22064	102.3529	9
		DUPL			0.123	0.046	
		OID	01408259	49408204	49408215	49408221	
99587	2-13CP2	CONC	8.90	<0.010	0.588	0.545	
		%REC					10
		DUPL					
		OID	01408259	49408204	49408215	49408221	
99588	2-18C	CONC	2.40	<0.010	0.908	1.44	
		%REC	94				11
		DUPL	2.32				
		OID	01408259	49408204	49408215	49408221	
99589	2-14CP2	CONC	2.04	<0.010	0.208	1.01	
		%REC				100.2	12
		DUPL				1.02	
		OID	01408259	49408204	49408215	01408272	
99590	2-14C	CONC	0.339	<0.010	0.060	19.3	
		%REC					13
		DUPL					
		OID	01408259	49408215	49408215	01408272	
99591	2-16CP2	CONC	0.934	<0.010	0.519	23.0	
		%REC					14
		DUPL					
		OID	01408259	49408215	49408215	01408272	
99592	2-15CP2	CONC	0.687	<0.010	0.747	5.23	
		%REC					15
		DUPL					
		OID	01408259	49408215	49408215	01408272	
99593	2-11CP2	CONC	1.07	<0.010	2.15	15.0	
		%REC					16
		DUPL					
		OID	01408259	49408214	49408215	01408272	

TOTAL KJELDAHL NITROGEN NO2-N NITRITE NITROGEN NO3-N NITRATE NITROGEN
NH3-N AMMONIA NITROGEN

JOB DESCRIPTION:CRANE - ZAPPI
REPORT DATE:17 Feb 89

RD8G093E1170001 H2SO4
RECEIPT DATE:05 Jul 88

JOB FILE:A:99578
EST. COMP. DATE:26 Aug 88

B : DENOTES PPB

LAB ID	PROJECT ID		COLUMN.... 1	2	3	4	ROW
			ANALYSIS.. 27	30	31	32	
			PPM..... TKN	NO2-N	NO3-N	NH3-N	
99594	2/11CP3	CONC	3.42	<0.010	0.097	2.93	17
		%REC		109	90.31079		
		DUPL		0.010	0.089		
		OID	01408259	49408214	49408215	01408272	
99595	2/11C	CONC	5.40	<0.010	1.08	5.60	18
		%REC					
		DUPL					
		OID	01408259	49408214	49408215	01408272	
99596	02-01	CONC	0.503	<0.010	0.715	9.84	19
		%REC	99.2				
		DUPL	0.451				
		OID	01408259	49408214	49408215	01408272	
99597	2-15C	CONC	1.73	<0.010	2.40	2.78	20
		%REC				101.2	
		DUPL				2.76	
		OID	01408259	49408214	49408215	01408272	
99598	2-14CP3	CONC	0.773	<0.010	0.569	9.07	21
		%REC					
		DUPL					
		OID	01408259	49408214	49408215	01408272	
99599	2-17CP2	CONC	0.907	<0.010	0.480	7.96	22
		%REC					
		DUPL					
		OID	01408259	49408214	49408215	01408272	
99600	2-16C	CONC	7.78	<0.010	6.34	0.437	23
		%REC					
		DUPL					
		OID	01408259	49408214	49408215	49408221	
99601	2-05	CONC	0.585	<0.010	0.104	0.358	24
		%REC					
		DUPL					
		OID	01408259	49408214	49408215	49408221	

TKN TOTAL KJELDAHL NITROGEN
NO2-N NITRITE NITROGEN
NO3-N NITRATE NITROGEN
NH3-N AMMONIA NITROGEN

Total Organic Carbon (TOC)

JOB DESCRIPTION:CRANE - ZAPPI
REPORT DATE:17 Feb 89

RD8G093E1170001
RECEIPT DATE:05 Jul 88

JOB FILE:A:99504
EST. COMP. DATE:26 Aug 88

COLUMN.... 1
ANALYSIS.. 150
PPM..... TOC

B : DENOTES PPB

LAB ID	PROJECT ID				ROW
99504	B1	CONC	<1.0	*	
		%REC	104	*	1
		DUPL	<1.0	*	
		OID	09038245*		
99505	B2	CONC	<1.0	*	
		%REC		*	2
		DUPL		*	
		OID	09038245*		
99506	2-15C	CONC	4.4	*	
		%REC		*	3
		DUPL		*	
		OID	09038245*		
99507	2-14CP3	CONC	<1.0	*	
		%REC		*	4
		DUPL		*	
		OID	09038245*		
99508	2-17CP2	CONC	1.2	*	
		%REC		*	5
		DUPL		*	
		OID	09038245*		
99509	2-16C	CONC	7.0	*	
		%REC		*	6
		DUPL		*	
		OID	09038245*		
99510	2-05	CONC	1.3	*	
		%REC		*	7
		DUPL		*	
		OID	09038245*		
99511	02-01	CONC	4.3	*	
		%REC		*	8
		DUPL		*	
		OID	09038245*		

TOC TOTAL ORGANIC CARBON

JOB DESCRIPTION:CRANE - ZAPPI
REPORT DATE:17 Feb 89

RD8G093E1170001
RECEIPT DATE:05 Jul 88

JOB FILE:A:99504
EST. COMP. DATE:26 Aug 88

COLUMN.... 1
ANALYSIS.. 150
PPM..... TOC

B : DENOTES PPB

LAB ID	PROJECT ID				ROW
99512	2/11C	CONC	21.8	*	
		%REC	122.8	*	9
		DUPL		*	
		OID	09038245	*	
99513	DBG-SEEP-W	CONC	15.9	*	
		%REC		*	10
		DUPL		*	
		OID	09038245	*	
99514	2/11CP3	CONC	<1.0	*	
		%REC		*	11
		DUPL		*	
		OID	09038245	*	
99515	2/11CP2	CONC	1.1	*	
		%REC		*	12
		DUPL		*	
		OID	09038245	*	
99516	2-15CP2	CONC	1.2	*	
		%REC		*	13
		DUPL		*	
		OID	09038245	*	
99517	2-16CP2	CONC	<1.0	*	
		%REC		*	14
		DUPL		*	
		OID	09038245	*	
99518	2-14C	CONC	<1.0	*	
		%REC		*	15
		DUPL		*	
		OID	09038245	*	
99519	2-14CP2	CONC	4.4	*	
		%REC		*	16
		DUPL		*	
		OID	09038245	*	

TOTAL ORGANIC CARBON

JOB DESCRIPTION:CRANE - ZAPPI
REPORT DATE:17 Feb 89

RD8G093E1170001
RECEIPT DATE:05 Jul 88

JOB FILE:A:99504
EST. COMP. DATE:26 Aug 88

COLUMN.... 1
ANALYSIS.. 150
PPM..... TOC

B : DENOTES PPB

LAB ID	PROJECT ID				ROW
99520	2-18C	CONC	1.7	*	
		%REC	94.8	*	17
		DUPL	1.7	*	
		OID	09038245*		
99521	2-13CP2	CONC	1.3	*	
		%REC		*	18
		DUPL		*	
		OID	09038245*		
99522	2-10CP3	CONC	<1.0	*	
		%REC		*	19
		DUPL		*	
		OID	09038245*		
99523	2-13CP3	CONC	<1.0	*	
		%REC		*	20
		DUPL		*	
		OID	09038245*		
99524	2-10CP2	CONC	<1.0	*	
		%REC		*	21
		DUPL		*	
		OID	09038245*		
99525	2-04	CONC	<1.0	*	
		%REC		*	22
		DUPL		*	
		OID	09038245*		
99526	SP-C	CONC	<1.0	*	
		%REC		*	23
		DUPL		*	
		OID	09038245*		
99527	2-17C	CONC	<1.0	*	
		%REC		*	24
		DUPL		*	
		OID	09038245*		

TOC TOTAL ORGANIC CARBON

JOB DESCRIPTION:CRANE - ZAPPI
REPORT DATE:17 Feb 89

RD8G093E1170001
RECEIPT DATE:05 Jul 88

JOB FILE:A:99504
EST. COMP. DATE:26 Aug 88

COLUMN.... 1
ANALYSIS.. 150
PPM..... TOC

B : DENOTES PPB

LAB ID	PROJECT ID				ROW
99528	2-18CP2	CONC	<1.0	*	
		%REC	93.2	*	25
		DUPL	<1.0	*	
		OID	09038245	*	
99529	2-13C	CONC	2.5	*	
		%REC		*	26
		DUPL		*	
		OID	09038245	*	
99530	2-12CP3	CONC	2.3	*	
		%REC		*	27
		DUPL		*	
		OID	09038245	*	

TOC TOTAL ORGANIC CARBON

JOB DESCRIPTION:CRANE - ZAPPI
REPORT DATE:17 Feb 89

RD8G093E1170001 SEDIMENT
RECEIPT DATE:05 Jul 88

JOB FILE:A:99629
EST. COMP. DATE:26 Aug 88

COLUMN.... 1
ANALYSIS.. 150
PPM..... TOC

_
B : DENOTES PPB

LAB ID	PROJECT ID				ROW
99629	DBG-SEEP-S	CONC	34350	*	
		%REC		*	1
		DUPL		*	
		OID	09038214	*	

TOC TOTAL ORGANIC CARBON

US Army Corps of Engineers

LABORATORY

IN5 170 023 498
11 Jan, 1991

Geology, Hydrology and Phase II Ground-Water Quality
Assessment of the Dye Burial Grounds
Naval Weapons Support Center Crane, Indiana

PLATES

by

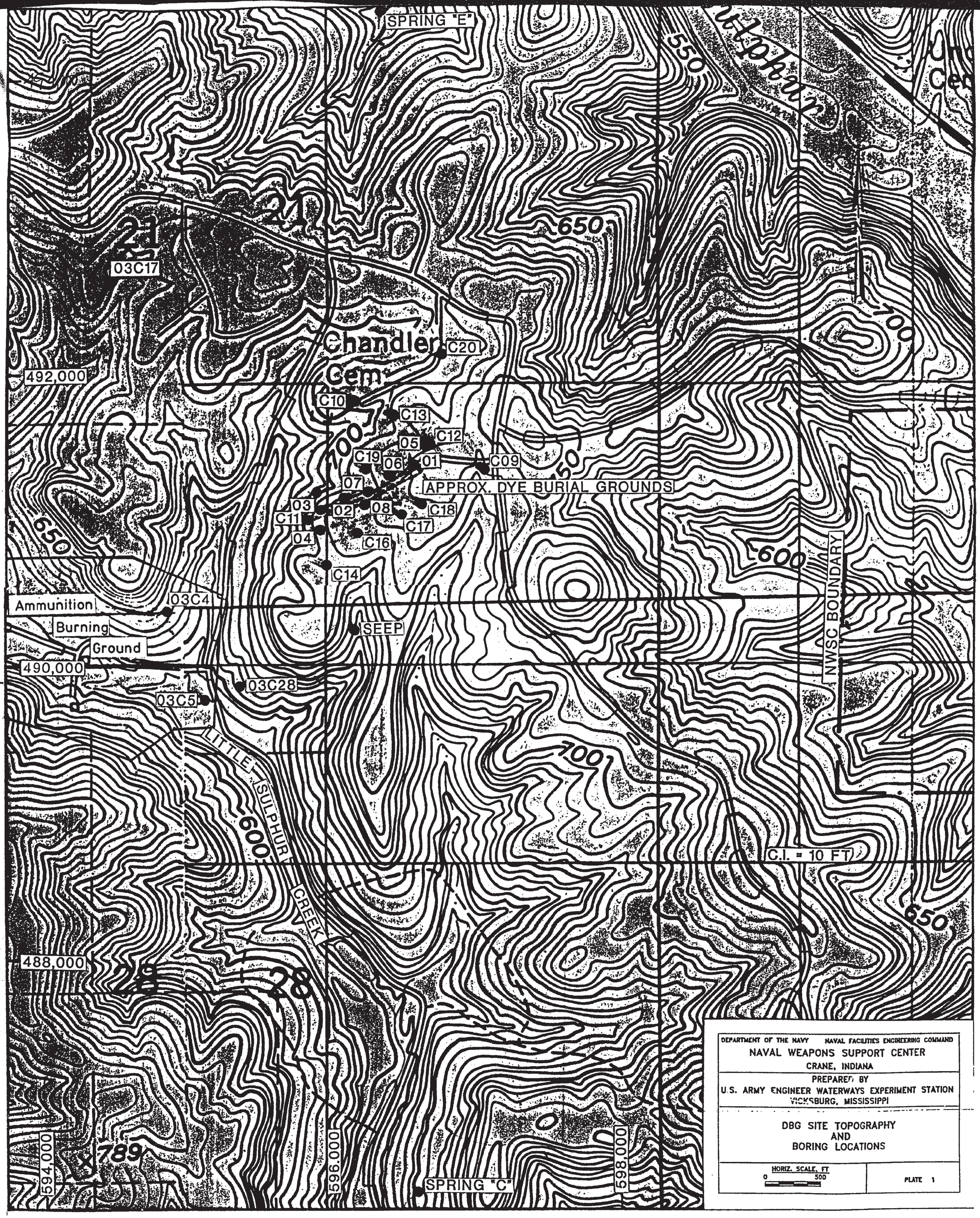
William L. Murphy

Geotechnical Laboratory

January, 1991

Prepared for Department of the Navy
Northern Division
Naval Facilities Engineering Command
Philadelphia, Pennsylvania

U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION



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NAVAL WEAPONS SUPPORT CENTER

CRANE, INDIANA

PREPARED BY

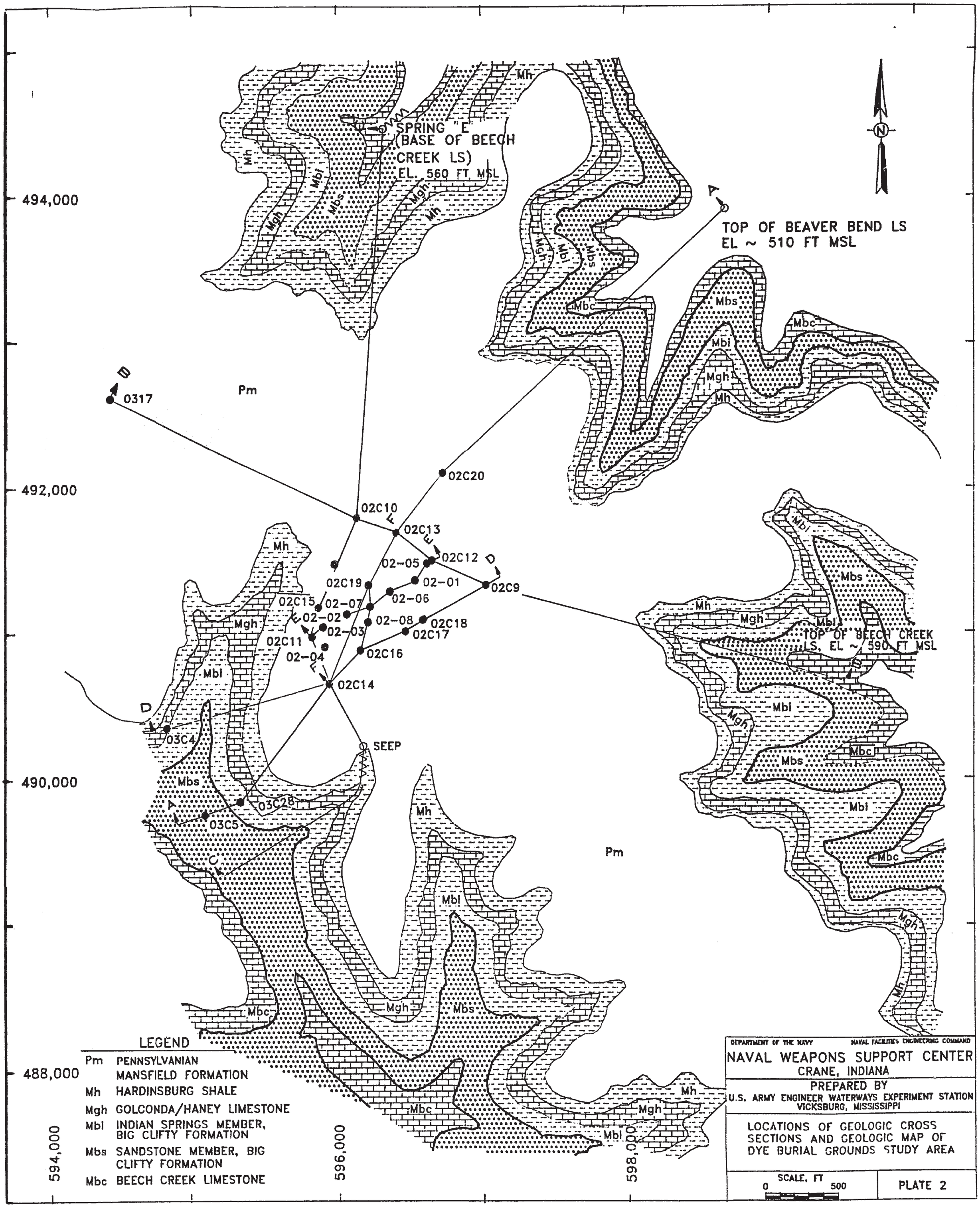
U.S. ARMY ENGINEER WATERWAYS EXPERIMENT STATION

VICKSBURG, MISSISSIPPI

DBG SITE TOPOGRAPHY AND BORING LOCATIONS

HORIZ. SCALE, FT 0 500

PLATE 1


SPRING "E"
(BASE OF BEECH
CREEK LS)
EL. 560 FT MSL
TOP OF BEAVER BEND LS
EL ~ 510 FT MSL
TOP OF BEECH CREEK
LS, EL ~ 590 FT MSL
494,000
492,000
490,000
488,000
594,000
596,000
598,000
Pm
Mh
Mgh
Mbl
Mbs
Mbc
0317
02C20
02C10
02C13
02C12
02C9
02-05
02-01
02-06
02C19
02C15
02-07
02-02
02-08
02C18
02-03
02C17
02C11
02-04
02C16
02C14
SEEP
03C4
03C28
03C5
LEGEND
Pm PENNSYLVANIAN MANSFIELD FORMATION
Mh HARDINSBURG SHALE
Mgh GOLCONDA/HANEY LIMESTONE
Mbl INDIAN SPRINGS MEMBER, BIG CLIFTY FORMATION
Mbs SANDSTONE MEMBER, BIG CLIFTY FORMATION
Mbc BEECH CREEK LIMESTONE
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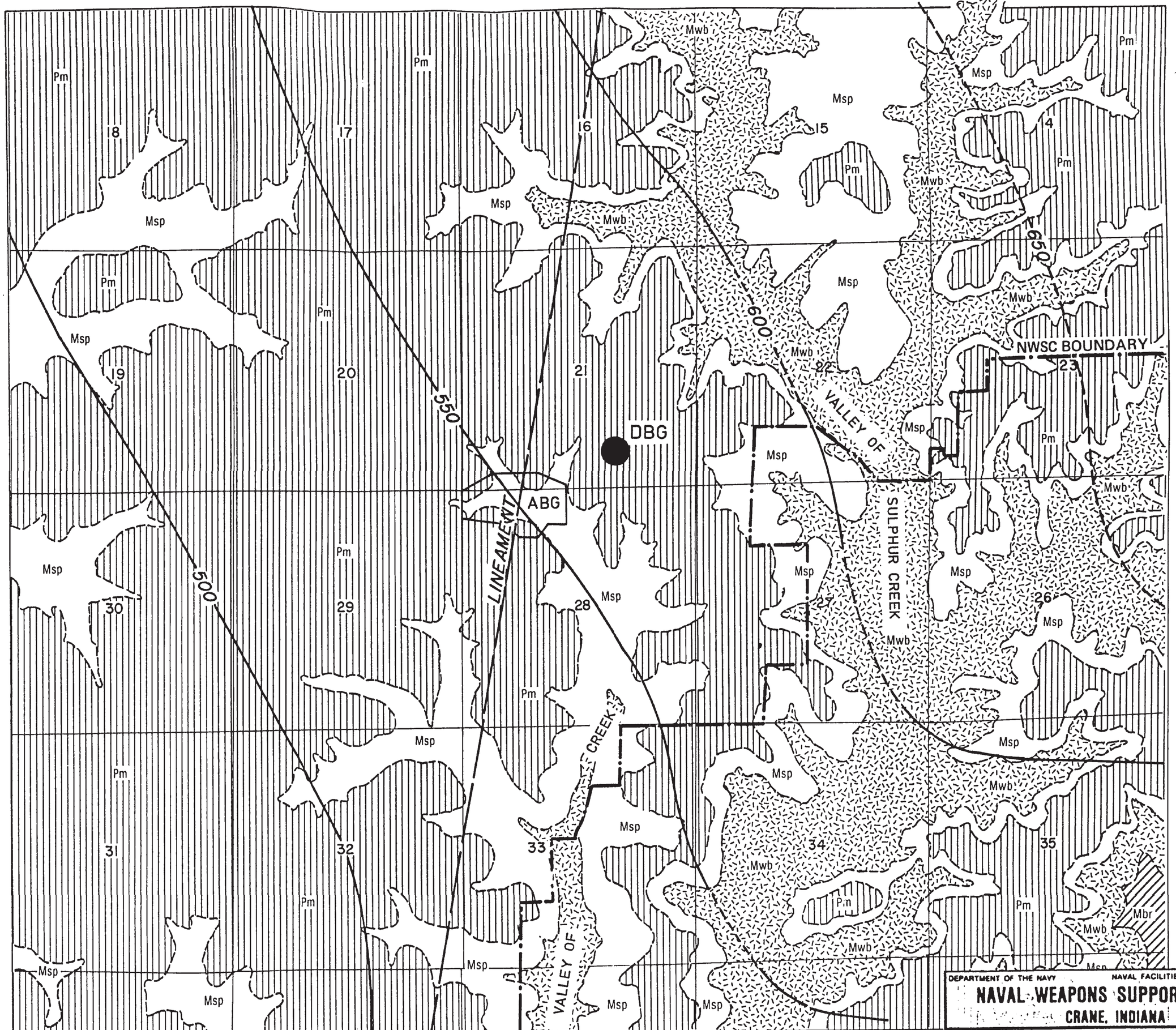
VICKSBURG, MISSISSIPPI
LOCATIONS OF GEOLOGIC CROSS SECTIONS AND GEOLOGIC MAP OF DYE BURIAL GROUNDS STUDY AREA
SCALE, FT
0
500
PLATE 2



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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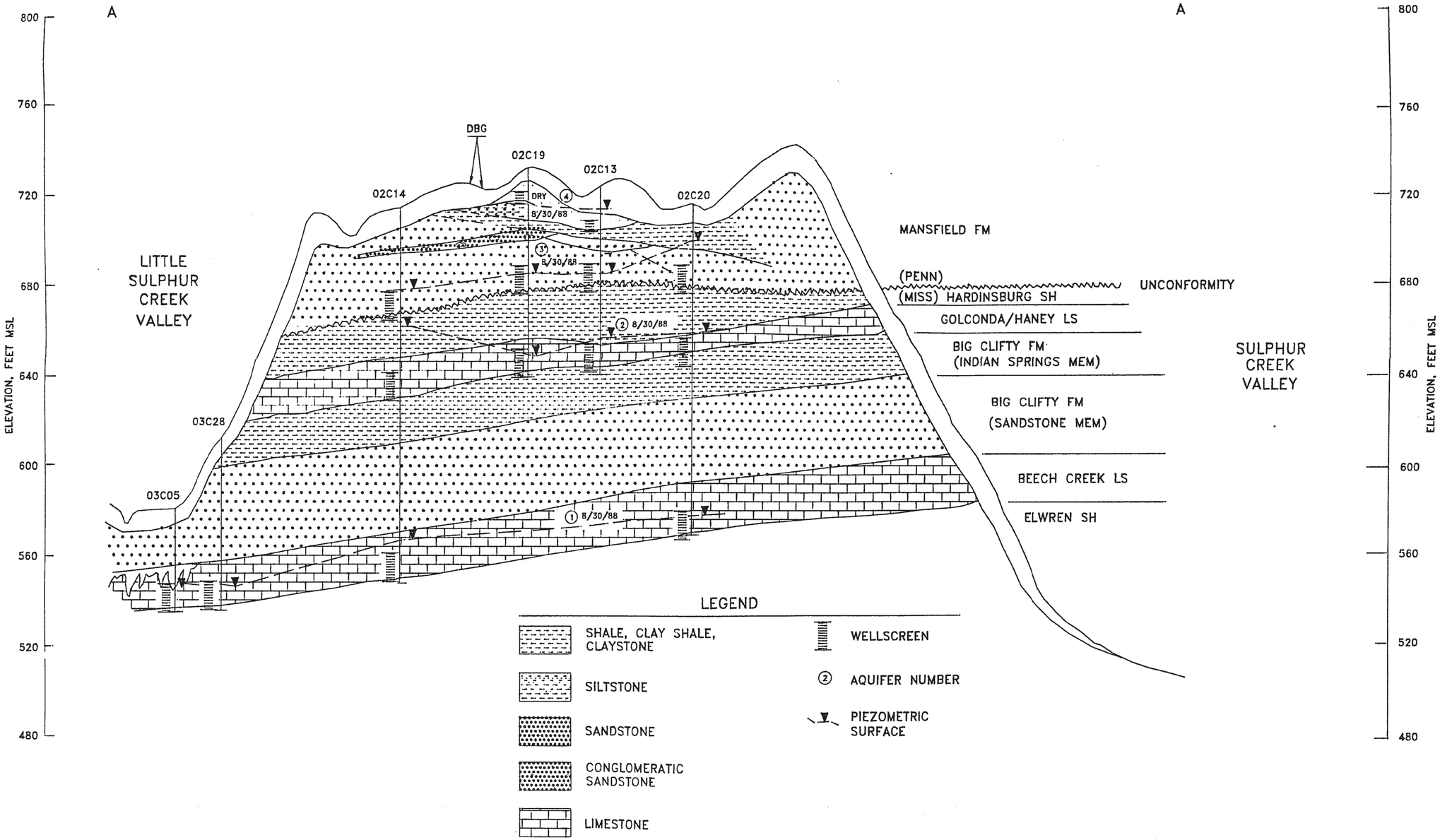
VICKSBURG, MISSISSIPPI

DRAWN BY: R. Hunt
CHECKED BY: W. Murphy

GEOLOGIC MAP
ABG Study Area

1000 0 1000 FT

PLATE 3



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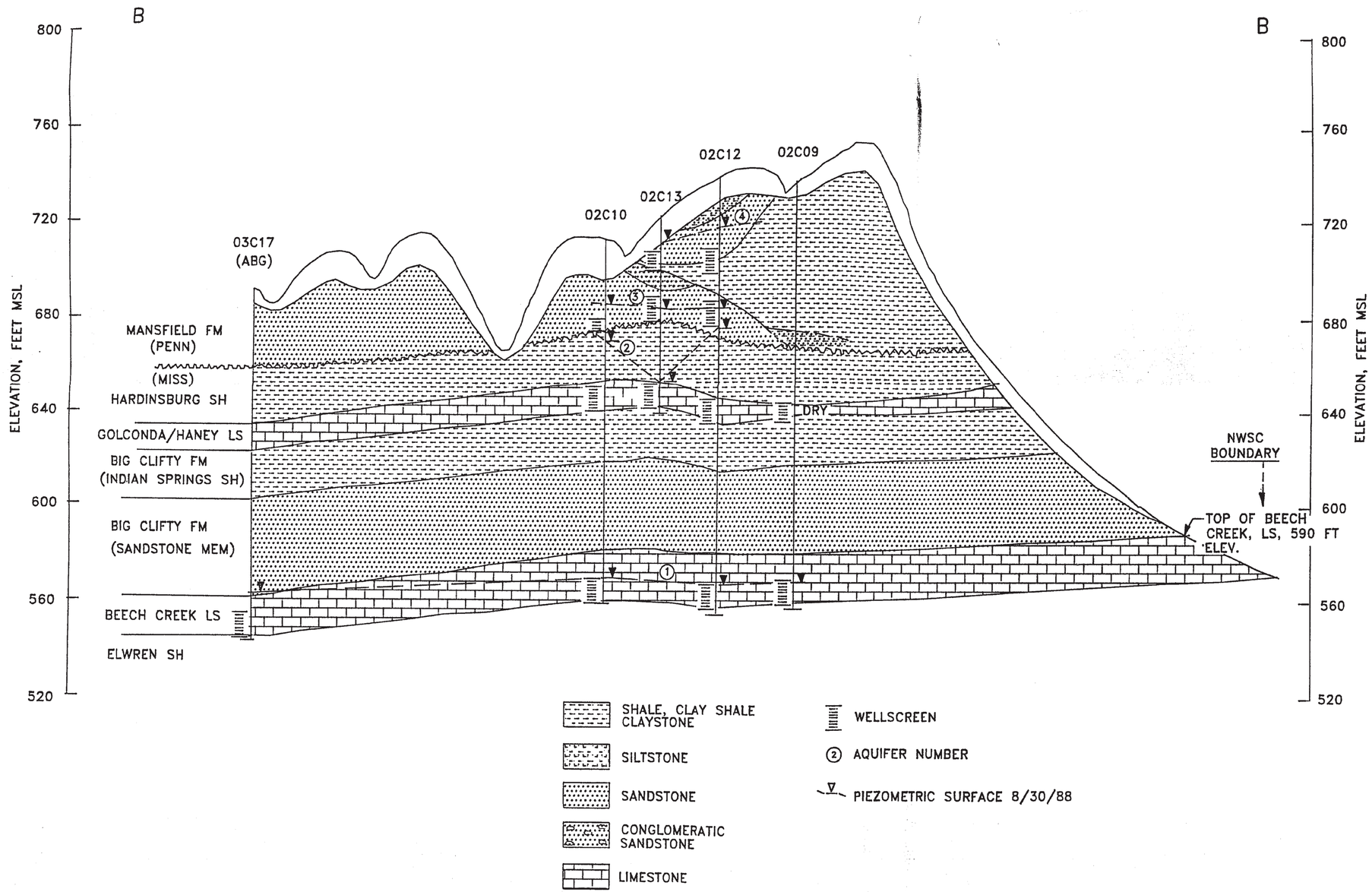
CROSS SECTION AA
DBG Study Area

HORIZ. SCALE, FT 0 — 500

PLATE 4



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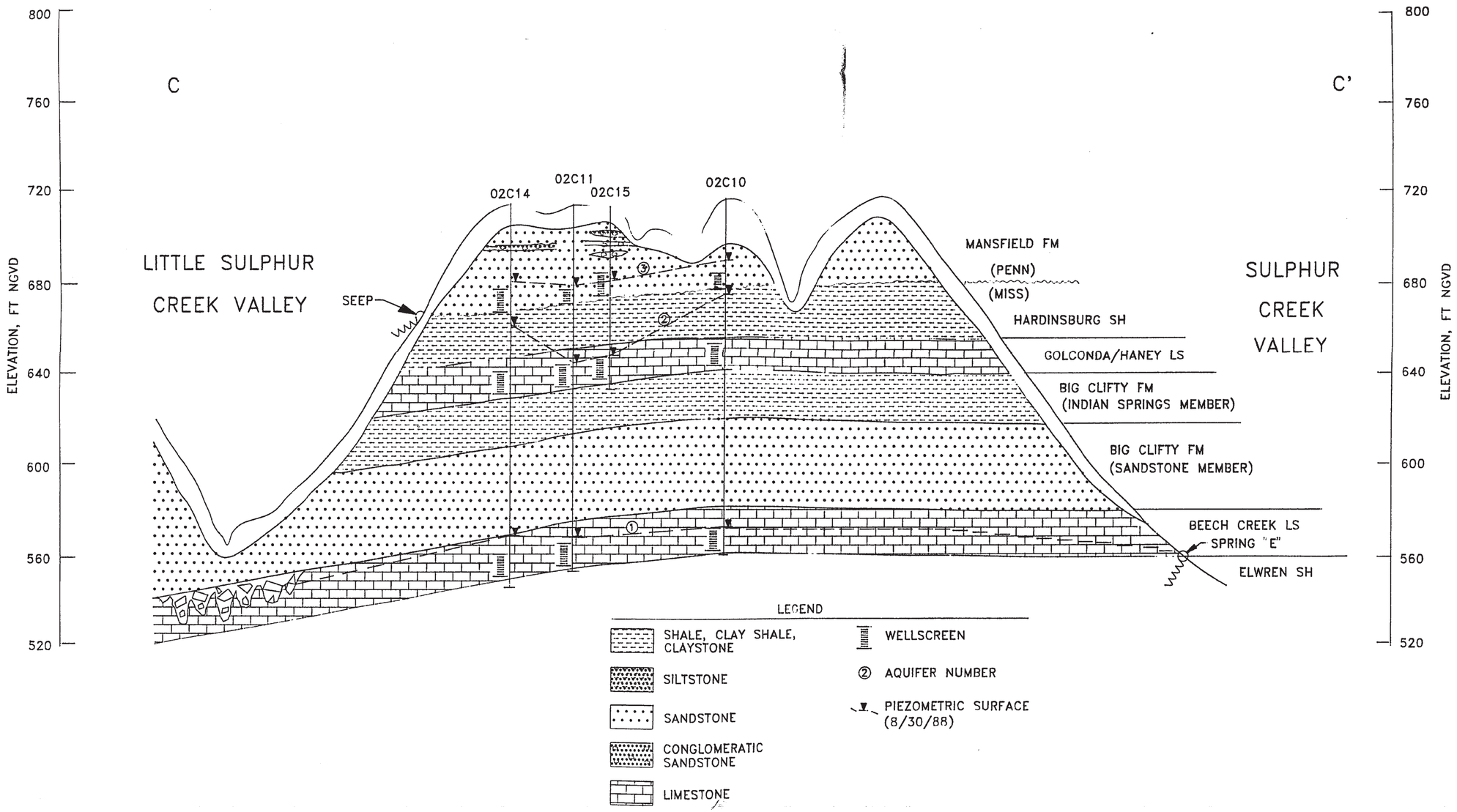
CROSS SECTION B–B

DBG Study Area

HORIZ. SCALE, FT 0 500

PLATE 5



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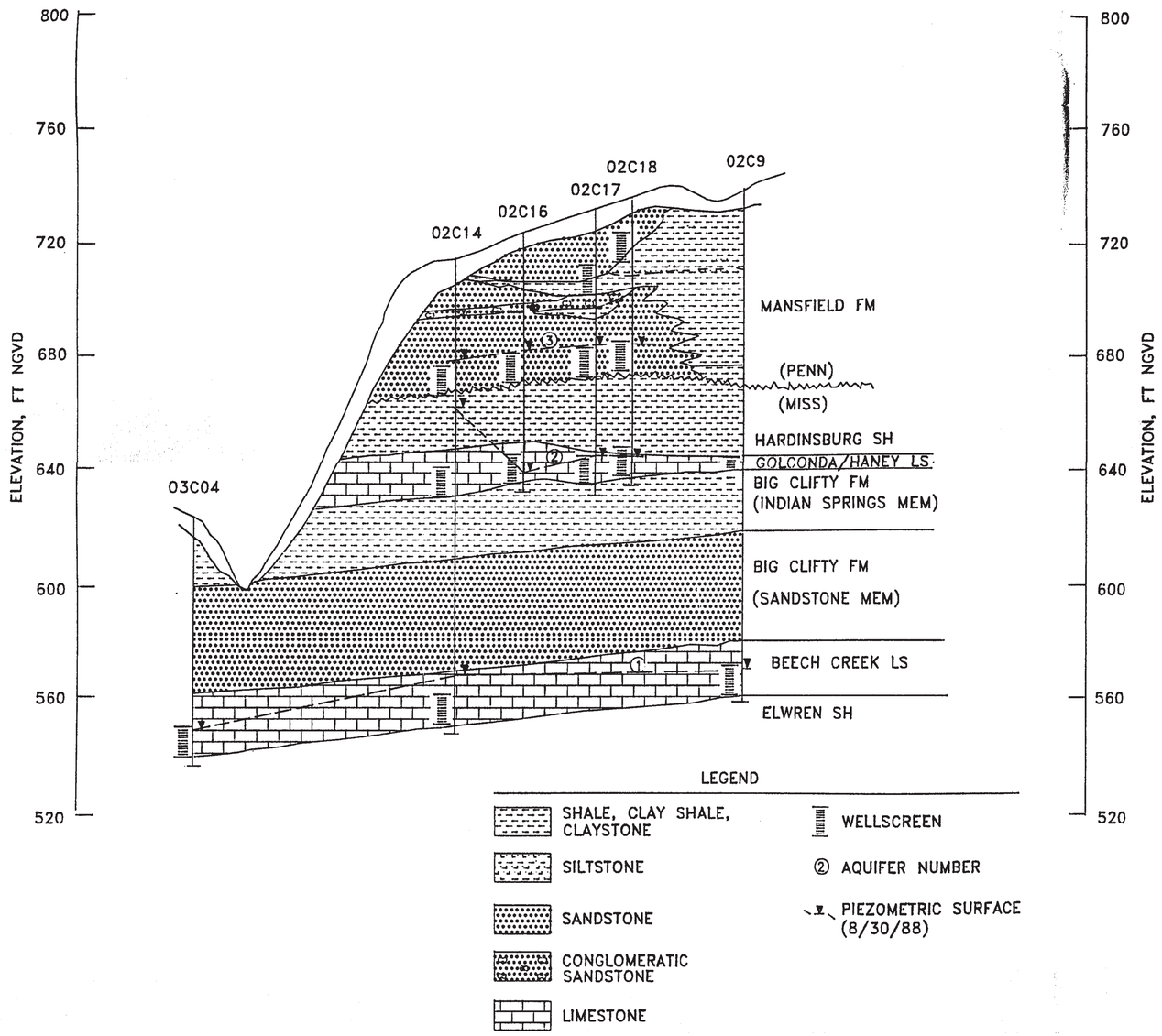
CROSS SECTION C–C'

DBG Study Area

HORIZ. SCALE, FT 0 500

PLATE 6



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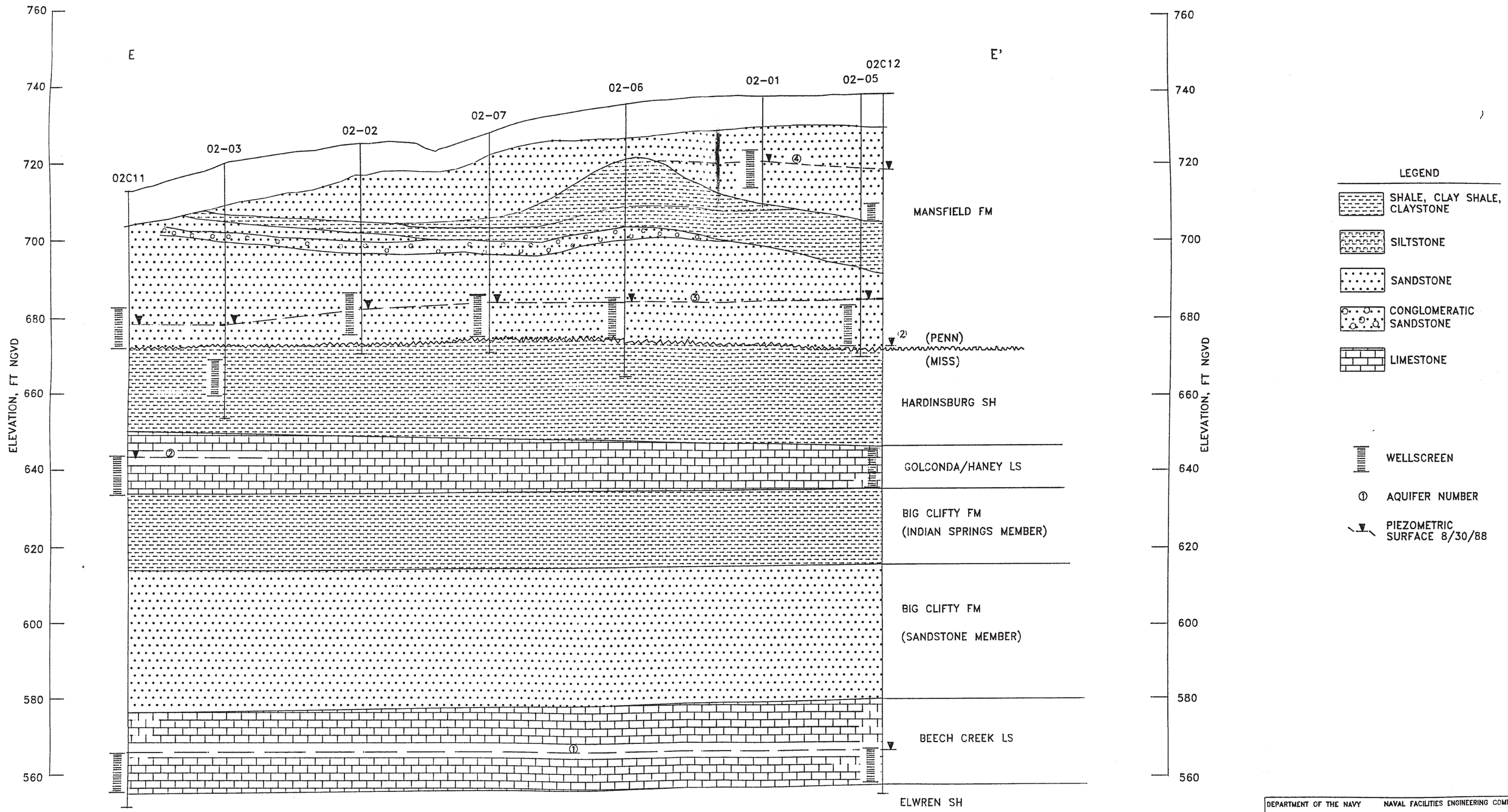
CROSS SECTION D–D'

DBG Study Area

HORIZ. SCALE, FT 0 500

PLATE 7



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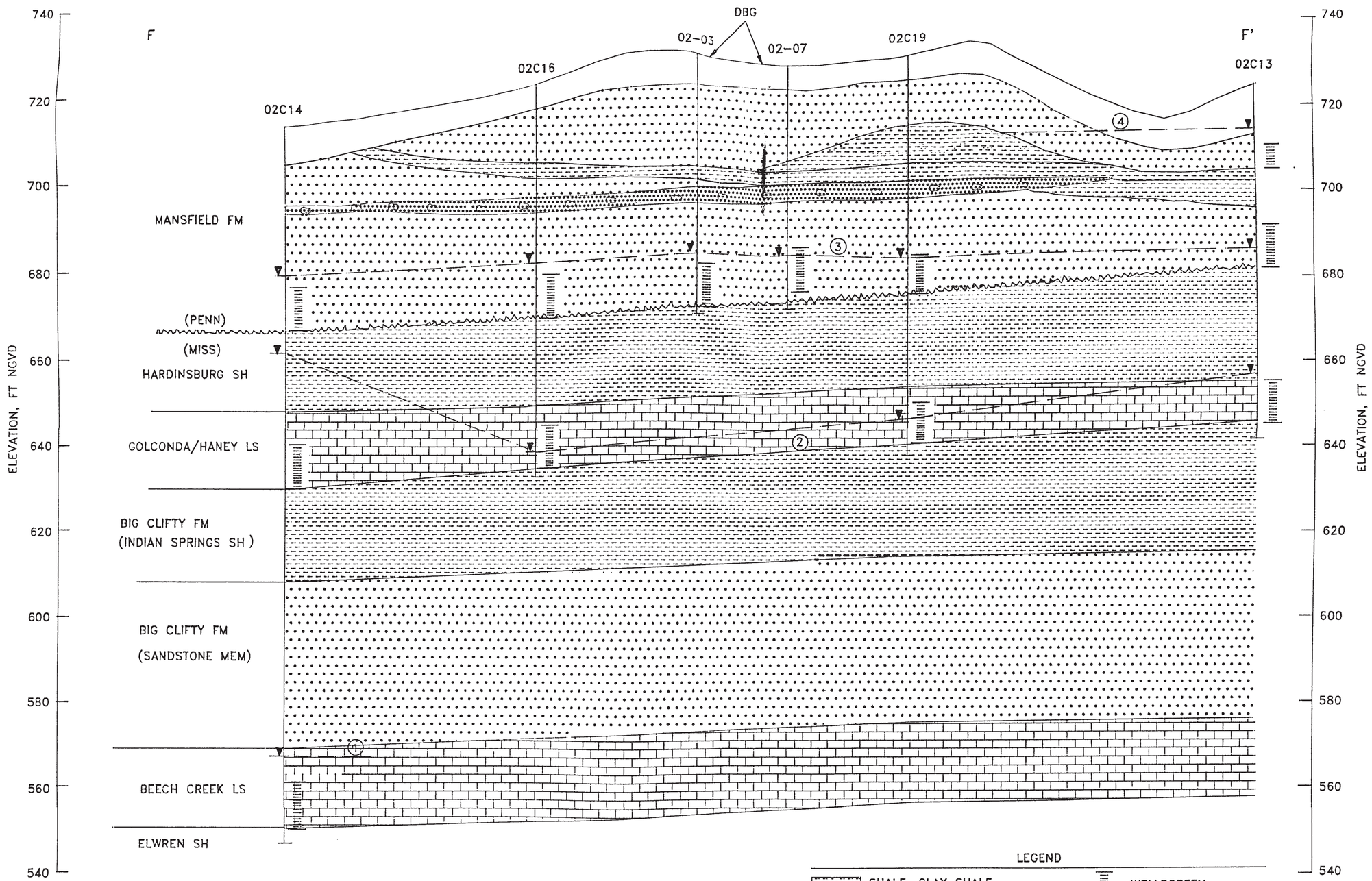
CROSS SECTION E-E'

DBG Study Area

HORIZ. SCALE, FEET 0 100

PLATE 8



LEGEND

- SHALE, CLAY SHALE, CLAYSTONE
- SILTSTONE
- SANDSTONE
- CONGLOMERATIC SANDSTONE
- LIMESTONE
- WELLSCREEN
- (2) AQUIFER NUMBER
- PIEZOMETRIC SURFACE (8/30/88)

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NAVAL WEAPONS SUPPORT CENTER

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CROSS-SECTION F-F'

DBG Study Area

HORIZ. SCALE IN FEET 0 100

PLATE 9