NOTICE!

ALL DRAWINGS
ARE LOCATED
AT THE END OF
THE DOCUMENT

DRAFT FINAL

Phase III RFI/RI Report

Rocky Flats Plant
881 Hillside Area
(Operable Unit No. 1)

Volume III

Appendix A1
Geologic Data

U.S. Department of Energy
Rocky Flats Plant
Golden, Colorado

October 1992

REVIEWED FOR CLASSIFICATION/UCNI
By
Date 11/4/92
ADMIN RECORD

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Appendix A

Geologic Data

Phase III
RFI/RI Report

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LIST OF ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
BH	Borehole
cm/sec	centimeters per second
DCN	Document Change Notice
DOE	Department of Energy
E	extraction well
EMD	Environmental Management Department
EPA	Environmental Protection Agency
FSP	Field Sampling Plan
GRRASP	General Radiochemistry and Routine Analytical Services Protocol
GT	geotechnical
GW	groundwater
I	injection well
I.D.	inside diameter
IHSS	Individual Hazardous Substance Site
IM/IRA	Interim Measure/Interim Remedial Action
ml	milliliter
MW	monitoring well
O	observation well
O.D.	outside diameter
OU	operable unit
OU1	Operable Unit No. 1
PCB	Polychlorinated biphenyl
PH	pilot hole
PZ	Piezometer
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RFEDS	Rocky Flats Environmental Database System
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RFP	Rocky Flats Plant
SOP	Standard Operating Procedure
SOPA	SOP Addendum
SVOC	Semivolatile organic compound
SW	surface water
TOC	total organic carbon
USCS	Unified Soil Classification System
VOC	Volatile organic compound

Appendix A1 · Text

Drilling and Sampling Data

Phase III RFI/RI Report

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GEOLOGIC DATA

Geologic data gathered during the Phase III Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI) at Operable Unit No. 1 (OU1) at Rocky Flats Plant (RFP) include a summary of drilling and sampling data (Appendix A1), a discussion of geotechnical data (Appendix A2), a discussion of surveying data (Appendix A3), and a discussion of geologic data collected during construction of the french drain (Appendix A4).

A1 DRILLING AND SAMPLING DATA

This appendix summarizes the drilling and sampling procedures used during the Phase III RFI/RI field investigation at OU1. In general, drilling and sampling operations followed the guidelines and rationale of the field sampling plan as presented in the *Phase III RFI/RI Work Plan* (work plan) (DOE 1991a). The field investigation commenced in April 1991, when drilling locations specified in the work plan were located and staked in the field. Mobilization was conducted from April through July 1991, and included training field personnel in radiological safety and *Environmental Management Department (EMD) Standard Operating Procedures (SOPs)* (EG&G 1991a), as well as procuring necessary field and support equipment, supplies, and subcontractors.

Drilling operations were initiated on August 2, 1991, and were completed on December 9, 1991. Rig personnel included a driller, helper, geologist, health and safety technician, and sampling assistant. All operations were directly supervised by the site manager and the health and safety officer.

Drilling and sampling procedures followed SOPs where applicable. References to specific guidelines are provided throughout this appendix, and deviations from the field sampling plan and SOP guidelines are noted where appropriate.

A1.1 DRILLING

Section A1.1.1 discusses the general objectives of the drilling locations and Section A1.1.2 the specific objectives. Section A1.1.3 compares the drilling activities undertaken during the Phase III RFI/RI field program with those drilling activities proposed in the work plan.

A1.1.1 Locations

A total of 114 new locations were drilled during the Phase III RFI/RI field program at OU1. Drilling locations were chosen to meet the guidelines presented in the work plan. Actual drilling locations were marked in the field and cleared according to Geotechnical SOP GT.10, *Borehole Clearing*, by EG&G Rocky Flats, Inc. personnel.

Ninety-nine of the new locations were assigned 1991 project numbers in the 300 series; numbering from "30091" to "39891." The remaining 15 borings were temporary wellpoints used for multiple-well testing along Woman Creek. Table A1-1 notes the drilling and completion details for these locations. Appendix B2 gives additional details for the 15 borings affiliated with the temporary wellpoints. Figure A1-1 shows the locations and the site used for multiple-well testing.

A1.1.1.1 General Objectives

Drilling locations were generally defined in relation to one or more of the 11 individual hazardous substance site (IHSS) locations at OU1. Chemical sampling within and near these IHSS locations was intended to further characterize the locations as potential sources of contamination and to develop a thorough understanding of the nature and extent of the contamination at OU1. Geologic data supporting the physical characterization of the site were collected from every drilling location.

A1.1.1.2 Specific Objectives

The specific objectives for each drilling location are defined in the work plan. The five types of locations discussed in the work plan are boreholes, designated as "BH;" monitoring wells, designated as "MW;" piezometers, designated as "PZ;" and pilot holes, designated as "PH;" and temporary wellpoints drilled in conjunction with multiple-well tests along Woman Creek. Locations designated as both boreholes and monitoring wells were sampled according to the borehole sampling plan, and were subsequently completed as monitoring wells. Table A1-1 summarizes the work plan designations for each of the drilling locations, with the exception of the temporary wellpoints.

As noted above, a primary objective of the drilling program was to collect geologic data. This objective was met by collecting continuous split-spoon core samples from 98 of the 114 drilling locations and logging them according to Geotechnical SOP GT.01, *Logging Alluvial and Bedrock Material.* Attachment A-1 presents the final core log descriptions in LOGGER (a geological logging graphic software) format. Core was not collected from the remaining 16 locations as these were the temporary wellpoint and the drive point locations for the multiple-well test.

Specific data collection objectives varied according to the four work plan location designations. Borehole locations were drilled to define the nature and extent of soil contamination at OU1. To meet that objective, a borehole soil sampling protocol (discussed in Section A1.5) was designed to provide a complete suite of chemical data. Monitoring well locations were drilled to define the nature and extent of ground water contamination at OU1; completed locations have been incorporated into the routine monitoring program and are sampled quarterly for chemical analysis. Piezometer locations were drilled to provide hydrologic data defining the ground water conditions at OU1; water levels are taken quarterly at piezometer locations under the routine monitoring program. Pilot hole locations were drilled to determine whether multiple-well tests could be run at the locations prescribed by the work plan; the resulting data objectives at pilot hole locations (depth to bedrock and the thickness of saturated alluvium) were determined by field analysis of core samples.

Soil sampling at monitoring well, piezometer, and pilot hole locations followed an abbreviated protocol (described in Section A1.5) designed primarily to characterize cuttings drummed at these sites.

A1.1.1.3 Deviations From the Work Plan

Table A1-2 compares the drilling activities undertaken during the Phase III RFI/RI field program with the drilling activities proposed in the work plan. Net deviations included 5 additional boreholes, 6 additional monitoring wells, and 3 additional piezometers, as well as 3 fewer combination borehole/monitoring wells, and 29 fewer temporary wellpoints. These deviations

result in 18 fewer drilling locations than planned. Specific deviations from work plan guidelines are discussed below.

The net increase of five additional borehole locations resulted from six additional locations and one cancellation. The six additional borehole locations included three offsets from original locations (30491, 31291, and 31691) and three locations planned as combination borehole/monitoring wells that were not completed as wells (30791, 36491, 35191). All three of the borehole offsets were necessary because of poor recovery in the original boring (Table A1-3). Well completion at location 30791 was canceled due to equipment unavailability and location 36491 was canceled because it would have been damaged by construction activities, and location 35191 could not be completed as a well due to a shallow depth to bedrock (Table A1-4).

Each of the six additional monitoring well locations (31791, 38491, 38791, 39691, 37891, 39191) was an offset from an original location. Table A1-3 references these offset locations by their original locations. Location 31791 was offset from location 30791, which was not completed as a well due to temporary equipment unavailability. Location 38491 was offset from location 38391 because poor recovery in the original boring did not allow for a precise determination of the depth to bedrock. Location 38791 was offset from location 38691 because the depth to bedrock in location 38691 was too shallow for well completion. Location 39691 was offset from location 38091 because a water main was ruptured during initial drilling at location 38091. The remaining two offsets (37891 and 39191) were necessary because their original locations (33391 and 33091) were not, as prescribed by the work plan, completed as bedrock wells.

Three piezometer locations not prescribed by the work plan (39291, 38891, and 38991) were added to determine the effects of the french drain on alluvial and bedrock saturation. One piezometer location (PZ04) prescribed by the implementation plan was canceled prior to drilling because french drain construction activities would have destroyed it.

Nine locations prescribed by the work plan were to be initially drilled and sampled as boreholes and subsequently completed as monitoring wells. All nine locations were initially drilled and sampled according to the borehole sampling protocol, but only six of the nine locations were completed as wells. Two of the three locations not completed as monitoring wells (30791 and 36491) were canceled, the third location (35191) was not completed as a well due to a prohibitively shallow bedrock contact (Table A1-4).

Forty-five planned temporary wellpoints were to be distributed among 3 testing locations; each testing location was to consist of 15 wellpoints on a 3-foot by 5-foot grid. However, because preliminary pilot hole explorations showed that only one of the three planned locations was suitable for multiple-well testing, only one of the three planned testing grids was constructed. The sixteenth wellpoint or drive point hole, and the only one assigned a project number (39891), was installed for the single-well test run in conjunction with multiple-well testing at Site 1.

A1.1.2 Equipment and Procedures

A1.1.2.1 General

Ninety-six of the 114 drilling locations were initially drilled using hollow-stem augers equipped for continuous split-spoon core sampling following Geotechnical SOP GT.02, *Drilling and Sampling Using Hollow Stem Auger Techniques*. The 18 locations not drilled with hollow-stem augers included 2 locations that were drilled manually using a drive hammer (39491 and 39591; both were boreholes), and the 16 temporary wellpoint locations that were drilled using solid-stem augers (location 39891 and 15 other locations designated as E1-5, O1-5, and I1-5 for extraction, observation, and injection wells).

Except for the two manually driven locations and the 16 temporary wellpoints, all locations were drilled using mobile B-57 drill rigs. All locations from which continuous split-spoon core samples were collected, including the two manually driven boreholes, were sampled using a 2-1/2-inch inside diameter (I.D.), 2-foot-long split-spoon sampler. At mechanically augered locations, the split-spoon sampler was mounted to a latch box in the lead auger, and a "moss system" was used to retrieve the core after each run while leaving the augers in place. At the

two manually driven locations, the split-spoon sampler was driven directly into the soil. For volatile organic (VOC) and geotechnical sampling, a 3-inch-long, 2-1/2-inch-I.D. stainless-steel sleeve was placed at the lead end of the split-spoon sampler.

Sections A1.1.2.2 through A1.1.2.7 discuss the specific drilling equipment and procedures used at each type of drilling location. As discussed in Appendix A2, geotechnical sampling followed American Society for Testing and Materials (ASTM) D1586 procedures for drive sampling. The following discussion does not, however, include explicit reference to drive sampling procedures. For a full discussion of geotechnical sampling, and the related modifications of drilling procedures, refer to Appendix A2.

Handling of Drill Cuttings

Drill cuttings from all locations except temporary wellpoints were drummed in accordance with Geotechnical SOP GT.08, *Handling of Drilling Fluids and Cuttings*. Cuttings generated at temporary wellpoints were backfilled into the hole prior to grouting and abandonment. Boreholes at temporary wellpoint locations were abandoned according to Geotechnical SOP GT.05, *Plugging and Abandonment of Boreholes*.

Description and Handling of Core Samples

Continuous split-spoon core samples were collected from all locations except the 16 temporary wellpoints. Preliminary core log descriptions were written at the drill site by the rig geologist and all core not used for chemical sampling was boxed at the site. Wooden blocks were labeled and placed in the core boxes to note the beginning and finishing depth for each box, the beginning of each drilling interval, and to represent sections of no recovery. Once returned to the field trailer, these boxed cores were described in detail according to SOP GT.01, *Logging Alluvial and Bedrock Material*, by the project stratigrapher. Attachment A1-1 presents finalized core logs in LOGGER format.

Equipment Decontamination

Drilling and sampling equipment was decontaminated according to Field Operations SOP FO.03, *General Equipment Decontamination.* Sampling equipment was decontaminated prior to each use, while drilling equipment (augers, drill stems, drill bits, and all other down-hole equipment) was decontaminated before being used at each new borehole location. All drill rigs were completely decontaminated before entering each new IHSS according to procedures outlined in SOP FO.4, *Heavy Equipment Decontamination.*

Abandonment

All locations not completed as monitoring wells or piezometers were abandoned according to Geotechnical SOP GT.05, *Plugging and Abandonment of Boreholes.* Abandoned locations were marked with stainless-steel identification tags secured to the concrete at the surface. Identification tags include the designated 300-series location number, survey coordinates, elevation, and date of abandonment.

A1.1.2.2 Boreholes

All drilling at the 48 mechanically drilled borehole locations was accomplished using 6-1/2-inch outside diameter (O.D.) hollow-stem augers equipped with split-spoon samplers. Mechanically drilled borehole locations were drilled approximately 3 feet into bedrock. A general provision was made in the work plan for completing borehole locations as wells if subcropping bedrock sandstones were encountered. However, because no sandstones were encountered in locations planned as boreholes, all borehole locations were abandoned according to guidelines in Geotechnical SOP GT.05, *Plugging and Abandonment of Boreholes.*

Due to difficulties with rig access, two of the alluvial boreholes (39491 and 39591) were sampled using a manual drive hammer setup. Following the hand-auger sampling SOP Addendum (SOPA), the 2-1/2-inch-I.D. split spoon was initially equipped with 12-inch polybuterate tubes to collect continuous core samples for chemical analyses. After sending polybuterate-tubed core samples out for analysis, however, field personnel were informed that the analytical laboratory did not consider them appropriate for organics sampling. To provide acceptable samples, both

locations were redrilled less than 5 feet from the original locations (using the same location numbers) using split-spoon samplers equipped with the standard 3-inch-long stainless-steel sleeves used for VOC sampling. Following the hand-augering SOPA, manual drive hammering was accomplished by attaching the split spoon to a slide hammer and advancing it in 1-foot intervals to 10 feet or refusal, whichever came first.

A1.1.2.3 Alluvial Monitoring Wells and Piezometers

Alluvial monitoring wells and piezometers were initially drilled to the bedrock contact using a 6-1/2-inch-O.D. hollow-stem augers equipped with split-spoon samplers. As soon as the bedrock contact was identified in core samples, locations suitable for well or piezometer completion were reamed with an 11-5/8-inch- O.D. auger. After reaming, these locations were drive sampled 2 more feet into bedrock according to ASTM D1586 procedures using the split-spoon sampler equipped with 2-1/2-inch-I.D. augers and a 140-pound drive hammer. Drive sampling was employed to avoid smearing any of the bedrock clays upward along the walls of the boring. Section A1.1.3 discusses well and piezometer construction specifications.

As noted in Table A1-2, 14 proposed monitoring well locations were not actually completed as wells (see Section A1.1.3.2). Locations not suitable for well completion were not reamed, and drive sampling was not necessarily employed for bedrock sampling.

A1.1.2.4 Bedrock Monitoring Wells and Piezometers

Bedrock wells and piezometers were initially drilled a minimum of 3 feet into bedrock claystone using 6-1/2-inch-O.D. hollow-stem augers equipped with split-spoon samplers. After drilling 3 feet into bedrock, holes intended for completion as bedrock wells or piezometers were reamed with 14-inch-O.D. augers. Twelve-inch steel surface casing was then installed according to Geotechnical SOP GT.03, *Isolating Bedrock from Alluvium with Grouted Surface Casing*. Following Geotechnical SOP GT.03 guidelines for installing large-diameter surface casing, a mixture of cement and reduced pH bentonite grout was pumped into the borehole prior to emplacement of the surface casing. Stainless-steel centralizers were placed 2 feet from each end of the casing to ensure a minimum 2-inch annular space. Once the casing was in place, the

cement-grout mixture was forced out through pre-drilled ports at the base of the casing and into the annulus by pushing a plug down through the casing to the bottom of the hole. The annulus was topped off to the surface if necessary, and the cement grout was allowed to harden for a minimum of 24 hours.

Drilling through and below the surface casing was accomplished using 6-1/2-inch-O.D. hollow-stem augers equipped with split-spoon samplers. After reaching total depth, bedrock wells were installed according to Geotechnical SOP. GT.06, *Monitoring Well and Piezometer Installation.* Section A1.1.3 discusses the installation procedures in detail.

A1.1.2.5 Combination Borehole/Monitoring Wells

Combination borehole/monitoring wells (seven total) were drilled in the same fashion as alluvial monitoring wells, using 6-1/2-inch-O.D. hollow-stem augers equipped with split-spoon samplers from ground surface to the bedrock contact, and then drive sampling 2 feet into bedrock. They are distinguished from the other wells because soil samples were collected according to the borehole sampling protocol rather than the abbreviated monitoring well protocol. Section A1.1.2.1 discusses the distinction between these two sampling protocols.

A1.1.2.6 Pilot Holes

All drilling at pilot hole locations was accomplished using 6-1/2-inch-O.D. hollow-stem augers equipped with split-spoon samplers. Drilling procedures at pilot hole locations were tailored to meet specific data needs (depth to water table and depth to bedrock); following these general guidelines, each pilot hole was drilled between 2 and 3 feet into bedrock.

A1.1.2.7 Temporary Wellpoints

Procedures and equipment used to install temporary wellpoints generally followed the guidelines of Technical Memorandum 3, *Multi-Well Pumping Test Plan* (DOE 1991). Temporary wellpoint locations were first drilled to within 1 foot of the water table elevation using 4-inch-O.D. solid-stem augers. Wellpoints were supposed to be driven into the saturated zone from that point. Boulders and cobbles, however, made it necessary to auger guide holes to near total depth at

some locations. Stainless-steel wellpoints (1-1/2-inch O.D.) were placed in the guide holes and driven with a 140-pound drive hammer to final depth while held in a vertical orientation. After completion of multiple-well testing, the wellpoints were removed from the ground.

A1.1.3 Monitoring Well and Piezometer Installation

A total of 22 alluvial monitoring wells, four bedrock monitoring wells, three alluvial piezometers, and two bedrock piezometers were installed. Monitoring wells and piezometers, distinguished only by the intended data collection objectives, were constructed to meet the same specifications outlined in Geotechnical SOP GT.06, *Monitoring Well and Piezometer Installation.* Completed monitoring wells and piezometers were labeled with the appropriate 300-series project number on the protective casing as well as the concrete pad; locks were installed to deter tampering.

A1.1.3.1 Construction Specifications

Figure A1-2 illustrates the general features of an alluvial well completed in accordance with Geotechnical SOP GT.06, *Monitoring Well and Piezometer Installation.* Moving down from the surface, the annular space is occupied by the following materials: a concrete surface seal, bentonite grout, a bentonite seal above the filter pack, and a filter pack made of 16-40 gradation silica sand. Bedrock wells are constructed in the same fashion, except that the bedrock is isolated from alluvial materials with grouted surface casing installed according to Geotechnical SOP GT.03, *Isolating Bedrock from Alluvium with Grouted Surface Casing.*

SOP GT.06 guidelines for monitoring well and piezometer construction are provided in terms of thicknesses for each of the materials placed in the annular space. Guidelines current at the time of this report are as follows: the surface seal is to extend between 1-1/2 and 3 feet below ground surface, the bentonite seal is to be at least 2.0 feet thick, the filter pack is to extend at least 6 inches above the top of the screen, and the sump is to be 2 feet long. Stainless-steel centralizers were installed above and below the well screen. Section A1.1.3.2 discusses deviations from SOP specifications.

A1.1.3.2 Deviations From SOP Guidelines

The comparison of well and piezometer constructions to SOP guidelines is complicated by the fact that Geotechnical SOP GT.06, *Monitoring Well and Piezometer Installation*, has been revised by document change notices (DCNs) since the initiation of the Phase III field investigation at OU1 (Figure A1-3). Deviations discussed below are based on comparisons to current SOP guidelines; relevant DCNs are, however, noted where appropriate.

Surface seals in three wells (31791, 33691, 35991) extend more than the maximum 3 feet below ground surface. In all three cases, the surface seal was made slightly more than 3 feet in order to meet the top of the bentonite seal. These minor deviations from Geotechnical SOP GT.06 guidelines were made only when strict compliance with SOP guidelines would have required placing less than 1 foot of bentonite grout above the bentonite seal.

Three wells (30991, 33691, and 34791) have less than the minimum 6 inches of filter pack above the top of the screen. All three of these wells were, however, constructed prior to implementation of Geotechnical SOP GT.06 DCN 91.06 (effective November 8, 1991), which was the first time a specific lower limit (6 inches) was set for the amount of filter pack required above the top of the screen.

Fifteen of the 31 completed well and piezometer locations have sumps that are not exactly 2 feet long. All 15 of these locations have sumps extending approximately 2.4 feet below the screen. This deviation from SOP guidelines was due to an equipment lot change.

A1.1.3.3 Deviations From the Work Plan

Seventeen of the 39 planned well locations, including 3 locations planned as combination borehole/monitoring wells, were not completed as wells. Table A1-4 lists all 17 of these locations and provides brief explanations as to why the wells were not completed.

Eleven of the 17 planned wells were not completed because of prohibitively shallow bedrock contacts. Following current Geotechnical SOP GT.06 guidelines, *Monitoring Well and*

Piezometer Installation as illustrated in Figure A1-3, the minimum thickness of alluvium required for completion of an alluvial well is 6.0 feet. However, as also illustrated in Figure A1-3, the minimum alluvial thickness required for alluvial well completion was 8.5 feet until Geotechnical SOP GT.06 DCN 91.06 (effective November 8, 1991) was instituted.

The only two locations (38691 and 38791) that were abandoned due to prohibitively shallow depths to bedrock (although they had more than the prescribed minimum 6.0 feet of alluvial cover) were both drilled prior to the institution of DCN 91.06. However, because the depth to bedrock in both of these locations was less than the pre-DCN 91.06 minimum 8.5 feet, neither could have been completed in conformance with SOP guidelines at the time they were drilled. Bedrock was encountered at less than the current minimum of 6.0 feet at each of the remaining nine well locations that were abandoned due to shallow bedrock contacts.

The remaining six abandoned well locations were not completed for reasons other than insufficient alluvial thickness. Well completions at locations 30791 and 36491 were canceled; at location 30791 because the necessary field equipment was temporarily unavailable, and at location 36491 because it would have been destroyed by the construction of the french drain. Location 38091 had to be abandoned because a water main was ruptured during drilling, and location 38391 was not completed because poor recovery did not provide a well-constrained depth to bedrock.

The final two locations planned but not completed as wells, 33091 (MW28) and 33391 (MW27), were slated to be the first bedrock wells installed during the Phase III field investigation at OU1. Both locations were abandoned because guidelines for surface casing were not yet communicated to field personnel. Both locations were later offset and redrilled; the prescribed bedrock wells were then installed at these offset locations (37891 and 39191).

Location 39691 (MW20), initially slated for completion as an alluvial monitoring well, was screened in bedrock within a subcropping sandstone. Although location 39691 was not screened in alluvium as planned, the work plan did require that wells be completed in subcropping

sandstone units to evaluate the potential for downward migration of contaminants into bedrock. Therefore, screening the subcropping sandstone rather than true alluvial material at location 39691 was a reasonable modification of the work plan as it followed a contingency plan that was explicitly stated in the work plan.

A1.2 SAMPLING

A1.2.1 Soil Sampling

Soil sampling followed work plan guidelines. A broad suite of soil samples was collected from those locations designated as boreholes. Locations designated as monitoring wells, piezometers, and pilot holes were sampled according to an abbreviated sampling protocol designed to characterize cuttings drummed at the site. Soil samples were not collected at temporary wellpoints, because no cuttings were drummed at these sites.

Collection, containerization, preservation, handling, and shipping methods were standardized according to SOP guidelines for each sample type. Sample intervals varied according to the purpose of the drilling location. Figures A1-4 through A1-6 show typical sampling intervals.

A1.2.1.1 Analytical Suites

The "full suite" of analyses specified in the work plan is divisible into five distinct groups of analyses: volatile organics (VOCs); semivolatile organics (SVOCs), including acid extractables, base/neutral extractables, and pesticides/PCBs; radionuclides; metals; and indicators, including what the work plan calls "other inorganics" and "indicators." Table A1-5 lists the individual chemical parameters analyzed in each one of these five groups. Analytical procedures were to follow guidelines listed in the *General Radiochemistry and Routine Analytical Services Protocol* (EG&G 1990).

The work plan originally called for a full suite of analyses at borehole locations, and only VOC analyses at monitoring well, piezometer, and pilot hole locations. Technical Memorandum No. 1 (DOE 1991b), the chemical analysis plan, modified these guidelines to exclude SVOC analyses from the general borehole sampling protocol. Only locations specifically noted in the chemical

analysis plan were to be analyzed for a full suite of analytes, including SVOCs. Table A1-6 summarizes the actual soil sampling activities undertaken during the Phase III field investigations at OU1. Section A1.2.1.6 identifies and discusses deviations from the work plan or chemical analysis plan.

A1.2.1.2 Collection Methods

The two main types of soil samples taken for chemical analyses were 6-foot composite samples and 3-inch-long discrete samples collected in stainless-steel sleeves. Six-foot composite samples were taken for SVOC, metals, radionuclide, and indicator analyses. Stainless-steel sleeve samples were collected for VOC analyses. Containerization and handling procedures followed applicable guidelines in Field Operations SOP FO.13, *Containerization, Preserving, Handling, and Shipping of Soil and Water Samples.*

Composite sampling involved collecting material from each of three consecutive 2-foot split-spoons. Each core was first peeled with a stainless-steel putty knife to remove any surficial material smeared onto the outside of the core. Core material was then collected with a clean putty knife and homogenized in a stainless-steel bowl. Typically, one-quarter to one-half of the core in each spoon was removed for the composite sample; the remainder of the core was preserved in a core box for detailed logging by the project stratigrapher at the OU1 field trailer. All putty knives and bowls were decontaminated in the field between samples according to Field Operations SOP FO.03, *General Equipment Decontamination*, and sampling technicians changed gloves before collecting each new composite sample.

Following Geotechnical SOP GT.02, *Drilling and Sampling Using Hollow Stem Auger Techniques*, discrete samples for VOC analyses were collected in 3-inch stainless-steel liners placed inside the split-spoon samplers prior to drilling. Immediately after the core was opened, scanned, and measured, the stainless-steel liner was removed from the spoon and its exposed ends covered with sheets of teflon and capped. The capped sample was then wrapped with black electrical tape, labeled, recorded, bagged, and placed in a cooler chilled to 4 degrees Centigrade.

A1.2.1.3 Containerization, Preserving, Handling, and Shipping

Sampling procedures were designed and executed in accordance with Field Operations SOP FO.13, *Containerization, Preserving, Handling, and Shipping of Soil and Water Samples.* VOC samples were collected and shipped in a capped stainless-steel sleeve, and radionuclide samples were collected in 500-milliliter (ml) amber jars. Samples for metals, SVOC, and inorganic analyses were collected in a single 250-ml amber jar. All samples were labeled, recorded, bagged, and placed in coolers immediately after collection. Samples collected for radiological analyses (both the low-volume screening samples discussed in Section A1.9 and the high-volume analytical samples discussed in Section A1.2.1.2) were placed in a nonchilled cooler; all other samples were placed in a cooler chilled to 4 degrees Centigrade.

A1.2.1.4 Borehole Sampling Intervals

At locations designated as boreholes, continuous 6-foot composite samples were collected from the entire drilling depth. After three 2-foot runs, the full 6-foot composite sample was homogenized and divided into three containers: a 500-ml amber jar for radionuclide analyses; a 250-ml amber jar for metals, SVOC, or inorganic parameter analyses; and a 120-ml plastic bottle for radiological screening. Below the water table or bedrock contact (whichever was encountered first) composite samples consisted of radiological screening samples only.

Stainless-steel liner samples for VOC analysis were collected from borehole locations at the base of the 0- to 2-foot run and every 4 feet thereafter until either the water table or the alluvium/bedrock contact was encountered. In addition, one VOC sample was collected directly below the water table and one directly below the alluvium/bedrock contact.

A1.2.1.5 Monitoring Well, Piezometer, and Pilot Hole Intervals

At locations designated as monitoring wells, piezometers, and pilot holes, VOC samples were collected only at the water table and bedrock contact depths. Just as in borehole locations, continuous 6-foot composite samples were collected through the entire drilling depth; however, composite samples from these nonborehole locations were collected solely for radiological screening.

A1.2.1.6 Deviations From the Work Plan

Table A1-2 summarizes the actual sampling. Sampling intervals followed protocols as closely as possible. Locally poor recovery, however, did not allow for strict compliance in some cases. The only systematic deviations from the work plan or chemical analysis plan were made as a result of lack of finalization of SVOC sampling protocols. This lack of definitization was due primarily to the fact that drilling operations began before the final version of the chemical analysis plan was available.

As noted above, the chemical analysis plan modified work plan guidelines to exclude SVOC analyses from all but a select list of borehole locations. Until the chemical analysis plan was made available, field personnel were provided with a tentative list of locations where SVOC analyses were to be taken. Because preliminary guidance was conservative, SVOC analyses were requested at nine locations that were not specified for SVOC analyses in the chemical analysis plan (30091, 30391, 30491, 30591, 32991, 33191, 34891, 36391, and 39491). Two additional locations (30191 and 32191) had been drilled and sampled prior to receiving the preliminary guidance for abbreviating SVOC sampling.

In two instances (at locations 36491 and 36991) preliminary guidance authorizing deletion of SVOC sampling was at variance with the chemical analysis plan. Following preliminary guidance, but deviating from the chemical analysis plan, SVOC samples were not collected from those two locations.

Aside from the systematic changes in SVOC sampling, deviations from the analytical protocol occurred only at four locations. Indicator analyses were inadvertently not requested at borehole location 39591, and there were three monitoring well locations (31191, 34791, 38091) where no soil samples were collected. Location 38091 was not sampled because a water main was hit during drilling; an offset location (39691) was sampled as planned. Poor recovery at both location 31191 and location 34791 did not allow for collection of the prescribed samples.

A1.2.2 Water Sampling and Well Development

Water sampling and well development was accomplished under the routine monitoring program. The program involves quarterly and sometimes monthly rounds of water sampling: well locations are sampled using procedures referenced to Groundwater SOP GW.05, *Field Measurement of Groundwater Field Parameters*, and GW.06, *Groundwater Sampling*, surface water stations are sampled using procedures referenced to Surface Water SOP SW.02, *Field Measurement of Surface Water Field Parameters*, and SW.03, *Surface Water Sampling*, and water levels are taken at piezometer locations according to Groundwater SOP GW.01, *Water Level Measurements in Wells and Piezometers*. Monitoring wells and piezometers are developed during each round of sampling according to Groundwater SOP GW.02, *Well Development*.

A1.2.3 Geotechnical and Total Organic Carbon Sampling

At locations 37391, 37491, 37591, 37691, 37891, 37991, 38091, 38591, 38991, 39091, 39191, and 39691, geotechnical and total organic carbon (TOC) samples were taken in addition to the samples described above. Appendix A2 discusses the sampling protocol, testing procedures, and results of the geotechnical sampling. TOC sampling procedures followed guidelines in the TOC field sampling plan (see Section 1.3.11 of this report).

Because the results of TOC analyses are applied to fate and transport modeling in conjunction with geotechnical data, TOC sample intervals were chosen to correspond with the geotechnical samples (Figure A2-2). Unlike the geotechnical samples, which are collected as discrete samples similar to VOC samples, TOC samples were taken as composites from up to 6 feet of continuous core length. TOC samples were collected using the same procedures for standard composite samples (see Section A1.5.2). TOC samples were assigned separate sample numbers even when they were collected in the same 6-foot interval as a normal composite sample. Each TOC sample was containerized in a 500-ml amber jar for chemical analysis and a partially filled 120-ml plastic bottle for radiological screening.

A1.2.4 Miscellaneous Sampling

As prescribed by the work plan, additional samples collected during the Phase III field investigation included samples of effluent from the Building 881 footing drain as well as samples of Coherex, a commercially available dust suppressant previously used at OU1. Footing drain effluent samples were collected by lowering a bailer down through a manhole access located approximately 150 feet south of Building 881. Suspected as a potential source of VOC contamination, effluent samples were collected, handled, and shipped as VOC samples in two 40-ml glass vials. Coherex, which previously has been implicated as a potential source of toluene contamination at OU1, was sampled by pouring material directly from the storage drum into sample containers. Two 40-ml glass vials were collected for VOC analyses, and three 1-liter amber glass bottles were collected for SVOC analyses.

A1.2.5 Quality Assurance/Quality Control Sampling

Following guidelines presented in the *Quality Assurance Addendum (QAA)* (EG&G 1991b), quality control (QC) samples were incorporated in the sampling program as trip blanks, equipment rinsates, and field duplicates of composite samples. Soil blanks prescribed by the work plan were not used because standardized soil was unavailable. Appendix D presents the results of the QC sampling.

Each day that VOC sampling was planned, trip blanks consisting of two 40-ml VOC vials were filled with distilled water at the field trailer and placed inside the cooler chilled to 4 degrees Centigrade where VOC and 250-ml composite samples were to be stored in the field. Trip blanks were kept with the samples and shipped together with them to the laboratory to be analyzed for VOCs.

One rinsate sample was collected at each location site selected for SVOC analyses to evaluate sampling equipment as a possible source of phthalate contamination. Rinsate samples consisted of distilled water poured through a decontaminated split-spoon sampler with a VOC liner. Following Geotechnical SOP GT.02, *Drilling and Sampling Using Hollow Stem Auger*

Techniques, rinsate water was collected in a stainless-steel bowl and then transferred to 1-liter amber bottles.

Duplicate composite samples were typically collected in addition to the regular composite samples in one 6-foot interval per borehole. Duplicates were collected in 250-ml amber jars and were analyzed for the same suite of analytes as the original composites.

A1.2.6 Radiation Screening Samples

All samples except trip blanks had corresponding radiological screening samples that were collected in 120-ml plastic bottles. Radiological screening samples for composite samples were collected from the same bowl of material collected for the actual composite sample. Screening samples for stainless-steel sleeve samples were collected from the core directly above the sleeve.

Radiological screening samples were shipped to a laboratory for screening each day that samples were collected. No samples were shipped off site until their corresponding radiological screening sample results were received. Once the screening results were received, laboratories were chosen according to the guidelines presented in Field Operations SOP FO.18, Environmental Sample Radioactivity Content Screening.

A1.3 DATA AVAILABLE

Attachment A1-1 includes data packets for each of the boreholes, monitoring wells, piezometers, and pilot holes for the Phase III RFI/RI field investigation at OU1. Each data packet is prefaced by an index sheet showing the data available for that location. Data include geologic borehole logs completed by the project stratigrapher (presented in LOGGER format), natural gamma ray and caliper geophysical logs run in the bedrock boreholes, and finalized well construction diagrams. Data packets are arranged in numerical order by borehole/well location number.

A1.4 REFERENCES

DOE, 1991a. *Final Phase III RFI/RI Work Plan*, Rocky Flats Plant, 881 Hillside Area (OU1); U.S. Department of Energy, Rocky Flats Plant, Golden, Colorado, March 1991.

DOE, 1991b. *Technical Memorandum No. 1, Addendum to Final Phase III Work Plan, Chemical Analysis Plan*, Rocky Flats Plant, 881 Hillside Area (Operable Unit No. 1), Rocky Flats Plant, Golden, Colorado, August 1991.

EG&G, Rocky Flats, Inc. (EG&G), 1990. *General Radiochemistry and Routine Analytical Service Protocol (GRRASP)*, Environmental Restoration Program, Rocky Flats Plant, Golden, Colorado, February 1990.

EG&G, 1991a. Final Rocky Flats Plant *Environmental Management Department Standard Operating Procedures*, Environmental Restoration Program, Rocky Flats Plant, Golden, Colorado, July 1991.

EG&G, 1991b. *Quality Assurance Addendum* (QAA) to the Rocky Flats Plant Site-Wide Quality Assurance Project Plan for CERCLA RI/FS and RCRA RFI/CMS Activities for Operable Unit No. 1, 881 Hillside Area, Phase III RFI/RI, Version 1.1, July 1991.

Appendix A1 · Tables

Drilling and Sampling Data

Phase III RFI/RI Report

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Hillside 881

Borehole/Well Number	Work Plan Designation	Date Completed (month/day in 1991)	Total Depth (Feet)	Completion Details	Well Plumb Check	H&S Level	Drums Used	Additional Information
30091	BH54	8/05	13.9	Grouted	--	D	0150EB	Bedrock at 8.1 feet
30191	BH53	8/07	19.8	Grouted	--	D	0151EB 0152EB	Bedrock at 14.0 feet
30291	BH06	8/08	22.9	Grouted	--	D	0153EB 0364EB	Bedrock at 15.5 feet
30391	BH52	8/12	32.5	Grouted	--	D	0154EB 0155EB	Bedrock at 28.0 feet (estimated)
30491	BH52 offset	8/13	32.0	Grouted	--	D	0156EB 0157EB 0230EB	Offset 10 feet east of 30391; bedrock at 28.0 feet
30591	BH51	8/14	12.0	Grouted	--	D	0158EB	Bedrock at 7.0 feet
30691	BH09	8/15	14.7	Grouted	--	D	0159EB	Bedrock at 7.5 feet
30791	BH08/MW36	8/16 Abandoned	18.7	Grouted	--	D	0163EB	Bedrock at 9.5 feet
30891	BH07	8/19	18.0	Grouted	--	D	0161EB	Offset 20 feet south for more level location; bedrock at 2.7 feet
30991	MW35	8/20	12.2	Completed	Yes	D	0160EB 0180EB	Bedrock at 9.0 feet
31091	BH05	8/20	32.5	Grouted	–	D	0165EB 0166EB	No samples or core recovered below 24 feet due to flowing sands;

BH = Borehole
EB = EBASCO
H&S = Health and Safety
MW = Monitoring well
PH = Pilot Hole
PPE = Personal Protective Equipment
PZ = Piezometer
VOC = Volatile organic compound

Borehole/Well Number	Work Plan Designation	Date Completed (month/day in 1991)	Total Depth (Feet)	Completion Details	Well Plumb Check	H&S Level	Drums Used	Additional Information
								depth to bedrock not determined

BH = Borehole
EB = EBASCO
H&S = Health and Safety
MW = Monitoring well
PH = Pilot Hole
PPE = Personal Protective Equipment
PZ = Piezometer
VOC = Volatile organic compound

Borehole/Well Number	Work Plan Designation	Date Completed (month/day in 1991)	Total Depth (Feet)	Completion Details	Well Plumb Check	H&S Level	Drums Used	Additional Information
31191	MW32	8/21 Abandoned	8.0	Grouted	--	D	0164EB	Too shallow to complete as alluvial well; bedrock at 4.7 feet
31291	BH05 offset	8/22	36.0	Grouted	--	D	0167EB 0168EB 0170EB	Offset 71 feet west of 31091; bedrock at 12.5 feet
31391	MW31	8/28	4.0	Grouted	--	D	0175EB	Too shallow to complete as colluvial well; bedrock at 2.5 feet
31491	MW30	8/28	21.5	Completed	Yes	D	0174EB 0183EB 0185EB	Bedrock at 16.5 feet
31591	BH03	8/23	16.3	Grouted	--	D	0173EB	Bedrock at 10.7 feet
31619	BH05 offset	8/26	32.6	Grouted	--	D	0191EB 0363EB 0194EB	Offset 20 feet west of 31091; bedrock at 29.0 feet
31791	MW36 offset	8/28	14.2	Completed	Yes	D	0187EB 0188EB	Offset 15 feet northeast of 30791; bedrock at 8.8 feet
31891	BH04/MW02	8/30	21.6	Completed	Yes	D	0189EB 0177EB 0178EB	Bedrock at 17.2 feet
31991	BH48	8/28	18.6	Grouted	--	D	0346EB 0186EB	Bedrock at 14.8 feet

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VOC = Volatile organic compound

Borehole/Well Number	Work Plan Designation	Date Completed (month/day in 1991)	Total Depth (Feet)	Completion Details	Well Plumb Check	H&S Level	Drums Used	Additional Information
32091	BH18	8/29	20.7	Grouted	--	D	0172EB 0179EB	Bedrock at 16.1 feet Offset 120 feet southeast of IHSS 105.1 for rig access
32191	BH16	8/30	18.6	Grouted	--	D	0176EB 0182EB	Offset 220 feet southeast of IHSS 105.2 for rig access Bedrock at 15.0 feet
32291	MW33	9/03 Abandoned	8.0	Grouted	--	D	0212EB	Offset 8 feet south for rig access; too shallow to complete as alluvial well; bedrock at 4.1 feet
32391	BH49	9/03	12.9	Grouted	--	D	0205EB	Bedrock at 4.2 feet
32491	BH17	9/04	10.9	Grouted	--	C	0210EB	Offset 160 feet southwest of IHSS 105.2 for rig access. 0–2 foot interval had HNU hit of 24.5 ppb; remainder of borehole and core was clean; bedrock at 6.0 feet
32591	MW24	9/05	19.1	Completed	Yes	D	0184EB 0206EB 0203EB	Offset 5 feet north to clear service road; bedrock at 15.9 feet
32691	BH36	9/05	8.6	Grouted	--	D	0237EB	Bedrock at 3.3 feet
32791	MW25	9/06 Abandoned	8.0	Grouted	--	D	0223EB	Too shallow to complete as colluvial well; bedrock at 2.7 feet

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VOC = Volatile organic compound

Borehole/Well Number	Work Plan Designation	Date Completed (month/day in 1991)	Total Depth (Feet)	Completion Details	Well Plumb Check	H&S Level	Drums Used	Additional Information
32891	BH38	9/06	8.8	Grouted	--	D	0238EB	Bedrock at 4.0 feet
32991	BH39	9/06	8.6	Grouted	--	D	0225EB	Bedrock at 3.7 feet
33091	MW28	9/06 Abandoned	9.0	Grouted	--	D	0204EB	Too shallow to complete as colluvial well; bedrock at 2.6 feet
33191	BH35	9/09	6.6	Grouted	--	D	0207EB	Bedrock at 1.4 feet
33291	BH34	9/10	14.8	Grouted	--	D	0221EB 0231EB	Offset 33 feet southeast for more level location; offset twice more (2.6 feet northeast and 4.6 feet northeast) from this new location to compensate for poor recovery; bedrock at 10.0 feet
33391	MW27	9/09 Abandoned	8.0	Grouted	--	D	0239EB	Too shallow to complete as colluvial well; bedrock at 5.0 feet
33491	MW09	9/10	11.4	Completed	Yes	C/D	0224EB 0234EB 0248EB	Bedrock at 8.0 feet
33591	BH37	9/11	16.6	Grouted	--	D	0256EB	Bedrock at 12.0 feet
33691	MW10	9/12	10.9	Completed	Yes	D	0251EB 0257EB	Offset 10 feet north of staked location to avoid hazards of ditch; bedrock at 7.8 feet

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PPE = Personal Protective Equipment
PZ = Piezometer
VOC = Volatile organic compound

Borehole/Well Number	Work Plan Designation	Date Completed (month/day in 1991)	Total Depth (Feet)	Completion Details	Well Plumb Check	H&S Level	Drums Used	Additional Information
33791	BH33	9/12	22.6	Grouted	--	D	0253EB	Offset 50 feet south to avoid decon pad; bedrock 16.2 feet
33891	MW08	9/13	11.6	Completed	Yes	C/D	0243EB 0282EB 0266EB	Offset 12 feet northwest for rig access; bedrock at 8.1 feet
33991	BH25	9/13	12.6	Grouted	--	D	0270EB	Bedrock at 2.4 feet
34091	BH29	9/16	10.3	Grouted	--	D	0271EB	Bedrock at 6.2 feet
34191	MW07	9/16 Abandoned	8.2	Grouted	--	D	0279EB	Too shallow to complete as colluvial well; bedrock at 4.0 feet
34291	BH28	9/16	8.6	Grouted	--	D	0262EB	Bedrock at 3.4 feet
34391	MW11	9/17 Abandoned	7.5	Grouted	--	D	0278EB	Too shallow to complete as colluvial well; bedrock at 2.7 feet
34491	BH24	9/17	6.5	Grouted	--	D	0275EB	Bedrock at 0.6 feet
34591	MW12	9/19	11.3	Completed	Yes	D	0280EB 0290EB	Bedrock at 8.2 feet
34691	BH32	9/18	14.0	Grouted	--	D	0277EB	Bedrock at 10.0 feet
34791	MW13	9/20	11.0	Completed	Yes	D	0291EB 0284EB	No bedrock VOC sample collected due to poor recovery; additional field monitoring conducted on cuttings; bedrock at 8.0 feet

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PH = Pilot Hole
PPE = Personal Protective Equipment
PZ = Piezometer
VOC = Volatile organic compound

Borehole/Well Number	Work Plan Designation	Date Completed (month/day in 1991)	Total Depth (Feet)	Completion Details	Well Plumb Check	H&S Level	Drums Used	Additional Information
34891	BH27	9/19	14.6	Grouted	--	D	0304EB	Bedrock at 11.0 feet
34991	BH31	9/23	16.3	Grouted	--	D	0307EB	Offset 2.6 feet east due to rocks; bedrock at 12.3 feet
35091	MW36	9/23 Abandoned	9.8	Grouted	--	D	0292EB	Too shallow to complete as colluvial well; bedrock at 4.7 feet
35191	BH19/MW06	9/23 Abandoned	6.3	Grouted	--	D	0298EB	Too shallow to complete as colluvial well; bedrock at 2.0 feet
35291	BH30	9/24	12.6	Grouted	--	D	0303EB	Bedrock at 8.0 feet
35391	BH50/MW19	9/25	12.0 (BH) 10.5 (MW)	Grouted (BH) Completed (MW)	Yes	D	0297EB 0293EB	MW19 offset 2.4 feet west of BH50 to compensate for poor bedrock recovery; bedrock at 6.0 feet
35491	BH26	9/24	10.4	Grouted	--	D	0294EB	Bedrock at 6.8 feet
35591	BH23	9/26	6.3	Grouted	--	D	0361EB	Bedrock at 2.3 feet
35691	MW17	9/26	30.3	Completed	Yes	D	0283EB 0335EB 0336EB 0337EB	Bedrock at 25.2 feet
35791	BH43	9/27	16.3	Grouted	--	D	0326EB	Bedrock at 11.2 feet
35891	BH40	10/01	12.6	Grouted	--	D	0339EB	Bedrock at 8.0 feet

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PH = Pilot Hole
PPE = Personal Protective Equipment
PZ = Piezometer
VOC = Volatile organic compound

Borehole/Well Number	Work Plan Designation	Date Completed (month/day in 1991)	Total Depth (Feet)	Completion Details	Well Plumb Check	H&S Level	Drums Used	Additional Information
35991	MW18	10/01	16.1	Completed	Yes	D	0338EB 0348EB 0349EB	Bedrock at 12.1 feet
36091	BH44	10/02	18.6	Grouted	--	D	0362EB	Bedrock at 14.3 feet
36191	MW05	10/03	17.0	Completed	Yes	D	0368EB 0356EB 0370EB	Bedrock at 14.0 feet
36291	BH41	10/03	13.9	Grouted	--	D	0367EB	Bedrock at 8.5 feet
36391	BH45/MW14	10/08	29.8	Completed	Yes	D	0387EB 0378EB 0386EB 0374EB	Bedrock at 26.4 feet
36491	BH01/MW01	10/04	18.6	Grouted	--	D	0394EB	Offset 15 feet west for rig access; bedrock at 14.0 feet; no well installed as per EG&G Rocky Flats
36591	BH13	10/08	17.6	Grouted	--	B	0375EB	Offset 50 feet south to relocate on hillside; bedrock at 10.0 feet
36691	BH46/MW15	10/11	28.3	Completed	Yes	D	0435EB 0448EB 0446EB 0458EB	Bedrock at 25.0 feet
36791	BH12	10/09	16.3	Grouted	--	B	0376EB	Bedrock at 12.5 feet

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PPE = Personal Protective Equipment
PZ = Piezometer
VOC = Volatile organic compound

Borehole/Well Number	Work Plan Designation	Date Completed (month/day in 1991)	Total Depth (Feet)	Completion Details	Well Plumb Check	H&S Level	Drums Used	Additional Information
36891	BH11	10/10	13.6	Grouted	--	C	0380EB	Offset 5 feet east to avoid utilities; bedrock at 9.1 feet
36991	BH10/MW04	10/11	11.3	Completed	Yes	C	0434EB 0428EB	Offset 5 feet east to avoid utilities; bedrock at 8.0 feet
37091	BH14	10/14	8.6	Grouted	--	C/D	0379EB	Offset 80 feet south for more level location; bedrock at 4.1 feet
37191	BH47/MW16	10/15	23.8	Completed	Yes	D	0426EB 0486EB 0352EB 0502EB	Bedrock at 20.5 feet
37291	BH20	10/15	28.3	Grouted	--	D	0472EB 0488EB	Bedrock at 23.3 feet
37391	BH02	10/16	18.2	Grouted	--	D	0476EB	Offset 12 feet east for rig access; bedrock at 15.1 feet
37491	BH42	10/16	16.0	Grouted	--	D	0474EB	Bedrock at 12.0 feet
37591	MW22	10/21	14.7	Completed	Yes	D	0447EB 0462EB 0466EB 0467EB	Bedrock at 12.0 feet
37691	MW23	10/18	19.0	Completed	Yes	D	0473EB 0519EB 0480EB 0475EB	Offset 55 feet east to avoid trailer; bedrock at 16.2 feet

BH = Borehole
EB = EBASCO
H&S = Health and Safety
MW = Monitoring well
PH = Pilot Hole
PPE = Personal Protective Equipment
PZ = Piezometer
VOC = Volatile organic compound

Borehole/Well Number	Work Plan Designation	Date Completed (month/day in 1991)	Total Depth (Feet)	Completion Details	Well Plumb Check	H&S Level	Drums Used	Additional Information
37791	MW21	10/25	22.6	Completed	Yes	D	0469EB 0450EB 0487EB 0389EB	Bedrock at 20.0 feet
37891	MW27 offset	11/13	56.4	Completed	Yes	D	0498EB 0504EB 0501EB 0581EB 0594EB 0669EB 0609EB 0600EB 0651EB 0650EB	Offset 10 feet west of 33391; bedrock at 4.7 feet
37991	MW29	11/13	57.5	Completed	Yes	D	0510EB 0546EB 0500EB 0542EB 0553EB 0555EB 0562EB 0597EB 0527EB	Bedrock at 6.9 feet
38091	MW20	10/25 Abandoned	6.0	Backfilled by EG&G	--	D	0544EB (1/3 full)	Hit water main at 5.5 feet; location measured as 22.6 feet from north fence and 8.5 feet from west fence; bedrock not encountered

BH = Borehole
EB = EBASCO
H&S = Health and Safety
MW = Monitoring well
PH = Pilot Hole
PPE = Personal Protective Equipment
PZ = Piezometer
VOC = Volatile organic compound

Borehole/Well Number	Work Plan Designation	Date Completed (month/day in 1991)	Total Depth (Feet)	Completion Details	Well Plumb Check	H&S Level	Drums Used	Additional Information
38191	PZ05	10/29	18.2	Completed	Yes	D	0548EB 0543EB 0541EB (1/2 Full)	Bedrock at 14.6 feet
38291	PZ06	11/01	11.4	Completed	Yes	D	0530EB 0524EB	Bedrock at 8.4 feet
38391	MW03	11/04 Abandoned	10.3	Grouted	--	D	0576EB	No core recorvery for this interval; offset 36 feet north for rig access; bedrock between 4.9 feet and 8.3 feet
38491	MW03 offset	11/04 Abandoned	8.1	Grouted	--	D	0554EB	Offset 57.5 feet north by northwest to attempt to gain more alluvium; bedrock at 4.0 feet
38591	MW34	11/05	10.4	Completed	Yes	D	0577EB	Offset 6 feet north for rig access; bedrock at 7.2 feet
38691	MW37	11/07 Abandoned	10.2	Grouted	--	D	0575EB	Too shallow to complete as alluvial well; bedrock at 7.4 feet
38791	MW37 offset	11/07 Abandoned	10.2	Grouted	--	D	0587EB	Offset 20 feet north of 38691 to attempt to gain more alluvium; too shallow to complete as alluvial well; bedrock at 6.2 feet
38891	PZ02	11/11	14.2	Completed	Yes	D	0571EB 0560EB	Bedrock at 9.0 feet

BH = Borehole
EB = EBASCO
H&S = Health and Safety
MW = Monitoring well
PH = Pilot Hole
PPE = Personal Protective Equipment
PZ = Piezometer
VOC = Volatile organic compound

Borehole/Well Number	Work Plan Designation	Date Completed (month/day in 1991)	Total Depth (Feet)	Completion Details	Well Plumb Check	H&S Level	Drums Used	Additional Information
38991	PZ03	11/23	56.0	Completed	Yes	D	0675EB 0611EB 0612EB 0639EB 0615EB 0619EB 0616EB	Offset 12 feet north for rig access; bedrock at 19.5 feet
39091	PH01	11/14	8.0	Grouted	--	D	0551EB	Offset 98 feet east of 30091; bedrock at 6.0 feet
39191	MW28 offset	12/09	46.5	Completed	Yes	D	0625EB 0478EB 0668EB 0653EB 0667EB 0661EB 0731EB	Offset 6.5 feet slightly north of west of 33091; bedrock at 7.1 feet
39291	PZ01	12/02	55.5	Completed	Yes	D	0627EB 0642EB 0698EB 0673EB 0700EB 0658EB 0715EB	Bedrock at 10.7 feet
39391	PH02	11/16	10.0	Grouted	--	D	0645EB	Bedrock at 7.0 feet

BH = Borehole
EB = EBASCO
H&S = Health and Safety
MW = Monitoring well
PH = Pilot Hole
PPE = Personal Protective Equipment
PZ = Piezometer
VOC = Volatile organic compound

Borehole/Well Number	Work Plan Designation	Date Completed (month/day in 1991)	Total Depth (Feet)	Completion Details	Well Plumb Check	H&S Level	Drums Used	Additional Information
39491	BH21	12/14	4.0	Grouted	--	D	All soil used for samples	Hand augered or drive hammered due to problems with rig access; resampled on 12/14/91 adjacent to original location; bedrock at 1.4 feet
39591	BH22	12/14	3.0	Grouted	--	D	All soil used for samples	Hand augured or drive hammered due to problems with rig access; resampled on 12/14 /91adjacent to original location; bedrock not encountered
39691	MW20 offset	11/26	18.0	Completed	Yes	D	0674EB 0689EB 0690EB	Measured as 8.7 feet from north fence and 14.0 feet from west fence; approximately 14.9 feet northeast of 38091; bedrock at 6.8 feet
39791	PH03	11/26	8.0	Grouted	--	D	0654EB	Bedrock at 4.6 feet
39891	Drive Point Hole	11/29	6.0	Temporarily Installed	--	D	None	Offset 30 feet east of 39091; bedrock at 6.0 feet

Note: MW01, BH15, and PZ04 were canceled.
Grouted boreholes for 31391, 31591, 32791, and 35391 were destroyed during construction activities associated with french drain.

BH = Borehole
EB = EBASCO
H&S = Health and Safety
MW = Monitoring well
PH = Pilot Hole
PPE = Personal Protective Equipment
PZ = Piezometer
VOC = Volatile organic compound

Table A1-2 Comparison of Actual Drilling Activities to Work Plan Guidelines

	Work Plan (Field Sampling Plan)	Actual	Additions	Subtractions	Net Deviation from Work Plan
Boreholes (BH)	45	50	3 offsets 3 BH/MW not completed as MW	1 location canceled (BH15)	+5
Monitoring Wells (MW)	28	34	6 offsets	–	+6
Combination (BH/MW) Borehole/Monitoring Wells	9*	6		3 not completed as MW (additional BHs)	-3
Piezometers (PZ)	2	5	3 for monitoring french drain effectiveness	–	+3
Pilot Holes (PH)	3	3			
Temporary Wellpoints	45	16	1 wellpoint (39891) used for single well testing in conjunction with multiple-well testing	2 multiple-well test locations (15 wellpoints each) canceled	-29
Total new locations	132	114			-18

* Undefined number of wells prescribed for borehole (BH) locations where subcropping sandstone is encountered.

Note: 34 monitoring wells (including one [39691] screened in subcropping sandstone):
- 20 completed
  - 16 screened in alluvium
  - 4 screened in bedrock
- 14 abandoned (drilled and sampled as monitoring wells)
- 5 piezometers
  - 3 screened in alluvium
  - 2 screened in bedrock

Table A1-3 Offset Drilling Locations

Original Location	Work Plan Designation	Offset Location	Explanation for Offset
30391	BH52	30491	Poor recovery in original boring
30791	BH08/MW33	31791	30791 not completed as a monitoring well
31091	BH05	31291 31691	Poor recovery in original boring Poor recovery in original boring
33091	MW28	39191	33091 not completed as a monitoring well
33391	MW27	37891	33391 not completed as a monitoring well
38091	MW20	39691	38091 not completed as a monitoring well
38391	MW03	38491	Poor recovery in original boring
38691	MW37	38791	Depth to bedrock too shallow for alluvial well installation (7.4 feet); 38691 not completed as a monitoring well

BH = Borehole
MW = Monitoring well

Table A1-4 Locations Not Completed as Monitoring Wells

Location Number	Work Plan Designation	Offset Location	Reason Not Completed
30791	BH8/MW33	31791	Canceled - necessary equipment unavailable
31191	MW32	–	Depth to bedrock too shallow (4.7 feet)
31391	MW31	–	Depth to bedrock too shallow (2.5 feet)
32291	MW33	–	Depth to bedrock too shallow (4.1 feet)
32791	MW25	–	Depth to bedrock too shallow (2.7 feet)
33091	MW28	39191	Guidelines for bedrock well completion unavailable
33391	MW27	37891	Guidelines for bedrock well completion unavailable
34191	MW07	–	Depth to bedrock too shallow (4.0 feet)
34391	MW11	–	Depth to bedrock too shallow (2.7 feet)
35091	MW36	–	Depth to bedrock too shallow (4.7 5 feet)
35191	BH19/MW06	–	Depth to bedrock too shallow (2.0 feet)
36491	BH01/MW01	–	Canceled - would have been destroyed by french drain construction
38091	MW20	39691	Hit water main
38391	MW03	38491	Poor recovery; depth to bedrock uncertain
38491	MW03 offset	–	Depth to bedrock too shallow (4.0 feet)
38691	MW37	38791	Depth to bedrock too shallow* (7.4 feet)
38791	MW37 offset	–	Depth to bedrock too shallow* (6.2 feet)

BH = Borehole
MW = Monitoring well
* = Drilled prior to Directed Change Notice Geotechnical 91.06 (11-8-92) which made specific provisions for completion of alluvial wells in as little as 6 feet of alluvium

Table A1-5 Chemical Parameters for Phase III Soils

Volatile Organic Compounds (VOCs)

1,1,1,-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethene
1,2-Dichloroethane
1,2-Dichloroethene
1,2-Dichloropropane
2-Butanone
2-Hexanone
4-Methyl-2-pentanone
Acetone
Benzene
Bromodichloromethane
Bromoform
Bromomethane
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform
Chloromethane
Dibromochloromethane
Ethylbenzene
Methylene chloride
Styrene
Tetrachloroethene
Toluene
Total xylenes
Trichloroethene
Vinyl acetate
Vinyl chloride
cis-1,2-Dichloroethene
trans-1,2-Dichloroethene
trans-1,3-Dichloropropene

Semivolatile Organic Compounds (SVOCs)

1,2,4-Trichlorobenzene
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
2,4-Dichlorophenol
2,4-Dimethyphenol
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,6-Dinitrotoluene
2-Chloronaphthalene
2-Chlorophenol
2-Methylnaphthalene
2-Methyphenol
2-Nitroaniline
2-Nitrophenol
3,3'-Dichlorobenzidine
3-Nitroaniline
4,4'-DDD
4,4'-DDE
4,4'-DDT
4,6-Dinitro-2-Methylphenol
4'-Bromophenyl phenyl ether
4'-Chloro-3-methylphenol
4'-Chloroaniline
4'-Chlorophenyl phenyl ether
4'-Methylphenol
4'-Nitroaniline
4'-Nitrophenol
Acenaphthene
Acenaphthylene
Aldrin
Anthracene
AROCLOR-1016
AROCLOR-1221
AROCLOR-1232
AROCLOR-1242
AROCLOR-1248
AROCLOR-1254
AROCLOR-1260
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(ghi)perylene
Benzo(k)fluoranthene
Benzoic acid
Benzyl alcohol
Bis(2-chloroethoxy)methane
Bis(2-chloroethyl)ether
Bis(2-chloroisopropyl)ether
Bis(2-ethylhexyl)phthalate
Butyl benzyl phthalate
Chrysene
Di-n-butyl phthalate
Di-n-octyl phthalate
Dibenzo(a,h)anthracene
Dibenzofuran
Dieldrin
Diethyl phthalate
Diemethyl phthalate
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
Endrin ketone
Fluoranthene
Fluorene
Heptachlor
Heptachlor epoxide
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Indeno(1,2,3-cd)pyrene

Isophorone
Methoxychlor
N-nitroso-di-n-propylamine
N-nitroso-diphenylamine
Naphthalene
Nitrobenzene
Pentachlorophenol
Phenanthrene
Phenol
Pyrene
Toxaphene
alpha-BHC
alpha-chlordane
beta-BHC
delta-BHC
gamma-BHC (Lindane)
gamma-chlordane

Radionuclides

Americium-241
Cesium-137
Gross alpha - dissolved
Gross beta - dissolved
Plutonium-239,-240
Radium-226
Radium-228
Strontium-89,-90
Tritium
Uranium-233,-238,-239
Uranium-233,-234
Uranium-235
Uranium-235,-236

Metals

Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Cesium
Chromium
Cobalt
Copper
Iron
Lead
Lithium
Magnesium
Manganese
Mercury
Molybdenum
Nickel
Potassium
Selenium
Silicon
Silver
Sodium
Strontium
Thallium
Tin
Vanadium
Zinc

Indicators

Total petroleum hydrocarbons
Total organic carbon
pH

Table A1-6 Soil Samples Collected During the Phase III RFI/RI Field Program for Chemical Analyses

Borehole/Well Number	Work Plan Designation	VOCs	SVOCs	Radionuclides*	Metals†	Indicators**
30091	BH54	X	X	X	X	X
30191	BH53	X	X	X	X	X
30291	BH06	X	X	X	X	X
30391	BH52	X	X	X	X	X
30491	BH 52 offset	X	X	X	X	X
30591	BH51	X	X	X	X	X
30691	BH09	X	X	X	X	X
30791	BH08	X	X	X	X	X
30891	BH07	X	X	X	X	X
30991	MW35	X	NA	NA	NA	NA
31091	BH05	X	X	X	X	X
31191	MW32	NA	NA	NA	NA	NA
31291	BH05 offset	X	X	X	X	X
31391	MW31	X	NA	NA	NA	NA
31491	MW30	X	NA	NA	NA	NA
31591	BH03	X	X	X	X	X
31691	BH05 offset	X	X	X	X	X
31791	MW36	X	X	NA	NA	NA
31891	BH04/MW02	X	X	X	X	X
31991	BH48	X	X	X	X	X
32091	BH18	X	X	X	X	X
3219	BH16	X	X	X	X	X
32291	MW33	X	NA	NA	NA	NA
32391	BH49	X	X	X	X	X
32491	BH17	X	X	X	X	X
32591	MW24	X	NA	NA	NA	NA
32691	BH36	X	NA	X	X	X
32791	MW25	X	NA	NA	NA	NA
32891	BH38	X	NA	X	X	X
32991	BH39	X	X	X	X	X
33091	MW28	X	NA	NA	NA	NA
33191	BH35	X	X	X	X	X
33291	BH34	X	X	X	X	X
33391	MW27	X	NA	NA	NA	NA
33491	MW09	X	NA	NA	NA	NA
33591	BH37	X	X	X	X	X
33691	MW10	X	NA	NA	NA	NA
33791	BH33	X	NA	X	X	X

Borehole/Well Number	Work Plan Designation	VOCs	SVOCs	Radionuclides*	Metals†	Indicators**
33891	MW08	X	NA	NA	NA	NA
33991	BH25	X	NA	X	X	X
34091	BH29	X	NA	X	X	X
34191	MW07	X	NA	NA	X	NA
34291	BH28	X	X	X	X	X
34391	MW11	X	NA	NA	NA	NA
34491	BH24	X	NA	X	X	X
34591	MW12	X	NA	NA	NA	NA
34691	BH32	X	X	X	X	X
34791	MW13	NA	NA	NA	NA	NA
34891	BH27	X	X	X	X	X
34991	BH31	X	X	X	X	X
35091	MW26	X	NA	NA	NA	NA
35191	BH19/MW06	X	X	X	X	X
35291	BH30	X	NA	X	X	X
35391	BH50/MW19	X	NA	X	X	X
35491	BH26	X	NA	X	X	X
35591	BH23	X	NA	X	X	X
35691	MW17	X	NA	NA	NA	NA
35791	BH43	X	NA	X	X	X
35891	BH40	X	NA	X	X	X
35991	MW18	X	NA	NA	NA	NA
36091	BH44	X	X	X	X	X
36191	MW05	X	NA	NA	NA	NA
36291	BH41	X	NA	X	X	X
36391	BH45/MW14	X	X	X	X	X
36491	BH01/MW01	X	NA	X	X	X
36591	BH13	X	X	X	X	X
36691	BH46/MW15	X	NA	X	X	X
36791	BH12	X	X	X	X	X
36891	BH11	X	X	X	X	X
36991	BH10/MW04	X	NA	X	X	X
37091	BH14	X	X	X	X	X
37191	BH47/MW16	X	NA	X	X	X
37291	BH20	X	X	X	X	X
37391	BH02	X	X	X	X	X
37491	BH42	X	NA	X	X	X
37591	MW22	X	NA	NA	NA	NA

Borehole/Well Number	Work Plan Designation	VOCs	SVOCs	Radionuclides*	Metals†	Indicators**
37691	MW23	X	NA	NA	NA	NA
37791	MW21	X	NA	NA	NA	NA
37891	NW27 offset	X	NA	NA	NA	NA
37991	MW29	X	NA	NA	NA	NA
38091	MW20	NA	NA	NA	NA	NA
38191	PZ05	X	NA	NA	NA	NA
38291	PZ06	X	NA	NA	NA	NA
38391	MW03	X	NA	NA	NA	NA
38491	ME02 offset	X	NA	NA	NA	NA
38591	MW34	X	NA	NA	NA	NA
38691	MW37	X	NA	NA	NA	NA
38791	MW37 offset	X	NA	NA	NA	NA
38891	PZ 02	X	NA	NA	NA	NA
38991	PZ03	X	NA	NA	NA	NA
39091	PH01	X	NA	NA	NA	NA
39191	MW28 offset	X	NA	NA	NA	NA
39291	PZ01	X	NA	NA	NA	NA
39391	PH02	X	NA	NA	NA	NA
39491	BH21	X	X	X	X	X
39591	BH22	X	NA	X	X	NA
39691	MW20 offset	X	NA	NA	NA	NA
39791	PH03	X	NA	NA	NA	NA
39891	Drive Point Hole	NA	NA	NA	NA	NA

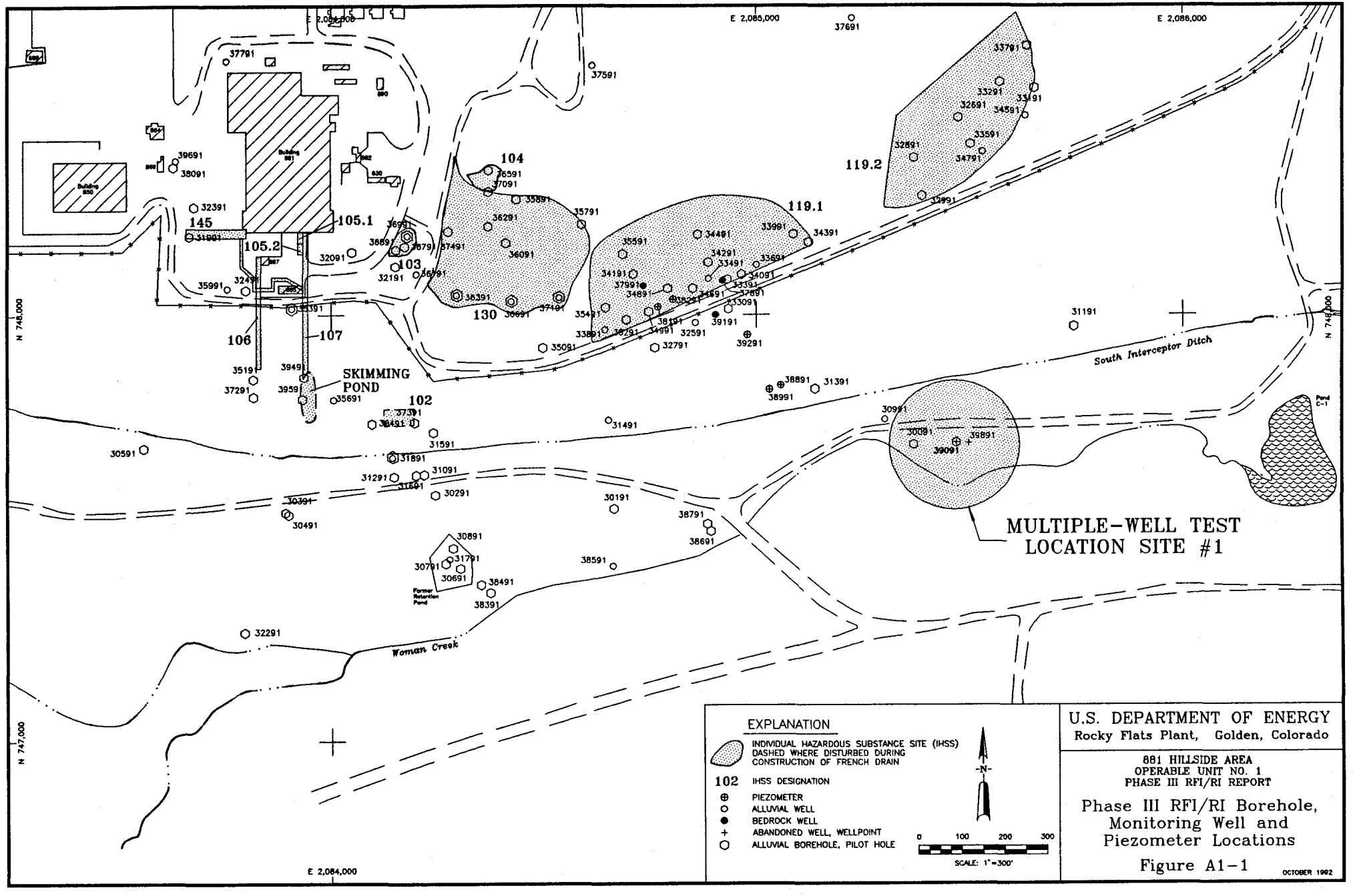
X = Method analyzed
† = Metals analyzed by EPA-CLP method (ICP, BFAA, FLAA)
* = Gross alpha/beta, tritium, radiochemical isotopes
** = Water quality paramaters
BNA = Base/neutral/acid extractables
CLP = Contract laboratory program
EPA = Environmental Protection Agency
FLAA = Flame atomic absorption
GC = Gas chromatography
GC/MS = Gas chromatography/mass spectrometry
GFAA = Graphite furnace atomic absorption
ICP = Inductively coupled plasma
NA = Method not analyzed
PCBs = Polychlorinated biphenyls
SVOCs = Semivolatile organic compounds analyzed by EPA-CLP BNA method (GC/MS) or EPA-CLP pesticides/PCBs method (GC)
VOCs = Volatile organic compounds analyzed by EPA-CLP method (GC/MS) or EPA Method 502.2 (GC)

Appendix A1 · Figures

Drilling and
Sampling Data

Phase III
RFI/RI Report

U1 OU1 OU
881 Hillside
OU1 OU1 O
Hillside 881
1 OU1 OU1
side 881 Hill
U1 OU1 OU
881 Hillside
OU1 OU1 O
Hillside 881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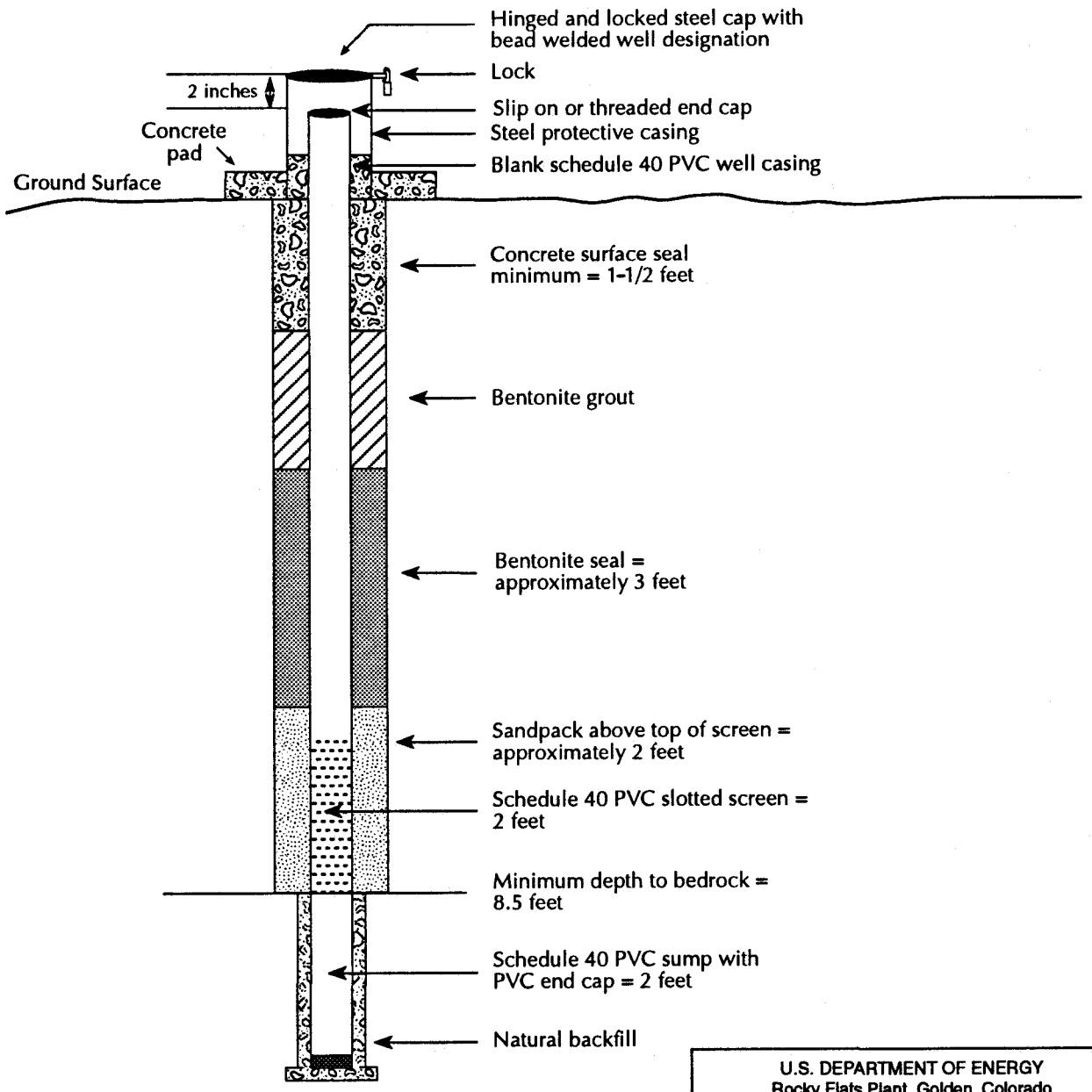
E 2,085,000
E 2,086,000
N 748,000
N 747,000
Building 881
Building 850
145
105.1
105.2
106
107
103
104
130
119.1
119.2
102
SKIMMING POND
South Interceptor Ditch
Woman Creek
Former Retention Pond
MULTIPLE-WELL TEST LOCATION SITE #1
EXPLANATION
INDIVIDUAL HAZARDOUS SUBSTANCE SITE (IHSS) DASHED WHERE DISTURBED DURING CONSTRUCTION OF FRENCH DRAIN
102 IHSS DESIGNATION
PIEZOMETER
ALLUVIAL WELL
BEDROCK WELL
ABANDONED WELL, WELLPOINT
ALLUVIAL BOREHOLE, PILOT HOLE
N
0 100 200 300
SCALE: 1"=300'
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado
881 HILLSIDE AREA
OPERABLE UNIT NO. 1
PHASE III RFI/RI REPORT
Phase III RFI/RI Borehole, Monitoring Well and Piezometer Locations
Figure A1-1
OCTOBER 1992



PVC - Polyvinyl chloride

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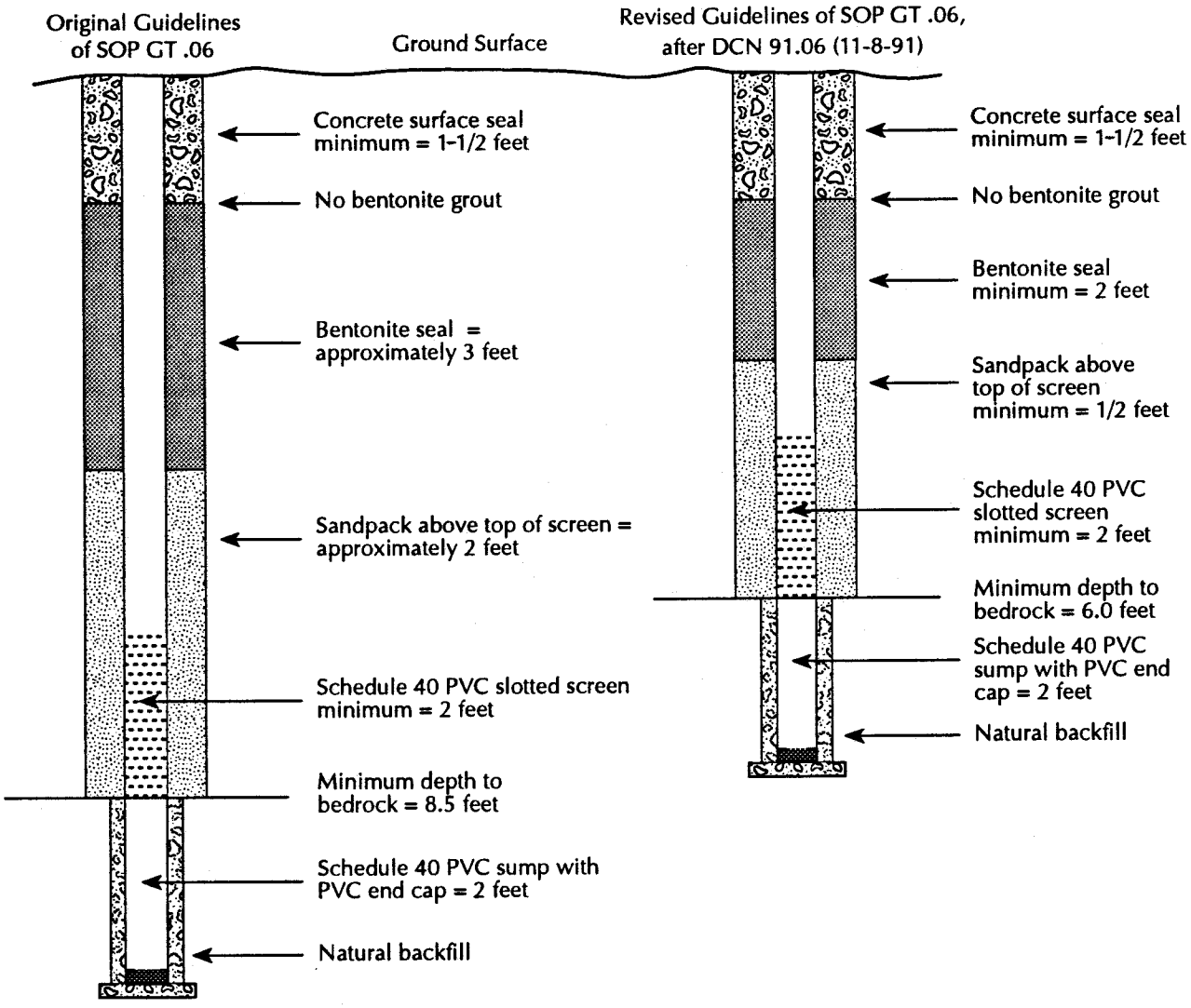
General Guidelines for Alluvial Well/Piezometer Construction

Figure A1-2

OCTOBER 1992



SOP - Standard operating procedure
GT - Geotechnical
DCN - Directed change notice
PVC - Polyvinyl chloride

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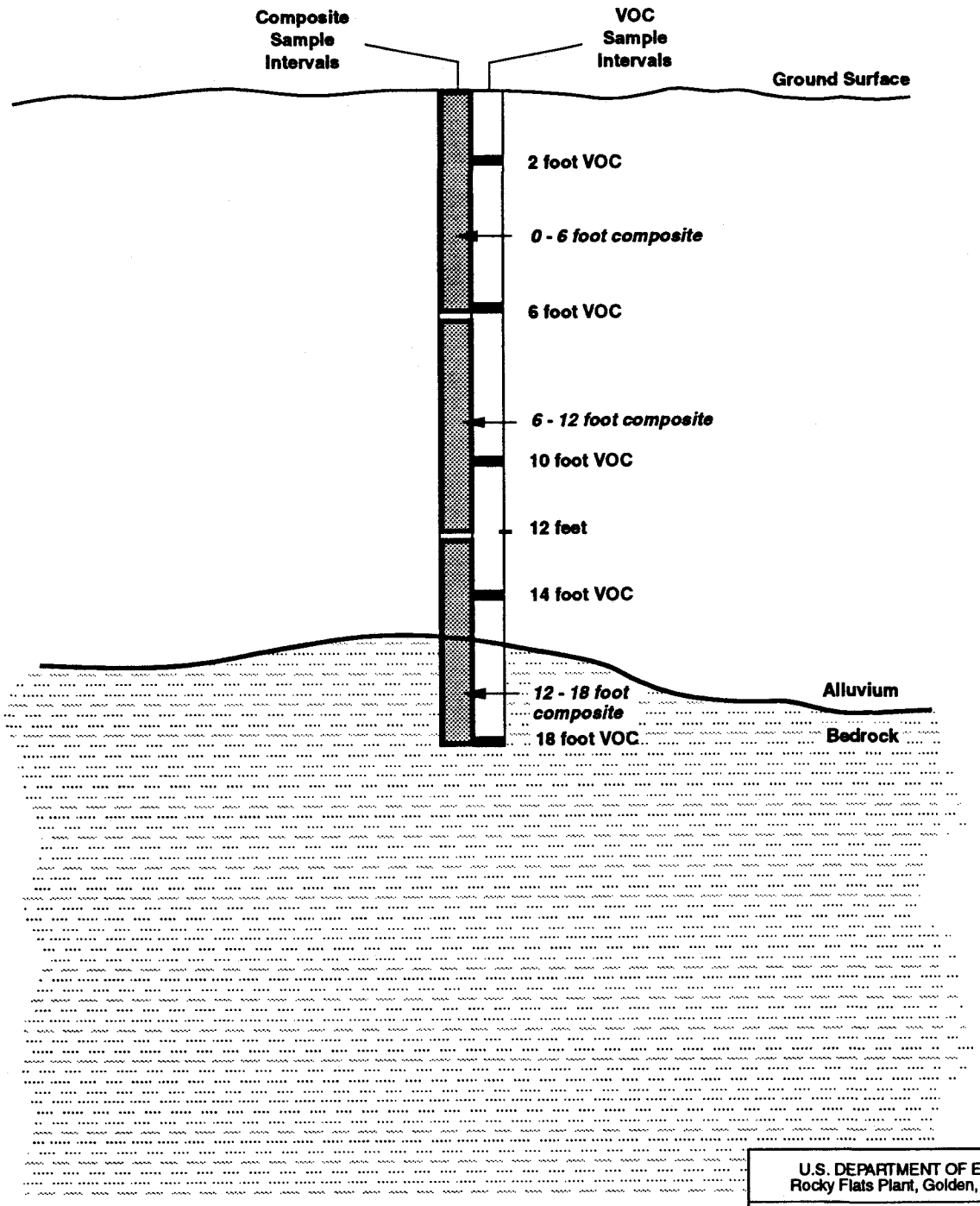
Minimum Specifications for Alluvial Well/Piezometer Construction

Figure A1-3

OCTOBER 1992



1 inch = 5 feet (Vertical scale only)

Notes: Geotechnical and TOC sample intervals not shown (see Appendix A2)

VOC - Volatile organic compound
TOC - Total organic carbon

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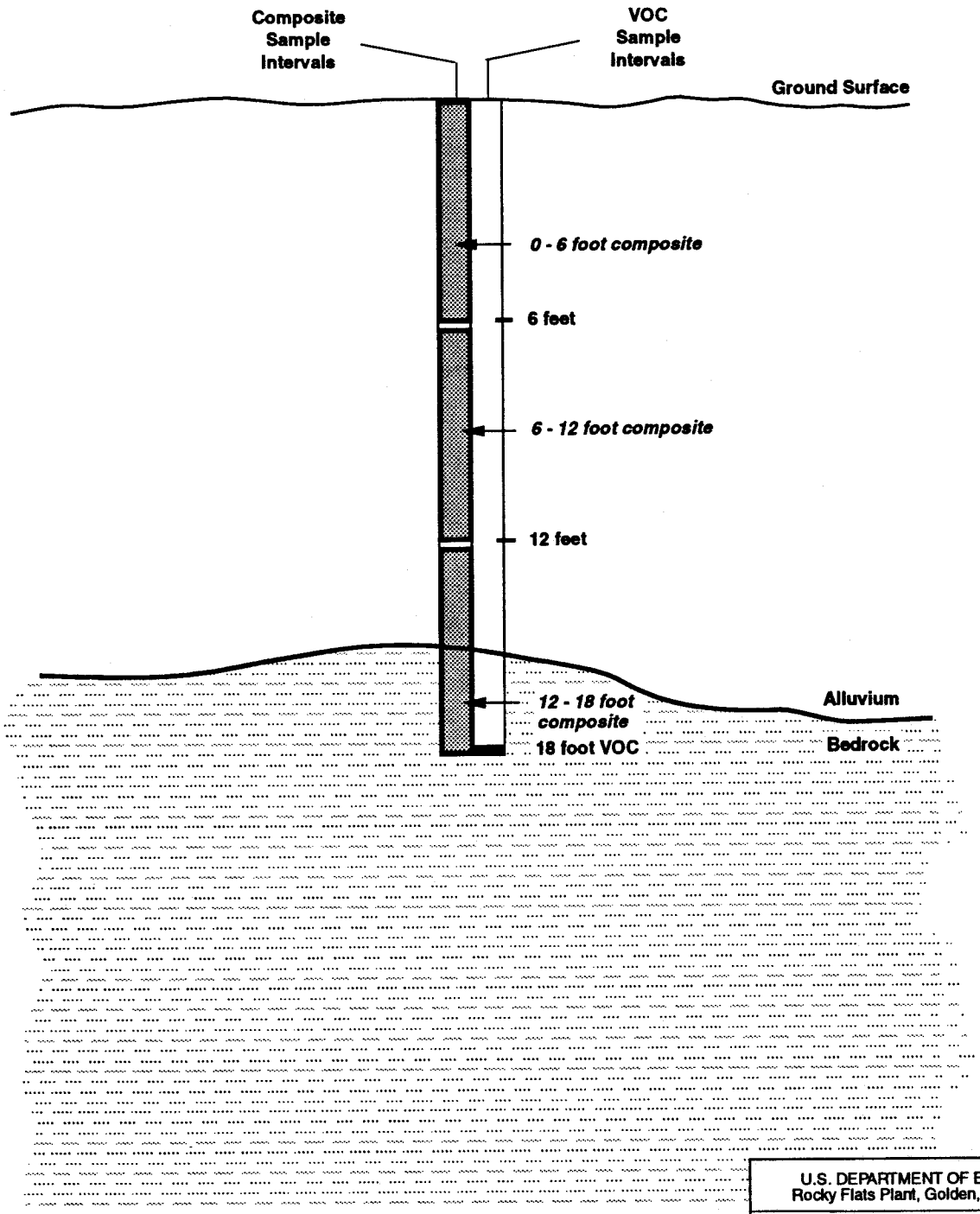
PHASE III RFI/RI REPORT

Borehole Subsurface Soil Sample Intervals

Figure A1-4

OCTOBER 1992



1 inch = 5 feet (Vertical scale only)

Notes: Composite samples collected for radiation screening only
Geotechnical and TOC sample intervals not shown (see Appendix A2)

VOC - Volatile organic compound
TOC - Total organic carbon

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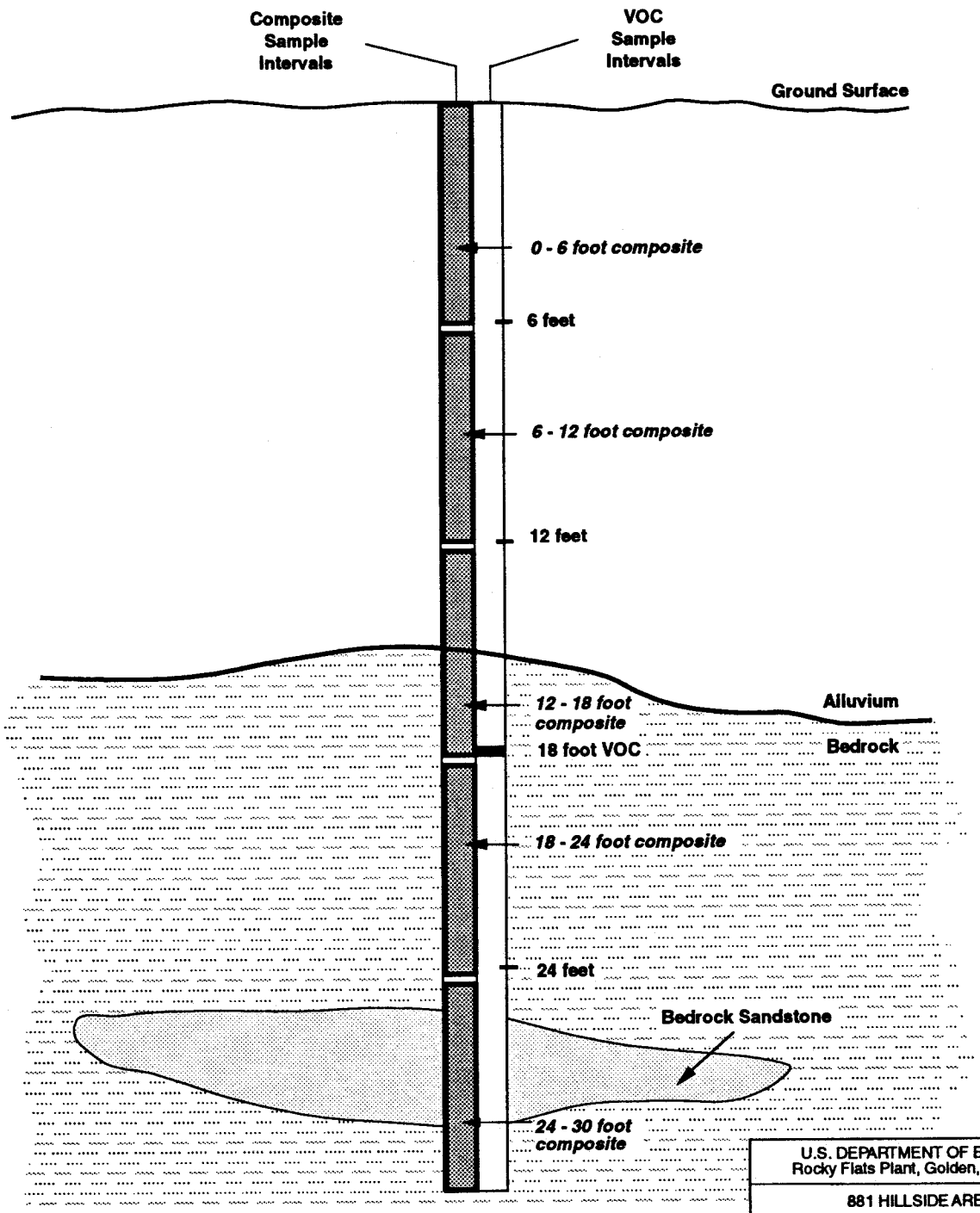
PHASE III RFI/RI REPORT

Alluvial Well/Piezometer Subsurface Soil Sample Intervals

Figure A1-5

OCTOBER 1992



1 inch = 5 feet (Vertical scale only)

Notes: Composite samples collected for radiation screening only
Geotechnical and TOC sample intervals not shown (see Appendix A2)

VOC - Volatile organic compound
TOC - Total organic carbon

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

881 HILLSIDE AREA
OPERABLE UNIT NO. 1
PHASE III RFI/RI REPORT

Bedrock Well/Piezometer Subsurface Soil Sample Intervals

Figure A1-6

OCTOBER 1992

Appendix A1
Attachments

Drilling and Sampling Data

Phase III
RFI/RI Report

U1 OU1 OU
881 Hillside
OU1 OU1 O
Hillside 881
1 OU1 OU1
side 881 Hill
U1 OU1 OU
881 Hillside
OU1 OU1 O
Hillside 881

ATTACHMENT A1-1
DRILLING DATA

INDEX OF DATA

Borehole Location Number:	**30091**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 13 9	GROUND ELEVATION (FT) 5843 56	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747691	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	30091
EAST	2085362	LOCATOR NUMBER M7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/05/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY / INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00001B	0% 50% 100%	0% 100%	0 26 /0 50	5843	0			GC	Sandy Clayey Gravel Black(5YR 2 5/1), well graded coarse gravel up to 3 5" diameter, cobbles composed of quartzite, granite, and schist in organic-rich matrix (sc-sp) of sand with clay and fine gravel Dry 60% Gravel, 30% Sand, 10% Fines
						1				No recovery for this interval
				0 50 /1 50	5842				GC	Same as above
										No recovery for this interval
						2			SW	Well graded Gravelly Sand very dark grayish brown (10YR 3/2), pebbles up to 0 5" diameter, avg fine gravel, sub-rounded to subangular, pebbles composed of quartzite, granite, fe-stone, metamorphic rocks, feldspars, subangular to subrounded med sand Dry 27% Gravel, 69% Sand, 4% Fines
				1 10 /2 00	5841	3				
	BH00001									No recovery for this interval
	BH00001B				5840					VOA sample obtained from this interval
						4			GW	Sandy well graded Gravel Dark brown (7 5YR 4/4) Gravel cobbles up to 4" diameter, avg is coarse gravel, sub-angular to subrounded, composed of quartzite, schist, granite, feldspar and quartz fragments (pegmatite?), med to coarse sand is angular to subrounded, also composed primarily of rock fragments plus some quartz, feldspar, trace micas Dry above 6' 54% Gravel, 43% Sand, 3% Fines
				1 17 /2 00	5839	5				
					5838					No recovery for this interval
	BH00001C									VOA sample obtained from this interval
						6			GW	Same as above
					5837					No recovery for this interval
				0 62 /2 00		7				
					5836					VOA sample obtained from this interval
	BH00002A					8			GW	Same as above
					5835				CLAYSTONE	Claystone with some Silt Medium bluish gray (5B 5/1) to dark yellowish brown (10YR 4/2) Variably oxidized and mottled with Fe-oxide stains Light brown (5YR 5/6) where Fe stained No bedding structures apparent, appears massive Water saturated/wet 98% Fines Top of bedrock = 8 1 ft
				2 00 /2 00		9				
					5834					
	BH00002B					10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 13 9	GROUND ELEVATION (FT)	5843 56	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747691	AREA 0U1	CASING DIAMETER (IN)		GEOLOGIST	DAB/KJT	30091
EAST	2085362	LOCATOR NUMBER M7	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	08/05/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2 00 /2 00	5833	10			CLAYSTONE	Same as above
					5832	11				
										Core retained in VOA sleeve
						12			CLAYSTONE	Same as above
	B-00003			1 90 /1 90	5831	13				
					5830					Core retained in VOA sleeve
						14				Total Depth 13 9 ft
					5829	15				
					5828	16				
					5827	17				
					5826	18				
					5825	19				
					5824	20				

INDEX OF DATA

Borehole Location Number:	**30191**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 19 8	GROUND ELEVATION (FT)	5872 51	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	797541	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	DAB/KJT	30191
EAST	2084662	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	08/07/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2 00 /2 00	5872	0			SC	Clayey Sand very dark grayish brown (10YR 3/2) Coarse to fine - (<1%) grained sand with trace fine-grained gravel Average med to fine-grained, subangular sand of quartzite, quartz, feldspar, metamorphic and igneous rock fragments Top 2' contains plant roots and abundant organic material Moist at top 2', dry below 2' 71% Sand, 29%
					5871	1				
	BH00004A									VOA sample obtained from this interval
						2			SC	Same as above
	BH00004			1 30 /2 00	5870	3				
					5869					No recovery for this interval
						4			SC	Same as above
				2 00 /2 00	5868	5				
					5867					
	BH00004B									VOA sample obtained from this interval
						6			SC	Same as above
					5866				SC	Clayey Sand Dark yellowish brown (10YR 3/4) clayey fine to very fine sand with some gravel and med to fine sand, gravel up to 0 5" diameter, avg sand is f g , subangular, pred quartz and rock fragments Dry 2% Gravel, 66% Sand, 32% Fines
				1 65 /2 00		7				
					5865					No recovery for this interval
						8			SW-SM	Well graded Gravelly Silty Sand Dark yellowish brown (10YR 4/6), coarse to fine sand with fine gravel, silt and clay, gravel up to 2 5" diameter Subangular to subrounded sand and gravel, composed of quartzite, quartz, feldspar, granite, metamorphic rock fragments Clay content is variable with more clay-rich zone(sc) at 10 8' - 11 5' Dry 10% Gravel, 81% Sand, 9% Fines
					5864					
	BH00005			1 80 /2 00		9				
					5863					No recovery for this interval
	BH00005A									VOA sample obtained from this interval
						10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 19 8	GROUND ELEVATION (FT) 5872 51	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747541	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	30191
EAST	2084662	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/07/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						10			SW-SM	Same as above
				1.90 /2.00	5862	11			SM-SW	Well graded Gravelly Silty Sand Yellowish brown (10YR 5/4) coarse to fine sand, avg is med sand, angular to subangular, composed of quartz, and rock fragments (quartzite, granite, other metamorphic rocks), some feldspar, trace mafic minerals Dry 17% Gravel, 73% Sand, 10% Fines
					5861					No recovery for this interval
						12			SM-SW	Same as above
				1.45 /2.00	5860	13				
					5859					No recovery for this interval
	BH00006A					14				VOA sample obtained from this interval
					5858				CLAYSTONE	Claystone with some Silt Light olive brown (2 5Y 5/4) claystone with some silt and very f g sand, sand is sub-angular, pred quartz with some unweathered biotites, no bedding apparent, slightly mottled colors appear subhoriz and may reflect original bedding Discontinuous caliche zones present Dry ~5% Sand, 19% Silt, 76% Clay Top of bed-rock = 14 0 ft
	BH00006			2.00 /2.00		15				
					5857					
	BH00006B									VOA sample obtained from this interval
						16			CLAYSTONE	Same as above
					5856				CLAYSTONE	Claystone dark yellowish brown (10YR 4/2) to dusky yellowish brown (10YR 2/2) claystone with trace of silt No apparent bedding Unweathered Dry 100% Fines
				1.85 /2.00		17				
					5855					No recovery for this interval
						18			CLAYSTONE	Same as above
					5854					
	BH00007			2.00 /2.00		19				
					5853					Core retained in VOA sleeve
						20				Total Depth = 19 8 ft

INDEX OF DATA

Borehole Location Number:	**30291**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 22 9	GROUND ELEVATION (FT)	5902 74	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747574	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	DAB/KJT	30291
EAST	2084245	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	08/08/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00087	0% 50% 100%	0% 100%	1 90 /1 90	5902	0			OL	Organic Sandy Clay Very dark grayish brown (10YR 3/2) Very fine to med sand, mean = fine, subangular to sub-rounded, composed of quartz, feldspar and rock fragments, within clay and silt (90%, 10%) matrix containing plant root sand a few dispersed pebbles up to 1" diameter Dry 5% Gravel, 75% Sand, 2% Silt, 18% Clay
	BH00088A				5901	1				VOA sample obtained from this interval
						2			OL	Some as above
	BH00088			2 00 /2 00	5900	3			CL	Sandy Clay Dark brown (10YR 3/3) very fine to med sand, fine to med gravel, in silt and clay matrix, mean = fine sand, subangular, quartz, feldspar, quartzite, other rock fragments Dry 6% Gravel, 29% Sand, 65% Fines
					5899	4				Core retained in VOA sleeve
				1 85 /2 00	5898	5			SC	Gravelly Clayey Sand Dark brown (7 5 YR 4/4), very fine to med sand and some gravel (fine to coarse pebbles) in silt and clay matrix Mean=med sand, angular to subangular, composed of quartz, feldspar, rock fragments, mafic minerals, weathered biotite Gravel pebbles have coating of caliche and are up to 1" diameter, composed of metamorphic rock fragments Localized carbonate cement Moist 22% Gravel, 30% Sand, 19% Silt, 29% Clay
	BH00088				5897	6				No recovery for this interval
										VOA sample obtained from this interval
				2 00 /2 00	5896	7			SC	Some as above
										Core retained in VOA sleeve
					5895	8			SC SM	Some as above
										Silty Sand with some Gravel Yellowish red (5YR 4/6) to strong brown (7 5YR 5/8) well graded very fine to coarse sand with silt, clay and some gravel Mean=fine to med sand, subangular to subrounded, composed of quartz, rock fragments, feldspar, mafic mineral grains, trace unweathered biotite and sedimentary rock fragments Caliche coatings on some gravels and filling open spaces within sandy/silty matrix Some carbonate cement present throughout Moist
	BH00089			1 65 /2 00	5894	9				No recovery for this interval
	BH00089A				5893	10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 22 9	GROUND ELEVATION (FT) 5902 74	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747574	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	30291
EAST	2084245	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/08/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2 00 /2 00	5892	10–11			SM	Same as above
					5891	11–12				Core retained in VOA sleeve
						12			SM	Same as above
				1 10 /2 40	5890	13				No recovery for this interval
	BH00010A				5889	14				VOA sample obtained from this interval
										No recovery for this interval
	BH00010			1 20 /1 60	5888	15			SM	Same as above
	BH00010B				5887				CLAYSTONE	Claystone Pale olive (10y 6/2) to light olive gray (5Y 5/2) claystone with trace of silt No apparent bedding structures Caliche fills discontinuous, subhoriz fractures or replaces claystone near top of interval (15 5' to 16'), coarse-sand-size carbonaceous fragments present, randomly distributed within massive claystone Wet 5% Silt, 95% Clay Top of bedrock = 15 5 ft
				2 00 /2 00	5886	16–17				VOA sample obtained from this interval
									CLAYSTONE	Same as above
					5885	18				
				1 10 /2 00	5884	19				No recovery for this interval
	BH00011				5883	20				Core retained in VOA sleeve

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 22 9	GROUND ELEVATION (FT) 5902 74	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747574	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	30291
EAST	2084245	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/08/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH / SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH00011 0%	50% 100%	0% 100%	2 30 /2 40	5882 5881 5880 5879 5878 5877 5876 5875 5874 5873	20 21 22 23 24 25 26 27 28 29 30			CLAYSTONE	Same as above
								CLAYSTONE	Claystone Light olive gray(5Y 5/2) to dusky yellow(5Y 6/4) mottled dark yellowish orange(10YR 6/6) Clay with some silt Appears massive, irregularly mottled with subhoriz caliche masses up to 2" thick 15% Silt, 85% Clay
									No recovery for this interval
									Total Depth = 22 9 ft

INDEX OF DATA

Borehole Location Number:	**30391**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32 5	GROUND ELEVATION (FT) 5910 79	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747534	AREA 001	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	30391
EAST	2083892	LOCATOR NUMBER K7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/12/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00018	CL 50%	100% CL 100%	1 85 /2 00	5910	0 1			CL	Inorganic Clay with some Silt Dark yellowish brown (10YR 4/4) to very dark grayish brown (10YR 3/2) CL matrix supports sand and gravel Gravel up to 1 5" diameter Sand and gravel are subrounded to subangular, ranges from fine sand to med gravel Adundant plant roots, organic rich Dry 5% Gravel, 10% Sand, 34% Silt, 51% Clay
										No recovery for this interval
	BH00012A				5909	2				VOA sample obtained from this interval
									CL	Same as above
	BH00012			2 10 /2 00	5908	3			GC	Silty Gravel with some Sand Light olive brown (2 5Y 5/3) well graded gravel and sand Maximum gravel size is coarse, 2" diameter, mean gravel is fine Sand is very fine to coarse, subangular to subrounded Sand and gravel supported in low plasticity matrix of clay (70%) and silt (30%) Dominant lithology of gravel is rock fragments (igneous and metamorphic), quartz, feldspar, quartzite Gravel often coated with caliche Dry 30% Gravel, 20% Sand, 15% Silt, 35% Clay
					5907	4				Core retained in VOA sleeve
									GC	Same as above
				2 00 /2 00	5906	5				
										VOA sample obtained from this interval
	BH00012B				5905	6			GC	Same as above
									CL	Inorganic Clay Olive gray (5Y 4/2) to very dark grayish brown (10YR 3/2) Clay contains a trace (<5%) of silt Silt composed of Fe-stone fragments and organic material Medium plasticity Caliche along irregular, discontinuous fractures/pore spaces Dry < 5% Silt, > 95% Clay
				2 00 /2 00	5904	7				Core retained in VOA sleeve
									CL	Same as above
					5903	8			SC	Clayey Sand with some Gravel Dark yellowish brown (10YR 4/4) well graded gravel, sand, silt and clay Gravel ranges from 4" max diameter to fine gravel, subangular to subrounded, composed of rock fragments (quartzite, granite, schist, quartz/feldspar pegmatite fragments) Sand is very fine to c g , mean is fine to very fine, subangular, composed dom of quartz, feldspar, and mafic minerals (including unweathered biotite) Gravel is unevenly distributed within clay and silt matrix (med plasticity) gravel proportion ranges up to 75% of core volume near 17' Caliche abundant between 10 5' and 11 3' Most, dry below 12' only 5% Gravel, 57% Sand, 15% Silt, 23% Clay
	BH00013			2 00 /2 00	5902	9				
	BH00013A				5901	10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32 5	GROUND ELEVATION (FT)	5910 79	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747534	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	DAB/KJT	30391
EAST	2083892	LOCATOR NUMBER K7	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	08/12/91	

REMARKS

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50%	100% 0% 100%			10			SC	Same as above
				2 00 /2 00	5900	11				
					5899	12				Core retained in VOA sleeve
									SC	Same as above
				2 00 /2 00	5898	13				
	BH00014A				5897	14				VOA sample obtained from this interval
									SC	Same as above
	BH00014			1 30 /2 00	5896	15				
										No recovery for this interval
					5895					Core retained in VOA sleeve
						16			SC	Same as above
				1 50 /2 00	5894	17				
										No recovery for this interval
	BH00014B				5893					VOA sample obtained from this interval
						18			GM	Sandy Gravel with some Silt Strong brown to dark yellowish brown (7 5 YR 5/6 to 10YR 4/6) Well graded gravel and sand Gravel up to 2 5" diameter, mean size is coarse (0 5" to 1 0") Dominantly composed of subangular rock fragments of granite, quartzite, and metamorphic rocks Sand is fine to coarse, mean size is coarse, subangular to subrounded, dom rock fragments Dry 54% Gravel, 40% Sand, 5% Silt, 1% Clay
				1 70 /2 00	5892	19				
					5891	20				No recovery for this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32 5	GROUND ELEVATION (FT)	5910 79	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747534	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	DAB/KJT	30391
EAST	2083892	LOCATOR NUMBER K7	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	08/12/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						20				No recovery for this interval
	BH00015			1 30 /2 00	5890	21			GM	Same as above
	BH00015A				5889	22			SP	Poorly - graded Sand Strong brown (7 5YR 5/6) to brown (7 5YR 5/3) Fine to coarse sand, mean is med - grained, angular to subrounded, composed of quartzite, quartz, feldspar, other rock fragments (granite, schist), mafic minerals Fines are dom silt Gravel is fine, subrounded to subangular, composed of rock fragments Wet 5% Gravel, 91% Sand, 4% Silt, trace clay
										VOA sample obtained from this interval
				1 75 /2 00	5888	23			SP	Same as above
					5887	24				No recovery for this interval
				2 00 /2 00	5886	25			SM	Gravelly Sand with some Silt Yellowish brown (10YR 5/4) to olive brown (2 5Y 4/3) Well graded, fine sand to fine gravel in silt and clay matrix Sand is dom med grained, angular to subrounded, composed of quartz, feldspar, mafic mineral grains plus some rock fragments of quartzite, granite, metamorphic rocks Gravel is fine with a few coarse cobbles (2" diameter) composed of igneous and metamorphic rock fragments, subangular Wet 32% Gravel, 54% Sand, 8% Silt, 6% Clay
					5885	26				
				2 00 /2 00	5884	27				
					5883	28				Core retained in VOA sleeve
				0 00 /2 00	5882	29				No recovery for this interval Top of bedrock estimated at 28 0 ft
					5881	30				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32 5	GROUND ELEVATION (FT)	5910 79	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747534	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	DAB/KJT	30391
EAST	2083892	LOCATOR NUMBER K7	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	08/12/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				0 00 /2 00	5880	30				
						31				
				0 00 /0 50	5875	32				
					5878	33				Total Depth = 32 5 Ft
					5877	34				
					5875	35				
					5875	36				
					5874	37				
					5873	38				
					5872	39				
					5871	40				

INDEX OF DATA

Borehole Location Number:	**30491**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32 0	GROUND ELEVATION (FT) 5909 74	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747529	AREA 001	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	30491
EAST	2083900	LOCATOR NUMBER K7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/13/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
					5909	0				No core taken from 0' to 24.0' Offset to 30391 Coring began at 24 0'
					5908	1				
					5907	2				
					5906	3				
					5905	4				
					5904	5				
					5903	6				
					5902	7				
					5901	8				
					5900	9				
						10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32 0	GROUND ELEVATION (FT) 5909 74	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747529	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	30491
EAST	2083900	LOCATOR NUMBER K7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/13/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				0 00 /24 00	5899	10				
					5898	11				
					5897	12				
					5896	13				
					5895	14				
					5894	15				
					5893	16				
					5892	17				
					5891	18				
					5890	19				
						20				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32 0	GROUND ELEVATION (FT) 5909 74	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747529	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	30491
EAST	2083900	LOCATOR NUMBER K7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/13/91	
REMARKS					

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%			20				
					5889	21				
					5888	22				
					5887	23				
					5886	24				
				1 30 /2 00	5885	25			GP	Poorly - graded Gravel Yellowish brown (10YR 5/4) Dominantly fine gravel with some pebbles up to 2" diameter Pebbles are subrounded to subangular and composed of rock fragments (granite, quartzite, metamorphic rocks, feldspars, quartz) Sand is poorly graded, very fine to coarse grained, subangular to subrounded Dominant lithologies quartz, feldspars, rock fragments, mafic minerals, unweathered biotite Wet 54% Gravel, 41% Sand, 4% Silt, 1% Clay
					5884	26				No recovery for this interval
	BH00041EBU1			2 30 /2 00	5883	27			GP	Same as above
	BH00042EBU1				5882	28				VOA sample obtained from this interval
				2 20 /2 00	5881	29			CLAYSTONE	Claystone Light olive brown (2 5Y 5/3) to dark olive gray (5Y 3/2) No bedding, appears massive Some carbonaceous fragments present - randomly distributed, do not mark bedding surfaces Unweathered Wet 15% Silt, 85% Clay Top of bedrock = 28 0 ft
					5880	30				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32.0	GROUND ELEVATION (FT) 5909.74	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747529	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	30491
EAST	2083900	LOCATOR NUMBER K7	BOREHOLE DIAMETER (IN) 7.25	DATE DRILLED 08/13/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH0030EU01	0% 50% 100%	0% 100%	2.20/2.00	5879	30				
					5878	31				
						32				Total Depth = 32.0 ft
					5877	33				
					5876	34				
					5875	35				
					5874	36				
					5873	37				
					5872	38				
					5871	39				
					5870	40				

INDEX OF DATA

Borehole Location Number:	**30591**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 12 0	GROUND ELEVATION (FT) 5942 18	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747683	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	30591
EAST	2083558	LOCATOR NUMBER K7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/14/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERED	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00050EBU1	0% 50%	100% 0% 100%	2 00 /2 00	5942 5941	0 1			OL	Organic Silty Clay with some Gravel Dark brown (7 5YR 3/2) silt and clay matrix (ol) supporting med to coarse sand and fine to coarse gravel Gravel up to 2 5" diameter, mean=fine Gravel present at 0'-1' only Abundant plant roots throughout Low plasticity Dry 10% Gravel, 20% sand, 70% Fines
	BH00045EBU1									VOA sample obtained from this interval
	BH00041EBU1			2 00 /2 00	5940 5939	2 3			CL	Silty Sandy Clay Dark brown (10YR 5/3) to dark yellowish brown (10YR 4/6) Inorganic silty clay matrix supports fine to coarse sand and fine gravel Dominant sand size is fine, gravel sized up to 0 5" diameter, mean=fine Sand and gravel are subangular to subrounded, composed of quartz, feldspar, rock fragments of granite, quartzite, schist Caliche abundant in 1" to 3" thick areas variably dispersed throughout clay Dry 10% Gravel, 30% Sand, 10% Silt, 50% Clay
				2 00 /2 00	5938 5937	4 5				
	BH00046EBU1									VOA sample obtained from this interval
					5936	6			CL	Same as above
				2.00 /2.00	5935	7			GM	Well graded Gravel Dark brown (7 5 YR 3/4) gravel in sand and silt matrix Gravel dom fine, range up to 1.5" diameter, subrounded, caliche coated rock fragments Dry 48% Gravel, 39% Sand, 13% Fines
					5934	8			CLAYSTONE	Claystone Very dark grayish brown (2 5Y 3/2) to light olive brown (2 5Y 5/3) Clay with traces of silt and very fine sand No apparent bedding, appears massive Caliche abundant in two subhoriz zones, each approx 3" thick Claystone is unweathered except for areas adjacent to caliche deposits, where the claystone is fe-oxide stained Dry Top of bedrock = 7 0 ft
	BH00049EBU1			2.20 /2 00	5933	9				
	BH00048EBU1					10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 12 0	GROUND ELEVATION (FT) 5942 18	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747683	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	30591
EAST	2083558	LOCATOR NUMBER K7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/14/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY / INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2 00 /2 00	5932	10			CLAYSTONE	Same as above
					5931	11				
					5930	12				Core retained in VOA sleeve Total Depth = 12 0 ft
					5929	13				
					5928	14				
					5927	15				
					5926	16				
					5925	17				
					5924	18				
					5923	19				
						20				

INDEX OF DATA

Borehole Location Number:	**30691**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 14 7	GROUND ELEVATION (FT)	5873 56	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747403	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	DAB/KJT	30691
EAST	2084301	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	08/15/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH / SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH00057EBU1	0% 50% 100%	0% 100%		5873	0			SC	Clayey Sand Olive brown (2 5Y 4/3) silty clay matrix (SL) supports very fine to med sand Sand is subangular, composed of quartz, feldspar, mafic minerals Dry 60% Sand, 15% Silt, 25% Clay
			1 10 /2 00		1				No recovery for this interval
									VOA sample obtained from this interval
BH00051EBU1				5872	2			GC	Well graded Gravel Very dark gray (10YR 3/1) to olive brown (2.5Y 4/3) Gravel is fine to coarse with max size= 3" diameter and mean size = coarse (1" to 1 5") Gravel is angular (broken cobbles) to subrounded and composed of rock fragments of granite, quartz vein material, quartzite, schist Sand is very fine to coarse, dom composed of quartz and quartzite fragments with some feldspar, mafic minerals, and rock fragments Dry 44% Gravel, 41% Sand, 15% Fines
BH00052EBU1			1 15 /2 00	5871	3				Core retained in VOA sleeve
								GC	Same as above
				5870	4				No recovery for this interval
				5869				GC	Same as above
			1 20 /2 00		5				No recovery for this interval
BH00053EBU1				5868	6				VOA sample obtained from this interval
				5867					Slough mixed in spoon Dominantly clay containing caliche-coated gravel and plant material (grass)
			0 65 /2 00		7				No recovery for this interval
				5866				CLAYSTONE	Claystone Dark grayish brown (2 5Y 4/2) clay with some (approx 15%) silt Appears massive with no bedding structures Stained in discontinuous patches with Fe-oxides Weathered Dry 15% Silt, 85% Clay Top of bedrock = 8 0 ft
BH00056EBU1			2 00 /2 00	5865	9			SILTSTONE	Siltstone Light olive brown (2 5Y 5/6) to light yellowish brown (2 5Y 6/2) Silt, clay and trace very fine-grained sand, well-sorted, subangular silt Uncemented, unweathered, mod to highly friable Sand composed of quartz No bedding apparent Uniform grain size distribution throughout Dry 5% Sand, 95% Clay
BH00054EBU1				5864	10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 14 7	GROUND ELEVATION (FT) 5873 56	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747403	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	30691
EAST	2084301	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/15/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY / INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2 00 /2 00	5863	10			SILTSTONE	Same as above
					5862	11				
										Core retained in VOA sleeve
				2 00 /2 00	5861	12			SILTSTONE	Same as above
					5860	13				
										Core retained in VOA sleeve
						14				No recovery for this interval
					5859					
						15				Total Depth = 14 7 ft
					5858					
						16				
					5857					
						17				
					5856					
						18				
					5855					
						19				
					5854					
						20				

INDEX OF DATA

Borehole Location Number:	**30791**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 18 7	GROUND ELEVATION (FT) 5876 48	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747414	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	30791
EAST	2084267	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/16/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00058EBU1	0% 50%	100% 0% 100%		5876	0				No recovery for this interval
				1 50 /2 00	5875	1			CL	Inorganic Silty Clay Dark olive brown (2 5Y 3/3) Predom silt and clay with some very fine to fine sand Sand is subangular Medium to low plasticity No bedding Some plant material Dry 15% Sand, 17% Silt,
	BH00059EBU1				5874	2			GW	Well graded Gravel Very dark grayish brown (2 5Y 3/2) matrix of sand, silt and clay supports gravel Angular to subrounded gravel ranges from fine to coarse, max diameter=2 75", mean=coarse, 1"-2" Sand is fine to coarse, mean = coarse, subangular to angular Lithologically diverse rock fragments (granite, schist, quartzite) Dry 62% Gravel, 33% Sand, 5% Fines
	BH00060EBU1			0 90 /2 00	5873	3				VOA sample obtained from this interval
									GW	Same as above
										No recovery for this interval
										Core retained in VOA sleeve
				2 00 /2 00	5872	4 5			CL	Inorganic Clay Dark grayish brown (2 5Y 4/2) to light olive brown (2 5Y 5/6) Clay with some silt and trace very fine sand Silt and very fine sand sized pieces of carbonaceous material are locally present along fine laminae Low to med plasticity Dry 2% Sand, 10% Silt, 88% Cloy
					5871					VOA sample obtained from this interval
									CL	Same as above
	BH00061EBU1			2 10 /2 00	5870	6 7			GP	Poorly-graded Gravel Olive brown (2 5Y 4/3) to light olive brown (2 5Y 5/4) Coarse gravel, up to 3 5" diameter, in sand and silt matrix (sm) Gravel subrounded to subangular, composed of granite, schist, and quartzite rock fragments Matrix composed of fine to coarse sand, subangular to angular, pred rock fragments of Fe-stone, granite, quarzite Medium to low plasticity Highly variable amounts of gravel and matrix Gravel makes up 90% of core volume at 9'-9 5' 60-90% Gravel in a matrix which is 23% Gravel, 65% Sand, and 12% Fines
					5869					No recovery for this interval
						8			GP	Same as above
					5868				CLAYSTONE	Claystone with some Silt Mixed slough? Matrix (contains some alluvial gravel mixed with claystone?) is claystone, very dark grayish brown (2 5Y 3/2) Clay with trace of silt The core appears discontinuous/mixed Interval probably does not represent a single lithology Claystone (bedrock) is dominant component Bedding not apparent in disturbed core material Dry 15% Silt, 85% Clay Top of bedrock = 9 5 ft
	BH00063EBU1			1 40 /2 00		9				
					5867					
	BH00062EBU1					10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 18 7	GROUND ELEVATION (FT)	5876 48	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747414	AREA 001	CASING DIAMETER (IN)		GEOLOGIST	DAB/KJT	30791
EAST	2084267	LOCATOR NUMBER 17	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	08/16/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%			10			CLASTONE	Same as above
				1 80 /2 00	5866	11				
					5865					
						12				No recovery for this interval
					5864				CLAYSTONE	Same as above
				1 80 /2 00		13			SILTY CLAYSTONE	Silty Claystone Dark grayish brown (2 5Y 4/2) Clay with some silt Uncemented, mod friable Silt is dom composed of heavy (mafic) mineral grains No bedding structures apparent Appears massive Unweathered Dry 20% Silt, 80% Clay
	B00066EB01				5863					
						14				No recovery for this interval
					5862					VOA sample obtained from this interval
									SILTY CLAYSTONE	Same as above
	B00065EB01			2 00 /2 00		15				
					5861					
						16				
					5860					
				2 00 /2 00		17				
					5859					
	B00064EB01									VOA sample obtained from this interval
						18				No recovery for this interval
				0 00 /0 20	5858					
						19				Total Depth = 18 7 ft
					5857					
						20				

INDEX OF DATA

Borehole Location Number:	**30891**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 18 0	GROUND ELEVATION (FT)	5879 04	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747450	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	DAB/KJT	30891
EAST	2084285	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	08/19/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00069EBU1	0% 50%	100% 0% 100%		5879	0			OL	Organic Silty Clay Very dark grayish brown (2 5Y 3/2 to 2 5Y 4/2) silty clay with some gravel (up to 2" diameter) and trace sand (fine) Abundant organic material, some caliche, carbonate cement Dry 25% Gravel, 5% Sand, 70% Fines
	BH00071EBU1			0 90 /2 00	5878	1				No recovery for this interval
										VOA sample obtained from this interval
										No recovery for this interval
					5877	2			CL	Inorganic Sandy Silty Clay Light olive brown (2 5Y 5/3) Matrix is clay (70%) and silt (30%) Low plasticity Abundant caliche, some carbonaceous material Appears massive, transitional to weathered bedrock Dry 22% Sand, 23% Silt, 55% Clay
	BH00070EBU1			1 80 /2 00	5876	3			SILTY CLAYSTONE	Silty Claystone Olive (5Y 5/3) to yellowish brown (10YR 5/8) clay and silt with some caliche and carbonate cement Also contains trace of silt-sized carbonaceous fragments Fe-oxide stains (yellowish brown) give claystone mottled appearance No bedding structures, appears massive Caliche content decreases with increasing depth Weathered Dry 22% Silt, 78% Clay Top of bedrock = 2 8 ft
					5875	4				No recovery for this interval
									SILTY CLAYSTONE	Same as above
				2 00 /2 00	5874	5				
	BH00072EBU1									VOA sample obtained from this interval
					5873	6			SILTY CLAYSTONE	Same as above
				2 00 /2 00	5872	7				
										Core retained in VOA sleeve
					5871	8			SILTY CLAYSTONE	Same as above
	BH00075EBU1			2 00 /2 00	5870	9				
	BH00076EBU1					10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 18 0	GROUND ELEVATION (FT) 5879 04	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747450	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	30891
EAST	2084285	LOCATION NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/19/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
					5869	10			SILTY CLAYSTONE	Same as above
				2 00 /2 00	5868	11			CLAYSTONE	Claystone Dark gray (10YR 4/1) to dark grayish brown (10YR 4/2) clay with trace of very fine sand and silt sized carbonaceous fragments No cement No bedding structures, but carbonaceous fragments concentrated along discontinuous, subhoriz bedding surfaces as very thin laminae Fe-stone concretions at 18' depth Unweathered Dry 5% Silt, 95% Clay
					5867	12				Core retained in VOA sleeve
									CLAYSTONE	Same as above
				2 00 /2 00	5866	13				
	BH00077LBU1				5865	14				VOA sample obtained from this interval
									CLAYSTONE	Same as above
	BH00078LBU1			2 00 /2 00	5864	15				
										Core retained in VOA sleeve
					5863	16			CLAYSTONE	Same as above
				2 00 /2 00	5862	17				
	BH00079LBU1				5861	18				VOA sample obtained from this interval
										Total Depth = 18 0 ft
					5860	19				
						20				

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Borehole Location Number:	N/A
Monitoring Well Location Number:	**30991**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 12.25	GROUND ELEVATION (FT): 5849.32	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:	
NORTH: 747745	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: JFU/JAB	30991	
EAST: 2085295	LOCATOR NUMBER: M7	BOREHOLE DIAMETER (IN): 11.5	DATE DRILLED: 08/20/91		
REMARKS:					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH0008EBU1			2.00 /2.00	5849	0			CL:	Sandy Silty Clay mixture with Gravel: Black (10YR 2/1) and very dark grayish brown (10YR 3/2) above approx.3.2', below which it lightens to brown/dark brown (10YR 4/3) to yellowish brown (10YR 5/4). Gravel to 1.5" (avg. approx. 0.3"), sand veryfine to very coarse (mean=fine to med.). Moderately graded. Gravels subangular to rounded, sands angular to subrounded. Low to med. plasticity. Gravels are quartzite, some gneiss, schist. Sands are quartz, some rock fragments, traces mafics, micas, organics. None to trace calcareous content above approx.2.9'; calcareous content is sharply increased below this point, corresponding with color change. No bedding apparent, although gravelly "layers" exist at 1.0'-1.1' and approx.3.0'-3.25'. Dry. 0-10% Gravel, 20%-25% Sand, 70%-80% Fines (more clay than silt)
				5848	1				
				5847	2				
			2.00 /2.00	5846	3				VOA sample obtained from this interval
								CL:	Same as above
									Core retained in VOA sleeve
								CL:	Same as above
				5845	4			GC:	Clayey, Silty Sand-Gravel mixture: Light olive brown (2.5Y 5/3), dark yellowish brown (10YR 4/4), brown/dark brown (10YR 4/3), and olive brown (2.5Y 4/3). Gravel to 2.5" (avg. approx.0.4"), sand very fine to very coarse (mean=med. to coarse). Well graded. Gravels angular (probably from drill-related fracturing) to rounded, sands angular to rounded. Gravels are quartzite, gneiss, and schist; sands are quartz with some rock fragments, trace to some Fe-oxide grains, traces mafics and micas. Except for a clay-rich, gravel-poor "layer" at 7.8'-8.0', there is no apparent bedding. Trace to some calcareous content. Dry. 40%-45% Gravel, 37%-43% Sand, 17%-24% Fines (approx. 11-18% clay)
			2.00 /2.00	5844	5				
				5843	6				Core retained in VOA sleeve
								GC:	Same as above
									No recovery for this interval
			0.70 /2.00	5842	7			GC:	Same as above
								GC:	Same as above
									Core retained in VOA sleeve.
				5841	8			CLAYSTONE:	Claystone: Brown (10YR 5/3), light brownish gray (10YR 6/2), light yellowish brown (2.5Y 6/3). Sand and gravel clasts in drive sample (10.0'-12.0') most likely imported from overlying intervals by caving. Porosity=nil to approx. 5%. Cement is argillaceous with trace calcareous content in some areas and caliche blebs at approx.10.4'. Non to slightly friable and slightly to mod. fissile. Occasional chunks of carbonaceous material, scattered Fe-oxide-rich streaks. No bedding apparent. Slightly moist. 100% Fines (95%-100% Clay). Top of bedrock = 9.0 ft
			1.80 /2.00	5840	9				
					10				No recovery for this interval

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 12.25	GROUND ELEVATION (FT): 5849.32	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	747745	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: JFU/JAB	30991
EAST:	2085295	LOCATOR NUMBER: M7	BOREHOLE DIAMETER (IN): 11.5	DATE DRILLED: 08/20/91	

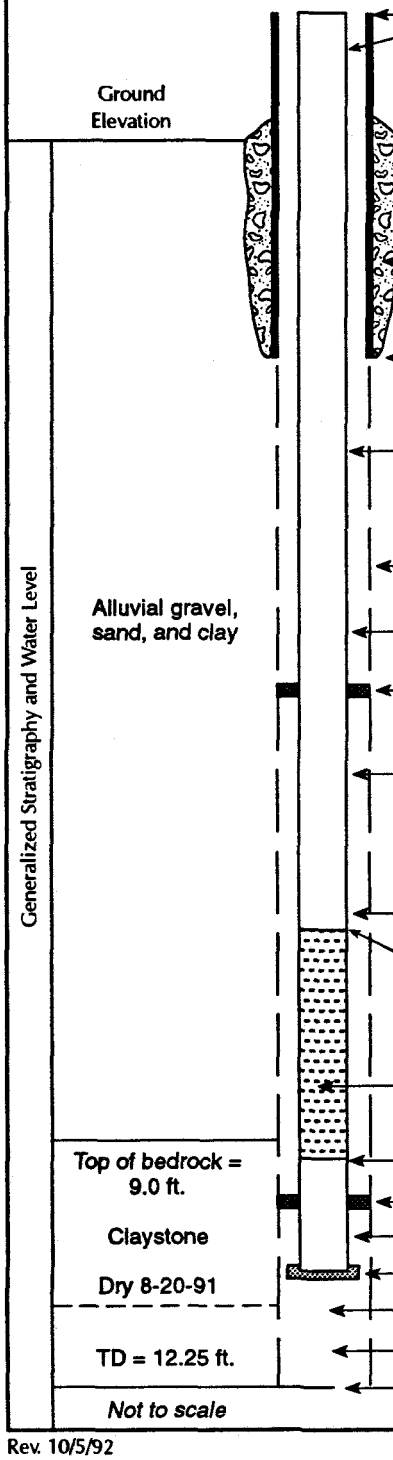
REMARKS:

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (100% 0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
					5839	10			CLAYSTONE:	Same as above.
									:	No recovery for this interval.
				0.60 /2.00	5838	11				
									CLAYSTONE:	Same as above.
				0.00 /0.25	5837	12			:	No recovery for this interval.
									:	Total Depth = 12.25 ft.
					5836	13				
					5835	14				
					5834	15				
					5833	16				
					5832	17				
					5831	18				
					5830	19				
						20				

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	747744.7518 ft.	Page	1 of 1
Location	881 Hillside	Easting	2085294.5935 ft.	Well No.	30991
Date Completed	8-20-91	Original Depth	12.25 ft.	Aquifer	Alluvial
Inspected by	J. Uhlinger	Date	8-20-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 12.25 ft.



Elevation of top of surface casing/riser pipe	5852.37 ft./5851.82 ft.
Height of top of surface casing/riser pipe above ground surface	3.05 ft./2.5 ft.
Depth of surface seal below ground surface	2.3 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	1.95 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	12.25 ft.
Type of backfill	NA
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	2.3 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	5.0 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	5.0 ft.
Elevation/depth top of screened section	5.1 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	9.9 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.35 ft.
Elevation/depth bottom of plugged blank section	12.25 ft.
Elevation/depth bottom of sand column	12.25 ft.
Type of backfill below observation pipe	NA
Elevation/depth of hole	12.25 ft.

Rev. 10/5/92

INDEX OF DATA

Borehole Location Number:	**31091**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32 5	GROUND ELEVATION (FT) 5907 01	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747622	AREA 001	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	31091
EAST	2084217	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/20/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00085EBU1	0% 50% 100%	0% 100%	2 20 /2 00	5907 5906	0 1			OL	Organic Clay with some Sand very dark grayish brown (10YR 3/2) Clay and silt matrix contains very fine to coarse sand and a trace of fine gravel (<0 5") Sand and gravel (mean=fine to med sand) are subangular, composed of quartz, feldspar, quartzite, granite Plant roots present throughout, some carbonate cement Dry Trace gravel, 15% Sand, 13% Silt, 72% Clay
	BH00081EBU1				5905	2				VOA sample obtained from this interval
	BH00080EBU1			2 10 /2 00	5904	3			ML	Sandy Silt Dark yellowish brown (10YR 4/4) inorganic silt and clay with some very fine to med sand and trace fine gravel Sand (mean=very fine) subangular, gravel (mean=fine, 3/8"-1/2") subrounded to subangular Low plasticity matrix Gravel very dispersed, random distribution of isolated pebbles throughout clay, silt, sand matrix Sand is quartz, micas (weathered biotite, muscovite, chlorite?), feldspar, granite fragments Gravel is rock fragments of various lithologies, but dom of igneous quartz (from granite/pegmatites), quartzite, feldspar Gravel is well graded, usually fine No bedding structures Mottling from fe-oxide stains (yellowish, red 5YR 4/6) does not appear to follow bedding surfaces or structures Wet below 18", moist above 18', 2% Gravel, 23% Sand, 53% Silt, 22% Clay
				2 00 /2 00	5903 5902	4 5				
	BH00082EBU1				5901	6				VOA sample obtained from this interval
				2 00 /2 00	5900	7			ML	Same as above
					5899	8				
	BH00085EBU1			2 00 /2 00	5898	9				
	BH00086EBU1					10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32 5	GROUND ELEVATION (FT) 5907 01	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747622	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	31091
EAST	2084217	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/20/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
					5897	10			ML	Same as above
				2 20 /2 00	5896	11				
					5895	12				
				2 00 /2 00	5894	13				
	BH00088EBU1				5893	14				VOA sample obtained from this interval
									ML	Same as above
	BH00087EBU1			2 00 /2 00	5892	15				
					5891	16				
				2 00 /2 00	5890	17				
					5889	18				Core retained in VOA sleeve
									ML	Same as above
				2 00 /2 00	5888	19			ML	Inorganic Clayey Sandy Silt with trace Gravel Yellowish brown (10YR 5/4) silt, clay and sand matrix (low to med plasticity) supports trace of fine to coarse well graded gravel Gravel is subangular to subrounded, composed of
						20				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32 5	GROUND ELEVATION (FT) 5907 01	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747622	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	31091
EAST	2084217	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/20/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
					5907	20				quartzite, igneous quartz, granite and feldspar Gravel size up to 2 5" diameter, gravel content ranges up to 15% of core volume at 20'-23' (gm) Sand is well graded, very fine to coarse, subangular, posed of quartz, quartzite, granite, feldspar, trace of weathered biotite, green pyroxene(?) Carbonate cement and caliche below 23' Wet 2% Gravel, 47% Sand, 36% Silt, 15% Clay
	B1009DEB01			0 50 /2 00	5906	21				No recovery for this interval
					5905	22			ML	Same as above
				1 70 /2 00	5904	23				
					5903	24				No recovery for this interval
				0 00 /2 00	5902	25				
					5901	26				
				0 00 /2 00	5900	27				
					5899	28				
				0 00 /2 00	5898	29				
						30				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32.5	GROUND ELEVATION (FT) 5907.01	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747622	AREA 001	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	31091
EAST	2084217	LOCATION NUMBER	BOREHOLE DIAMETER (IN) 7.25	DATE DRILLED 08/20/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%		5877	30				
				0.00 /2.00	5876	31				
				0.00 /0.50	5875	32				
					5874	33				Total Depth = 32.5 ft
					5873	34				
					5872	35				
					5871	36				
					5870	37				
					5869	38				
					5868	39				
						40				

INDEX OF DATA

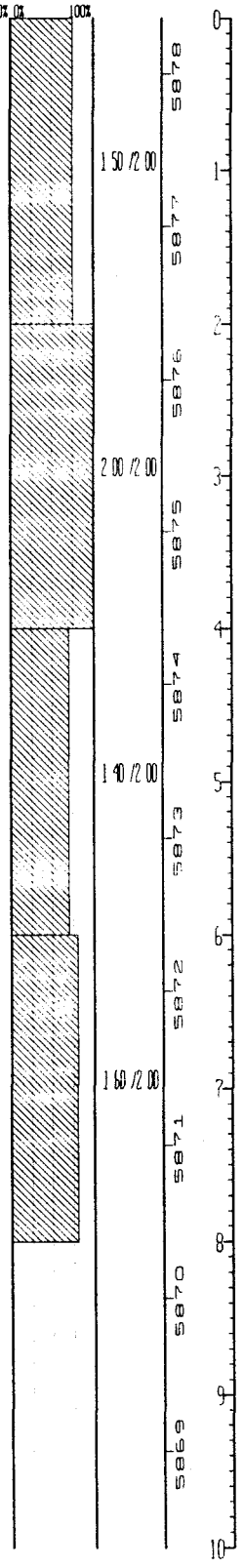
Borehole Location Number:	**31191**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

- ✔ Geologic Borehole Log (LOGGER Format)
- __ Geophysical Log
- __ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 8 0	GROUND ELEVATION (FT) 5878 37	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747967	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST JFU/KJT	31191
EAST	2085733	LOCATOR NUMBER M7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/21/91	
REMARKS					

CHEMICAL SAMPLE DEPTH
GEOTECHNICAL SAMPLE DEPTH
SAMPLE NUMBER
SAMPLE GRAIN SIZE (0% 50% 100%)
PERCENT RECOVERY (0% 100%)
RECOVERY / INTERVAL
DATUM (FT)
DEPTH (FT)
WELL OR PIEZOMETER CONSTRUCTION
LITHOLOGY



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
CL	Clay with some Sand Olive brown (2 5Y 4/3) Clay (85%) and silt (15%) matrix (cl) supports fine to med. sand and fine to coarse gravel Mean sand=med , mean gravel = 3/4"-1" Subrounded to subangular gravel composed of quartzite, granite, schist Sand is subangular to angular Dry 5% Gravel, 7% Sand, 13% Silt, 75% Clay
	No recovery for this interval
CH	Clay with some Silt and some Sand Dark yellowish brown (10YR 4/6) Clay and silt matrix is med to high plasticity (ch), and supports some sand and trace of gravel Gravel is well graded, max diameter = 1 1/4", avg < 1/2", subrounded Sand is very fine to coarse, mean=med , subangular to subrounded Caliche within matrix and coating gravel Dry 5% Gravel, 15% Sand, 20% Silt, 60% Clay
SANDY CLAYSTONE	Sandy Claystone Light yellowish brown (2 5Y 6 3) Claystone containing very fine to f g sand Porosity <5% Carbonate cement and thick zones (3"-4") of abundant caliche are present Slightly to mod friable Sand composed dom of quartz with some feldspar, trace mafic minerals and possibly biotite Strongly weathered Caliche growth along possible relict bedding laminae Laminae are very thin and wavy, discontinuous Dry 35% Sand, 13% Silt, 52% Clay Top of bedrock = 4 7 ft
	No recovery for this interval
SANDY CLAYSTONE	Same as above
	No recovery for this interval
	Total Depth = 8 0 ft

INDEX OF DATA

Borehole Location Number:	**31291**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

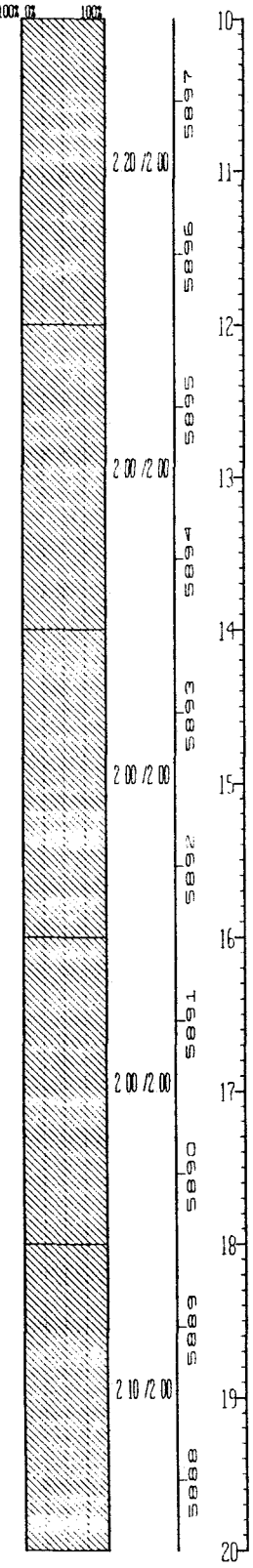
__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 36 0	GROUND ELEVATION (FT) 5907 54	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747616	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	31291
EAST	2084146	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/22/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00095EU1	0% 50% 100%	0% 100%	1 80 /2 00	5907	0			CL	Sandy Silt Yellowish brown (10YR 5/6) silt and clay with abundant poorly-graded, very fine to fine sand Sand is subangular, mean size=very fine, composed of weathered biotite and other micas, feldspar, quartz, mafic minerals Sandy silt is organic rich in top 1 5' (0'-1 5') where it contains plant roots Some carbonaceous material also present throughout interval Small (1"-3" diameter) caliche concentrations and local carbonate cement also present throughout Single gravel cobble at 5' Dry 40% Sand, 48% Silt, 12% Clay
					5906	1				
						2				No recovery for this interval
				1 80 /2 00	5905	3			CL	Same as above
					5904	4				No recovery for this interval
				1 75 /2 00	5903	5			CL	Same as above
					5902	6				No recovery for this interval
					5901	6			CL	Same as above
				2 10 /2 00	5900	7			CL	Sandy Clay with trace Gravel Dark yellowish brown (10YR 4/6) clay and sand matrix (low plasticity) supports variable amounts of coarse and fine gravel (between 0% and 20%, cl to gc) Gravel is angular to subangular, and composed of igneous quartz, granite, and quartzite Sand is poorly graded, very fine to med grained (mean=fine), subangular, composed of quartz, feldspar, mafic minerals (including green pyroxene), biotite, other micas No bedding Moist at 9 5' to 10' Dry elsewhere within interval 5% Gravel, 40% Sand, 11% Silt, 44% Clay
				1 80 /2 00	5899	8				
					5898	9				No recovery for this interval
						10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 36 0	GROUND ELEVATION (FT) 5907 54	PROJECT NUMBER CMAD	LOG OF BORING NUMBER
NORTH	747616	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	31291
EAST	2084146	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/22/91	
REMARKS					

CHEMICAL SAMPLE DEPTH
GEOTECHNICAL SAMPLE DEPTH
SAMPLE NUMBER
SAMPLE GRAIN SIZE (0% 50% 100%)
PERCENT RECOVERY (0% 100%)
RECOVERY/INTERVAL
DATUM (FT)
DEPTH (FT)
WELL OR PIEZOMETER CONSTRUCTION
LITHOLOGY
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE
DESCRIPTION



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
CL	Same as above
CLAYEY SILTSTONE	Clayey Siltstone Pale olive (5Y 6/3) above 18' to light olive brown (2 5Y 5/4) below 18' Silt and clay with some poorly graded very fine to fine sand Sand mean size=fine sand, subangular, dom composed of mafic minerals (heavy minerals), quartz, feldspar, no biotite or other micas Isolated coarse pebbles up to 3/4" and one cobble (2" diameter) present within claystone at 18 5', these clasts are composed of quartzite and micaceous schist, are coated with caliche and appear alluvial in origin, not part of bedrock, now lodged in weathered bedrock Caliche concentrations present throughout interval as discontinuous subhoriz masses, not more than 2" thick Local concentrations of silty carbonaceous material near base of interval (beginning at approx 22') Weathered Dry 15% Sand, 72% Silt, 13% Clay top of bedrock = 12 5 ft

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 36 0	GROUND ELEVATION (FT) 5907 54	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747616	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	31291
EAST	2084146	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/22/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% – 50% – 100%)	PERCENT RECOVERY (0% – 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2.00 /2.00	5887	20				
					5886	21				
				2.00 /2.00	5885	22				
					5884	23				
				1.90 /2.00	5883	24			CLAYSTONE	Claystone with some Silt Light olive gray (5Y 5/2) to light olive brown (2 5Y 5/6) Clay and silt with trace fine carbonaceous material Trace of Fe-oxide cement present throughout interval Fe-stone concretions at 26 5' Slightly to mod friable Usually massive but very fine laminae marked by carbonaceous material Some interbedding of clayey siltstone (described at 12 5' to 23 3' above) and this claystone in top 3' of interval - transitional to more massive claystone below 27' Claystone is weathered, has mottled appearance due to Fe-oxide stains and some caliche deposits Dry 2% Sand, 15% Silt, 83% Clay
					5882	25				No recovery for this interval
	B4000921BU1									VOA sample obtained from this interval
					5881	26			CLAYSTONE	Same as above
	B4000941BU1			2.00 /2.00	5880	27				
										Core retained in VOA sleeve
					5879	28			CLAYSTONE	Same as above
				2.00 /2.00	5878	29				
	B4000961BU1					30				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 36 0	GROUND ELEVATION (FT)	5907 54	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747616	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	DAB/KJT	31291
EAST	2089146	LOCATOR NUMBER 17	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	08/22/91	
REMARKS							

CHEMICAL SAMPLE TYPE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%			30			CLAYSTONE	Same as above
				2 00 /2 00	5877	31				
					5876					Core retained in VOA sleeve
						32			CLAYSTONE	Same as above
	BH00097EB01			2 00 /2 00	5875	33			CLAYSTONE	Claystone Light olive brown (2 5Y 5/3) clay with trace of silt and trace very fine sand No cement Slightly friable Very fine sand composed of mafic (heavy) mineral grains, quartz, minor carbonaceous fragments Massive Dominantly unweathered Fe-oxide staining at 35' Dry 2% Sand, 10% Silt, 88% Clay
					5874					VOA sample obtained from this interval
						34			CLAYSTONE	Same as above
				2 00 /2 00	5873	35				
					5872					Core retained in VOA sleeve
						36				Total Depth = 36 0 ft
	BH00096EB01				5871	37				
					5870	38				
					5869	39				
					5868	40				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**31391** (abandoned)
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 4 0	GROUND ELEVATION (FT)	5884 52	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747821	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	JFU/KJT	31391
EAST	2085130	LOCATOR NUMBER M7	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	08/22/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50%	100% 0% 100%	1 60 /2 00	5884	0			CL	Sandy Clay Very dark grayish brown (10YR 3/2) to red (2 5YR 4/6) Low plasticity clay (80%) and silt (20%) matrix containing very fine to coarse sand and trace of gravel Mean sand-fine, mean gravel size= 1/4", max diameter = 2 1/4" Subangular to angular sand composed of rock fragments (granite, schist, quartzite) and quartz and feldspar Plant roots present throughout, with silt- sized organic material within matrix Some caliche present within pore spaces
					5883	1				
						2				No recovery for this interval
				2 00 /2 00	5882	3			CL	Clay with some Sand Dark grayish brown (2 5Y 4/2) Fine to med sand within clay (90%) matrix Sand is subangular to angular, composed of feldspar, quartz, rock fragments (schist?, granite) Caliche present This clay appears to be reworked bedrock containing a component of clastic material derived from overlying alluvium Dry 8% Sand, 9% Silt, 83% Clay
	BH000988EU1				5881	4			CLAYSTONE	Claystone with some Sand Dark grayish brown (2 5Y 4/2) Sand is very f g , subangular, composed of quartz and mafic minerals Some carbonate cement Slightly friable No bedding apparent Dry 5% Sand, 10% Silt, 85% Clay Top of bedrock = 2 5 ft
					5880	5				VOA sample obtained from this interval
					5879	6				Total Depth = 4 0 ft
					5878	7				
					5877	8				
					5876	9				
					5875	10				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**31491**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 21 5	GROUND ELEVATION (FT)	5902 58	PROJECT NUMBER	NMAD	LOG OF BORING NUMBER
NORTH	747749	AREA 001	CASING DIAMETER (IN)	2 07	GEOLOGIST	JFU/KJT	31491
EAST	2084649	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	08/28/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00156EB01	0% 50% 100%	0% 100%	1 70 /2 00	5902	0			SM	Silty Sand Very dark grayish brown (2 5Y 3/2) very fine to med -grained sand in silt (80%) and clay (20%) matrix Some plant roots Some caliche 80% Sand, 16% Silt, 4% Clay
					5901	1			GM	Well graded Gravel and well graded Gravelly Sand Very dark grayish brown (2 5Y 3/2) Well graded gravel, up to 3" diameter, mean = 7/8" Well graded sand, very fine to coarse, mean=fine Fines approx 60% Silt, 40% Clay Gravel and sand is angular to subangular Matrix of sand and fines is low plasticity Gravel and sand composed dom of igneous rock fragments (granite, quartz, coarse quartz/feldspar) and metamorphic rocks (quartzite, mafic schist, mica-rich gneiss), and Fe-oxide nodule fragments No bedding apparent Variable gravel content as shown Some caliche coats coarse gravel and is present within matrix Dry below 2 7', moist above gm (0 5'-2 1' and 5 5'-7 6') 5-10% Gravel, 65-70% Sand, 25% Fines, gw (2 1'-5 5') 40% Gravel, 48% Sand, 12% Fines
				0 50 /0 60	5900	2				
	BH00150EB01					3				
				1 80 /2 00	5899	4				Core retained in VOA sleeve
									GM	Same as above
					5898					No recovery for this interval
				1 00 /0 80		5				
					5897					
						6			GM	Same as above
				1 60 /2 10	5896					
						7				
					5895				CL	Gravelly Clay with some Sand Light gray (5Y 6/2) to dark yellowish brown (10YR 4/3) Well graded gravel and sand in clay matrix Abundant caliche Gravel is quartzite, quartz, feldspar, granite Angular to subangular 20% gravel, 10% Sand, 7% Silt, 63% Clay
						8				
				1 75 /2 00	5894					
	BH00151EB01					9				
					5893					Core retained in VOA sleeve
									sm-SP	Poorly graded Sand with some Silt Dark yellowish brown (10YR 4/3) Very fine to med sand, mean=very fine, sub-
						10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 21 5	GROUND ELEVATION (FT)	5902 58	PROJECT NUMBER	NMAD	LOG OF BORING NUMBER
NORTH	747749	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	JFU/KJT	31491
EAST	2084649	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	08/28/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%	1 75 /2 00	5892	10				angular, poorly sorted, composed of quartz, biotite, other micas, feldspar, mafic minerals Caliche abundant between 10'-10 5' Loose No bedding apparent 90% Sand, 8% Silt 2% Clay
						11				No recovery for this interval
										Core retained in VOA sleeve
					5891				SM-SP	Same as above
						12			SW	Gravelly Sand Yellowish brown (10YR 5/4) Well graded gravel in poorly graded sand, silt and clay matrix Gravel up to 2 5" diameter, mean = 1" Sand very fine to fine, mean=very fine Gravel and sand are subangular, gravel composed of quartzite, quartz, feldspar, sand composed of quartz, micas (including unweathered biotite), feldspar 10-30% Gravel, 60-70% Sand, 10-20% Fines (Fines are 60% Silt, 40% Clay)
				2 00 /2 00	5890					
					5889	13				
						14				Core retained in VOA sleeve
	BH00152EBU1			1 75 /2 00	5888				CL	Clay with some Gravel and Sand Grayish brown (2 5Y 5/2) Clay with very fine to fine-grained sand and fine gravel No bedding Caliche cement present Clay also contains fine, subangular to subrounded gravel composed of quartzite, quartz, schist, and feldspar fragments 10% Gravel, 15% Sand, 75% Fines
					5887	15				
						16			SILTY SANDSTONE	Silty Sandstone Pale olive (5Y 6/4) to yellowish brown (10YR 5/6) fine to med grained sandstone Moderately sorted, subangular sand Approx 7% porosity Some Fe-oxide cement Highly friable Sand is dom quartz with some rock fragments, mafic minerals, trace feldspar, Fe-oxide fragments Interbedded with massive sandy claystone between 17' to 17 25' and at 17 5' to 17 7' Weathered 70% Sand, 27% Silt, 3% Clay Top of bedrock = 16 5 ft
				1 75 /2 00	5886					
						17				Core retained in VOA sleeve
					5885				SILTY SANDSTONE	Same as above
						18				
	BH00153EBU1			2 00 /2 00	5884				CLAYSTONE	Claystone Light brownish gray (2 5Y 6/2) clay with trace of very fine sand sized organic (carbonaceous) fragments Not-porous Non-friable Some caliche cement present in thin (1") discontinuous patches, otherwise appears massive with slight mottled appearance due to color variation 2% Sand, 98% Fines
						19				
					5883	20				

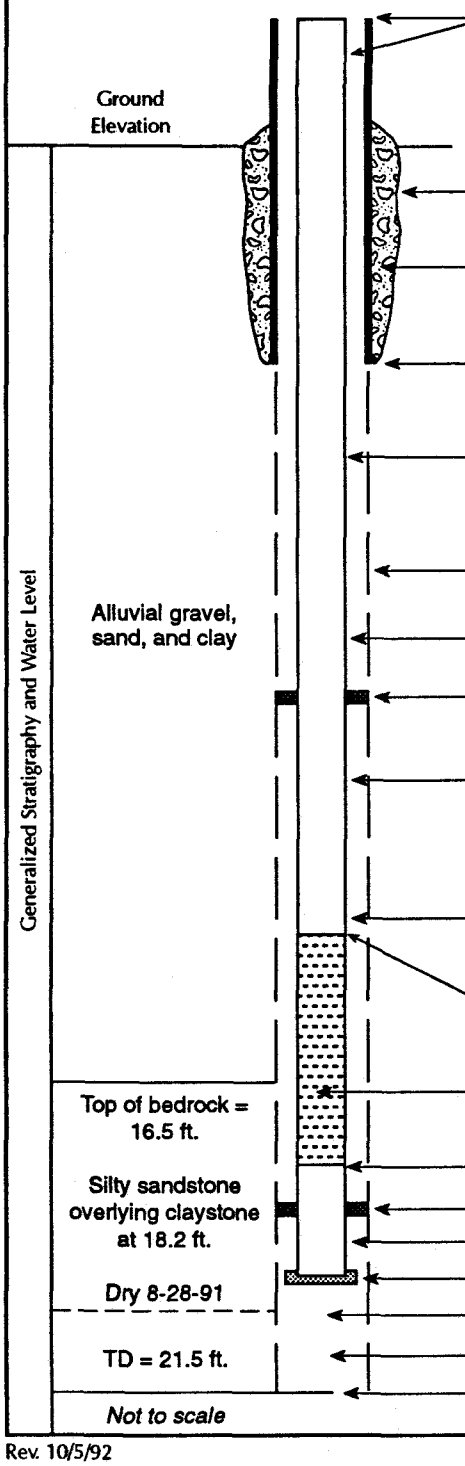
STATE PLANE COORDINATE		TOTAL DEPTH (FT) 21 5	GROUND ELEVATION (FT) 5902 58	PROJECT NUMBER NMAD	LOG OF BORING NUMBER
NORTH	747749	AREA OU1	CASING DIAMETER (IN) 2 07	GEOLOGIST JFU/KJT	31491
EAST	2084649	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 11 5	DATE DRILLED 08/28/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%							
	BH00155E001			1 75 /2 00	5882	20				
	BH00154E001				5881	21				Core retained in VOA sleeve Total Depth = 21 5 ft
					5880	22				
					5879	23				
					5878	24				
					5877	25				
					5876	26				
					5875	27				
					5874	28				
					5873	29				
						30				

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	747749.2184 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084648.5230 ft.	Well No.	31491
Date Completed	8-28-91	Original Depth	21.5 ft.	Aquifer	Alluvial
Inspected by	J. Uhlinger	Date	8-28-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 21.5 ft.



Elevation of top of surface casing/riser pipe	5905.38 ft./5905.03 ft.
Height of top of surface casing/riser pipe above ground surface	2.8 ft./2.45 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.2 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	21.5 ft.
Type of backfill	Grout
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	8.6 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	11.75 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	11.75 ft.
Elevation/depth top of screened section	13.9 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	18.9 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.4 ft.
Elevation/depth bottom of plugged blank section	21.3 ft.
Elevation/depth bottom of sand column	21.3 ft.
Type of backfill below observation pipe	Natural
Elevation/depth of hole	21.5 ft.

Rev. 10/5/92

INDEX OF DATA

Borehole Location Number:	**31591**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

- ✔ Geologic Borehole Log (LOGGER Format)
- __ Geophysical Log
- __ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 16 3	GROUND ELEVATION (FT) 5915 07	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747720	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	31591
EAST	2084238	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/23/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	B400105EBU1	CL	100% CL	100%	5915	0			ML	Clayey Sandy Silt Olive brown (2 5Y 4/3) Clayey silt matrix (low plasticity - ml) contains well graded, very fine to coarse sand (mean=med.), subangular to subrounded, composed of quartzite, quartz, feldspar with trace weathered biotite and mafic mineral fragments Gravel is well-graded, mean size=1/2" diameter, up to 1 1/2" diameter, subangular to angular (broken some organic material (silt size) Dry 6% Gravel, 41% Sand, 32% Silt, 21% Clay
	B400101EBU1			0 40 /2 00	5914	1				
										VOA sample obtained from this interval
					5913	2				No recovery for this interval
									ML	Same as above
	B400100EBU1			2 00 /2 00	5912	3				
					5911	4			CL	Gravelly Sandy Clay Yellowish brown (10YR 5/4) Clay and silt matrix supports very fine to coarse, well graded sand, and fine to coarse gravel Mean sand=med , mean gravel size=1/2" diameter (up to 3" diameter) Subangular to subrounded sand and gravel Low plasticity matrix Gravel and sand composed of quartzite, granite, quartz Dry Caliche present at 5 3' 18% Gravel, 17% Sand, 26% Silt, 39% Clay
				1 60 /2 00	5910	5				
										No recovery for this interval
	B400102EBU1				5909	6				VOA sample obtained from this interval
									CL	Same as above
				2 00 /2 00	5908	7			SC	Clayey Silty Sand Light olive brown (2 5Y 5/4) to yellowish brown (2 5Y 6/2) Sand is poorly graded, very fine to fine grained with trace of coarse sand, subangular, composed of quartz, quartzite, feldspar, rock fragments of schist, micas, other mafic minerals Gravel is well graded, mean size = 1/2" diameter, up to 1 1/2" diameter, subangular to rounded, composed of quartzite, quartz, granite, feldspar Contains some caliche, trace of carbonaceous material, has mottled colors due to discontinuous, patchy Fe-oxide stains Dry 7% Gravel, 50% Sand, 43% Fines
					5907	8				Core retained in VOA sleeve
	B400106EBU1			2 00 /2 00	5906	9			SC	Same as above
	B400107EBU1					10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 16 3	GROUND ELEVATION (FT) 5915 07	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747720	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	31591
EAST	2084238	LOCATOR NUMBER 17	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/23/91	
REMARKS					

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%						SC	Same as above
				2 00 /2 00	5905 5904	10 11			CLAYSTONE	Claystone with some Silt Dark grayish brown (2 5Y 4/2) to dark gray (2 5Y NA4/) Non-porous, to 5% porosity where weathered Trace carbonate cement plus caliche filling small cavities, patchy -- appears to replace claystone Slightly friable to mod friable Weathered above 13 75', relatively unweathered below 13 75' Fe-stone nodules at 11.7' Fe-oxide stained where weathered No bedding apparent Dry 15% Silt, 85% Clay Top of bedrock = 10 7 ft
					5903	12				Core retained in VOA sleeve
				2 00 /2 00	5902	13			CLAYSTONE	Same as above
	BH00108LBU1									VOA sample obtained from this interval
	BH00109LBU1				5901	14			CLAYSTONE	Same as above
				1 10 /2 00	5900	15				No recovery for this interval
				0 00 /0 30	5899	16				
					5898	17				Total Depth = 16 3 ft
					5897	18				
					5896	19				
						20				

INDEX OF DATA

Borehole Location Number:	**31691**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

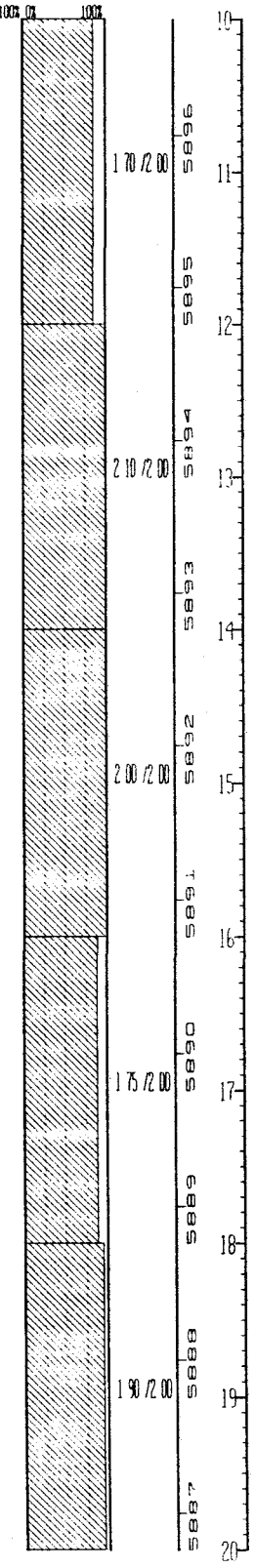
STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32 6	GROUND ELEVATION (FT)	5906 76	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747620	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	DAB/KJT	31691
EAST	2084198	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	08/26/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00115EBU1	0% 50%	100% 0% 100%	2 00 /2 00	5906	0			CL	Sandy Clay with some Silt Black (5Y 2 5/1) to very dark grayish brown (2 5Y 3/2) sand and clay with some silt and trace of gravel (fine) Sand is very fine to coarse, mean=fine to med , subangular to subrounded Matrix low plasticity Sand composed of quartz, feldspar, rock fragments (quartzite, Fe-stone, schist, granite) Caliche present within matrix and on larger sand grains Abundant plant roots in upper 1' Dry 40% Sand, 12% Silt, 48% Clay
					5905	1				
				2 00 /2 00	5904	2			SM	Silty Sand with some Clay Dark yellowish brown (10YR 4/4) Very fine to med sand, mean=fine to very fine, sub-angular, composed dom of quartz, with some unweathered biotite, other micas (weathered biotite?), feldspar, mafic minerals Fines are dom (70%) silt Trace of gravel present, mean=fine (<1/4" diameter) No bedding structures Some carbonaceous fragments (fine to med sand size) present throughout interval Trace of carbonate (as cement?) Dry 55% Sand, 32% Silt, 13% Clay
					5903	3				
										Core retained in VOA sleeve
				2 00 /2 00	5902	4			SM	Same as above
					5901	5				
				2 00 /2 00	5900	6			ML	Sandy Clayey Silt with some Gravel Dark yellowish brown (10YR 4/4) Well graded gravel and sand in a silt, sand and clay matrix (ml -- low plasticity) Gravel is fine to coarse, up to 2" max diameter, mean=3/4" to 1" diameter, sub rounded to angular (freshly broken) Composed of igneous and metamorphic rock fragments, quartzite, granite, schist, pegmatite (quartz and feldspar), also igneous quartz Sand is very fine to med , mean=fine, subangular to subrounded, composed of quartz, feldspar, biotite, other micas, rock fragments (metamorphic quartzite and schist), mafic minerals No bedding structures Gravel is randomly distributed throughout the ml matrix, does not lie along visible bedding surfaces Trace carbonate cement Dry Moist between 8' and 10', moist 18 8' to 20' 10% Gravel, 35% Sand, 33% Silt, 22% Clay
					5899	7				
				2 00 /2 00	5898	8				
					5897	9				
						10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32 6	GROUND ELEVATION (FT) 5906 76	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747620	AREA OUI	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	31691
EAST	2084198	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/26/91	
REMARKS					

CHEMICAL SAMPLE DEPTH
GEOTECHNICAL SAMPLE DEPTH
SAMPLE NUMBER
SAMPLE GRAIN SIZE (0% 50% 100%)
PERCENT RECOVERY (0% 100%)
RECOVERY / INTERVAL
DATUM (FT)
DEPTH (FT)
WELL OR PIEZOMETER CONSTRUCTION
LITHOLOGY
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE
DESCRIPTION



		No recovery for this interval
	ML	Same as above
		No recovery for this interval
	ML	Same as above

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32 6	GROUND ELEVATION (FT) 5906 76	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747620	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	31691
EAST	2084198	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/26/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY / INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						20				No recovery for this interval
									ML	Same as above
				1 80 /2 00	5906	21			SM	Silty Gravelly Sand Dark yellowish brown (10YR 4/4) Well graded gravel in sand, silt and clay matrix (ml, same as preceeding interval, 7 8' to 20 2') Gravel is subrounded to subangular, coarse, up to 2" diameter, mean approx 3/4" Moist to wet 28% Gravel, 40% Sand, 32% Fines
					5905					
						22				No recovery for this interval
									SM	Same as above
				2 00 /2 00	5904	23			GM	Silty Sandy Gravel Light yellowish brown (2 5Y 6/4) Well graded gravel, up to 2 1/4" diameter, mean=1 1/4", angular (broken) to subangular Sand is very fine to med grained, mostly within matrix as very fine to fine sand Subangular to subrounded Caliche coats gravel and fills pore space within matrix and between gravel Dry 35% Gravel, 27% Sand, 27% Silt, 11% Clay
					5903					
						24				No recovery for this interval
					5902				GM	Same as above
				1 50 /2 00		25			GW	Well graded Gravel Well graded coarse gravel with some dark yellowish brown (10YR 4/6) matrix of silt, sand, and clay adhering to sides of gravel cobbles Gravel is broken, max size of gravel could not be determined but is > 3" diameter Mean size=2" diameter, composed of quartzite Dry 80% Gravel, 15% Sand, 5% Fines
	BH00110LBU1				5901	26				VOA sample obtained from this interval
									GW	Same as above
	BH00112EBU1			0 70 /2 00	5900	27				No recovery for this interval
									GW	Same as above
					5899	28			CL	Clay with some Sand Dark grayish brown (2 5Y 4/2) Sand is very fine to med grained, subangular to angular, composed of quartz, quartzite, feldspar, granite fragments, mafic minerals, trace weathered biotite A few gravel pebbles present approx 1/2" diameter Dry 2% Gravel, 5% Sand, 93% Fines
				2 00 /2 00	5898	29			CLAYSTONE	Claystone with some Silt Light olive brown (2 5Y 5/6) where weathered to dark olive brown (2 5Y 3/3) where fresh Claystone with trace of silt (2%) Upper 0 4' strongly weathered and contains fine-sand-sized spheres of Fe-oxide/ Fe-hydroxide plus some Fe-oxide cement Claystone is mod friable where strongly weathered and slightly friable elsewhere Dry 2% Silt, 98% Clay Top of bedrock = 29 0 ft
	BH00111EBU1				5897	30				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32.6	GROUND ELEVATION (FT) 5906.76	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747620	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	31691
EAST	2084198	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7.25	DATE DRILLED 08/26/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	B00114B01			2.00/2.00	5876	30			CLAYSTONE	VOA sample obtained from this interval Same as above
					5875	31				
						32				Core retained in VOA sleeve
				0.00/0.60						No recovery for this interval
					5874	33				Total Depth = 32.6 ft
					5873	34				
					5872	35				
					5871	36				
					5870	37				
					5869	38				
					5868	39				
					5867	40				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**31791**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 14 2	GROUND ELEVATION (FT)	5877 06	PROJECT NUMBER	NMAD	LOG OF BORING NUMBER
NORTH	747425	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	JFU/KJT	31791
EAST	2084276	LOCATOR NUMBER 17	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	08/28/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00161BU1			1 80 /2 00	5876	1			CL	Sandy Clay with some Gravel Olive brown (2 5Y 4/3) Clay matrix supports well graded sand, very fine to coarse, and some fine gravel Low plasticity Sand and gravel are subangular to angular, composed of quartz, quartzite, feldspar, granite fragments, pieces of Fe-oxide, Fe-hydroxide Organic material disseminated throughout Carbonate cement present locally Dry 20% Gravel, 30% Sand, 50% Fines
					5875	2				No recovery for this interval
									CL	Same as above
	BH00160BU1			1 10 /2 00	5874	3			CL	Silty Sandy Clay Olive brown (2 5Y 4/3) Clay (80%) and silt (20%) matrix with very fine to f g sand Sand and silt concentrated on surfaces of very thin laminae Laminae are subparallel, wavy Dry 20% Sand, 16% Silt, 64% Clay
										No recovery for this interval
					5873	4			CL	Sandy Gravelly Clay Black (N2) to dark grayish brown (10YR 4/4) Color changes from dark grayish brown to black with depth Low plasticity clay matrix supporting well graded gravel and sand Gravel is fine to coarse, mean size = 1 1/2", max size > 2 1/2" diameter, subrounded to angular (freshly broken) Sand is very fine to coarse, mean = med to coarse, subangular to angular Sand and gravel composed of rock fragments, quartz, feldspar Organic rich Abundance of organic material increases with depth 15% Gravel, 20% Sand, 13% Silt, 52% Clay
				0 40 /2 00	5872	5				
										No recovery for this interval
									CL	Same as above
										No recovery for this interval
					5871	6			CL	Clay with some Sand Gray (10YR 5/1) to yellowish brown (10YR 5/8) Well graded sand and gravel within clay matrix Sand dom f g with rare med and coarse grains Gravel sparse but ranges up to 3" diameter Dry 2% Gravel, 8% Sand, 9% Silt, 81% Clay
				1 20 /2 00	5870	7			CLAYSTONE	Claystone Yellowish brown (10YR 5/8) to dark grayish brown (10YR 4/2) to gray (10YR 5/1) Homogeneous claystone except for zone of interbedded claystone and clayey siltstone at 11' to 11 6' as shown Porosity varies 0%-8% Moderately to slightly friable Dominantly massive without bedding structures except for interval at 11' to 11 6' where clayey siltstone and claystone have gradational, subhoriz contacts Claystone most strongly weathered between 10 7' and 11 75', weathering decreases with depth Black carbonaceous material present at 11' and dispersed throughout core, especially below 11' Some caliche present 10 7'-11', possibly filling small fracture zone along planar fracture surface Fe-oxides along planar fracture surface and small patch of caliche at 13 4' Claystone more weathered adjacent to fracture surface Possible
					5869	8				
	BH00162BU1			2 00 /2 00	5868	9				
						10				

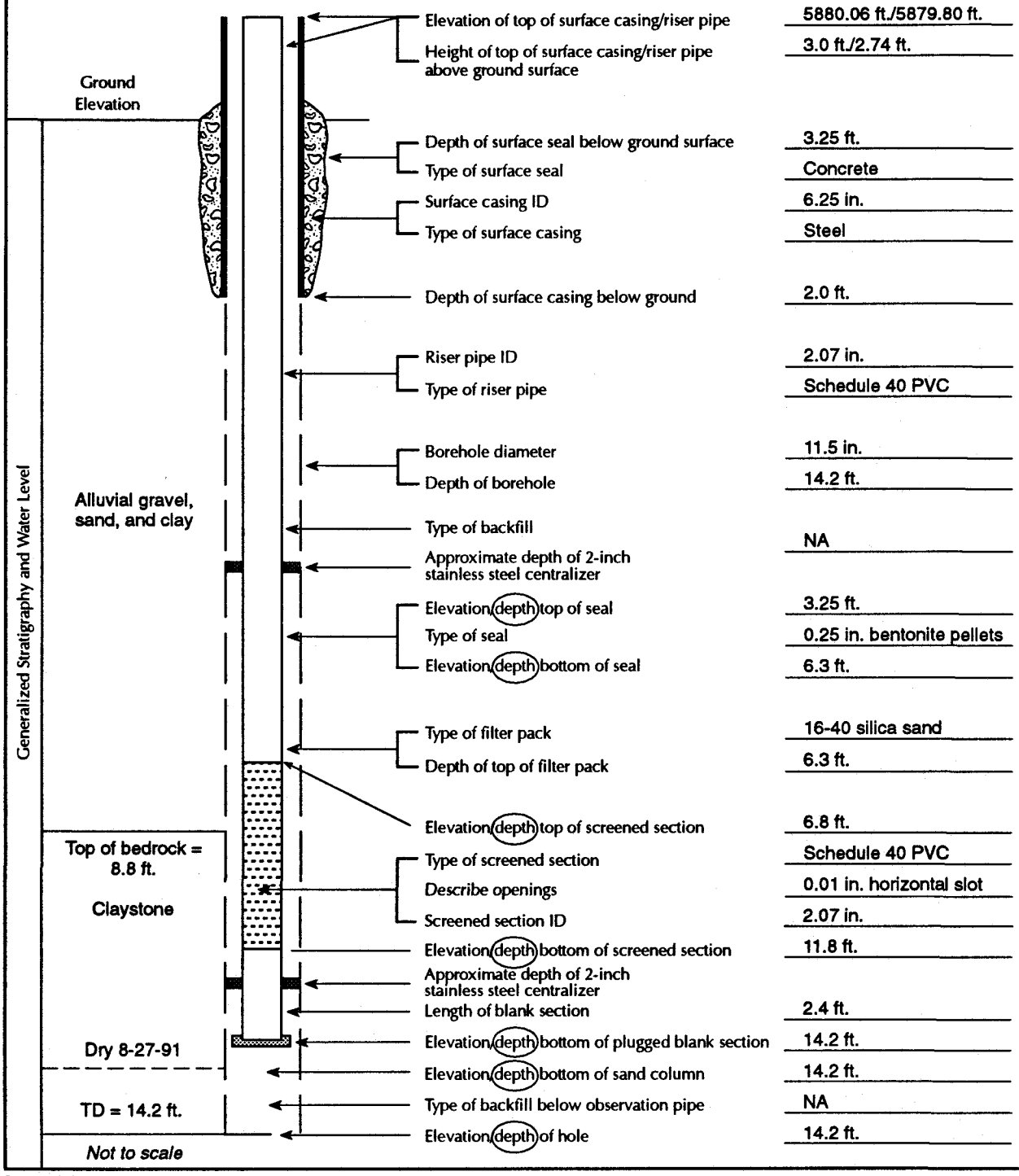
STATE PLANE COORDINATE		TOTAL DEPTH (FT) 14 2	GROUND ELEVATION (FT)	5877 06	PROJECT NUMBER	NMAD	LOG OF BORING NUMBER
NORTH	747425	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	JFU/KJT	31791
EAST	2084276	LOCATOR NUMBER 17	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	08/28/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%		5867	10			CLAYSTONE	(cont from above) slickenside (?) present as well 90-95% Clay, 5-10% Silt, with silt to 70% at 11'-11 6' Top of bedrock = 8 8 ft
				1 75 /2 20	5866	11				
										No recovery for this interval
	BH00161EB01									VOA sample obtained from this interval
					5865	12				No recovery for this interval
									CLAYSTONE	Same as above
	BH00163EB01			2 00 /2 00	5864	13				
					5863	14				
										Total Depth = 14 2 ft
					5862	15				
					5861	16				
					5860	17				
					5859	18				
					5858	19				
						20				

Form GT.6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	747424.7431 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084275.9940 ft.	Well No.	31791
Date Completed	8-28-91	Original Depth	14.2 ft.	Aquifer	Alluvial
Inspected by	J. Uhlinger	Date	8-28-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 14.2 ft.



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Borehole Location Number:	N/A
Monitoring Well Location Number:	**31891**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 21.6	GROUND ELEVATION (FT): 5916.91	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	747661	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: DAB/KJT	31891
EAST:	2084142	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN): 11.5	DATE DRILLED: 08/30/91	
REMARKS:					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00120EBU1	0% 50% 100%	0% 100%			0			SC	Clayey Silty Sand with some Gravel: Dark olive brown (2.5Y 3/3) to light olive brown (2.5Y 5/6). Clay (70%) and silt (30%) low plasticity matrix with very fine to coarse sand and some well graded gravel. Sand mean=fine, gravel mean size=1/2" diameter. Subrounded to subangular, composed of rock fragments, quartz, quartzite, feldspar, some carbonaceous fragments (sand), micas (sand), other mafic minerals (sand). Abundant plant roots and organic clay in top 0.5'. Dry. 9% Gravel, 15% Sand, 14% Silt, 32% Clay
				1.75 /2.00	5916	1				
	BH00123EBU1				5915	2				VOA sample obtained from this interval
										No recovery for this interval
	BH00125EBU1			2.00 /2.00	5914	3			CL	Sandy Silty Clay: Black (N2) to dark yellowish brown (10YR 3/4). Well graded sand (very fine to coarse), mean=med. to fine, subangular to subrounded, composed of quartz, quartzite, feldspar, schist fragments, trace weathered biotite, mafic minerals. Some organic material. Gravel is fine to coarse, mean size=1 1/2", max. size=broken cobble >3". Composed of quartzite with some granite, fine grained igneous intrusive rock. Dry. 13% Gravel, 27% Sand, 18% Silt, 42% Clay
					5913	4				
										Core retained in VOA sleeve
	BH00124EBU1								CL	Same as above.
										VOA sample obtained from this interval
				0.75 /2.00	5912	5				No recovery for this interval
					5911	6			CL	Clay with some Sand and Gravel: Olive brown (2.5Y 4/3) to light olive brown (2.5Y 5/3). Dominantly clay (90%) matrix contains well graded gravel and sand. Gravel mean size = 5/8", max. size = 1" diameter, subrounded to subangular, composed of quartzite, granite, micaceous schist, quartz, feldspar. Sand is fine to coarse, mean size=med. to coarse, subangular to subrounded, dom. quartz and rock fragments. 8% Gravel, 15% Sand, 8% Silt, 69% Clay
										No recovery for this interval
				1.60 /2.00	5910	7				Core retained in VOA sleeve
					5909	8			GC	Sandy Clayey Gravel: Dark brown (10YR 3/3). Well graded gravel and sand in silt (40%) and clay (60%) matrix (low plasticity). Sand is fine to coarse (mean=coarse), subangular to angular, composed of quartz, feldspar, rock fragments of quartzite, granite, schist. Gravel also composed of quartz, rock fragments (metamorphic and igneous), pred. coarse, up to 3" diameter (freshly broken). Dry. 35% Gravel, 30% Sand, 14% Silt, 21% Clay
	BH00128EBU1			1.95 /2.00	5908	9			CL	Clay with some Sand and Gravel: Olive brown (2.5Y 4/3) to very dark grayish brown (2.5Y 3/2). Color becomes less olive brown (2.5Y 4/3) and more light olive brown (2.5Y 5/4) with depth. Clay and silt matrix; silt content varies from 10% to 40% of fines; low plasticity. Silt fraction = 40% between 10'-10.5'. Well graded gravel and sand, subrounded to angular. Gravel mean size = 1", max. size = 2 1/4 in.
	BH00126EBU1				5907	10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 21.6	GROUND ELEVATION (FT):	5916.91	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747661	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	DAB/KJT	31891
EAST:	2084142	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN):	11.5	DATE DRILLED:	08/30/91	
REMARKS:							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%	0.75 /2.00	5911	5			CL	Clay with some Sand and Gravel: Olive brown (2.5Y 4/3) to light olive brown (2.5Y 5/3). Dominantly clay (90%) matrix contains well graded gravel and sand. Gravel mean size = 5/8", max. size = 1" diameter, subrounded to subangular, composed of quartzite, granite, micaceous schist, quartz, feldspar. Sand is fine to coarse, mean size=med. to coarse, subangular to subrounded, dom. quartz and rock fragments. 8% Gravel, 15% Sand, 8% Silt, 69% Clay.
						6				No recovery for this interval.
				1.60 /2.00	5910	7				Core retained in VOA sleeve.
					5909	8			GC	Sandy Clayey Gravel: Dark brown (10YR 3/3). Well graded gravel and sand in silt (40%) and clay (60%) matrix (low plasticity). Sand is fine to coarse (mean=coarse), subangular to angular, composed of quartz, feldspar, rock fragments of quartzite, granite, schist. Gravel also composed of quartz, rock fragments (metamorphic and igneous), pred. coarse, up to 3" diameter (freshly broken). Dry. 35% Gravel, 30% Sand, 14% Silt, 21% Clay.
	BH00128EBU1			1.95 /2.00	5908	9			CL	Clay with some Sand and Gravel: Olive brown (2.5Y 4/3) to very dark grayish brown (2.5Y 3/2). Color becomes less olive brown (2.5Y 4/3) and more light olive brown (2.5Y 5/4) with depth. Clay and silt matrix; silt content varies from 10% to 40% of fines; low plasticity. Silt fraction = 40% between 10'-10.5'. Well graded gravel and sand, subrounded to angular. Gravel mean size = 1", max. size = 2 1/4 in. diameter. Composed of rock fragments: granite, micaceous schist, quartzite, igneous quartz, feldspar. Sand is very fine to coarse, mean=fine, composed of quartz, rock fragments, feldspar, micas including biotite, other mafic minerals, Fe-oxide nodule fragments. Caliche coats largest gravels. Carbonate cement locally present. Color becomes less olive brown (2.5Y 4/3) and more light olive brown (2.5Y 5/4) with depth. Dry. 8% Gravel, 12% Sand, 8-32% Silt.
	BH00129EBU1				5907	10				
				2.10 /2.00	5906	11				
					5905	12				No recovery for this interval.
										VOA sample obtained from this interval.
									CL	Same as above. (cont. from above) 48-72% Clay.
				2.00 /2.00	5904	13				VOA sample obtained from this interval.
									CL	Same as above.
	BH00127EBU1				5903	14				
	BH00131EBU1			2.00 /2.00	5902	15	08/29/91			

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 21.6	GROUND ELEVATION (FT): 5916.91	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH: 747661	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: DAB/KJT	31891
EAST: 2084142	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN): 11.5	DATE DRILLED: 08/30/91	
REMARKS:				

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2.10 /2.00	5906	11				
					5905	12				VOA sample obtained from this interval
									CL	Same as above. (cont. from above) 48-72% Clay
				2.00 /2.00	5904	13				VOA sample obtained from this interval
									CL	Same as above.
									CL	Core retained in VOA sleeve.
									CL	Same as above.
	BH0127EBU1				5903	14			CL	Sandy Clay with trace Gravel: Olive yellow (2.5Y 6/6) to light gray (5Y 7/1). Very fine to fine, subangular, pred. quartz sand in clay (80%) and silt (20%) matrix. Isolated med. to coarse sand and fine gravels also present, most often composed of rock fragments. Some caliche filling thin subhoriz. patches. Looks like strongly weathered bedrock containing some component of alluvial sand and gravel. Dry. 40% Sand, 12% Silt, 48%
	BH0131EBU1			2.00 /2.00	5902	15	08/29/91		CLAYEY SANDSTONE	Clayey Sandstone: Olive yellow (2.5Y 6/6) to light gray (5Y 7/1). Very fine to f.g. sand, subangular, well sorted. Porosity = 8%, trace carbonate cement, highly friable. Sand composed dom. of quartz with some rock fragments, mafic (heavy?) minerals and trace feldspar. Interval fines upwards from clayey sandstone at base to sandy claystone at top. Dry. 60% Sand, 40% Clay. Top of bedrock = 17.2 ft
					5901	16				
				2.00 /2.00	5900	17				VOA sample obtained from this interval
									CLAYEY SANDSTONE	Clayey Sandstone: Light yellowish brown (2.5Y 6/4). Very fine to med., subangular, poorly sorted sand composed dom. of quartz (80%), rock fragments (<10%), feldspar (<5%), mafic minerals (5-10%). Wet. 65% Sand, 35% Clay
	BH0129EBU1				5899	18			CLAYSTONE	Claystone: Gray (10YR 5/1) to light yellowish brown (2.5Y 6/4). Mottled colors due to Fe-oxide staining. Claystone contains variable amounts of silt from 0% to approx. 15%. No regular fining or coarsening sequenceis present, however. Porosity is variable, from 0% - 10% (highest in thin silty areas). Slightly to highly friable. Very thin bed of clayey sand (same as described for 18'-18.6') present at 20.1'. Total thickness preserved in core is less than 1". Trace of caliche present. Wet. 0-15% Silt, 85-100% Clay
				2.00 /2.00	5898	19				
	BH0132EBU1									
	BH0130EBU1				5897	20				VOA sample obtained from this interval

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 21.6	GROUND ELEVATION (FT):	5916.91	PROJECT NUMBER:	EMAD
NORTH: 747661	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	DAB/KJT
EAST: 2089142	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN):	11.5	DATE DRILLED:	08/30/91
REMARKS:					

LOG OF BORING NUMBER: 31891

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00131EBU1	0% 50%	100% 0% 100%	2.00 /2.00	5901	15				rock containing some component of alluvial sand and gravel. Dry. 40% Sand, 12% Silt, 48%
						16			CLAYEY SANDSTONE	Clayey Sandstone: Olive yellow (2.5Y 6/6) to light gray (5Y 7/1). Very fine to f.g. sand, subangular, well sorted. Porosity = 8%, trace carbonate cement, highly friable. Sand composed dom. of quartz with some rock fragments, mafic (heavy?) minerals and trace feldspar. Interval fines upwards from clayey sandstone at base to sandy claystone at top. Dry. 60% Sand, 40% Clay. Top of bedrock = 17.2 ft.
				2.00 /2.00	5900	17				VOA sample obtained from this interval.
									CLAYEY SANDSTONE	Clayey Sandstone: Light yellowish brown (2.5Y 6/4). Very fine to med., subangular, poorly sorted sand composed dom. of quartz (80%), rock fragments (<10%), feldspar (<5%), mafic minerals (5-10%). Wet. 65% Sand, 35% Clay.
	BH00129EBU1				5899	18			CLAYSTONE	Claystone: Gray (10YR 5/1) to light yellowish brown (2.5Y 6/4). Mottled colors due to Fe-oxide staining. Claystone contains variable amounts of silt from 0% to approx. 15%. No regular fining or coarsening sequences present, however. Porosity is variable, from 0% - 10% (highest in thin silty areas). Slightly to highly friable. Very thin bed of clayey sand (same as described for 18'-18.6') present at 20.1'. Total thickness preserved in core is less than 1". Trace of caliche present. Wet. 0-15% Silt, 85-100% Clay.
				2.00 /2.00	5898	19				
	BH00132EBU1									
	BH00130EBU1				5897	20				VOA sample obtained from this interval.
									CLAYSTONE	Same as above.
				0.70 /1.00	5896	21				No recovery for this interval.
				0.00 /0.60						No recovery for this interval.
					5895	22				Total Depth = 21.6 ft
					5894	23				
					5893	24				
					5892	25				

STATE PLANE COORDINATES	TOTAL DEPTH (FT): 21.6	GROUND ELEVATION (FT):	5916.91	PROJECT NUMBER:	EMAD
NORTH: [redacted]	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	DAB/KJT
EAST: [redacted]	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN):	11.5	DATE DRILLED:	08/30/91

LOG OF BORING NUMBER: 31891

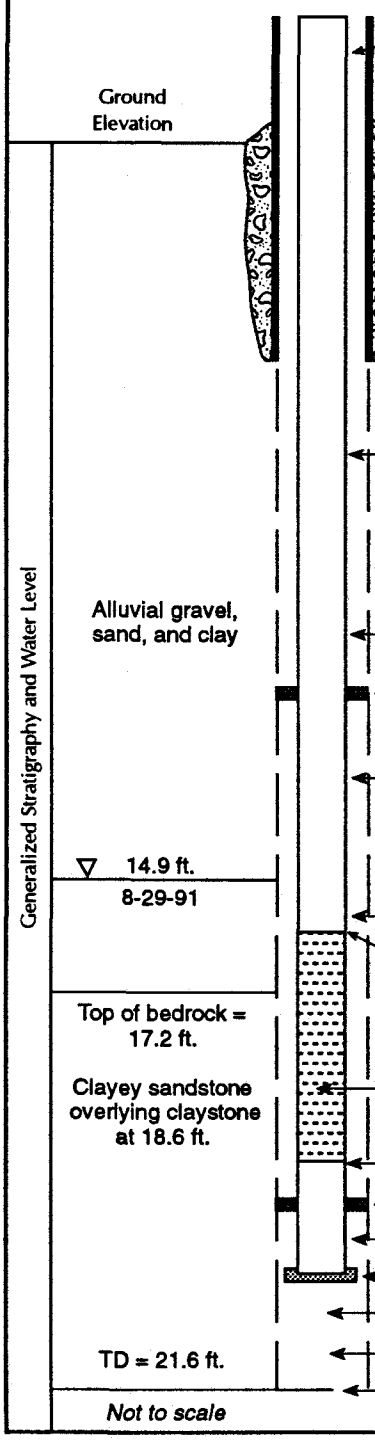
REMARKS:

CHEMICAL SAMPLE DEPTH	GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% – 50%)	RECOVERY	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						20			CLAYSTONE	Same as above.
					5896					No recovery for this interval.
						21				No recovery for this interval.
					5895					Total Depth = 21.6 ft.
						22				
					5894					
						23				
					5893					
						24				
					5892					
						25				
					5891					
						26				
					5890					
						27				
					5889					
						28				
					5888					
						29				
					5887					
						30				

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	747661.1305 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084142.4159 ft.	Well No.	31891
Date Completed	8-30-91	Original Depth	21.6 ft.	Aquifer	Alluvial
Inspected by	J. Uhlinger	Date	8-30-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 21.6 ft.



Elevation of top of surface casing/riser pipe	5919.81 ft./5919.52 ft.
Height of top of surface casing/riser pipe above ground surface	2.9 ft./2.61 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.1 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	21.6 ft.
Type of backfill	Grout
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	11.45 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	14.6 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	14.6 ft.
Elevation/depth top of screened section	16.59 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	18.59 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.41 ft.
Elevation/depth bottom of plugged blank section	21.0 ft.
Elevation/depth bottom of sand column	21.0 ft.
Type of backfill below observation pipe	Natural
Elevation/depth of hole	21.6 ft.

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INDEX OF DATA

Borehole Location Number:	**31991**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 18 6	GROUND ELEVATION (FT) 5993 91	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	749181	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	31991
EAST	2083666	LOCATOR NUMBER K8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/28/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERED	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00136EBU1	0% 50% 100%	0% 100%			0			ML	Sandy Gravelly Silt Very dark grayish brown (10YR 3/2) to olive yellow (2 5Y 6 4) Well graded gravel and sand in pred silt matrix Gravel mean size=1" diameter, max size = 1 1/2" diameter, angular to subangular, composed of quartzite, granite, schist, feldspar, quartz, trace Fe-oxide fragments Sand is very fine to coarse, angular to sub-angular, composed of quartz, feldspar, rock fragments, trace micas (weathered), mafic minerals 10% gravel, 35% Sand, 49% Silt, 6% Clay
				2 00 /2 00	5993	1				
	BH00137EBU1				5992	2				VOA sample obtained from this interval
									ML	Same as above
	BH00138EBU1			2 00 /2 00	5991	3				
					5990	4			GM	Sandy Silty Gravel Very dark grayish brown (2 5Y 3/2) Well graded gravel and sand in silt and clay matrix of low plasticity Gravel mean size=3/4", max size = 1 1/2" diameter, subangular to angular, composed of rock fragments quartzite, granite, schist, quartz, feldspar Sand is very fine to coarse, mean is fine and coarse (bimodal distribution) Sand is angular to subrounded, coarse composed of rock fragments (as described for gravel) and quartz, feldspar, fine sand is quartz, feldspar micas, mafic minerals Caliche abundant below 4' to 4 5' 37% Gravel, 30% Sand, 23% Silt, 10% Clay
				2 00 /2 00	5989	5				
	BH00139EBU1				5988	6				VOA sample obtained from this interval
									GM	Same as above
				1 90 /2 00	5987	7			SM	Gravelly Silty Sand Olive brown (2 5Y 4/4) to yellowish brown (10YR 5/6) Well graded gravel and sand supported by silt, clay, and sand matrix Gravel mean size=1/4", max diameter = 1 1/2", angular to subangular, composed of quartzite, granite, quartz -- gravel often coated with caliche Sand is very fine to coarse, subangular to angular, mean size=fine, composed of quartz and rock fragments with some feldspar, biotite, mafic minerals including green hornblende 29% Gravel, 32% Sand, 27% Silt, 12% Clay
					5986	8				No recovery for this interval
	BH00140EBU1			2 00 /2 00	5985	9			SM	Same as above
	BH00141EBU1				5984	10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 18 6	GROUND ELEVATION (FT) 5993 91	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748181	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	31991
EAST	2083666	LOCATOR NUMBER K8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/28/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% – 50% – 100%)	PERCENT RECOVERY (0% – 100%)	RECOVERY / INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				1 50 /2 00	5983	10–11			GW	Well graded Gravel Strong brown (7 5YR 5/6) Gravel mean size=1 1/2", max size = broken cobble >3", angular to sub-rounded, composed of quartzite, granite, gneiss Sand is very fine to coarse, mean size=coarse, angular to sub-angular, composed of quartz, quartzite, other rock fragments (granite, gneiss, schist), feldspar, mafic minerals, trace biotite 38% Gravel, 49% Sand, 7% Silt, 4% Clay
					5982	11–12				No recovery for this interval
				1 40 /2 00	5981	12–13			GW	Same as above
	BH00142EB01				5980	13–14				VOA sample obtained from this interval
									GW	Same as above
										No Recovery? Mixed in spoon Gravel driven down into claystone (see below)
	BH00143EB01			2 00 /2 00	5979	14–15			CLAYSTONE	Claystone Yellowish brown (10YR 5/8) to light brownish gray (2 5Y 6/2) Claystone with trace of silt Very low (<2%) porosity No cement Slightly to mod friable No bedding apparent Variably weathered Fe-oxide stained Yellowish brown and mod friable where weathered Trace of carbonaceous material present throughout interval 5% Silt, 95% Clay
					5978	15–16				Top of bedrock = 14 8 ft
										Core retained in VOA sleeve
				2 00 /2 00	5977	16–17			CLAYSTONE	Same as above
	BH00144EB01				5976	17–18				VOA sample obtained from this interval
				0 00 /0 60						No recovery for this interval
					5975	18–19				Total Depth = 18 6 ft
					5974	19–20				

INDEX OF DATA

Borehole Location Number:	**32091**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 20 7	GROUND ELEVATION (FT) 5967 14	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	749141	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	32091
EAST	2084048	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/29/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH / SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT) / DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH00200EBU1 0%	50%	100% 0% 100%						
BH00201EBU1			2 00 /2.00	5967 0 5966 1			CH	Silty Clay with trace Sand Yellowish brown (10YR 5/4) Medium to high plasticity clay and silt with trace very fine sand Sand is subangular, composed pred. of quartz, biotite, weathered micas, feldspar, mafic minerals No bedding apparent Dry 5% Sand, 33% Silt, 62% Clay
BH00203EBU1				2				VOA sample obtained from this interval
				5965			CH	Same as above
BH00202EBU1			2.00 /2.00	5964 3				
				5963 4				
			2.00 /2.00	5962 5			SC	Gravelly Clayey Sand Strong brown (7 5YR 4/6) Clay and silt matrix (cl) supports well graded gravel and sand Gravel mean size = 1/2" diameter, max size = 2 1/2" diameter, subangular to subrounded, composed of quartzite, granite, quartz, feldspar, metamorphic schist/gneiss Sand is very fine to coarse, subangular to subrounded, composed of quartz, rock fragments (including quartzite and granite), feldspar, mafic minerals, trace biotite, other micas (weathered?) Moist below approx 9' 32% Gravel, 39% Sand, 10% Silt, 19% Clay
BH00204EBU1				5961 6				
			2 00 /2.00	5960 7				VOA sample obtained from this interval
							SC	Same as above
								Core retained in VOA sleeve
				5959 8			SC	Same as above
BH00205EBU1 BH00206EBU1			2 00 /2.00	5958 9				
BH00206EBU1				10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 20 7	GROUND ELEVATION (FT) 5967 14	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748141	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	32091
EAST	2084048	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/29/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%			10			SC	Same as above
				2.00 /2.00	5956	11			GW	Well graded Gravel Reddish yellow (5YR 6/6) Low plasticity (cl) silty clay matrix supports well graded gravel and sand Gravel ranges up to >3" diameter, mean > 1" diameter, subangular to angular, composed of quartzite, granite, metamorphic schist and gneiss, feldspar, quartz Sand is well graded, very fine to coarse, mean = coarse to med , composed of quartz, quartzite fragments, rock fragments, with some feldspar, mafic minerals, mica Dry 45% Gravel, 45% Sand, 10% Fines
					5955	12				
				1 80 /2.00	5954	13				Core retained in VOA sleeve
									GW	Same as above
										No recovery for this interval
	BH00207EBU1									VOA sample obtained from this interval
					5953	14			GW	Same as above
	BH00211EBU1			2.00 /2.00	5952	15				
										Core retained in VOA sleeve
					5951	16			GW	Same as above
				2.00 /2.00	5950	17			CLAYSTONE	Claystone Pale olive (5Y 6/2) to olive yellow (5Y 6/4) Massive claystone contains trace of very fine sand Not friable However, mod friable and approx 5% porosity where weathered between 17 4' and 18' Dry 2% Sand, 5% Silt, 93% Clay Top of bedrock = 16 1 ft
	BH00209EBU1									VOA sample obtained from this interval
					5949	18			CLAYSTONE	Same as above
	BH00212EBU1			2.00 /2.00	5948	19				
						20				Core retained in VOA sleeve

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 20.7	GROUND ELEVATION (FT): 5967.14	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	748141	AREA OU1	CASING DIAMETER (IN):	GEOLOGIST: DAB/KJT	32091
EAST:	2084048	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 08/29/91	

REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				0.00 /0.70	5947	20				No recovery for this interval.
					5946	21				Total Depth = 20.7 ft.
					5945	22				
					5944	23				
					5943	24				
					5942	25				
					5941	26				
					5940	27				
					5939	28				
					5938	29				
						30				

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Borehole Location Number:	**32191**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

- ☑ Geologic Borehole Log (LOGGER Format)
- __ Geophysical Log
- __ Well Construction Summary

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 18.6	GROUND ELEVATION (FT): 5965.04	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	748108	AREA: OU1	CASING DIAMETER (IN):	GEOLOGIST: DAB/KJT	32191
EAST:	2084149	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 08/30/91	
REMARKS:					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERED	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00214EBU1	0% 50% 100%	0% 100%		5965	0			SM:	Gravelly Silty Sand: Olive brown (2.5Y 4/3). Well graded gravel and sand. Gravel mean size=3/4" to 1" diameter, subrounded to subangular, composed of quartzite, granite, schist fragments. Sand is coarse to very fine, mean size = med. to fine, subangular, also composed pred. of rock fragments.
	BH00215EBU1			1.90 /2.00	5964	1			CL	Clay with some Sand and trace Gravel: Light olive brown (2.5Y 5/6) to olive gray (5Y 5/2). Clay matrix supports med. to coarse, subangular sand and trace fine gravel. Sand composed of rock fragments, quartz, feldspar, biotite, mafic minerals (green hornblende). Abundant caliche 1.5'- 2.5' 2% Gravel, 8% Sand, 9% Silt, 81% Clay.
	BH00217EBU1				5963	2				No recovery for this interval.
										VOA sample obtained from this interval.
	BH00219EBU1			1.80 /2.00	5962	3			CL:	Same as above.
									OL:	Organic Clay with some Sand: Yellowish brown (10YR 5/6) to dark yellowish brown (10YR 3/2). Organic-rich silty clay (70% Clay, 30% Silt) matrix (OL) with some sand and trace gravel. Gravel is fine (<1/2" diameter). Sand is very fine to coarse, well graded, subangular, composed of rock fragments, quartz, feldspar, biotite, mafic minerals, Fe-oxide cemented sand. Abundant plant material at top of interval. Dry. 3% Gravel, 12% Sand, 26% Silt, 59% Clay.
					5961	4				No recovery for this interval.
				2.30 /2.00	5960	5			CL:	Sandy Clay: Very dark grayish brown (10YR 3/2) to yellowish brown (10YR 5/4). Color change from very dark grayish brown to yellowish brown occurs gradually with increasing depth. Clay (80%) and silt (20%) matrix (CL) with variable proportions of sand (2% to 25%) and gravel (0% to 5%). Gravel occurs as isolated pebbles. Sand is very fine to med. grained, mean = fine, with trace coarse sand. Sand composed of quartz, feldspar, weathered micas, mafic mineral grains. Some plant roots in upper 1'. Dry, moist below 10". 2% Gravel, 18% Sand, 16% Silt, 64% Clay.
	BH00218EBU1				5959	6				
				2.10 /2.00	5958	7				VOA sample obtained from this interval.
									CL:	Same as above.
					5957	8				
	BH00216EBU1			2.00 /2.00	5956	9				
	BH00221EBU1									
	BH00220EBU1					10				VOA sample obtained from this interval.

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 18 6	GROUND ELEVATION (FT) 5965 04	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748108	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	32191
EAST	2084149	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 08/30/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY / INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
					5955	10			CL	Same as above
				1 50 /2 00	5954	11				
										Core retained in VOA sleeve
										No recovery for this interval
					5953	12			SW	Gravelly Sand Strong brown (7 5YR 5/6) to yellowish brown (10YR 5/4) Sandy clay matrix contains well graded sand and gravel Gravel, mean= 3/4", subangular to subrounded, composed of quartzite, granite, feldspar Sand very fine to coarse (mean=med), subangular to subrounded, composed of quartz, feldspar, quartzite, granite, mafic minerals, biotite (unweathered) Slightly moist 40% Gravel, 55% Sand, 2% Silt, 3% Clay
				2 00 /2 00	5952	13				
	BH00222EBU1									VOA sample obtained from this interval
					5951	14			SW	Same as above
									CL	Clay with some Gravel Light olive brown (2 5Y 5/6) clay matrix supporting fine gravel (mean=1/2") and coarse to med sand Gravel is subangular to rounded, composed of quartzite, granite, feldspar, quartz, other rocks 5% gravel, 5% Sand, 90% Fines
	BH00224EBU1			2 00 /2 00	5950	15				
									CLAYSTONE	Claystone Light olive brown (2 5Y 5/6), grayish brown (2 5Y 5/2), and black (N2/0) clay with some sand Sandy claystone bed (1"-2" thick) at 15 5' Sand is very fine grained No cement Not friable No bedding apparent except for horiz sandy claystone bed within massive claystone Organic material (black, carbonaceous) present but discontinuous Dry 4% Sand, 96% Fines (> 90% Clay) Top of bedrock = 15 0 ft
	BH00223EBU1				5949	16				
				2.10 /2.00	5948	17				
										VOA sample obtained from this interval
									CLAYSTONE	Same as above
					5947	18				
				0 00 /0 60						Core retained in VOA sleeve
										No recovery for this interval
					5946	19				
						20				Total Depth = 18 6 ft

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Borehole Location Number:	**32291**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 8.0	GROUND ELEVATION (FT): 5887.99	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:	
NORTH: 747252	AREA: OU1	CASING DIAMETER (IN):	GEOLOGIST: JFU/KJT	32291	
EAST: 2083795	LOCATOR NUMBER: K7	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 09/03/91		
REMARKS:					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00167EBU1	0% 50% 100%	0% 100%	1.00 /2.00	5887	0			SC:	Clayey Gravelly Sand: Very dark grayish brown (2.5Y 3/2). Clay and silt matrix (cl) supports well graded gravel and sand. Gravel is fine to coarse, mean size = 1/2", max. size = 1 1/2" diameter, subrounded to angular, composed of quartzite, granite, mafic schist, feldspar and quartz. Sand is fine to coarse, mean = med., subangular, composed of quartz, granite and quartzite, feldspar, some biotite. Dry. 25% Gravel, 35% Sand, 8% Silt, 32% Clay.
					5886	1				No recovery for this interval.
						2			SC:	Same as above.
										No recovery for this interval.
	BH00166EBU1			0.30 /2.00	5885	3				
					5884	4			SC:	Same as above.
									CLAYSTONE	Claystone: Dark gray (5Y 4/1) to light olive brown (2.5Y 5/6). Porosity <5%. No cement. Moderately friable. Contains trace of caliche. No bedding apparent. Weathered. Dry, slightly moist below 6'. 2% Silt, 98% Clay. Top of bedrock = 4.1 ft.
				1.75 /2.00	5883	5				
	BH00165EBU1				5882	6				VOA sample obtained from this interval.
									CL	Same as above.
	BH00168EBU1			1.75 /2.00	5881	7				
					5880	8				No recovery for this interval.
										Total Depth = 8.0 ft.
					5879	9				
					5878	10				

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Borehole Location Number:	**32391**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 12 9	GROUND ELEVATION (FT) 5997 96	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748247	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	32391
EAST	2083678	LOCATOR NUMBER K8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/03/91	
REMARKS					

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00225EBU1	0% 50% 100%	0% 100%			0			SM	Gravelly Sand with some Silt Olive brown (2 5Y 4/4) Gravel is well graded, mean size = 1" diameter, up to 2" diameter, angular to subangular, composed of granite, micaceous schist, gneiss, quartzite Sand is very fine to coarse, angular to subangular, composed of quartz, feldspar, rock fragments (granite, quartzite, schist, gneiss) 40% Gravel, 40% Sand, 16% Silt, 4% Clay
	BH00226EBU1			2 00 /2 00	5997	1				
	BH00227EBU1				5996	2				VOA sample obtained from this interval
									SM	Same as above
	BH00229EBU1			0 60 /2 00	5995	3				No recovery for this interval
					5994	4			SM	Same as above
				2 00 /2 00	5993	5			CLAYSTONE	Claystone Light olive brown (2 5Y 5/6) to light olive gray (5Y 6/2) Light olive brown where weathered (Fe-oxides) Clay with trace silt Porosity <5% No cement Moderately to slightly friable Some caliche replacing claystone throughout interval -- fills discontinuous patches No bedding apparent Variably Fe-oxide stained 5% Silt, 95% Clay Top of bedrock = 4 25 ft
	BH00228EBU1				5992	6				VOA sample obtained from this interval
				1 80 /2 00	5991	7			CLAYSTONE	Same as above
										Core retained in VOA sleeve
					5990	8				No recovery for this interval
									CLAYSTONE	Same as above
	BH00231EBU1			2 00 /2 00	5989	9				
	BH00232EBU1									
	BH00230EBU1				5988	10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 12.9	GROUND ELEVATION (FT): 5997.96	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	749247	AREA: OU1	CASING DIAMETER (IN):	GEOLOGIST: DAB/KJT	32391
EAST:	2083678	LOCATOR NUMBER: K8	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 09/03/91	

REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2.00 /2.00	5987	10			CLAYSTONE	Same as above.
					5986	11				
				0.00 /0.90	5985	12				No recovery for this interval.
					5984	13				Total Depth = 12.90 ft.
					5983	14				
					5982	15				
					5981	16				
					5980	17				
					5979	18				
					5978	19				
						20				

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Borehole Location Number:	**32491**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 10 9	GROUND ELEVATION (FT)	5968 19	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748053	AREA 001	CASING DIAMETER (IN)		GEOLOGIST	DAB/KJT	32491
EAST	2083800	LOCATOR NUMBER K8	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	09/04/91	

REMARKS

CHEMICAL GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	ELEVATION (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00236BU1	0% 50% 100%	3% 100%	0 80 /2 00	5968 5967	0 1			SM	Silty Gravelly Sand Dark yellowish brown (10YR 4/4) Well graded sand and gravel with matrix of silt (80%) and clay (20%) Sand very fine to coarse, mean = coarse to med, angular to subrounded, composed of quartz, rock fragments, feldspar, pyroxene/hornblende, some biotite (weathered) Gravel mean size = 3/4", max diameter = 1", angular to sub-angular, composed of granite and quartzite Dry 20% gravel, 53% Sand, 22% Silt, 5% Clay
										No recovery for this interval
					5966	2			SM	Same as above
	BH00238BU1			1 80 /2 00	5965	3			CL	Sandy Clay Very dark grayish brown (2 5Y 6/2) to light brownish gray (2 5Y 6/2) Clay matrix (med to low plasticity, all contains well graded sand Sand is very fine to coarse, subangular, composed of quartz, quartzite, feldspar, granite fragments Gravel is sparse, isolated pebbles, up to 2" diameter, subangular, composed of quartzite, granite Dry 2% Gravel, 18% Sand, 80% Fines
										Core retained in VOA sleeve
					5964	4				No recovery for this interval
	BH00239BU1			2 00 /2 00	5963	5			CL	Clay with some Sand and trace Gravel Light olive brown (2 5Y 5/3) Clay matrix (CL) supports very fine to med sand and fine gravel (max size = 3/4" diameter) Sand and gravel are subangular to subrounded, and are composed of quartzite, quartz, other rock fragments Dry 3% Gravel, 12% Sand, 85% Clay
	BH00240BU1									VOA sample obtained from this interval
					5962	6			CLAYSTONE	Claystone with some Sand Light brownish gray (2 5Y 6/2) to yellowish brown (10YR 5/8) Color changes due to mottled, Fe-oxide staining Sand is very f g, subangular, well sorted, composed pred of quartz, with some mafic (dark black) minerals Trace carbonaceous fragments Appears massive Trace of caliche present in upper 0 5' (6'-6'5') Dry 8% Sand, 9% Silt, 83% Clay Top of bedrock = 6 0 ft
				2 00 /2 00	5961	7				
	BH00242BU1									Core retained in VOA sleeve
					5960	8			CLAYSTONE	Same as above
				2 00 /2 00	5959	9				
	BH00241BU1					10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 10 9	GROUND ELEVATION (FT) 5968 19	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748053	AREA OU1 .	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	32491
EAST	2083800	LOCATOR NUMBER K8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/04/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE 0% 50% 100%	PERCENT RECOVERY 0% 100%	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				0 00 /0 90	5958	10				No recovery for this interval
					5957	11				Total Depth = 10 9 ft
					5956	12				
					5955	13				
					5954	14				
					5953	15				
					5952	16				
					5951	17				
					5950	18				
					5949	19				
						20				

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Borehole Location Number:	N/A
Monitoring Well Location Number:	**32591**
Piezometer Location Number:	N/A

Data Available:

- ✔ Geologic Borehole Log (LOGGER Format)
- __ Geophysical Log
- ✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 19 1	GROUND ELEVATION (FT)	5914 86	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747976	AREA 001	CASING DIAMETER (IN)	2 07	GEOLOGIST	JFD/KJT	32591
EAST	2084852	LOCATOR NUMBER 17	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	09/05/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00170EB01	50%	100%	1 00 /2 00	5914	1			SM	Silty Sand Very dark grayish brown (10YR 3/2) Well graded sand and gravel with silt (80%) and clay (20%) matrix (mh -- high plasticity) Sand is very fine to coarse, mean = fine, angular to subangular, composed of quartz, trace feldspar, trace of rock fragments, trace biotite (weathered) Gravel is fine to coarse, mean size < 1/4", subangular to angular, composed of schist, quartzite, quartz 8% Gravel, 54% Sand, 30% Silt, 8% Clay
					5913	2				No recovery for this interval
	BH00172EB01			2 00 /2 00	5912	3			MH	Sandy Silt Very dark grayish brown (10YR 3/2) Well-graded sand and gravel in high plasticity silt/clay matrix Sand is angular to subangular, mean size=fine to med , composed of quartz, quartzite, feldspar, granite, mafic schist Gravel fine to coarse, mean size = 1/2" diameter, max size=2" oblong diameter, composed of quartzite, quartz, granite, schist 10% Gravel, 20% Sand, 52% Silt, 18% Clay
					5911	4			SM	Silty Gravelly Sand Dark yellowish brown (10YR 3/4) Well graded sand and gravel Sand is pred v fine to fine grained, subangular, composed of quartz, feldspar, biotite, weathered micas, mafic minerals Gravel is fine to coarse, pred fine (diameter < 1/2"), max size = 1 1/2" diameter, angular to subangular, composed of quartzite, granite, quartz Some granite cobbles strongly weathered, crumbling and broken 18% Gravel, 52% Sand, 23% Silt, 7% Clay
				0 50 /2 00	5910	5				No recovery for this interval
					5909	6			SM	Same as above
				0 65 /2 00	5908	7				No recovery for this interval
					5907	8			SM	Same as above
	BH00174EB01			0 35 /2 00	5906	9				No recovery for this interval
					5905	10				

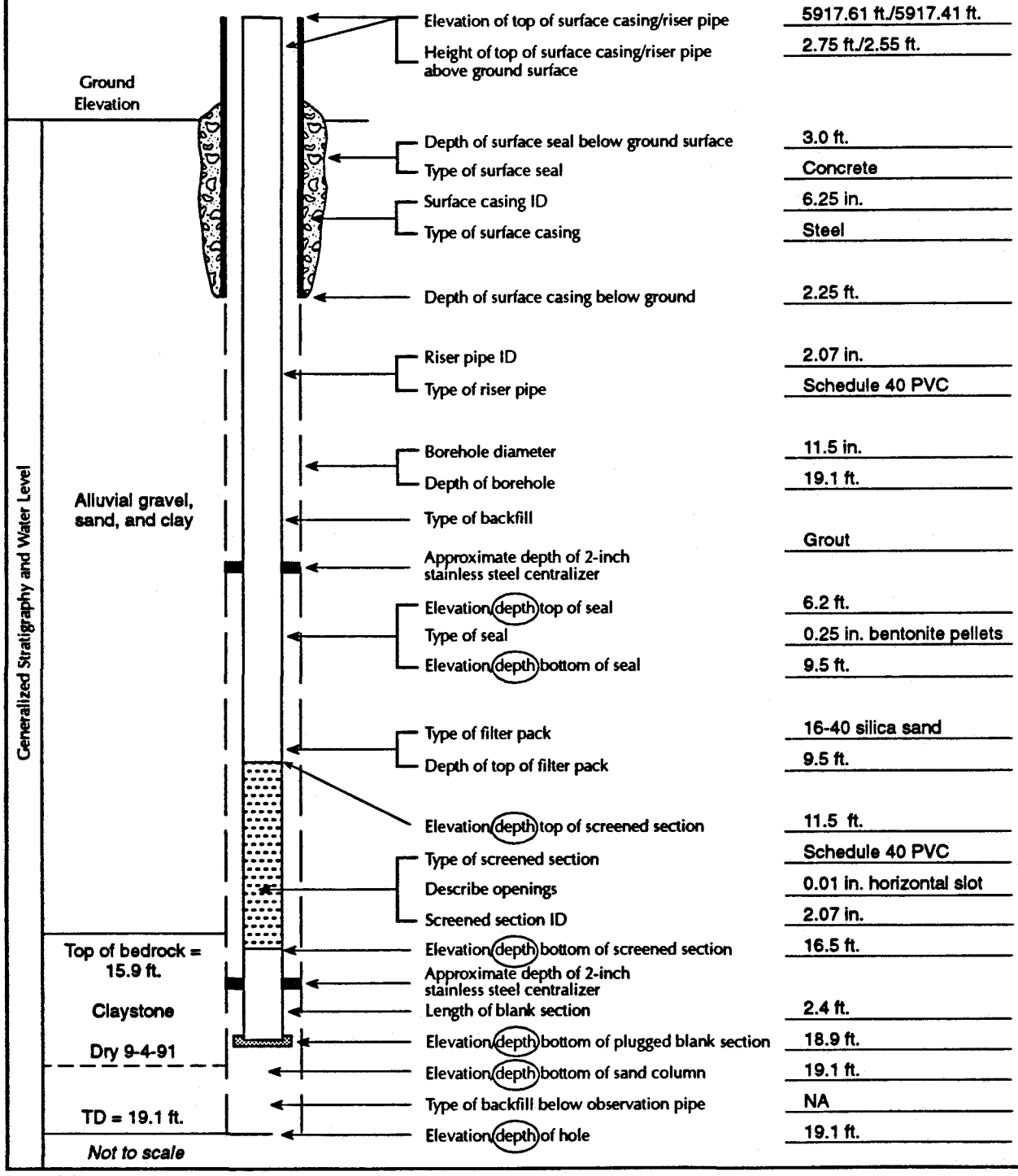
STATE PLANE COORDINATE		TOTAL DEPTH (FT) 19 1	GROUND ELEVATION (FT)	5914 86	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747976	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	JFU/KJT	32591
EAST	2084852	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	09/05/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						10				No recovery for this interval
				0 00 /2 00	5904	11				
					5903	12			CL	Sandy Silty Clay Dark yellowish brown (10YR 4/4) Sand is very fine to med grained, mean is f g, subangular, composed of quartz, feldspar, biotite, weathered micas, trace green hornblende(?) and other mafic minerals Trace gravel, 20% Sand, 32% Silt, 48% Clay
				2 00 /2 00	5902	13				
					5901	14			SM	Silty Gravelly Sand Dark yellowish brown (10YR 4/4) Well graded sand with some gravel in silt/clay (ml) matrix Sand is very fine to coarse, mean=coarse, angular to subrounded, composed of rock fragment (quartzite, granite, mica schist, mafic schist), quartz, feldspar, micas including biotite, mafic minerals Gravel is fine to coarse, mean size = 5/8", up to 2" diameter, angular to subangular, composed of rock fragments (quartzite, schist, granite), plus some quartz and feldspar Gravel fraction increases with depth especially below 15 2' Caliche coats gravel and sand below 15'2' 13% Gravel, 41% Sand, 32% Silt, 14% Clay
B4001756U1				0 40 /2 00	5900	15				
B4001746U1					5899	16				No recovery for this interval
				1 00 /0 90	5898	17			CLAYSTONE	Claystone with some Silt Light brownish gray (2 5Y 6/2) to dark grayish brown (2 5Y 4/2) Porosity varies 3%-8%, more porous between 15 9' - 17 9' Weathered above 17 9', unweathered below (17 9'-18 9') Mottled appearance from Fe-oxide stains above 18' No bedding apparent 10% Silt, 90% Clay Top of bedrock = 15 9 ft
										VOA sample obtained from this interval
B4001766U1				2 00 /2 00	5897	18			CLAYSTONE	Same as above
				0 00 /0 20	5896	19				No recovery for this interval
					5895	20				Total Depth = 19 1 ft

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	747976.3544 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084852.3592 ft.	Well No.	32591
Date Completed	9-5-91	Original Depth	19.1 ft.	Aquifer	Alluvial
Inspected by	J. Uhlinger	Date	9-5-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 19.1 ft.



Elevation of top of surface casing/riser pipe	5917.61 ft./5917.41 ft.
Height of top of surface casing/riser pipe above ground surface	2.75 ft./2.55 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.25 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	19.1 ft.
Type of backfill	Grout
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	6.2 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	9.5 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	9.5 ft.
Elevation/depth top of screened section	11.5 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	16.5 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.4 ft.
Elevation/depth bottom of plugged blank section	18.9 ft.
Elevation/depth bottom of sand column	19.1 ft.
Type of backfill below observation pipe	NA
Elevation/depth of hole	19.1 ft.

Rev. 10/5/92

INDEX OF DATA

Borehole Location Number:	**32691**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

- ✔ Geologic Borehole Log (LOGGER Format)
- __ Geophysical Log
- __ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 8 6	GROUND ELEVATION (FT)	5962 42	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748456	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	DAB/KJT	32691
EAST	2085466	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	09/05/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH0246EBU1				5962	0			ML	Sandy Gravelly Silt Very dark grayish brown (10YR 3/2) Low plasticity silt and clay matrix supports well graded sand and gravel Sand is fine to coarse, mean=med , angular to subrounded, composed pred of quartz, quartzite, feldspar Gravel is angular (freshly broken) to subangular, fine to coarse, mean size=1/2", max size = 1 1/2" diameter, composed of rock fragments of granite, quartzite, schist, plus quartz, feldspar Dry 20% Gravel, 25% Sand, 55% Silt
	BH0247EBU1			1 20 /2 00	5961	1				VOA sample obtained from this interval
										No recovery for this interval
	BH0248EBU1			2 00 /2 00	5960	2			SM	Gravelly Silty Sand Dark yellowish brown (10YR 4/6) Well graded sand and gravel Sand is very fine to coarse, mean=med , angular to subangular, composed of quartz, feldspar, granite, schist, quartzite Gravel mean size=1/2", max size = 2" diameter, angular to subangular, composed of granite, quartzite, feldspar, quartz, other rock fragments Some gravel clasts highly weathered Caliche coats some gravel as well Dry 33% Gravel, 45% Sand, 22% Fines
					5959	3			CLAYEY SANDSTONE	Clayey Sandstone Light yellowish brown (2 5Y 6/3) to olive yellow (2 5Y 6/6) Very fine to f g sand, well sorted, subangular <5% porosity, clay cement, highly friable Composed of quartz, mafic (heavy) minerals, feldspar No bedding apparent Dry 75% Sand, 5% Silt, 20% Clay Top of bedrock = 3 3 ft
					5958	4				
				2 00 /2 00	5957	5			CLAYSTONE	Claystone Grayish brown (2 5Y 5/2) to olive yellow (2 5Y 6/6) Clay with trace of silt and some organic (black -- carbonaceous) fragments Porosity < 5% Some carbonate present but no cement No bedding apparent Weathered Mottled appearance with Fe-oxide stains at 7 8' to 8' and at 4 7' to 5 7' Dry 5% Silt, 95% Clay
	BH0249EBU1					6				VOA sample obtained from this interval
					5956				CLAYSTONE	Same as above
	BH0251EBU1			2 00 /2 00	5955	7				
						8				No recovery for this interval
				0 00 /0 60	5954					
					5953	9				Total Depth = 8 6 ft
						10				

INDEX OF DATA

Borehole Location Number:	**32791**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 8 0	GROUND ELEVATION (FT)	5915 34	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747918	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	JFU/KJT	32791
EAST	2084757	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	09/06/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH0018OEBU1	CR 50%	100% CR 100%			0			SM	Silty Sand Very dark grayish brown (10YR 3/2) Well graded sand with silt (80%) and clay (20%) matrix (mh) Sand is very fine to coarse, mean = very fine to fine, angular to subangular, composed pred of quartz, trace feldspar, some rock fragments Gravel is fine, sparse, composed of rock fragments of quartzite Plant roots abundant in upper 4" of core 3% Gravel, 58% Sand, 31% Silt, 8% Clay
	BH0018IEBU1			0 60 /2 00	5915					
					5914	1				No recovery for this interval
						2			SM	Same as above
					5913				CL	Silty Clay with some Sand Light olive brown (2 5Y 5/3) Low plasticity silt (30%) and clay (70%) matrix contains well graded sand, trace gravel and organic fragments Sand is very fine to coarse, subangular, composed of quartz, rock fragments and feldspar, biotite, mafic minerals Gravel avg size = 3/8", max size = 1 1/4" diameter, subangular, composed of quartzite Caliche abundant at 3' 7% Gravel, 18% Sand, 23% Silt, 52% Clay
	BH0018ZEBU1			1.70 /2 00	5912	3				
					5911	4			CLAYSTONE	Claystone Gray (10YR 5/1) to olive (5Y 5/3) Low porosity (<5%) claystone with trace of silt Calcium carbonate present, mod friable when dry Contains some (approx 5%) organic/carbonaceous fragments Horizontal color banding (gray and olive) present between 4 4' and 5 7' may indicate bedding orientation -- planar color bands Color more olive towards bottom of core Note Upper 1' of bedrock contains trace of alluvial sand 5% Silt, 95% Clay Top of bedrock = 2 7 ft
				2 00 /2 00	5910	5				
										No recovery for this interval
					5909	6			CLAYSTONE	Same as above
	BH0018MEBU1			1.75 /2 00	5908	7				
	BH0018QEBU1					8				VOA sample obtained from this interval
					5907					Total Depth = 8 0 ft
					5906	9				
						10				

INDEX OF DATA

Borehole Location Number:	**32891**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 8.8	GROUND ELEVATION (FT) 5960.63	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748363	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/JAB	32891
EAST	2085363	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN) 7.25	DATE DRILLED 09/06/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00254EBU1	CR	50%	100% CR 100%	5960	0			CL	Clay with Silt, Sand, Gravel. Light gray (2.5YR 7/2) to brown (10YR 5/3) and to yellowish brown (10YR 5/4). Gravel to 0.6", sand very fine to very coarse (mean = fine). Poorly graded. Clasts are subangular to subrounded. Medium plasticity. Clasts are quartzitic. Rich in caliche (disseminated, blebs, clasts), trace Fe-oxides. Rich in organics (rooted). No bedding apparent. Dry. 5-10% Gravel, 10-15% Sand, 75-85% Fines (mostly clay)
				1.00/2.00	5959	1				
	BH00255EBU1				5958	2			gm-SM	Gravel-Sand mixture with Silt, Clay. Dark brown (7.5YR 3/2, 7.5YR 3/3, 10YR 4/3, 10YR 3/3). Gravel to 2" (fractured size), avg. approx 0.4", sand very fine to very coarse, mean = med. Well graded. Except for clasts fractured during drilling, clasts are subangular-subrounded. Gravels are quartzite, gneiss, schist, sands are quartz, some rock fragments, traces mica, mafics, organics, and below 2.0', caliche clasts. No bedding apparent (entire interval from 0.0' to 4.0' is disaggregated, loose). Dry. 25-40% Gravel, 30-45% Sand, 20-35% Fines
	BH00257EBU1			1.00/2.00	5957	3				
	BH00258EBU1									
					5956	4				No recovery for this interval
										VOA sample obtained from this interval
									gm-SM	Same as above
										No recovery for this interval
				2.00/2.00	5955	5			CLAYSTONE	Claystone. Light brownish gray (2.5Y 6/2) to light yellowish brown (2.5Y 6/3) to light olive brown (2.5Y 5/3). Approximately 90-97% Clay. Porosity approx 2-6%. Cement argillaceous and, frequently, trace to some Fe-oxides. Non to slightly friable, non to mod fissile. Trace organics, trace to some Fe-oxides. No bedding apparent. Where not disseminated, Fe-oxides are seen to heal fractures, which are prevalent below 6.0'. Condition of core (heavily damaged) obscures orientation of all but a few fractures, which are seen to vary from approx 10 degrees to nearly vertical (approx 85 degrees). Dry. 3%-10% Silt, 90%-97% Clay. Top of bedrock = 4.0 ft
	BH00256EBU1				5954	6				
										VOA sample obtained from this interval
	BH00259EBU1			1.80/2.00		7			CLAYSTONE	Same as above
					5953	8				No recovery for this interval
				0.00/0.80	5952	9				
					5951	10				Total Depth = 8.8 ft

INDEX OF DATA

Borehole Location Number:	**32991**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 8 6	GROUND ELEVATION (FT) 5949 07	PROJECT NUMBER CMAD	LOG OF BORING NUMBER
NORTH	748273	AREA 001	CASING DIAMETER (IN)	GEOLOGIST DAB/JAB	32991
EAST	2085382	LOCATOR NUMBER MB	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/06/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH0260EBU1	CX 50%	100% CX 100%		5949	0			GC	Clayey Sandy Gravel Light brown (5Y 5/6) to mod brown(5YR 4/4 and 5YR 3/4) matrix Gravels are mostly quartzite, some granite, schist, gravels to 1 5" diameter, avg 1/4" to 1/2" Well graded, angular to subangular Matrix is low to med plasticity Bedding not apparent Argillaceous cement Dry 57% Gravel, 34% Sand, 1% Silt, 8% Clay
	BH0261EBU1				5948	1				
	BH0262EBU1			1 00 /2 00						
										VOA sample obtained from this interval
										No recovery for this interval
					5947	2			SM	Silty Sand with some Gravel Moderate brown (5YR 3/4), gravels to 0 5", avg 0 2"-0 3", rarely to 1 5" diameter Sand is mod graded to well graded, very fine to coarse (mean=fine), angular to subangular Low to med plasticity Dominantly quartz with some quartzite, schist, gneiss, and feldspar No bedding apparent Overall, material is very much like above unit but with less gravel Dry 28% Gravel, 61% Sand, 7% Silt, 4% Clay
	BH0264EBU1			1 90 /2 00	5946	3				
	BH0265EBU1									
					5945	4			CLAYSTONE	Claystone with some Silt Light olive gray (5Y 5/2) to olive gray (5Y 3/2) to dusky yellowish brown (10YR 2/2), dark yellowish brown (10YR 4/2), and light olive gray (5Y 6/1) to olive gray (5Y 4/1) Porosity=nil to 5% where weathered andincreased silt content is present Some zones filled with caliche (3 72', 4 8' - 5 0'), some strongly Fe-stained (5 6' - 5 7'), otherwise, cement is argillaceous Weathered zones (4'-4 5', 6'- 7 1') highly friable, fresh zones slightly friable, malleable No bedding apparent, although some zones (e g , 7 25'-7 5') show mottling Dry 5%-20% Silt, 80-95% Clay Top of bedrock = 3 7 ft
				2 00 /2 00	5944	5				
										No recovery for this interval
	BH0263EBU1				5943	6			CLAYSTONE	Same as above
										VOA sample obtained from this interval
									CLAYSTONE	Same as above
	BH0266EBU1			1 80 /2 00	5942	7				
										Core retained in VOA sleeve
					5941	8				No recovery for this interval
				0 00 /0 60						
					5940	9				Total Depth = 8 6 ft
						10				

INDEX OF DATA

Borehole Location Number:	**33091**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 9 0	GROUND ELEVATION (FT)	5916 29	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	749010	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	JFU/JAB	33091
EAST	2084928	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	09/06/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00185EBU1	GR 50%	100% GR	100%	5916	0			SM	Silty Clayey Sand with some Gravel Dark yellowish brown (10YR 4/2), gravels to 1" but averaging 0 1"-0 3", sand ranges fine to very coarse (mean=med) Well graded to mod graded, subangular to subrounded, low plasticity Grains pred quartz and quartzite, also gneiss, schist, feldspar, weathered micas No bedding apparent Heavily rooted zone in top approx 4" Dry 13% Gravel, 53% Sand, 17% Silt, 17% Clay
	BH00186EBU1			0 60 /2 00	5915	1				No recovery for this interval
									CL	Sandy Silty Clay Light olive brown (5Y 5/6) to mod olive brown (5Y 4/4) to olive gray (5Y 3/2) to dark yellowish brown (10YR 4/2) Rare 1(<1%) gravel to 1/2" diameter, sand is dom (98%) very fine to fine grained, with the balance med to c g Poorly graded, subangular to subrounded, low to med plasticity Composition mainly quartz, with some dark mafic minerals, feldspar, micas, gravels are quartzite, granite fragments, gneisses and schists Cement is calcareous and argillaceous, with some areas (2 9') more heavily calcified No apparent bedding Dry Trace gravel, 20% Sand, 12-20% Silt, 60-68% Clay
	BH00187EBU1			1 75 /2 00	5914	2				
					5913	3				
					5912	4			CLAYSTONE	Claystone Light olive gray (5Y 5/2) to light olive brown (5Y 5/6) Trace carbonaceous material (as dark grains), weathered biotite At 7', color changes to dark gray (10YR 4/1) to grayish brown (2 5Y 5/2) and dark grayish brown (2 5Y 4/2) Heavy Fe staining visible at 5 6' to 6' and in localized patches (5 25', 7 1", and smaller scattered spots) Porosity = nil to approx 2% Cement is argillaceous Slightly to mod friable, grayer portion more friable, chippy, and less malleable than overlying olive interval No bedding apparent Slightly moist Top of bedrock = 2 65'
				1 95 /2 00	5911	5				
					5910	6				No recovery for this interval
									CLAYSTONE	Same as above
										No recovery for this interval
									CLAYSTONE	Same as above
				1 75 /2 00	5909	7				
	BH00189EBU1									
	BH00188EBU1									VOA sample obtained from this interval
					5908	8			CLAYSTONE	Same as above
				1 00 /1 00						
					5907	9				Total Depth = 9 0 ft
						10				

INDEX OF DATA

Borehole Location Number:	**33191**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 6.6	GROUND ELEVATION (FT) 5958.55	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	749526	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/JAB	33191
EAST	2085642	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN) 7.25	DATE DRILLED 09/09/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH0270EBU1, BH0271EBU1	GR 50%	100% GR 100%	1.90 /2.00	5958	0			SM	Silty Gravelly Sand Dark brown (7.5YR 3/2), gravels to 1.5" diameter, avg. 0.4", sands very fine to very coarse (mean = fine) Well graded, subangular to rounded Low plasticity. Heavily rooted with much organic content in upper 1' Gravels quartzite, schist, gneisses, some granite, sands mainly quartz, quartzite, schist/gneiss fragments, some feldspar, weathered micas No bedding apparent Approx 0.1" interval of reworked claystone at base Dry 44% Gravel, 34% Sand, 13% Silt, 9% Clay
BH0272EBU1				5957	1			CLAYSTONE	Claystone Brown (10YR 5/3), light yellowish brown (10YR 6/4), yellowish brown (10YR 5/6), dark gray (10YR 4/1), at approx 2.3'-2.4', changes to gray (10YR 5/1), dark gray (10YR 4/1), and grayish brown (2.5Y 5/2), around 3.4', becomes heavily Fe-enriched, with color yellowish brown (10YR 5/8) to brownish yellow (10YR 6/8) around 4.35', loses Fe-staining and becomes gray (10YR 5/1) to light brownish gray (10YR 6/2) Porosity nil to approx 2.3', 2-6% from 2.3' to 3.4', nil from 3.4' to 4.35', 2-6% at 4.35' to 6.0' Calcium carbonate cement is present from top of unit to approx 2.3', below this point, cement is argillaceous and, to some extent, Fe-oxides Top of unit to 2.3' is slightly to mod. friable, 2.3-3.4' is highly friable and crumbly, 3.4' - 4.35' is slightly to mod. friable, and 4.35' to 6.0' is mod. friable Dry 5-30% Silt, (cont. below)
BH0274EBU1, BH0275EBU1			1.90 /2.00	5956	2				
				5955	3				
				5954	4				
			1.80 /2.00	5953	5				No recovery for this interval
					6				VOA sample obtained from this interval
								CLAYSTONE	(cont. from above) 70-95% Clay Top of bedrock = 1.4 ft
									No recovery for this interval
BH0273EBU1								CLAYSTONE	Same as above
									No recovery for this interval
									VOA sample obtained from this interval
			0.00 /0.60	5952					No recovery for this interval
				5951	7				
				5950	8				
				5949	9				
					10				Total Depth = 6.6 ft

INDEX OF DATA

Borehole Location Number:	**33291**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 14 8	GROUND ELEVATION (FT) 5966 85	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748539	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST RIC/KJT	33291
EAST	2085561	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/10/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH0280EBU1	0% 50% 100%	0% 100%	1 30 /2 00	5966	0			SC	Gravelly Clayey Sand Very dark grayish brown (10YR 3/2) Well graded sand and gravel in silty clay, low-plasticity matrix Sand is very fine to coarse, mean = fine to med , subangular to subrounded, composed of quartz, granite, quartzite, feldspar, mafic minerals Gravel is fine to coarse, mean size = 1 3/8", max diameter = 2 1/2" (broken cobble), subrounded to angular, composed of quartzite, quartz, granite, mafic schist Dry 30% Gravel, 50% Sand, 8% Silt, 12% Clay
	BH0282EBU1				5965	2				No recovery for this interval
										VOA sample obtained from this interval
	BH0284EBU1			1 30 /2 00	5964	3			SW-SC	Gravelly Sand Dark brown (7 5YR 3/2) Well graded sand and gravel in clay matrix Sand is fine to coarse, mean = coarse, subangular to subrounded, composed of quartz, feldspar, rock fragments, micas (weathered), mafic minerals, fresh biotite Gravel is fine to coarse, mean size = 3/4", max diameter > 3", subrounded to angular, composed of granite, mafic schist, quartz, quartzite, feldspar Caliche abundant 2' to 2 5' Rock fragments (gravel) strongly weathered, crumbly Dry 25% Gravel, 65% Sand, 10% Clay
					5963	4				
					5962	5			SC	Gravelly Clayey Sand Very dark grayish brown (10YR 3/2) Well graded sand and gravel in silty clay, low plasticity matrix Sand is very fine to coarse, mean = fine, subangular to subrounded, composed of quartz, granite, quartzite, feldspar, mafic minerals Gravel is fine to coarse, mean size = 3/4", max diameter = 1 1/2", subrounded to subangular, composed of quartz, granite, mafic schist, feldspar Dry 25% Gravel, 60% Sand, 15% Fines
				0 80 /2 00						
	BH0286EBU1				5961	6				No recovery for this interval
									GC	Sandy Gravel Strong brown (7 5YR 4/6) Well graded sand and gravel in silty clay, low plasticity matrix Sand is very fine to coarse, mean size = med to coarse, subrounded to subangular, composed of quartz, rock fragments (mica schist, granite, mafic schist), feldspar, mafic minerals Some sand size fragments of Fe-oxide (possible cement) also present Gravel is well graded, fine to coarse, mean size = 1 1/2", max diameter > 3" (only portion of larger cobbles), subrounded to angular, composed of quartzite, granite, quartz, mafic schist, trace feldspar Caliche present on gravel surfaces Some gravel strongly weathered and easily broken Dry 40% Gravel, 40% Sand, 3% Silt, 17% Clay
				2 00 /2 00	5960	7				
					5959	8				
					5958	9				No recovery for this interval
	BH0288EBU1			0 80 /2 00						VOA sample obtained from this interval
									GC	Same as above
										No recovery for this interval
	BH0285EBU1				5957	10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 14 8	GROUND ELEVATION (FT)	5966 85	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748539	AREA 001	CASING DIAMETER (IN)		GEOLOGIST	RTC/KJT	33291
EAST	2085561	LOCATOR NUMBER M6	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	09/10/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2 00 /2 00	5956	10			CLAYSTONE	Claystone Grayish brown (2 5Y 5/2) to light yellowish brown (2 5Y 6/4) Clay with trace of silt, very low porosity (<5%), no cement Not friable (clay) No bedding structures apparent Fe-oxide stains along planar, low-angle fracture surfaces at 12 6' to 12 9' and at 13 7' to 14 0' Otherwise, claystone has mottled appearance and is relatively unweathered Trace silt, > 95% clay Top of bedrock = 10 0 ft
					5955	11				
	BH0287BU1 BH0288BU1					12				VOA sample obtained from this interval
				2 00 /2 00	5954	13			CLAYSTONE	Same as above
					5953	14				
				0 00 /0 80						No recovery for this interval
					5952	15				Total Depth = 14 8 ft
					5951	16				
					5950	17				
					5949	18				
					5948	19				
					5947	20				

INDEX OF DATA

Borehole Location Number:	**33391**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 8 0	GROUND ELEVATION (FT)	5924 92	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748078	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	JFU/JAB	33391
EAST	2084926	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	09/09/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH / SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH00190CBU1	CX 50%	100% CX 100%	1 00 /2 00	5924 5923	0 1			CL	Silty Clay with some Gravel and Sand Very dark grayish brown (10YR 3/2) to very dark brown (10YR 2/2) Gravels to 0 7"-0 8", avg 0 2"-0 3" Sands range very fine to very coarse, mean=fine Well graded, subangular to rounded, low to med plasticity Mainly quartz, quartzite, some feldspar, gneiss, schist, micas No apparent bedding Color changes to yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/6) approx 2 6'-2 7', and cement is argillaceous, plus some calcification from approx 3 1' to 4 6' Dry 8% Gravel, 32% Sand, 24% Silt, 36% Clay
				5922	2				No recovery for this interval
								CL	Same as above
									No recovery for this interval
								CL	Same as above
BH00191CBU1			1 50 /2 00	5921	3			GM	Sandy, Silty Gravel Dark brown (7 5YR 3/4) to strong brown (7 5YR 5/6 and 7 5YR 4/6) to light yellowish brown (2 5Y 6/4), latter color comes from inclusion of underlying clay Gravels to 1", avg 0 3"-0 5", sands are fine to very coarse (mean=coarse) Sand is subangular to rounded, gravel is the same Low plasticity Dominantly quartz, fine fraction (fine sands) contains 10-15% dark, angular to sub-angular grains, plus quartz, traces of mica and rock fragments, coarse sand fraction mostly quartz, trace rock fragments, gravels mainly quartzite, quartz, dark metamorphic rock fragments, some quartzites are bright, pinkish red and are strongly weathered No bedding apparent, bottom of interval is angular contact with underlying clay Cement is argillaceous, trace to some calcareous Dry 51% Gravel, 29% Sand, 14% Silt, 6% Clay
				5920	4				
			2 00 /2 00	5919	5				
				5918	6			CLAYSTONE	Claystone Grayish brown (2 5Y 5/2) to light olive brown (2 5Y 5/3) and where Fe-stained, yellowish brown (10YR 5/8) 5-20% Silt Porosity = nil to approx 3% Cement is argillaceous, with traces of calcareous cement and caliche blebs Moderately friable, malleable Increasing carbonaceous content changes color to grayish brown (10YR 5/2) and dark gray (10YR 4/1) at approx 6 4' to 6 7' or 6 8' No apparent bedding except for some uneven, wavy color banding seen at 6 6' to 6 65' Slightly moist 5-20% Silt, 80-95% Clay Top of bedrock = 5 0 ft
BH00192CBU1			1 75 /2 00	5917	7				
				5916	8				VOA sample obtained from this interval
									Total Depth = 8 0 ft
				5915	9				
					10				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**33491**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 11 4	GROUND ELEVATION (FT)	5926 06	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	749080	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	JFU/JAB	33491
EAST	2084883	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	09/10/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00300EBU1				5926	0			ML	Sandy Clay-Silt mixture with Gravel Very dark grayish brown (10YR 3/2) to very dark brown (10YR 2/2) Gravel to approx 0 6", sand very fine to very coarse (mean=fine to med) Poor to mod grading Subangular to subrounded clastics Low to med plasticity Trace to some organics (rooted), gravel quartzite, gneiss, schist, sand quartz, some rock fragments, traces mafics, mica No bedding apparent Dry 5% Gravel, 15%-20% Sand, 75%-80% Fines
				1.10 /2.00	5925	1				
					5924	2			CL	Silty Clay with Sand, trace Gravel Brown (10YR 4/3) Rare, scattered gravels to approx 0 4", sand very fine to v coarse (mean=very fine to fine) Poorly graded Clastics are subangular to subrounded Low to med plasticity Sand dom quartz, some rock fragments, traces mica, mafics, Fe-oxides, organics (rooted) Indistinct color banding seen at 2 5'-3 2', which is subhoriz , straight, even This interval (from approx 2 5'-3 2') is also slightly calcareous Dry Trace gravel, 10-15% Sand, 85%-90% Fines (mostly clay)
	BH00301EBU1			1 70 /2.00	5923	3				
										No recovery for this interval
									CL	Same as above
					5922	4			ML	Sand-Silt mixture with Clay, Gravel Dark yellowish brown (10YR 4/4) to, at 4 25'-4 4', light olive brown (2 5Y 5/6) to yellowish brown (10YR 5/6) Gravel to 1" (but fractured to this size), sand v f g to v c g (mean = v f g to f g) From approx 4 25'-4 4', material is richer in clay, but still gravelly and sandy Poor to mod grading Except for fractured gravels (which are angular), clastics are sub-angular to subrounded Low plasticity Gravels quartzite, gneiss, schist, sands quartz, some rock fragments, traces Fe-oxides, mafics, mica, organics Calcareous (slightly) No bedding apparent Dry 3-8% Gravel, 30-40% Sand, 55-65% Fines (mostly silt)
				0 40 /2.00	5921	5				
					5920	6				
										No recovery for this interval
									ML	Same as above
										No recovery for this interval
				1 75 /2.00	5919	7			ml-CL	Clay-Silt mixture with Sand, trace Gravel Yellowish brown (10YR 5/4) Scattered gravel to approx 0 5", sand v f g to v c g (mean=v f g to f g) Poorly graded Clasts are sub-angular to subrounded Low to med plasticity Sand is quartz with some rock fragments, trace to some Fe-oxides, traces mica, mafics, organics Scattered pockets rich in Fe-oxides No bedding apparent Slightly calcareous Slightly moist Trace Gravel, 10-25% Sand, 75-90% Fines
					5918	8				
										No recovery for this interval
	BH00302EBU1								ml-CL	Same as above
				1.80 /2.00	5917	9			CLAYSTONE	Claystone Light brownish gray (10YR 6/2, 2 5Y 6/2) to light yellowish brown (2 5Y 6/4), Fe-oxides are rich, brown-ish yellow (10YR 6/8) to yellowish brown (19YR 5/6, 5/8), below 11 2' gray (10YR 5/1) to dark gray (cont below)
										No recovery for this interval
	BH00302EBU1					10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 11 4	GROUND ELEVATION (FT)	5926 06	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748080	AREA 001	CASING DIAMETER (IN)	2 07	GEOLOGIST	JFU/JAB	33491
EAST	2084883	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	09/10/91	

REMARKS

CHEMICAL SAMPLE DEPTH
GEOTECHNICAL SAMPLE DEPTH
SAMPLE NUMBER
SAMPLE GRAIN SIZE (0% 50% 100%)
PERCENT RECOVERY (0% 100%)
RECOVERY/INTERVAL
DATUM (FT): 5916, 5915, 5914, 5913, 5912, 5911, 5910, 5909, 5908, 5907
DEPTH (FT): 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
WELL OR PIEZOMETER CONSTRUCTION
LITHOLOGY
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE
DESCRIPTION

0 10/1 10

CLAYSTONE (cont from above) (10YR 4/1) Approx 95-98% Clay Porosity nil-approx 4% Cement argillaceous, trace to some Fe-oxide, rare trace calcareous Non to slightly friable and fissile, but very fissile below 11 2' Fe-oxides rich at 9 0-9 3', 9 45-9 8', and 8 05-8 15' (including Fe-stone nodules) Trace organics No bedding apparent Slightly moist 100% Fines, excluding slough at 9 4-9 6' in drive sample Top of bedrock=8 05'

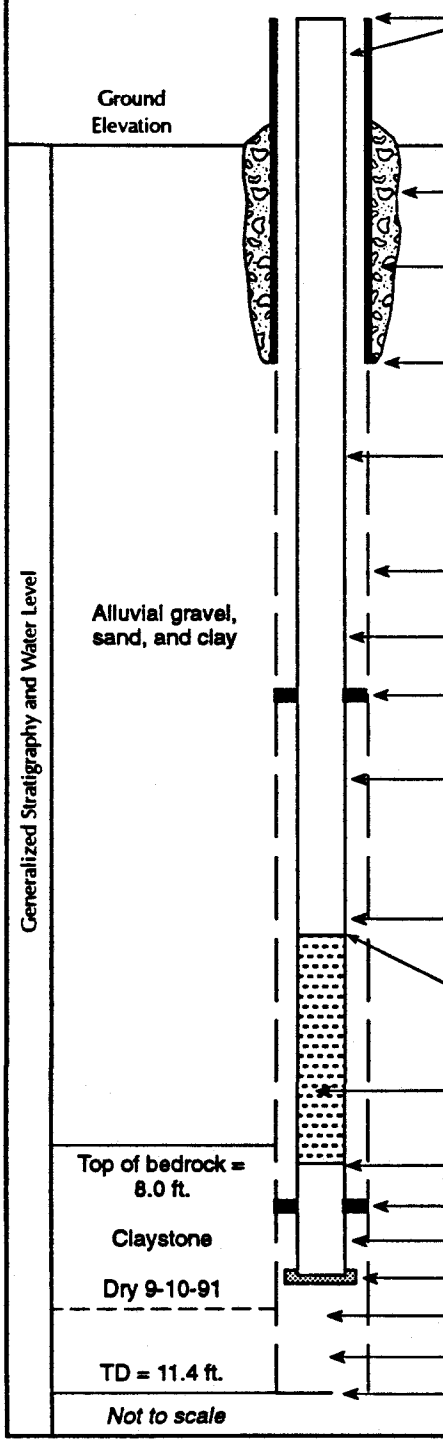
No recovery for this interval

Total Depth = 11 4 ft

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748079.7679 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084882.8818 ft.	Well No.	33491
Date Completed	9-10-91	Original Depth	11.4 ft.	Aquifer	Alluvial
Inspected by	J. Uhlinger	Date	9-10-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 11.4 ft.



Elevation of top of surface casing/riser pipe	5929.16 ft./5928.59 ft.
Height of top of surface casing/riser pipe above ground surface	3.1 ft./2.53 ft.
Depth of surface seal below ground surface	2.9 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	1.9 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	11.4 ft.
Type of backfill	NA
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	2.9 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	6.1 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	6.1 ft.
Elevation/depth top of screened section	6.68 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	8.69 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.41 ft.
Elevation/depth bottom of plugged blank section	11.1 ft.
Elevation/depth bottom of sand column	11.2 ft.
Type of backfill below observation pipe	Natural
Elevation/depth of hole	11.4 ft.

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Borehole Location Number:	**33591**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 16 6	GROUND ELEVATION (FT) 5955 48	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748395	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/KJT	33591
EAST	2085494	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/11/91	

REMARKS

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH0290EU1					0			SC	Clayey Gravelly Sand Very dark grayish brown (10YR 3/2) Well graded sand, gravel and clay Sand is very fine to med , mean = fine, subangular, composed of quartz, feldspar, granite, Fe-oxide fragments, mafic minerals Gravel mean size=3/4" diameter, up to 2 1/2", angular to subrounded, composed of quartz, quartzite, feldspar, granite Dry 20% Gravel, 40% Sand, 8% Silt, 32% Clay
	BH0291EU1				5955					
				1 30 /2 00		1				
	BH0292EU1				5954					VOA sample obtained from this interval
										No recovery for this interval
						2			SC	Same as above
					5953				CL	Sandy Clay Dark yellowish brown (10YR 4/4) to yellowish brown (10YR 5/8) Silty clay matrix of low plasticity contains poorly graded sand and trace of fine gravel (< 1/2" diameter) Sand is very fine to fine, subangular, composed of quartz, feldspar, micas (weathered), green hornblende, rock fragments (granite, quartzite), mafic minerals Gravel is subangular, composed of quartzite and quartz Caliche present on gravel and sand grains, also dispersed in small patches throughout top 2 5' of interval Carbonaceous material present at 4 2' - 4 5' Clay mottled by Fe-oxide stains below 4 2' Dry 5% Gravel, 30% Sand, 13% Silt, 52% Clay
	BH0294EU1			1 90 /2 00		3				
	BH0295EU1				5952					
						4				
					5951					No recovery for this interval
									CL	Same as above
				1 90 /2 00		5				
					5950					
										No recovery for this interval
	BH0298EU1									VOA sample obtained from this interval
						6			CL	Same as above
					5949					
				2 00 /2 00		7			SW	Well graded Gravelly Sand Strong brown (7 5YR 4/6) Very fine to coarse sand, mean=med to coarse, angular to sub-rounded, composed of quartz, feldspar, rock fragments (quartzite, granite, schist), mafic minerals including green hornblende Well graded gravel, mean size = 3/4" diameter, up to 3" max , subrounded to angular, composed of quartz, quartzite, feldspar, granite Caliche coats large pebbles and cobbles Some gravel strongly weathered, crumbles easily Moist 27% Gravel, 70% Sand, 3% Silt, trace clay
					5948					
						8				
					5947					
	BH0296EU1									
	BH0297EU1			1 00 /2 00		9				VOA sample obtained from this interval
					5946					No recovery for this interval
						10				

STATE [redacted]	TOTAL DEPTH (FT) 16 6	GROUND ELEVATION (FT) 5955 48	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
[redacted]	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST	DAB/KJT	33591
EAST [redacted]	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED	09/11/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	[redacted]	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				5945	10			SW	Same as above
					11				Core retained in VOA sleeve
				5944					No recovery for this interval
					12			SW	Same as above
				5943				CLAYSTONE	Claystone with some Silt Grayish brown (2 5Y 5/2) to olive brown (2 5Y 4/3) Clay with some silt Also contains carbonaceous material of silt size (<10% of silt) Variably weathered and Fe-oxide stained Fe-oxide concentrated along low-angle fracture surface at 15', and along numerous planar surfaces at 14'-14 25' Moist 15% Silt, 85% Clay Top of bedrock = 12 05 ft
				5942	13				
	BH00298EBU1								VOA sample obtained from this interval
	BH00299EBU1				14			CLAYSTONE	Same as above
				5941					
				5940	15				
									Core retained in VOA sleeve
					16				No recovery for this interval
				5939					
									Total Depth = 16 6 ft
				5938	17				
				5937	18				
					19				
				5936	20				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**33691**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE	TOTAL DEPTH (FT) 10.9	GROUND ELEVATION (FT)	5926.99	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH 749112	AREA OU1	CASING DIAMETER (IN)	2.07	GEOLOGIST	JFU/KJT	33691
EAST 2084994	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	11.5	DATE DRILLED	09/12/91	

REMARKS:

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH00305EBU1, BH00309EBU1	0% 50% 100%	0% 100%	1.75/2.00	5926	0			CL	Sandy Gravelly Clay: Very dark grayish brown (10YR 3/2). Low plasticity clay matrix with well graded sand and gravel. Sand is very fine to coarse, mean = fine, well rounded to subangular, composed pred. of quartz, with some feldspar, granite and quartzite fragments. Gravel: avg. size = 5/8", max. size 1 1/2", angular to subangular, composed of quartzite, mica schist, granite. Plant roots present 0'-1.5'. Some gravel cobbles are strongly weathered and crumbling. Dry. 8% Gravel, 30% Sand, 3% Silt, 59% Clay
				5925	1				No recovery for this interval
					2			CL	Same as above
BH00306EBU1			1.50/2.00	5924	3			ML	Sandy Silt: Brown (10YR 5/3). Clayey silt matrix contains very fine to med. sand (mean = fine) and trace of gravel. Sand is subangular to subrounded, composed of quartz, feldspar, Fe-oxide fragments, trace micas, trace mafic minerals. Gravel is usually fine (<1/2" diameter), but one cobble is present with 2" diameter, composed of quartzite, quartz. Caliche fills small cavities throughout. Dry. Trace gravel. 15% Sand, 68% Silt, 17% Clay
				5923	4				No recovery for this interval
			0.70/2.00	5922	5			SM	Gravelly Silty Sand: Brownish yellow (10YR 6/6). Low plasticity clayey silt matrix contains well graded sand and gravel. Sand is very fine to coarse, mean=coarse, subrounded to subangular, composed of quartz, feldspar, quartzite, granite, schist, Fe-oxide, mafic minerals, trace of biotite. Gravel mean size = 3/4", max. size = 2", composed of quartz, quartzite, sandstone, feldspar, schist, granite. Dry. 32% Gravel, 40% Sand, 18% Silt, 10% clay
									No recovery for this interval
				5921	6			SM	Same as above
								CL	Inorganic Clay: Light brownish gray (2.5Y 6/2) to very dark grayish brown (2.5Y 3/2). Massive, low plasticity clay with discontinuous patches of Fe-oxide staining. Dry. 2% Silt, 98% Clay
			1.55/2.00	5920	7			SM	Gravelly Silty Sand: Same brownish yellow sand described at 4.0' to 6.25'. Same composition, see above. Dry. 32% gravel, 40% Sand, 18% Silt, 10% Clay
				5919	8			CLAYSTONE	Claystone: Light brownish gray (2.5Y 6/2) to very dark grayish brown (2.5Y 3/2). No cement, more porous (5-10%) where more strongly weathered. Trace of black carbonaceous material, trace of caliche replacing clay in small patches. Fe-oxide stains are irregular, patchy. Slightly moist to dry. Mixed slough makes up 2' drive sample from 8.8' - 10.9'. Slough saved but does not represent lithology of rock below 10' alone. This material mixed with overlying alluvial and bedrock material. Claystone is 5% Silt, (cont. below)
BH00308EBU1									
			1.70/2.00	5918	9				No recovery for this interval
								CLAYSTONE	Same as above (cont. below)
									No recovery for this interval
BH00307EBU1				5917	10				VOA sample obtained from this interval

STATE PLANE COORDINATE	TOTAL DEPTH (FT): 10.9	GROUND ELEVATION (FT): 5926.99	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:	
NORTH: [illegible]	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: JFU/KJT	33691	
EAST: [illegible]	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN): 11.5	DATE DRILLED: 09/12/91		

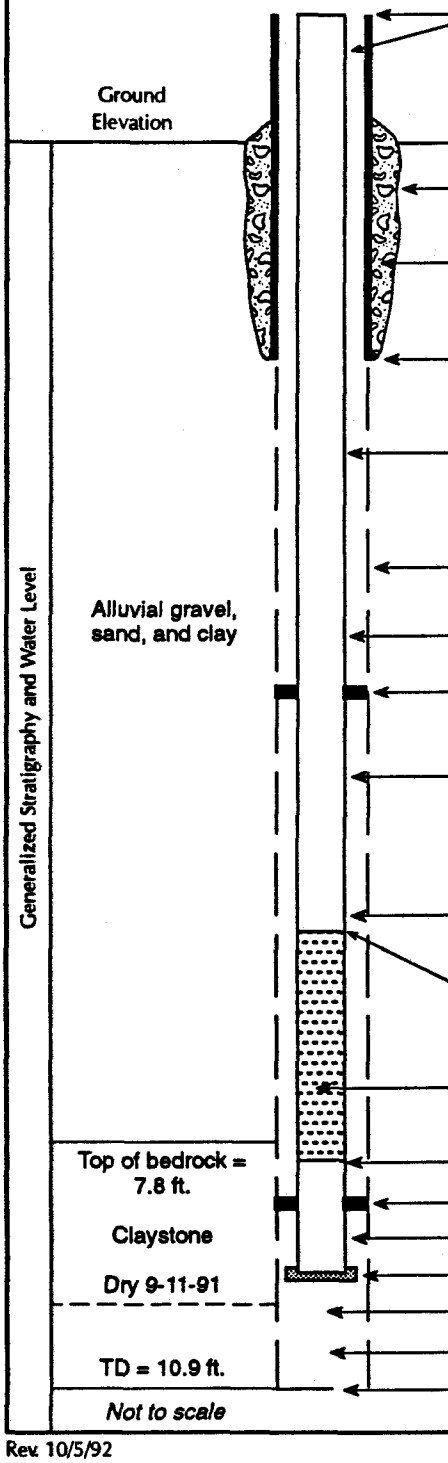
REMARKS:

CHEMICAL SAMPLE / GEOTECHNIC SAMPLE	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERED INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						10			CLAYSTONE	(cont. from above) 95% Clay. Top of bedrock = 7.8 ft.
										No recovery for this interval.
					5916	11				Total Depth = 10.9 ft.
					5915	12				
					5914	13				
					5913	14				
					5912	15				
					5911	16				
					5910	17				
					5909	18				
					5908	19				
					5907	20				

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748111.6859 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084994.4826 ft.	Well No.	33691
Date Completed	9-12-91	Original Depth	11.4 ft.	Aquifer	Alluvial
Inspected by	J. Uhlinger	Date	9-12-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 10.9 ft.



Elevation of top of surface casing/riser pipe	5929.89 ft./5929.24 ft.
Height of top of surface casing/riser pipe above ground surface	2.9 ft./2.25 ft.
Depth of surface seal below ground surface	3.05 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.1 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	10.9 ft.
Type of backfill	NA
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	3.05 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	6.1 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	6.1 ft.
Elevation/depth top of screened section	6.19 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	8.11 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.49 ft.
Elevation/depth bottom of plugged blank section	10.6 ft.
Elevation/depth bottom of sand column	10.9 ft.
Type of backfill below observation pipe	NA
Elevation/depth of hole	10.9 ft.

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Borehole Location Number:	**33791**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 22 6	GROUND ELEVATION (FT) 5974 99	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	749626	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST SEC/JAB	33791
EAST	2085624	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/12/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	B4003CEBU1	0% 50%	100% 0% 100%			0			SM	Silty Gravelly Sand Root zone -- dark brown (10YR 3/3 to 7 5YR 3/2) Sands are very fine to very coarse (mean = med) and gravel up to 1" diameter (avg 0 2"-0 3") Well graded, angular to rounded Very calcareous (with discrete grains, from very fine to very coarse, of caliche) with quartz, feldspar, rock fragments in sands and gravels No bedding apparent Dry 17% Gravel, 59% Sand, 14% Silt, 10% Clay
	B4003DEBU1			1 40 /2 00	5974	1			GC	Clayey Gravel Sparsely rooted -- pale brown (10YR 6/3), sands very fine to very coarse (mean = fine) with gravels to 1 8", averaging approx 0 5"-0 8" Well graded, sands sub-angular to rounded, gravels angular to subrounded Extremely calcareous, with discrete grains of caliche as well as caliche coatings on grains, balance is mainly quartz, quartzite No bedding apparent Dry 67% Gravel, 10% sand, 5% Silt, 18% Clay
	B4003EEBU1			1 40 /2 00	5972	3				VOA sample obtained from this interval
										No recovery for this interval
									GC	Same as above
										No recovery for this interval
					5971	4			GC	Same as above
				1 90 /2 00	5970	5			gm-GW	Well graded Gravel-Sand-Silt-Clay mixture Dark brown (7 5YR 4/4 and 7 5YR 3/3) to strong brown (7 5YR 4/6) with, at approx 8 5' to 9 25', light yellowish brown (2 5Y 6/3) mixed in Sands are very fine to very coarse (mean=coarse), gravel up to 1 4" but avg 0 3" to 0 5", grains range from angular to rounded (both sand and gravel) Calcareous/ caliche content decreases with depth No bedding apparent Dry 52% Gravel, 40% Sand, 4% Silt, 4% Clay
	B4003GEBU1				5969	6				VOA sample obtained from this interval
										No recovery for this interval
									gm-GW	Same as above
				2 00 /2 00	5968	7				
					5967	8				
	B4003HEBU1			1 50 /2 00	5966	9				
	B4003JEBU1				5965	10				VOA sample obtained from this interval
										No recovery for this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 22 6	GROUND ELEVATION (FT)	5974 99	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748626	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	SEC/JAB	33791
EAST	2085624	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	09/12/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY / INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%			10			gm-GW	Gravel-Sand mixture with some Silt and Clay Wide range of colors yellowish red (5YR 4/6, 5YR 5/6), pale brown (10YR 6/3), light yellowish brown (10YR 6/4), gray (10YR 6/1), dark yellowish brown (10YR 4/4), strong brown (7 5YR 5/6), red (10r 5/6), reddish brown (5YR 5/4), and others Majority of grains are gravel-sized, and range to 2" in diameter, averaging approx 0 5" to 0 8" Sands are very fine to very coarse, mean is med Grading is well to mod Grains range from angular to rounded Traces of caliche are present, mainly in the upper portion, with cementing in lower portion mainly argillaceous Grains of sand are dominantly quartz, with micas, feldspars, and other rock fragments, and mafic minerals also present Gravels are dominantly quartzite, with weathering granite components, gneisses, and schists also No bedding apparent Dry 72%Gravel, 21%Sand, 7%Fines
				1 60 /2 00	5964	11				
					5963	12				
				1 90 /2 00	5962	13				
										No recovery for this interval
									gm-GW	Same as above
	BH00357EBU1				5961	14				VOA sample obtained from this interval
										No recovery for this interval
									gm-GW	Same as above
	BH00359EBU1			1 40 /2 00	5960	15				
										No recovery for this interval
					5959	16				
									gm-GW	Same as above
				2 00 /2 00	5958	17			CLAYSTONE	Claystone with some Silt Grayish brown (2 5Y 5/2) to light olive brown (2 5Y 5/3 and 2 5Y 5/4) to light yellowish brown (2 5Y 6/4) and olive yellow (2 5Y 6/6) Siltier zones present at 17 6' to 18 4' and 19 3' to 19 75', where silt may compose approx 20% of rock Porosity is nil to approx 8% Cement is argillaceous Highly to mod friable Fe-stone nodules present at 18 4' No bedding apparent, although there is an obvious color change at approx 20' from upper portion's browns to lower portion's yellowish brown and olive yellow Moist 5-20% Silt, 80-95% Clay Top of bedrock = 16 2 ft
	BH00358EBU1				5957	18				
										VOA sample obtained from this interval
				2 00 /2 00	5956	19			CLAYSTONE	Same as above
	BH00360EBU1				5955	20				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 22 6	GROUND ELEVATION (FT) 5974 99	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	749626	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST SEC/JAB	33791
EAST	2085624	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/12/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH0036DEBU1	0% 50% 100%	0% 100%	2 00 /2 00	5954	20 21				
				0 00 /0 60	5953	22				Core retained in VOA sleeve No recovery for this interval
					5952	23				Total Depth = 22 6 ft
					5951	24				
					5950	25				
					5949	26				
					5948	27				
					5947	28				
					5946	29				
					5945	30				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**33891**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 11.6	GROUND ELEVATION (FT) 5927.54	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747961	AREA 001	CASING DIAMETER (IN) 2.07	GEOLOGIST JFU/JAB	33891
EAST	2084641	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 11.5	DATE DRILLED 09/13/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH / SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH0031DEBU1	CX 50%	100% CX 100%			0			CL	Clay with Sand and Silt, trace Gravel: Light olive brown 2.5Y 5/3) Gravel to 0.6", sand very fine to very coarse (mean=fine). Poorly graded. Subangular to subrounded clasts. Low to med. plasticity. Traces organics, Fe-oxides, clasts quartzitic. No bedding apparent. Scattered caliche blebs. Dry. 0-10% Gravel, 10-20% Sand, 70%-90% Fines
			1.25 /2.00	5927	1				
				5926	2			ML	Silt-Clay mixture with Sand and Gravel: Very dark grayish brown to very dark brown (10YR 3/2 to 10YR 2/2). Gravel to 1", avg. approx 0.4", sand very fine to very coarse, mean=fine. Moderately graded. Clay/silt ratio undetermined. Clasts subangular to subrounded, except for some fractured gravels (drill-related). Low plasticity. Gravels quartzite, schist, gneiss. Sands quartz, some rock fragments, traces organics, micas, mafics. No bedding apparent. Dry. 10%-15% Gravel, 15%-25% Sand, 60%-75% Fines
BH0031EBU1			0.60 /2.00	5925	3				
									No recovery for this interval
				5924	4			GM	Silty, Clayey Sand-Gravel mixture. Very dark grayish brown (10YR 3/2) to very dark brown (10YR 2/2). Fractured gravels, pieces to 1.5". Sand very fine to very coarse (mean=fine to med.). Well graded to mod. graded. Gravels angular (due to drill) to subrounded, sands some. Gravels quartzite, gneiss, schist, sands quartz, some rock fragments, traces mica, mafics. No bedding apparent. Dry. 30% Gravel, 25% Sand, 45% Fines
			1.40 /2.00	5923	5			CL	Silty Clay with traces Sand, Gravel, and Caliche. Yellowish brown (10YR 5/4, 10YR 5/6) to dark yellowish brown (10YR 4/4) to brown (10YR 4/3) to light yellowish brown (2.5Y 6/3). Scattered gravels, to approx 0.4", scattered sand, very fine to very coarse. Clastic fraction decreases below approx 7.5'. Poorly graded. Clasts subangular to subrounded. Medium to low plasticity. Gravels and sands mainly quartzitic with occasional Fe-stone (as at 7.15'). Caliche blebs present throughout, though not as abundant above 2.6' and below approx 7.4'. Trace organics. No bedding apparent, interval, especially lowest portions (below approx 7.4'), appears to be reworked claystone bedrock. Lower contact (with bedrock) transitional. Dry to slightly moist. Trace Gravel, trace to 10% Sand, 85%-98% Fines (mostly Clay)
				5922	6				
			1.80 /2.00	5921	7				
				5920	8				
									No recovery for this interval
								CL	Same as above
									No recovery for this interval
BH0031CBU1				5919				CL	Same as above
									No recovery for this interval
BH0031ZBU1								CL	Same as above
			0.95 /2.00	5918	9			CLAYSTONE	Claystone with caliche. Light gray (2.5Y 7/2) to pale yellow (2.5Y 7/3) to light brownish gray (2.5Y 6/2) to light yellowish brown (2.5Y 6/3, 2.5Y 6/4). Approx. 90-97% Clay, balance Silt, with blebby and (cont. below)
									VOA sample obtained from this interval
					10				No recovery for this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 11.6	GROUND ELEVATION (FT) 5927.54	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH 747961		AREA OU1	CASING DIAMETER (IN) 2.07	GEOLOGIST JFU/JAB	33891
EAST 2084641		LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 11.5	DATE DRILLED 09/13/91	

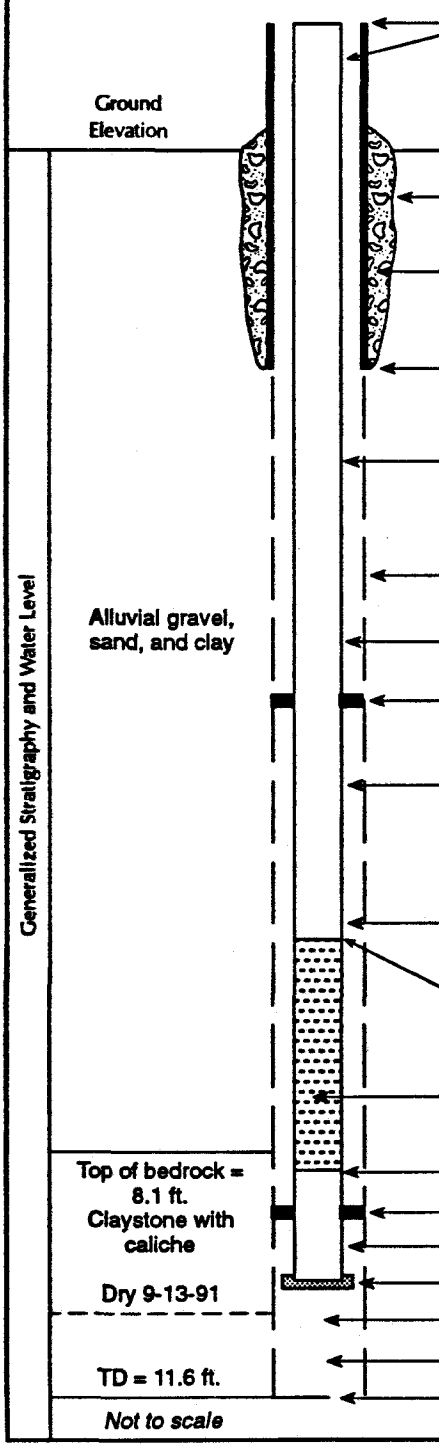
REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				1.40 /1.10	5917	10			CLAYSTONE	(cont. from above) disseminated caliche. Porosity: nil to approx. 4%. Cement argillaceous plus trace to some calcareous and trace scattered Fe-oxides. Non to slightly friable and fissile. Trace organics. No bedding apparent; unit appears weathered and possibly physically mixed. Caliche content appears to decrease at 10.9'-11.1'. Slightly moist. Drive sample (9.1'-11.1') contained sloughed material at 9.1'-9.5'. 100% Fines (approx. 90-97% Clay), excluding sloughed material. Top of bedrock = 9.1 ft.
				0.00 /0.50	5916	11				No recovery for this interval.
					5915	12				Total Depth = 11.6 ft.
					5914	13				
					5913	14				
					5912	15				
					5911	16				
					5910	17				
					5909	18				
					5908	19				
						20				

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Form GT6A

Project	OU1 Phase III RFI/RI	Northing	747960.6244 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084640.6464 ft.	Well No.	33891
Date Completed	9-13-91	Original Depth	11.6 ft.	Aquifer	Alluvial
Inspected by	J. Uhlinger	Date	9-13-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 11.6 ft.



Elevation of top of surface casing/riser pipe	5930.54 ft./5929.94 ft.
Height of top of surface casing/riser pipe above ground surface	3.0 ft./2.25 ft.
Depth of surface seal below ground surface	2.9 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.0 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	11.6 ft.
Type of backfill	NA
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	2.9 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	6.0 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	6.0 ft.
Elevation/depth top of screened section	6.7 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	8.7 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.4 ft.
Elevation/depth bottom of plugged blank section	11.1 ft.
Elevation/depth bottom of sand column	11.6 ft.
Type of backfill below observation pipe	NA
Elevation/depth of hole	11.6 ft.

Rev. 10/5/92

INDEX OF DATA

Borehole Location Number:	**33991**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 12 6	GROUND ELEVATION (FT) 5934 23	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748184	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/JAB	33991
EAST	2085081	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/13/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH0036 1EBU1				5934	0			CL	Sandy, Rooted Clay Very dark grayish brown (10YR 3/2) to dark brown (10YR 4/3), with very fine to coarse sand (mean = med), angular to subrounded Medium plasticity Poorly graded Sand is quartz with traces of feldspar, rock Fragments No bedding Dry 10% Sand, 10% Silt, 80% Clay
	BH0036 2EBU1			1 30 /2 00	5933	1				VOA sample obtained from this interval
										No recovery for this interval
					5932	2			cl-CH	Gravelly Clay Light brown (2 5Y 5/3) to olive brown (2 5Y 4/3) to dark brown (10YR 3/3) to very dark grayish brown (10YR 3/2) Gravels to 0 7", avg 0 2" Poorly graded, angular to subrounded Medium to high plasticity Calcareous (slightly) No bedding apparent Dry 37% Gravel, 4% Sand 59% Fines
	BH0036 4EBU1			1 90 /2 00	5931	3			CLAYSTONE	Claystone Light yellowish brown (2 5Y 6/3) to light olive brown (2 5Y 5/3 and 2 5Y 5/4) to olive brown (2 5Y 4/3) to grayish brown (2 5Y 5/2), with trace (<1% to 3%) sand and some (2-20%) silt Non-porous to approx 5% where more weath ered Calcareous, with some streamers of caliche, also argillaceous cement and some Fe-oxides Moderately to highly friable No apparent bedding Dry 0-3% Sand, 2-20% Silt, 80-95% Clay Top of bedrock = 2 45 ft
	BH0036 5EBU1				5930	4				No recovery for this interval
				2 00 /2 00	5929	5			SILTY CLAYSTONE	Silty Claystone to Clayey Siltstone Light olive brown (2 5Y 5/3) to light yellowish brown (2 5Y 6/4) Varies from approx 20% to 50% Silt, increasing fairly regularly and gradually with depth, with sand (very fine) increasing from 0% to approx 10% with depth Porosity from approx 3% to approx 15%, increasing with depth Argillaceous cement plus some Fe-oxides Moderately to highly friable No bedding apparent Dry 0-10% Sand, 20-50% Silt, 40-80% Clay
	BH0036 3EBU1				5928	6				VOA sample obtained from this interval
				1 80 /2 00	5927	7			CLAYEY SANDSTONE	Silty Clayey Sandstone Light olive brown (2 5Y 5/4 and 2 5Y 5/3) to light yellowish brown (2 5Y 6/3) Very fine grained, mod well-sorted, subangular to rounded Porosity approx 15% Cemented poorly, with small amount of calcareous cement and balance argillaceous, more clay-rich in upper and lower portions, with cleanest sand towards middle No apparent bedding Dry 60-80% Sand, 15-30% Silt 5-10% Clay
					5926	8			SANDY SILTSTONE	Sandy Clayey Siltstone Light olive brown (2 5Y 5/3) to dark grayish brown (2 5Y 4 2) to (where Fe-stained) olive yellow (2 5Y 6/6) Clay-rich at top (to 50%) with decreasing clay towards bottom Sand is very f g approx 5-15% porosity Argillaceous cement Moderately to highly friable No bedding apparent Dry 5-15% Sand, 85-95% Fines
	BH0036 7EBU1			2 00 /2 00	5925	9				No recovery for this interval
									SANDY SILTSTONE	Same as above
	BH0036 6EBU1					10				

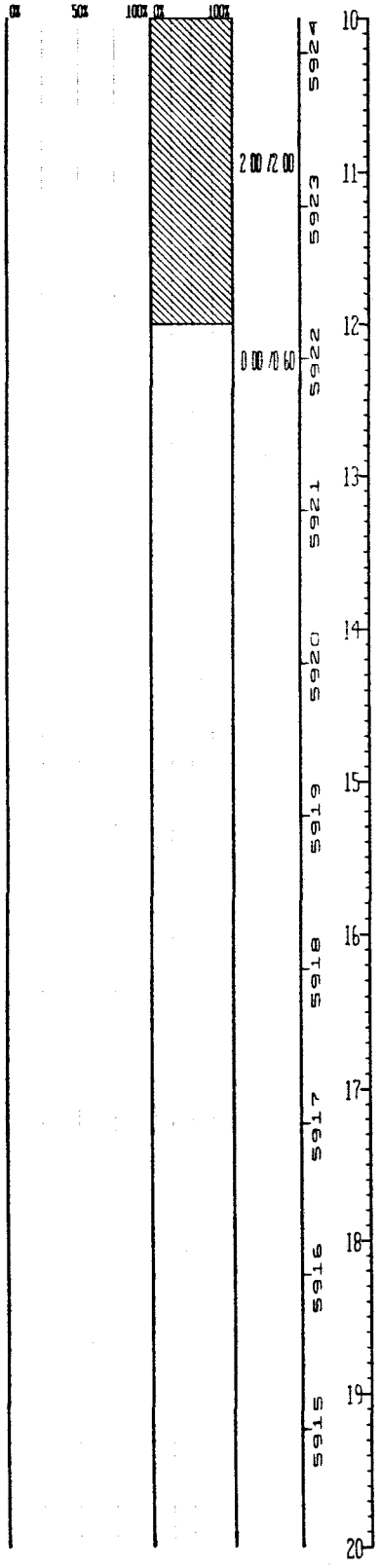
STATE PLANE COORDINATE		TOTAL DEPTH (FT) 12 6	GROUND ELEVATION (FT)	5934 23	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748184	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	DAB/JAB	33991
EAST	2085081	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	09/13/91	

REMARKS

CHEMICAL SAMPLE DEPTH	GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		BH00361EBU1		100%		5934	0				
		BH00362EBU1			1 30 /2 00	5933	1				
						5932	2				
		BH00364EBU1			1 90 /2 00	5931	3				
		BH00365EBU1									
						5930	4				
					2 00 /2 00	5929	5				
		BH00363EBU1									No recovery for this interval
						5928	6			SANDY SILTSTONE	Same as above
										CLAYSTONE	Claystone Grayish brown (2 5Y 3/2) to dark grayish brown (2 5Y 4/2) to light olive brown (2 5Y 5/3) Trace silt Nil porosity Trace calcareous cement -- mainly argillaceous Slightly friable Vague, indistinct laminations, sharp lower contact, gradual upper contact Dry 0-10% Silt, 90-100% Clay
					1 80 /2 00	5927	7				
										SANDSTONE	Sandstone Light yellowish brown (2 5Y 6/3) to light olive brown (2 5Y 5/3) to dark yellowish brown (10YR 4/6) to light brownish gray (2 5Y 6/2) and grayish brown (10YR 5/2) to dark yellowish brown (10YR 4/4) to yellowish brown (10YR 5/4) Very f g to f g mod well sorted Subangular to rounded, with a porosity of approx 10-15% Argillaceous cement, mod to highly friable 90-97% quartz, balance is micas, dark mafic minerals, and fe-oxides and rock fragments Sharp upper contact, no bedding apparent Dry 75-90% Sand, 10-25% Fines
						5926	8				
		BH00367EBU1			2 00 /2 00	5925	9				
		BH00366EBU1					10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 12 6	GROUND ELEVATION (FT) 5934 23	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748184	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST DAB/JAB	33991
EAST	2085081	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/13/91	
REMARKS					

CHEMICAL SAMPLE DEPTH
GEOTECHNICAL SAMPLE DEPTH
SAMPLE NUMBER
SAMPLE GRAIN SIZE (0% 50% 100%)
PERCENT RECOVERY (0% 100%)
RECOVERY/INTERVAL
DATUM (FT)
DEPTH (FT)
WELL OR PIEZOMETER CONSTRUCTION
LITHOLOGY
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE
DESCRIPTION



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
CLAYSTONE	Claystone Light olive brown (2 5Y 5/3) to grayish brown (2 5Y 5/2) to Ywhere rich in Fe-oxides) yellowish brown (10YR 5/6) Trace silt Porosity approx 0%-2% Argillaceous cement Moderately friable (top approx 3"-4") to slightly friable (rest of interval) Strong Fe-staining, with streamers of Fe-oxides scattered throughout No apparent bedding
	Core retained in VOA sleeve
	No recovery for this interval
	Total Depth = 12 6 ft

INDEX OF DATA

Borehole Location Number:	**34091**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

- ✔ Geologic Borehole Log (LOGGER Format)
- __ Geophysical Log
- __ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 10 3	GROUND ELEVATION (FT) 5924 86	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748090	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST CLG/KJT	34091
EAST	2084959	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/16/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	B0035EU1					0			CL	Sandy Clay Very dark gray (10YR 3/1) Well graded sand and gravel in low plasticity clay (80%) and silt (20%) matrix Sand is subrounded to subangular, very fine to med, mean = fine, composed of quartz, feldspar, Fe-oxide fragments, dark green mafic minerals Gravel is subrounded to subangular, mean size = 1" diameter, max size = 2" diameter, composed of, quartzite and quartz Dry Abundant plant roots above 0 75' 8% Gravel, 17% Sand, 15% Silt, 60% Clay
	B0036EU1			1 00 /2 00	5924	1				
					5923	2				VOA sample obtained from this interval
										No recovery for this interval
									CL	Same as above
	B0037EU1			2 00 /2 00	5922	3			CL	Silty Clay with some Sand Dark brown (10YR 4/3) Clay and silt matrix contains very fine to med sand and trace of fine gravel Sand is subangular, mean size = fine, composed of Fe-oxide fragments, quartz, feldspar, micas (weathered) Gravel mean size= 1/4" diameter, up to 1" diameter below 4', subangular, composed of quartzite, quartz, rock fragments Gravel more abundant at base (5 4') Some caliche present throughout 2% Gravel, 8% Sand, 36% Silt, 54% Clay
	B0038EU1									
					5921	4				Core retained in VOA sleeve,
									CL	Same as above
				2 00 /2 00	5920	5			SC	Gravelly Sand Clay Dark brown (7 5YR 4/4) Well graded sand and gravel in clay (75%) and silt (25%) low plasticity matrix Sand is very fine to coarse, mean = med to fine, subangular Composed of quartz, quartzite, rock fragments of granite, schist, feldspar, micas (weathered), mafic minerals Gravel is well graded, mean size = 2" diameter, max size=3" diameter (broken), composed of quartzite 30% Gravel, 35% Sand, 9% Silt, 26% Clay
	B0039EU1				5919	6				
										VOA sample obtained from this interval
									SC	Same as above
				2 00 /2 00	5918	7			SILTY CLAYSTONE	Silty Claystone Gray (5Y 5/1) to light olive brown (2 5Y 5/3) Non porous (<5%) claystone contains trace of caliche in upper 2' (6 2' to 8') and is mottled with patchy Fe-oxide stains No carbonate cement Appears massive Carbonaceous material present in discontinuous patches between 6' and 8' 20% Silt, 80% Clay Top of bedrock = 6 2 ft
	B0040EU1				5917	8				Core retained in VOA sleeve
				2 00 /2 00	5916	9			SILTY CLAYSTONE	Same as above
	B0041EU1				5915	10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 10.3	GROUND ELEVATION (FT) 5924.86	PROJECT NUMBER ENAD	LOG OF BORING NUMBER
NORTH	748090	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST CLG/KJT	34091
EAST	2084959	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7.25	DATE DRILLED 09/16/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%	0.00 /0.30		10				No recovery for this interval.
					5914	11				Total Depth = 10.3 ft.
					5913	12				
					5912	13				
					5911	14				
					5910	15				
					5909	16				
					5908	17				
					5907	18				
					5906	19				
					5905	20				

INDEX OF DATA

Borehole Location Number:	**34191**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 8 2	GROUND ELEVATION (FT)	5935 82	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748089	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	JFU/JAB	34191
EAST	2084707	LOCATOR NUMBER LB	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	09/16/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00314EBU1	0% 50%	100% 0% 100%	1 30 /2 00	5935	0			GM	Silty, Sandy Gravel Very dark grayish brown (10YR 3/2), very dark brown (10YR 2/2), and brown/dark brown (7 5YR 4/3) Gravels to 1 7" (avg 0 4"-0 6"), sands v f g to v c g (mean=f g) Mod graded Gravels subangular to well rounded (some angular, but probably due to fracturing during coring) sands angular to subrounded Gravels mainly quartzite, schists, gneisses, sands quartz and rock fragments Slightly rooted No apparent bedding Dry 70% Gravel, 11% Sand, 19% Fines (approx 11% Silt, 8% Clay
					5934	2				No recovery for this interval
	BH00315EBU1			0 30 /2 00	5933	3			SC	Clayey, Gravelly Sand Reddish brown (5YR 4/4) to strong brown (7 5YR 4/6) Gravel to 0 5", avg 0 3", sand v fine to very coarse, mean=fine Well graded Subangular to sub-rounded gravels, angular to subrounded sands Gravels quartzite and gneisses and schists, sands mainly quartz with some rock fragments No apparent bedding Dry 23% Gravel, 41% Sand, 8% Silt, 28% Clay
					5932	4				No recovery for this interval
				2 00 /2 00	5931	5			CLAYSTONE	Claystone with quartz Sand Light brownish gray (2 5Y 6/2) to light olive brown (2 5Y 5/3) to (where Fe-stained) yellowish brown (10YR 5/6 and 10YR 5/8) Contains very fine to f g quartz sand as well as silt Sand is angular to subangular Porosity = nil to approx 3% Cement is argillaceous Non to slightly friable, slightly fissile Sand is quartz, rock also contains Fe-oxides and trace organics Small areas laminated (6 65', 6 75'-6 80') with organic-rich layers, balance shows no apparent bedding Dry Note Fe-mineralization may be related to faulting/fracturing with Fe-oxides filling voids, healing fractures See 7 1'-7 25', 7 3'-7 45' for clearest examples of these oxides 0-10% Sand, 90%-100% Fines (75%-100% Clay, balance Silt) Top of bedrock = 4 0 ft
					5930	6				
	BH00317EBU1			1 75 /2 00	5929	7				
	BH00316EBU1			0 00 /0 20	5928	8				VOA sample obtained from this interval
										No recovery for this interval
										Total Depth = 8 2 ft
					5927	9				
					5926	10				

INDEX OF DATA

Borehole Location Number:	**34291**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 8 6	GROUND ELEVATION (FT) 5932 03	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748118	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST CLG/KJT	34291
EAST	2084882	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/16/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00375EBU1	50%	100%		5932	0			ML	Gravelly Sandy Silt Very dark grayish brown (10YR 3/2) Well graded gravel and sand with low plasticity clayey silt matrix Sand is fine to coarse, mean = fine, sub-angular to subrounded, composed of quartz, rock fragments of quartzite and granite, feldspar, trace biotite and weathered micas, with trace mafic minerals Gravel is fine to coarse, mean size = 1 1/4", max diameter = 1 3/4", subrounded to subangular, composed of quartzite, granite, schist, gneiss, quartz Some gravel highly weathered, crumbles when handled Caliche coats some gravel surfaces (present in trace amounts only) Abundant plant roots 0'-0 5' Dry 18% Gravel, 15% Sand, 44% Silt, 19% Clay
	BH00376EBU1									VOA sample obtained from this interval
				1 70 /2 00	5931	1				No recovery for this interval
	BH00377EBU1									
					5930	2				
	BH00379EBU1			1 80 /2 00	5929	3			ML	Same as above
	BH00380EBU1								CL	Clay with trace of Sand Dark grayish brown (2 5Y 4/2) clay (98%) and silt (2%) matrix with scarce sand Sand is fine to coarse, subrounded, composed of quartz, quartzite, feldspar Occurs as isolated grains within clay matrix Dry 5% Sand, 2% Silt, 93% Clay
					5928	4			SILTY CLAYSTONE	Silty Claystone Olive gray (5Y 5/2) to light olive brown (2 5Y 5/3) Silt and clay, very low porosity (<5%), no cement, not friable, trace caliche present replacing patches of claystone Color progressively more olive with depth Weathered Dry 25% Silt, 75% Clay Top of bedrock = 3 4 ft
				2 00 /2 00	5927	5				No recovery for this interval
									SILTY CLAYSTONE	Same as above
	BH00382EBU1				5926	6				VOA sample obtained from this interval
									SILTY CLAYSTONE	Same as above
	BH00381EBU1			2 00 /2 00	5925	7			CLAYEY SILTSTONE	Clayey Siltstone Olive (5Y 5/3) Silt and clay, porosity = 8%, no cement, mod friable, massive, no apparent bedding Weathered Dry 80% Silt, 20% Clay
					5924	8				Core retained in VOA sleeve
				0 00 /0 60						No recovery for this interval
					5923	9				
						10				Total Depth = 8 6 ft

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Borehole Location Number:	**34391**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 7.5	GROUND ELEVATION (FT) 5930.29	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748166	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST JFU/JAB	34391
EAST	2085116	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN) 7.25	DATE DRILLED 09/17/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00318EBU1			1.00/2.00	5930	0			CL	Silty Sandy Clay with some Gravel. Very dark grayish brown (10YR 3/2) to dark brown (10YR 3/3). Gravel to 1" diameter, avg. approx 0.5". Sand very fine to coarse (mean=very fine). Poorly graded. Sand angular to well rounded, mostly subrounded; gravel angular to subrounded; med. plasticity. Sand approx. 85-90% quartz plus traces mafics, feldspar, rock fragments; gravel mainly quartzite, with weathered granite, sandstone; no bedding apparent. Interval is lightly rooted. Dry. 12% Gravel, 30% Sand, 22% Silt, 36% Clay.
	BH00320EBU1			1.50/2.00	5929	1			CL	Silty Sandy Clay. Yellowish brown (10YR 5/4) to brown (10YR 5/3) to dark brown (10YR 4/3) to dark yellowish brown (10YR 4/4). Several isolated gravel clasts present. Loose gravels also present, probably from 2-2.2' but possibly from anywhere between 1' and 2.2'. Sands very fine to very coarse (mean=med.). Poorly graded. Sands subangular to well rounded, dom. subrounded to rounded. Low to med. plasticity. Sands dom. quartz with traces of mafic minerals, feldspar, and rock fragments. No bedding apparent. 14% Sand, 26% Silt, 60% Clay.
					5928	2				
					5927	3				
										No recovery for this interval.
					5926	4			CL	Same as above.
	BH00319EBU1			1.00/2.00	5925	5			ML	Sandy Silt. Yellowish brown (10YR 5/6 and 10YR 5/8) to dark yellowish brown (10YR 4/4). approx 35-40% Sand, grains of which are very fine to f.g. Also includes some clay. Moderately to well sorted, sands are subangular to very well rounded, dom. rounded. Porosity approx 5-15%. Cement is both calcareous and Fe-oxides plus some argillaceous. Moderately friable. Composition dominated by quartz (approx 50-75%) and semi-lithified, soft Fe-oxides/oxyhydroxides (20-40%), plus traces feldspar, mafics, and rock fragments. No bedding apparent, somewhat gradual upper contact, fairly sharp lower contact. 35-40% Sand, 50% Silt, 10-15% Clay.
					5924	6				
	BH00321EBU1			1.40/1.50	5923	7			CLAYSTONE	Claystone with trace of rounded quartz Sand. Light yellowish brown (2.5Y 6/3) to grayish brown (2.5Y 5/2) to dark grayish brown (2.5Y 4/2) to light brownish gray (2.5Y 6/2). 90-95% Clay with trace silt, trace very fine to f.g. quartz sand, which is subrounded to very well rounded. Nil porosity. Argillaceous with trace calcareous cement. Slightly to non-friable. No bedding apparent. Trace Sand, trace Silt, 90-95% Clay. Top of bedrock = 3.0 ft
					5922	8				
					5921	9				
						10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 7 5	GROUND ELEVATION (FT) 5930 29	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748166	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST JFU/JAB	34391
EAST	2085116	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/17/91	

REMARKS

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00318EBU1	0% 50% 100%	0% 100%		5930	0				
				1 00 /2 00	5929	1				
	BH00320EBU1				5928	2				
				1 50 /2 00	5927	3				No recovery for this interval
					5926	4			CLAYSTONE	Claystone Grayish brown (2 5Y 5/2) to light brownish gray (2 5Y 6/2) Porosity = nil to approx 2% Cement is argillaceous and slightly calcareous Slightly to non-friable Trace organics No apparent bedding 2-10% Silt, 90-98% Clay
	BH00319EBU1			1 00 /2 00	5925	5				VOA sample obtained from this interval No recovery for this interval
					5924	6			SILTY CLAYSTONE	Silty Claystone with a trace of quartz Sand Light brownish gray (2 5Y 6/2) to grayish brown (2 5Y 5/2) to (where Fe-stained) light yellowish brown (2 5Y 6/4) and olive yellow (2 5Y 6/6) 10-30% Silt plus trace of v f g , subangular to well rounded (dom subrounded to rounded, quartz sand -- occasionally to approx 10% Porosity is nil to approx 3% Cement is argillaceous, augmented by Fe-oxides in lowermost approx 0 5' Non-friable to slightly friable No apparent bedding in upper portion, lower approx 0 6 shows v f laminations, slightly wavy 0-10% Sand, 10-30 Silt, 70-90% Clay
	BH00321EBU1			1 40 /1 50	5923	7				
					5922	8				No recovery for this interval Total Depth = 7 5 ft
					5921	9				
						10				

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Borehole Location Number:	**34491**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 6 50	GROUND ELEVATION (FT) 5939 73	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748184	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST CLG/JAB	34491
EAST	2084857	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/17/91	

REMARKS:

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00382EBU1	0% 50% 100%	0% 100%			0			SM	Silty Gravelly Sand Very dark grayish brown (10YR 3/2) and very dark brown (10YR 2/2) to dark brown (10YR 3/3) Gravel to 1 5", avg 0 4" Sand v f g to v c g (mean = m g), well graded, gravel subrounded to rounded, sand angular to subrounded Sand mainly quartz, traces feldspar, rock fragments, gravels quartzite, metamorphic schist and gneiss, sandstone and granite No apparent bedding, rooted at top 25% Gravel, 30% Sand, > 25% Silt, < 20% Clay
				1 40 /2 00	5939	1				
	BH00383EBU1				5938	2			CLAYSTONE	Claystone Dark yellowish brown (10YR 4/4) to grayish brown (2 5Y 5/2) to light olive brown (2 5Y 5/4) to light brownish gray (2 5Y 6/2) to (where Fe-stained) yellowish brown (10YR 5/6 and 10YR 5/8) Traces of very f g quartz sand and up to approx 15% Silt Porosity nil to approx 5% Cement is argillaceous and, in places, calcareous as well Nonfriable to slightly friable, slightly fissile to crumbly Heavily Fe-stained at approx 3 8'-4 3' and approx 4 55'-4 7' No apparent bedding Dry Trace Sand, 5-15% Silt, 85-90% Clay Top of bedrock = 0 6 ft
	BH00385EBU1			2 00 /2 00	5937	3				
	BH00386EBU1				5936	4				VOA sample obtained from this interval
										No recovery for this interval
									CLAYSTONE	Same as above
				1 80 /2 00	5935	5				
	BH00384EBU1				5934	6				VOA sample obtained from this interval
				0 00 /0 50						No recovery for this interval
					5933	7				Total Depth = 6 5 ft
					5932	8				
					5931	9				
					5930	10				

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Borehole Location Number:	N/A
Monitoring Well Location Number:	**34591**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 11 3	GROUND ELEVATION (FT)	5952 19	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748462	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	JFU/JAB	34591
EAST	2085621	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	09/19/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH / SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH00322EBU1	0% 50% 100%	0% 100%		5952	0			SM	Silty Gravelly Sand Very dark brown (10YR 2/2), gravel to 2" diameter, avg 0 5"-0 7", sand very fine to very coarse (mean=med), well graded Grains subangular to rounded, with finer sands to angular Sand dom quartz, with traces of rock fragments, micas, feldspar, gravel quartzite, schist and gneiss No bedding apparent Dry 32% Gravel, 24% Sand, 33% Silt, 11% Clay
			0 60 /2 00	5951	1				No recovery for this interval
				5950	2			CL	Silty Sandy Clay with some Gravel Very dark brown (10YR 2/2), lightening with increasing depth to dark yellowish brown (10YR 4/4) approx 2 7' Grain sizes also vary slightly with depth, with a slight fining downward Gravels in the interval range to approx 2" diameter, avg 0 2"-0 4", and sands are very fine to very coarse (mean=fine) Poorly graded Subangular to subrounded Low to med plasticity Predom quartz sands with traces of micas, feldspar, mafics and rock fragments, micas appear to be generally weathered biotite, with some fresh, from approx 2 8' or 3' and deeper, unit is slightly to heavily calcified, with clasts and streamers of caliche scattered throughout No bedding apparent Dry to slightly moist 5-8% Gravel, 10-25% Sand, 70%-80% Fines
BH00324EBU1			1 60 /2 00	5949	3				No recovery for this interval
				5948	4			CL	Same as above
			1 85 /2 00	5947	5				No recovery for this interval
								CL	Same as above
									No recovery for this interval
				5946	6			SM	Silty Gravelly Sand Yellowish brown (10YR 5/4) Sands range very fine to very coarse (mean=fine to med) and gravels are up to 0 5" (mean=0 2") Well graded Angular to subrounded Sand mainly quartz, traces of mafics, micas, feldspars, in coarse sand - gravel fraction, quartzites dominate with some schists, gneisses, rock fragments also present No bedding apparent Slightly moist 22% Gravel, 41% Sand, 37% Fines
			0 90 /2 00	5945	7			CLAYSTONE	Claystone Light yellowish brown (2 5Y 6/3 and 2 5Y 6/4) to grayish brown (2 5Y 5/2) to light olive brown (2 5Y 5/3 and 2 5Y 5/4) to light brownish gray (2 5Y 6/2) to, where rich in Fe-oxides, yellowish brown (10YR 5/6 and 10YR 5/8) Porosity=nil to approx 3% Argillaceous and minor calcareous cement Non to slightly friable and generally nonfissile with interval from approx 9 6'-10 0' being slightly crumbly Sparse, isolated, rare, sand-sized specks of caliche present above 10 0' Fe-oxides richest approx 10 35' where possible fracture zone is visible Fe-oxides also appear to replace organic fragments No bedding apparent Slightly moist After coring to 10 0', drive sample collected from 9 6'-11 3', portion of drive sample from 9 6'-10 15' is sloughed material 0-10% Silt, 90-100% Clay, exclusive of sloughed material Top of bedrock = 8 2 ft
BH00326EBU1				5944	8				
			2 00 /2 00	5943	9				
					10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 11 3	GROUND ELEVATION (FT)	5952 19	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748462	AREA 0U1	CASING DIAMETER (IN)	2 07	GEOLOGIST	JFU/JAB	34591
EAST	2085621	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	09/19/91	

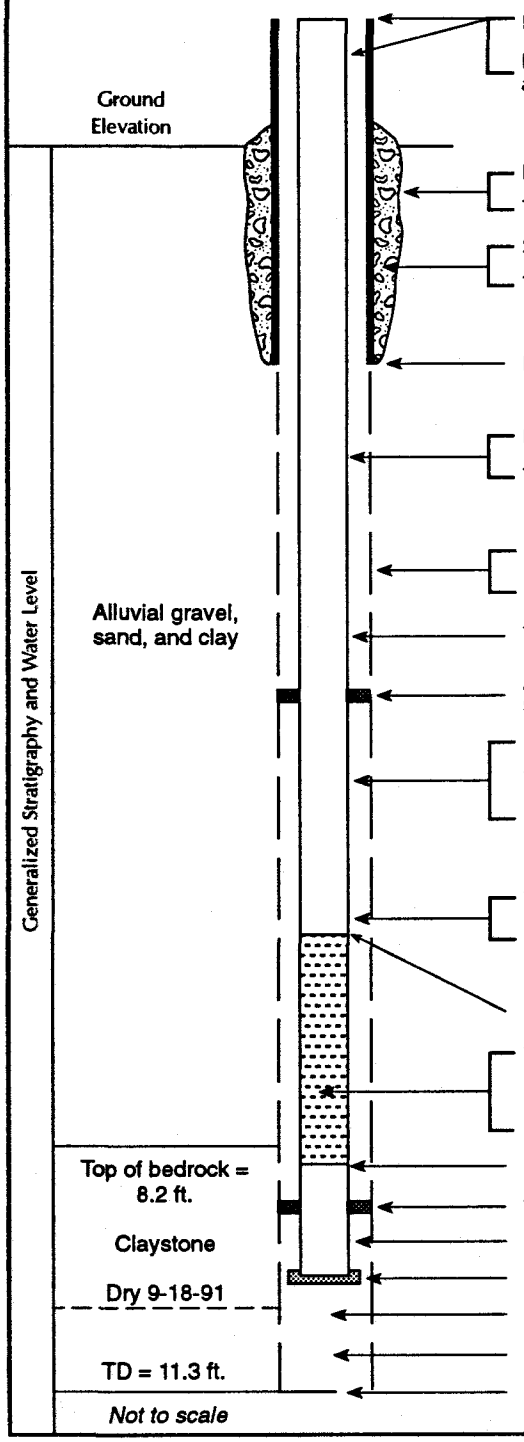
REMARKS

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00325L0U1	0% 50% 100%	0% 100%	1 30 /1 30	5942 5941 5940 5939 5938 5937 5936 5935 5934 5933	10 11 12 13 14 15 16 17 18 19 20			CLAYSTONE	Claystone Light olive brown (2 5Y 5/3 to light yellowish brown (2 5Y 6/3) to light olive brown (2 5Y 5/4) to light brownish gray (2 5Y 6/2) to, where Fe-stained, yellowish brown (10YR 5/6 and 5/8) Porosity = nil Argillaceous with minor calcareous cement Non to slightly friable, noncrumbly Fe-oxides strongest at point approx 10 35' (measuring from 9 6 block downward) where possible fracture zone is visible No other structures, except more possible Fe-oxide-replaced organic fragments apparent Slightly moist 100% Fines (90-100% Clay, balance Silt)
										VOA sample obtained from this interval
										No recovery for this interval
										Total Depth = 11 3 ft

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748462.1375 ft.	Page	1 of 1
Location	881 Hillside	Easting	2085620.5622 ft.	Well No.	34591
Date Completed	9-19-91	Original Depth	11.3 ft.	Aquifer	Alluvial
Inspected by	J. Uhlinger	Date	9-19-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 11.3 ft.



Elevation of top of surface casing/riser pipe	5955.19 ft./5954.63 ft.
Height of top of surface casing/riser pipe above ground surface	3.0 ft./2.4 ft.
Depth of surface seal below ground surface	2.95 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.0 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	11.3 ft.
Type of backfill	NA
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	2.95 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	6.0 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	6.0 ft.
Elevation/depth top of screened section	6.9 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	8.9 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.4 ft.
Elevation/depth bottom of plugged blank section	11.3 ft.
Elevation/depth bottom of sand column	11.3 ft.
Type of backfill below observation pipe	NA
Elevation/depth of hole	11.3 ft.

Rev. 10/5/92

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Borehole Location Number:	**34691**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 14 0	GROUND ELEVATION (FT)	5925 03	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748057	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	CLG/JAB	34691
EAST	2084846	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	09/18/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	B4003788U1	CL SC	100% 0% 100%		5925	0			CL	Silty Sandy Clay with Gravel Dark grayish brown (10YR 4/2) to dark reddish brown (5YR 3/4) to very dark brown (10YR 2/2) Gravel to 0 5" (avg 0 2"), sand very fine to very coarse (mean=fine) Poorly graded Subangular to subrounded Low to med plasticity Sand quartz and rock fragments Gravel quartzite, schists and gneisses, interval rooted and contains substantial organics No apparent bedding Dry 4% Gravel, 25% Sand, 26% Silt, 45% Clay
	B4003888U1									
				1 40 /2 00	5924	1				
	B4003898U1									
					5923	2				VOA sample obtained from this interval
										No recovery for this interval
									CL	Silty Sandy Clay Dark grayish brown (10YR 4/2) to very dark grayish brown (10YR 3/2) to dark brown (10YR 3/3) Trace scattered gravel (to approx 0 2" diameter) Sands very fine to very coarse (mean=med) Poorly graded, subangular to rounded Medium plasticity Sand dom quartz, traces mafics, micas, feldspar, rock fragments, trace calcareous material towards bottom of interval Minor rooting, organics No apparent bedding Dry Trace gravel, 15% Sand, 15% Silt, 70% Clay
	B4003918U1			1 70 /2 00	5922	3				
	B4003928U1									
					5921	4			CL	Silty Sandy Clay with Gravel Dark brown (10YR 4/3 and 10YR 3/3) to dark yellowish brown (10YR 4/4) Gravel to 0 6" (avg 0 2" - 0 3"), sand very fine to very coarse (mean =med) Poorly to mod graded, angular to rounded (avg approx subangular to subrounded), med plasticity Calcareous, gravels include volcanic clasts (andesitic), quartzite, sands mainly quartzite with mafics (from weathering volcanics, most likely) plus feldspar, micas, rock fragments Calcareous content sharply decreasedin 4 0-6 0' interval, this interval also shows decrease in gravel (to approx 5%) and increase in fines (to approx 75%) No bedding apparent Dry 10% Gravel, 20% Sand, 30% Silt, 40% Clay
				2 00 /2 00	5920	5				
	B4003968U1									
					5919	6				
				1 50 /2 00	5918	7				
					5917	8				
	B4003978U1									
	B4003988U1			1 00 /2 00	5916	9				
						10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 14 0	GROUND ELEVATION (FT) 5925 03	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748057	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST CLG/JAB	34691
EAST	2084846	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/18/91	

REMARKS

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00387EBU1	0% 50%	100% 0% 100%		5925	0				
	BH00388EBU1									
				1 40 /2.00	5924	1				
	BH00389EBU1									
					5923	2				
	BH00391EBU1			1 70 /2.00	5922	3				
	BH00392EBU1									
										No recovery for this interval
					5921	4			CL	Same as above
				2 00 /2.00	5920	5				
										VOA sample obtained from this interval
	BH00390EBU1				5919	6			SM	Gravelly Silty Sand Dark yellowish brown (10YR 4/4) to dark brown (7 5YR 4/4) to strong brown (7 5YR 4/6) to yellowish brown (10YR 5/6) Gravels to 2", avg approx 0 5" - 0 7", sands very fine to very coarse (mean=med) Well graded Angular to subrounded Sand mainly quartz, with traces of mafics, feldspar, micas and some rock fragments Gravels dom quartzite, with minor schists and gneisses Slightly calcareous No bedding apparent, although some zones are more gravel-rich than others Silty sand is Fe-stained to varying degrees, carbonaceous material also present as scattered fragments and globs Dry 30% Gravel, 35% Sand, 24% Silt, 11% Clay
				1 50 /2.00	5918	7				
					5917	8				No recovery for this interval
									SM	Same as above
	BH00393EBU1									
	BH00394EBU1			1 00 /2.00	5916	9				VOA sample obtained from this interval
										No recovery for this interval
						10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 14 0	GROUND ELEVATION (FT) 5925 03	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748057	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST CLG/JAB	34691
EAST	2084846	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/18/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				1 60 /2 00	5914	11			CLAYSTONE	Claystone From 10' to 11 6', light yellowish brown (2 5Y 6/3 and 2 5Y 6/4) to light olive brown (2 5Y 5/4) to (where Fe-stained) yellowish brown (10YR 5/8); from 12' to 13 75' light brownish gray (2 5Y 6/2) to grayish brown (2 5Y 5/2) to light olive brown (2 5Y 5/3) to (where Fe-stained) light olive brown (2 5Y 5/4 and 2 5Y 5/6) and yellowish brown (10YR 5/6 and 10YR 5/8). Interval from 10' to 11 6' contains more silt (5-15%) than interval from 12' to 13 75' (2-10%) Porosity=2-5% Cement is argillaceous Non to slightly friable, and slightly to mod Fissile/ crumbly No apparent bedding, although there appears to be a vague order to the Fe-staining from 10 7' to 11 2', where it looks like incipient color banding Dry 2-15% Silt, 85-98% Clay Top of bedrock = 10 0 ft
					5913	12				
	BH00396EBU1			2 00 /2 00	5912	13				No recovery for this interval
									CLAYSTONE	Same as above
	BH00395EBU1				5911	14				VOA sample obtained from this interval
										Total Depth = 14 0 ft
					5910	15				
					5909	16				
					5908	17				
					5907	18				
					5906	19				
						20				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**34791**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 11.0	GROUND ELEVATION (FT) 5951.39	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH 748377		AREA OU1	CASING DIAMETER (IN) 2.07	GEOLOGIST JFU/JAB	34791
EAST 2085521		LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN) 11.5	DATE DRILLED 09/20/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00327EBU1	0% 50% 100%	0% 100%		5951	0			CL	Gravelly, Sandy Clay with Silt. Very dark brown (10YR 2/2), lightening to dark brown (7.5YR 3/4 and 7.5YR 3/3) and strong brown (7.5YR 4/6) around 0.6' to 1.0', then darkening again to very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) from 1.0' to 1.2'. Gravels to 1.2" (avg. 0.2" - 0.3"), sand very fine to very coarse (mean=fine to med.). Moderately to well graded. Grains subangular to subrounded. Low to med. plasticity. Sands mainly quartz, with traces of mafics, micas, feldspar; gravels mainly quartzite. Rooted. No bedding apparent. Dry. 18% Gravel, 13% Sand, 19% Silt, 40% Clay.
	BH00328EBU1			1.20 /2.00	5950	1				
	BH00329EBU1				5949	2				No recovery for this interval.
				1.10 /2.00	5948	3			SM	Silty, Gravelly Sand. Brown (7.5YR 5/4), gravels to 1.5" (avg. 0.3" - 0.4"), sands very fine to very coarse (mean=med.). Moderately graded. Sands angular to rounded (avg. approx subrounded), gravels subangular to rounded. Calcareous, sands mainly quartz and quartzite with traces of mafics, micas, feldspar, rock fragments. Gravels mainly quartzite with some schist and gneiss. No bedding apparent. Dry. 16% Gravel, 47% Sand, 25% Silt, 12% Clay.
					5947	4				No recovery for this interval.
				0.60 /2.00	5946	5			GM	Silty, Sandy Gravel. Reddish yellow (7.5YR 6/6) to strong brown (7.5YR 5/6). Gravel to 2" diameter, avg. 0.5"; sands very fine to very coarse, mean=med. to coarse. Well graded. Sands are subangular to rounded, with coarser fraction showing more rounding; gravels are subangular to subrounded. Sands are mainly quartz, with some rock fragments; gravels mainly quartzite, schist and gneiss. No apparent bedding. Dry to moist. 50-55% Gravel, 30-35% Sand, 7-12% Silt, trace Clay.
					5945	6				No recovery for this interval.
									GM	Same as above.
				0.60 /2.00	5944	7				No recovery for this interval.
	BH00330EBU1				5943	8			CLAYSTONE	Claystone. Light olive brown (2.5Y 5/3) to grayish brown (2.5Y 5/2). Trace to approx. 10% Silt, increasing to approx. 15% from 9.6' to 10.0'. Porosity is nil, increasing to approx. 3% from 9.6' to 10.0'. Argillaceous cement. Non to slightly friable (9.6' to 10.0' more friable than balance of interval), malleable and non fissile above 9.6'; below 9.6', unit is less malleable, more fissile and crumbly. Trace organics, often present as distinct carbonaceous chips or twig-shaped fragments; also present are scattered Fe-stained areas. No clear bedding, although some areas (such as 8.0'-8.4' and 9.2'-9.3') show faint, wavy laminations which are somewhat blended together. Slightly moist. After coring to 10.0', drive sample collected from 9.5' - 11.0'; portion from 9.5'-10.1' in drive sample is sloughed material. 5-15% Silt, 85-95% Clay, exclusive of slough.
				2.00 /2.00	5942	9				
						10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 11.0	GROUND ELEVATION (FT):	5951.39	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER
NORTH:	748377	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	JFU/JAB	34791
EAST:	2085521	LOCATOR NUMBER: M8	BOREHOLE DIAMETER (IN):	11.5	DATE DRILLED:	09/20/91	

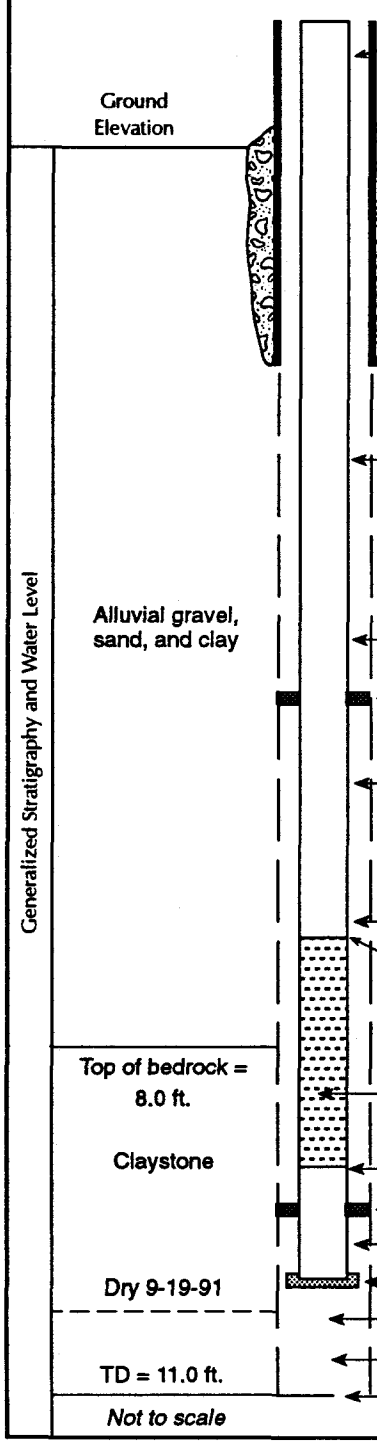
REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				0.50 /1.00	5941	10			CLAYSTONE	(cont. from above) Top of bedrock = 8.0 ft.
										No recovery for this interval
					5940	11				Total Depth = 11.0 ft.
					5939	12				
					5938	13				
					5937	14				
					5936	15				
					5935	16				
					5934	17				
					5933	18				
					5932	19				
						20				

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748376.5147 ft.	Page	1 of 1
Location	881 Hillside	Easting	2085521.1555 ft.	Well No.	34791
Date Completed	9-20-91	Original Depth	11.0 ft.	Aquifer	Alluvial
Inspected by	J. Uhlinger	Date	9-20-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 11.0 ft.



Elevation of top of surface casing/riser pipe	5954.39 ft./5953.91 ft.
Height of top of surface casing/riser pipe above ground surface	3.0 ft./2.52 ft.
Depth of surface seal below ground surface	2.8 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.0 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	11.0 ft.
Type of backfill	NA
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	2.8 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	5.9 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	5.9 ft.
Elevation/depth top of screened section	6.0 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	8.0 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.42 ft.
Elevation/depth bottom of plugged blank section	10.42 ft.
Elevation/depth bottom of sand column	11.0 ft.
Type of backfill below observation pipe	NA
Elevation/depth of hole	11.0 ft.

Rev. 10/5/92

INDEX OF DATA

Borehole Location Number:	**34891**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 14 6	GROUND ELEVATION (FT) 5927 67	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748057	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST CLG/KJT	34891
EAST	2084789	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/19/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00400EBU1	0% 50% 100%	0% 100%			0			GC	Clayey Sandy Gravel Very dark gray (10YR 3/1) Well graded gravel and poorly graded sand in clay and silt matrix Sand is very fine to fine, mean=fine, subangular, composed of quartz, feldspar, rock fragments, mafic minerals Gravel is fine to coarse, well graded, rounded to subrounded max size >3" (large mica schist cobble at 2 2'), mean size is 3/4" diameter Gravel composed of mica schist, quarzite, quartz, granite Plant roots present 0' to 0 65' 40% Gravel, 30% Sand, 9% Silt, 21% Clay
	BH00401EBU1									VOA sample obtained from this interval
	BH00402EBU1			0 90 /2 00	5927 5926	1				
						2				No recovery for this interval
									GC	Same as above
					5925				CL	Silty Clay with some Sand Olive gray (5Y 4/2) Matrix is low plasticity clay (85%) and silt (15%) Sand is very fine to coarse, mean=fine, subrounded to subangular, composed of quartz, feldspar, Fe-oxide chunks, mafic minerals Trace of caliche within matrix throughout interval 18% Sand, 12% Silt, 70% Clay
	BH00403EBU1			2 00 /2 00		3				
	BH00405EBU1				5924				CL	Sandy Clay Dark yellowish brown (10YR 4/3) Very fine to med sand and fine to coarse gravel within low plasticity clay and silt matrix Sand mean size = fine to very fine, subangular, composed of quartz, feldspar, weathered micas, green (hornblende?) mafic, black mafic minerals Gravel is sparse, mean size <1", max diameter = 2" at 6 25' (where several large cobbles are present), sub-rounded, composed of quartzite, granite, quartz, schist Caliche present just above 7 5' 5% Gravel, 33% Sand, 19% Silt, 43% Clay
					5923	4				
				2 00 /2 00		5				
					5922					Core retained in VOA sleeve
	BH00404EBU1					6			CL	Same as above
										VOA sample obtained from this interval
									CL	Same as above
					5921				CL	Inorganic Clay Yellowish brown (10YR 5/6) Low plasticity clay with traces of sand and gravel Well graded Sand is very fine to coarse, subrounded to subangular, mean size=coarse, composed of quartz, rock fragments Gravel is fine to coarse, mean size = 1 1/2", max size=2" lengthwise, rounded to subrounded, composed of quartzite, quartz, granite Sand and gravel widely dispersed through clay Coarse gravel occurs at 10', 10 7' Matrix appears composed of weathered bedrock claystone (see below) 3% Gravel, 5% Sand, 2% Silt, 90% Clay
				2 00 /2.00		7				
					5920					
						8				
										Core retained in VOA sleeve
					5919				CL	Same as above
	BH00407EBU1			2 00 /2 00		9				
					5918					
	BH00406EBU1					10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 14 6	GROUND ELEVATION (FT) 5927 67	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748057	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST CLG/KJT	34891
EAST	2084789	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/19/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERED (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						10			CL	Same as above
				2 00 /2 00	5917	11			CLAYSTONE	Claystone Dark gray (10YR 4/1) to gray (5Y 5/1) with strong brown (7 5YR 5/8) Fe-oxide stains Low porosity (5-10%), easily crumbled/broken below 11 5', no cement Fe-oxide stains along irregular, discontinuous, low-angle fracture surfaces Fe-stone nodules (fine pebble size) at 11 5' Wavy laminations apparent where organic material present at 11'' to 11 3' Weathered 5% Silt, 95% Clay
					5916	12				Top of bedrock = 11 0 ft
										Core retained in VOA sleeve
					5915	13			CLAYSTONE	Same as above
	B10019EBU1			2 00 /2 00						
	B10018EBU1				5914	14				VOA sample obtained from this interval
				0 00 /0 60						No recovery for this interval
					5913	15				Total Depth = 14 6 ft
					5912	16				
					5911	17				
					5910	18				
					5909	19				
					5908	20				

INDEX OF DATA

Borehole Location Number:	**34991**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 16 3	GROUND ELEVATION (FT) 5924 78	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748002	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/KJT	34991
EAST	2084742	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/23/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
0%	BH00410EBU1	50%	100% 0% 100%	2 00 /2 00	5924	0			SC	Gravelly, Clayey Sand Very dark grayish brown (10YR 3/2) Well graded sand and gravel with silty clay, low plasticity matrix Sand is v f g to c g , mean = f g to v f g , sub-angular to subrounded, composed of quartz, feldspar, biotite and weathered micas, mafic minerals, rock fragments (c g sand) Gravel is f g to c g , mean size=1/2" diameter, max size = 1", subrounded, composed of quartz, mica schist, feldspar, quartzite, granite Roots and plant material abundant at 0' to 0 3' Dry 20% Gravel, 40% Sand, 14% Silt, 26% Clay
	BH00411EBU1				5923	1				
						2				VOA sample obtained from this interval
						2			SC	Same as above
	BH00413EBU1			2 00 /2 00	5922	3			ML	Clayey Silt Dark yellowish brown (10YR 4/4) with some sand and gravel Low plasticity silt and clay matrix contains well graded sand and gravel Sand is v f g to c g , mean= v f g to f g , subangular to subrounded, composed of quartz rock fragments, feldspar, biotite, muscovite, mafic minerals Gravel is pred fine, mean size=1/2", max diameter 3/4", subrounded, composed of quartzite and quartz, some schist fragments Coarse sand size organic/carbonaceous fragments also present Trace of caliche--patchy, replacing silt and clay Dry 15% Gravel, 10% Sand, 50% Silt, 25% Clay
	BH00414EBU1				5921	4				
						4				Core retained in VOA sleeve
				1 90 /2 00	5920	5			SW-SM	Gravelly Sand Strong brown (7 5YR 4/6) Well graded gravel and sand Matrix low plasticity silt and clay Sand very fine to coarse, mean = coarse, subangular to rounded, composed of quartz, rock fragments (quartzite, granite), feldspar, trace mafic minerals, trace weathered micas Gravel fine to coarse, well graded, mean size = 1 3/4", max size > 3" diameter (freshly broken cobbles common), subangular to rounded, composed of quartzite, granite, some felsic mica schists Granite cobbles strongly weathered, crumbly, broken Some caliche present on gravel surfaces above 7' and within sandy matrix Dry 45% Gravel, 50% Sand, 3% Silt, 2% Clay
	BH00412EBU1				5919	6				
						7				VOA sample obtained from this interval
						7				No recovery for this interval
				1 40 /2 00	5918	7			SW-SM	Same as above
						7				No recovery for this interval
	BH00415EBU1				5917	8			SW-SM	Same as above
				1 40 /2 00	5916	9				
					5915	10				No recovery for this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 16 3	GROUND ELEVATION (FT) 5924 78	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH 748082		AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/KJT	34991
EAST 2084742		LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/23/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				1 90 /2 00	5914	10–11			SW-SM	Same as above
	BH0041GEBU1				5913	11–12				VOA sample obtained from this interval
										No recovery for this interval
									SW-SM	Same as above
	BH0041BEBU1			2 00 /2 00	5912	12–13			CLAYSTONE	Claystone Light olive gray (5Y 6/2) to yellowish brown (10YR 5/6) Non-porous, no cement, non-friable claystone Contains some organic material, low-angle, wavy laminations apparent where organics present Dry 5% Silt, 95% Clay Top of bedrock = 12 3 ft
					5911	13–14				Core retained in VOA sleeve
				2 00 /2 00	5910	14–15			CLAYSTONE	Claystone Dark gray (5Y 4/1) Porosity approx 15% (crumbly-breaking), no cement, mod fissile, contains some organic material (coarse sand-size chips) No bedding apparent Dry 2% Silt, 98% Clay
	BH0041ZEBU1				5909	15–16				VOA sample obtained from this interval
				0 00 /0 30						No recovery for this interval
					5908	16–17				Total Depth = 16 3 ft
					5907	17–18				
					5906	18–19				
					5905	19–20				

INDEX OF DATA

Borehole Location Number:	**35091**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 9 8	GROUND ELEVATION (FT)	5936 97	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747918	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	JFU/KJT	35091
EAST	2084495	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	09/23/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00332EBU1	0% 50% 100%	0% 100%	0 90 /2 00	5936	0			SC	Gravelly Clayey Sand Dark brown (7 5YR 3/2) Well graded gravel in low plasticity sand, clay and silt matrix Sand very fine to coarse, mean = coarse to med , sub-rounded to subangular, composed of quartz, rock fragments (granite, schist, quartzite), feldspar, trace micas, trace mafic minerals Gravel fine to coarse, mean size=1 1/2", max size > 3" (broken cobble of mica schist), rounded to subangular, composed of quartzite, muscovite-bearing schist, granite, quartz Plant roots present within top 0 9' Dry 35% Gravel, 40% Sand, 5% Silt, 20% Clay
					5935	2				No recovery for this interval
	BH00333EBU1			0 30 /2 00	5934	3			GC	Sandy Gravel with some Clay Yellowish brown (10YR 5/6) Well graded sand and gravel with some silty clay matrix Sand fine to coarse, mean = coarse, subrounded to subangular, composed of quartz, rock fragments (granite, gneiss, quartzite), feldspar Gravel fine to coarse, mean size = 3/4", max size > 3 1/2" diameter, rounded to subrounded, composed of quartzite and granite Caliche present within matrix at 4 7' to 4 75' Dry 60% Gravel, 27% Sand, 3% Silt, 10% Clay
					5933	4				No recovery for this interval
									GC	Same as above
				1 30 /2 00	5932	5			SILTY CLAYSTONE	Silty Claystone Light olive brown (2 5Y 5/4) Bedrock composed of clay and silt Top 0 5' of interval also contains trace of alluvial sand (med to coarse) and gravel Porosity <5%, except where caliche is abundant and replacing claystone between 4 75' to 5 3' and 6 0' to 6 3' No cement Slightly friable/crumbly Contains trace black carbonaceous material Appears massive Dry 30% Silt, 70% Clay Top of bedrock = 4 75 ft
					5931	6				
	BH00334EBU1									No recovery for this interval
									SILTY CLAYSTONE	Same as above
				0 55 /2 00	5930	7				VOA sample obtained from this interval
										No recovery for this interval
	BH00335EBU1				5929	8			SILTY CLAYSTONE	Same as above
				1 90 /1 80	5928	9				
					5927	10				Total Depth = 9 8 ft

INDEX OF DATA

Borehole Location Number:	**35191**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 6.0	GROUND ELEVATION (FT)	5951.10	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747845	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	KMM/KJT	35191
EAST	2083816	LOCATOR NUMBER K7	BOREHOLE DIAMETER (IN)	7.25	DATE DRILLED	09/23/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH / SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH00336EBU1	0% 50% 100%	0% 100%		5951	0			CL	Clay with trace of Sand. Dark grayish brown (2.5Y 4/2). Poorly graded, very fine to fine sand in low plasticity clay matrix. Sand is subangular, composed of quartz and feldspar. Plant roots present throughout. No bedding apparent. Clay matrix is identical to clay in underlying bedrock. Dry. 5% Sand, 95% Clay.
BH00337EBU1			0.50 /2.00	5950	1				No recovery for this interval.
				5949	2			CLAYSTONE	Claystone. Light olive brown (2.5Y 5/3) to gray (5Y 5/1) with fe-oxide stained patches of olive yellow (2.5Y 6/8). Very f.g. sand, well sorted, subangular, composed of quartz, trace mafic (heavy) minerals. Claystone is crumbly in upper 1' (2' to 3.3') and therefore has porosity = 8%. No cement. Crumbly, easily broken off core. Sub-horiz., discontinuous color streaks may be related to bedding. Dry. 2% Sand, 8% Silt, 90% Clay. Top of bedrock = 2.0 ft.
BH00340EBU1			1.30 /2.00	5948	3				VOA sample obtained from this interval.
BH00338EBU1									No recovery for this interval.
				5947	4			CLAYSTONE	Same as above.
			1.50 /2.00	5946	5				
BH00339EBU1									VOA sample obtained from this interval.
				5945	6				No recovery for this interval.
									Total Depth = 6.0 ft.
				5944	7				
				5943	8				
				5942	9				
					10				

INDEX OF DATA

Borehole Location Number:	**35291**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 12 6	GROUND ELEVATION (FT) 5926 30	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747985	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/KJT	35291
EAST	2084692	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/24/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00419CBU1	0% 50% 100%	0% 100%		5926	0			CL	Clay with some Silt and Sand Very dark grayish brown (2 5Y 3/2) Low plasticity clay and silt matrix with some v f g to m g sand Sand is pred f g to med , sub-angular to rounded, composed of quartz, feldspar, mafic minerals(?), trace rock fragments of quartzite Plant roots between 0' and 2 5' Some f g gravel present 0'-0 5' Gravel is sub-rounded, composed of quartzite or quartz, mean size approx 1/2" diameter No bedding Dry 10% Sand, 15% Silt, 75% Clay
				2.00 /2.00	5925	1				
	BH00420CBU1									VOA sample obtained from this interval
					5924	2			CL	Same as above
	BH00422CBU1			1.90 /2.00		3				Core retained in VOA sleeve
	BH00423CBU1									No recovery for this interval
					5923				CL	Sandy Silty Clay Dark yellowish brown (10YR 4/4) Well graded sand in silty clay Low plasticity matrix Sand is v f g to c g , mean=m g , subangular to subrounded, composed of quartz, rock fragments (granite, mica schist, quartzite), feldspar Trace caliche No bedding 20% Sand, 20% Silt, 60% Clay
					5922	4				
				2.00 /2.00	5921	5			SC	Gravelly Sand Dark yellowish brown (10YR 4/4) to light olive brown (2 5Y 5/6) Sand and gravel in sandy clay and silt, low plasticity matrix Sand v f g to c g , mean size=v f g to f g , subangular, composed of quartz, granite and quartzite fragments, weathered micas, feldspar, mafic minerals Gravel f g to c g , mean size=1", max size=1 3/4" diameter, subrounded to subangular, composed of quartz-ite, quartz, granite Dry 30% Gravel, 40% Sand, 15% Silt, 15% Clay
	BH00421EBU1					6				
					5920					
										VOA sample obtained from this interval
									SC	Same as above
				1.10 /2.00	5919	7				
										No recovery for this interval
					5918	8			CLAYSTONE	Claystone Light olive brown (2 5Y 5/6) to gray (10YR 5/1) Claystone is usually not porous except where strongly weath-ered with abundant caliche present (8 2' to 8 3', 10 5' to 11 0') No cement, caliche replaces claystone Not friable but easily broken up Some silt size carbonaceous fragments present that appear to lie along subhoriz bedding surfaces, otherwise, claystone is massive Color change from light olive brown to gray occurs at 10' Dry 5% Silt, 95% Clay Top of bedrock at 8 0'
	BH00425EBU1			2.00 /2.00		9				
					5917					
	BH00424EBU1					10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 12.6	GROUND ELEVATION (FT) 5926.30	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747985	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/KJT	35291
EAST	2084692	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7.25	DATE DRILLED 09/24/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2.00 /2.00	5916	10			CLAYSTONE	Same as above
					5915	11				
				0.00 /0.60	5914	12				No recovery for this interval
					5913	13				Total Depth = 12.6 ft
					5912	14				
					5911	15				
					5910	16				
					5909	17				
					5908	18				
					5907	19				
						20				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**35391**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 10 5	GROUND ELEVATION (FT) 5960 53	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748011	AREA OU1	CASING DIAMETER (IN) 2 07	GEOLOGIST KMM/JAB	35391
EAST	2083907	LOCATOR NUMBER K8	BOREHOLE DIAMETER (IN) 11 5	DATE DRILLED 09/25/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00341EBU1				5960	0			CL	Clay with Silt, Sand, and Gravel Mottled -- brown (10YR 5/3, 10YR 4/3), strong brown (10YR 4/6), grayish brown (2 5Y 5/2) Gravel to approx 0 7", average approx 0 3", sand v f g to v c g (mean= f g to m g), pockets of sandy and clayey material exist Poorly graded Clasts subangular to subrounded Low to med plasticity Traces organics, Fe-oxides, calcareous content No bedding apparent, though if seen on larger scale, the sandy/clayey pockets might prove to be lenses Dry 5%-10% Gravel, 10%-20% Sand, 70%-85% Fines (mostly Clay)
	BH00342EBU1			1 20 /2.00	5959	1				
						2				VOA sample obtained from this interval
										No recovery for this interval
	BH00344EBU1				5958				SM	Gravelly Sand with Silt and Clay Dark yellowish brown (10YR 4/4) to strong brown (7 5YR 4/6) Gravel to 2", average approx 0 3"-0 5", sand v f g to v c g , mean=m g Appears to be coarser towards top, finer towards bottom Well graded Except for angular, fractured gravels, all clasts are subangular to subrounded (fracturing due to drill) Gravels are quartzite, schist, gneiss Sands are quartz, some rock fragments, traces mica, mafics Fe-oxides No bedding apparent Dry 15%-25% Gravel, 30%-40% Sand, 35%-45% Fines
	BH00345EBU1			1 20 /2.00	5957	3				
						4				No recovery for this interval
					5956				SM	Same as above
				1 40 /2.00		5				
	BH00350EBU1				5955					VOA sample obtained from this interval
										No recovery for this interval
						6			CLAYSTONE	Claystone Light gray (10YR 7/1) to light olive brown (2 5Y 5/3) to light brownish gray (10YR 6/2) to grayish brown (10YR 5/2) approx 90-98% Clay Porosity nil to approx 4% Cement argillaceous plus trace to some calcareous in vicinity of caliche blebs Non to slightly friable, slightly to mod fissile Trace organics, Fe-oxides, scattered caliche blebs Rare pebbles, probably imported from above, despite variation in 6' and deeper material from this and duplicate (2' offset) runs No bedding apparent Top of bedrock = 6 0'
					5954					
				1 30 /2.00		7				
	BH00348EBU1				5953					
	BH00346EBU1									
						8				No recovery for this interval
					5952				CLAYSTONE	Same as above
				1 20 /1 70		9				
	BH00347EBU1				5951					VOA sample obtained from this interval
										No recovery for this interval
						10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 10.5	GROUND ELEVATION (FT):	5960.53	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER
NORTH:	748011	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	KMM/JAB	35391
EAST:	2083907	LOCATOR NUMBER: K8	BOREHOLE DIAMETER (IN):	11.5	DATE DRILLED:	09/25/91	

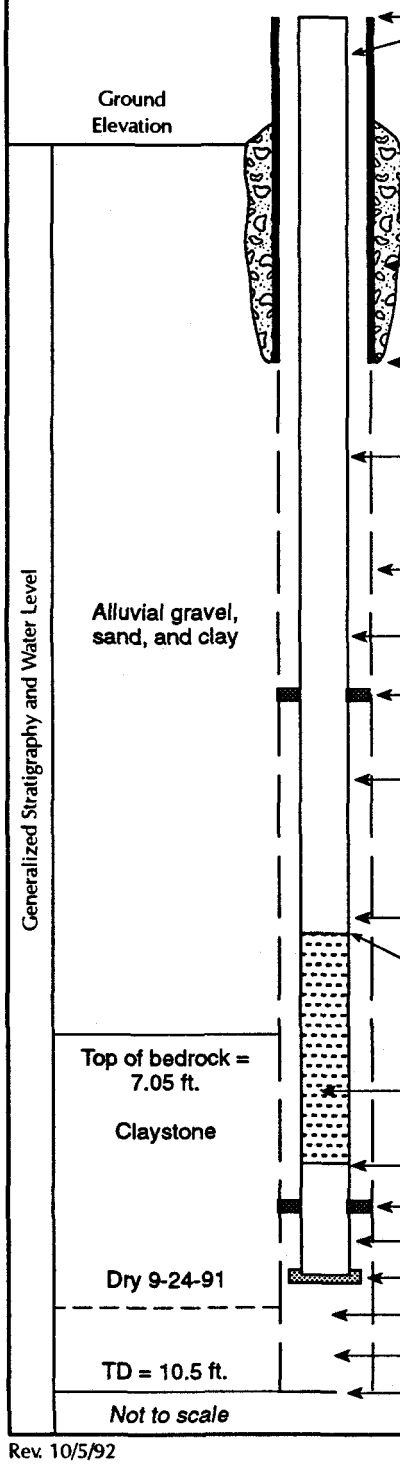
REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%	0.00 /0.80	5950	10				
					5949	11				Total Depth = 10.5 ft.
					5948	12				
					5947	13				
					5946	14				
					5945	15				
					5944	16				
					5943	17				
					5942	18				
					5941	19				
						20				

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748010.7387 ft.	Page	1 of 1
Location	881 Hillside	Easting	2083907.0046 ft.	Well No.	35391
Date Completed	9-25-91	Original Depth	10.5 ft.	Aquifer	Alluvial
Inspected by	K. Maley	Date	9-25-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 10.5 ft.



Elevation of top of surface casing/riser pipe	5963.83 ft./5963.03 ft.
Height of top of surface casing/riser pipe above ground surface	3.3 ft./2.5 ft.
Depth of surface seal below ground surface	2.4 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	1.7 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	10.5 ft.
Type of backfill	NA
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	2.4 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	5.5 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	5.5 ft.
Elevation/depth top of screened section	6.1 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	8.11 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.39 ft.
Elevation/depth bottom of plugged blank section	10.5 ft.
Elevation/depth bottom of sand column	10.5 ft.
Type of backfill below observation pipe	NA
Elevation/depth of hole	10.5 ft.

Rev. 10/5/92

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Borehole Location Number:	**35491**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 10 4	GROUND ELEVATION (FT) 5932 85	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748013	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/KJT	35491
EAST	2084643	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/24/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH / SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH00426EBU1	0% 50% 100%	0% 100%			0			CL	Sandy Clay with some Gravel Very dark gray (5Y 3/1) Well graded sand and gravel within silty, sandy clay matrix Sand v f g to c g, mean=m g to f g, sub-rounded to sub-angular, composed of quartz, rock fragments (granite, schist, quartzite), feldspar Gravel f g to c g, mean size=1/2", max size >3" diameter (large cobble broken by drill), subrounded, composed of quartzite, quartz, granite Gravel often coated with caliche Caliche present throughout Plant roots abundant in top 0 5' Dry 12% Gravel, 35% Sand, 13% Silt, 40% Clay
			1.60 /2.00	5932	1				
BH00427EBU1									
				5931	2				VOA sample obtained from this interval
									No recovery for this interval
								CL	Same as above
									No recovery for this interval
BH00429EBU1			0 70 /2.00	5930	3			CL	Same as above
								GC	Clayey Sandy Gravel Dark yellowish brown (10YR 4/4) Well graded sand and gravel in sandy, silty clay matrix Sand v f g to c g, mean=m g to c g, subrounded to angular, composed of quartz, rock fragments (granite, mica schist, quartz, mafic schist), feldspar, micas, mafic mineral grains Gravel f g c g, mean size approx 5/8", max size =2 1/4" diameter, subrounded to angular, composed of quartzite, sandstone, granite, quartz, schist Some caliche present, coating sand and gravel Dry 45% Gravel, 40% Sand, 3% Silt, 12% Clay
				5929	4				
			1 30 /2.00	5928	5				
BH00428EBU1									VOA sample obtained from this interval
									No recovery for this interval
								CL	Silty Clay Light olive gray (5Y 6/2) to grayish brown (2 5Y 5/2) Low plasticity silt and clay matrix contains trace of sand (c g to m g) and f g pebbles (gravel) Caliche abundant at 6 4' Clay has mottled appearance but no apparent bedding structures Clay appears to be strongly weathered and reworked bedrock that now includes sparse alluvial grains from overlying gravel and sand Dry 2% Sand, 20% Silt, 78% Clay
				5927	6				
			2.00 /2.00	5926	7				
								CLAYSTONE	Claystone Light olive gray (5Y 6/2) to light olive brown (2 5Y 5/4) Clay with some silt, very low porosity (<5%), no cement, easily crumbled, subhoriz color variation may be related to bedding but no bedding structures apparent Dry 10% Silt, 90% Clay Top of bedrock = 6 8'
				5925	8				
BH00431EBU1									
BH00432EBU1									Core retained in VOA sleeve
								SILTY CLAYSTONE	Silty Claystone Dark grayish brown (2 5Y 4/2) to very dark gray (10YR 3/1) Clay with variable silt content, from 30% at top of interval to <10% at base Also increasing amount of organic material (black carbonaceous fragments) with depth Very low porosity, crumbly, weathered, no cement Fe-oxide stains present on planar fracture surfaces at 9 5' to 9 75' Organic material appears concentrated along subhoriz, wavy laminations Dry 20% Silt, 80% Clay
			2.00 /2.00	5924	9				
				5923	10				
BH00433EBU1									VOA sample obtained from this interval

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 10.4	GROUND ELEVATION (FT): 5932.85	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH: 748013	AREA: OU1	CASING DIAMETER (IN):	GEOLOGIST: WGP/KJT	35491
EAST: 2084643	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 09/24/91	

REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				0.00 /0.40		10				No recovery for this interval.
					5922	11				Total Depth = 10.4 ft
					5921	12				
					5920	13				
					5919	14				
					5918	15				
					5917	16				
					5916	17				
					5915	18				
					5914	19				
					5913	20				

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Borehole Location Number:	**35591**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 6 3	GROUND ELEVATION (FT) 5944 04	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748138	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/KJT	35591
EAST	2084682	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/26/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
0%	B00433EB01	50%	100% 0%	100%	5944	0			gp-GC	Well graded Gravel Light olive brown (2 5Y 5/3) Low plasticity clay and silt matrix surrounding well graded sand and gravel Sand v f g to c g, mean=m g, subangular to rounded, composed pred of rock fragments (granite, schist, quartzite), quartz, feldspar, trace micas Gravel f g to v c g, mean size = 2", max diameter >3", large cobbles broken into angular fragments Gravel is rounded to angular, composed of granite, granite pegmatite, quartz Dry 75% Gravel, 18% Sand, 3% Silt, 4% Clay
	B00434EB01			0 70 /2 00	5943	1				
					5942	2				VOA sample obtained from this interval
										No recovery for this interval
									gp-GC	Same as above
	B00436EB01			2 00 /2 00	5941	3			CLAYSTONE	Claystone Grayish brown (2 5Y 5/2) to grayish brown (10YR 5/2) with stains colored yellowish brown (10YR 5/8) Clay with trace of silt Most of silt size grains are made of carbonaceous material (black, crumbly) Claystone has very low porosity (<5%) above approx 3 5' Below 3 5', claystone is easily broken, chippy, porosity approx 10% No cement No bedding surfaces present At 2'6", Fe-stone is abundant, replacing claystone along thin (0 1') subhoriz line Between 4 6' and 5 2', claystone cut by numerous planar fractures with Fe-oxide coated surfaces Fracture surfaces are at various angles, but are discontinuous, intersecting Dry 5% Silt, 95% Clay Top of bedrock = 2 3'
	B00437EB01				5940	4				
				2 00 /2 00	5939	5				VOA sample obtained in this interval
	B00435EB01			0 00 /0 30	5938	6				No recovery for this interval
										Total Depth = 6 3 ft
					5937	7				
					5936	8				
					5935	9				
						10				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**35691**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 30.3	GROUND ELEVATION (FT)	5938.76	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER
NORTH:	747797	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	KMM/KJT	35691
EAST:	2084005	LOCATOR NUMBER: K7	BOREHOLE DIAMETER (IN):	11.5	DATE DRILLED:	09/26/91	

REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH / SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH00500EBU1	0% 50% 100%	0% 100%	1.40 /2.00	5938 5937 5936	0 1 2 3			CL	Sandy Gravelly Clay. Brown (10YR 5/3) clay, low plasticity matrix, contains silt, sand and clay with broken fragments of claystone. Well graded sand and gravel. Sand: v.f.g. to c.g., mean size= f.g., subangular to rounded, composed pred of quartz but also includes rock fragments of granite, mica schist and quartzite. Gravel is well graded, f.g. to c.g., mean size=1/2" diameter, max. size >3" (large quartzite cobble), rounded to angular, composed of quartzite, granite, mica schist, quartz, feldspar. Has sharp lower contact with underlying sandy clay (<0.1' thick transition). Clay is Fe-oxide stained at contact. Dry. 10% Gravel, 15% Sand, 15% Silt, 60% Clay
									No recovery for this interval
								CL	Same as above
BH00501EBU1			0.90 /2.00	5935					No recovery for this interval
					4			CL	Same as above
				5934					No recovery for this interval
			0.70 /2.00		5			CL	Same as above
								CL	Sandy Clay. Very dark grayish brown (10YR 3/2). Silty clay, low plasticity matrix, contains well graded sand. Sand: v.f.g. to c.g., mean v.f.g. to f.g., subangular, composed of quartz, granitic quartz, feldspar. Single c.g. cobble present at 8.5'. The cobble is subrounded, 2 1/2" diameter, composed of granite. Dry. Trace Gravel, 22% Sand, 8% Silt, 70% Clay
				5933	6				
				5932					No recovery for this interval
			0.60 /2.00		7			CL	Same as above
								CL	Silty Clay with some Sand and Gravel. Yellowish brown (10YR 5/4). Well graded sand and gravel in silty clay matrix. Sand is v.f.g. to c.g., mean=f.g. and c.g. (bimodal), subangular to subrounded, composed of rock fragments of granite, schist, quartzite, and quartz, trace feldspar, trace micas including biotite. Gravel is f.g. to c.g., mean size = f.g. (3/8" diameter), max. size=1 1/4", composed of quartzite, schist, granite, feldspar. Carbonaceous material also present throughout interval as silt to m.g. sand size fragments. Carbonaceous material makes up approx. 20% of this size material. No bedding--appears massive. Irregularly mottled on small/fine scale. Moist. 8% Gravel, 17% Sand, 15% Silt, 60% Clay
				5931	8				
BH00502EBU1			1.00 /2.00	5930	9				
				5929	10				No recovery for this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 30.3	GROUND ELEVATION (FT):	5938.76	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER
NORTH	747797	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	KMM/KJT	35691
EAST:	2084005	LOCATOR NUMBER: K7	BOREHOLE DIAMETER (IN):	11.5	DATE DRILLED:	09/26/91	
REMARKS:							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% – 50% – 100%)	PERCENT RECOVERY (0% – 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				1.30 /2.00	5928	10–11			CL	Same as above
					5927	11–12				No recovery for this interval
				1.80 /2.00	5926	12–13			CL	Same as above
					5925	13–14				No recovery for this interval
	BH00503EB01			1.90 /2.00	5924	14–15			CL	Same as above
					5923	15–16				No recovery for this interval
				1.80 /2.00	5922	16–17			CL	Same as above
					5921	17–18				No recovery for this interval
				1.60 /2.00	5920	18–19			CL	Sandy Clay: Dark brown (10YR 4/3) to yellowish brown (10YR 5/6). Trace of f.g. gravel and poorly graded sand in silty clay matrix. Gravel is f.g., max. size <1/4" diameter, subrounded, composed of quartz, quartzite. Sand is v.f.g. to m.g., mean=f.g., subangular, composed of quartz, micas (weathered muscovite and biotite), carbonaceous material. Trace of calcium carbonate present within fine matrix. Carbonaceous material is concentrated in very fine, subhoriz., wavy laminae, probably related to depositional bedding. Moist. 5% Gravel, 15% Sand, 5% Silt, 75% Clay.
	BH00505EB01				5919	19–20				VOA sample obtained from this interval
										No recovery for this interval

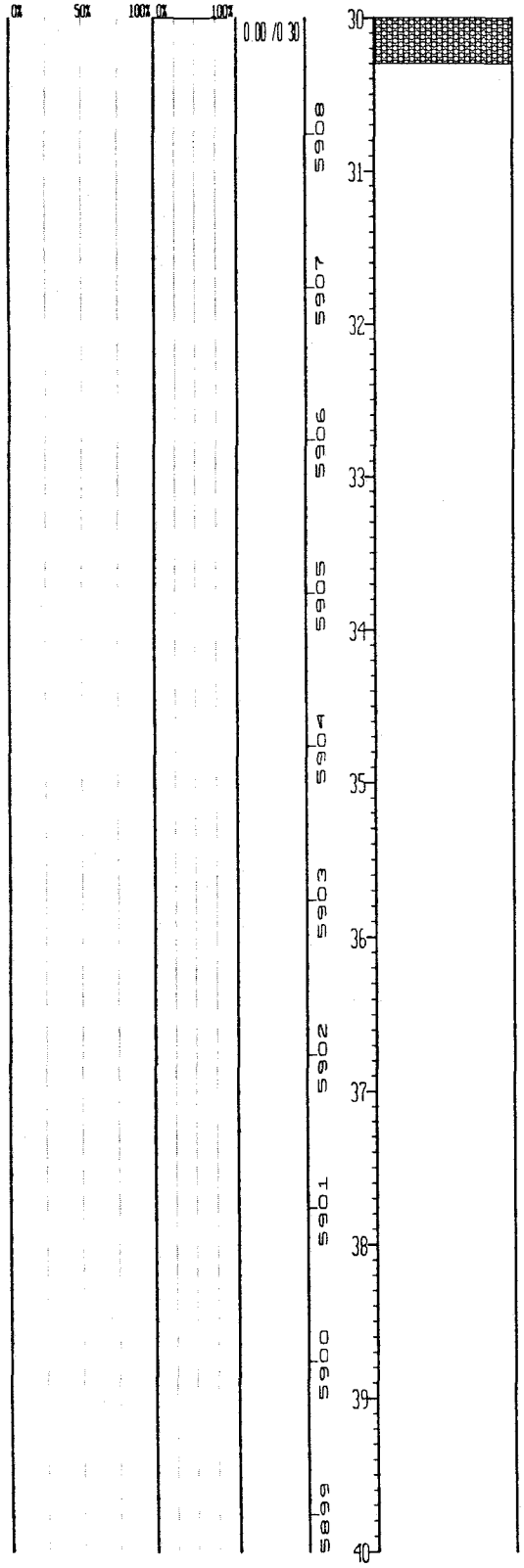
STATE PLANE COORDINATE		TOTAL DEPTH (FT) 30 3	GROUND ELEVATION (FT)	5938 76	PROJECT NUMBER	[MAD	LOG OF BORING NUMBER
NORTH	747797	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	KMM/KJT	35691
EAST	2084005	LOCATOR NUMBER K7	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	09/26/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%							
	BH00504EBU1			1 10 /2 00	5918	20			GC	Clayey Gravel Dark brown (10YR 4/3) to yellowish brown (10YR 5/6) Well graded gravel and sand in clay matrix Gravel is rounded to angular, f g to c.g , mean size = 1", max size = 2 1/2", composed of quartzite, granite, granite pegmatite, quartz Most of the gravel is freshly broken/angular (during drilling) Sand is v f g to m g , mean=f g , subangular, composed of quartz, micas, carbonaceous material Moist 40% Gravel, 15% Sand, 10% Silt, 35% Clay
					5917	21				No recovery for this interval
				1 80 /2 00	5916	22			CL	Silty Clay with some Sand and Gravel Same as at 8 5' - 17 8' Caliche present at 24 4' to 24 6' and at 25 2' Clay appears identical to bedrock claystone immediately below except it contains up to 10% Gravel and 10-15% Sand of alluvial/soil origin No sharp boundary present between this interval and underlying bedrock Moist
					5915	23				No recovery for this interval
						24			CL	Same as above
				1 90 /2 00	5914	25			SILTY CLAYSTONE	Silty Claystone Yellowish brown (10YR 5/4) to very dark grayish brown (10YR 3/2) Massive, mottled claystone, with trace of sand in upper 1' (25 2' to 26 0') Low porosity (5-10%), no cement, not fissile but crumbly-breaking below 28' Weathered throughout with some caliche present between 25 2' and 27 5' and trace of caliche present below 28' Fe-oxide stained in irregular patches throughout No bedding structures apparent Moist 28% Silt, 72% Clay Top of bedrock = 25 2'
					5913	26				No recovery for this interval
					5912	27	09/26/91		SILTY CLAYSTONE	Same as above
	BH00508EBU1			1 60 /2 00						
	BH00506EBU1				5911					VOA sample obtained from this interval
										No recovery for this interval
						28			SILTY CLAYSTONE	Same as above
				1 80 /2 00	5910	29				
	BH00507EBU1				5909					VOA sample obtained from this interval
						30				No recovery for this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 30.3	GROUND ELEVATION (FT):	5938.76	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER
NORTH:	747797	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	KMM/KJT	35691
EAST:	2084005	LOCATOR NUMBER: K7	BOREHOLE DIAMETER (IN):	11.5	DATE DRILLED:	09/26/91	
REMARKS:							

CHEMICAL SAMPLE DEPTH
GEOTECHNICAL SAMPLE DEPTH
SAMPLE NUMBER
SAMPLE GRAIN SIZE
PERCENT RECOVERY
RECOVERY/INTERVAL
DATUM (FT)
DEPTH (FT)
WELL OR PIEZOMETER CONSTRUCTION
LITHOLOGY
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE
DESCRIPTION

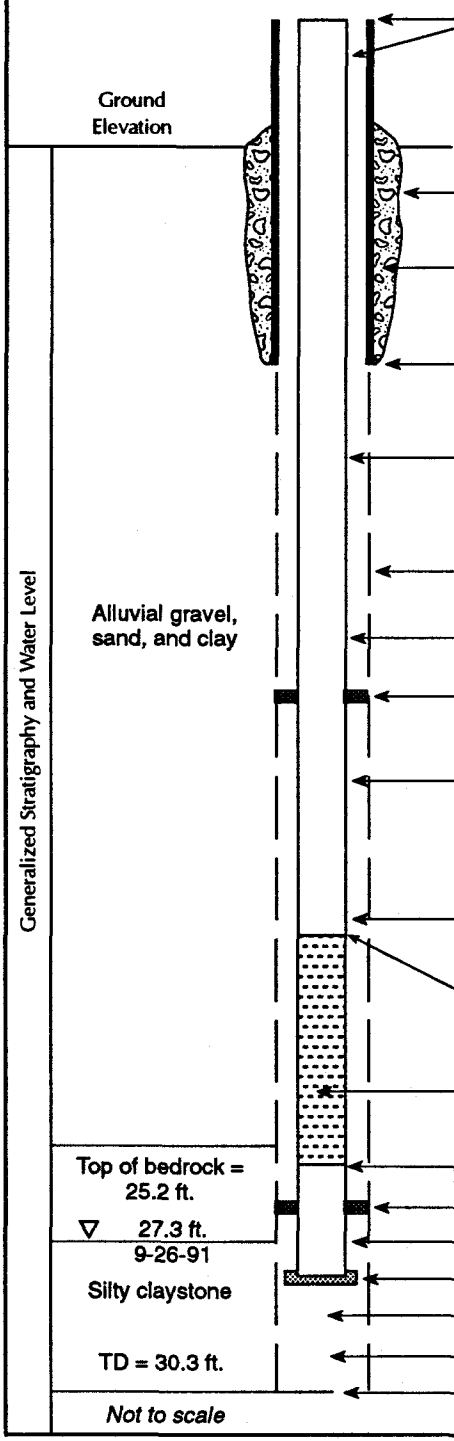


Total Depth = 30.3 ft

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	747796.9597 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084005.3620 ft.	Well No.	35691
Date Completed	9-26-91	Original Depth	30.3 ft.	Aquifer	Alluvial
Inspected by	K. Maley	Date	9-26-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 30.3 ft.



Elevation of top of surface casing/riser pipe	5941.86 ft./5941.36 ft.
Height of top of surface casing/riser pipe above ground surface	3.1 ft./2.6 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	1.9 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	30.3 ft.
Type of backfill	Grout
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	10.4 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	13.4 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	13.4 ft.
Elevation/depth top of screened section	15.58 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	26.56 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.4 ft.
Elevation/depth bottom of plugged blank section	28.96 ft.
Elevation/depth bottom of sand column	28.96 ft.
Type of backfill below observation pipe	Natural
Elevation/depth of hole	30.3 ft.

Rev. 10/5/92

INDEX OF DATA

Borehole Location Number:	**35791**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE	TOTAL DEPTH (FT) 16 3	GROUND ELEVATION (FT) 5958 97	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH 748207	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/KJT	35791
EAST 2084586	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/27/91	
REMARKS				

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH / SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH00438EBU1	0% 50%	100% 0% 100%			0			CL	Sandy Clay with some Gravel Light olive brown (2 5Y 5/4) to yellowish brown (10YR 5/4) Well graded sand and gravel in clay matrix Sand f g to c g, mean=c g, subangular, composed of rock fragments (granite, schist, quartzite) and quartz Gravel f g, mean size = 1/2", max size = 1" diameter, subrounded, composed of quartzite, granite, mica schist. Gravel concentrated between 0 25' to 0 4' and 1 3' to 1 4' Matrix is mixture to two distinctly colored clays (olive brown and yellowish brown) Caliche abundantat 0' to 0 6' and 1 3' to 1 4' Plant roots present withintop 0 3' Dry 10% Gravel, 30% Sand, 5% Silt, 55% Clay
			1 90 /2 00	5958	1				
BH00439EBU1				5957	2				
								CL	Clay with some Sand and Gravel Black (10YR 2/1) to dark yellowish brown (10YR 4/4) (cont below)
									VOA sample obtained from this interval
BH00441EBU1			2 00 /2 00	5956	3				No recovery for this interval
BH00442EBU1								CL	(cont from above) Isolated gravel clasts and dispersed sand within clay matrix Low plasticity clay is organic-rich Sand is v f g to c g, mean=c g, subangular, composed of quartz, rock fragments (gneiss, mica schist, granite pegmatite) Gravel is f g to c g, mean=1/2", max diameter = 1 1/4", subrounded to subangular, composed of some rock fragments Dry 8% Gravel, 15% Sand, 5% Silt, 72% Clay
				5955	4				Core retained in VOA sleeve
			2 00 /2 00	5954	5			CL	Sandy Clay Brown (10YR 4/3) Silty clay matrix Poorly graded sand with trace of f g gravel in low plasticity silty clay matrix Sand f g to m g, subangular, composed pred of rock fragments (granite, schist, quartzite), quartz, feldspar, trace biotite, trace mafic minerals (black) All gravel is f g, rounded, does not exceed 3/4" diameter, composed of granite, quartzite, schist No bedding --massive appearance Dry 2% Gravel, 35% Sand, 13% Silt, 50% Clay
BH00410EBU1				5953	6				VOA sample obtained from this interval
			2 00 /2 00	5952	7			CL	Same as above
									Core retained in VOA sleeve
				5951	8			CL	Same as above
BH00444EBU1			2 00 /2 00	5950	9			SW-SM	Well graded Gravelly Sand Yellowish brown (10YR 5/6) to strong brown (7 5YR 5/6) Well graded gravel and sand Gravel f g to c g, subangular to rounded, mean size=3/4", max size 3" diameter (quartzite cobble), composed of quartzite, granite, schist, quartz, feldspar Sand is v f g to c g, mean=c g, subrounded to subangular, composed of quartzite, quartz, feldspar, schist, granite, mafic mineral grains Has sharp lower contact with underlying claystone bedrock Dry 38% Gravel, 55% Sand, 7% Fines
BH00446EBU1				5949	10				VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 16 3	GROUND ELEVATION (FT) 5958 97	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748207	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/KJT	35791
EAST	2084586	LOCATOR NUMBER LB	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 09/27/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% – 50% – 100%)	PERCENT RECOVERY (0% – 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						10			SW-SM	Same as above
				2 00 /2 00	5948	11			CLAYSTONE	Claystone Light olive gray (5Y 6/2) to light yellowish brown (2 5Y 6/4) Very low porosity (<5%) No cement Non-friable No bedding structures apparent Irregular color mottling Dry 7% Silt, 93% Clay Top of bedrock = 11 2'
										Core retained in VOA sleeve
					5947	12			CLAYSTONE	Same as above
				2 00 /2 00	5946	13			CLAYSTONE	Claystone Yellowish brown (10YR 5/6) Same as above, except contains abundant Fe-oxide nodules and Fe-oxide replacing claystone Porosity = 15% Dry 7% Silt, 93% Clay
	BH0045GBU1								CLAYSTONE	Claystone Grayish brown (10YR 5/2) to light yellowish brown (2 5Y 6 4) Porosity approx 15%, easily crumbled and loose, no cement Massive appearing without bedding structures Fe-oxide stains between 15 5' and 15 75', may be coating fracture surfaces Dry 7% Silt, 93% Clay
	BH0046GBU1				5945	14				VOA sample obtained from this interval
									CLAYSTONE	Same as above
				2 00 /2 00	5944	15				
					5943	16				Core retained in VOA sleeve
				0 00 /0 30						No recovery for this interval
										Total Depth = 16 3 ft
					5942	17				
					5941	18				
					5940	19				
					5939	20				

INDEX OF DATA

Borehole Location Number:	**35891**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 12.6	GROUND ELEVATION (FT): 5975.90	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER
NORTH:	748265	AREA: OU1	CASING DIAMETER (IN):	GEOLOGIST: WGP/JAB	35891
EAST:	2084933	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 10/01/91	

REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH / SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH00446EBU1	0% 50% 100%	0% 100%			0			sc-CL	Gravel-Sand-Clay mixture: Widely variable in color and texture. Light olive brown (2.5Y 5/3, 2.5Y 5/4), light brownish gray (2.5Y 6/2), grayish brown (2.5Y 5/2) and light yellowish brown (2.5Y 6/3, 2.5Y 6/4). Gravels to 1.75", average 0.3"-0.4"; sands v.f.g. to v.c.g. (mean=f.g. to m.g.) Mod. well graded. Subangular to rounded. Medium plasticity. Sands are quartz and rock fragments; gravels are quartzite, schists, gneisses, with a trace of granites; rooted to approx. 2.7' deep, calcareous. No bedding apparent. Dry. 35-40% Gravel, 10-20% Sand, 10-15% Silt, 30-40% Clay.
BH00447EBU1			1.40/2.00	5975	1				
				5974	2				
									VOA sample obtained from this interval.
									No recovery for this interval.
								sc-CL	Same as above.
BH00450EBU1			1.40/2.00	5973	3				No recovery for this interval.
BH00451EBU1								sc-CL	Same as above.
				5972	4			CL	Clay with some Sand and Silt: Light olive brown (2.5Y 5/4) to light yellowish brown (2.5Y 6/3) to, where Fe-stained, olive yellow (2.5Y 6/8). May also contain rare gravels (or they may be imported from under/overlying intervals by drilling), sands v.f.g. to m.g. (mean=f.g.), poorly graded. Subangular to subrounded. Low to med. plasticity. Trace organics, Fe-oxide grains (in addition to Fe-staining), calcareous; sands are mostly quartz plus some rock fragments and traces of mafics and micas. No bedding apparent. Slightly moist. 8% Sand, 5%-9% Silt, 83%-87% Clay.
			1.60/2.00	5971	5				
BH00449EBU1								SM	Silty Gravel - Sand mixture: Very dark brown (10YR 2/2) to dark brown (7.5YR 3/2 and 7.5YR 4/4). Gravels to 1.5" diameter, average 0.3"-0.5". Sands v.f.g. to v.c.g., mean = m.g. Well graded. Angular to rounded. Sands dom. quartz and rock fragments (quartzite, quartz-rich schist and gneiss fragments, and others), with traces of feldspar and carbonaceous clasts. Gravels are mainly quartzite, schist, and gneiss cobbles. No bedding apparent. Slightly moist. 45% Gravel, 40% Sand, 10% Silt, 5% Clay.
				5970	6				
			0.80/2.00	5969	7				
									VOA sample obtained from this interval.
									No recovery for this interval.
								SM	Same as above.
									No recovery for this interval.
				5968	8			CLAYSTONE	Claystone: Light yellowish brown (2.5Y 6/3) to light brownish gray (2.5Y 6/2) from 8.0'-9.75', with a yellow (2.5Y 8/6) caliche-rich zone, from 10.0'-11.75', grayish brown (2.5Y 5/2) to dark gray (10YR 4/1) to, where Fe-stained, olive yellow (2.5Y 6/6). Porosity: nil to approx. 5%. Cement is calcareous plus argillaceous from 8.0' to approx. 9.3', then argillaceous with a small amount of Fe-oxides to 12.0'. Non to slightly friable, slightly to mod. fissile and crumbly. Laminated at 8.0'-8.2' and at 11.0'-11.1' (latter zone less clearly laminated), otherwise (cont. below)
BH00453EBU1			2.00/2.00	5967	9				
BH00452EBU1				5966	10				VOA sample obtained from this interval.

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 12 6	GROUND ELEVATION (FT) 5975 90	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748265	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/JAB	35891
EAST	2084433	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 10/01/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2.00 /2.00	5965	10			CLAYSTONE	(cont from above) no apparent bedding. Caliche-filled fracture present at 8 3' cutting across the core at approx 45 degrees. Weathering decreases with depth, below 10 75', minimal caliche, Fe-oxides present. Dry 5%-30% Silt, 70%-95% Clay. Top of bedrock = 8 0 ft
					5964	11				
				0 00 /0 60		12				Core retained in VOA sleeve No recovery for this interval
					5963	13				Total Depth = 12 6 ft
					5962	14				
					5961	15				
					5960	16				
					5959	17				
					5958	18				
					5957	19				
					5956	20				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**35991**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 16 1	GROUND ELEVATION (FT)	5973 25	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748057	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	KMM/JAB	35991
EAST	2083756	LOCATOR NUMBER K8	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	10/01/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00509EBU1	0% 50% 100%	0% 100%	0 90 /2 00	5973 5972	0 1			CL	Sandy, Gravelly Clay Light olive brown (2 5Y 5/3 and 2 5Y 5/4) to light brownish gray (2 5Y 6/2) to dark yellowish brown (10YR 4/4 and, where Fe-stained, 10YR 4/6) Gravels compose trace to 10% of interval (at 2 9'-3 2', approx 30%), range to 2" diameter, average 0 3"-0 4", sands are v f g to v c g (mean=f g) Overall, poorly graded but at approx 2 9'-3'2' reaches mod well graded Gravels and sands are subangular to subrounded Low to med plasticity Gravels are dom quartzite, schist, and gneiss, sands are mainly quartz with some rock fragments Interval is calcareous No bedding apparent Slightly rooted at very top 2%-10% Gravel, 15%-26% Sand, 10%-35% Silt, 44%-50% Clay
	BH00510EBU1			1 20 /2 00	5971 5970	2 3				No recovery for this interval
									CL	Same as above
										No recovery for this interval
						4			CL	Silty Clay with occasional traces of Sand and Gravel Light olive brown (2 5Y 5/4), light brownish gray (2 5Y 6 2), dark grayish brown (2 5Y 4/2), olive brown (2 5Y 4/3) and dark yellowish brown (10YR 4/4), where Fe-stained, yellowish brown (10YR 5/8) The scattered gravels range up to 1" but average 0 2"-0 3" in diameter, sands are v f g to v c g (mean approx f g) Poorly graded Angular to rounded Low to med plasticity Traces of caliche and calcareous cement from 6 0" to 8 4" Gravels are quartzite, schists, gneisses, sands are quartz with some rock fragments No bedding apparent 0-4% Gravel, 0-10% Sand, 8-40% Silt, 50-90% Clay
				1 10 /2 00	5969 5968	5				No recovery for this interval
						6			CL	Same as above
					5967					No recovery for this interval
				0 30 /2 00	5966	7				
	BH00511EBU1				5965	8			CL	Same as above
										No recovery for this interval
				0 40 /2 00	5964	9 10				

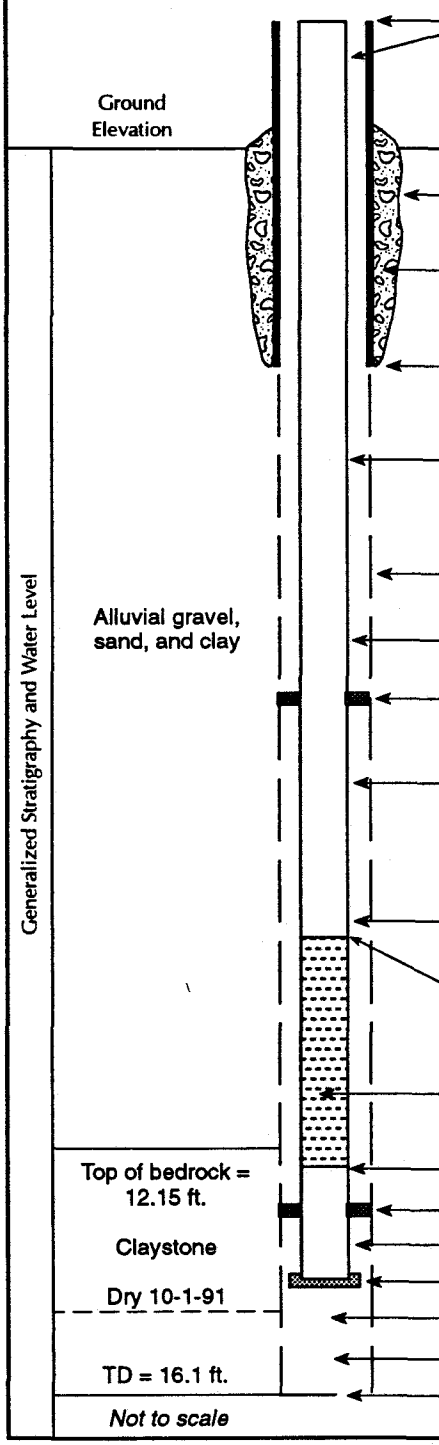
STATE PLANE COORDINATE		TOTAL DEPTH (FT) 16 1	GROUND ELEVATION (FT)	5973 25	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748057	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	KMM/JAB	35991
EAST	2083756	LOCATOR NUMBER K8	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	10/01/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%						CL	Same as above
					5963	10			ML	Sandy Silt-Clay mixture Brown/dark brown (7 5YR 4/4) V f g to v c g sand (mean=f g to v f g), trace gravel (to 0 3") Moderate grading Subangular to rounded gravel, angular to subrounded sands Low plasticity Sand is quartz with some rock fragments No bedding apparent Dry Trace gravel, 30% Sand, 70% Fines
				0 40 /2 00	5962	11				No recovery for this interval
					5961	12			ML	Same as above
				1 90 /2 00	5960	13			CLAYSTONE	Claystone Light brownish gray (2 5Y 6/2) and light yellowish brown (2 5Y 6/3) to grayish brown (2 5Y 5/2), light olive brown (2 5Y 5/3), where Fe-stained, yellowish brown (10YR 5/6) 0-1% Sand (v f g to f g), up to 30% Silt, rest Clay Porosity is nil to approx 3% Cement is argillaceous Non to slightly friable and slightly fissile and crumbly-- not very malleable Trace organics to approx 20% from 14 9' to approx 15 2' Rare sand is almost exclusively quartz Zone from approx 14 9' to approx 15 2' is also somewhat siltier than rest of unit No bedding apparent Trace sand 10%-30% Silt 70%-90% Clay Top of bedrock = 12 15'
	BH0513CBU1					14				
				0 00 /0 90	5959					No recovery for this interval
					5958	15			CLAYSTONE	Same as above
				0 75 /1 00						
	BH0512CBU1									VOA sample obtained from this interval
				0 00 /0 20	5957	16				No recovery for this interval
										Total Depth = 16 1 ft
					5956	17				
					5955	18				
					5954	19				
						20				

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748056.6558 ft.	Page	1 of 1
Location	881 Hillside	Easting	2083755.8410 ft.	Well No.	35991
Date Completed	10-1-91	Original Depth	16.1 ft.	Aquifer	Alluvial
Inspected by	K. Maley	Date	10-1-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 16.1 ft.



Elevation of top of surface casing/riser pipe	5976.82 ft./5976.45 ft.
Height of top of surface casing/riser pipe above ground surface	3.57 ft./3.2 ft.
Depth of surface seal below ground surface	3.67 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	1.43 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	16.1 ft.
Type of backfill	NA
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	3.67 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	6.5 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	6.5 ft.
Elevation/depth top of screened section	8.68
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	13.7 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.4 ft.
Elevation/depth bottom of plugged blank section	16.1 ft.
Elevation/depth bottom of sand column	16.1 ft.
Type of backfill below observation pipe	NA
Elevation/depth of hole	16.1 ft.

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INDEX OF DATA

Borehole Location Number:	**36091**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 18 6	GROUND ELEVATION (FT)	5969 83	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748164	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	CLG/JAB	36091
EAST	2084408	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	10/02/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00454EBU1	0% 50% 100%	0% 100%			0			GM	Hydrocarbon-rich Silty, Sandy Gravel (artificial) Dark brown (10YR 3/3) and very dark grayish brown (10YR 3/2) to black (7 5YR N2) Gravels to 1"5", average 0 4", with asphalt-cemented chunks (asphaltic conglomerates) to core width (2 5"), sands v f g to v c g (mean=m g to c g) Well graded Angular to rounded Sands are approx 25% black grains, most or all of which are either asphalt or asphalt-coated Distinguishable grains are mainly quartz with some rock fragments, traces of feldspar and micas, some black grains may be mafics instead of asphalt Gravels are quartzite, schists and gneisses Calcareous to some extent No apparent bedding, lowermost 1 5" composed of aggregate cement plug overlain by clay-rich (to 20%) material Dry 54% Gravel, 33% Sand, 10% Silt, 3% Clay
	BH00455EBU1			2 00 /2 00	5969	1				
	BH00456EBU1				5968	2				
	BH00458EBU1			1 70 /2 00	5967	3				VOA sample obtained from this interval
	BH00459EBU1								GM	Same as above
										No recovery for this interval
									SM	Same as above
					5966	4			SM	Silty, Gravelly Sand Yellowish brown (10YR 5/4) to brown (7 5YR 5/4) Gravels to 1 2", average 0 2-0 3", sands f g to v c g (mean=m g) Mod to mod well graded Sub-angular to subrounded Sands are quartz, some rock fragments, traces organics, micas, feldspar Gravels mainly quartzite, schists, gneisses Calcareous No apparent bedding Dry 12% Gravel, 55% Sand, 15% Silt 14% Clay
				1 90 /2 00	5965	5				VOA sample obtained from this interval
										No recovery for this interval
	BH00457EBU1				5964	6			CL	Clay with caliche-rich pockets Light yellowish brown (2 5Y 6/4) to gray (5Y 6/1), light olive gray (5Y 6/2), pale olive (5Y 6/4), where Fe-stained, brownish yellow (10YR6/8), in caliche-rich areas, white (10YR 8/1 and2 5Y N8) Poorly graded Medium plasticity Some zones essentially pure caliche, also some zones heavily Fe-stained Caliche also seen as thin drapings and streamers, roots present No bedding apparent Unit appears to be very similar to claystone bedrock Dry 0-10% Silt, 90-100% Clay
				1 80 /2 00	5963	7				No recovery for this interval
									CL	Same as above
					5962	8			GM	Silty, Sandy Gravel Very dark brown (10YR 2/2) to light yellowish brown (10YR 6/4), brown/dark brown (7 5YR 4/3, 7 5 YR 4/4), reddish brown (2 5YR 4/4), dark brown (10YR 3/3), black (10YR 2/1) Gravels to 2" (average 0 3"), sands v f g to v c g (mean=m g to c g), well graded, angular to subrounded Gravels dom quartzite, gneisses, and schists, sands are mostly quartz with some rock fragments and traces of organics as well as some grains of caliche Caliche throughout, except for zone 12 8'-13 15' No bedding apparent Dry to moist 57% Gravel, 30% Sand, 9% Silt, 4% Clay
	BH00460EBU1			1.20 /2 00	5961	9				
	BH00461EBU1									VOA sample obtained from this interval
					5960	10				No recovery for this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 18 6	GROUND ELEVATION (FT) 5969 83	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748164	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST CLG/JAB	36091
EAST	2084908	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 10/02/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						10			GM	Same as above
				1.00 /2.00	5959	11				No recovery for this interal
					5958	12			GM	Same as above
				1.40 /2.00	5957	13				VOA sample obtained from this interval
	BH0046ZEBU1									No recovery for this interal
					5956	14			GM	Same as above
									CLAYSTONE	Claystone Brown (10YR 5/3), light brownish gray (2 5Y 6/2), light olive brown (2 5Y 5/3), and (where strongly calcareous) white (2 5Y 8/2 and 2 5Y N8) Porosity = nil to 3% where more strongly weathered/silty/calcareous (especially 16 9'-17 3') Cement is argillaceous and, below approx 15 5', calcareous Non to slightly friable, non to mod fissile and crumbly Below 16 9', caliche content increases, pure caliche is present in places Fe-staining is present from 14 35' to 14 8', decreasing sharply below 14 8' No apparent bedding Dry 100% Fines (mostly Clay) Top of bedrock = 14 35'
	BH0046YEBU1			2.00 /2.00	5955	15				
					5954	16				Core retained in VOA sleeve
									CLAYSTONE	Same as above
				2.00 /2.00	5953	17				
	BH0046XEBU1				5952	18				VOA sample obtained from this interval
				0.00 /0.60						No recovery for this interval
					5951	19				Total Depth = 18 6 ft
					5950	20				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**36191**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 17.0	GROUND ELEVATION (FT)	5962.89	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748091	AREA OU1	CASING DIAMETER (IN)	2.07	GEOLOGIST	KMM/KJT	36191
EAST	2084198	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	11.5	DATE DRILLED	10/03/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH / SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH00514EBU1	0% 50% 100%	0% 100%	1.60 /2.00	5962	0			CL	Sandy Clay with some Gravel Light brownish gray (2.5Y 6/2) Well graded sand and gravel in silty clay matrix Sand is v f g to m g, mean=f g, angular to subrounded, composed of quartz, granite fragments, feldspar, metamorphic rock fragments Gravel is f g to c g, mean size=1", several cobbles=2 1/2" diameter, subrounded to angular, composed of granite, quartzite, quartz, schist Some granite cobbles strongly weathered and easily broken up/crumbled Caliche abundant at 1 2'-1 5', 2 7'-3 1' Some caliche present throughout Plant roots in top 0'-0 4' Dry 15% Gravel, 25% Sand, 10% Silt, 50% Clay
				5961	1				
BH00515EBU1					2				No recovery for this interval
								CL	Same as above
			1.60 /2.00	5960	3			CL	Clay with some Sand Variably colored from very dark grayish brown (2.5Y 3/2) to light yellowish brown (2.5Y 6/4) and light brownish gray (2.5Y 6/2) Clay with some f g to m g sand Sand is usually f g, subangular, composed of quartz, feldspar and grantic quartz-feldspar Yellowish brown clay at top of interval becomes intermixed with brownish gray and dark grayish brown clay at 3 5' Below 3 5', clay is organic rich, dark grayish brown, massive appearing, with only trace of sand Trace of carbonate present at 3 3" to 3 6' Dry 8% Sand, 14% Silt, 78% Clay
				5959	4				
				5958	5				No recovery for this interval
			0.60 /2.00					CL	Same as above
									No recovery for this interval
				5957	6			CL	Sandy Clay with trace of Gravel Brown (10YR 5/3) to dark yellowish brown (10YR 4/6) V f g to m g sand (mean size = v f g) and trace of gravel in silty clay matrix (med to low plasticity) Sand is subangular to subrounded, composed of quartz, feldspar, micas (muscovite, weathered biotite), metamorphic rock, mafic minerals Gravel is well graded, f g to c g, mean size = 3/4" diameter, max size= 2" lengthwise diameter, subrounded to subangular, composed of quartz, quartzite, granite, mafic schist Dry 10% Gravel, 25% Sand, 15% Silt, 50% Clay
			1.90 /2.00	5956	7				
									No recovery for this interval
								CL	Same as above
				5955	8			SW-SM	Well graded Gravelly Sand Strong brown (7.5Y 4/6) Gravel and sand in low plasticity silt/clay matrix Gravel is f g to c g, mean size = 3/4", max size 2 1/4" diameter, angular to rounded, composed of quartz, quartzite, granite, arkosic wacke, mica schist Sand is v f g to c g, mean size= f g to m g, subangular to rounded, composed of quartz, feldspar, rock fragments (mafic schist, granite, quartzite) Some gravel fragments are strongly weathered, easily crumbled into sand and fine flour (Some large cobbles broken during drilling Maximum size probably > 2 1/4" as measured) Dry 35% Gravel, 38% Sand, 15% Silt, 12% Clay
BH00516EBU1									
			1.60 /2.00	5954	9				
				5953	10				No recovery for this interval

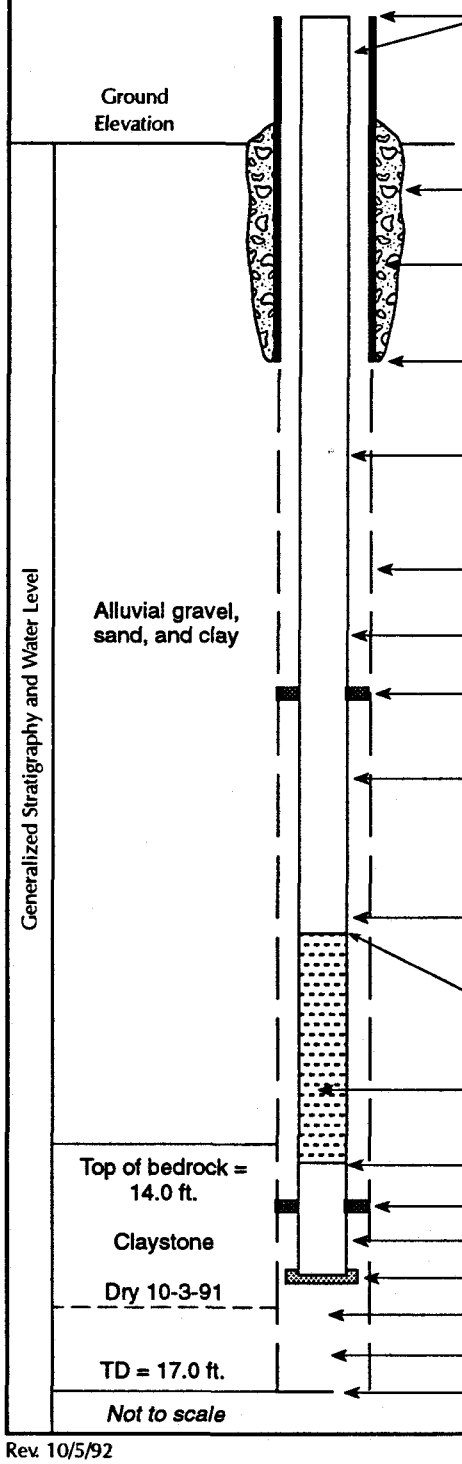
STATE PLANE COORDINATE		TOTAL DEPTH (FT) 17 0	GROUND ELEVATION (FT)	5962 89	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748091	AREA 001	CASING DIAMETER (IN)	2 07	GEOLOGIST	KMM/KJT	36191
EAST	2084198	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	10/03/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						10			SW-SM	Same as above
				0 40 /2 00	5952	11				No recovery for this interval
					5951	12			SW-SM	Same as above
									CL	Clay Light brownish gray (10YR 6/2) to brownish yellow (10YR 6/6) Low plasticity clay with trace of silt-sized carbonaceous fragments This clay looks same lithologically as bedrock claystone, may be large clast or reworked bedrock within alluvium No bedding apparent 2% Silt, 98% Clay
				0 80 /2 00	5950	13			SW-SM	Same as at 8 1' to 12 2', as described above Dry
										No recovery for this interval
					5949	14			CLAYSTONE	Claystone Light brownish gray (10YR 6/2) to brownish yellow (10YR 6/6) Very low porosity (<2%), no cement, nonfriable, composed of clay with trace of silt-sized carbonaceous fragments Appears massive, no bedding surfaces apparent Faint sub-horiz , low-angle color banding is present Dry to slightly moist Trace caliche throughout 2% Silt, 98% Clay Top of bedrock = 14 0'
	BH00518EBU1			1 75 /2 00	5948	15				
	BH00517EBU1				5947	16				VOA sample obtained from this interval
										No recovery for this interval
				0 70 /1 00	5946	17			CLAYSTONE	Same as above
										Total Depth = 17 0 ft
					5945	18				
					5944	19				
					5943	20				

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748090.9342 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084198.4737 ft.	Well No.	36191
Date Completed	10-3-91	Original Depth	17.0 ft.	Aquifer	Alluvial
Inspected by	K. Maley	Date	10-3-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 17.0 ft.



Elevation of top of surface casing/riser pipe	5965.69 ft./5965.17 ft.
Height of top of surface casing/riser pipe above ground surface	2.8 ft./2.28 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.2 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	17.0 ft.
Type of backfill	Grout
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	4.45 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	7.4 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	7.4 ft.
Elevation/depth top of screened section	9.52
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	14.6 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.4 ft.
Elevation/depth bottom of plugged blank section	17.0 ft.
Elevation/depth bottom of sand column	17.0 ft.
Type of backfill below observation pipe	NA
Elevation/depth of hole	17.0 ft.

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INDEX OF DATA

Borehole Location Number:	**36291**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 13.9	GROUND ELEVATION (FT): 5971.90	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	748203	AREA: OU1	CASING DIAMETER (IN):	GEOLOGIST: WGP/KJT	36291
EAST:	2084367	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 10/03/91	
REMARKS:					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00465EBU1	0% 50%	100% 0% 100%			0			SW-SC:	Mixed Gravel, Sand and Man-made Asphalt (gravelly sand). Very dark gray (10YR 3/1). Well graded sand and gravel in pred. clay matrix. Also includes gravel and sand-sized pieces of asphalt (man-made) throughout interval. Sand is v.f.g. to c.g., mean=c.g., angular to rounded, composed of quartz, feldspar, rock fragments, asphalt pieces. Gravel is f.g. to c.g., mean size=1" diameter, max. size=3" diameter, angular to subrounded, composed of quartzite, quartz, mica schist, granite, feldspar, gneiss. Soil is loose, unconsol., and dry. 38% Gravel, 49% Sand, 3% Silt, 10% Clay.
				1.40 /2.00	5971	1				
	BH00466EBU1									
					5970	2				VOA sample obtained from this interval.
										No recovery for this interval.
									SW-SC:	Same as above.
										No recovery for this interval.
	BH00468EBU1			0.70 /2.00	5969	3			SW-SC:	Same as above.
									SC	Sandy Clay with some Gravel: Yellowish red (5YR 4/6), black (5YR 2.5/1), yellow (10YR 8/6), and dark yellowish brown (10 YR 4/3). Well graded sand and gravel in multi-colored clay matrix with abundant caliche. Sand is v.f.g. to c.g., mean size=m.g. to c.g., subrounded to angular, composed pred. of quartz, rock fragments (schist, granite, quartzite), feldspar, micas, mafic minerals. Gravel is f.g. to c.g., mean size=1/2" diameter, max. size=2 3/4" diameter, subrounded, composed of granite, quartzite, smaller fragments of micaceous schist and gneiss. Caliche abundant between 5.0' and 5.4'. Yellow deposit within caliche/clay above 5.0' (4.75'-5.0') may be Fe-sulfate or Fe-hydroxide. Deep yellowish red clay predom. below 5.25', but some present at all levels. Dry. 20% Gravel, 30% Sand, 5% Silt, 45% Clay.
				1.90 /2.00	5967	5				
					5968	4				
	BH00467EBU1				5966	6			cl-SC:	Inter-mixed Silty Clay with some Sand (cl) and Clayey Sand and Gravel (sc). cl is light olive brown (2.5Y 5/3), sc is dark brown (7.5YR 3/3). Silty clay (cl) contains poorly graded sand, v.f.g. to f.g., subangular; quartz, feldspar, Fe-oxide fragments, mafic minerals. No gravel, appears massive, contains some calcium carbonate within clay. Clayey sand (sc) is well graded sand and gravel in clay matrix. Sand is v.f.g. to c.g., mean=m.g., subangular to subrounded, composed of quartz, feldspar, rock fragments of quartzite, granitic pegmatite. Gravel is f.g. to c.g., mean size=1 1/4" max. size = 3" lengthwise, subrounded to rounded, composed of quartzite, granite, quartz, feldspar, muscovite schist. Some caliche present throughout. Dry. CL: 20% Sand, 20% Silt, 60% Clay. SC: 30% Gravel, 50% Sand, 20% Clay.
				1.70 /2.00	5965	7				
					5964	8				
					5963	9				VOA sample obtained from this interval.
	BH00470EBU1			1.60 /2.00						No recovery for this interval.
									cl-SC:	Same as above.
	BH00469EBU1									Core retained in VOA sleeve.
										No recovery for this interval.
					5962	10			cl-SC:	Same as above.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 13.9	GROUND ELEVATION (FT): 5971.90	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH: 748203	AREA: OU1	CASING DIAMETER (IN):	GEOLOGIST: WGP/KJT	36291
EAST: 2084367	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 10/03/91	
REMARKS:				

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERED (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				1.90 /2.00		5				5.4'. Yellow deposit within caliche/clay above 5.0' (4.75'-5.0') may be Fe-sulfate or Fe-hydroxide. Deep yellowish red clay predom. below 5.25', but some present at all levels. Dry. 20% Gravel, 30% Sand, 5% Silt, 45% Clay.
	BH00467EBU1				5966	6			cl-SC:	Inter-mixed Silty Clay with some Sand (cl) and Clayey Sand and Gravel (sc); cl is light olive brown (2.5Y 5/3), sc is dark brown (7.5YR 3/3). Silty clay (cl) contains poorly graded sand, v.f.g. to f.g., subangular; quartz, feldspar, Fe-oxide fragments, mafic minerals. No gravel, appears massive, contains some calcium carbonate within clay. Clayey sand (sc) is well graded sand and gravel in clay matrix. Sand is v.f.g. to c.g., mean=m.g., subangular to subrounded, composed of quartz, feldspar, rock fragments of quartzite, granitic pegmatite. Gravel is f.g. to c.g., mean size=1 1/4" max. size = 3" lengthwise, subrounded to rounded, composed of quartzite, granite, quartz, feldspar, muscovite schist. Some caliche present throughout. Dry. CL: 20% Sand, 20% Silt, 60% Clay. SC: 30% Gravel, 50% Sand, 20% Clay.
				1.70 /2.00	5965	7				
					5964	8				
										VOA sample obtained from this interval.
	BH00470EBU1			1.60 /2.00	5963	9				No recovery for this interval.
									cl-SC:	Same as above.
	BH00469EBU1									Core retained in VOA sleeve.
										No recovery for this interval.
					5962	10			cl-SC:	Same as above.
									CLAYSTONE:	Claystone: Olive gray (5Y 5/2). Clay with trace of black carbonaceous material. Very low porosity, no cement, non-friable. Outside surfaces of core are Fe-oxide stained. Massive. Dry. 2% Silt, 98% Clay. Top of bedrock = 8.5'
				2.00 /2.00	5961	11				VOA sample obtained from this interval.
										No recovery for this interval.
									SILTY CLAYSTONE:	Silty Claystone: Gray (5Y 6/1) to olive yellow (2.5Y 6/4). Clay and silt with trace silt-sized carbonaceous material present at 10' to 11'. Variable porosity, 8% to 30%. Most porous where strongly weathered below 12.5'. No cement, but there are areas where caliche is abundant. Not friable except for caliche zones, which are mod. friable/crumbly. No bedding surfaces apparent. Low angle color banding may reflect original bedding. Dry. 30% Silt, 70% Clay.
					5960	12				
	BH00473EBU1			1.90 /1.90	5959	13				Core retained in VOA sleeve.
									SILTY CLAYSTONE:	Same as above.
	BH00472EBU1				5958	14				VOA sample obtained from this interval.
										Total Depth = 13.9 ft.
					5957	15				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**36391**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 29.8	GROUND ELEVATION (FT) 5964.57	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH 748042		AREA OU1	CASING DIAMETER (IN) 2.07	GEOLOGIST JFU/KJT	36391
EAST 2084294		LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 11.5	DATE DRILLED 10/08/91	
REMARKS					

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00519EBU1	0% 50% 100%	0% 100%			0			SC	Mixed Sand and Clays (artificial fill). Olive brown (2.5Y 4/3) to brown (10YR 4/3). Mixture of variably-colored clays (in pieces), sand and gravel with small asphalt or tar chunks (c.g. sand to silt-sized). Sand is v.f.g. to c.g., well graded, mean size=m.g., angular to subrounded, composed of quartz, feldspar, rock fragments (granite, metamorphic schists and gneisses [garnet-bearing]). Gravel is well graded, mean size=5/8", max. size=2 3/4" diameter (at base of interval), angular to subangular, composed of quartzite and granite. Caliche locally present within clay matrix but not throughout interval. Clay content increases with depth to max. of 50% (by volume). Plant roots present in top 0.7'. Dry above 4', moist below. 10% Gravel, 50% Sand, 5% Silt, 35% Clay.
	BH00520EBU1				5964					
	BH00531EBU1									
	BH00474EBU1									
	BH00521EBU1			0.70 /2.00		1				
					5963					
						2				
	BH00523EBU1				5962					
	BH00524EBU1									
				0.50 /2.00		3				VOA sample obtained from this interval.
										No recovery for this interval.
									SC	Same as above.
					5961					No recovery for this interval.
						4			SC	Same as above.
					5960					VOA sample obtained from this interval.
										No recovery for this interval.
				1.00 /2.00		5			SC	Same as above.
	BH00522EBU1								CL	Sandy Clay with some Gravel. Light olive gray (5Y 6/2) to light olive brown (2.5Y 5/4). Well graded sand and gravel in clay matrix. Gravel mean size (1/2", max. size = 1" diameter, subrounded, composed of quartzite, schist, granite. Sand is v.f.g. to c.g., mean size=m.g., subrounded to angular, composed of quartz, feldspar, rock fragments (gneiss, mica schist, granite), weathered micas (muscovite/chlorite). Fe-oxide stains present 8.5' to 9.0'. Some manmade material remaining--looks like organics, but must be tar or asphalt. This interval may also have been mixed for artificial fill or reworked during construction (?). Moist. 10% Gravel, 30% Sand, 60% Clay.
					5959					
						6				
					5958					
				1.60 /2.00		7				
					5957					
										No recovery for this interval.
						8			CL	Same as above.
					5956					
	BH00526EBU1			1.00 /2.00		9				
	BH00525EBU1									VOA sample obtained from this interval.
										No recovery for this interval.
					5955	10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 29.8	GROUND ELEVATION (FT)	5964.57	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748042	AREA OU1	CASING DIAMETER (IN)	2.07	GEOLOGIST	JFU/KJT	36391
EAST	2084294	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	11.5	DATE DRILLED	10/08/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				1.80/1.60	5954	10			CL	Clay with some Silt and trace of Sand and Gravel: Light olive gray (5Y 6/2) to light olive brown (2.5Y 5/4). Sand and gravel concentrated within narrow band between 12.5' and 13.25', gravel is f.g., sand c.g. to m.g., subangular, composed of strongly weathered granite, schist, and quartzite, with f.g. gravel-sized clay clasts. These clay clasts are present at 14.75' as well. At other depths, clay matrix is mottled with Fe-oxide stains and is massive to finely laminated (but not fissile). Some caliche present between 13' and 13.5'. Clay matrix lithologically similar to underlying claystone bedrock, and may be composed of reworked bedrock. Dry: 3% Gravel, 5% Sand, 15% Silt, 72% Clay.
					5953	11				
	BH00527EBU1					12				
				2.00/2.15	5952					VOA sample obtained from this interval.
						13			CL	Same as above.
	BH00528EBU1				5951					VOA sample obtained from this interval.
						14			CL	Same as above.
					5950					No recovery for this interval.
	BH00530EBU1			1.40/2.00		15			SC	Clayey Sand and Gravel: Strong brown (7.5YR 5/6) to dark brown (7.5YR 3/2). Well graded gravel and sand in silty clay (low plasticity) matrix. Sand: v.f.g. to m.g., mean=m.g. to f.g., subangular to rounded, composed of quartz, rock fragments (granite, schist, quartzite), feldspar. Gravel: f.g. to v.c.g., mean=1", max=2 1/4", subrounded (angular fragments broken during drilling), composed of quartzite, granite, quartz, quartz/feldspar pegmatite. Matrix is mixture of two distinct materials: dark brown silty sandy clay with plant remains and roots, mixed into more abundant strong brown sandy silty clay. Dark brown portion appears to be a buried soil, but its distribution isn't along a horiz. zone. Near vertical mass of dark brown "soil" lies within (cont. below).
					5949	16				
				1.80/2.45	5948	17				
					5947					No recovery for this interval.
										VOA sample obtained from this interval.
	BH00529EBU1					18			SC	(cont. from above) strong brown matrix at 17.4'-17.8'. Dry: 25% Gravel, 25% Sand, 20% Silt, 30% Clay.
					5946				SC	Clayey Silty Sand: Dark yellowish brown (10YR 3/4). V.f.g. to m.g. sand and trace of c.g. gravel in silty clay matrix. Sand: mean size=f.g., subangular, composed of quartz, feldspar, rock fragments (granite, mica schist, quartzite), mafic minerals. Gravel cobble at 19.1' is 1 1/2" diameter and composed of strongly weathered granite. Carbonaceous material also present throughout as black, c.g. to m.g. sand-sized fragments. Dry: 8% Gravel, 55% Sand, 12% Silt, 25% Clay.
				1.80/2.00		19				
					5945	20				

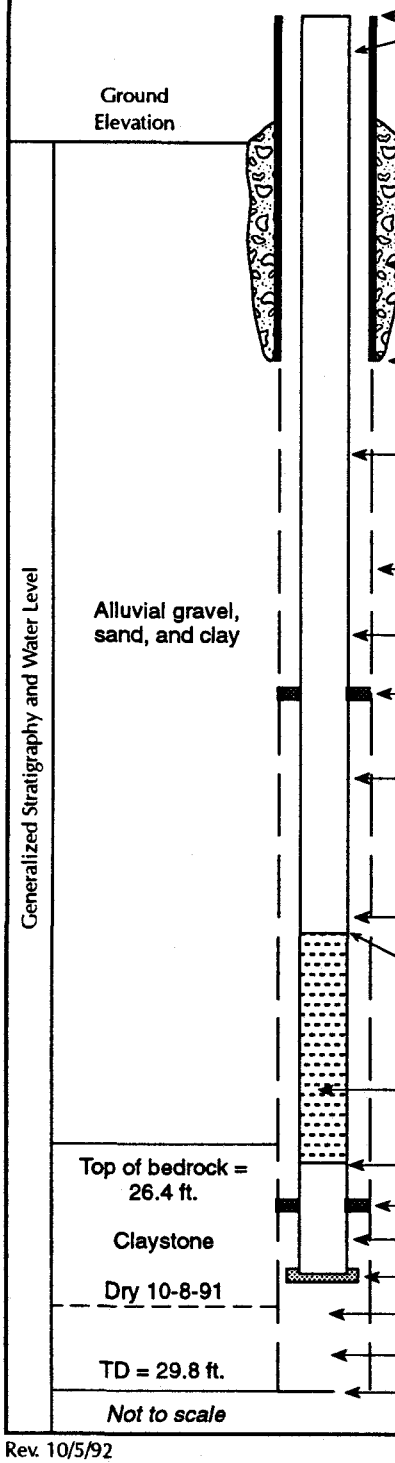
STATE PLANE COORDINATE		TOTAL DEPTH (FT) 29.8	GROUND ELEVATION (FT)	5964.57	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748042	AREA OU1	CASING DIAMETER (IN)	2.07	GEOLOGIST	JFU/KJT	36391
EAST	2084294	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	11.5	DATE DRILLED	10/08/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						No recovery for this interval
	BH00533EBU1	1.75 /2.00	5944	20–21	GC	Sandy Clayey Gravel: Light yellowish brown (2.5Y 6/4). Well graded gravel in clayey sand matrix. Gravel is f.g. to c.g., mean size=1.5" diameter, max. size>3"-diameter (broken during drilling), most of gravel is subrounded to rounded except those fractured during drilling. Gravel composed of quartzite, granite (weathered), strongly weathered arkosic wacke, metamorphic schist and gneiss. Sand is f.g. to c.g., mean=m.g. to c.g., subangular to rounded, composed of quartz, feldspar, micas, granite fragments, and other rock fragments. Gravel has sharp lower contact with underlying bedrock. Dry. 60% Gravel, 20% Sand, 20% Clay
	BH00532EBU1		5943	22		
						VOA sample obtained from this interval
		2.00 /2.00	5942	23	GC	Same as above
			5941	24		
		1.30 /2.00	5940	25		
	BH00534EBU1		5939			
				26		VOA sample obtained from this interval
						No recovery for this interval
					GC	Same as above
	BH00537EBU1		5938	27	CLAYSTONE	Claystone: Grayish brown (2.5Y 5/2) to olive yellow (2.5Y 6/6). Has variable porosity up to 15%, no cement, not friable but crumbly when dry. No bedding structure but trace of carbonaceous material lies along discontinuous subhoriz. laminae. At 26.8', clay is Fe-oxide stained, Mn-oxide also present. Dry. Top of bedrock = 26.2'
		1.75 /2.00	5937			
	BH00535EBU1			28		VOA sample obtained from this interval
		0.00 /0.50	5936			No recovery for this interval
		0.70 /1.00		29	CLAYSTONE	Same as above
	BH00536EBU1		5935			VOA sample obtained from this interval
						No recovery for this interval
				30		Total Depth = 29.8 ft

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748042.1118 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084293.9581 ft.	Well No.	36391
Date Completed	10-8-91	Original Depth	29.8 ft.	Aquifer	Alluvial
Inspected by	K. Maley	Date	10-8-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 29.8 ft.



Elevation of top of surface casing/riser pipe	5967.57 ft./5967.01 ft.
Height of top of surface casing/riser pipe above ground surface	3.0 ft./2.44 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.0 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	29.8 ft.
Type of backfill	Grout
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	11.7 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	14.75 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	14.75 ft.
Elevation/depth top of screened section	17.43
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	27.41 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.39 ft.
Elevation/depth bottom of plugged blank section	29.8 ft.
Elevation/depth bottom of sand column	29.8 ft.
Type of backfill below observation pipe	NA
Elevation/depth of hole	29.8 ft.

Rev. 10/5/92

INDEX OF DATA

Borehole Location Number:	**36491**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 18 6	GROUND ELEVATION (FT) 5929 83	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747740	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/KJT	36491
EAST	2084094	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 10/04/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00475EBU1	0% 50% 100%	0% 100%	1 70 /2 00	5929	0			ML	Sandy Silt with some Gravel Olive brown (2 5Y 4/3) Well graded sand and gravel in clayey silt matrix Clay occurs in discrete, med to c g sand-sized clasts within silty matrix Gravel size=3/4", max =1 1/4", rounded, composed of strongly weathered granite, some quartzite Sand is v f g to c g , mean size=v f g to f g , subangular, composed of quartz, feldspar, rock fragments (granite, schist, gneiss), muscovite, weathered biotite, green hornblende Plant roots present throughout Some caliche throughout Moist 5% Gravel 35% Sand 40% Silt, 20% Clay
					5928	2				VOA sample obtained from this interval
										No recovery for this interval
	BH00477EBU1 BH00478EBU1			1 70 /2 00	5927	3			ML	Clayey Silt with trace of Gravel Dark brown (10YR 3/3) to dark yellowish brown (10YR 4/4) Clay and silt contains trace of f g gravel (average size <3/4") and some v f g to f g sand Gravel is subrounded to rounded, composed of quartzite Sand is subangular, composed of quartz, feldspar, biotite, mafic minerals Clayey silt is massive with trace of caliche as indicated Becomes siltier with depth--clay content decreasing Moist 3% Gravel, 10% Sand, 55% Silt, 32% Clay
					5926	4				Core retained in VOA sleeve
										No recovery for this interval
				1 40 /2 00	5925	5			ML	Same as above
	BH00476EBU1									VOA sample obtained from this interval
										No recovery for this interval
					5924	6			CL	Sandy Gravelly Clay Yellowish brown (10YR 5/3) to strong brown (7 5YR 4/4) Well graded sand and gravel in clay matrix Sand is v f g to c g , mean size=c g to m g , subrounded to subangular, composed of rock fragments of granite, mafic schist, muscovite schist, quartzite, plus quartz and feldspar and trace of f g mafic minerals Gravel is f g to c g , mean size=3/8", max size >3" (broken during drilling), angular to rounded, composed of granite, micaceous schist, quartzite, some arkosic wacke Gravel unevenly distributed through interval Moist 20% Gravel, 25% Sand, 10% Silt, 45% Clay
				1 90 /2 00	5923	7				
					5922	8				Core retained in VOA sleeve
										No recovery for this interval
									CL	Same as above
	BH00480EBU1			1 90 /2 00	5921	9				
	BH00479EBU1				5920	10				VOA sample obtained from this interval
										No recovery for this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 18 6	GROUND ELEVATION (FT) 5929 83	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747740	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/KJT	36491
EAST	2084094	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 10/04/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				1 80 /2 00	5919	10–11			SC	Clayey Gravelly Sand Dark brown (7 5YR 4/4) to light olive brown (2 5Y 5/3) Well graded sand and gravel in a variably colored (dark brown and olive brown) clay matrix Gravel is f g to c g, mean size=7/8", max diameter=3", subrounded to subangular, composed of quartzite, granite, garnet-bearing schist, micaceous schist, quartz Sand is f g to c g, mean size=m g, subrounded to subangular, composed of quartz, rock fragments (mainly metamorphic), feldspar, micas (muscovite and chlorite) Some gravels strongly weathered and easily broken/crumbly, with feldspars weathering to clay Moist 30% Gravel, 40% Sand, 30% Clay
					5918	12				Core retained in VOA sleeve
										No recovery for this interval
				1 30 /2 00	5917	13			SC	Same as above
	BH00481EBU1									VOA sample obtained from this interval
										No recovery for this interval
					5916	14			SILTY CLAYSTONE	Silty Claystone Light brownish gray (2 5Y 6/2) to olive yellow (2 5Y 6/6) Low porosity (varies between 0-10%), no cement, non-friable Mottled appearance due to Fe-oxide staining, carbonaceous material and patchy caliche Otherwise, appears massive Interval between 15' and 16 5' is siltier with some sand (40% Silt, 10% Sand, 50% Clay) Caliche concentrated along high angle, planar fracture surfaces at 16 1' to 16 7' Moist 25% Silt, 75% Clay Top of bedrock = 14 0'
	BH00483EBU1			2 00 /2 00	5915	15				
					5914	16				Core retained in VOA sleeve
									SILTY CLAYSTONE	Same as above
				2 00 /2 00	5913	17				
	BH00482EBU1				5912	18				VOA sample obtained from this interval
				0 00 /0 60						No recovery for this interval
					5911	19				Total Depth = 18 6 ft
					5910	20				

INDEX OF DATA

Borehole Location Number:	**36591**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 17 6	GROUND ELEVATION (FT) 5987 86	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748334	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/KJT	36591
EAST	2084368	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 10/08/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY / INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00484EBU1	0% 50%	100% 0% 100%			0			SC	Well graded Sand and Gravel Black (10YR 2/1), sand is v f to c g (mean size=m g), angular to subrounded, composed of quartz, feldspar, quartzite, mafic minerals Gravel is f g to c g , mean size=1" diameter, max size= 1 1/2", angular to subrounded, composed of granite, schist, quartzite Plant roots present in top 6", silty clay matrix is organic rich Dry 30% Gravel, 40% Sand, 10% Silt, 20% Clay
	BH00485EBU1			1 30 /2 00	5987	1				VOA sample obtained from this interval
	BH00486EBU1				5986	2				No recovery for this interval
									SC	Same as above
									CL	Clayey Silt Light gray (2 5Y 7/2) to yellow (2 5Y 7/6) Clay and silt contain trace of f g gravel at 3 5' and at 4 1' Interval becomes more clay-rich with increasing depth Gravel is f g (<1" diameter), subrounded, composed of quartzite Caliche abundant between 3 2' and 3 55', and from 4 25' to 4 6' This interval looks like reworked bedrock material Dry Trace Gravel, 10%-40% Silt, 60%-90% Clay
	BH00488EBU1			1 80 /2 00	5985	3				Core retained in VOA sleeve
	BH00489EBU1				5984	4				No recovery for this interval
									CL	Same as above
									SC	Gravelly Clayey Sand Very dark grayish brown (10YR 3/2) to strong brown (7 5YR 4/6) Well graded sand and gravel in pred clay matrix Gravel is f g to c g , mean size= 1" diameter, max size=1 3/4", subrounded to angular, composed of granite, muscovite schist, cemented sandstone (Lyons Formation?), quartzite Sand is v f g to c g , mean size = c g , subangular to subrounded, composed of quartz, feldspar, granite, quartzite, schist fragments Matrix is stained yellow at 7 0' Trace caliche present at 7 0' as well Dry 35% Gravel, 40% Sand, 5% Silt, 20% Clay
				1 50 /2 00	5983	5				VOA sample obtained from this interval
	BH00487EBU1				5982	6				No recovery for this interval
				1 30 /2 00	5981	7			SC	Same as above
	BH00490EBU1				5980	8				VOA sample obtained from this interval
										No recovery for this interval
	BH00491EBU1			0 00 /2 00	5979	9				
					5978	10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 17.6	GROUND ELEVATION (FT) 5987.86	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748334	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/KJT	36591
EAST	2084368	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7.25	DATE DRILLED 10/08/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				1.40/2.00	5977	10–11			CLAYEY SANDSTONE	Clayey Sandstone Light yellowish brown (2.5YR 6/4) to yellowish brown (10YR 5/8) V.f.g. to f.g. sand and clay Mod sorted, subangular sand in an argillaceous cement Porosity <15%, mod to slightly friable Sand composed of quartz, trace feldspar, some mafic minerals (v.f.g.) No bedding apparent Dry 75% Sand, 25% Clay Top of bedrock = 10'0'
				0.00/1.00	5976	12				No recovery for this interval
					5975	13			CLAYSTONE	Claystone Gray (10YR 5/1) to brownish yellow (10YR 6/8) Porosity varies between 10%-15%, no cement, crumbly when dry Trace of carbonaceous material Fe-stone nodules present at 14.5' No bedding apparent Cut through with discontinuous fractures that are variably Fe-stained along fracture surfaces Dry 10% Silt, 90% Clay
				2.00/2.00	5974	14				
	BH00492EBU1				5973					VOA sample obtained from this interval
	BH00493EBU1					15			CLAYSTONE	Same as above
				2.00/2.00	5972	16				
					5971	17				Core retained in VOA sleeve
				0.00/0.60						No recovery for this interval
					5970	18				Total Depth = 17.6 ft
					5969	19				
					5968	20				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**36691**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 28.33	GROUND ELEVATION (FT)	5949.76	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH:	748027	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	SEC/JAB	36691
EAST:	2084421	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN):	11.5	DATE DRILLED:	10/11/91	

REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00538EBU1	0% 50%	100% 0% 100%			0			CH	High Plasticity Clay with pockets of Sandy and Gravelly Clay. Light brownish gray (2.5Y 6/2), light yellowish brown (2.5Y 6/4) and (where Fe-stained) olive yellow (2.5Y 6/6), and (where sandy, at 2.5'-2.7' and 3.0'-3.1') very dark brown (10YR 2/2). Gravels to 1", sands v.f.g. to c.g. (generally v.f.g. to f.g.). Poorly graded. Gravels subrounded to rounded, sands angular to subrounded. High plasticity. Sands quartz; gravels quartzite, schist, and gneiss. No true bedding apparent, abrupt change to sandier clays at 2.5', back to less sandy clay at 2.7', and another sharply defined sand and gravel clay is present at 3.0' to 3.1'. Dry. 0%-10% Gravel, 0%-15% Sand, 5%-25% Silt, 60%-95% Clay.
	BH00551EBU1									VOA sample obtained from this interval.
				1.40 /2.00	5949	1				No recovery for this interval.
	BH00539EBU1				5948	2				
					5947	3				
	BH00541EBU1			1.20 /2.00					CH	Same as above.
										No recovery for this interval.
									CH	Same as above.
					5946	4			CL	Sandy Clay. Dark brown (10YR 3/3). Poorly graded. Sand is v.f.g. to f.g. (mean=v.f.g.), angular to subrounded. Medium plasticity. Sand is quartz with some rock fragments. No apparent bedding. Dry. 30% Sand, 20% Silt, 50% Clay.
										VOA sample taken from this interval.
										No recovery for this interval.
				1.60 /2.00	5945	5			SM	Silty Gravelly Sand. Brown/dark brown (10YR 4/3). Gravels to 1.5", average 0.3"; sands v.f.g. to v.c.g. (mean=m.g.). Well graded. Gravels subangular to rounded, sands angular to subrounded. Gravels quartzite, schist, gneiss. Sands mainly quartz with some rock fragments, trace feldspar. No bedding apparent. Dry. 30% Gravel, 56% Sand, 10% Silt, 4% Clay.
	BH00540EBU1				5944	6				
					5943	7			ML	Sand-Silt-Clay mixture with pockets of Gravel. Dark yellowish brown (10YR 4/4), brown/dark brown (10YR 4/3, 10YR 3/3, and 7.5YR 4/4), strong brown (7.5YR 4/6). Gravel to 0.6" (mean 0.2"-0.3"), sand v.f.g. to v.c.g. (mean=f.g. to m.g.). Mod. graded. Subangular to subrounded gravels, angular to subrounded sands. Low plasticity. Gravels quartzite, gneiss, schist, sands mostly quartz with some rock fragments, trace organics, trace calcareous material (in place). No bedding apparent. Dry to moist. 0%-10% Gravel, 35%-45% Sand, 50%-57% Fines.
				1.50 /2.00						
					5942	8				No recovery for this interval.
									ML	Same as above.
					5941	9				
	BH00543EBU1			2.00 /2.00						
	BH00544EBU1									
					5940	10				
	BH00542EBU1									VOA sample obtained from this interval.

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 28 33	GROUND ELEVATION (FT)	5949 76	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH:	748027	AREA 0U1	CASING DIAMETER (IN)	2 07	GEOLOGIST	SEC/JAB	36691
EAST:	2084421	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	10/11/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50%	100% 0%	100%		10			ML	Same as above
				1 20 /2 00	5939	11			GC	Sandy Gravel with Clay and Silt Light brown (7 5YR 6/4) to reddish yellow (7 5YR 6/6) Gravel to 2" (mean approx 1"), sands v f g to v c g (mean=f g to m g) Mod to well graded Gravels are subangular to rounded (also present angular clasts, probably fractured during drilling), sands angular to subrounded, with coarser grains approaching rounded Gravels are quartzite, schist, gneiss, sands are dom quartz with some rock fragments No bedding apparent Moist 60%-80% Gravel, 15%-27% Sand, 2%-4% Silt, 3%-9% Clay
					5938	12				No recovery for this interval
				2 00 /2 00	5937	13			ML	Sandy Silt-Clay mixture with pockets of Gravel Strong brown (7 5YR 4/6) and yellowish red (5YR 4/6), at base (16 6'-17 15'), reddish yellow (7 5YR 6/6) to strong brown (7 5YR 5/6) Gravel pockets (13 5'-14 3', 16 5'-16 7', 16 9'-17 15') contain gravels to 2" (mean 0 5"-0 7"), elsewhere, gravels to 0 6" (mean 0 3") Sands v f g to v c g , above approx 14 7', mean=f g , below 14 7', mean=m g to c g Overall, interval is poorly graded, but gravel rich zones are well graded Gravels subangular to rounded (angular clasts fractured during drilling) Sands subangular to subrounded Low plasticity Gravels quartzite, schist, gneiss, sands dom quartz, some rock fragments, soft Fe-oxide grains, trace organics No bedding apparent Moist 0%-40% Gravel, 20%-45% Sand, 40%-70% Fines
					5936	14				
BH0054EBU1										
BH0054TEBU1				1 40 /2 00	5935	15				VOA sample obtained from this interval
					5934	16			ML	Same as above
										No recovery for this interval
									ML	Same as above
										VOA sample obtained from this interval
										No recovery for this interval
				1 40 /2 00	5933	17			SC	Clayey, Gravelly Sand Light brown (7 5YR 6/4) light yellowish brown (10YR 6/4), yellowish brown (10YR 5/4) and strong brown (7 5YR 4/6) Gravels to 2" (mean 0 4"-0 6"), sands v f g to v c g (mean=m g) Well graded Gravels are subangular to rounded, sands are angular to subrounded Gravels quartzite, schist, gneiss, sands are mainly quartz and rock fragments with some calcareous clasts and trace mica No bedding apparent Moist 20% Gravel, 45% Sand, 10% Silt, 25% Clay
BH0054GEBU1					5932	18				
				2 00 /2 00	5931	19			CH	Caliche-rich Clay with trace Gravel and Sand Light olive brown (2 5Y 5/4), light yellowish brown (2 5Y 6/4), light brownish gray (2 5Y 6/2), and pale yellow (2 5Y 7/3) to (where Fe-oxide-rich) yellowish brown (10YR 5/6 and 10YR 5/8) and (where caliche is concentrated) white (10YR 8/1 and 10YR 8/2) Trace gravel, to 0 6", trace sand, to v c g , thin sand and gravel-rich zones at 22' to 22 15' and 24' to 24 15' Poorly graded, med to high plasticity Caliche
					5930	20				

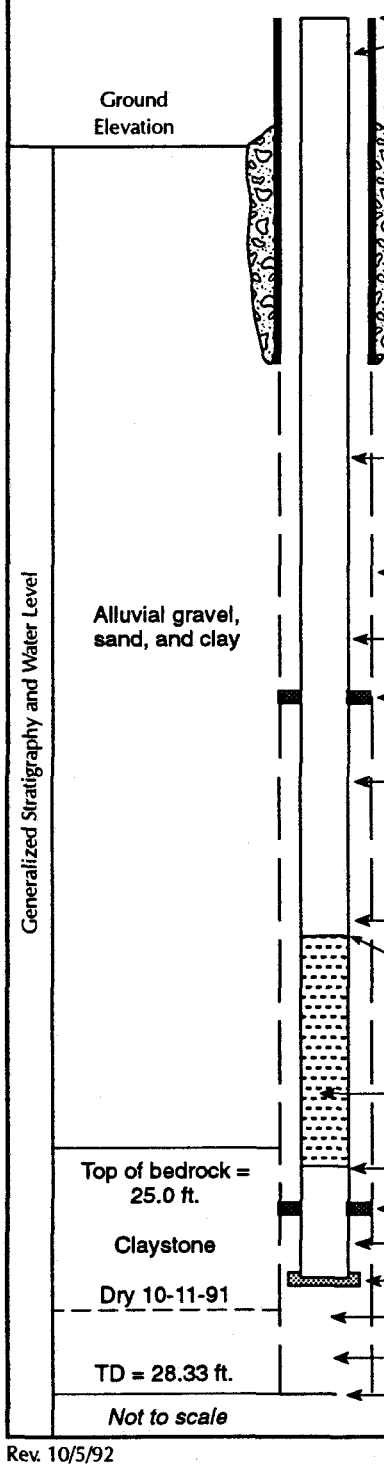
STATE PLANE COORDINATE		TOTAL DEPTH (FT) 28 33	GROUND ELEVATION (FT)	5949 76	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748027	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	SEC/JAB	36691
EAST	2084421	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	11.5	DATE DRILLED	10/11/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% – 50% – 100%)	PERCENT RECOVERY (0% – 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						20				present throughout, both mixed with clay and as essentially pure zones, Fe-oxides also present in varying degrees throughout No bedding apparent Interval is very similar to bedrock claystone except that the latter is not as caliche-rich Thin vertical factures present throughout Moist 100% Fines (mostly clay), <1% Gravel and Sand
	BH00550EBU1			2.00 /2.00	5929	21				
	BH00548EBU1				5928					VOA sample obtained from this interval
						22			CH	Same as above
				2.00 /2.00	5927	23				
	BH00549EBU1				5926					VOA sample obtained from this interval
						24			CH	Same as above
				2.00 /2.00	5925	25			CLAYSTONE	Claystone Grayish brown (2 5Y 5/2) to light brownish gray (2 5Y 6/2), where Fe-oxide rich, color is yellowish brown (10YR 5/8) A single gravel-sized (1 25") clast is present at 26 5', but this clast was probably pushed down into the interval from higher in the section; except for this clast, only clay (and small amount silt) is evident Porosity=nil to approx 2% Cement is argillaceous, in some places, trace calcareous material also present Non to slightly friable, non to slightly or mod fissile and crumbly Fe-oxide present, apparently as thin mineralized zones infilling fractures (25 1'-25 5' and 27 25'-27 75'), trace organics also present Caliche clasts present at top of interval (25.25') and at 26 2' No bedding apparent except for indistinct wavy/deformed laminae at 25 0'-25 2' Moist 100% Fines (mostly clay) Top of bedrock = 25 0'
	BH00552EBU1 BH00554EBU1				5924	26				
				2.00 /2.00	5923	27				VOA sample obtained from this interval
									CLAYSTONE	Same as above
	BH00553EBU1				5922	28				VOA sample obtained from this interval
				0.00 /0.33						No recovery for this interval
					5921	29				Total Depth = 28 33 ft
					5920	30				

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748026.7638 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084421.0591 ft.	Well No.	36691
Date Completed	10-11-91	Original Depth	28.33 ft.	Aquifer	Alluvial
Inspected by	S. Condran	Date	10-11-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 28.33 ft.



Elevation of top of surface casing/riser pipe	5952.26 ft./5951.52 ft.
Height of top of surface casing/riser pipe above ground surface	2.5 ft./1.76 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.5 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	28.33 ft.
Type of backfill	Grout
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	10.35 ft.
Type of seal	*0.25 in. bentonite pellets*
Elevation/depth bottom of seal	13.67 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	13.67 ft.
Elevation/depth top of screened section	15.83
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	25.83 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.0 ft.
Elevation/depth bottom of plugged blank section	27.83 ft.
Elevation/depth bottom of sand column	28.33 ft.
Type of backfill below observation pipe	NA
Elevation/depth of hole	28.33 ft.

Rev. 10/5/92

INDEX OF DATA

Borehole Location Number:	**36791**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 16 3	GROUND ELEVATION (FT)	5969 84	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748155	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	WGP/KJT	36791
EAST	2084171	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	10/09/91	
REMARKS							

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00494EBU1	0% 50% 100%	0% 100%			0			SM	Gravelly Silty Sand Very dark grayish brown (2 5Y 3/2) Well graded sand and gravel in clayey silt matrix Sand is v f g to c g, mean size=m g to c g, angular to subrounded, composed of quartz, feldspar, quartzite, granite, muscovite schist, gneiss, micas, mafic minerals Gravel is f g to c g, mean size=1/2" diameter, max =1 1/4", rounded to subangular, composed of granite, quartz, quartzite, schist Highly variable clay content--upper 0 5' is most clay-rich (30%) Moist 25% Gravel, 50% Sand, 15% Silt, 10% Clay
	BH00495EBU1									
	BH00497EBU1			0 90 /2 00	5969	1				
					5968	2				
										VOA sample obtained from this interval
										No recovery for this interval
									SM	Same as above
	BH00499EBU1			2 00 /2 00	5967	3				
	BH00600EBU1									
										VOA sample obtained from this interval
	BH00496EBU1				5966	4			CL	Silty Clay Grayish brown (2 5Y 5/2) to light olive brown (2 5Y 5/6) Massive silty clay (low plasticity) contains carbonaceous material and is mottled orange and gray Appears to be reworked bedrock or large piece of bedrock Moist 30% Silt, 70% Clay
				2 00 /2 00	5965	5			SC	Clayey Sand Brown (10YR 5/3) Mixed clayey sand and sandy clay with some caliche throughout Sand is v f g to c g, mean size=f g to m g, angular to subrounded, composed of quartz, feldspar, rock fragments, muscovite, chlorite, sand-sized fragments of charcoal (woody) Gravel is f g, mean size=3/4" diameter, subrounded, composed of quartzite Moist 10% Gravel, 60% Sand, 30% Clay
	BH00498EBU1				5964	6				
									SC	Clayey Sand Dark brown (10YR 3/3) to brown (10YR 4/3) Poorly graded sand and some gravel in a silty clay matrix Clay content decreases with increasing depth Gravel is f g, <1/2" diameter, subrounded, composed of quartzite Sand is v f g to f g, subangular, composed of quartz, micas, feldspars, mafic minerals Clayey sand is massive, color becomes brown with depth Moist 5% Gravel, 60% Sand, 15% Silt, 20% Clay
				2 00 /2 00	5963	7				
										VOA sample obtained from this interval
					5962	8			SC	Same as above
										Core retained in VOA sleeve
									SC	Same as above
	BH00602EBU1			2 00 /2 00	5961	9				
					5960	10				
	BH00601EBU1									VOA sample obtained from this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 16.3	GROUND ELEVATION (FT) 5969.84	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748155	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/KJT	36791
EAST	2084171	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7.25	DATE DRILLED 10/09/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						10			SC	Same as above
				1.90 /2.00	5959	11				Core retained in VOA sleeve
										No recovery for this interval
					5958	12			SC	Well graded Clayey Gravelly Sand: Dark brown (7.5YR 4/4) Gravel is f g , average size=1/2" diameter, subangular to subrounded, composed of quartzite and granite with some schist fragments. Sand is f g to c g , mean=m g , subrounded to subangular, composed of quartz, quartzite, granite, mica schist, feldspar, micas, mafic minerals. Trace of caliche present throughout. Moist. 15% Gravel, 45% Sand, 40% Clay
				2.00 /2.00	5957	13			CLAYSTONE	Claystone with some Silt. Grayish brown (2.5Y 5/2) to olive yellow (2.5Y 6/8). Clay with some silt, also contains some carbonaceous material in upper 1' (12.5' to 13.5') and trace below. Clay is stained olive yellow pervasively above 13.5' and in uneven patches below. Very low porosity (<5%), non-friable, no cement except for Fe-oxide cemented patches (coarse-sand sized). No bedding apparent. Moist, wet/saturated below 16.0'. 20% Silt, 80% Clay. Top of bedrock=12.5'
	BH00603EBU1				5956	14				
	BH00604EBU1									VOA sample obtained from this interval
				2.00 /2.00	5955	15			CLAYSTONE	Same as above
					5954	16				Core retained in VOA sleeve
				0.00 /0.30						No recovery for this interval
					5953	17				Total Depth = 16.3 ft
					5952	18				
					5951	19				
					5950	20				

INDEX OF DATA

Borehole Location Number:	**36891**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 13.6	GROUND ELEVATION (FT) 5970.09	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH 748147		AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/KJT	36891
EAST 2084151		LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7.25	DATE DRILLED 10/10/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00605EBU1	0% 50%	100% 0% 100%		5970	0			GC	Sandy Clayey Gravel: Strong brown (7.5YR 4/6). Clay matrix contains well graded sand and gravel. Gravel is f.g. to c.g., subrounded to subangular, composed of pred. well-cemented sandstone (Lyons? looks like fill for dirt roads at RFP). Sand is rounded to subrounded, v.f.g. to c.g., mean size=f.g. to m.g., composed of quartz and fragments of quartz sandstone (same as gravel), with some feldspar, quartzite fragments, green hornblende (?), and other mafic minerals. Slightly moist. 40% Gravel, 35% Sand, 5% Silt, 20% Clay.
	BH00606EBU1			1.40 /2.00	5969	1				
	BH00607EBU1									
					5968	2				VOA sample obtained from this interval.
										No recovery for this interval.
									SM	Gravelly Silty Sand: Dark grayish brown (2.5Y 4/2). Well graded sand and gravel with some silt and clay. Sand is v.f.g. to c.g., mean=f.g. to m.g., angular to subrounded, composed of quartz, feldspar, rock fragments (mafic schist, quartzite, granite), fine mafic minerals with some m.g. to f.g. sand sized fragments of asphalt or tar. Gravel is f.g. to c.g., mean size=1 3/8", up to 2" diameter, angular to subrounded, composed of weathered granite, felsic gneiss, quartzite. Contains some caliche within silty matrix. Becomes more clay-rich, less gravelly with increasing depth. Slightly moist. 30% Gravel, 30% Sand, 20% Silt, 20% Clay.
	BH00609EBU1									
	BH00610EBU1			1.30 /2.00	5967	3				
					5966	4				
										No recovery for this interval.
				1.80 /2.00	5965	5			SM	Same as above.
									GC	Well graded Clayey Sandy Gravel: Brown (10YR 5/3). Gravel is f.g. to c.g., mean size=1/2", max. size=2 1/2" diameter (at 5'55'), subrounded to subangular, composed of granite, quartzite, quartz. Sand is v.f.g. to c.g., mean size=m.g. to c.g., angular to subrounded, composed of rock fragments (quartzite, pegmatitic igneous quartz, granite, schist and gneiss), quartz, feldspar, micas, trace of v.f.g. mafic minerals. Both sand and gravel coated with caliche, caliche present throughout interval. Slightly moist. 40% Gravel, 30% Sand, 30% Clay.
	BH00608EBU1									
					5964	6				
				0.00 /2.00	5963	7				VOA sample obtained from this interval.
										No recovery for this interval.
					5962	8				
				0.00 /1.00					GC	Same as above.
					5961	9			CLAYSTONE	Claystone: Olive gray (5Y 5/2) to, at 12', dark gray (5Y 4/1), with brownish yellow (10YR 6/8) stains. Clay with some silt-size carbonaceous fragments. Very low porosity (<5%), no cement, non-friable. Caliche present at top of bedrock (under gravels), clay has mottled appearance due to staining by Fe-oxides/hydroxides. No apparent bedding structures. Slightly moist. 10% Silt, 90% Clay. Top of bedrock at 9.1'
				2.00 /2.00		10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 13 6	GROUND ELEVATION (FT)	5970 09	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748147	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	WGP/KJT	36891
EAST	2084151	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	10/10/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%	2 00 /2 00	5960	10				
	B00611EB01 B00612EB01				5959	11				VOA sample obtained from this interval
									CLAYSTONE	Same as above
				2 00 /2 00	5958	12				
					5957	13				Core retained in VOA sleeve
				0 00 /0 60						No recovery for this interval
										Total Depth = 13 6 ft
					5956	14				
					5955	15				
					5954	16				
					5953	17				
					5952	18				
					5951	19				
						20				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**36991**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 11.3	GROUND ELEVATION (FT) 5969.48	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748180	AREA OU1	CASING DIAMETER (IN) 2.07	GEOLOGIST KMM/JAB	36991
EAST	2084177	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 11.5	DATE DRILLED 10/11/91	
REMARKS:					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	B400613EB01	0% 50% 100%	0% 100%		5969	0			GC	Gravel-Sand-Clay mixture: Reddish brown (5YR 4/4 and 5YR 5/4). Gravels to 1", average 0.4"-0.6", sand v.f.g. to v.c.g., mean=f.g. to m.g. Well graded. Gravels subangular to subrounded, sands some. Gravels are pink sandstone. Sands are dom. quartz, with some rock fragments, traces mica, mafics. No bedding apparent. Gravel composition implies that this is the commonly used fill seen especially as road gravel. Dry. 53% Gravel, 32% Sand, 5% Silt, 10% Clay.
	B400614EB01			0.50 /2.00	5968	1				VOA sample obtained from this interval.
										No recovery for this interval.
						2			GC	Same as above.
					5967				CH	Sandy Gravelly Clay: Light yellowish brown (2.5Y 6/3) to light olive brown (2.5Y 5/3). Gravels to 1", sands v.f.g. to v.c.g. (mean size=v.f.g. to f.g.). Poorly graded. Coarser grain sizes angular to subrounded, gravel to rounded. Medium to high plasticity. Gravel is quartzite, schist, gneiss. Sand is quartz with some rock fragments, traces mafics and micas. No bedding apparent. Calcareous. 5% Gravel, 14% Sand, 81% Fines.
	B400616EB01			1.60 /2.00	5966	3				
						4			SC	Clayey Sand with Gravel: Brown/dark brown (10YR 4/3), dark brown (10YR 3/3), very dark grayish brown (10YR 3/2); below 9', except for 4.7' to 6.3', color is brown/dark brown (7.5YR4/4). Gravels to 1.5" (average 0.4"), sands v.f.g. to v.c.g. (mean=f.g.). Interval from 4.0' to 4.8' is more gravel-rich (to approx. 15%). Moderately to well graded gravels, subangular to rounded, sands subangular to subrounded. Gravels are quartzite, schist, gneiss; sands are quartz with some rock fragments, traces mica, mafics, feldspar. Calcareous. No apparent bedding. Dry. 7% Gravel, 48% Sand, 45% Fines.
	B400615EB01			0.80 /2.00	5965	5				
					5964	6				No recovery for this interval.
									SC	Same as above.
					5963					VOA sample obtained from this interval.
										No recovery for this interval.
				1.75 /2.00		7			SC	Same as above.
					5962				CH	Clay with Trace Sand: Olive brown (2.5Y 4/3) to light olive brown (2.5Y 5/3). Trace v.f.g. to c.g. sand. Poorly graded. Sand subangular to subrounded. Medium to high plasticity. Sands quartz with some rock fragments, traces mica, organics, mafics, Fe-oxides, calcareous. No bedding apparent. Dry. 97%-100% Fines (75%-95% Clay, balance Silt) 0% - 3% Sand.
	B400617EB01					8				
	B400618EB01				5961					
	B400619EB01									
										VOA sample obtained from this interval.
				1.75 /2.00		9			CLAYSTONE	Claystone: Light brownish gray (2.5Y 6/2) and light gray (2.5Y 7/2) to light yellowish brown (7.5Y 6/3) and light olive brown (2.5Y 5/3), where re-stained, color is olive yellow (2.5Y 6/6) to yellowish brown (10YR 5/6). Special note on grain size: sand content (thin dusting at 8" and gravel-sand-clay mixture at 10'-10.1')(cont. below)
					5960	10				No recovery for this interval.

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 11.3	GROUND ELEVATION (FT)	5969.48	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH:	748180	AREA: OU1	CASING DIAMETER (IN)	2.07	GEOLOGIST	KMM/JAB	36991
EAST	2084177	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	11.5	DATE DRILLED	10/11/91	

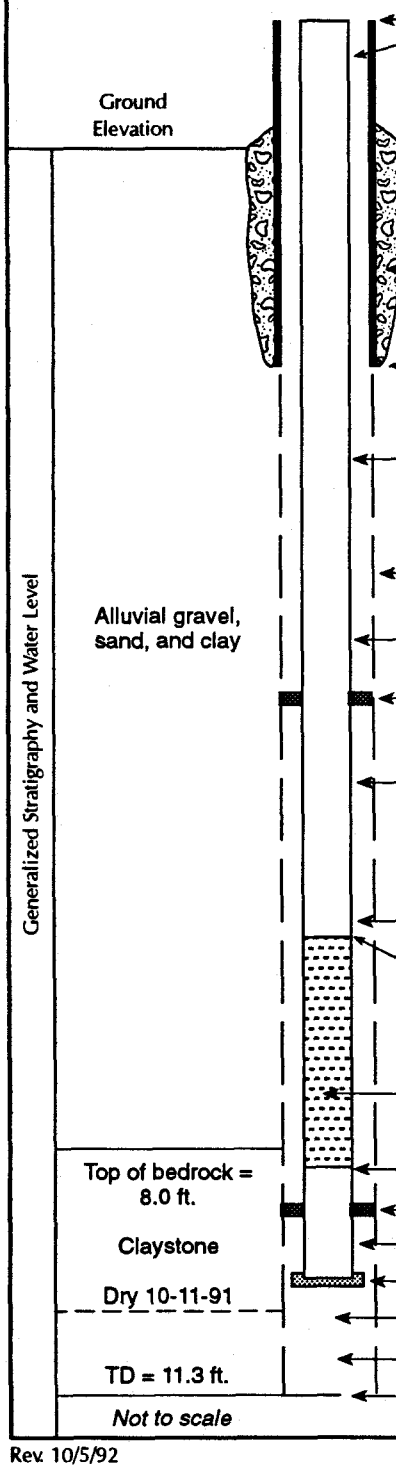
REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				0.55/1.00	5959	10			CLAYSTONE	(cont. from above) are felt to be imported during the drilling process, and not present originally. Porosity = nil to 2%. Cement is argillaceous. Non to slightly friable, non to slightly or mod fissile and crumbly. Fe-oxides present as well as trace organics. No apparent bedding. Dry. 100% Fines (90-100% Clay, balance Silt) (see description for special note re grain size). Top of bedrock = 8.0 ft
				0.00/0.30	5958	11				No recovery for this interval
					5957	12				Total Depth = 11.3 ft
					5956	13				
					5955	14				
					5954	15				
					5953	16				
					5952	17				
					5951	18				
					5950	19				
						20				

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748179.7430 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084711.3669 ft.	Well No.	36991
Date Completed	10-11-91	Original Depth	11.3 ft.	Aquifer	Alluvial
Inspected by	K. Maley	Date	10-11-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 11.3 ft.



Elevation of top of surface casing/riser pipe	5972.88 ft./5972.31 ft.
Height of top of surface casing/riser pipe above ground surface	3.4 ft./2.83 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	1.6 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	11.3 ft.
Type of backfill	NA
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	3.0 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	6.0 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	6.0 ft.
Elevation/depth top of screened section	6.62
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	8.62 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.0 ft.
Elevation/depth bottom of plugged blank section	10.62 ft.
Elevation/depth bottom of sand column	11.3 ft.
Type of backfill below observation pipe	NA
Elevation/depth of hole	11.3 ft.

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INDEX OF DATA

Borehole Location Number:	**37091**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 8 6	GROUND ELEVATION (FT) 5977 18	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748284	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST SEC/JAB	37091
EAST	2084367	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 10/14/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	B00620EBU1	0% 50% 100%	0% 100%							
	B00621EBU1				5975	0			ML	Gravelly Silt-Sand mixture with pockets of Clay and Mud Caliche Dark brown (10YR 3/2) to very dark brown (10YR 2/2) with flecks of white caliche gravel to 0 6" (avg 0 2"- 3"), sands v f g to v c g, mean=f g to m g Well graded Gravels subangular to subrounded, sands angular to subrounded Low plasticity Gravels quartzite, schist, gneiss, sands mainly quartz and cal clasts with some rock fragments, organics Moderately ------- No apparent bedding Dry 5% Gravel, 40% Sand, 55% Fines (30% Silt, 25% Clay)
				2 00 /2 00	5975	1				
	B00622EBU1									
	B00626EBU1				5975	2			CL	Caliche-Clay mixture with some Sand and Silt Light gray (10YR 7/1 and 2 5Y 7/2) Trace gravel (0 1"), sands v f g to v c g (mean=v f g to f g) Poorly graded, subangular to subrounded except for angular caliche clasts Low to med plasticity Nearly solid caliche, sand is quartz, some rock fragments No bedding apparent Dry 0-2% Gravel, 15% Sand, 83%-85% Fines (5%-10% Silt)
	B00624EBU1			0 80 /2 00		3				
	B00625EBU1				5975				ML	Sand-Silt mixture with some Clay Brown/dark brown (7 5YR 4/4 and 7 5YR 3/4) Trace gravel, to 0 8" (average approx 0 4"), sand v f g to v c g (mean=f g to v f g) Moderate grading Angular to subrounded, with coarser sand and gravel to rounded Low plasticity Sands mainly quartz and rock fragments with traces micas, mafics No apparent bedding Dry 0-2% Gravel, 36-40% Sand, 35-40% Silt, 22-27% Clay
					5973	4				
										VOA sample obtained from this interval
				2 00 /2 00	5972	5			SM	Gravelly Silty Sand Reddish brown (5YR 4/3) to brown/dark brown (7 5YR 4/3) Gravel to 1 75", average 0 2"-0 4", sands v f g to v c g (mean=m g) Well graded Gravels angular to rounded (angular clasts may have resulted from fracturing during drilling), sands angular to subrounded Gravels quartzite, schist, gneiss, sands quartz, some rock fragments Calcareous No apparent bedding Dry 25% Gravel, 53% Sand, 15% Silt, 7% Clay
	B00623EBU1				5971	6				
										No recovery for this interval
	B00627EBU1			2 00 /2 00	5970	7			SM	Same as above
				0 00 /0 60	5969	8				
					5968	9				
						10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 8 6	GROUND ELEVATION (FT) 5977 18	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	749284	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST SEC/JAB	37091
EAST	2084367	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 10/14/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00620EBU1	0% 50% 100%	0% 100%		5977	0				
	BH00621EBU1									
				2.00 /2.00	5976	1			SM	Gravelly Silty Sand Reddish brown (5YR 4/3) to brown/dark brown (7 5YR 4/3) Gravel to 1 75", average 0 2"-0 4", sands v f g to v c g (mean=m g) Well graded Gravels angular to rounded (angular clasts may have resulted from fracturing during drilling), sands angular to subrounded Gravels quartzite, schist, gneiss, sands quartz, some rock fragments Calcareous No apparent bedding Dry 25% Gravel, 53% Sand, 15% Silt, 7% Clay
	BH00622EBU1									
	BH00623EBU1				5975	2				
	BH00624EBU1			0 80 /2.00	5974	3				No recovery for this interval
	BH00625EBU1								SM	Same as above
									CLAYSTONE	Claystone and Silty Claystone Pale yellow (2 5Y 7/3) to light yellowish brown (2 5Y 6/3) and light brownish gray (2 5Y 6/2) to grayish brown (2 5Y 5/2, 10YR 5/2) to very dark grayish brown (10YR 3/2), where Fe-rich, brownish yellow (10YR 6/8) to yellowish brown (10YR 5/8) Silty zone(4'-5', with highest silt content 4 7'-5') contains up to 9% v f g to f g Sand and 20%-25% Silt Sand subangular to subrounded Porosity=nil to approx 4% Cement is argillaceous and, approx 4 5'- 5 7'', a trace calcareous Non to slightly friable, non to mod fissile/crumbly Sand dom quartz, trace rock fragments, trace to some organics No true bedding apparent, although curvilinear color banding is evident at 4 2"-5 75', 7 4'-8" and an organic-rich "lamination" occurs at 7 55' or 7 6' Caliche blebs are present in the calcareous area Dry (cont below)
					5973	4				
				2.00 /2.00	5972	5				
	BH00626EBU1									
					5971	6				
										VOA sample obtained from this interval
									CLAYSTONE	(cont from above) 0-9% Sand, 0-30% Silt, 70-100% Clay
	BH00627EBU1			2.00 /2.00	5970	7				
					5969	8				
				0.00 /0 60						No recovery for this interval
					5968	9				
						10				Total Depth = 8 6 ft

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**37191**
Piezometer Location Number:	N/A

Data Available:

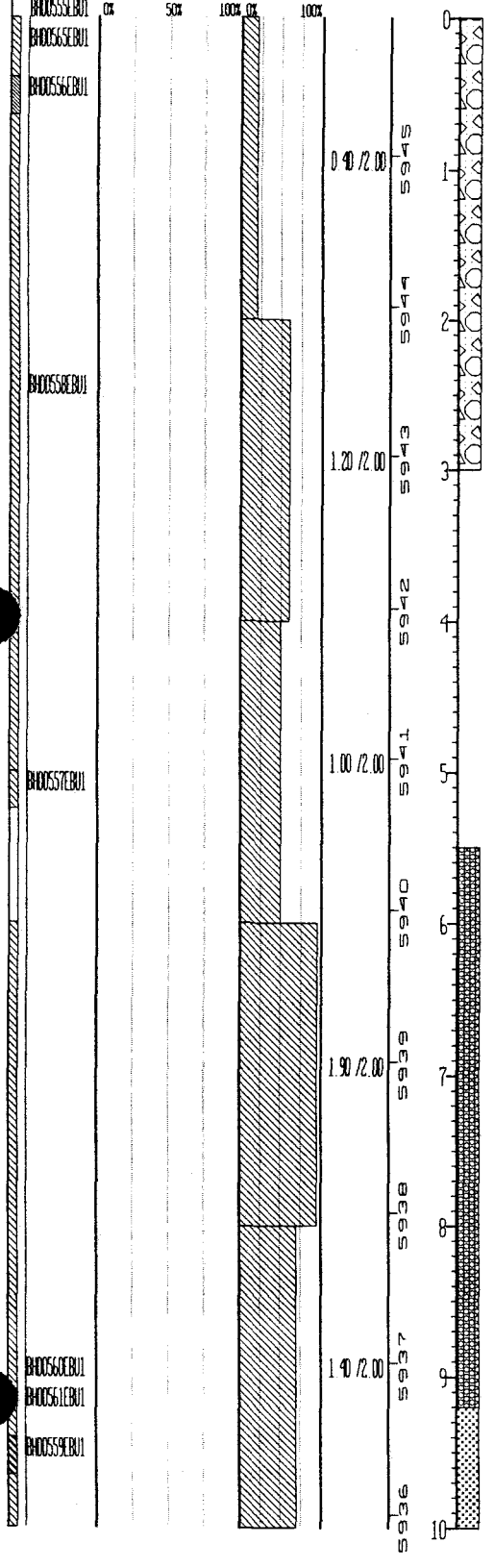
✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 23.8	GROUND ELEVATION (FT)	5945.91	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748036	AREA OU1	CASING DIAMETER (IN)	2.07	GEOLOGIST	KMM/JAB	37191
EAST	2084533	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	11.5	DATE DRILLED	10/15/91	
REMARKS							

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE / DEPTH / SAMPLE NUMBER / SAMPLE GRAIN SIZE / PERCENT RECOVERY / RECOVERY/INTERVAL / DATUM(FT) / DEPTH(FT) / WELL OR PIEZOMETER CONSTRUCTION / LITHOLOGY / UNIFIED SOILS CLASSIFICATION OR ROCK TYPE / DESCRIPTION



CL Gravelly, Sandy Clay with Silt: Brown (10YR 5/3), dark brown (10YR 4/3), light olive brown (2.5Y 5/4), light brownish gray (2.5Y 6/2), light yellowish brown (2.5Y 6/3), red (2.5YR 4/6), and brownish yellow (10YR 6/8). Gravels 0.6"-0.7", (average 0.2"-0.3"); sands v.f.g. to v.c.g., mean=m.g. Poorly graded. Sands, gravels subangular to subrounded. Medium plasticity. Gravels quartzite, schist, gneiss; sands quartz, rock fragments. Lightly rooted at top. Calcareous. No bedding apparent. Dry. 6% Gravel, 7% Sand, 2-22% Silt, 65-85% Clay.

VOA sample obtained from this interval

No recovery for this interval

CL Same as above.

No recovery for this interval

GC Clayey, Silty Sand-Gravel mixture: Pale yellow (2.5Y 7/3) to very dark brown (10YR 2/2) with light yellowish brown (2.5Y 6/3), light olive brown (2.5Y 5/3), and light brownish gray (2.5Y 6/2). Gravel to 2" (average 0.5"), sand v.f.g. to v.c.g. (mean=f.g. to m.g.). Well graded. Gravels subangular to rounded (angular clasts probably from drill-caused fracturing); sands subangular to subrounded. Gravel quartzite, schist, gneiss; sands are quartz with rock fragments. Calcareous. No bedding, but sharp contact with underlying clay. Dry. 35%-40% Gravel, 30%-40% Sand, 20%-35% Fines.

CL Sandy Silty Clay with Gravel: Light yellowish brown (2.5Y 6/3) to olive yellow (2.5Y 6/6) to olive brown (2.5Y 4/4) to very dark grayish brown (10YR 3/2). Gravel to 0.5", average 0.2", sand v.f.g. to v.c.g. (mean=f.g. to m.g.). Poorly to mod. graded. Gravel subangular to rounded, sand subangular to subrounded. Low to med. plasticity. Gravel is quartzite, some gneiss/schist; sand is quartz, some rock fragments. Semi-bedded, as indicated by color and grain size changes: 4.7'-4.85'= clay, light yellowish brown to olive yellow; 4.85'-4.87' = discontinuous pod of sandy clay with gravel; 4.87'-4.9' =discontinuous clay, olive brown; 4.9'-5.0'=very dark grayish brown. Dry. 0-4% Gravel, 4-15% Sand, 1-11% Silt, 70-95% Clay.

VOA sample obtained from this interval

No recovery for this interval

CL Gravelly, Sandy Clay: Brown (10YR 5/3), yellowish brown (10YR 5/4). Gravel content gradually increases with depth to approx. 15% at 15.75', then sharply increases from 16.4' to 17.4' where it approaches 30%. Clasts are up to 2" in diameter. Poorly graded at top of interval, increasing to well graded at 16.4'-17.4'. Gravels are subangular to rounded, sands are angular to subrounded. (cont. below)

No recovery for this interval

CL Same as above. (cont. below)

VOA sample obtained from this interval

No recovery for this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 23.8	GROUND ELEVATION (FT)	5945.91	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748036	AREA OU1	CASING DIAMETER (IN)	2.07	GEOLOGIST	KMM/JAB	37191
EAST	2084533	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	11.5	DATE DRILLED	10/15/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				1.30 /2.00	5935	10–11			CL	(cont from above) Low to med plasticity Gravels are quartzite with some gneiss and schist and a trace (especially at 17.0'-17.4') of sandstone Sands are quartz with some rock fragments, traces mafics, gold-colored (weathered) biotite, feldspar, and Fe-oxides Calcareous Approx depth to water=12.0' 0-30% Gravel, 5-25% Sand, 50-95% Silt (up to approx 35% Silt) (9.65'-13.75' same as 6.0'-9.4')
					5934	12				No recovery for this interval
				1.75 /2.00	5933	13			CL	Same as above
	BH00562EBU1				5932	14				VOA sample obtained from this interval
	BH00564EBU1			1.75 /2.00	5931	15			CL	Same as above
					5930	16				No recovery for this interval
				1.40 /2.00	5929	17			CL	Same as above
	BH00563EBU1				5928	18				VOA sample obtained from this interval No recovery for this interval
				1.30 /2.00	5927	19			SM	Sand-Gravel-Silt-Clay mixture Brownish yellow (10YR 6/6) to yellowish brown (10YR 5/4 and 10YR 5/6) to strong brown (7.5YR 5/6 and 7.5YR 4/6) Gravel to 1", average 0.3"-0.4"; sand v f g to v c g, mean=f g to m g Well graded Gravels subangular to rounded; sands angular to subrounded Gravels quartzite, schist, gneiss Sands quartz with some rock fragments, traces caliche clasts, feldspar, micas No bedding apparent Wet 30% Gravel, 40% Sand, 15%- 20% Silt, 10-15% Clay
	BH00566EBU1				5926	20				VOA sample obtained from this interval No recovery for this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 23.8	GROUND ELEVATION (FT)	5945.91	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748036	AREA OU1	CASING DIAMETER (IN)	2.07	GEOLOGIST	KMM/JAB	37191
EAST	2084533	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	11.5	DATE DRILLED	10/15/91	

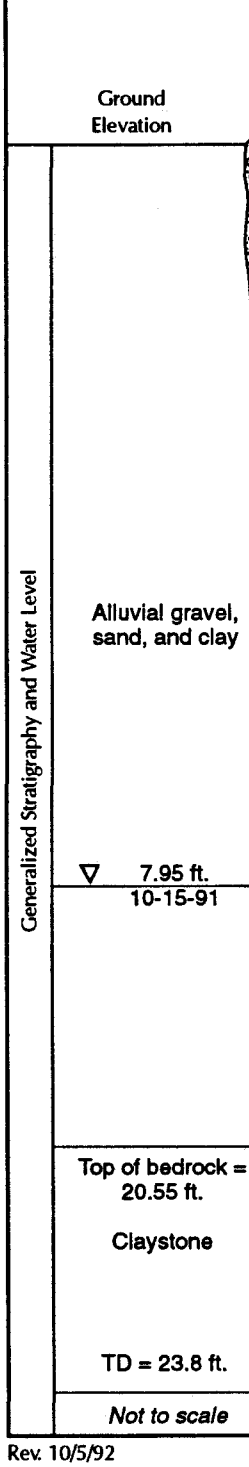
REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00567EB01	0% 50% 100%	0% 100%	1.75/2.00	5925	20, 21			SM	Same as above
									CLAYSTONE	Claystone Light brownish gray (2.5Y 6/2) to light yellowish brown (2.5Y 6/3, 2.5Y 6/4) to (with increased Fe-staining) olive yellow (2.5Y 6/6) to (with increased caliche content) white (10YR 8/1, 5Y 8/1); also light gray (5Y 6/1) and dark gray (10YR 4/1). A few gravel and sand clasts present, felt by geologist (rig and logging) to be result of caveins. Porosity=nil to 2% or 3%. Cement is both argillaceous and calcareous. Non-friable, non-fissile, not crumbly--malleable and sticky instead. Caliche, Fe-oxides present; in interval from 20.7' to 21.3', color banding results from alternating layers of clay, Fe-oxide-rich clay, and caliche-rich clay (along the lattermost of which the core separates easily). Other than this color banding, no bedding structures are apparent. Wet. 0-100% Silt, 90-100% Clay. Top of bedrock = 20.5'
				1.40/1.80	5924, 5923	22, 23				
										VOA sample obtained from this interval
									CLAYSTONE	Same as above
										No recovery for this interval
					5922	24			CLAYSTONE	Same as above
										No recovery for this interval
										Total Depth = 23.8 ft.
					5921	25				
					5920	26				
					5919	27				
					5918	28				
					5917	29				
					5916	30				

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748036.4145 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084533.4608 ft.	Well No.	37191
Date Completed	10-15-91	Original Depth	23.8 ft.	Aquifer	Alluvial
Inspected by	K. Maley	Date	10-15-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 23.8 ft.



Elevation of top of surface casing/riser pipe	5948.66 ft./5948.29 ft.
Height of top of surface casing/riser pipe above ground surface	2.75 ft./2.38 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.25 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	23.8 ft.
Type of backfill	Grout
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	5.5 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	9.2 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	9.2 ft.
Elevation/depth top of screened section	11.12 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	21.07 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.0 ft.
Elevation/depth bottom of plugged blank section	23.07 ft.
Elevation/depth bottom of sand column	22.0 ft.
Type of backfill below observation pipe	Natural
Elevation/depth of hole	23.8 ft.

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INDEX OF DATA

Borehole Location Number:	**37291**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 28 3	GROUND ELEVATION (FT) 5947 41	PROJECT NUMBER CMAD	LOG OF BORING NUMBER
NORTH	747803	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST SEC/JAB	37291
EAST	2083817	LOCATOR NUMBER K7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 10/15/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH / SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH00628EBU1	0% 50% 100%	0% 100%			0			CL	Clay Light olive brown (2 5Y 5/3, 2 5Y 5/4), light brownish gray (2 5Y 6/2), olive yellow (2 5Y 6/6), and yellowish brown (10YR 5/6, 10YR 5/8) where Fe-rich, black (10YR 2/1) to very dark brown (10YR 2/2), dark grayish brown (2 5Y 4/2), very dark grayish brown (2 5Y 3/2), and brown/dark brown (10YR 4/3) where rich in organics Rare scattered gravels, trace sand Poorly graded Gravels subangular to rounded, sand subangular to subrounded Low to med plasticity Lightly coated at top. (cont below)
BH00629EBU1			2.00 /2.00	5947	1				
BH00630EBU1				5946	2				VOA sample obtained from this interval
BH00632EBU1				5945				CL	(cont from above) trace to abundant clay-sized organics (as at 1 55'-1 65', where organic-rich layer drapes over 1 5" gravel clast) Gravels quartzite, some schist, gneiss, sand quartz, some rock fragments Where core is intact above 9 15', vague laminations may be seen (approx footages 3 0'-3 2', 6 9'-7 3', 8 6'-8 75'), other than these locations and the organic-rich interval at 1 55'-2 65', no bedding is apparent Trace Gravel, trace Sand, 0-30% Silt, 70-100% Clay
BH00633EBU1			1 40 /2 00		3				
BH00634EBU1				5944					No recovery for this interval
				5943	4			CL	Same as above
			1.80 /2 00		5				
BH00631EBU1				5942					VOA sample obtained from this interval
					6				No recovery for this interval
				5941				CL	Same as above
			1.60 /2 00		7				
				5940					Core retained in VOA sleeve
									No recovery for this interval
				5939	8			CL	Same as above
BH00636EBU1			1 40 /2 00		9				
BH00635EBU1				5938					VOA sample obtained from this interval
									No recovery for this interval
					10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 28 3	GROUND ELEVATION (FT) 5947 41	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747803	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST SEC/JAB	37291
EAST	2083817	LOCATOR NUMBER K7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 10/15/91	
REMARKS					

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERED (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2 00 /2 00	5937 5936	10 11			CL	Same as above
										Core retained in VOA sleeve
				2 00 /2 00	5935 5934	12 13			CL	Same as above
										VOA sample obtained from this interval
									CL	Same as above
	B-00637EBU1					14			ML	Sandy, Clayey Silt Very dark grayish brown (10YR 3/2, 2 5Y 3/2), very dark brown (10YR 2/2), where Fe-rich, dark yellowish brown (10YR 4/4, 10YR 3/4) Sands v f g to v c g (mean=v f g to f g) Poorly graded Sands angular to subrounded Low to med plasticity (hence "ML to cl") Sands are quartz with some rock fragments, traces micas, mafics No bedding apparent 11% Sand, 50% Silt, 39% Clay
										Core retained in VOA sleeve
	B-00639EBU1			2 00 /2 00	5933 5932	15			CL	Clay with organic-rich pockets Light olive brown (2 5Y 5/3, 2 5Y 5/4) where organic-poor, yellowish brown (10YR 5/6) where Fe-rich, and where richest in organics, dark grayish brown (2 5Y 4/2), very dark grayish brown (10YR 3/2, 2 5Y 3/2), brown/dark brown (10YR 4/3), very dark brown (10YR 2/2), black (10YR 2/1) Scattered, rare gravels to 0 7", sands v f g to v c g (mean=v f g to f g) Poorly graded Gravel subangular to rounded, sands angular to subrounded Low plasticity Gravels are quartzite, schist, gneiss, sands quartz with some rock fragments, traces micas and mafics No bedding apparent, instead, unit has mottled appearance Trace Gravel, 0-10% Sand, 0-30% Silt, 70-100% Clay
				2.00 /2 00	5931 5930	16 17			CL	Same as above
										VOA sample obtained from this interval
									ML	Same as above
	B-00638EBU1					18			SC	Silty, Clayey Sand-Gravel mixture Dark grayish brown (2 5Y 4/2), brown (10YR 4/3, 10YR 5/3), from 22 0' to 23 3', color is strong brown (7 5YR 5/6, 7 5YR 4/6) Grain size distribution is variable, with some zones more gravelly (20 0' to 21 1'), some zones finer grained (21 1' to 21 35'), and the balance in-between Gravels to 2" (average approx 0 5"), sands v f g to v c g (mean=m g) Well graded Gravels subangular to well-rounded, sands angular to subrounded Gravels mainly quartzite, schist, gneiss, sand mainly quartz, with some rock fragments No bedding apparent 15-40% Gravel, 30-50% Sand, 20-50% Silt (slightly more clay than silt)
				1 00 /2 00	5929 5928	19 20				No recovery for this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 28 3	GROUND ELEVATION (FT) 5947 41	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747803	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST SEC/JAB	37291
EAST	2083817	LOCATOR NUMBER K7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 10/15/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00641EBU1				5927	20			SC	Same as above
	BH00642EBU1			1.60 /2.00		21				
	BH00643EBU1				5926					VOA sample obtained in this interval
										No recovery for this interval
						22			SC	Same as above
					5925					
				1.40 /2.00		23			CLAYSTONE	Claystone Light gray (2 5Y 7/2), light brownish gray (2 5Y 6/2), light yellowish brown (2 5Y 6/3, 2 5Y 6/4), with Fe-staining yellowish brown (10YR 5/6 and 10YR 5/8) Up to approx 10% Silt Porosity=nil to 1% or 2% Cement is argillaceous, unit is non to very slightly friable, non to slightly fissile/crumbly Some Fe-oxides present, as well as trace organics No bedding apparent 0-10% Silt, 90%-100% Clay Top of bedrock = 23'3"
					5924					
						24				
					5923					No recovery for this interval
									CLAYSTONE	Same as above
				2.00 /2.00		25				
					5922					
	BH00643EBU1									VOA sample obtained from this interval
	BH00644EBU1					26			SILTY CLAYSTONE	Silty Claystone Light olive brown (2 5Y 5/3) Up to approx 40% silt Porosity=4%-7% Moderately friable, fissile, crumbly Trace organics Cement is argillaceous Bedding may be indicated by the light and somewhat indistinct color variations 25-40% Silt, 60%-75% Clay
					5921					
				2.00 /2.00		27				
					5920					
						28				Core retained in VOA sleeve
				0.00 /0.30						No recovery for this interval
					5919					Total Depth = 28 3 ft
						29				
					5918					
						30				

INDEX OF DATA

Borehole Location Number:	**37391**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 18.2	GROUND ELEVATION (FT): 5922.50	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	747744	AREA: OU1	CASING DIAMETER (IN):	GEOLOGIST: MGP/JAB	37391
EAST:	2084194	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 10/16/91	
REMARKS:					

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00646EBU1	0% 50% 100%	0% 100%		5922	0			CL:	Sandy, Silty Clay with Gravel: Yellowish brown (10YR 5/4) to brown/dark brown (10YR 4/3 and 10YR 3/3). Gravel to 2", average 0.3"-0.5"; sands v.f.g. to v.c.g., mean=f.g. Well graded. Gravel subangular to well rounded, with some angular clasts probably resulting from drill-related fracturing. Sands angular to subrounded. Low to med. plasti-city. Gravel mainly quartzite, with some schist, gneiss, and sandstone; sand mainly quartz with some rock fragments and traces mica, mafics, organics; lightly rooted at top, trace calcareous content. No true bedding, although upper 3" is darker brown in color and more loam-like (this is the rooted portion), while lower portion is more gravelly and lower-most interval (from 2.0'-2.2') is again finer grained. Dry to slightly moist. 0-5% Gravel, 30-35% Sand, 60-70% Fines (up to 35% Silt)
			1.90 /2.00		5921	1				
	BH00647EBU1					2				
	00661EBU1				5920	2.5				
	BH00650EBU1			0.80 /2.00		3				VOA sample obtained from this interval.
										No recovery for this interval.
					5919	3.5			CL:	Same as above.
										Geotech samples obtained from this interval.
										No recovery for this interval.
					5918	4			CL:	Sandy, Silty Clay with Gravel: Yellowish brown (10YR 5/4), brown (10YR 5/3), and (with higher Fe-oxide content) strong brown (7.5YR 5/6, 7.5YR 5/8, 7.5YR 4/6). Gravels present in scattered pockets (pockets are sc to gc), and are up to 1.25" (average 0.4"-0.5"); sands v.f.g. to v.c.g. (mean=f.g.). Mod. graded, except in well graded gravel-rich pockets (4.6', 5.4'-6.1', 6.7'-6.9', 7.25'-7.4', 7.6'-7.75', and (to a lesser extent) 8.9'-9.1', and sandier zone at 9.4'-9.75'). Gravels subangular to rounded, sands angular to subrounded. Low to med. plasticity. (cont. below)
			2.00 /2.00		5917	5				
	BH00649EBU1					5.5				
						6				VOA sample obtained from this interval.
					5916				CL:	(cont. from above). Gravels quartzite, schist, gneiss; sands quartz, some rock fragments, traces mica, mafics, and trace to some Fe-oxide grains. Caliche present, as on gravel and in material immediately surrounding gravels. No apparent bedding. Slightly moist to dry. 0-10% Gravel, 20-30% Sands, 10-40% Silt, 40-55% Clay.
			2.00 /2.00		5915	7				
						8				Core retained in VOA sleeve.
					5914				CL:	Same as above.
	BH00654EBU1		2.00 /2.00			9				
					5913					
	BH00653EBU1					10				VOA sample obtained from this interval.

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 18.2	GROUND ELEVATION (FT): 5922.50	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	747744	AREA: OU1	CASING DIAMETER (IN):	GEOLOGIST: WGP/JAB	37391
EAST:	2084194	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 10/16/91	
REMARKS:					

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE / DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERED (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						10			CL:	Clay with Sand, Silt and scattered Gravel: Light yellowish brown (2.5Y 6/4), light olive brown (2.5Y 5/4), yellowish brown (10YR 5/4), and (where caliche is concentrated) white (10YR 8/2, 2.5Y 8/2). Gravels to 1" (average 0.3"-0.2"), sands v.f.g. to v.c.g. (mean=v.f.g. to f.g.). Poorly to mod. graded. Gravels subangular to well rounded, sands angular to subrounded. Medium plasticity. Gravels quartzite, schist, gneiss; sands quartz, some rock fragments, traces mica, mafics, trace to some Fe-oxide grains, (locally concentrated, as at 10.2'-10.4'). Locally concentrated pockets of caliche, sparse between 10.25'-11.3', most concentrated between 11.3'-13.4'. Caliche appears as fracture-fill at 13.2'-13.25' where fracture runs nearly perpendicular to axis of core. No bedding apparent. Dry (cont. below)
	00660EBU1			2.00 /2.00	5912	11				
					5911	12				
				2.00 /2.00	5910	13				Geotech samples obtained from this interval.
	BH00659EBU1				5909				CL:	(cont. from above) Note: unit resembles reworked claystone bedrock. Greater clay content, caliche content, and lesser gravel and sand content are reasons for separating this unit from the overlying unit.
	BH00655EBU1					14				VOA sample obtained from this interval.
					5908				CL:	Gravelly Clay with Sand and Silt: Light yellowish brown (2.5Y 6/3) to light olive brown (2.5Y 5/3, 2.5Y 5/4). Gravels to 1.5" (average approx. 0.4"), sands v.f.g. to v.c.g. (mean=f.g.). Well graded. Gravels subangular to rounded; sands angular to subrounded. Medium plasticity. Gravels mainly quartzite, schist, and gneiss, with traces sandstone and andesite. Sands mainly quartz with some rock fragments, traces Fe-oxides, mafics, micas. Trace to some caliche center. No apparent bedding. Unit resembles reworked claystone bedrock. Dry. 12-20% Gravel, 13-18% Sand, 15-20% Silt, 50-60% Clay)
	BH00656EBU1			2.00 /2.00		15				
					5907					
						16				
					5906				CLAYSTONE:	Claystone with trace Sand: Light olive brown (2.5Y 5/3) above 15.75'; below 16.0' grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2). Throughout, color and texture are mottled on a small (1/8"-1/4") scale. Sand v.f.g. to v.c.g., sparse and scattered, subangular to subrounded. Porosity=nil to approx. 2%. Cement is argillaceous and to some extent calcareous; calcareous content decreases sharply below approx. 16.8'. Non to slightly friable/fissile. Caliche blebs present at approx. 15.7'-16.7' and to a lesser extent above and below (to 17') this interval. Some Fe-oxides present in small, scattered areas. Sand quartz, rock fragments, organic chips. Internal structure appears jumbled, possibly even brecciated (though strong evidence of a fault in the interval is apparent); otherwise, no bedding or structures evident. Dry. 0-2% Sand, 98-100% Fines (cont. below)
				2.00 /2.00		17				
					5905					
	BH00657EBU1			0.00 /0.20		18				
					5904					
						19				
					5903	20				Core retained in VOA sleeve.
									CLAYSTONE:	(cont. from above) (mostly Clay) Top of bedrock = 15.15'

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 18.2	GROUND ELEVATION (FT):	5922.50	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747744	AREA: OU1	CASING DIAMETER (IN):		GEOLOGIST:	WGP/JAB	37391
EAST:	2084194	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	10/16/91	

REMARKS:

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00656EBU1	0% 50%	100% 0% 100%	2.00 /2.00	5907	15				mainly quartzite, schist, and gneiss, with traces sandstone and andesite. Sands mainly quartz with some rock fragments, traces Fe-oxides, mafics, micas. Trace to some caliche center. No apparent bedding. Unit resembles reworked claystone bedrock. Dry. 12-20% Gravel, 13-18% Sand, 15-20% Silt, 50-60% Clay)
					5906	16			CLAYSTONE:	Claystone with trace Sand. Light olive brown (2.5Y 5/3) above 15.75'; below 16.0' grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2). Throughout, color and texture are mottled on a small (1/8"-1/4") scale. Sand v.f.g. to v.c.g., sparse and scattered, subangular to subrounded. Porosity=nil to approx. 2%. Cement is argillaceous and to some extent calcareous; calcareous content decreases sharply below approx. 16.8'. Non to slightly friable/fissile. Caliche blebs present at approx. 15.7'-16.7' and to a lesser extent above and below (to 17') this interval. Some Fe-oxides present in small, scattered areas. Sand quartz, rock fragments, organic chips. Internal structure appears jumbled, possibly even brecciated (though strong evidence of a fault in the interval is apparent); otherwise, no bedding or structures evident. Dry. 0-2% Sand, 98-100% Fines (cont. below)
				2.00 /2.00	5905	17				
	BH00657EBU1			0.00 /0.20	5904	18				
					5903	19				Core retained in VOA sleeve.
					5902	20			CLAYSTONE:	(cont. from above)(mostly Clay) Top of bedrock = 15.15'
										VOA sample obtained from this interval.
										No recovery for this interval.
					5901	21				Total Depth = 18.2 ft.
					5900	22				
					5899	23				
					5898	24				
						25				

INDEX OF DATA

Borehole Location Number:	**37491**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 16.0	GROUND ELEVATION (FT) 5964.99	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748190	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST KMM/JAB	37491
EAST	2084274	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7.25	DATE DRILLED 10/16/91	
REMARKS					

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE / DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00568EBU1	0% 50% 100%	0% 100%			0			CL	Sandy Clay. Light olive brown (2.5Y 5/3), light yellowish brown (2.5Y 6/4), and olive yellow (2.5Y 6/6). Occasional gravel to approx. 0.3", sand v.f.g. to v.c.g. (mean=v.f.g. to f.g.). Poorly graded. Subangular to subrounded. Medium plasticity. Sand is quartz, some rock fragments, some Fe-oxide and calcareous content. No bedding apparent, abrupt lower contact. Resembles reworked bedrock claystone. Dry. 0-1% Gravel, 6% Sand, 4-9% Silt, 85-90% Clay.
				1.50 /2.00	5964	1				
	BH00569EBU1									
					5963	2			CL	Sandy Silt-Clay mixture. Uppermost 1.5" are brown/dark brown (10YR 4/3), below this, color is between brown (7.5YR 5/4) and yellowish brown (10YR 5/4), and gradually reddens with increasing depth to strong brown (7.5YR 4/6) by 7.0'. Gravel is rare and scattered and up to 1" diameter. Sand is v.f.g. to c.g., mean=v.f.g. to f.g. Poorly graded. Subangular to subrounded. Low to med. plasticity. Sands are quartz with traces rock fragments, mica (weathered), mafics. Calcareous content decreases with depth to essentially nil below approx. 5.95'. Some Fe-oxides present, both scattered grains and locally concentrated pockets. Trace organics also present. No bedding apparent. Gravels appear to be slightly more concentrated between 5.2'-5.95'. Dry. 0-2% Gravel, 6-8% Sand, 90-94% Silt, (up to approx. 40% Silt).
	BH00573EBU1			0.70 /2.00	5962	3				
	00571EBU1									VOA sample obtained from this interval.
	BH00574EBU1									No recovery for this interval.
					5961	4			CL	Same as above.
				2.20 /2.20	5960	5				Geotech samples obtained from this interval.
										No recovery for this interval.
									CL	Same as above.
	BH00572EBU1				5959	6			SM	Silty Sand with Gravel and Clay. Strong brown (7.5YR 5/6, 7.5YR 4/6). Gravels to 2.5", average 0.4"-0.6", sands v.f.g. to v.c.g., mean=f.g. to m.g. Well graded. Gravels subangular to rounded (some angular as well, probably from drill-related fracturing), sands angular to subrounded. Gravels are quartzite, schist, gneiss, trace sandstone, sands quartz with some rock fragments, traces mafics, micas, feldspar. No apparent bedding. Dry. 11%-15% Gravel, 50%-60% Sand, 20% Silt, 15% Clay.
				1.80 /1.80	5958	7				
					5957	8				VOA sample obtained from this interval.
									SM	Same as above.
	BH00576EBU1									
	BH00577EBU1			1.75 /2.00	5956	9				
	BH00583EBU1									
	BH00575EBU1				5955	10				VOA sample obtained from this interval.

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 16.0	GROUND ELEVATION (FT) 5964.99	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	798190	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST KMM/JAB	37491
EAST	2084274	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7.25	DATE DRILLED 10/16/91	
REMARKS					

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50%	100% 0% 100%			10			SM	Same as above
				1.75/2.00	5954	11				
					5953	12				No recovery for this interval
				1.80/2.00	5952	13			CLAYSTONE	Claystone Olive yellow (2.5Y 6/6) fading to light yellowish brown (2.5Y 6/4) and light olive brown (2.5Y 5/4) by approx 13.65', and by T.D. is increasingly light gray (2.5Y 7/2) and decreasingly olives and yellows. Up to approx. 20% Silt, but averaging approx 10%-15% Silt. Porosity=nil to approx 2% Cement argillaceous. Non to slightly friable/fissile. Fe-oxide content greatest at top of interval, decreasing gradually with depth, this may correlate with decreasing weathering with depth. Trace organic content. No apparent bedding or fracture traces. Dry. 5-20% Silt, 80-95% Clay. Top of bedrock = 12.05'
	BH00578EBU1 BH00581EBU1 BH00582EBU1				5951	14				VOA sample obtained from this interval
				1.10/2.00	5950	15			CLAYSTONE	Same as above
	BH00580EBU1 BH00579EBU1									Geotech samples obtained from this interval
					5949	16				No recovery for this interval
										Total Depth = 16.0 ft
					5948	17				
					5947	18				
					5946	19				
					5945	20				

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Borehole Location Number:	N/A
Monitoring Well Location Number:	**37591**
Piezometer Location Number:	N/A

Data Available:

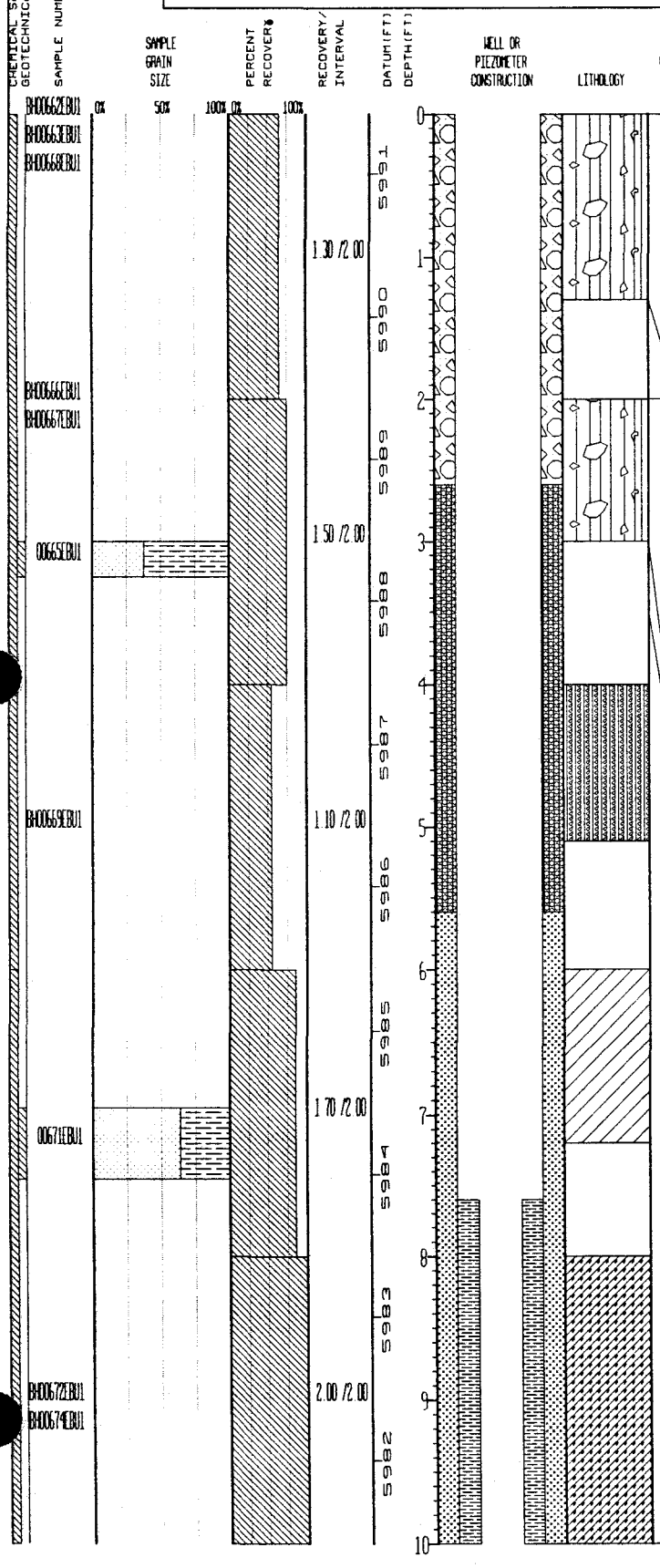
✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 14 7	GROUND ELEVATION (FT)	5991 42	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH:	748580	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	WGP/JAB	37591
EAST:	2084610	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	10/21/91	

REMARKS:



GM

Sandy, Silty Gravel Dark brown (10YR 3/3) Gravel to 2 5", average 0 4", sands v f g to v c g, mean=m g Well graded Gravel angular (possibly from fracturing during drilling) to well rounded Sands angular to subrounded Gravels quartzite, schist, gneiss, and a trace dry asphaltic "conglomerate" Sands are mainly quartz with some rock fragments and asphaltic grains (dry, hydrophobic, and often coating quartz grains) Calcareous No apparent bedding Lightly rooted at top Dry 65-70% Gravel, 18-20% Sand, 7-13% Silt, 3-5% Clay

No recovery for this interval

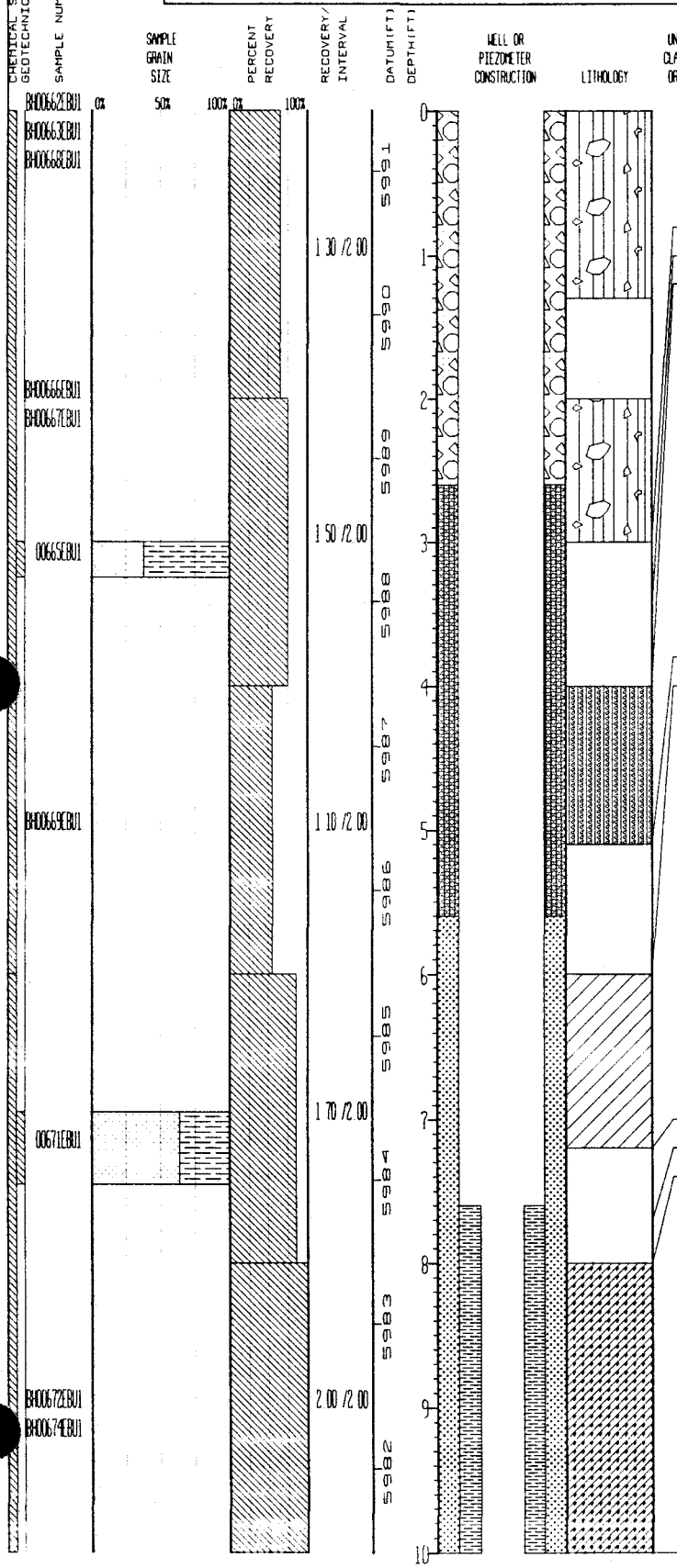
GM

Silty, Sandy Gravel Dark red (2 5YR 3/6) to dark reddish brown (5YR 3/4) Gravels to 2 5", average 0 4"-0 7", sand v f g to v c g (mean=m g) Well graded Gravels angular (probably from fracturing during drilling) to rounded; sand angular to subrounded Gravels are schist, gneiss, quartzite Sands are quartz with some rock fragments, traces mafics and micas High Fe-oxide content (and possibly Mn-oxides) gives the color No apparent bedding The Fe/Mn oxides also serve to cement the finer-grained fraction together into fairly hard clasts Dry 30-35% Gravel, 17-22% Sand, 43-49% Silt (28-35% Silt, balance Clay)

Geotech samples obtained from this interval

No recovery for this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 14 7	GROUND ELEVATION (FT)	5991 42	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748580	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	WGP/JAB	37591
EAST	2084610	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	10/21/91	
REMARKS							



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	Geotech samples obtained from this interval
	No recovery for this interval
SM	Silty Sand with Gravel and Caliche Strong brown (7 5YR 5/6, 7 5YR 4/6) to light brown (7 5YR 6/3, 7 5YR 6/4), light yellowish brown (10YR 6/4), pale yellow (2 5Y 8/3, 2 5Y 7/3), and white (2 5Y 8/2, 10YR 8/2) with increasing caliche content Gravels to 1 3", average 0 3"-0 4", sand v f g to v c g, mean=m g Well graded Gravels angular (probably from fracturing during drilling) to well rounded, sands angular to rounded Gravels quartzite, schist, gneiss, soft caliche-cemented clods Sand mainly quartz with some soft clasts of caliche, traces rock fragments, micas Lots of caliche, as both "pure" clasts and as binding material No bedding apparent Dry 4-10% Gravel, 60-68% Sand, 28-36% Fines (approx 20-25% Silt)
	No recovery for this interval
CL	Caliche-filled Gravelly, Sandy Clay Light yellowish brown (10YR 6/4), very pale brown (10YR 7/4), and pale yellow (2 5Y 7/4) to approx 6 2', where unit gradually becomes more caliche-rich and by approx 6 5' color is pink (7 5YR 8/3 to 7 5YR 7/4) and white (10YR 8/2) with pockets of pale yellow (5Y 7/3) to pale olive (5Y 6/3), small, isolated Fe-rich blebs are yellowish brown (10YR 5/6) Gravels to 1" (average 0 2"- 0 4"), sands v f g to v c g (mean=m g) Well graded Gravels angular (probably fractured during drilling) to rounded, sands angular to subrounded Med plasticity Gravel is quartzite, gneiss, schist, sand is soft caliche clasts and quartz, some rock fragments Caliche acts as cement to bind the various sizes together No bedding apparent Dry 20% Gravel, 30% Sand, 5-15% Silt, 35-45% Clay
	Geotech samples obtained from this interval
	No recovery for this interval
SC	Gravel-Sand-Clay mixture Widely varying colors, textures and other characteristics Colors most often strong brown (7 5YR 4/6) to yellowish brown (10YR 5/6, 10YR 5/8), between approx 9'-10', colors are light yellowish brown (10YR 6/4) to yellow (2 5Y 7/6) to strong brown (7 5YR 5/6) and brown (7 5YR 5/4, 7 5YR 4/4) Gravels up to 2", although the yellow area from 9 35"-9 6" may be a strongly weathered sandstone cobble Sands v f g to v c g, mean=m g Well graded Gravels angular to rounded, sands are angular to subrounded Gravels are quartzite, gneiss, schist, sands are quartz, some rock fragments, traces mafics, micas, caliche clasts Matrix contains Fe-oxides No bedding apparent Dry 25-35% Gravel, 45-55% Sand, 7-10% Silt, 13-20% Clay

STATE PLANE COORDINATE	TOTAL DEPTH (FT) 14 7	GROUND ELEVATION (FT) 5991 42	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH 748580	AREA OU1	CASING DIAMETER (IN) 2 07	GEOLOGIST WGP/JAB	37591
EAST 2084610	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 11 5	DATE DRILLED 10/21/91	
REMARKS				

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% – 50% – 100%)	PERCENT RECOVERY (0% – 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				0 60 /2 00	5981	10				No recovery for this interval
				1 10 /1 00	5980	11			CLAYSTONE	Claystone Light brownish gray (2 5Y 6/2) to light yellowish brown (2 5Y 6/3 and 2.5Y 6/4) to (with increasing Fe-oxides) olive yellow (2 5Y 6/6) Porosity=nil to approx 2% Cement is argillaceous with scattered traces of calcareous content Non to slightly friable/fissile Trace organics, Fe-oxides No bedding apparent Dry NOTE sandy material at 13 0'-13 1' is caved material from above 0% Silt, 90-100% Clay Top of bedrock = 12 0'
	BH00673EB01				5979	12				
	BH00675EB01			1 90 /1 70	5978	13				VOA sample obtained from this interval
					5977	14			CLAYSTONE	Same as above
					5976	15				No recovery for this interval
					5975	16				
					5974	17				
					5973	18				
					5972	19				Total Depth = 14 7 ft
						20				

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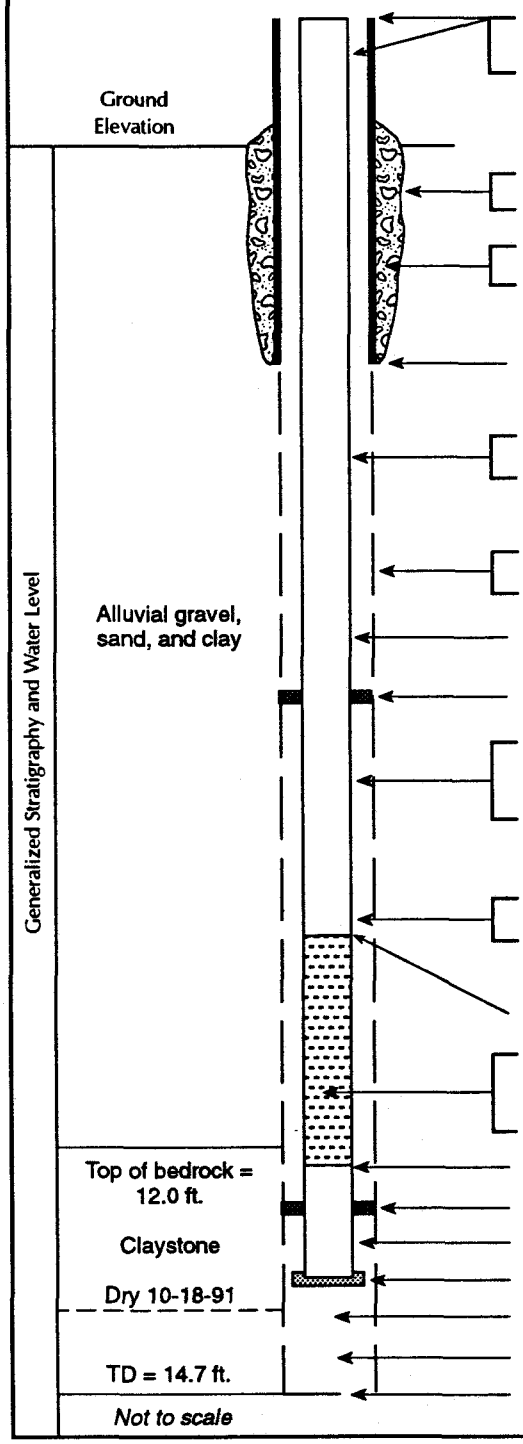
Project	OU1 Phase III RFI/RI	Northing	748579.7152 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084610.4271 ft.	Well No.	37591
Date Completed	10-21-91	Original Depth	14.7 ft.	Aquifer	Alluvial
Inspected by	B. Polivka	Date	10-21-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 14.7 ft.



Elevation of top of surface casing/riser pipe	5993.82 ft./5993.45 ft.
Height of top of surface casing/riser pipe above ground surface	2.4 ft./2.03 ft.
Depth of surface seal below ground surface	2.6 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.6 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	14.7 ft.
Type of backfill	NA
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	2.6 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	5.6 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	5.6 ft.
Elevation/depth top of screened section	7.6
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	12.6 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.0 ft.
Elevation/depth bottom of plugged blank section	14.6 ft.
Elevation/depth bottom of sand column	14.7 ft.
Type of backfill below observation pipe	NA
Elevation/depth of hole	14.7 ft.

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INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**37691**
Piezometer Location Number:	N/A

Data Available:

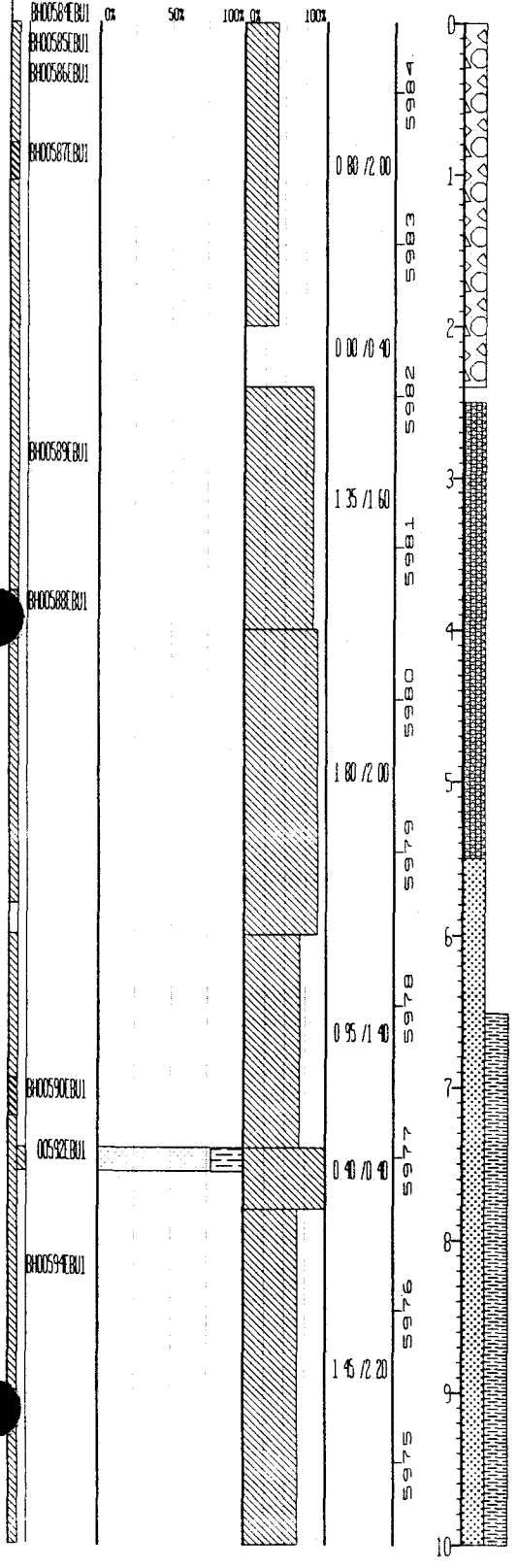
✔ Geologic Borehole Log (LOGGER Format)

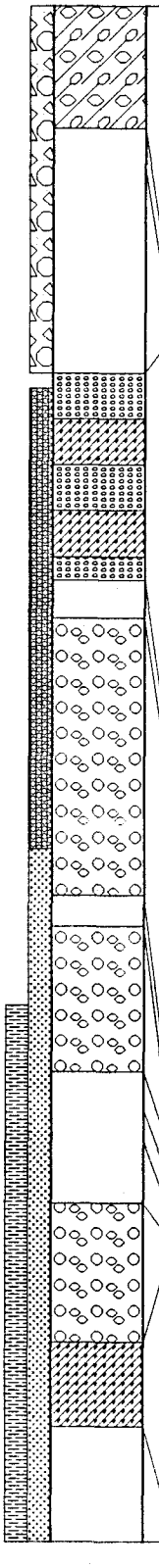
__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 19.0	GROUND ELEVATION (FT)	5984.46	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748692	AREA OU1	CASING DIAMETER (IN)	2.07	GEOLOGIST	KMM/KJT	37691
EAST	2085217	LOCATOR NUMBER MB	BOREHOLE DIAMETER (IN)	11.5	DATE DRILLED	10/18/91	
REMARKS							

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE / DEPTH / SAMPLE NUMBER / SAMPLE GRAIN SIZE / PERCENT RECOVERY / RECOVERY/INTERVAL / DATUM(FT) / DEPTH(FT) / WELL OR PIEZOMETER CONSTRUCTION / LITHOLOGY / UNIFIED SOILS CLASSIFICATION OR ROCK TYPE / DESCRIPTION





Unified Soils Classification	Description
GC	Sandy Clayey Gravel Black (10YR 2/1) well graded sand and gravel in clay matrix Sand is f g to c g, mean=m g to c g, angular to subrounded, composed of rock fragments of gneiss, schist, granite, quartzite, plus quartz, some feldspar, trace micas Gravel is f g to c g, mean size=1 1/4", max size=2 1/4" diameter, angular to subangular, composed of granite, quartzite, some other metamorphic rock fragments (micaceous gneiss) Clay matrix is dark, possibly organic-rich Dry 60% Gravel, 25% Clay, 15% Sand
	VOA sample obtained from this interval
	No recovery for this interval
SW	Clayey Gravelly Sand Light yellowish brown (10YR 7/4) Well graded sand and gravel with some clay Gravel is f g to c g, mean size=3/4", size=2 1/2" diameter, subangular, composed of granite, quartzite, garnet schist, feldspar Some gravel is strongly weathered Sand is v f g to c g, mean size=f g, generally subangular, composed of quartz, granite, quartzite, feldspar, biotite, muscovite, mafic minerals (heavy minerals?) Caliche present on gravel as coating and within sandy matrix Sand has bi-modal grain size distribution (70% fine - 25% coarse) Thin bed of more clay-rich sand is present at 3 1' to 3 2' The clay matrix is black, like interval from 0' to 0 8' Dry 40% Gravel, 50% Sand, 10% Clay
	VOA sample obtained from this interval
GW	Well graded Sand and Gravel Light yellowish brown (10YR 7/4) Sand and gravel within silty clay matrix, abundant caliche in matrix as well Sand is v f g to c g, mean size =m g to c g, subangular to subrounded, composed of quartz and rock fragments (granite, schist, gneiss) with some feldspar, micas, and mafic minerals Gravel is f g to c g, mean size=1" diameter, max size= 3 1/4", angular to rounded, composed pred of quartzite with some strongly weathered and crumbly granite, trace of micaceous schist Dry 58% Gravel, 33% Sand, 1% Silt, 8% Clay
	No recovery for this interval
GW	Same as above
	VOA sample obtained from this interval
	No recovery for this interval
	Geotech samples obtained from this interval
GW	Same as above
SC	Clayey Sand Dark brown (7 5YR 4/4) to light yellowish brown (2 5Y 6/3) Well graded sand with some gravel in silty clay matrix Gravel is sparse, scattered throughout interval, but most abundant above 12 0' Gravel composed of c g to f g gravel, mean size=1" diameter, max =2 1/2", subangular to rounded, composed of granite, quartzite, quartz and felspar Sand is v f g to c g, mean size=v f g to f g, subangular to subrounded, composed of quartz, (cont below)
	No recovery for this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 19 0	GROUND ELEVATION (FT)	5984 46	PROJECT NUMBER	ENAD	LOG OF BORING NUMBER
NORTH	748692	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	KMM/KJT	37691
EAST	2085217	LOCATOR NUMBER M8	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	10/18/91	
REMARKS							

CHEMICAL SAMPLE DEPTH
GEOTECHNICAL SAMPLE DEPTH

SAMPLE NUMBER	RECOVERY/INTERVAL	DEPTH (FT)	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH00593EBU1	0.45 /2.00	10–11	SC	(cont from above) to f g., subangular to subrounded, composed of quartz, mafic minerals, feldspar, rock fragments of quartzite and granite Organic material (dark brown/carbonaceous) present in discontinuous patches, caliche also present in patches throughout interval Clay content variable throughout from <10% to >50% Dry 15% Gravel, 50% Sand, 5% Silt, 30% Clay
				VOA sample obtained from this interval
				No recovery for this interval
BH00598EBU1	1 50 /2.00	12–13	SC	Same as above
00596EBU1		13		Geotech samples obtained from this interval
		14	SC	Same as above
BH00597EBU1				VOA sample obtained from this interval
BH00599EBU1	0 50 /2.00	15		No recovery for this interval
			SC	Same as above
		16	CLAYSTONE	Interbedded Claystone and Clayey Sandstone Pale olive (5Y 6/3) to olive yellow (2 5Y 6/6) Claystone beds (2" to 5" thick) within thicker clayey sandstone Sand is v f g to f g , subangular to subrounded, well sorted, porosity of clayey sandstone approx 20%, porosity of claystone <10%, mod to highly friable, sand is composed of quartz, with trace of feldspar, trace of mafic minerals and rock fragments Claystone beds contain carbonaceous material Large cobble and clayey sand from overlying interval appear pushed into core just below 10' Below 18 4', color changes to dom yellowish brown (10YR 5/8) with some pale olive (5Y 6/3) Dry Clayey sandstone 60% Sand, 40% Clay, claystone 20% Sand, 80% Clay Top of bedrock = 16 2'
BH00700EBU1	1 80 /2.00	17		
BH00701EBU1	0 75 /1.00	18		
				VOA sample obtained from this interval
			CLAYSTONE	Same as above
				No recovery for this interval
		19		Total Depth = 19 0 ft
		20		

SAMPLE GRAIN SIZE: 0% 50% 100%
PERCENT RECOVERY: 0% 100%
DATUM (FT): 5974, 5973, 5972, 5971, 5970, 5969, 5968, 5967, 5966, 5965
WELL OR PIEZOMETER CONSTRUCTION
LITHOLOGY

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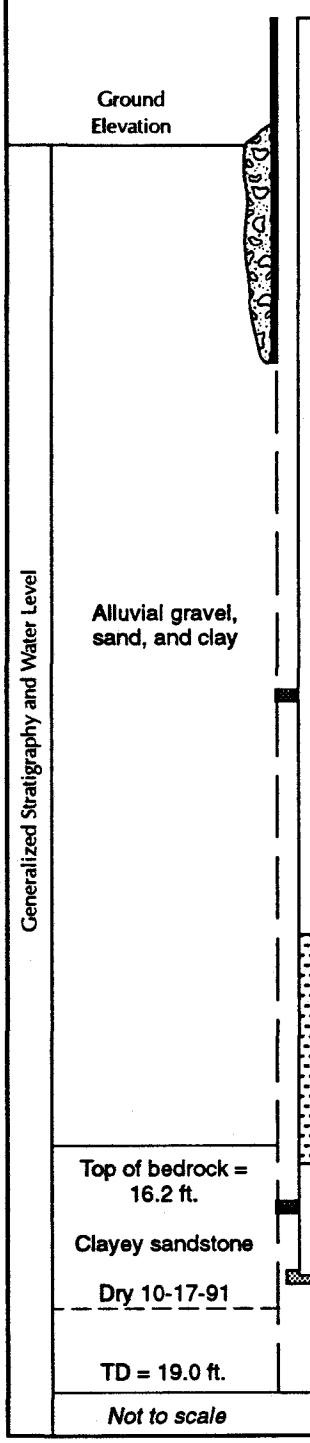
Project	OU1 Phase III RFI/RI	Northing	748691.9137 ft.	Page	1 of 1
Location	881 Hillside	Easting	2085217.1390 ft.	Well No.	37691
Date Completed	10-18-91	Original Depth	19.0 ft.	Aquifer	Alluvial
Inspected by	K. Maley	Date	10-18-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 19.0 ft.



Elevation of top of surface casing/riser pipe	5987.16 ft./5985.24 ft.
Height of top of surface casing/riser pipe above ground surface	2.7 ft./0.78 ft.
Depth of surface seal below ground surface	2.5 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.3 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	19.0 ft.
Type of backfill	NA
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	2.5 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	5.5 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	5.5 ft.
Elevation/depth top of screened section	6.51
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	16.5 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.0 ft.
Elevation/depth bottom of plugged blank section	18.5 ft.
Elevation/depth bottom of sand column	18.5 ft.
Type of backfill below observation pipe	Natural
Elevation/depth of hole	19.0 ft.

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Borehole Location Number:	N/A
Monitoring Well Location Number:	**37791**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 22 6	GROUND ELEVATION (FT) 6002 16	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748592	AREA OU1	CASING DIAMETER (IN) 2 07	GEOLOGIST WGP/JAB	37791
EAST	2083753	LOCATOR NUMBER K8	BOREHOLE DIAMETER (IN) 11 5	DATE DRILLED 10/25/91	

REMARKS

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	B400676EBU1	0% 50%	100% 0%		6002	0			SM	Clay-Silt-Sand mixture Brown/dark brown (10YR 5/3, 10YR 4/3) to dark brown (10YR 3/3), clay-rich lens at 0 8' to 1 0' is also brown (7 5YR 5/4) to strong brown (7 5YR 4/6) Trace gravels, to 1", sands v f g to v c g (mean=f g to m g) Well graded Slightly more silt than clay, except for interval from 0 8' to 1'0' which is more clay-rich Subangular to rounded Sands mainly quartz with some rock fragments, traces micas, mafics, organics Calcareous No bedding apparent, although color darkens from brown/dark brown to dark brown rather abruptly at approx 0 5' or 0 55', and lowermost interval at 0 8' to 1 0' is more clay-rich than rest of unit Dry 62% Sand, (cont below)
	B400677EBU1			1 00 /2 00	6001	1				
					6000	2				
										No recovery for this interval
	B400678EBU1			0 00 /2 00	5999	3			SM	(cont from above) 20% Silt 18% Clay
									CL	Clay with varying amounts of Silt Sand, and Gravel Widely varying in color pale brown (10YR 6/3), brown/dark brown (7 5YR 4/4, 7 5YR 3/4), light olive brown (2 5Y 5/3, 2 5Y 5/4), light gray (2 5Y 7/2), very dark grayish brown (10YR 3/2), very dark brown (10YR 2/2), with blebs of yellowish brown (10YR 5/6, 10YR 5/8), dark yellowish brown (10YR 4/6) and red (2 5YR 4/6) Gravels to 2'5", average approx 0 4", sands v f g to v c g , mean=m g Well graded, although some areas with more are mod to poorly graded Gravels angular to rounded, sands angular to subrounded Low to med plasticity Gravels are quartzite, schist, gneiss, traces sandstone and granitic components Sands are quartz, some rock fragments, traces micas, mafics, feldspar, trace to some organics (richer below approx 12 6'), Fe-oxides Calcareous (cont below)
				0 75 /2 00	5998	4				
					5997	5				
					5996	6				No recovery for this interval
									CL	(cont from above) no bedding apparent Slightly moist 5%-30% Gravel, 10-25% Sand, 50-80% Fines (more clay than silt)
				2 00 /2 00	5995	7				
					5994	8				
	B400679EBU1			1 25 /2 00	5993	9				No recovery for this interval
						10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 22.6	GROUND ELEVATION (FT) 6002.16	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH 748592		AREA OU1	CASING DIAMETER (IN) 2.07	GEOLOGIST WGP/JAB	37791
EAST 2083753		LOCATOR NUMBER K8	BOREHOLE DIAMETER (IN) 11.5	DATE DRILLED 10/25/91	
REMARKS					

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
					5992	10			CL	Same as above
				1.50 /2.00	5991	11				
										No recovery for this interval
					5990	12			CL	Same as above
				1.60 /2.00	5989	13				
										No recovery for this interval
					5988	14			CL	Same as above
	BH00680EBU1			1.90 /2.00	5987	15				
										No recovery for this interval
					5986	16			CL	Same as above
				1.00 /2.00	5985	17				
										No recovery for this interval
					5984	18			CL	Same as above
				0.60 /2.00	5983	19				
										No recovery for this interval
						20				

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 22.6	GROUND ELEVATION (FT): 6002.16	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	748592	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: WGP/JAB	37791
EAST:	2083753	LOCATOR NUMBER: K8	BOREHOLE DIAMETER (IN): 11.5	DATE DRILLED: 10/25/91	

REMARKS:

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00682EBU1	0% 50% 100%	0% 100%	2.00 /2.00	5982 5981	20 21			CLAYSTONE:	Claystone: Brownish yellow (10YR 6/6, 10YR 6/8), yellowish brown (10YR 5/8), and olive yellow (2.5Y 6/6) from Fe-oxide enrichment, which decreases with depth; below approx. 22.25', predom. colors are light brownish gray (2.5Y 6/2) and grayish brown (2.5Y 5/2), gravelly layer (clasts to approx. 0.6") present at approx. 21.0"-21.25" may be the result of faulting or slumping which may have "imported" these gravels and the Fe-oxide abundance. Porosity=nil to approx. 15% at gravel layer. Cement is argillaceous, with calcareous cement and caliche present at gravel layer. Non to slightly friable, non to slightly fissile (moderatley friable/fissile at gravel layer). Gravels are quartzitic. Coarser material at approx. 22.0'-22.1' are caved from above. No bedding apparent. Dry. Excepting gravel layer, 100% Fines (mostly clay). Top of bedrock = 20.0'
	BH00681EBU1			0.60 /0.60	5980	22				
					5979	23				VOA sample obtained from this interval
									CLAYSTONE:	Same as above. Total Depth = 22.6 ft.
					5978	24				
					5977	25				
					5976	26				
					5975	27				
					5974	28				
					5973	29				
						30				

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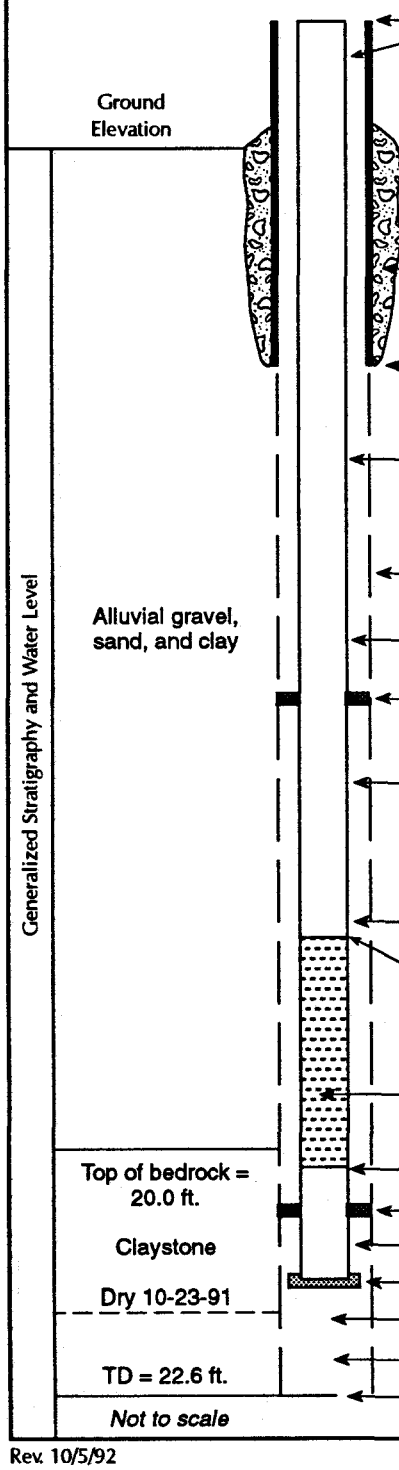
Project	OU1 Phase III RFI/RI	Northing	748591.7685 ft.	Page	1 of 1
Location	881 Hillside	Easting	2083753.4178 ft.	Well No.	37791
Date Completed	10-25-91	Original Depth	22.6 ft.	Aquifer	Alluvial
Inspected by	B. Polivka	Date	10-25-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 22.6 ft.



Elevation of top of surface casing/riser pipe	6004.66 ft./6004.18 ft.
Height of top of surface casing/riser pipe above ground surface	2.5 ft./2.02 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.5 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	22.6 ft.
Type of backfill	Grout
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	5.6 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	8.8 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	8.8 ft.
Elevation/depth top of screened section	10.6
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	20.6 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.0 ft.
Elevation/depth bottom of plugged blank section	22.6 ft.
Elevation/depth bottom of sand column	22.6 ft.
Type of backfill below observation pipe	NA
Elevation/depth of hole	22.6 ft.

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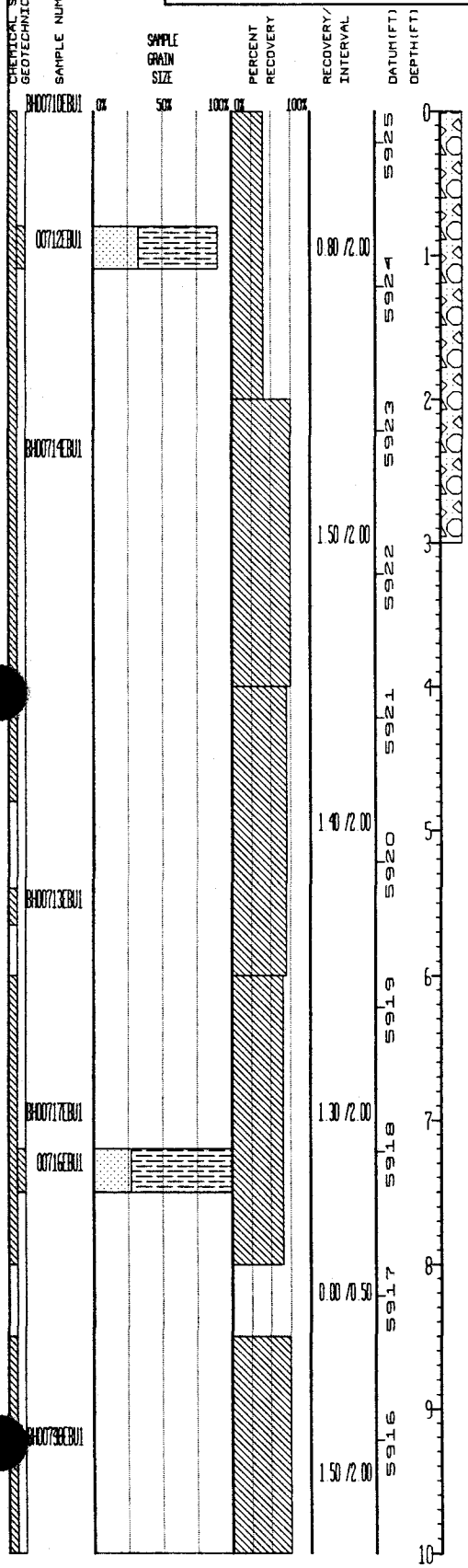
Borehole Location Number:	N/A
Monitoring Well Location Number:	**37891**
Piezometer Location Number:	N/A

Data Available:

- ✔ Geologic Borehole Log (LOGGER Format)
- ✔ Geophysical Log
- ✔ Well Construction Summary

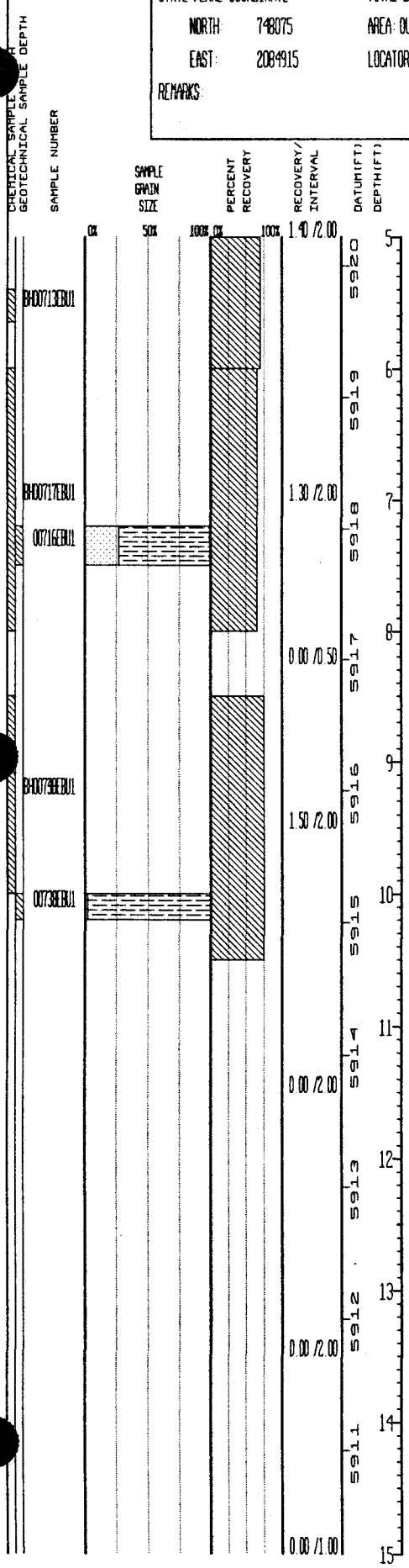
STATE PLANE COORDINATE		TOTAL DEPTH (FT): 56.4	GROUND ELEVATION (FT): 5925.22	PROJECT NUMBER: ENAD	LOG OF BORING NUMBER
NORTH:	748075	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: KMM/JAB	37891
EAST:	2084915	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 11/13/91	
REMARKS:					



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
CL	Clay with Sand and trace Gravel: Dark brown (10YR 3/3) to very dark grayish brown (10YR 3/2). Gravel (mainly present in upper approx. 0.2") to 1", sand v.f.g. to v.c.g. (mean=f.g. to v.f.g.). Poorly graded. Subangular to sub-rounded clastics. Low to med. plasticity. Gravel is quartzite, schist, gneiss; sand is quartz with some rock fragments, traces mafics and micas. No bedding apparent. Organics also present; unit is rooted. Dry. Trace Gravel, 7%-10% Sand, 90%-93% Fines (approx. 20%-25% Silt)
CL	Clay with Silt and Sand: Brown/dark brown (10YR 4/3) at top (to approx. 2.1'); dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/4, 10YR 5/6) below this. Sand content appears to increase with depth. Scattered gravels, to 1.5" (average approx. 0.2"), sand v.f.g. to v.c.g. (mean=v.f.g. to f.g.). At approx. 2.3', 13% Sand; at approx. 3.1', 29% Sand (locations picked at random). Grading increases from poor at top of interval to poor-mod. at bottom. Subangular to subrounded, with sands in top portion apparently more rounded than those of bottom portion. Low to med. plasticity. Sand in upper portion more mature, cleaner quartz sand with some rock fragments, traces mafics, micas, and rare trace rounded to well rounded amethyst sand; lower sand less mature quartz sand with some (cont. below)
	Geotech samples obtained from this interval
	No recovery for this interval
CL	(cont. from above) (more than upper portion) rock fragments, trace to some micas and mafics. Below 2.7', calcareous material present. Trace organics throughout. No bedding apparent. Silt content appears approx. uniform from upper to lower portion of interval, at approx. 30%-40% of total fines. Dry. Approx. 1%-2% Gravel, 10%-30% Sand, 70%-90% Fines. (approx. 20%-30% Silt)
	No recovery for this interval
SC	Sand-Clay mixture with Silt and Gravel: Strong brown (7.5YR 5/6, 7.5YR 4/6) to dark brown (10YR 3/3). Gravel to 1" (average approx. 0.3"), sand v.f.g. to v.c.g. (mean=m.g.). Well graded. Gravel angular (probably drill-related fracturing) to subrounded, sand angular to subrounded. Gravel quartzite, schist, gneiss; sand quartz with some rock fragments, traces micas, mafics, carbonaceous chips. Trace calcareous content in places. No bedding apparent. Dry. 15% Gravel, 47% Sand, 38% Fines (12%-16% Silt)
CLAYSTONE	Claystone (weathered and disturbed): Range of grays: light gray/gray (10YR 7/1, 10YR 6/1), very dark gray (5YR 3/1), grayish brown (10YR 5/2 and 2.5Y 5/2) to light olive brown (2.5Y 5/3) and, where Fe-oxide-rich, (cont. below)
	VOA sample obtained from this interval
	No recovery for this interval
CLAYSTONE	(cont. from above) yellowish brown (10YR 5/6, 5/8). Approx. 90-100% Clay, balance Silt. Porosity=nil-approx. 5% Cement

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 56.4	GROUND ELEVATION (FT): 5925.22	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER
NORTH:	748075	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: KMM/JAB	37891
EAST:	2084915	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 11/13/91	

REMARKS:



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE — DESCRIPTION

CLAYSTONE: Claystone (weathered and disturbed): Range of grays: light gray/gray (10YR 7/1, 10YR 6/1), very dark gray (5YR 3/1), grayish brown (10YR 5/2 and 2.5Y 5/2) to light olive brown (2.5Y 5/3) and, where Fe-oxide-rich, (cont. below)

VOA sample obtained from this interval

No recovery for this interval

CLAYSTONE: (cont. from above) yellowish brown (10YR 5/6, 5/8). Approx. 90-100% Clay, balance Silt. Porosity=nil-approx. 5%. Cement is argillaceous and trace to some calcareous content (disseminated and blebs. Non to slightly friable, slightly to mod. fissile/crumbly. Calcareous content greatest at 4.9' (blebs) 8.5-10.0' (disseminated and blebs), and 15.5-15.6' (disseminated and blebs); Fe-oxide content (cont. below)

Geotech samples obtained from this interval

No recovery for this interval

CLAYSTONE: (cont. from above) greatest at 4.8', 7.0-7.3', and 8.6-8.7'. Fe-oxides present as broad color bands rather than thin, distinct healed fractures; may indicate narrow, fracture-related breccia zones or similar structures. Trace organics also present. Wood chips and nail at 8.5'-approx. 9.0' are imported from above. No bedding apparent; interval appears to be mixed and jumbled. Dry. 100% Fines (mostly Clay) Top of bedrock = 4.7'

Geotech samples taken from this interval

No recovery for this interval.

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 56.4	GROUND ELEVATION (FT):	5925.22	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	748075	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	KMM/JAB	37891
EAST:	2084915	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	11/13/91	
REMARKS:							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	00738EBU1				5915	10				
					5914	11				
				0.00 /2.00					CLAYSTONE:	(cont. from above) greatest at 4.8', 7.0-7.3', and 8.6-8.7'. Fe-oxides present as broad color bands rather than thin, distinct healed fractures; may indicate narrow, fracture-related breccia zones or similar structures. Trace organics also present. Wood chips and nail at 8.5'-approx. 9.0' are imported from above. No bedding apparent; interval appears to be mixed and jumbled. Dry. 100% Fines (mostly Clay). Top of bedrock = 4.7'
					5913	12				
						13				Geotech samples taken from this interval
				0.00 /2.00	5912					No recovery for this interval
					5911	14				
				0.00 /1.00	5910	15				
									CLAYSTONE:	Same as above.
				2.00 /2.00	5909	16			CLAYSTONE:	Claystone: Colors range through grays, olives, browns, often Fe-oxide-yellowed. Color range may be summarized as light gray (10YR 7/2) to dark gray (10YR 4/1), light brownish gray (2.5Y 6/2, 10YR 6/2) to grayish brown (10YR 5/2, 2.5Y 5/2), light olive brown (2.5Y 5/3, 2.5Y 5/4) to olive brown (2.5Y 4/3), with Fe-oxides bringing colors to yellowish brown (10YR 5/6, 10YR 5/8) and less commonly to strong brown (7.5YR 4/6) and dark brown (7.5YR 3/3, 7.5YR 3/4). 90%-100% Silt, except at 20.5'-24.3' (approx. 30%-35% Silt), 24.3'-26.3' (to approx. 20% Silt), 39.5'-40.35' (increases over transition to underlying unit, from approx. 10% at 39.5' to >50% by 40.5'). Porosity generally nil to approx. 6%, with aforementioned silty zones more porous (approx. 2%-20%). Cement dom. argillaceous, frequently augmented by Fe-oxides in (cont. below)
					5908	17				
	BH00741EBU1			2.00 /2.00	5907	18			CLAYSTONE:	(cont. from above) trace to (occasionally) abundant amounts, and trace calcareous cement in scattered areas. Generally non to slightly friable, though silty zones up to mod. friable, generally non to slightly to mod. fissile (to very fissile at 30.0'-32.0', 34.0'-36.0'). Generally trace amounts organics (carbonaceous), up to (cont. below)
					5906	19				
						20				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 56.4	GROUND ELEVATION (FT):	5925.22	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	749075	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	KMM/JAB	37891
EAST:	2084915	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	11/13/91	
REMARKS:							

CHEMICAL SAMPLE & GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				1.80 /2.00	5905	20			CLAYSTONE:	(cont. from above) some organics at 20.5'-22.5', trace Fe-oxides (to some at 15.7'-17.0', to abundant at 17.0'-18.2' throughout, almost always associated with Fe-oxide-healed fractures. Ironstone region present at 35.25'-35.5'. Scattered caliche blebs and calcareous areas (in trace amounts). No bedding apparent except for vague, (cont. below)
					5904	21				
										No recovery for this interval
				2.00 /2.00	5903	22			CLAYSTONE:	(cont. from above) discontinuous color banding at 26.3'-26.9' and color variations resembling indistinct ripple laminations at 39.5'-40.35'. Entire interval shows signs of fractures of various orientations, they are clearest at 15.7'-18.5' (caliche appears to fill fracture at 18.5') 31.5', 32.5', 34.6'-37.1', 38.8'-40.0'. Except as noted, Fe-oxides fill fractures. Dry. 100% Fines.
					5902	23				
				1.80 /2.00	5901	24				
	BH00742EB01				5900	25				
										No recovery for this interval
				2.00 /2.00	5899	26			CLAYSTONE:	Same as above.
					5898	27				
				2.00 /2.00	5897	28				
					5896	29				
						30				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 56.4	GROUND ELEVATION (FT): 5925.22	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	748075	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: KMM/JAB	37891
EAST:	2084915	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 11/13/91	
REMARKS:					

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH0074CEB01			2.00 /2.00	5895	30			CLAYSTONE:	Same as above.
				2.00 /2.00	5894	31				
				2.00 /2.00	5893	32				
				2.00 /2.00	5892	33				
				2.00 /2.00	5891	34				
				2.00 /2.00	5890	35				
	BH0074EB01			2.00 /2.00	5889	36				
				2.00 /2.00	5888	37				
				2.00 /2.00	5887	38				
					5886	39				
						40				

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 56.4	GROUND ELEVATION (FT):	5925.22	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER
NORTH:	748075	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	KMM/JAB	37891
EAST:	2084915	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	11/13/91	
REMARKS:							

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE / DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% – 50% – 100%)	PERCENT RECOVERY (0% – 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2.00 /2.00	5893	32			CLAYEY SILTSTONE	Clayey Siltstone: Grayish brown (10YR 5/2) to light brownish gray (2.5Y 6/2). Clay content variable, from approx. 20% -45%. Porosity approx. 10%-30%. Cement: argillaceous with trace calcareous cement and in some places trace Fe-oxides. Slightly to mod. friable, slightly fissile. Trace to some organics. Vague ripple laminations present in haphazard, discontinuous manner and may be no more than color variations unrelated to deposition. Some of these patterns also resemble bioturbation, especially at 40.8'-40.9'. Fractures present, Fe-oxide-healed, subvertical throughout unit (especially visible at 41.0'-41.5'). Dry. 100% Fines.
					5892	33				
					5891	34				
				2.00 /2.00						
					5890	35			SILTY CLAYSTONE	Silty Claystone: Light brownish gray (10YR 6/2, 2.5Y 6/2) where siltiest, to dark gray (10YR 4/1) and grayish brown (2.5Y 5/2) where most clayey (below the siltiest portion). Silt content varies from approx. 45% at top of interval to approx. 20% at middle and base. Porosity decreases with depth, from approx. 20%-25% at top to approx. 3%-8% at base. Cement: argillaceous, trace calcareous in some places, trace to some Fe-oxides in immediate vicinity of Fe-oxide-mineralized fractures. Non to mod. friable, proportional to silt content, non to slightly fissile. Trace to some organics; carbonaceous material appears to form drapes and seams. No true bedding apparent, although hazy, indistinct and discontinuous laminations present approx. 41.9'-42.1'. Transitional upper contact, fairly sharp lower (cont. below).
					5889	36				
	BH0074EBU1			2.00 /2.00						
					5888	37				
					5887	38			SILTY CLAYSTONE	(cont. from above) contact. Fe-oxide-healed fractures, oriented both sub-vertically and sub-horiz., present throughout interval. Dry. 100% Fines.
				2.00 /2.00						
					5886	39				
					5885	40				
				2.00 /2.00						
					5884	41				
						42				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 56.4	GROUND ELEVATION (FT): 5925.22	PROJECT NUMBER: ENAD	LOG OF BORING NUMBER:
NORTH:	748075	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: KMM/JAB	37891
EAST:	2084915	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 11/13/91	
REMARKS:					

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% – 50% – 100%)	PERCENT RECOVERY (0% – 100%)	RECOVERY/INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						37				No true bedding apparent, although hazy, indistinct and discontinuous laminations present approx. 41.9'-42.1'. Transitional upper contact, fairly sharp lower (cont. below)
					5888				SILTY CLAYSTONE	(cont. from above) contact. Fe-oxide-healed fractures, oriented both sub-vertically and sub-horiz., present throughout interval. Dry. 100% Fines.
						38			CLAYEY SILTSTONE	Clayey Siltstone: Grayish brown (2.5Y 5/2) to pale yellow (2.5Y 7/3). Up to approx. 40% clay. Porosity is approx. 10%-30%. Cement is argillaceous with scattered traces of calcareous cement and Fe-oxides localized around healed fractures. Moderately friable, slightly fissile. Trace to some organics. Distinct, small-scale ripple laminations at 42.4'-42.5', and less distinct in small areas above and below this. Healed fractures, generally at an angle of approx. 30-45 degrees to core axis, present through interval. Dry. 100% Fines.
				2.00 /2.00	5887					
						39				
					5886					
						40				
				2.00 /2.00	5885					
						41			SILTY CLAYSTONE	Silty Claystone: Mottled: pale yellow (2.5Y 7/4), light olive brown (2.5Y 5/3), and dark gray (5Y 4/1) to 43.5'; from 43.5'-43.7' is an Fe-stone that is yellowish brown (10YR5/8, 10YR 5/6), strong brown (7.5YR 4/6), dark brown (7.5YR 3/3, 7.5YR 3/4); below this, light olive brown (2.5Y 5/3) to brown (10YR 5/3) with scattered Fe-stone fragments of same colors as that at 43.5'-43.7'. 20%-40% Silt. Porosity approx. 3%-15%. Cement is argillaceous, occasional trace calcareous, trace to abundant Fe-oxides in/near fractures and Fe-stone. Non to slightly friable and non to very fissile (most fissile in Fe-stone portion). Trace organics. No true bedding apparent, but very small "laminations" similar to those at 41.9'-42.1' are present above Fe-stone. Healed fractures (with Fe-oxides) of various orientations present throughout. Dry. 100% Fines.
					5884					
						42				
	BH0074SEBU1			2.00 /2.00	5883					
						43				
					5882					
						44			CLAYEY SILTSTONE	Clayey Siltstone: Dark yellowish brown (10YR 4/4) to yellowish brown (10YR 5/4, 10YR 5/6). 20%-40% Clay. Porosity approx. 15%-30%. Cement: argillaceous, trace Fe-oxides. Slightly to mod. friable and fissile. Trace organics. Ripple laminations are present at 44.6'-45.2', and may exist below this but core is too broken to tell, and above this but less distinct and more discontinuous in nature. No healed fractures apparent. Dry. Soft-sediment deformation evident; bioturbation possible, especially at approx. 44.05'-44.6', but this is not certain. 100% Fines.
				2.00 /2.00	5881					
						45				
					5880					
	0074TEBU1			0.20 /0.90		46				Geotech samples obtained from this interval.
					5879					No recovery for this interval.
									CLAYEY SILTSTONE	Clayey Siltstone with trace Sand: Yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/4). Approx. 35%-45% Clay, 1%
						47				

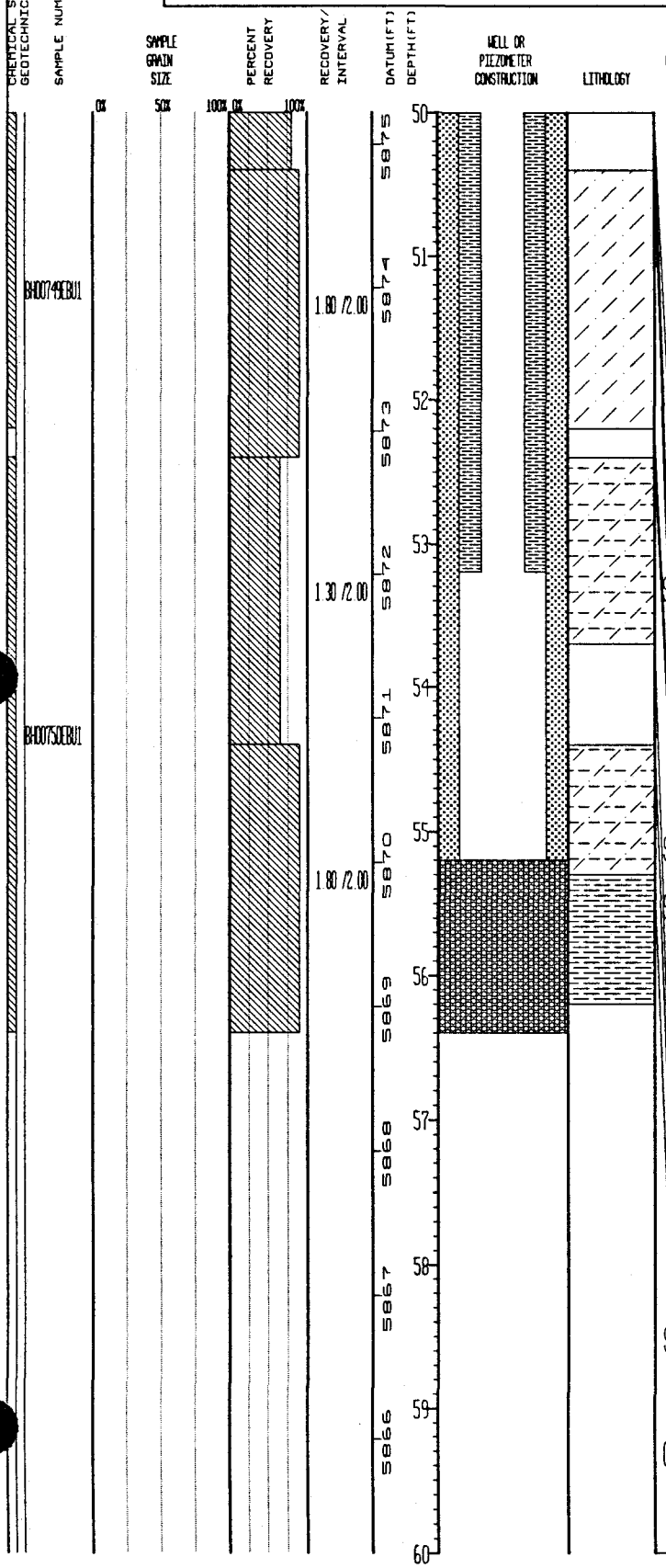
STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 56.4	GROUND ELEVATION (FT):	5925.22	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	748075	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	KMM/JAB	37891
EAST:	2084915	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	11/13/91	

REMARKS:

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
					5880	45				distinct and more discontinuous in nature. No healed fractures apparent. Dry. Soft-sediment deformation evident; bioturbation possible, especially at approx. 44.05'-44.6', but this is not certain. 100% Fines.
	00747EBU1			0.20 /0.90	5879	46				Geotech samples obtained from this interval.
										No recovery for this interval.
				1.50 /2.00	5878	47			CLAYEY SILTSTONE	Clayey Siltstone with trace Sand: Yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/4). Approx. 35%-45% Clay, 1% Sand (v.f.g., very well sorted, subangular to subrounded quartz sand). Porosity approx. 10%-20%. Cement: argillaceous with slight trace calcareous cement. Slightly friable, slightly to mod. fissile. Trace Fe-oxides, micas, undetermined soft yellow metal flakes that are not micas. Some core pieces appear to be laminated, but this interval is too broken up to tell if it is truly laminated, nor can fracturing be determined. Dry. 1% Sand, 99% Fines (35%-45% Clay).
	BH00748EBU1				5877	48				
				1.60 /2.00	5876	49				
					5875	50			SILTSTONE:	Siltstone with Clay and trace Sand: Yellowish brown (10YR 5/4), light olive brown (2.5Y 5/3), brown (10YR 5/3). Up to 2% v.f.g. to f.g., very well sorted, subangular to subrounded, quartz sand, and up to 15%-20% clay. Porosity approx. 20%-35%. Cement: argillaceous with scattered traces of calcareous cement (strongest below thin, approx. 1" clayey layer at approx. 50.9'-51.0'). Fe-oxides also present and probably contribute to cementation. Slightly to mod. friable, slightly to very fissile/crumbly. Sand is almost pure quartz; traces Fe-oxides, mafics, rock fragments, organics; up to approx. 2% sand from 46.7'-47.9', approx. 1% approx. 47.9'-49.9', and less from approx. 49.9'-52.2'. Laminations present in most places. Fe-oxides richest at approx. 47.4'-47.65', approx. 49.0'-49.1', approx. 50.4'-50.6', 51.1'-51.3', approx. 51.6', approx. 51.85', approx. (cont. below)
	BH00749EBU1			1.80 /2.00	5874	51				
					5873	52				
					5872	53				No recovery for this interval.
				1.30 /2.00					SILTSTONE:	(cont. from above) 51.95'-52.1' (due to core breakage, these locations are very approximate). No fractures readily evident, though broken condition of core may be obscuring such fractures. Soft-sediment deformation evident in most places where laminations are discernable; also visible are reactivation surfaces. Planar and climbing ripple laminations appear most common; M. Buddy (EG&G) sees indications of festoon-style cross-bedding. Dry. 0%-2% Sand, 98%-100% Fines.
					5871	54				
	BH00750EBU1					55				No recovery for this interval.

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 56.4	GROUND ELEVATION (FT):	5925.22	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	748075	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	KMM/JAB	37891
EAST:	2084915	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	11/13/91	

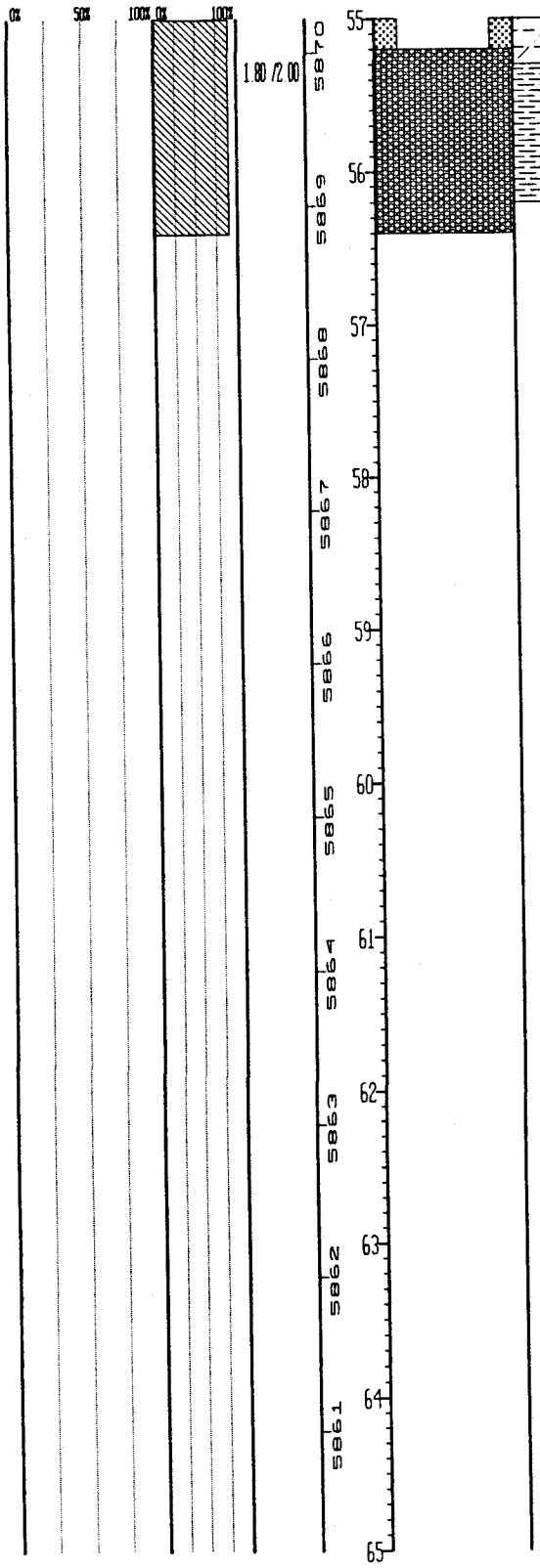
REMARKS:



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
SILTSTONE:	(cont. from above) 51.95'-52.1' (due to core breakage, these locations are very approximate). No fractures readily evident, though broken condition of core may be obscuring such fractures. Soft-sediment deformation evident in most places where laminations are discernable; also visible are reactivation surfaces. Planar and climbing ripple laminations appear most common; M. Buddy (EG&G) sees indications of festoon-style cross-bedding. Dry. 0%-2% Sand, 98%-100% Fines.
	No recovery for this interval
SILTSTONE:	Same as above.
	No recovery for this interval
SILTY CLAYSTONE:	Silty Claystone to Clayey Siltstone: Olive brown (2.5Y 4/3) to dark yellowish brown (10YR 4/4) to very dark grayish brown (2.5Y 3/2) to dark grayish brown (2.5Y 4/2); with Fe-oxide content high, as at 53.45'-53.7', colors are yellowish brown (10YR 5/6, 10YR 5/8) to dark yellowish brown (10YR 4/6). Content of silt and clay varies; silt ranges from approx. 30%-70%, clay also ranges approx. 30%-70%, and there is no distinct silty claystone or clayey siltstone. Porosity: approx. 10%-30%. Cement is argillaceous, with scattered Fe-oxides, scattered traces calcareous cement. Carbonate content appears highest where Fe-oxide colors are strongest (at 53.45'-53.7'), and may indicate presence of siderite/Fe-carbonate cement. Slightly to mod. friable, mod. to very fissile; core is heavily damaged and broken. (cont. below)
	No recovery for this interval
SILTY CLAYSTONE:	(cont. from above) Traces organics. Some pieces of the core indicate laminations are present. Condition of core obscures any distinct fractures which might otherwise be visible. Dry. 100% Fines.
CLAYSTONE:	Claystone: Light olive brown (2.5Y 5/3), olive brown (2.5Y 4/3), dark grayish brown (2.5Y 4/2), very dark grayish brown (2.5Y 3/2), where Fe-oxide-rich, to yellowish brown (10YR

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 56.4	GROUND ELEVATION (FT): 5925.22	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	748075	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: KMM/JAB	37891
EAST:	2084915	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 11/13/91	
REMARKS:					

CHEMICAL SAMPLE DEPTH
GEOTECHNICAL SAMPLE DEPTH
SAMPLE NUMBER
SAMPLE GRAIN SIZE (0% 50% 100%)
PERCENT RECOVERY (0% 100%)
RECOVERY/INTERVAL
DATUM (FT)
DEPTH (FT)
WELL OR PIEZOMETER CONSTRUCTION
LITHOLOGY
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE
DESCRIPTION



SILTY CLAYSTONE: (cont. from above) Traces organics. Some pieces of the core indicate laminations are present. Condition of core obscures any distinct fractures which might otherwise be visible. Dry. 100% Fines.

CLAYSTONE: Claystone: Light olive brown (2.5Y 5/3), olive brown (2.5Y 4/3), dark grayish brown (2.5Y 4/2), very dark grayish brown (2.5Y 3/2), where Fe-oxide-rich, to yellowish brown (10YR 5/6, 10YR 5/8), brownish yellow (10YR 6/8), and strong brown (7.5YR 5/8). 95%-100% Clay. Porosity=nil to approx. 5%. Cement is argillaceous, trace Fe-oxide, and scattered traces carbonate cement (coinciding with Fe-oxides from 55.3'-55.5'; Fe-carbonate may be present). Non to slightly friable, slightly to almost mod. fissile. Scattered chips and seams of organics. Fe-oxides concentrated along seams also, mostly above 55.5'. Color banded throughout, especially distinct below 55.85', may indicate bedding. No obvious fractures, though Fe-oxide/carbonate mineralization may indicate presence of healed fractures. Dry. 100% Fines.

No recovery for this interval.

Total Depth = 56.4 ft.

COLOG INC

BOREHOLE GEOPHYSICS

17301 W. COLFAX, STE. 265, GOLDEN, CO 80401
PHONE: (303) 279-0171 FAX: 279-2759

CALIPER
NATURAL GAMMA
WELL: 37891

PROJECT: OU1 881 HILLSIDE — DATE: 8 NOVEMBER 1991

CLIENT: EBASCO — COLOG ID NO.:

LOCATION: EG&G ROCKY FLATS/881 HILLSIDE

STATE: COLORADO — COUNTY: JEFFERSON — ELEV: — DEPTH REF: GROUND

BOREHOLE DATA

DRILLING CONTRACTOR: BOYLES BROTHERS – GOLDEN, COLORADO

CUSTOMER TD: 56.8' — COLOG TD: 56.3'

RUN NO.	BIT RECORD: Bit Size	From	To	CASING RECORD: Size/Wgt/Thk	From	To
1	7" HUSKER	0	TD	7"	SURFACE	12'
2						
3						
4						

HOLE MEDIUM: AIR — DRILL METHOD: AUGER (MOBILE B57)

MUD TYPE: NONE — TIME SINCE CIRC:

VISCOSITY: — WEIGHT: — Fm: — at: — Deg:

GENERAL DATA

INSTRUMENTATION: MT SUPPIS SERIES III — UNIT/TRUCK: 3 / 461

LOGGING ENGINEER: MICHAEL CULIG

CLIENT REP: MS. KAREN MALE – EBASCO

OTHER SERVICES: NONE

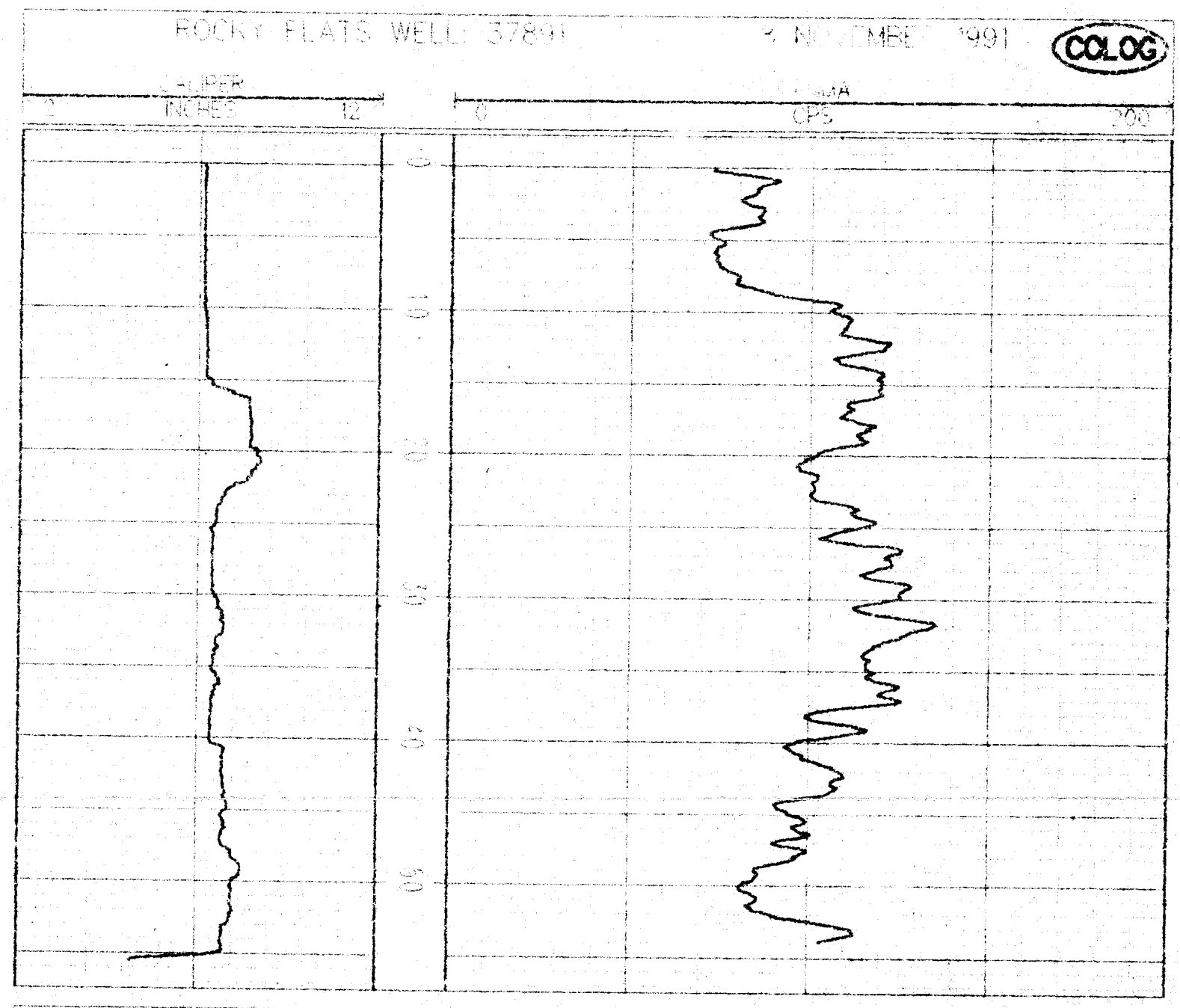
LOGGING DATA

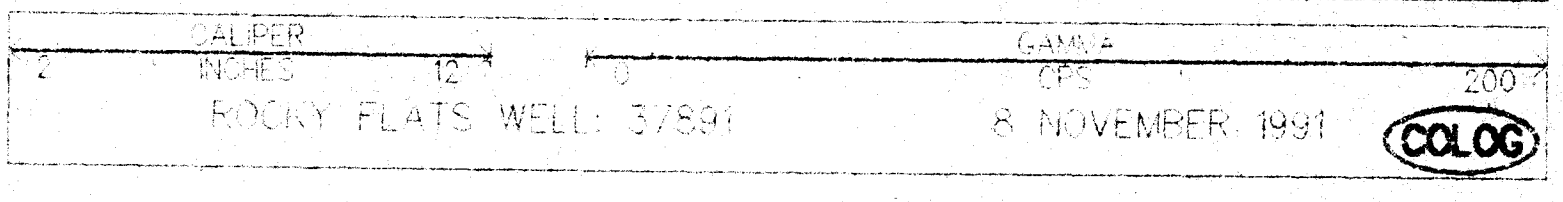
LOG FUNCTION	RUN NO.	EQUIPMENT: MODEL	PROBE S/N	CABLE S/N	LOGGING: DOWN FEET	SPEED FT/MIN	DETECTOR: TYPE	SPACING: T/R FEET	R-R FEET	SOURCE: TYPE	SIZE CURIE	LOGGED INTERVAL: FROM	TO	INT. FEET
CALIPER	1	3 ARM	1000	468	0.1	10						55.8'	SURF	55.8'
GAMMA	1	NPF	1730	968	0.1	10	Nal					54	SURF	54

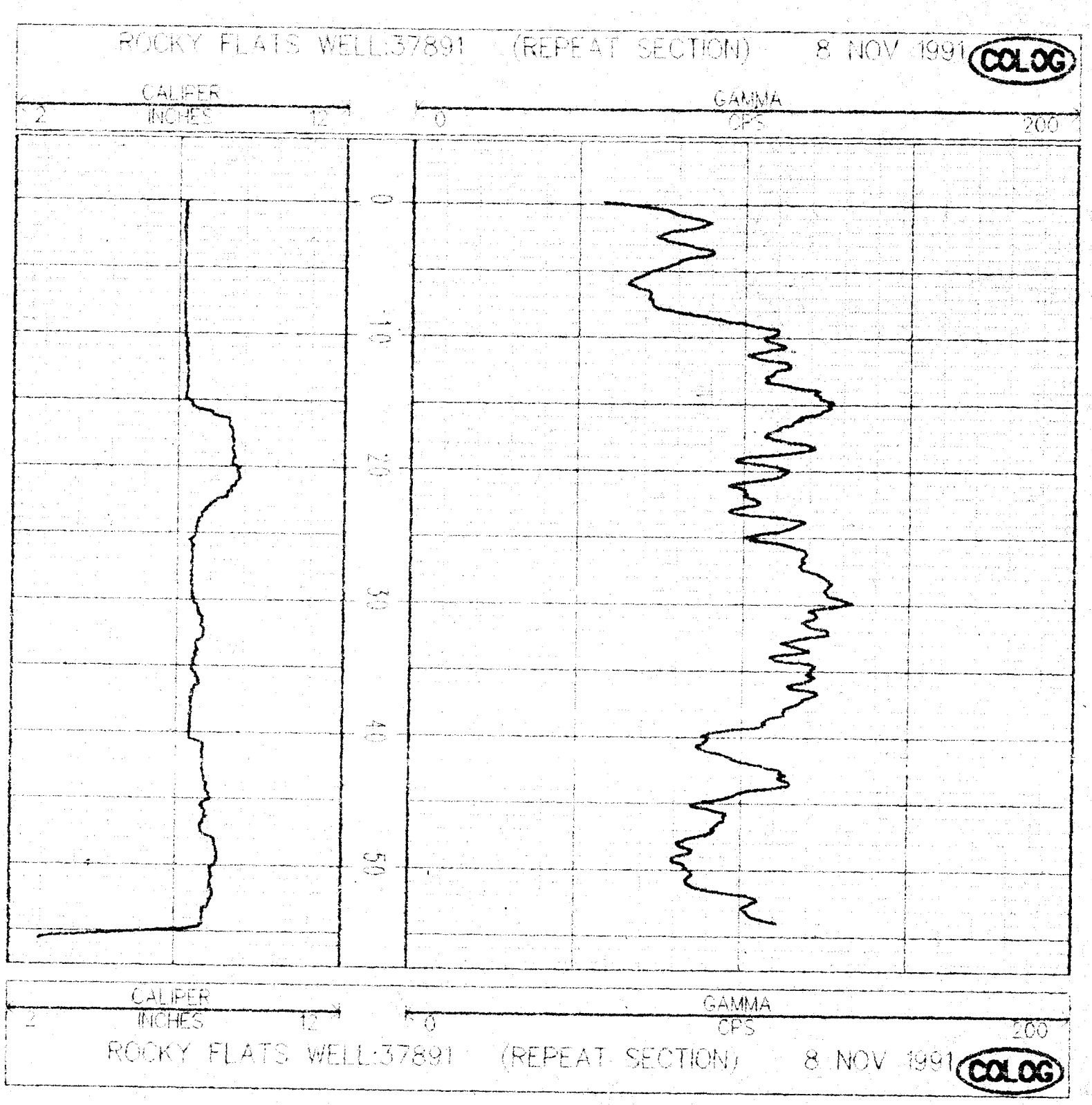
CALIBRATION FACTOR(S):

DIGITAL FILE NAME(S): 37891PIN, 37891PLR, 37891NGR

REMARKS:


ROCKY FLATS WELL: 37891
8 NOVEMBER 1991
COLOG
CALIPER
2
INCHES
12
GAMMA
0
CPS
200
0
10
20
30
40

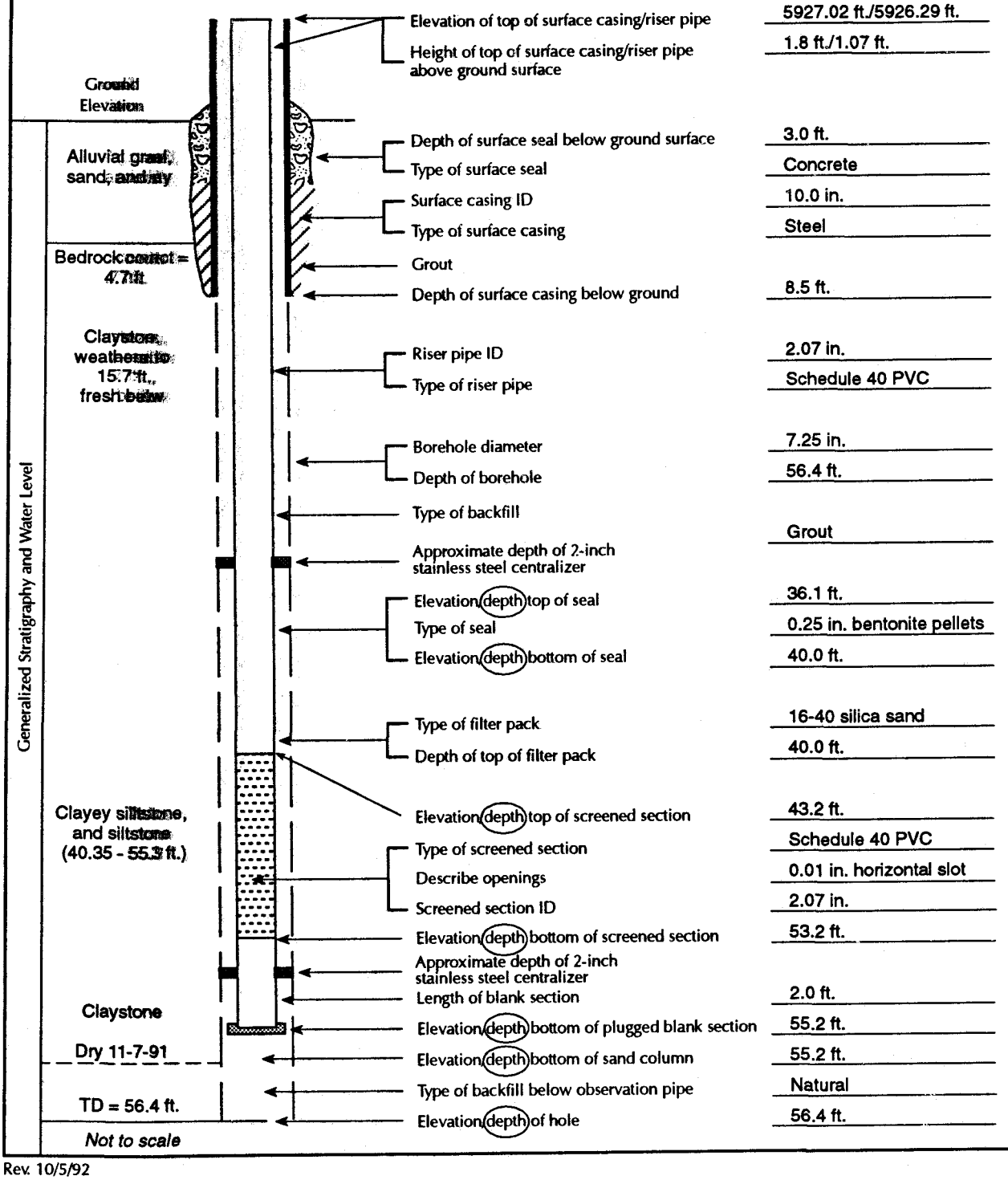

CALIPER
2
INCHES
12
GAMMA
0
CPS
200
ROCKY FLATS WELL: 37891
8 NOVEMBER 1991
COLOG


ROCKY FLATS WELL:37891 (REPEAT SECTION) 8 NOV 1991
COLOG
CALIPER
2
INCHES
12
GAMMA
0
CPS
200
0
10
20
30
40
50
ROCKY FLATS WELL:37891 (REPEAT SECTION) 8 NOV 1991
COLOG

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748075.0260 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084915.4356 ft.	Well No.	37891
Date Completed	11-13-91	Original Depth	56.4 ft.	Aquifer	Bedrock
Inspected by	K. Maley	Date	11-13-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 56.4 ft.



Rev. 10/5/92

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**37991**
Piezometer Location Number:	N/A

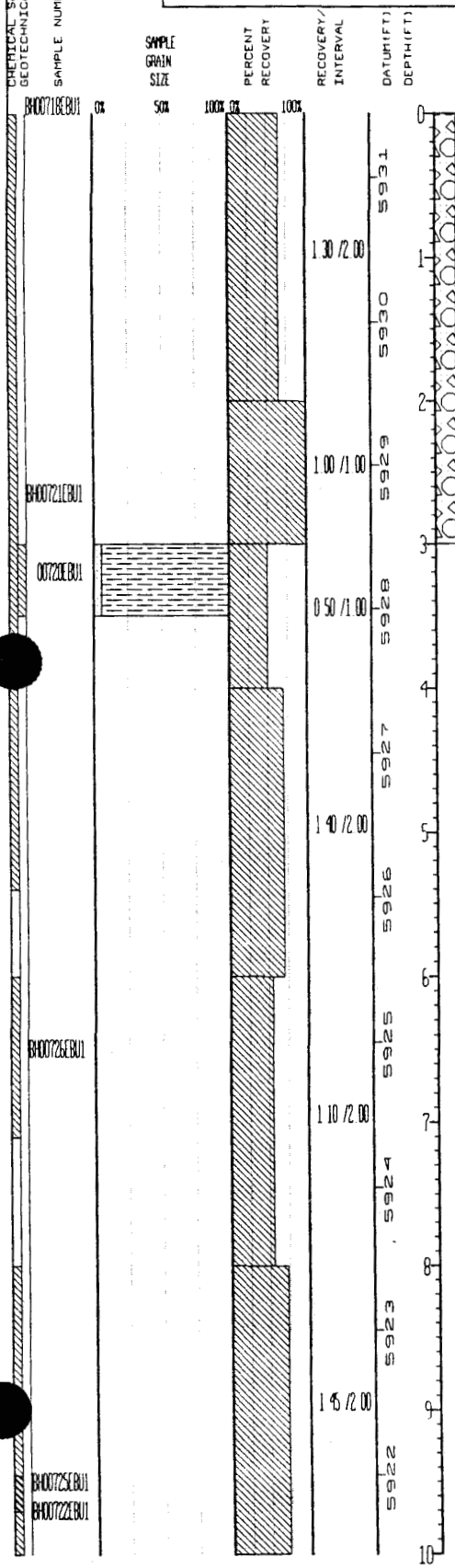
Data Available:

✔ Geologic Borehole Log (LOGGER Format)

✔ Geophysical Log

✔ Well Construction Summary

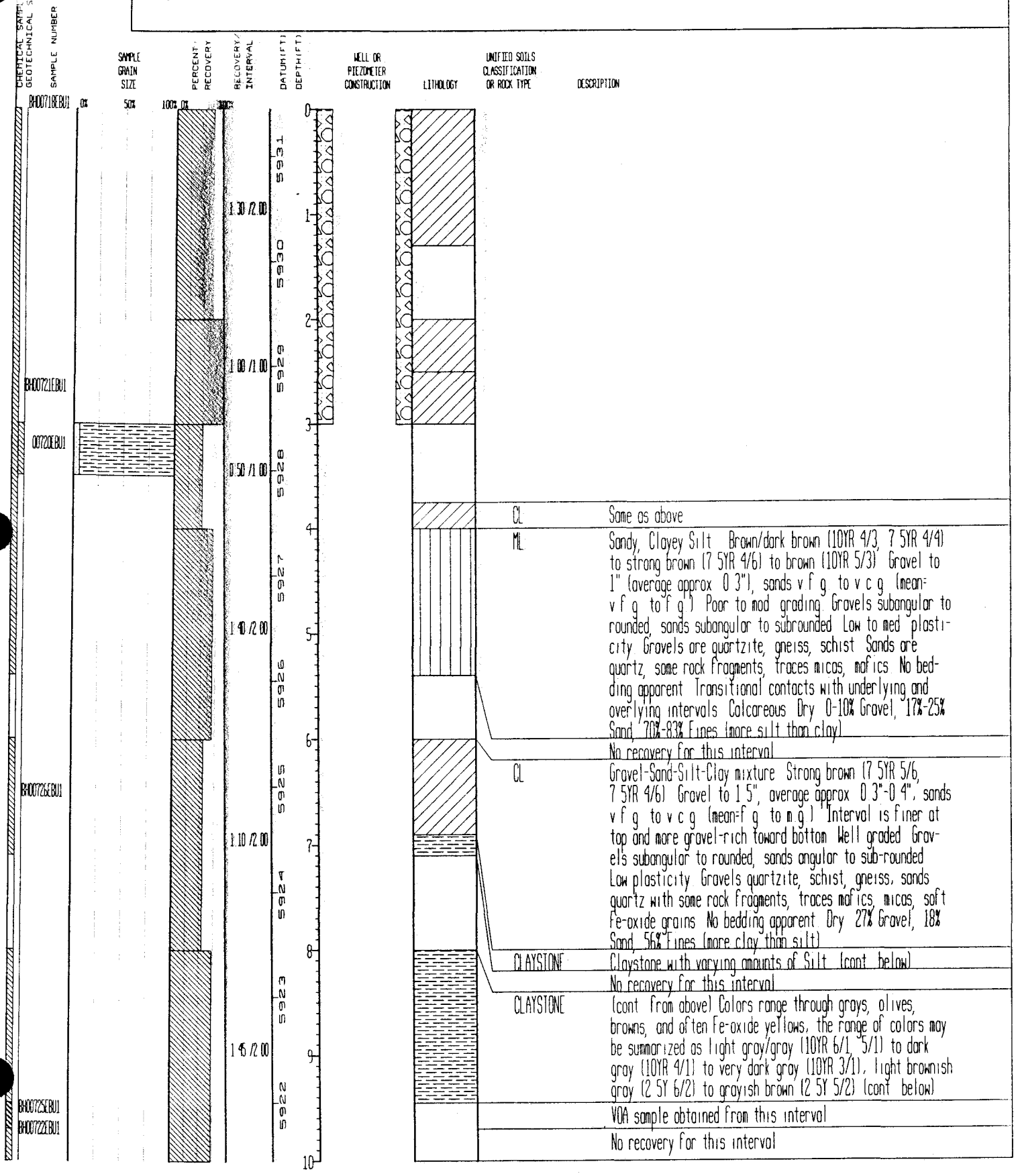
STATE PLANE COORDINATE		TOTAL DEPTH (FT) 57 5	GROUND ELEVATION (FT) 5931 45	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH 748063		AREA OU1	CASING DIAMETER (IN) 2 07	GEOLOGIST KMM/JAB	37991
EAST 2084731		LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 11/13/91	
REMARKS					



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
CL	Gravelly, Sandy Silt-Clay mixture Very dark grayish brown (10YR 3/2) to very dark brown (10YR 2/2) Shattered gravel to 1" (average approx 0 3"-0 4"), sands v f g to v c g (mean=f g) Well graded Gravels angular (probably due to fracturing during drilling) to well rounded, sands angular to subrounded Low plasticity Gravels quartzite, gneiss, schist Sands quartz with some rock fragments, traces feldspar, mafics, micas Calcareous content decreases with depth, no "fizz" below approx 0 4' Rooted at upper portion No bedding apparent Dry 30% Gravel, 15% Sand, 55% Fines (more silt than clay)
	No recovery for this interval
CL	Same as above
CL	Sandy Clay Reddish brown (5YR 4/4), dark reddish brown (5YR 3/4), dark brown (10YR 3/3), and brown/dark brown (10YR4/3) Gravel to 1" (average approx 0 2"-0 3"), sand v f g to v c g (mean=f g) Moderately graded Gravels subangular to well rounded, sands angular to subrounded (with coarser fraction to rounded) Low to med plasticity Gravels quartzite, schist, gneiss Sands quartz, some rock fragments, traces mafics, soft black organics (like charcoal) No bedding apparent, transitional contact with underlying interval Dry 10% Gravel, 15%-20% Sand, 70%-75% Fines (mostly Clay)
	Geotech samples obtained from this interval
CL	Same as above

STATE PLANE COORDINATES		TOTAL DEPTH (FT) 57.5	GROUND ELEVATION (FT)	5931.45	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	[illegible]	AREA OU1	CASING DIAMETER (IN)	2.07	GEOLOGIST	KMM/JAB	37991
EAST	[illegible]	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	7.25	DATE DRILLED	11/13/91	

REMARKS



STATE PLANE COORDINATE		TOTAL DEPTH (FT) 57 5	GROUND ELEVATION (FT)	5931 45	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748063	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	KMM/JAB	37991
EAST	2084731	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	11/13/91	

REMARKS

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
					5921	10			CLAYSTONE	(cont from above) to dark grayish brown (2 5Y 4/2) to very dark grayish brown (2 5Y 3/2), light olive brown (2 5Y 5/3, 2 5Y 5/4) to olive brown (2 5Y 4/3), Fe-oxides bring colors to brownish yellow (10YR 6/6, 6/8) to yellowish brown (10YR 5/4, 5/6, 5/8) to, less commonly, dark yellowish brown (10YR 4/6), strong brown (7 5YR 4/6, 5/6, 5/8), reddish yellow (7 5YR 6/8), and to dark reddish brown (5YR 3/3) Generally 0-10% Silt, except at 14 0'-15 75' (up to approx 20%), 18 0'-20 0' (approx 15-20%) (cont below)
				1 10 /2.00		11				
	00724EBU1				5920					
						12				Geotech samples obtained from this interval
										No recovery for this interval
					5919				CLAYSTONE	(cont from above) 24 0'-26 0' (up to approx 25%-30%), 26 0'-28 0' (to approx 30%-35%), 30 0'-32 0' (to approx 20%), 40 0'-42 0' (up to approx 15%) Very rare traces v f g to f g quartz sand Porosity is generally nil to approx 4%, and somewhat higher in silty zones mentioned Cement dom argillaceous, often with Fe-oxides and/or calcareous components in trace amounts, Fe/Mn-oxides also present, though rare (as at 26 0'-28 0') Generally non to slightly friable, slightly to mod fissile (cont below)
				1 75 /2.00		13				
					5918					
						14				No recovery for this interval
					5917				CLAYSTONE	(cont from above) (to extremely fissile at 34 0'-36 0') Trace organics generally present, occasionally Fe-oxide-replaced, and occasionally as larger (to approx 0 25") chips Trace (rarely to some) Fe-oxides throughout, almost always associated with Fe-oxide-healed fractures, also present are Fe-stone nodules and fragments (27 5'-27 75', 31 8'-32 0', 33 2'-33 4') Scattered traces carbonaceous material (disseminated and blebs) No bedding apparent except for wavy, blurred bedding and thin laminations (cont below)
	BH00727EBU1			1 75 /2.00		15				
					5916					
						16				No recovery for this interval
					5915				CLAYSTONE	(cont from above) (dicontinuous) at 26 0'-28 0', and fine-scale, slightly wavy, varve-like laminations (discontinuous) at 31 3'-32 3' Healed fractures of various orientations common throughout interval, though infrequent above 9 45', fracture fill is Fe-oxides, and at 27 7'-27 75', Fe/Mn-oxide mineralization Dry Trace Sand, but much less than 1%, balance is Fines Top of bedrock = 6 9'
				1 75 /2.00		17				
					5914					
						18				No recovery for this interval
					5913				CLAYSTONE	Same as above
				2 00 /2.00		19				
					5912	20				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 57.5	GROUND ELEVATION (FT)	5931.45	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748063	AREA OU1	CASING DIAMETER (IN)	2.07	GEOLOGIST	KMM/JAB	37991
EAST	2084731	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	7.25	DATE DRILLED	11/13/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						20			CLAYSTONE	Same as above
	BH00728EBU1			1.90 /2.00	5911	21				
					5910					No recovery for this interval
						22			CLAYSTONE	Same as above
					5909					
				2.00 /2.00	5908	23				
						24				
					5907					
				2.00 /2.00		25				
					5906					
						26				
					5905					
	BH00729EBU1			2.00 /2.00		27				
					5904					
						28				
					5903					
				2.00 /2.00		29				
					5902					
						30				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 57 5	GROUND ELEVATION (FT)	5931 45	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748063	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	KMM/JAB	37991
EAST	2084731	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	11/13/91	

REMARKS

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERED (0% 100%)	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
					5901	30			CLAYSTONE	Same as above
				2.00 /2.00	5900	31				
					5899	32				
	BH00730EBU1			2.00 /2.00	5898	33				
					5897	34				
				2.00 /2.00	5896	35				
					5895	36				
				2.00 /2.00	5894	37				
					5893	38				
	BH00731EBU1			2.00 /2.00	5892	39				
						40				

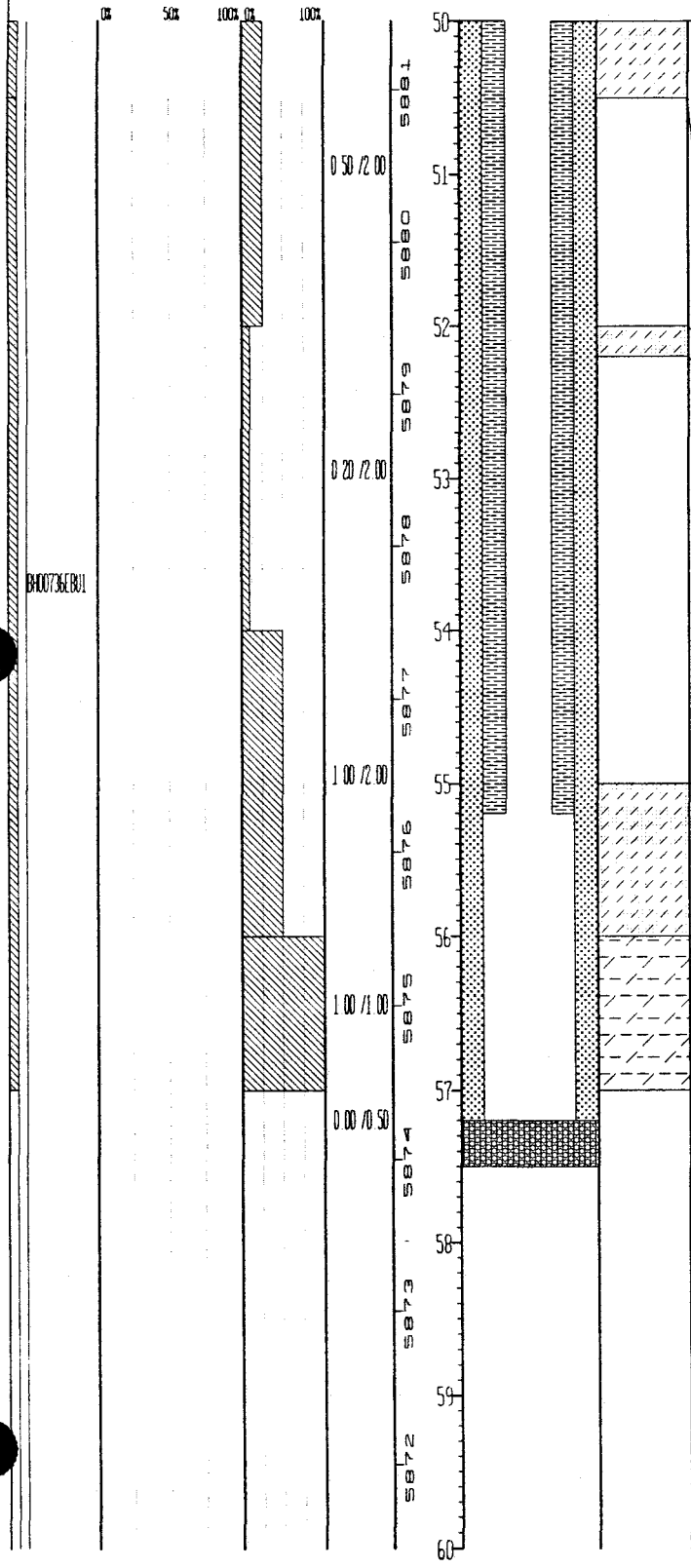
STATE PLANE COORDINATE		TOTAL DEPTH (FT) 57 5	GROUND ELEVATION (FT) 5931 45	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH 748063		AREA OU1	CASING DIAMETER (IN) 2 07	GEOLOGIST KNM/JAB	37991
EAST 2084731		LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 11/13/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
						40			CLAYSTONE	Same as above
				2.00 /2.00	5891	41			CLAYEY SILTSTONE	Clayey Siltstone Grayish brown (10YR 5/2) and dark gray (10YR 4/1) with patches of very dark grayish brown (10YR 3/2), dark yellowish brown (from Fe-oxides) (10YR 4/6), and brownish black (where organic-rich) (5YR 2/1) Trace very f g , subangular to subrounded quartz sand Porosity approx 10%-18% Cement is argillaceous with Fe-oxide component in some places (most notable at 42 0'-42 8') Slightly to mod friable and fissile Trace to some organics, organics occasionally replaced with Fe-oxides Soft Fe-oxides also present, balance is mainly quartz No bedding apparent, although Fe-oxides are present in subhoriz deposits (visible at 42 4', 42 55'-42 65', 42 75') which often indicate Fe-oxide-replaced organic-rich layers or fracturing Dry Traces and 96%-100% Fines (approx 75% Silt)
				2.00 /2.00	5890	42				
					5889	43				
					5888	44			CLAYSTONE	Claystone Light olive brown (2 5Y 5/3), olive brown (2 5 4/3), dark grayish brown (2 5Y 4/2), brown/dark brown (10YR 4/3), very dark gray (10YR 3/1), and where Fe-oxide-rich, yellowish brown (10YR 5/6, 10YR 5/8) and dark yellowish brown (10YR 4/6) Trace quartz sand and up to approx 15% silt Porosity approx 2%-6% Cement is argillaceous, with Fe-oxide component in some places (especially 45 8'-46 0') Non to slightly friable and fissile Trace to some organics No true bedding apparent, although wavy, vague to clear color banding is seen throughout Dry Organic-rich layer exposed at approx 45 1', where core has broken along this layer 100% Fines
	B400733EB01				5887					
				2.00 /2.00		45				
					5886				CLAYEY SILTSTONE	Clayey Siltstone Brown (10YR 5/3) to yellowish brown (10YR 5/4), with top 1"-2" olive brown (2 5Y 4/3) Trace very f g , subangular to subrounded quartz sand, and approx 20%-35% clay Porosity approx 15%-30% Cement is argillaceous Slightly to mod friable and fissile Trace organics and Fe-oxides Laminations present at 47 25'-48 0' Unit is much like that at 42 0'-44 55' except for different color and decreased organics Bedding shows soft-sediment deformation, cross-bedded to thin-laminated varves to massive to burrowed (burrows at 47 3'-47 4', 47 78'-47 87'), and where distinct, beds/laminae are often wavy, and from <1mm to approx 1/4" thick Dry Trace Sand, 96%-100% Fines
				0 70 /0 70	5885	46				
	00734EB01									
				1 00 /1 30	5884	47				
						48				Geotech sample obtained from this interval
	B400735EB01				5883				CLAYEY SILTSTONE	Same as above
										No recovery for this interval
				0 50 /2.00		49			SANDY SILTSTONE	Sandy, Clayey Siltstone Between strong brown (7 5YR 4/6) and dark yellowish brown (10YR 3/4) above 48 5', below 50 0', color is yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/4) Sand is v f g to m g , mean=v f g Single 1" pebble present approx 50 1' (cont below)
					5882					No recovery for this interval
						50				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 57.5	GROUND ELEVATION (FT)	5931.45	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748063	AREA OU1	CASING DIAMETER (IN)	2.07	GEOLOGIST	KMM/JAB	37991
EAST	2084731	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	7.25	DATE DRILLED	11/13/91	
REMARKS							

CHEMICAL SAMPLE DEPTH
GEOTECHNICAL SAMPLE DEPTH
SAMPLE NUMBER
SAMPLE GRAIN SIZE (0% 50% 100%)
PERCENT RECOVERY (0% 100%)
RECOVERY/INTERVAL
DATUM (FT)
DEPTH (FT)
WELL OR PIEZOMETER CONSTRUCTION
LITHOLOGY
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE
DESCRIPTION



SANDY SILTSTONE (cont from above) Well sorted Sands are subangular to subrounded Porosity unknown, as "core" condition is dust to pebble-sized fragments, intact "pebbles" have porosity approx 20%-35% Cement is calcareous and argillaceous, with calcareous content somewhat decreased between 50 0'-50 5' Friability is mod to high, given condition of core Sand quartz, traces mica, dark mafics, and/or organics (too small to differentiate), and some soft Fe-oxides Bedding, fractures which may have been present have been obscured Dry 10% Sand, 90% Fines (50%-65% Silt)

No recovery for this interval

SANDY SILTSTONE Same as above

No recovery for this interval

SANDY SILTSTONE Same as above

SILTY CLAYSTONE Silty Claystone Light olive brown (2 5Y 5/3), olive brown (2 5Y 4/3), and dark grayish brown (2 5Y 4/2) to very dark grayish brown (10YR 3/2) and very dark gray (10YR 3/1) Up to approx 25% silt Porosity approx 5%-15% (hard to estimate, as core has expanded due to pressure unloading, causing greater than original porosity) Cement is argillaceous with trace calcareous content and some Fe-oxides in places (Fe-oxides concentrated at 56 7'-56 85') Non to slightly friable, slightly to very fissile, where organics are concentrated (e g , 56 7'-56 8'), friability increases to mod Organic-rich with thin carbonaceous flakes and chips Another concentration of organics is at 55 3'-55 4' No bedding apparent Dry 100% Fines

No recovery for this interval

Total Depth = 57 5 ft

COLOG INC

BOREHOLE GEOPHYSICS

17301 W. COLFAX, STE. 265, GOLDEN, CO 80401
PHONE: (303) 279-0171 FAX: 279-2730

CALIPER
NATURAL GAMMA
WELL: 37991

PROJECT: OU1 - 881 HILLSIDE

DATE: 31 OCTOBER 1991

CLIENT: EBASCO

COLOG ID NO:

LOCATION: EG&G ROCKY FLATS 881 HILLSIDE

STATE: COLORADO COUNTY: JEFFERSON ELEV: DEPTH REF: GROUND

BOREHOLE DATA

DRILLING CONTRACTOR: BOYLES BROTHERS - GOLDEN, COLORADO

CUSTOMER TD: 57' COLOG TD: 57'

RUN	BIT RECORD			CASING RECORD		
NO.	Bit Size	From	To	Size/Wgt/Thk.	From	To
1	7" AUGER	12'	TD	10" (ID)	SURFACE	12'
2						
3						
4						

HOLE MEDIUM: AIR

DRILL METHOD: AUGER (MOBILE B57)

MUD TYPE: NONE

TIME SINCE CIRC:

VISCOSITY: WEIGHT: Rm: at Deg

GENERAL DATA

INSTRUMENTATION: SERIES III

UNIT/TRUCK: 3 / 451

LOGGING ENGINEER: TOM STAATZ

CLIENT REP: MS. KAREN MALEY, MR. DENNIS BOUCHER - EBASCO

OTHER SERVICES: NONE

LOGGING DATA

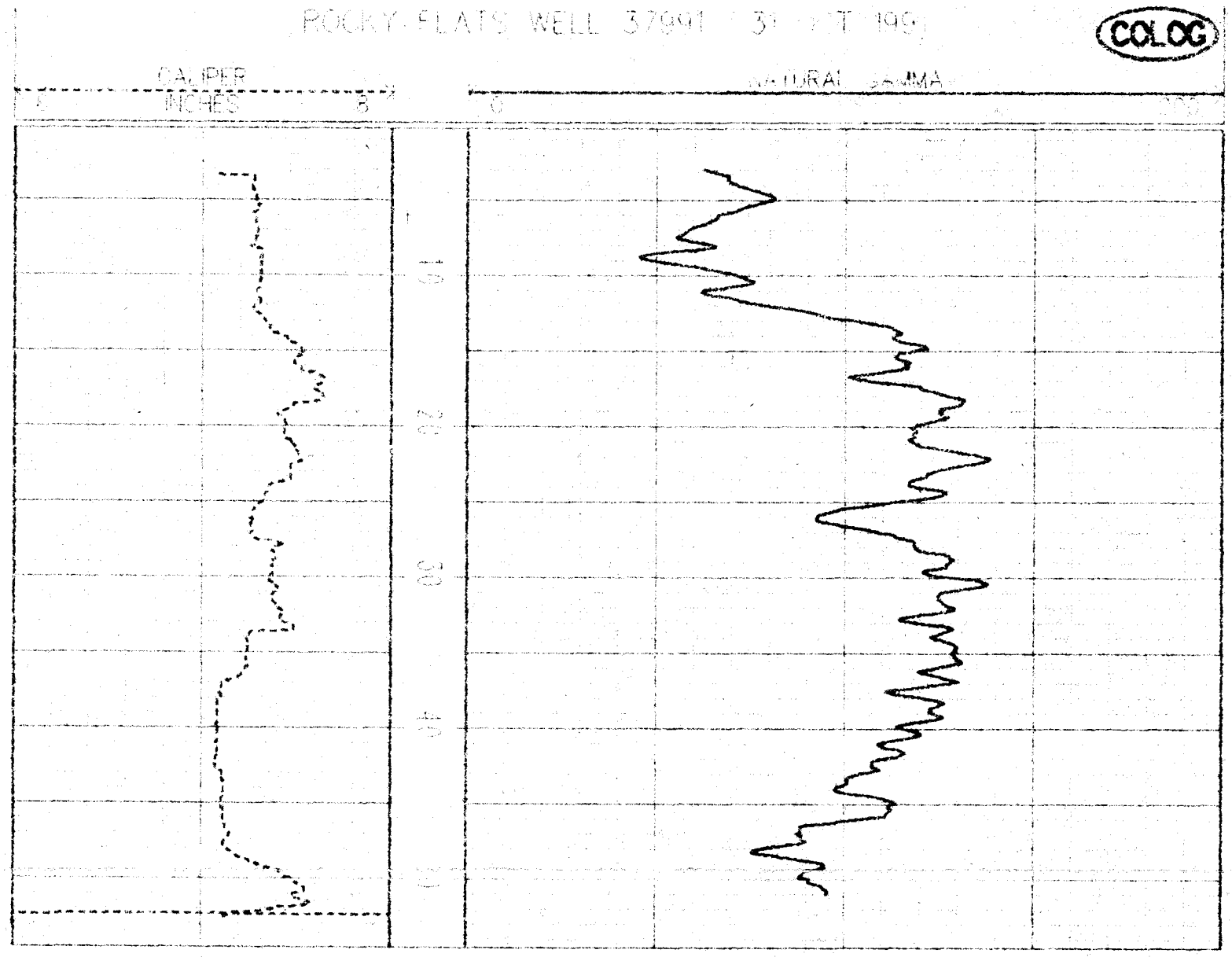
LOG FUNCTION	RUN NO.	EQUIPMENT MODEL	PROBE S/N	UPHOLE S/N	LOGGING DIST/INT FEET	SPEED FT/MIN	DETECTOR TYPE	SPACING Tx-Rx FEET	Rx-Rx FEET	SOURCE TYPE	SIZE CURIE	LOGGED INTERVAL FROM	TO	INT FEET
CALIPER	1	3-ARM	1300	166	0.1	15						51.5	3.5	48
GAMMA	2	BPT	1750	933	0.1	15	INS					57	3	48'

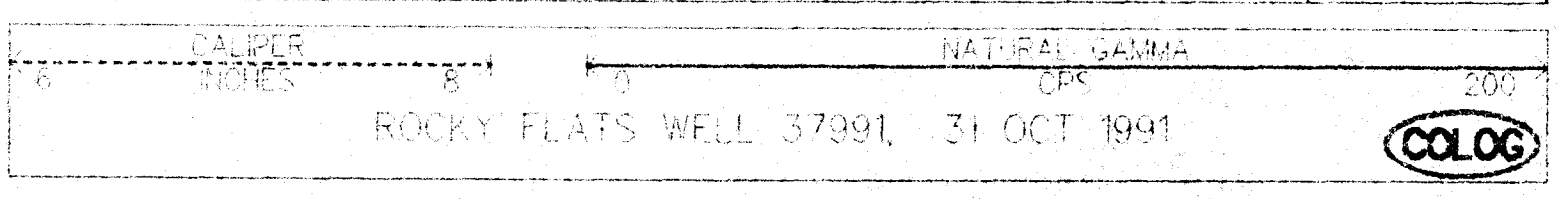
CALIBRATION FACTOR(S):

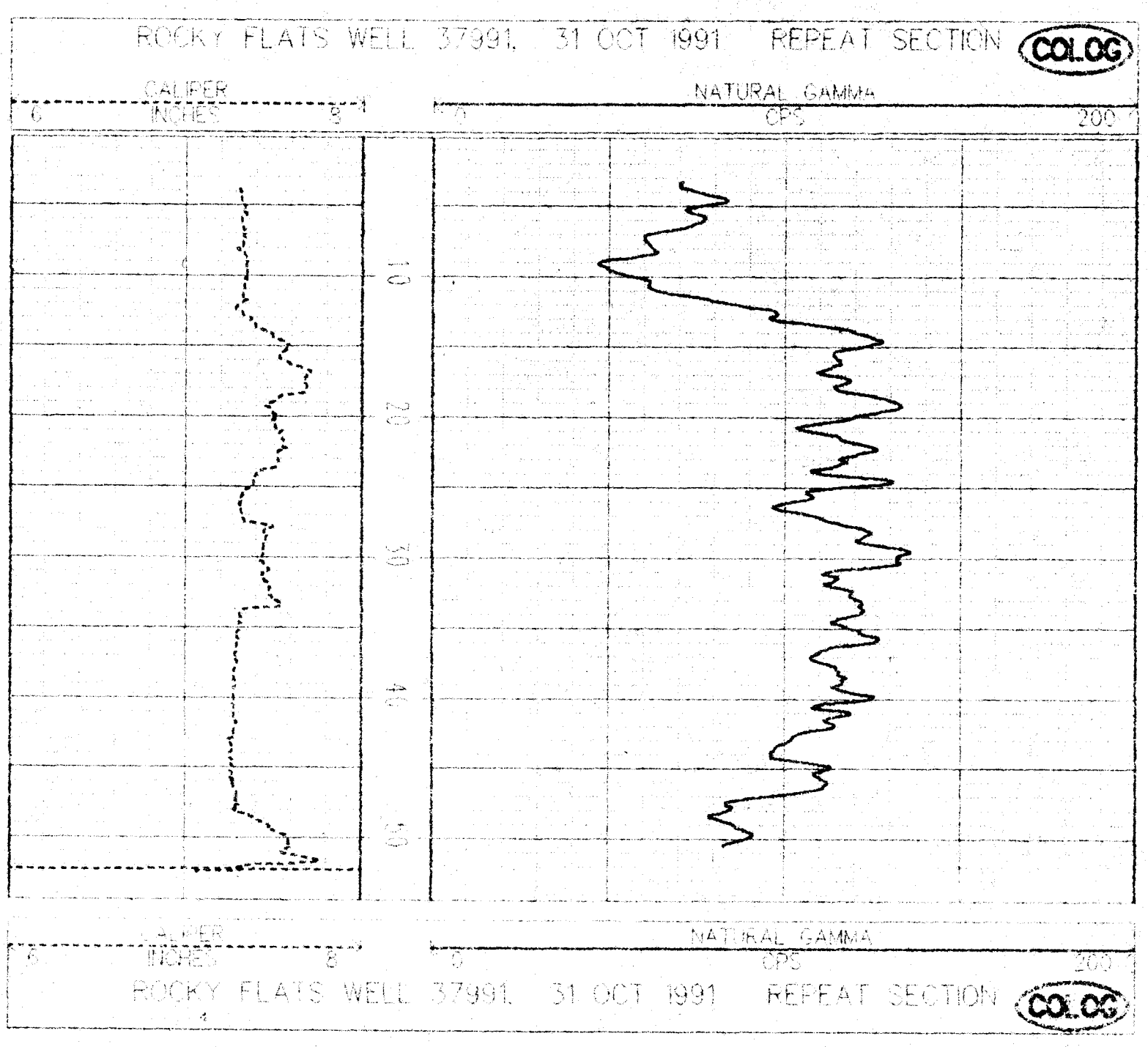
DIGITAL FILE NAME(S): 37991.DAT, 37991.LIS, 37991.HDR

REMARKS:

CUTTINGS LEFT ON THE INSIDE OF THE CASING WHEN AUGER BEING RUN.


ROCKY FLATS WELL 37991 31 OCT 1991
COLOG
CALIPER
6 INCHES 8
NATURAL GAMMA
0 CPS 200
10
20
30
40
50

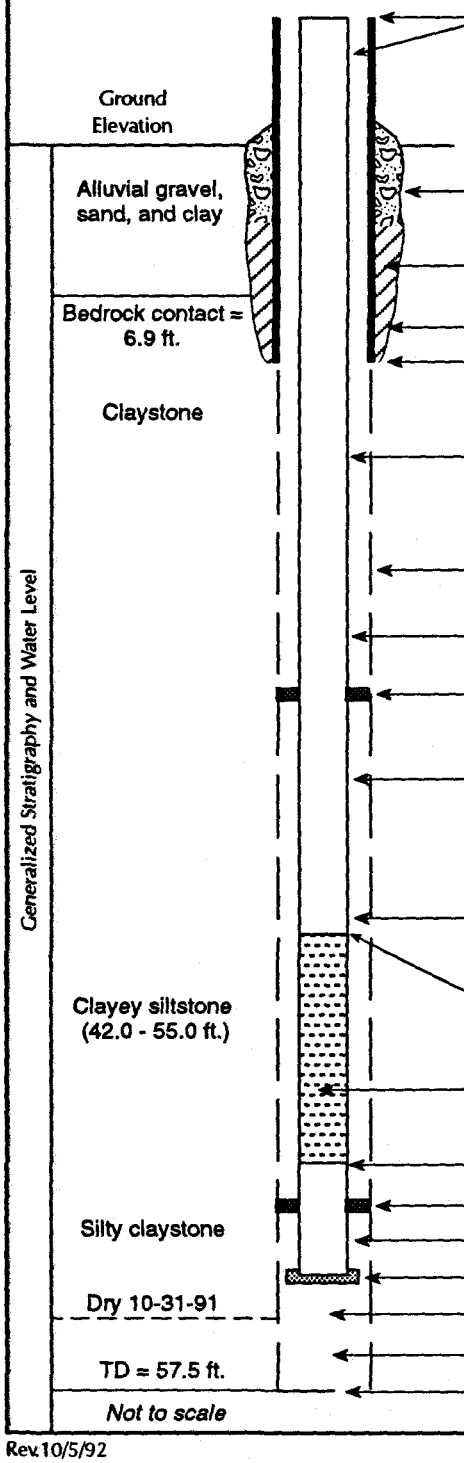

CALIPER
6 INCHES 8
NATURAL GAMMA
0 CPS 200
ROCKY FLATS WELL 37991, 31 OCT 1991
COLOG


ROCKY FLATS WELL 37991, 31 OCT 1991 REPEAT SECTION
COLOG
CALIPER
6 INCHES 8
NATURAL GAMMA
0 CPS 200
10
20
30
40
50
CALIPER
6 INCHES 8
NATURAL GAMMA
0 CPS 200
ROCKY FLATS WELL 37991 31 OCT 1991 REPEAT SECTION
COLOG

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748063.0664 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084731.0135 ft.	Well No.	37991
Date Completed	11-13-91	Original Depth	57.5 ft.	Aquifer	Bedrock
Inspected by	K. Maley	Date	11-13-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 57.5 ft.



Elevation of top of surface casing/riser pipe	5934.15 ft./5933.55 ft.
Height of top of surface casing/riser pipe above ground surface	2.7 ft./2.1 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	10.0 in.
Type of surface casing	Steel
Grout	
Depth of surface casing below ground	12.0 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	7.25 in.
Depth of borehole	57.5 ft.
Type of backfill	Grout
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	41.0 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	43.0 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	43.0 ft.
Elevation/depth top of screened section	45.2 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	55.2 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.0 ft.
Elevation/depth bottom of plugged blank section	57.2 ft.
Elevation/depth bottom of sand column	57.2 ft.
Type of backfill below observation pipe	Natural
Elevation/depth of hole	57.5 ft.

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INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**38091**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 6 0	GROUND ELEVATION (FT) 6003 71	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748343	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST SEC/JAB	38091
EAST	2083629	LOCATOR NUMBER K8	BOREHOLE DIAMETER (IN) 11 5	DATE DRILLED 10/25/91	

REMARKS

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH0683EBU1	0% 50% 100%	0% 100%						CL	Gravel-Sand-Silt-Clay mixture Multi-colored mottling, including dark brown (10YR 3/3), yellowish brown (10YR 5/6, 10YR 5/8), dark yellowish brown (10YR 4/4), brown/dark brown (7 5YR 4/4), strong brown (7 5YR 4/6), light gray (2 5Y 7/2), and (where caliche is concentrated) white (10YR 8/2) Gravel to 1 5" (average 0 3"), sand v f g to v c g (mean= f g) Well graded Gravels angular to rounded, sands angular to subrounded Low to med plasticity Gravels quartzite, gneiss, schist (often caliche-coated), sands quartz, some rock fragments, traces of micas, mafics, organics, some caliche clasts Calcareous Lightly rooted at top No apparent bedding Dry NOTE Hole was abandoned after water main was encountered, this interval may be artificial fill 8-15% Gravel, 20-30% Sand, 60-70% Fines (35-50% Clay)
	BH0684EBU1				6003	0				
				1 70 /2 00	6002	1				
					6001	2				
	BH0687EBU1			1 60 /2 00	6000	3				Core retained in VOA sleeve
										No recovery for this interval
									CL	Same as above
					5999	4			SM	Silty Sand-Gravel mixture Brown/dark brown (10YR 4/3) Gravel to 1 5" (average 0 3"), sand v f g to v c g (mean= m g) Well graded Gravels angular (possibly due to fracturing during drilling) to very well rounded, sands angular to subrounded Gravels are mostly granitic and quartzite, sands are mostly quartz, some rock fragments, trace to some mafics and micas Trace calcareous content Completely loose without any trace of lithification or cohesive binding, no bedding Dry NOTE Hole was abandoned after water main was encountered, this interval may be artificial fill 33% Gravel, 51% Sand, 16% Fines (10-12% Silt, balance Clay)
	BH0686EBU1			1 40 /2 00		5				
	BH0685EBU1				5998					
										No recovery for this interval
						6			SM	Same as above
										Geotech samples obtained from this interval
										No recovery for this interval
					5997	7				Total Depth = 6 0 ft
					5996	8				
					5995	9				
					5994	10				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	N/A
Piezometer Location Number:	**38191**

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 18.2	GROUND ELEVATION (FT):	5924.47	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER
NORTH:	748014	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	SEC/JAB	38191
EAST:	2084765	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN):	11.5	DATE DRILLED:	10/29/91	
REMARKS:							

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00688ERU1	0% 50% 100%	0% 100%		5924	0			CL	Gravel-Sand-Silt-Clay mixture: Very dark grayish brown (10YR 3/2) to very dark brown (10YR 2/2). Gravel to approx. 0.7" (average approx. 0.2"), sands v.f.g. to v.c.g. (mean=f.g.). Moderately to well graded. Gravels subangular to rounded, sand angular to subrounded. Low plasticity. Rooted in upper portion. Gravels are quartzite, schist, gneiss; sands are quartz with some rock fragments, traces mica and mafics. Upper approx. 0.25' is calcareous. No bedding, although only upper approx. 0.25' is calcareous and is also intact rather than loose and broken up. Gradual contact with underlying interval. Dry. 8% Gravel, 19% Sand, 73% Fines (mostly clay)
				1.30 /2.00	5923	1				
						2				Core retained in VOA sleeve
					5922					No recovery for this interval
									CL	Same as above
	BH00690ERU1			1.80 /2.00	5921	3			CL	Gravelly, Sandy, Silty Clay: Dark brown (10YR 3/3). Gravel to approx. 0.5"; sands v.f.g. to v.c.g. (mean=f.g.). Poorly graded. Gravel subangular to subrounded, sand angular to subrounded. Low to med. plasticity. Calcareous below approx. 3.1'. Gravels are quartzite, schist, gneiss; sands quartz with some rock fragments. No bedding apparent. Very gradual, transitional contact with underlying unit (4.3' is only approximate). Slightly moist. 6% Gravel, 13% Sand, 81% Fines (approx. 57% Clay, balance Silt)
						4				
					5920					No recovery for this interval
				2.00 /2.00		5			CL	Same as above
					5919				CL	Sandy Clay-Silt mixture: Brown (7.5YR 5/4) to yellowish brown (10YR 5/4). Trace gravel, to approx. 0.5"; sand v.f.g. to v.c.g. (mean=f.g.). Poorly graded. Sands angular to subrounded. Low plasticity. Sands mainly quartz with some rock fragments, trace to some micas, trace mafics. Trace to no calcareous content in bulk, but there are several spiralling, semiplanar (but twisting) seams at 4.6'-5.5' which exhibit calcareous mineralization. Interval very similar to that overlying, with main differences being color and silt content (this interval is redder, siltier). Transitional contact with overlying unit (4.3' is approx.). No bedding apparent. Slightly moist. The spiralling of the calcareous seams may be from drill torque; they may have initially been subvertical, planar. 0-5% Gravel, 17-20% Sand, 49-53% Silt, 30% Clay
						6				
				2.00 /2.00	5918	7				
					5917					
						8				Core retained in VOA sleeve
									CL	Same as above
					5916					Core retained in VOA sleeve
									CL	Same as above
	BH00691ERU1			2.00 /2.00		9			SC	Sand with Gravel, Silt and Clay: Strong brown (7.5YR 5/6, 7.5YR 4/6). Gravel to 1.5", average 0.3"-0.4"; sands v.f.g. to v.c.g. (mean=m.g.). Well graded. Gravels subangular to well rounded, sands angular to subrounded (some grains to rounded). Gravels quartzite, gneiss, schist; sands quartz with some rock fragments, traces mafics, micas, feldspar. No
					5915					
						10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 18.2	GROUND ELEVATION (FT): 5924.47	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	748014	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: SEC/JAB	38191
EAST:	2084765	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN): 11.5	DATE DRILLED: 10/29/91	
REMARKS:					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%	2.00 /2.00	5919	5			CL	Sandy Clay-Silt mixture: Brown (7.5YR 5/4) to yellowish brown (10YR 5/4). Trace gravel, to approx. 0.5"; sand v.f.g. to v.c.g. (mean=f.g.). Poorly graded. Sands angular to subrounded. Low plasticity. Sands mainly quartz with some rock fragments, trace to some micas, trace mafics. Trace to no calcareous content in bulk, but there are several spiralling, semiplanar (but twisting) seams at 4.6'-5.5' which exhibit calcareous mineralization. Interval very similar to that overlying, with main differences being color and silt content (this interval is redder, siltier). Transitional contact with overlying unit (4.3' is approx.). No bedding apparent. Slightly moist. The spiralling of the calcareous seams may be from drill torque; they may have initially been subvertical, planar. 0-5% Gravel, 17-20% Sand, 49-53% Silt, 30% Clay
					5918	6				
				2.00 /2.00	5917	7				
					5916	8				Core retained in VOA sleeve
									CL	Same as above
										Core retained in VOA sleeve
									CL	Same as above
	BH0091ER01			2.00 /2.00	5915	9			SC	Sand with Gravel, Silt and Clay: Strong brown (7.5YR 5/6, 7.5YR 4/6). Gravel to 1.5", average 0.3"-0.4"; sands v.f.g. to v.c.g. (mean=m.g.). Well graded. Gravels subangular to well rounded, sands angular to subrounded (some grains to rounded). Gravels quartzite, gneiss, schist; sands quartz with some rock fragments, traces mafics, micas, feldspar. No bedding apparent. Slightly moist. 10% Gravel, 65% Sand, 25% Fines (more clay than silt)
					5914	10				
				1.50 /2.00	5913	11			CL	Sandy Clay-Silt mixture with Gravel: (Very similar to 4.3'-8.2' interval). Yellowish brown (10YR 5/4) to brown (7.5YR 5/4). Gravel to approx. 0.5"; sand v.f.g. to v.c.g. (mean=f.g.). Poorly graded. Sand angular to subrounded. Low plasticity. Gravel quartzite, gneiss, schist; sand quartz with some rock fragments, traces micas, mafics, feldspar. No bedding apparent. Slightly moist. 3%-7% Gravel, 18%-22% Sand, 71%-79% Fines (more silt than clay)
					5912	12				Core retained in VOA sleeve
				1.50 /2.00	5911	13			CL	Sand-Silt-Clay mixture with Gravel: Brown/dark brown (7.5YR 4/4, 7.5YR 3/4). Gravel to 1"; sand v.f.g. to v.c.g. (mean=f.g.). Mod. to well graded. Gravel subangular to rounded, sand angular to rounded. Low plasticity. Gravels are quartzite with some gneiss, schist; sands are quartz with some rock fragments, traces mafics, micas, metal shavings (probably from drill). No bedding apparent. Slightly moist. 0-7% Gravel, 30%-40% Sand, 55%-70% Fines (30%-50% Silt)
					5910	14			SM	Silty, Gravelly Sand: Yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) to strong brown (7.5YR 4/6), brown/dark brown (7.5YR 5/4, 7.5YR 4/4), yellowish red (5YR 4/6), and reddish brown (5YR 4/4). Gravels to 2", average approx. 0.4"-0.5"; sands v.f.g. to v.c.g. (mean=f.g. to m.g.). Well graded. Gravels angular (possibly from fractur-
				2.00 /2.00		15				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 18.2	GROUND ELEVATION (FT):	5924.47	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	749014	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	SEC/JAB	38191
EAST:	2084765	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN):	11.5	DATE DRILLED:	10/29/91	

REMARKS:

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
					5914	10				
				1.50 /2.00	5913	11				
						12				Core retained in VOA sleeve
				1.50 /2.00	5912	13			CL	Sand-Silt-Clay mixture with Gravel: Brown/dark brown (7.5YR 4/4, 7.5YR 3/4). Gravel to 1"; sand v.f.g. to v.c.g. (mean=f.g.). Mod. to well graded. Gravel subangular to rounded, sand angular to rounded. Low plasticity. Gravels are quartzite with some gneiss, schist; sands are quartz with some rock fragments, traces mafics, micas, metal shavings (probably from drill). No bedding apparent. Slightly moist. 0-7% Gravel, 30%-40% Sand, 55%-70% Fines (30%-50% Silt)
					5911	14			SM	Silty, Gravelly Sand: Yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) to strong brown (7.5YR 4/6), brown/dark brown (7.5YR 5/4, 7.5YR 4/4), yellowish red (5YR 4/6), and reddish brown (5YR 4/4). Gravels to 2", average approx. 0.4"-0.5"; sands v.f.g. to v.c.g. (mean=f.g. to m.g.). Well graded. Gravels angular (possibly from fracturing during drilling) to rounded; sands angular to subrounded. Gravels are quartzite, schist and gneiss; sands are quartz with some rock fragments, traces micas, mafics, feldspar, and metal shavings (from drill?). No bedding apparent. Slightly moist. 20%-25% Gravel, 50% Sand, 25%-30% Fines (15%-22% Silt)
				2.00 /2.00	5910	15				
	BH00692EBU1				5909					
	BH00693EBU1					16				
										No recovery for this interval
				1.50 /1.50	5908				SM	Same as above
										Core retained in VOA sleeve
						17			SM	Same as above
	BH00693EBU1				5907				CLAYSTONE	Claystone: Light brownish gray (2.5Y 6/2), grayish brown (2.5Y 5/2), light yellowish brown (2.5Y 6/3, 2.5Y 6/4) and light olive brown (2.5Y 5/3, 2.5Y 5/4); with concentrated Fe-oxides, to yellowish brown (10YR 5/4, 10YR 5/6, 10YR5/8). Trace silt. Porosity=nil to approx. 1%. Cement argillaceous, and to some extent in some areas, Fe-oxides. Nonfriable, non to slightly fissile/crumbly. Fe-oxides especially notable at approx. 15.1'-15.25' and more so at approx. 17.8'-18.25'. Trace organics, with organic-rich streamers at 17.65' to 17.75'. No bedding apparent. Slightly moist. 100% Fines (trace Silt, balance Clay). Top of bedrock = 14.7'
				0.70 /0.70		18				
					5906					
						19				
					5905					
										VOA sample obtained from this interval
									CLAYSTONE	Same as above
										Core retained in VOA sleeve
						20			CLAYSTONE	Same as above

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 18.2	GROUND ELEVATION (FT):	5924.97	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	748014	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	SEC/JAB	38191
EAST:	2084765	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN):	11.5	DATE DRILLED:	10/29/91	

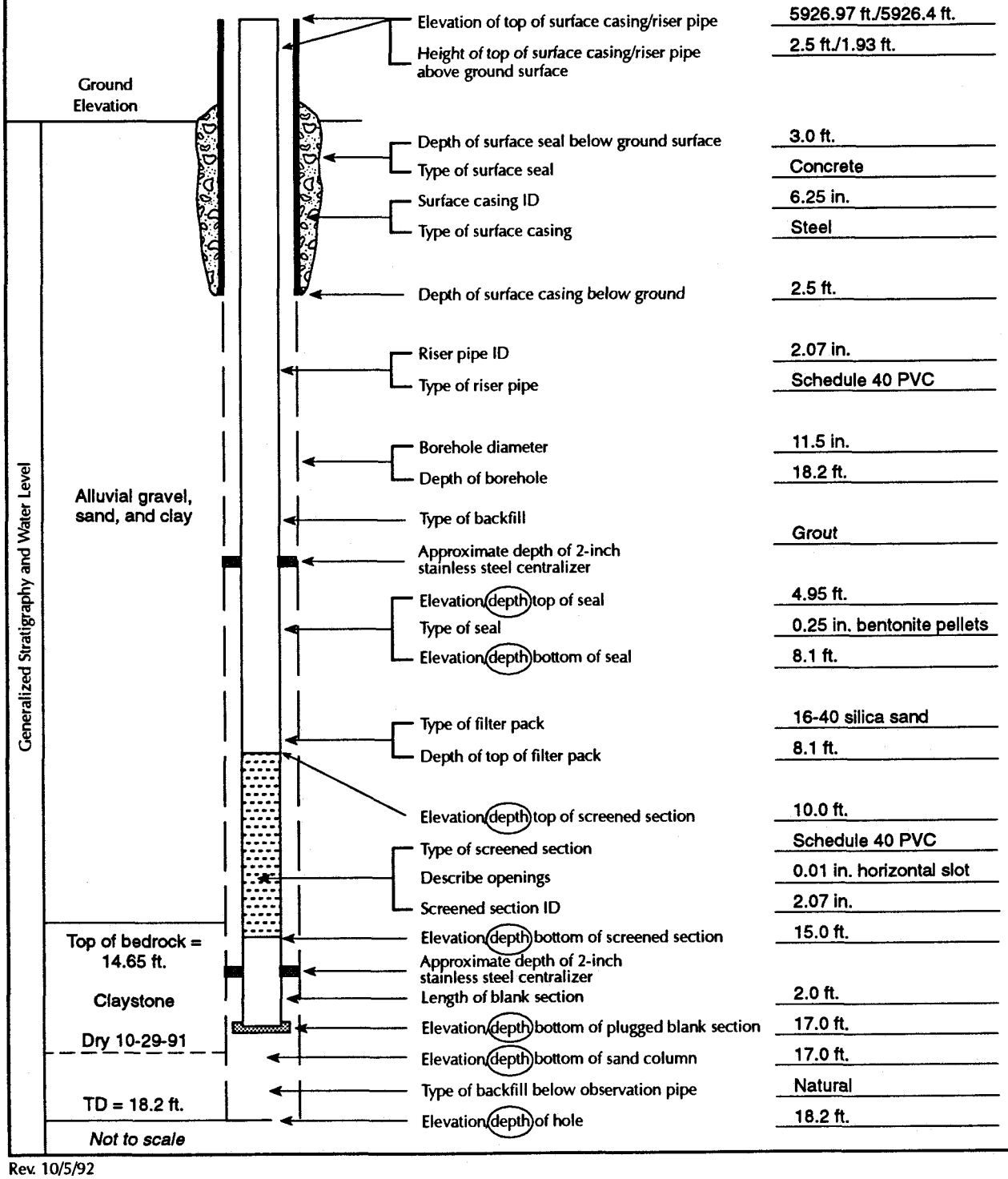
REMARKS:

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00692EBU1	0% 50% 100%	0% 100%	2.00 /2.00	5909	15				
	BH00693EBU1			1.50 /1.50	5908	16				
	BH00693EBU1			0.70 /0.70	5907	17			CLAYSTONE	Claystone. Light brownish gray (2.5Y 6/2), grayish brown (2.5Y 5/2), light yellowish brown (2.5Y 6/3, 2.5Y 6/4) and light olive brown (2.5Y 5/3, 2.5Y 5/4); with concentrated Fe-oxides, to yellowish brown (10YR 5/4, 10YR 5/6, 10YR5/8). Trace silt. Porosity=nil to approx. 1%. Cement argillaceous, and to some extent in some areas, Fe-oxides. Nonfriable, non to slightly fissile/crumbly. Fe-oxides especially notable at approx. 15.1'-15.25' and more so at approx. 17.8'-18.25'. Trace organics, with organic-rich streamers at 17.65' to 17.75'. No bedding apparent. Slightly moist. 100% Fines (trace Silt, balance Clay). Top of bedrock = 14.7'
					5906	18				
					5905	19				VOA sample obtained from this interval
									CLAYSTONE	Same as above
										Core retained in VOA sleeve
									CLAYSTONE	Same as above
					5904	20				Total Depth = 18.2 ft.
					5903	21				
					5902	22				
					5901	23				
					5900	24				
						25				

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748013.7967 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084765.2122 ft.	Well No.	38191
Date Completed	10-29-91	Original Depth	18.2 ft.	Aquifer	Alluvial
Inspected by	S. Condran	Date	10-29-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 18.2 ft.



Elevation of top of surface casing/riser pipe	5926.97 ft./5926.4 ft.
Height of top of surface casing/riser pipe above ground surface	2.5 ft./1.93 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.5 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	18.2 ft.
Type of backfill	Grout
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	4.95 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	8.1 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	8.1 ft.
Elevation/depth top of screened section	10.0 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	15.0 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.0 ft.
Elevation/depth bottom of plugged blank section	17.0 ft.
Elevation/depth bottom of sand column	17.0 ft.
Type of backfill below observation pipe	Natural
Elevation/depth of hole	18.2 ft.

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INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	N/A
Piezometer Location Number:	**38291**

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

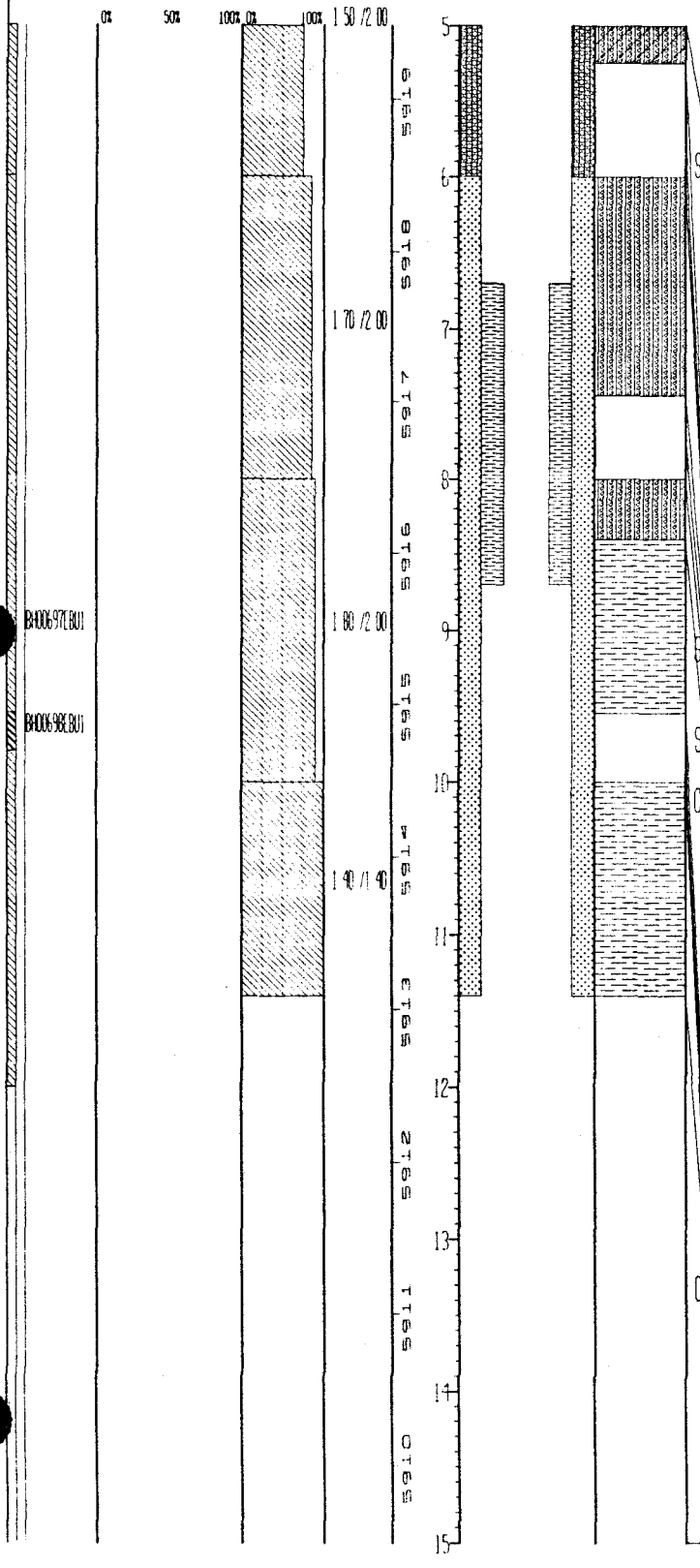
✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 11 4	GROUND ELEVATION (FT)	5924 49	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	749032	AREA 001	CASING DIAMETER (IN)	2 07	GEOLOGIST	WGP/JAB	38291
EAST	2084801	LOCATOR NUMBER 18	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	11/01/91	
REMARKS							

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH / SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY / INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
B4006950B01	0% 50% 100%	0% 100%			0			CL	Silty Clay Brown (10YR 5/3, 10YR 4/3) to dark brown (10YR 3/3) to dark grayish brown (10YR 4/2) Trace sand, 30%-40% Silt Poorly graded Low plasticity Organic-rich with roots and vegetal mat Calcareous No bedding apparent Moist Trace sand, 98-100% Fines (60-70% Clay)
			1 70 /2 00	5924	1			CL	Silty, Sandy Clay Very dark grayish brown (10YR 3/2) Sand v f g to v c g, mean=v f g to f g Poorly graded Sands subangular to subrounded Low to med plasticity Sands quartz with some rock fragments, traces micas, mafics, metal shavings (from drill? One metallic particle fizzed continuously in HCl) calcareous No bedding apparent Dry Trace Gravel 20% Sand, 80% Silt (45-55% Clay)
				5923	2				
B4006960B01			1 50 /2 00	5922	3			CL	Sandy Silt-Clay mixture with Gravel Very dark brown (10YR 2/2) to brown/dark brown (10YR 4/3) to yellowish brown (10YR 5/4) Gravels to 1 5" (average approx 0 3"), sands v f g to v c g (mean=f g) From 1 0" to 1 45' is more gravel rich than rest of interval (to approx 25% Gravel) Moderately to well graded Gravels subangular to rounded, sands angular to subrounded Medium plasticity Gravels mainly quartzite, schist, gneiss, with trace sandstone Sands mainly quartz with some rock fragments, traces micas, mafics, metal shavings (from drill?) No apparent bedding Dry 5-10% Gravel, 15-18% Sand, 72-80% Fines (approx 35% silt)
				5921	3				
				5920	4				
			1 50 /2 00	5919	5				No recovery for this interval
									Core retained in VOA sleeve
								CL	Same as above
									No recovery for this interval
									Core retained in VOA sleeve
								CL	Same as above
				5918	6			SM	Silty, Clayey, Sand-Gravel mixture Predominantly strong brown (7 5YR 5/6, 7 5YR 4/6), olive gray (5Y 4/2) Gravel to 2", average approx 0 2"-0 4", sand v f g to v c g, mean=m g Two clay-rich intervals (CL), break up this unit, they are located at 6 0'-6 2' and 7 2'-7 45' Portion between 6 2'-7 2' is slightly sandier and more Fe-oxide-enriched than balance of unit Well graded Gravels subangular to well rounded (except for some angular clasts fractured during drilling), sands angular to sub-rounded Gravels are quartzite, gneiss, schist Sands are quartz, some rock fragments, traces micas, mafics, organics, grains of caliche Calcareous throughout Other than the two clayey intervals, no bedding is apparent Dry 30-40% Gravel, 40-45% Sand, 20-30% Fines (more silt than clay)
			1 70 /2 00	5917	7				
				5916	8				
B4006970B01			1 80 /2 00	5915	9				No recovery for this interval
									Core retained in VOA sleeve
								SM	Same as above
									No recovery for this interval
B4006980B01									Core retained in VOA sleeve
					10			SM	Same as above

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 11 4	GROUND ELEVATION (FT)	5924 49	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748032	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	WGP/JAB	38291
EAST	2084801	LOCATOR NUMBER 18	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	11/01/91	
REMARKS							

CHEMICAL SAMPLE DEPTH
GEOTECHNICAL SAMPLE DEPTH
SAMPLE NUMBER
SAMPLE GRAIN SIZE (0% 50% 100%)
PERCENT RECOVERY (0% 100%)
RECOVERY/INTERVAL
DATUM (FT)
DEPTH (FT)
WELL OR PIEZOMETER CONSTRUCTION
LITHOLOGY
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE
DESCRIPTION

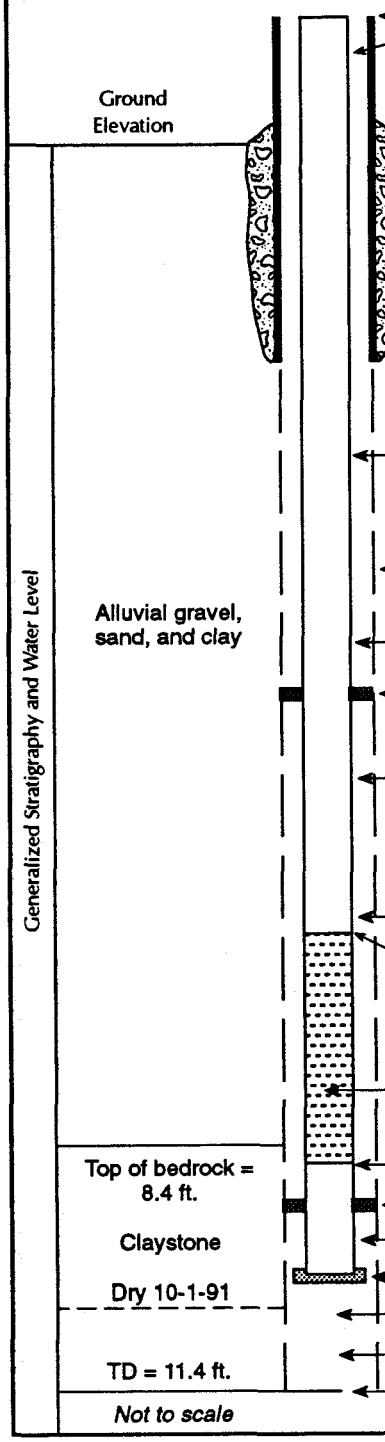


UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
SM	Silty, Clayey, Sand-Gravel mixture Predominantly strong brown (7 5YR 5/6, 7 5YR 4/6), olive gray (5Y 4/2) Gravel to 2", average approx 0 2"-0 4", sand v f g to v c g, mean= m g Two clay-rich intervals (CL), break up this unit, they are located at 6 0'-6 2' and 7 2'-7 45' Portion between 6 2'-7 2' is slightly sandier and more Fe-oxide-enriched than balance of unit Well graded Gravels subangular to well rounded (except for some angular clasts fractured during drilling), sands angular to sub-rounded Gravels are quartzite, gneiss, schist Sands are quartz, some rock fragments, traces micas, mafics, organics, grains of caliche Calcareous throughout Other than the two clayey intervals, no bedding is apparent Dry 30-40% Gravel, 40-45% Sand, 20-30% Fines (more silt than clay)
	No recovery for this interval
	Core retained in VOA sleeve
SM	Same as above
	No recovery for this interval
	Core retained in VOA sleeve
SM	Same as above
CLAYSTONE	Claystone Above 9 55', light gray (2 5Y 7/2) and light brownish gray (2 5Y 6/2) to (with Fe-oxides) olive yellow (2 5Y 6/6, 2 5Y 6/8) and brownish yellow (10YR 6/8), below 10 0', light brownish gray (10YR 6/2), gray (10YR 5/1), grayish brown (10YR 5/2), brown (10YR 5/3) and yellowish brown (10YR 5/4) Up to approx 15% Silt Porosity=nil to approx 5%, generally lower above 9 55' than below 10 0' Cement is argillaceous and to some extent Fe-oxides Fe-oxide-rich zones appear more prevalent above 9 55' than below 10 0' Fe-oxides may be indicative of fracturing, but healed fractures have been obscured by broken condition of core Non to slightly friable, slightly to mod fissile and crumbly No bedding apparent Dry 100% Fines (up to 15% Silt, balance Clay) Top of bedrock = 8 4'
	VOA sample obtained from this interval
	No recovery for this interval
CLAYSTONE	Same as above
	Total Depth = 11 4 ft

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748031.5099 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084801.0737 ft.	Well No.	38291
Date Completed	10-1-91	Original Depth	11.4 ft.	Aquifer	Alluvial
Inspected by	B. Polivka	Date	10-1-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 11.4 ft.



Elevation of top of surface casing/riser pipe	5927.14 ft./5926.71 ft.
Height of top of surface casing/riser pipe above ground surface	2.65 ft./2.22 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.35 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	11.4 ft.
Type of backfill	NA
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	3.0 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	6.0 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	6.0 ft.
Elevation/depth top of screened section	6.7 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	8.7 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.0 ft.
Elevation/depth bottom of plugged blank section	10.7 ft.
Elevation/depth bottom of sand column	11.4 ft.
Type of backfill below observation pipe	NA
Elevation/depth of hole	11.4 ft.

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Borehole Location Number:	**38391**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 10 3	GROUND ELEVATION (FT) 5870 76	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747347	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/JAB	38391
EAST	2084371	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 11/04/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00888EBU1	0% 50% 100%	0% 100%	1 00 /2 00	5870 5869	0 1 2			GM	Gravel-Sand-Silt-Clay mixture Dark brown (10YR 3/3) to very dark brown (10YR 2/2) Gravel to 2.5" (average approx 0 4"- 0 5"), sands v f g to v c g (mean=m g) Well graded Gravels angular to well rounded (some angular clasts, probably due to drill), sands angular to subrounded Gravel quartzite, gneiss, schist Sand quartz with some rock fragments, traces micas and mafics No bedding apparent, core in broken/pulverized condition Dry NOTE A large proportion of the sand, gravel, and fines appears to be rock flour resulting from drill-caused pulverizing of larger clasts 35-45% Gravel, 25-35% Sand, 30-40% Fines (more silt than clay)
										No recovery for this interval
	BH00801EBU1			0 70 /2 00	5868 5867	3 4			GM	Gravel-Sand mixture with Silt and Clay Brown/dark brown (10YR 4/3, 10YR 3/3), dark yellowish brown (10YR 4/4) Gravel to 1 75", average approx 0 4", sand v f g to v c g, mean=m g Well-graded Gravels are angular (probably fractured during drilling) to rounded, sands are angular to subrounded Gravels are quartzite, schist, gneiss, sands are quartz with some rock fragments, traces Fe-stone, mica, organics, mafics No bedding apparent, core in broken/pulverized condition Dry NOTE Quantity of rock flour present 40-45% Gravel, 40-45% Sand, 10-20% Fines (more silt than clay)
										No recovery for this interval
				0 90 /2 00	5866	5			GM	Same as above
					5865	6			CL	Pebbly, Sandy, Clay (NOTE This may be bedrock which has been mechanically mixed with overlying material during drilling) Light olive brown (2 5Y 5/4) to light brownish gray (2 5Y 6/2) Gravel to 0 5" (average approx 0 2"), sand v f g to v c g (mean=m g) Moderately graded Gravel subangular to rounded (with a few angular clasts, probably fractured during drilling sand angular to subrounded Low to med plasticity Gravel quartzite, gneiss, schist, sand quartz some rock fragments, traces micas, mafics, Fe-stone, metal fragments (from drill?) No bedding apparent Dry Top of bedrock cannot be accurately located due to core loss 10-15% Gravel, 8-12% Sand, 75-80% Fines (up to 18% Silt)
				0 00 /2 00	5864	7				No recovery for this interval
					5863	8			CLAYSTONE	Claystone Light brownish gray (2 5Y 6/2), grayish brown (2 5Y 5/2) to (with increasing Fe-oxide content) light yellowish brown (2 5Y 6/4), olive yellow (2 5Y 6/6) Trace v f g to f g, subangular to subrounded, quartz sand, also trace silt Porosity=nil to approx 5% Cement is mainly argillaceous, with some Fe-oxide component and trace calcareous content Non to slightly friable, non to mod fissile and crumbly Trace organics Coarse sand grains at 9 5' likely imported from above No bedding apparent Fe-oxides at 8 8'-8 9', 9 25', and 9 7' may be indicative of healed fractures Dry Trace Sand 99-100% Fines (trace Silt) Top of bedrock between 4 9 ft and 8 3 ft
	BH00803EBU1			1 70 /2 00	5862	9				
	BH00802EBU1				5861	10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 10 3	GROUND ELEVATION (FT) 5870 76	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747347	AREA OU1	CASING DIAMETER (IN)	GEOLOGIST WGP/JAB	38391
EAST	2084371	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 11/04/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				0 00 /0 30		10				VOA sample obtained from this interval No recovery for this interval Total Depth = 10 3 ft
					5860	11				
					5859	12				
					5858	13				
					5857	14				
					5856	15				
					5855	16				
					5854	17				
					5853	18				
					5852	19				
					5851	20				

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Borehole Location Number:	**38491**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 8.1	GROUND ELEVATION (FT): 5871.49	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	747365	AREA: OU1	CASING DIAMETER (IN):	GEOLOGIST: WGP/JAB	38491
EAST:	2084350	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 11/04/91	
REMARKS:					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERED (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				1.90 /2.00	5871	0			ML:	Silt-Clay-Sand mixture with some Gravel: Black (10YR 2/1), very dark brown (10YR 2/2). Gravel to 2", average approx. 0.3"; sands v.f.g. to v.c.g., mean=m.g. Well-graded. Gravels angular (due to drill-related fracturing) to rounded, sands angular to subrounded. Slight to low plasticity. Gravels quartzite, gneiss, schist; sands quartz with some rock fragments, traces micas, mafics, organics (more concentrated in uppermost rooted portion), soft Fe-stone fragments, pink feldspar. No bedding apparent. Dry. 6-12% Gravel, 30-33% Sand, 55-65% Fines (subequal silt--clay)
					5870	1				
						2				No recovery for this interval
					5869				GM-GC:	Silty, Clayey Sand-Gravel mixture: Lightens in color with increasing depth, from very dark brown (10YR 2/2) to dark brown (10YR 3/3) to dark grayish brown (10YR 4/2). Gravel to 2" (average approx. 0.3"-0.4"), sand v.f.g. to v.c.g. (mean=m.g. to c.g.). Well-graded. Gravels angular (substantial quantities of rock flour may be present) to subrounded, sands angular to subrounded. Gravels are gneiss, schist, quartzite; sands are quartz with some rock fragments, traces micas and mafics. No bedding apparent. Dry. 40% Gravel, 30% Sand, 30% Fines (subequal silt--clay)
	BH0080SEBU1			0.90 /2.00		3				
					5868	4				No recovery for this interval
					5867				CLAYSTONE:	Claystone with Fe-stone interval: Claystone is light yellowish brown (2.5Y 6/3), light brownish gray (2.5Y 6/2); Fe-stone is yellowish brown (10YR 5/6, 10YR 5/8) to strong brown (7.5YR 4/6), dark brown (7.5YR 3/4); where clay is mixed with Fe-stone, colors are mottled. Claystone is 97-100% Clay with soft caliche casts to 1/4"; Fe-stone is fractured and up to 2" clasts are present. Ironstone is within claystone, at 4.15'-4.85'. Porosity: claystone is nil to approx. 2%, Fe-stone is 3-20%. Cement in claystone is argillaceous with some calcareous and Fe-oxide; Fe-stone cement is Fe-oxides with trace to some argillaceous. Claystone non to slightly friable and fissile; Fe-stone slightly to mod. friable, mod. to very fissile. Trace organics. Caliche clasts richest at 4.0'-4.15', 5.2'-5.65'. Dry. Excepting Fe-stone, 0-3% Silt, 97-100% Clay. Top of bedrock = 4.0'
				1.90 /2.00		5				
					5866					
	BH0084EBU1					6				
					5865					
	BH0086EBU1			2.00 /2.00		7				
					5864					VOA sample obtained from this interval
										No recovery for this interval
				0.00 /0.10		8			CLAYSTONE:	Claystone: Grayish brown (2.5Y 5/2), light olive brown (2.5Y 5/3), and brown (10YR 5/3). Very similar to overlying claystone except for greater fissility and decreased caliche content (caliche is very rare below approx. 6.2'). Porosity=nil to approx. 6%. Non to slightly friable, slightly to mod. fissile. Trace organics. No bedding apparent. Fe-oxide mineralization at 7.4'-7.5' may indicate presence of healed fracture. Dry. 0-3% Silt, 97-100% Clay
					5863					
						9				
					5862					Core retained in VOA sleeve
										No recovery for this interval
						10				Total Depth = 8.1 ft

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Borehole Location Number:	N/A
Monitoring Well Location Number:	**38591**
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 10.4	GROUND ELEVATION (FT):	5864.72	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747408	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	WGP/JAB	38591
EAST:	2084659	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN):	11.5	DATE DRILLED:	11/05/91	

REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% – 50% – 100%)	PERCENT RECOVERY (0% – 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00808EBU1			0.50 /2.00	5864	0			CL	Sand-Gravel-Silt-Clay mixture: Very dark brown (10YR 2/2) to black (10YR 2/1). Gravel to 0.7" (average approx. 0.2"-0.3"), sand v.f.g. to v.c.g. (mean=m.g.). Well graded. Gravel and sand subangular to subrounded. Low plasticity. Gravel quartzite, schist, gneiss; sand quartz with some rock fragments, trace to some organics (interval is rooted), traces mafics, micas, pink feldspar. No bedding apparent. Dry. 20% Gravel, 30% Sand, 20% Silt, 30% Clay.
					5863	1				No recovery for this interval
					5862	2			GW-GM	Sand-Gravel mixture with Silt and Clay: Dark grayish brown (10YR 4/2) to very dark grayish brown (10YR 3/2) to brown/dark brown (10YR 4/3). Gravel to >2.5" (average approx. 0.4"-0.5"), sand v.f.g. to v.c.g. (mean=m.g. to c.g.). Well graded. Gravel angular (due to drill-related fracturing) to subrounded, nearly rounded. Sand angular to subrounded. Gravel quartzite, schist, gneiss, trace sandstone; sand quartz, some rock fragments, traces mica, mafics, soft Fe-stone; metal shavings probably from drill, organics. No bedding apparent. Dry. (NOTE! Material in this interval is pulverized and rich in rock flour; boulders seen obstructing drill in situ materials probably coarser: greater gravel content in size, and lesser sand/silt/clay content; unit may be GP-GW). 46% Gravel, 42% Sand, 7% Silt, 5% Clay.
	BH00809EBU1			1.30 /2.00	5861	3				
					5860	4				
										No recovery for this interval
	00812EBU1			1.30 /2.00		5			GW-GM	Same as above.
										Geotechnical samples obtained from this interval
										No recovery for this interval
					5859	6			SM	Silty Sand with Clay and Gravel: Yellowish brown (10YR 5/4) to brown/dark brown (10YR 4/3). Gravel to 1" (average approx. 0.2"-0.3"), sand v.f.g. to v.c.g. (mean=m.g. to c.g.); clay rich zone, probably reworked claystone bedrock with some coarser material, is present at 7.1' to base of unit/top of bedrock. Well-graded, except below 7.1' where unit is poorly to mod. graded. Gravel and sand subangular to subrounded. Gravels are quartzite, gneiss, schist; sands are quartz, some rock fragments, traces mafics, micas, metal shavings (from drill?). No bedding apparent save clay-rich transition to bedrock at bottom of interval. Dry. 5% Gravel, 60% Sand, 21% Silt, 14% Clay.
	BH00814EBU1			1.50 /2.00	5858	7				
	BH00813EBU1 BH00815EBU1				5857	8			CLAYSTONE	Claystone: Light gray (10YR 7/1, 10YR 6/1, 2.5Y 7/2), light brownish gray (2.5Y 6/2), pale yellow (2.5Y 7/3), light yellowish brown (2.5Y 6/3); with increased Fe-oxide content yellow (2.5Y 6/6). Up to approx. 10% Silt. Sand at 8.0'-8.25' is imported from overlying materials through caving processes. Porosity=nil to approx. 3%. Cement is argillaceous, below approx. 7.45' trace calcareous cement added and below 8.0' Fe-oxides also present. Non to slightly friable, non to slightly fissile, with fissility below 8.0' greater than that above 7.75'. Trace organics, Fe-oxides are disseminated in clay with some oxide-enriched pockets rather
				0.90 /2.00	5856	9				
					5855	10				

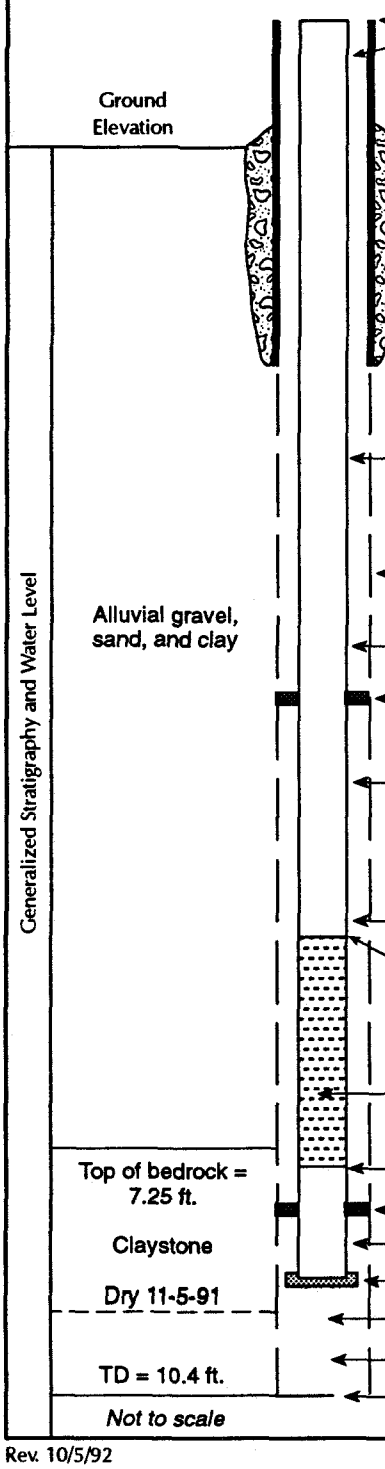
STATE PLANE COORDINATE		TOTAL DEPTH (FT): 10.4	GROUND ELEVATION (FT):	5864.72	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747408	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST	WGP/JAB	38591
EAST:	2084659	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN):	11.5	DATE DRILLED:	11/05/91	
REMARKS:							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%	1.30 /2.00		5				Geotechnical samples obtained from this interval. No recovery for this interval.
					5859	6			SM	Silty Sand with Clay and Gravel: Yellowish brown (10YR 5/4) to brown/dark brown (10YR 4/3). Gravel to 1" (average approx. 0.2"-0.3"), sand v.f.g. to v.c.g. (mean=m.g. to c.g.); clay rich zone, probably reworked claystone bedrock with some coarser material, is present at 7.1' to base of unit/top of bedrock. Well-graded, except below 7.1' where unit is poorly to mod. graded. Gravel and sand subangular to subrounded. Gravels are quartzite, gneiss, schist; sands are quartz, some rock fragments, traces mafics, micas, metal shavings (from drill?). No bedding apparent save clay-rich transition to bedrock at bottom of interval. Dry. 5% Gravel, 60% Sand, 21% Silt, 14% Clay.
	BH00814RU1			1.50 /2.00	5858	7				
	BH00813RU1 BH00815RU1				5857	8			CLAYSTONE	Claystone: Light gray (10YR 7/1, 10YR 6/1, 2.5Y 7/2), light brownish gray (2.5Y 6/2), pale yellow (2.5Y 7/3), light yellowish brown (2.5Y 6/3), with increased Fe-oxide content yellow (2.5Y 6/6). Up to approx. 10% Silt. Sand at 8.0'-8.25' is imported from overlying materials through caving processes. Porosity=nil to approx. 3%. Cement is argillaceous; below approx. 7.45' trace calcareous cement added and below 8.0' Fe-oxides also present. Non to slightly friable, non to slightly fissile, with fissility below 8.0' greater than that above 7.75'. Trace organics; Fe-oxides are disseminated in clay with some oxide-enriched pockets rather than present as distinct, planar fracture fill. No bedding apparent. Dry. 0-10% Silt, 90-100% Clay. Top of bedrock = 7.25'
				0.90 /2.00	5856	9				
				0.00 /0.40	5855	10				
					5854					VOA sample obtained from this interval.
						11			CLAYSTONE	Same as above. No recovery for this interval.
					5853	12				
					5852	13				Total Depth = 10.4 ft.
					5851	14				
					5850	15				

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	747407.9024 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084658.8764 ft.	Well No.	38591
Date Completed	11-5-91	Original Depth	10.4 ft.	Aquifer	Alluvial
Inspected by	B. Polivka	Date	11-5-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 10.4 ft.



Elevation of top of surface casing/riser pipe	5867.42 ft./5866.62 ft.
Height of top of surface casing/riser pipe above ground surface	2.7 ft./1.9 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.3 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	10.4 ft.
Type of backfill	NA
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	3.0 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	5.0 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	5.0 ft.
Elevation/depth top of screened section	5.66 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	7.66 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.0 ft.
Elevation/depth bottom of plugged blank section	9.66 ft.
Elevation/depth bottom of sand column	10.4 ft.
Type of backfill below observation pipe	NA
Elevation/depth of hole	10.4 ft.

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Borehole Location Number:	**38691**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 10 2	GROUND ELEVATION (FT)	5856 98	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747488	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	WGP/JAB	38691
EAST	2084888	LOCATION NUMBER 17	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	11/07/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT) / DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00816BU1	0% 50% 100%	0% 100%	1 25 /2 00	5856			CL	Sand-Clay-Silt mixture Very dark brown (10YR 2/2), black (10YR 2/1), dark brown (10YR 3/3), and very dark grayish brown (10YR 3/2) Up to 10% Gravel (gravel-rich zone present at approx 1 0'-1 25'), to approx 1"2", sand v f g to v c g (mean=m g) Mod to well graded Gravel subangular to subrounded, sands same Low plasticity Gravel quartzite, schist, gneiss, sand quartz with some rock fragments, trace to some organics (interval is rooted), traces micas, Fe-oxides, mafics No bedding apparent Slightly moist (probably due to snow) 0-10% Gravel, 40%-45% Sand, 50%-55% Fines (approx 30%-35% Clay)
					5855				No recovery for this interval
	BH00818BU1			0 50 /2 00	5854			SW-SM	Gravelly Sand with Silt Brown/dark brown (10YR 4/3, 10YR 3/3), yellowish brown (10YR 5/4), dark yellowish brown (10YR 4/4) Gravel to 1 5" (average approx 0 4"), sand v f g to v c g (mean=m g to c g) Well graded Gravel angular (probably fractured during drilling) to subrounded, sand angular to subrounded Gravels are quartzite, schist, gneiss, sands are quartz with some rock fragments, traces mafics micas, Fe-oxides No bedding apparent Dry 35% Gravel, 53% Sand, 12% Fines (mostly silt)
					5853				No recovery for this interval
								SW-SM	Same as above
									No recovery for this interval
				1 00 /2 00	5852			SW-SM	Same as above
					5851			CL	Clay with traces Sand and Gravel From brownish yellow (10YR 6/6) to light yellowish brown (2 5Y 6/4) to gray/light gray (5Y 6/1, 5Y 7/1) with decreasing Fe content Trace pebbles (especially evident approx 7 1'-7 3'), trace sand (mostly Fe-oxide grains with some quartz, mean=v f g to f g) Poorly graded Subangular to subrounded grains of sand, pebbles Low to med plasticity Calcareous (mainly as caliche blebs and grains), trace organics No bedding apparent, although color banding is visible at bottom of interval Dry Lower contact is transitional, interval appears to be reworked claystone bedrock Traces Gravel and Sand, 92%-98% Fines (mostly clay)
				2 00 /2 00	5850				
	BH00819BU1 BH00820BU1				5849			CLAYSTONE	Claystone From brownish yellow (10YR 6/6) to light yellowish brown (2 5Y 6/4) to gray/light gray (5Y 6/1, 5Y 7/1) with decreasing Fe content, also light yellowish brown (2 5Y 6/3) and light olive brown (2 5Y 5/3) Approx 92%-100% Clay Porosity=nil to approx 3% Argillaceous with trace calcareous and at least trace Fe-oxide cements Non to slightly friable and fissile Trace organics, trace to some Fe-oxide grains, trace to some caliche grains and blebs No bedding apparent Slightly moist 0-8% Silt, 92%-100% Clay Top of bedrock = 7 45'
				2 00 /2 00	5848				
					5847				VOA sample obtained from this interval
								CLAYSTONE	Same as above

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 10 2	GROUND ELEVATION (FT) 5856 98	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747488	AREA 001	CASING DIAMETER (IN)	GEOLOGIST WGP/JAB	38691
EAST	2084886	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 11/07/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%	1 00 /2 00		5			SW-SM	Same as above
					5851	6			CL	Clay with traces Sand and Gravel From brownish yellow (10YR 6/6) to light yellowish brown (2 5Y 6/4) to gray/light gray (5Y 6/1, 5Y 7/1) with decreasing Fe content Trace pebbles (especially evident approx 7 1'-7 3'), trace sand (mostly Fe-oxide grains with some quartz, mean=v f g to f g) Poorly graded Subangular to subrounded grains of sand, pebbles Low to med plasticity Calcareous (mainly as caliche blebs and grains), trace organics No bedding apparent, although color banding is visible at bottom of interval Dry Lower contact is transitional, interval appears to be reworked claystone bedrock Traces Gravel and Sand, 92%-98% Fines (mostly clay)
				2 00 /2 00	5850	7				
	840081SEB01 840082CLB01				5849	8			CLAYSTONE	Claystone From brownish yellow (10YR 6/6) to light yellowish brown (2 5Y 6/4) to gray/light gray (5Y 6/1, 5Y 7/1) with decreasing Fe content, also light yellowish brown (2 5Y 6/3) and light olive brown (2 5Y 5/3) Approx 92%-100% Clay Porosity=nil to approx 3% Argillaceous with trace calcareous and at least trace Fe-oxide cements Non to slightly friable and fissile Trace organics, trace to some Fe-oxide grains, trace to some caliche grains and blebs No bedding apparent Slightly moist 0-8% Silt, 92%-100% Clay Top of bedrock = 7 45'
				2 00 /2 00	5848	9				
				0 00 /0 20	5847	10				VOA sample obtained from this interval
									CLAYSTONE	Same as above
					5846	11			SANDY SILTSTONE	Sandy, Clayey Siltstone Yellowish brown (10YR 5/4), light olive brown (2 5Y 5/3), light yellowish brown (2 5Y 6/3), light gray (2 5Y 7/2) Up to approx 20% Sand (v f g to m g , mean=v f g to f g), 25%-35% Clay, balance silt Sand subangular to subrounded Porosity=15%-25% Argillaceous cement Slightly to mod friable and fissile Sand is quartz with some Fe-oxide grains Trace organics Fairly abrupt upper contact, but transitional lower contact (over approx 0' 5") No bedding apparent Dry 10%-20% Sand, 80%-90% Fines (mostly silt)
					5845	12			CLAYSTONE	Claystone Brownish yellow (10YR 6/6), light yellowish brown (2 5Y 6/4), yellowish brown (10YR 5/4), and light olive brown (2 5Y 5/3, 2 5Y 5/4) Up to approx 30% Silt Porosity =nil to approx 10% Cement is argillaceous with trace to some Fe-oxides and trace calcareous cement Slightly to non-friable and fissile Fe-oxide grains present Unit very similar to that at approx 7 45'-8 5' No bedding apparent Transitional upper contact Dry
					5844	13				Core retained in VOA sleeve
					5843	14				No recovery for this interval
					5842	15				Total Depth = 10 2 ft

INDEX OF DATA

Borehole Location Number:	**38791**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 10 2	GROUND ELEVATION (FT)	5857 60	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747506	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	WGP/JAB	38791
EAST	2084880	LOCATOR NUMBER	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	11/07/91	
REMARKS							

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% – 50% – 100%)	PERCENT RECOVERY (0% – 100%)	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				1 00 /2 00	5857	0			GM	Sandy Gravel with Silt and Clay Very dark grayish brown (10YR 3/2) to very dark brown (10YR 2/2) Gravel to 2 5" (average approx 1"), sand v f g to v c g (mean: m g to c g) Well graded Gravels angular (due to drill-related fracturing) to subrounded, sands some Gravels are sandstone, schist, quartzite, gneiss, sands mainly quartz with some rock fragments, traces mafics, feldspar, micas, Fe-oxides, organics (interval is rooted) No apparent bedding Moist to dry 40% Gravel, 35% Sand, 25% Fines (more silt than clay)
					5856	1				
						2				No recovery for this interval
										Core retained in VOA sleeve
	BH00821EBU1			0 50 /2 00	5855	3			GM	Sandy Gravel with Silt and Clay Brown/dark brown (10YR 5/3, 10YR 4/3) Gravel to 0 6" (average approx 0 2"-0 3"), sand v f g to v c g (mean=m g to c g) Well graded Gravel subangular to (a few) rounded, sand some Gravel quartzite, schist, gneiss, sand mainly quartz, some rock fragments, traces micas, mafics, feldspar, Fe-oxides, organics No bedding apparent Dry 50% Gravel, 35% Sand, 15% Fines
					5854	4				
				1 20 /2 00	5853	5				
										No recovery for this interval
					5852	6			SC	Sand-Gravel mixture with Clay and Silt Yellowish brown (10YR 5/4) to brown/dark brown (10YR 5/3, 10YR 4/3, 10YR 3/3) Gravel to 1" (average 0 4"-0 6"), sand v f g to v c g (mean=m g to c g) Well graded Gravels angular (drill-related?) to subrounded, as are sands Gravels schist, gneiss, quartzite, sands quartz with some rock fragments, traces organics, micas, mafics, Fe-oxides Only calcareous where unit grades into underlying clay, and caliche blebs are present No bedding apparent Dry 38% Gravel, 40% Sand, 22% Fines (more clay than silt)
					5851	7				
	BH00822EBU1			1 20 /2 00						
					5850	8				No recovery for this interval
									SC	Same as above
	BH00823EBU1								CLAYSTONE	Claystone Light brownish gray (2 5Y 6/2), light olive gray (5Y 6/2), and (where Fe-oxides are concentrated) yellow (2 5Y 7/6), olive yellow (2 5Y 6/6), and light yellowish brown (2 5Y 6/4) 95%-100% Clay, scattered caliche blebs, Fe-oxide grains, and rare quartz sand (latter is v f g to f g , <1% bulk, and former two are up to c g sand and rarely small pebble size) The oxides, caliche, and sand combined are <1% of total bulk rock Porosity=nil to approx 3% Cement is argillaceous with pockets rich in Fe-oxides, scattered blebs of caliche, and, below 8 0', disseminated calcareous material, all of which probably contribute to
				2 00 /2 00	5849	9				
						10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 10 2	GROUND ELEVATION (FT)	5857 60	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747506	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	WGP/JAB	38791
EAST	2084880	LOCATOR NUMBER L7	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	11/07/91	

REMARKS

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%	1 20 /2 00	5852	5			SC	Sand-Gravel mixture with Clay and Silt Yellowish brown (10YR 5/4) to brown/dark brown (10YR 5/3, 10YR 4/3, 10YR 3/3) Gravel to 1" (average 0 4"-0 6"), sand v f g to v c g (mean=m g to c g) Well graded Gravels angular (drill-related?) to subrounded, as are sands Gravels schist, gneiss, quartzite, sands quartz with some rock fragments, traces organics, micas, mafics, Fe-oxides Only calcareous where unit grades into underlying clay, and caliche blebs are present No bedding apparent Dry 38% Gravel, 40% Sand, 22% Fines (more clay than silt)
					5851	6				
	BH00822IB01			1 20 /2 00		7				
					5850					No recovery for this interval
	BH00823IB01					8			SC	Same as above
					5849				CLAYSTONE	Claystone Light brownish gray (2 5Y 6/2), light olive gray (5Y 6/2) and (where Fe-oxides are concentrated) yellow (2 5Y 7/6), olive yellow (2 5Y 6/6), and light yellowish brown (2 5Y 6/4) 95%-100% Clay, scattered caliche blebs, Fe-oxide grains, and rare quartz sand (latter is v f g to f g , <1% bulk, and former two are up to c g sand and rarely small pebble size) The oxides, caliche, and sand combined are <1% of total bulk rock Porosity=nil to approx 3% Cement is argillaceous with pockets rich in Fe-oxides, scattered blebs of caliche, and, below 8 0', disseminated calcareous material, all of which probably contribute to cementation Non-friable, slightly fissile Trace organics Unit appears either considerably weathered, reworked, or both, but looks more like bedrock than alluvial material Top of bedrock = 6 25'
				2 00 /2 00		9				
					5848					
				0 00 /0 20		10				
					5847					
						11				VOA sample obtained from this interval
										No recovery for this interval
					5846				CLAYSTONE	(cont from above) No bedding apparent Swirling, nonlinear pockets of Fe-oxides may be fracture-related Dry 100% Fines
						12			CLAYSTONE	Claystone with Silt Light brownish gray (2 5Y 6/2) to gray (5Y 5/1), light yellowish brown (2 5Y 6/4), light olive brown (2 5Y 5/4), and (where Fe-rich) olive yellow (2 5Y 6/6) Approximately 20%-30% Silt, trace quartz sand (<1%, but more than in interval described above at 6 25'-8 4', sand v f g to f g) Porosity=approx 5%-10% Cement=argillaceous, trace calcareous (plus caliche blebs), and intermixed Fe-oxides Slightly friable, slightly to mod fissile Trace organics No bedding apparent, nor are fractures clearly evident, although Fe-oxides may be fracture-related Dry <1% Sand, 99%-100% Fines
					5845					
						13				
					5844					
						14			SILTSTONE	Siltstone with Sand and Clay Banded--yellowish brown (10YR 5/6) alternating with light yellowish brown (2 5Y 6/4), bands 0 2"-0 3" thick Sand v f g to f g , mod sorted, subangular to subrounded quartz with Fe-oxides (trace), traces mica, mafics, rock fragments Porosity approx 25%-
					5843					
						15				

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 10.2	GROUND ELEVATION (FT): 5857.60	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER
NORTH:	747506	AREA: OU1	CASING DIAMETER (IN):	GEOLOGIST: WGP/JAB	38791
EAST:	2084880	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 11/07/91	
REMARKS:					

CHEMICAL SAMPLE ID / GEOTECHNICAL SAMPLE	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00823EBU1	0% 50% 100%	0% 100%	2.00 /2.00	5849	8 9				
				0.00 /0.20	5848	10				
					5847	11				No recovery for this interval
					5846	12			CLAYSTONE	(cont. from above) No bedding apparent. Swirling, nonlinear pockets of Fe-oxides may be fracture-related. Dry. 100% Fines
					5845	13			CLAYSTONE	Claystone with Silt: Light brownish gray (2.5Y 6/2) to gray (5Y 5/1), light yellowish brown (2.5Y 6/4), light olive brown (2.5Y 5/4), and (where Fe-rich) olive yellow (2.5Y 6/6). Approximately 20%-30% Silt, trace quartz sand (<1%, but more than in interval described above at 6.25'-8.4'; sand v.f.g. to f.g.). Porosity=approx. 5%-10%. Cement=argillaceous, trace calcareous (plus caliche blebs), and intermixed Fe-oxides. Slightly friable, slightly to mod. fissile. Trace organics. No bedding apparent, nor are fractures clearly evident, although Fe-oxides may be fracture-related. Dry. <1% Sand, 99%-100% Fines
					5844	14			SILTSTONE	Siltstone with Sand and Clay: Banded--yellowish brown (10YR 5/6) alternating with light yellowish brown (2.5Y 6/4), bands 0.2"-0.3" thick. Sand v.f.g. to f.g., mod. sorted, subangular to subrounded, quartz with Fe-oxides (trace), traces mica, mafics, rock fragments. Porosity approx. 25%-35%. Cement: argillaceous, Fe oxides, calcareous (disseminated and as caliche blebs). Moderately friable and fissile. Bedding has hummocky appearance. No clearly evident fractures. Dry. 10%-15% Sand, 85%-90% Fines (60%-70% Silt)
					5843	15				Core retained in VOA sleeve
					5842	16				No recovery for this interval
					5841	17				Total Depth = 10.2 ft.
					5840	18				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	N/A
Piezometer Location Number:	**38891**

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 14 2	GROUND ELEVATION (FT)	5891 26	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747830	AREA 001	CASING DIAMETER (IN)	2 07	GEOLOGIST	WGP/JAB	38891
EAST	2085051	LOCATOR NUMBER M7	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	11/11/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH / SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	ELEVATION (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
BH00825EBU1	0% 50% 100%	0% 100%	1 80 /2 00	5891 5890	0 1			CL	Clay-Silt mixture with Gravel and Sand Very dark brown (10YR 2/2) Gravel to 1 5", sand v f g to v c g (mean=f g) Poorly graded Gravels subangular to subrounded, sands angular to subrounded Low to med plasticity Gravels are schist, gneiss, quartzite, sands are quartz (including rare euhedral grains), some rock fragments, traces mafics, micas, organics (interval is rooted) No bedding apparent Slightly moist 7-12% Gravel, 5-8% Sand, 83-90% Fines (35-40% Silt)
									Core retained in VOA sleeve
BH00826EBU1			0 80 /2 00	5889 5888	2 3			CL	Sandy Clay with Silt and Gravel Dark brown (10YR 3/3) to dark yellowish brown (10YR 4/4) Gravel to 1 5", sand v f g to v c g (mean=f g) Moderately graded Gravels angular (due to drill-related fracturing) to subrounded, sands some Low to med plasticity Gravels quartzite, schist, gneiss, sands quartz with some rock fragments, traces mafics, mica, organics, Fe-oxides Trace calcareous content below 3 0' No bedding apparent Dry to slightly moist 10% Gravel, 30-35% Sand, 60-70% Fines (15%-25% Silt)
									No recovery for this interval
				5887	4			CL	Same as above
									No recovery for this interval
			2 00 /2 00	5886	5			ML	Sand-Silt-Clay mixture with trace Gravel Brown (7 5YR 5/4) Gravel to 1", sand v f g to v c g (mean=v f g to f g) Moderate grading Gravel angular (from drill?) to subrounded, sand some Slight to low plasticity Gravel quartzite, gneiss, schist, sand quartz, some rock fragments, traces mica, mafics, Fe-oxides Interval is calcareous No bedding apparent Dry 0-3% Gravel, 38-41% Sand, 58-60% Fines (35% Silt)
									Core retained in VOA sleeve
				5885	6			ML	Same as above
									Core retained in VOA sleeve
								ML	Same as above
			2 00 /2 00	5884	7			CL	Clay with Sand, Gravel, and Silt Yellowish brown (10YR 5/4) Gravel to 0 5", sand v f g to v c g (mean=f g) Gravel subangular to subrounded, sand some Poorly graded Med plasticity Gravel quartzite, schist, gneiss, sand quartz, some rock fragments, traces Fe-oxides, mica, mafics Calcareous-trace in matrix plus scattered caliche blebs Available core is only "squeezings", as drill pushed gravel clast through this interval No bedding apparent Probably reworked claystone bedrock Dry 0-3% Gravel, 10-15% Sand, 85-90% Fines (mostly clay)
				5883	8				
BH00827EBU1			1 30 /2 00	5882	9 10			CLAYSTONE	Claystone with Silt Pale yellow (2 5Y 7/4) and light yellowish brown (2 5Y 6/4) above 9 3', light olive brown (2 5Y 5/3) below 10 0' (1% Sand (v f g to f g, subangular to subrounded, quartz), up to 15% Silt Porosity=nil to approx 4% Cement is argillaceous, trace to abundant calcareous (both disseminated and as caliche blebs and streamers),

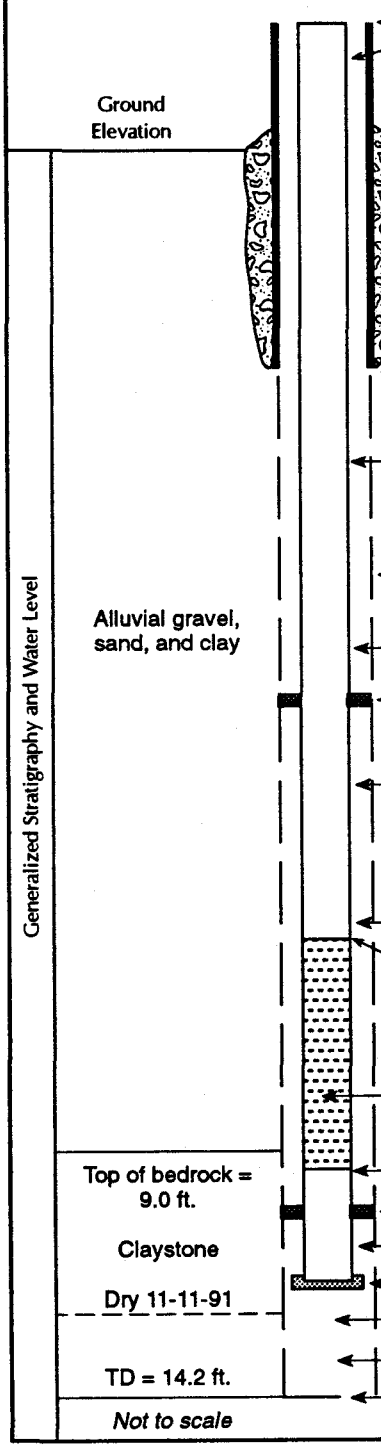
STATE PLANE COORDINATE		TOTAL DEPTH (FT) 14 2	GROUND ELEVATION (FT)	5891 26	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747830	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	WGP/JAB	38891
EAST	2085051	LOCATOR NUMBER M7	BOREHOLE DIAMETER (IN)	11 5	DATE DRILLED	11/11/91	
REMARKS							

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%	2 00 /2 00	5886	5				ed, sand some Slight to low plasticity Gravel quartzite, gneiss, schist, sand quartz, some rock fragments, traces mica, mafics, Fe-oxides Interval is calcareous No bedding apparent Dry 0-3% Gravel, 38-41% Sand, 58-60% Fines (35% Silt)
					5885	6				Core retained in VOA sleeve
									ML	Same as above
										Core retained in VOA sleeve
									ML	Same as above
				2 00 /2 00	5884	7			CL	Clay with Sand, Gravel, and Silt Yellowish brown (10YR 5/4) Gravel to 0 5", sand v f g to v c g (mean=f g) Gravel subangular to subrounded, sand some Poorly graded Med plasticity Gravel quartzite, schist, gneiss, sand quartz, some rock fragments, traces Fe-oxides, mica, mafics Calcareous-trace in matrix plus scattered caliche blebs Available core is only "squeezings", as drill pushed gravel clast through this interval No bedding apparent Probably reworked claystone bedrock Dry 0-3% Gravel, 10-15% Sand, 85-90% Fines (mostly clay)
					5883	8				
BH00827EBU1				1 00 /2 00	5882	9			CLAYSTONE	Claystone with Silt Pale yellow (2 5Y 7/4) and light yellowish brown (2 5Y 6/4) above 9 3', light olive brown (2 5Y 5/3) below 10 0' <1% Sand (v f g to f g, subangular to subrounded, quartz), up to 15% Silt Porosity=nil to approx 4% Cement is argillaceous, trace to abundant calcareous (both disseminated and as caliche blebs and streamers), trace Fe-oxides Non friable, slightly fissile No bedding nor fractures apparent, although condition of core (squeezings) may obscure such features above 11 4' Below 13 0', some laminations visible and organics are present Fe-oxides more abundant, and unit is up to highly fissile Dry <1% Sand, 99-100% Fines (85%-100% Clay) Top of bedrock = 9 0'
					5881	10				
				1 40 /2 00	5880	11				No recovery for this interval
									CLAYSTONE	Same as above
										No recovery for this interval
					5879	12				
BH00829EBU1				1 00 /2 00	5878	13			CLAYSTONE	Same as above
BH00828EBU1										VOA sample obtained from this interval
				0 00 /0 20	5877	14				No recovery for this interval
										Total Depth = 14 2 ft
						15				

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	747830.4462 ft.	Page	1 of 1
Location	881 Hillside	Easting	2085051.1201 ft.	Well No.	38891
Date Completed	11-11-91	Original Depth	14.2 ft.	Aquifer	Alluvial
Inspected by	B. Polivka	Date	11-11-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 14.2 ft.



Elevation of top of surface casing/riser pipe	5893.61 ft./5893.24 ft.
Height of top of surface casing/riser pipe above ground surface	2.35 ft./1.98 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Depth of surface casing below ground	2.65 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	14.2 ft.
Type of backfill	NA
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	3.0 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	6.6 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	6.6 ft.
Elevation/depth top of screened section	7.3 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	9.3 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.0 ft.
Elevation/depth bottom of plugged blank section	11.3 ft.
Elevation/depth bottom of sand column	11.6 ft.
Type of backfill below observation pipe	Natural
Elevation/depth of hole	14.2 ft.

Rev. 10/5/92

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	N/A
Piezometer Location Number:	**38991**

Data Available:

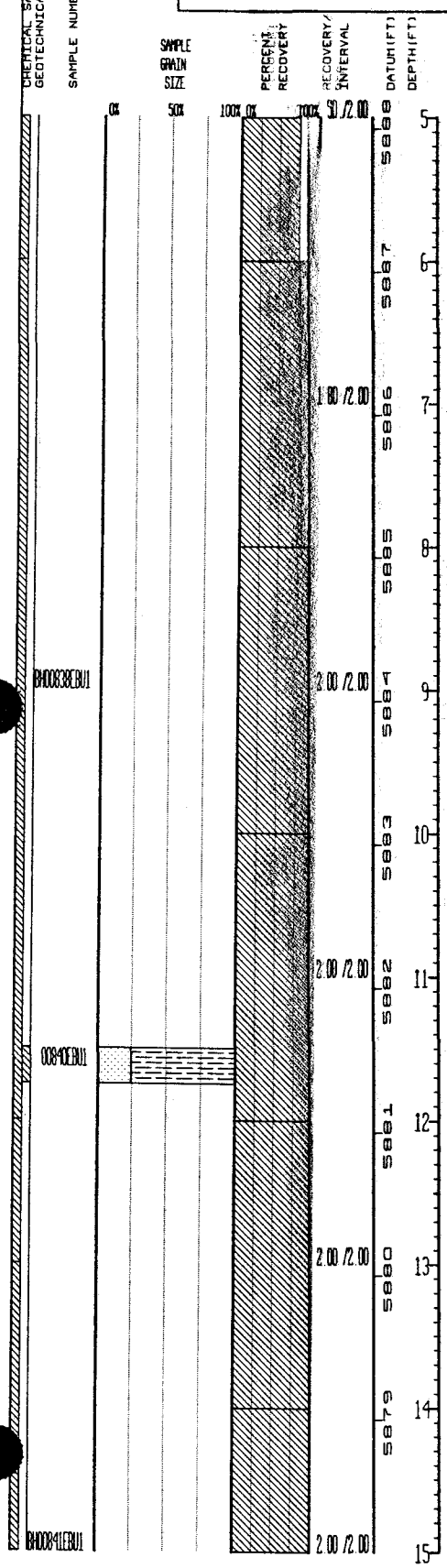
- ✔ Geologic Borehole Log (LOGGER Format)
- ✔ Geophysical Log
- ✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 56.00	GROUND ELEVATION (FT): 5893.08	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER
NORTH:	747820	AREA OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: WGP/JAB	38991
EAST:	2085024	LOCATOR NUMBER: M7	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 11/23/91	

REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00832EBU1	0% 50% 100%	0% 100%		5893	0			CL	Clay with Caliche: Light brownish gray (2.5Y 6/2) to approx. 1.3'-1.5', yellowish brown (10YR 5/4). Trace (approx. 0'-4%) gravel (up to 0.7"), trace (approx. 0-6%) sand (v.f.g. to c.g., mean=v.f.g. to f.g.). Poorly graded. Subangular to subrounded gravel and sand. Some organics (interval is rooted), some (possibly up to abundant) caliche. No bedding apparent. Med. plasticity. Dry. Traces Gravel and Sand, 90%-98% Fines (3%-10% Silt)
				2.00 /2.00	5892	1				
	BH00835EBU1									
	00833EBU1				5891	2				Geotechnical samples obtained from this interval
									gm-GC	Gravel-Clay-Silt-Sand mixture: Light yellowish brown (2.5Y 6/3, 2.5Y 6/4), dark yellowish brown (10YR 4/4), reddish yellow (7.5YR 6/6). Interval consists of apparent physical mixture of clay pockets, sandy-silty clay pockets, and gravel clasts. Gravel to 2" (average approx. 0.5"), sand v.f.g. to v.c.g. (mean=m.g.). Mod. to well graded. Clasts are subangular to subrounded, with some angular (fractured) gravels. Med. plasticity. Gravels are quartzite, schist, gneiss; sands are quartz, trace to some rock fragments, traces mafics, micas. Calcareous. No true bedding, although clay lens is present at 2.0'-2.1'. Dry. 30%-40% Gravel, 15%-25% Sand, 47%-53% Fines (20%-30% Silt)
	BH00836EBU1			1.30 /2.00	5890	3				
	BH00834EBU1									
					5889	4				
				1.50 /2.00	5888	5			CL	Clay: (NOTE: Probable unmarked missing section somewhere between 4.0' and 5.75'.) Above 3.05' and below 4.6' (measuring down from 4.0'), colors are light brownish gray (2.5Y 6/2), light olive brown (2.5Y 5/3), light yellowish brown (2.5Y 6/3), and (with Fe-oxides) yellowish brown (10YR5/6, 10YR 5/8); from 4.0'-4.6', light gray (10YR 7/1) to light brownish gray (2.5Y 6/2). Caliche blebs and streamers throughout, generally white (10YR 8/2). Poorly graded. Medium plasticity. Fe-oxides present throughout, though sharply decreased in 4.0'-4.6' interval which lacks the yellowish brown coloration. Occasional traces organics, especially above 3.05'. No apparent bedding. Fe-oxides may indicate healed fractures. Soft caliche clasts/inclusions at 4.1', 4.35'. Unit appears to be displaced bedrock. Dry. 0-7% Silt, 93%-100% Clay
					5887	6				
				1.80 /2.00	5886	7				
										VOA sample obtained from this interval
										No recovery for this interval
									CL	Same as above
					5885	8				No recovery for this interval
									CL	Sandy Clay with Silt and Gravel: Colors change with depth: light yellowish brown (2.5Y 6/3) to approx. 6.2'; brown/dark brown (7.5YR 4/4) from approx. 6.2' to 6.65'; yellowish red (5YR 4/6) to red (2.5YR 4/6) to dark red (2.5YR 3/6) from approx. 6.65' to 7.35'; brown (7.5YR 5/4, 10YR 5/3) to yellowish brown (10YR 5/4) from approx. 7.35' to 7.55'. Gravel to >2.5", average approx. 0.3"-0.5", sand v.f.g. to v.c.g. (mean=v.f.g. to f.g.). Mod. graded. Gravel and sand angular (gravel fractured during drilling) to subrounded. Medium plasticity. Gravel quartzite, sandstone, gneiss, schist.
	BH00838EBU1			2.00 /2.00	5884	9				
						10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 56.00	GROUND ELEVATION (FT):	5893.08	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER
NORTH:	7[illegible]	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	WGP/JAB	38991
EAST:	20[illegible]	LOCATOR NUMBER: M7	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	11/23/91	
REMARKS:							



WELL OR PIEZOMETER CONSTRUCTION

LITHOLOGY

UNIFIED SOILS CLASSIFICATION OR ROCK TYPE

DESCRIPTION

CL: Same as above

No recovery for this interval

CL: Sandy Clay with Silt and Gravel: Colors change with depth: light yellowish brown (2.5Y 6/3) to approx. 6.2'; brown/dark brown (7.5YR 4/4) from approx. 6.2' to 6.65'; yellowish red (5YR 4/6) to red (2.5YR 4/6) to dark red (2.5YR 3/6) from approx. 6.65' to 7.35'; brown (7.5YR 5/4, 10YR 5/3) to yellowish brown (10YR 5/4) from approx. 7.35' to 7.55'. Gravel to >2.5", average approx. 0.3"-0.5", sand v.f.g. to v.c.g. (mean=v.f.g. to f.g.). Mod. graded. Gravel and sand angular (gravel fractured during drilling) to subrounded. Medium plasticity. Gravel quartzite, sandstone, gneiss, schist; sand quartz, trace to some rock fragments, traces Fe-oxides, mafics, mica, organics. Scattered traces of caliche. No bedding apparent. Dry. 10% Gravel, 25% Sand, 65% Fines (15%-20% Silt)

No recovery for this interval

Core retained in VOA sleeve

CL: Clay with Caliche: Light yellowish brown (2.5Y 6/4) to very pale brown (10YR 7/4 to 10YR 8/3). Rare, scattered gravel clasts (<1%), trace sand (0-2%), 5%-15% Silt. Poorly graded. Sand is v.f.g. to f.g. (rarely coarser), subangular to subrounded, quartz. Medium plasticity. Caliche abundant to 10.25', and in decreased quantities from 10.25' to 11.5'. Trace to some Fe-oxides also present. Entire interval is heavily damaged such that bedding is obscured or totally destroyed, where pieces of core >1" in length exist, caliche is predominantly in subhoriz. deposits. Dry. Trace (<1%) Gravel, trace (0-2%) Sand, 98%-100% Fines (mostly clay)

Core retained in VOA sleeve

CL: Same as above

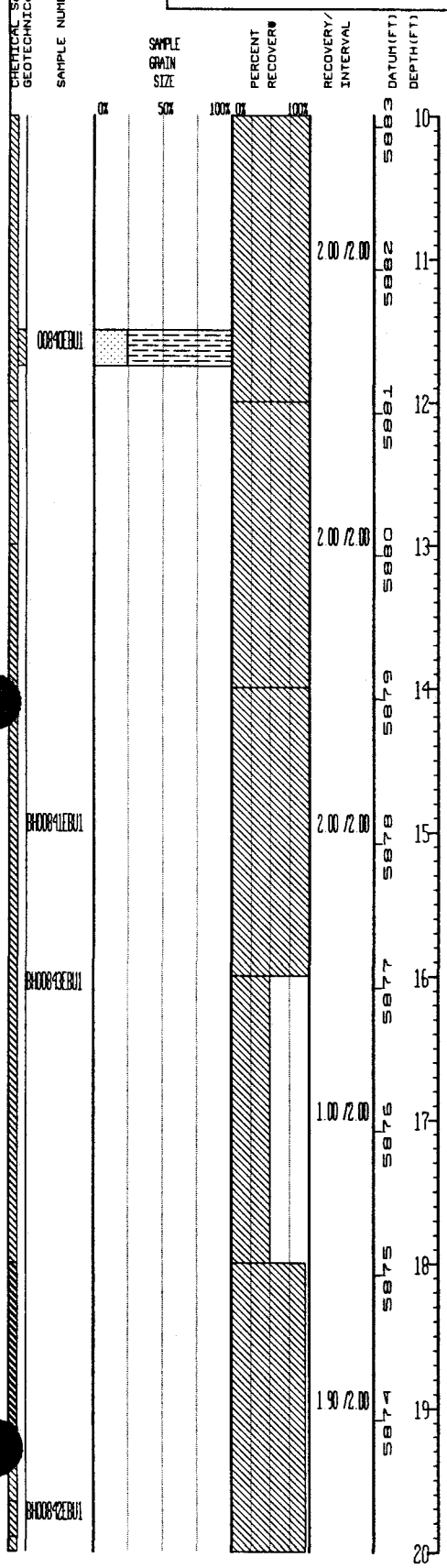
Geotechnical samples obtained from this interval

Core retained in VOA sleeve

CL: Silty Clay with Sand and Gravel: Strong brown (7.5YR 4/6), light olive brown (2.5Y 5/4), yellowish brown (10YR 5/4), light yellowish brown (10YR 6/4, 2.5Y 6/3, 2.5Y 6/4). Gravel to 1.5" (average approx. 0.2"-0.4"), sand v.f.g. to v.c.g.

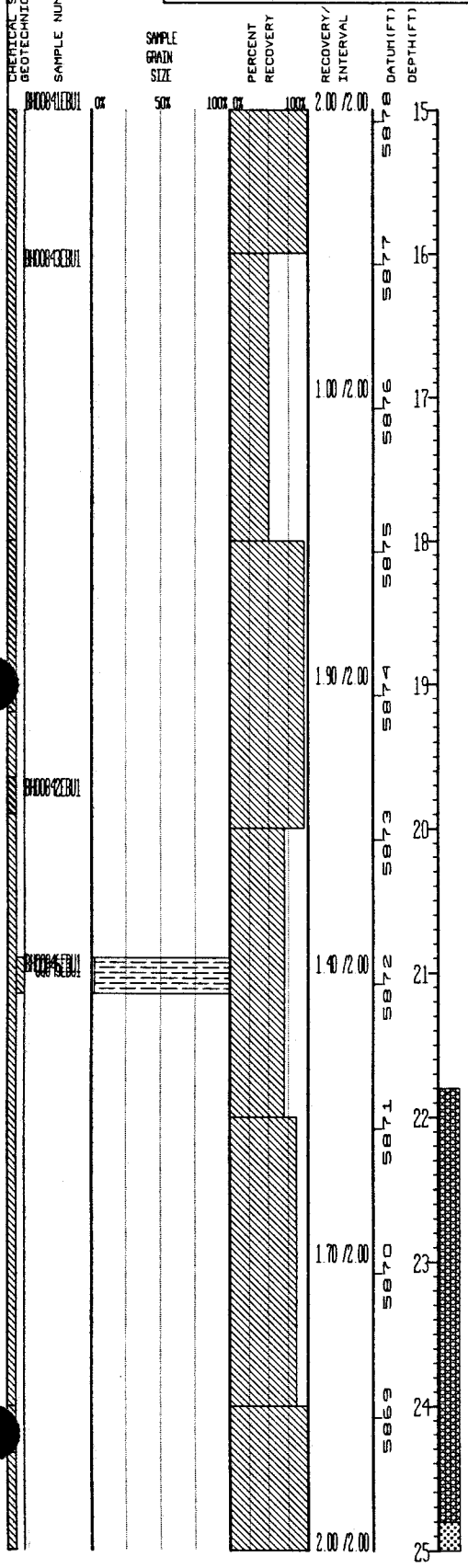
STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 56.00	GROUND ELEVATION (FT):	5893.08	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747820	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	MGP/JAB	38991
EAST:	2085024	LOCATOR NUMBER: M7	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	11/23/91	

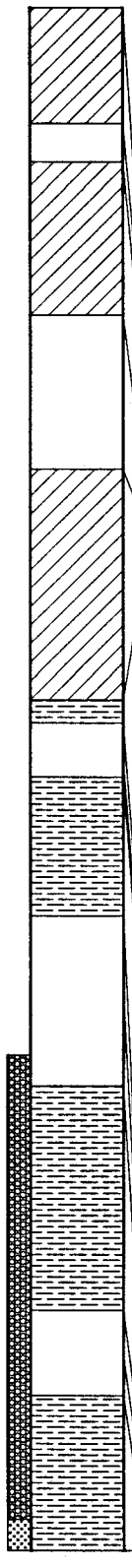
REMARKS:



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	Core retained in VOA sleeve
CL	Same as above
	Geotechnical samples obtained from this interval
	Core retained in VOA sleeve
CL	Silty Clay with Sand and Gravel: Strong brown (7.5YR 4/6), light olive brown (2.5Y 5/4), yellowish brown (10YR 5/4), light yellowish brown (10YR 6/4, 2.5Y 6/3, 2.5Y 6/4). Gravel to 1.5" (average approx. 0.2"-0.4"), sand v.f.g. to v.c.g. (mean=m.g. to c.g.). Poor to (in gravel-rich zones such as 14.0'-14.8', 16.0'-17.0') mod. grading. Gravel angular (fractured during drilling) to subrounded, sands same. Medium plasticity. Gravel: quartzite, schist, gneiss, traces Fe-stone, sandstone, andesitic to basaltic volcanics (rare, weathered). Sand: quartz, some rock fragments, trace to some Fe-oxides, traces mafics, micas, metal shavings (from drill?), feldspar. Calcareous (disseminated, plus caliche blebs, streamers), but less than upper portion of overlying interval. Caliche richest at approx. 18.35'-18.7' (cont.)
	Core retained in VOA sleeve
CL	Same as above
	Core retained in VOA sleeve
CL	(cont. from above) Underlying contact transitional over approx. 2"-3". No bedding apparent. Dry. 10%-15% Gravel, 10%-15% Sand, 75%-80% Fines (approx. 15%-30% Silt)
	No recovery for this interval
CL	Same as above
CLAYSTONE	Claystone: Light yellowish brown (2.5Y 6/3) to grayish brown (2.5Y 5/2) to light olive brown (2.5Y 5/3); dark brown (7.5YR3/2) at base of interval (28.5'-28.9'), and yellowish brown (10YR 5/6, 10YR 5/8), brownish yellow (10YR 6/6, 10YR 6/8) where rich in Fe-oxides. 5%-10% Silt. Porosity: nil to approx. 5%. Cement: argillaceous, plus trace calcareous in

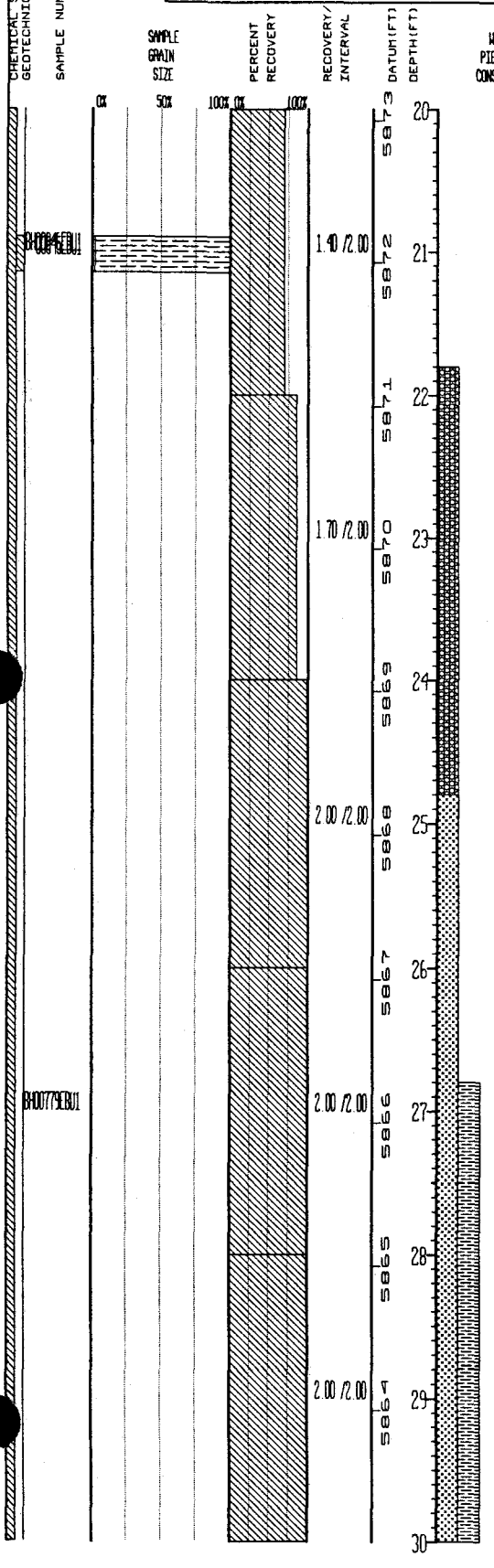
STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 56.00	GROUND ELEVATION (FT):	5893.08	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747820	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	WGP/JAB	38991
EAST:	2085024	LOCATOR NUMBER: M7	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	11/23/91	
REMARKS:							

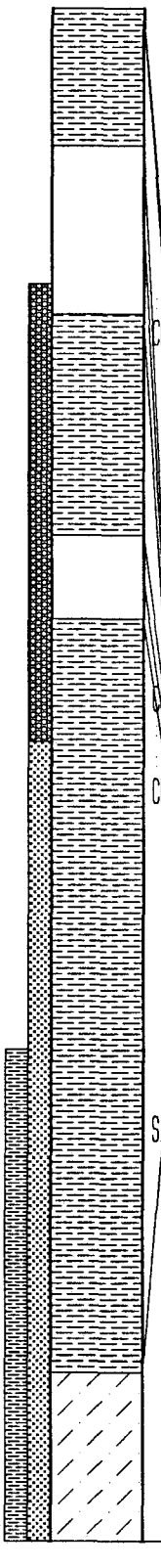




UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
CL	Same as above
	Core retained in VOA sleeve
GL	(cont. from above) Underlying contact transitional over approx. 2"-3". No bedding apparent. Dry. 10%-15% Gravel, 10%-15% Sand, 75%-80% Fines (approx. 15%-30% Silt)
	No recovery for this interval
CL	Same as above
CLAYSTONE	Claystone: Light yellowish brown (2.5Y 6/3) to grayish brown (2.5Y 5/2) to light olive brown (2.5Y 5/3), dark brown (7.5YR3/2) at base of interval (28.5'-28.9'), and yellowish brown (10YR 5/6, 10YR 5/8), brownish yellow (10YR 6/6, 10YR 6/8) where rich in Fe-oxides. 5%-10% Silt. Porosity: nil to approx. 5%. Cement: argillaceous, plus trace calcareous in some areas (calcareous content decreases below approx.25.0', increases again at bottom of interval [28.4'-28.9']) and Fe-oxides scattered throughout in trace quantities. Non-friable slightly (below 28') to mod. (above 28') fissile. Caliche streamers and clasts scattered throughout unit above approx. 24.5', rare to absent below approx. 24.5'. Trace organics (coally at 28.1'). No bedding apparent; brecciated appearance (jumbled, disorganized) above 28'. Trace concretions, (cont. below)
	VOA sample obtained from this interval
	No recovery for this interval
CLAYSTONE	(cont. from above) Concretions are present, generally as either calcareous clasts or having an Fe-oxide rind; however, concretions are only present in trace quantiyies (note calcareous concretion at 24.45'). Fe-oxides are present in complexly intersecting, webby, semi-planar deposits having the appearance of fracture-healing mineralization but of various orientations and high density (large number of such "fractures" per unit volume), again resembling Fe-oxide-healed breccia. No discrete fractures are apparant. Dry. 100% Fines (90-95% Clay). Top of bedrock = 19.5'
	Geotechnical samples obtained from this interval
	No recovery for this interval
CLAYSTONE	Same as above
	No recovery for this interval
	Core retained in VOA sleeve

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 56.00	GROUND ELEVATION (FT): 5893.08	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	747820	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: WGP/JAB	38991
EAST:	2085024	LOCATOR NUMBER: M7	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 11/23/91	
REMARKS:					





UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	No recovery for this interval
CLAYSTONE:	(cont. from above) Concretions are present, generally as either calcareous clasts or having an Fe-oxide rind; however, concretions are only present in trace quantiyies (note calcareous concretion at 24'-45'). Fe-oxides are present in complexly intersecting, webby, semi-planar deposits having the appearance of fracture-healing mineralization but of various orientations and high density (large number of such "fractures" per unit volume), again resembling Fe-oxide-healed breccia. No discrete fractures are apparant. Dry. 100% Fines (90-95% Clay). Top of bedrock = 19.5'
	Geotechnical samples obtained from this interval
	No recovery for this interval
CLAYSTONE:	Same as above
	No recovery for this interval
	Core retained in VOA sleeve
CLAYSTONE:	Same as above
SILTSTONE:	Siltstone with Clay and Sand: Light yellowish brown (2.5Y 6/3, 2.5Y 6/4), light olive brown (2.5Y 5/3), light brownish gray (2.5Y 6/2), grayish brown (2.5Y 5/2); where Fe-oxide-rich, brownish yellow (10YR 6/6, 10YR 6/8), yellowish brown (10YR 5/6, 10YR 5/8). Variable clay, silt content; 32.5'-32.8' is more clayey than rest of interval. Trace v.f.g., angular to subrounded sand. Porosity approx. 15%-30%. Cement: argillaceous, traces scattered Fe-oxides and calcareous cement. Slightly to mod. friable, slightly to very fissile. Sand: quartz, traces mica, mafics, Fe-oxides. Small areas contain bedded sediments; soft sediment deformation, discontinuous wavy bedding, thin to med. laminations most common. Calcareous concretions noted below 32'. Fe-oxide-replaced

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 56.00	GROUND ELEVATION (FT): 5893.08	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	747820	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: WGP/JAB	38991
EAST:	2085024	LOCATOR NUMBER: M7	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 11/23/91	

REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2.00 /2.00	5868	25			CLAYSTONE:	Same as above.
					5867	26				
	BH00779EBU1			2.00 /2.00	5866	27			SILTSTONE:	Siltstone with Clay and Sand: Light yellowish brown (2.5Y 6/3, 2.5Y 6/4), light olive brown (2.5Y 5/3), light brownish gray (2.5Y 6/2), grayish brown (2.5Y 5/2); where Fe-oxide-rich, brownish yellow (10YR 6/6, 10YR 6/8), yellowish brown (10YR 5/6, 10YR 5/8). Variable clay, silt content; 32.5'-32.8' is more clayey than rest of interval. Trace v.f.g., angular to subrounded sand. Porosity approx. 15%-30%. Cement: argillaceous, traces scattered Fe-oxides and calcareous cement. Slightly to mod. friable, slightly to very fissile. Sand: quartz, traces mica, mafics, Fe-oxides. Small areas contain bedded sediments, soft sediment deformation, discontinuous wavy bedding, thin to med. laminations most common. Calcareous concretions noted below 32'. Fe-oxide-replaced organic fragments seen in some Fe-rich areas. (cont. below)
					5865	28				
				2.00 /2.00	5864	29				
					5863	30				
				2.00 /2.00	5862	31			SILTSTONE:	(cont. from above) (29.9'-30', 32.8'-33.1', and other thinner deposits). A couple of these Fe-oxide deposits are probably healed fractures, as drawn, but others may be permeability and/or organic content-controlled. Dry. 5% Sand, 80% Silt, 15% Clay.
					5861	32			SILTY CLAYSTONE:	Silty Claystone: Light yellowish brown (2.5Y 6/3, 2.5Y 6/4) to light olive brown (2.5Y 5/3), with some brown (7.5YR 5/2) and (with Fe-oxide content higher) brownish yellow (10YR 6/8) to yellowish brown (10YR 5/6, 10YR 5/8). Porosity: nil to approx. 4%. Cement: argillaceous, occasional traces Fe-oxides, calcareous material. Non to slightly friable, slightly fissile. Trace organics, most notable at 33.97'. No bedding apparent. Hairline, discontinuous Fe-oxide-healed fractures at 33.75'-34.0'; above this are thicker Fe-oxide deposits (blebby rather than planar) that may not be fracture-contolled. Dry. 100% Fines (85%-90% Clay).
	BH00780EBU1			2.00 /2.00	5860	33				
					5859	34			CLAYEY SILTSTONE:	Clayey Siltstone: Light brownish gray (10YR 6/2, 2.5Y 6/2), light yellowish brown (2.5Y 6/3, 2.5Y 6/4), grayish brown (2.5Y 5/2), light olive brown (2.5Y 5/3); with increased Fe-oxides, as at bottom (approx. 43.2'-44.0') and in mottled
				2.00 /2.00		35				

STATE PLANE COORDINATE	TOTAL DEPTH (FT): 56.00	GROUND ELEVATION (FT): 5893.08	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER
NORTH: [redacted]	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: WGP/JAB	38991
EAST: [redacted]	LOCATOR NUMBER: M7	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 11/23/91	

REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% – 50%)	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
										organic fragments seen in some Fe-rich areas (cont. below)
				2.00/2.00	5863	30			SILTSTONE	(cont. from above) (29.9'-30', 32.8'-33.1', and other thinner deposits). A couple of these Fe-oxide deposits are probably healed fractures, as drawn, but others may be permeability and/or organic content-controlled. Dry. 5% Sand, 80% Silt, 15% Clay.
				2.00/2.00	5862	31				
					5861	32			SILTY CLAYSTONE	Silty Claystone: Light yellowish brown (2.5Y 6/3, 2.5Y 6/4) to light olive brown (2.5Y 5/3), with some brown (7.5YR 5/2) and (with Fe-oxide content higher) brownish yellow (10YR 6/8) to yellowish brown (10YR 5/6, 10YR 5/8). Porosity: nil to approx. 4%. Cement: argillaceous, occasional traces Fe-oxides, calcareous material. Non to slightly friable, slightly fissile. Trace organics, most notable at 33.97'. No bedding apparent. Hairline, discontinuous Fe-oxide-healed fractures at 33.75'-34.0'; above this are thicker Fe-oxide deposits (blebby rather than planar) that may not be fracture-contolled. Dry. 100% Fines (85%-90% Clay).
	BH00780EBU1			2.00/2.00	5860	33				
					5859	34			CLAYEY SILTSTONE	Clayey Siltstone: Light brownish gray (10YR 6/2, 2.5Y 6/2), light yellowish brown (2.5Y 6/3, 2.5Y 6/4), grayish brown (2.5Y 5/2), light olive brown (2.5Y 5/3); with increased Fe-oxides, as at bottom (approx. 43.2'-44.0') and in mottled area (approx. 36.65'-38'), brownish yellow (10YR 6/8), yellowish brown (10YR 5/6, 10YR 5/8), dark yellowish brown (10YR 4/6), and strong brown (7.5YR 5/8). Trace (0-5%) v.f.g. subangular to subrounded sand. Silt content generally 65%-80%; clay content greater at bottom (approx. 43.0'-44.0') leaving 50%-55% Silt. Porosity: approx. 15%-30%. Cement: argillaceous, plus occasional trace calcareous and trace to some Fe-oxide. Slightly to mod. friable and fissile. Trace organics, except towards bottom of unit (approx. 43.2'-44.0') where (cont. below)
				2.00/2.00	5858	35				
					5857	36				
				2.00/2.00	5856	37				
	BH00781EBU1				5855	38				
				2.00/2.00	5854	39			CLAYEY SILTSTONE	(cont. from above) coally chips, seams, dust exist. Organic streamers at 34'-35', less common below this. Clay lens at 40'-40.25'. No clear bedding apparent; unit has the look of extreme soft-sediment deformation or bioturbation resulting
						40				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 56.00	GROUND ELEVATION (FT):	5893.08	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747820	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	WGP/JAB	38991
EAST:	2085024	LOCATOR NUMBER: M7	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	11/23/91	

REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2.00 /2.00	5858	35				area (approx. 36.65'-38'), brownish yellow (10YR 6/8), yellowish brown (10YR 5/6, 10YR 5/8), dark yellowish brown (10YR 4/6), and strong brown (7.5YR 5/8). Trace (0-5%) v.f.g. subangular to subrounded sand. Silt content generally 65%-80%; clay content greater at bottom (approx. 43.0'-44.0') leaving 50%-55% Silt. Porosity: approx. 15%-30%. Cement: argillaceous, plus occasional trace calcareous and trace to some Fe-oxide. Slightly to mod. friable and fissile. Trace organics, except towards bottom of unit (approx. 43.2'-44.0') where (cont. below)
					5857	36				
				2.00 /2.00	5856	37				
	BH0078LEBU1				5855	38				
				2.00 /2.00	5854	39			CLAYEY SILTSTONE	(cont. from above) coally chips, seams, dust exist. Organic streamers at 34'-35', less common below this. Clay lens at 40'-40.25'. No clear bedding apparent; unit has the look of extreme soft-sediment deformation or bioturbation resulting in eradication of bedding but not so complete as to give massive appearance. Fractures healed by both Fe-oxides and by dark material looking like organic-rich clays (see 37'-37.5', and potentially re-fractured fracture at 34.1'-34.4'); caliche rarely present as fracture-fill. Dry. 0-5% Sand, 95%-100% Fines (65%-80% Silt).
					5853	40				
				2.00 /2.00	5852	41				
					5851	42				
	BH0078HEBU1			2.00 /2.00	5850	43				
					5849	44			CLAYSTONE	Claystone: Dark grayish brown (2.5Y 4/2), light olive brown (2.5Y 5/3), dark gray (10YR 4/1, 5Y 4/1), gray (5Y 5/1); where Fe-oxides are concentrated, brownish yellow (10YR 6/8), yellowish brown (10YR 5/6, 10YR 5/8), dark yellowish
				2.00 /2.00		45				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 56.00	GROUND ELEVATION (FT):	5893.08	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747820	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	WGP/JAB	38991
EAST:	2085024	LOCATOR NUMBER: M7	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	11/23/91	
REMARKS:							

CHEMICAL SAMPLE DE / GEOTECHNICAL SAMPL	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
					5853	40				in eradication of bedding but not so complete as to give massive appearance. Fractures healed by both Fe-oxides and by dark material looking like organic-rich clays (see 37'-37.5', and potentially re-fractured fracture at 34.1'-34.4'); caliche rarely present as fracture-fill. Dry. 0-5% Sand, 95%-100% Fines (65%-80% Silt).
				2.00 /2.00	5852	41				
					5851	42				
	BH00784EBU1			2.00 /2.00	5850	43				
					5849	44			CLAYSTONE	Claystone: Dark grayish brown (2.5Y 4/2), light olive brown (2.5Y 5/3), dark gray (10YR 4/1, 5Y 4/1), gray (5Y 5/1); where Fe-oxides are concentrated, brownish yellow (10YR 6/8), yellowish brown (10YR 5/6, 10YR 5/8), dark yellowish brown (10YR 4/6). Up to approx. 15% Silt. Porosity: nil to approx. 5%, and greater where fractured Fe-oxide nodules exist (as at 44.95'). Cement is argilloceous, plus in some areas Fe-oxides (trace to some) and/or calcareous material. Non to slightly friable, slightly to mod. fissile. Fe-oxide-enriched at 44.7'-45.15', 47.5'-48.1', and to a lesser degree elsewhere and rare below 50'. Caliche present as blebs (as at 49'-49.3') and fracture fill (as at 46.8') and to lesser degrees elsewhere. Trace f.g. (cont. below)
				2.00 /2.00	5848	45				
					5847	46				
				2.00 /2.00	5846	47				
					5845	48			CLAYSTONE	(cont. from above) organics throughout, occasionally in thin, discontinuous seams and rare coal chunks (as at 53.8', above caliche clast at 53.9'). Thin, parallel laminations at 45.7'-46' in organic-rich portion; rest of unit, where core is intact, is massive and free of bedding. Fractures, healed with Fe-oxides and/or (rarely) calcareous mineralization, present in locations as drawn. Fractures occasionally lined with coally fragments (as at approx. 51.8'). Material at 48'-50' is pulverized, but pieces show Fe-oxide minerali-
	BH00785EBU1			2.00 /2.00	5844	49				
						50				

STATE PLANE COORDINATE	TOTAL DEPTH (FT): 56.00	GROUND ELEVATION (FT): 5893.08	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH: [redacted]	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: WGP/JAB	38991
EAST: [redacted]	LOCATOR NUMBER: M7	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 11/23/91	

REMARKS:

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	BLOW COUNT / INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		CL 50%	100%	2.00 /2.00	5848	45				brown (10YR 4/6). Up to approx. 15% Silt. Porosity: nil to approx. 5%, and greater where fractured Fe-oxide nodules exist (as at 44.95'). Cement is argillaceous, plus in some areas Fe-oxides (trace to some) and/or calcareous material. Non to slightly friable, slightly to mod. fissile. Fe-oxide-enriched at 44.7'-45.15', 47.5'-48.1', and to a lesser degree elsewhere and rare below 50'. Caliche present as blebs (as at 49'-49.3') and fracture fill (as at 46.8') and to lesser degrees elsewhere. Trace f.g. (cont. below)
					5847	46				
				2.00 /2.00	5846	47				
					5845	48			CLAYSTONE	(cont. from above) organics throughout, occasionally in thin, discontinuous seams and rare coal chunks (as at 53.8', above caliche clast at 53.9'). Thin, parallel laminations at 45.7'-46' in organic-rich portion; rest of unit, where core is intact, is massive and free of bedding. Fractures, healed with Fe-oxides and/or (rarely) calcareous mineralization, present in locations as drawn. Fractures occasionally lined with coally fragments (as at approx. 51.8'). Material at 48'-50' is pulverized, but pieces show Fe-oxide mineralization and this portion appears heavily fractured, though orientations are obscured. Fe-oxide-rich zone at 44.7'-45.15' shows no clear orientation of mineralized fractures. Dry. 100% Fines (85%-95% Clay).
	BH00785EBU1			2.00 /2.00	5844	49				
					5843	50				
				2.00 /2.00	5842	51				
					5841	52				
				2.00 /2.00	5840	53				
	BH00786EBU1				5839	54				
				2.00 /2.00		55				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 56.00	GROUND ELEVATION (FT):	5893.08	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747820	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	WGP/JAB	38991
EAST:	2085024	LOCATOR NUMBER: M7	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	11/23/91	

REMARKS:

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
					5843	50				zation and this portion appears heavily fractured, though orientations are obscured." Fe-oxide-rich zone at 44.7'-45.15' shows no clear orientation of mineralized fractures. Dry. 100% Fines (85%-95% Clay).
				2.00 /2.00	5842	51				
					5841	52				
				2.00 /2.00	5840	53				
	BH00786EBU1				5839	54				
				2.00 /2.00	5838	55				
					5837	56				Total Depth = 56.9 ft.
					5836	57				
					5835	58				
					5834	59				
						60				

COLOG INC

BOREHOLE GEOPHYSICS

17301 W. COLFAX, STE. 265, GOLDEN, CO 80401

PHONE: (303) 279-0171 FAX: 279-2730

CALIPER
NATURAL GAMMA
WELL: PZ-03

PROJECT: OU1 881 HILLSIDE

DATE: 22 NOVEMBER 1991

CLIENT: EBASCO

COLOG ID NO:

LOCATION: EG&G ROCKY FLATS 881 HILLSIDE

STATE: COLORADO COUNTY: JEFFERSON ELEV: DEPTH REF: GROUND

BOREHOLE DATA

DRILLING CONTRACTOR: BOYLES BROTHERS -- GOLDEN, COLORADO

CUSTOMER TD: 52' COLOG TD: 52'

RUN	BIT RECORD			CASING RECORD		
NO.	Bit Size	From	To	Size/Wgt/Thk.	From	To
1	7" AUGER	23'	TD	10" ID *	SURFACE	23'
2						
3						
4						

HOLE MEDIUM: AIR

DRILL METHOD: AUGER (MOBILE B57)

MUD TYPE: NONE

TIME SINCE CIRC:

VISCOSITY: WEIGHT: Rm: at Deg

GENERAL DATA

INSTRUMENTATION: SERIES III

UNIT/TRUCK: 3 / 451

LOGGING ENGINEER: TOM STAATZ

CLIENT REP: MR. TIMOTHY DEIGNAN, MS. KAREN MALEY -- EBASCO

OTHER SERVICES: NONE

LOGGING DATA

LOG FUNCTION	RUN NO.	EQUIPMENT			LOGGING		DETECTOR	SPACING		SOURCE		LOGGED INTERVAL		
		MODEL	PROBE S.N.	UPHOLE S.N.	DIG INT FEET	SPEED FT./MIN	TYPE	Tx-Rx FEET	Rx-Rx FEET	TYPE	SIZE CURIE	FROM	TO	INT. FEET
CALIPER	2	3 ARM	1300	466	0.1	15						50'	3.5'	46.5'
GAMMA	1	ALP-S	C003	450	0.1	15	NaI					50'	2.5'	47.5'

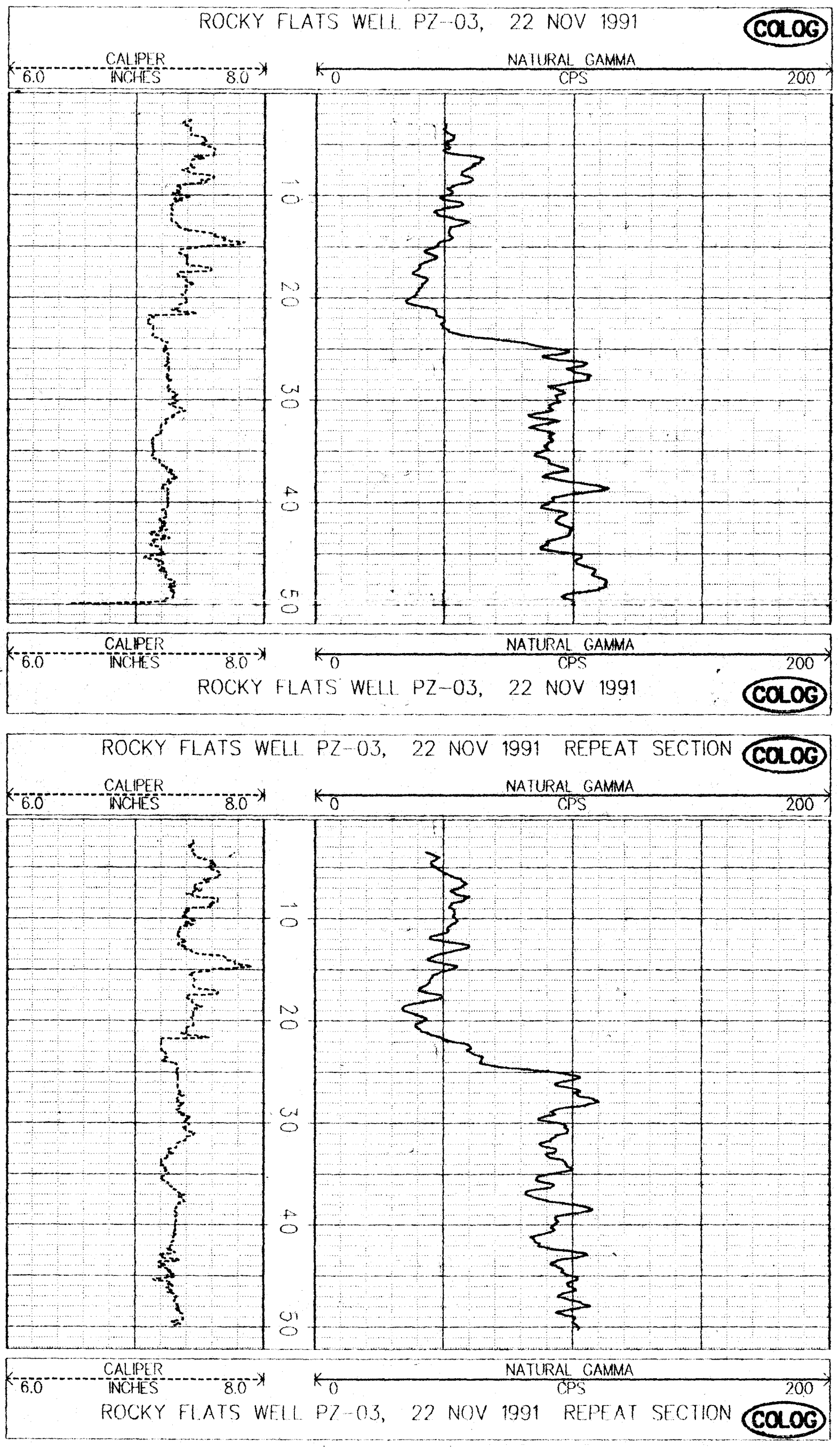
CALIBRATION FACTOR(S):

DIGITAL FILE NAME(S): PZ03.DAT, PZ03.PLP, PZ03.HDP

REMARKS:

* CUTTINGS LEFT ON THE INSIDE OF THE CASING WHEN AUGER PULLED OUT OF HOLE.

HOLE ORIGINALLY DRILLED TO 56' BUT CAVED TO 52'.


ROCKY FLATS WELL PZ-03, 22 NOV 1991
COLOG
CALIPER
6.0 INCHES 8.0
NATURAL GAMMA
0 CPS 200
10
20
30
40
50
ROCKY FLATS WELL PZ-03, 22 NOV 1991 REPEAT SECTION

COLOG INC — **BOREHOLE GEOPHYSICS**

12303 W. COLFAX, STE. 265, GOLDEN, CO 80401
PHONE: (303) 279-0171 FAX: 279-2730

CALIPER
NATURAL GAMMA
WELL: PZ-03

PROJECT: OU1 881 HILLSIDE — DATE: 22 NOVEMBER 1991
CLIENT: EBASCO — COLOG ID NO:
LOCATION: EG&G ROCKY FLATS 881 HILLSIDE
STATE: COLORADO — COUNTY: JEFFERSON — ELEV: — DEPTH REF: GROUND

BOREHOLE DATA

DRILLING CONTRACTOR: BOYLES BROTHERS — GOLDEN, COLORADO
CUSTOMER TD: 52' — COLOG TD: 52' *

RUN NO.	BIT RECORD Bit Size	From	To	CASING RECORD Size/Wgt/Thk	From	To
1	7" AUGER	2.5'	TD	10" ID *	SURFACE	2.5'
2						
3						
4						

HOLE MEDIUM: AIR — DRILL METHOD: AUGER (MOBILE B57)
MUD TYPE: NONE — TIME SINCE CIRC:
VISCOSITY: — WEIGHT: — Rm: — at — Deg

GENERAL DATA

INSTRUMENTATION: SERIES II — UNIT/TRUCK: 3 / 451
LOGGING ENGINEER: TOM STAATZ
CLIENT REP: MR. TIMOTHY DEGNAN, MS. KAREN MALEY — EBASCO
OTHER SERVICES: NONE

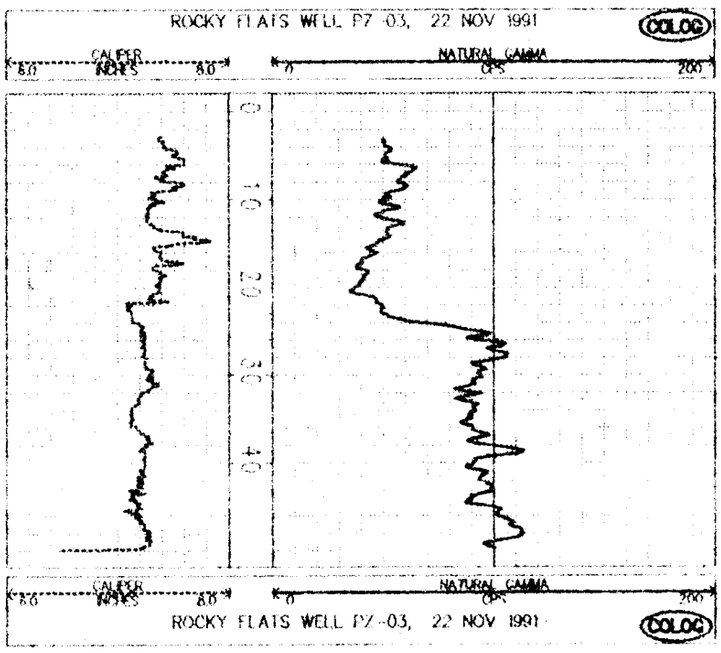
LOGGING DATA

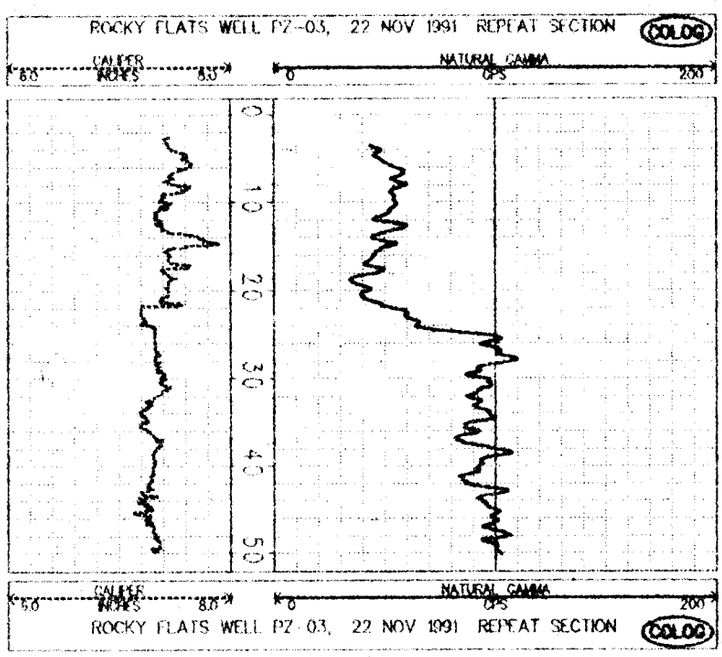
LOG FUNCTION	RUN NO.	EQUIPMENT Serial	Truck	Unit	LOGGING Out BIT FEET	Speed FT/MIN	DETECTOR Type	SPACING To-Det FEET	Det-Src FEET	SOURCE Type	Size CURIE	LOGGED INTERVAL From	To	Int FEET
CALIPER	2	3 ARM	3340	451	0.1	15						0.0'	3.5'	46.5'
GAMMA	1	ASP-15	2303	450	0.1	15	HP					0.0'	3.5'	47.5'

CALIBRATION FACTOR(S):
DIGITAL FILE NAME(S): PZ03.DAT, PZ03.PLP, PZ03.NOP
REMARKS:

* CUTTINGS LEFT ON THE INSIDE OF THE CASING WHEN AUGER PULLED OUT OF HOLE.

HOLE ORIGINALLY DRILLED TO 58' BUT CAVED TO 52'

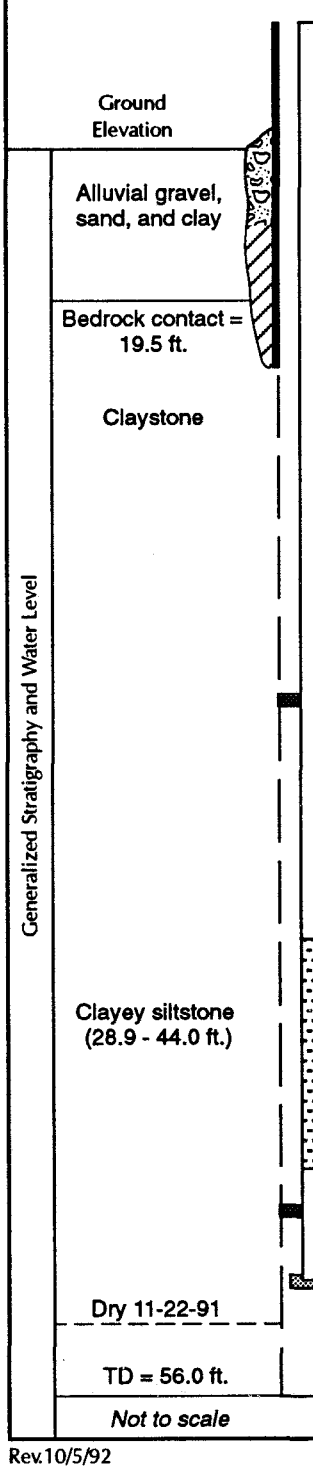




Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	747820.4241 ft.	Page	1 of 1
Location	881 Hillside	Easting	2085024.0557 ft.	Well No.	38991
Date Completed	11-23-91	Original Depth	56.0 ft.	Aquifer	Bedrock
Inspected by	C. Bieniulis	Date	11-23-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 56.0 ft.



Elevation of top of surface casing/riser pipe	5895.93 ft./5895.49 ft.
Height of top of surface casing/riser pipe above ground surface	2.85 ft./2.41 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	10.0 in.
Type of surface casing	Steel
Grout	
Depth of surface casing below ground	23.0 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	7.25 in.
Depth of borehole	56.0 ft.
Type of backfill	Grout
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	21.8 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	24.8 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	24.8 ft.
Elevation/depth top of screened section	26.8 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	36.8 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.0 ft.
Elevation/depth bottom of plugged blank section	38.8 ft.
Elevation/depth bottom of sand column	37.8 ft.
Type of backfill below observation pipe	0.25 in. bentonite pellets 37.8 to 52.3 ft.; natural 52.3 to 56.0 ft.;
Elevation/depth of hole	56.0 ft.

Rev.10/5/92

INDEX OF DATA

Borehole Location Number:	**39091**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 8.0	GROUND ELEVATION (FT):	5839.79	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747695	AREA: OU1	CASING DIAMETER (IN):		GEOLOGIST:	KMM/JAB	39091
EAST:	2085461	LOCATOR NUMBER: M7	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	11/14/91	
REMARKS:							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00753EBU1	0% 50% 100%	0% 100%			0			SM	Silty Sand with Gravel and Clay: Very dark grayish brown (10YR 3/2) to very dark brown (10YR 2/2). Gravel to 1" (average approx. 0.3"), sand v.f.g. to v.c.g. (mean=f.g.). Well graded. Gravel subangular to subrounded, sands angular to subrounded. Gravel quartzite, gneiss, schist; sand quartz with some rock fragments, traces organics (interval is rooted), mafics, feldspar, micas. Trace calcareous content. No bedding apparent. Dry. 15%-20% Gravel, 40%-45% Sand, 40% Fines (approx. 22%-25% Silt).
				0.50 /2.00	5839	1				
					5838	2				Geotechnical samples obtained from this interval.
										No recovery for this interval.
	BH00755EBU1			1.20 /2.00	5837	3			SM	Gravelly Sand with Silt and Clay: Brown/dark brown (10YR 5/3, 10YR 4/3, 10YR 3/3). Gravel to 1.5" (average approx. 0.3"-0.5"), sand v.f.g. to v.c.g. (mean=m.g. to c.g.). Well graded. Subangular to subrounded. Gravel quartzite, schist, gneiss; sand quartz, some rock fragments, trace mica, mafics, organics. Trace calcareous content above 2.6'. No bedding apparent. Interval is saturated below 2.6', causing material below this depth to flow and conform to core box shape, perhaps obscuring any bedding which may have existed. 20%-35% Gravel, 40%-52% Sand, 20%-30% Fines (15%-20% Silt).
					5836	4				
										No recovery for this interval.
									SM	Same as above.
				2.00 /2.00	5835	5			SILTY CLAYSTONE	Silty Claystone: Gray (5Y 6/1, 5Y 5/1) to light olive brown (2.5Y 5/3, 2.5Y 5/4) to (where richest in Fe-oxides) yellowish brown (10YR 5/6, 10YR 5/8) and dark yellowish brown (10YR 4/6). 75%-100% Clay. Occasional concretions, including Fe-stone (not fully lithified, as at 6.1') and calcareous concretions (as at 7.2', where a concretion of this type is 1" diameter). Porosity=nil to approx. 15%. Cement: argillaceous; traces to some Fe-oxides and calcareous cements also present in Fe-oxide-colored areas for the former and whitish caliche blebs and streaks for the latter). Non to slightly friable and fissile. Trace organics also present. Color banding and siltier zones are present in discontinuous, apparently random fashion -- no true bedding nor clear fractures present. 100% Fines (75%-100% Clay). Top of bedrock = 6.0'
					5834	6				
	BH00757EBU1			1.75 /2.00	5833	7				
	BH00756EBU1				5832	8				No recovery for this interval.
										VOA sample obtained from this interval.
					5831	9				Total Depth = 8.0 ft.
					5830	10				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**39191**
Piezometer Location Number:	N/A

Data Available:

- ✔ Geologic Borehole Log (LOGGER Format)
- ✔ Geophysical Log
- ✔ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 46 5	GROUND ELEVATION (FT) 5916 16	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748009	AREA OU1	CASING DIAMETER (IN) 2 07	GEOLOGIST KMM/JAB	39191
EAST	2084921	LOCATOR NUMBER 19	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 12/09/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH0076BEBU1	0% 50% 100%	0% 100%		5916	0			ML	Sandy, Clayey Silt with trace Gravel Very dark brown (10YR 2/2) Gravel (approx 5% of bulk) up to 1", sand v f g to v c g (mean=m g) Poorly graded Subangular to subrounded Low plasticity Gravel quartzite, schist, gneiss Sand quartz, some rock fragments, traces Fe-oxides, mafics, mica, organics (interval is rooted) No bedding apparent Dry Trace Gravel, 19%-23% Sand, 76%-82% Fines (more silt than clay)
				1 60 /2 00	5915	1				No recovery for this interval
					5914	2			CL	Clay with Silt, trace Sand From 2 0'-3 0', brown (10YR 5/3), from 4 0'- 6 6', light yellowish brown (2 5Y 6/3) with mottled light gray (2 5Y 7/2), light brownish gray (2 5Y 6/2), and (with increased Fe content) olive yellow (2 5Y 6/6), below 6 6', light brownish gray (2 5Y 6/2, 10YR 6/2) and grayish brown (2 5Y 5/2) with Fe-oxide-rich areas to olive yellow (2 5Y 6/6) Very rare gravels (granule to pebble-sized, <0 4"), and scattered traces of v f g to m g sand, sand plus gravel make up much less than 1% of bulk, with sand more common than gravel Poorly graded Gravel, sand subangular to subrounded Medium plasticity Trace organics Sand quartz, trace to some Fe-oxides, traces rock fragments, mafics, micas Calcareous (caliche blebs and disseminated), (cont below)
	BH0076CEBU1 0076TEBU1			1 00 /2 00	5913	3				
					5912	4				
										Geotechnical samples obtained from this interval
				1 75 /2 00	5911	5				No recovery for this interval
									CL	Same as above
					5910	6			CL	(cont from above) blebs most concentrated at 2 0'-3 0', less so (rare) from 4 0'-5 75', and almost nonexistent from 6 0' to 7 1' Disseminated calcareous content also decreases with depth No bedding apparent Entire interval, perhaps excepting 2 0'-3 0' portion, looks like bedrock with a miniscule amount of gravel and sand, therefore, accurate location of bedrock contact is difficult, and is only approximated here (based on color and lack of sand content) Dry Trace sand, >99% Fines (up to approx 20% Silt)
				2 00 /2 00	5909	7				No recovery for this interval
									CL	Same as above
					5908	8			CLAYSTONE	Claystone Grayish brown (2 5Y 5/2) and light brownish gray (2 5Y 6/2, 10YR 6/2) to 8 5', from 8 5' down, colors are light gray (5Y 7/1 to 2 5Y 7/2) to light brownish gray (2 5Y 6/2), Fe-rich patches from 8 9'-9 4' includes olive yellow (2 5Y 6/6), yellowish brown (10YR 5/4, 10YR 5/6, 10YR 5/8) 90%-100% Clay, balance silt Porosity=nil to approx 5% Cement argillaceous, plus accasional traces calcareous cement (and rare caliche blebs) and trace to some Fe-oxides (richest at 8 9' 9 4') Non friable, slightly fissile Trace organics, Fe-oxides (abundant Fe-oxides at 8 9'-9 4') No bedding apparent Dry Top of bedrock = 7 1'
	BH0076TEBU1			2 50 /2 50	5907	9				
						10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 46 5	GROUND ELEVATION (FT) 5916 16	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748009	AREA OU1	CASING DIAMETER (IN) 2 07	GEOLOGIST KMM/JAB	39191
EAST	2084921	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 12/09/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%	1 75 /2 00	5911	5			CL	(cont from above) blebs most concentrated at 2 0'-3 0', less so (rare) from 4 0'-5 75', and almost nonexistent from 6 0' to 7 1' Disseminated calcareous content also decreases with depth No bedding apparent Entire interval, perhaps excepting 2 0'-3 0' portion, looks like bedrock with a miniscule amount of gravel and sand, therefore, accurate location of bedrock contact is difficult, and is only approximated here (based on color and lack of sand content) Dry Trace sand, >99% Fines (up to approx 20% Silt)
					5910	6				
				2 00 /2 00	5909	7				No recovery for this interval
									CL	Same as above
					5908	8			CLAYSTONE	Claystone Grayish brown (2 5Y 5/2) and light brownish gray (2 5Y 6/2, 10YR 6/2) to 8 5', from 8 5' down, colors are light gray (5Y 7/1 to 2 5Y 7/2) to light brownish gray (2 5Y 6/2). Fe-rich patches from 8 9'-9 4' includes olive yellow (2 5Y 6/6), yellowish brown (10YR 5/4, 10YR 5/6, 10YR 5/8) 90%-100% Clay, balance silt Porosity nil to approx 5% Cement argillaceous, plus occasional traces calcareous cement (and rare caliche blebs) and trace to some Fe-oxides (richest at 8 9'-9 4') Non friable, slightly fissile Trace organics, Fe-oxides (abundant Fe-oxides at 8 9'-9 4') No bedding apparent Dry Top of bedrock = 7 1'
	BH00767EBU1			2 50 /2 50	5907	9				
					5906	10				
	BH00764EBU1									VOA obtained from this interval
									CLAYSTONE	Same as above
				0 70 /1 50	5905	11			SILTY CLAYSTONE	Silty Claystone Light brownish gray (10YR 6/2) to grayish brown (10YR 5/2) to gray (10YR 5/1) Trace (0%-3%) v f g to f g, subangular to subrounded, quartz sand, 20%-45% Silt, balance Clay Porosity approx 10%-30% Cement argillaceous, plus trace calcareous above 11 2' and some calcareous below 12 0' Slightly friable, slightly to mod fissile Trace Fe-oxide grains, trace organics Wood chips and fibers at 12 0'-12 1 are imported from surface No bedding apparent Dry 0%-3% Sand, 97%-100% Fines
	00766EBU1				5904	12				
				1 50 /1 50						Geotechnical samples obtained from this interval
					5903	13				No recovery for this interval
									SILTY CLAYSTONE	Same as above
					5902	14			CLAYEY SILTSTONE	Clayey Siltstone with trace Sand 12 2' to approx 13 0', light brownish gray (2 5Y 6/2 to 10YR 6/2) to grayish brown (2 5Y 5/2), from approx 13 0' to approx 14 4', unit is heavily Fe-stained and rich in Fe-oxides, and is strong brown (7 5YR 5/6, 7 5 YR 5/8, 7 5YR 4/6) to yellowish brown (10YR 5/6, 10YR 5/8) to dark brown (especially prevalent at 13 1'-13 3') (7 5YR 3/3, 7 5YR 3/4) Sand is v f g, angular to subrounded Porosity approx 25%-35% Cement mainly argillaceous above approx 13 0', below 13 0', Fe-oxide cement
	BH00769EBU1			2 00 /2 00						
						15				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 46 5	GROUND ELEVATION (FT)	5916 16	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748009	AREA 001	CASING DIAMETER (IN)	2 07	GEOLOGIST	KMM/JAB	39191
EAST	2084921	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	12/09/91	

REMARKS

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT) / DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00764B01				5906				VOA obtained from this interval
								CLAYSTONE	Same as above
				0 70 / 1 50	5905			SILTY CLAYSTONE	Silty Claystone Light brownish gray (10YR 6/2) to grayish brown (10YR 5/2) to gray (10YR 5/1) Trace (0%-3%) v f g to f g, subangular to subrounded, quartz sand, 20%-45% Silt, balance Clay Porosity approx 10%-30% Cement argillaceous, plus trace calcareous above 11 2' and some calcareous below 12 0' Slightly friable, slightly to mod fissile Trace Fe-oxide grains, trace organics Wood chips and fibers at 12 0'-12 1 are imported from surface No bedding apparent Dry 0%-3% Sand, 97%-100% Fines
	00766B01				5904				Geotechnical samples obtained from this interval
				1 50 / 1 50					No recovery for this interval
					5903			SILTY CLAYSTONE	Same as above
					5902			CLAYEY SILTSTONE	Clayey Siltstone with trace Sand 12 2' to approx 13 0', light brownish gray (2 5Y 6/2 to 10YR 6/2) to grayish brown (2 5Y 5/2), from approx 13 0' to approx 14 4', unit is heavily Fe-stained and rich in Fe-oxides, and is strong brown (7 5YR 5/6, 7 5 YR 5/8, 7 5YR 4/6) to yellowish brown (10YR 5/6, 10YR 5/8) to dark brown (especially prevalent at 13 1'-13 3') (7 5YR 3/3, 7 5YR 3/4) Sand is v f g, angular to subrounded Porosity approx 25%-35% Cement mainly argillaceous above approx 13 0', below 13 0', Fe-oxide cement is abundant, trace calcareous cement above 13 5', and significantly enriched below 13 5' (Fe-carbonates may be present) Slightly to mod friable, mod to very fissile (more fissile above 13 5' and between 13 6'-13 9') Sand is quartz (Fe-stained below 13 0') with trace to some Fe-oxide grains, trace (cont below)
	BH00769B01			2 00 / 2 00					
					5901				
					5900				
				2 00 / 2 00				CLAYEY SILTSTONE	(cont from above) traces mafics, mica, organics No bedding apparent, although core is fissile and chippy/flakey in subhorizontal direction perhaps related to bedding that is otherwise not visible Dry 3%-6% Sand, 60%-85% Silt, balance Clay
					5899			CLAYSTONE	Claystone with Silt Light olive brown (2 5Y 5/4), light yellowish brown (2 5Y 6/3, 2 5Y 6/4), and light brownish gray (2 5Y 6/2) 10%-20% Silt Porosity approx 5%-10% Cement argillaceous plus traces calcareous and Fe-oxides Non-friable, slightly fissile Trace organics Color banding, which is wavy, indistinct, and discontinuous, may represent soft-sediment deformation of laminae Hairline fractures present throughout, healed with Fe-oxides Dry 100% Fines (approx 80%-90% Clay)
				2 00 / 2 00	5898				
					5897			CLAYEY SILTSTONE	Clayey Siltstone with trace Sand Light brownish gray (2 5Y 6/2) to light yellowish brown (2 5Y 6/3) Trace (0%-3%) v f g, angular to subrounded, quartz sand, approx 25%-40% Clay, balance silt Porosity approx 15%-30% Cement argil-
				1 80 / 0 50					

10 11 12 13 14 15 16 17 18 19 20

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 46.5	GROUND ELEVATION (FT): 5916.16	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	748009	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: KMM/JAB	39191
EAST:	2084921	LOCATOR NUMBER: L8	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 12/09/91	

REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2.00 /2.00	5901	15				
					5900	16				
					5899	17			CLAYSTONE	Claystone with Silt: Light olive brown (2.5Y 5/4), light yellowish brown (2.5Y 6/3, 2.5Y 6/4), and light brownish gray (2.5Y 6/2). 10%-20% Silt. Porosity approx. 5%-10%. Cement: argillaceous plus traces calcareous and Fe-oxides. Non-friable, slightly fissile. Trace organics. Color banding, which is wavy, indistinct, and discontinuous, may represent soft-sediment deformation of laminae. Hairline fractures present throughout, healed with Fe-oxides. Dry. 100% Fines (approx. 80%-90% Clay)
				2.00 /2.00	5898	18				
					5897	19			CLAYEY SILTSTONE	Clayey Siltstone with trace Sand: Light brownish gray (2.5Y 6/2) to light yellowish brown (2.5Y 6/3). Trace (0%-3%) v.f.g., angular to subrounded, quartz sand; approx. 25%-40% Clay, balance silt. Porosity approx. 15%-30%. Cement: argillaceous, with trace calcareous and Fe-oxide; caliche and Fe-oxides present as fracture-fill; Fe-carbonates may also be present. Slightly to mod. friable, slightly to very fissile. Scattered traces organics. Hairline fractures and thicker, less-common caliche-filled fractures present throughout. Below 16.2', thin to med., straight to wavy/disturbed, vague to distinct laminations present; no evidence of cross-bedding present although soft-sediment deformation is seen in places. 16.6'-16.85' is richest in clay (approx. 60%). Dry. 0-3% Sand, 97-100% Fines (60-75% Silt)
				1.80 /0.50	5896	20				
	BH00770EBU1			1.70 /1.50	5895	21				
				1.70 /2.00	5894	22			CLAYSTONE	Claystone with varying amounts of Silt: Light olive brown (2.5Y 5/3), grayish brown (2.5Y 5/2), dark gray (10YR 4/1), dark grayish brown (10YR 4/2), and very dark grayish brown (10YR 3/2), with first 2 colors predominating. Up to approx. 20% Silt, except at 19.5'-approx. 19.75' (up to approx. 30% Silt). Porosity: nil to approx. 12%, highest where varves are present. Cement: argillaceous, plus occasional traces calcareous and Fe-oxides (especially notable as fracture-filling, usually by Fe-oxides). Non to slightly friable, slightly to very fissile. Trace organics. Laminated (mainly varves) at 18.7'-19.3', 22.4'-23.2', 24.3'-25.2', 28.5'-29.1', 30.0'-30.8'; however, heavily damaged condition of core in many places prohibits identification of any bedding (as at 17.5'-18.1', 19.5'-19.9', 21.5'-22.0', 23.5'-24.2', 27.4'-28.2'. (cont below)
				1.70 /2.00	5893	23				
					5892	24				Core retained in VOA sleeve
						25				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 46 5	GROUND ELEVATION (FT)	5916 16	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748009	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	KMM/JAB	39191
EAST	2084921	LOCATOR NUMBER L8	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	12/09/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%							
	BH0770EBU1			1 70 /1 50	5896	20				
					5895	21				
				1 70 /2 00	5894	22				
					5893	23				
				1 70 /2 00	5892	24				
					5891	25			CLAYSTONE	Same as above
										Core retained in VOA sleeve
									CLAYSTONE	Same as above
										No recovery for this interval
									CLAYSTONE	Same as above
										No recovery for this interval
	BH0771EBU1			2 00 /2 00	5890	26			CLAYSTONE	(cont from above) 29 5'-29 9', 31 5'-31 8', and 33 0'-33 5') Fractures are sub-horiz (as drawn), from 24 3' to 25 2', Fe-oxides are mixed with clay and may be the result of fracturing or water seepage Dry 100% Fines (80%-95% Clay)
					5889	27				
				1 60 /2 00	5888	28				
					5887	29				No recovery for this interval
									CLAYSTONE	Same as above
						30				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 46 5	GROUND ELEVATION (FT)	5916 16	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748009	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	KMM/JAB	39191
EAST	2084921	LOCATION NUMBER 18	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	12/09/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%			25				
					5891				CLAYSTONE	Same as above
						26				No recovery for this interval
	BH00771EBU1			2 00 /2 00	5890				CLAYSTONE	(cont from above) 29 5'-29 9', 31 5'-31 8', and 33 0'-33 5') Fractures are sub-horiz (as drawn), from 24 3' to 25 2', Fe-oxides are mixed with clay and may be the result of fracturing or water seepage Dry 100% Fines (80%-95% Clay)
					5889	27				
				1 60 /2 00	5888	28				
					5887	29				No recovery for this interval
									CLAYSTONE	Same as above
				1 30 /2 00	5886	30				
										No recovery for this interval
					5885	31			CLAYSTONE	Same as above
									CLAYEY SILTSTONE	Clayey Siltstone with organics Very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), dark brown (2 5YR 3/2), and brown (10YR 4/3), with chips and clots of coal that are black (N1) Sand, 1%-3%, is v f g, subangular to subrounded, 65% 75% Silt, balance clay Porosity approx 15%-30% Cement argillaceous and probably some Mn/Fe-oxides also Slightly to mod friable, slightly to very fissile Sand is quartz, traces Fe-oxides, mica, mafics, organics present throughout, being most abundant at 34 8'-34 9' where coal pocket is present Interval is thinly bedded at 34 9'-35 5' laminations between 34 9'-35 25' show soft-sediment deformation and possible bioturbation (the latter is not clear), deformation present to a lesser degree below 35 25' and slightly thicker (to 0 25") laminae (cont)
					5884	32				
	BH00772EBU1			2 00 /2 00						
					5883	33				
					5882	34			CLAYEY SILTSTONE	(cont from above) are the norm Fe-oxides replace organics, no clear evidence of fracturing rather than replacement as a source of Fe Dry 1%-3% Sand, 97%-99% Fines (65%-75% Silt)
				2 00 /2 00						
						35				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 46 5	GROUND ELEVATION (FT)	5916 16	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748009	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	KMM/JAB	39191
EAST	2084921	LOCATOR NUMBER 18	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	12/09/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50% 100%	0% 100%							
				1 30 /2 00	5886	30				No recovery for this interval
									CLAYSTONE	Same as above
					5885	31			CLAYEY SILISTONE	Clayey Siltstone with organics Very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), dark brown (2 5YR 3/2), and brown (10YR 4/3), with chips and clots of coal that are black (N1) Sand, 1%-3%, is v f g , subangular to subrounded, 65%-75% Silt, balance clay Porosity approx 15%-30% Cement argillaceous and probably some Mn/Fe-oxides also Slightly to mod friable, slightly to very fissile Sand is quartz, traces Fe-oxides, mica, mafics, organics present throughout, being most abundant at 34 8'-34 9' where coal pocket is present Interval is thinly bedded at 34 9'-35 5' laminations between 34 9'-35 25' show soft-sediment deformation and possible bioturbation (the latter is not clear), deformation present to a lesser degree below 35 25' and slightly thicker (to 0 25") laminae (cont)
	BH00772EBU1			2 00 /2 00	5884	32				
					5883	33				
					5882	34			CLAYEY SILISTONE	(cont from above) are the norm Fe-oxides replace organics, no clear evidence of fracturing rather than replacement as a source of Fe Dry 1%-3% Sand, 97%-99% Fines (65%-75% Silt)
				2 00 /2 00					CLAYSTONE	Claystone with Silt Dark grayish brown (2 5Y 4/2) with silty pockets that are light yellowish brown (2 5Y 6/3) to light olive brown (2 5Y 5/3) and Fe-oxide-rich areas to yellowish brown (10YR 5/6, 10YR 5/8) and dark yellowish brown (10YR 4/6) 15%-20% Silt, balance Clay Porosity approx 3%-5%, with silty pockets (rare above approx 36 6', increasing below approx 36 6') having porosity approx 20%-30% Cement is argillaceous, trace to some Fe-oxides (especially rich at 36 5'-36 6' and 37 1' into underlying unit) Non to slightly friable, slightly to mod fissile Scattered traces organics No true bedding apparent Fe-oxide-healed fractures evident at 36 0', 36 3', 36 6'-36 9', and 37 2' Dry 100% Fines (80%-85% Clay)
					5881	35				
					5880	36				
				2 00 /2 00						
					5879	37			SILISTONE	Siltstone with Clay Light olive brown (2 5Y 5/3, 2 5Y 5/4, 2 5Y 5/6) to olive brown (2 5Y 4/3), with increased Fe-oxides, to dark yellowish brown (10YR 4/6) and strong brown (7 5YR 4/6) Trace v f g , subangular to subrounded sand, 80%-85% Silt, balance Clay Porosity approx 25%-35% Cement argillaceous, trace calcareous (strongest at 40 0'-approx 40 5', 41 5'-42 0'), Fe-oxides (most notable at 38 2'-38 5', 40 0'-40 5') Slightly to mod friable, mod to very fissile Sand is quartz, traces Fe-oxides, mafics, micas Scattered traces organics Bedding is disrupted, discontinuous, exhibiting soft-sediment deformation with clayey varves and laminae and silt pockets to massive silt zones Some areas (especially approx 41 0'- 43 0') too broken to determine bedding Unit is more clay-rich (cont
					5878	38				
	BH00773EBU1			2 00 /2 00						
					5877	39				
	BH00776LBU1					40				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 46.5	GROUND ELEVATION (FT)	5916.16	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748009	AREA OU1	CASING DIAMETER (IN)	2.07	GEOLOGIST	KMM/JAB	39191
EAST	2084921	LOCATOR NUMBER 18	BOREHOLE DIAMETER (IN)	7.25	DATE DRILLED	12/09/91	
REMARKS							

CHEMICAL SAMPLE DEPTH
GEOTECHNICAL SAMPLE DEPTH

SAMPLE NUMBER: B40077DB01, B40077EB01, B40077FB01, 0077GB01

SAMPLE GRAIN SIZE: 0% 50% 100%

PERCENT RECOVERY: 0% 100%

RECOVERY/INTERVAL: 2.00/2.00; 2.00/2.00; 2.00/2.00; 0.50/1.00; 1.70/2.00

DATUM (FT): 5881, 5880, 5879, 5878, 5877, 5876, 5875, 5874, 5873, 5872

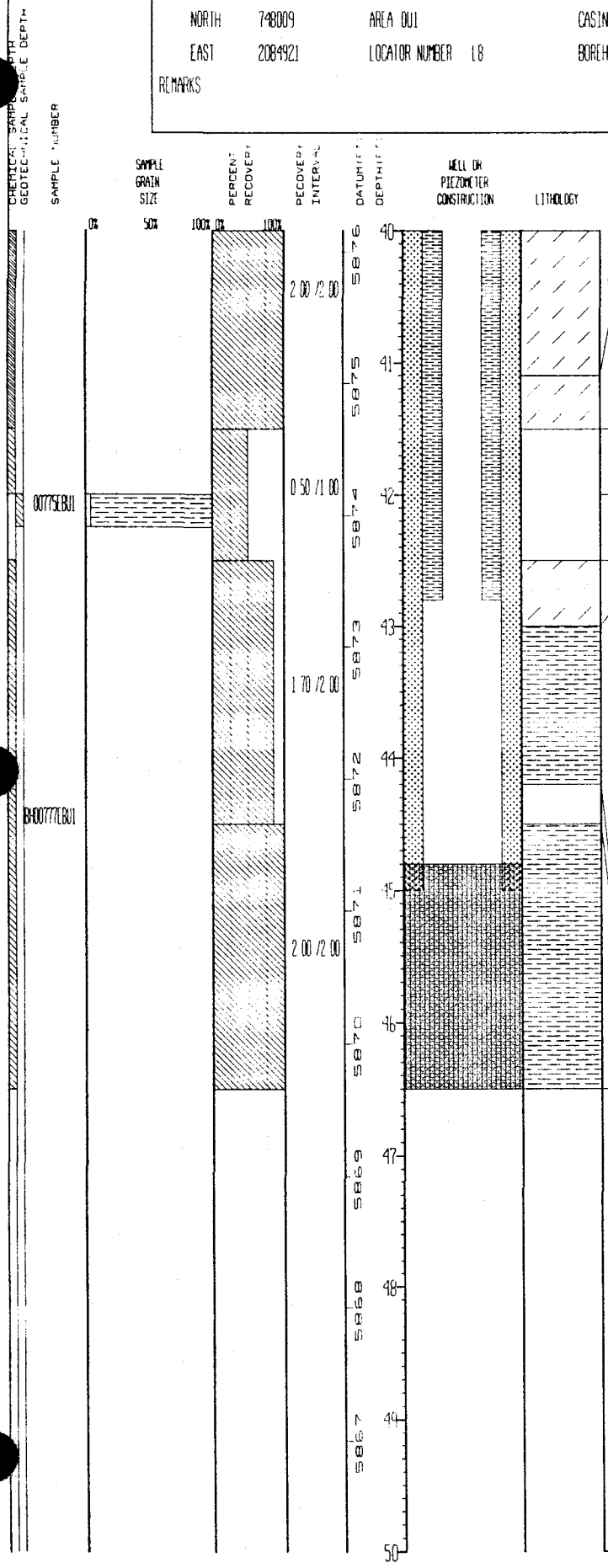
DEPTH (FT): 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45

WELL OR PIEZOMETER CONSTRUCTION

LITHOLOGY

UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	light olive brown (2.5Y 5/3) and Fe-oxide-rich areas to yellowish brown (10YR 5/6, 10YR 5/8) and dark yellowish brown (10YR 4/6). 15%-20% Silt, balance Clay. Porosity approx. 3%-5%, with silty pockets (rare above approx. 36.6', increasing below approx. 36.6') having porosity approx. 20%-30%. Cement is argillaceous, trace to some Fe-oxides (especially rich at 36.5'-36.6' and 37.1' into underlying unit). Non to slightly friable, slightly to mod. fissile. Scattered traces organics. No true bedding apparent. Fe-oxide-healed fractures evident at 36.0', 36.3', 36.6'-36.9', and 37.2'. Dry. 100% Fines (80%-85% Clay).
SILTSTONE	Siltstone with Clay. Light olive brown (2.5Y 5/3, 2.5Y 5/4, 2.5Y 5/6) to olive brown (2.5Y 4/3), with increased Fe-oxides, to dark yellowish brown (10YR 4/6) and strong brown (7.5YR 4/6). Trace v.f.g., subangular to subrounded sand, 80%-85% Silt, balance Clay. Porosity approx. 25%-35%. Cement: argillaceous, trace calcareous (strongest at 40.0'-approx. 40.5', 41.5'-42.0'), Fe-oxides (most notable at 38.2'-38.5', 40.0'-40.5'). Slightly to mod. friable, mod. to very fissile. Sand is quartz, traces Fe-oxides, mafics, micas. Scattered traces organics. Bedding is disrupted, discontinuous, exhibiting soft-sediment deformation with clayey varves and laminae and silt pockets to massive silt zones. Some areas (especially approx. 41.0'-43.0') too broken to determine bedding. Unit is more clay-rich (cont. below)
SILTSTONE	(cont. from above) (to clayey siltstone and silty claystone) from 42.5'-43.0', this portion of unit also contains calcareous material. Some of the intensely deformed portions may be brecciated or bioturbated, although obvious signs of these processes (e.g., slickensides, infilled burrows) are not visible. Dry. 1%-2% Sand, 98%-99% Fines (80%-85% Silt).
	No recovery for this interval
	Geotechnical samples obtained from this interval
SILTSTONE	Same as above
CLAYSTONE	Claystone with Silt. Light olive brown (2.5Y 5/3) to grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2) with occasional Fe-oxide-rich laminae which are yellowish brown (10YR 5/6, 10YR 5/8) to dark yellowish brown (10YR 4/6). 10%-20% Silt. Porosity approx. 4%-8%. Cement: argillaceous, traces Fe-oxides and calcareous cements; calcareous content generally corresponds to location of Fe-oxides, so Fe-carbonates may also be present. Non to slightly friable, slightly to very fissile (most fissile at top, 43.0'-43.25'). Trace organics, generally as specks and chips of

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 46 5	GROUND ELEVATION (FT)	5916 16	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748009	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	KMM/JAB	39191
EAST	2084921	LOCATOR NUMBER 18	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	12/09/91	
REMARKS							



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	below)
SILTSTONE	(cont from above) (to clayey siltstone and silty claystone) from 42 5'-43 0', this portion of unit also contains calcareous material Some of the intensely deformed portions may be brecciated or bioturbated, although obvious signs of these processes (e g , slickensides, infilled burrows) are not visible Dry 1%-2% Sand, 98%-99% Fines (80%-85% Silt)
	No recovery for this interval
	Geotechnical samples obtained from this interval
SILTSTONE	Same as above
CLAYSTONE	Claystone with Silt Light olive brown (2 5Y 5/3) to grayish brown (2 5Y 5/2) and dark grayish brown (2 5Y 4/2) with occasional Fe-oxide-rich laminae which are yellowish brown (10YR 5/6, 10YR 5/8) to dark yellowish brown (10YR 4/6) 10% -20% Silt Porosity approx 4%-8% Cement argillaceous, traces Fe-oxides and calcareous cements, calcareous content generally corresponds to location of Fe-oxides, so Fe-carbonates may also be present Non to slightly friable, slightly to very fissile (most fissile at top, 43 0'-43 25') Trace organics, generally as specks and chips of coal, most notable at 43 0'-43 2' Thin to med , slightly wavy laminations oriented subhorizontally Fe-oxides are present along/within bedding planes and do not seem to be healing fractures Dry
	No recovery for this interval
CLAYSTONE	Same as above
	Total Depth = 46 5 ft

COLOG INC

BOREHOLE GEOPHYSICS

17301 W. COLFAX, STE. 265, GOLDEN, CO 80401
PHONE: (303) 279-0171 FAX: 279-2730

CALIPER
NATURAL GAMMA
WELL: 39191

PROJECT: OU1 881 HILLSIDE — DATE: 04 DECEMBER 1991

CLIENT: EBASCO — COLOG ID NO.:

LOCATION: EG&G ROCKY FLATS 881 HILLSIDE

STATE: COLORADO — COUNTY: JEFFERSON — ELEV: — DEPTH REF: GROUND

BOREHOLE DATA

DRILLING CONTRACTOR: BOYLES BROTHERS – GOLDEN, COLORADO

CUSTOMER TD: 42' — COLOG TD: 43'

RUN	BIT RECORD			CASING RECORD		
NO.	Bit Size	From	To	Size/Wgt/Thk.	From	To
1	7" AUGER	13'	54'	10" ID *	SURFACE	13'
2						
3						
4						

HOLE MEDIUM: AIR # — DRILL METHOD: AUGER (MOBILE B57)

MUD TYPE: NONE — TIME SINCE CIRC:

VISCOSITY: — WEIGHT: — Rm: — at — Deg

GENERAL DATA

INSTRUMENTATION: SERIES III — UNIT / TRUCK: 3 / 451

LOGGING ENGINEER: TOM STAATZ

CLIENT REP: MR. TIMOTHY DEIGNAN – EBASCO

OTHER SERVICES: NONE

LOGGING DATA

LOG FUNCTION	RUN NO.	EQUIPMENT MODEL	PROBE S.N.	UPHOLE S.N.	LOGGING DIGITIZ FEET	SPEED FT./MIN	DETECTOR TYPE	SPACING Tx-Rx FEET	Rx-Rx FEET	SOURCE TYPE	SIZE CURIE	LOGGED INTERVAL FROM	TO	INT. FEET
CALIPER	1	3 ARM	1300	466	0.1	15						42'	3'	39
GAMMA	2	ALP-S	C003	450	0.1	15	NaI					42'	3.5'	38.5'

CALIBRATION FACTOR(S):

DIGITAL FILE NAME(S): 39191.DAT, 39191.PLP, 39191.HDP

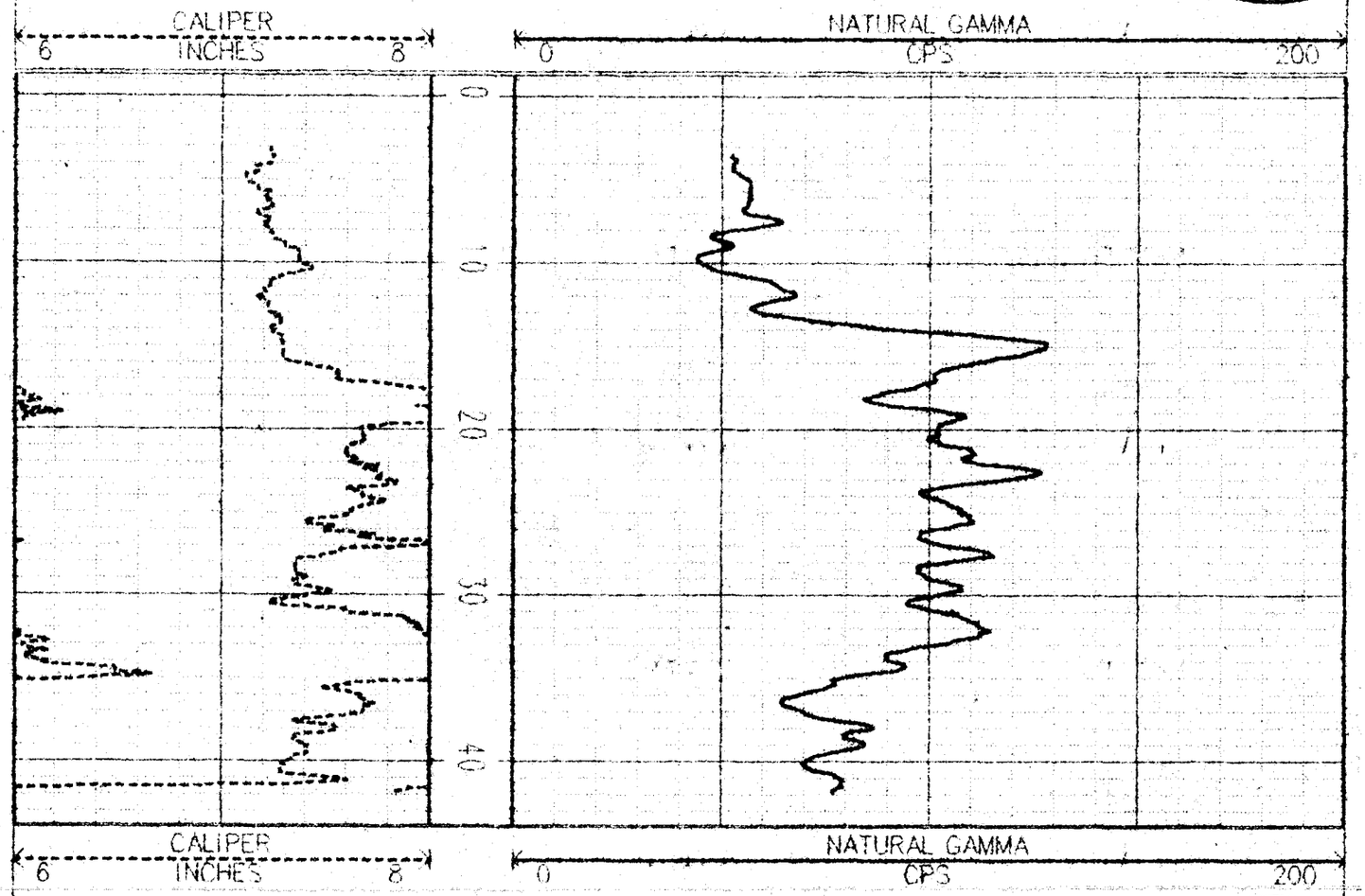
REMARKS:

* CUTTINGS LEFT ON THE INSIDE OF THE CASING WHEN AUGER PULLED OUT OF HOLE.

POSSIBLE FLUID IN THE HOLE. DRILLERS NOTED INCREASING MOISTURE STARTING @ 20 FEET. HOLE WAS MUDDY AND MAY OR MAY NOT HAVE BEEN FLUID FILLED.

ROCKY FLATS WELL 39191, 02 DEC 1991

COLOG

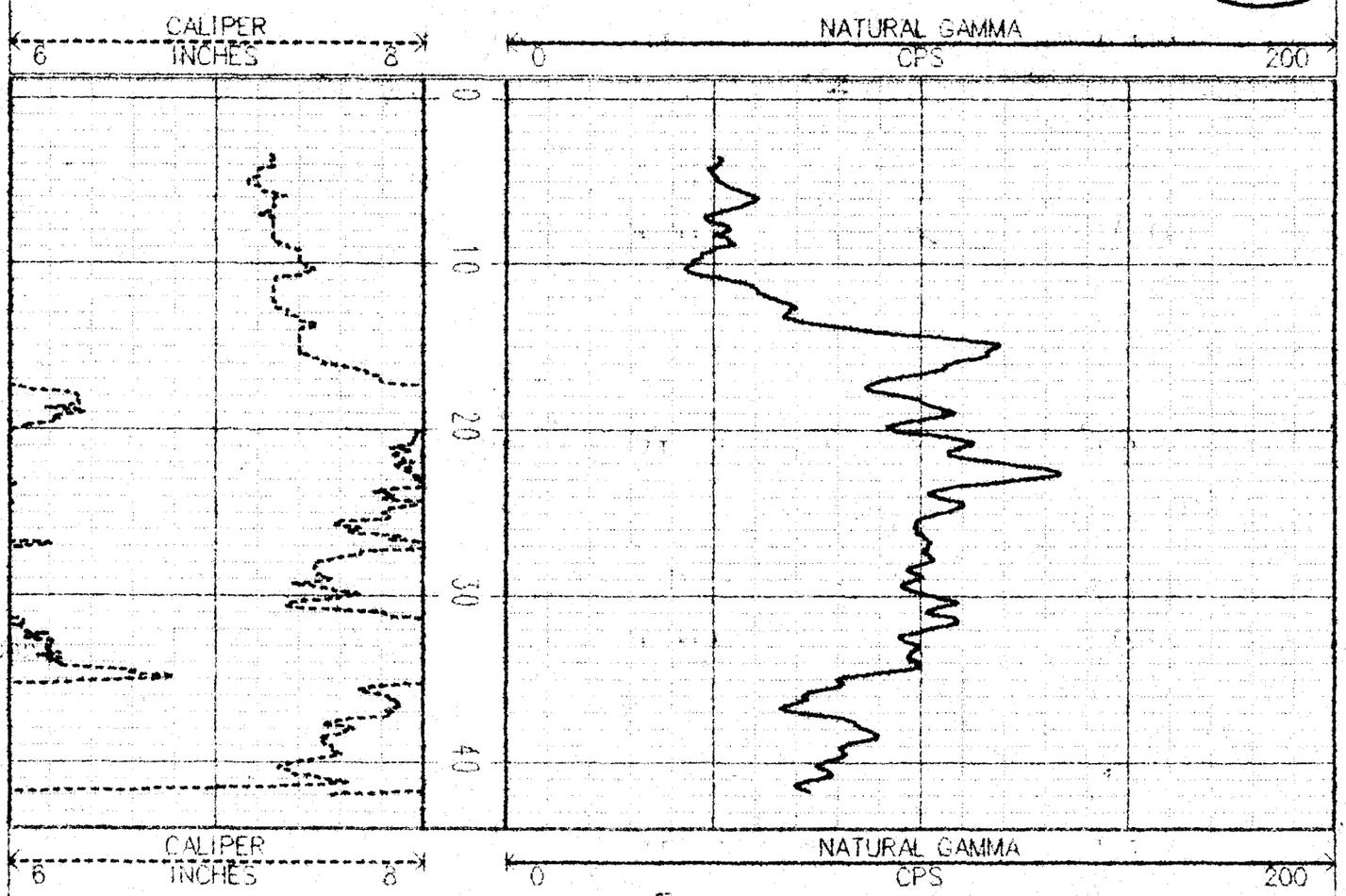


ROCKY FLATS WELL 39191, 02 DEC 1991

COLOG

ROCKY FLATS WELL 39191, 04 DEC 1991 REPEAT

COLOG



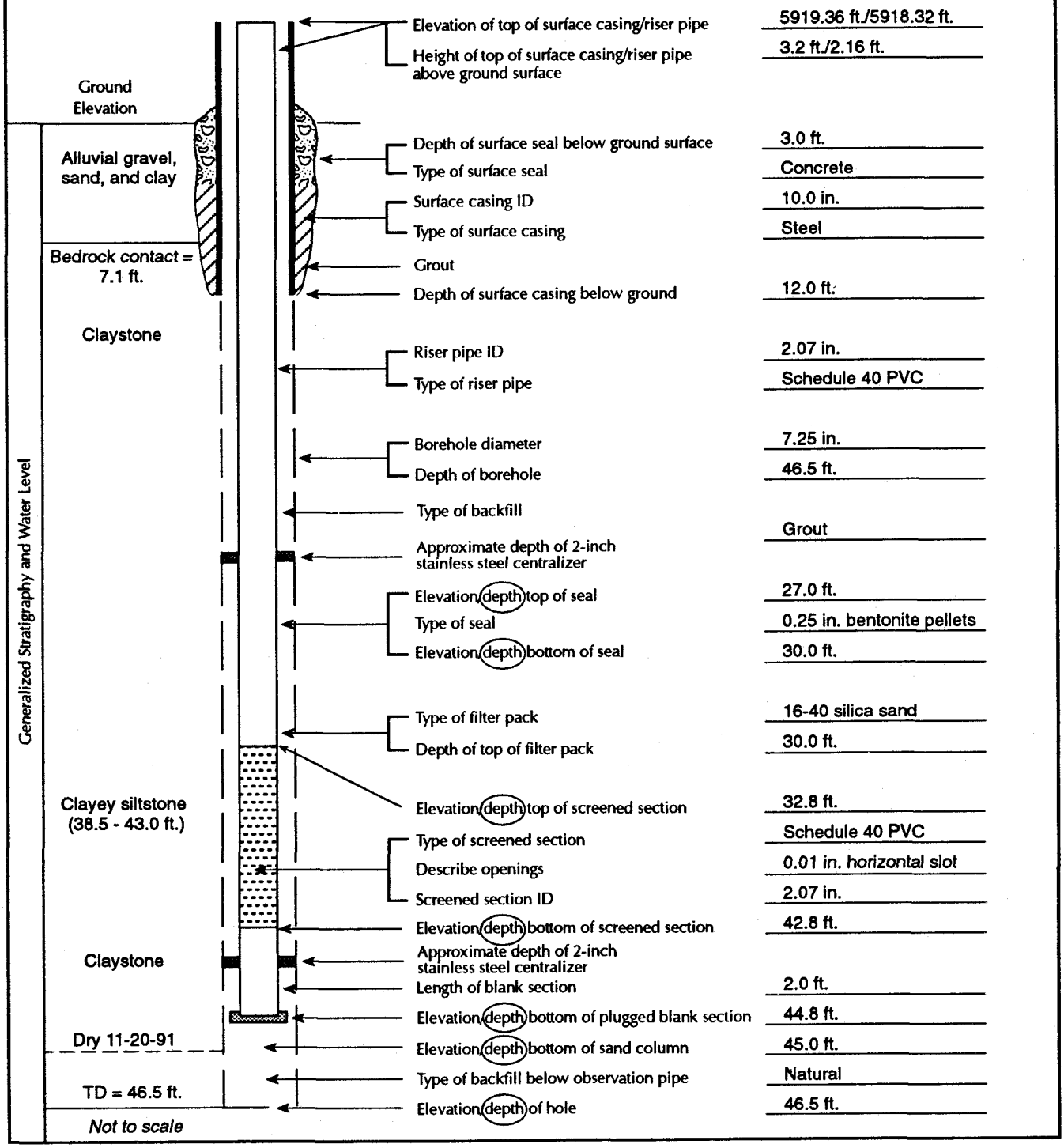
ROCKY FLATS WELL 39191, 04 DEC 1991 REPEAT

COLOG

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748009.1771 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084920.9155 ft.	Well No.	39191
Date Completed	12-9-91	Original Depth	46.5 ft.	Aquifer	Bedrock
Inspected by	C. Bieniulis	Date	12-9-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 46.5 ft.



Rev. 10/5/92

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	N/A
Piezometer Location Number:	**39291**

Data Available:

- ✔ Geologic Borehole Log (LOGGER Format)
- ✔ Geophysical Log
- ✔ Well Construction Summary

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 55.5	GROUND ELEVATION (FT):	5908.38	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747949	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	WGP/JAB	39291
EAST:	2084974	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	12/02/91	
REMARKS:							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00898EBU1	0% 50% 100%	0% 100%	2.00 /2.00	5908	0			CL	Silt-Clay mixture with Sand and trace Gravel: Dark brown (10YR 4/3) to dark yellowish brown (10YR 4/4). More clayey above approx. 0.8', more silty below approx. 0.8'. Rare, scattered pebbles (average approx. 0.3"), sand is v.f.g. to f.g. Poorly graded. Angular to subrounded. Low to med. plasticity. Sand is quartz, traces rock fragments, mafics, mica, Fe-oxides, calcareous grains, organics. Calcareous content negligible above approx. 1.5', and increased below approx. 1.5'. No bedding apparent. Rooted at top. Slightly moist at top, dry below. Trace Gravel, 5%-10% Sand, 90%-95% Fines (25%-45% Silt)
					5907	1				
					5906	2				Core retained in VOA sleeve
	BH00849EBU1			2.00 /2.00	5905	3			SM	Gravelly, Silty Sand: Brown (7.5YR 4/4) to strong brown (7.5YR 4/6). Gravel to 1.5" (average approx. 0.3"), sand v.f.g. to v.c.g. (mean=m.g. to c.g.). Well graded. Gravel subangular to rounded, sand angular to subrounded. Gravel schist, gneiss, quartzite, with trace granitic component. Sand quartz, some rock fragments, trace to some soft Fe-oxides, traces mafics, mica, feldspar, organics. No bedding apparent; fairly abrupt contact with underlying interval. 20%-25% Gravel, 40%-43% Sand, 33%-37% Fines (approx. 6%-9% Clay)
					5904	4				
				2.00 /2.00	5903	5			CL	Sandy Silty Clay with trace Gravel: Dark yellowish brown (10YR 4/4) to yellowish brown (10YR 5/4) in upper, lower portions; middle (approx. 2.4' to 2.95') is yellowish brown (10YR 5/6, 10YR 5/8) to strong brown (7.5YR 4/6). Gravel to 1.5", sand v.f.g. to v.c.g. (mean=f.g.). Poor to mod. grading. Subangular to subrounded gravel and sand. Low to med. plasticity. Gravel schist, gneiss, quartzite. Sand quartz, some rock fragments, trace to some Fe-oxides, traces calcareous grains, micas, mafics. Above approx. 2.9', calcareous content negligible, and below approx. 2.9' is increased. No bedding apparent. Dry. 5% Gravel, 35% Sand, 60% Fines (12%-20% Silt)
					5902	6				
				1.00 /2.00	5901	7			CL	Silty Clay with trace Sand and Gravel: Yellowish brown (10YR 5/4). Rare, scattered gravels (average approx. 0.3"-0.4"), sand v.f.g. to f.g. Poorly graded. Sand angular to subrounded. Low to med. plasticity. Sand quartz, trace to some golden (weathered) mica and rock fragments, trace mafics. Calcareous, both as trace to some disseminated carbonates and as scattered caliche blebs. No bedding apparent. Dry. Trace Gravel, 3%-5% Sand, 95%-97% Fines (20%-35% Silt)
					5900	8				Core retained in VOA sleeve
									CL	Same as above
	BH00850EBU1			0.50 /2.00	5899	9				Core retained in VOA sleeve
						10			CL	Sand-Silt-Clay mixture with Gravel: Dark yellowish brown (10YR 4/4) to dark brown (7.5YR 4/4). Scattered gravel (average 0.3"-0.4"); sand v.f.g. to v.c.g. (mean= v.f.g. to f.g.). Poorly to mod. graded. Gravels subangular to subrounded, sands angular to subrounded. Low to med. plasti-

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 55.5	GROUND ELEVATION (FT):	5908.38	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747949	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	WGP/JAB	39291
EAST:	2084974	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	12/02/91	

REMARKS:

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2.00 /2.00	5903	5				
					5902	6				
				1.00 /2.00	5901	7				
					5900	8				
	BH00850EBU1			0.50 /2.00	5899	9				
					5898	10				
				2.00 /2.00	5897	11				
					5896	12				
	BH00852EBU1			1.75 /2.00	5895	13				
	BH00851EBU1				5894	14				
				1.50 /1.50		15				

Unified Soils Classification or Rock Type	Description
	Same as above
	Core retained in VOA sleeve
CL	Sand-Silt-Clay mixture with Gravel: Dark yellowish brown (10YR 4/4) to dark brown (7.5YR 4/4). Scattered gravel (average 0.3"-0.4"); sand v.f.g. to v.c.g. (mean= v.f.g. to f.g.). Poorly to mod. graded. Gravels subangular to subrounded, sands angular to subrounded. Low to med. plasticity. Gravel schist, gneiss, quartzite; sand quartz, some rock fragments, trace to some mica, traces Fe-oxides, mafics. Micas again golden-colored. Calcareous. No bedding apparent. Dry. 8% Gravel, 25% Sand, 67% Fines (approx. 30% Silt)
GM	Sand-Gravel mixture with Silt and Clay: Dark yellowish brown (10YR 4/4). Gravel to >2" (average approx. 0.3"-0.5"), sand v.f.g. to v.c.g. (mean=m.g.). Well graded. Gravels angular (probably fractured during drilling) to subrounded, sands same. Gravel quartzite, gneiss, schist; sand quartz, some rock fragments, traces micas, mafics, Fe-oxides. No bedding apparent. Dry. 40%-45% Gravel, 35%-40% Sand, 20%-25% Fines (more silt than clay)
	No recovery for this interval
GM	Same as above
	No recovery for this interval
ml-CL	Clayey Silt with Sand and trace Gravel: Yellowish brown (10YR 5/8, 10YR 5/6) to dark yellowish brown (10YR 4/6). Scattered pebbles and a single 2" cobble; sand v.f.g. Poorly graded. Subangular to subrounded gravel, angular to subrounded sand. Low plasticity. Gravel schist, gneiss, quartzite; sand quartz (Fe-stained), trace to some Fe-oxides, traces mafics, mica. No bedding apparent. Trace organics. Appears to be reworked bedrock clay/siltstone. Slightly moist. Trace gravel, 10% Sand, 90% Fines (approx. 60%-80%

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 55.5	GROUND ELEVATION (FT): 5908.38	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	747949	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: WGP/JAB	39291
EAST:	2084974	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 12/02/91	
REMARKS:					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% – 50% – 100%)	PERCENT RECOVERY (0% – 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
					5898	10				
				2.00 /2.00	5897	11				
					5896	12				
	BH00852EBU1			1.75 /2.00	5895	13				No recovery for this interval
	BH00851EBU1				5894	14			ml-CL	Clayey Silt with Sand and trace Gravel: Yellowish brown (10YR 5/8, 10YR 5/6) to dark yellowish brown (10YR 4/6). Scattered pebbles and a single 2" cobble; sand v f.g. Poorly graded. Subangular to subrounded gravel, angular to subrounded sand. Low plasticity. Gravel schist, gneiss, quartzite; sand quartz (Fe-stained), trace to some Fe-oxides, traces mafics, mica. No bedding apparent. Trace organics. Appears to be reworked bedrock clay/siltstone. Slightly moist. Trace gravel, 10% Sand, 90% Fines (approx. 60%-80% Silt)
				1.50 /1.50	5893	15			SILTY CLAYSTONE	Silty Claystone with trace Sand: Dominantly yellowish brown (10YR 5/6, 10YR 5/8) and dark yellowish brown (10YR 4/6) above 11/75'; dom. light yellowish brown (2.5Y 6/3, 2.5Y6/4) and light brownish gray (2.5Y 6/2) and light gray (5Y 7.1) below 12.0', signifying decreasing Fe-content and weathering. Trace (<1%) v f.g., subangular to subrounded, quartz sand. 15%-30% Silt, decreasing with depth. Also present are Fe-stone nodules, from coarse sand-sized to >1" (large clast at 11.25'), generally only above 12.5'. Porosity: nil to approx. 10% along Fe-stone "seams." Cement: argillaceous plus trace to some to abundant Fe-oxide cement and rare traces calcareous cement. Non to slightly friable, fissile. Trace organics. No true bedding apparent, although between 10.65'-11.75' there is in some places a somewhat orderly arrangement (cont. below)
					5892	16				
	BH00790EBU1			2.00 /2.00	5891	17				
					5890	18				Core retained in VOA sleeve
				2.00 /2.00					SILTY CLAYSTONE	Same as above
					5889	19			SILTY CLAYSTONE	(cont. from above) of silty and clayey intervals. Also, Fe-stone "beds" are present that are somewhat continuous. Both of these features are probably disturbed in the core (re: orientation and extent) by drilling process. Lower contact transitional. Trace Sand, 99%-100% Fines (70%-85% Clay). Top of bedrock = 10.7'
						20				No recovery for this interval

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 55.5	GROUND ELEVATION (FT): 5908.38	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	747949	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: MGP/JAB	39291
EAST:	2084974	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 12/02/91	
REMARKS:					

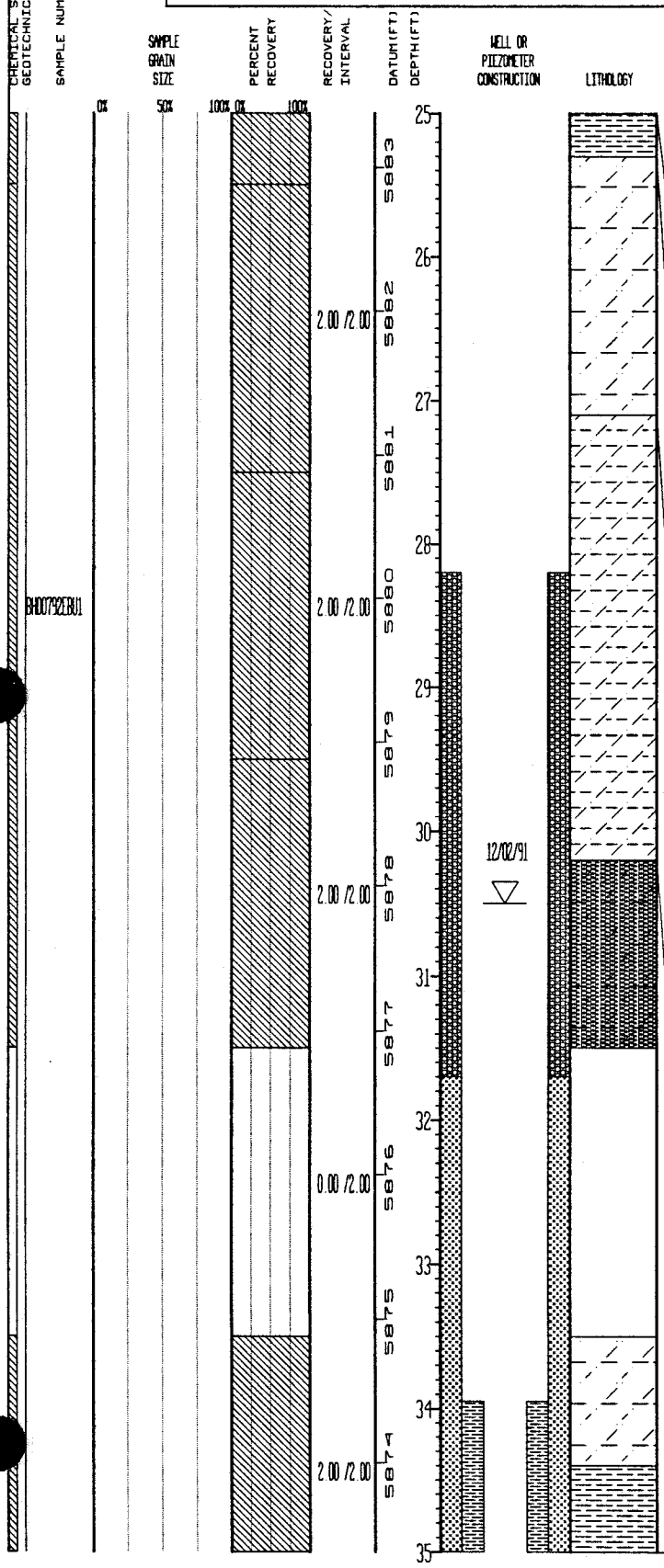
CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00790EBU1			2.00 /2.00	5893	15				
					5892	16				
				2.00 /2.00	5891	17				
					5890	18				
				2.00 /2.00	5889	19				
					5888	20			CLAYSTONE:	Claystone: Light gray (2.5Y 7/2), light brownish gray (2.5Y 6/2), light yellowish brown (2.5Y 6/3, 2.5Y 6/4), grayish brown (2.5Y 5/2), light olive brown (2.5Y 5/3), to, at bottom of interval (transitional with underlying unit), dark brown (7.5Y 3/2); Fe-oxide-rich areas, scattered throughout interval, are olive yellow (2.5Y 6/6), brownish yellow (10YR 6/6, 10YR 6/8), yellowish brown (10YR 5/6, 10YR5/8), dark yellowish brown (10YR 4/6), strong brown (7.5YR 4/6). Silt content decreases sharply with depth: approx. 15% at 14.0'-15.5', approx. 5% at 15.5'-17.0', and approx. 2% to nil from 17' to approx. 24.5', then gradually increases to approx. 10% by bottom of unit. Large (approx. 0.75") single caliche clast present at approx. 17.25'. Porosity: nil to approx. 10%, highest where Fe-oxides have formed Fe-stone grains and where claystone has a jumbled, (cont. below)
				2.00 /2.00	5887	21				
					5886	22				
	BH00791EBU1			2.00 /2.00	5885	23			CLAYSTONE:	(cont. from above) pulverized appearance (similar to breccia gouge). Cement: argillaceous, often with trace calcareous and/or Fe-oxide cements, possibly trace Fe-carbonates in some places. Non to slightly friable, slightly to extremely fissile. Carbonaceous material present, generally scattered specks but occasionally (as at 16.4'-16.5') enriched or as larger (to approx. 0.2") chips. Caliche present as clast (approx. 17.25') and as blebs, streamers, and potentially as
					5884	24				
				2.00 /2.00		25				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 55.5	GROUND ELEVATION (FT):	5908.38	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747949	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	MGP/JAB	39291
EAST:	2084974	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	12/02/91	

REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2.00 /2.00	5888	20				
						21				
				2.00 /2.00	5887					
						22				
	BH00791EBU1			2.00 /2.00	5886					
						23			CLAYSTONE:	(cont. from above) pulverized appearance (similar to breccia gouge). Cement: argillaceous, often with trace calcareous and/or Fe-oxide cements, possibly trace Fe-carbonates in some places. Non to slightly friable, slightly to extremely fissile. Carbonaceous material present, generally scattered specks but occasionally (as at 16.4'-16.5') enriched or as larger (to approx. 0.2") chips. Caliche present as clast (approx. 17.25') and as blebs, streamers, and potentially as fracture-fill, as at 18.1' and 18.35' where caliche fills discontinuous seams. Fe-oxides present as fracture fill and as Fe-stone grains/flakes (at 23.55' and 20.25'). No distinct bedding. Fe-oxides heal fractures in some places; in other areas (as at 24.0'), Fe-oxides replace organics; in other areas (as at 14.0'-15.5'), Fe-oxides disseminated in pockets (cont. below)
				2.00 /2.00	5885					
						24				
				2.00 /2.00	5884					
						25				
					5883					
						26			CLAYSTONE:	(cont. from above) which often have a semi-linear orientation but are too well mixed with clays to conclude that they are definitely fracture-related. Lower contact transitional. Fe-oxide-healed fractures are present at approx. 17.5'-18', 21', 21.7', 21.7'-22', approx. 22.75', approx. 23'-23.6', and, less clearly, elsewhere. 100% Fines (85%-100% Clay)
				2.00 /2.00	5882					
						27			CLAYEY SILTSTONE:	Clayey Siltstone: Grayish brown (10YR 5/2) and dark brown (7.5YR 3/2). 65%-75% Silt. Porosity approx. 20%-30%. Cement: argillaceous, with scattered trace Fe-oxides. Slightly to mod. friable and fissile. Trace organics, Fe-oxides (latter confined to yellowish brown-colored patches). No bedding apparent, although some areas show what may be extreme soft-sediment deformation. Fe-oxide-healed fracture present at 26.2'-26.5'. Transitional lower and upper contacts. 100% Fines (65%-75% Silt)
					5881					
						28				
	BH00792EBU1			2.00 /2.00	5880					
						29			SILTY CLAYSTONE:	Silty Claystone: Grayish brown (2.5Y 5/2) with Fe-oxide-rich areas that are yellowish brown (10YR 5/6, 10YR 5/8) to dark yellowish brown (10YR 4/6). From 27.1' to approx. 27.9',
					5879					
						30				

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 55.5	GROUND ELEVATION (FT): 5908.38	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH: 747949	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: WGP/JAB	39291
EAST: 2084974	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 12/02/91	
REMARKS:				



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
CLAYSTONE	(cont. from above) which often have a semi-linear orientation but are too well mixed with clays to conclude that they are definitely fracture-related. Lower contact transitional. Fe-oxide-healed fractures are present at approx. 17.5'-18', 21', 21.7', 21.7'-22', approx. 22.75', approx. 23'-23.6', and, less clearly, elsewhere. 100% Fines (85%-100% Clay)
CLAYEY SILTSTONE	Clayey Siltstone: Grayish brown (10YR 5/2) and dark brown (7.5YR 3/2). 65%-75% Silt. Porosity approx. 20%-30%. Cement: argillaceous, with scattered trace Fe-oxides. Slightly to mod. friable and fissile. Trace organics, Fe-oxides (latter confined to yellowish brown-colored patches). No bedding apparent, although some areas show what may be extreme soft-sediment deformation. Fe-oxide-healed fracture present at 26.2'-26.5'. Transitional lower and upper contacts. 100% Fines (65%-75% Silt)
SILTY CLAYSTONE	Silty Claystone: Grayish brown (2.5Y 5/2) with Fe-oxide-rich areas that are yellowish brown (10YR 5/6, 10YR 5/8) to dark yellowish brown (10YR 4/6). From 27.1' to approx. 27.9', silt content is highest (approx. 35%); below this, silt content is approx. 25%-30%. Porosity approx. 5%-20%. Cement: argillaceous, plus trace to some Fe-oxides in some places and trace calcareous cement in scattered places. Non to slightly friable, slightly to mod. (and in some places to very) fissile. Trace organics, trace to some Fe-oxides (and possibly trace Fe/Mn-OT. Color banding at approx. 29.1'-29.9', approx. 0-20 degrees to horiz. (core axis-vertical), probably depositional, fracture visible at 27.5'-28.0' (approx. 0.05"-thick line of gray clay running vertically thru browner clay). Other fractures noted, drawn if orientations seen. 100% Fines (approx. 25-35% Silt)
CLAYEY SILTSTONE	Clayey Siltstone with trace Sand: Light olive brown (2.5Y 5/3) down to approx. 30.9; below this, brown (10YR 5/3), yellowish brown (10YR 5/4), until 31.5'; below 33.5' and in scattered places (generally related to fractures) from 30.2'-31.5', yellowish brown (10YR 5/6, 10YR 5/8), brownish yellow (10YR 6/8), dark yellowish brown (10YR 4/6). Approx. 60%-70% Silt, plus 2% v.f.g. to f.g., subangular to subrounded, quartz sand present from 30.2'-31.5'; approx. 9% Sand (same characteristics) at 33.5'-33.6'. (Missing section at 31.5'-33.5' could be of critical importance to permeability, transmissivity, hydrologic models given presence of sand in adjacent rock.) Porosity approx. 15%-35%. Cement: argillaceous and, above 31.5', traces Fe-oxides, calcareous cements;

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 55.5	GROUND ELEVATION (FT):	5908.38	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER
NORTH:	747949	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	MGP/JAB	39291
EAST:	2084974	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	12/02/91	
REMARKS:							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				2.00 /2.00	5878	30	12/02/91			silt content is highest (approx. 35%); below this, silt content is approx. 25%-30%. Porosity approx. 5%-20%. Cement: argillaceous, plus trace to some Fe-oxides in some places and trace calcareous cement in scattered places. Non to slightly friable, slightly to mod. (and in some places to very) fissile. Trace organics, trace to some Fe-oxides (and possibly trace Fe/Mn-OT). Color banding at approx. 29.1'-29.9', approx. 0-20 degrees to horiz. (core axis=vertical), probably depositional; fracture visible at 27.5'-28.0' (approx. 0.05"-thick line of gray clay running vertically thru browner clay). Other fractures noted, drawn if orientations seen. 100% Fines (approx. 25-35% Silt)
					5877	31				
				0.00 /2.00	5876	32			CLAYEY SILTSTONE	Clayey Siltstone with trace Sand: Light olive brown (2.5Y 5/3) down to approx. 30.9; below this, brown (10YR 5/3), yellowish brown (10YR 5/4), until 31.5'; below 33.5' and in scattered places (generally related to fractures) from 30.2'-31.5', yellowish brown (10YR 5/6, 10YR 5/8), brownish yellow (10YR 6/8), dark yellowish brown (10YR 4/6). Approx. 60%-70% Silt, plus 2% v.f.g. to f.g., subangular to subrounded, quartz sand present from 30.2'-31.5'; approx. 9% Sand (same characteristics) at 33.5'-33.6'. (Missing section at 31.5'-33.5' could be of critical importance to permeability, transmissivity, hydrologic models given presence of sand in adjacent rock.) Porosity approx. 15%-35%. Cement: argillaceous and, above 31.5', traces Fe-oxides, calcareous cements; below 33.5', trace to some calcareous and Fe-oxide cements (Fe-CO3 also possible) with argillaceous cement (cont. below)
					5875	33				
				2.00 /2.00	5874	34				
					5873	35				No recovery for this interval
						36			CLAYEY SILTSTONE	(cont. from above) Slightly to mod. friable and fissile. Trace organics, most notably above 31.5'. Ironstone present at 33.8'. No bedding apparent. Healed (with Fe-oxides) fractures present as drawn; they are mainly confined to upper and lower portions, although missing section might also prove to be fractured. 2%-9% Sand, 91%-98% Fines (60%-70% Silt)
	BH00793EBU1			2.00 /2.00	5872					
					5871	37			CLAYSTONE	Claystone: Grayish brown (10YR 5/2, 2.5Y 5/2), pale brown (10YR 6/3), and where rich in Fe-oxides, yellowish brown (10YR 5/6, 10YR 5/8) to dark yellowish brown (10YR 4/6). approx. 3%-10% Silt. Porosity: nil to approx. 4%. Cement: argillaceous, scattered areas rich in Fe-oxides, scattered traces calcareous cement. Non to slightly friable, slightly to very fissile. Ironstone flakes present at 36.4'-36.7' and 36.1' along healed fractures; porosity along these fractures is >10%. Trace organics. Thin, discontinuous laminae present at 35.4'. No other bedding apparent. Fe-oxide-healed fractures present throughout interval. Transitional upper and lower contacts. Laminae at 35.4' show evidence of soft-sediment deformation. 100% Fines (approx. 3%-10% Silt)
				2.00 /2.00	5870	38				
					5869	39			SILTY CLAYSTONE	Silty Claystone: 37.5'-38.4' is light yellowish brown (2.5Y 6/3) to light olive brown (2.5Y 5/3, 2.5Y 5/4) and is rich-
						40				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 55.5	GROUND ELEVATION (FT):	5908.38	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747949	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	WGP/JAB	39291
EAST:	2084974	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	12/02/91	
REMARKS:							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00793EBU1			2.00 /2.00	5873 / 5872	35 / 36				
				2.00 /2.00	5871 / 5870	37 / 38			CLAYSTONE	Claystone: Grayish brown (10YR 5/2, 2.5Y 5/2), pale brown (10YR 6/3), and where rich in Fe-oxides, yellowish brown (10YR 5/6, 10YR 5/8) to dark yellowish brown (10YR 4/6). approx. 3%-10% Silt. Porosity: nil to approx. 4%. Cement: argillaceous, scattered areas rich in Fe-oxides, scattered traces calcareous cement. Non to slightly friable, slightly to very fissile. Ironstone flakes present at 36.4'-36.7' and 36.1' along healed fractures; porosity along these fractures is >10%. Trace organics. Thin, discontinuous laminae present at 35.4'. No other bedding apparent. Fe-oxide-healed fractures present throughout interval. Transitional upper and lower contacts. Laminae at 35.4' show evidence of soft-sediment deformation. 100% Fines (approx. 3%-10% Silt)
				2.00 /2.00	5869 / 5868	39 / 40			SILTY CLAYSTONE	Silty Claystone: 37.5'-38.4' is light yellowish brown (2.5Y 6/3) to light olive brown (2.5Y 5/3, 2.5Y 5/4) and is richest in Fe-oxides (by visual estimates) than balance of interval; 38.4'-40.5' is light brownish gray (2.5Y 6/2) to grayish brown (2.5Y 5/2). 20%-45% Silt, generally increasing with depth as interval undergoes transition to underlying clayey siltstone. Porosity approx. 7%-18%. Cement: argillaceous, combined with trace (to some, in 37.5'-38.4' interval) Fe-oxides localized around healed fractures (more disseminated above 38.4') and occasional trace calcareous cement (richest at 37.5'-37.6', approx. 39.3'-39.5'). Slightly friable, slightly to mod. fissile. Traces organics, Fe-oxides; single silt-sized flake of gold-colored metallic material (marcasite? gold? too small to tell) (cont. below)
	BH00794EBU1			2.00 /2.00	5867 / 5866	41 / 42			SILTY CLAYSTONE	(cont. from above) found in claystone from 38.5'-39.5'. Thin, wavy, discontinuous, varve-like laminae present at approx. 40.0'-40.5'; soft-sediment deformation, fluid escape structures visible. This bedding present in siltiest portion of this interval as it makes the transition to underlying unit. Fe-oxide-healed fractures present as noted; hairline fractures at approx. 38.7'-39.0' are partially obscured such that orientations may not be accurate. Transitional upper, lower contacts. 100% Fines (approx. 20%-45% Silt)
				2.00 /2.00	5865 / 5864	43 / 44			CLAYEY SILTSTONE	Clayey Siltstone: Grayish brown (2.5Y 5/2) to light olive brown (2.5Y 5/3). Approx. 35%-45% Clay, balance silt. Porosity approx. 15%-25%. Cement: argillaceous, plus rare trace calcareous and fracture-localized Fe-oxides (trace). Slight-
						45				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 55.5	GROUND ELEVATION (FT):	5908.38	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747949	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	WGP/JAB	39291
EAST:	2084974	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	12/02/91	

REMARKS:

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00794EBU1			2.00 /2.00	5868	40			SILTY CLAYSTONE	(cont. from above) found in claystone from 38.5'-39.5'. Thin, wavy, discontinuous, varve-like laminae present at approx. 40.0'-40.5'; soft-sediment deformation, fluid escape structures visible. This bedding present in siltiest portion of this interval as it makes the transition to underlying unit. Fe-oxide-healed fractures present as noted; hairline fractures at approx. 38.7'-39.0' are partially obscured such that orientations may not be accurate. Transitional upper, lower contacts. 100% Fines (approx. 20%-45% Silt)
				2.00 /2.00	5867	41				
				2.00 /2.00	5866	42				
				2.00 /2.00	5865	43				
				2.00 /2.00	5864	44			CLAYEY SILTSTONE	Clayey Siltstone: Grayish brown (2.5Y 5/2) to light olive brown (2.5Y 5/3). Approx. 35%-45% Clay, balance silt. Porosity approx. 15%-25%. Cement: argillaceous, plus rare trace calcareous and fracture-localized Fe-oxides (trace). Slightly to mod. friable and fissile. Trace organics, Fe-oxides, possibly trace Fe/Mn-oxides in some places as fracture mineralization. On both small (mm) and larger (several inch) scales, some areas are siltier or clayier than others; on the smaller scale, varves and disrupted varves are present in some places, and on the larger scale are varves to med. laminae or unbedded areas dominated to a greater degree by silt. Wavy, discontinuous laminae most common, often with soft-sediment deformation and (more rarely) fluid escape structures; all bedding is (cont. below)
				2.00 /2.00	5863	45				
	BH00797EBU1			2.00 /2.00	5862	46			CLAYEY SILTSTONE	(cont. from above) sub-horizontal (as shown). Healed fractures present throughout; where orientations are discernible, they are drawn. 100% Fines (approx. 35%-45% Clay)
				2.00 /2.00	5861	47			CLAYEY SILTSTONE	Silty Claystone: Grayish brown (2.5Y 5/2) to light olive brown (2.5Y 5/3) from 43.5'-45.5'; from 45.5'-47.5', light brownish gray (2.5Y 6/2), light yellowish brown (2.5Y 6/3). Approx. 20% Silt. Porosity approx. 4%-10%. Cement: argillaceous, plus (localized around healed fractures) trace to some Fe-oxides, some times combined with trace to some caliche (Fe-carbonates may also be present). Non to slightly friable, slightly to mod. fissile. Trace organics (as large as to approx. 0.25" carbonaceous flecks at approx. 44.9'-45.2'). Fe-oxides and caliche fracture fill. No bedding apparent. Healed fractures throughout; where orientations are discernable, they are drawn. From 47.5'-49.5', approx. 40%
				2.00 /2.00	5860	48				
					5859	49				
						50				

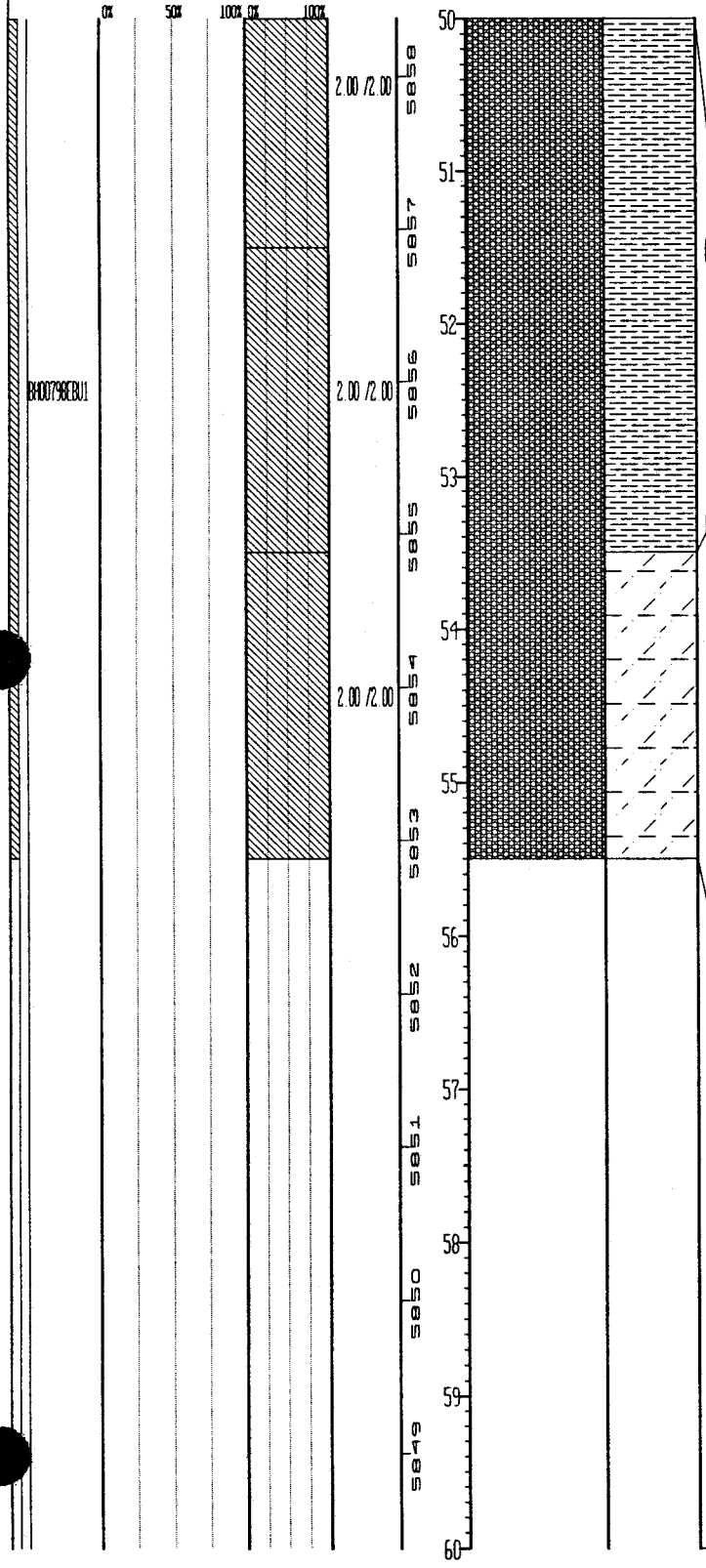
STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 55.5	GROUND ELEVATION (FT):	5908.38	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747949	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	WGP/JAB	39291
EAST:	2084974	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	12/02/91	
REMARKS:							

CHEMICAL SAMPLE / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% – 50% – 100%)	PERCENT RECOVERY (0% – 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00797EBU1			2.00 /2.00	5863	45			CLAYEY SILTSTONE	Silty Claystone: Grayish brown (2.5Y 5/2) to light olive brown (2.5Y 5/3) from 43.5'-45.5', from 45.5'-47.5', light brownish gray (2.5Y 6/2), light yellowish brown (2.5Y 6/3). Approx. 20% Silt. Porosity approx. 4%-10%. Cement: argillaceous, plus (localized around healed fractures) trace to some Fe-oxides, some times combined with trace to some caliche (Fe-carbonates may also be present). Non to slightly friable, slightly to mod. fissile. Trace organics (as large as to approx. 0.25" carbonaceous flecks at approx. 44.9'-45.2'). Fe-oxides and caliche fracture fill. No bedding apparent. Healed fractures throughout; where orientations are discernable, they are drawn. From 47.5'-49.5', approx. 40% Silt; varves (wavy, vague, discontinuous to sharp, linear, continuous) at approx. 48.25'-48.8' and, at 48.45'-48.6', siltiest varves (cont. below)
				2.00 /2.00	5862	46				
				2.00 /2.00	5861	47				
				2.00 /2.00	5860	48				
				2.00 /2.00	5859	49				
				2.00 /2.00	5858	50			CLAYEY SILTSTONE	(cont. from above) are present and filled with caliche. Otherwise, the 47.5'-49.5' is same as 43.5'-47.5' interval. (Good example of healed fracture at approx. 48.0'-49.3'.) 100% Fines (approx. 20% Silt, to approx. 40% Silt below 47.5')
				2.00 /2.00	5857	51			CLAYSTONE	Claystone: Grayish brown (10YR 5/2) with minor portions brown (10YR 5/3). Approx. 85%-95% Clay. Porosity approx. 3%-12%. Cement: argillaceous plus (around healed fractures) trace to some Fe-oxides and, rarely, trace calcareous cement. Non to slightly friable, slightly to very fissile. Traces organics, Fe-oxides, caliche blebs (rare). Massive; no bedding apparent. Healed fractures present throughout, but seemingly not as numerous as in overlying intervals, and not as clearly defined. 100% Fines (5%-15% Silt)
	BH00798EBU1			2.00 /2.00	5856	52				
					5855	53			CLAYEY SILTSTONE	Clayey Siltstone: Above 54.25', color is grayish brown (10YR 5/2), light brownish gray (10YR 6/2); below 54.25', light brownish gray (2.5Y 6/2), light yellowish brown (2.5Y 6/3) due to increased Fe-oxide content (Fe-oxide-healed fractures are common in this lower portion). Approx. 60%-75% Silt, with silt content increased in lower portion relative to upper portion. <1% v.f.g., subangular to subrounded, quartz sand also present in lower portion (54.25'-55.5'). Porosity
				2.00 /2.00	5854	54				
						55				

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 55.5	GROUND ELEVATION (FT):	5908.38	PROJECT NUMBER:	EMAD
NORTH: 747949	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	WGP/JAB
EAST: 2084974	LOCATOR NUMBER: L7	BOREHOLE DIAMETER (IN):	7.25	DATE DRILLED:	12/02/91
REMARKS:					

LOG OF BORING NUMBER: 39291

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH | SAMPLE NUMBER | SAMPLE GRAIN SIZE (0% 50% 100%) | PERCENT RECOVERY (0% 100%) | RECOVERY/INTERVAL | DATUM (FT) | DEPTH (FT) | WELL OR PIEZOMETER CONSTRUCTION | LITHOLOGY | UNIFIED SOILS CLASSIFICATION OR ROCK TYPE | DESCRIPTION



CLAYSTONE: Claystone: Grayish brown (10YR 5/2) with minor portions brown (10YR 5/3). Approx. 85%-95% Clay. Porosity approx. 3%-12%. Cement: argillaceous plus (around healed fractures) trace to some Fe-oxides and, rarely, trace calcareous cement. Non to slightly friable, slightly to very fissile. Traces organics, Fe-oxides, caliche blebs (rare). Massive; no bedding apparent. Healed fractures present throughout, but seemingly not as numerous as in overlying intervals, and not as clearly defined. 100% Fines (5%-15% Silt).

CLAYEY SILTSTONE: Clayey Siltstone: Above 54.25', color is grayish brown (10YR 5/2), light brownish gray (10YR 6/2); below 54.25', light brownish gray (2.5Y 6/2), light yellowish brown (2.5Y 6/3) due to increased Fe-oxide content (Fe-oxide-healed fractures are common in this lower portion). Approx. 60%-75% Silt, with silt content increased in lower portion relative to upper portion. <1% v.f.g., subangular to subrounded, quartz sand also present in lower portion (54.25'-55.5'). Porosity approx. 15%- 25%, possibly to 30%. Cement: argillaceous, plus trace to some Fe-oxides in lower portion (mainly around fractures). Slightly to mod. friable and fissile. Trace organics (occasionally Fe-oxide-replaced), trace to some Fe-oxides. No bedding apparent. Fe-oxide-healed fractures concentrated at approx. 54.25-TD. 0-1% Sand, 99-100% Fines (60-75% Silt).

Total Depth = 55.7 ft.

COLOG INC

BOREHOLE GEOPHYSICS

[illegible]

CALIPER
NATURAL GAMMA
WELL: PZ-01

PROJECT: OU1 881 HILLSIDE

DATE: 26 NOVEMBER 1991

CLIENT: EBASCO

COLOG ID: NC1

LOCATION: [illegible] 881 HILLSIDE

STATE: COLORADO COUNTY: JEFFERSON ELEV: DEPTH PIT GROUND:

[illegible]

[illegible] CONTRACTOR: [illegible] [illegible] COLORADO

[illegible]

RUN	HOLE RECORD			CASING RECORD		
	BIT SIZE	FROM	TO	SIZE/WGT/TYPE	FROM	TO
[illegible]	[illegible]	0	34	[illegible]	SURFACE	13

[illegible] DRILL METHOD: AUGER CHOKE DIA:

MUD TYPE: [illegible] [illegible] SINGLE [illegible]

[illegible] [illegible] [illegible] [illegible]

[illegible]

INSTRUMENTATION: [illegible] UNIT/TRUCK: [illegible] 451

ENGINEER: [illegible]

CLIENT: [illegible] EBASCO

OTHER: [illegible]

LOGGING DATA

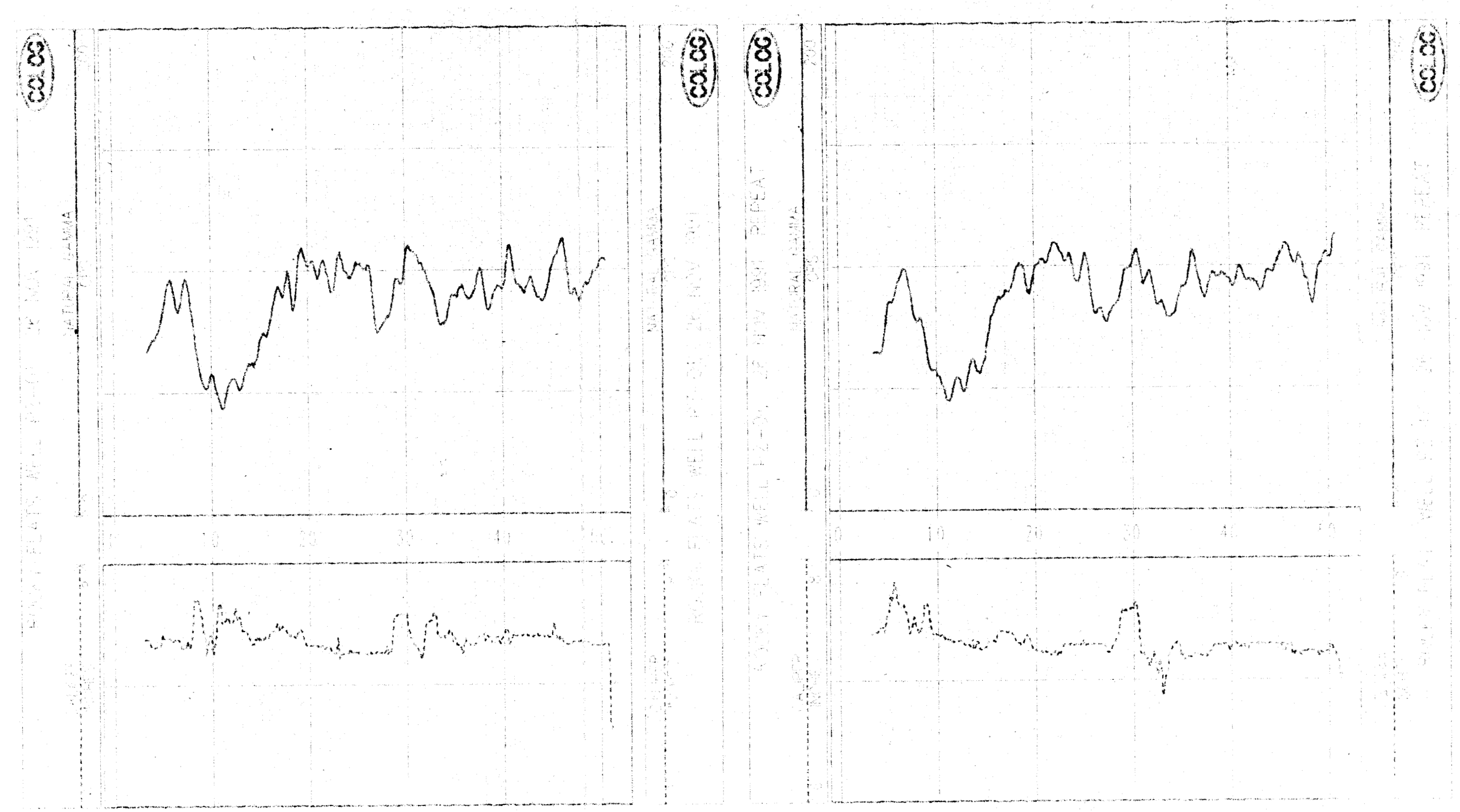
RUN NUMBER	RUN NO.	LEVEL	REAMPED FROM (FT)	REAMPED TO (FT)	LOGGING DIRECTION	SPEED (FT/MIN)	OPERATOR	TIME	SPACING (FT)	FILTER (FT)	SOURCE TYPE	SOURCE SIZE/DIRE	LOGGED INTERVAL FROM	TO	OUT (FEET)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]							[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]						[illegible]	[illegible]	[illegible]

[illegible]

[illegible]

REMARKS:

CUTTINGS LEFT ON THE INSIDE OF THE CASING
WHEN AUGER PULLED OUT OF HOLE



COLOG INC — **BOREHOLE GEOPHYSICS**

10701 W. COLFAX, STE. 215, GOLDEN, CO 80401
PHONE: (303) 278-0171 FAX: 278-2730

CALIPER
NATURAL GAMMA
WELL: PZ-01

PROJECT: OU1 881 HILLSIDE — DATE: 26 NOVEMBER 1991
CLIENT: EBASCO — COLOG ID NO.:
LOCATION: EG&G ROCKY FLATS 881 HILLSIDE
STATE: COLORADO — COUNTY: JEFFERSON — ELEV: — DEPTH REFERENCE:

BOREHOLE DATA

DRILLING CONTRACTOR: BOYLES BROTHERS - GOLDEN, COLORADO
CUSTOMER TD: 54' — COLOG TD: 53'

RUN	BIT RECORD			CASING RECORD		
NO.	Bit Size	From	To	Size/Wgt/Thk	From	To
1	7" AUGER	13'	54'	10" ID *	SURFACE	13'
2						
3						
4						

HOLE MEDIUM: AIR — DRILL METHOD: AUGER (NOBLE DET)
MUD TYPE: NONE — TIME SINCE CIRC:
VISCOSITY: — WEIGHT: — PH: — Wt: — Deg:

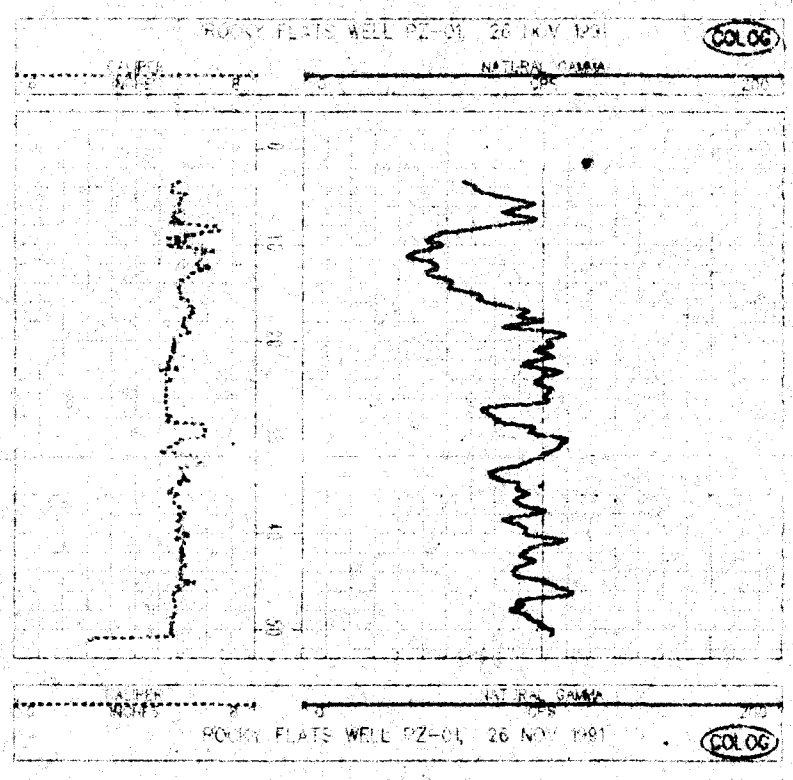
GENERAL DATA

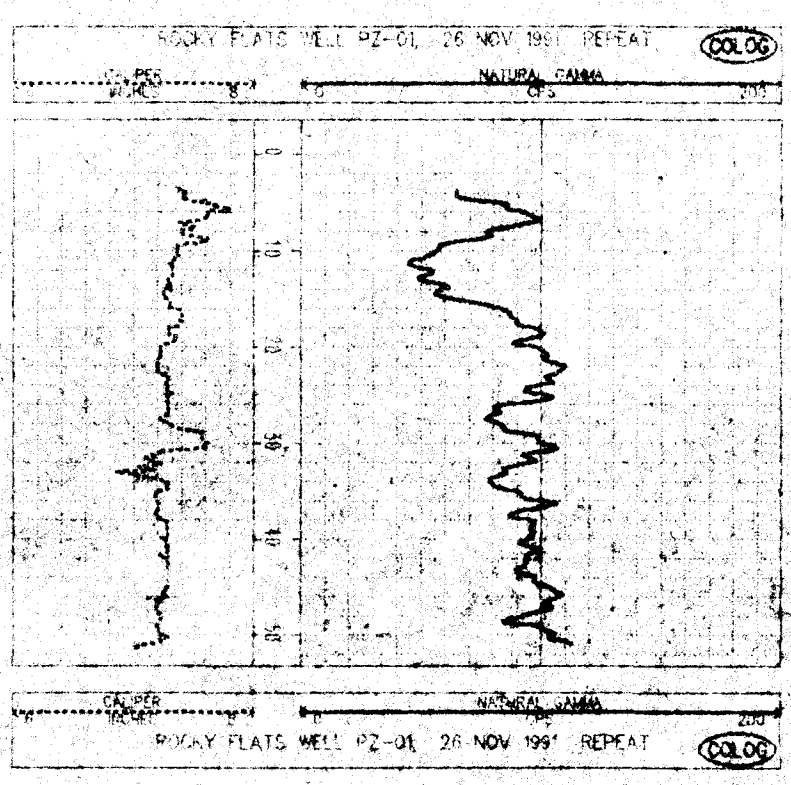
INSTRUMENTATION: SERIES 'B' — UNIT/TRUCK: 3 (245)
LOGGING ENGINEER: JON STAATZ
CLIENT REPRESENTATIVE: TIMOTHY DEGNAN - EBASCO
OTHER SERVICES: NONE

LOGGING DATA

FUNCTION	RUN NO.	MODE	LENGTH	SPEED	TIME CONSTANT	SENSITIVITY	VIEW	TO-B	TO-T	TYPE	SIZE	WEIGHT	FLUID	DEPTH
			FT	FT/MIN	SEC	CPS/DIV		FT	FT					FT
CALIPER	1	AUTO	53	40	0.1	1V								15
GAMMA	1	AUTO	53	40	0.1	10	No					37		15

CALIBRATION FACTOR(S):
DIGITAL FILE NAME(S): [illegible]
REMARKS:
* CUTTINGS DEPOSITED ON THE INSIDE OF THE CASING WHEN AUGER PULLED OUT OF HOLE.

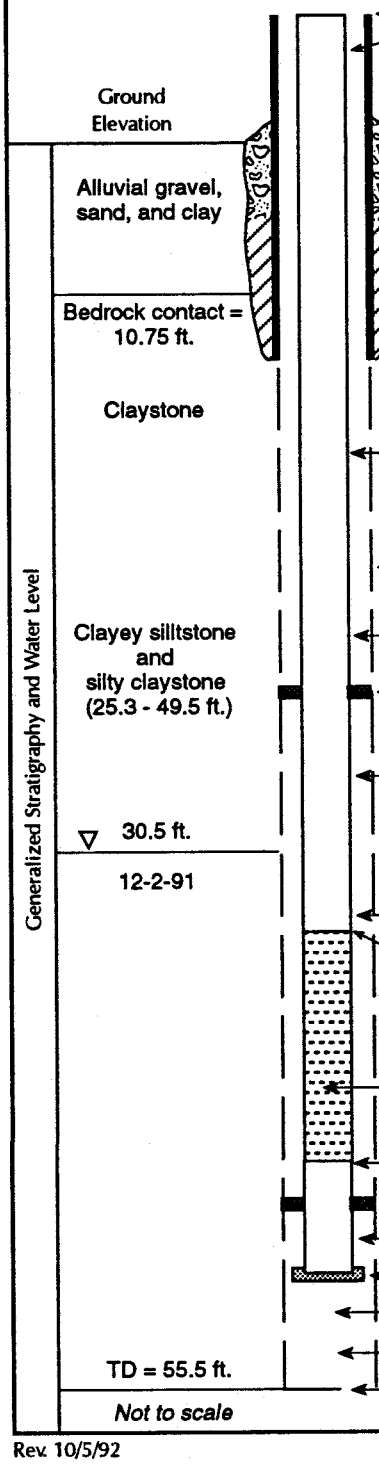




Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	747948.5072 ft.	Page	1 of 1
Location	881 Hillside	Easting	2084973.7217 ft.	Well No.	39291
Date Completed	12-2-91	Original Depth	55.5 ft.	Aquifer	Bedrock
Inspected by	K. Maley	Date	12-2-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 55.5 ft.



Elevation of top of surface casing/riser pipe	5910.68 ft./5910.21 ft.
Height of top of surface casing/riser pipe above ground surface	2.3 ft./1.83 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	10.0 in.
Type of surface casing	Steel
Grout	
Depth of surface casing below ground	13.5 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	7.25 in.
Depth of borehole	55.5 ft.
Type of backfill	Grout
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	28.2 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	31.7 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	31.7 ft.
Elevation/depth top of screened section	33.95 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	43.95 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.0 ft.
Elevation/depth bottom of plugged blank section	45.95 ft.
Elevation/depth bottom of sand column	45.95 ft.
Type of backfill below observation pipe	Natural
Elevation/depth of hole	55.5 ft.

Rev. 10/5/92

INDEX OF DATA

Borehole Location Number:	**39391**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 10.0	GROUND ELEVATION (FT): 5801.64	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	747865	AREA: OU1	CASING DIAMETER (IN):	GEOLOGIST: KMM/JAB	39391
EAST:	2086969	LOCATOR NUMBER: 07	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 11/16/91	
REMARKS:					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00768EBU1			0.40 /2.00	5801	0–1			ML	Sandy, Clayey Silt: Black (10YR 2/1). Trace gravel (to approx. 0.5"); v.f.g. to v.c.g. sand (mean=v.f.g. to f.g.). Poorly graded. Subangular to subrounded. Slight plasticity. Abundant organics; unit is nearly ol, is rooted. Sand is quartz, some rock fragments, traces micas, mafics, Fe-oxides. No bedding apparent. Dry. 0-5% Gravel, 22-30% Sand, 68-75% Fines (approx. 24% Clay)
										No recovery for this interval
	BH00770EBU1			1.10 /2.00	5800–5799	2–3			CL	Sandy Silt-Clay mixture with Gravel: Dark brown (10YR 3/3) to very dark brown (10YR 2/2). Gravel includes fragments of boulder; average gravel size approx. 0.4". Sand v.f.g. to v.c.g. (mean=v.f.g. to f.g.). Poorly graded. Subangular to subrounded, with angular boulder fragments. Low to med. plasticity. Gravel quartzite, schist, gneiss; sand quartz with some rock fragments, traces mafics, micas, organics, metal shavings (from drill?), Fe-oxides. No bedding apparent. Dry. 5-10% Gravel, 25-30% Sand, 62-66% Fines (approx. 27-30% Clay)
										No recovery for this interval
				0.00 /2.00	5798–5797	4–5			CL	Silty Clay with Caliche and trace Sand: Mottled with wide range of colors: dark yellowish brown (10YR 4/6), yellowish brown (10YR 5/6, 10YR 5/8, 10YR 5/4), brown/dark brown (10YR 4/3, 10YR 3/3), light gray (2.5Y N7, 2.5Y N6, 5Y 6/1); where caliche is richest, pale yellow (2.5Y 7/4, 2.5Y 8/3), yellow (2.5Y 7/6), light yellowish brown (2.5Y 6/3, 2.5Y 6/4). Trace (<1%) Sand (v.f.g. to f.g., rare m.g.); 15-30% Silt. Poorly graded. Med. plasticity. Rich in Fe-oxides, caliche, possibly some Fe-carbonate. No bedding apparent; unit looks like reworked and weathered claystone bedrock. Dry. <1% Sand, 99-100% Fines (15-30% Silt)
				2.00 /2.00	5796–5795	6–7			SILTY CLAYSTONE	Variegated Silty Claystone and Clayey Siltstone: Pale brown (10YR 6/3), brown (10YR 5/3), yellowish brown (10YR 5/4), light yellowish brown (2.5Y 6/3), gray (5Y 6/1, 5Y 5/1), light olive brown (2.5Y 5/3); where Fe-oxide-rich, yellowish brown (10YR 5/6, 10YR 5/8), dark yellowish brown (10YR 4/6). Mottled, patchy, and/or mixed colors. Silty claystone areas are 55%-95% Clay, balance silt; clayey siltstone areas are 50%-80% Silt, balance clay, occasional traces v.f.g. to f.g. sand (to 2%). The two rock types are present in an apparently disordered fashion and at too small a scale to differentiate into separte units. Sand is subangular to subrounded. Porosity approx. 6% to approx. 28%. Cement: argillaceous, calcareous (disseminated and caliche), Fe-oxides; calcareous content decreases below approx. 8.0, nearly absent below (cont. below)
	BH00772EBU1			1.75 /2.00	5794–5793	8–9			SILTY CLAYSTONE	(cont. from above) 9.0'. Non to mod. friable, slightly to very fissile. Scattered traces organics. Entire interval laminated to thin-bedded, often in rather jumbled fashion, often with silty and clayey layers alternating. Top of bedrock uncertain due to similar appearance of overlying unit
	BH00771EBU1				5792	10				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 10.0	GROUND ELEVATION (FT): 5801.64	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	747865	AREA: OU1	CASING DIAMETER (IN):	GEOLOGIST: KMM/JAB	39391
EAST:	2086969	LOCATOR NUMBER: 07	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 11/16/91	
REMARKS:					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% – 50% – 100%)	PERCENT RECOVERY (0% – 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
				0.00 /2.00	5796	5				Trace (<1%) Sand (v.f.g. to f.g., rare m.g.); 15-30% Silt. Poorly graded. Med. plasticity. Rich in Fe-oxides, caliche, possibly some Fe-carbonate. No bedding apparent; unit looks like reworked and weathered claystone bedrock. Dry. <1% Sand, 99-100% Fines (15-30% Silt)
				2.00 /2.00	5795	6			SILTY CLAYSTONE	Variegated Silty Claystone and Clayey Siltstone: Pale brown (10YR 6/3), brown (10YR 5/3), yellowish brown (10YR 5/4), light yellowish brown (2.5Y 6/3), gray (5Y 6/1, 5Y 5/1), light olive brown (2.5Y 5/3); where Fe-oxide-rich, yellowish brown (10YR 5/6, 10YR 5/8), dark yellowish brown (10YR 4/6). Mottled, patchy, and/or mixed colors. Silty claystone areas are 55%-95% Clay, balance silt; clayey siltstone areas are 50%-80% Silt, balance clay, occasional traces v.f.g. to f.g. sand (to 2%). The two rock types are present in an apparently disordered fashion and at too small a scale to differentiate into separte units. Sand is subangular to subrounded. Porosity approx. 6% to approx. 28%. Cement: argillaceous, calcareous (disseminated and caliche), Fe-oxides; calcareous content decreases below approx. 8.0', nearly absent below (cont. below)
					5794	7				
	BH00772EBU1				5793	8				
				1.75 /2.00	5792	9			SILTY CLAYSTONE	(cont. from above) 9.0'. Non to mod. friable, slightly to very fissile. Scattered traces organics. Entire interval laminated to thin-bedded, often in rather jumbled fashion, often with silty and clayey layers alternating. Top of bedrock uncertain due to similar appearance of overlying unit. Claystone may be increasingly dominant below approx. 9.2'. Dry. 0-2% Sand, 98-100% Fines. Top of bedrock = 7.0'
	BH00771EBU1				5791	10				No recovery for this interval
					5790	11				VOA sample obtained from this interval
					5789	12				Total Depth = 10.0 ft
					5788	13				
					5787	14				
						15				

INDEX OF DATA

Borehole Location Number:	**39491**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 4.0	GROUND ELEVATION (FT):	5938.11	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	747849	AREA: OU1	CASING DIAMETER (IN):		GEOLOGIST:	KMM/JAB	39491
EAST:	2083935	LOCATOR NUMBER: K7	BOREHOLE DIAMETER (IN):	3.5	DATE DRILLED:	12/14/91	
REMARKS:							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00596EB01	0% 50% 100%	0% 100%		5938	0			CL	Clay with traces Sand and Gravel: Yellowish brown (10YR 5/4) to light olive brown (2.5Y 5/4); where rich in Fe-oxides, yellowish brown (10YR 5/6, 10YR 5/8). Rare gravel, to 0.8"; sand v.f.g. to f.g. Poorly graded. Subangular to subrounded. Medium plasticity. Sand is quartz, traces mafics, micas, Fe-oxides; gravel is Fe-stone, sandstone. Trace organics. No bedding apparent. Unit is identical to claystone bedrock save for the traces sand and gravel. Because of this, picking actual "top" of bedrock is difficult. Moist to very moist. <1% Gravel, approx. 1% Sand, 98%-99% Fines (75%-90% Clay)
	BH01032EB01			0.80 /1.00	5937	1				
	BH01039EB01			0.40 /1.00						
	BH00636EB01				5936	2				
				0.20 /1.00						No recovery for this interval
									CL	Same as above
										No recovery for this interval
					5935	3			CL	Same as above
										No recovery for this interval
	BH01032EB01			0.20 /1.00					CLAYSTONE	Claystone: Yellowish brown (10YR 5/4) to light olive brown (2.5Y 5/4) to gray (5Y 5/1). 80%-90% Clay. Porosity difficult to determine due to disruption of core by hand auger, but is estimated at nil to approx. 5%. Cement is argillaceous and trace Fe-oxides. Nonfriable, expect slightly fissile. Trace organics. No bedding or fractures apparent -- they would have been obscured or eliminated by hand auger. Very moist to wet. 100% Fines. Top of bedrock 1.4'
					5934	4				
										VOA sample obtained from this interval
					5933	5				Total Depth = 4.0 ft
					5932	6				
					5931	7				
					5930	8				
					5929	9				
						10				

INDEX OF DATA

Borehole Location Number:	**39591**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 3 0	GROUND ELEVATION (FT)	5938 00	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747799	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	KMM/JAB	39591
EAST	2083933	LOCATOR NUMBER K7	BOREHOLE DIAMETER (IN)	3 5	DATE DRILLED	12/14/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY / INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00858EBU1	0% 50% 100%	0% 100%		5938	0				VOA sample obtained from this interval
	BH00859EBU1			0 80 /1 00						No recovery for this interval
	BH01036EBU1				5937	1			CL	Silty Clay with Gravel and Sand Light olive brown (2 5Y 5/3) to brown (10YR 5/3) Gravel to approx 0 5", sand v f g to v c g (mean=m g to c g) Poorly graded Sub-angular to subrounded sands and gravels Medium plasticity Gravels are quartzite, schist, gneiss, sands are quartz with some rock fragments, traces fe-oxides, mica, mafics Trace organics (interval is rooted) Calcareous No bedding apparent Wet at top, moist in middle, and saturated for bottom 0 5' 7% Gravel, 7% Sand, 86% Fines (approx 18%-25% Silt)
	BH01037EBU1									
	BH00860EBU1			0 30 /1 00						
					5936	2				
				0 70 /1 00						
					5935	3				No recovery for this interval
									CL	Same as above
										No recovery for this interval
					5934	4				Total Depth = 3 0 ft
					5933	5				
					5932	6				
					5931	7				
					5930	8				
					5929	9				
						10				

INDEX OF DATA

Borehole Location Number:	N/A
Monitoring Well Location Number:	**39691**
Piezometer Location Number:	N/A

Data Available:

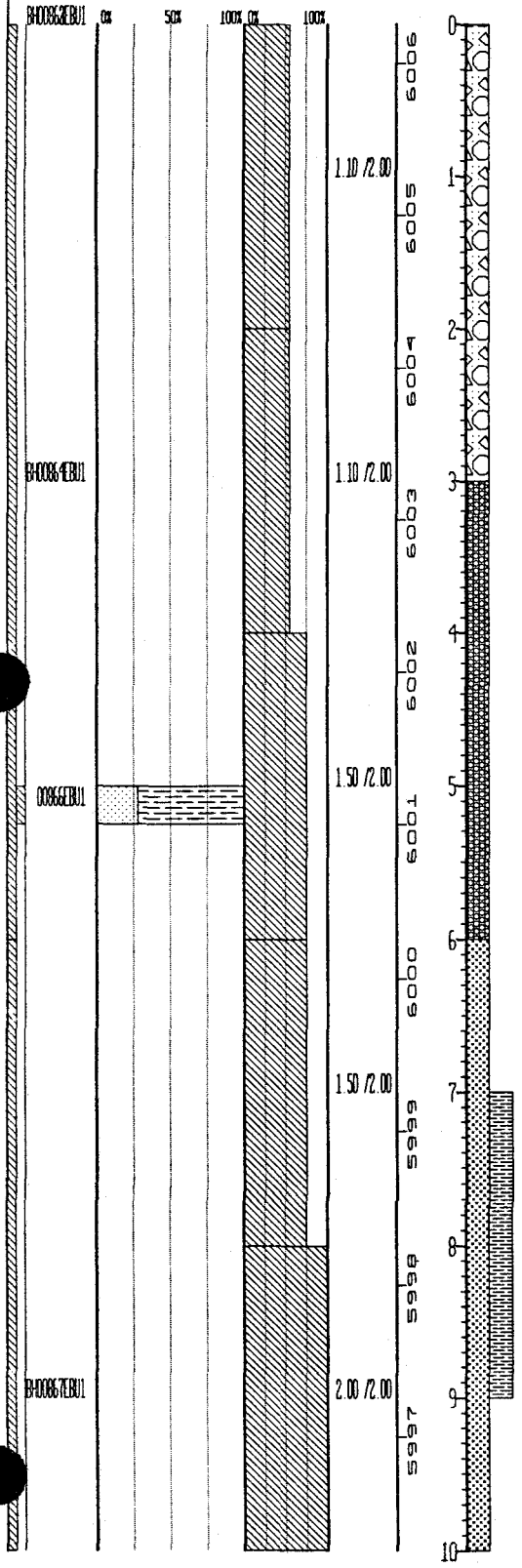
✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

✔ Well Construction Summary

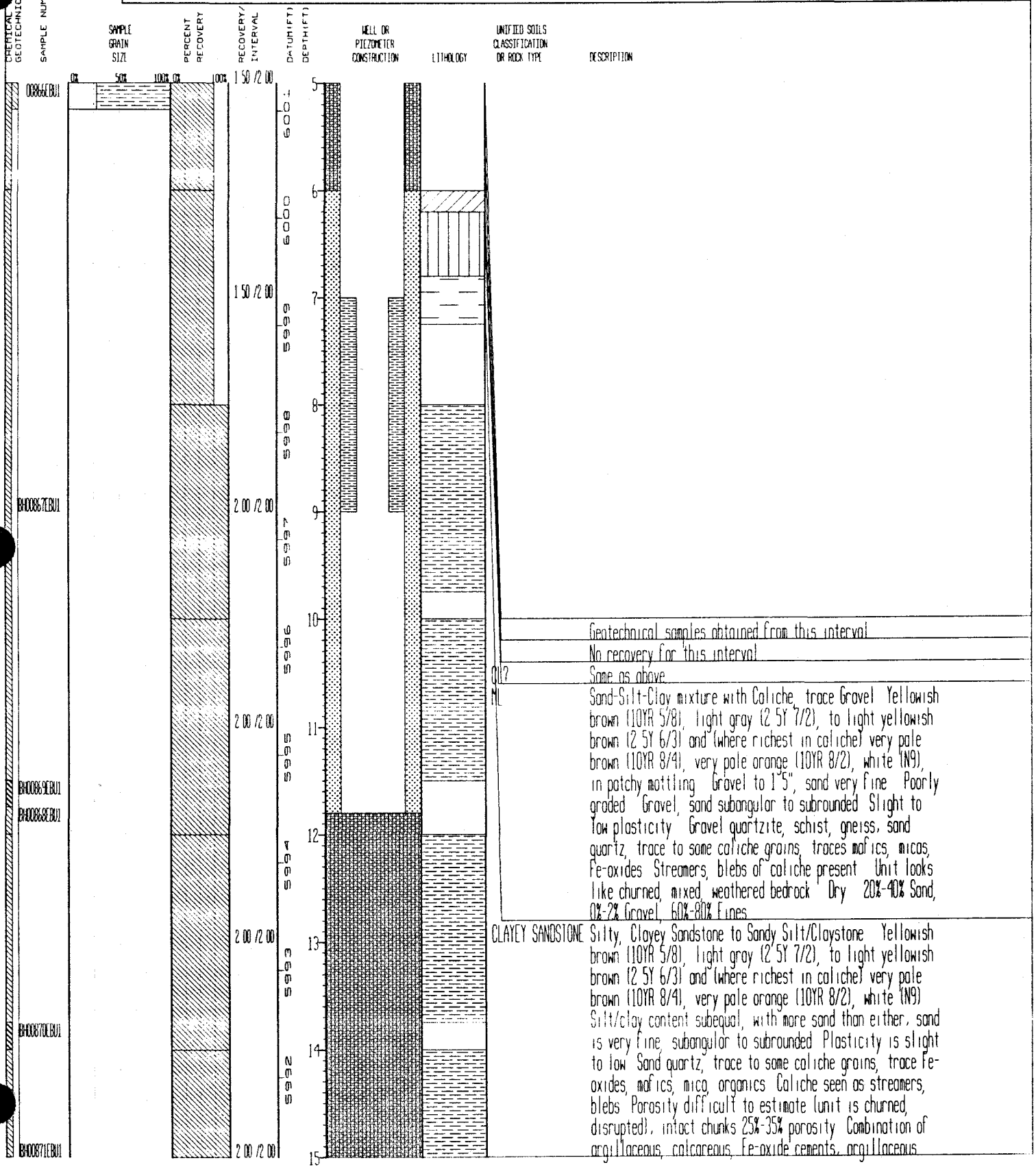
STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 18.0	GROUND ELEVATION (FT):	6006.26	PROJECT NUMBER:	EMAD	LOG OF BORING NUMBER:
NORTH:	748357	AREA: OU1	CASING DIAMETER (IN):	2.07	GEOLOGIST:	WGP/JAB	39691
EAST:	2083634	LOCATOR NUMBER: K8	BOREHOLE DIAMETER (IN):	11.50	DATE DRILLED:	11/26/91	

REMARKS:



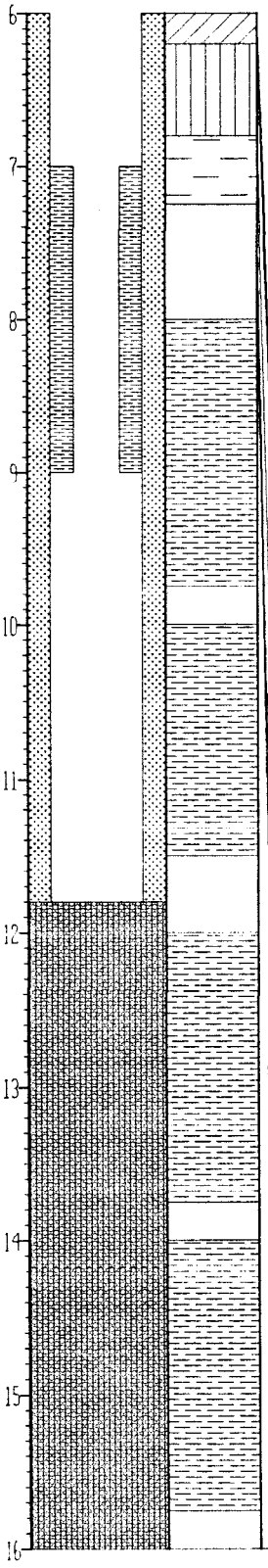
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
SM:	Gravelly, Silty Sand: Very dark brown (10YR 2/2) to brown/dark brown (7.5YR 4/3, 7.5YR 4/4), with clots of caliche in upper 0.2' that are white (10YR 8/2 to 2.5Y 8/2) and clay that is red (2.5YR 4/6). Gravel to 1" (average approx. 0.3"), sand v.f.g. to v.c.g. (mean=m.g.). Well graded. Gravels subangular to subrounded, sands same. Gravels quartzite, gneiss, schist; sands quartz, some rock fragments, traces caliche grains, Fe-oxides, mafics, mica, organics (interval is rooted). Calcareous--heavy at top, with caliche, less below approx. 0.2'. No bedding apparent. Slightly moist. 25%-30% Gravel, 40% Sand, 30%-35% Fines, (20%-27% Silt)
	No recovery for this interval
	Core retained in VOA sleeve
SC:	Gravelly, Clayey, Silty Sand: Dark reddish brown (5YR 3/4); bottom 3" is dark reddish brown (2.5YR 2.5/3). Gravel to 1" (average 0.3"-0.4"), sand v.f.g. to v.c.g. (mean=m.g.). Well graded. Gravels are subangular to subrounded (with a few angular clasts, probably fractured during drilling); sands angular to subrounded. Medium to low plasticity. Gravels quartzite, schist, gneiss; sands quartz, some rock fragments, trace to some Fe-oxides (color may be clue that these are Fe/Mn oxides), traces mafics, micas. Traces calcareous content, organics. No bedding apparent. Slightly moist to dry. 10%-15% Gravel, 40%-45% Sand, 40%-50% Fines (25%-30% Clay)
	No recovery for this interval
	Core retained in VOA sleeve
GM:	Silty Gravel with Sand and Clay: Yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/4). Gravel to 2" (average approx. 0.4"); sand v.f.g. to c.g. (mean=f.g.). Subangular to subrounded (with a few angular, drill-fractured gravels) clastics. Gravels quartzite, schist, gneiss; sands quartz, some rock fragments, traces caliche grains, mica, mafics, organics, metal shavings (from drill?). Calcareous. No apparent bedding other than fairly sharp lower contact. Dry. 35%-40% Gravel, 15%-20% Sand, 42%-47% Fines (approx. 25% Silt)
CL?:	Caliche-Clay-Silt mixture with Gravel: Very pale brown (10YR 8/4). Gravel to 1" (gravel content greater in portion below missing section than in portion above missing section); sand v.f.g. to v.c.g. (mean=f.g. to m.g.). Poorly to moderately graded. Gravel and sand are subangular to subrounded. Slight to low plasticity. Gravels are quartzite, schist, gneiss; sands are quartz, caliche grains, some rock fragments, traces Fe-oxides, mafics, mica, organics. Abundant caliche, but texture remains malleable and clay-like rather than crumbly like coliche with little clay. No bedding apparent. Dry. 10%-20% Gravel, 5%-10% Sand, 75%-85% Fines (30%-35% Silt)

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 18 0	GROUND ELEVATION (FT)	6006 26	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748357	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	WGP/JAB	39691
EAST	2083634	LOCATOR NUMBER K8	BOREHOLE DIAMETER (IN)	11 50	DATE DRILLED	11/26/91	
REMARKS							



STATE PLANE COORDINATE		TOTAL DEPTH (FT) 18 0	GROUND ELEVATION (FT)	6006 26	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748357	AREA 001	CASING DIAMETER (IN)	2 07	GEOLOGIST	WGP/JAB	39691
EAST	2083634	LOCATION NUMBER K8	BOREHOLE DIAMETER (IN)	11 50	DATE DRILLED	11/26/91	
REMARKS							

CHEMICAL SAMPLE DEPTH
GEOTECHNICAL SAMPLE DEPTH
SAMPLE NUMBER
SAMPLE GRAIN SIZE (0% 50% 100%)
PERCENT RECOVERY (0% 100%)
RECOVERY INTERVAL
DATUM (FT)
DEPTH (FT)
WELL OR PIEZOMETER CONSTRUCTION
LITHOLOGY
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE
DESCRIPTION



Sample number	Recovery interval	Unified soils classification or rock type	Description
			No recovery for this interval
		ML?	Same as above
		ML	Sand-Silt-Clay mixture with Caliche, trace Gravel Yellowish brown (10YR 5/8), light gray (2 5Y 7/2), to light yellowish brown (2 5Y 6/3) and (where richest in caliche) very pale brown (10YR 8/4), very pale orange (10YR 8/2), white (N9), in patchy mottling Gravel to 1 5", sand very fine Poorly graded Gravel, sand subangular to subrounded Slight to low plasticity Gravel quartzite, schist, gneiss, sand quartz, trace to some caliche grains, traces mafics, micas, Fe-oxides Streamers, blebs of caliche present Unit looks like churned, mixed, weathered bedrock Dry 20%-40% Sand, 0%-2% Gravel, 60%-80% Fines
BH00867EB01	1 50 /2 00		
BH00868EB01	2 00 /2 00		
BH00869EB01	2 00 /2 00		
BH00870EB01	2 00 /2 00	CLAYEY SANDSTONE	Silty, Clayey Sandstone to Sandy Silt/Claystone Yellowish brown (10YR 5/8), light gray (2 5Y 7/2), to light yellowish brown (2 5Y 6/3) and (where richest in caliche) very pale brown (10YR 8/4), very pale orange (10YR 8/2), white (N9) Silt/clay content subequal, with more sand than either, sand is very fine, subangular to subrounded Plasticity is slight to low Sand quartz, trace to some caliche grains, trace Fe-oxides, mafics, mica, organics Caliche seen as streamers, blebs Porosity difficult to estimate (unit is churned, disrupted), intact chunks 25%-35% porosity Combination of argillaceous, calcareous, Fe-oxide cements, argillaceous dominant except in caliche-rich areas Moderately friable, moderately to extremely fissile Any bedding, fractures now obscured by drilling process Dry 40% Sand, 30% Silt, 30% Clay Top of bedrock = 6 8'
BH00871EB01	2 00 /2 00		
			No recovery for this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 18 0	GROUND ELEVATION (FT) 6006 26	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	748357	AREA OU1	CASING DIAMETER (IN) 2 07	GEOLOGIST WGP/JAB	39691
EAST	2083634	LOCATOR NUMBER K8	BOREHOLE DIAMETER (IN) 11 50	DATE DRILLED 11/26/91	
REMARKS					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT) / DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50%	100% 0% 100%	1 50 /2 00	5999				
					5998				
	BH00867EBU1			2 00 /2 00	5997				
					5996				
				2 00 /2 00	5995				
	BH00869EBU1								
	BH00868EBU1				5994				
				2 00 /2 00	5993			CLAYEY SANDSTONE	Silty, Clayey Sandstone to Sandy Silt/Claystone Yellowish brown (10YR 5/8), light gray (2 5Y 7/2), to light yellowish brown (2 5Y 6/3) and (where richest in caliche) very pale brown (10YR 8/4), very pale orange (10YR 8/2), white (N9) Silt/clay content subequal, with more sand than either, sand is very fine, subangular to subrounded Plasticity is slight to low Sand quartz, trace to some caliche grains, trace Fe-oxides, mafics, mica, organics Caliche seen as streamers, blebs Porosity difficult to estimate (unit is churned, disrupted), intact chunks 25%-35% porosity Combination of argillaceous, calcareous, Fe-oxide cements, argillaceous dominant except in caliche-rich areas Moderately friable, moderately to extremely fissile Any bedding, fractures now obscured by drilling process Dry 40% Sand, 30% Silt, 30% Clay, Top of bedrock = 6 8'
	BH00870EBU1				5992				
	BH00871EBU1			2 00 /2 00	5991				
					5990				No recovery for this interval
									Core retained in VOA sleeve
				2 00 /2 00				CLAYSTONE	Claystone with Silt Yellowish brown (10YR 5/6, 10YR 5/8) (this color appears to be absent below approx 16 3') and light gray (2 5Y 7/2), light brownish gray (2 5Y 6/2), and

7 8 9 10 11 12 13 14 15 16 17

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 18 0	GROUND ELEVATION (FT)	6006 26	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748357	AREA OU1	CASING DIAMETER (IN)	2 07	GEOLOGIST	WGP/JAB	39691
EAST	2083634	LOCATOR NUMBER K8	BOREHOLE DIAMETER (IN)	11 50	DATE DRILLED	11/26/91	

REMARKS

CHEMICAL SAMPLE DEPTH
GEOTECHNICAL SAMPLE DEPTH
SAMPLE NUMBER
SAMPLE GRAIN SIZE
PERCENT RECOVERY
RECOVERY/INTERVAL
DATUM (FT)
DEPTH (FT)
WELL OR PIEZOMETER CONSTRUCTION
LITHOLOGY
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE
DESCRIPTION

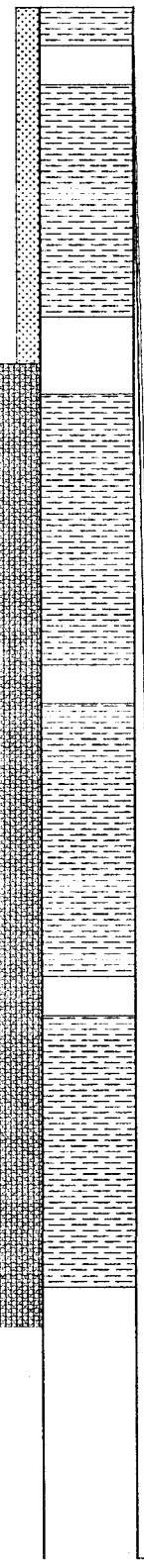
0% 50% 100% 0% 100%

BH00869EBU1
BH00868EBU1
BH00870EBU1
BH00871EBU1

2 00 /2 00
2 00 /2 00
2 00 /2 00
2 00 /2 00

5996 5995 5994 5993 5992 5991 5990 5989 5988 5987

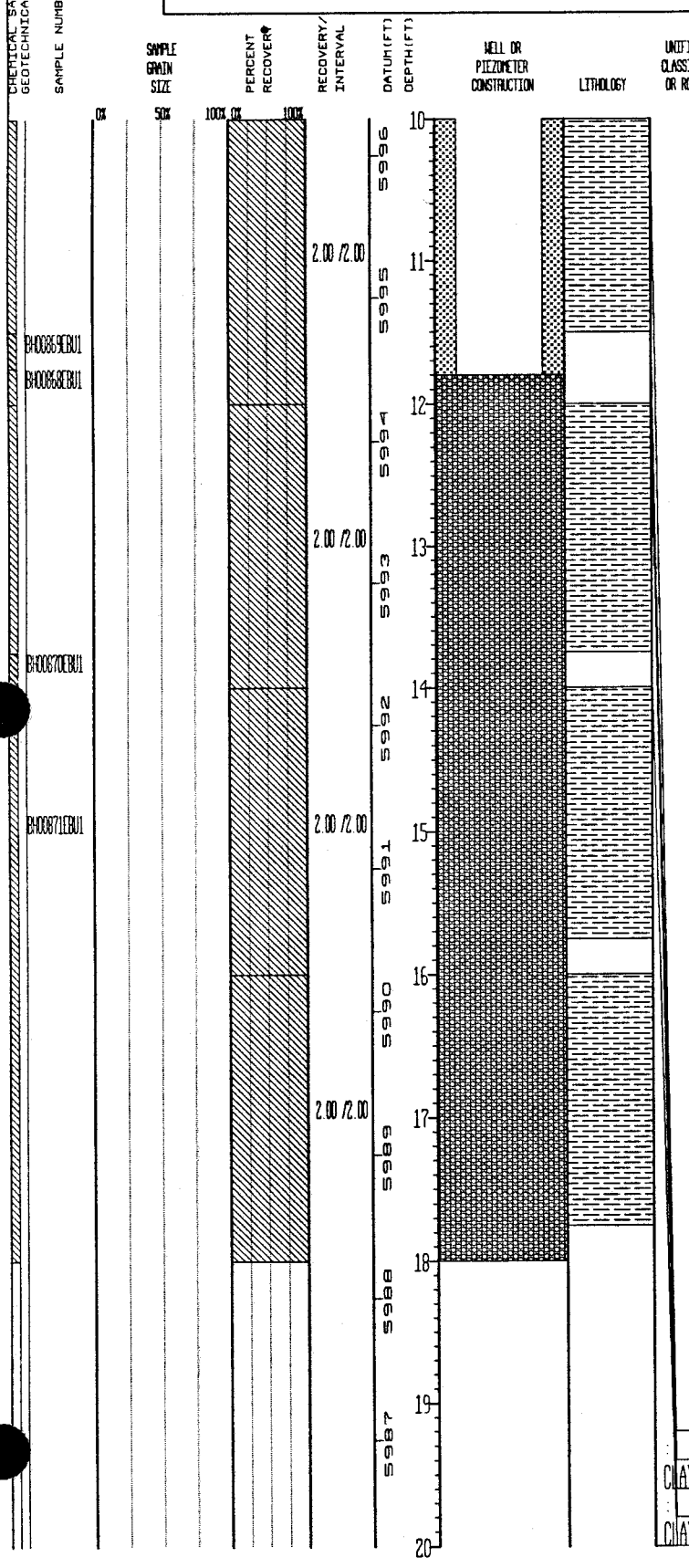
10 11 12 13 14 15 16 17 18 19



CLAYSTONE — Claystone with Silt Yellowish brown (10YR 5/6, 10YR 5/8) (this color appears to be absent below approx 16 3') and light gray (2 5Y 7/2), light brownish gray (2 5Y 6/2), and light yellowish brown (2 5Y 6/3, 2 5Y 6/4), caliche-rich areas very pale brown (10YR 8/4) to very pale orange (10YR 8/2 to white (N9) Up to approx 20% silt, single 1" clast of cryptocrystalline calcite present at approx 10 7'-10 8' Porosity nil-approx 10%, and higher in caliche zones Cement mainly argillaceous, with substantial Fe-oxide and calcareous components in some areas Non to slightly friable, slightly to very fissile (estimated from pulverized portions at 12 2'-13 1', 14 0'-17 75', to a lesser extent 8 0'-8 9') Traces organics (most notable above approx 9 3'), Mn-oxides as thin planar deposits, mainly below 14 0') which may heal (cont below)

Core retained in VOA sleeve

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 18.0	GROUND ELEVATION (FT): 6006.26	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	748357	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: WGP/JAB	39691
EAST:	2083634	LOCATOR NUMBER: K8	BOREHOLE DIAMETER (IN): 11.50	DATE DRILLED: 11/26/91	
REMARKS:					



Core retained in VOA sleeve

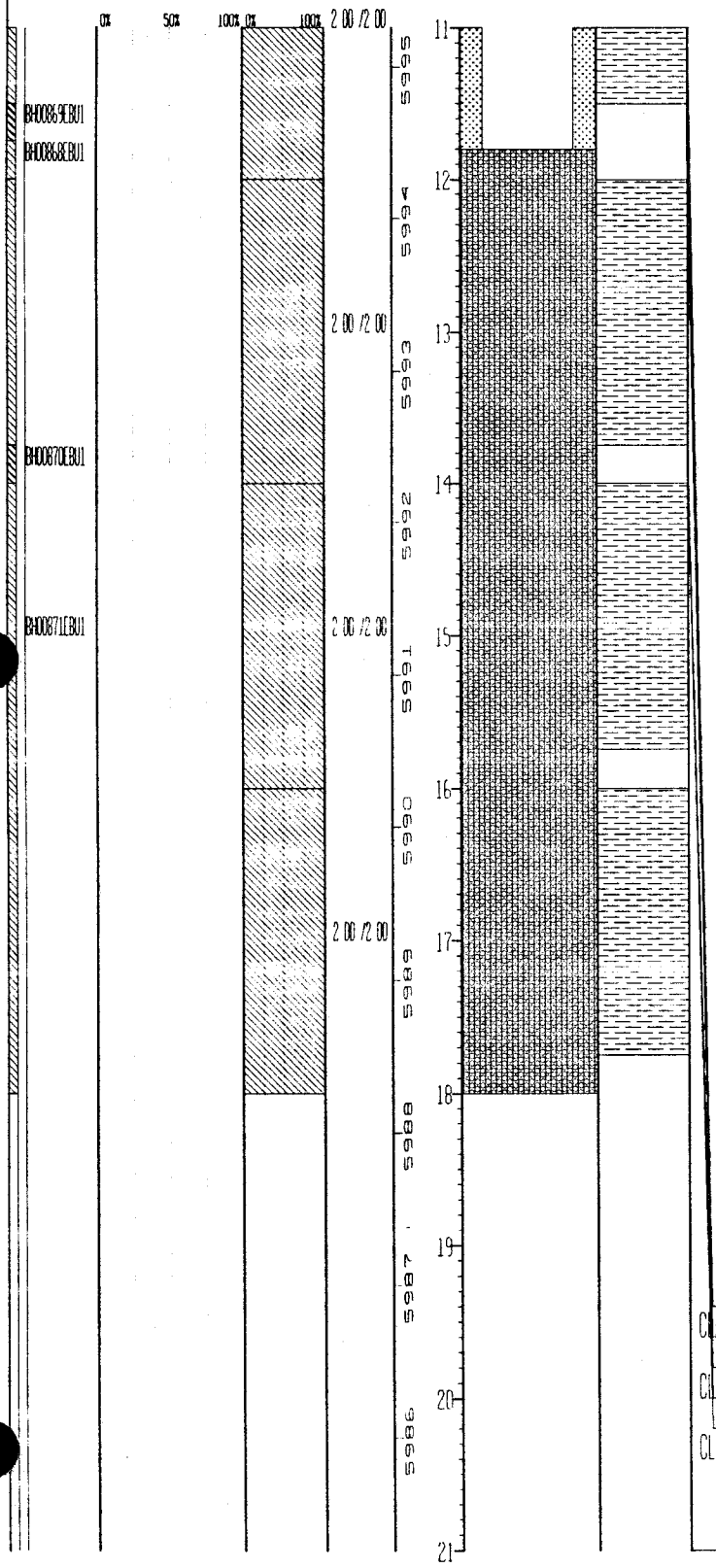
CLAYSTONE: Same as above

Geotechnical samples obtained from this interval

CLAYSTONE: Same as above

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 18 0	GROUND ELEVATION (FT)	6006 26	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	748357	AREA 001	CASING DIAMETER (IN)	2 07	GEOLOGIST	WGP/JAB	39691
EAST	2083634	LOCATION NUMBER K8	BOREHOLE DIAMETER (IN)	11 50	DATE DRILLED	11/26/91	
REMARKS							

CHEMICAL SAMPLE DEPTH
GEOTECHNICAL SAMPLE DEPTH
SAMPLE NUMBER
SAMPLE GRAIN SIZE (0% 50% 100%)
PERCENT RECOVERY (0% 100%)
RECOVERY/INTERVAL
DATUM (FT)
DEPTH (FT)
WELL OR PIEZOMETER CONSTRUCTION
LITHOLOGY
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE
DESCRIPTION



CLAYSTONE	Same as above Geotechnical samples obtained from this interval
CLAYSTONE	Same as above VOA sample obtained from this interval
CLAYSTONE	(cont from above) fractures that are now obscured by condition of core Silty lens present at 12 0'-12 2' Color banding seen in most places where core is intact.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 18.0	GROUND ELEVATION (FT): 6006.26	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH: 740357	AREA: OU1	CASING DIAMETER (IN): 2.07	GEOLOGIST: WGP/JAB	39691
EAST: 2083634	LOCATOR NUMBER: K8	BOREHOLE DIAMETER (IN): 11.50	DATE DRILLED: 11/26/91	
REMARKS:				

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM(FT)	DEPTH(FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	B40071EB01	0% 50%	100% 0% 100%	2.00 /2.00	5991	15				
					5990	16				
				2.00 /2.00	5989	17				
					5988	18				
					5987	19				
					5986	20				
					5985	21				
					5984	22				
					5983	23				
					5982	24				
						25				

CLAYSTONE: (cont. from above) fractures that are now obscured by condition of core. Silty lens present at 12.0'-12.2'. Color banding seen in most places where core is intact; unable to determine if these are depositional or diagenetic. Condition of core obscures any fractures which may be present. Dry. Ironstone nodule present at 16.2'. MnOx staining from 16.0'-17.2'. 100% Fines (80%-93% Clay)

Core retained in VOA sleeve

CLAYSTONE: Same as above

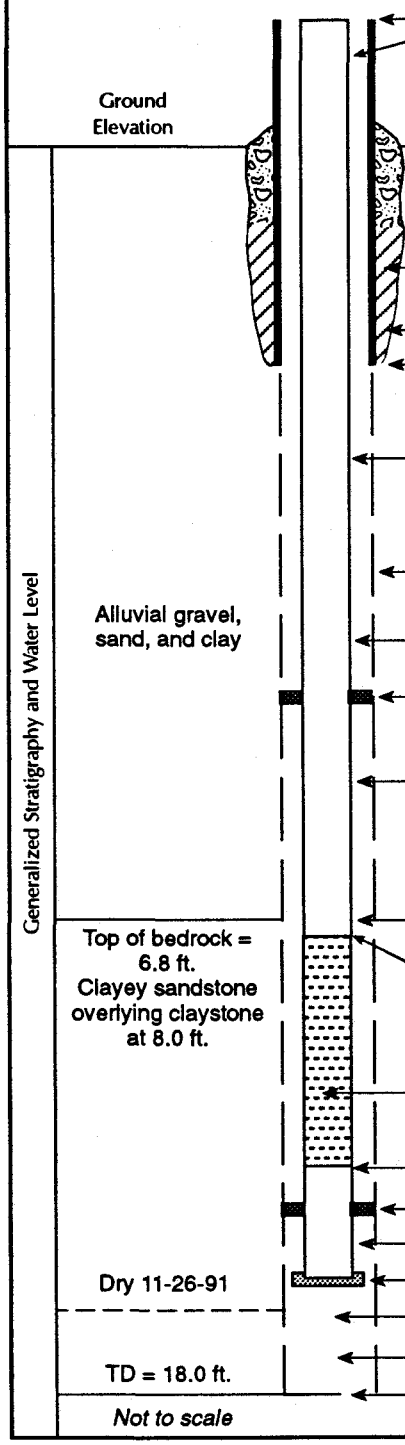
Core retained in VOA sleeve

Total Depth = 18.0 ft.

Form GT6A

U.S. Department of Energy
Rocky Flats Plant
Groundwater Monitoring Well and Piezometer Report

Project	OU1 Phase III RFI/RI	Northing	748356.9583 ft.	Page	1 of 1
Location	881 Hillside	Easting	2083634.4566 ft.	Well No.	39691
Date Completed	11-11-91	Original Depth	18.0 ft.	Aquifer	Bedrock
Inspected by	B. Polivka	Date	11-26-91		
Checked by	J. Ostergren	Date	7-21-92	Depth Interval	0 - 18.0 ft.



Elevation of top of surface casing/riser pipe	6008.76 ft./6008.37 ft.
Height of top of surface casing/riser pipe above ground surface	2.5 ft./2.11 ft.
Depth of surface seal below ground surface	3.0 ft.
Type of surface seal	Concrete
Surface casing ID	6.25 in.
Type of surface casing	Steel
Grout	
Depth of surface casing below ground	2.5 ft.
Riser pipe ID	2.07 in.
Type of riser pipe	Schedule 40 PVC
Borehole diameter	11.5 in.
Depth of borehole	18.0 ft.
Type of backfill	NA
Approximate depth of 2-inch stainless steel centralizer	
Elevation/depth top of seal	3.0 ft.
Type of seal	0.25 in. bentonite pellets
Elevation/depth bottom of seal	6.0 ft.
Type of filter pack	16-40 silica sand
Depth of top of filter pack	6.0 ft.
Elevation/depth top of screened section	7.0 ft.
Type of screened section	Schedule 40 PVC
Describe openings	0.01 in. horizontal slot
Screened section ID	2.07 in.
Elevation/depth bottom of screened section	9.0 ft.
Approximate depth of 2-inch stainless steel centralizer	
Length of blank section	2.0 ft.
Elevation/depth bottom of plugged blank section	11.0 ft.
Elevation/depth bottom of sand column	11.8 ft.
Type of backfill below observation pipe	Natural
Elevation/depth of hole	18.0 ft.

Rev. 10/5/92

INDEX OF DATA

Borehole Location Number:	**39791**
Monitoring Well Location Number:	N/A
Piezometer Location Number:	N/A

Data Available:

✔ Geologic Borehole Log (LOGGER Format)

__ Geophysical Log

__ Well Construction Summary

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 8 0	GROUND ELEVATION (FT) 5730 37	PROJECT NUMBER EMAD	LOG OF BORING NUMBER
NORTH	747351	AREA 001	CASING DIAMETER (IN)	GEOLOGIST WGP/JAB	39791
EAST	2089761	LOCATOR NUMBER 01	BOREHOLE DIAMETER (IN) 7 25	DATE DRILLED 11/26/91	

REMARKS

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00872EBU1	0% 50% 100%	0% 100%	1 90 /2 00	5730	0			ML	Clayey Silt with Sand Very dark brown (10YR 2/2) to very dark grayish brown (10YR 3/2) in upper portion, gradually changing with increasing depth to dark grayish brown (10YR 4/2) Sand is v f g to c g (mean=v f g to f g), rare pebbles (approx 0 25") present towards bottom of interval, subequal silt, clay content, with silt slightly greater Poorly graded Angular to subrounded sands Low plasticity (therefore, more like cl in this aspect than ml) Sand is quartz, traces rock fragments, mafics, mica Trace to some organics (interval is rooted) Calcareous content increases from nil at top to abundant at bottom, with sharp increase at approx 0 6' No bedding apparent Dry 8% Sand, 92% Fines (approx 55% Silt)
					5729	1				
					5728	2				
	BH00874EBU1			0 50 /2 00	5727	3			CL	Silty Clay with traces Sand and Gravel Dark grayish brown (10YR 4/2) to dark yellowish brown (in Rock Color Chart instead of Munsell Soil Color Chart, has same designation, 10YR 4/2) 1% pebbly gravel (to 0 6") in portion above 1 9', to 10% gravel (to 1") below 2 0', trace (3%) sand (v f g to v c g, mean=f g), balance fines, approx 65% clay above 1 9', approx 45% clay below 2 0' Poor to moderate grading Subangular to subrounded gravels, angular to subrounded sands Low to medium plasticity Gravels schist, gneiss, quartzite, sands quartz, traces rock fragments, mafics, caliche grains, mica Trace organics (interval is rooted) Calcareous No bedding apparent Dry approx 1-10% Gravel, 3% Sand, 87%-96% Fines (approx 45%-65% Clay)
					5726	4				
				1 90 /2 00		5				
					5725					No recovery for this interval
									CL	Same as above
	BH00875EBU1									No recovery for this interval
					5724	6			GM	Gravelly, Silty Sand Yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/4) Gravel to 1 75" (average approx 0 3") sand v f g to v c g (mean=m g) Well graded Gravel subangular to subrounded, sand some Gravels gneiss, schist, quartzite, sands quartz, some rock fragments, traces mafics, mica, Fe-oxides, feldspar No bedding apparent Transitional contact with underlying unit Very dry 20% Gravel, 53% Sand, 22% Fines (approx 20% Silt)
	BH00876EBU1			2 00 /2 00		7				
					5723					
						8			CL	Silty Clay with Sand and trace Gravel Grayish brown (2 5Y 5/2) Gravel to 1", sand v f g to v c g (mean=m g to c g) approx 23%-27% silt, balance clay Poorly graded Subangular to subrounded clastics Low to med plasticity Gravels schist, gneiss, quartzite, sands quartz, some rock fragments, traces mica, mafics, Fe-oxides, feldspar, garnet Caliche blebs and grains (trace to some) also present Transitional contacts with over-, underlying units No bedding apparent Dry 3%-6% Gravel, 7% Sand, 87-90% Fines (approx 23%-27% Silt)
					5722	9				
					5721	10			CLAYSTONE	Claystone with Silt From 4 65'-5 15', gray (10YR 6/1) to grayish brown (10YR 5/2), from 5 15' to 6 5', grayish brown (10YR 5/2) to dark grayish brown (10YR 4/2), from

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 8 0	GROUND ELEVATION (FT)	5730 37	PROJECT NUMBER	EMAD	LOG OF BORING NUMBER
NORTH	747351	AREA OU1	CASING DIAMETER (IN)		GEOLOGIST	WGP/JAB	39791
EAST	2089761	LOCATION NUMBER 07	BOREHOLE DIAMETER (IN)	7 25	DATE DRILLED	11/26/91	
REMARKS							

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH00875EB01	0% 50% 100%	0% 100%	1 90 /2 00	5725	5				
	BH00876LB01			2 00 /2 00	5724	6				
					5723	7				
					5722	8				
					5721	9				
					5720	10				
					5719	11				
					5718	12				
					5717	13				
					5716	14				
						15			CLAYSTONE	Claystone with Silt From 4 65'-5 15', gray (10YR 6/1) to grayish brown (10YR 5/2), from 5 15' to 6 5', grayish brown (10YR 5/2) to dark grayish brown (10YR 4/2), from 6 5' to 7 15', light brownish gray (2 5Y 6/2), some color-banding is present in transition from 5 15'-6 5' portion to 6 5'-7'15' portion 15%-25% silt, less silt above 6 5' than below 6 5' Porosity 2%-8% Cement argillaceous plus trace calcareous throughout Non to slightly friable and fissile Trace organics, Fe-oxides, Fe-oxide cement also present, but only in rare, scattered, trace amounts, mainly below 6 2' Thin, wavy, often vague, discontinuous laminae present at 6 0' to base of unit, subhorizontal-10 degrees Generally harder to see below 6 5' (less contrast) Varves common Fe(/Mn?)-oxide-healed fracture at 6 45' (cont)
										VOA sample obtained from this interval
										No recovery for this interval
									CLAYSTONE	(cont from above) Below 6 5', trace sand (<1%) is present, very fine, subangular to subrounded, quartz Dry above 6 6', moist below 6 6' 100% Fines (75%-85% Clay), <1% Sand below 6 5' Top of bedrock = 4 65'
									SANDY SILTSTONE	Sandy, Clayey Siltstone Light gray (2 5Y 7/2) to, with increasing Fe-oxide content, light yellowish brown (2 5Y 6/4) to yellowish brown (10YR 5/8) Sand is v f g, angular to subrounded Porosity approx 30%-35% Cement argillaceous plus traces calcareous and Fe-oxides Slightly to moderately friable and fissile Sand is quartz plus traces Fe-oxide grains, mafics, mica Thin to medium parallel laminations present below approx 7 8', and at approx 7 4'-

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 8.0	GROUND ELEVATION (FT): 5730.37	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:
NORTH:	747351	AREA: OU1	CASING DIAMETER (IN):	GEOLOGIST: WGP/JAB	39791
EAST:	2089761	LOCATOR NUMBER: 07	BOREHOLE DIAMETER (IN): 7.25	DATE DRILLED: 11/26/91	
REMARKS:					

CHEMICAL SAMPLE DEPTH / GEOTECHNICAL SAMPLE DEPTH	SAMPLE NUMBER		SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/ INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	BH0087GEBU1	0%	50%	100% 0% 100%	2.00 /2.00	5723	7				
						5722	8				
						5721	9				
						5720	10				
						5719	11				
						5718	12				
						5717	13			CLAYSTONE:	(cont. from above) Below 6.5', trace sand (<1%) is present; very fine, subangular to subrounded, quartz. Dry above 6.6', moist below 6.6'. 100% Fines (75%-85% Clay), <1% Sand below 6.5'. Top of bedrock = 4.65'
						5716	14			SANDY SILTSTONE:	Sandy, Clayey Siltstone: Light gray (2.5Y 7/2) to, with increasing Fe-oxide content, light yellowish brown (2.5Y 6/4) to yellowish brown (10YR 5/8). Sand is v.f.g., angular to subrounded. Porosity approx. 30%-35%. Cement: argillaceous plus traces calcareous and Fe-oxides. Slightly to moderately friable and fissile. Sand is quartz plus traces Fe-oxide grains, mafics, mica. Thin to medium parallel laminations present below approx. 7.8', and at approx. 7.4'-7.8' med. laminations at approx. 15 degrees to horiz. present. No fractures apparent. Moist. 28% Sand, 72% Fines (approx. 46-50% Silt)
						5715	15				
						5714	16				Total Depth = 8.0 ft.
							17				