GJO-MOA 19.2.3

Lithologic, Well Construction, and Field Sampling Results from the 2002 Field Investigation

October 2002

Prepared for
U.S. Department of Energy
Grand Junction Office
Grand Junction, Colorado

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Task Order Number ST03–104

MOAB PROJECT

Calculation Cover Sheet

Calc. No. Moab–10–2002–03–01–00 **Discipline:** Hydrogeology **Number of Sheets:** 2

Project:
Moab Groundwater

Site:
Moab, UT

Feature:

Sources of Data:
Field Investigations, 2002

Sources of Formulae & References:

U.S. Department of Energy (DOE), 2002. *Groundwater and Tailings Pile Characterization Activities to Support the Plan for Remediation Work Plan*, GJO-2002-337-TAR, prepared for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, June.

Preliminary Calc. ☐ **Final Calc.** ☒ **Supersedes Calc. No.** _____

		K. Kemp	10/10/02	C. Goodnight	10/10/02	W. Lyf	10/10/02
Rev. No.	Revision	Calculation by	Date	Checked by	Date	Approved by	Date

1.0 Purpose

The purpose of this calculation set is to provide lithologic, well construction information, and field sampling results for 14 monitor wells installed during the drilling campaign conducted at the Moab Project Site from July 9, 2002, through August 25, 2002. All fieldwork was performed in accordance with the *Groundwater and Tailings Pile Characterization Activities to Support the Plan for Remediation Work Plan*, June (DOE 2002). The drilling was performed by Boart Longyear Company using a Gus Pech 300 Sonic Rig.

The following information is provided:

2.0 Boring and Well Logs

Lithologic and well completion logs were prepared for 14 monitor wells installed during the course of the drilling campaign. Logs are provided in Attachment 1. Core samples collected from selected intervals from each boring are stored at the Moab Project Site for future reference.

3.0 Monitor Well Locations

A location map showing where each monitor well was installed with respect to the Moab Project Site is provided as Attachment 2.

State plane survey coordinates for each of the 14 monitor wells are summarized in the coordinate location table provided as Attachment 3. The coordinate location table also provides the surveyed land surface elevation and the date each well was installed.

4.0 Monitor Well Construction

Borehole depth and diameter, top of casing elevation, well depth and diameter, and screen intervals are provided on the monitor well report as Attachment 4.

5.0 Field Conductivity Measurements

Ground-water grab samples were collected at discrete depth intervals from selected borings using the either Hydropunch® sampling method or bailer (first water only) and analyzed in the field for specific conductance. Results of the field analyses are presented as Attachment 5.

6.0 Preliminary Findings

A summary of the depths to major lithologic changes and geologic contacts is presented in Attachment 6.

Bedrock was encountered at six locations (MOA–430, –431/443, –432, –433, –434, and –435/444) at depths of 92.5-ft, 81-ft, 10-ft, 82-ft, 59.5-ft, and 161-ft below land surface, respectively. All of the borings that encountered bedrock were drilled near the northern boundary of the site. Borings MOA–430 and –431 terminated in the Moenkopi Formation. Boring

MOA–432 terminated in the Navajo Sandstone. Boring MOA–433 terminated in the Entrada Sandstone. Borings MOA–434 and –435 terminated in the Chinle Formation.

Most of the borings drilled within the site boundary encountered sand and gravels deposited by the ancestral Colorado River. The gravel clasts typically consist of rounded pebbles and cobbles of resistant crystalline rock types that have been eroded and transported from metamorphic and igneous rocks present in the upper Colorado River basin. The greatest thickness of Colorado River alluvium was encountered in borings (MOA–436, –437, and –439). These borings terminated in alluvium at depths of 205-ft, 250-ft, and 304-ft below land surface, respectively. Bedrock was not reached at these borings. Therefore, the thickness of the river alluvial deposits is unknown and exceeds the thickness of 178, 148.5, and 186.5 ft, respectively, found in each boring.

Colorado River alluvium was encountered between 27-ft and 161-ft below land surface at boring MOA–435. Wood fragments discovered in alluvium collected from 116.5-ft below land surface indicate a radiocarbon age date of 45,340 years old. The analytical results are included as Attachment 7. This translates to a depositional/subsidence rate of 0.002 ft/yr (89.5 ft/45,340 yrs).

Elevation contours drawn on the top of the river gravel contact is presented in the map as Attachment 8. Control points used to generate the kriged contour surface are presented in Attachment 9.

Three borings (MOA–437, –438, and –439) were drilled through the top of the tailings pile into underlying loess, sand, and gravel deposits. The base of the mill tailings was encountered at 41-ft, 73-ft, and 82.5-ft below land surface, respectively. The tailings lower most material consist of 4-ft to 9-ft of moist, dense, clay to silty clay. Native material directly beneath the contact was dry. The only other boring (MOA–442) that encountered tailings was located just off the slope at the southwest side of the pile. Similarly, the native material directly beneath the moist tailings at the contact was dry. Radiologic analysis of eight soil samples collected from 12-ft to 22-ft below land surface at MOA–442 is provided as Attachment 10. Radium-226 concentrations range from 404 pCi/g to 1,537 pCi/g. Total uranium concentrations range from 537 pCi/g to 2,191 pCi/g.

Attachment 1

Boring and Well Logs

MONITORING WELL COMPLETION LOG MOA01-0430

PROJECT MOAB
LOCATION Moab, UT
SITE MOAB
WELL NUMBER 0430

NORTH COORD. (FT) 6667757.07
EAST COORD. (FT) 2182243.89
HOLE DEPTH (FT) 113.00
WELL DEPTH (FT) 106.30

DATE DRILLED 07/13/2002 to 07/14/2002
SURFACE ELEV. (FT NGVD) 4022.60
TOP OF CASING (FT) 4022.10
MEAS. PT. ELEV. (FT) 4022.10
SLOT SIZE (IN) 0.020
BIT SIZE(S) (IN) 6.0

WELL INSTALLATION		INTERVAL (FT)		
SURFACE CASING:				
BLANK CASING:	2 in. PVC Sch 40	0.5	to	96.0
WELL SCREEN:	2 in. Slotted PVC	96.0	to	106.0
SUMP/END CAP:	2 in. PVC Sch 40	106.0	to	106.3
SURFACE SEAL:	Cement	0.0	to	2.0
GROUT:	Bentonite Grout	2.0	to	84.0
SEAL:	Bentonite Chips	84.0	to	88.0
UPPER PACK:	20-40 Silica Sand	88.0	to	91.5
LOWER PACK:	10-20 Silica Sand	91.5	to	113.0

DRILLING METHOD SONIC
SAMPLING METHOD SAMPLE TUBE
DATE DEVELOPED 07/15/2002
WATER LEVEL (FT BTOC) 60.1 on 07/15/2002
LOGGED BY Goodknight, C.
REMARKS Centralizer at 50.0 ft., and 112.0 ft. Flush Mount Well.

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
0	4020				Cement		0-5.0 ft. SAND (SP); very fine grained, light red (2.5YR 6/6), dry.
10	4010						5.0-11.0 ft. SAND (SW); mostly fine grained, but a wide range in grain sizes, ~20% rock fragments (up to 3.0" in diameter and are mostly gray limestone), light red (10Y 6/6). Large rock fragment (6.0" in diameter) @ 11.0 ft. Dry.
							11.0-13.0 ft. SILT (ML); mottled with white specs of caliche, somewhat consolidated, trace of rock fragments (paleosoil).
20	4000						13.0-24.0 ft. SAND (SP); mostly fine grained sand with small amount of silt, red (2,5YR 5/6). Dry.
							@23.5 ft. large rock fragment (slightly calcareous conglomerate). Mottled at 24.0 ft. with white calcareous specs (paleosoil), somewhat consolidated.
30	3990						24.0-49.0 ft. SAND (SP); fine grained, red (2.5YR 5/6 to 2.5YR 4/6), calcareous. Up to 10% rock fragments. Some mottled zones (representing soil horizons) with white caliche specs scattered throughout. Dry.
							34.5-35.0 ft. limestone fragments.
40	3980				Bentonite Grout		@38.0 ft. Large rock fragments (up to 4.0" diameter).
							@42.0 ft. fragment of fine grained calcareous sandstone, reddish brown (2.5YR 5/4).
							48.0-49.0 ft. fragments of calcareous cemented sandstone. Dry

MONITORING WELL COMPLETION LOG MOA01-0430

PROJECT MOAB **WELL NUMBER** 0430

SITE MOAB **DATES DRILLED** 07/13/2002 to 07/14/2002

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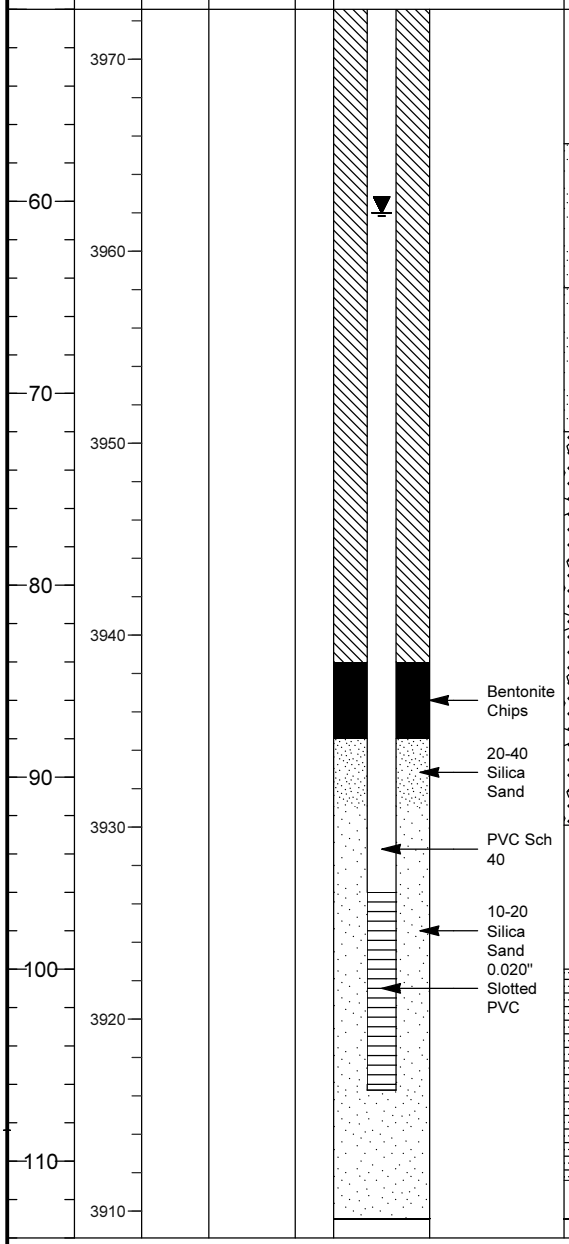

49.0-57.0 ft. SILT (ML); and very fine grained sand (SP), 5-10% rock fragments, red (2.5YR 5/6), calcareous.
@52.0 ft. fragments of a limestone pebble conglomerate. Some mottling scattered throughout-light color is caliche specs.

57.0-64.5 ft. SILTY SAND (SM); red (2.5YR 4/6), calcareous, subangular quartz and feldspar sand, becoming damp, approximately 10-20% rock fragments at 58.5-59.5 ft.
@60.5 ft. wet, trace of dark minerals.

64.5-72.0 ft. SAND (SP); red (2.5YR 4/6), fine to medium grained sand, subrounded grains, slightly calcareous, trace of dark minerals.

72.0-92.5 ft. GRAVELLY SAND (SW); sand is very fine to fine grained with 5-10% pebbles and rock fragments (up to 2.0" in diameter). A few subangular pebbles, slightly calcareous, red (2.5YR 5/6), rock fragments increase (10-20%) below 78.0 ft.

This material is ancestral Moab Wash detritus.

92.5-100.0 ft. ENTRADA SANDSTONE- SLICK ROCK MEMBER (probable): SANDSTONE; abrupt contact with weathered sandstone, fine to very fine grained, subrounded grains, trace dark minerals, slightly calcareous, friable, grayish orange (10YR 7/4) to dark yellowish orange (10YR 6/6).
97.0-98.0 ft. sand becomes mottled with dark minerals (Fe, Mn?), moderate yellowish brown (10YR 5/4), to dark yellowish brown (10YR 4/2).
98.0-100.0 ft. sandstone as above with some thin red layers. (Possible Moab Fault zone ~100.0 ft.).

100.0-113.0 ft. MOENKOPI FORMATION (possibly):
100.0-111.0 ft. SILTSTONE; mixed with very fine grained sandstone, mottled greenish gray (5GY 6/1) and pale reddish brown (10R 5/4), noncalcareous.
103.0-104.0 ft. mottled, mixed zone, some limonite alteration.
104.0-105.0 ft. soft, moderate reddish brown (10R 4/6), calcareous, moist.
105.0-110.0 ft. No recovery - soft material, probably siltstone.
110.0-111.0 ft. siltstone, as above, damp.
111.0-113.0 ft. SANDSTONE; very fine grained, light brown (5YR

MONITORING WELL COMPLETION LOG MOA01-0430

PROJECT MOAB **WELL NUMBER** 0430

SITE MOAB **DATES DRILLED** 07/13/2002 to 07/14/2002

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DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
120	3900						\5/6 to 5YR 6/4), calcareous, dry.
							Total Depth 113.0 ft.
							NOTE: Believed to be Moenkopi Formation siltstone on the south side of the Moab Fault.
130	3890						
140	3880						
150	3870						
160	3860						
170	3850						

WELL COMPLETION LOG MOA01-0431

PROJECT MOAB
LOCATION Moab, UT
SITE MOAB
WELL NUMBER 0431

NORTH COORD. (FT) 6666521.90
EAST COORD. (FT) 2182943.22
HOLE DEPTH (FT) 106.00
WELL DEPTH (FT) 99.30

DATE DRILLED 07/28/2002 to 07/29/2002
SURFACE ELEV. (FT NGVD) 4004.40
TOP OF CASING (FT) 4007.04
MEAS. PT. ELEV. (FT) 4007.04
SLOT SIZE (IN) 0.020
BIT SIZE(S) (IN) 6.0

WELL INSTALLATION		INTERVAL (FT)		
SURFACE CASING:				
BLANK CASING:	2 in. PVC Sch 40	-2.64	to	89.0
WELL SCREEN:	2 in. Slotted PVC	89.0	to	99.0
SUMP/END CAP:	2 in. PVC Sch 40	99.0	to	99.3
SURFACE SEAL:	Cement	0.0	to	2.0
GROUT:	Bentonite Grout	2.0	to	79.0
SEAL:	Bentonite Chips	79.0	to	86.0
UPPER PACK:	20-40 Silica Sand	86.0	to	87.0
LOWER PACK:	10-20 Silica Sand	87.0	to	99.3

DRILLING METHOD SONIC
SAMPLING METHOD SAMPLE TUBE
DATE DEVELOPED 07/30/2002
WATER LEVEL (FT BTOC) 47.05 on 08/13/2002
LOGGED BY Goodknight, C., Kautsky, M.
REMARKS ~10.0 -15.0 ft. north of well 0443. Centralizers @9.0 ft., 59.0 ft., and 99.0 ft. Core sample saved from 82.0-106.0 ft.

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
10	4000				Cement		0-68.0 ft. SAND (SP); red (2.5YR 5/6), fine grained sand, subrounded, moist, loose.
							7.0-8.0 ft. few pebbles (~5%).
20	3990				PVC Sch 40		11.0-14.5 ft. contains subrounded pebbles and coarser (medium) sand, then red fine sand, subrounded, moist, and loose below 14.0 ft.
30	3980						19.0-21.0 ft. contains a trace of subangular to subrounded pebbles.
40	3970				Bentonite Grout		38.0-39.0 ft. reddish yellow (5YR 6/6).
	3960						@40 ft. moisture content increasing rapidly below 40.0 ft. Becoming wet from 42.0 to 45.0 ft.

WELL COMPLETION LOG MOA01-0431

PROJECT MOAB **WELL NUMBER** 0431

SITE MOAB **DATES DRILLED** 07/28/2002 to 07/29/2002

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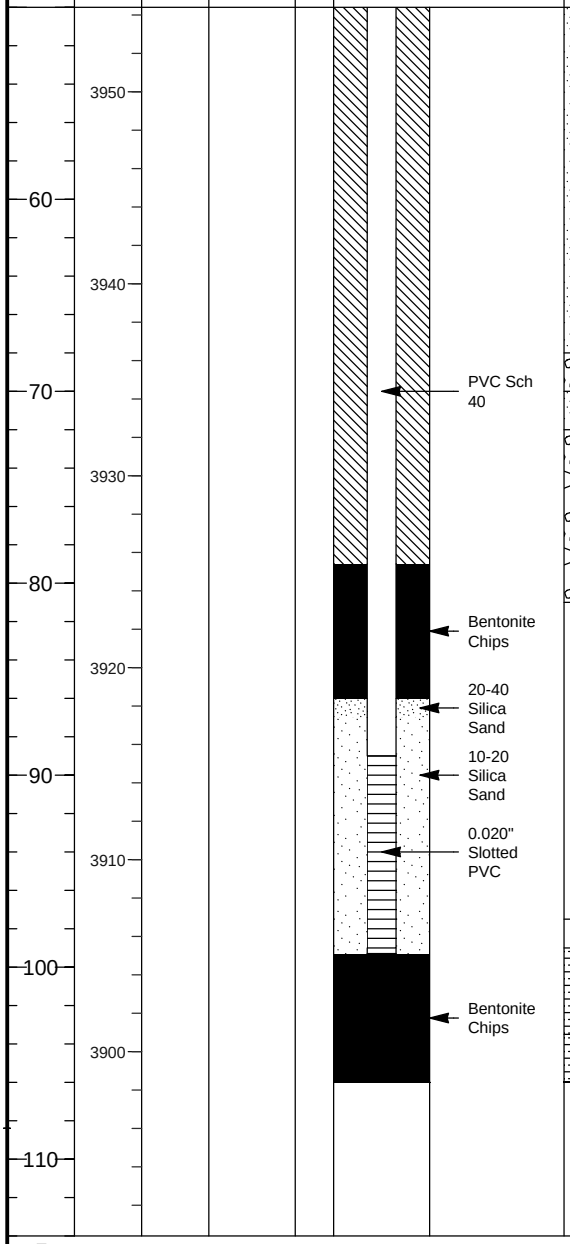
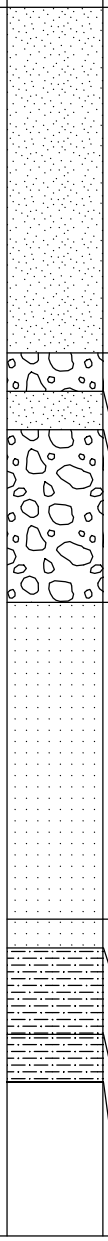




LITHOLOGIC DESCRIPTION

@50.0 ft. color of fine grained sand is red (2.5YR 5/6 or 2.5YR 4/6).

53.0-57.0 ft. very fine grained to silt size, trace of mica, wet, dark yellowish brown (10YR 4/4). Limonitic streak at 56.0 ft.

57.0-63.0 ft. 10% small pebbles (rounded) and angular rock fragments, red (2.5YR 4/6).

63.0-65.0 ft. sand, fine grained, red (2.5YR 5/6).

65.0-68.0 ft. fine to medium grained, trace of mica, subrounded grains, grayish brown (10YR 5/2).

68.0-70.0 ft. GRAVEL (GP); cobble gravel (20-30%), pebbles and cobbles (up to 4.0" in diameter), fine grained sand matrix of yellowish brown (10YR 5/4) deposited by the ancestral Colorado River.

70.0-72.0 ft. SAND (SP); fine to medium grained, dark yellowish brown (10YR 4/4).

72.0-81.0 ft. GRAVEL (GP); 40-50% cobbles (up to 6.0" diameter), matrix of medium to fine grained sand is dark grayish brown (10YR 4/2).

81.0-97.5 ft. MOENKOPI FORMATION: SANDSTONE; fine grained, friable, soft, mottled, and weathered down to ~85.0 ft. appears altered. Dark yellowish orange (10YR 6/6) color. Below 85.0 ft., color changes to grayish orange (10YR 7/4) to dark yellowish orange (10YR 6/6), non to slightly calcareous, well sorted, subrounded grains. Dry.

97.5-99.0 ft. MIXED ZONE, gray noncalcareous (gouge material), yellowish sandstone, and reddish siltstone. Possible Moab Fault Zone.

99.0-103.0 ft. MOENKOPI FORMATION -or- (UPPER PART OF CUTLER FORMATION): SILTSTONE; well cemented, trace of mica, noncalcareous, pale reddish brown (10R 5/4)-dry color. Lower part of interval is mottled with mainly reddish brown (2.5YR 5/4) and light gray (2.5Y 7/1) coloration.

103.5-106.0 ft. MIXED ZONE; gray to reddish silty material and yellow (limonitic) coloration. Obvious fractures in fine grained sandstone and some fractures are coated- both rock and fracture coating are noncalcareous.

Total Depth 106.0 ft.

MONITORING WELL COMPLETION LOG MOA01-0432

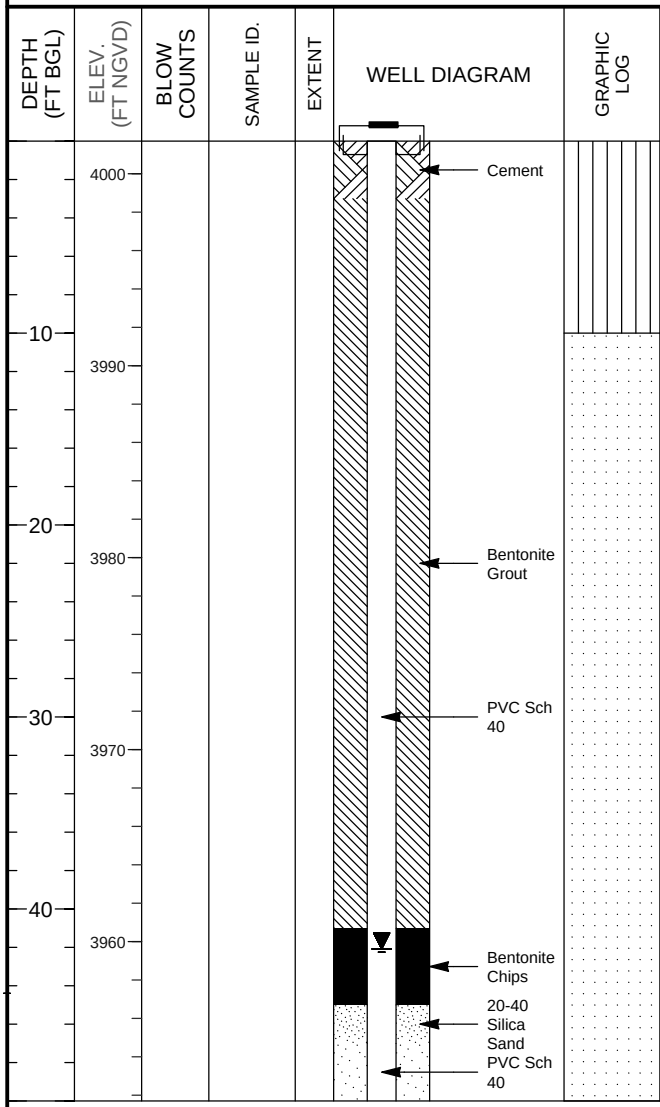
PROJECT MOAB
LOCATION Moab, UT
SITE MOAB
WELL NUMBER 0432

NORTH COORD. (FT) 6667039.84
EAST COORD. (FT) 2184809.02
HOLE DEPTH (FT) 60.30
WELL DEPTH (FT) 60.30

DATE DRILLED 07/12/2002 to 07/13/2002
SURFACE ELEV. (FT NGVD) 4001.70
TOP OF CASING (FT) 4001.47
MEAS. PT. ELEV. (FT) 4001.47
SLOT SIZE (IN) 0.020
BIT SIZE(S) (IN) 6.0

WELL INSTALLATION		INTERVAL (FT)		
SURFACE CASING:				
BLANK CASING:	2 in. PVC Sch 40	0.23	to	50.0
WELL SCREEN:	2 in. Slotted PVC	50.0	to	60.0
SUMP/END CAP:	2 in. PVC Sch 40	60.0	to	60.3
SURFACE SEAL:	Cement	0.0	to	3.0
GROUT:	Bentonite Grout	3.0	to	41.0
SEAL:	Bentonite Chips	41.0	to	45.0
UPPER PACK:	20-40 Silica Sand	45.0	to	47.0
LOWER PACK:	10-20 Silica Sand	47.0	to	60.3

DRILLING METHOD SONIC
SAMPLING METHOD SAMPLE TUBE
DATE DEVELOPED 08/06/2002
WATER LEVEL (FT BTOC) 41.85 on 07/14/2002
LOGGED BY Goodknight, C.
REMARKS Centralizer placed @59.5 ft. and 30.0 ft.



0-10.0 ft. SILT (ML); small amount of very fine grained sand, reddish yellow (5YR 6/8). Trace of rock fragments.

@6.0 ft. Navajo Sandstone chunk @ 6.0-7.0 ft.

10.0-60.0 ft. NAVAJO SANDSTONE:
10.0-32.0 ft. SANDSTONE; weathered, moderate orange pink (10R 7/4), noncalcareous, fine to very fine grained. Well fractured sandstone mostly rubblized by the sonic drilling (dry) process. Sandstone generally friable and poorly to moderately cemented. Dry.

32.0-38.0 ft. sandstone more cemented - more intact chunks in core. Most rock is moderate orange pink (10R 7/4), some limonite along fractures.

38.0-60.0 ft. sandstone less cemented (fewer intact pieces).

@ 40.0 ft. fine to very fine grained sandstone, friable (poorly cemented), non to very slightly calcareous, light brown (5YR 6/4) - wet color. Becoming damp at 45.0 ft., some crossbedding, saturated by 46.0 ft.

MONITORING WELL COMPLETION LOG MOA01-0432

PROJECT MOAB **WELL NUMBER** 0432

SITE MOAB **DATES DRILLED** 07/12/2002 to 07/13/2002

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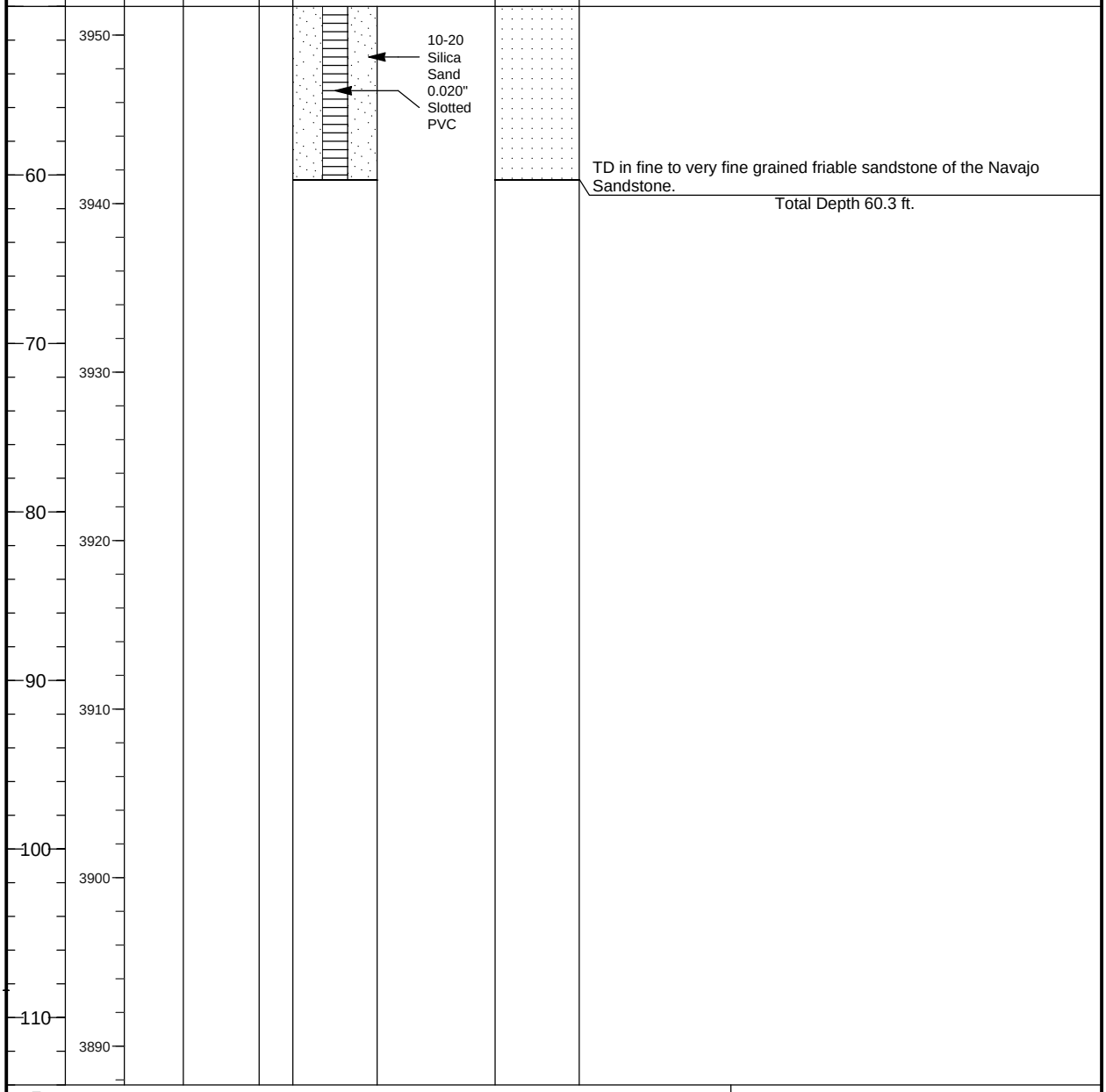


MONITORING WELL COMPLETION LOG MOA01-0433

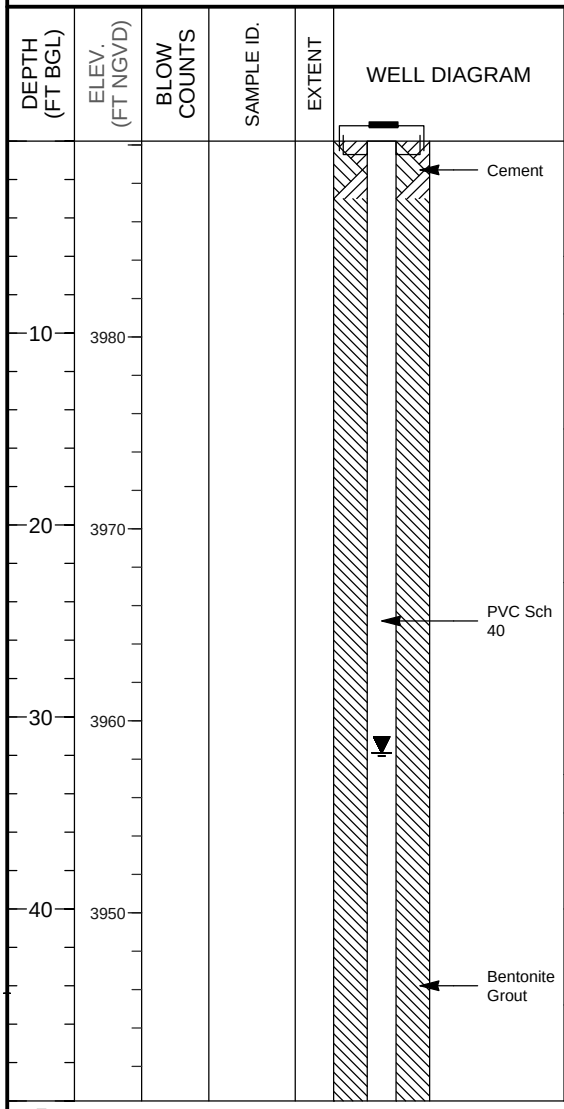
PROJECT MOAB
LOCATION Moab, UT
SITE MOAB
WELL NUMBER 0433

NORTH COORD. (FT) 6666772.57
EAST COORD. (FT) 2184863.22
HOLE DEPTH (FT) 106.00
WELL DEPTH (FT) 104.30

DATE DRILLED 07/14/2002 to 07/15/2002
SURFACE ELEV. (FT NGVD) 3990.20
TOP OF CASING (FT) 3989.99
MEAS. PT. ELEV. (FT) 3989.99
SLOT SIZE (IN) 0.020
BIT SIZE(S) (IN) 6.0

WELL INSTALLATION		INTERVAL (FT)		
SURFACE CASING:				
BLANK CASING:	2 in. PVC Sch 40	0.21	to	94.0
WELL SCREEN:	2 in. Slotted PVC	94.0	to	104.0
SUMP/END CAP:	2 in. PVC Sch 40	104.0	to	104.3
SURFACE SEAL:	Cement	0.0	to	3.0
GROUT:	Bentonite Grout	3.0	to	85.0
SEAL:	Bentonite Chips	85.0	to	89.0
UPPER PACK:	20-40 Silica Sand	89.0	to	92.0
LOWER PACK:	10-20 Silica Sand	92.0	to	106.0

DRILLING METHOD SONIC
SAMPLING METHOD SAMPLE TUBE
DATE DEVELOPED 07/15/2002
WATER LEVEL (FT BTOC) 31.65 on 08/07/2002
LOGGED BY Goodknight, C.
REMARKS Centralizers placed @ 50.0 ft., and 104.0 ft. Packer test in fine grained SS of the Dewey Bridge Member at 90.0 - 96.5 ft. Note: packers did not seal).



LITHOLOGIC DESCRIPTION

0-6.0 ft. SILT (ML); reddish yellow (5YR 6/8). Windblown material.

6.0-9.0 ft. GRAVELLY SAND (GP-SP); some silt, about 20% angular to semiangular, rock fragments (up to 4.0" in diameter), red (2.5YR 4/6), dry.

9.0-15.0 ft. SAND (SP); fine grained with some silt, ~ 5% rock fragments (up to 2.0" in diameter), red (2.5YR 4/8).

15.0-23.0 ft. SILTY SAND (SM); fine to very fine grained, red (2.5YR 5/6), subrounded to rounded grains, trace of small rock fragments, dry, trace of mica flecks. Becoming damp and more consolidated below 23.0 ft.

23.0-33.0 ft. SILT AND SAND (ML-SP); fine grained in alternating layers, red (2.5YR 5/6), rock fragments (up to 2.0" in diameter), low plasticity in silt beds.

27.0-28.0 ft. Sand, very fine grained, yellowish red (5YR 5/6), trace of mica flecks. Moist at 29.5 ft. and wet below 30.5 ft.

33.0-35.0 ft. SAND (SP); fine grained, grading to silty clay (CL).

35.0-40.0 ft. SILTY CLAY (CL-ML); red, (2.5YR 4/6), color changes to dark grayish brown (10YR 4/2) at ~ 36.0 ft. Layer is wet. Trace of mica flecks, moderate plasticity.

40.0-45.0 ft. CLAYEY SILT (ML); dark grayish brown (10YR 4/2), trace mica flecks, slightly plastic, noncalcareous, wet.

@44.0 ft., limonite streaks with ~5% rock fragments to 2.0" diameter.

45.0-52.5 ft. GRAVELLY SAND (SP-GP); sand is mostly fine grained and ~ 25% gravel (up to 2.0" in diameter), dark yellowish brown (10YR 4/4). Gravel is mainly rounded crystalline and

MONITORING WELL COMPLETION LOG MOA01-0433

PROJECT MOAB **WELL NUMBER** 0433

SITE MOAB **DATES DRILLED** 07/14/2002 to 07/15/2002

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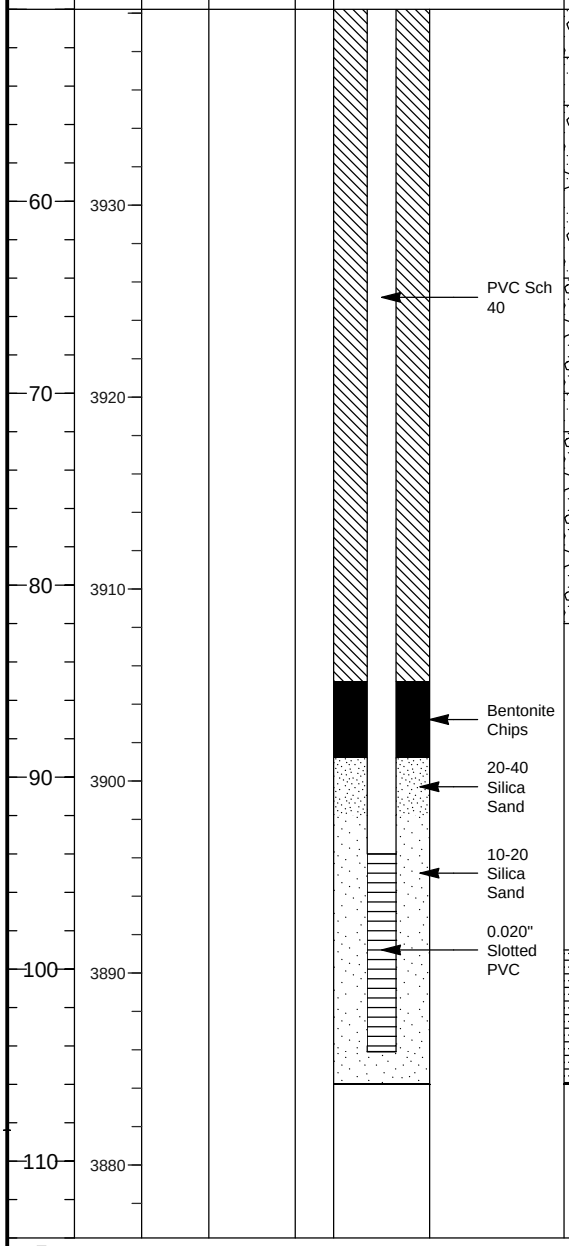
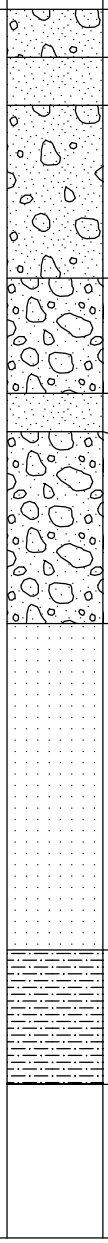




LITHOLOGIC DESCRIPTION

metamorphic rock types deposited by the ancestral Colorado River..

52.5-55.0 ft. SAND (SP); fine to medium grained, mostly subrounded, dark yellowish brown (10YR 4/4).

55.0-64.0 ft. GRAVELLY SAND (GP-SP); same as interval from 45.0-52.5 ft.

64.0-70.0 ft. SANDY GRAVEL (GP); 50% gravel and cobbles (up to 5.0" in diameter). Sand is mostly fine to medium grained and brown (10YR 4/3).

70.0-72.0 ft. GRAVELLY SAND (SP); mostly medium grained, only ~10% gravel, dark grayish brown (10YR 4/2).

72.0-82.0 ft. same as interval from 64.0-70.0 ft.

82.0-99.0 ft. ENTRADA SANDSTONE (possibly Dewey Bridge Member): SANDSTONE; fine grained, fractured, friable, some dark minerals along bedding and fracture surfaces, pale reddish brown (10R 5/4), noncareous, some inclined bedding (cross beds) in places.

@ 88.0 ft. sandstone is more reddish, a moderate reddish brown (10R 4/6), noncalcareous.

@92.0 ft. high angle fracture coated with calcite. Sandstone is slightly calcareous.

96.0-98.0 ft. some core loss.

99.0-106.0 ft. SILTSTONE (Siltstones of the Dewey Bridge Member of the Entrada Sandstone); soft, friable, moderate reddish brown (10R 4/6), some very fine grained sandstone layers, non to slightly calcareous.

Total Depth 106.0 ft.

MONITORING WELL COMPLETION LOG MOA01-0434

PROJECT MOAB
LOCATION Moab, UT
SITE MOAB
WELL NUMBER 0434

NORTH COORD. (FT) 6667455.31
EAST COORD. (FT) 2186665.40
HOLE DEPTH (FT) 85.30
WELL DEPTH (FT) 85.30

DATE DRILLED 07/11/2002 to 07/12/2002
SURFACE ELEV. (FT NGVD) 3990.60
TOP OF CASING (FT) 3990.21
MEAS. PT. ELEV. (FT) 3990.21
SLOT SIZE (IN) 0.020
BIT SIZE(S) (IN) 6.0

WELL INSTALLATION		INTERVAL (FT)		
SURFACE CASING:				
BLANK CASING:	2 in. PVC Sch 40	0.39	to	75.0
WELL SCREEN:	2 in. Slotted PVC	75.0	to	85.0
SUMP/END CAP:	2 in. PVC Sch 40	85.0	to	85.3
SURFACE SEAL:	Cement	0.0	to	3.0
GROUT:	Bentonite Grout	3.0	to	65.5
SEAL:	Bentonite Chips	65.5	to	71.0
UPPER PACK:	20-40 Silica Sand	71.0	to	73.0
LOWER PACK:	10-20 Silica Sand	73.0	to	85.3

DRILLING METHOD SONIC
SAMPLING METHOD SAMPLE TUBE
DATE DEVELOPED 07/12/2002
WATER LEVEL (FT BTOC) 33.65 on 07/12/2002
LOGGED BY Goodknight, C.
REMARKS Centralizer placed @ 84.5 - 85.0 ft.

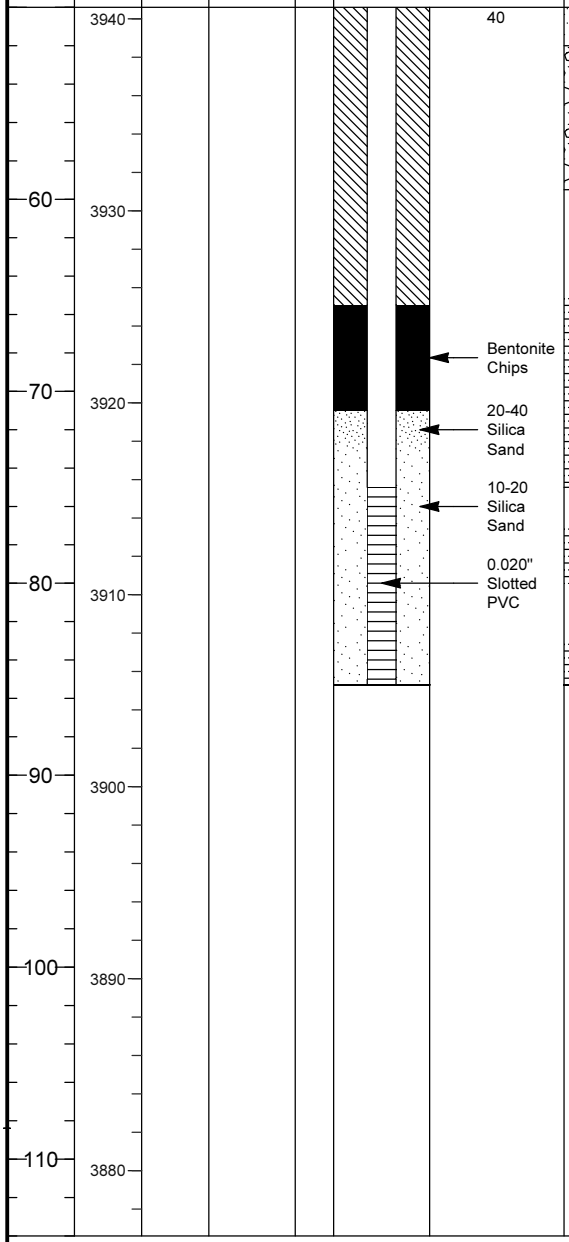
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
	3990				Cement		0-14.0 ft. SILTY SAND(SM); sand and silt, very fine grained, reddish yellow (5YR 6/6), loose, dry.
10	3980						@14.0 ft. some mottling, slightly compacted. 14.0-30.0 ft. SILT (ML); reddish yellow (5YR 6/6) to red (2.5YR 5/6), some very fine grained sand, loose, dry.
20	3970				PVC Sch 40		22.0-27.0 ft. silt slightly compacted. 27.0-29.0 ft. silt is red (2.5YR 5/6), noncalcareous, well compacted.
30	3960				Bentonite Grout		29.0-30.0 ft. silt is yellow (10YR 7/6) and white, calcareous, represents a soil development zone. 30.0-40.0 ft. SILTY SAND (SM); very fine grained sand with silt, <5% rock fragments and pebbles, red (2.5YR 5/6), dry above 34.0 ft. Rock fragments (~10%) at 33.0 ft.
40	3950				PVC Sch		38.0-40.0 ft. damp to wet. @ 40.0 ft. is a large rock fragment (fine grained sandstone). 40.0-41.0 ft. CLAYEY SILT (ML); mottled, brown (10YR 4/3) and red (2.5 YR 4/6), moist. 41.0-46.0 CLAYEY SAND (SC); very fine grained, and clayey silt (ML), brown (10YR 4/3), slight plasticity, saturated. 46.0-52.0 ft. SAND (SP); fine grained, reddish brown (5YR 4/4). @47.0 ft. color changes to dark yellowish brown (10YR 4/4), trace of small pebbles.

MONITORING WELL COMPLETION LOG MOA01-0434

PROJECT MOAB **WELL NUMBER** 0434

SITE MOAB **DATES DRILLED** 07/11/2002 to 07/12/2002

Continued from Previous Page



52.0-59.5 ft. SANDY GRAVEL (GP); hard, mainly metamorphic and crystalline lithologies with 30-50% pebbles/cobbles (up to 3.0 to 4.0" in diameter), fine to medium grained sand matrix, yellowish brown (10YR 5/4), wet. Material deposited by the ancestral Colorado River.

59.5-65.0 ft. SANDSTONE: weathered, fine-grained, noncalcareous, brownish yellow (10YR 6/6).
60-65.0 ft. (only about 1.0 ft. recovery) fine to very fine grained, light brown (5YR 5/6), obvious bedding mostly parallel and flat, but some crossbeds, noncalcareous, Fe oxides along fractures. Probably lower part of Wingate Sandstone.
65.0-75.0 ft. No Recovery, but likely alternating beds of very fine grained sandstone and siltstone/shale. Est. top of Chinle Formation @65.0 ft.

75.0-80.0 ft. SILTSTONE and SANDSTONE; alternating beds of fine to very fine grained sandstone, light brownish gray (5YR 6/1) and siltstone, soft, pale brown (5YR 5/2). Some high angle fractures. Both lithologies are noncalcareous. About 50% recovery.
80.0-85.0 ft. alternating beds of siltstone, dark yellowish orange (10YR 6/6) and pale yellowish brown (10YR 6/2) and soft, friable siltstone, pale reddish brown (10R 5/4). Both rock types are noncalcareous. About 50% recovery.

Total Depth 85.3 ft.

Note: From the interpretation of geologic formations in this borehole, it is necessary that a normal fault trending east, down to the south, is present between the borehole and outcrops of Chinle Formation present north of the old highway.

MONITORING WELL COMPLETION LOG MOA01-0435

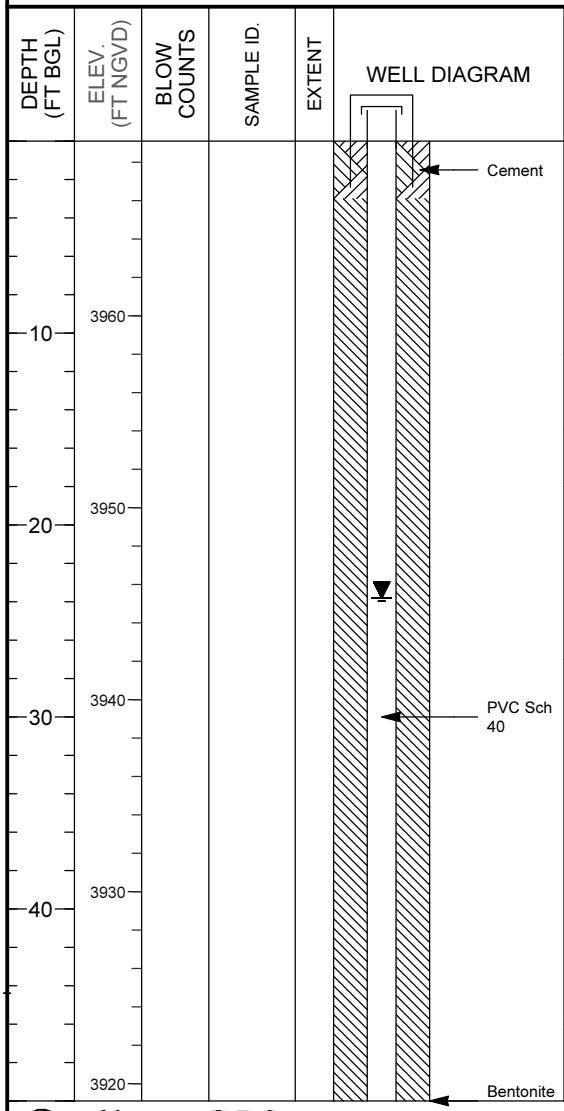
PROJECT MOAB
LOCATION Moab, UT
SITE MOAB
WELL NUMBER 0435

NORTH COORD. (FT) 6667025.87
EAST COORD. (FT) 2186797.60
HOLE DEPTH (FT) 181.30
WELL DEPTH (FT) 181.30

DATE DRILLED 07/16/2002 to 07/24/2002
SURFACE ELEV. (FT NGVD) 3969.10
TOP OF CASING (FT) 3971.67
MEAS. PT. ELEV. (FT) 3971.67
SLOT SIZE (IN) 0.020
BIT SIZE(S) (IN) 6.0

WELL INSTALLATION		INTERVAL (FT)		
SURFACE CASING:				
BLANK CASING:	2 in. PVC Sch 40	-2.57	to	171.0
WELL SCREEN:	2 in. Slotted PVC	171.0	to	181.0
SUMP/END CAP:	2 in. PVC Sch 40	181.0	to	181.3
SURFACE SEAL:	Cement	0.0	to	3.0
GROUT:	Bentonite Grout	3.0	to	160.0
SEAL:	Bentonite Chips	160.0	to	167.0
UPPER PACK:	20-40 Silica Sand	167.0	to	168.0
LOWER PACK:	10-20 Silica Sand	168.0	to	181.3

DRILLING METHOD SONIC
SAMPLING METHOD SAMPLE TUBE
DATE DEVELOPED 07/24/2002
WATER LEVEL (FT BGS) 23.8 on 07/23/2002
LOGGED BY Goodknight, C.
REMARKS ~15.0 ft. west of well 0444. Packer test on 7/24 from 174.0-181.0 ft.



0-11.0 ft. SILT (ML); yellowish red (5YR 5/6), dry. Damp at ~10.0 ft.

11.0-15.0 ft. SILTY CLAY (CL-ML); red (2.5YR 4/6), moderate plasticity, wet at 12.0 ft.
13.0-15.0 ft. moderate plasticity, dark grayish brown (10YR 4/2), trace of mica.

15.0-18.0 ft. SILTY SAND (SM); slight plasticity, red (2.5YR 4/6), trace of mica.

18.0-27.0 ft. SAND (SP); fine to medium grained, reddish brown (5YR 5/4). Some mottling, limonitic staining at 26.0 ft.

27.0-46.0 ft. SANDY GRAVEL (GW); cobble gravel (up to 6.0" diameter), dark grayish brown (2.5Y 4/2), fine grained sand matrix, cobbles and pebbles are ~40 to 50% of volume. Deposited by the ancestral Colorado River.
30.0-40.0 ft. cobbles and pebbles are slightly smaller (2.0 to 4.0" in diameter). Cobbles and pebbles are resistant metamorphic and crystalline rock types.

46.0-53.0 ft. SAND (SP); mostly medium grained sand, recovered only about 3.0 ft of sample interval. The rest was washed out in what is believed to be sand. Dark grayish brown (10YR 4/2).

MONITORING WELL COMPLETION LOG MOA01-0435

PROJECT MOAB **WELL NUMBER** 0435

SITE MOAB **DATES DRILLED** 07/16/2002 to 07/24/2002

Continued from Previous Page

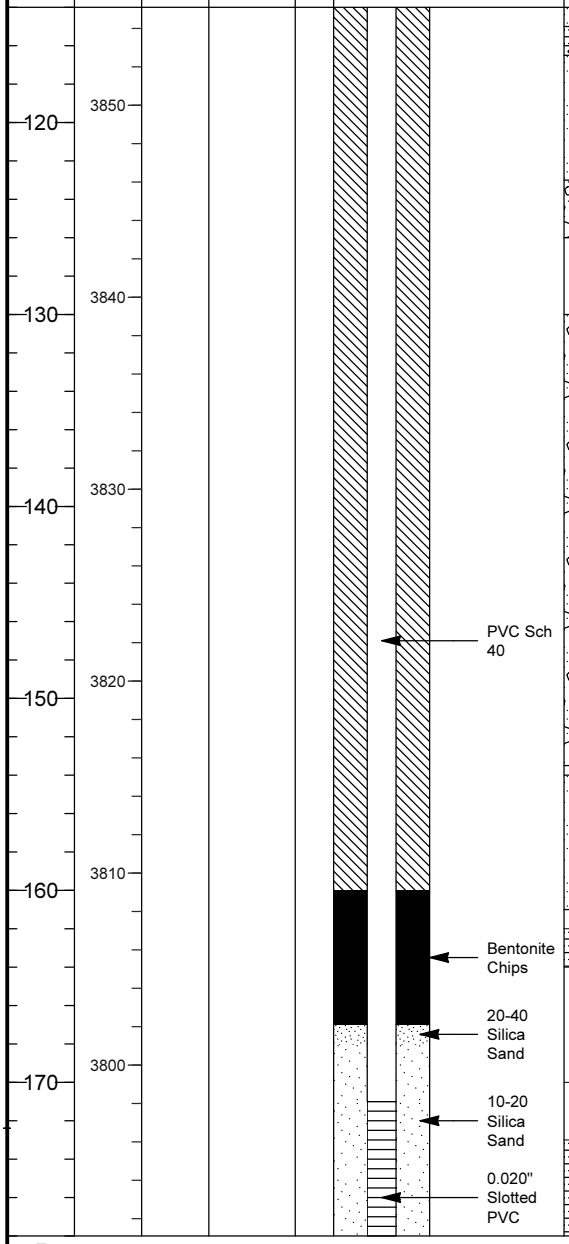
DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
					Chips		
							53.0-91.0 ft. SANDY GRAVEL (GW); cobble gravel (up to 5.0" in diameter) and smaller pebbles (30-40%) with fine grained sand matix, dark grayish brown (10YR 4/2).
60	3910						@60.0 ft. gravel (cobbles) become more abundant (~50%) and larger (up to 6.0" diameter). Approximately 75% recovery in 56.0 to 66.0 ft. interval.
							Near 100% recovery in 66.0-76.0 ft. interval.
70	3900						
							76.0-86.0 ft. most cobbles/pebbles < 3.0 " diameter. Approximately 75% recovery.
80	3890				Bentonite Grout		
90	3880						91.0-92.0 ft. SAND (SP); fine to medium grained, dark grayish brown (10YR 4/2). Most grains are rounded to subrounded. Approximately 5% red grains (feldspar?).
							92.0-97.0 ft. SANDY GRAVEL (GW);
							97.0-100.0 SAND (SP); medium to coarse grained, dark grayish brown (10YR 4/2), thickness is estimated for this interval.
100	3870						100.0-110.0 ft. SANDY GRAVEL (GW), cobbles (up to 4.0 " in diameter).
					PVC Sch 40		
110	3860						110.0-115.0 ft. SAND (SP); fine to medium grained sand (80-90%), and 10 to 20% pebble gravel (<2" diameter), brown (10YR 5/3).

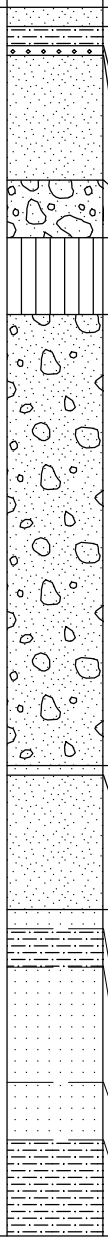
MONITORING WELL COMPLETION LOG MOA01-0435

PROJECT MOAB **WELL NUMBER** 0435

SITE MOAB **DATES DRILLED** 07/16/2002 to 07/24/2002

Continued from Previous Page





LITHOLOGIC DESCRIPTION

115.0-116.0 ft. SILTSTONE; weathered (a piece of talus), soft, dark yellowish brown (10YR 4/2), calcareous, trace mica and fine pyrite.

116.0-116.5 ft. SAND (SW); limonitic sand layer with black (carbonaceous, woody) material.

116.5-123.0 ft. SAND (SP); fine grained, ~5 to 10% pebbles, reddish brown (2.5YR 5/4). At 120.5 is a piece of oil shale (~3.0" diameter) from Green River Formation, Mahogany Ledge.

123.0-126.0 ft. SANDY GRAVEL (GW), 50% gravel (up to 2.0 diameter) and fine grained sand matrix.

126.0-130.0 ft. SILT (ML); reddish brown (5YR 4/4).

130.0-153.0 ft. SANDY GRAVEL (GW); dark grayish brown (10YR 4/2), mainly fine grained sand. Matrix of pebbles and cobbles (30 to 50%). Cobbles range up to 4.0-5.0" diameter. Moderately calcareous.

153.5-154.0 ft. Mixed layer, weathered material (?), some tan weathered fine grained sandstone fragments.

154.0-161.0 ft. SAND (SP); fine grained, some sandy silt, unconsolidated, soft, no rock fragments noted, yellowish red (5YR 5/6), mostly subrounded grains, calcareous, trace of pebbles. Interpret this as base of alluvial section (lack of rock fragments).

161.0-181.3 ft. CHINLE FORMATION (possibly):

161.0-162.0 ft. SANDSTONE; fine grained, well cemented, grayish orange pink (5YR 7/2), noncalcareous. Probable Chinle Formation bedrock.

162.0-164.0 ft. SILTSTONE; soft, noncalcareous, moderate, reddish brown (10R 4/6).

164.0-170.0 ft. Mixed layers of fine grained sandstone, light brown (5YR 6/4), slightly calcareous and siltstone, slightly calcareous, moderate reddish brown (10R 4/6), well layered. Sandstone is well fractured, some mottling (indicating paleosoils).

170.0-173.0 ft. SANDSTONE; fine grained, noncalcareous, grayish orange (10YR 7/4) to yellowish gray (5Y 7/2), trace manganese (dendrites) along fractures, somewhat friable.

173.0-179.0 ft. SILTSTONE; mottled, pale reddish brown (10R 5/4), and pale greenish yellow (10Y 8/2), slightly calcareous, trace of mica, probably paleosoil horizons.

MONITORING WELL COMPLETION LOG MOA01-0435

PROJECT MOAB **WELL NUMBER** 0435

SITE MOAB **DATES DRILLED** 07/16/2002 to 07/24/2002

Continued from Previous Page

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
180	3790						179.0-180.0 ft. SANDSTONE; fine to very fine grained, yellowish gray (5Y 7/2), noncalcareous.
							180.0-181.3 ft. SILTSTONE, noncalcareous, trace of pyrite and manganese, trace of greenish clay (mottling), pale reddish brown (10R 5/4).
							Total Depth 181.3 ft.
190	3780						
200	3770						
210	3760						
220	3750						
230	3740						
240	3730						

MONITORING WELL COMPLETION LOG MOA01-0436

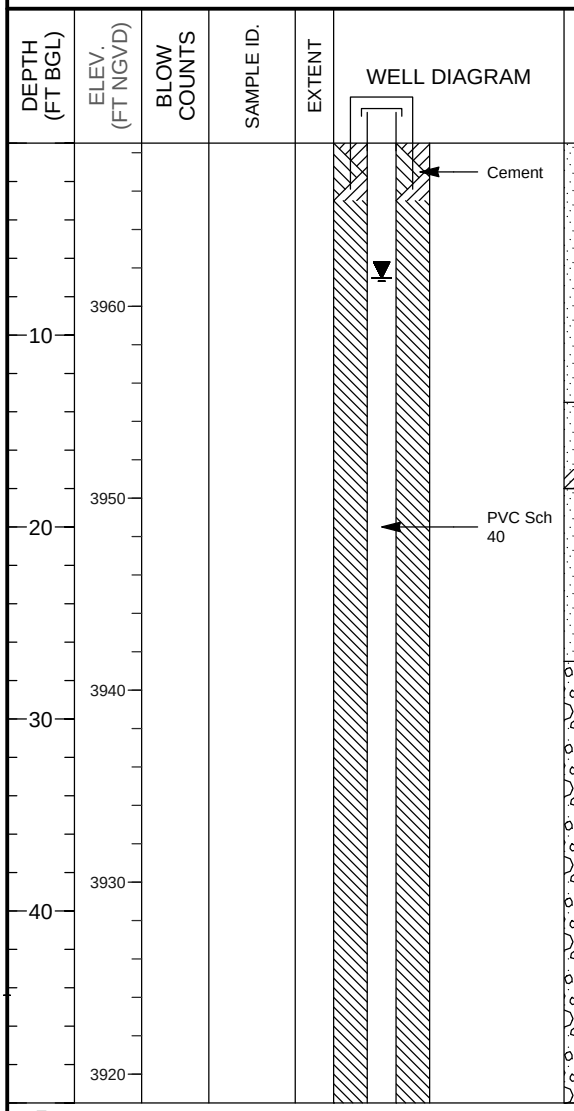
PROJECT MOAB
LOCATION Moab, UT
SITE MOAB
WELL NUMBER 0436

NORTH COORD. (FT) 6666105.49
EAST COORD. (FT) 2186196.67
HOLE DEPTH (FT) 205.30
WELL DEPTH (FT) 205.30

DATE DRILLED 07/31/2002 to 08/07/2002
SURFACE ELEV. (FT NGVD) 3968.50
TOP OF CASING (FT) 3970.80
MEAS. PT. ELEV. (FT) 3970.80
SLOT SIZE (IN) 0.020
BIT SIZE(S) (IN) 8.0

WELL INSTALLATION		INTERVAL (FT)		
SURFACE CASING:				
BLANK CASING:	2 in. PVC Sch 40	-2.3	to	195.0
WELL SCREEN:	2 in. 0.02 Slotted PVC	195.0	to	205.0
SUMP/END CAP:	2 in. PVC Sch 40	205.0	to	205.3
SURFACE SEAL:	Cement	0.0	to	3.0
GROUT:	Bentonite Grout	3.0	to	186.0
SEAL:	Bentonite Chips	186.0	to	192.0
UPPER PACK:	20-40 Silica Sand	192.0	to	193.0
LOWER PACK:	10-20 Silica Sand	193.0	to	205.3

DRILLING METHOD SONIC
SAMPLING METHOD SAMPLE TUBE
DATE DEVELOPED 08/21/2002
WATER LEVEL (FT BTOC) 9.33 on 08/14/2002
LOGGED BY Goodknight, C.
REMARKS Well is West of SMI-PW03 cluster. Centralizer at 10.0,10.5, and 205.0 ft.



0-13.5 ft. SAND (SP); mostly fine grained with few rock fragments (up to 6.0" in diameter). Fill material, red (2.5YR 4/6).

3.5-13.5 ft. coarsening to medium grained sand toward base, <5% pebbles (up to 1.0" in diameter), dry.

Damp at 12.0 ft.

13.5-18.0 ft. SILTY SAND (SM); very fine grained sand and silt, trace mica, red (2.5YR 4/6). Grades down to clay by 17.0 ft. Wet by 13.5 ft.

17.0-18.0 ft CLAY (CL); low to medium plasticity, slightly calcareous.

18.0-27.0 ft. SAND (SP); fine to medium grained, brown (7.5YR 4/3), subrounded grains, slightly calcareous, reduced zone, trace of small pebbles toward base of sand interval. Wet.

27.0-75.0 ft. SANDY GRAVEL (GW/GP); cobbles and pebbles (up to 6.0" in diameter), mostly crystalline rock, with few sandstone pieces (30-40%). Matrix is mostly fine to medium grained sand, brown (7.5YR 4/4). Deposited by the ancestral Colorado River.

35.0-50.0 ft. matrix is finer grained with some clay material and darker colored, brown (7.5YR 4/2), slightly to moderately calcareous. Below ~45.0 ft., gravel/cobbles become coarse (many over 6.0" diameter), and more numerous ~50%. Matrix continues to be mostly fine grained sand with some clay (~1-2%).

MONITORING WELL COMPLETION LOG MOA01-0436

PROJECT MOAB **WELL NUMBER** 0436

SITE MOAB **DATES DRILLED** 07/31/2002 to 08/07/2002

Continued from Previous Page

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
60	3910						70.0-75.0 ft. matrix is mostly very fine grained sand and clayey silt.
70	3900						75.0-77.0 ft. SAND (SP); mostly fine to medium grained, trace small pebbles, brown (7.5YR 4/3), noncalcareous.
80	3890						77.0-80.0 ft. GRAVELLY SAND (SP); fine to medium grained sand, with increasing pebbles and cobbles (10-30%) down to 80.0 ft.
							80.0-85.0 ft. SANDY GRAVEL (GW/GP); 81.0-83.0 ft. matrix is mostly CLAYEY SILT (ML); calcareous, brown (7.5YR 4/2).
							85.0-89.0 ft. SAND (SP); mostly medium-fine grained sand, trace of small pebbles, brown (7.5YR 4/2), noncalcareous.
90	3880						89.0-98.5 ft. SANDY GRAVEL (GW-GP); matrix mostly medium to fine grained sand with ~50% pebble/cobbles.
					Grout		92.0-95.0 ft. matrix is mainly very fine grained sand and silt.
							95.0-98.0 ft. matrix gradually coarsens to medium to fine grained sand. Salty efflorescence in core below ~95.0 ft as it dries.
100	3870				PVC Sch 40		98.5-100.0 ft. SAND (SP); fine to medium grained, brown (7.5YR 4/2).
							100.0-105.0 ft. No recovery. Lost interval.
							105.0-110.0 ft. SILTY GRAVEL (GM); matrix is mostly silt with trace of sand and clay. Pebbles are ~30% and up to 3.0" in diameter. Matrix is dark grayish brown (10YR 4/2).
110	3860						110.0-112.0 ft. SAND (SP); mostly medium grained, <5% small (<1/2" in diameter), pebbles, brown (7.5YR 4/2). Slightly calcareous.

MONITORING WELL COMPLETION LOG MOA01-0436

PROJECT MOAB **WELL NUMBER** 0436

SITE MOAB **DATES DRILLED** 07/31/2002 to 08/07/2002

Continued from Previous Page

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
							112.5-117.5 ft. COBBLE GRAVEL (GP); about 75% cobbles/pebbles and matrix is fine to medium grained sand. Slab of oil shale (Green River Formation, Mahogany Ledge) at 115.0 ft. At 113.0 ft. a white fossil wood or a mastodon/mammoth tooth fragment (angular).
	3850						117.5-120.0 ft. SAND (SP); grades downward to sand, with only ~5% pebbles at 120.0 ft., brown (7.5YR 4/2), slightly calcareous.
120							120.0-125.0 ft. GRAVELLY SAND (SP); mostly fine to medium grained, brown (7.5YR 4/2), pebbles and small cobbles - 10-30% (up to 3.0" in diameter), moderately calcareous.
							125.0-130.0 ft. SANDY GRAVEL (GP); mostly medium to fine grained sand matrix, brown (7.5YR 4/2), 40-50% pebbles and cobbles (up to 3.0" in diameter), calcareous.
	3840						
130							130.0-134.0 ft. SAND (SP); medium to fine grained, slightly calcareous, reddish brown (5YR 4/4).
							134.0-141.0 ft. SANDY GRAVEL (GP); pebbles and cobbles - ~50-60% (up to 6.0" diameter), fine grained sand matrix, weak red (2.5YR 4/2).
	3830						
140							141.0-144.0 ft. SAND (SP); trace of small pebbles, noncalcareous.
							144.0-150.0 ft. SANDY GRAVEL (GP); as above.
	3820						
150							150.0-154.0 ft. SAND (SP); trace of small pebbles.
							154.0-161.5 ft. SANDY GRAVEL (GP); driller indicates flowing sand (so, intervals of sand from 130.0 ft. and down are suspect). Matrix becomes finer grained (more silt and clay), below 158.0 ft., matrix is brown (7.5YR 4/3).
	3810						
160							161.5-162.5 ft. SAND (SP); with ~5-10% pebbles, calcareous, brown (7.5YR 4/2).
							162.5-175.0 ft. SANDY GRAVEL (GP); fine to medium grained sand matrix.
	3800						
170							
							175.0-181.0 ft. SAND (SP); mostly medium grained, calcareous, brown (7.5YR 4/2), trace of small pebbles.

MONITORING WELL COMPLETION LOG MOA01-0436

PROJECT MOAB **WELL NUMBER** 0436

SITE MOAB **DATES DRILLED** 07/31/2002 to 08/07/2002

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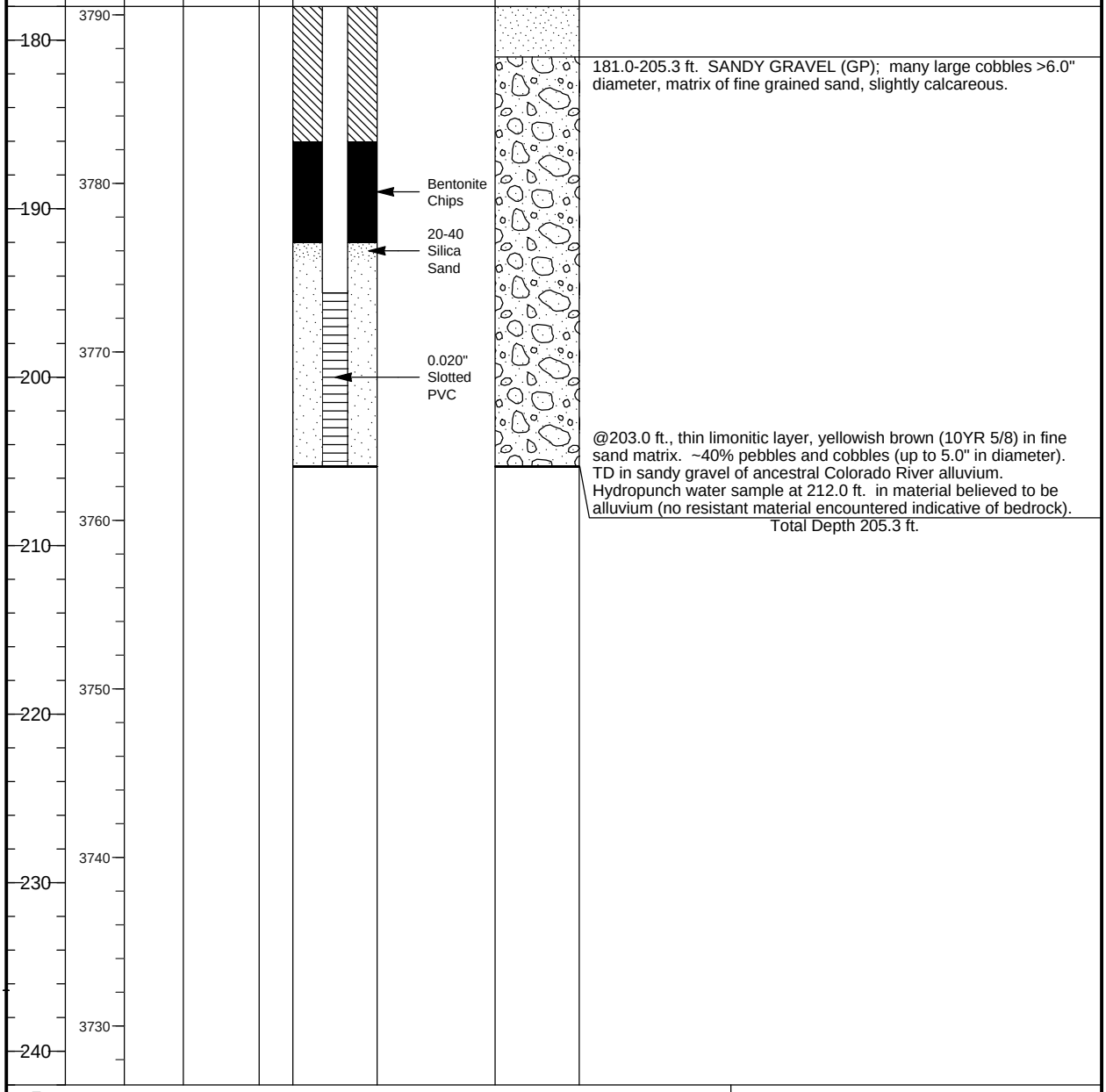


MONITORING WELL COMPLETION LOG MOA01-0437

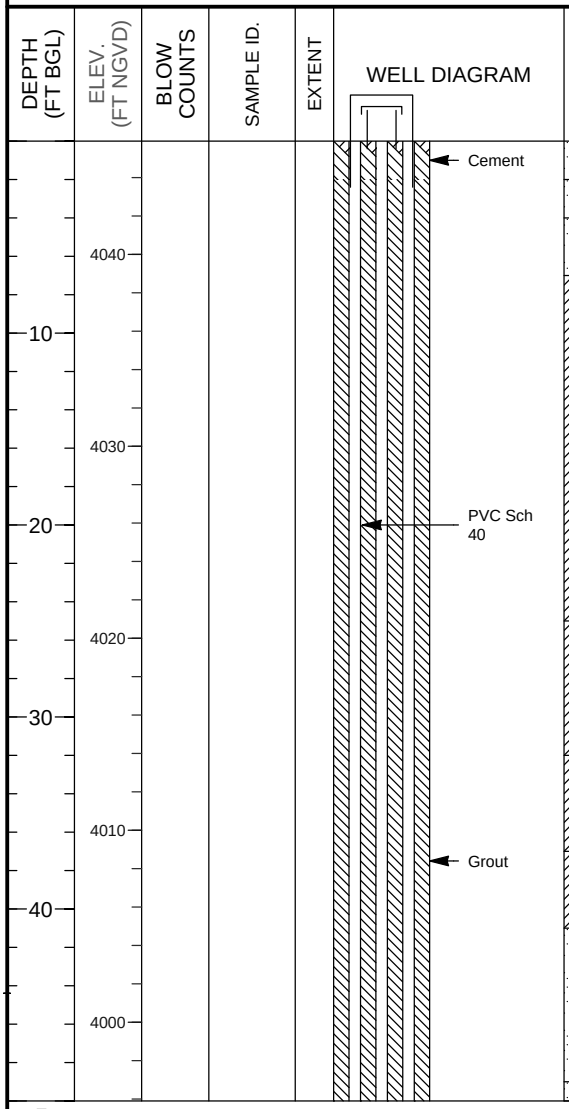
PROJECT MOAB
LOCATION Moab, UT
SITE MOAB
WELL NUMBER 0437

NORTH COORD. (FT) 6665399.33
EAST COORD. (FT) 2183802.67
HOLE DEPTH (FT) 250.00
WELL DEPTH (FT) 100.30

DATE DRILLED 08/22/2002 to 08/25/2002
SURFACE ELEV. (FT NGVD) 4045.90
TOP OF CASING (FT) 4048.25
MEAS. PT. ELEV. (FT) 4048.25
SLOT SIZE (IN) 0.010
BIT SIZE(S) (IN) 8.0

WELL INSTALLATION		INTERVAL (FT)		
SURFACE CASING:				
BLANK CASING:	2 in. PVC Sch 40	-2.35	to	90.0
WELL SCREEN:	2 in. 0.01 Slotted PVC	90.0	to	100.0
SUMP/END CAP:	2 in. PVC Sch 40	100.0	to	100.3
SURFACE SEAL:	Cement	0.0	to	2.0
GROUT:	Bentonite Grout	2.0	to	73.0
SEAL:	Bentonite Chips	73.0	to	83.0
UPPER PACK:	20-40 Silica Sand	83.0	to	85.0
LOWER PACK:	10-20 Silica Sand	85.0	to	102.0

DRILLING METHOD SONIC
SAMPLING METHOD SAMPLE TUBE
DATE DEVELOPED 09/12/2002
WATER LEVEL (FT BTOC) 90.11 on 09/12/2002
LOGGED BY Goodknight, C.
REMARKS No centralizers.

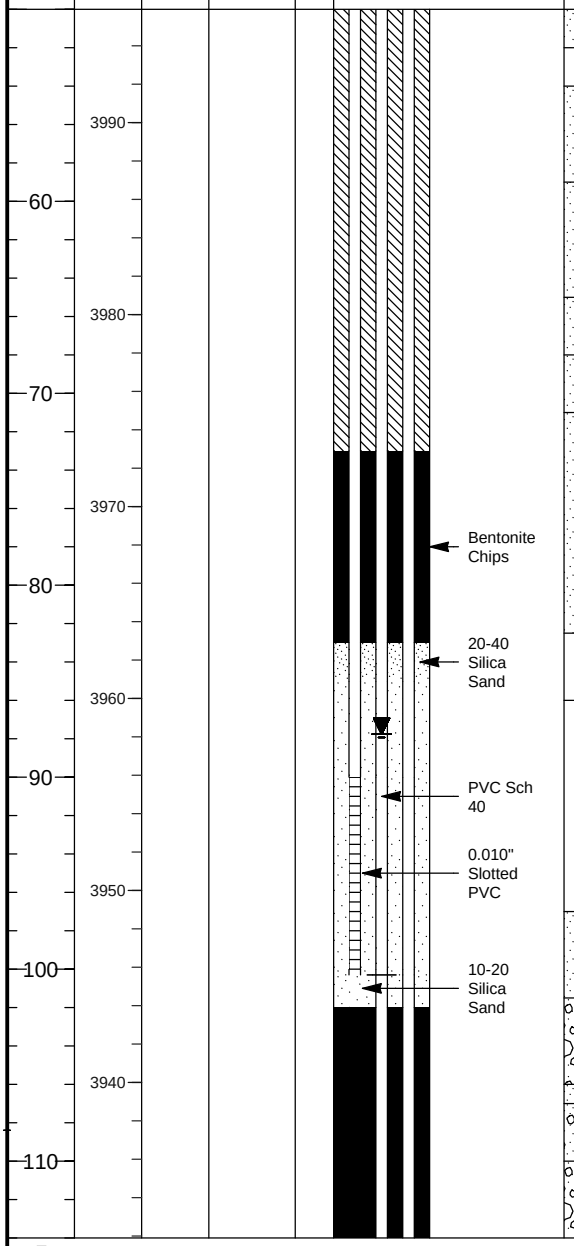


MONITORING WELL COMPLETION LOG MOA01-0437

PROJECT MOAB **WELL NUMBER** 0437

SITE MOAB **DATES DRILLED** 08/22/2002 to 08/25/2002

Continued from Previous Page



49.0-52.0 ft. SAND (SP); mostly very fine grained sand, loose, no rock fragments, red (2.5YR 5/6), highly calcareous, trace of mica.

52.0-54.0 ft. No recovery.

54.0-59.0 ft. SANDY SILT (SM); very fine grained sand, mottled, compacted, red (2.5YR 4/6), trace of mica, highly calcareous.

59.0-65.0 ft. SAND (SP); very fine grained, loose, dry, red (2.5YR 5/6), calcareous.

65.0-68.0 ft. SANDY SILT (SM); very fine gained sand, mottled with small gray-green clasts, compacted, red (2.5YR 4/6), trace of mica, becoming damp at 65 ft., highly calcareous. From 66.0-67.0 ft., no recovery.

68.0-71.0 ft. SAND (SP); very fine grained, loose, dry.

71.0-82.5 ft. SANDY SILT (SM); mottled, compacted, alternating with sand, very fine grained, loose, dry to damp, trace of mica, red (2.5YR 4/6), highly calcareous, trace of weathered rock fragments.

82.5-86.0 ft. SILT (ML); some very fine grained sand, compacted to loose, mottled, reddish brown (2.5YR 4/4), highly calcareous. Damp at ~84.0 ft.

86.0-97.0 ft. SILT (ML); red (2.5YR 4/6), trace of mica, highly calcareous, slightly plastic. Wet at 86.0 ft.

91.5-97.0 ft. dark grayish green brown (10YR 4/2), with limonitic mottling, trace of mica, highly calcareous, slightly plastic. Amount of fine grained sand increases with depth.

97.0-101.5 ft. SAND (SP); fine grained, subangular grains, brown (7.5YR 4/3), calcareous.

101.5-106 ft. SANDY GRAVEL (GP); matrix is fine grained sand (~60%), brown (7.5YR 4/2), pebble gravel up to 1" diameter from 101.5-104.0 ft., calcareous. Pebble gravel increases in size up to 2" diameter below 104.0 ft. Deposited by the ancestral Colorado River.

106.0-107.0 ft. SAND (SP); fine grained.

107.0-110.0 ft. GRAVELLY SAND (SP); mostly fine grained sand with ~10% gravel and cobbles (up to 3.0" in diameter), brown (7.5YR 4/2), calcareous.

110.0-155.0 ft. SANDY GRAVEL (GP); matrix is fine grained sand (30-50%), gravel pebbles/cobbles up to 3.0" in diameter. Some

MONITORING WELL COMPLETION LOG MOA01-0437

PROJECT MOAB **WELL NUMBER** 0437

SITE MOAB **DATES DRILLED** 08/22/2002 to 08/25/2002

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DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
							limonitic stain at 113.0 ft.
120	3930						@118.0 gravel becomes coarser (up to and > 4.0" in diameter). Cobbles and pebbles are rounded, of Colorado River origin, and are composed mostly of Precambrian metamorphic rocks, igneous rocks, and a few are sandstone. Matrix is mostly fine grained sand, brown (7.5YR 4/2), and calcareous.
	3920						126.0-134.0 ft. pebbles/cobbles are smaller - mainly less than 2.0" in diameter.
130							
	3910						134.0-147.0 ft. pebbles/cobbles are larger (up to and > 4.0" in diameter). Matrix mostly fine grained sand and calcareous.
140					Bentonite Chips		
	3900						147.0-149.0 ft. sandy gravel is very saturated and matrix is finer grained with some clay/silt. 149.0-155.0 ft. large cobbles (up to 4.0" in diameter are common). Matrix mostly fine grained sand, calcareous.
150							
	3890						155.0-158.0 ft. SAND (SP); mostly fine grained, "salt and pepper sand", trace of pebbles, wet, dark grayish brown (10YR 4/2), slightly calcareous.
160							158.0-167.0 ft. SANDY GRAVEL (GP); matrix is fine grained sand; gravel - pebbles and cobbles (up to ~3.0" in diameter).
	3880						167.0-169.0 ft. CLAYEY GRAVEL (GC); gravel has more silty/clayey matrix.
170							169.0-177.0 ft. SAND (SP); red (2.5YR 4/6), with small pebbles and red siltstone fragments. 170.0-173.0 ft. contains "salt and pepper" sand, dark grayish brown (10YR 4/2), calcareous. 173.0-177.0 ft. contains ~10% small pebbles (up to 1.0" in diameter), calcareous.
	3870				Bentonite Chips		

MONITORING WELL COMPLETION LOG MOA01-0437

PROJECT MOAB **WELL NUMBER** 0437

SITE MOAB **DATES DRILLED** 08/22/2002 to 08/25/2002

Continued from Previous Page

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
180							177.0-179.0 ft. SANDSTONE; arkosic fragment, red (2.5YR 4/6), slightly calcareous.
							179.0-184.0 ft. SILTY SAND (SM); with 10% small pebbles, highly calcareous, red (2.5YR 4/6), some small weathered rock fragments. @183.0 ft. - weathered mauve-purple siltstone fragments.
	3860						184.0-186.0 ft. SILTY GRAVEL (GM); ~10% rounded pebbles (up to 2.0" in diameter), red (2.5YR 4/6) to reddish brown (5YR 4/4), calcareous.
							186.0-190.0 ft. SAND (SP); fine grained sand , red (2.5YR 4/6). 10-15% gravel (pebbles up to 2.0" in diameter, wet.
190							190.0-207.0 ft. SANDY GRAVEL (GP); sand in matrix is mainly fine to very fine grained, brown (7.5YR 4/2), calcareous, pebbles (up to 3.0" in diameter), wet.
	3850						
200							
							203.0-207.0 ft. matrix becomes more reddish, red (2.5YR 4/6), calcareous, trace of weathered sandstone fragments. @203.5 ft a flat , thin , 2.0" piece of oil shale, dark gray, of Green River Formation, Mahogany Ledge.
	3840						207.0-210.0 ft. GRAVELLY SAND (SP); very fine to fine grained sand, "salt and pepper", brown (10YR 4/3), ~10% pebbles (up to 2.0" in diameter), calcareous.
210					← Bentonite Chips		210.0-216.0 ft. SANDY GRAVEL (GP); sand in matrix is mainly fine grained, brown (7.5YR 4/3), calcareous. Pebbles ~30% and up to 3.0" in diameter.
	3830						216.0-219.0 ft. SAND (SP); mostly fine gained, "salt and pepper", trace of pebbles, brown (7.5YR 5/2), calcareous.
220							219.0-220.0 ft. SANDY GRAVEL (GP); 30% pebbles and cobbles, fine grained sand matrix.
							220.0-224.0 ft. SAND (SP); fine grained, "salt and pepper", trace of pebbles, brown (7.5YR 5/2), calcareous.
	3820						224.0-229.0 ft. GRAVELLY SAND (SP); fine grained, 10-15% pebbles and cobbles (up to 2.0" in diameter), brown (7.5YR 4/2), calcareous.
230							229.0-231.0 ft. SANDY GRAVEL (GP); fine grained sand matrix, dark reddish gray (5YR 4/2), calcareous.
							231.0-235.0 ft. SAND (SP); mostly fine grained, brown (7.5YR 4/2), calcareous, trace of pebbles (up to 2.0" in diameter).
	3810						235.0-250.0 ft. SANDY GRAVEL (GP); mostly fine grained sand matrix, brown (7.5YR 4/2), cobbles (up to 4.0" in diameter).
240							

MONITORING WELL COMPLETION LOG MOA01-0437

PROJECT MOAB **WELL NUMBER** 0437

SITE MOAB **DATES DRILLED** 08/22/2002 to 08/25/2002

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DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
250	3800				Piezometer VW (0452) OH (0458) Slough		246.0-250.0 ft. gravel (cobbles) become more coarse (up to 5.0" in diameter), some weathered rock fragments near TD.
							Total Depth 250.0 ft.
							NOTE: @248.5 ft. Installed location #452, vibrating wire piezometer (Geokon 4500s-100 PSI), and location #458, 1.0" diameter open hole PVC piezometer. Vibrating wire piezometer was taped to outside of 1.0" diameter PVC.
260	3790						
270	3780						
280	3770						
290	3760						
300	3750						

MONITORING WELL COMPLETION LOG MOA01-0438

PROJECT MOAB
LOCATION Moab, UT
SITE MOAB
WELL NUMBER 0438

NORTH COORD. (FT) 6665241.03
EAST COORD. (FT) 2185009.53
HOLE DEPTH (FT) 120.00
WELL DEPTH (FT) 119.30

DATE DRILLED 08/20/2002 to 08/21/2002
SURFACE ELEV. (FT NGVD) 4052.00
TOP OF CASING (FT) 4054.22
MEAS. PT. ELEV. (FT) 4054.22
SLOT SIZE (IN) 0.010
BIT SIZE(S) (IN) 8.0

WELL INSTALLATION		INTERVAL (FT)		
SURFACE CASING:				
BLANK CASING:	2 in. PVC Sch 40	-2.22	to	109.0
WELL SCREEN:	2 in. 0.01 Slotted PVC	109.0	to	119.0
SUMP/END CAP:	2 in. PVC Sch 40	119.0	to	119.3
SURFACE SEAL:				
GROUT:	Bentonite Grout	0.0	to	91.0
SEAL:	Bentonite Chips	91.0	to	100.5
UPPER PACK:	20-40 Silica Sand	100.5	to	103.5
LOWER PACK:	10-20 Silica Sand	103.5	to	120.0

DRILLING METHOD SONIC
SAMPLING METHOD SAMPLE TUBE
DATE DEVELOPED 09/16/2002
WATER LEVEL (FT BTOC) 97.47 on 09/16/2002
LOGGED BY Karp, K.
REMARKS Centralizers @ 9.0, 69, and 119.0 ft.

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
	4050						0-3.0 ft. SAND (SP); mostly fine grained (2.5YR 4/6), red, some pebbles, angular. From 1.0-3.0 ft., mottled fill material, gray (5Y 6/1), dry.
							3.0-5.0 ft. CLAYEY SILT (ML); tailings, very fine grained sand to clayey silt, reddish brown (5YR 4/3), to dark gray (5Y 4/1), dry.
10	4040						5.0-18.0 ft. CLAYEY SILT TO SILTY CLAY (CL); some plasticity, dark grayish brown (10YR 4/2), wet.
20	4030				PVC Sch 40		18.0-21.0 ft. SAND (SP); very fine sand, yellowish brown (10YR 5/6), moist. No recovery from 20.0-21.0 ft.
							21.0-22.0 ft. SILTY CLAY (CL); dark grayish brown (10YR 4/2), wet.
							22.0-26.0 ft. SAND (SP); very fine sand, yellowish brown (10YR 5/6) to 23.0 ft., moist to dry.
							23.0-26.0 ft. color change to grayish brown (10YR 5/2), moist to dry.
30	4020						26.0-38.0 ft. CLAYEY SILT (ML); reddish brown (5YR 4/3) slightly plastic, wet @27.0 ft.
40	4010						38.0-44.0 ft. SILTY CLAY (CL); black organic streaks at 40.0 ft., more dense.
					Grout		44.0-48.0 ft. No recovery.
							48.0-52.0 ft. CLAYEY SILT (ML); wet to saturated slimes, reddish

MONITORING WELL COMPLETION LOG MOA01-0438

PROJECT MOAB **WELL NUMBER** 0438

SITE MOAB **DATES DRILLED** 08/20/2002 to 08/21/2002

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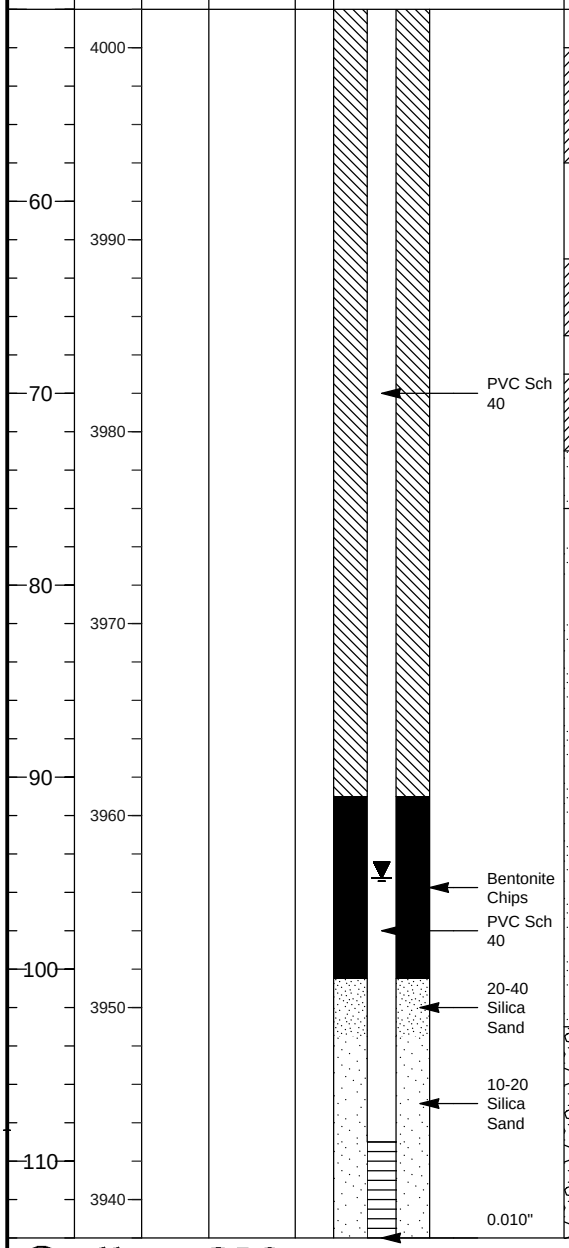

brown (5YR 4/4).

52.0-58.0 ft. SILTY CLAY (CL); wet, reddish brown (5YR 4/4) with black organic streaks to 54.0 ft..
54.0-58.0 ft. dense, some plasticity and color change to grayish brown (10YR 5/2).

58.0-63.0 ft. CLAYEY SILT (ML); wet to saturated slimes, dense, grayish brown (10YR 5/2).

63.0-67.0 ft. SILTY CLAY (CL); wet, dense, grayish brown (10YR 5/2).

67.0-69.0 ft. CLAYEY SILT (ML); wet, grayish brown (10YR 5/2).

69.0-73.0 ft. SILTY CLAY (CL); wet to moist, very dense. Pinkish gray (5YR 6/2) to gray (5YR 6/1). Some plasticity; bottom of tailings at 73.0 ft.

73.0-103 ft. SAND (SP); very fine grained, red (2.5YR 4/6). Sub pile sediments, calcareous, dry, some pebbles up to 1" diameter.

76.0-78.0 ft. No recovery - some slough @78.0 ft.

80.0-82.0 ft. No recovery - slough.

@85.0 ft. wet, large cobble ~6" diameter.

@95.0 ft saturated.

103.0-120.0 ft. SANDY GRAVEL (GM); poorly sorted sand matrix, reddish brown (5YR 4/4 - wet color), crystalline pebbles up to 1.0" in diameter. Colorado River deposits.

109.0-120.0 ft. gravel is coarser than above, color change to dark brown (7.5YR 4/2 - wet color), cobbles (up to 3.0" in diameter).

MONITORING WELL COMPLETION LOG MOA01-0438

PROJECT MOAB **WELL NUMBER** 0438

SITE MOAB **DATES DRILLED** 08/20/2002 to 08/21/2002

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DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
120	3930				Slotted PVC		Total Depth 120.0 ft.
130	3920						
140	3910						
150	3900						
160	3890						
170	3880						

MONITORING WELL COMPLETION LOG MOA01-0439

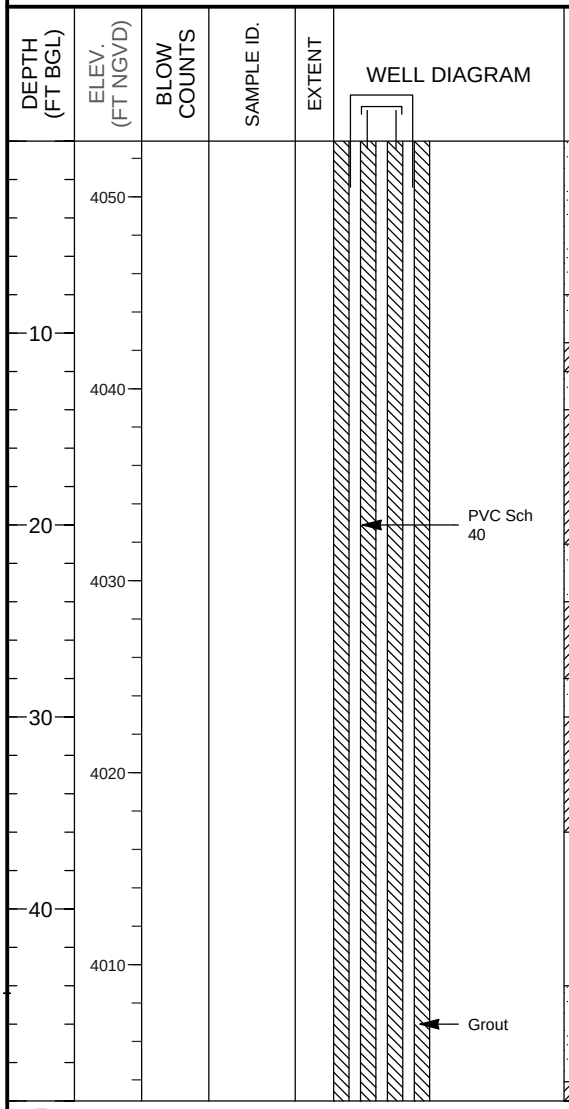
PROJECT MOAB
LOCATION Moab, UT
SITE MOAB
WELL NUMBER 0439

NORTH COORD. (FT) 6664189.32
EAST COORD. (FT) 2184731.49
HOLE DEPTH (FT) 304.00
WELL DEPTH (FT) 120.30

DATE DRILLED 08/07/2002 to 08/13/2002
SURFACE ELEV. (FT NGVD) 4052.90
TOP OF CASING (FT) 4055.27
MEAS. PT. ELEV. (FT) 4055.27
SLOT SIZE (IN) 0.020
BIT SIZE(S) (IN) 8.0

WELL INSTALLATION		INTERVAL (FT)		
SURFACE CASING:				
BLANK CASING:	2 in. PVC Sch 40	-2.37	to	110.0
WELL SCREEN:	2 in. 0.02 Slotted PVC	110.0	to	120.0
SUMP/END CAP:	2 in. PVC Sch 40	120.0	to	120.3
SURFACE SEAL:				
GROUT:	Bentonite Grout	0.0	to	92.0
SEAL:	Bentonite Chips	92.0	to	102.5
UPPER PACK:	20-40 Silica Sand	102.5	to	105.2
LOWER PACK:	10-20 Silica Sand	105.2	to	122.0

DRILLING METHOD SONIC
SAMPLING METHOD SAMPLE TUBE
DATE DEVELOPED 09/18/2002
WATER LEVEL (FT BTOC) 99.82 on 09/18/2002
LOGGED BY Goodknight, C., Kautsky, M.
REMARKS Centralizer @ 120.0 ft..



MONITORING WELL COMPLETION LOG MOA01-0439

PROJECT MOAB **WELL NUMBER** 0439

SITE MOAB **DATES DRILLED** 08/07/2002 to 08/13/2002

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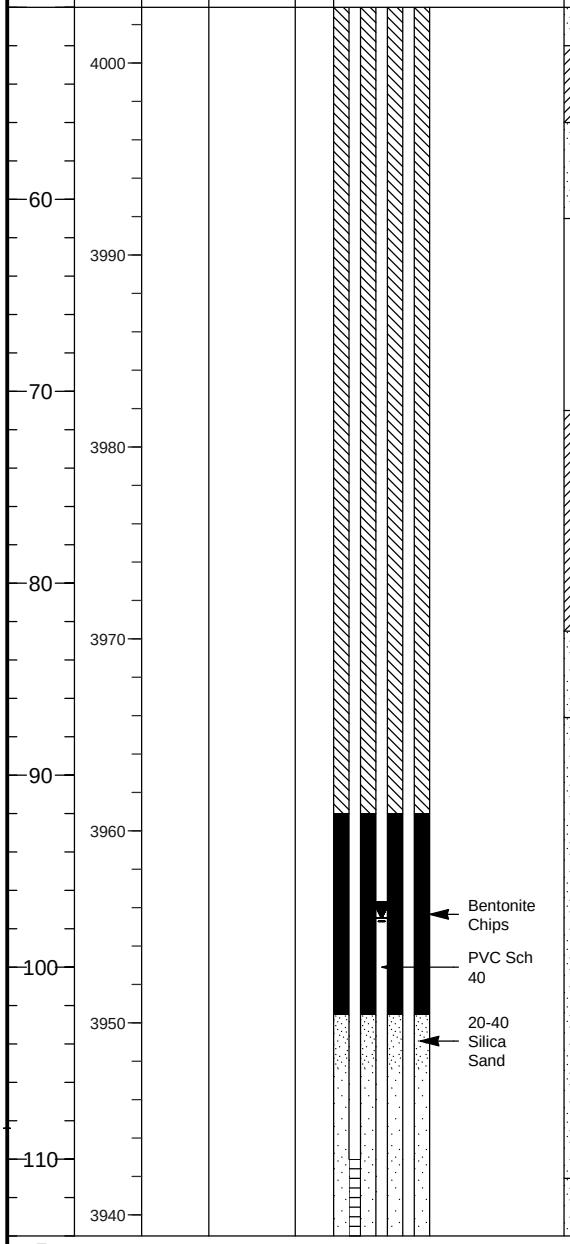

GRAPHIC LOG	LITHOLOGIC DESCRIPTION
	49.0-50.0 ft. SILTY CLAY (CL); moderate plasticity.
	50.0-52.0 ft. SILTY SAND (SM); very fine grained.
	52.0-56.0 ft. SILTY CLAY (CL); moderately plastic, reddish gray (5YR 5/2), highly calcareous, holds moisture well.
	56.0-61.0 ft. SILTY SAND (SM); slightly plastic, reddish brown (5YR 5/3), highly calcareous, very wet.
	61.0-71.0 ft. CLAYEY SILT (ML); slimes, slightly plastic, grayish brown (10YR 5/2), highly calcareous.
	71.-82.5 ft. SILTY CLAY (CL); limonitic surface at 71.0 ft., light yellowish brown (2.5Y 6/4), moderately plastic to highly plastic, dense, brown (7.5YR 5/3) to gray (7.5YR 6/1), brown and yellowish brown material is calcareous and gray material is noncalcareous, slimes. Mostly noncalcareous and gray below 76.0 ft.
	82.5-87.0 ft. SILTY SAND (SM); very fine grained, highly calcareous, red (2.5YR 4/6), ~5% small rock fragments dry. Probably prepared base for tailings pile down to 87.0 ft.
	87.0-111.0 ft. SAND (SP): highly calcareous, mostly very fine grained, red (2.5YR 4/6), mostly windblown material (loess). Damp below 94.0 ft., moist by 98.0 ft. 101.0-111.0 ft. No recovery. Believed to still be in loess (fine sand), that is nearly saturated. Sample recovered on 8/9/2002, but somewhat disturbed.
	111.0-117.5 ft. SAND (SP); mostly very fine grained with some silt, dark grayish brown (10YR 4/2), calcareous, damp/moist.

MONITORING WELL COMPLETION LOG MOA01-0439

PROJECT MOAB **WELL NUMBER** 0439

SITE MOAB **DATES DRILLED** 08/07/2002 to 08/13/2002

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DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
120	3930				0.020" Slotted PVC; 10-20 Silica Sand		117.5-180.0 ft. SANDY GRAVEL (GP-GW); pebbles and cobbles (up to 5.0" diameter), matrix of fine grained sand, brown (7.5YR 4/2), ~50% sand, wet. Deposited by the ancestral Colorado River.
130	3920						131.0-132.0 ft. gravel is finer grained with pebbles only up to 1.0" in diameter.
140	3910						140.0-142.0 ft. matrix is coarser grained - mostly fine to medium grained sand.
150	3900						@155.0 ft. coarse cobble gravel.
160	3890				Bentonite Chips		
170	3880						170.0-176.0 ft. cobbles increasing in size and amount, most matrix material being lost - ~60% recovery.

MONITORING WELL COMPLETION LOG MOA01-0439

PROJECT MOAB **WELL NUMBER** 0439
SITE MOAB **DATES DRILLED** 08/07/2002 to 08/13/2002

Continued from Previous Page

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
180							178.0-180.0 ft. increasing amount of fine to medium grained sand matrix (~50-60%).
	3870						180.0-184.0 ft. SAND (SP); light red gray (2.5YR 7/1), medium grained, wet, subangular grains with black mica chips.
							184.0-200.0 ft. SANDY GRAVEL (GP); light red gray (2.5YR 7/1), cobble size rock fragments, rounded, comprise ~50% of mass, remaining 50% is fine to medium grained sand.
190							
	3860						
200							200.0-202.0 ft. SAND (SP); fine to medium grained sand.
	3850						202.0-206.0 ft. GRAVELLY SAND (SP); fine to medium grained sand with ~30% 1.0" diameter gravel (subrounded).
					Bentonite Chips		206.0-209.0 ft. SANDY GRAVEL (GP); gravel clasts (up to 3.0" in diameter) mixed with ~30% sand.
210							209.0-210.0 ft. SANDY CLAY (CL); dark gray (5YR 4/1), medium stiff.
							210.0-212.0 ft. SANDY GRAVEL (GP); mixed with ~20% sand.
	3840						212.0-219.0 ft. GRAVELLY SAND (SP); mixed with 30% gravel, subrounded to 2.0" diameter.
220							219.0-227.5 ft. SAND (SP); medium grained sand , no gravel, subrounded, red-gray (2.5YR 5/1).
	3830						
							227.5-228.0 ft. SANDY CLAY (CL); dark gray (5YR 4/1).
230							228.0-244.5 ft. SAND (SP); fine to medium grained sand, subrounded, no gravel. 230.0-240.0 ft. few gravel fragments, rounded (< 1%), loose. Flowing sand.
	3820						
240							

MONITORING WELL COMPLETION LOG MOA01-0439

PROJECT MOAB **WELL NUMBER** 0439

SITE MOAB **DATES DRILLED** 08/07/2002 to 08/13/2002

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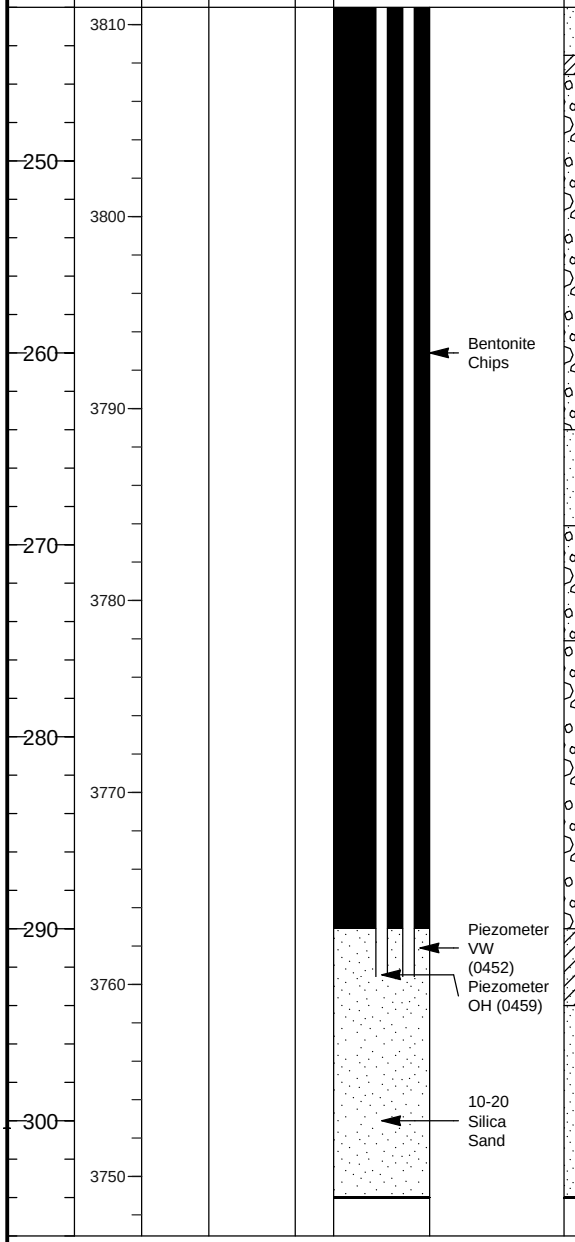


244.5-245.5 ft. SANDY CLAY (CL); dark gray (5YR 4/1), fine grained sand.

245.5-264.0 ft. SANDY GRAVEL (GP); reddish gray (2.5YR 5/1), ~30% sand, 70% gravel, rounded (average 1.0" in diameter).

262.0-263.0 ft. contains ~10% clay in matrix.

264.0-269.0 ft. SAND (SP); fine to medium grained sand, clean, no gravel.

269.0-275.0 ft. SANDY GRAVEL (GP); ~40% sand and 60% gravel (average 1.0" in diameter).

275.0-290.0 ft. CLAYEY SANDY GRAVEL (GP); reddish brown (5YR 5/3, 5/4, 4/3, and 4/4). Mottled, clay mixed with some sand and gravel, with individual clasts (up to 5.0" in diameter), with ~10% clay matrix.

290.0-294.0 ft. CLAYEY SAND (SC); poor recovery, red brown siltstone clasts in clayey sand matrix.

294.0-304.0 ft. SAND (SP); fine to medium grained sand.

NOTE: @292.85 ft. Installed location #451, vibrating wire piezometer (Geokon 4500s-100 PSI), and location #459, 1.0" diameter open hole PVC piezometer. Vibrating wire piezometer was taped to outside of 1.0" diameter PVC.

Total Depth 304.0 ft.

MONITORING WELL COMPLETION LOG MOA01-0440

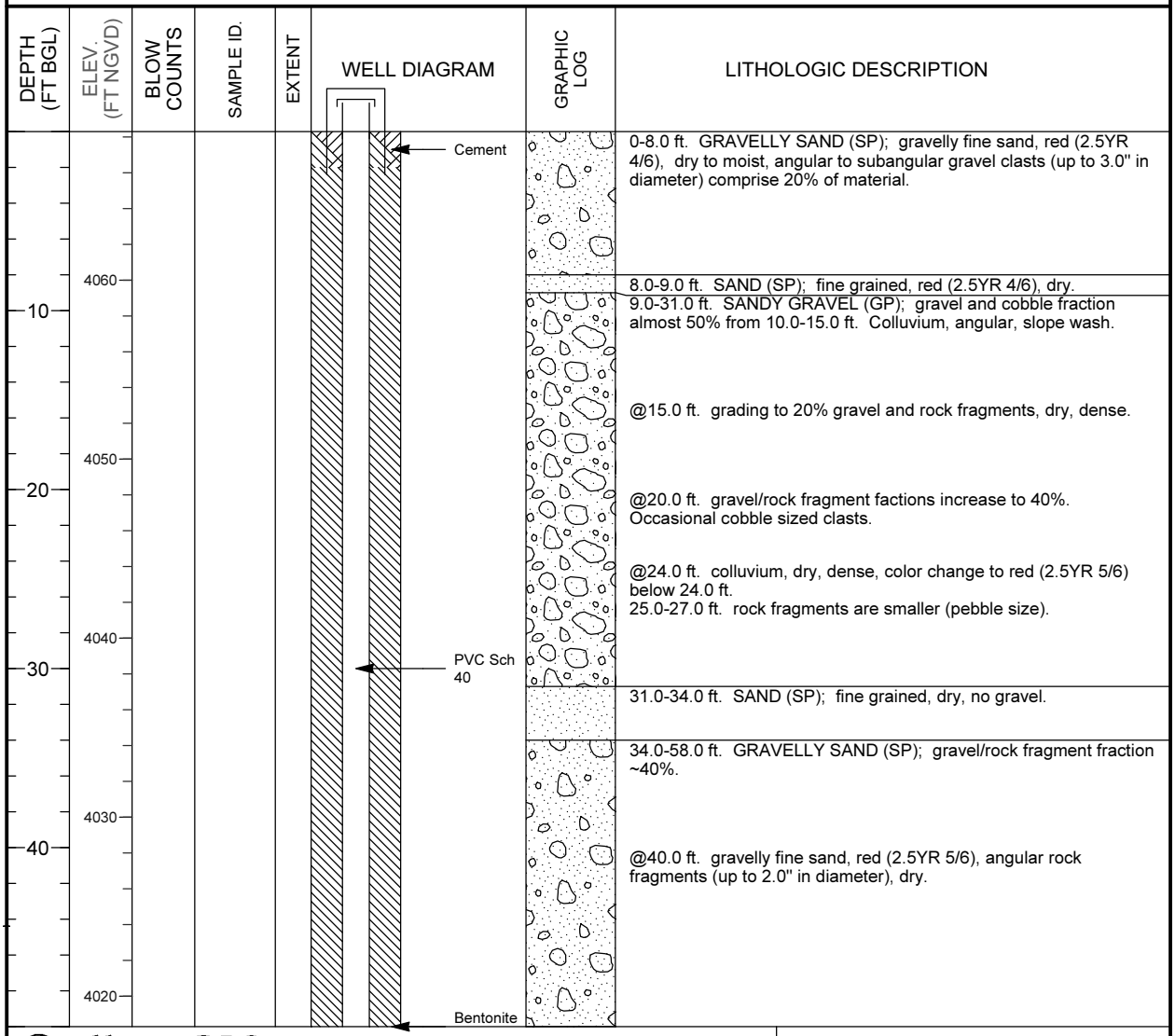
PROJECT MOAB
LOCATION Moab, UT
SITE MOAB
WELL NUMBER 0440

NORTH COORD. (FT) 6665301.40
EAST COORD. (FT) 2182825.04
HOLE DEPTH (FT) 120.00
WELL DEPTH (FT) 119.30

DATE DRILLED 07/27/2002
SURFACE ELEV. (FT NGVD) 4068.30
TOP OF CASING (FT) 4070.71
MEAS. PT. ELEV. (FT) 4070.71
SLOT SIZE (IN) 0.020
BIT SIZE(S) (IN) 6.0

WELL INSTALLATION		INTERVAL (FT)		
SURFACE CASING:				
BLANK CASING:	2 in. PVC Sch 40	-2.41	to	109.0
WELL SCREEN:	2 in. Slotted PVC	109.0	to	119.0
SUMP/END CAP:	2 in. PVC Sch 40	119.0	to	119.3
SURFACE SEAL:	Cement	0.0	to	2.0
GROUT:	Bentonite Grout	2.0	to	98.0
SEAL:	Bentonite Chips	98.0	to	105.0
UPPER PACK:	20-40 Silica Sand	105.0	to	107.0
LOWER PACK:	10-20 Silica Sand	107.0	to	119.0

DRILLING METHOD SONIC
SAMPLING METHOD SAMPLE TUBE
DATE DEVELOPED 07/28/2002
WATER LEVEL (FT BTOC) 110.6 on 07/30/2002
LOGGED BY Kautsky, M.
REMARKS

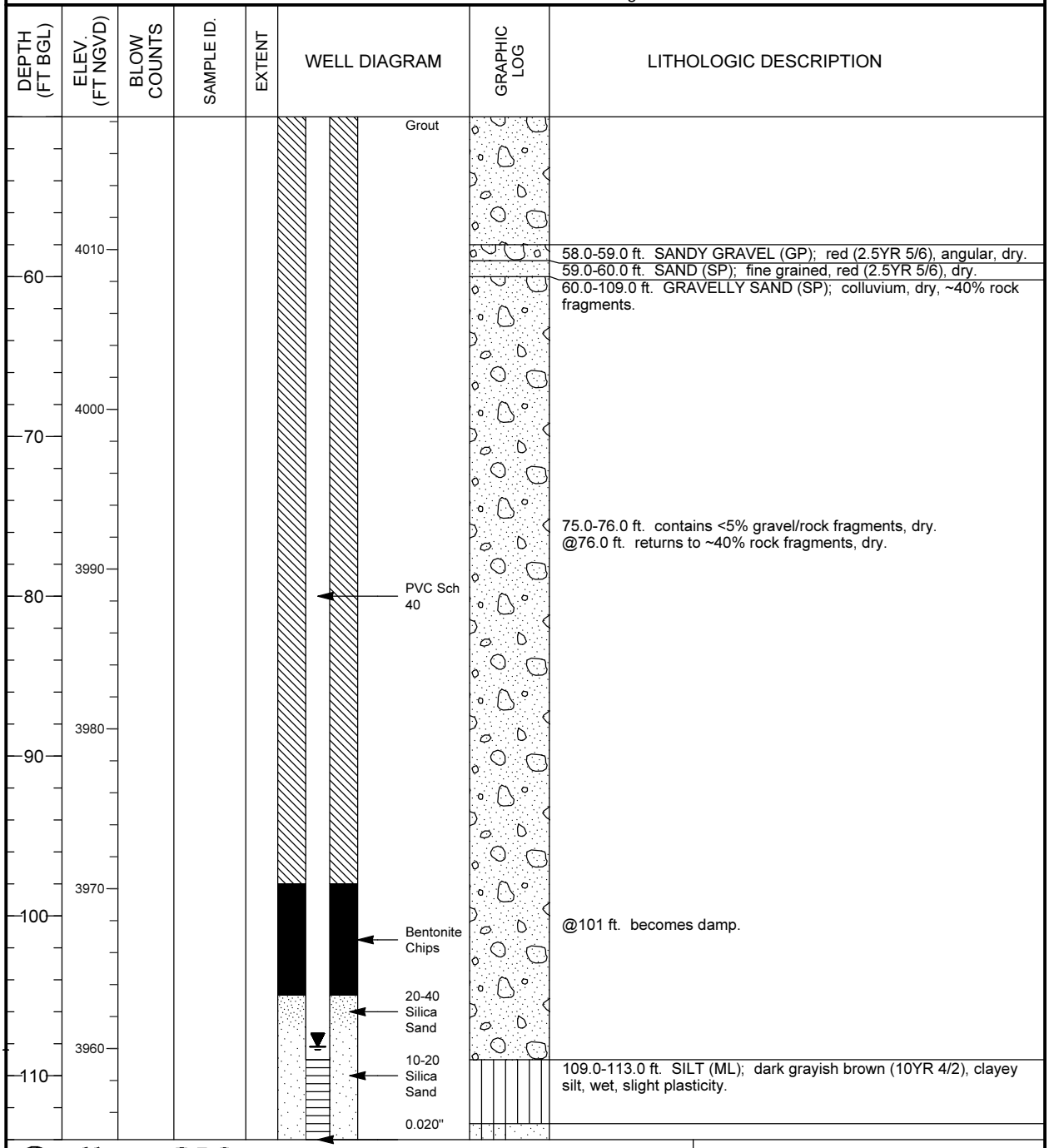


MONITORING WELL COMPLETION LOG MOA01-0440

PROJECT MOAB **WELL NUMBER** 0440

SITE MOAB **DATES DRILLED** 07/27/2002

Continued from Previous Page



MONITORING WELL COMPLETION LOG MOA01-0440

PROJECT MOAB **WELL NUMBER** 0440

SITE MOAB **DATES DRILLED** 07/27/2002

Continued from Previous Page

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
120	3950				Slotted PVC		113.0-120.0 ft. SILTY SAND (ML/SP); mottled grayish brown (10YR 5/2) and red (2.5YR 4/6), calcareous fine silty sand, moist to wet, trace (<1%) of small crystalline pebbles (up to 1.0" in diameter).
							Total Depth 120.0 ft.
130	3940						
140	3930						
150	3920						
160	3910						
170	3900						

MONITORING WELL COMPLETION LOG MOA01-0442

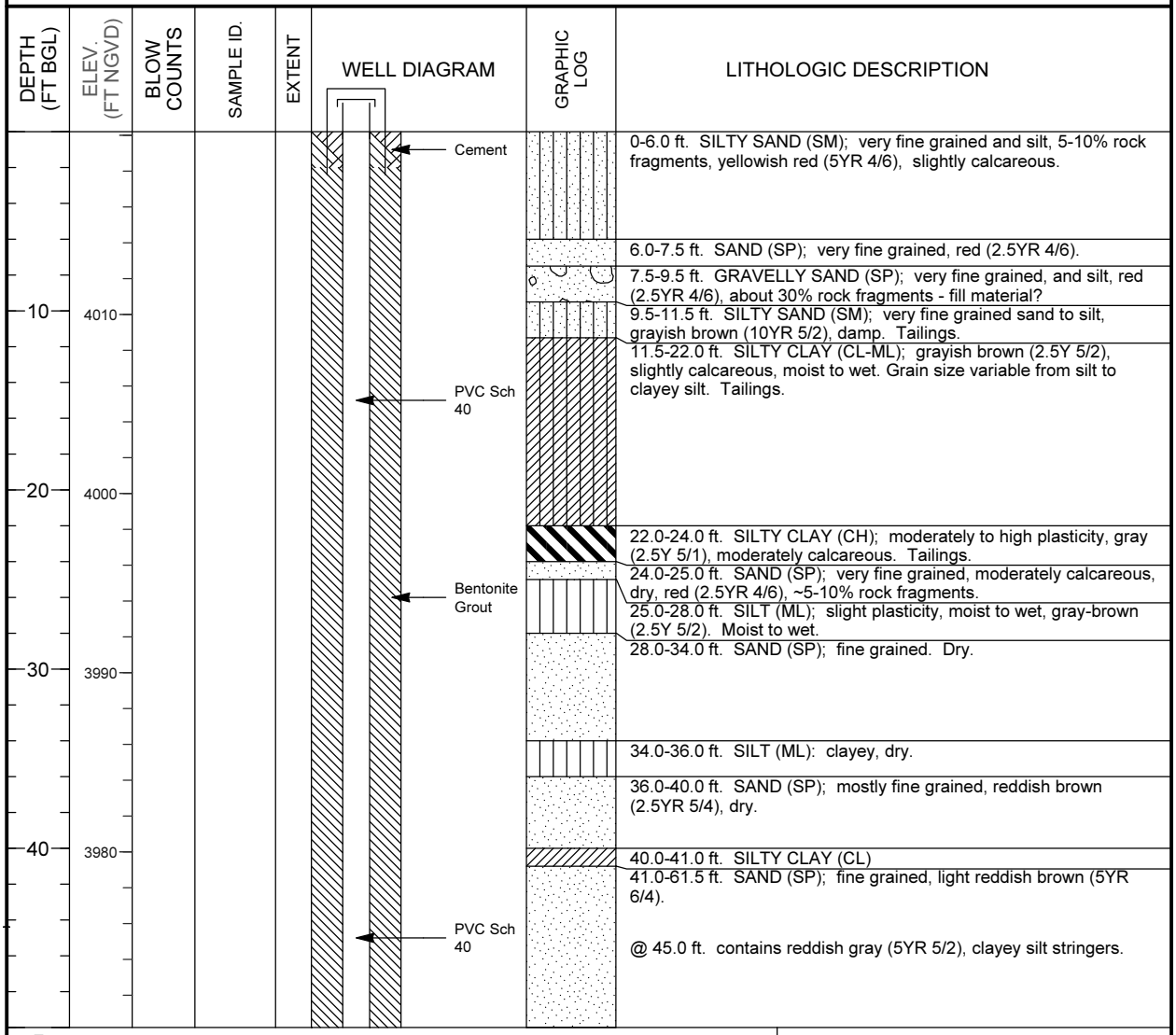
PROJECT MOAB
LOCATION Moab, UT
SITE MOAB
WELL NUMBER 0442

NORTH COORD. (FT) 6663696.44
EAST COORD. (FT) 2184113.44
HOLE DEPTH (FT) 66.30
WELL DEPTH (FT) 66.30

DATE DRILLED 07/26/2002
SURFACE ELEV. (FT NGVD) 4020.20
TOP OF CASING (FT) 4022.78
MEAS. PT. ELEV. (FT) 4022.78
SLOT SIZE (IN) 0.020
BIT SIZE(S) (IN) 6.0

WELL INSTALLATION		INTERVAL (FT)		
SURFACE CASING:				
BLANK CASING:	2 in. PVC Sch 40	-2.58	to	61.0
WELL SCREEN:	2 in. Slotted PVC	61.0	to	66.0
SUMP/END CAP:	2 in. PVC Sch 40	66.0	to	66.3
SURFACE SEAL:	Cement	0.0	to	2.0
GROUT:	Bentonite Grout	2.0	to	50.0
SEAL:	Bentonite Chips	50.0	to	57.0
UPPER PACK:	20-40 Silica Sand	57.0	to	59.0
LOWER PACK:	10-20 Silica Sand	59.0	to	66.3

DRILLING METHOD SONIC
SAMPLING METHOD SAMPLE TUBE
DATE DEVELOPED 07/27/2002
WATER LEVEL (FT BTOC) 66.5 on 07/30/2002
LOGGED BY Goodknight, C., Kautsky, M.
REMARKS



MONITORING WELL COMPLETION LOG MOA01-0442

PROJECT MOAB **WELL NUMBER** 0442

SITE MOAB **DATES DRILLED** 07/26/2002

Continued from Previous Page

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
60	3960				Bentonite Chips; 20-40 Silica Sand; 10-20 Silica Sand; 0.020" Slotted PVC		@ 50.0 ft. contains reddish gray (5YR 5/2), clayey silt stringers. @ 55.0 ft. contains reddish gray (5YR 5/2), clayey silt stringers. 61.5-65.0 ft. SANDSTONE; reddish brown (2.5YR 4/6), calcareous, fine grained with pale green (10G 6/2) blebs of siltstone. Deeply weathered and moist, hard, with angular hard rock fragments of pale green and pale red arkosic sandstone.
70	3950						65.0-66.0 ft. CONGLOMERATE; pale red (10YR 6/2), pebble conglomerate containing abundant subangular to subrounded clasts of pale reddish brown (10YR 5/4) to grayish red (10YR 4/2) siltstone. Grain size ranges from coarse sand to pebble size, very hard, dry. TD @66.0 ft., in alluvial material; Bottom 5.0 ft. is believed to be in a talus boulder of conglomeratic material in the middle part of the Chinle Formation (Black Ledge). This is based on occurrences of similar talus boulders on the slope nearby to the north and the outcrop of the Black Ledge present on the slope directly to the west. Total Depth 66.3 ft.
80	3940						
90	3930						
100	3920						
110	3910						

MONITORING WELL COMPLETION LOG MOA01-0443

PROJECT MOAB
LOCATION Moab, UT
SITE MOAB
WELL NUMBER 0443

NORTH COORD. (FT) 6666506.51
EAST COORD. (FT) 2182942.72
HOLE DEPTH (FT) 82.50
WELL DEPTH (FT) 80.30

DATE DRILLED 07/25/2002 to 07/26/2002
SURFACE ELEV. (FT NGVD) 4004.40
TOP OF CASING (FT) 4006.72
MEAS. PT. ELEV. (FT) 4006.72
SLOT SIZE (IN) 0.020
BIT SIZE(S) (IN) 6.0

WELL INSTALLATION		INTERVAL (FT)		
SURFACE CASING:				
BLANK CASING:	2 in. PVC Sch 40	-2.32	to	70.0
WELL SCREEN:	2 in. Slotted PVC	70.0	to	80.0
SUMP/END CAP:	2 in. PVC Sch 40	80.0	to	80.3
SURFACE SEAL:	Cement	0.0	to	3.0
GROUT:	Bentonite Grout	3.0	to	59.0
SEAL:	Bentonite Chips	59.0	to	66.0
UPPER PACK:	20-40 Silica Sand	66.0	to	67.0
LOWER PACK:	10-20 Silica Sand	67.0	to	80.3

DRILLING METHOD SONIC
SAMPLING METHOD SAMPLE TUBE
DATE DEVELOPED 07/26/2002
WATER LEVEL (FT BTOC) 46.75 on 08/13/2002
LOGGED BY Goodknight, C.
REMARKS ~10.0-15.0 ft. south of well 0431. Centralizers @ 10.0 ft., 50.0 ft., and 80.0 ft.

DEPTH (FT BGL)	ELEV. (FT NGVD)	BLOW COUNTS	SAMPLE ID.	EXTENT	WELL DIAGRAM	GRAPHIC LOG	LITHOLOGIC DESCRIPTION
					Cement		0-68.0 ft. SAND (SP); red (2.5YR 5/6), fine grained sand, subrounded, moist, loose.
	4000						
							7.0-8.0 ft. few pebbles (~5%).
10							
							11.0-14.5 ft. contains subrounded pebbles and coarser (medium) sand, thin red fine sand, subrounded, moist, and loose below 14.0 ft.
	3990						
					PVC Sch 40		
20							19.0-21.0 ft. contains a trace of subangular to subrounded pebbles.
	3980						
30					Bentonite Grout		
	3970						
							38.0-39.0 ft. reddish yellow (5YR 6/6).
40							@40 ft. moisture content increasing rapidly below 40.0 ft. Becoming wet from 42.0 to 45.0 ft.
	3960				PVC Sch 40		

MONITORING WELL COMPLETION LOG MOA01-0443

PROJECT MOAB **WELL NUMBER** 0443

SITE MOAB **DATES DRILLED** 07/25/2002 to 07/26/2002

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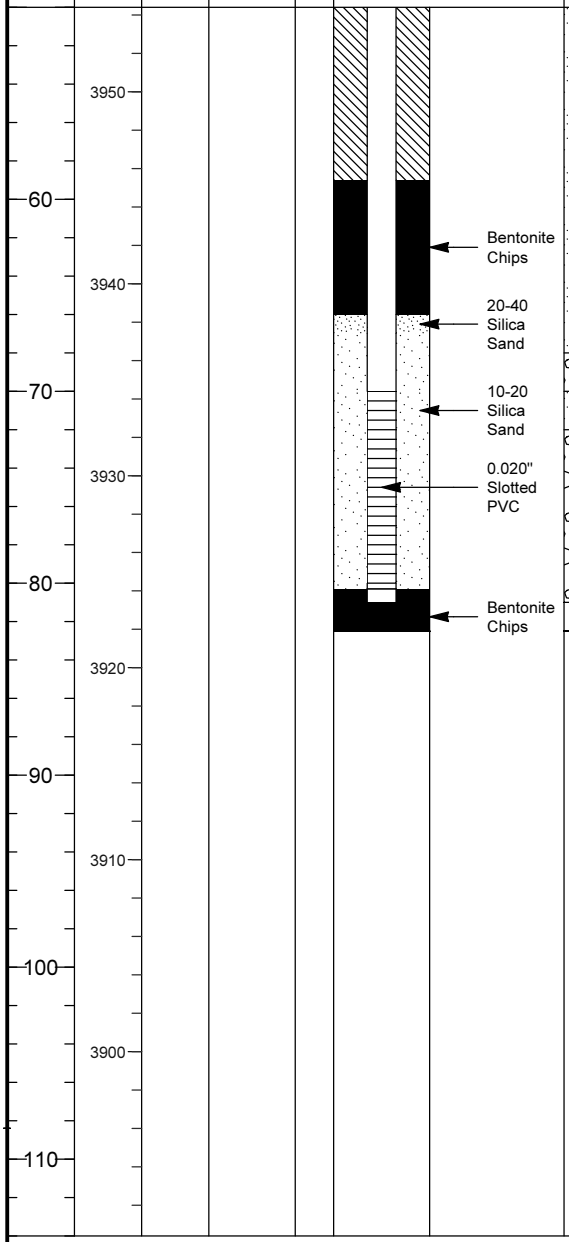


@50.0 ft. color of fine grained sand is red (2.5YR 5/6 or 2.5YR 4/6).

53.0-57.0 ft. very fine grained to silt size, trace mica, wet, dark yellowish brown (10YR 4/4). Limonitic streak at 56.0 ft.

57.0-63.0 ft. 10% small pebbles (rounded) and angular rock fragments, red (2.5YR 4/6).

63.0-65.0 ft. sand, fine grained, red (2.5YR 5/6).

65.0-68.0 ft. fine to medium grained, trace of mica, subrounded grains, grayish brown (10YR 5/2).

68.0-70.0 ft. GRAVEL (GP); cobble gravel (20-30%), pebbles and cobbles (up to 4.0" in diameter, fine grained sand matrix of yellowish brown (10YR 5/4). Deposited by the ancestral Colorado River.

70.0-72.0 ft. SAND (SP); fine to medium grained, dark yellowish brown (10YR 4/4).

72.0-81.0 ft. GRAVEL (GP); 40-50% cobbles (up to 6.0" in diameter), matrix of medium to fine grained sand is dark grayish brown (10YR 4/2).

81.0-82.5 ft. ENTRADA SANDSTONE (possible Slick Rock Member): SANDSTONE; fine grained, friable, soft, mottled, and weathered, and dark yellowish orange (10YR 6/6).

Total Depth 82.5 ft.

MONITORING WELL COMPLETION LOG MOA01-0444

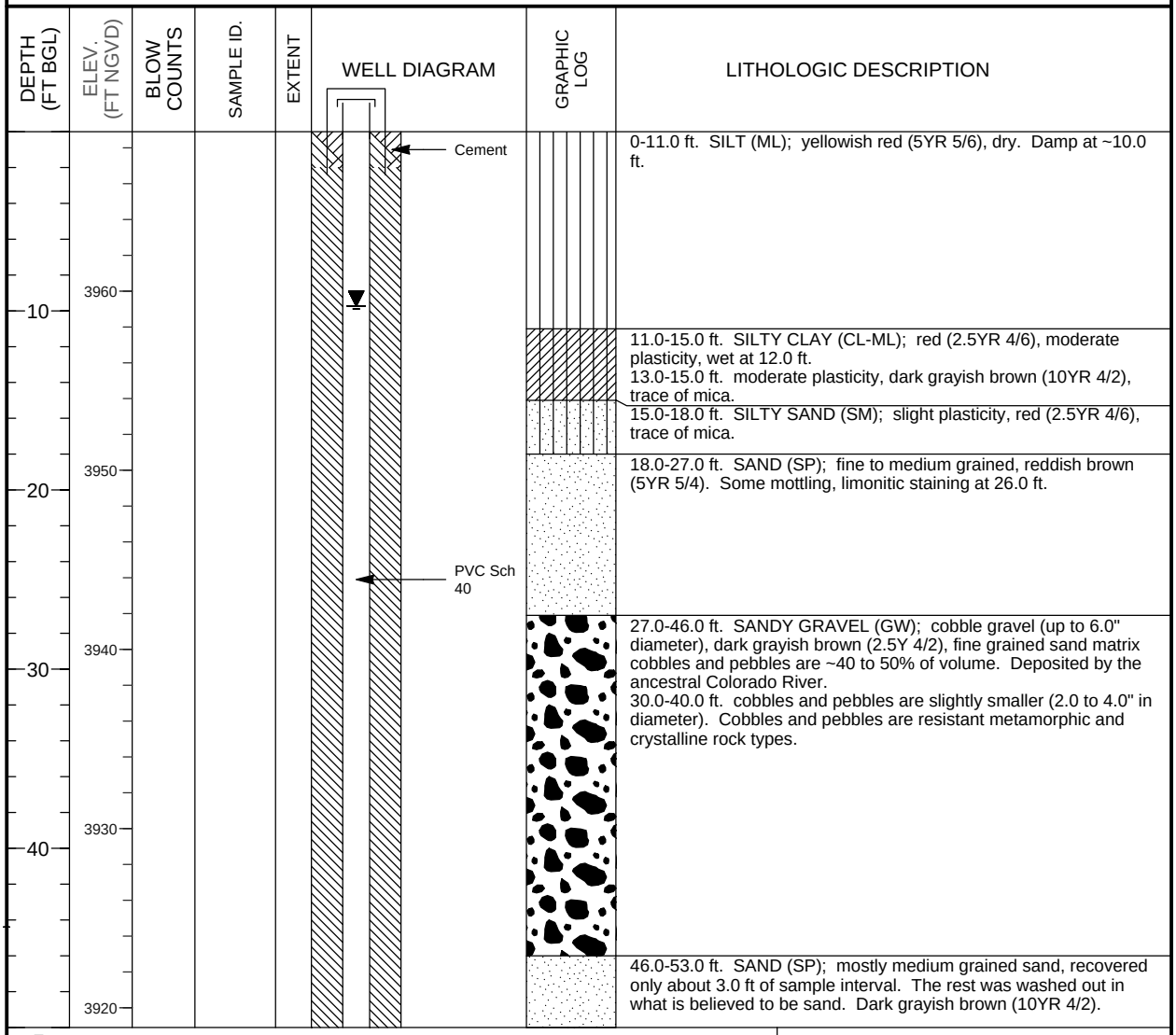
PROJECT MOAB
LOCATION Moab, UT
SITE MOAB
WELL NUMBER 0444

NORTH COORD. (FT) 6667025.14
EAST COORD. (FT) 2186808.28
HOLE DEPTH (FT) 120.30
WELL DEPTH (FT) 120.30

DATE DRILLED 07/30/2002
SURFACE ELEV. (FT NGVD) 3968.90
TOP OF CASING (FT) 3970.99
MEAS. PT. ELEV. (FT) 3970.99
SLOT SIZE (IN) 0.020
BIT SIZE(S) (IN) 6.0

WELL INSTALLATION		INTERVAL (FT)		
SURFACE CASING:				
BLANK CASING:	2 in. PVC Sch 40	-2.09	to	110.0
WELL SCREEN:	2 in. Slotted PVC	110.0	to	120.0
SUMP/END CAP:	2 in. PVC Sch 40	120.0	to	120.3
SURFACE SEAL:	Cement	0.0	to	2.0
GROUT:	Bentonite Grout	2.0	to	99.0
SEAL:	Bentonite Chips	99.0	to	106.0
UPPER PACK:	20-40 Silica Sand	106.0	to	107.0
LOWER PACK:	10-20 Silica Sand	107.0	to	120.3

DRILLING METHOD SONIC
SAMPLING METHOD SAMPLE TUBE
DATE DEVELOPED 07/30/2002
WATER LEVEL (FT BTOC) 11.82 on 08/08/2002
LOGGED BY Goodknight, C.
REMARKS ~15.0 ft. East of Well Location 0435. Centralizers @ 119.5 ft., 70.0 ft., and 10.0 ft.



MONITORING WELL COMPLETION LOG MOA01-0444

PROJECT MOAB **WELL NUMBER** 0444

SITE MOAB **DATES DRILLED** 07/30/2002

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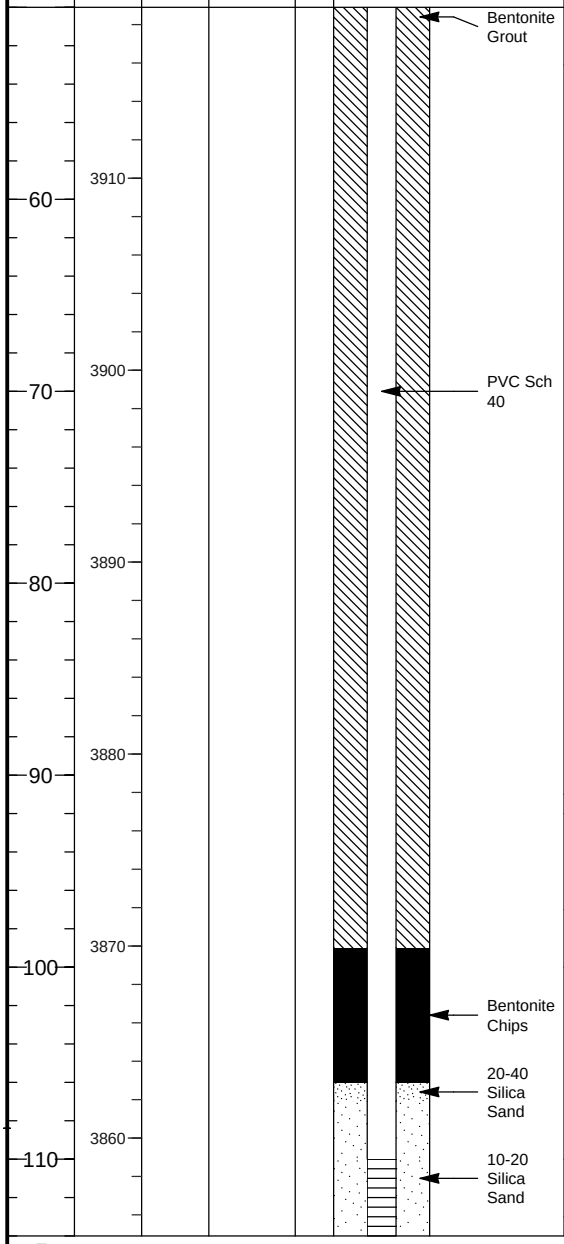


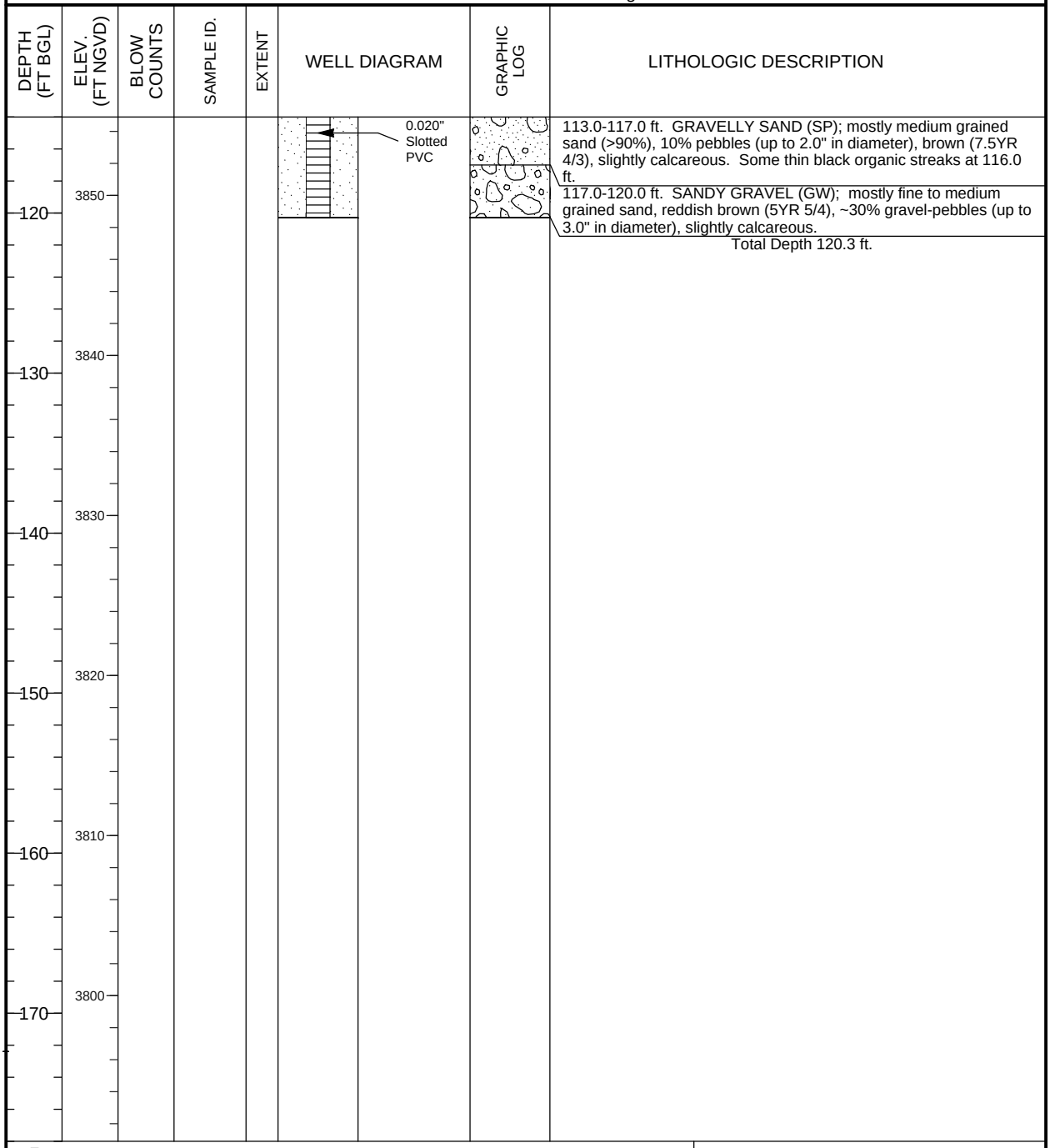
GRAPHIC LOG	LITHOLOGIC DESCRIPTION
	53.0-91.0 ft. SANDY GRAVEL (GW); cobble gravel (up to 5.0" in diameter) and smaller pebbles (30-40%) with fine grained sand matix, dark grayish brown (10YR 4/2).
	@60.0 ft. gravel (cobbles) become more abundant (~50%) and larger (up to 6.0" diameter). Approximately 75% recovery in 56.0 to 66.0 ft. interval.
	Near 100% recovery in 66.0-76.0 ft. interval.
	76.0-86.0 ft. most cobbles/pebbles < 3.0 " diameter. Approximately 75% recovery.
	91.0-92.0 ft. SAND (SP); fine to medium grained, dark grayish brown (10YR 4/2). Most grains are rounded to subrounded. Approximately 5% red grains (feldspar?).
	92.0-97.0 ft. SANDY GRAVEL (GW);
	97.0-100.0 SAND (SP); medium to coarse grained, dark grayish brown (10YR 4/2), thickness is estimated for this interval.
	100.0-110.0 ft. SANDY GRAVEL (GW), cobbles (up to 4.0 " in diameter).
	110-113.0 ft. SANDY GRAVEL (GW); mostly fine to medium grained sand, dark grayish brown (10YR 4/2), 30-40% gravel (up to 3.0" in diameter), some clay material (<5%), slightly calcareous.

MONITORING WELL COMPLETION LOG MOA01-0444

PROJECT MOAB **WELL NUMBER** 0444

SITE MOAB **DATES DRILLED** 07/30/2002

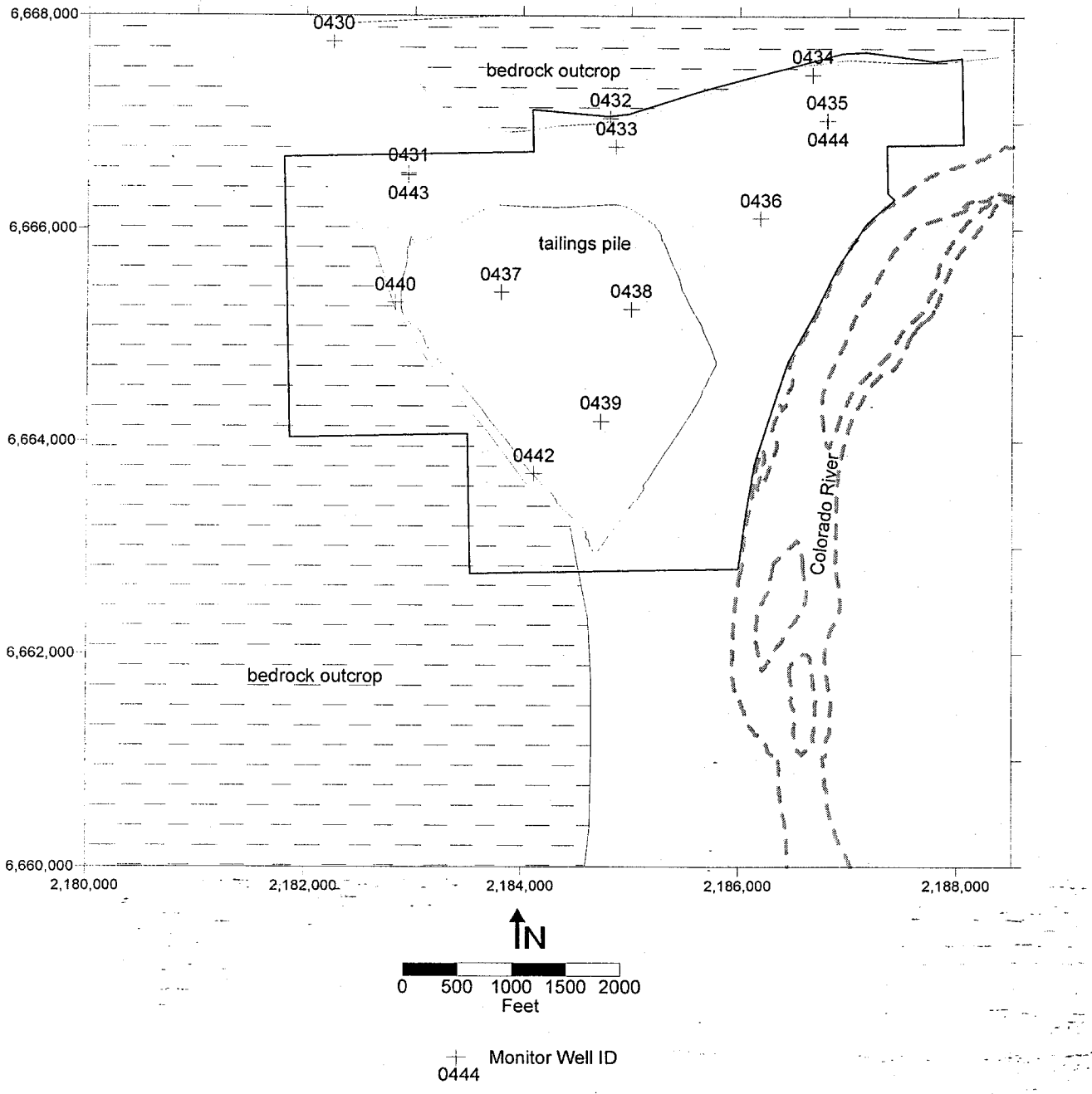
Continued from Previous Page



Attachment 2

Monitor Well Location Map

Monitor Well Locations



Attachment 3

Coordinate Location Table

(**Note:** Coordinates are Modified Utah State Plane, Central Zone, North American Datum (NAD) 1983/1994. Elevations are North American Vertical Datum (NAVD) 1988.)

COORDINATE LOCATION INFORMATION (USEE400) FOR SITE MOA01, MOAB
REPORT DATE: 9/27/2002 2:15 pm

LOCATION CODE	NORTH COORD. (FT STATE-PLANE)	EAST COORD. (FT STATE-PLANE)	GROUND ELEV. (FT)	DATE ESTAB.	INSTALLED BY	LOCATION TYPE	LOCATION COMMENTS
0430	6667757.07	2182243.89	4022.60	07/13/2002	Mactec-ers	WL	
0431	6666521.90	2182943.22	4004.40	07/28/2002	S.M. Stoller	WL	
0432	6667039.84	2184809.02	4001.70	07/12/2002	Mactec-ers	WL	
0433	6666772.57	2184863.22	3990.20	07/14/2002	Mactec-ers	WL	
0434	6667455.31	2186665.40	3990.60	07/11/2002	Mactec-ers	WL	
0435	6667025.87	2186797.60	3969.10	07/16/2002	Mactec-ers	WL	
0436	6666105.49	2186196.67	3968.50	07/31/2002	S.M. Stoller	WL	
0437	6665399.33	2183802.67	4045.90	08/22/2002	S.M. Stoller	WL	
0438	6665241.03	2185009.53	4052.00	08/20/2002	S.M. Stoller	WL	
0439	6664189.32	2184731.49	4052.90	08/07/2002	S.M. Stoller	WL	
0440	6665301.40	2182825.04	4068.30	07/27/2002	S.M. Stoller	WL	
0442	6663696.44	2184113.44	4020.20	07/26/2002	S.M. Stoller	WL	
0443	6666506.51	2182942.72	4004.40	07/25/2002	S.M. Stoller	WL	
0444	6667025.14	2186808.28	3968.90	07/30/2002	S.M. Stoller	WL	

RECORDS: SELECTED FROM USEE400 WHERE site_code='MOA01' AND location_code in('0430','0431','0432','0433','0434','0435','0436','0437','0438','0439','0440','0442','0443','0444')

LOCATION TYPES: WL WELL

Attachment 4

Monitor Well Construction Table

(**Note:** Coordinates are Modified Utah State Plane, Central Zone, North American Datum [NAD] 1983/1994. Elevations are North American Vertical Datum [NAVD] 1988.)
FT BLS = feet below land surface

MONITOR WELL REPORT (USEE300) FOR SITE MOA01, MOAB
REPORT DATE: 9/27/2002 2:15 pm

LOCATION CODE	NORTH COORD. (FT STATE-PLANE)	EAST COORD. (FT STATE-PLANE)	GROUND ELEV. (FT)	BORE HOLE DEPTH (FT BLS)	BORE HOLE DIA. (INCHES)	TOP OF CASING ELEV. (FT)	CASING LENGTH (FT)	CASING DIAMETER (INCHES)	SCREEN DEPTH (FT BLS)	SCREEN LENGTH (FT)	ZONE OF COMPL.
0430	6667757.07	2182243.89	4022.60	113.00	6.0	4022.10	105.80	2.0	96.00	10.00	BR
0431	6666521.90	2182943.22	4004.40	106.00	6.0	4007.04	101.94	2.0	89.00	10.00	BR
0432	6667039.84	2184809.02	4001.70	60.30	6.0	4001.47	60.07	2.0	50.00	10.00	BR
0433	6666772.57	2184863.22	3990.20	106.00	6.0	3989.99	104.09	2.0	94.00	10.00	BR
0434	6667455.31	2186665.40	3990.60	85.30	6.0	3990.21	84.91	2.0	75.00	10.00	BR
0435	6667025.87	2186797.60	3969.10	181.30	6.0	3971.67	183.87	2.0	171.00	10.00	BR
0436	6666105.49	2186196.67	3968.50	205.30	8.0	3970.80	207.60	2.0	195.00	10.00	AL
0437	6665399.33	2183802.67	4045.90	250.00	8.0	4048.25	102.65	2.0	90.00	10.00	AL
0438	6665241.03	2185009.53	4052.00	120.00	8.0	4054.22	121.52	2.0	109.00	10.00	AL
0439	6664189.32	2184731.49	4052.90	304.00	8.0	4055.27	122.67	2.0	110.00	10.00	AL
0440	6665301.40	2182825.04	4068.30	120.00	6.0	4070.71	121.71	2.0	109.00	10.00	AL
0442	6663696.44	2184113.44	4020.20	66.30	6.0	4022.78	68.88	2.0	61.00	5.00	AL
0443	6666506.51	2182942.72	4004.40	82.50	6.0	4006.72	82.62	2.0	70.00	10.00	AL
0444	6667025.14	2186808.28	3968.90	120.30	6.0	3970.99	122.39	2.0	110.00	10.00	AL

RECORDS: SELECTED FROM USEE300 WHERE site_code='MOA01' AND location_code in('0430','0431','0432','0433','0434','0435','0436','0437','0438','0439','0440','0442','0443','0444')

ZONES OF COMPLETION:

AL ALLUVIUM

BR UNDIFFERENTIATED BEDROCK

Attachment 5

Field Conductance Measurements

Boring	Sample Depth (ft bls)	Sample ID	Date Sampled	Field Conductance (uS/cm)
431	50	MOA 431-50	7/29/2002	1,306
435	146	MOA 435-146	7/23/2002	58,000
436	20	MOA 436-20	7/31/2002	5,430
436	105	MOA 436-105	7/31/2002	41,500
436	135	MOA 436-135	7/31/2002	92,300
436	180	MOA 436-180	8/1/2002	87,500
436	212	MOA 436-212	8/6/2002	117,100
437	94	MOA 437-94	8/23/2002	12,540
437	130	MOA 437-130	8/23/2002	8,980
437	160	MOA 437-160	8/23/2002	9,200
437	188	MOA 437-188	8/23/2002	11,130
437	218	MOA 437-218	8/24/2002	11,900
437	252	MOA 437-252	8/24/2002	77,100
438	44	MOA 438-44	8/20/2002	15,830
438	105	MOA 438-105	8/21/2002	8,580
439	27	MOA 439-27	8/8/2002	53,300
439	120	MOA 439-120	8/8/2002	37,477
439	135	MOA 439-135	8/9/2002	9,100
439	155	MOA 439-155	8/9/2002	11,020
439	165	MOA 439-165	8/9/2002	9,900
439	185	MOA 439-185	8/10/2002	42,100
439	205	MOA 439-205	8/10/2002	29,900
439	235	MOA 439-235	8/10/2002	56,400
439	265	MOA 439-265A	8/11/2002	77,500
439	266	MOA 439-266	8/11/2002	68,600
439	265	MOA 439-265B	8/12/2002	82,200
440	115	MOA 440-115	7/28/2002	8,460
443	55	MOA 443-55	7/30/2002	1,525
444	25	MOA 444-25	7/24/2002	6,600
444	50	MOA 444-50	7/25/2002	11,200
444	80	MOA 444-80	7/25/2002	50,400

ft bls; feet below land surface.

uS/cm; microSiemen per centimeter.

Attachment 6

Preliminary Findings

Monitor Well	Easting Coordinate (ft)	Northing Coordinate (ft)	Land Surface Elevation (ft amsl)	Total Depth of Boring (ft bls)	Depth to Top of Tailings (ft bls)	Depth to Bottom of Tailings (ft bls)	Depth to Top of River Gravel (ft bls)	Depth to Top of Bedrock (ft bls)	Elevation to Top of Tailings (ft amsl)	Elevation to Bottom of Tailings (ft amsl)	Elevation to Top of River Gravel (ft amsl)	Elevation to Top of Bedrock (ft amsl)	River Gravel Thickness (ft)
0430	6667757	2182244	4022.6	113				92.5				3930.1	0
0431	6666522	2182943	4004.4	106			68	81			3936.4	3923.4	13
0432	6667040	2184809	4001.7	60				10				3991.7	0
0433	6666773	2184863	3990.2	106			45	82			3945.2	3908.2	37
0434	6667455	2186665	3990.6	85			52	59.5			3938.6	3931.1	7.5
0435	6667026	2186798	3969.1	181			27	161			3942.1	3808.1	134
0436	6666105	2186197	3968.5	205			27				3941.5		+178
0437	6665399	2183803	4045.9	250	7	41	101.5		4038.9	4004.9	3944.4		+148.5
0438	6665241	2185010	4052	120	3	73	103		4049	3979	3949		+17
0439	6664189	2184731	4052.9	304	8	82.5	117.5		4044.9	3970.4	3935.4		+186.5
0440	6665301	2182825	4068.3	120									0
0442	6663696	2184113	4020.2	66	9.5	24			4010.7	3996.2			0
0443	6666507	2182943	4004.4	82.5			68	81			3936.4	3923.4	13
0444	6667025	2186808	3968.9	120			27	161			3941.9	3807.9	134

Coordinates are Modified Utah State Plane, Central Zone, North American Datum (NAD) 1983/1994.
Elevations are North American Vertical Datum (NAVD) 1988.
amsl; above mean sea level.
bls; below land surface.
ft; feet.

Attachment 7

Radiocarbon Age Date Results

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RADIOCARBON AGE DETERMINATION — REPORT OF ANALYTICAL WORK

Our Sample No.	**GX-29361**	Date Received:	07/29/2002
Your Reference:		Date Reported:	09/11/2002
Submitted by:	Gregory M. Smith U.S. Department of Energy 2597 B 3/4 Road Grand Junction, CO 81503		
Sample Name:	**#435 @116.5 ft**		
AGE =	**45340 $^{+3310}_{-2340}$ ^{14}C years BP (^{13}C corrected)**		
Description:	Sample of wood		
Pretreatment:	The wood sample was cleaned of dirt and other foreign material and split into small pieces. It was then treated with hot dilute HCl to remove any carbonates; with 0.1N dilute NaOH to remove humic acids and other organic contaminants; and a second time with dilute HCl. After washing and drying, the sample was combusted to recover carbon dioxide for the analysis.		
Comments:	The sample was counted for an extended period of time.		
$\delta^{13}C_{PDB}$ =	**-26.4 ‰**		

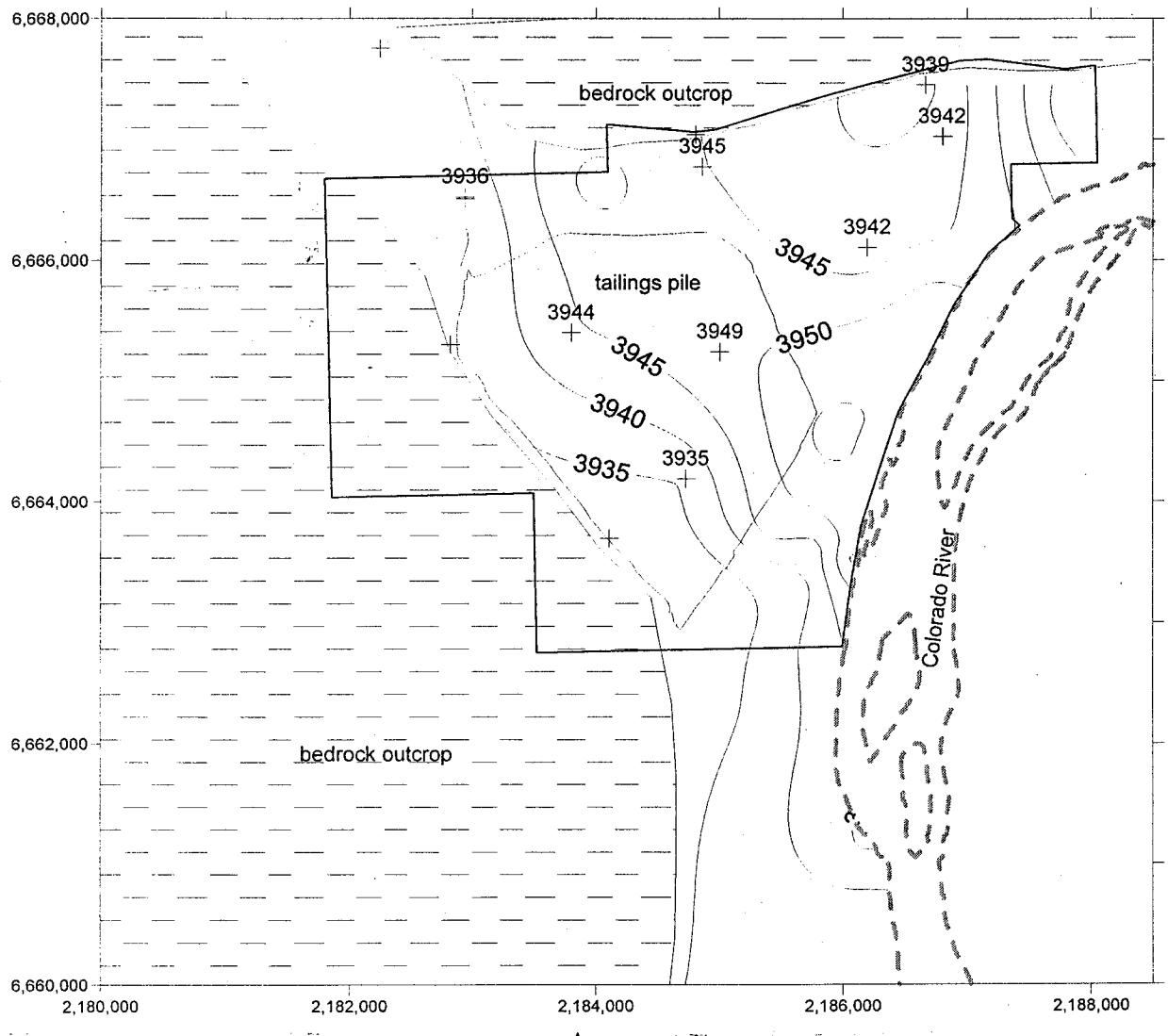
Notes: This date is based upon the Libby half life (5570 years) for ^{14}C. The error is +/- 1 s as judged by the analytical data alone. Our modern standard is 95% of the activity of N.B.S. Oxalic Acid.

The age is referenced to the year A.D. 1950.

Attachment 8

Elevation Contour Map at the Top of the River Gravel Contact

Elevation at the Top of the River Gravel Contact



3935
Drawn on top of the river gravel contact
Contour interval 5-ft

3935 Elevation (ft amsl) at upper gravel contact

Attachment 9

Control Points: Elevation at the Top of the River Gravel Contact

Monitor Well	Easting Coordinate (ft)	Northing Coordinate (ft)	Land Surface Elevation (ft amsl)	Depth to Top of River Gravel (ft bls)	Elevation to Top of River Gravel (ft amsl)
0401	2186101	6663842	3967.70	14.5	3953.2
0402	2186089	6663682	3967.70	16.5	3951.2
0403	2186078	6663535	3966.90	10.5	3956.4
0405	2186331	6664404	3966.40	12.5	3953.9
0406	2186333	6664631	3967.90	13.5	3954.4
0431	2182943	6666522	4004.4	68	3936.4
0433	2184863	6666773	3990.2	45	3945.2
0434	2186665	6667455	3990.6	52	3938.6
0435	2186798	6667026	3969.1	27	3942.1
0436	2186197	6666105	3968.5	27	3941.5
0437	2183803	6665399	4045.9	101.5	3944.4
0438	2185010	6665241	4052	103	3949
0439	2184731	6664189	4052.9	117.5	3935.4
0443	2182943	6666507	4004.4	68	3936.4
0444	2186808	6667025	3968.9	27	3941.9
AMM-1	2187878	6667298	3970.00	5	3965
AMM-2	2186027	6664125	3965.50	13	3952.5
AMM-3	2185005	6663156	3965.70	35	3930.7
ATP-1-D	2185982	6664509	3968.20	10	3958.2
ATP-1-IS	2185982	6664509	3968.20	10	3958.2
ATP-2-D	2185460	6663830	3964.40	15	3949.4
ATP-2-S	2185460	6663829	3964.40	15	3949.4
ATP-3	2183965	6666653	3996.90	45	3951.9
OW-1	2185471	6663839	3964.40	16	3948.4
OW-2	2185479	6663845	3964.50	16	3948.5
OW-3	2185445	6663827	3964.70	16	3948.7
OW-4	2185434	6663829	3964.40	16	3948.4
PW-1	2185334	6664574	4058.00	109	3949
SMI-MW01	2186811	6665680	3966.50	12.5	3954
SMI-PZ1D2	2186171	6664475	3966.40	13	3953.4
SMI-PZ2D	2185789	6663621	3965.20	22	3943.2
SMI-PZ3D2	2186246	6666136	3973.30	30	3943.3
TH-27	2182908	6666206	4002.00	68	3934
TP-01	2187358	6666340	3967.60	18	3949.6
TP-02	2186980	6665915	3973.90	28	3945.9
TP-06	2185083	6662810	3962.20	29	3933.2
TP-07	2185523	6662802	3964.60	26	3938.6
TP-08	2185682	6663276	3966.30	28	3938.3
TP-09	2185879	6663762	3965.80	17	3948.8
TP-18	2186168	6661175	3963.90	18	3945.9
TP-19	2186369	6660472	3962.30	27	3935.3
TP-20	2185361	6662194	3966.50	30	3936.5
TP-21	2186400	6659976	3963.70	22	3941.7

Coordinates are Modified Utah State Plane, Central Zone, North American Datum (NAD) 1983/1994.
Elevations are North American Vertical Datum (NAVD) 1988.
amsl; above mean sea level.
bls; below land surface.
ft; feet.

Attachment 10

Radiologic analysis of soil samples collected from MOA–442

OCS Gamma Spectral Analysis
Ra-226 Data Form

Property Number: Moab Project Site	Date: August 22, 2002
Operator: Colunga & Trevino	Moab Stationary Unit: MCB 1

Ref. STD (pCi/g)	Weight (grams)	Net Peak (count)	Total Activity (pCi)	Net Countrate (cps)	Calcltd. Conc.	Within Limits?
15.00	395.4	2456	A15 = 5931.0	R15 = 4.91	14.9	Yes
50.00	419.9	8788	A50 = 20995.0	R50 = 17.58	50.0	Yes
Count Time (sec) =		500	Calibration Factor	(pCi/count second) =	1195.5	

Sample Location Number	Sample Ticket Number	Sample Depth (~~Inches~~)	Net Mass (grams)	Net Peak Area (counts)	Calcltd Conc. (pCi/g)	True Conc. (pCi/g)	Notes:
442-12		~~12~~ 12'	505.5	57601	272.4	500.4	
442-13		13'	521.3	138301	634.3	1166.2	
442-14		14'	501.4	116286	554.5	1019.4	
442-15		15'	474.8	125365	631.3	1160.7	
442-17		17'	493.4	172455	835.7	1536.8	
442-19		19'	551.0	61146	265.3	487.3	
442-21		21'	491.4	45254	220.2	404.2	
442-22		22'	585.3	63667	260.1	477.6	
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Total Uranium Analyses

Operator: Colunga	Date: 8-22-02
MCA Number: S-16294	Detector Number: C-3020

Sample Number	Ticket Number	Net Weight (Grams)	Gross Area 93 kev peak	Back-Ground (15 min.)	Net Counts	Total Uranium pCi/g	Comments
442-12	N/A	505.5	4671	22	4649	736.5	
442-13	N/A	521.3	10822	22	10800	1659.1	
442-14	N/A	501.4	8951	22	8929	1426.1	
442-15	N/A	474.8	9529	22	9507	1603.5	
442-17	N/A	493.4	13519	22	13497	2190.6	
442-19	N/A	551.0	4915	22	4893	711.1	
442-21	N/A	491.4	3316	22	3294	536.8	
442-22	N/A	585.3	5596	22	5574	762.6	

Total Uranium in pCi/g = net counts / net weight x 80.08
All samples are counted for 15 minutes (900 seconds) unless otherwise noted.
This data is not approved for verification purposes.