FINAL

PHASE II RFI/RI AQUIFER TEST REPORT

VOLUME II-APPENDICES

ROCKY FLATS PLANT

903 PAD, MOUND, AND EAST TRENCHES AREAS (OPERABLE UNIT NO.2)

U.S. DEPARTMENT OF ENERGY

ROCKY FLATS PLANT

GOLDEN, COLORADO

ENVIRONMENTAL RESTORATION PROGRAM

November 19, 1992

ADMIN RECORD

A-OU02-000475

"REVIEWED FOR CLASSIFICATION/UCNI
By S. V. Hall
Date 12/8/92
12/9/92

APPENDIX A

WELL CONSTSRUCTION AND LITHOLOGIC INFORMATION

ADMIN RECORD

REVIEWED FOR CLASSIFICATION/UCNI
By K.L. Dallenbach
Date 12/9/92 (UNCL.)

SITE 1

WELLS

OU2-ALLUVIUM

RFEDS
WELL INSTALLATION FORM

Well Number: pw 2Ø891 Project Number: 4ØØ6EMAD
Old Well No.:

Area: NE Trenches North or Y: East or X:
Purpose: GW Plume Characterization / Pump Testing
Formation: Ka. SS Well Status: Active
Contractor: Woodward-Clyde Drilling Method: Hollow-Stem Auger
Geologist: B. Edgerly Locator: H14 Top of pad (~6" thick
Date Drilled: 4/3-4/7/92 Ground Elev: 5949.35 ft. 5949.85

Total Depth: 64.Ø ft. Stick Up: ft.
Depth to Bedrock: 64.Ø ft. Completed Depth: 64.Ø ft.
Casing Diameter: 2.0 in. Borehole Diam.: 10.0 in.

Monitoring Interval: 21.7 ft. to 63.7 ft.
Initial Water Level: 37.Ø ft. Date: 4-3-92
Completed Water Level: 22.Ø ft. Date: 4-7-92

Item	From		To		I.D.	Type
Surface Seal:		ft.		ft.		Concrete
Protective Casing:		ft.		ft.	6.0 in.	Steel
Surface Casing:	64.Ø	ft.	-2.Ø	ft.	2.0 in.	PVC Sch. 40
Secondary Casing:	N/A	ft.		ft.	in.	N/A
Centralizer:	~~N/A~~ 4Ø.5	ft.	41.5	ft.	2.75 in.	N/A
Bentonite Seal:	18.Ø	ft.	14.Ø	ft.		Bentonite
Filter Pack:	64.Ø	ft.	18.Ø	ft.		16-40 Sand
Volume:	24.Ø cu. ft.					
Screen:	63.7	ft.	21.7	ft.	2.0 in.	PVC Sch. 40
Slot Size:	0.01 in.					
Sump:	64.Ø	ft.	63.7	ft.	2.0 in.	PVC Sch. 40
Backfill Seal:	N/A	ft.		ft.		Bentonite
Backfill:	N/A	ft.		ft.		Bentonite
Volume:	cu. ft.					

Tech-CK
Rel 4-08-92

OU2-ALLUVIUM

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

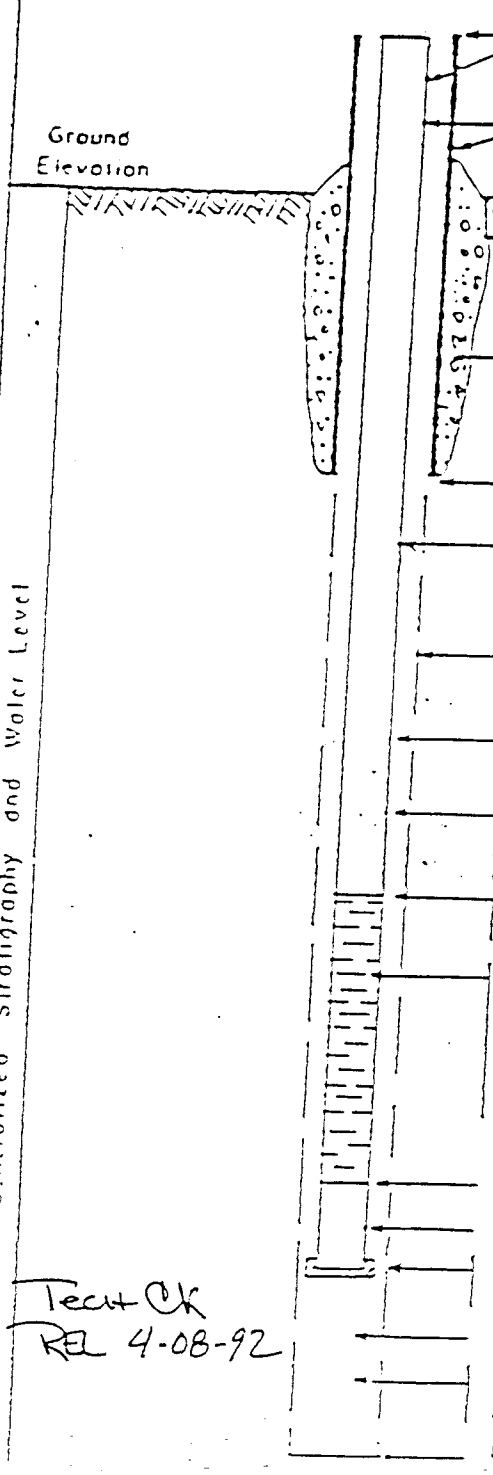
FORM GT.6A

GROUNDWATER MONITORING WELL AND PIEZOMETER REPORT

PROJECT OU2 RFI/RI Phase II
LOCATION NE Trenches
Date Completed 4-7-92 Original Depth 64.0 ft.
Inspected By _____ Date _____
Checked By _____ Date _____

Page 1 of 1
Well No. IW2089
Aquifer Ka SS
Depth Interval 21.7-63.7 ft.

NOTE CENTRALIZER DEPTHS



Elevation of top of surface casing / riser pipe.	
Height of top of surface casing / riser pipe above ground surface	-2.2ft / -2.0ft
Depth of surface seal below ground surface	3.0 ft
Type of surface seal: concrete	
I.D. of surface casing.	6.0 in
Type of surface casing: steel	
Depth of surface casing below ground	2.8ft
I.D. of riser pipe.	2.0 in
Type of riser pipe: PVC sch. 40	
Diameter of borehole	10.0 in
Depth of borehole	64.0 ft
Type of backfill: Bentonite grout	
Elev./depth top of seal.	14.0 ft.
Type of seal:	
Elev./depth bottom of seal.	18.0 ft.
Type of filter pack 16-40 silica sand	
Depth of top of filter pack.	18.0 ft.
Elev./depth top of screened section.	21.7 ft.
Type of screened section: PVC sch. 40	
Screen openings 0.01 in.	
I.D. of screened section.	2.0 in.
Elev./depth bottom of screened section.	63.7 ft.
Length of blank section.	0.3 ft
Elev./depth bottom of plugged blank section	64.0 ft B/K ~~63.7~~ ft.
Elev./depth bottom of sand column.	64.0 ft.
Type of backfill below observation pipe. 16-40 silica sand	
Elev./depth of hole	64.0 ft

Tect Ck
REL 4-08-92

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

Page One

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Randy Reichert - Field Tech. DO NOT Sample

Well ID P4120891

Survey location coordinates: North n/a East n/a

Date this report ~~3~~ 4 4/14/92 Date well installation 4/7/92 Date well development 4/14/92 & 4/15/92

Well designation: Pumping Well - E626

Ground elevation: Est: n/a Survey: n/a

Screened interval: 23.7' - 65.7' Formation: n/a

Measuring point (MP): Top of well casing/other: — Well stick up: 2.0'

Water level (below MP): Start: 28.64' End: 65.34 + 0.28 = 65.62'

Well depth (below MP): 64.00' + .28' = 64.28' Water elevation (BGS) n/a

Method used to measure water level: Solinst Estimated recharge rate:

Volume of saturated annulus (assume 30 percent porosity): n/a

Volume Calculation: 64.28' - 28.64' = 35.64 x 0.16 = 5.70 gal.

Quantity of water used during drilling: n/a

Depth of sediment (below MP): Before: n/a After: n/a

Development equipment: Grundfos Pump / Teflon Bailer

Sampling equipment: n/a

pH meter No. 910 714162 Calibration: 4.00/13.1°C; 7.03/15.6°C @ 0933

Specific conductance meter No.: 90704633 Calibration: 1.00 @ 19.2°C - 0928

F.T.U. meter No.: R0913 Calibration: N/A

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
0944	N/A	OURR	6.76	16.8	0.47	~~5.70~~	0	Cloudy Reddish BRN
0953	.63	OURR	6.80	15.4	0.50	~~11.40~~ 5.70	1	" " " "
1002	.63	OURR	6.84	15.7	0.51	~~17.10~~ 11.40	2	" " " "
1011	.63	OURR	6.89	15.0	0.58	~~22.80~~ 17.10	3	" " " " (Sediment slightly)
* 1113	N/A	OURR	6.92	13.6	0.59	22.80	4	Cloudy Reddish BRN
1122		OURR	6.96	13.8	0.63	28.50	5	" " " "
1134		OURR	6.98	13.8	0.66	34.20	6	" " " "
1145		OURR	7.00	13.6	0.64	39.90	7	" " " "
1155		OURR	7.01	13.8	0.64	35.60	8	" " " "
1306		OURR	6.95	13.3	0.66	51.30	9	" " " "

Comments: * Pump is broken - will continue to develop with Bailer

* Bailer will not sink in the water column, it's so dense - it will only fill up & stop descending.

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form

Page Two

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title R. Rockhold - Field Tech

Well ID PW 20891 — SEE PAGE ONE

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1317	N/A	OVER	7.05	12.9	0.66	47.00	10	Cloudy, Med. BRN.
1326		OVER	7.15	12.7	0.67	52.70	11	" " "
1355		OVER	7.15	12.9	0.68	58.40	12	" " "
1402		OVER	7.20	12.4	0.67	64.10	13	" " "
1414		OVER	7.28	12.2	0.69	69.80	14	" " " Clearing Slightly
1424		OVER	7.24	12.1	0.68	75.50	15	Cloudy, Med. BRN
1436		OVER	7.23	12.0	.70	81.20	16	
Stopping for some		tests continue				86.90	17	
to check well		volumes		use Robert Smith		91.60	18	
				6.616		97.30	19	Well still not clearing much
						103.00	20	

Comments: _____

(4011-452)WATER3-2.SOP)(02-27-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form [illegible]

Page 3 cont

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Patty E Goodman - Field Tech

Well ID PW20891

Survey location coordinates: North _____ East See page 1

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: 28.84 End: 65

Well depth (below MP): 65.31+0.28=65.59 Water elevation (BGS) _____

Method used to measure water level: Solinst Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: 65.59 - 28.84 = 36.75 x 0.16 = 5.88 (17.64

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. 9107 14159 Calibration: 4.00 / 14.3° - 7.05 / 13.9°

Specific conductance meter No.: 900103503 Calibration: 1.02 14.9°

F.T.U. meter No.: 9010R0839 Calibration: n/a

	Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
0927	na	na	na	na	na	na	108.33	21	na
0929	na	na	na	na	na	na	114.76	22	na
0931	4.4	na	over	7.11	12.8	0.70	120.64	23	cloudy-Brow
0933	—	—	—	—	—	—	126.52	24	—
0935	—	2.94	—	—	—	—	132.40	25	—
	0937	4.41	190	7.25	12.9	0.68	138.28	26	yellowish-clear
0939	—	—	—	—	—	—	144.16	27	—
0941	—	—	—	—	—	—	150.04	28	—
0944		2.52	198	7.22	13.2	0.66	155.92	29	yellowish
0946	—	—	—	—	—	—	161.80	30	—

Comments: Only doing Parameters every 3rd volume per Bob Smith EE'E

(4011-452)WATER2-2SOP)(02-27-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

4/Cont.

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Patty E. Goodman - Field Tech

Well ID PW 20891

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____ See Page 31

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: 1764

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
0948	4.41	—	—	—	—	167.68	31	—
0951	2.52	252	7.31	13.2	0.66	173.56	32	
0953	—	—	—	—	—	179.44	33	—
0955	—	—	—	—	—	185.32	34	—
0957	2.94	199	7.20	13.2	0.666	191.20	35	Brownish-yellow
0959	—	—	—	—	—	197.08	36	—
1002	—	—	—	—	—	202.96	37	—
1004	2.52	74	7.20	13.3	0.666	208.84	38	clearer
~~1008~~	—	—	—	—	—	214.72	39	—
~~1014~~ 1008	n/a	31	7.18	13.4	0.666	220.60	40	—

Comments: Doing Volumes every 6 minutes

(4011-452)WATER2-2.SOP(02-27-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

5 cont

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Patty E. Goodman

Well ID PW 20891

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: 17.64 (5.88)

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
1014	na	86	7.30	13.6	0.66	226.48	41	pretty clear
						232.36	42	
						238.24	43	
rged pump 1020	n/a	290	7.25	13.7	0.66	244.12	44	turbidi - see note
						250	45	
						255.88	46	
1026	n/a	273	7.27	13.8	0.66	261.76	47	yellowish
						267.64	48	
						273.52	49	
1032	na	134	7.21	13.8	0.66	279.10	50	slightly yellow

Comments: using minutes (4) not gallons

(4011-452)WATER2-2.SOP)(02-27-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Patty Goodman - Field Tech.

Well ID 04120891 to cont.

Survey location coordinates: North _____ East _____ See page 3

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

29.4
5 volumes

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
038 ~~1032~~ ~~1038~~	n/a	131	7.31	14.0	0.68	284.98	51	yellowish
1044 ~~1042~~	N/a	90	7.22	14.5	0.67	290.86	52	Slightly milky
1050 1248						296.74	53	
1250						302.62	54	
1256						308.50	55	
1258	~~2.45~~					314.38	56	
1300	~~over~~	over	7.46	13.8	0.65	320.26	57	~~DK. Brown~~
1302						326.14	58	
1304						332.02	59	
1305						337.90	60	

Comments: Taking parameters every 5 volumes per Bob (EG&G)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Patty Goodman - Field Tech. 7 cont.

Well ID PW20891

Survey location coordinates: North _____ East _____ Sheet page 3

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: 1300 29.4

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1307						343.78	61	
1309	3.26	over	7.25	13.3	0.65	349.66	62	Silty - DK
1310						355.54	63	
1311						361.42	64	
1313						367.30	65	
1314						373.18	66	
1316	4.20	over	7.20	13.6	0.64	379.06	67	Silty - yellowish
1317						384.94	68	
1319						390.82	69	
1321						396.70	70	

Comments: _____

(4011-452)WATER2-2.SOP)(02-27-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Patty Goodman - Field Tech 8 (Cont)

Well ID PW20891 See page 3

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: 1316 2941

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Borehole	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
1322	—				4025	~~343.78~~	71	—
1324	3.68	187	7.20	13.4	0.625	408.46	72	
1325	—					414.34	73	—
1327	—					420.22	74	—
1328	—					426.10	75	—
1330	—					431.98	76	—
1338	—					437.86	77	—
1345	—	401	7.31	13.2	0.65	443.74	78	Milky - yellow
1352	—	243	7.28	13.4	0.65	449.62	79	—
~~1359~~	—					455.50	80	

Comments: _____

(4011-452)WATER2-2.SOP)(02-27-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

9 cont.

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Patty Goodman - Field Tech.

Well ID PW20891 See page 3

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

	Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
	1406						461.38	81	
1359	~~1413~~		62	7.31	13.4	0.66	467.26	82	clearer
	1420						473.14	83	
PG	1427						479.02	84	
	1434						484.90	85	
	1441						490.78	86	
1406	~~1448~~		23	7.29	13.6	0.65	496.66	87	clear
	1455						502.54	88	
	1502						508.42	89	
	1509						514.30	90	

Comments: _____

(4011-452)WATER2-2.SOP)(02-27-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form [illegible]

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Patty Goodman - Field Tech. 10 cont

Well ID PW20891 See page 3

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
						520.18	91	
1413	na	17	7.23	13.1	0.66	526.06	92	Clear
						531.94	93	
						537.82	94	
						543.70	95	
						549.58	96	
1420	na	16	7.39	13.3	0.66	555.46	97	
						561.34	98	
						567.22	99	
						573.10	100	

Comments: _____

(4011-452)WATER2-2.SOP)(02-27-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Patty Goodman- Field Tech II cont.

Well ID See page 3

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1427	na	3	7.28	13.5	0.07	602.50	105	Very clear
1434						631.90	110	

Comments: _____

(4011-452)WATER2-2.SOP)(02-27-91)

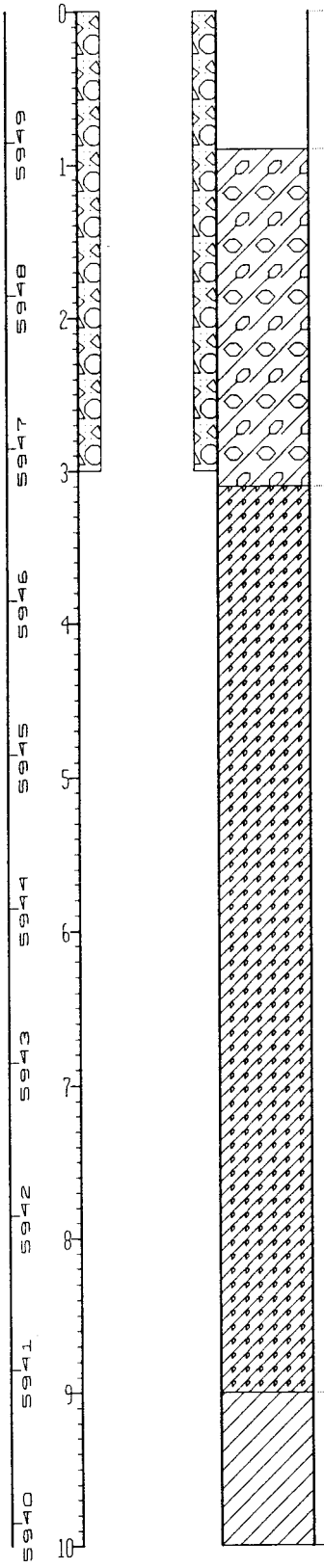
STATE PLANE COORDINATE		TOTAL DEPTH (FT) 64.0	GROUND ELEVATION (FT)	5949.85	PROJECT NUMBER	OU2/RI	LOG OF BORING NUMBER
NORTH	750168	AREA: NE TRENCHES	CASING DIAMETER (IN)	2.0	GEOLOGIST	J.P. O'BRIEN	20891
EAST	2087819	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN)	10.0	DATE DRILLED	04/03/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 18.0 FT - 14.0 FT

WELL 20891 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20991.

CHEMICAL SAMPLE DEPTH
GRADATIONAL 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
GC	Sandy Gravel with some clay and silt
SC	Clayey Sand with abundant gravel and some silt
CL	Silty Clay with some sand.

STATE PLANE COORDINATE	TOTAL DEPTH (FT) 64 0	GROUND ELEVATION (FT)	5949 85	PROJECT NUMBER	OU2/RI
NORTH 750168	AREA NE TRENCHES	CASING DIAMETER (IN)	2 0	GEOLOGIST	J P O'BRIEN
EAST 2087819	LOCATOR NUMBER H14	BOREHOLE DIAMETER (IN)	10 0	DATE DRILLED	04/03/92

LOG OF BORING NUMBER

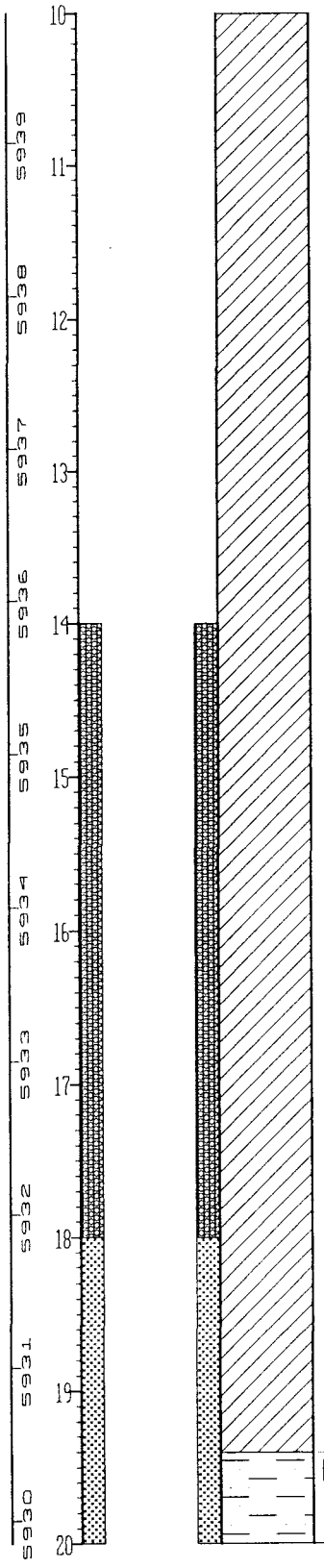
20891

REMARKS HOLLOW-STEM AUGER BENTONITE SEAL 18 0 FT - 14 0 FT

WELL 20891 WAS REAMED UNIT BREAKS BASED ON CORE FROM WELL 20991.

CHEMICAL SAMPLE DEPTH
GRADATIONAL 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



CLAYEY SANDSTONE Clayey Sandstone with some silt

STATE PLANE COORDINATE	TOTAL DEPTH (FT): 64.0	GROUND ELEVATION (FT):	5949.85	PROJECT NUMBER:	OU2/RI
NORTH 750168	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST 2087819	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/03/92

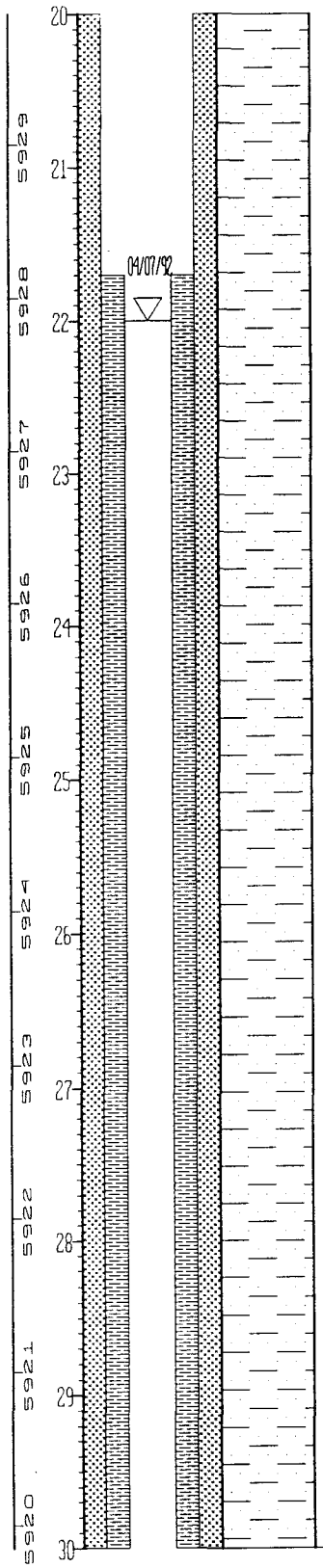
LOG OF BORING NUMBER

20891

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 18.0 FT. - 14.0 FT.

WELL 20891 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20991.

CHEMICAL SAMPLE DEPTH
GRADATIONAL 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

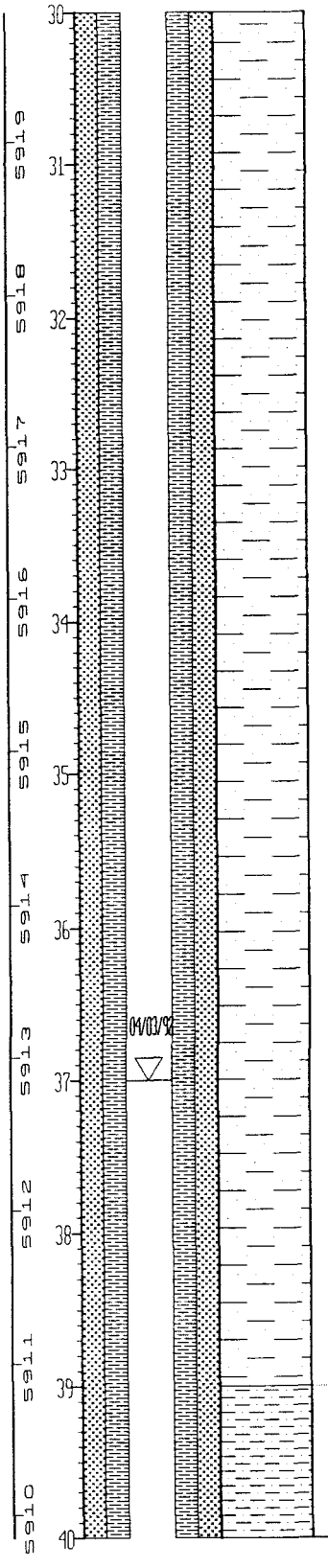


STATE PLANE COORDINATE:		TOTAL DEPTH (FT) 64.0	GROUND ELEVATION (FT)	5949.85	PROJECT NUMBER:	OU2/RI	LOG OF BORING NUMBER:
NORTH:	750168	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	20891
EAST:	2087819	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/03/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 18.0 FT. - 14.0 FT.
WELL 20891 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20991

CHEMICAL SAMPLE DEPTH
GRADATIONAL SAMPLE DEPTH
SAMPLE NUMBER

SAMPLE GRAIN SIZE: 0% 50% 100%
PERCENT RECOVERY: 0% 100%
RECOVERY/INTERVAL



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE

DESCRIPTION

SANDY CLAYSTONE: Sandy Claystone with some silt.

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 64.0	GROUND ELEVATION (FT)	5949.85	PROJECT NUMBER	002/RI	LOG OF BORING NUMBER
NORTH	750168	AREA NE TRENCHES	CASING DIAMETER (IN)	2.0	GEOLOGIST	J.P. O'BRIEN	20891
EAST	2087819	LOCATOR NUMBER H14	BOREHOLE DIAMETER (IN)	10.0	DATE DRILLED	04/03/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 18.0 FT - 14.0 FT

WELL 20891 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20991.

CHEMICAL SAMPLE DEPTH
GRADATIONAL SAMPLE DEPTH
SAMPLE NUMBER

SAMPLE GRAIN SIZE: 0% 50% 100%

PERCENT RECOVERY: 0% 100%

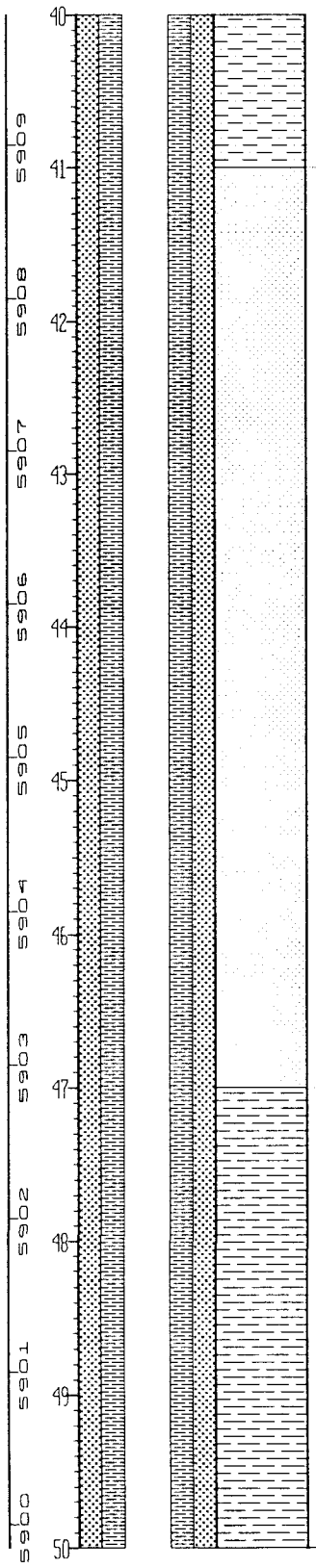
RECOVERY/INTERVAL

DATUM (FT) | DEPTH (FT)

WELL OR PIEZOMETER CONSTRUCTION

LITHOLOGY

UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
SANDSTONE	Sandstone with some silt and clay
CLAYSTONE	Claystone with some sand

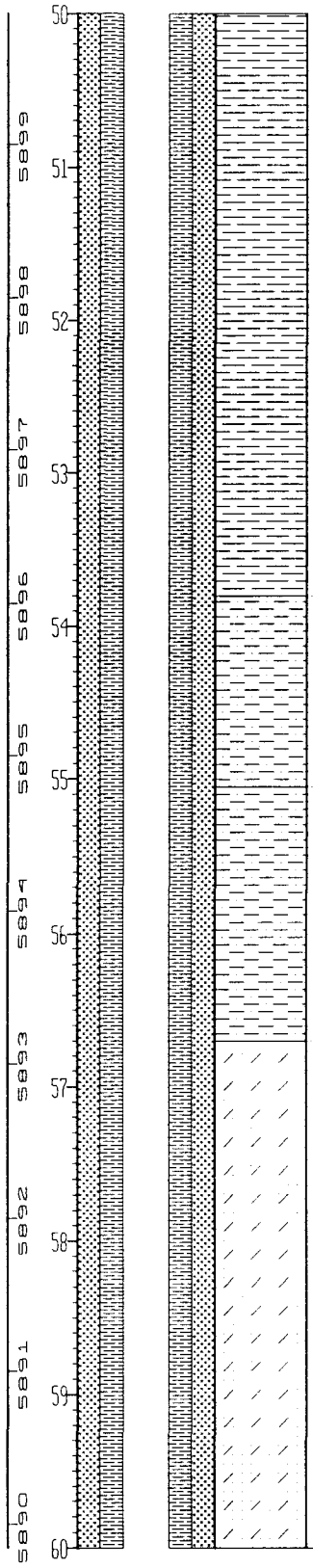


STATE PLANE COORDINATE		TOTAL DEPTH (FT) 64.0	GROUND ELEVATION (FT) 5949.85	PROJECT NUMBER 002/RI	LOG OF BORING NUMBER
NORTH	750168	AREA NE TRENCHES	CASING DIAMETER (IN) 2.0	GEOLOGIST J.P. O'BRIEN	20891
EAST	2087819	LOCATOR NUMBER H14	BOREHOLE DIAMETER (IN) 10.0	DATE DRILLED 04/03/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 18.0 FT. - 14.0 FT.
WELL 20891 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20991.

CHEMICAL SAMPLE DEPTH
GRADATIONAL 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 CLAYSTONE: Sandy Claystone with some silt.

SANDY CLAYSTONE: Sandy Claystone with some silt.

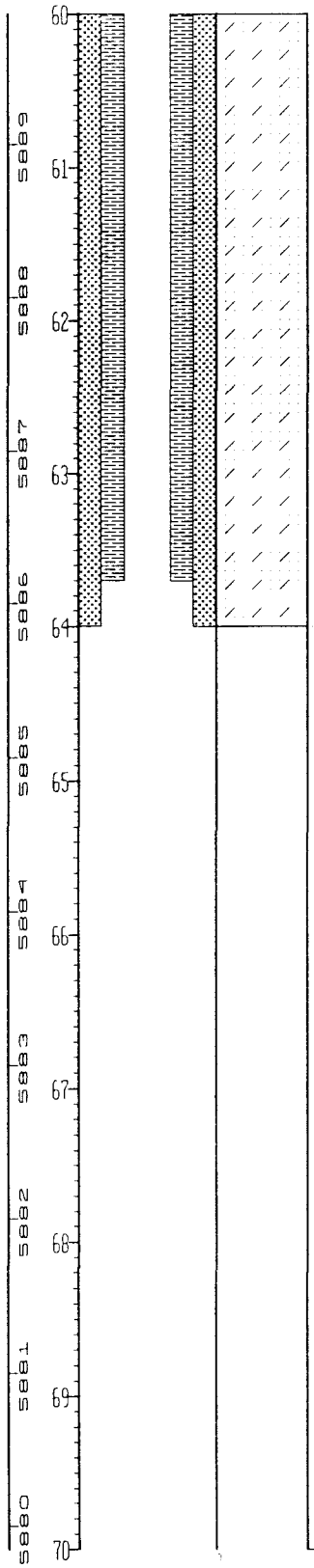
SILTY SANDSTONE: Silty Sandstone.

STATE PLANE COORDINATE:		TOTAL DEPTH (FT) 64.0	GROUND ELEVATION (FT)	5949.85	PROJECT NUMBER:	OU2/RI	LOG OF BORING NUMBER
NORTH:	750168	AREA NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST	J.P. O'BRIEN	20891
EAST:	2087819	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/03/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 18.0 FT. - 14.0 FT.
WELL 20891 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20991.

CHEMICAL SAMPLE DEPTH
GRADATIONAL SAMPLE DEPTH
SAMPLE NUMBER

SAMPLE GRAIN SIZE: 0% 50% 100%
PERCENT RECOVERY: 0% 100%
RECOVERY/INTERVAL



WELL OR PIEZOMETER CONSTRUCTION

LITHOLOGY

UNIFIED SOILS CLASSIFICATION OR ROCK TYPE

DESCRIPTION

Total depth at 64.0 ft

OU2-ALLUVIUM

RFEDS
WELL INSTALLATION FORM

Well Number: 20991
Old Well No.: ——

Project Number: EMAD

Area: NE Trenches
Purpose: GW Plume Characterization
Formation: Arapaho
Contractor: Woodward-Clyde
Geologist: Kent Trimbach
Date Drilled: 4-3-92

North or Y:
East or X:
Well Status: Active
Drilling Method: Hollow-Stem Auger
Locator:
Ground Elev: 5,949.28 ft.
Top of pad (~6" thick 5949.78

Total Depth: 70 ~~65~~ KBT ft.
Depth to Bedrock: 64 ft.
Casing Diameter: 2.0 in.

Stick Up: ft.
Completed Depth: 65.0 ft.
Borehole Diam.: 10.0 in.

Monitoring Interval: 21 ft. to 63 ft.
Initial Water Level: 28 ft. Date: 4-1-92
Completed Water Level: 28 ft. Date: 4-3-92

Item		From	To	I.D.	Type
Surface Seal:		ft.	ft.		Concrete
Protective Casing:		ft.	ft.	6.0 in.	Steel
Surface Casing:		65.0 ft.	ft.	2.0 in.	PVC Sch. 40
Secondary Casing:	N/A	ft.	ft.	in.	N/A
Centralizer:	N/A	ft.	ft.	in.	N/A
Bentonite Seal:		18.5 ft.	15.5 ft.		Bentonite
Filter Pack:		65 ft.	18.5 ft.		16-40 Sand
Volume:	24.25 cu. ft.				
Screen:		63 ft.	21 ft.	2.0 in.	PVC Sch. 40
Slot Size:	0.01 in.				
Sump:		65 ft.	63 ft.	2.0 in.	PVC Sch. 40
Backfill Seal:		~~70 ft.~~	~~65 ft KBT~~		Bentonite
Backfill:		70 ft.	65 ft.		Bentonite
Volume:	2.7 cu. ft.				

Comments: No Back Fill seal was installed per JAJ
* Screened interval per EG&G instructions

Tech CK
TEL 4-6-92

OU2-ALLUVIUM

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GT.6A

GROUNDWATER MONITORING WELL AND PIEZOMETER REPORT

PROJECT OU2 RFI/RI Phase II

LOCATION NE Trenches

Date Completed 4-3-92 Original Depth 70 ft.

Inspected By _____ Date _____

Checked By _____ Date _____

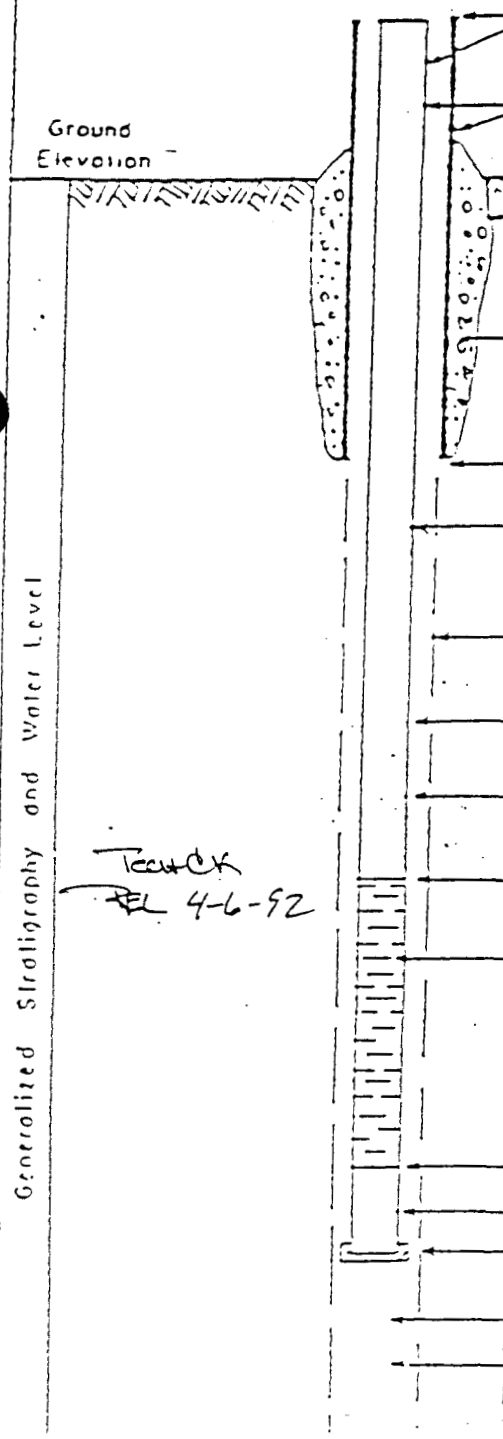
Page 1 of 1

Well No. OB20991

Aquifer Arapaho

Depth Interval 21 - 63 ft.

NOTE CENTRALIZER DEPTHS



Elevation of top of surface casing / riser pipe.	
Height of top of surface casing / riser pipe above ground surface	-2.2 ft / -2.0 ft
Depth of surface seal below ground surface	3.0 ft
Type of surface seal: ~~Bentonite~~ Concrete	
I.D. of surface casing.	6"
Type of surface casing: STEEL	
Depth of surface casing below ground	2.8 ft
I.D. of riser pipe.	2.0"
Type of riser pipe: 2" ID sch40 PVC	
Diameter of borehole	10"
Depth of borehole	65"
Type of backfill: Bentonite	
Elev./depth top of seal.	15.5
Type of seal: Bentonite	
Elev./depth bottom of seal.	18.5
Type of filter pack: 16-40 silica Sand	
Depth of top of filter pack.	18.5'
Elev./depth top of screened section.	21
Type of screened section: 2" ID PVC sch.40	
Screen openings 0.010	
I.D. of screened section.	2.0"
Elev./depth bottom of screened section.	63'
Length of blank section.	2.0'
Elev./depth bottom of plugged blank section.	65'
Elev./depth bottom of sand column.	65'
Type of backfill below observation pipe: NA	
Elev./depth of hole	70.0

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

Page One

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title: B. Hoichart - Field Tech.

Well ID: OB 20991

Survey location coordinates: North: N/A East: N/A

Date this report: 4/16/91 Date well installation: 4/3/92 Date well development: ~~2-0~~ NR

Well designation: OB well

Ground elevation: Est: N/A Survey: N/A

Screened interval: 23.05' - 65.05' Formation: ARA pahoe

Measuring point (MP): Top of well casing/other: N/A Well stick up: 2.05'

Water level (below MP): Start: 29.00 End: N/A

Well depth (below MP): 66.68 + .28 = 66.96 Water elevation (BGS) N/A

Method used to measure water level: Solinst Estimated recharge rate:

Volume of saturated annulus (assume 30 percent porosity): N/A

Volume Calculation: 66.96 - 29.00 = 37.96' X 0.16 = 6.07 gal.

Quantity of water used during drilling: N/A

Depth of sediment (below MP): Before: N/A After: N/A

Development equipment: Grundfos Pump

Sampling equipment: N/A

pH meter No. 910714159 Calibration: 4.00/10.6°C; 7.06 - 10.7°C - 1005

Specific conductance meter No.: 960103503 Calibration: 1.07 @ 11.6°C @ 0955

F.T.U. meter No.: 900409105 Calibration: N/A

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
1043	—	OVRL	7.26	11.5	0.69	0	0	Cldy, Rd Brn.
1045	-	OVRL	7.24	11.4	0.68	6.07	1	" " "
1048	2.02	OVRL	7.32	11.1	0.65	12.14	2	" " "
1051		OVRL	7.34	11.2	0.68	18.21	3	" " "
1053	3.00	OVRL	7.32	11.2	0.66	24.28	4	" " "
1055	3.00	OVRL	7.36	11.4	0.66	30.35	5	" " "
1057	3.00	OVRL	7.41	11.4	0.63	36.42	6	" " "
1059	3.00	OVRL	7.37	11.8	0.64	42.49	7	" " "
1101	3.00	OVRL	7.35	11.7	0.64	46.56	8	" " "
1103	3.00	OVRL	7.36	11.7	0.62	52.63	9	V. Cldy. BRN

Comments:

(REV 02-27-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Page Two

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title: Randy Reichert - Field Tech

Well ID: 0B 20991

Survey location coordinates: North _____ East _____

Date this report: 4/16/91 Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

	Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
X	1105	3.00 ~~1105~~	OVRL	7.33	11.5	0.59	60.70	10	V. cldy Lt BRN
Hrd Hp.	1110	0111	365	7.32	10.9	0.66	66.77	11	Cldy MILKY Lt. BRN.
	~~1115~~ 14						72.84	12	
							78.91	13	
							84.98	14	
X	1118	3.00	OVRL	7.34	11.0	0.65	91.05	15	Cldy, MILKY Lt BRN.
							97.12	16	
							103.19	17	
							109.26	18	
							115.33	19	

cleaning surged well.

Comments: Taking parameters on every 5 gal vol after 10 vols

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form ...

Page Three

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Brandy Reichert - Field Tech

Well ID OB 20991

Survey location coordinates: North _____ East _____

Date this report 4/16/91 Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

	Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
X	1134	3.00	264	7.35	11.6	0.62	121.41	28	Cldy, MLKy cleaning
7'31'30"							127.48	21	
							133.55	22	
							139.62	23	
							145.69	24	
12'41'30"X	1241		OVER	7.45	11.6	0.64	151.76	25	Cldy, MLKy BRN
							157.83	26	
							163.90	27	
							169.97	28	
							176.04	29	

Comments: _____

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Page 4

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Randy Reichert - Field Tech

Well ID OB 20991

Survey location coordinates: North _____ East _____

Date this report 4/16/91 Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est. _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
X 1251	3.00	387			0.63	182.11	30	Milky - cleaning
						188.18	31	
						194.25	32	
						200.32	33	
						206.41	34	
X 1301	↓	117	7.45	1.11	0.61	212.48	35	Slightly Muddy
						218.53	~~14 36~~ 36	
						224.60	~~14 38~~ 37	
						230.67	~~14 39~~ 38	
						236.74	~~14 40~~ 39	

Comments: _____

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

Page 5

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Randy Reichert

Well ID OB 20991

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

	Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed		Physical Description of Water
							Gallons	Casing Vols.	
X	1311	3.00	28	7.41	11.8	0.61	242.81	40	Clear
							248.88	41	
							254.95	42	
							261.02	43	
							267.09	44	
X	1321		26	7.35	11.7	0.61	273.16	45	Clear
								46	
								47	
								48	
								49	

Comments: _____

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 70.0	GROUND ELEVATION (FT)	5949.78	PROJECT NUMBER:	OU2/RI	LOG OF BORING NUMBER:
NORTH:	750162.79	AREA: NE TRENCHES	CASING DIAMETER (IN)	2.0	GEOLOGIST:	J.P. O'BRIEN	20991
EAST:	2087820.74	LOCATOR NUMBER:	BOREHOLE DIAMETER (IN)	10.0	DATE DRILLED:	04/03/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 18.5 FT. - 15.5 FT. BACKFILL MATERIAL: BENTONITE 70.0 FT. - 65.0 FT.

DRAFT

CHEMICAL SA GRADATIONAL	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%	0.00/0.90	5949	0				Top soil, start of boring at 0.90 ft.
						1			GC:	Sandy Gravel with some clay and silt - very dusky red (10R2/2), maximum gravel diameter .17', average .07', fine- to coarse-grained sand, well graded, gravel is sub-rounded, sand is angular to sub-rounded, low plasticity, gravel is primarily quartzite, sand contains abundant carbonaceous/ organic material, quartz, some rock fragments, clear quartz, feldspar, trace mica, moist. 39% gravel, 31% sand, 12% silt, 18% clay.
				0.60/2.10	5948	2				No recovery for this interval.
					5947	3			GC:	Sandy Gravel with some clay and silt - very dusky red (10R2/2), as described above.
									SC:	Clayey Sand with abundant gravel and some silt - very pale orange (10YR8/2), maximum gravel diameter .12', average .07' fine- to coarse-grained sand, well graded, gravel is rounded, sand is sub-angular, medium plasticity, gravel is primarily caliche coated quartzite and calcrete, sand contains abundant calcrete/caliche, quartz, some rock fragments, trace dark minerals 29% gravel, 33% sand, 7% silt, 31% clay.
				0.60/2.00	5946	4				No recovery for this interval.
					5945	5				
				0.00/2.00	5944	6				
					5943	7				
				0.00/2.00	5942	8			CL:	Silty Clay with some sand - light gray (N7), color change to light olive gray (5Y5/2) at 16.0-19.0', dark yellowish orange (10YR6/6) where iron stained, maximum gravel diameter > .25' at 19.1-19.4', average .02', fine- grained sand, poorly graded, angular, medium plasticity, gravel is primarily iron stained quartzite, sand contains abundant quartz, some feldspar and dark minerals, vertically alligned carbonaceous organic material (plant roots?) at 9.4-9.6', caliche nodules at 9.7-9.9' and 10.6-11.0', well developed calcite nodule at 17.2' which displays boytroydal crystal form indicative of growth in open pore space, calcite/caliche nodules-iron stain and laminations at sharp bedrock contact, moist. 1% gravel, 6% sand, 22% silt, 71% clay.
					5941	9				
				2.00/2.00	5940	10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 70.0	GROUND ELEVATION (FT)	5949.78	PROJECT NUMBER	002/RI	LOG OF BORING NUMBER
NORTH	750162.79	AREA NE TRENCHES	CASING DIAMETER (IN)	2.0	GEOLOGIST	J.P. O'BRIEN	20991
EAST	2087820.74	LOCATOR NUMBER	BOREHOLE DIAMETER (IN)	10.0	DATE DRILLED	04/03/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 18.5 FT. - 15.5 FT. BACKFILL MATERIAL: BENTONITE 70.0 FT. - 65.0 FT.

DRAFT

CHEMICAL SAMPLE / GRADATIONAL	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		10				
					5939	11				No recovery for this interval.
				0.00/2.00	5938	12				
					5937	13				
				0.00/1.00	5936	14				
				0.00/2.00	5935	15				
					5934	16			CL	Silty Clay with some sand - light gray (N7), as described above. Top of bedrock at 19.4 ft.
				1.00/1.00	5933	17				
				0.40/2.00	5932	18				
					5931	19			CLAYEY SANDSTONE	Clayey Sandstone with some silt - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6) where iron stained, as described below.
				0.60/1.00	5930	20				No recovery for this interval.

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 70.0	GROUND ELEVATION (FT):	5949.78	PROJECT NUMBER:	002/RI	LOG OF BORING NUMBER
NORTH:	750162.79	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	20991
EAST:	2087820.74	LOCATOR NUMBER:	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/03/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 18.5 FT. - 15.5 FT. BACKFILL MATERIAL: BENTONITE 70.0 FT. - 65.0 FT.

DEPTH	CHEMICAL SAMP GRADATIONAL	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%	1.00/1.00	5929	20			CLAYEY SANDSTONE	Clayey Sandstone with some silt - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6) where iron stained, very fine- to medium-grained sand, moderately sorted, sub-angular to sub-rounded, approximately 17% porosity, argillaceous cement, moderately to highly friable, abundant frosted quartz some rock fragments, feldspar, dark minerals, iron stain, well developed iron nodules with a maximum diameter of .08' at 21.0-22.0', thick lamination of clay at 22.9', iron staining at 23.2-23.4', 26.3-26.7', 28.0-29.0', 29.1-30.0', 30.5', 31.0-31.4', 32.0-32.6', 33.4-39.0', increased sand/silty clay laminations at 26.0-27.0', slight increase in clay lamination at 31.5-31.8', ripple lamination 34.4-34.5', iron stained sand loaded into clay bed 37.3-37.8', moist to wet 53% sand, 19% silt, 28% clay.
					2.00/2.00	5928	21				
					2.00/2.00	5927	22				
					2.00/2.00	5926	23				
					2.00/2.00	5925	24				
					2.00/2.00	5924	25				
					2.00/2.00	5923	26				
					2.00/2.00	5922	27	04/03/92			
					2.00/2.00	5921	28				
					2.00/2.00	5920	29				
							30				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 70.0	GROUND ELEVATION (FT):	5949.78	PROJECT NUMBER:	OU2/RI	LOG OF BORING NUMBER
NORTH:	750162.79	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	20991
EAST:	2087820.74	LOCATOR NUMBER:	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/03/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 18.5 FT. - 15.5 FT. BACKFILL MATERIAL: BENTONITE 70.0 FT. - 65.0 FT.

CHEMICAL SAF GRADATIONAL	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		30				
					S919	31				
				1.60 /2.00	S918	32				
					S917	33				No recovery for this interval.
				1.60 /2.00	S916	34			CLAYEY SANDSTONE	Clayey Sandstone with some silt - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6) where iron stained, as described above.
					S915	35				No recovery for this interval.
				1.30 /2.00	S914	36			CLAYEY SANDSTONE	Clayey Sandstone with some silt - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6) where iron stained, as described above.
					S913	37				No recovery for this interval.
				1.20 /2.00	S912	38			CLAYEY SANDSTONE	Clayey Sandstone with some silt - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6) where iron stained, as described above.
										No recovery for this interval.
				1.30 /2.00	S911	39			SANDY CLAYSTONE	Sandy Claystone with some silt - pale brown (5YR5/2), very fine- to medium-grained, moderately sorted, rounded, approximately 10% porosity, argilloceous cement, highly friable, abundant frosted quartz, trace dark minerals, iron and limonite stain, unconsolidated, iron stain at 39.9-40.1', wet to saturated 39% sand, 10% silt, 51% clay.
					S910	40				

STATE PLANE COORDINATE	TOTAL DEPTH (FT) 70.0	GROUND ELEVATION (FT) 5949.78	PROJECT NUMBER 002/RI	LOG OF BORING NUMBER	
NORTH 750162.79	AREA NE TRENCHES	CASING DIAMETER (IN) 2.0	GEOLOGIST J.P. O'BRIEN	20991	
EAST 2087820.74	LOCATOR NUMBER	BOREHOLE DIAMETER (IN) 10.0	DATE DRILLED 04/03/92		

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 18.5 FT. - 15.5 FT. BACKFILL MATERIAL: BENTONITE 70.0 FT. - 65.0 FT.

CHEMICAL SAF GRADATIONAL	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
	BH00762A002			1.30/2.00		40				VOA sample obtained from this interval. No recovery for this interval.
				2.00/2.00	5909, 5908	41, 42			SANDSTONE	Sandstone with some silt and clay - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6) where iron stained, clay is medium gray (N5), fine- to medium-grained, well sorted, rounded to well rounded, approximately 20% porosity, argillaceous cement, highly friable, abundant frosted quartz, some dark minerals/rock fragments, trace clear quartz, iron/limonite stain, sand loaded into top of clay bed at 43.6-43.8', sand at 43.8-44.1' loaded into top of clay bed at 44.1-44.3' laminated clay/sand at 44.3-44.6', clay rip-up clast at 46.0', laminated, cross-laminated and ripple laminated at 45.8-47.0', iron stain at 43.8-44.1', 44.3-44.6', 45.7-45.8', saturated. 81% sand, 12% silt, 7% clay.
	20991-42.8				5907	43				GEO-TECH sample obtained from this interval.
				1.60/2.00	5906	44			SANDSTONE	Sandstone with some silt and clay - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6) where iron stained, as described above.
					5905	45				No recovery for this interval.
				2.00/2.00	5904	46			SANDSTONE	Sandstone with some silt and clay - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6) where iron stained, as described above.
				2.00/2.00	5903, 5902	47, 48			CLAYSTONE	Claystone with some sand - light gray (N7) to yellowish gray (5Y7/2), very fine- to fine-grained, very well sorted, rounded, approximately 9% porosity, argillaceous cement, moderate friability, abundant frosted quartz, some dark minerals/rock fragments, trace iron stain, silty clay/clayey sand thinly bedded to thinly laminated, increased sand content at 47.7-48.2', 48.9-49.4', and 49.6-50.4', saturated. 15% sand, 5% silt, 80% clay.
				1.40/2.00	5901, 5900	49, 50				

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 70.0	GROUND ELEVATION (FT):	5949.78	PROJECT NUMBER:	OU2/RI	LOG OF BORING NUMBER
NORTH:	750162.79	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	20991
EAST:	2087820.74	LOCATOR NUMBER:	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/03/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 18.5 FT. - 15.5 FT. BACKFILL MATERIAL: BENTONITE 70.0 FT. - 65.0 FT.

CHEMICAL SAMPLE / GRADATIONAL	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
				1.40/2.00	5899	50				No recovery for this interval.
				2.00/2.00	5898	51			CLAYSTONE	Claystone with some sand - light gray (N7) to yellowish gray (5Y7/2), as described above.
				1.90/2.00	5896	52			SANDY CLAYSTONE	Sandy Claystone with some silt - dark yellowish orange (10YR6/6), very fine- to medium-grained, moderately sorted, rounded to well-rounded, approximately 16% porosity, argillaceous cement, highly friable, abundant iron stained frosted quartz some dark minerals/rock fragments, trace clear quartz, excellent flame structure (clay injected into overlying sand) at 54.6-55.0' 37% sand, 22% silt, 41% clay
				2.00/2.00	5894	53			SANDY CLAYSTONE	Sandy Claystone with some silt - medium dark gray (N4) to light gray (N7), dark yellowish orange (10YR6/6) where iron stained, very fine- to fine-grained, very well sorted, sub-rounded to rounded, approximately 10% porosity, argillaceous cement, highly friable, abundant frosted quartz, some rock fragments, dark minerals, iron stain, trace limonite stain, thinly laminated to thinly bedded, increased sand content at 56.0-56.4', increased sand content at 56.4-56.6', wet to saturated. 23% sand, 12% silt, 65% clay
	20991-56.8			2.00/2.00	5892	54			SILTY SANDSTONE	Silty Sandstone - sand is dusky yellow (5Y6/4), clay interbeds are medium dark gray (N4), sand is dark yellowish orange (10YR6/6) where iron stained, as described below.
										GEO-TECH sample obtained from this interval.
				2.00/2.00	5890	55			SILTY SANDSTONE	Silty Sandstone - sand is dusky yellow (5Y6/4), clay interbeds are medium dark gray (N4), sand is dark yellowish orange (10YR6/6) where iron stained, sand is fine- to coarse-grained moderately sorted, rounded to well-rounded, approximately 23% porosity, argillaceous cement, highly friable, abundant frosted quartz, rock fragments, trace dark minerals, clay beds at 57.4-57.6', 58.5-58.7', and 58.9-59.1', sand is loaded into top of clay bed at 58.5' with .2' relief, iron staining at 58.3-58.5', and 59.2-61.0', iron nodules at 59.2', clay-sand interbedded at 63.0-64.0', wet to saturated. 79% sand, 16% silt, 5% clay.

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 70.0	GROUND ELEVATION (FT):	5949.78	PROJECT NUMBER:	OU2/RI	LOG OF BORING NUMBER
NORTH:	750162.79	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	20991
EAST:	2087820.74	LOCATOR NUMBER:	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/03/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 18.5 FT. - 15.5 FT. BACKFILL MATERIAL: BENTONITE 70.0 FT. - 65.0 FT.

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
		100%	2.00/2.00	5889	60				
					61				No recovery for this interval.
			0.00/2.00	5888	62				
				5887	63			SILTY SANDSTONE	Silty Sandstone - sand is dusky yellow (5Y6/4), clay interbeds are medium dark gray (N4), sand is dark yellowish orange (10YR6/6), as described above.
			1.00/1.00	5886	64			SANDY CLAYSTONE	Sandy Claystone - medium dark gray (N4) to grayish black (N2), very fine- to fine-grained, very well sorted, rounded to well rounded, approximately 5% porosity, argilloceous cement, moderately to slightly friable, abundant quartz, trace dark minerals, carbonaceous material throughout, laminated, iron stain and nodules at 64.3', core is dry below 64.4', sand rip-up clast at 65.8', increased sand content at 69.8-70.0, wet at 64.0-64.4', dry to moist 64.4-70.0' 27% sand, 5% silt, 68% clay
			2.00/2.00	5885	65				
BH0076AC02				5884	66				VOA sample obtained from this interval.
								SANDY CLAYSTONE	Sandy Claystone - medium dark gray (N4) to grayish black (N2), as described above.
			2.00/2.00	5883	67				
				5882	68				
			2.00/2.00	5881	69				
				5880	70				Total depth at 70.0 ft.

OU2-ALLUVIUM

RFEDS
WELL INSTALLATION FORM

Well Number: 0Ø21Ø91 Project Number: 4ØØ6EMAD
Old Well No.:

Area: NE Trenches North or Y: East or X:
Purpose: GW Plume Characterization / Pump testing
Formation: Ka. SS Well Status: Active
Contractor: Woodward-Clyde Drilling Method: Hollow-Stem Auger
Geologist: B. Edgerly Locator: H14
Date Drilled: 4-3 to 4-8-92 Ground Elev: 5,948.07 ft. Top pad (~6" thic 5948.57

Total Depth: 68.Ø ft. Stick Up: ft.
Depth to Bedrock: 63.Ø ft. Completed Depth: 65.Ø ft.
Casing Diameter: 2.0 in. Borehole Diam.: 10.0 in.

Monitoring Interval: 19.Ø ft. to 63.Ø ft.
Initial Water Level: 29.Ø ft. Date: 4-3-92
Completed Water Level: 27.4 ft. Date: 4-9-92

Item		From	To	I.D.	Type
Surface Seal:		ft.	ft.		Concrete
Protective Casing:		ft.	ft.	6.0 in.	Steel
Surface Casing:		65.Ø ft.	-2.Ø ft.	2.0 in.	PVC Sch. 40
Secondary Casing:	N/A	ft.	ft.	in.	N/A
Centralizer:	N/A	ft.	ft.	in.	N/A
Bentonite Seal:		17.Ø ft.	14.5 ft.		Bentonite
Filter Pack:		63.8 ft.	17.Ø ft.		16-40 Sand
Volume:	24.6 cu. ft.				
Screen:		63.Ø ft.	19.Ø ft.	2.0 in.	PVC Sch. 40
Slot Size:	0.01 in.				
Sump:		65.Ø ft.	63.Ø ft.	2.0 in.	PVC Sch. 40
Backfill Seal:		65.Ø ft.	63.8 ft.		Bentonite
Backfill:		68.Ø ft.	65.Ø ft.		Bentonite
Volume:	1.6 cu. ft.				

OU2-ALLUVIUM

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

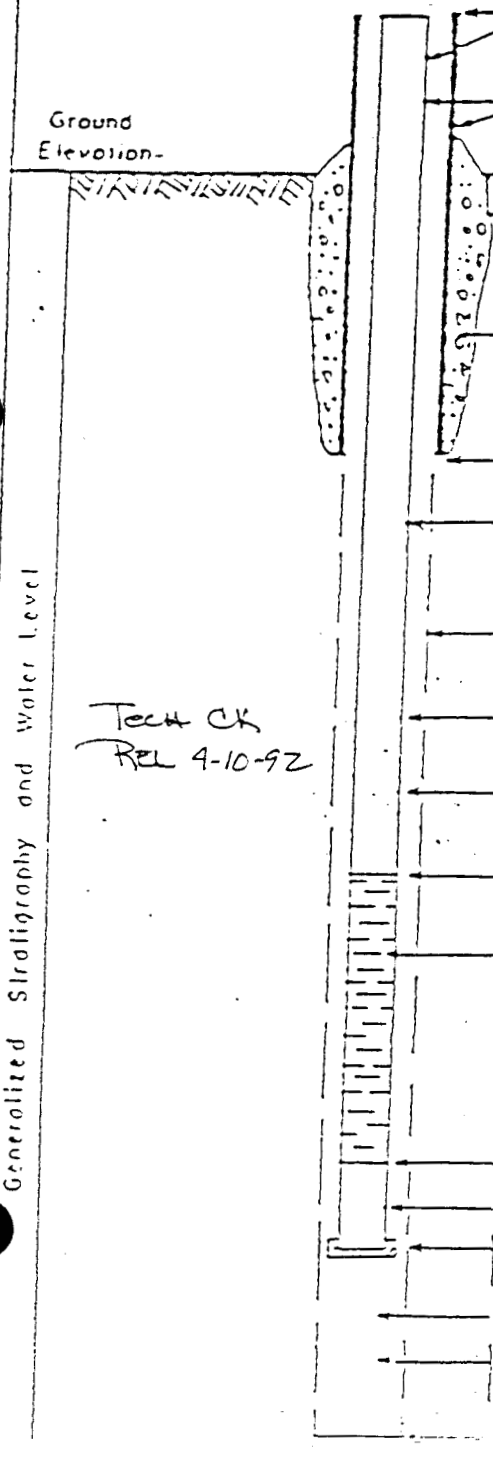
FORM GT.6A

GROUNDWATER MONITORING WELL AND PIEZOMETER REPORT

PROJECT OU2 RFI/RI Phase II
LOCATION NE Trenches
Date Completed 4-9-92 Original Depth 68.0 ft
Inspected By _____ Date _____
Checked By _____ Date _____

Page 1 of 1
Well No. 08210 91
Aquifer Ka. SS
Depth Interval A-63 ft

NOTE CENTRALIZER DEPTHS



Tech Ck
REL 4-10-92

Elevation of top of surface casing / riser pipe.	
Height of top of surface casing / riser pipe above ground surface	-2.2 ft / -2.0 ft
Depth of surface seal below ground surface	3.0 ft
Type of surface seal: concrete	
I.D. of surface casing.	6"
Type of surface casing: Steel	
Depth of surface casing below ground	2.8 ft.
I.D. of riser pipe.	2.0 in.
Type of riser pipe: sch. 40 PVC	
Diameter of borehole	10"
Depth of borehole	68.0 ft
Type of backfill: Bentonite grout	
Elev./depth top of seal.	14.5'
Type of seal: Bentonite	
Elev./depth bottom of seal.	17.0'
Type of filter pack 16-40 silica sand	
Depth of top of filter pack.	17.0'
Elev./depth top of screened section.	~~63.8'~~ 19.0'
Type of screened section: sch. 40 PVC	
Screen openings 0.01 in.	
I.D. of screened section.	2.0 in.
Elev./depth bottom of screened section.	63.0'
Length of blank section.	2.0 ft.
Elev./depth bottom of plugged blank section.	65.0'
Elev./depth bottom of sand column.	63.8'
Type of backfill below observation pipe. Bentonite	
Elev./depth of hole	68.0

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Randy Reichert FieldTech

Well ID OB 21091

Survey location coordinates: North n/a East n/a

Date this report 4/17/92 Date well installation 4/9/92 Date well development 4/17/92

Well designation: OB Well

Ground elevation: Est: n/a Survey: n/a

Screened interval: 21.0' - 65.0' Formation: Arapaho Ss.

Measuring point (MP): Top of well casing/other: n/a Well stick up: 2.0'

Water level (below MP): Start: 27.87 End: 66.68 + 0.28 = 66.96

Well depth (below MP): 62.45 + .28 = 62.73 Water elevation (BGS) n/a

Method used to measure water level: Solinst Estimated recharge rate: n/a

Volume of saturated annulus (assume 30 percent porosity): —

Volume Calculation: 62.73 - 27.87 = 34.86 x 0.16 = 5.58 gal.

Quantity of water used during drilling: n/a

Depth of sediment (below MP): Before: n/a After: n/a

Development equipment: Grundfos Pump

Sampling equipment: n/a

pH meter No. 910214159 Calibration: 4.00 @ 13.9°C; 7.05 @ 13.6°C / 0915

Specific conductance meter No.: 900105503 Calibration: 1.00 @ 13.8°C / 0907

F.T.U. meter No.: 900409105 Calibration: N/A

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water	
						Gallons	Casing Vols.		
0920	N/A	OVRR	7.53	12.3	0.41	0	0	Muddy	Md. BRN
0921	5.6	OVRR	7.67	12.7	0.40	5.58	1	"	" "
0927	—	OVRR	7.53	12.3	0.41	11.16	2	"	" "
0930	1.86	OVRR	7.51	12.4	0.44	16.74	3	"	" "
0933	1.86	OVRR	7.51	12.4	0.48	22.32	4	"	Lt. BRN
0937	—	OVRR	7.47	14.3	0.53	27.90	5	"	" "
0943	—	OVRR	7.43	13.7	0.57	33.48	6	"	" "
0947	—	OVRR	7.37	12.4	0.58	39.06	7	Cldy	" "
0957	1.20	OVRR	7.363	12.9	0.61	44.64	8	Muddy	" "
0957		Impact	7.37	13.4	0.63	50.22	9	"	" "

Comments:

1.5 gal per min max on pump 35.72 @ 1412

(COPY 02-27-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

WELL DEVELOPMENT AND SAMPLING FORM

Page Two

Recorder's Name and Title Kandy Reichert - Field Tech

Well ID OB 2109

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: See Page 1

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water	
K 1003	9.6	[illegible]	7.75	13.3	0.64	55.18	10	milky lt gray	Cleaning
	1.0					61.38	11		
						66.96	12		
						72.54	13		
			7.39			78.12	14		
1027	1.0	133	13	13.5	0.65	83.70	15	v.sl. cldy, milky	Cleaning
						89.28	16		
						94.86	17		
						100.44	18		
						106.02	19		

Comments: _____

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

Page Three

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Randy Reichert / P. Goodman Field techs

Well ID OB 21091

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): See page

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: 2.55-4gal 5.58 gals

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1055	1.0	—	7.34	13.5	0.69	111.60	20	
1218						117.18	21	
						122.76	22	
						128.34	23	
						133.92	24	
1239	1.3gpm	na	7.34	13.1	0.70	139.50	25	yellowish
						145.08	26	
						150.66	27	
						156.24	28	
						161.82	29	

Comments: SC not working properly after 55.9 gal. measurement.

Form 2.2A

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

5 cont.

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Patty Goodman - Field Tech.

Well ID 0B21091

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): See page 1

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1338	1.3 gpm	47	7.26	13.7	0.70	223.20	40	pretty clear
						228.78	41	
						234.36	42	
						239.94	43	
						245.52	44	
						251.10	45	
1357	1.3 gpm	27	7.	14.3	0.71	256.68	46	
						262.26	47	
						267.84	48	
						273.42	49	

Comments: 1.3 gpm pump

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

4 cont.

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Patty Goodman - Field Tech

Well ID OB21091

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: See Page 1

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

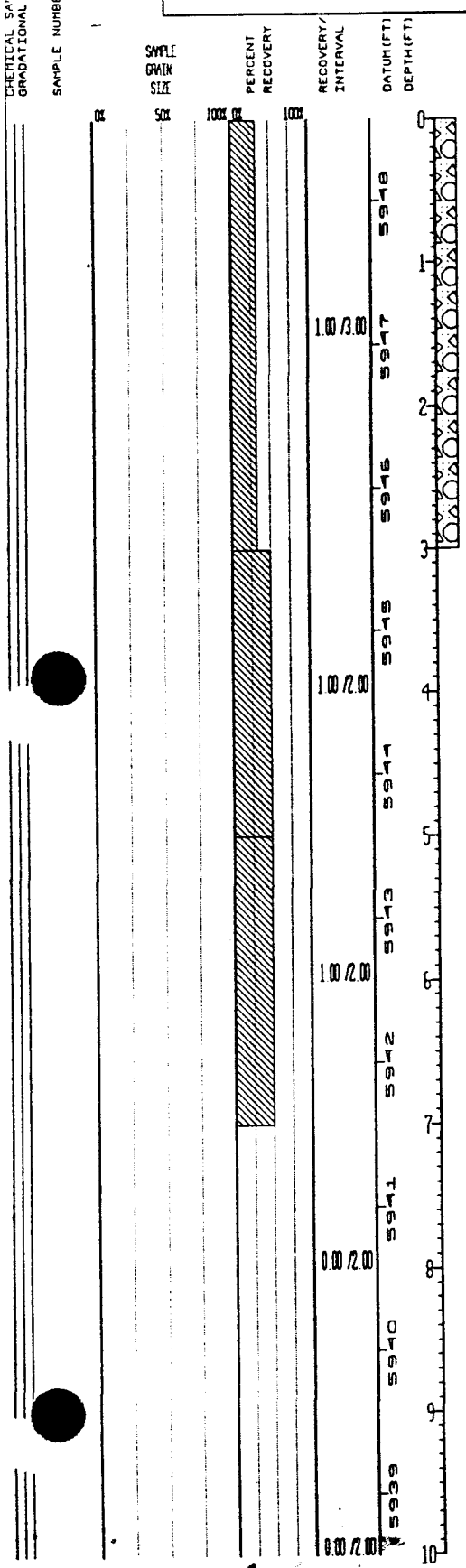
F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
56 / ~~1360~~	1.6 gal/s	149	7.26	12.9	0.70	167.40	30	clearer
						172.98	31	
						178.56	32	
						184.14	33	
						189.72	34	
317 / 1327	1.3 gal/s	175	7.35	13.5	0.71	195.30	35	yellowish
						200.88	36	
						206.46	37	
						212.04	38	
						217.62	39	

Comments: running 1 1/3 gals per min, then 1.6

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 68.0	GROUND ELEVATION (FT):	5948.57	PROJECT NUMBER:	002/RI	LOG OF BORING NUMBER:
NORTH:	750188.98	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	21091
EAST:	2087816.20	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/08/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 17.0 FT. - 14.5 FT. BACKFILL MATERIAL: BENTONITE 68.0 FT. - 19.0 FT.



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	Top soil, start of boring at 0.90 ft.
SM:	Silty Sand with some gravel and clay - grayish brown (5YR3/2), maximum gravel diameter .2', average .09', fine- to coarse-grained sand, well graded, angular to sub-angular, medium plasticity, gravel is primarily quartzite with some weathered granite, sand contains abundant carbonaceous/organic material, quartz, some rock fragments, feldspar, calcrete, trace mica, no apparent bedding, moist. 19% gravel, 46% sand, 21% silt, 14% clay
	No recovery for this interval.
SC:	Clayey Sand with some gravel and silt - light brown (5YR6/4) to light brown (5YR5/6), maximum gravel diameter > .25', average .05', fine- to coarse-grained sand, well graded, angular to sub-angular, medium plasticity, gravel is primarily caliche coated quartzite with some weathered granite at 3.7', sand contains abundant quartz, caliche/calcrete, trace rock fragments, dark minerals, feldspar, mica, no apparent bedding, manganese staining, dry. 14% gravel, 50% sand, 10% silt, 26% clay
	No recovery for this interval.
GM:	Sandy Gravel with some silt and clay - light brown (5YR5/6), maximum gravel diameter .2', average .08', fine- to coarse-grained sand, well graded, angular to sub-angular, low to medium plasticity, gravel is primarily quartzite, sand contains abundant quartz, some feldspar, rock fragments, dark minerals, iron and limonite stain, trace mica, obsedian, no apparent bedding, dry. 39% gravel, 36% sand, 16% silt, 9% clay. Note: grab samples were taken at 11.0-13.0', and 13.0-14.6', enabling this unit break, despite no split spoon recovery.
	No recovery for this interval.

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 68.0	GROUND ELEVATION (FT):	5948.57	PROJECT NUMBER:	OU2/RI	LOG OF BORING NUMBER:
NORTH:	750188.98	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	21091
EAST:	2087816.20	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/08/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 17.0 FT. - 14.5 FT. BACKFILL MATERIAL: BENTONITE 68.0 FT. - 19.0 FT.

CHEMICAL SAMPLE DEPTH	GRADATIONAL	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	5938	10				
							11				No recovery for this interval.
					0.00/2.00	5937	12				
						5936	13				
					0.00/1.60	5935	14				
					0.40/0.40	5934	15			CL:	Sandy Clay with some silt and gravel - yellowish gray (5Y7/2), maximum gravel diameter > .25', average .01', fine- to medium-grained, poorly graded, angular to sub-angular, medium to high plasticity, gravel is primarily quartzite, sand contains abundant quartz, some rock fragments, dark minerals, trace feldspar, iron/limonite stain, mica, moderately laminated alluvial material and reworked bedrock, note laminea of coarse sandy alluvial material at 14.7-14.8', iron stain at 14.8-15.0', moist. 3% gravel, 26% sand, 21% silt, 50% clay. Top of bedrock at 15.0 ft. Note: Grab samples available from 11.0-14.6'
					2.00/2.00	5933	16			SANDY CLAYSTONE:	Sandy Claystone - medium light gray (N6), very fine- to medium-grained, moderately sorted, sub-rounded to well rounded, approximately 6% porosity, argillaceous cement, moderately friable, abundant frosted quartz, some clear quartz, iron and limonite stain, trace dark minerals/rock fragments, iron stain at 15.1', 15.3', 15.5', 16.2-16.3', caliche nodules at 15.2', 16.2-16.3', 16.7', moist. 38% sand, 4% silt, 58% clay.
					2.00/2.00	5931	18			CLAYEY SANDSTONE:	Clayey Sandstone with some silt - yellowish gray (5Y7/2), very fine- to medium-grained, well sorted, sub-rounded to rounded, approximately 12% porosity, argillaceous cement, highly friable, abundant frosted quartz, some dark minerals, feldspar, trace iron and limonite stain, thinly to thickly laminated, carbonaceous material throughout, vertically aligned roots at 18.0', 19.7', wood fragment at 19.6', iron nodules at 19.8', iron stain at 17.6', 17.9' 19.4', 19.8', moist. 60% sand, 16% silt, 24% clay.
					0.90/2.00	5929	20				No recovery for this interval.

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 68.0	GROUND ELEVATION (FT):	5948.57	PROJECT NUMBER:	OU2/RI	LOG OF BORING NUMBER
NORTH:	750188.98	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	21091
EAST:	2087816.20	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/08/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 17.0 FT. - 14.5 FT. BACKFILL MATERIAL: BENTONITE 68.0 FT. - 19.0 FT.

DEPTH	GRADATIONAL	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
					0.90/2.00		20				No recovery for this interval.
						5928	21			SILTY SANDSTONE	Silty Sandstone with some clay - yellowish gray (5Y7/2) to grayish yellow (5Y8/4), very fine- to medium-grained, moderately sorted, sub-rounded to rounded, approximately 12% porosity, argillaceous cement, highly friable, abundant frosted quartz, some dark minerals, trace clear quartz feldspar, iron and limonite stain, iron nodules at 28.9', iron stain at 23.4', 23.7', 27.1', 28.9', increased clay content at 27.6-27.8', some faint de-watering structures throughout, moist to wet. 56% sand, 24% silt, 20% clay
					1.10/2.00	5927	22				No recovery for this interval.
						5926	23			SILTY SANDSTONE	Silty Sandstone with some clay - yellowish gray (5Y7/2) to grayish yellow (5Y8/4), as described above.
					0.70/2.00	5925	24				No recovery for this interval.
						5924	25			SILTY SANDSTONE	Silty Sandstone with some clay - yellowish gray (5Y7/2) to grayish yellow (5Y8/4), as described above.
					0.50/2.00	5923	26				No recovery for this interval.
						5922	27	04/09/92		SILTY SANDSTONE	Silty Sandstone with some clay - yellowish gray (5Y7/2) to grayish yellow (5Y8/4), as described above.
					1.00/2.00	5921	28				No recovery for this interval.
						5920	29	04/10/92		CLAYEY SANDSTONE	Clayey Sandstone with some silt - yellowish gray (5Y7/2) to grayish yellow (5Y8/4), clay is light gray (N7), as described below.
					0.50/2.00	5919	30				No recovery for this interval

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 68.0	GROUND ELEVATION (FT):	5948.57	PROJECT NUMBER:	OU2/RI	LOG OF BORING NUMBER
NORTH:	750188.98	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	21091
EAST:	2087816.20	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/08/92	

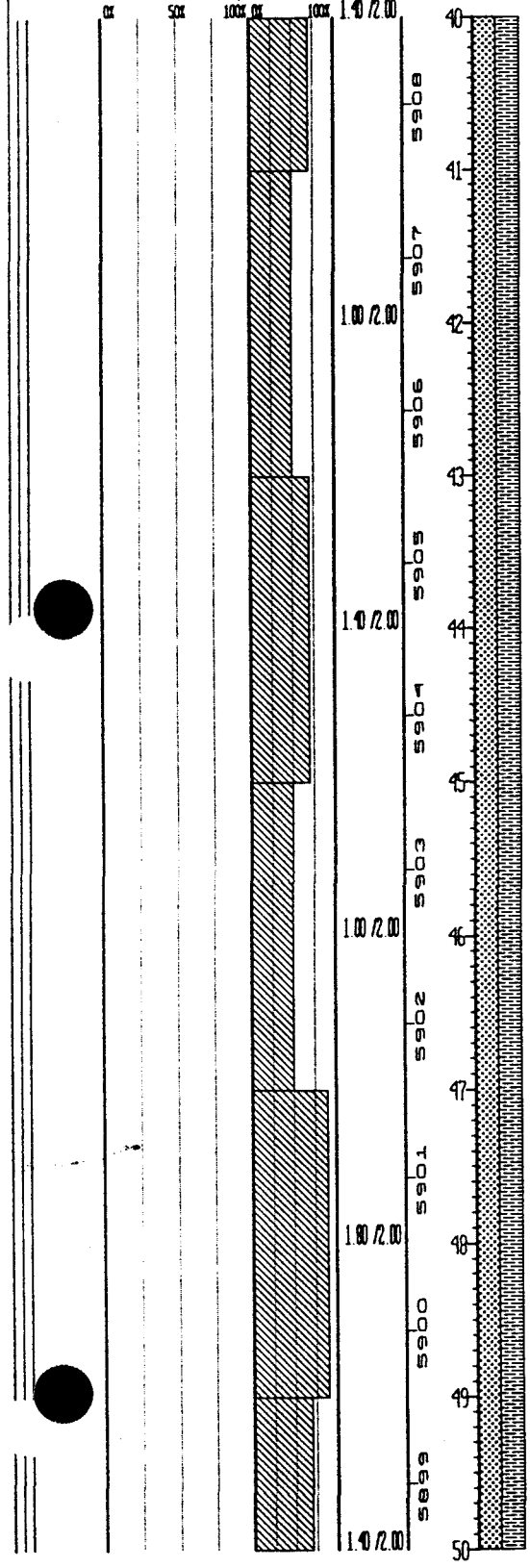
REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 17.0 FT. - 14.5 FT. BACKFILL MATERIAL: BENTONITE 68.0 FT. - 19.0 FT.

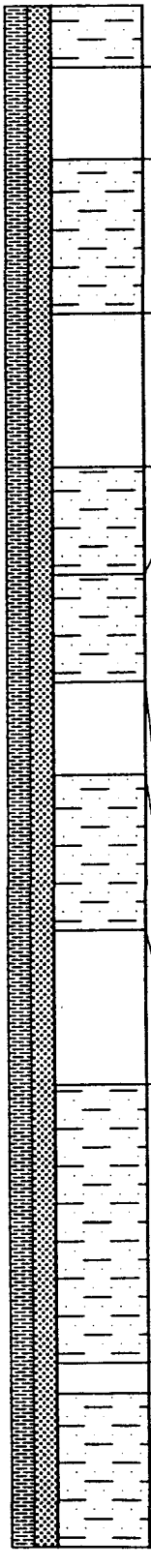
SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	0% 50% 100%	0% 100%	0.50 /2.00	5918	30			CLAYEY SANDSTONE	Clayey Sandstone with some silt - yellowish gray (5Y7/2) to grayish yellow (5Y8/4), clay is light gray (N7), very fine- to medium-grained, moderately sorted, rounded to well rounded, approximately 15% porosity, argilloceous cement, moderately friable, abundant frosted quartz, trace dark minerals, rock fragments, iron nodules, iron/limonite stain, laminated, sand is ripple laminated, increased sand content at 35.4-36.0', 41.05-41.3', increased sand content at 43.4-43.7', moderately laminated to thinly bedded clay/sand at 39.8-40.4', iron staining at 37.1', 43.3-43.5', clay rip-up clast (>.12'x.12') with iron stain coating at 39.1', clay rip-up clasts at 43.3-43.5', saturated. 66% sand, 8% silt, 26% clay.
				5917	31				
			0.50 /2.00		32				No recovery for this interval.
				5916					
BH007&002					33			CLAYEY SANDSTONE	Clayey Sandstone with some silt - yellowish gray (5Y7/2) to grayish yellow (5Y8/4), clay is light gray (N7), as described above. VOA samples obtained from 33.0-33.2', and from 33.2-33.4'.
BH007&002				5915					
			0.40 /2.00		34				No recovery for this interval.
				5914					
					35			CLAYEY SANDSTONE	Clayey Sandstone with some silt - yellowish gray (5Y7/2) to grayish yellow (5Y8/4), clay is light gray (N7), as described above.
				5913					
			1.10 /2.00		36				No recovery for this interval.
				5912					
					37			CLAYEY SANDSTONE	Clayey Sandstone with some silt - yellowish gray (5Y7/2) to grayish yellow (5Y8/4), clay is light gray (N7), as described above.
				5911					
			1.50 /2.00		38				
				5910					No recovery for this interval.
					39			CLAYEY SANDSTONE	Clayey Sandstone with some silt - yellowish gray (5Y7/2) to grayish yellow (5Y8/4), clay is light gray (N7), as described above.
				5909					
			1.40 /2.00		40				

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 68.0	GROUND ELEVATION (FT):	5948.57	PROJECT NUMBER:	002/R1	LOG OF BORING NUMBER:
NORTH: 750188.98	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	21091
EAST: 2087816.20	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/08/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 17.0 FT. - 14.5 FT. BACKFILL MATERIAL: BENTONITE 68.0 FT. - 19.0 FT.

DEPTH | CHEMICAL SAT | GRADATIONAL | 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.

CLAYEY SANDSTONE: Clayey Sandstone with some silt - yellowish gray (5Y7/2) to grayish yellow (5Y8/4), clay is light gray (N7), as described above.

No recovery for this interval.

CLAYEY SANDSTONE: Clayey Sandstone with some silt - yellowish gray (5Y7/2) to grayish yellow (5Y8/4), clay is light gray (N7), as described above.

CLAYEY SANDSTONE: Clayey Sandstone with some silt - clay is medium light gray (N6) to medium gray (N5), sand is yellowish gray (5Y7/2), very fine- to fine-grained, very well sorted, rounded, approximately 5% porosity, argillaceous cement, slightly friable, abundant frosted quartz, trace dark minerals, increased clay content at 43.7-43.9', increased sand at 48.6-48.8', thinly to moderately laminated clay/sand at 43.9-44.4', sandy clay at 44.4-45.7', thinly laminated at 45.7-46.0', laminations become more clayey downward at 47.0-48.6', carbonaceous lamination at 48.7', thinly bedded clay/sand at 49.0-50.3', sand beds are iron stained and dark yellowish orange (10YR6/6) at 49.0-50.3', wet to saturated.
57% sand, 7% silt, 36% clay

No recovery for this interval.

CLAYEY SANDSTONE: Clayey Sandstone with some silt - clay is medium light gray (N6) to medium gray (N5), sand is yellowish gray (5Y7/2), as described above.

No recovery for this interval

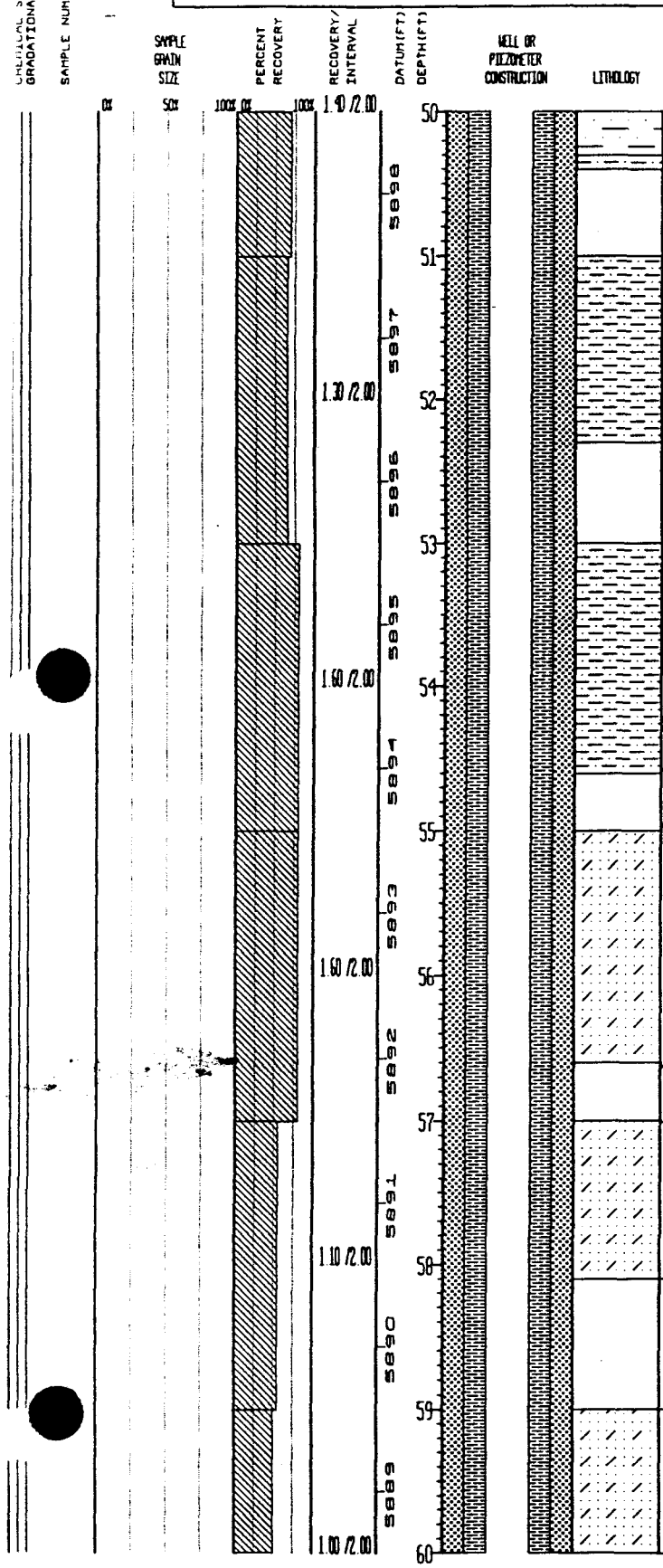
CLAYEY SANDSTONE: Clayey Sandstone with some silt - clay is medium light gray (N6) to medium gray (N5), sand is yellowish gray (5Y7/2), as described above.

No recovery for this interval.

CLAYEY SANDSTONE: Clayey Sandstone with some silt - clay is medium light gray (N6) to medium gray (N5), sand is yellowish gray (5Y7/2), as described above.

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 68.0	GROUND ELEVATION (FT):	5948.57	PROJECT NUMBER:	002/R1	LOG OF BORING NUMBER:
NORTH:	750188.98	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	21091
EAST:	2087816.20	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/08/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 17.0 FT. - 14.5 FT. BACKFILL MATERIAL: BENTONITE 68.0 FT. - 19.0 FT.



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
SANDY CLAYSTONE	Sandy Claystone with some silt - clay is medium gray (N5) to light gray (N7), sand is dark yellowish orange (10YR6/6) where iron stained, as described below.
	No recovery for this interval.
SANDY CLAYSTONE	Sandy Claystone with some silt - clay is medium gray (N5) to light gray (N7), sand is dark yellowish orange (10YR6/6) where iron stained, very fine- to fine-grained, well sorted, rounded, approximately 9% porosity, argilloceous cement, moderately friable, abundant frosted quartz, trace limonite/iron stain, dark minerals/rock fragments, feldspar, mica, thinly laminated to thinly bedded, increased sand content at 51.0-51.4', 51.8-52.3', increased sand content at 51.4-51.8', laminations dipping 10 degrees at 51.0-51.4', ripple lamination with amplitude of .05' and wavelength of .15' at 51.8', sand contains iron stain and nodules at 51.8-52.3', wavy and convolute laminea at 53.0-53.5', pseudonodules of sand-wavy and convolute laminea of sand/sandy clay at 53.5- 54.6', wet to saturated. 40% sand, 12% silt, 48% clay
	No recovery for this interval.
SANDY CLAYSTONE	Sandy Claystone with some silt - clay is medium gray (N5) to light gray (N7), sand is dark yellowish orange (10YR6/6) where iron stained, as described above.
	No recovery for this interval.
SILTY SANDSTONE	Conglomerate Bearing Silty Sandstone with some clay - yellowish gray (5Y8/1) to dark yellowish orange (10YR6/6), very fine- to medium-grained with trace granule pebbles, very poorly sorted, rounded to well rounded, approximately 22% porosity, argilloceous cement, highly friable, abundant frosted quartz, some unconsolidated rounded clay clasts, feldspar, rock fragments/dark minerals, iron stain, trace clear quartz, mica, iron stain and white clay rip-up clasts throughout, largest clay rip-up clast is approximately .05' x .05', granule pebbles at 57.5'-63.0', saturated. 1% granule pebbles, 60% sand, 21% silt, 18% clay
	No recovery for this interval.
SILTY SANDSTONE	Conglomerate Bearing Silty Sandstone with some clay - yellowish gray (5Y8/1) to dark yellowish orange (10YR6/6), as described above.
	No recovery for this interval
SILTY SANDSTONE	Conglomerate Bearing Silty Sandstone with some clay - yellowish gray (5Y8/1) to dark yellowish orange (10YR6/6), as described above.

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 68.0	GROUND ELEVATION (FT): 5948.57	PROJECT NUMBER: 002/R1	LOG OF BORING NUMBER
NORTH:	750188.98	AREA: NE TRENCHES	CASING DIAMETER (IN): 2.0	GEOLOGIST: J.P. O'BRIEN	21091
EAST:	2087816.20	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN): 10.0	DATE DRILLED: 04/08/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 17.0 FT. - 14.5 FT. BACKFILL MATERIAL: BENTONITE 68.0 FT. - 19.0 FT.

CHEMICAL SAMPLE / GRADATIONAL	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
				1.00 /2.00	5888	60				No recovery for this interval.
					5887	61			SILTY SANDSTONE	Conglomerate Bearing Silty Sandstone with some clay - yellowish gray (5Y8/1) to dark yellowish orange (10YR6/6), as described above.
				0.80 /2.00	5886	62				No recovery for this interval.
					5885	63			CLAYEY SANDSTONE	Clayey Sandstone with some silt - interbedded medium gray (N5) clay and dark yellowish orange (10YR6/6) sand, very fine- to coarse-grained, poorly sorted, rounded to well-rounded, approximately 16% porosity, argillaceous cement, highly friable, abundant frosted quartz, some rock fragments, dark minerals, feldspar, trace iron staining, mica, cross-laminations dipping 13 degrees at 63.9', convolute and contorted laminea with pseudonodules inclined up to 45 degrees (possible slump) at 64.4-64.6', contorted laminea and sand lenses at 63.0-63.9', wet to saturated. 60% sand, 16% silt, 24% clay
				1.80 /2.00	5884	64				
	3H007G9002									VOA sample obtained from this interval.
						65				No recovery for this interval.
				1.00 /1.00	5883	66			SANDY CLAYSTONE	Sandy Claystone with some silt - medium light gray (N6) to medium dark gray (N4), very fine- to fine-grained, well sorted, sub-rounded to rounded, approximately 8% porosity, argillaceous cement, slightly to moderately friable, abundant frosted quartz, some dark minerals, clear quartz, ripple laminated - thin beds of cross-laminated sandy clay at 65.8-66.0', 67.8-68.0', moist to wet 37% sand, 13% silt, 50% clay.
				2.00 /2.00	5882	67				
					5881	68				Total depth at 68.0 ft.
					5880	69				
					5879	70				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 74.5		GROUND ELEVATION (FT):	5949.04	PROJECT NUMBER:	667.11	LOG OF BORING NUMBER:	
NORTH:	749979	AREA: EAST TRENCHES		CASING DIAMETER (IN):	2 ID	GEOLOGIST:	DCB		36-87BR
EAST:	2087295	LOCATOR NUMBER:	09	BOREHOLE DIAMETER (IN):	7.5	DATE DRILLED:	08/27/87		
REMARKS: Hollow Stem Auger.									

CHEMICAL SAMPLE DEPTH / GRADATIONAL 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
				1.3/2	5949	0			GC:	Clayey Gravel - light gray (N7), clay matrix is dark yellowish brown (10YR 4/2), angular, moderately sorted, max. size 5.5 cm., some plant debris in upper 0.3 ft.
				2/2	5948	1			GC:	GRAVEL - light gray (N7), angular to sub-angular, moderately sorted, max. size 4.5 cm., caliche matrix.
				0.5/0.5	5947	2			GC:	As above, gravel fraction is coarser, max size 6 cm., some sand.
				0/0.5	5946	3			NO SAMPLE:	
				1.5/1.5	5945	4			GC:	Clayey Gravel - light gray (N7), clay matrix is light brown (5YR 5/6), angular to sub-rounded, poorly graded, max. size 5.5 cm., some sand, caliche rind on gravel.
				0/0.5	5944	5			NO SAMPLE:	
				2/2	5943	6			SP:	GRAVELLY SAND - grayish orange (10YR 7/4), coarse grained to very fine grained, poorly graded, angular to sub-angular, some clay and calcareous mineralization.
					5942	7			CLAYSTONE:	Top of Bedrock Very light gray (N7), high plasticity (est.) local iron staining and bodies of caliche, some silt and stringers.
					5941	8				
					5940	9			CLAYSTONE:	As above, caliche bodies/stringers less frequent below 10 ft.
				2/2		10				

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 74.5	GROUND ELEVATION (FT): 5949.04	PROJECT NUMBER: 667.11	LOG OF BORING NUMBER:
NORTH: 749979	AREA: EAST TRENCHES	CASING DIAMETER (IN): 2 ID	GEOLOGIST: DCB	36-87BR
EAST: 2087295	LOCATOR NUMBER: 09	BOREHOLE DIAMETER (IN): 7.5	DATE DRILLED: 08/27/87	
REMARKS: Hollow Stem Auger.				

SAMPLE NUMBER	SAMPLE GRADN 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 ft	5939	10				
				5938	11			CLAYSTONE:	As above at 12 ft. (est.depth) interval grades to very pale orange (10YR 8/2).
			2 ft	5937	12				
				5936	13			CLAYSTONE:	As above.
			2 ft	5935	14				
				5934	15			CLAYSTONE:	As above.
			2 ft	5933	16			CLAYSTONE:	Light gray (N7), bedding not apparent (massive?), highly weathered, moderately friable, localized iron staining.
				5932	17			CLAYSTONE:	As above.
			2 ft	5931	18				
				5930	19			CLAYSTONE:	As above, below 20 ft. (est. depth) interval grades from claystone to siltstone to sandstone.
			2 ft		20				

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 74.5	GROUND ELEVATION (FT): 5949.04	PROJECT NUMBER: 667.11	LOG OF BORING NUMBER:
NORTH: 749979	AREA: EAST TRENCHES	CASING DIAMETER (IN): 2 ID	GEOLOGIST: DCB	36-87BR
EAST: 2087295	LOCATOR NUMBER: 09	BOREHOLE DIAMETER (IN): 7.5	DATE DRILLED: 08/27/87	
REMARKS: Hollow Stem Auger.				

GRADATIONAL 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
				2/2	5929.65	20				
				0.5/0.5	5928.65	21			SANDSTONE:	Yellowish gray (5Y 7/2), bedding not apparent, may be horizontal from appearance of core breaks, highly weathered, moderately friable, fine grained, sub-angular to sub-rounded, well sorted, localized to wide spread iron staining.
				1.5/1.5	5927.65	22			SANDSTONE:	As above.
				1.5/1.5	5926.65	23			SANDSTONE:	As above.
				1.5/1.5	5925.65	24			SANDSTONE:	As above.
				1.5/1.5	5924.65	25			SANDSTONE:	As above.
	UNK			1.5/1.5	5923.65	26			SANDSTONE:	As above.
				1.5/1.5	5922.65	27			SANDSTONE:	As above.
				1.5/1.5	5921.65	28			SANDSTONE:	As above.
				1.5/1.5	5920.65	29			SANDSTONE:	As above.
						30				

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 74.5	GROUND ELEVATION (FT): 5949.04	PROJECT NUMBER: 667.11	LOG OF BORING NUMBER:
NORTH: 749979	AREA: EAST TRENCHES	CASING DIAMETER (IN): 2 ID	GEOLOGIST: DCB	36-87BR
EAST: 2087295	LOCATOR NUMBER: 09	BOREHOLE DIAMETER (IN): 7.5	DATE DRILLED: 08/27/87	
REMARKS: Hollow Stem Auger.				

GRADATIONAL 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
					5919	30				
				2/2	5918	31	12/01/87		SANDSTONE:	As above, at about 31 ft. bedding becomes distinct, 2 mm. and less in thickness.
					5917	32				
				1.5/1.5	5916	33			SANDSTONE:	As above.
				1.5/1.5	5915	34	08/27/87		SANDSTONE:	As above, at about 34.5, bedding thickness increases to 5 mm. and less, medium grained fraction present.
				1.5/1.5	5914	35			SANDSTONE:	Very light gray (N8) and grayish orange (10YR 7/4), bedding not apparent, highly weathered, highly friable, very fine grained to fine grained, poorly sorted, localized to widely disseminated iron staining.
				1.5/1.5	5913	36				
				1.5/1.5	5912	37			SANDSTONE:	As above.
				1.5/1.5	5911	38			SANDSTONE:	As above.
				1.5/1.5	5910	39				
						40				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 74.5	GROUND ELEVATION (FT):	5949.04	PROJECT NUMBER:	667.11	LOG OF BORING NUMBER:
NORTH:	749979	AREA: EAST TRENCHES	CASING DIAMETER (IN):	2 ID	GEOLOGIST:	DCB	36-87BR
EAST:	2087295	LOCATOR NUMBER: 09	BOREHOLE DIAMETER (IN):	7.5	DATE DRILLED:	08/27/87	

REMARKS: Hollow Stem Auger.

CHEMICAL SAMPLE DEPTH
GRADATIONAL SAMPLE DEPTH

SAMPLE NUMBER

SAMPLE GRAIN SIZE (0% 50% 100%)

PERCENT RECOVERY (0% 100%)

RECOVERY/INTERVAL

DATUM (FT)

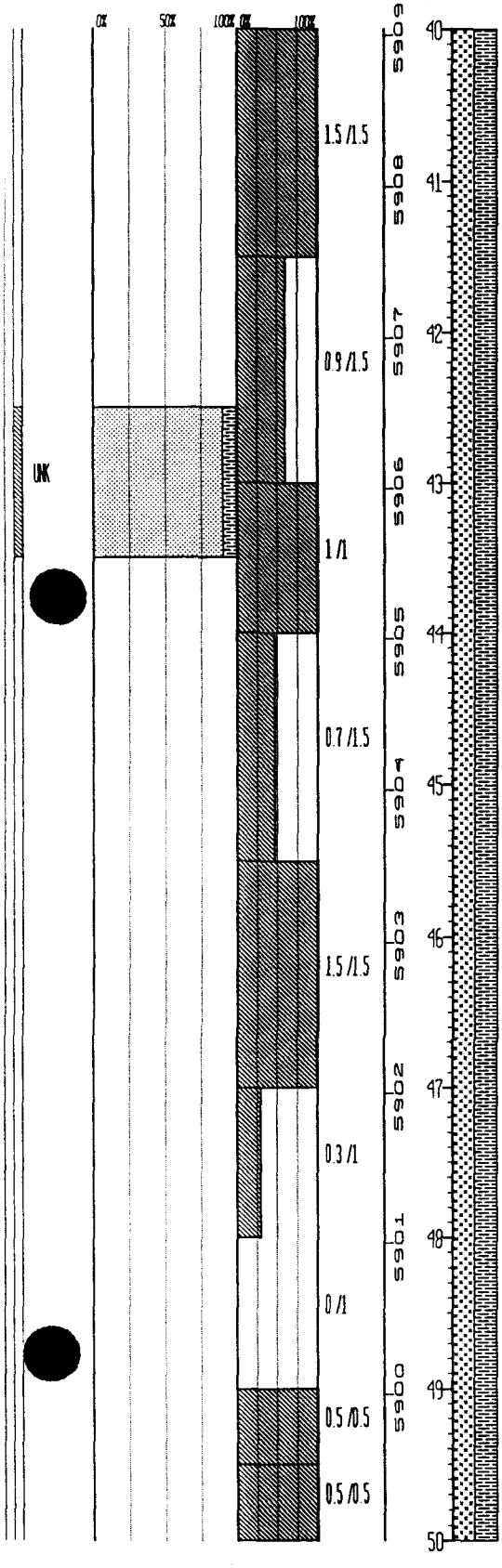
DEPTH (FT)

WELL OR PIEZOMETER CONSTRUCTION

LITHOLOGY

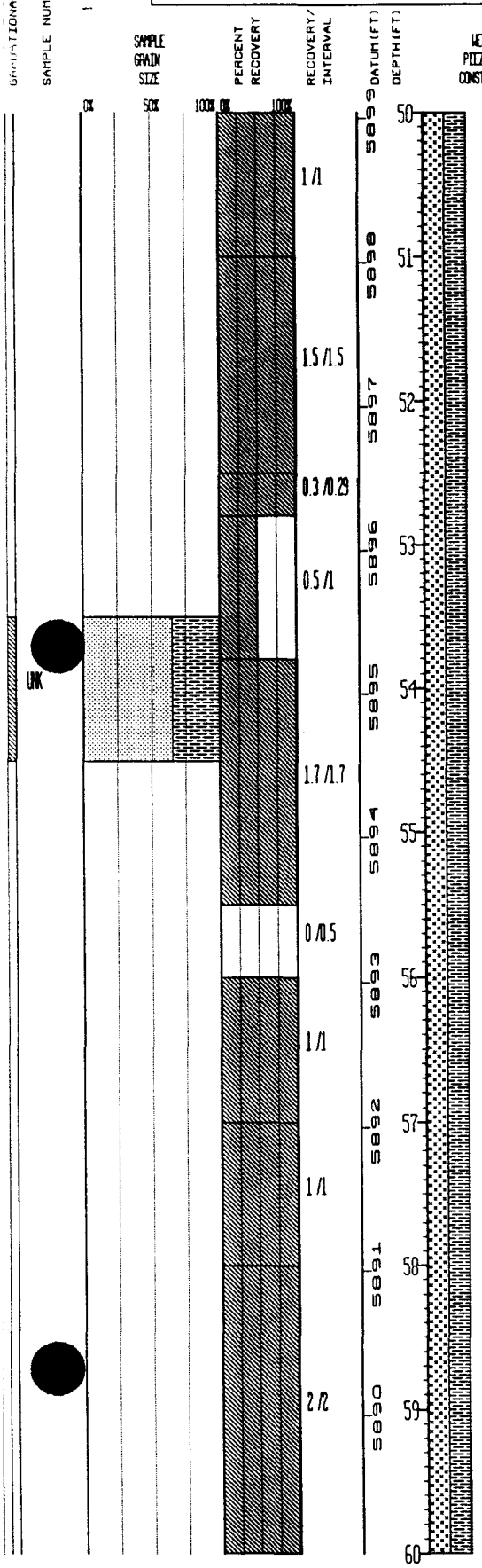
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE

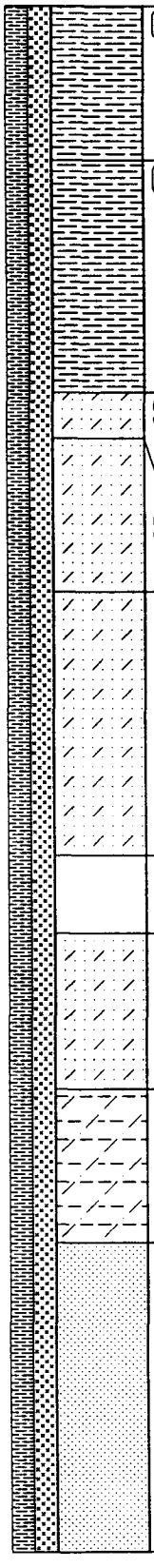
DESCRIPTION



Unified Soils Classification or Rock Type	Description
SANDSTONE:	As above.
SANDSTONE:	At 42 ft. (est depth), interval grades to medium grained, well rounded sandstone.
SANDSTONE:	As above.
SANDSTONE:	As above.
SILTSTONE:	Interval grades to siltstone below 45 ft, light gray (N7), well weathered, moderate to slightly friable, slight VFG sand fraction.
SILTSTONE:	As above.
NO SAMPLE:	
SILTSTONE:	As above (reference interval 45.5 to 47.0 ft.).
SILTSTONE:	As above.

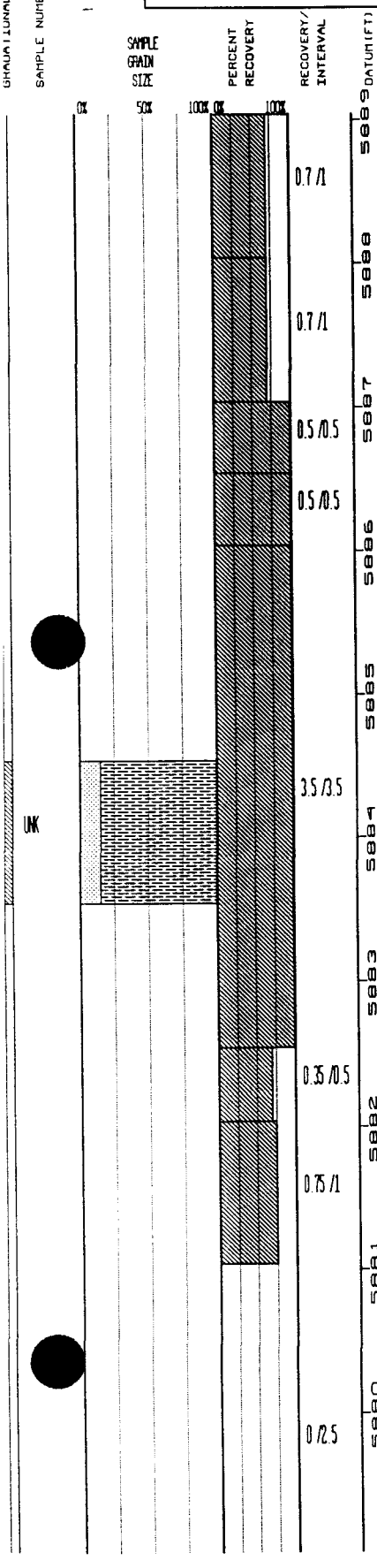
STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 74.5	GROUND ELEVATION (FT): 5949.04	PROJECT NUMBER: 667.11	LOG OF BORING NUMBER:
NORTH: 749979	AREA: EAST TRENCHES	CASING DIAMETER (IN): 2 ID	GEOLOGIST: DCB	36-87BR
EAST: 2087235	LOCATOR NUMBER: 09	BOREHOLE DIAMETER (IN): 7.5	DATE DRILLED: 08/27/87	
REMARKS: Hollow Stem Auger.				





UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
CLAYSTONE:	Medium light gray (N6), bedding not apparent (massive?), well weathered, moderately to slightly friable, slight silt fraction.
CLAYSTONE:	As above.
SILTY SANDSTONE:	Very pale orange (10YR 8/2), bedding not apparent (massive?), highly weathered, moderately friable, very fine grained, localized iron staining.
SILTY SANDSTONE:	As above.
SILTY SANDSTONE:	As above.
NO SAMPLE:	
SILTY SANDSTONE:	As above (reference interval 52 to 55.5).
SILTY CLAYSTONE:	Very light gray (N8), weathered, slightly friable, interval grades to sandstone, dark yellowish orange (10YR 6/6), bedding not apparent (massive?), well weathered, moderately friable, very fine grained with abundant silt.
SANDSTONE:	Grayish orange (10YR 7/4), bedding not apparent (massive?), highly weathered, slightly friable, some silt, interval grades to medium grained to very fine grained, well rounded, moderate sorting and highly friable.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 74.5	GROUND ELEVATION (FT): 5949.04	PROJECT NUMBER: 667.11	LOG OF BORING NUMBER:
NORTH: 749979	AREA: EAST TRENCHES	CASING DIAMETER (IN): 2 ID	GEOLOGIST: DCB	36-87BR
EAST: 2087295	LOCATOR NUMBER: 09	BOREHOLE DIAMETER (IN): 7.5	DATE DRILLED: 08/27/87	
REMARKS: Hollow Stem Auger.				

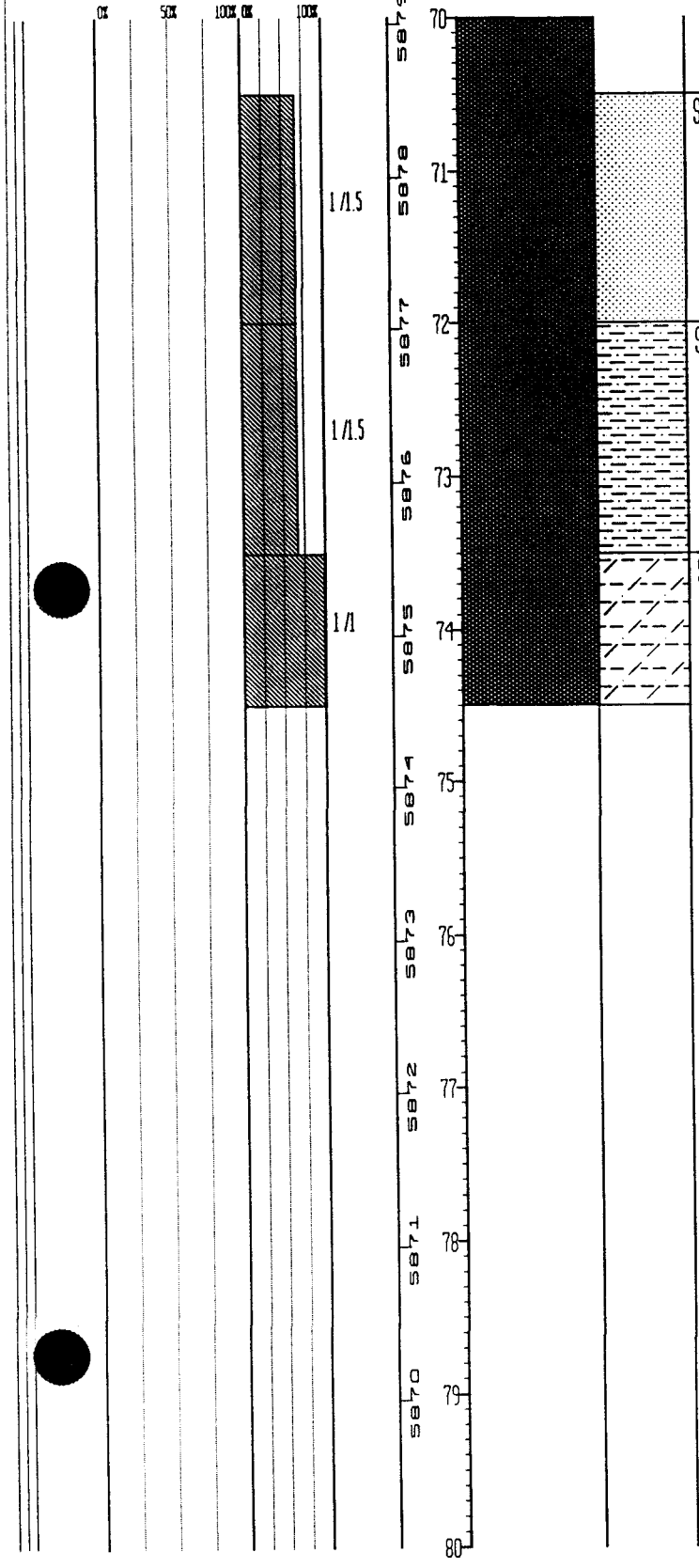


UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
SANDSTONE:	As above.
SANDSTONE:	As above.
SANDSTONE:	As above.
SANDSTONE:	Dark yellowish orange (10YR 6/6), bedding not apparent (massive?), well weathered, moderately to highly friable, very fine grained, well sorted, moderate silt fraction.
CLAYSTONE:	Medium light gray (N6), bedding not apparent (massive?), well weathered, moderately friable, localized iron staining and carbonaceous mineralization. Interval grades to clayey siltstone with depth.
CLAYEY SILTSTONE:	Med. light gray, massive bedding, well weathered, slightly friable, trace of carbonaceous and iron staining.
SANDSTONE:	Fine grained, mottled, very light gray (N8) and very pale orange (10YR 8/2), massive bedding, highly weathered, mod. friable, well sorted, becoming clayey at bottom of interval.
NO SAMPLE:	

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 74.5	GROUND ELEVATION (FT): 5949.04	PROJECT NUMBER: 667.11	LOG OF BORING NUMBER:
NORTH: 749979	AREA: EAST TRENCHES	CASING DIAMETER (IN): 2 ID	GEOLOGIST: DCB	36-87BR
EAST: 2087295	LOCATOR NUMBER: 09	BOREHOLE DIAMETER (IN): 7.5	DATE DRILLED: 08/27/87	

REMARKS: Hollow Stem Auger.

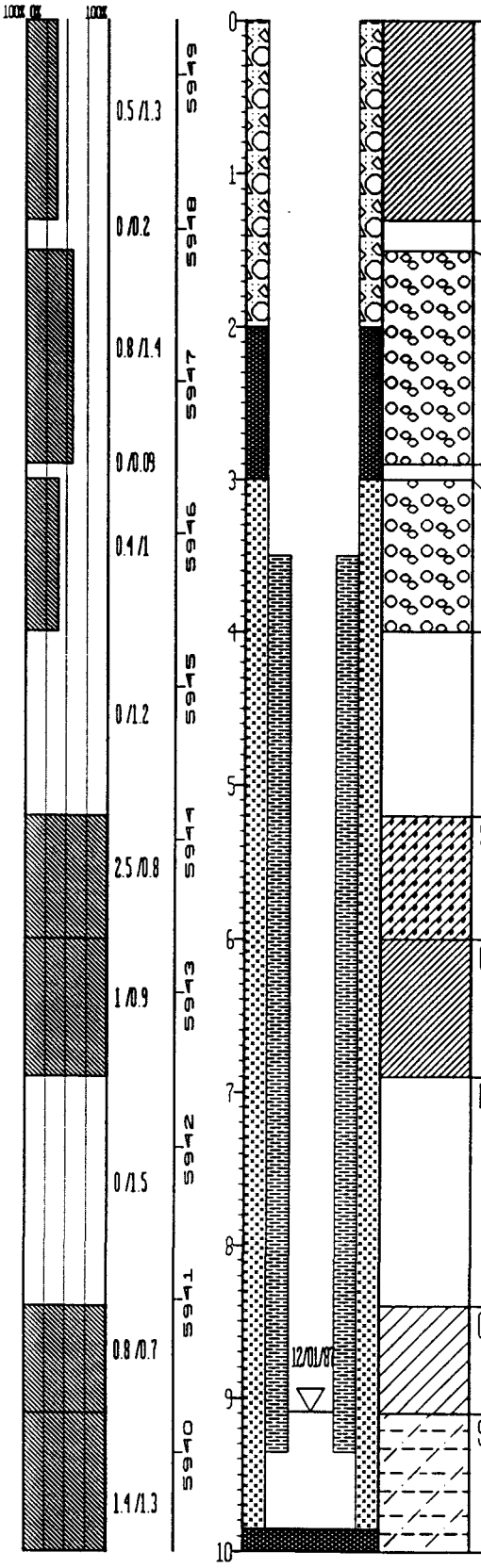
CHEMICAL SAMPLE DEPTH
GRADATIONAL SAMPLE DEPTH
SAMPLE NUMBER
SAMPLE GRAIN SIZE (0% 50% 100%)
PERCENT RECOVERY (0% 100%)
RECOVERY/INTERVAL
DATUM (FT)
DEPTH (FT)
WELL OR PIEZOMETER CONSTRUCTION
LITHOLOGY
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE
DESCRIPTION



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
SANDSTONE:	Fine grained, light gray (N8), massive bedding, well weathered, well sorted, some iron staining mottled, trace of carbonaceous material, wavy bedding, at 70 degrees with clay infilling.
SANDY CLAYSTONE:	Fine grained, light gray (N7), massive bedding, well weathered, mod. friable, trace of organic material.
SILTY CLAYSTONE:	Light gray (N7), massive bedding, well weathered, mod. friable, some organic material, FG sandstone occurs in pockets.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 14.4	GROUND ELEVATION (FT): 5949.36	PROJECT NUMBER: 667.11	LOG OF BORING NUMBER:
NORTH: 749975	AREA: EAST TRENCHES	CASING DIAMETER (IN): 2 ID	GEOLOGIST: LAA	35-87
EAST: 2087268	LOCATOR NUMBER: 09	BOREHOLE DIAMETER (IN): 7.5	DATE DRILLED: 08/31/87	
REMARKS: Hollow Stem Auger.				

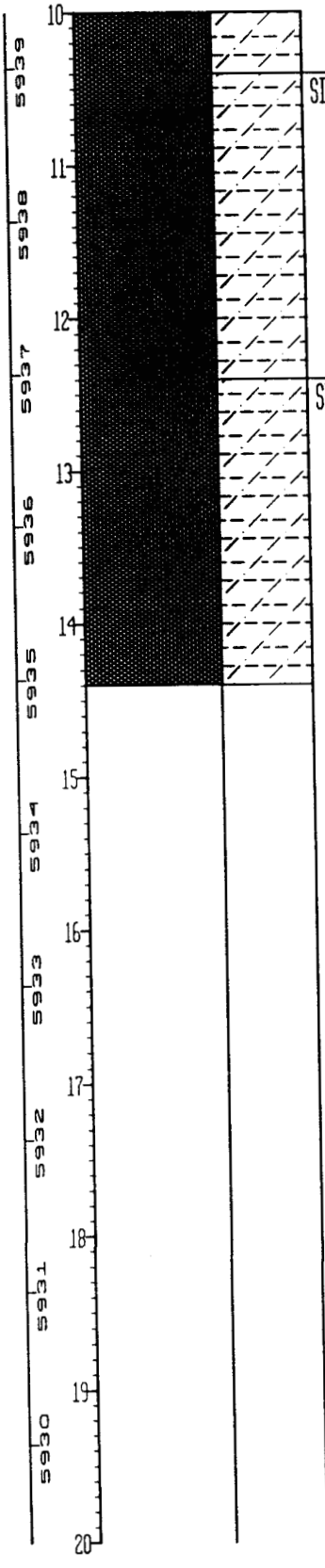
CHEMICAL SAMPLE DEPTH
GRADATIONAL SAMPLE DEPTH
SAMPLE NUMBER
SAMPLE GRAIN SIZE (0% 50% 100%)
PERCENT RECOVERY (0% 100%)
RECOVERY/INTERVAL
DATUM (FT)
DEPTH (FT)
WELL OR PIEZOMETER CONSTRUCTION
LITHOLOGY



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
CH:	Gravelly Clay - between dark reddish brown (10R 3/4) to moderate brown (5YR 3/4). Est. plast. mod. to high. Gravel angular to sub-rounded, granules to 3 cm., mod. graded, some silt. Trace sand VFG to med. grained. Trace root material.
NO SAMPLE:	
GW:	GRAVEL - pale yellowish brown (10YR 6/2), angular, mod. well graded, granules to 3 cm., some clay, silt and sand VFG to VCG. Some CaCO3.
NO SAMPLE:	
GW:	Same as above.
NO SAMPLE:	
SC:	Clayey Sand - grayish orange to very pale orange (10YR 7/4 to 8/2). Sand VFG to coarse, well graded, some gravel, granules to 33.5 cm., some silt, CaCO3.
CH:	Same as above.
NO SAMPLE:	
CL:	Same as above. Trace gravel.
SILTY CLAYSTONE:	Top of Bedrock Yellowish gray (5Y 8/1) (Light), Mod. to high plast. Some CaCO3.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 14.4	GROUND ELEVATION (FT): 5949.36	PROJECT NUMBER: 667.11	LOG OF BORING NUMBER:
NORTH: 749975	AREA: EAST TRENCHES	CASING DIAMETER (IN): 2 ID	GEOLOGIST: LAA	35-87
EAST: 2087268	LOCATOR NUMBER: 09	BOREHOLE DIAMETER (IN): 7.5	DATE DRILLED: 08/31/87	
REMARKS: Hollow Stem Auger.				

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



SILTY CLAYSTONE: Pinkish gray (5YR 8/1) Est. plast. mod. to high.

SILTY CLAYSTONE: Yellowish gray (5Y 8/1), est. plast. mod. to high. Some dk. yellowish orange coloring toward bottom (10YR 6/6). Calcite stringer near bottom. NOTE: No water encountered while drilling.

SITE 2

WELLS AND BOREHOLES

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 42.6	GROUND ELEVATION (FT):	5947.61	PROJECT NUMBER:	002RI	LOG OF BORING NUMBER:
NORTH:	750053.14	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	L.A. GUST	05691
EAST:	2087620.69	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	10/04/91	

REMARKS: HOLLOW STEM AUGER BENTONITE SEAL 23.0 FT. - 20.0 FT. BACKFILL MATERIAL: BENTONITE 42.6 FT. - 37.1 FT CUTTING SAMPLES OBTAINED IN 16 OZ. JARS EVERY TWO FEET WITH THE EXCEPTION OF 24.7-28.4 AND 34.8-37.0, OFFSET TO 11391.

CHEMICAL SAMPLE / GRADATIONAL	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				Top soil, start of boring at 0.90 ft.
				0.00 /0.90	5947				GW:	Organic Sandy Gravel with some clay - grayish black (N2), maximum gravel size 2", average size 1" diameter, coarse- to fine-grained sand, well graded, low plasticity, sub-angular sand, sub-rounded gravel, gravel primarily quartzite and granite, abundant caliche coating, dominant lithology sand quartz with some rock fragments and trace mica and dark minerals, abundant caliche throughout interval, no apparent bedding, moist, abundant root present. 58% gravel, 27% sand, 5% silt, 10% clay.
				0.00 /1.10	5946	1				
						2				
				0.00 /2.00	5945	3			GW:	Clayey Sandy Gravel - pale brown (5YR5/2), maximum size gravel 1/2" diameter, average size 1/4" diameter, coarse- to fine-grained sand, well graded, sub-rounded gravel, sub-angular sand, low to medium plasticity, gravel primarily quartzite with caliche coating, dominant lithology sand quartz, with some rock fragments and trace mica, abundant caliche throughout interval, some iron staining on grains and throughout interval, no apparent bedding, moist, some roots present. 71% gravel, 21% sand, 8% clay.
					5944	4				
				0.00 /2.00	5943	5			GW:	Sandy Gravel - moderate yellowish brown (10YR5/4), maximum size gravel 1 1/2" diameter, average size 1/2", coarse- to fine-grained sand, well graded, sub-rounded gravel, sub-angular to sub-rounded sand, low plasticity, gravel primarily quartzite and granite, dominant lithology sand quartz with some iron staining on grains, iron staining throughout interval, some caliche throughout interval, no apparent bedding, moist, increase in sand at 10.0-12.0', no caliche at 18.0-20.0'. 67% gravel, 26% sand, 2% silt, 5% clay.
					5942	6				
				0.00 /2.00	5941	7				
					5940	8				
					5939	9				
				0.00 /4.00	5938	10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 42.6		GROUND ELEVATION (FT):	5947.61	PROJECT NUMBER:	0U2RI
NORTH:	750053.14	AREA: NE TRENCHES		CASING DIAMETER (IN):	2.0	GEOLOGIST:	L.A. GUST
EAST:	2087620.69	LOCATOR NUMBER:	I14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	10/04/91

LOG OF BORING NUMBER: 05691

REMARKS: HOLLOW STEM AUGER. BENTONITE SEAL 23.0 FT. - 20.0 FT. BACKFILL MATERIAL: BENTONITE 42.6 FT. - 37.1 FT. CUTTING SAMPLES OBTAINED IN 16 OZ. JARS EVERY TWO FEET WITH THE EXCEPTION OF 24.7-28.4 AND 34.8-37.0, OFFSET TO 11391.

CHEMICAL SAP GRADATIONAL	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 /4.00		10				
					5937	11				
					5936	12				
				0.00 /2.00	5935	13				
					5934	14				
				0.00 /2.00	5933	15				
					5932	16				
				0.00 /2.00	5931	17				
					5930	18				
				0.00 /2.00	5929	19				
					5928	20				

STATE PLANE COORDINATE	TOTAL DEPTH (FT): 42.6	GROUND ELEVATION (FT):	5947.61	PROJECT NUMBER	002RI
NORTH: 750053.14	AREA NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	L.A. GUST
EAST 2087620.69	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	10/04/91

LOG OF BORING NUMBER: 05691

REMARKS: HOLLOW STEM AUGER. BENTONITE SEAL 23.0 FT. - 20.0 FT. BACKFILL MATERIAL: BENTONITE 42.6 FT. - 37.1 FT. CUTTING SAMPLES OBTAINED IN 16 OZ. JARS EVERY TWO FEET WITH THE EXCEPTION OF 24.7-28.4 AND 34.8-37.0, OFFSET TO 11391.

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
			0.00 /2.00	5927	20–21			SC:	Clayey Sand - moderate brown (5YR4/4), medium- to fine-grained sand, average size gravel 1/4" diameter, poorly graded, sub-angular to sub-rounded sand, sub-angular gravel, medium plasticity, dominant lithology sand quartz with some granite rock fragments, trace mica, K-spar, and dark minerals, gravel granite, some iron staining on grains, some iron staining throughout interval, trace carbonaceous material, no apparent bedding, moist, clay like appearance. 5% gravel, 62% sand, 2% silt.
			0.00 /2.00	5926	21–22				
			0.00 /2.00	5925	22–23				
			0.00 /0.70	5924	23–24				
			2.00 /2.20	5923	24–25				No recovery for this interval.
			1.50 /1.50	5922	25–26	10/07/91		SC:	Clayey Sand - moderate brown (5YR4/4), as described above, increase in sand grain size to coarse.
			0.00 /1.60	5921	26–27	11/01/91		GW:	Sandy Gravel - moderate brown (5YR4/4), maximum size gravel 2 1/2" diameter, average size 1", coarse- to fine-grained sand, well graded, sub-angular gravel, sub-angular to sub-rounded sand, low plasticity, gravel primarily quartzite and granite with some limonite and carbonaceous material, dominant lithology sand quartz with some quartzite and granite rock fragments with trace mica, K-spar and dark minerals, some iron staining on grains and throughout interval, no apparent bedding, saturated. 59% gravel, 33% sand, 2% silt, 6% clay.
				5920	27–28				VOA sample obtained from this interval.
				5919	28–29			GP:	Gravel with some sand - moderate brown (5YR4/4), maximum size gravel 3/4" diameter, average 1/4" diameter, coarse- to fine-grained sand, poorly graded, angular to sub-angular, low plasticity, gravel primarily quartzite with some granite, dominant lithology sand quartz, no apparent bedding, saturated. 85% gravel, 12% sand, 3% clay.
				5918	29–30			SC:	Gravelly Sand with some clay - moderate brown (5YR3/4), coarse- to fine-grained sand, maximum gravel size 1/2" diameter, average 1/4" diameter, well graded, sub-angular to sub-rounded sand, sub-rounded gravel, medium plasticity, dominant lithology

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STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 42.6	GROUND ELEVATION (FT):	5947.61	PROJECT NUMBER:	0028I
NORTH: 750053.14	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	L.A. GUST
EAST: 2087620.69	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	10/04/91

LOG OF BORING NUMBER: 05691

REMARKS: HOLLOW STEM AUGER. BENTONITE SEAL 23.0 FT. - 20.0 FT. BACKFILL MATERIAL: BENTONITE 42.6 FT. - 37.1 FT. CUTTING SAMPLES OBTAINED IN 16 OZ. JARS EVERY TWO FEET WITH THE EXCEPTION OF 24.7-28.4 AND 34.8-37.0, OFFSET TO 11391.

CHEMICAL SAMPLE	GRADATIONAL 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
			0% 50% 100%	0% 100%	0.00 /2.00	5917	30 31				sand quartz with some granite and quartzite rock fragments, trace mica and dark minerals, trace iron staining on grains, gravels primarily quartzite and granite, no apparent bedding, saturated to moist. 22% gravel, 61% sand, 5% silt, 12% clay.
					0.00 /2.80	5916 5915 5914	32 33 34			SC	Clayey Sand - moderate greenish yellow (10Y7/4), maximum size gravel 1/4", coarse- to fine-grained sand, well graded, sub-angular, high plasticity, dominant lithology sand quartz with some dark minerals and trace K-spar, gravel primarily quartzite and granite, no apparent bedding, saturated, increase in sand at 34.8-35.2'. 2% gravel, 69% sand, 1% silt, 28% clay. Top of bedrock at 35.2 ft.
		BH00093A02			2.20 /2.20	5913 5912 5911	35 36			SANDY CLAYSTONE	Sandy Claystone - pale olive (10Y6/2), very fine-grained sand, well sorted, sub-angular, approximately 15% porosity, argillaceous cement, slightly friable, dominant lithology sand quartz with trace mica and dark minerals, trace horizontal bedding at 35.5-36.0', trace carbonaceous material, interbedded sand lenses at 35.9-37.0', trace clay clasts throughout interval, fossil mold at 35.4', weathered. 2% gravel, 68% sand, 3% silt, 27% clay.
		BH00094A02									VOA sample obtained from this interval.
							37			SANDY CLAYSTONE	Sandy Claystone - pale olive (10Y6/2), as described above.
											VOA Duplicate sample obtained from this interval.
						5910				SANDY CLAYSTONE	Sandy Claystone - pale olive (10Y6/2), as described above.
											No recovery for this interval.
						5909	38 39				
					0.00 /5.60	5908	40				

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 42.6	GROUND ELEVATION (FT):	5947.61	PROJECT NUMBER:	OU2RI
NORTH: 750053.14	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	L.A. GUST
EAST: 2087620.69	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	10/04/91

LOG OF BORING NUMBER

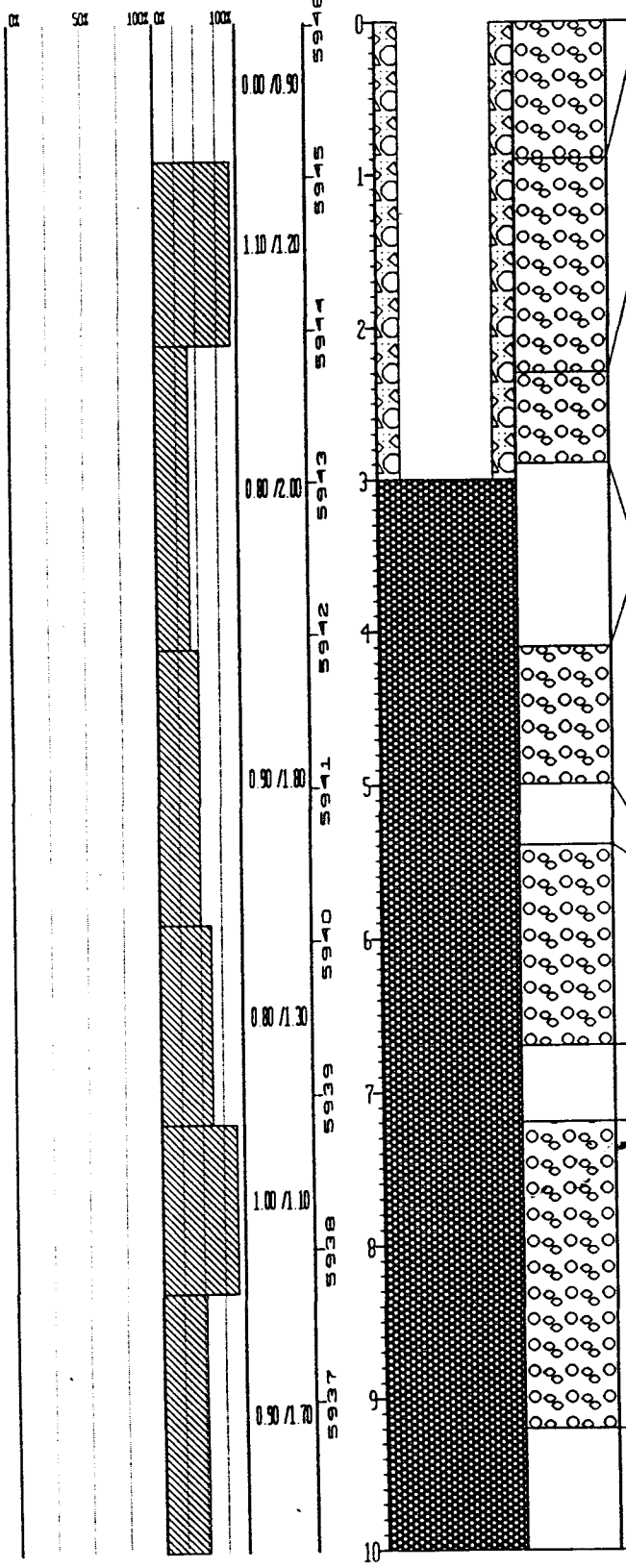
05691

REMARKS: HOLLOW STEM AUGER. BENTONITE SEAL 23.0 FT. - 20.0 FT. BACKFILL MATERIAL: BENTONITE 42.6 FT. - 37.1 FT. CUTTING SAMPLES OBTAINED IN 16 OZ. JARS EVERY TWO FEET WITH THE EXCEPTION OF 24.7-28.4 AND 34.8-37.0, OFFSET TO 11391.

CHEMICAL SAP GRADATIONAL	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	40				
					5906	41				
					5905	42				
					5904	43				Total depth at 42.6 ft.
					5903	44				
					5902	45				
					5901	46				
					5900	47				
					5899	48				
					5898	49				
						50				

STATE PLANE COORDINATE	TOTAL DEPTH (FT): 66.0	GROUND ELEVATION (FT): 5946.01	PROJECT NUMBER: 002RI	LOG OF BORING NUMBER	
NORTH: 750072.20	AREA: NE TRENCHES	CASING DIAMETER (IN):	GEOLOGIST: L.A. GUST	11391	
EAST: 2087615.12	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN): 6.57	DATE DRILLED: 09/27/91		
REMARKS: HOLLOW STEM AUGER.		BACKFILL MATERIAL: BENTONITE 66.0 FT. - 3.0 FT			
WELL WAS ABANDONED DUE TO WATER INFLUX, OFFSET TO WELL 05391.					

CHEMICAL SAMP
GRADATIONAL
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



GW:	Top soil, start of boring at 0.90 ft.
GW:	Sandy Gravel - grayish black (N2), maximum size gravel 1" diameter, average size 1/4" diameter, coarse- to fine-grained sand, well graded, sub-angular, low plasticity, gravel primarily quartzite, dominant lithology sand quartz with some dark minerals, trace mica and caliche, some caliche coating around gravel, no apparent bedding, moist, abundant roots. 70% gravel, 26% sand, 4% silt
GW:	Sandy Gravel - light olive gray (5Y6/1), maximum gravel size 3" diameter, average 1" diameter, coarse- to fine-grained sand, well graded, sub-angular gravel, sub-angular to sub-rounded sand, low plasticity, gravel primarily quartzite with some granite, dominant lithology of sand quartz, with some K-spar and mica and trace dark minerals, abundant caliche throughout interval, caliche coating on gravel, no apparent bedding, dry. 73% gravel, 24% sand, 3% silt.
	No recovery for this interval.
GW	Sandy Gravel - moderate yellowish brown (10YR5/4), maximum gravel size 2" diameter, average size 3/4", coarse- to fine-grained sand, well graded, gravel sub-angular to sub-rounded, sand sub-angular, low plasticity, gravel primarily quartzite and granite, dominant lithology of sand quartz with some K-spar and mica, trace dark minerals, trace iron staining on grains, some caliche coating at 4.1-4.6', no apparent bedding, dry. 59% gravel, 37% sand, 4% clay
	No recovery for this interval
GW:	Sandy Gravel - moderate yellowish brown (10YR5/4), as described above, increase in sand at 5.9-6.5'
	No recovery for this interval.
GW:	Sandy Gravel - moderate yellowish brown (10YR5/4), as described above, increase in iron staining at 8.5-9.2'.
	No recovery for this interval.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 66.0	GROUND ELEVATION (FT): 5946.01	PROJECT NUMBER: 002R1	LOG OF BORING NUMBER:	
NORTH: 750072.20	AREA: NE TRENCHES	CASING DIAMETER (IN):	GEOLOGIST: L.A. GUST	11391	
EAST: 2087615.12	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN): 6.57	DATE DRILLED: 09/27/91		
REMARKS: HOLLOW STEM AUGER		BACKFILL MATERIAL: BENTONITE 66.0 FT - 3.0 FT			

WELL WAS ABANDONED DUE TO WATER INFLUX, OFFSET TO WELL 05391.

CHEMICAL SAT GRADATIONAL	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%	0.90 /2.20	5936 5935	10 11			SC:	Clayey Sand - moderate brown (5YR4/4) with some pale olive (10Y6/2) clay, maximum size gravel 1/4" diameter, coarse- to fine-grained sand, well graded, sub-rounded gravel, sub-angular sand, medium plasticity, gravel primarily quartzite, dominant lithology sand quartz with some rock fragments, trace mica and K-spar, trace iron staining on grains, no apparent bedding, moist. 6% gravel, 68% sand, 4% silt, 22% clay
										No recovery for this interval.
				0.80 /0.80	5934 5933	12 13			GW:	Sandy Gravel - moderate yellowish brown (10YR5/4), maximum gravel size 2" diameter, average size 1" diameter, coarse- to fine-grained sand, well graded, sub-rounded gravel, sub-angular to sub-rounded sand, low plasticity, gravel primarily quartzite and granite, dominant lithology sand quartz with some K-spar and mica, trace dark minerals, some iron staining on grains, no apparent bedding, dry 75% gravel, 24% sand, 1% silt.
				0.70 /1.00						
										No recovery for this interval.
				1.10 /1.10	5932 5931	14 15			SC:	Clayey Sand - moderate brown (5YR4/4) with some light olive (10Y5/4) clay, coarse- to fine-grained sand, gravel size 1/5" diameter, well graded, sub-angular, high plasticity, dominant lithology sand quartz with some granite rock fragments trace mica, K-spar and dark minerals, trace iron staining on grains, trace carbonaceous material throughout interval, no apparent bedding, moist, no light olive color after 18.4'. 1% gravel, 71% sand, 3% silt, 25% clay
				1.80 /1.80	5930	16				
				1.70 /1.50	5929 5928	17 18				
				2.00 /2.00	5927	19 20				

STATE PLANE COORDINATE	TOTAL DEPTH (FT): 66.0	GROUND ELEVATION (FT):	5946.01	PROJECT NUMBER:	OU2RI
NORTH: 750072.20	AREA: NE TRENCHES	CASING DIAMETER (IN):		GEOLOGIST:	L A GUST
EAST: 2087615.12	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	6.57	DATE DRILLED:	09/27/91

LOG OF BORING NUMBER: 11391

REMARKS: HOLLOW STEM AUGER.
WELL WAS ABANDONED DUE TO WATER INFLUX, OFFSET TO WELL 05391.

BH0008N012

CHEMICAL SAMPLE / GRADATIONAL	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
				1.80/1.70	5925	21				
				1.90/1.60	5923	23				
				1.60/1.60	5922	24				
				1.10/1.10	5920	26			SW	Gravelly Sand - dark yellowish brown (10YR4/2), maximum size gravel 2" diameter, average 3/4" diameter, coarse- to fine-grained sand, well graded, sub-angular, low plasticity, gravel primarily quartzite and granite, schist, dominant lithology sand quartz with some rock fragments and trace mica, K-spar, dark minerals and fibrous mineral, trace iron staining on grains, no apparent bedding, saturated. 34% gravel, 65% sand, 1% silt.
				0.90/1.60	5919	27				
										VOA sample obtained from this interval.
					5918	28			SW	Gravelly Sand - dark yellowish brown (10YR4/2), as described above, pea-size gravel at 28.0-29.2'.
				1.20/2.00	5917	29				
										No recovery for this interval.

STATE PLANE COORDINATE	TOTAL DEPTH (FT): 66.0	GROUND ELEVATION (FT): 5916.01	PROJECT NUMBER: 002RI	LOG OF BORING NUMBER
NORTH: 750072.20	AREA: NE TRENCHES	CASING DIAMETER (IN):	GEOLOGIST: L.A. GUST	11391
EAST: 2087615.12	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN): 6.57	DATE DRILLED: 09/27/91	

REMARKS: HOLLOW STEM AUGER. BACKFILL MATERIAL: BENTONITE 66.0 FT. - 3.0 FT.
WELL WAS ABANDONED DUE TO WATER INFLUX, OFFSET TO WELL 05391.

CHEMICAL SAMPLE GRADATIONAL	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 /2.10	5916	30				
					5915	31				
				0.00 /1.80	5914	32				
					5913	33				
				0.00 /1.60	5912	34				
					5911	35				
				1.40 /2.50	5910	36			SC:	Clayey Sand - moderate greenish yellow (10Y7/4), maximum size gravel 1/4" diameter, coarse- to fine-grained sand, well graded, sub-angular, high plasticity, gravel primarily quartzite with trace granite, dominant lithology of sand quartz with some dark minerals and trace K-spar, no apparent bedding, saturated, large size gravel at 35.3-35.5' 2% gravel, 68% sand, 3% silt, 27% clay. Top bedrock at 37.5 ft.
					5909	37				
B00089C02										VOA sample obtained from this interval.
				1.00 /2.00	5908	38			SILTY SANDSTONE	Silty Sandstone - pale olive (10Y6/2) to light olive brown (5Y5/6), fine- to very-fine grained sand, well sorted, approximately 25% porosity, argillaceous cement, highly friable, dominant lithology sand clear quartz with trace mica and dark minerals, trace iron staining on grains, trace clay clasts throughout interval, trace carbonaceous material throughout interval, some limonite oxidation throughout interval, no apparent bedding, massive sand, no fractures, saturated, weathered. 70% sand, 20% silt, 10% clay.
					5907	39				
						40				No recovery for this interval.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT) 66.0	GROUND ELEVATION (FT) 5946.01	PROJECT NUMBER: OU2RI	LOG OF BORING NUMBER	
NORTH: 750072.20	AREA: NE TRENCHES	CASING DIAMETER (IN):	GEOLOGIST: L.A. GUST	11391	
EAST: 2087615.12	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN): 6.57	DATE DRILLED: 09/27/91		

REMARKS: HOLLOW STEM AUGER.
WELL WAS ABANDONED DUE TO WATER INFLUX, OFFSET TO WELL 05391.

CHEMICAL SAT GRADATIONAL	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%		5906	40			SILTY SANDSTONE	Silty Sandstone - pale olive (10Y6/2) to light olive brown (5Y5/6), as described above.
				2.00 /2.00	5905	41				
					5904	42				
				0.80 /2.10	5903	43				No recovery for this interval
					5902	44			SILTY SANDSTONE	Silty Sandstone - pale olive (10Y6/2) to light olive brown (5Y5/6), as described above
				1.00 /1.90	5901	45				No recovery for this interval
					5900	46			SILTY SANDSTONE	Silty Sandstone - pale olive (10Y6/2) to light olive brown (5Y5/6), as described above.
				1.30 /2.00	5899	47				No recovery for this interval
					5898	48			SILTY SANDSTONE	Silty Sandstone - pale olive (10Y6/2) to light olive brown (5Y5/6), as described above, increase in clay content at 48.0-48.5'.
				1.20 /2.00	5897	49				No recovery for this interval
						50				

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 66.0	GROUND ELEVATION (FT): 5946.01	PROJECT NUMBER: 002RI	LOG OF BORING NUMBER	
NORTH: 750072.20	AREA: NE TRENCHES	CASING DIAMETER (IN):	GEOLOGIST: L.A. GUST	11391	
EAST: 2087615.12	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN): 6.57	DATE DRILLED: 09/27/91		

REMARKS: HOLLOW STEM AUGER. BACKFILL MATERIAL: BENTONITE 66.0 FT. - 3.0 FT.

WELL WAS ABANDONED DUE TO WATER INFLUX, OFFSET TO WELL 05391.

CHEMICAL SAT GRADATIONAL	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
				1.75 /2.00	5896	50			SILTY SANDSTONE	Silty Sandstone - pale olive (10Y6/2) to light olive brown (5Y5/6), as described above, increase to some carbonaceous material and some laminated 30 degree bedding with clay deformation at 50.0-50.6', increase in limonite oxidation at 50.6-52.8'.
					5895	51				
					5894	52				No recovery for this interval.
									SILTY SANDSTONE	Silty Sandstone - pale olive (10Y6/2) to light olive brown (5Y5/6), as described above, large clay clast at 52.1'
				0.80 /2.00	5893	53				No recovery for this interval.
					5892	54			SILTY SANDSTONE	Silty Sandstone with some clay - dark gray (N3) to light olive brown (5Y5/6), fine- to very-fine grained sand, well sorted, angular to sub-angular, approximately 20% porosity, argillaceous cement, highly to moderately friable, dominant lithology sand quartz with trace K-spar, mica and dark minerals, some iron staining on grains, trace carbonaceous material throughout interval, horizontal to 5 degree bedding 54.6-55.5', no apparent fractures, wet to saturated, alternating oxide and gray bands throughout interval, some clay clasts, clay deformation throughout interval, interbedded clay lenses with clay deformation at 56.1-56.2', 56.4-56.5' and 56.8-56.9' 66% sand, 20% silt, 14% clay.
				2.00 /2.00	5891	55				
					5890	56				
				1.60 /2.00	5889	57				
									CLAYEY SANDSTONE	Clayey Sandstone - dark gray (N3), as described below
					5888	58				No recovery for this interval.
				2.00 /2.00	5887	59			CLAYEY SANDSTONE	Clayey Sandstone - dark gray (N3), medium- to very fine-grained sand, moderately sorted, sub-angular to sub-rounded, approximately 25% porosity, argillaceous cement, highly friable, dominant lithology sand clear quartz, trace dark minerals, trace iron staining on grains, trace carbonaceous material and limonite throughout interval, massive, no apparent bedding, fracture of 55 degrees at 62.6', wet, trace clay clasts, increase in coarseness of sand downhole, increase in clay content 60.0-61.2', increase in clay clasts at 62.3', trace horizontal bedding and clay deformation
						60				

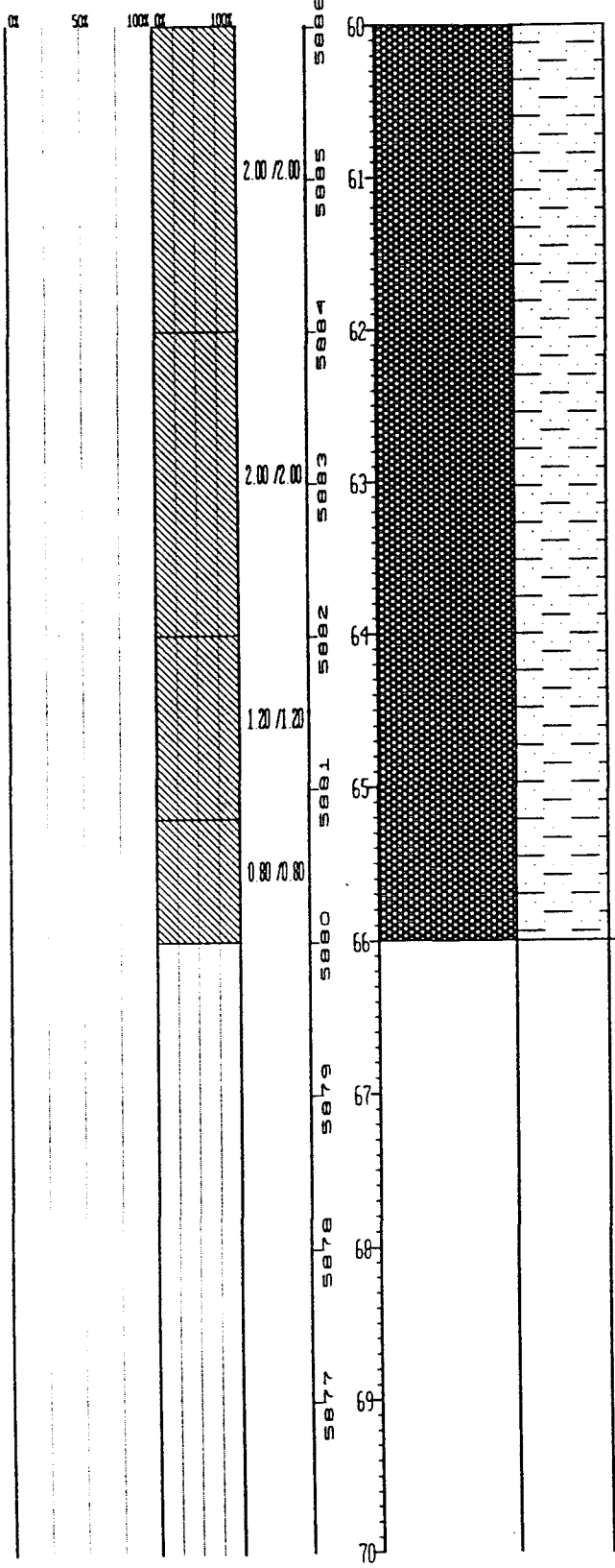
STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 66.0	GROUND ELEVATION (FT):	5946.01	PROJECT NUMBER:	00281
NORTH 750072.20	AREA: NE TRENCHES	CASING DIAMETER (IN):		GEOLOGIST:	L.A. GUST
EAST: 2087615.12	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	6.57	DATE DRILLED:	09/27/91

LOG OF BORING NUMBER: 11391

REMARKS: HOLLOW STEM AUGER.
WELL WAS ABANDONED DUE TO WATER INFLUX, OFFSET TO WELL 05391.

BACKFILL MATERIAL: BENTONITE 66.0 FT. - 3.0 FT.

CHEMICAL SA GRADATIONAL | 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



at 62.8-63.5', saturated 64.0-66.0'
69% sand, 8% silt, 23% clay

Total depth at 66.0 ft

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 27.3	GROUND ELEVATION (FT): 0.00	PROJECT NUMBER: EMAB	LOG OF BORING NUMBER:
NORTH: 0	AREA: N.E. TRENCHES	CASING DIAMETER (IN): 2	GEOLOGIST: JPOB	11491
EAST: 0	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN): 10.00	DATE DRILLED: 10/09/91	

REMARKS: Hollow stem auger. 5.0' to 8.0' is bentonite seal. No backfill, well casing set on T.O. This well is on offset to well 05691. Recovery is not recorded from surface to 24 ft. because cuttings samples were taken down to that point.

5948.22 G.S.

GRADATIONAL 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			GW:	Top soil, start of boring @ 0.90 ft.
						1, 2, 3, 4, 5, 6, 7, 8, 9, 10			GW:	Sandy Gravel - light olive gray (5Y6/1), max gravel size 1 1/2", average 1/2" diameter, coarse to fine grained sand, well graded, subangular to subround sand, subround gravel, low plasticity, gravel primarily quartzite and granite, dominant lithology sand quartz with some rock fragments and mica, trace dark minerals, abundant caliche throughout interval, dry, some roots at top of interval. 61/29/6/4 gravel/sand/silt/clay.
									SC:	Clayey Sand with some gravel - moderate brown (5YR4/4), coarse to fine-grained sand, max size gravel 1/2" diameter, average size 1/4" diameter, well graded, subangular, medium plasticity, dominant lithology sand quartz with some rock fragments, trace mica, dark minerals and K-spar, gravel primarily quartzite and granite, some caliche, moist. 5/68/2/25 gravel/sand/silt/clay.
									GW:	Sandy Gravel - moderate yellowish brown (10YR4/1), maximum gravel size 1" diameter, average size 1/4" diameter, coarse to fine-grained sand, well graded, subround gravel, subangular to subround sand, low plasticity, gravel primarily quartzite and granite, dominant lithology sand quartz with some rock fragments, trace mica and dark minerals, trace iron staining on grains, some caliche throughout interval, no apparent bedding, moist, increase in sand from 16' to 20'. 59/28/5/8 gravel/sand/silt/clay.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 27.3	GROUND ELEVATION (FT): 0.00	PROJECT NUMBER: EMAD	LOG OF BORING NUMBER:	
NORTH: 0	AREA: N.E. TRENCHES	CASING DIAMETER (IN): 2	GEOLOGIST: JPOB	11491	
EAST: 0	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN): 10.00	DATE DRILLED: 10/09/91		

REMARKS: Hollow stem auger. 5.0' to 8.0' is bentonite seal. No backfill, well casing set on T.D. This well is an offset to well 05691. Recovery is not recorded from surface to 24 ft. because cuttings samples were taken down to that point.

GRADATIONAL 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
		DK	50%	100% DK	100%					
						10				
					-10					
						11				
					-11					
						12				
					-12					
				1.90 /26.00		13				
					-13					
						14				
					-14					
						15				
					-15					
						16				
					-16					
						17				
					-17					
						18				
					-18					
						19				
					-19					
						20				
					-20					

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 27.3	GROUND ELEVATION (FT):	0.00	PROJECT NUMBER:	EMAD
NORTH: 0	AREA: N.E. TRENCHES	CASING DIAMETER (IN):	2	GEOLOGIST:	JPOB
EAST: 0	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	10.00	DATE DRILLED:	10/09/91

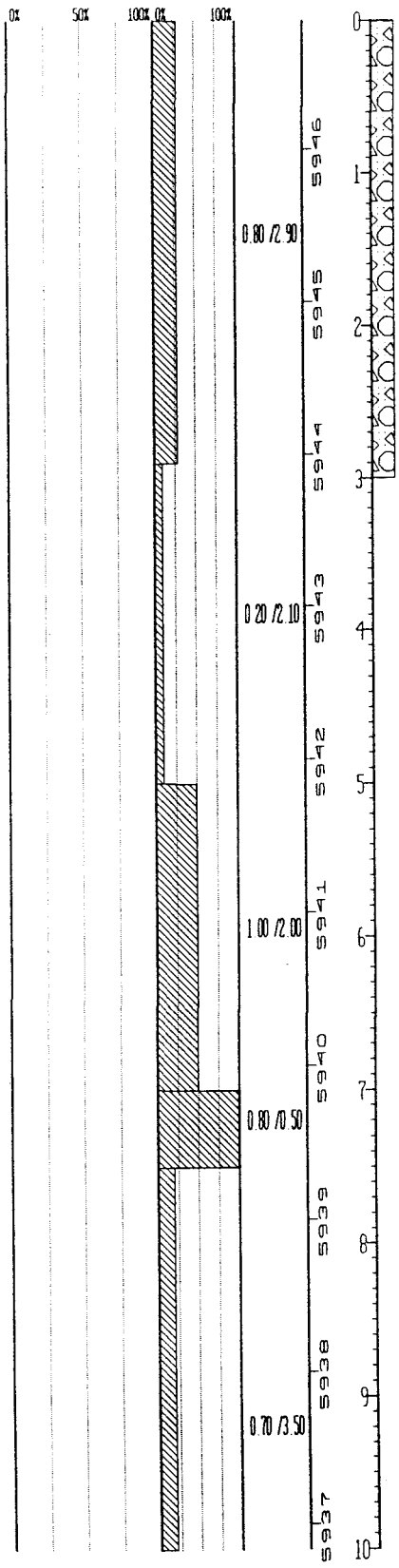
LOG OF BORING NUMBER: **11491**

REMARKS: Hollow stem auger. 5.0' to 8.0' is bentonite seal. No backfill, well casing set on T.D. This well is an offset to well 05691. Recovery is not recorded from surface to 24 ft. because cuttings samples were taken down to that point.

GRADATIONAL 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				
					-21	21				
					-22	22			SC:	Clayey Sand - moderate brown (5Y4/4), coarse to fine-grained sand, max gravel size 1 1/2" diameter, average 1/4" diameter well graded, subangular sand, subangular to subround gravel, medium to high plasticity, dominant lithology sand quartz with some rock fragments, trace mica and dark minerals, gravel quartzite, trace carbonaceous material, no apparent bedding, large quartzite gravel from 24.0' - 24.3', saturated from 26.8' - 27.3', increase in sand from 27.1' - 27.3'. 6/61/2/31 gravel/sand/silt/clay. T.D. @ 27.3 ft.
					-23	23				
					-24	24				
					-25	25	11/01/91			
				0.00 /3.30	-26	26				
				1.30 /1.30			10/09/91			
	H00198012				-27	27				
					-28	28				
					-29	29				
					-30	30				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 65.9	GROUND ELEVATION (FT):	5946.84	PROJECT NUMBER:	OU2/RI	LOG OF BORING NUMBER
NORTH:	750250.16	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	LAG/JPOB	12491
EAST:	2088122.50	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	12/27/91	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 41.7 FT - 37.6 FT. BACKFILL MATERIAL: BENTONITE 65.9 FT - 60.0 FT.



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	Top soil, start of boring at 0.90 ft
GC	Sandy Gravel with some clay and silt - brownish black (5YR2/1), maximum size gravel 1 inch diameter, average 1/2 inch diameter, coarse- to fine-grained sand, well graded, sub-rounded, low to medium plasticity, gravel primarily quartzite with some caliche clasts, dominant lithology sand quartz with some dark minerals and trace rock fragments, abundant caliche throughout and coating on gravels, no apparent bedding, moist, some root present 50% gravel, 24% sand, 7% silt, 19% clay
	No recovery for this interval
GW	Sandy Gravel - light brown (5YR5/6), maximum gravel size greater than 2 inch diameter, average 1/2 inch diameter, coarse- to fine-grained, well graded, angular to sub-angular, low plasticity, gravel primarily quartzite with some granite and trace weathered schist, dominant lithology sand quartz with some rock fragments and trace dark minerals, abundant caliche throughout, no apparent bedding, moist, weathered. 61% gravel, 36% sand, 2% silt, 1% clay
	No recovery for this interval
GW	Sandy Gravel - light brown (5YR5/6), as described above.
	No recovery for this interval
GW	Sandy Gravel - moderate brown (5YR4/4), maximum size gravel greater than 2 inches diameter, average size 1/4 inch diameter, coarse- to fine-grained sand, well graded, sub-angular to sub-rounded, low plasticity, gravel primarily quartzite with some granite and some arkosic arenite at 9.4-9.7', dominant lithology sand quartz with some rock fragments and trace dark minerals and mica, some caliche and iron staining throughout, abundant caliche at 11.0-13.2', no apparent bedding, moist. 59% gravel, 37% sand, 3% silt, 1% clay
	No recovery for this interval.
GW	Sandy Gravel - moderate brown (5YR4/4), as described above.
	No recovery for this interval.

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 65.9	GROUND ELEVATION (FT)	5946 84	PROJECT NUMBER	OU2/RI	LOG OF BORING NUMBER
NORTH	750250 16	AREA NE TRENCHES	CASING DIAMETER (IN)	2 0	GEOLOGIST	LAG/JPOB	12491
EAST	2088122 50	LOCATOR NUMBER I14	BOREHOLE DIAMETER (IN)	10 0	DATE DRILLED	12/27/91	

REMARKS HOLLOW-STEM AUGER BENTONITE SEAL 41 7 FT - 37 6 FT BACKFILL MATERIAL BENTONITE 65 9 FT - 60 0 FT

CHEMICAL SAT GRADATIONAL	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				
					5936	11			GW	Sandy Gravel - moderate brown (5YR4/4), as described above
				0 30 /2 00	5935	12				No recovery for this interval
					5934	13			GW	Sandy Gravel - moderate brown (5YR4/4), as described above
				2.00 /2 00	5933	14			SC	Clayey Sand with some silt - light brown (5YR5/6) with some pale olive (10Y6/2), mottling or marbling throughout, maximum size gravel 1 1/2 inch diameter, 1/4 inch diameter average, fine- to coarse-grained sand, well graded, low plasticity, sub-angular to sub-rounded, dominant lithology sand quartz with some rock fragments, feldspar and trace mica and dark minerals, gravel primarily quartzite with some quartz, some carbonaceous material throughout, some caliche at 13.2-13.5', no apparent bedding, moist, pale olive (10Y6/2) clay swirled into sand to give marbled texture throughout 2% gravel, 79% sand, 8% silt, 11% clay
					5932	15				
				2 00 /2 00	5931	16				
					5930	17				
				1.70 /2 00	5929	18				
					5928	19				No recovery for this interval
				2.00 /2 00	5927	20			SC	Clayey Sand with some silt - light brown (5YR5/6), average size gravel 1/4" diameter, coarse- to fine-grained sand, well graded, angular to sub-rounded, low plasticity, dominant lithology sand quartz with some rock fragments and feldspar with trace mica and

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 65.9	GROUND ELEVATION (FT) 5946.84	PROJECT NUMBER OU2/RI	LOG OF BORING NUMBER
NORTH:	750250.16	AREA: NE TRENCHES	CASING DIAMETER (IN): 2.0	GEOLOGIST: LAG/JPOB	12491
EAST:	2088122.50	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN): 10.0	DATE DRILLED: 12/27/91	

REMARKS: HOLLOW-STEM AUGER BENTONITE SEAL 41.7 FT. - 37.6 FT BACKFILL MATERIAL BENTONITE 65.9 FT. - 60.0 FT

CHEMICAL SAMPLE NUMBER	GRADATIONAL 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		20				dark minerals, trace caliche clasts throughout and iron staining, some carbonaceous material throughout, no apparent bedding, moist. 1% gravel, 73% sand, 8% silt, 18% clay
					5926	21				
				2.00/2.00	5925	22				
					5924	23				
				2.00/2.00	5923	24				
					5922	25				
				2.00/2.00	5921	26				
					5920	27			GW	Sandy Gravel - moderate yellowish brown (10YR5/4), maximum size gravel greater than 2 inches in diameter, coarse- to fine-grained sand, well graded, angular to sub-angular, low plasticity, gravel primarily quartzite, dominant lithology sand quartz with some rock fragments with trace mica, dark minerals and K-spar, trace iron staining throughout, trace carbonaceous material at 27.0-28.2', trace limonite at 29.0-30.0', no apparent bedding, moist at 27.0-29.0', saturated at 29.0-30.0' 69% gravel, 27% sand, 3% silt, 1% clay
				1.20/2.00	5919	28				No recovery for this interval
					5918	29	12/27/91 ▽		GW	Sandy Gravel - moderate yellowish brown (10YR5/4), as described above.
				0.70/1.00	5917	30				No recovery for this interval Top of bedrock at 30.0 ft.

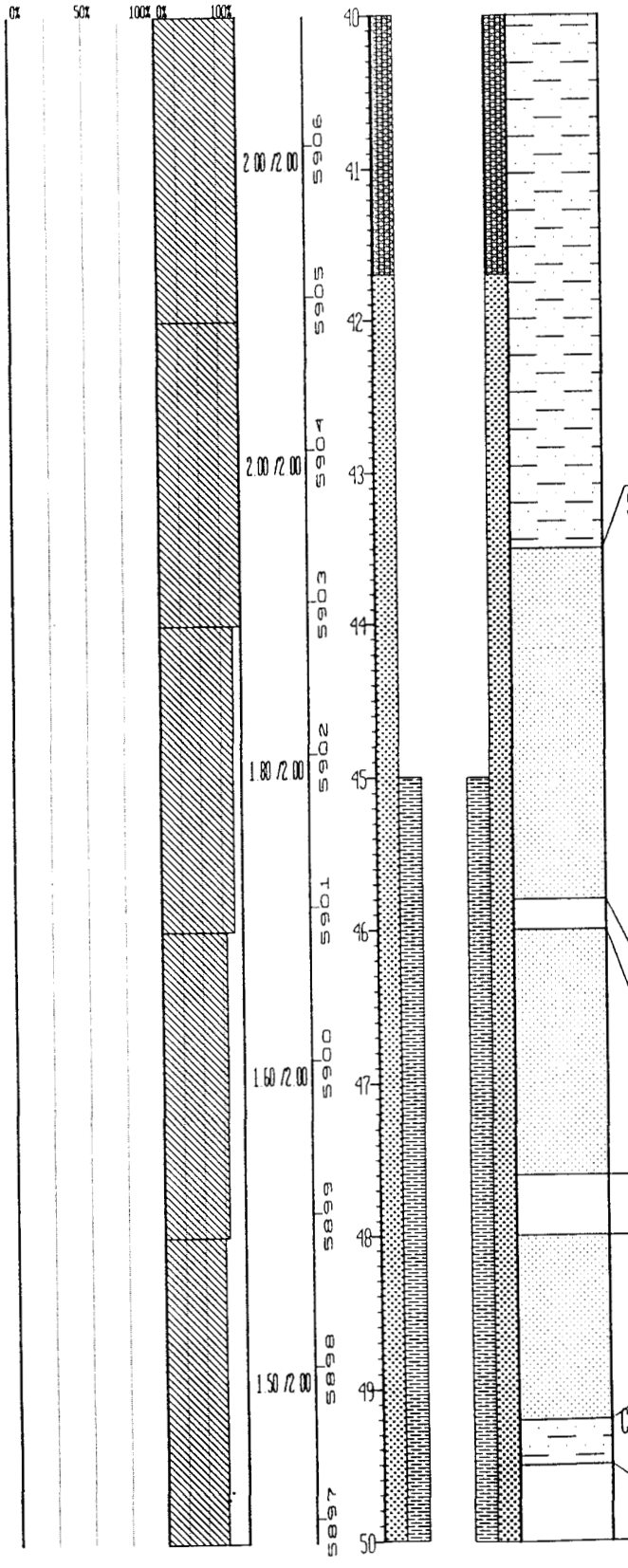
STATE PLANE COORDINATE		TOTAL DEPTH (FT) 65.9	GROUND ELEVATION (FT)	5946.84	PROJECT NUMBER	OU2/RI	LOG OF BORING NUMBER
NORTH	750250.16	AREA NE TRENCHES	CASING DIAMETER (IN)	2.0	GEOLOGIST	LAG/JPOB	12491
EAST	2088122.50	LOCATOR NUMBER I14	BOREHOLE DIAMETER (IN)	10.0	DATE DRILLED	12/27/91	

REMARKS HOLLOW-STEM AUGER BENTONITE SEAL 41.7 FT - 37.6 FT. BACKFILL MATERIAL: BENTONITE 65.9 FT - 60.0 FT

CHEMICAL SAMPLE / GRADATIONAL	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			CLAYEY SANDSTONE	Clayey Sandstone with some silt - dusky yellow (5Y6/4), as described below.
	BH00664D02			1.10 /2.00	5916	31				VOA sample obtained from this interval.
										No recovery for this interval.
					5915	32			CLAYEY SANDSTONE	Clayey Sandstone with some silt - dusky yellow (5Y6/4), fine-grained sand, well sorted, sub-angular to sub-rounded, approximately 20% porosity, argillaceous cement, moderately friable, dominant lithology sand quartz with trace dark minerals, some limonite throughout, some clay clasts at 32.7-33.0', some carbonaceous material at 33.0-34.0', low angle bedding with thin laminations of clayey silt at 30.0-30.9', trace soft sediment deformation, convolute bedding with trace iron nodules at 33.8-34.0', no apparent fractures, saturated. 75% sand, 9% silt, 16% clay.
				2.00 /2.00	5914	33				
					5913	34			SANDY CLAYSTONE	Sandy Claystone with some silt - yellowish gray (5Y7/2), fine-grained sand, well sorted, sub-rounded, approximately 5% porosity, argillaceous cement, slightly friable, dominant lithology clear quartz with trace dark minerals and mica, some iron staining and trace carbonaceous material throughout, no preferred bedding orientation, no apparent fractures, saturated. 20% sand, 16% silt, 64% clay.
				2.00 /2.00	5912	35				
					5911	36				
				2.00 /2.00	5910	37			CLAYEY SANDSTONE	Clayey Sandstone with some silt - dusky yellow (5Y6/4), fine- to very fine-grained sand, moderately sorted, sub-angular to sub-rounded, approximately 18% porosity, argillaceous cement, slightly to moderately friable, dominant lithology sand clear quartz with trace dark minerals, rose quarzt, and mica, some iron staining on grains, some limonite and trace carbonaceous material throughout, laminations of silt and clay with soft sediment deformation (pseudonodules of silt) at 37.5-38.0', sand layer with thin laminations of clay with some convoluted bedding at 39.8-40.0', increase in clay at 40.0-40.5', thin laminations of clay and sand at 40.5-41.8', low angle bedding with very thin laminations of clay and sand controlling trace carbonaceous material at 41.8-43.0', no apparent fractures, saturated. 72% sand, 8% silt, 20% clay.
					5909	38				
				2.00 /2.00	5908	39				
					5907	40				

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 65.9	GROUND ELEVATION (FT)	5946.84	PROJECT NUMBER	OU2/RI	LOG OF BORING NUMBER
NORTH	750250.16	AREA NE TRENCHES	CASING DIAMETER (IN)	2.0	GEOLOGIST	LAG/JPOB	12491
EAST	2088122.50	LOCATOR NUMBER I14	BOREHOLE DIAMETER (IN)	10.0	DATE DRILLED	12/27/91	

REMARKS: HOLLOW-STEM AUGER BENTONITE SEAL 41.7 FT - 37.6 FT BACKFILL MATERIAL: BENTONITE 65.9 FT - 60.0 FT



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE — DESCRIPTION

SANDSTONE: Sandstone with some silt - dusky yellow (5Y6/4), medium- to very fine-grained sand, poorly sorted, sub-rounded to rounded, approximately 25% porosity, silica with some argillaceous cement, moderately to highly friable, dominant lithology sand clear quartz with trace dark minerals, rose quartz and mica, some iron staining on grains, some limonite and trace carbonaceous material throughout, iron nodule at 45.4', abundant limonite at 46.3-46.5', 48.9-49.2', increase in sand with trace cross stratification at 43.0-44.0', some trough cross bedding at 44.4-44.6', thick laminations of clay and sand at 44.6-45.0' with some soft sediment deformation, cross laminations at 46.6', increased clay content - thickly laminated to thinly bedded silty clay at 46.6-47.0', trace horizontal bedding with very thin laminations at 48.0-48.2', very thin iron laminations at 48.7', very thin clay laminations at 48.7-48.9', no apparent fractures, saturated. 80% sand, 17% silt, 3% clay

No recovery for this interval

SANDSTONE: Sandstone with some silt - dusky yellow (5Y6/4), as described above.

No recovery for this interval

SANDSTONE: Sandstone with some silt - dusky yellow (5Y6/4), as described above.

CLAYEY SANDSTONE: Clayey Sandstone with some silt - medium gray (N4) to dark gray (N3), as described below.

No recovery for this interval

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 65.9		GROUND ELEVATION (FT)	5946.84	PROJECT NUMBER:	002/RI
NORTH	750250.16	AREA NE TRENCHES		CASING DIAMETER (IN)	2.0	GEOLOGIST:	LAG/JPOB
EAST	2088122.50	LOCATOR NUMBER	I14	BOREHOLE DIAMETER (IN)	10.0	DATE DRILLED:	12/27/91

LOG OF BORING NUMBER: 12491

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 41.7 FT - 37.6 FT. BACKFILL MATERIAL: BENTONITE 65.9 FT - 60.0 FT.

CHEMICAL SAMPLE	GRADATIONAL	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%			50			CLAYEY SANDSTONE	Clayey Sandstone with some silt - medium gray (N4) to dark gray (N3), medium- to very fine-grained sand, poorly sorted, sub-rounded to rounded, approximately 15% porosity, argillaceous cement, slightly to moderately friable, dominant lithology sand clear quartz with some dark minerals, trace carbonaceous material throughout, thin laminations of clay and sand with some soft sediment deformation, possible basal channel contact at 50.8' with discordent erosional surface, no apparent fractures, wet. 55% sand, 7% silt, 38% clay.
					2.00 /2.00	5896	51				
						5895	52			CLAYEY SANDSTONE	Clayey Sandstone with some silt - dusky yellow (5Y6/4) to olive gray (5Y3/2), as described below.
											No recovery for this interval.
					2.00 /2.00	5894	53			CLAYEY SANDSTONE	Clayey Sandstone with some silt - dusky yellow (5Y6/4) to olive gray (5Y3/2), fine- to very fine-grained sand, moderately sorted, sub-angular to sub-rounded, approximately 10% porosity, argillaceous cement, slightly to moderately friable, dominant lithology sand clear quartz some dark minerals, some iron staining on grains, some limonite throughout, abundant carbonaceous material at 52.0-52.1', carbonized wood fragments at 52.0', trace convoluted laminea with low angle bedding at 52.1-52.4', increase in sand at 52.5-52.7', thin laminations of clay and sand with wavy cross lamination controlling limonite along planes with possible ripples at 53.2-54.0', no apparent fractures, saturated, weathered, soft sediment deformations at 53.0-54.0'. 47% sand, 16% silt, 37% clay.
						5893	54				
					1.00 /1.00	5892	55				
					2.00 /2.00	5891	56			CLAYEY SANDSTONE	Clayey Sandstone with some silt - dusky yellow (5Y6/4) to olive gray (5Y3/2), fine- to very fine-grained sand, moderately sorted, sub-rounded to rounded, approximately 12% porosity, argillaceous cement, slightly to moderately friable, dominant lithology sand clear quartz with trace dark minerals, trace carbonaceous material throughout, thin laminations of clay and sand with low angle bedding at 54.0-54.4', clay bed at 54.4-54.6', 35 degree bedding at 54.8-55.5', iron nodule at 56.2', no apparent fractures, saturated, weathered. 47% sand, 8% silt, 45% clay.
						5890	57			SILTY SANDSTONE	Silty Sandstone with some clay - yellowish gray (5Y7/2), medium to fine-grained sand, moderately sorted, sub-rounded, aproximately 25% porosity, argillaceous cement, highly to moderately friable, dominant lithology sand clear quartz with trace dark minerals and rose quartz, some limonite stain throughout, trace horizontal bedding at 57.0-57.7', trace cross bedding at 57.7-58.0', no apparent fractures, saturated, weathered. 71% sand, 20% silt, 9% clay.
					1.70 /2.00	5889	58				
						5888	59			SILTY CLAYSTONE	Silty Claystone with some clay - yellowish gray (5Y7/2) to olive gray (5Y3/2), as described above.
											No recovery for this interval.
					0.90 /1.00	5887	60			SILTY CLAYSTONE	Silty Claystone wtih some clay - yellowish gray (5Y7/2) to olive gray (5Y3/2), as described above.
											No recovery for this interval.

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 65.9	GROUND ELEVATION (FT)	5916.84	PROJECT NUMBER	OU2/RI	LOG OF BORING NUMBER
NORTH:	750250.16	AREA: NE TRENCHES	CASING DIAMETER (IN)	2.0	GEOLOGIST:	LAG/JPOB	12491
EAST:	2088122.50	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN)	10.0	DATE DRILLED:	12/27/91	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 41.7 FT. - 37.6 FT. BACKFILL MATERIAL: BENTONITE 65.9 FT. - 60.0 FT

CHEMICAL SAMPLE / GRADATIONAL	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	5886	60–61			SILTY SANDSTONE	Sitly Sandstone with some clay - yellowish gray (5Y7/2) to olive gray (5Y3/2), medium- to fine-grained sand, moderately sorted, sub-angular to sub-rounded, approximately 15% porosity, argillaceous cement, slightly to mod friable, sand contains abundant clear quartz, some dark minerals, trace limonite stain and iron nodules, thin laminations of clay and sand with some soft sediment deformations at 58.0-58.5', increased sand content at 58.5-59.2', interlaminated clay and sand with low angle bedding at 59.2-59.5', incresed sand content at 59.5-59.6', thin laminations of clay and sand with low angle bedding and soft sediment deformation at 59.6-60.5', increased clay content and wavy cross stratification at 60.3-60.7', possibble ripples with dropped bedding at 60.7-60.9', thinly interbedded silty clay and clay with low angle bedding and soft sediment deformation at 60.9-63.0', increased sand content at 62.0-62.2', 62.6-62.7', 50 degree apparent bedding with thin laminations of clay and sand at 62.2-63.0', possible slump feature, fracture plane of 50 degrees at 62.7-63.0', thin laminations of clay and silty clay with 15 degree bedding at 63.1-63.4', disturbed 30 degree bedding of thin beds of clay with soft sediment deformation at 63.7-64.0', laminations of sand with convolute bedding and load structures at 64.0-65.0', wet 56% sand, 29% silt, 15% clay.
				2.00/2.00	5885	61–62				
					5884	62–63				
					5883	63–64				
				1.00/1.00	5882	64–65				
	B4000680012				5881	65–66				VOA sample obtained from this interval. Total depth at 65.0 ft
					5880	66–67				
					5879	67–68				
					5878	68–69				
					5877	69–70				

STATE PLANE COORDINATE	TOTAL DEPTH (FT): 57.0	GROUND ELEVATION (FT):	5947.03	PROJECT NUMBER:	002/RI
NORTH: 750247.49	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST: 2088136.87	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/09/92

LOG OF BORING NUMBER: 20091

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 14.6 FT. - 11.6 FT.

CHEMICAL, SA GRADATIONAL	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
					5947	0				Top soil, start of boring at 0.90 ft.
				0.50 /2.00	5946	1			CL:	Gravelly Clay with some silt and sand - grayish brown (5YR3/2), maximum gravel diameter .21', average .07', fine- to coarse-grained sand, well graded, angular to sub-rounded, low to medium plasticity, gravel is primarily caliche coated quartzite and weathered granite, sand contains abundant carbonaceous/organic material, quartz, some feldspar, rock fragments, trace mica, caliche nodules at 1.2-1.4', moist. 28% gravel, 19% sand, 22% silt, 31% clay.
					5945	2				No recovery for this interval.
				0.00 /2.00	5944	3			GC:	Clayey gravel with some sand and silt - light brown (5YR6/4) where abundant caliche (2.0-6.3'), otherwise light brown (5YR5/6) to moderate brown (5YR4/4), maximum gravel diameter > .25', average .1', fine- to coarse-grained sand, well graded, sub-angular to sub-rounded, low plasticity, gravel is primarily quartzite with some pale olive (10Y6/2) sandy clay clasts, sand contains abundant quartz, some rock fragments, feldspar, dark minerals, trace mica, calcrete, epidote, pale olive sandy clay clast at 6.8-7.0', increased sand content at 12.0-13.2', dry. 46% gravel, 18% sand, 17% silt, 19% clay.
					5943	4				
				1.10 /2.00	5942	5				No recovery for this interval.
					5941	6			GC:	Clayey Gravel with some sand and silt - light brown (5/4) where abundant caliche (2.0-6.3'), otherwise light brown (5YR5/6) to moderate brown (5YR4/4), as described above.
				1.20 /2.00	5940	7				
										No recovery for this interval.
					5939	8			GC:	Clayey Gravel with some sand and silt - light brown (5YR6/4) where abundant caliche (2.0-6.3'), otherwise light brown (5YR5/6) to moderate brown (5YR4/4), as described above.
				1.60 /2.00	5938	9				
						10				No recovery for this interval.

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 57.0	GROUND ELEVATION (FT):	5947.03	PROJECT NUMBER:	002/RI	LOG OF BORING NUMBER:
NORTH:	750247.49	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	20091
EAST:	2088136.87	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/09/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 14.6 FT. - 11.6 FT.

CHEMICAL SAT GRADATIONAL	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
				1.00 /1.00	5937	10			GC:	Clayey Gravel with some sand and silt - light brown (5YR6/4) where abundant caliche (2.0-6.3'), otherwise light brown (5YR5/6) to moderate brown (5YR4/4), as described above.
				1.30 /2.00	5936	11				
					5935	12				
										No recovery for this interval.
					5934	13			GC:	Clayey Gravel with some sand and silt - light brown (5YR6/4) where abundant caliche (2.0-6.3'), otherwise light brown (5YR5/6) to moderate brown (5YR4/4), as described above.
				2.00 /2.00	5933	14			CL:	Sandy Clay with some silt - light brown (5YR5/6), maximum gravel diameter .05', average .02', sand is fine- to coarse-grained, poorly graded, angular to rounded, high plasticity, gravel is primarily quartzite, sand contains abundant quartz, trace feldspar, rock fragments, dark minerals, mica, kaolinized feldspar throughout, trace carbonaceous material at 14.4-14.8', pale olive (10Y6/2) sandy clay rip-up clasts at 13.5-13.7', slightly moist. 1% gravel, 39.5% sand, 11.5% silt, 48% clay.
					5932	15			CL:	Sandy Clay with some silt - moderate brown (5YR4/4), maximum gravel diameter .07', average .03', sand is fine- to medium-grained, poorly graded, angular to rounded, high plasticity, gravel is primarily quartzite, sand contains abundant quartz, trace rock fragments, feldspar, mica, kaolinized feldspar, epidote, streaks of pale olive (10Y6/2) sandy clay throughout, caliche nodules at 15.7', 16.3', 16.6', carbonaceous material at 19.0-19.3', slightly moist. 1% gravel, 35% sand, 7% silt, 57% clay.
				2.00 /2.00	5931	16				
					5930	17				
				2.00 /2.00	5929	18				
					5928	19				
				2.00 /2.00		20			CL:	Sandy Clay with some silt - moderate brown (5YR4/4), maximum gravel diameter .04', sand is fine- to medium-grained, poorly graded, sub-angular to sub-rounded, medium plasticity, sand contains

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 57.0	GROUND ELEVATION (FT):	5947.03	PROJECT NUMBER:	002/RI	LOG OF BORING NUMBER:
NORTH:	750247.49	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	20091
EAST:	2088136.87	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/09/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 14.6 FT. - 11.6 FT.

CHEMICAL SAP / GRADATIONAL	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
				2.00/2.00	5927	20				abundant quartz, trace rock fragments, feldspar, kaolinized feldspar, mica, trace carbonaceous material throughout, slightly moist. 1% gravel, 45% sand, 6% silt, 48% clay.
					5926	21			SC:	Clayey Sand with some silt - moderate brown (5YR4/4), maximum gravel diameter .08', average .01', sand is fine- to coarse-grained, poorly graded, sub-rounded, medium plasticity, gravel is primarily quartzite, sand contains abundant quartz, some rock fragments, trace dark minerals, mica, kaolinized feldspar, carbonaceous material throughout, wood fragments at 22.4-22.7', 22.9', pale olive (10Y6/2) sandy clay clasts at 22.7-22.9', slightly moist. 1% gravel, 54% sand, 12% silt, 33% clay.
				2.00/2.00	5925	22				
					5924	23			CL./SC:	Clayey Sand with some silt - light brown (5YR5/6), maximum gravel diameter .03', average .02', sand is fine- to coarse-grained, well graded, sub-angular to sub-rounded, medium plasticity, gravel is primarily quartzite, sand contains abundant quartz, some rock fragments, trace dark minerals, mica, kaolinized feldspar, feldspar, some carbonaceous material throughout, maximum carbonaceous material diameter > .03' x .03' at 23.3-23.9', pale olive (10Y6/2) sandy clay clasts and faint laminations at 24.1-24.7', slightly moist. 1% gravel, 48% sand, 9% silt, 42% clay.
				2.00/2.00	5923	24	04/09/92			
					5922	25			CL:	Sandy Clay with some silt - light olive gray (5Y6/1) to moderate brown (5YR4/4), maximum gravel diameter .06', average .03', fine- to coarse-grained sand, poorly graded, gravel is rounded, sand is sub-rounded to rounded, medium plasticity, gravel is primarily quartzite, sand contains abundant quartz, trace rock fragments, mica, iron and limonite stain, thinly to moderately interbedded, sandy alluvial material and gray sandy clay (bedrock?), saturated. 1% gravel, 35% sand, 7% silt, 57% clay.
				1.30/2.00	5921	26				
					5920	27				No recovery for this interval.
									GC:	Sandy Gravel with some clay and silt - light brown (5YR6/4), maximum gravel diameter > .25', average .1', sand is fine- to coarse-grained, well graded, gravel is rounded, sand is angular to sub-rounded, low plasticity, gravel is primarily quartzite with some granite and trace arkosic arenite at 31.6', sand contains abundant quartz, some rock fragments, iron stain, feldspar, dark minerals, trace mica, increased sand - decreased gravel at 27.3-27.6', bedrock contact is sharp and scoured with gravel loaded into bedrock, saturated. 60% gravel, 27% sand, 8% silt, 11% clay.
				1.30/2.00	5919	28				
					5918	29				No recovery for this interval.
				1.00/2.00		30			GC:	Sandy Gravel with some clay and silt - light brown (5YR6/4), as described above.

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 57.0	GROUND ELEVATION (FT):	5947.03	PROJECT NUMBER:	002/RI	LOG OF BORING NUMBER:
NORTH:	750247.49	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	20091
EAST:	2088136.87	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/09/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 14.6 FT. - 11.6 FT.

CHEMICAL SAT GRADATIONAL	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	5917	30				No recovery for this interval.
					5916	31			GC:	Sandy Gravel with some clay and silt - light brown (5YR6/4), as described above. Top of bedrock at 31.7 ft.
				2.00 /2.00	5915	32			CLAYSTONE:	Claystone with some sand - dark yellowish orange (10YR6/6) where iron stained to light olive gray (5Y5/2), very fine- to fine-grained, very well sorted, sub-rounded to rounded, approximately 3% porosity, argillaceous cement, slightly friable, abundant quartz, some iron stain, trace dark minerals, rock fragments, mica, thinly laminated to thinly bedded, carbonaceous material along lamina, some iron stain throughout, abundant iron stain at 31.7-33.8', iron nodules at 33.1', caliche nodules at 34.4-34.7', faint cross-laminations at 34.7-35.0', slightly moist. 7% sand, 5% silt, 88% clay.
					5914	33				
				2.00 /2.00	5913	34				
					5912	35			CLAYSTONE:	Claystone with some silt - grayish yellow (5Y8/4), very fine-grained, very well sorted, sub-angular, approximately 2% porosity, argillaceous cement, slightly friable, abundant frosted quartz, trace dark minerals, mottled to thickly laminated, slightly moist. 5% sand, 10% silt, 85% clay.
				2.00 /2.00	5911	36				
					5910	37				
				2.00 /2.00	5909	38			CLAYEY SANDSTONE:	Clayey Sandstone with some silt - yellowish gray (5Y7/2) to dusky yellow (5Y6/4), very fine- to medium-grained, moderately sorted, sub-rounded to well rounded, approximately 13% porosity, argillaceous cement, moderately friable, abundant frosted quartz, some dark minerals, trace rock fragments, clear quartz, iron stain, clay rip-up clast at 37.5-37.8', increased sand content at 38.5-39.0', ripple laminations and faint cross-laminations at 38.6', 20 degree laminations-possibly cross laminea at 38.85', moist. 65% sand, 6% silt, 29% clay.
					5908	39				
				2.00 /2.00		40			CLAYEY SANDSTONE:	Clayey Sandstone with some silt - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6) where iron stained (39.9-40.0'),

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 57.0	GROUND ELEVATION (FT):	5947.03	PROJECT NUMBER:	002/RI	LOG OF BORING NUMBER:
NORTH:	750247.49	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	20091
EAST:	2088136.87	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/09/92	

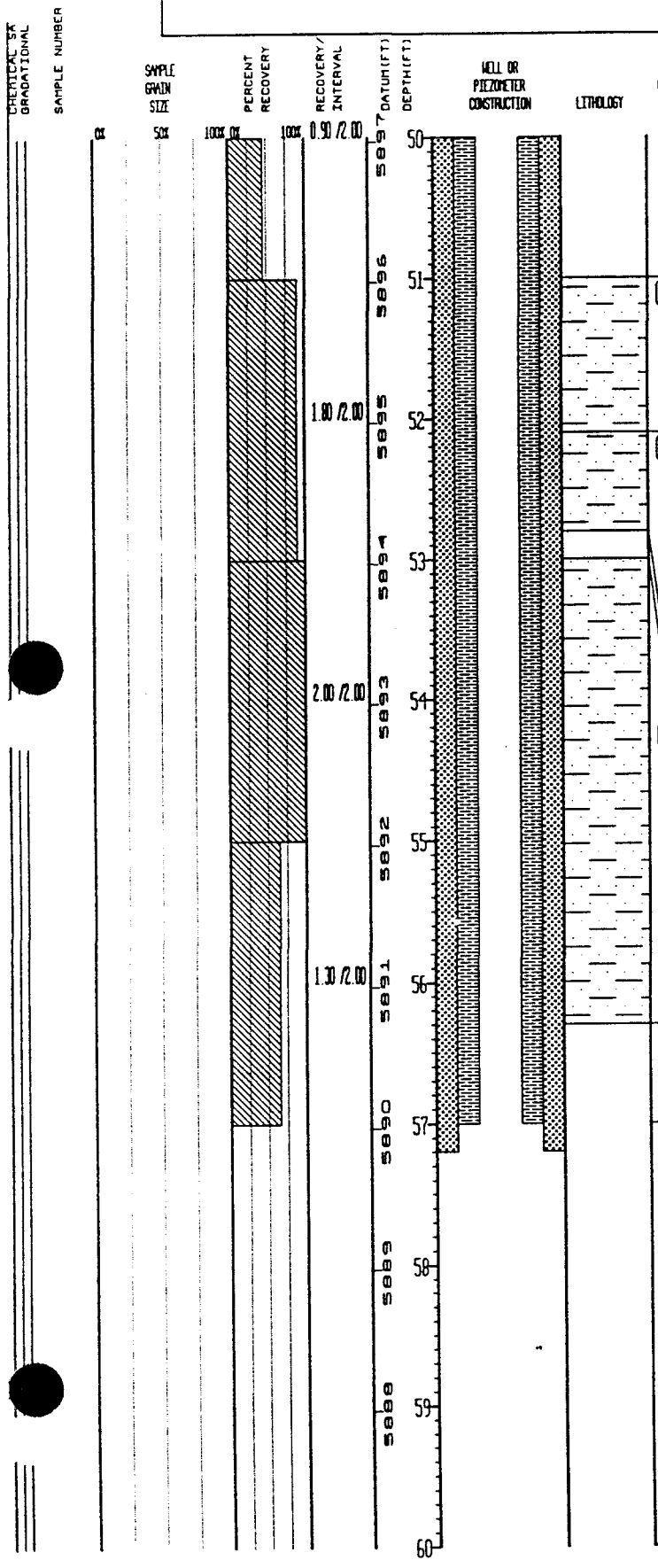
REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 14.6 FT. - 11.6 FT.

CHEMICAL SA GRADATIONAL	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
				2.00 /2.00	5907	40				very fine- to medium-grained, moderately sorted, sub-rounded to well rounded, approximately 11% porosity, argilloceous cement, highly friable, abundant frosted quartz, some dark minerals, iron stain, trace clear quartz, biotite, increased clay content at 39.0-39.8', increased sand content at 39.9-40.0', moist. 63% sand, 15% silt, 22% clay.
					5906	41			CLAYEY SANDSTONE	Clayey Sandstone with some silt - yellowish gray (5Y7/2) to pale yellowish orange (10YR8/6) where iron stained (41.1-41.2', 41.7-41.8', 42.3'), very fine- to medium-grained, well sorted, sub-rounded to well rounded, approximately 8% porosity, argilloceous cement, slightly friable, abundant frosted quartz, some iron and limonite stain, trace dark minerals, rock fragments, mica, dry to moist. 43% sand, 15% silt, 42% clay.
				1.70 /2.00	5905	42				
					5904	43			CLAYEY SANDSTONE	Clayey Sandstone with some silt - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6) where iron stained, very fine- to medium-grained, moderately sorted, rounded to well rounded, approximately 16% porosity, argilloceous cement, highly friable, abundant frosted quartz, some iron stain, dark minerals, rock fragments, trace feldspar, healed 45 degree fracture at 43.8', increased clay content at 43.2-44.0', moist to wet. 68% sand, 10% silt, 22% clay.
				2.00 /2.00	5903	44				
					5902	45				
				1.10 /2.00	5901	46				No recovery for this interval
					5900	47			CLAYEY SANDSTONE	Clayey Sandstone with some silt - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6) where iron stained, as described above.
				1.90 /2.00	5899	48			CLAYEY SANDSTONE	Clayey Sandstone with some silt - interlaminated/bedded dark yellowish orange (10YR6/6) sand and medium light gray (N6) clay, very fine- to medium-grained, well sorted, sub-rounded to well rounded, approximately 10% porosity, argilloceous cement, highly friable, abundant frosted quartz, some iron stain, trace dark minerals/rock fragments, clear quartz, carbonaceous material throughout, ripple laminations at 49.5' (amplitude .03', wavelength .1') and 51.65' (amplitude .02', wavelength .17'), thin bed of gray sandy clay at 51.3-51.65', vertical de-watering structures at 51.8-52.1', moist. 45% sand, 12% silt, 43% clay.
					5898	49				
				0.90 /2.00		50				No recovery for this interval.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 57.0	GROUND ELEVATION (FT):	5947.03	PROJECT NUMBER:	002/RI
NORTH: 750247.49	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST: 2088136.87	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/09/92

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 14.6 FT. - 11.6 FT.

LOG OF BORING NUMBER: 20091



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
CLAYEY SANDSTONE	Clayey Sandstone with some silt - interlaminated/bedded dark yellowish orange (10YR6/6) sand and medium light gray (N6) clay, as described above.
CLAYEY SANDSTONE	Clayey Sandstone with some silt - light gray (N7) to dark gray (N3), yellowish gray (5Y7/2) sand beds at 53.2-53.45', 53.9-54.0', very fine- to fine-grained, well sorted, rounded to well rounded, approximately 8% porosity, argillaceous cement, moderately friable, abundant frosted quartz, some dark minerals/rock fragments, trace clear quartz, mica, thinly laminated, cross-laminations dipping 30 degrees at 54.7-54.9', increased clay content at 55.0-55.3', moist. 47% sand, 11% silt, 42% clay
	No recovery for this interval.
CLAYEY SANDSTONE	Clayey Sandstone with some silt - light gray (N7) to dark gray (N3), yellowish gray (5Y7/2) sand beds at 53.2-53.45', 53.9-54.0', as described above.
	No recovery for this interval
	Total depth at 57.0 ft.

OU2-ALLUVIUM

RFEDS
WELL INSTALLATION FORM

Well Number: OB2Ø191 Project Number: EMAD
Old Well No.:

Area: NE Trenches North or Y: East or X:
Purpose: GW Plume Characterization
Formation: Arapahoe Fm. Well Status: Active
Contractor: Woodward-Clyde Drilling Method: Hollow-Stem Auger
Geologist: RMH Locator:
Date Drilled: Ø4/Ø3/92 Ground Elev: ft.

Total Depth: 76.Ø ft. Stick Up: ft.
Depth to Bedrock: 33.Ø' ft. Completed Depth: 59.Ø ft.
Casing Diameter: 2.0 in. Borehole Diam.: 10.0 in.

Monitoring Interval: 37.Ø ft. to 57.Ø ft.
Initial Water Level: 27.Ø ft. Date: Ø4/Ø1/92
Completed Water Level: 19.9 ft. Date: Ø4/06/92

Item		From	To	I.D.	Type
Surface Seal:		ft.	ft.		Concrete
Protective Casing:		ft.	ft.	6.0 in.	Steel
Surface Casing:		59.Ø ft.	– ft.	2.0 in.	PVC Sch. 40
Secondary Casing:	N/A	ft.	ft.	in.	N/A
Centralizer:	N/A	ft.	ft.	in.	N/A
Bentonite Seal:		34.1 ft.	3Ø.9 ft.		Bentonite
Filter Pack:		59.Ø ft.	34.1 ft.		16–40 Sand
Volume:	13.Ø cu. ft.				
Screen:		57.Ø ft.	37.Ø ft.	2.0 in.	PVC Sch. 40
Slot Size:	0.01 in.				
Sump:		59.Ø ft.	57.Ø ft.	2.0 in.	PVC Sch. 40
Backfill Seal:		59.Ø ft.	59.Ø ft.		Bentonite
Backfill:		76.Ø ft.	59.Ø ft.		Bentonite
Volume:	1Ø.Ø cu. ft.				

Tech Ck
REL 4-Ø7-92

OU2-ALLUVIUM

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

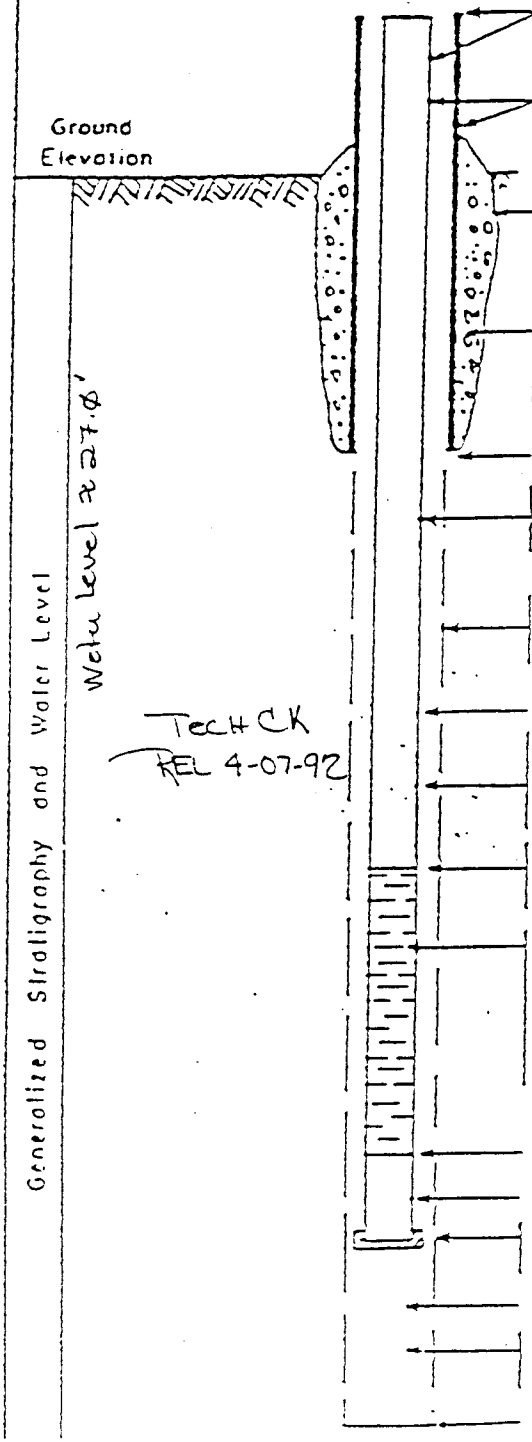
FORM GT.6A

GROUNDWATER MONITORING WELL AND PIEZOMETER REPORT

PROJECT: OU2 RFI/RI Phase II
LOCATION: NE Trenches
Date Completed: 04/06/92 Original Depth: ~~54.0'~~ 76'
Inspected By: _____ Date: _____
Checked By: _____ Date: _____

Page 1 of 1
Well No. OB 20191
Aquifer: Arapahoe Fm.
Depth Interval: 37'-57'

NOTE CENTRALIZER DEPTHS



Tech CK
REL 4-07-92

Elevation of top of surface casing / riser pipe.	
Height of top of surface casing / riser pipe above ground surface	-2.2/-2.0 ft
Depth of surface seal below ground surface	3.0 ft
Type of surface seal: concrete	
I.D. of surface casing.	6.0"
Type of surface casing: steel	
Depth of surface casing below ground	2.8 ft.
I.D. of riser pipe.	2.0"
Type of riser pipe: PVC sch. 40	
Diameter of borehole	10.0"
Depth of borehole	76.0'
Type of backfill: bentonite grout	
Elev./depth top of seal.	30.9'
Type of seal: bentonite seal	
Elev./depth bottom of seal.	34.1'
Type of filter pack 16/40 silica sand	
Depth of top of filter pack.	34.1'
Elev./depth top of screened section.	37.0'
Type of screened section: PVC sch. 40	
Screen openings 0.010"	
I.D. of screened section.	2.0"
Elev./depth bottom of screened section.	57.0'
Length of blank section.	2.0'
Elev./depth bottom of plugged blank section.	59.0'
Elev./depth bottom of sand column.	59.0'
Type of backfill below observation pipe. bentonite pellets	
Elev./depth of hole	76.0'

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title: Jan Garrett

Well ID: OB 20191

Survey location coordinates: North _____ East: N/A

Date this report: 05-05-92 Date well installation: 4-6-92 Date well development: N/A

Well designation: OBWell

Ground elevation: Est: N/A Survey: N/A

Screened interval: 39.0 - 59.0 Formation: N/A

Measuring point (MP): Top of well casing/other: N/A Well stick up: 2'

Water level (below MP): Start: 22.39 End: N/A

Well depth (below MP): 61.16 + .07 = 61.23 Water elevation (BGS): n/a

Method used to measure water level: Solinst Estimated recharge rate: n/a

Volume of saturated annulus (assume 30 percent porosity): n/a

Volume Calculation: 61.23 - 22.39 = 38.84 × 0.16 = 6.21

Quantity of water used during drilling: n/a

Depth of sediment (below MP): Before: n/a After: n/a

Development equipment: Grundfos pump

Sampling equipment: n/a

pH meter No. 910714159 Calibration: 4.00/7.04 14.4° Time 0930

Specific conductance meter No.: 900103503 Calibration: 1.12 15.5° Time 0931

F.T.U. meter No.: 900409105 Calibration: N/A

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1341	193	over range	7.88	24.0	0.44	Ø	Ø	odor - sulfur
						6.21	1	
						12.42	2	
						18.63	3	
						24.84	4	
						31.05	5	

Comments: Dave Spruce is working in our exclusion zone 1330-1420 to clear obstruction @ PW20091

1357 - pump broken at 5gal. purge - Repairs until 1455

Pump completely down @ 1500

(4011-452)WATER2-2.SOP)(02-27-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

Page One

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Jan Jarrett - Field Tech

Well ID OB20191

Survey location coordinates: North N/A East N/A

Date this report 05-12-92 Date well installation 4-6-92 Date well development 5-12-92

Well designation: OB Well

Ground elevation: Est: N/A Survey: N/A

Screened interval: 39.0 - 59.0 Formation: N/A

Measuring point (MP): Top of well casing/other: N/A Well stick up: 2'

Water level (below MP): Start: 22.71 End: N/A

Well depth (below MP): 51.19 + .07 = 51.26 Water elevation (BGS) N/A

Method used to measure water level: Solinst Estimated recharge rate: 11.07

Volume of saturated annulus (assume 30 percent porosity): N/A

Volume Calculation: 51.26 - 22.71 = 28.55 x 0.16 = 4.57

Quantity of water used during drilling: N/A

Depth of sediment (below MP): Before: N/A After: N/A

Development equipment: Grundfos pump

Sampling equipment:

pH meter No. 910714159 Calibration: 4.00/7.03 16.2° Time 0838

Specific conductance meter No.: 900103503 Calibration: 1.11 17.1° Time 0835

F.T.U. meter No.: 900409105 Calibration: N/A

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
0935	.45	over range	7.64	13.0	0.46	Ø	Ø	Muddy
0945	.45	over range	7.61	14.0	0.40	4.57	1	Cloudy
0955	.45	over range	7.66	13.5	0.40	9.14	2	Cloudy
1006	.45	over range	7.62	14.6	0.38	13.71	3	Cloudy
1015	.45	over range	7.51	15.0	0.37	18.28	4	Cloudy
1025	.45	391	7.42	15.5	0.36	22.85	5	Clearer
1035	.45	399	7.45	15.5	0.37	27.42	6	Clearer
1045	.45	over range	7.57	14.1	0.38	31.99	7	Cloudy
1055	.45	over range	7.61	15.3	0.41	36.56	8	Cloudy
1254	.45	over range	7.78	14.9	0.37	41.13	9	Cloudy

Comments: Well dry @ 39.4 gal. Time 1103
56.57 Time 1108
52.88 Time 1118 Water level 41.04 Time 1239
Volume .59

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

Page Two

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title: Jan Jarrett - Field Tech

Well ID: OB20191

Survey location coordinates: North N/A East N/A

Date this report 05-12-92 Date well installation 4-16-92 Date well development 5-12-92

Well designation: OB Well

Ground elevation: Est: N/A Survey: N/A

Screened interval: 39.0 - 59.0 Formation: N/A

Measuring point (MP): Top of well casing/other: N/A Well stick up: 2'

Water level (below MP): Start: 22.71 End: N/A

Well depth (below MP): 51.19 + .07 = 51.26 Water elevation (BGS) n/a

Method used to measure water level: Solinst Estimated recharge rate: 11.07

Volume of saturated annulus (assume 30 percent porosity): N/A

Volume Calculation: 51.26 - 22.71 = 28.55 x 0.16 = 4.57

Quantity of water used during drilling: N/A

Depth of sediment (below MP): Before: N/A After: N/A

Development equipment: Grundfos pump

Sampling equipment: n/a

pH meter No. 910714159 Calibration: 4.00/7.03 16.2° Time 0838

Specific conductance meter No.: 900103503 Calibration: 1.11 17.1° Time 0835

F.T.U. meter No.: 900409105 Calibration: N/A

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1259	.91	~~[illegible]~~	7.87	14.6	0.37	~~5.54~~ 8.70	10	Cloudy
1306	.65	~~[illegible]~~	7.94	15.2	0.37	50.27	11	Cloudy

Comments: Well dry @ 52.25 gal Time 1309
Water still contains suspended material

(4011-452)WATER2-2.SOP)(02-27-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title: Ray Michael Field Tech

Well ID: OB 20191

Survey location coordinates: North: N/A East: N/A

Date this report: 5-19-92 Date well installation: _____ Date well development: 5-19-92

Well designation: OB well

Ground elevation: Est: N/A Survey: N/A

Screened interval: 39.0 — 59.0 Formation: N/A

Measuring point (MP): Top of well casing/other: N/A Well stick up: 2 FT

Water level (below MP): Start: 22.78 End: _____

Well depth (below MP): 61.17 + .07 = 61.24 Water elevation (BGS): N/A

Method used to measure water level: Solinst Estimated recharge rate: 15.12 gal per 30 min

Volume of saturated annulus (assume 30 percent porosity): N/A

Volume Calculation: 38.46 X 0.16 = 6.15 Ft Per Volume

Quantity of water used during drilling: N/A

Depth of sediment (below MP): Before: N/A After: N/A

Development equipment: Grund Fos Pump

Sampling equipment: N/A

pH meter No. 910714159 Calibration: 4.00/7.01 @ 21.4°C Time 0909

Specific conductance meter No.: 900103503 Calibration: 1.09 @ 21.9°C Time 0906

F.T.U. meter No.: 900109105 Calibration: N/A

Time	Pumping Rate gpm	FTU	pH	Temp °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
0929	NA	over	7.37	17.3	0.39	0	0	Brown Grey
0933	1.05	over	7.46	15.1	0.39	6.15	1	Lt Brown Grey
0939	1.03	over	7.57	15.5	0.39	12.30	2	Lt Brown
0948	1.03	over	7.51	15.5	0.39	18.45	3	Brown Grey
1030	NA	over	7.68	17.8	0.39	24.60	4	Dark Brown Grey
1037	.85	over	7.57	16.0	0.36	30.75	5	Brown Grey
1117	NA	over	7.59	17.3	0.38	36.90	6	Brown Grey
						43.05	7	
						49.20	8	
						55.35	9	

Comments: Dewatered at 0955 23.50 Gal

Dewatered 2nd time at 1043 34.25 Gal

Dewatered 3rd time at 1122 41.5 gal

Recharge rate began at 1125 Beginning DTW 55.20

55.20 − 50.16 = 5.04 × 3 = 15.12 gal per 30 min

(MU-4T)WATER2-2.SOP(X-27-91)

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 75.0	GROUND ELEVATION (FT):	5946.93	PROJECT NUMBER:	002/RI
NORTH: 750253.15	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST: 2088144.56	LOCATOR NUMBER:	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/01/92

LOG OF BORING NUMBER: 20191

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 34.1 FT. - 30.9 FT. BACKFILL MATERIAL: BENTONITE 76.0 FT. - 59.0 FT.

CHEMICAL SAT GRADATIONAL	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				Top soil, start of boring at 0.90 ft.
				0.00 /0.90	5946	1			SC:	Sandy Clay with some gravel - blackish red (5R2/2), maximum gravel diameter .07', average .04', fine- to coarse-grained sand, well graded, sub-angular to sub-rounded, low to medium plasticity, gravel is primarily caliche coated quartzite with some calcrete, sand contains abundant carbonaceous/organic material, quartz, some calcrete, rock fragments, feldspar, trace dark minerals, mica, no apparent bedding, moist. 23% gravel, 31% sand, 15% silt, 32% clay.
				0.40 /2.10	5945	2				No recovery for this interval.
					5944	3			SC/gc:	Clayey Sand with abundant gravel - very pale orange (10YR8/2) at 3.0-5.4', light brown (5YR6/4) at 5.4-9.4', light brown (5YR5/6) at 9.4-13.2', maximum gravel diameter > .25', average .13', fine- to coarse-grained sand, well graded, gravel is rounded or fractured, sand is angular to sub-rounded, low/medium plasticity, gravel is primarily quartzite with some gneiss at 7.8', 9.1-9.3' and 9.4-9.5', trace pale olive (10Y6/2) sandy clay clasts at 7.5' and 11.3', sand contains abundant quartz, some feldspar, rock fragments, increased calcrete and gravel at 3.0-5.4', physical appearance of sandy gravel, increased sand content at 9.4-11.4', dry. 32% gravel, 40% sand, 10% silt, 18% clay.
				0.70 /2.00	5943	4				
										No recovery for this interval.
					5942	5			SC/gc:	Clayey Sand with abundant gravel - very pale orange (10YR8/2) at 3.0-5.4', light brown (5YR6/4) at 5.4-9.4', light brown (5YR5/6) at 9.4-13.2', as described above.
				0.40 /2.00	5941	6				No recovery for this interval.
					5940	7			SC/gc:	Clayey Sand with abundant gravel - very pale orange (10YR8/2) at 3.0-5.4', light brown (5YR6/4) at 5.4-9.4', light brown (5YR5/6) at 9.4-13.2', as described above.
				1.20 /2.00	5939	8				
										No recovery for this interval.
					5938	9			SC/gc:	Clayey sand with abundant gravel - very pale orange (10YR8/2) at 3.0-5.4', light brown (5YR6/4) at 5.4-9.4', light brown (5YR5/6) at 9.4-13.2', as described above.
				0.70 /2.00	5937	10				No recovery for this interval.

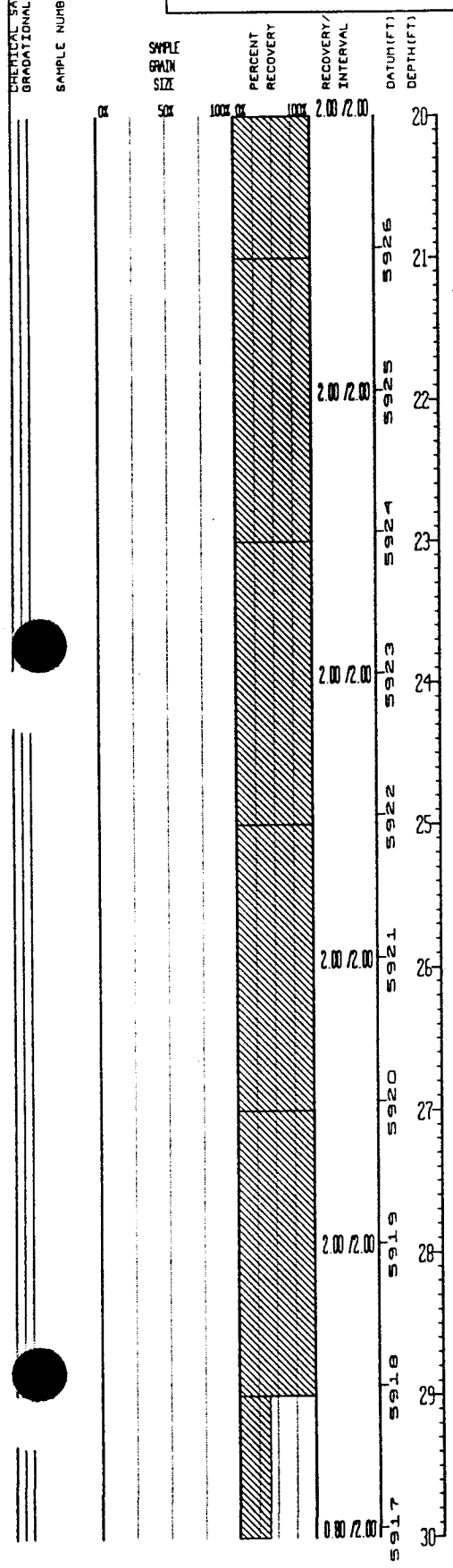
STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 75.0	GROUND ELEVATION (FT):	5946.93	PROJECT NUMBER:	002/R1	LOG OF BORING NUMBER:
NORTH:	750253.15	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	20191
EAST:	2088144.56	LOCATOR NUMBER:	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/01/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 34.1 FT. - 30.9 FT. BACKFILL MATERIAL: BENTONITE 76.0 FT. - 59.0 FT.

CHEMICAL SAT GRADATIONAL	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% 0.70 /2.00		10				
					5936	11			SC/gc:	Clayey Sand with abundant gravel - very pale orange (10YR8/2) at 3.0-5.4', light brown (5YR6/4) at 5.4-9.4', light brown (5YR5/6) at 9.4-13.2', as described above.
				0.60 /2.00	5935	12				No recovery for this interval.
					5934	13			SC/gc:	Clayey Sand with abundant gravel - very pale orange (10YR8/2) at 3.0-5.4', light brown (5YR6/4) at 5.4-9.4', light brown (5YR5/6) at 9.4-13.2', as described above.
									CL:	Sandy Clay with some silt - light brown (5YR5/6) to moderate brown (5YR4/4), as described below.
				0.50 /2.00	5933	14				No recovery for this interval.
					5932	15			CL:	Sandy Clay with some silt - light brown (5YR5/6) to moderate brown (5YR4/4), maximum gravel diameter .07', average .02', fine- to medium-grained sand, poorly graded, sub-angular to rounded, medium to high plasticity, gravel is primarily quartzite with abundant deformed clasts of pale olive (10Y6/2) silty/sandy clay at 13.2-14.8', 25.5-25.8', sand contains abundant quartz, some feldspar, dark minerals, rock fragments, calcrete or kaolinized feldspar (does not effervese in HCl acid), trace mica (muscovite), carbonaceous material at 19.8-24.3', slightly moist. 4% gravel, 33% sand, 15% silt, 48% clay.
				2.00 /2.00	5931	16				
					5930	17				
				2.00 /2.00	5929	18				
					5928	19	04/06/92 ▽			
				2.00 /2.00	5927	20				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 75.0	GROUND ELEVATION (FT):	5946.93	PROJECT NUMBER:	002/RI	LOG OF BORING NUMBER:
NORTH:	750253.15	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	20191
EAST:	2088144.56	LOCATOR NUMBER:	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/01/92	

REMARKS: HOLLOW-STEM AUGER BENTONITE SEAL 34.1 FT. - 30.9 FT. BACKFILL MATERIAL: BENTONITE 76.0 FT. - 59.0 FT.

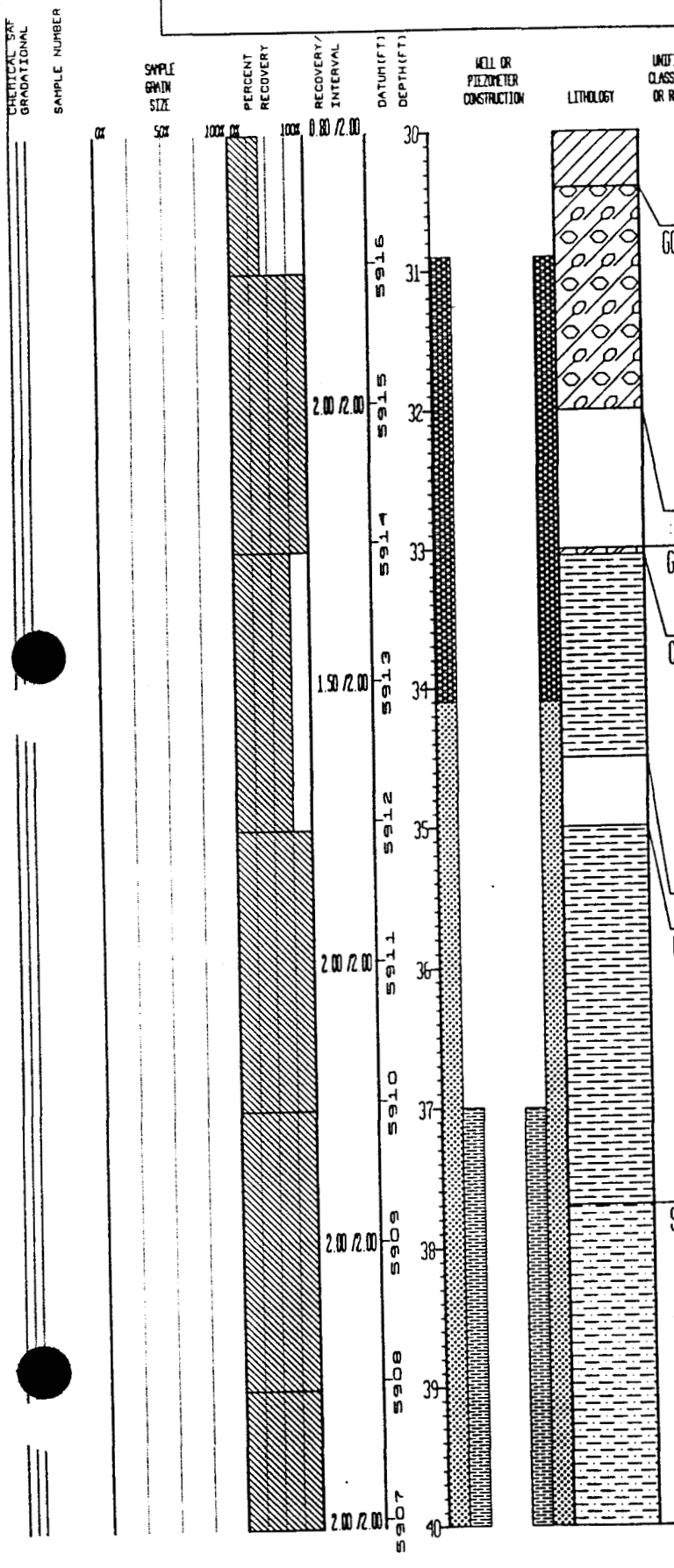


SC/gc:	Gravelly Sand with abundant clay and some silt - light brown (5YR6/4), maximum gravel diameter .2', average .07', fine- to coarse-grained sand, well graded, angular to sub-rounded, medium plasticity, gravel is primarily quartzite with some weathered granite at 26.5' and light olive gray (5Y5/2), clay clast at 26.8', sand contains abundant quartz, some feldspar, rock fragments, iron stain, dark minerals, trace mica (muscovite), kaolinized feldspar, no apparent bedding, saturated. 30% gravel, 34% sand, 10% silt, 26% clay.
	No recovery for this interval.
SC/gc:	Gravelly Sand with abundant clay and some silt - light brown (5YR6/4), as described above.
CL:	Sandy Clay with some gravel and silt - moderate yellowish brown (10YR5/4) to light olive gray (5Y6/1) at 29.6-30.1', maximum gravel diameter .16', average .02', fine- to coarse-grained sand, well graded, sub-angular to sub-rounded, medium plasticity, gravel is primarily quartzite with some granite at 30.2', sand contains abundant quartz, trace rock fragments, feldspar, dark minerals, mica, kaolinized feldspar,

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 75.0	GROUND ELEVATION (FT):	5946.93	PROJECT NUMBER:	002/RI
NORTH: 750253.15	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST: 2088144.56	LOCATOR NUMBER:	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/01/92

LOG OF BORING NUMBER: 20191

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 34.1 FT. - 30.9 FT. BACKFILL MATERIAL: BENTONITE 76.0 FT. - 59.0 FT.



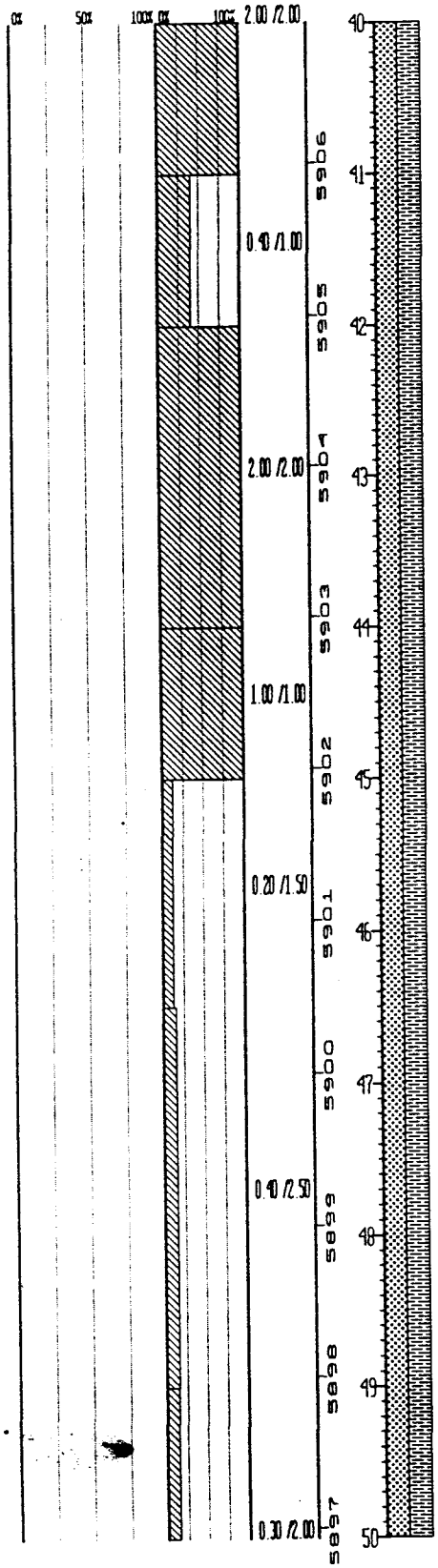
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	limonite/iron stain, thin bed of dark yellowish orange (10YR6/6) iron stained sand at 30.1-30.3', faintly laminated carbonaceous material at 29.6-30.1', saturated. 12% gravel, 32% sand, 12% silt, 44% clay.
GC:	Sandy Gravel with abundant clay and some silt - moderate brown (5YR4/4), maximum gravel diameter .21', average .07', fine- to coarse-grained sand, well graded, angular to rounded, medium to low plasticity, gravel is primarily quartzite with some light olive gray (5Y6/1), bedrock rip-up clasts throughout, sand contains abundant quartz, some rock fragments, feldspar, dark minerals, trace mica, kaolinized feldspar, bedrock contact is sharp - scoured undulating surface with amplitude of >= .04, wavelength > 2', saturated. 41% gravel, 27% sand, 7% silt, 26% clay.
	No recovery for this interval.
GC:	Sandy Gravel with abundant clay and some silt - moderate brown (5YR4/4), as described above. Top of bedrock at 33.05 ft.
CLAYSTONE:	Claystone with some sand - light olive gray (5Y5/2) to yellowish gray (5Y7/2), very fine- to fine-grained, well sorted, sub-rounded, approximately 6% porosity, argillaceous cement, slightly friable, abundant quartz, trace dark minerals, mica, iron stain, mottled with trace carbonaceous material, stringers of dark yellowish orange (10YR6/6) iron stain at 33.05-36.0', thinly bedded to moderately laminated at 36.0-37.0', increased sand content at 37.0-37.7', dry to slightly moist. 13% sand, 5% silt, 82% clay.
	No recovery for this interval.
CLAYSTONE:	Claystone with some sand - light olive gray (5Y5/2) to yellowish gray (5Y7/2), as described above
SANDY CLAYSTONE:	Sandy Claystone with some silt - light olive gray (5Y5/2) to yellowish gray (5Y7/2), very fine- to fine-grained, well sorted, sub-rounded to well rounded, approximately 10% porosity, argillaceous cement, moderately friable, abundant frosted quartz, some dark minerals, feldspar, trace rock fragments, mottled to thinly/thickly laminated clay/sand, iron stain at 37.8-37.9', 39.5-40.4', flame and dewatering structures at 40.0-40.4', increased sand content at 40.1-41.0', slightly moist. 33% sand, 10% silt, 57% clay.

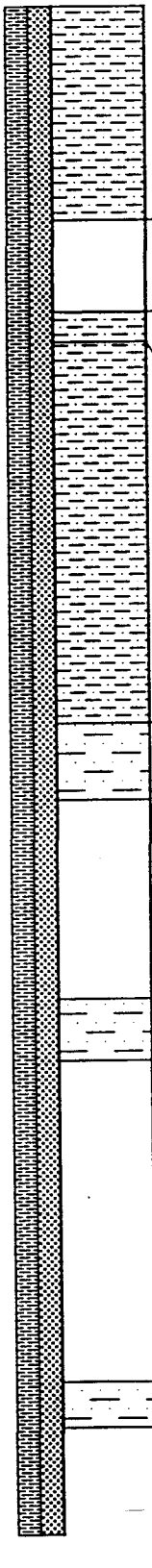
STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 75.0	GROUND ELEVATION (FT):	5946.93	PROJECT NUMBER:	002/RI
NORTH: 750253.15	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST: 2088144.56	LOCATOR NUMBER:	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/01/92

LOG OF BORING NUMBER: 20191

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 34.1 FT. - 30.9 FT. BACKFILL MATERIAL: BENTONITE 76.0 FT. - 59.0 FT.

CHEMICAL SAT GRADATIONAL | 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.

SANDY CLAYSTONE: Sandy Claystone with some silt - light olive gray (5Y5/2) to yellowish gray (5Y7/2), as described above.

SANDY CLAYSTONE: Sandy Claystone with some silt - medium dark gray (N4) clay and yellowish gray (5Y7/2) sand, very fine- to fine-grained, well sorted, sub-rounded to well rounded, approximately 12% porosity, argillaceous cement, moderately to highly friable, abundant frosted quartz, some dark minerals, feldspar, trace clear quartz, rock fragments, iron stain, interbedded to interlaminated sand/clay at intervals of approximately .05', dark yellowish orange (10YR6/6) iron stained sand at 42.7-43.0', 44.5-44.7', moist. 46% sand, 6% silt, 48% clay.

CLAYEY SANDSTONE: Clayey Sandstone with some silt - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6), very fine- to medium-grained, moderately sorted, rounded to well-rounded, approximately 15% porosity, argillaceous cement, moderately friable, abundant frosted quartz, some dark minerals, feldspar, trace clear quartz, rock fragments, iron stain, iron staining throughout interval, slightly moist to moist. 57% sand, 17% silt, 26% clay.

No recovery for this interval.

CLAYEY SANDSTONE: Clayey Sandstone with some silt - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6), as described above.

No recovery for this interval.

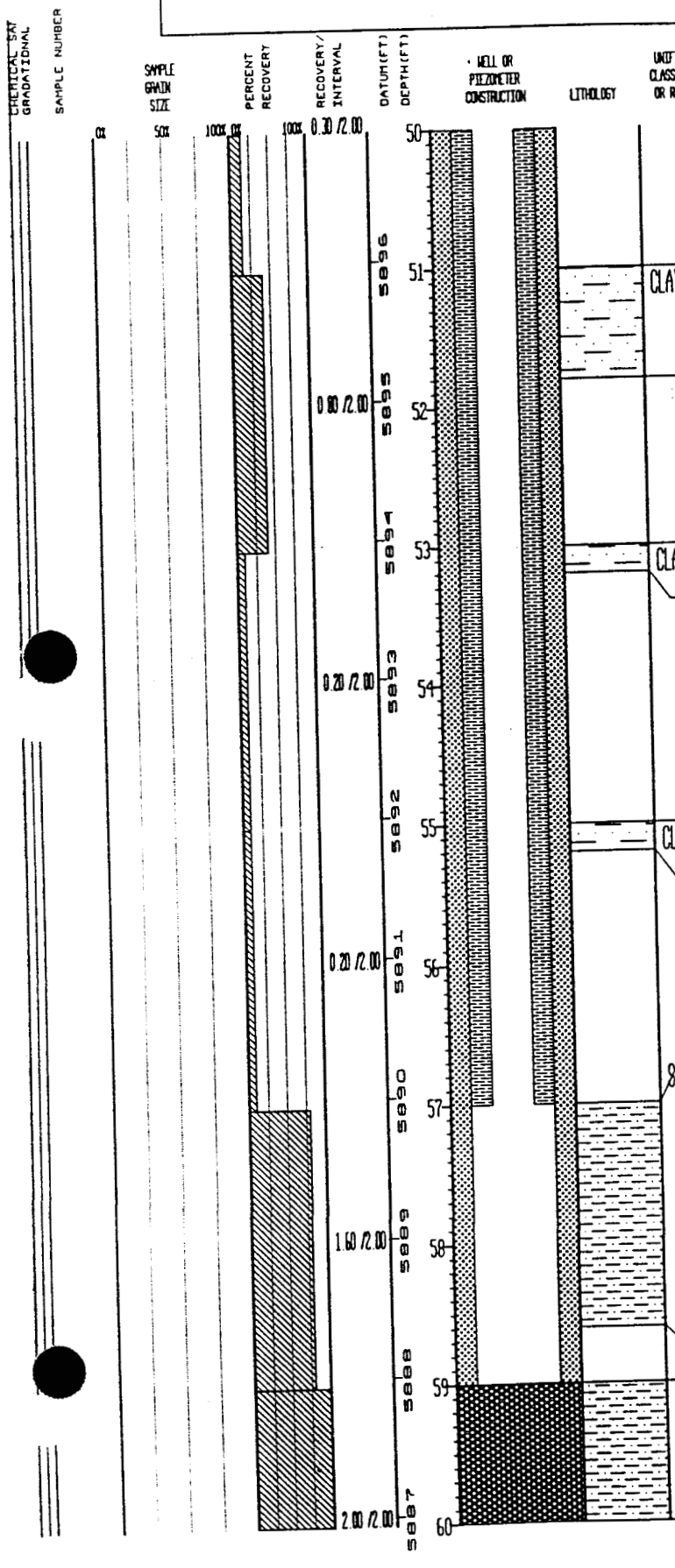
CLAYEY SANDSTONE: Clayey Sandstone with some silt - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6), as described above.

No recovery for this interval.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 75.0	GROUND ELEVATION (FT):	5946.93	PROJECT NUMBER:	002/R1
NORTH: 750253.15	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST: 2088144.56	LOCATOR NUMBER:	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/01/92

LOG OF BORING NUMBER 20191

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 34.1 FT. - 30.9 FT. BACKFILL MATERIAL: BENTONITE 76.0 FT. - 59.0 FT.



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE — DESCRIPTION

CLAYEY SANDSTONE: Clayey Sandstone with some silt - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6), as described above.

No recovery for this interval.

CLAYEY SANDSTONE: Clayey Sandstone with some silt - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6), as described above.

No recovery for this interval.

CLAYEY SANDSTONE: Clayey Sandstone with some silt - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6), as described above.

No recovery for this interval.

SANDY CLAYSTONE: Sandy Claystone with some silt - light gray (N7) sand, dark gray (N3) clay, very fine- to fine-grained, very well sorted, sub-angular to rounded, approximately 7% porosity, argillaceous cement, moderately to slightly friable, abundant clear quartz, some frosted quartz, dark minerals/rock fragments, thinly laminated to moderately bedded sand/clay throughout, sand slumped along 35 degree detachment plane at 57.1-57.3', ripple laminations at approximately 58.0' with .03' amplitude and .15' wavelength, increased sand content at 58.0-58.1', moist. 28% sand, 11% silt, 61% clay.

No recovery for this interval.

SANDY CLAYSTONE: Sandy Claystone with some silt - light gray (N7) sand, dark gray (N3) clay, as described above, convolute laminations and low angle (2 degree) planar cross-laminations at 59.5-60.0', 60 degree slump detachment surface with chaotic/

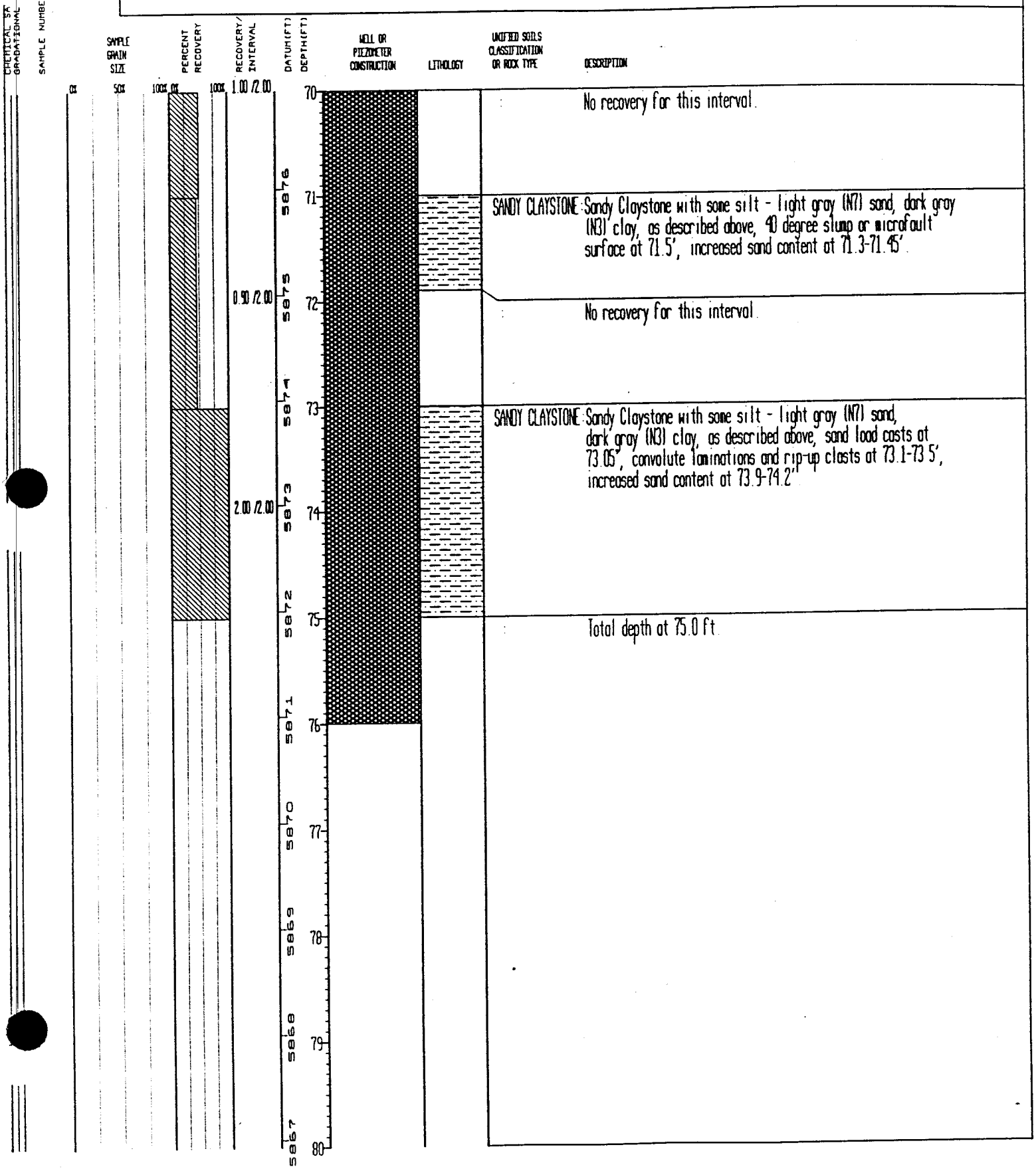
STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 75.0	GROUND ELEVATION (FT):	5946.93	PROJECT NUMBER:	002/RI	LOG OF BORING NUMBER
NORTH:	750253.15	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	20191
EAST:	2088144.56	LOCATOR NUMBER:	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/01/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 34.1 FT. - 30.9 FT. BACKFILL MATERIAL: BENTONITE 76.0 FT. - 59.0 FT.

CHEMICAL SAMPLE / GRADATIONAL	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
				2.00 /2.00	5886	60				disturbed bedding above and below detachment surface at 60.6', sandstone rip-up clasts at 61.3', increased sand content at 59.1-59.2', increased clay content at 63.0-63.8'.
						61				
				2.00 /2.00	5885	62				
					5884	63				
				1.10 /2.00	5883	64				No recovery for this interval.
					5882	65			SANDY CLAYSTONE	Sandy Claystone with some silt - light gray (N7) sand, dark gray (N3) clay, as described above, 20 degree surface (channel or slump surface) filled with discordant lamination bedding at 66.1', chaotic laminations with multiple rotational detachments (.05' offset) at 66.2-66.4'.
				1.80 /2.00	5881	66				
					5880	67				No recovery for this interval.
									SANDY CLAYSTONE	Sandy Claystone with some silt - light gray (N7) sand, dark gray (N3) clay, as described above, clay with sand clast rip-ups at 67.0-67.9'
				1.70 /2.00	5879	68				
					5878	69				No recovery for this interval.
									SANDY CLAYSTONE	Sandy Claystone with some silt - light gray (N7) sand, dark gray (N7) clay, as described above, laminations inclined at 25 degrees at 69.3', increased sand content at 68.5-69.1'.
				1.00 /2.00	5877	70				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 75.0	GROUND ELEVATION (FT):	5946.93	PROJECT NUMBER:	002/RI	LOG OF BORING NUMBER:
NORTH:	750253.15	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	20191
EAST:	2088144.56	LOCATOR NUMBER:	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/01/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 34.1 FT. - 30.9 FT. BACKFILL MATERIAL: BENTONITE 76.0 FT. - 59.0 FT.



OU2-ALLUVIUM

RFEDS
WELL INSTALLATION FORM

Well Number: 0B2Ø291 Project Number: 4Ø06 EMAD
Old Well No.:

Area: NE Trenches North or Y: East or X:
Purpose: GW Plume Characterization / Pump testing
Formation: Alluvium Well Status: Active
Contractor: Woodward-Clyde Drilling Method: Hollow-Stem Auger
Geologist: B. Edgerly Locator: H13
Date Drilled: 4/9-4/10/92 Ground Elev: ft.

Total Depth: ~~33.3~~ ft. Stick Up: ft.
Depth to Bedrock: 33.2 ft. Completed Depth: ~~33.3 ft.~~
Casing Diameter: 2.0 in. Borehole Diam.: 10.0 in.

Monitoring Interval: 33.Ø ft. to 18.Ø ft.
Initial Water Level: 26.Ø ft. Date: 4-9-92
Completed Water Level: 16.9 ft. Date: 4-1Ø-92

Item	From	To	I.D.	Type
Surface Seal:	ft.	ft.		Concrete
Protective Casing:	ft.	~~3.0~~ ft.	6.0 in.	Steel
Surface Casing:	33.3 ft.	-2.Ø ft.	2.0 in.	PVC Sch. 40
Secondary Casing:	N/A ft.	ft.	in.	N/A
Centralizer:	N/A ft.	ft.	in.	N/A
Bentonite Seal:	16.Ø ft.	13.Ø ft.		Bentonite
Filter Pack:	33.3 ft.	16.Ø ft.		16-40 Sand
Volume:	9.1 cu. ft.			
Screen:	33.Ø ft.	18.Ø ft.	2.0 in.	PVC Sch. 40
Slot Size:	0.01 in.			
Sump:	33.3 ft.	33.Ø ft.	2.0 in.	PVC Sch. 40
Backfill Seal:	N/A ft.	ft.		Bentonite
Backfill:	N/A ft.	ft.		Bentonite
Volume:	cu. ft.			

Tech Ck
REL 4-13-92

OU2-ALLUVIUM

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GT.6A

GROUNDWATER MONITORING WELL AND PIEZOMETER REPORT

PROJECT OU2 RFI/RI Phase II

LOCATION NE Trenches

Date Completed 4-10-92 Original Depth 33.3 ft.

Inspected By _____ Date _____

Checked By _____ Date _____

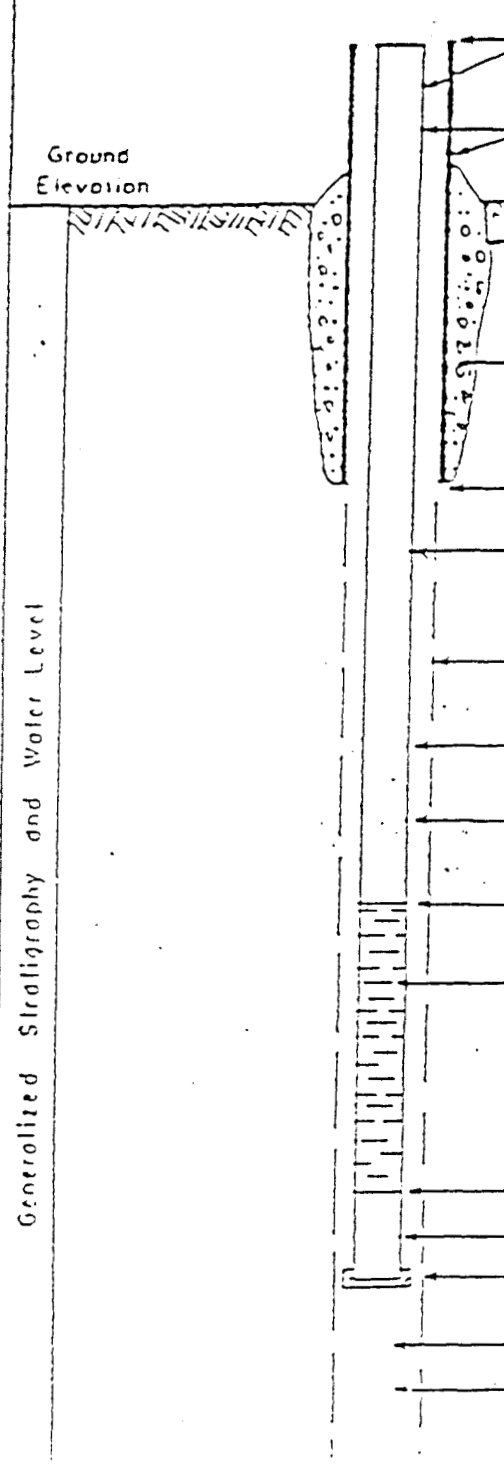
Page 1 of 1

Well No. OB2029

Aquifer Alluvium

Depth Interval 18.0-33.0

NOTE CENTRALIZER DEPTHS



Elevation of top of surface casing / riser pipe.	
Height of top of surface casing / riser pipe above ground surface	-2.2 / -2.0 ft
Depth of surface seal below ground surface	3.0 ft
Type of surface seal: Concrete	
I.D. of surface casing.	6.0 in.
Type of surface casing: steel	
Depth of surface casing below ground	2.8 ft
I.D. of riser pipe.	2.0 in.
Type of riser pipe: sch. 40 PVC	
Diameter of borehole	10.0 in.
Depth of borehole	33.3 ft.
Type of backfill: Bentonite grout	
Elev./depth top of seal.	13.0 ft.
Type of seal: Bentonite	
Elev./depth bottom of seal.	16.0 ft.
Type of filter pack: 16-40 Silica Sand	
Depth of top of filter pack.	16.0 ft.
Elev./depth top of screened section.	18.0 ft.
Type of screened section: sch. 40 PVC	
Screen openings 0.01 in.	
I.D. of screened section.	2.0 in.
Elev./depth bottom of screened section.	33.0 in
Length of blank section.	0.3 in.
Elev./depth bottom of plugged blank section.	33.3 ft.
Elev./depth bottom of sand column.	33.3 ft.
Type of backfill below observation pipe: N/A	
Elev./depth of hole	33.3 ft

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

PG 1

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title: RAY Michael Field Tech

Well ID: 0B20291

Survey location coordinates: North — East —

Date this report: 0-13-92 Date well installation: 4-10-92 Date well development: 5-13-92 + 5-14-92 + 5-15-92

Well designation: —

Ground elevation: Est: — Survey: —

Screened interval: 20.1' - 35.0' Formation: —

Measuring point (MP): Top of well casing/other: — Well stick up: 2'

Water level (below MP): Start: 22.42 (5-13-92) ~~End:~~ 22.40 (5-14-92)

Well depth (below MP): 34.37 + .35 = 34.72 Water elevation (BGS) —

Method used to measure water level: Solinst Estimated recharge rate: —

Volume of saturated annulus (assume 30 percent porosity): —

Volume Calculation: 12.3' X 0.16 = 1.97

Quantity of water used during drilling: —

Depth of sediment (below MP): Before: — After: —

Development equipment: Grundfos Pump

Sampling equipment: N/A

pH meter No. 910714159 Calibration: 4.00/7.03 16.8°C Time 1006

Specific conductance meter No.: 900103503 Calibration: 1.14 @ 18.1°C Time 1008

F.T.U. meter No.: 900409105 Calibration: ~~Date date~~ N/A

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
1252	NA	OVRR	7.80	20.8	0.64	0	0	muddy
1256	.49	OVRR	7.87	15.4	0.46	1.97	1	"
1259	.66	OVRR	7.39	14.8	0.49	3.94	2	"
1302	.66	OVRR	7.78	14.5	0.49	5.91	3	"
Pump Stopped 1305	NA	OVRR	7.73	15.2	0.51	7.88	4	"
1309	.49	OVRR	7.71	15.8	0.54	9.85	5	"
Pump Stopped 1323	NA	OVRR	7.68	18.1	0.56	11.82	6	"
1326	.66	OVRR	7.70	15.5	0.61	13.79	7	"
1330	.49	OVRR	7.62	14.2	0.58	15.76	8	"
1334	.49	OVRR	7.64	14.6	0.60	17.73	9	"

Comments: DRY at 10.40 Waiting for Recharge 1312. WLm @ 24.69

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

PG 2

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Ray Michael Field Tech

Well ID 0B20291

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): See _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1337	.66	OVRR	7.68	16.3	0.61	19.7	10	muddy
1341	.49	OVRR	7.72	16.2	0.62	21.67	11	"
1346	.49	OVRR	7.68	15.5	0.62	23.64	12	"
1351	.49	OVRR	7.78	16.5	0.62	25.61	13	Clearing Sl.
1357	.32	OVRR	7.79	16.4	0.61	27.58	14	Tan - very Cloudy
1401	.49	OVRR	7.72	16.3	0.63	29.55	15	Tan - Very Cloudy
1405	.49	OVRR	7.79	15.6	0.65	31.52	16	Tan Cloudy
1411	.32	432	7.73	15.7	0.63	33.49	17	Cloudy
1416	.39	282	7.73	16.7	0.64	35.46	18	Cloudy
Pump Stopped 1426	NA	322	7.75	18.5	0.64	37.43	19	Cloudy

Comments: DRY @ ~~18 Gal~~ 37 Gal 1421

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

PG3

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title RAY michael Field Tech

Well ID OB 20291

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est. _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: See pg 2 End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. 910714159 Calibration: 4.00/7.03 18.5°C Time 0935

Specific conductance meter No.: 900103503 Calibration: 1.14 17.9°C 0937

F.T.U. meter No.: 900409105 Calibration: NA

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
1431	.39	OVR R	7.65	17.0	0.64	39.40	20	Cloudy
1435	.49	OVR R	7.85	16.6	0.66	41.37	21	Cloudy
1439	.49	OVR R	7.70	17.1	0.65	43.34	22	maddy
1444	.39	OVR R	7.73	17.5	0.65	45.31	23	Cloudy
5-14-92 1015	NA	over	7.65	16.3	0.64	47.28	24	~~Pty Cloudy~~ maddy Red
1019	.49	over	7.58	15.4	0.63	49.25	25	maddy, Red
1022	.65	over	7.60	15.0	0.62	51.22	26	maddy, Red
1024	.98	over	7.64	13.6	0.61	53.19	27	Clearer mad
pump stop 1033	NA	over	7.67	14.3	0.63	55.16	28	Maddy, Red
1035	.98	over	7.68	13.2	0.63	57.13	29	Maddy, Red

Comments: DRY @ 46 gal 1447

~~DRY @~~ 1029 5-14-92 we are Pumping at Rapid Rate to See if it will Clean up better.

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

PG4

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title RAK Michael Field Tech.

Well ID OB 2091

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development 5-13 + 14-92

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

See page

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1221	NA	over	7.68	25.0	0.64	59.10	30	muddy Red
1224	.65	over	7.61	15.4	0.62	61.07	31	muddy Red
1227	NA	over	7.62	16.5	0.62	63.04	32	muddy Red
1229	NA	over	7.66	15.6	0.61	65.01	33	muddy Red
1245	NA	over	7.72	17.9	0.62	66.98	34	muddy Red
1247	NA	over	7.62	15.3	0.61	68.95	35	muddy Red
1248	NA	over	7.65	14.0	0.62	70.92	36	muddy Red
Bailer 1309	NA	over	7.66	14.0	0.62	72.89	37	muddy Red
1314	NA	over	7.53	15.0	0.62	74.86	38	muddy Red
1318	NA	over	7.75	13.0	0.61	76.83	39	muddy Red

Comments: Pumped DRY after 4 vol in about 8 min Rech 59

Recharge 30.98 at 1230 Dry 1249 3 vol. appx 3 min

23.81 at 1240

7.17 x 3 = 21.51

@ 1290

1300 going to Bailer instead of Pump as per conversation w/ Bob Smit

Rech. 29.56
23.66
5.9
17.7

(4011-452)WATER2-2.SOP)(02-27-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

Pg 5

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title RAX michael Field Tech

Well ID 03 20291

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development 5-14-91

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

See Page 1

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1322	NA	over	7.69	12.6	0.62	78.80	40	Muddy - Red
1327	NA	over	7.77	13.0	0.65	80.77	41	Muddy Red
Pump 1332	NA	over	7.66	18.3	0.65	82.74	42	Muddy - Red
1335	NA	over	7.69	15.0	0.63	84.71	43	Muddy Red
1348	NA	over	7.69	17.2	0.67	86.68	44	Tan Muddy
1350	NA 40	~~over~~	7.62	15.7	0.64	88.65	45	Cloudy
1353	NA	over	7.63	14.7	0.63	90.62	46	Cloudy
1356	NA	over	7.80	14.8	0.65	92.59	47	Cloudy
1413	NA	over	7.63	18.0	0.67	94.56	48	Sl Cloudy
1415	NA	167	7.59	14.1	0.67	96.53	49	Cloudy

Comments: Bailed 5 vol no Perceptable Change; Switch to pump 2 vol = Dry pump 8.5 gal Dry again.

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

PG.6

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Ray Michael Field Tech.

Well ID OB 20291

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development 5-14-91

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

See Page 1

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1419	NA	459	7.63	14.6	0.64	98.50	50	Cloudy
1422	NA	218	7.62	14.6	0.66	100.47	51	Cloudy
1425	NA	over	7.61	12.2	0.64	102.44	52	Muddy Red
1448	NA	over	7.65	12.3	0.64	104.41	53	muddy Red
1452	NA	over	7.88	12.8	0.65	106.38	54	muddy Red
1456	NA	over	7.60	11.9	0.66	108.35	55	muddy Red
1501	NA	over	7.85	12.2	0.66	110.32	56	muddy Red
1523	NA	over	7.81	11.9	0.65	112.29	57	Muddy Red
1528	NA	over	7.67	12.3	0.66	114.26	58	Muddy Tan
1533	NA	over	7.79	12.1	0.65	116.23	59	muddy Tan

Bailer

Comments: Pumped dry again at 4 Vol in appx 9 min Recho

29.88
23.88
6.00
x 3
18.0 ft

_____

_____

_____

_____

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

PG 7

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title: RAY Michael Field Tech

Well ID: OB 20291

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development 5-14-92

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. 910714159 Calibration: 4.00/7.02 19.1°C Time 0833

Specific conductance meter No.: 900103503 Calibration: 1.09 18.6°C Time 0833

F.T.U. meter No.: 900409105 Calibration: N/A

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
1538	NA	over	7.75	12.0	.065	118.20	60	muddy Tan
1544	NA	over	7.78	12.6	0.66	120.17	61	muddy Tan
0907	NA	.23	7.40	13.5	0.66	122.14	62	Clear
0912	NA	over	7.71	12.4	0.65	124.11	63	muddy Brown (stirred)
0918	NA	over	7.68	12.9	0.68	126.08	64	muddy Brown
0924	NA	over	7.64	13.1	0.65	128.05	65	muddy Lt Brown
0929	NA	398	7.53	13.4	0.65	130.02	66	Sl. muddy Lt Brown
0935	NA	380	7.55	13.3	0.66	132.99	67	Sl. muddy Lt Brown
0940	NA	447	7.59	13.1	0.65	133.96	68	Sl. muddy Lt Brown
0946	NA	350	7.67	13.3	0.65	135.93	69	Sl. muddy Lt Brown

OFF TOP

Comments: Water level @ 0850 22.42'

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

PG 8

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title RAY Michael Field Tech

Well ID OB20291

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development 5-13-15-92

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: See Page 1 End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
0959	NA	379	7.43	14.7	0.59	137.90	70	Cldy Mt brnish gray
1006		346	7.59	12.5	0.60	139.87	71	" " "
1011		419	7.56	12.8	0.63	141.84	72	" " " "
1019		367	7.51	13.0	0.61	143.81	73	" " " "
1025		303	7.52	14.0	0.62	145.78	74	" " " "
1031		over	7.60	14.0	0.66	147.75	75	" " "
1036		458	7.66	13.3	0.64	149.72	76	" " "
1043		383	7.68	13.4	0.64	151.69	77	" " "
1050		over	7.59	15.8	0.66	153.66	78	" " "
1055		334	7.62	15.0	0.66	155.63	79	" " " "

Comments: _____

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

PG 9

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Ray michael Field Tech

Well ID OB 20291

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development 5-15-92

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

See Page 1

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1129	NA	374	7.51	14.1	0.65	157.60	80	Cldy LtBRNGRY
1134		OVER	7.59	13.7	0.64	159.57	81	" " " "
1140		442	7.63	13.5	0.64	161.54	82	" " " "
1146		OVER	7.63	13.4	0.65	164.51	83	" " " "
1151		388	7.58	14.1	0.67	166.48	84	" " " "
1152		264	7.61	14.1	0.63	168.45	85	" " " "
1313	NA	over	7.60	25.9	0.69	170.42	86	muddy Brown
1316	NA	360	7.66	18.0	0.67	172.39	87	Cloudy TAN
1318	NA	over	7.61	17.5	0.65	174.36	88	muddy TAN
1322	1.2	over	7.62	16.8	0.66	176.33	89	muddy Lt Brown

Pump off 1:37

Comments: _____

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

PG 10

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Ray Michael Field Tech

Well ID OB 20291

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development 5-15-92

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): See Pg 1

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1328	1.2	over	7.61	17.1	0.67	178.30	90	Muddy Brown
1330	1.2	over	7.63	16.3	0.69	180.27	91	muddy Brown
1332	1.2	over	7.64	14.9	0.64	182.24	92	Mudd y Lt Brown
1353	1.2	over	7.63	20.0	0.69	184.21	93	muddy Brown
1356	1.2	over	7.67	17.4	0.65	186.18	94	Muddy Lt Brown
1359	1.2	over	7.71	17.2	0.66	188.15	95	muddy Brown
1403	1.2	over	7.62	17.5	0.66	200.12	96	Muddy Brown
1405	1.2	over	7.63	16.6	0.67	202.09	97	muddy Brown
1425	1.2	over	7.64	21.9	0.67	204.06	98	muddy
1427	1.2	over	7.70	16.4	0.64	206.03	99	Very cloudy

out of water at 1844 gal

Comments: DTW at 1334 = 34.35
26.14
10.21 X3 = 30.63 per 30 min

Dewatered 202.30 gal

21.35

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

Pg 11

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title RAY Michael Field Tech

Well ID OB20291

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development 5-15-92

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

See page 1

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1430	1.2	over	7.63	16.1	0.64	208.00	100	muddy
						~~210.~~ 209.9	101	
							102	
							103	
							104	
							105	
							106	
							107	
							108	
							109	

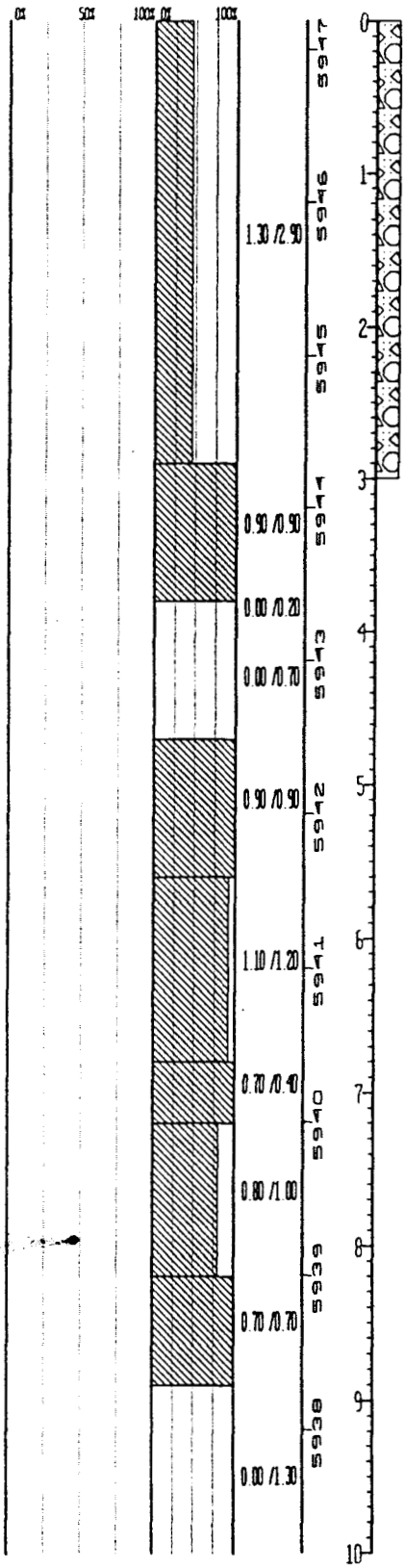
Comments: Dewatered at 209.25 Gal @ 1435 Recharge 27.93
8.74 FT Per 30 min. 23.56
4.37
x2
8.74 FT

(4011-452)WATER2-2.SOP)(02-27-91)

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 35.6	GROUND ELEVATION (FT):	5947.19	PROJECT NUMBER:	002/RI	LOG OF BORING NUMBER:
NORTH:	750244.32	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	20291
EAST:	2088146.57	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/09/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 16.0 FT. - 13.0 FT.

CHEMICAL SAT GRADATIONAL | 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



Top soil, start of boring at 0.90 ft.

SC: Clayey Sand with some silt and gravel - grayish brown (5YR3/2), maximum gravel diameter .15', average .07', fine- to medium-grained, poorly graded, sub-rounded to sub-angular, low to medium plasticity, gravel is primarily quartzite and calcrete, sand contains abundant carbonaceous/organic material, calcrete/caliche, quartz, some rock fragments, feldspar, trace mica, no apparent bedding, moist to wet.
10% gravel, 42% sand, 20% silt, 28% clay

GC: Clayey Gravel with some sand and silt - very pale orange (10YR6/2) to pale yellowish brown (10YR6/2), maximum gravel diameter > .25', average .1', fine- to coarse-grained sand, well graded, sub-rounded, moderate plasticity, gravel is primarily quartzite coated with caliche or iron stain at 3.1', sand contains abundant calcrete/caliche, quartz, some rock fragments, feldspar, trace dark minerals, mica, paleosoil horizon at 1.7', moist to wet.
32% gravel, 24% sand, 7% silt, 37% clay

No recovery for this interval.

GC: Clayey Gravel with some sand and silt - very pale orange (10YR8/2) to pale yellowish brown (10YR6/2), as described above.

No recovery for this interval.

GM: Sandy Gravel with some silt and clay - light brown (5YR5/6) to moderate brown (5YR4/4), maximum gravel diameter > .25', average .09', fine- to coarse-grained sand, well graded, sub-angular to sub-rounded, low plasticity, gravel is primarily quartzite, sand contains abundant quartz, some rock fragments, feldspar, dark minerals, iron stain, trace biotite, muscovite, increased sand content at 6.0-6.5', 14.0-15.1', dry to moist.
59% gravel, 19% sand, 15% silt, 7% clay

No recovery for this interval.

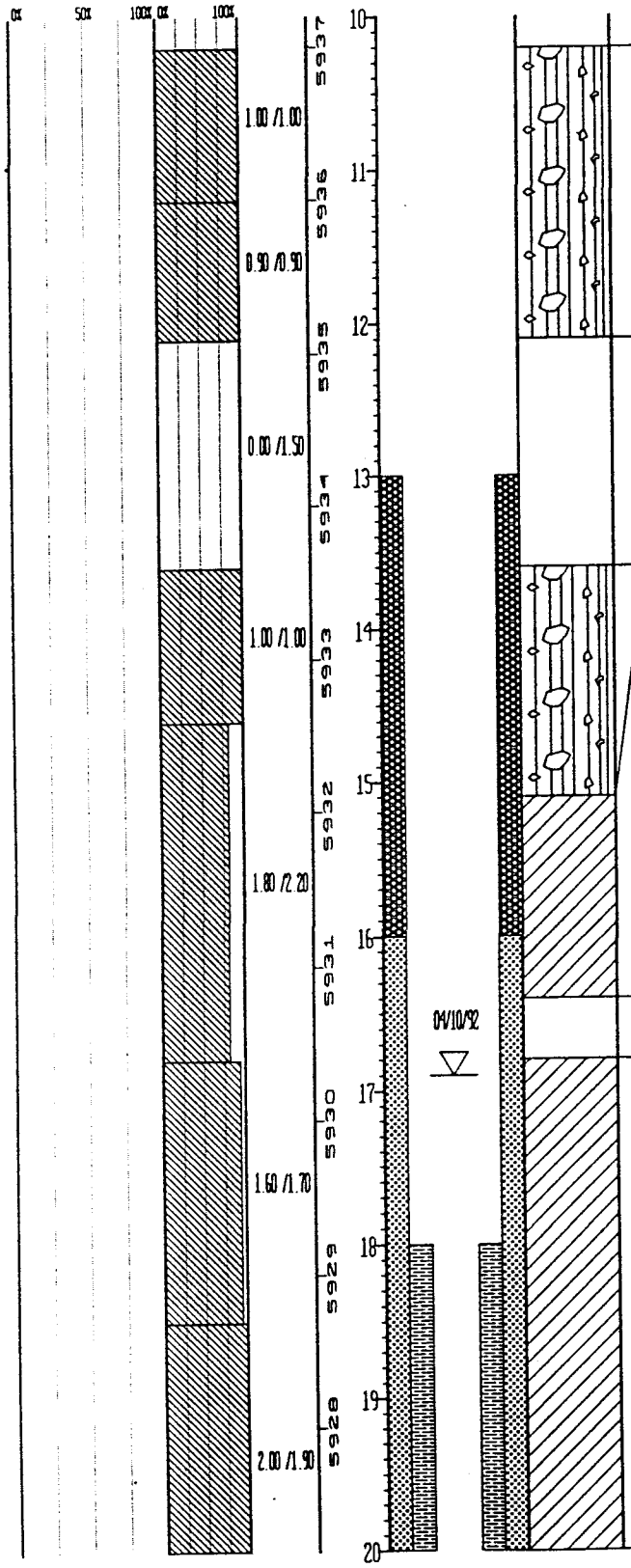
GM: Sandy Gravel with some silt and clay - light brown (5YR5/6) to moderate brown (5YR4/4), as described above.

No recovery for this interval.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 35.6	GROUND ELEVATION (FT):	5947.19	PROJECT NUMBER:	002/R1
NORTH: 750244.32	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST: 2088146.57	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/09/92

LOG OF BORING NUMBER: 20291

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 16.0 FT. - 13.0 FT.



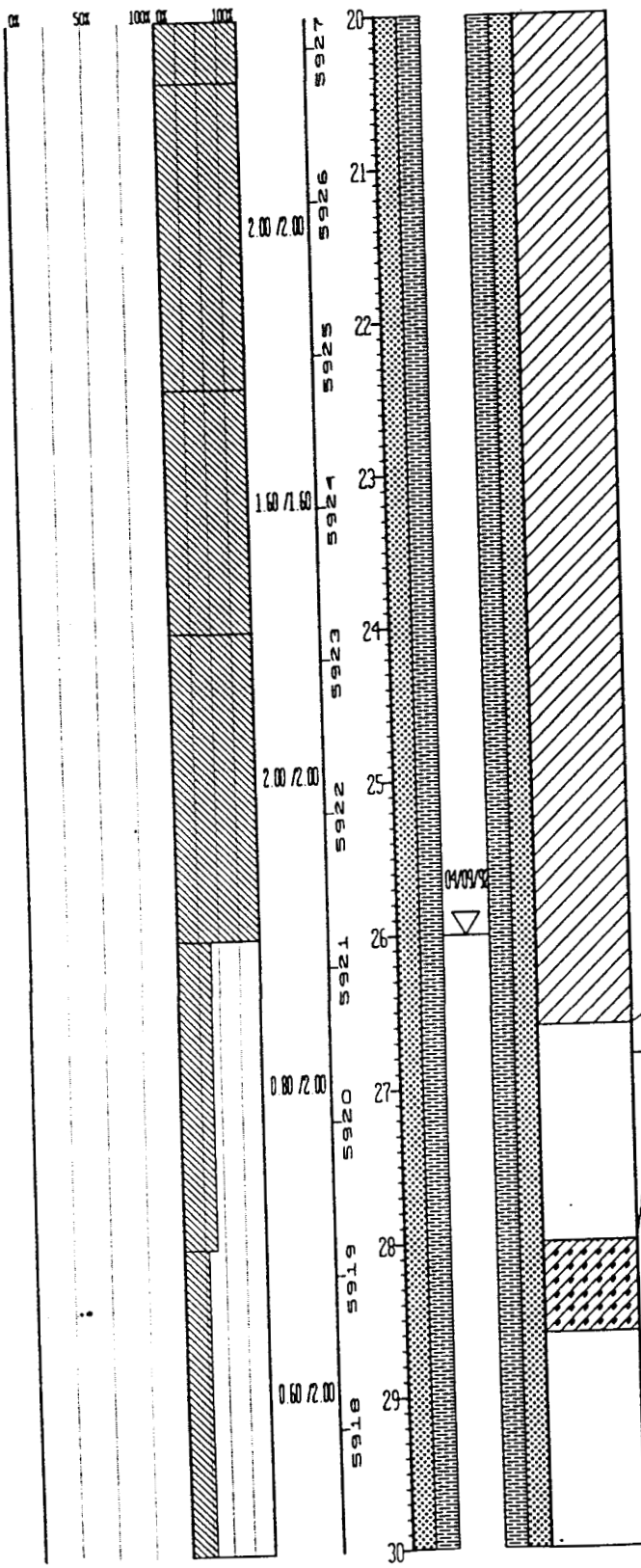
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
GM:	Sandy Gravel with some silt and clay - light brown (5YR5/6) to moderate brown (5YR4/4), as described above.
	No recovery for this interval.
GM:	Sandy Gravel with some silt and clay - light brown (5YR5/6) to moderate brown (5YR4/4), as described above.
CL:	Sandy Clay with some silt - light brown (5YR5/6) to moderate brown (5YR4/4), maximum and average gravel diameter .02', sand is fine- to medium-grained, poorly graded, gravel is rounded, sand is sub-rounded to sub-angular, gravel is primarily quartzite, sand contains abundant quartz, some rock fragments, calcrete, feldspar, trace mica, pale olive (10Y6/2) sandy clay rip-up clasts throughout, carbonaceous material at 17.8-18.5', 19.9-20.4', 23.1-23.6', 26.5', rounded .07'x.02' iron coated clay rip-up clast at 19.5', increased sand content at 20.4-21.2', thickly laminated at 21.5-22.4', moist at 15.1-26.0', wet to saturated at 26.0-28.0'. 1% gravel, 42% sand, 12% silt, 45% clay.
	No recovery for this interval.
CL:	Sandy Clay with some silt - light brown (5YR5/6) to moderate brown (5YR4/4), as described above.

STATE PLANE COORDINATE	TOTAL DEPTH (FT): 35.6	GROUND ELEVATION (FT):	5947.19	PROJECT NUMBER:	002/R1
NORTH: 750244.32	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST: 2088146.57	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/09/92

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 16.0 FT. - 13.0 FT.

LOG OF BORING NUMBER: 20291

CHEMICAL SAMPLE NUMBER | GRADATIONAL | 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



VOA sample obtained from this interval.

No recovery for this interval.

SC/gc: Gravelly Sand with some clay and silt - moderate brown (5YR4/4) to moderate brown (5YR3/4), maximum gravel diameter .18', average .04', sand is fine- to coarse-grained, well graded, gravel is rounded, sand is angular to rounded, moderate plasticity, gravel is primarily quartzite, sand contains abundant quartz, some rock fragments, feldspar, trace mica, iron/limonite stain, contact with underlying bedrock is undulating but sharp with well rounded imbricated pebbles at the contact, wet to saturated.
31% gravel, 36% sand, 9% silt, 24% clay

No recovery for this interval.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 35.6	GROUND ELEVATION (FT):	5947.19	PROJECT NUMBER:	002/RI	LOG OF BORING NUMBER:
NORTH: 750244.32	AREA NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	20291
EAST: 2088146.57	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/09/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 16.0 FT. - 13.0 FT.

CHEMICAL SAMP GRADATIONAL	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 /1.00	5917	30			SC/gc:	Gravelly Sand with some clay and silt - moderate brown (5YR4/4) to moderate brown (5YR3/4), as described above. Top of bedrock at 33.1 ft.
				2.00 /2.00	5916	31				
					5915	32				
					5914	33			CLAYSTONE:	Claystone with some silt and sand - dusky yellow (5Y6/4), very fine- to fine-grained, sub-angular to sub-rounded, approximately 4% porosity, argillaceous cement, slightly friable, abundant quartz, trace dark minerals, mottled with carbonaceous material throughout, heavily iron stained dark yellowish orange (10YR6/6) bed at 34.0', thin laminea of clay dipping 20 degrees at 35.0', iron nodule at 35.1', wet. 7% sand, 10% silt, 83% clay.
				2.60 /2.60	5913	34				
					5912	35				VOA sample obtained from this interval.
	H1006-5A002				5911	36				Total depth at 35.6 ft.
					5910	37				
					5909	38				
					5908	39				
						40				

STATE PLANE COORDINATE	TOTAL DEPTH (FT) 76.6	GROUND ELEVATION (FT) 5946.96	PROJECT NUMBER 0U2RI	LOG OF BORING NUMBER	
NORTH 750242	AREA NE TRENCHES	CASING DIAMETER (IN)	GEOLOGIST J.P. O'BRIEN	20391	
EAST 2088140	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN): 6.5	DATE DRILLED: 04/08/92		

REMARKS: HOLLOW-STEM AUGER. BACKFILL MATERIAL: BENTONITE 41.6 FT - 76.0 FT

CHEMICAL/GRADATIONAL	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%							Top soil, start of boring at 0.90 ft.
				0.70 /3.00	5946	1			SC:	Clayey Sand with abundant gravel and some silt - grayish brown (5YR3/2), maximum gravel diameter .21', average .07', fine- to coarse-grained sand, well graded, angular, low to medium plasticity, gravel is primarily caliche coated quartzite and calcrete, sand contains abundant quartz, calcret/caliche, some organic/carbonaceous material, rock fragments, no apparent bedding, slightly moist. 28% gravel, 34% sand, 8% silt, 30% clay.
					5945	2			GC:	Sandy Gravel with some clay and silt - very pale orange (10YR8/2) to grayish orange (10YR7/4), as described below.
										No recovery for this interval.
				1.00 /2.00	5944	3			GC:	Sandy Gravel with some clay and silt - very pale orange (10YR8/2) to grayish orange (10YR7/4), maximum gravel diameter .2', average .14', sand is fine- to coarse-grained, well graded, angular to sub-rounded, low plasticity, gravel is primarily quartzite, sand contains abundant calcrete/caliche, quartz, some rock fragments, feldspar, trace limonite stain, muscovite, no apparent bedding, slightly moist to dry. 53% gravel, 21% sand, 9% silt, 17% clay.
					5943	4				No recovery for this interval.
				0.70 /2.00	5942	5			GC:	Sandy Gravel with some clay and silt - light brown (5YR6/4) to light brown (5YR5/6), maximum gravel diameter > .25', average .09', sand is fine- to coarse-grained, well graded, angular to sub-rounded, low plasticity, gravel is primarily quartzite, sand contains abundant quartz, some rock fragments, feldspar, trace dark minerals, iron/limonite stain, mica, no apparent bedding, dry. 42% gravel, 25% sand, 12% silt, 21% clay.
					5941	6				No recovery for this interval.
					5940	7			GC:	Sandy Gravel with some clay and silt - light brown (5YR6/4) to light brown (5YR5/6), as described above.
				0.80 /2.00	5939	8				No recovery for this interval.
					5938	9			GC:	Sandy Gravel with some clay and silt - light brown (5YR6/4) to light brown (5YR5/6), as described above.
				1.20 /2.00	5937	10				

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 76.6	GROUND ELEVATION (FT): 5946.96	PROJECT NUMBER: OU2RI	LOG OF BORING NUMBER:
NORTH: 750242	AREA: NE TRENCHES	CASING DIAMETER (IN):	GEOLOGIST: J.P. O'BRIEN	20391
EAST: 2088140	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN): 6.5	DATE DRILLED: 04/08/92	

REMARKS: HOLLOW-STEM AUGER. BACKFILL MATERIAL: BENTONITE 41.6 FT. - 76.0 FT

CHEMICAL SAMPLE GRADATIONAL	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
				1.20 /2.00		10				No recovery for this interval.
					5936	11			GC:	Sandy Gravel wiht some clay and silt - light brown (5YR6/4) to light brown (5YR5/6), as described above.
				0.20 /2.00	5935	12				No recovery for this interval.
					5934	13			GC:	Sandy Gravel with some clay and silt - light brown (5YR6/4) to light brown (5YR5/6), as described above.
				0.60 /1.00						No recovery for this interval.
					5933	14			GC:	Sandy Gravel with some clay and silt - light brown (5YR6/4) to light brown (5YR5/6), as described above
				1.30 /2.00	5932	15				No recovery for this interval
					5931	16			GC:	Sandy Gravel with some clay and silt - light brown (5YR6/4) to light brown (5YR5/6), as described above.
				0.40 /2.00	5930	17				No recovery for this interval.
					5929	18			CL:	Silty Clay with some sand - light brown (5YR5/6), maximum and average gravel diameter .02", fine- to medium-grained sand, poorly graded, gravel is rounded, sand is angular to sub-rounded, medium plasticity, gravel is primarily quartzite, sand contains abundant quartz, some rock fragments, kaolinized feldspar, feldspar, dark minerals, mica, carbonaceous material throughout, especially heavy at 21.1', thinly laminated to thinly bedded, moist. Perched water zone at 22.0-22.7', saturated 2% gravel, 8% sand, 23% silt, 67% clay.
				2.00 /2.00	5928	19				
					5927	20				

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 76.6	GROUND ELEVATION (FT):	5996.96	PROJECT NUMBER:	0U2RI
NORTH: 750242	AREA: NE TRENCHES	CASING DIAMETER (IN):		GEOLOGIST:	J.P. O'BRIEN
EAST: 2088140	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	6.5	DATE DRILLED:	04/08/92

LOG OF BORING NUMBER: 20391

REMARKS: HOLLOW-STEM AUGER. BACKFILL MATERIAL: BENTONITE 41.6 FT. - 76.0 FT.

CHEMICAL SAMP GRADATIONAL	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	5926	20 21				
				2.00 /2.20	5925 5924	22 23				
				2.20 /2.30	5923 5922	24 25				No recovery for this interval.
					5921	26			CL	Silty Clay with some sand - light brown (5YR5/6), as described above.
				1.30 /2.20	5920 5919	27 28	03/27/92 ▽		CL	Sandy Clay with some silt - moderate brown (5YR4/4), maximum gravel diameter .23' at 28.8', average .03', fine- to medium-grained sand, poorly graded, sub-angular to rounded, medium plasticity, gravel is primarily quartzite with some pale olive (10Y6/2) sandy clay rip-up clasts at 27.5-28.0', and trace weathered granite, sand contains abundant quartz, some rock fragments, kaolinized feldspar, feldspar, mica, trace dark minerals, carbonaceous material throughout, very moist to saturated 2% gravel, 35% sand, 13% silt, 50% clay.
				0.50 /0.50	5918	29			GC	Sandy Gravel with some clay and silt - light brown (5Y5/6) to moderate brown (5YR3/4), maximum gravel diameter > .25', average .12', sand is fine- to coarse-grained, well graded, gravel is rounded to well rounded, sand is angular to sub-rounded, low plasticity, gravel is primarily quartzite with some weathered
				1.40 /1.40	5917	30				

STATE PLANE COORDINATE	TOTAL DEPTH (FT): 76.6	GROUND ELEVATION (FT):	5946.96	PROJECT NUMBER:	0021
NORTH: 750242	AREA: NE TRENCHES	CASING DIAMETER (IN):		GEOLOGIST:	J.P. O'BRIEN
EAST: 2088140	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	6.5	DATE DRILLED:	04/08/92

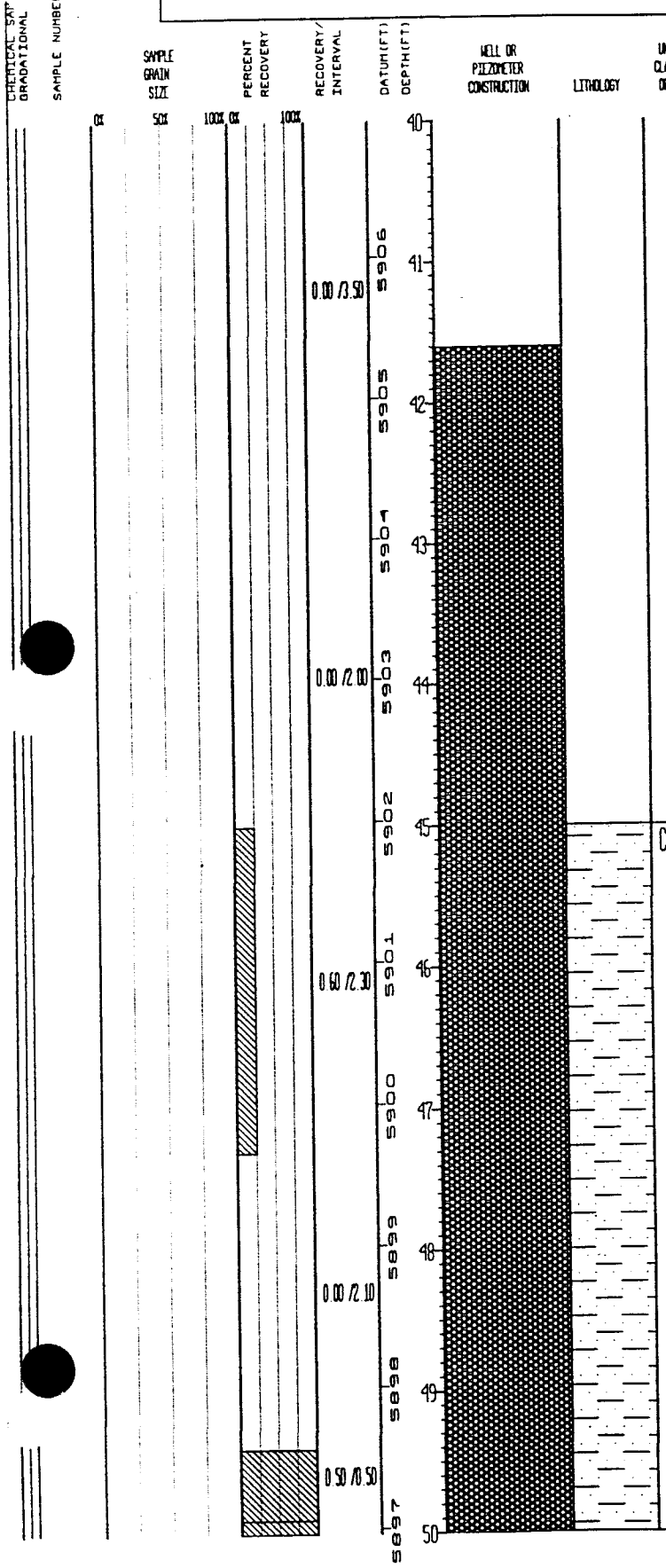
LOG OF BORING NUMBER: 20391

REMARKS: HOLLOW-STEM AUGER. BACKFILL MATERIAL: BENTONITE 41.6 FT. - 76.0 FT.

CHEMICAL SAT GRADATIONAL	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%	1.70 /1.70	5916 5915	30 31 32				granite at 30.2', and trace very friable weathered dark mafic igneous rock fragment (.2'x.2') at 31.8', sand contains abundant quartz, some rock fragments, feldspar, trace dark minerals, kaolinized feldspar, mica, increased sand content and no gravel at 29.7-29.9', 30.6-32.0', pale olive (10Y6/2), sandy clay rip-up clasts at 32.1-36.0', contact with underlying bedrock is sharp with pebbles loaded into claystone, claystone rip-up clasts .06'x.04' along contact, saturated. 49% gravel, 24% sand, 11% silt, 16% clay.
				0.00 /2.00	5914 5913	33 34				No recovery for this interval.
				0.90 /1.70	5912	35			GC:	Sandy Gravel with some clay and silt - light brown (5Y5/6) to moderate brown (5YR3/4), as described above.
					5911	36				No recovery for this interval. Top of bedrock at 36.0 ft
				1.60 /1.70	5910	37			SANDY CLAYSTONE:	Sandy Claystone with some silt - grayish yellow (5Y8/4) to yellowish gray (5Y7/2), very fine- to fine-grained, very well sorted, sub-rounded to rounded, approximately 11% porosity, argillaceous cement, moderately to slightly friable, abundant frosted quartz, trace dark minerals, iron stain, thinly laminated, few very thin beds, iron staining, throughout, dry. 22% sand, 6% silt, 72% clay.
				0.10 /0.10	5909	38				
				0.00 /1.10	5908	39				
				0.60 /0.60	5907	40				No recovery for this interval.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 76.6	GROUND ELEVATION (FT): 5996.96	PROJECT NUMBER: 002RI	LOG OF BORING NUMBER:	
NORTH: 750242	AREA: NE TRENCHES	CASING DIAMETER (IN):	GEOLOGIST: J.P. O'BRIEN	20391	
EAST: 2088140	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN): 6.5	DATE DRILLED: 04/08/92		

REMARKS: HOLLOW-STEM AUGER. BACKFILL MATERIAL: BENTONITE 41.6 FT. - 76.0 FT.



CLAYEY SANDSTONE: Clayey Sandstone with some silt - dusky yellow (5Y6/4), maximum gravel diameter fine- granule- and pebble gravel (sluff, see rig geologist's log), sand is fine- to very fine-grained, very poorly sorted, sand is angular to well rounded, approximately 20% porosity, argillaceous cement, highly friable, sand contains abundant frosted quartz, some rock fragments, trace dark minerals, kaolinized feldspar, iron/limonite stain, clear quartz, carbonaceous material, conglomerate at 45.1-45.5', and 49.4-49.6', drilling sluff thinly laminated at 49.7-50.4', trace convolute laminations, dry.
1% gravel, 57% sand, 7% silt, 35% clay.
Note: Coarse material gravel is from Alluvium above, core barrel was tipped out and hole dry cored at 45.0-49.4'.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 76.6	GROUND ELEVATION (FT):	5946.96	PROJECT NUMBER:	002RI
NORTH: 750242	AREA: NE TRENCHES	CASING DIAMETER (IN):		GEOLOGIST:	J.P. O'BRIEN
EAST: 2088140	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN):	6.5	DATE DRILLED:	04/08/92

LOG OF BORING NUMBER: 20391

REMARKS: HOLLOW-STEM AUGER. BACKFILL MATERIAL: BENTONITE 41.6 FT. - 76.0 FT.

CHEMICAL SAT GRADATIONAL	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%	0.50 /0.50	5896	50				No recovery for this interval at 50.4-74.0'. This interval was reamed as per instructions from: Robert Smith, Connie Dodge, Eric Dille
					5895	51				
					5894	52				
					5893	53				
					5892	54				
					5891	55				
					5890	56				
					5889	57				
					5888	58				
					5887	59				
						60				

STATE PLANE COORDINATE	TOTAL DEPTH (FT) 76.6	GROUND ELEVATION (FT) 5946.96	PROJECT NUMBER 002RI	LOG OF BORING NUMBER	
NORTH 750242	AREA NE TRENCHES	CASING DIAMETER (IN)	GEOLOGIST J.P. O'BRIEN	20391	
EAST 2088140	LOCATOR NUMBER I14	BOREHOLE DIAMETER (IN) 6.5	DATE DRILLED 04/08/92		

REMARKS HOLLOW-STEM AUGER BACKFILL MATERIAL: BENTONITE 41.6 FT. - 76.0 FT.

CHEMICAL SAMPLE / GRADATIONAL	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%		5886	60				
					5885	61				
					5884	62				
					5883	63				
					5882	64				
					5881	65				
					5880	66				
					5879	67				
					5878	68				
					5877	69				
						70				

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 76.6	GROUND ELEVATION (FT): 5946.96	PROJECT NUMBER: 002RI	LOG OF BORING NUMBER:	
NORTH: 750242	AREA: NE TRENCHES	CASING DIAMETER (IN):	GEOLOGIST: J.P. O'BRIEN	20391	
EAST: 2088140	LOCATOR NUMBER: I14	BOREHOLE DIAMETER (IN): 6.5	DATE DRILLED: 04/08/92		

REMARKS: HOLLOW-STEM AUGER. BACKFILL MATERIAL: BENTONITE 41.6 FT. - 76.0 FT.

CHEMICAL SAMP GRADATIONAL	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
					5876	70				
					5875	71				
					5874	72				
					5873	73				
					5872	74			SANDY CLAYSTONE	Sandy Claystone with some silt - medium gray (N5) to dark gray (N3), very fine-grained, very well sorted, sub-angular to rounded, approximately 9% porosity, argilloceous cement, moderately to slightly friable, abundant frosted quartz, some dark minerals, thinly laminated to thinly bedded, dry. 31% sand, 14% silt, 55% clay.
					5871	75				No recovery for this interval.
					5870	76			SANDY CLAYSTONE	Sandy Claystone with some silt - medium gray (N5) to dark gray (N3), as described above.
					5869	77				Total depth at 76.6 ft.
					5868	78				
					5867	79				
						80				

OU2-ALLUVIUM

RFEDS

WELL INSTALLATION FORM

Well Number: 02 2491 Project Number: 4006 EMAD
Old Well No.:

Area: NE Trenches North or Y: 750242.48 East or X: 2088134.94
Purpose: GW Plume Characterization / pump testing
Formation: Alluvium Well Status: Active
Contractor: Woodward-Clyde Drilling Method: Hollow-Stem Auger
Geologist: B. Edgerly Locator: H 19
Date Drilled: 4/10-4/13/92 Ground Elev: 5947.23 ft.

Total Depth: 32.9 ft. Stick Up: -2.0 ft.
Depth to Bedrock: 31.6 ft. Completed Depth: 32.9 ft.
Casing Diameter: 2.0 in. Borehole Diam.: 10.0 in.

Monitoring Interval: 16.6 ft. to 31.6 ft.
Initial Water Level: 27.0 ft. Date: 4-10-92
Completed Water Level: 19.6 ft. Date: 4-13-92

Item	From	To	I.D.	Type
Surface Seal:	3.0 ft.	0.0 ft.		Concrete
Protective Casing:	2.8 ft.	-2.8 ft.	6.0 in.	Steel
Surface Casing:	32.9 ft.	-2.0 ft.	2.0 in.	PVC Sch. 40
Secondary Casing:	N/A ft.	ft.	in.	N/A
Centralizer:	N/A ft.	ft.	in.	N/A
Bentonite Seal:	14.6 ft.	10.9 ft.		Bentonite
Filter Pack:	32.1 ft.	14.6 ft.		16-40 Sand
Volume:	9.2 cu. ft.			
Screen:	31.6 ft.	16.6 ft.	2.0 in.	PVC Sch. 40
Slot Size:	0.01 in.			
Sump:	32.9 ft.	31.6 ft.	2.0 in.	PVC Sch. 40
Backfill Seal:	32.9 ft.	32.1 ft.		Bentonite
Backfill:	N/A ft.	ft.		Bentonite
Volume:	0.4 cu. ft.			

Tech CK
REL 4-14-92

OU2-ALLUVIUM

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

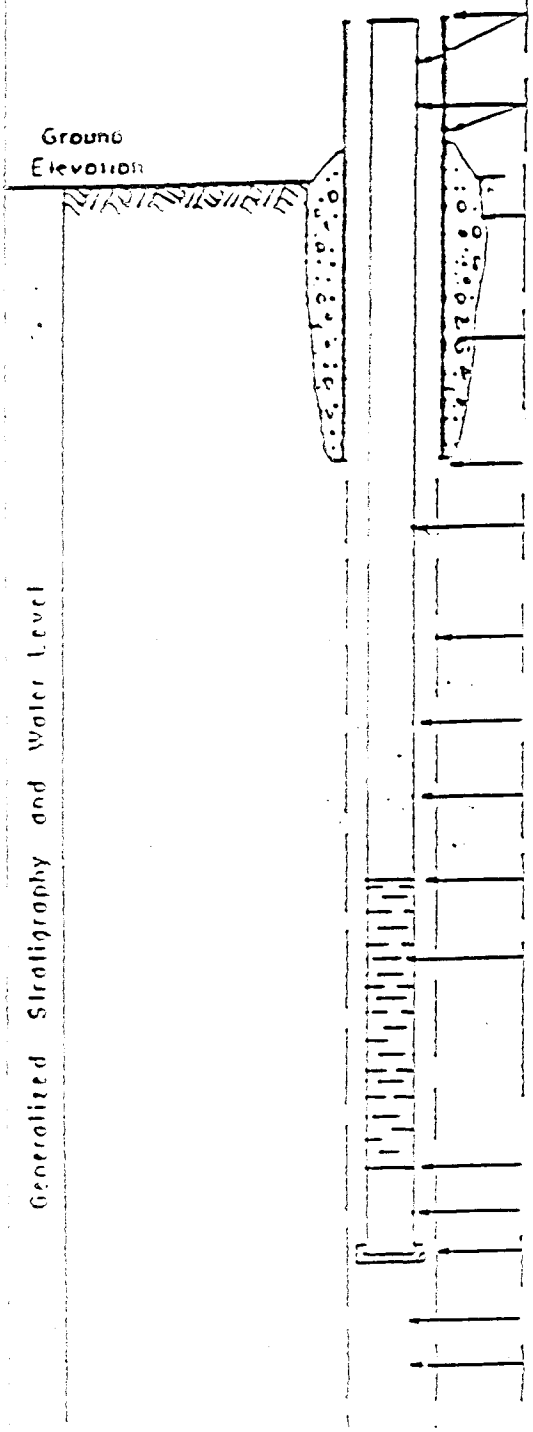
FORM GT.6A

GROUNDWATER MONITORING WELL AND PIEZOMETER REPORT

PROJECT: OU2 RFI/RI Phase II
LOCATION: NG Trenches
Date Completed: 4-13-92 Original Depth: 32.9 ft.
Inspected By: _____ Date: _____
Checked By: _____ Date: _____

Page 1 of 1
Well No. 0B2049
Aquifer: Alluvium
Depth Interval: 16.6-31.6

NOTE CENTRALIZER DEPTHS



Elevation of top of surface casing / riser pipe.	
Height of top of surface casing / riser pipe above ground surface	-2.2 / -2.0 ft.
Depth of surface seal below ground surface	3.0 ft
Type of surface seal: concrete	
I.D. of surface casing.	6.0 in.
Type of surface casing: ~~concrete~~ steel	
Depth of surface casing below ground	2.8 ft
I.D. of riser pipe.	2.0 in.
Type of riser pipe: sch. 40 PVC	
Diameter of borehole	10.0 in.
Depth of borehole	32.9 ft.
Type of backfill: bentonite grout	
Elev./depth top of seal.	10.9 ft.
Type of seal: bentonite pellets	
Elev./depth bottom of seal.	14.6 ft.
Type of filter pack: 16-40 silica sand	
Depth of top of filter pack.	14.6 ft.
Elev./depth top of screened section.	16.6 ft.
Type of screened section: sch. 40 PVC	
Screen openings: 0.01 in.	
I.D. of screened section.	2.0 in.
Elev./depth bottom of screened section.	31.6 ft.
Length of blank section.	1.0 ft.
Elev./depth bottom of plugged blank section.	32.9 ft.
Elev./depth bottom of sand column	32.1 ft.
Type of backfill below observation pipe: ~~bentonite pellets~~ Bentonite	32.9 ft.
Elev./depth of hole	

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

PG QA 5-14-92

Form 2.2A

PG 1

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title: Ray Michael – Field Tech

Well ID: 0B20491

Survey location coordinates: North: N/A East: N/A

Date this report: 5-13-92 Date well installation: 4-13-92 Date well development: 5-13-92

Well designation: OB well

Ground elevation: Est: N/A Survey: N/A

Screened interval: 18.6'–33.6' Formation: N/A

Measuring point (MP): Top of well casing/other: ~~22.54+.07=22.61~~ Well stick up: ~~.26~~ .27'

Water level (below MP): Start: 22.54 End: 22.63

Well depth (below MP): ~~22.54+.07=22.61~~ 35.08 +.07=35.15 Water elevation (BGS): N/A

Method used to measure water level: Solinst Estimated recharge rate:

Volume of saturated annulus (assume 30 percent porosity): N/A

Volume Calculation: 35.15 – 22.54 = 12.61 x 0.16 = 2.02

Quantity of water used during drilling: N/A

Depth of sediment (below MP): Before: N/A After: N/A

Development equipment: Grundfos Pump

Sampling equipment: N/A

pH meter No. 910714159 Calibration: 4.00/7.03 16.8°C Time/10:06

Specific conductance meter No.: 900103503 Calibration: 1.14 @ 18.1°C Time 1008

F.T.U. meter No.: 900409105 Calibration: N/A

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1036	NA	OVRR	7.61	20.4	0.58	0	0	Muddy Brown
1040	0.50	OVRR	7.42	16.2	0.88	2.02	1	Muddy Brown
1043	0.67	OVRR	7.48	15.4	0.89	4.04	2	Muddy Brown
1046	0.67	OVRR	7.47	15.3	0.78	6.06	3	Muddy Brown
1050	0.50	OVRR	7.51	15.1	0.96	8.08	4	Muddy Brown
1052	1.01	294	7.49	15.0	0.79	10.10	5	Muddy Brown
1054	1.01	OVRR	7.52	15.0	0.97	12.12	6	Muddy Brown
1057	.67	350	7.50	14.5	0.81	14.14	7	Muddy Brown
1100	.67	241	7.48	14.9	0.77	16.16	8	Muddy Brown
1102	1.01	149	7.49	15.4	0.77	18.18	9	Cloudy Lt Brown

Comments:

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

PG 2 Cont

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title RAY Michael Field tech

Well ID ~~OB2024R~~ OB20491

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: See Page 1 End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1105	0.67	162	7.48	15.7	0.76	20.20	10	Cloudy Lt Brown
1108	0.67	73	7.44	15.6	0.77	22.22	11	Cloudy Tan
1111	0.67	112	7.49	15.9	0.76	24.24	12	Cloudy Tan
1113	0.67	77	7.46	16.4	0.76	26.26	13	Cloudy Whitish
1116	0.67	78	7.50	16.2	0.76	28.28	14	Cloudy Whitish
1119	0.67	69	7.40	15.5	0.76	30.30	15	Cloudy Whitish
1121	0.67	60	7.49	15.5	0.77	32.32	16	Cloudy Whitish
1124	0.67	34	7.51	15.2	0.77	34.34	17	Cloudy Whitish
1127	0.67	48	7.47	15.6	0.79	36.36	18	Cloudy Whitish
1129	1.01	55	7.47	15.1	0.76	38.38	19	Cloudy Whitish

Comments: _____

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form

PG 3

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title RAY michael Field Tech

Well ID 05204491

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

See Page 2

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1133	0.51	52	7.53	14.9	0.77	40.40	20	Cloudy whitish
1136	0.67	71	7.53	15.8	0.77	42.42	21.	Cloudy whitish

Comments: _____

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

PG-1

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title RAx Michael Field Tech

Well ID OB 20491

Survey location coordinates: North N/A East N/A

Date this report 5-18-92 Date well installation 4-13-92 Date well development 5-18-92

Well designation: OB well

Ground elevation: Est: N/A Survey: N/A

Screened interval: 18.6' – 33.6' Formation: N/A

Measuring point (MP): Top of well casing/other: N/A Well stick up: 2'

Water level (below MP): Start: 22.78 End:

Well depth (below MP): 35.08 + .07 = 35.15 Water elevation (BGS) N/A

Method used to measure water level: Solinst Estimated recharge rate: 5.31 gal/30 min

Volume of saturated annulus (assume 30 percent porosity): N/A

Volume Calculation: 12.32 X 0.16 = 1.98

Quantity of water used during drilling: N/A

Depth of sediment (below MP): Before: N/A After: N/A

Development equipment: Grundfos Pump

Sampling equipment: N/A

pH meter No. 910714159 Calibration: 4.00 @ 7.02 20.2°C @ Time 0905

Specific conductance meter No.: 90010503 Calibration: 1.08 @ 23.0°C Time 0908

F.T.U. meter No.: 90409105 Calibration: N/A

Time	Pumping Rate gpm	FTU	pH	Temp °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
0936	NA	over	7.42	24.1	0.79	0	0	muddy Brown
0938	0.99	over	7.45	15.8	0.82	1.98	1	muddy Brown
0940	0.99	over	7.44	14.9	0.79	3.96	2	muddy Brown
0944	0.99	over	7.44	15.6	0.79	5.94	3	muddy Brown
0946	0.99	over	7.43	15.3	0.77	7.92	4	muddy Brown
0950	0.99	over	7.45	15.6	0.77	9.90	5	muddy Brown
0952	0.99	over	7.46	15.1	0.77	11.88	6	muddy Brown
0955	0.99	over	7.45	14.9	0.75	13.86	7	muddy Brown
0958	0.99	over	7.51	15.7	0.75	15.84	8	muddy Brown
1000	0.99	over	7.48	14.9	0.75	17.82	9	muddy Brown

Comments:

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

PG 2

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title RAY Michael Field Tech

Well ID 0B20491

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development 5-18-92

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: See pg End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1004	1.32	Over	7.44	16.0	0.78	19.80	10	Muddy Brown
1007	1.32	Over	7.62	15.6	0.75	21.78	11	Muddy Brown
1010	1.32	over	7.46	16.1	0.77	23.76	12	muddy Brown
1012	1.32	over	7.56	15.0	0.76	25.74	13	muddy Brown
1016	1.32	over	7.52	16.3	0.74	27.72	14	muddy Brown
* 1018	1.32	over	7.48	15.8	0.76	29.70	15	muddy Brown
1022	—				—	31.68	16	" "
1024	—				—	33.66	17	" "
1026	—				—	35.64	18	" "
1027	—				—	37.62	19	" "

Comments: *Started taking Parameters every 5 Vol

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

PG3

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Ray Michael Field Tech

Well ID OB20491

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

See Page 1

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

	Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed Gallons	Cum. Vol. of H_2O Removed Casing Vols.	Physical Description of Water
*	1029	1.32	over	7.45	14.9	0.72	39.6	20	muddy Brown
**	1039	1.58	—	—	—	—	41.58	21	muddy Brown
	1040	1.58	—	—	—	—	43.56	22	muddy Brown
	1041	1.58	—	—	—	—	45.54	23	muddy Brown
	1043	1.58	—	—	—	—	47.52	24	muddy Brown
	1044	1.58	over	7.47	15.8	0.71	49.50	25	muddy Lt. Brown
X	1047	1.98	—	—	—	—	51.48	26	" " "
	1049	1.98	—	—	—	—	53.46	27	" " "
	1050	1.98	—	—	—	—	55.44	28	" " "
	1051	1.98	—	—	—	—	57.42	29	" " "

Comments: ** Stopped to refresh & resurge well

*** Refigured Pump rate

X Pump off

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

PG 4

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title RAy Michael Field Tech

Well ID OB 20491

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

See Page 1

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1052	1.9	over	7.48	16.3	0.71	59.40	30	muddy Lt. Brown
1055	1.9	—	—	—	—	61.38	31	" " "
1057	1.9	—	—	—	—	63.36	32	" " "
1058	1.8	—	—	—	—	65.34	33	" " "
1059	1.8	—	—	—	—	67.32	34	" " "
1100	1.8	over	7.57	15.8	0.73	69.30	35	" " "
1101	1.8	—	—	—	—	71.28	36	" " "
1102	1.8	—	—	—	—	73.26	37	" " "
1105	1.8	—	—	—	—	75.24	38	
1108	1.8	—	—	—	—	77.22	39	

MP off

Comments: _____

(4011-452)WATER-2-SOP(02-27-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 22A

Pg 5

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Ray Michaud Field Tech

Well ID OB 20491

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): See Page 1

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1110	1.62	over	7.47	16.6	0.74	79.20	40	muddy Lt. Brown
1111	1.62	—	—	—	—	81.18	41	" " "
1113	1.62	—	—	—	—	83.16	42	" " "
1114	1.62	—	—	—	—	85.14	43	" " "
1115	1.8	—	—	—	—	87.12	44	" " "
1117	1.8	over	7.50	16.2	0.73	89.10	45	" " "
1134	NA	—	—	—	—	91.08	46	muddy Lt Brown
1135	1.77	—	—	—	—	93.06	47	" " "
1136	1.77	—	—	—	—	95.04	48	" " "
1137	1.77	—	—	—	—	97.02	49	" " "

Comments: _____

(4011-4ST)WATER2-2SOF(02-27-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

PG6

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title RAY Michael Field Tech

Well ID ~~OB24~~ OB20491

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

See Page 1

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
1138	1.77	over	7.42	15.7	0.70	99.0	50	muddy Lt Brown
1140	1.77	"				100.98	51	" " "
1145	1.32	"				102.96	52	" " "
1146	1.66	"				104.94	53	" " "
1147	1.66	"			0.74	106.92	54	" " "
1148	1.66	"	7.53	15.4	0.74	108.90	55	" " "
1149	1.66					110.88	56	" " "
1151	1.66					112.86	57	" " "
1153	1.66					114.84	58	" " "
1154	1.66					116.86	59	" " "

Comments: _____

(4011-4ST)WATER3-2.SOP(02-27-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form [illegible]

PG7

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Ray Michael Field Tech

Well ID OB 20491

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): See PG 1

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1155	1.66	283	7.52	16.8	0.75	118.84	60	Cloudy white
1157	1.66					120.82	61	" "
1159	1.66					122.80	62	" "
1200	1.66					124.78	63	" "
1202	1.58					126.76	64	"
1203	1.58	99	7.48	15.6	0.75	128.74	65	" "
* 1206						130.72	66	
						132.70	67	
						134.68	68	
						136.66	69	

Comments: Check Recharge Rate @ 1208 5.31 Ft Per 30 min

25.25
23.48
1.77 =
5.31

STATE PLANE COORDINATE	TOTAL DEPTH (FT): 32.9	GROUND ELEVATION (FT):	5947.23	PROJECT NUMBER:	002/RI
NORTH: 750242	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST: 2088134	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/10/92

LOG OF BORING NUMBER: 20491

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 14.6 FT - 10.9 FT.
WELL 20491 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20391.

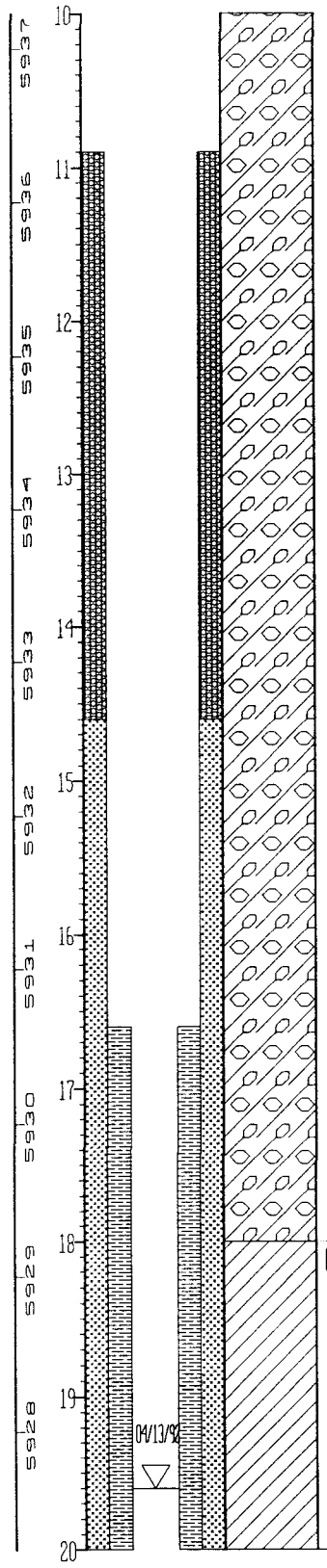
CHEMICAL SAMPLE DEPTH	GRADATIONAL SAMPLE NUMBER	SAMPLE GRAIN SIZE (0% 50% 100%)	PERCENT RECOVERY (0% 100%)	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
					5947	0				
					5946	1			SC	Clayey Sand with abundant gravel and some silt
									GC	Sandy Gravel with some clay and silt
					5945	2				
					5944	3				
					5943	4				
					5942	5			GC	Sandy Gravel with some clay and silt
					5941	6				
					5940	7				
					5939	8				
					5938	9				
						10				

STATE PLANE COORDINATE	TOTAL DEPTH (FT): 32.9	GROUND ELEVATION (FT)	5947.23	PROJECT NUMBER:	OU2/RI
NORTH: 750242	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST: 2088134	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/10/92

LOG OF BORING NUMBER: 20491

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 14.6 FT - 10.9 FT.
WELL 20491 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20391.

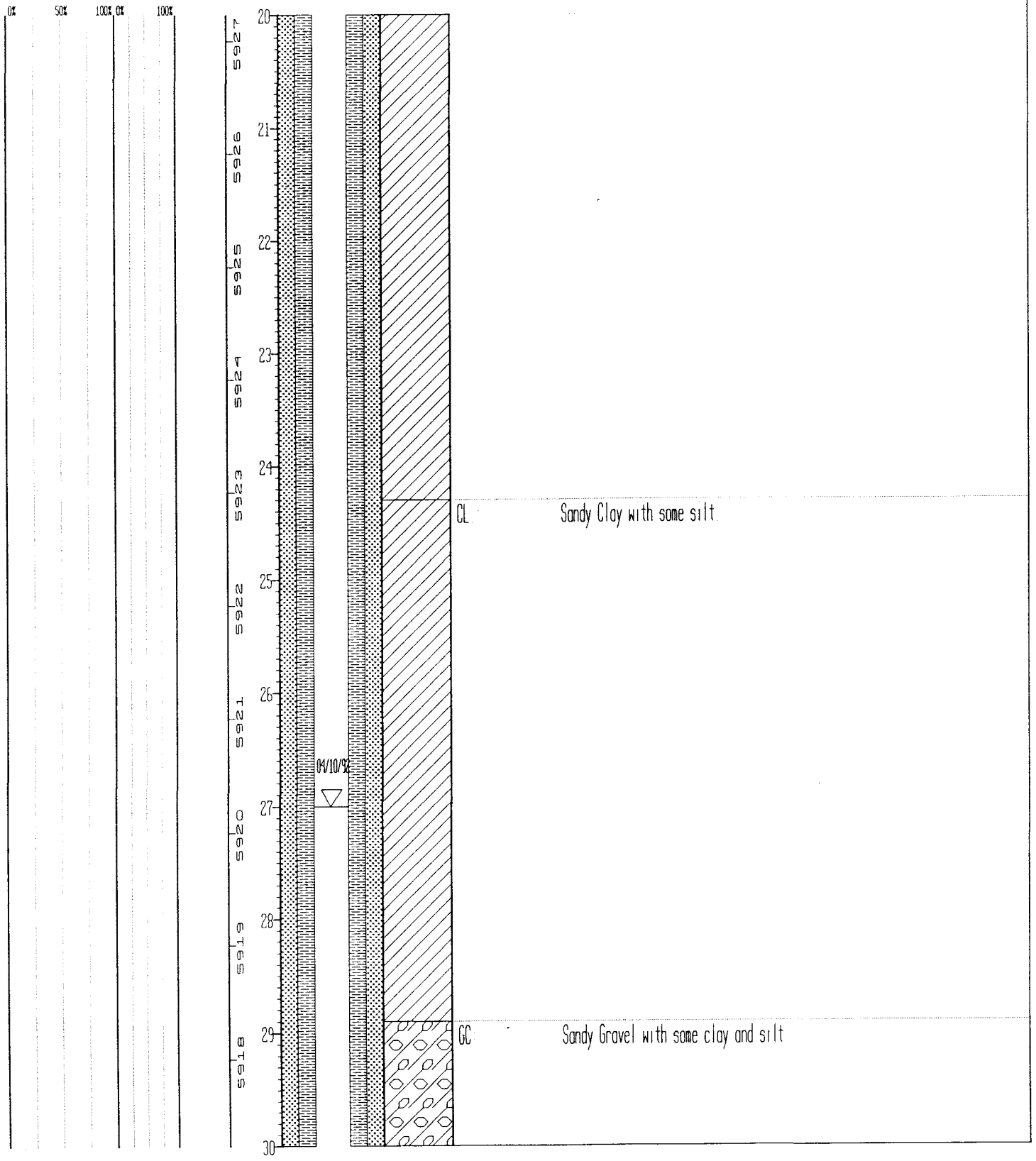
CHEMICAL SAMPLE DEPTH | GRADATIONAL SAMPLE DEPTH | SAMPLE NUMBER | SAMPLE GRAIN SIZE (0% 50% 100%) | PERCENT RECOVERY (0% 100%) | RECOVERY/INTERVAL | DATUM (FT) | DEPTH (FT) | WELL OR PIEZOMETER CONSTRUCTION | LITHOLOGY | UNIFIED SOILS CLASSIFICATION OR ROCK TYPE | DESCRIPTION



CL Silty Clay with some sand.

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 32.9	GROUND ELEVATION (FT) 5947.23	PROJECT NUMBER OU2/RI	LOG OF BORING NUMBER
NORTH	750242	AREA NE TRENCHES	CASING DIAMETER (IN) 2.0	GEOLOGIST J.P. O'BRIEN	20491
EAST	2088134	LOCATOR NUMBER H14	BOREHOLE DIAMETER (IN) 10.0	DATE DRILLED 04/10/92	

REMARKS: HOLLOW-STEM AUGER BENTONITE SEAL 14.6 FT - 10.9 FT.
WELL 20491 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20391.



STATE PLANE COORDINATE	TOTAL DEPTH (FT) 32.9	GROUND ELEVATION (FT)	5947.23	PROJECT NUMBER	OU2/RI
NORTH 750242	AREA NE TRENCHES	CASING DIAMETER (IN)	2.0	GEOLOGIST	J.P. O'BRIEN
EAST 2088134	LOCATOR NUMBER H14	BOREHOLE DIAMETER (IN)	10.0	DATE DRILLED	04/10/92

LOG OF BORING NUMBER 20491

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 14.6 FT. - 10.9 FT.
WELL 20491 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20391.

CHEMICAL SAMPLE DEPTH	GRADATIONAL 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
						5917	30				
						5916	31				
						5915	32				
						5914	33				Total depth at 32.9 ft
						5913	34				
						5912	35				
						5911	36				
						5910	37				
						5909	38				
						5908	39				
							40				

OU2-ALLUVIUM

RFEDS
WELL INSTALLATION FORM

Well Number: OB 21191 | Project Number: EMAD
Old Well No.:

Area: N E Trenches | North or Y: 750251.90 | East or X: 2088153.07
Purpose: GW Plume Characterization
Formation: Arapahoe Fm. | Well Status: Active
Contractor: Woodward-Clyde | Drilling Method: Hollow-Stem Auger
Geologist: AMH | Locator: H 14
Date Drilled: 4/13/92 | Ground Elev: 5946.85 ft.

Total Depth: 58 ft. | Stick Up: -2.0 ft.
Depth to Bedrock: 31.7 ft. | Completed Depth: 58.0 ft.
Casing Diameter: 2.0 in. | Borehole Diam.: 10.0 in.

Monitoring Interval: 57.8 ft. to 35.8 ft.
Initial Water Level: 26.7 REL ~~17.2~~ ft. | Date: ~~4/15/92~~ 4-14-92
Completed Water Level: 17.2 ft. | Date: 4/15/92

Item		From	To	I.D.	Type
Surface Seal:		3.0 ft.	0.0 ft.		Concrete
Protective Casing:		2.8 ft.	-2.2 ft.	6.0 in.	Steel
Surface Casing:		51.8 ft.	-2.0 ft.	2.0 in.	PVC Sch. 40
Secondary Casing:	N/A	ft.	ft.	in.	N/A
Centralizer:	N/A	ft.	ft.	in.	N/A
Bentonite Seal:		29.0 ft.	25.5 ft.		Bentonite
Filter Pack:		58.0 ft.	29.0 ft.		16-40 Sand
Volume:	15.0 cu. ft.				
Screen:		57.8 ft.	35.8 ft.	2.0 in.	PVC Sch. 40
Slot Size:	0.01 in.				
Sump:		58.0 ft.	57.8 ft.	2.0 in.	PVC Sch. 40
Backfill Seal:		- ft.	- ft.		Bentonite
Backfill:		- ft.	- ft.		Bentonite
Volume:	cu. ft.				

Tour CK
REL 4-16-92

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GT.6A

GROUNDWATER MONITORING WELL AND PIEZOMETER REPORT

PROJECT OU2 RFI/RI Phase II

LOCATION NE Trenches

Date Completed 4-15-92 Original Depth 58.0

Inspected By _____ Date _____

Checked By _____ Date _____

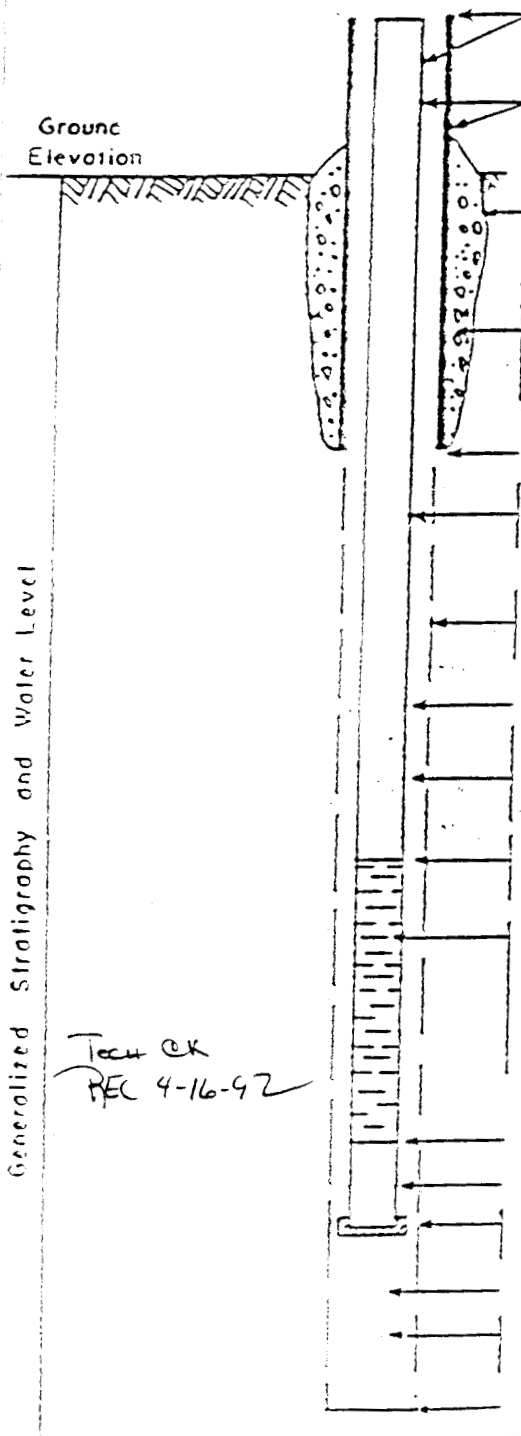
Page 1 of 1

Well No. OB21191

Aquifer Arapahoe Fm.

Depth Interval 35.8 - 57.8

NOTE CENTRALIZER DEPTHS



Elevation of top of surface casing / riser pipe.	
Height of top of surface casing / riser pipe above ground surface	-2.2 / 2.0 ft
Depth of surface seal below ground surface	3.0 ft
Type of surface seal: concrete	
I.D. of surface casing.	6.0"
Type of surface casing: steel	
Depth of surface casing below ground	2.8 ft
I.D. of riser pipe.	2.0"
Type of riser pipe: PVC sch 40	
Diameter of borehole	10.0"
Depth of borehole	58
Type of backfill: bentonite grout	
Elev./depth top of seal.	25.5
Type of seal: bentonite pellets	
Elev./depth bottom of seal.	29.0
Type of filter pack. 16-40 silica sand	
Depth of top of filter pack.	29.0
Elev./depth top of screened section.	35.8
Type of screened section: PVC sch 40	
Screen openings 0.010"	
I.D. of screened section.	2.0"
Elev./depth bottom of screened section.	57.8
Length of blank section.	0.2'
Elev./depth bottom of plugged blank section.	58.0
Elev./depth bottom of sand column.	58.0
Type of backfill below observation pipe. N/A	
Elev./depth of hole	58.0

Tech ck
REC 4-16-92

U.S. DEPARTMENT OF ENERGY

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title: Ray Michael Field Tech.

Well ID: OB 2/91

Survey location coordinates: North N/A East N/A

Date this report 5-18-92 Date well installation 4-15-92 Date well development 5-18-92

Well designation: OB well

Ground elevation: Est: N/A Survey: N/A

Screened interval: 37.8-59.8 Formation: N/A

Measuring point (MP): Top of well casing/other: N/A Well stick up: 2'

Water level (below MP): Start: 22.90 End: N/A

Well depth (below MP): 60.09 + .07 = 60.16 Water elevation (BGS) NA

Method used to measure water level: Solinst Estimated recharge rate: 51.54/30min

Volume of saturated annulus (assume 30 percent porosity): NA

Volume Calculation: 60.16 - 22.90 = 37.26 X .16 = 5.96 = 6.0 Gal per Vol 5.96

Quantity of water used during drilling: N/A

Depth of sediment (below MP): Before: N/A After: N/A

Development equipment: Grundfos Pump

Sampling equipment: N/A

pH meter No. 910710159 Calibration: 4.00/7.02 @ 20.2°C Time 0905

Specific conductance meter No.: 900103503 Calibration: 1.08 @ 23.0°C Time 0908

F.T.U. meter No.: 900409105 Calibration: N/A

Time	Pumping Rate gpm	FTU	pH	Temp °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
1334	NA	over	7.70	25.7	0.66	0	0	Dark grey
1343	NA	over	7.55	19.5	0.56	5.96	1	Grey Brown
1357	.43	277	7.52	19.4	0.55	11.92	2	Grey
1425	NA	over	7.50	17.1	0.55	17.88	3	Brown
1444	.95	over	7.55	17.2	0.53	23.84	4	Green Grey
							5	
							6	
							7	
							8	
							9	

Comments: Initial Reading may not be accurate due to PH meter screen going Black Due to heat & immediate reading was not obtained (5-7 min)

Dewatered at 1429 20.2 Gal

Dewatered at 25.84 Gal

Dewatered at 29.25

54.50
3732
17.18 x 3 =

30 min Recharge rate = 51.54

(4011-4ST)WATER2-2.SOP(03-27-91)

Page 1

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title Jan Jarrett - Field Tech

Well ID OB21191

Survey location coordinates: North N/A East N/A

Date this report 05-12-92 Date well installation 4-15-92 Date well development 5-12-92

Well designation: OBWell

Ground elevation: Est: N/A Survey: N/A

Screened interval: 37.8 - 59.8 Formation: N/A

Measuring point (MP): Top of well casing/other: N/A Well stick up: 2'

Water level (below MP): Start: 22.19 End: N/A

Well depth (below MP): 60.10 + .07 = 60.17 Water elevation (BGS) N/A

Method used to measure water level: Solinst Estimated recharge rate: 18.99/3 min.

Volume of saturated annulus (assume 30 percent porosity): N/A

Volume Calculation: 60.17 - 22.19 = 37.98 x 0.16 = 6.08

Quantity of water used during drilling: N/A

Depth of sediment (below MP): Before: N/A After: N/A

Development equipment: Grundfos Pump

Sampling equipment: N/A

pH meter No. 910714159 Calibration: 4.00/7.03 16.2° Time 0838

Specific conductance meter No.: 900103503 Calibration: 1.11 17.1° Time 0835

F.T.U. meter No.: 900409105 Calibration: N/A

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
0858	.43	over range	7.36	10.7	0.48	Ø	Ø	Muddy
0912	.43	over range	7.68	12.5	0.50	6.08	1	Lt Brown
1122	.45	over range	7.68	14.7	0.47	12.16	2	Cloudy
1230	.55	411	7.78	15.9	0.48	18.24	3	Clearer
1241	.55	over range	7.72	15.4	0.52	24.32	4	Clearer
1330	—	428	7.70	16.3	0.53	30.40	5	Lt Brown

Comments: Well dry @ 9.8 gal. Time 0921 Wait for recharge
52.76 @ 0929 Well dry @ 16.85 Time 1130
46.43 @ 0939 Well dry @ 25.45 Time 1241
Volume 1.01 Well dry @ 33.25 Time 1345

Form 2A

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

GA PG DO NOT Sample 5-14-92 ~~page 2~~

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title: JAN JARRETT - Field Tech

Well ID: OB21191

Survey location coordinates: North: n/a East: n/a

Date this report: 05-12-92 Date well installation: 4-15-92 Date well development: 5-12-92

Well designation: OB well

Ground elevation: Est: n/a Survey: n/a

Screened interval: 37.8 - 59.8 Formation: n/a

Measuring point (MP): Top of well casing/other: n/a Well stick up: 2'

Water level (below MP): Start: 22.19 + .07 = 22.26 End: n/a

Well depth (below MP): 60.10 Water elevation (BGS): n/a

Method used to measure water level: SOLINST Estimated recharge rate: 18.99/30 min

Volume of saturated annulus (assume 30 percent porosity): n/a

Volume Calculation: 60.10 - 22.26 = 37.84 × 0.16 = 6.05

Quantity of water used during drilling: n/a

Depth of sediment (below MP): Before: n/a After: n/a

Development equipment: GRUNDFOS PUMP

Sampling equipment: n/a

pH meter No. 910714159 Calibration: 4.00/7.03 16.2° Time 0838

Specific conductance meter No.: 900103503 Calibration: 1.11 17.1° Time 0835

F.T.U. meter No.: 900409105 Calibration: N/A

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
0858	~~2.31~~ 43	over range	7.36	10.7	0.48	Ø	Ø	Muddy
0912	~~2.31~~ 43	over range	7.68	12.5	0.50	6.05	1	Light brown
1122	.45	over range	7.68	14.7	0.47	12.10	2	Cloudy
1230	.55	411	7.78	15.9	0.48	18.15	3	Clearer
1241	.55	over range	7.72	15.4	0.52	24.20	4	Clearer
1330		428	7.70	16.3	0.53	30.25	5	Light brown
						36.30	6	
						~~42.35~~	7	
						48.40	8	
						54.45	9	

er - *
harge
e

Comments: well dry @ 9.8 gal. Time: 0921 - Wait for recharge
52.76 @ 0924
46.43 @ 0939
Volume: 1.01
Well dry @ 16.85 Time: 1130 Wait for recharge
Well dry @ ~~26.20~~ 25.45 Time: 1241
Well dry @ 33.25 Time: 1345

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

QA-PG 5-14-92

page 1

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title: JAN JARRETT

Well ID: 21191 OB

Survey location coordinates: North: N/A East: N/A

Date this report: 05-05-92 Date well installation: 4-15-92 Date well development: not done

Well designation: AKM11

Ground elevation: Est: N/A Survey: N/A

Screened interval: 37.8' - 59.8' Formation: N/A

Measuring point (MP): Top of well casing/other: N/A Well stick up: 2.0'

Water level (below MP): Start: 22.08 End: N/A

Well depth (below MP): 59.88 Water elevation (BGS): N/A

Method used to measure water level: SOUNDST Estimated recharge rate: N/A

Volume of saturated annulus (assume 30 percent porosity): N/A

Volume Calculation: 59.88 - 22.08 = 37.80 x 0.16 = 6.05

Quantity of water used during drilling: N/A

Depth of sediment (below MP): Before: N/A After: N/A

Development equipment: Grundfos pump

Sampling equipment: N/A

pH meter No. 910714159 Calibration: 4.00/7.04 14.4° Time: 0930

Specific conductance meter No.: 900103503 Calibration: 1.12 15.5° Time 0931

F.T.U. meter No.: 900409105 Calibration: N/A

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
1132	*	over range	7.55	20.9	0.49	Ø	Ø	light brown
1157	180	over range	7.74	20.4	0.49	6.05	1	thick brown
						12.10	2	
						18.15	3	
						24.20	4	
						30.25	5	
						36.30	6	
						42.35	7	
						48.40	8	
						54.45	9	

Comments: Pumped well dry @ 11:44 - waiting for recharge until 11:54 and 5.8 gal. - Parameter 1 - water sitting in hose. 12:15-12:45 recharge

Recharge Water levels:

56.92 Time: 1325 55.73 Time: 1335 Volume = 0.19

Well not developed per Bob Smith @ 1300

(4011-452)WATER2-2.SOP)(02-27-91)

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 58.0		GROUND ELEVATION (FT)	5946.85	PROJECT NUMBER	OU2/RI
NORTH	750251	AREA NE TRENCHES		CASING DIAMETER (IN)	2.0	GEOLOGIST	J.P. O'BRIEN
EAST	2088133	LOCATOR NUMBER	H14	BOREHOLE DIAMETER (IN)	10.0	DATE DRILLED	04/13/92

LOG OF BORING NUMBER: 21191

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 29.0 FT - 25.5 FT.
WELL 21191 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20091.

CHEMICAL SAMPLE DEPTH
GRADATIONAL SAMPLE DEPTH
SAMPLE NUMBER

SAMPLE GRAIN SIZE: 0% 50% 100%
PERCENT RECOVERY: 0% 100%
RECOVERY/INTERVAL

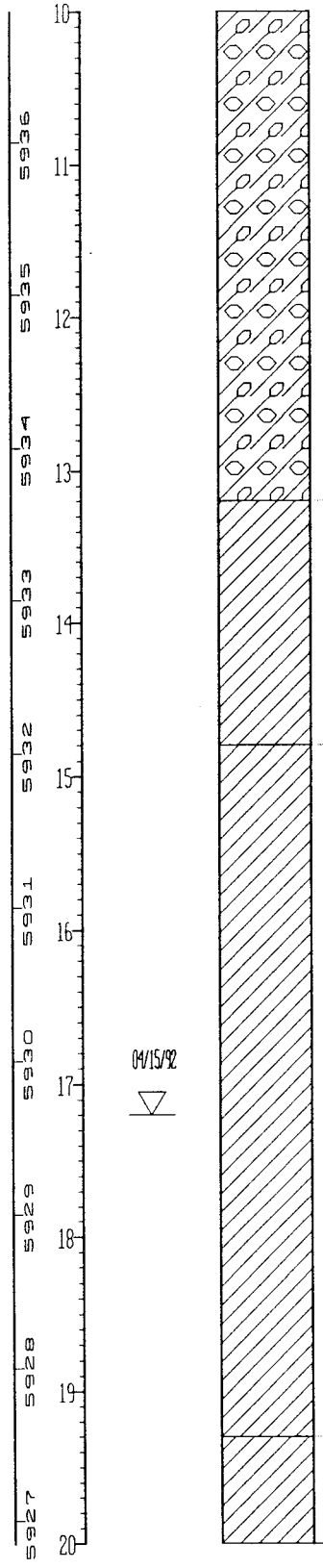
DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
5946	0				
	1			CL	Gravelly Clay with some silt and sand.
5945	2			GC	Clayey Gravel with some sand and silt.
5944	3				
5943	4				
5942	5				
5941	6				
5940	7				
5939	8				
5938	9				
5937	10				

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 58.0	GROUND ELEVATION (FT)	5946.85	PROJECT NUMBER	OU2/RI	LOG OF BORING NUMBER:
NORTH:	750251	AREA: NE TRENCHES	CASING DIAMETER (IN)	2.0	GEOLOGIST	J.P. O'BRIEN	21191
EAST:	2088133	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/13/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL: 29.0 FT - 25.5 FT.
WELL 21191 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20091.

CHEMICAL SAMPLE DEPTH
GRADATIONAL 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



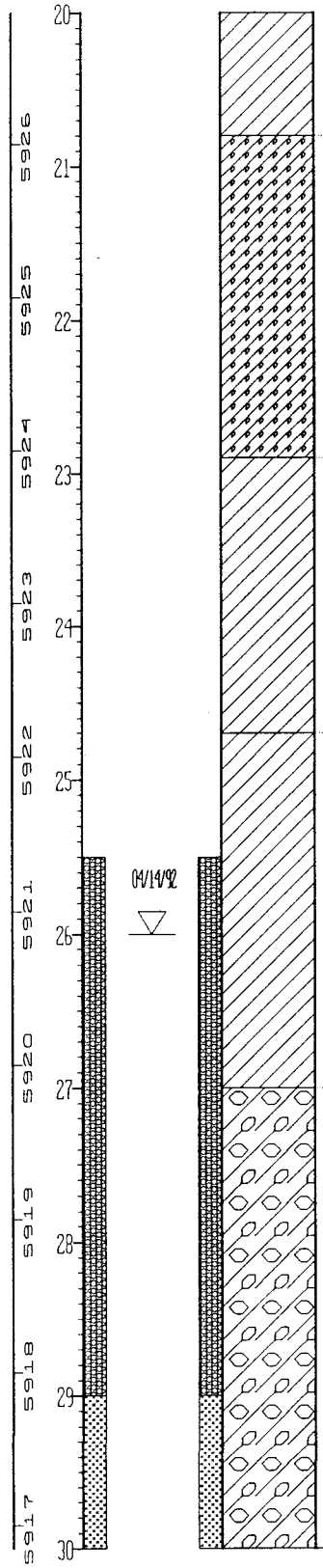
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
CL	Sandy Clay with some silt
CL	Sandy Clay with some silt
CL	Sandy Clay with some silt

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 58.0	GROUND ELEVATION (FT)	5946.85	PROJECT NUMBER	OU2/RI	LOG OF BORING NUMBER
NORTH:	750251	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	21191
EAST:	2088133	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/13/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL: 29.0 FT - 25.5 FT.
WELL 21191 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20091.

CHEMICAL SAMPLE DEPTH
GRADATIONAL SAMPLE DEPTH
SAMPLE NUMBER

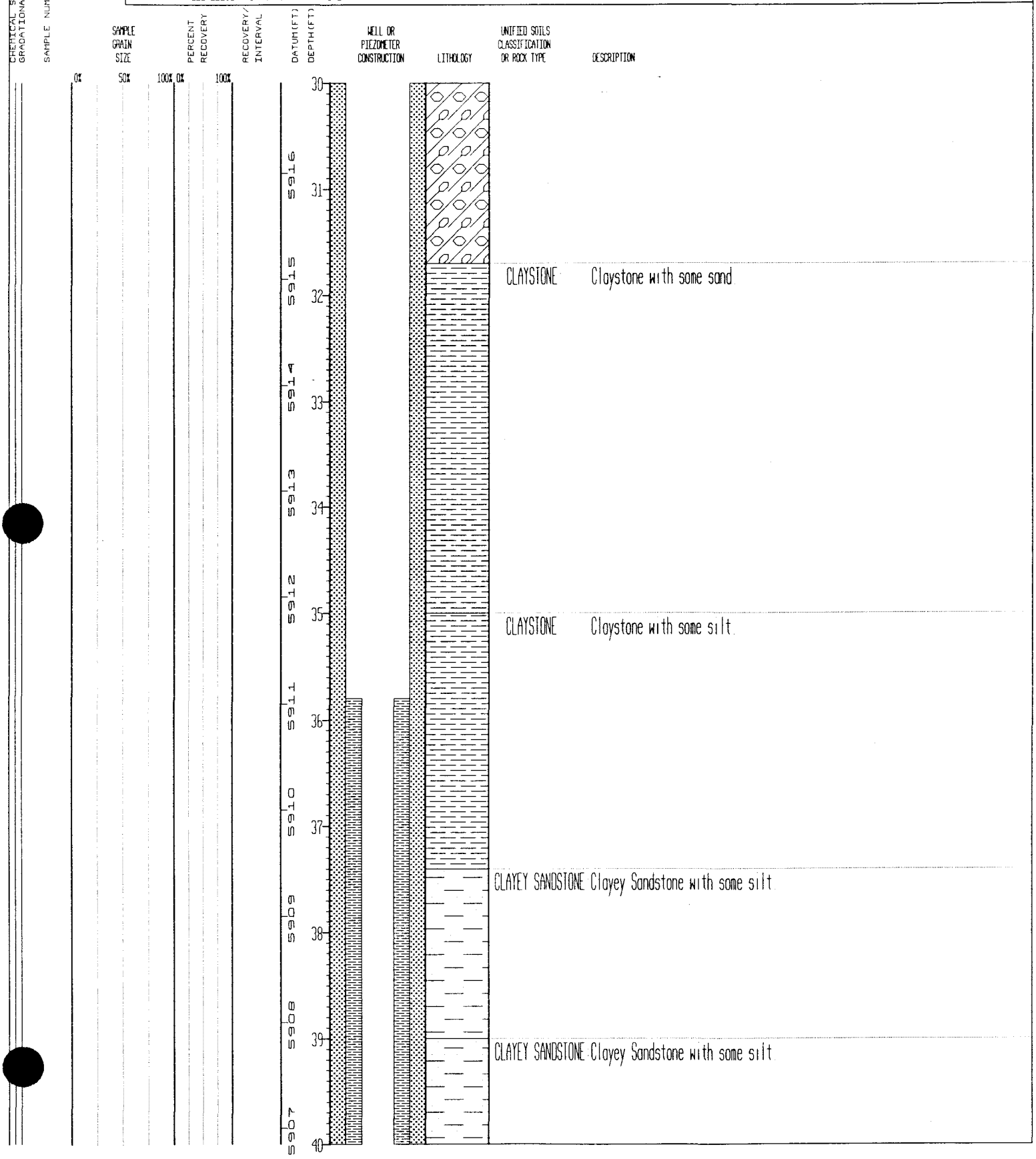
SAMPLE GRAIN SIZE (0% 50% 100%) | PERCENT RECOVERY (0% 100%) | RECOVERY/INTERVAL | DATUM (FT) | DEPTH (FT) | WELL OR PIEZOMETER CONSTRUCTION | LITHOLOGY | UNIFIED SOILS CLASSIFICATION OR ROCK TYPE | DESCRIPTION



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
SC	Clayey Sand with some silt.
CL /sc	Clayey Sand with some silt
CL	Sandy Clay with some silt
GC	Sandy Gravel with some clay and silt.

STATE PLANE COORDINATE		TOTAL DEPTH (FT): 58.0	GROUND ELEVATION (FT)	5946.85	PROJECT NUMBER:	OU2/RI	LOG OF BORING NUMBER
NORTH	750251	AREA: NE TRENCHES	CASING DIAMETER (IN)	2.0	GEOLOGIST:	J.P. O'BRIEN	21191
EAST:	2088133	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/13/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL: 29.0 FT - 25.5 FT.
WELL 21191 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20091



STATE PLANE COORDINATE	TOTAL DEPTH (FT): 58.0	GROUND ELEVATION (FT): 5946.85	PROJECT NUMBER: 002/RI	LOG OF BORING NUMBER
NORTH: 750251	AREA: NE TRENCHES	CASING DIAMETER (IN): 2.0	GEOLOGIST: J.P. O'BRIEN	21191
EAST: 2088133	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN): 10.0	DATE DRILLED: 04/13/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL: 29.0 FT. - 25.5 FT.
WELL 21191 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20091

CHEMICAL SAMPLE DEPTH / GRADATIONAL 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
					5906	40			CLAYEY SANDSTONE	Clayey Sandstone with some silt
					5905	41				
					5904	42				
					5903	43			CLAYEY SANDSTONE	Clayey Sandstone with some silt
					5902	44				
					5901	45				
					5900	46				
					5899	47			CLAYEY SANDSTONE	Clayey Sandstone with some silt
					5898	48				
					5897	49				
						50				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 58.0	GROUND ELEVATION (FT)	5946.85	PROJECT NUMBER:	OU2/RI	LOG OF BORING NUMBER
NORTH	750251	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	21191
EAST:	2088133	LOCATOR NUMBER: H14	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/13/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL: 29.0 FT. - 25.5 FT.

WELL 21191 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20091

CHEMICAL DEPTH
GRADATION DEPTH
SAMPLE NUMBER

SAMPLE GRAIN SIZE: 0% 50% 100%

PERCENT RECOVERY: 0% 100%

RECOVERY/INTERVAL

DATUM (FT): 5896, 5895, 5894, 5893, 5892, 5891, 5890, 5889, 5888, 5887

DEPTH (FT): 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60

WELL OR PIEZOMETER CONSTRUCTION

LITHOLOGY

UNIFIED SOILS CLASSIFICATION OR ROCK TYPE

DESCRIPTION

CLAYEY SANDSTONE: Clayey Sandstone with some silt.

Total depth at 58.0 ft

SITE 3

WELLS

OU2-ALLUVIUM

RFEDS
WELL INSTALLATION FORM

Well Number: 0B2Ø591 Project Number: 4Ø06EMAD
Old Well No.:

Area: NE Trenches North or Y: East or X:
Purpose: GW Plume Characterization / Pump Testing
Formation: Alluvium Well Status: Active
Contractor: Woodward-Clyde Drilling Method: Hollow-Stem Auger
Geologist: B. Edgerly Locator: H13
Date Drilled: 4-2 & 4-3-92 Ground Elev: 5967.56 ft.

Total Depth: 24.6 ft. Stick Up: -2.Ø ft.
Depth to Bedrock: 24.2 ft. Completed Depth: 24.6 ft.
Casing Diameter: 2.0 in. Borehole Diam.: 10.0 in.

Monitoring Interval: 24.1 ft. to 4.1 ft.
Initial Water Level: 16.Ø ft. Date: 4-2-92
Completed Water Level: 6.4 ft. Date: 4-3-92

Item		From		To		I.D.	Type
Surface Seal:		1.6	ft.	Ø.Ø	ft.		Concrete
Protective Casing:		2.8	ft.	-2.2	ft.	6.0 in.	Steel
Surface Casing:		24.6	ft.	-2.0	ft.	2.0 in.	PVC Sch. 40
Secondary Casing:	N/A		ft.		ft.	in.	N/A
Centralizer:	N/A		ft.		ft.	in.	N/A
Bentonite Seal:	3.6		ft.	Ø.Ø	ft.		Bentonite
Filter Pack:	24.6		ft.	3.6	ft.		16-40 Sand
Volume:	11.Ø cu. ft.						
Screen:	24.1		ft.	4.1	ft.	2.0 in.	PVC Sch. 40
Slot Size:	0.01 in.						
Sump:	24.6		ft.	24.1	ft.	2.0 in.	PVC Sch. 40
Backfill Seal:	N/A		ft.		ft.		Bentonite
Backfill:	N/A		ft.		ft.		Bentonite
Volume:	N/A cu. ft.						

Tech Ck
RRL 4-6-92

OU2-ALLUVIUM

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GT.6A

GROUNDWATER MONITORING WELL AND PIEZOMETER REPORT

PROJECT OU2 RFI/RI Phase II

LOCATION NE Trenches

Date Completed 4-3-92 Original Depth 24.6 ft.

Inspected By _____ Date _____

Checked By _____ Date _____

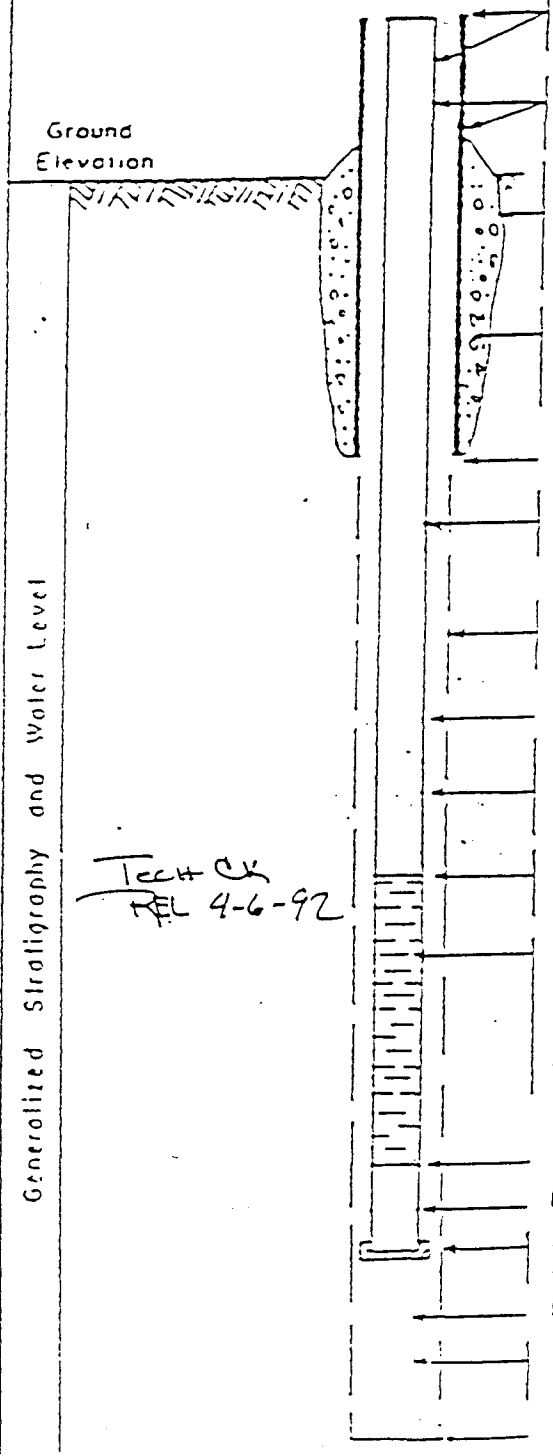
Page 1 of 1

Well No. OB20591

Aquifer Alluvium

Depth Interval 4.1-24.1 ft

NOTE CENTRALIZER DEPTHS



Tech Ck
RFL 4-6-92

Elevation of top of surface casing / riser pipe.	_____
Height of top of surface casing / riser pipe above ground surface	-2.2/2.0 ft
Depth of surface seal below ground surface	1.6 ft
Type of surface seal: Concrete	
I.D. of surface casing.	6.0 in.
Type of surface casing: steel	
Depth of surface casing below ground	2.8 ft.
I.D. of riser pipe.	2.0 in.
Type of riser pipe: sch. 40 PVC	
Diameter of borehole	10.0 in.
Depth of borehole	24.6 ft.
Type of backfill: N/A	
Elev./depth top of seal	0.0 ft.
Type of seal: Bentonite	
Elev./depth bottom of seal.	3.6 ft.
Type of filter pack 16-40 silica sand	
Depth of top of filter pack.	3.6 ft.
Elev./depth top of screened section.	4.1 ft.
Type of screened section: sch. 40 PVC	
Screen openings 0.01 in.	
I.D. of screened section.	2.0 in.
Elev./depth bottom of screened section.	24.1 ft.
Length of blank section.	0.5 ft.
Elev./depth bottom of plugged blank section.	24.6 ft
Elev./depth bottom of sand column.	24.6 ft.
Type of backfill below observation pipe. N/A	
Elev./depth of hole	24.6 ft.

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

WELL DEVELOPMENT AND SAMPLING FORM

Don't sample

Recorder's Name and Title Patty E. Goodman

Well ID OB 20591

Survey location coordinates: North n/a East n/a

Date this report 4-10-92 Date well installation 4-3-92 Date well development 4-10-92

Well designation: ALMW

Ground elevation: Est: n/a Survey: n/a

Screened interval: 6.1 → 26.1' Formation: n/a

Measuring point (MP): Top of well casing/other: n/a Well stick up: 2'

Water level (below MP): Start: 8.40 End: 26.44+0.28=26.72

Well depth (below MP): 26.40+0.28=26.68 Water elevation (BGS) n/a

Method used to measure water level: Solinst Estimated recharge rate: n/a

Volume of saturated annulus (assume 30 percent porosity): n/a

Volume Calculation: 26.68-8.40 = 18.28 x 0.16 = 2.92

Quantity of water used during drilling: n/a

Depth of sediment (below MP): Before: n/a After: n/a

Development equipment: Grundfos Pump

Sampling equipment: n/a

pH meter No. 910714159 Calibration: 4.00/16.7° - 7.04/16.8°

Specific conductance meter No.: 900903503 Calibration: 1.00 - 17.1°

F.T.U. meter No.: 960409105 Calibration: n/a

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1420	na	~~over~~ over	8.00	23.2	0.30	0	0	very silty
1427	0.41	over	7.96	16.5	0.43	2.92	1	clearer-yellowish
1437	0.29	over	7.58	16.7	0.55	5.84	2	clearer
1443	0.48	over	7.70	17.3	0.56	8.76	3	Silty - Dk Brown
1501	0.16	336	7.79	20.2	0.59	11.68	4	clearer-yellowish
1513	0.24	110	7.75	19.8	0.58	14.00	5	clearer

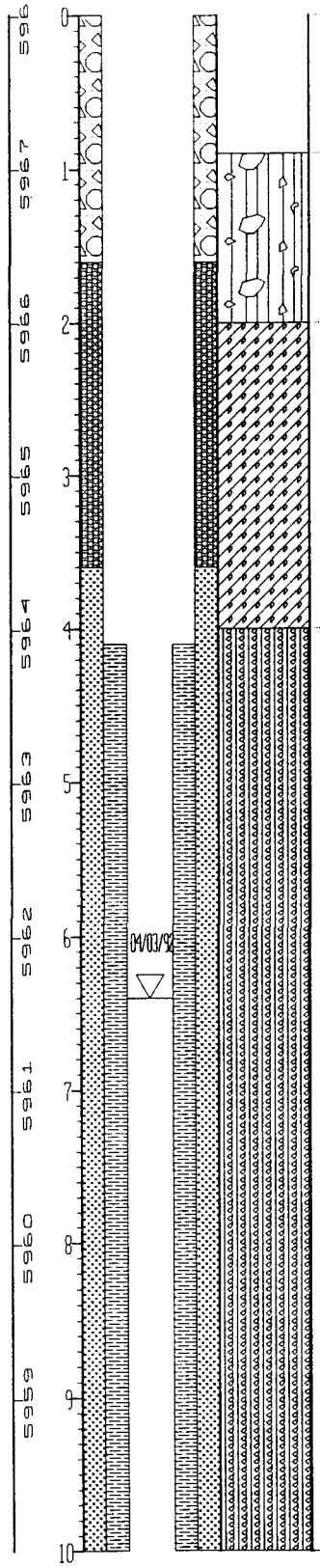
Comments: cleaned up pretty good

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 24.6	GROUND ELEVATION (FT):	5968.01	PROJECT NUMBER:	OU2/RI
NORTH: 749596	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST: 2086850	LOCATOR NUMBER: H13	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/02/92

LOG OF BORING NUMBER: 20591

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 3.6 FT. - 0.0 FT.
WELL 20591 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20791

CHEMICAL SAMPLE DEPTH
GRADATIONAL 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



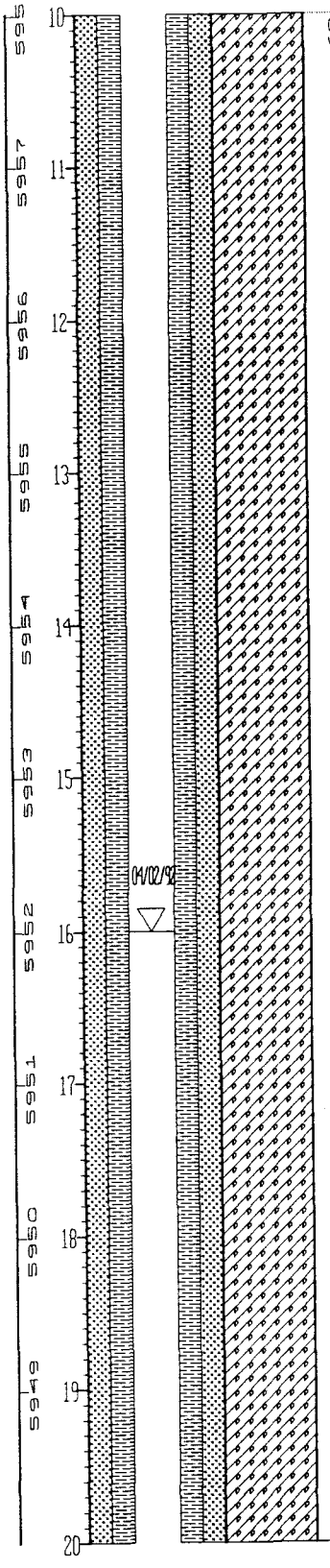
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
GM:	Sandy Gravel with some silt.
SC:	Gravelly Sand with abundant clay/clayey sand with abundant gravel.
SM/gm:	Gravelly Sand with some silt and clay

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 24.6	GROUND ELEVATION (FT):	5968.01	PROJECT NUMBER:	002/RI
NORTH: 749596	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST: 2086850	LOCATOR NUMBER: H13	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/02/92

LOG OF BORING NUMBER: 20591

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 3.6 FT. - 0.0 FT.
WELL 20591 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20791

CHEMICAL SAMPLE DEPTH
GRADATIONAL 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



SC: Gravelly Sand with some clay and silt.

STATE PLANE COORDINATE	TOTAL DEPTH (FT): 24.6	GROUND ELEVATION (FT):	5968.01	PROJECT NUMBER:	OU2/RI
NORTH: 749596	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST: 2086850	LOCATOR NUMBER: H13	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/02/92

LOG OF BORING NUMBER: 20591

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 3.6 FT. - 0.0 FT.
WELL 20591 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20791.

CHEMICAL SAMPLE DEPTH
GRADATIONAL 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
GC	Sandy Gravel with some clay and silt
SANDY CLAYSTONE	Sandy Claystone
	Total depth at 24.6 ft

OU2-ALLUVIUM

13.7

RFEDS
WELL INSTALLATION FORM

Well Number: PW20691 Project Number: 4006 EMAD
Old Well No.:

Area: NG Trenches North or Y: East or X:
Purpose: GW Plume Characterization / Pump testing
Formation: Alluvium Well Status: Active
Contractor: Woodward-Clyde Drilling Method: Hollow-Stem Auger
Geologist: B. Edgerly Locator: H13
Date Drilled: 4-1-92 Ground Elev: 5967.59 ft.

Total Depth: 25.8 ft. Stick Up: ~~0~~ -2.0 ft.
Depth to Bedrock: 24.5 ft. Completed Depth: 25.0 ft.
Casing Diameter: 2.0 in. Borehole Diam.: 10.0 in.

Monitoring Interval: 4.5 ft. to 24.5 ft.
Initial Water Level: 15.0 ft. Date: 4-1-92
Completed Water Level: 6.0 ft. Date: 4-2-92

Item		From		To		I.D.	Type
Surface Seal:		1.8	ft.	0.0	ft.		Concrete
Protective Casing:		2.8	ft.	-2.2	ft.	6.0 in.	Steel
Surface Casing:		25.0	ft.	-2.0	ft.	2.0 in.	PVC Sch. 40
Secondary Casing:	N/A		ft.		ft.	in.	N/A
Centralizer:	~~N/A~~	15.0	ft.	14.0	ft.	in.	N/A
Bentonite Seal:	3.8		ft.	0.0	ft.		Bentonite
Filter Pack:	25.0		ft.	~~4.0~~ 3.8	ft.		16-40 Sand
Volume:	11.0 cu. ft.						
Screen:	24.5		ft.	4.5	ft.	2.0 in.	PVC Sch. 40
Slot Size:	0.01 in.						
Sump:	25.0		ft.	24.5	ft.	2.0 in.	PVC Sch. 40
Backfill Seal:	N/A		ft.	NA	ft.		Bentonite
Backfill:	25.8		ft.	25.0	ft.		Bentonite
Volume:	0.4 cu. ft.						

Tocuck
REL 4-6-92

21.5" P.C. SU.
+ 6" PAD
27.5"
2' 3½"

OU2-ALLUVIUM

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GT.6A

GROUNDWATER MONITORING WELL AND PIEZOMETER REPORT

PROJECT: OU2 Phase II RFI/RI

LOCATION: NE Trenches

Date Completed: 4-2-92 Original Depth: 25.8 ft.

Inspected By: _____ Date: _____

Checked By: _____ Date: _____

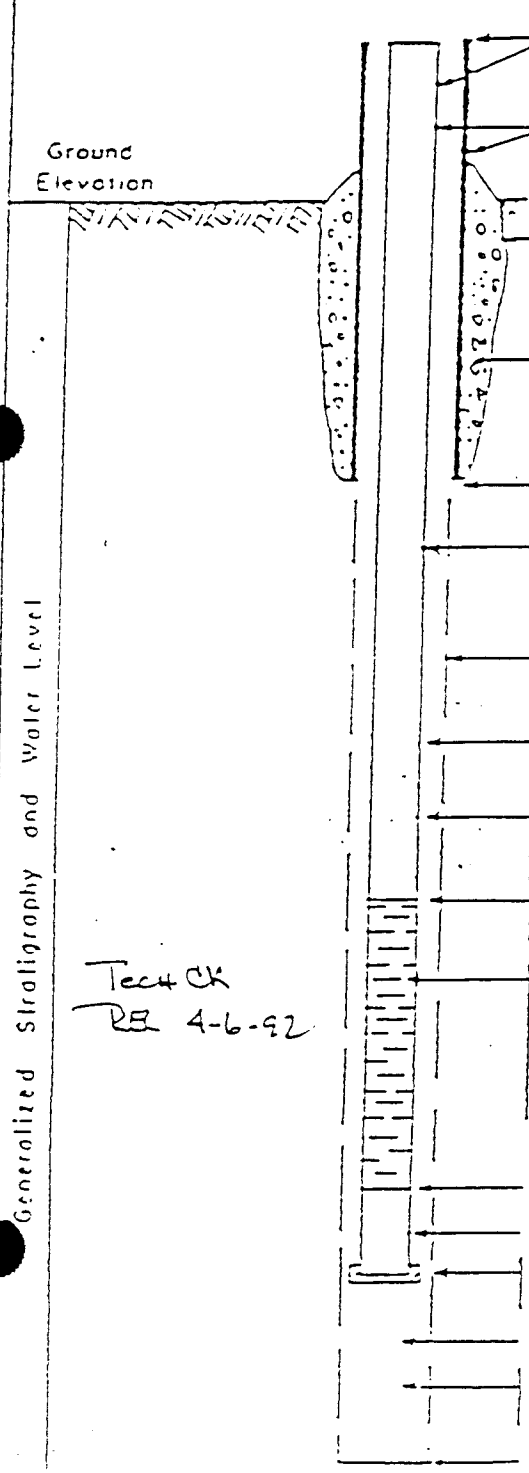
Page 1 of 1

Well No. PW20691

Aquifer: Alluvium

Depth Interval: 4.5-24.5 ft.

NOTE CENTRALIZER DEPTHS



Elevation of top of surface casing / riser pipe.	
Height of top of surface casing / riser pipe above ground surface	-22/-2.05 ft
Depth of surface seal below ground surface	1.8 ft
Type of surface seal: Concrete	
I.D. of surface casing.	6.0 in.
Type of surface casing: steel	
Depth of surface casing below ground	2.8 ft.
I.D. of riser pipe.	2.0 in.
Type of riser pipe: PVC sch. 40	
Diameter of borehole	10.0 in.
Depth of borehole	25.8 ft.
Type of backfill: Bentonite	
Elev./depth top of seal.	0.0 ft.
Type of seal: bentonite	
Elev./depth bottom of seal.	3.3 ft.
Type of filter pack 16-40 silica sand.	3.8 ft
Depth of top of filter pack.	4.0 ft.
Elev./depth top of screened section.	4.5 ft.
Type of screened section: PVC sch. 40	
Screen openings 0.01 in.	
I.D. of screened section.	2.0 in.
Elev./depth bottom of screened section.	24.5 ft.
Length of blank section.	0.5 ft.
Elev./depth bottom of plugged blank section.	25.0 ft.
Elev./depth bottom of sand column.	25.0 ft.
Type of backfill below observation pipe. bentonite	
Elev./depth of hole	25.8 ft.

Tech Ck
RE 4-6-92

Form 2.2A

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

WELL DEVELOPMENT AND SAMPLING FORM

Don't sample

Recorder's Name and Title: P. Goodman - Field Tech.

Well ID: PW20691

Survey location coordinates: North: n/a East: n/a

Date this report: 4-10-92 Date well installation: 4-2-92 Date well development: 4-10-92

Well designation: ALMW

Ground elevation: Est: n/a Survey: n/a

Screened interval: 6.5 -> 26.5' Formation: n/a

Measuring point (MP): Top of well casing/other: n/a Well stick up: 2'

Water level (below MP): Start: 8.34 End: 26.76+.028 - 27.04

Well depth (below MP): 26.77+.028 - 27.05 Water elevation (BGS): n/a

Method used to measure water level: Solinst Estimated recharge rate: 6.12' per 30min 7.80 per 30min (2nd recharge)

Volume of saturated annulus (assume 30 percent porosity): n/a

Volume Calculation: 27.05 - 8.34 = 18.71 x 0.16 = 2.99

Quantity of water used during drilling: n/a

Depth of sediment (below MP): Before: n/a After: n/a

Development equipment: Grundfos Pump + Teflon Bailer

Sampling equipment: n/a

pH meter No. 900103503 Calibration: 4.00 / 16.7° 7.04 / 16.8°

Specific conductance meter No.: 910714159 Calibration: 1.00 - 17.1°

F.T.U. meter No.: 900409105 Calibration: n/a

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
0904	na	over	7.74	16.9	0.51	0	0	yellowish
0908	0.74	over	7.86	13.8	0.53	2.99	1	reddish yellow
0913	0.59	over	7.72	14.3	0.59	5.98	2	same
0924	0.27	over	7.66	15.9	0.68	8.97	3	same
1013	na	304	7.68	12.7	0.68	11.95	4	clearer - yellowish
1024	na	over	7.69	12.5	0.68	14.94	5	Silty - Brown
1042	na	over	7.64	13.1	0.67	17.93	6	same
1052	na	over	7.62	12.9	0.67	20.92	7	yellowish
1103	na	over	7.73	12.9	0.73	23.91	8	Brownish
1230	na	over	7.62	12.9	0.68	26.90	9	yellowish
1238	na	over	7.70	12.8	0.68	29.89	10	same

Bailer

Comments: DRY @ 0931 11½ gals

21.88 @ 0935 0945 @ 19.84

21.88 - 19.84 = 6.12' 24.02 - 21.42 = 7.80'

~~5.89~~ 1104 24.02 1116 21.42

EG&G + ASI are here w/ us. Are pulling more volumes per them

STATE PLANE COORDINATE	TOTAL DEPTH (FT): 25.8	GROUND ELEVATION (FT):	5968.09	PROJECT NUMBER:	OU2/RI
NORTH: 749602	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST: 2086851	LOCATOR NUMBER: H13	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/01/92

LOG OF BORING NUMBER: 20691

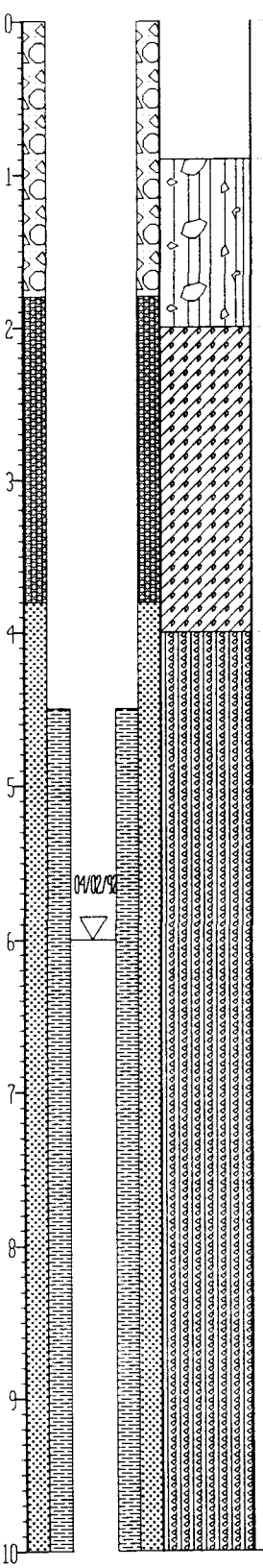
REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 3.8 FT. - 0.0 FT. BACKFILL MATERIAL: BENTONITE 25.8 FT. - 25.0 FT.
WELL 20691 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20791

CHEMICAL SAMPLE DEPTH
GRADATIONAL SAMPLE DEPTH
SAMPLE NUMBER

SAMPLE GRAIN SIZE: 0% 50% 100%
PERCENT RECOVERY: 0% 100%
RECOVERY/INTERVAL

DATUM (FT): 5968, 5967, 5966, 5965, 5964, 5963, 5962, 5961, 5960, 5959
DEPTH (FT): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

WELL OR PIEZOMETER CONSTRUCTION



LITHOLOGY

UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
GM	Sandy Gravel with some silt.
SC	Gravelly Sand with abundant clay/clayey sand with abundant gravel.
SM/gm	Gravelly Sand with some silt and clay.

STATE PLANE COORDINATE		TOTAL DEPTH (FT) 25.8	GROUND ELEVATION (FT)	5968.09	PROJECT NUMBER	OU2/RI	LOG OF BORING NUMBER
NORTH	749602	AREA NE TRENCHES	CASING DIAMETER (IN)	2.0	GEOLOGIST	J.P. O'BRIEN	20691
EAST	2086851	LOCATOR NUMBER H13	BOREHOLE DIAMETER (IN)	10.0	DATE DRILLED	04/01/92	

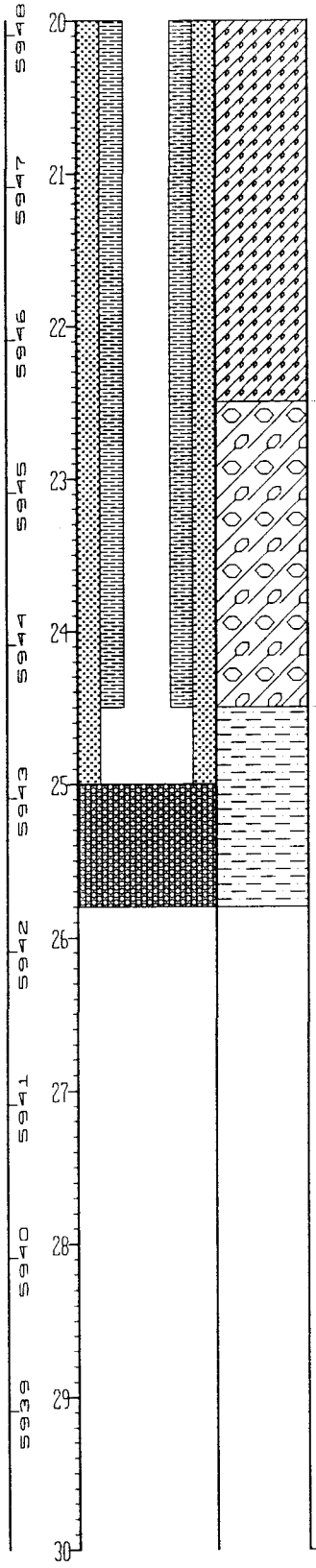
REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 3.8 FT - 0.0 FT. BACKFILL MATERIAL: BENTONITE 25.8 FT. - 25.0 FT.
WELL 20691 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20791

CHEMICAL SAMPLE DEPTH	GRADATIONAL 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%		5958	10			SC	Gravelly Sand with some clay and silt.
						5957	11				
						5956	12				
						5955	13				
						5954	14				
						5953	15	04/01/92			
						5952	16				
						5951	17				
						5950	18				
						5949	19				
							20				

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 25.8	GROUND ELEVATION (FT):	5968.09	PROJECT NUMBER:	002/RI	LOG OF BORING NUMBER
NORTH:	749602	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN	20691
EAST:	2086851	LOCATOR NUMBER: H13	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	04/01/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 3.8 FT. - 0.0 FT. BACKFILL MATERIAL: BENTONITE 25.8 FT. - 25.0 FT.
WELL 20691 WAS REAMED. UNIT BREAKS BASED ON CORE FROM WELL 20791.

CHEMICAL SAMPLE DEPTH
GRADATIONAL 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
GC	Sandy Gravel with some clay and silt.
SANDY CLAYSTONE	Sandy Claystone.
	Total depth at 25.8 ft

OU2-ALLUVIUM

RFEDS

WELL INSTALLATION FORM

Well Number: 0B2Ø791 Project Number: 4006 EMAD

Old Well No.:

Area: NE Trenches North or Y: East or X:

Purpose: GW Plume Characterization / Pump testing

Formation: Well Status: Active

Contractor: Woodward-Clyde Drilling Method: Hollow-Stem Auger

Geologist: B. Edgerly Locator: H13

Date Drilled: ~~3-30~~ & 3-31-92 Ground Elev: 5967.40 ft.

Total Depth: 37.9 ft. Stick Up: -2.Ø ft.

Depth to Bedrock: 24.5 ft. Completed Depth: 36.5 ft.

Casing Diameter: 2.0 in. Borehole Diam.: 10.0 in.

Monitoring Interval: 29.5 ft. to 34.5 ft.

Initial Water Level: 10.Ø ft. Date: 3-3Ø-92

Completed Water Level: 5.5 ft. Date: 4-2-92 Note: Completed water level taken 2 days after well set. May be affected by work on well 207 5 ft to the South

Item	From		To		I.D.	Type
Surface Seal:	3.Ø	ft.	Ø.Ø	ft.		Concrete
Protective Casing:	2.8	ft.	-2.2	ft.	6.0 in.	Steel
Surface Casing:	36.5	ft.	-2.Ø	ft.	2.0 in.	PVC Sch. 40
Secondary Casing:	N/A	ft.		ft.	in.	N/A
Centralizer:	N/A	ft.		ft.	in.	N/A
Bentonite Seal:	28.7	ft.	23.6	ft.		Bentonite
Filter Pack:	34.5	ft.	28.7	ft.		16-40 Sand
Volume:	3.Ø cu. ft.					
Screen:	34.5	ft.	29.5	ft.	2.0 in.	PVC Sch. 40
Slot Size:	0.01 in.					
Sump:	36.5	ft.	34.5	ft.	2.0 in.	PVC Sch. 40
Backfill Seal:	36.5	ft.	34.5	ft.		Bentonite
Backfill:	37.9	ft.	~~34.5~~	ft.		Bentonite
Volume:	BJE ~~1.9~~ 0.8 cu. ft.		BJE 36.5			

Tech
REL 4-2-92

OU2-ALLUVIUM

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GT.6A

GROUNDWATER MONITORING WELL AND PIEZOMETER REPORT

PROJECT OU2 RFI RI Phase II

LOCATION NE Trenches

Date Completed 3-31-92 Original Depth ~~36.5 ft.~~ 37.9 ft.

Inspected By _____ Date _____

Checked By _____ Date _____

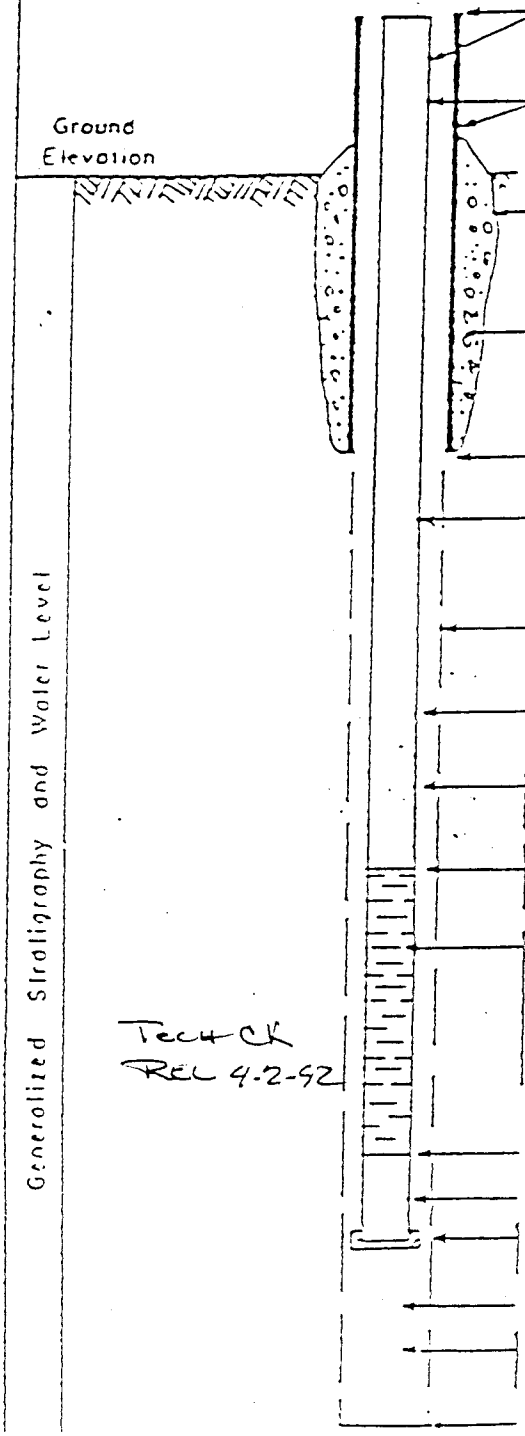
Page 1 of 1

Well No. 06Ø791

Clay stone Aquifer Bedrock

Depth Interval 29.5-34.5

NOTE CENTRALIZER DEPTHS



Elevation of top of surface casing / riser pipe.	
Height of top of surface casing / riser pipe above ground surface	-2.2/-2.0 ft.
Depth of surface seal below ground surface	3.Ø ft.
Type of surface seal: Concrete	
I.D. of surface casing.	6.Ø in.
Type of surface casing: steel	
Depth of surface casing below ground	2.8 ft.
I.D. of riser pipe.	2.Ø in.
Type of riser pipe: PVC sch. 4Ø	
Diameter of borehole	1Ø.Ø in. O.D.
Depth of borehole	37.9 ft.
Type of backfill: bentonite grout	
Elev./depth top of seal.	23.6 ft.
Type of seal: Bentonite	
Elev./depth bottom of seal.	28.7 ft.
Type of filter pack 16-4Ø silica sand	
Depth of top of filter pack.	28.7 ft.
Elev./depth top of screened section.	29.5 ft.
Type of screened section: PVC sch. 4Ø	
Screen openings Ø.Ø1 in	
I.D. of screened section.	2.Ø in.
Elev./depth bottom of screened section.	34.5 ft.
Length of blank section.	2.Ø ft.
Elev./depth bottom of plugged blank section.	36.5 ft.
Elev./depth bottom of sand column.	34.5 ft
Type of backfill deep observation pipe. Bentonite	
Elev./depth of hole	37.9 ft.

Tech CK
REL 4-2-92

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form 2.2A

WELL DEVELOPMENT AND SAMPLING FORM

not a MW

Recorder's Name and Title: Patty E. Goodman

Well ID: ~~0B02~~ 0B20791

Survey location coordinates: North n/a East n/a

Date this report 4-10-92 Date well installation 3-31-92 Date well development 4-10-92

Well designation: ALMW

Ground elevation: Est: n/a Survey: n/a

Screened interval: 31.5' → 36.5' Formation: n/a

Measuring point (MP): Top of well casing/other: n/a Well stick up: 2'

Water level (below MP): Start: 7.94 End: 38.51 + 0.28 = 38.84

Well depth (below MP): 36.12 + 0.28 = 36.40 Water elevation (BGS) n/a

Method used to measure water level: Solinst Estimated recharge rate: 1.53' per 30 min

Volume of saturated annulus (assume 30 percent porosity): n/a

Volume Calculation: 36.40 - 7.94 = 28.46 x 0.16 = 4.55

Quantity of water used during drilling: n/a

Depth of sediment (below MP): Before: n/a After: n/a

Development equipment: Grundfos pump / Teflon Bailer

Sampling equipment: n/a

pH meter No. 910714159 Calibration: 4.00/16.7° - 7.04/16.8°

Specific conductance meter No.: 900103503 Calibration: 1.00 - 17.1°

F.T.U. meter No.: 900409105 Calibration: n/a

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1253	n/a	~~na~~	7.86	21.5	0.67	0	0	very thick + silty
*						~~4.55~~	1	
						9.10	2	
						13.65	3	
						18.20	4	
						22.75	5	

Comments: well Dry @ 1309 - 35.12 1319 34.61

35.12 - 34.61 = 0.51 x 3 = 1.53'

36.46 - 31.50 = 4.90 x 0.16 = 0.78 gal - Screened Interval volume

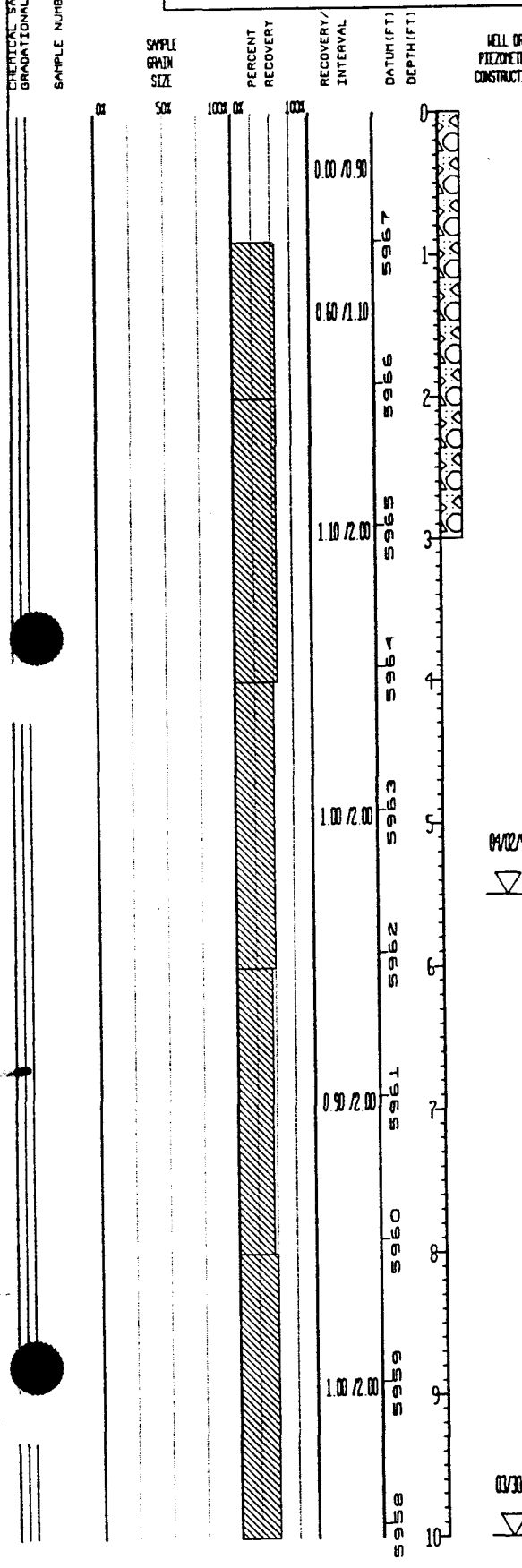
0.78 x 4 = 3.13 gal of DI to add 4.60 gal removed.

* Couldn't do 1st parameter as water set in pump too long to be accurate.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 36.5	GROUND ELEVATION (FT):	5967.90	PROJECT NUMBER:	002/RI
NORTH: 749607.79	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST: 2088851.43	LOCATOR NUMBER: H13	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	03/31/92

LOG OF BORING NUMBER: 20791

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 28.7 FT. - 23.6 FT. BACKFILL MATERIAL: BENTONITE 37.9 FT. - 36.5 FT.



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
	Top soil, start of boring at 0.90 ft.
GM	Sandy Gravel with some silt - grayish brown (5YR3/2), maximum gravel diameter .18', average .1', fine- to coarse-grained sand, well graded, gravel is sub-rounded, sand is angular to sub-rounded, low plasticity, gravel is primarily quartzite, sand contains abundant carbonaceous/organic material, quartz, some rock fragments, feldspar, trace volcanic rock fragments, mica, no apparent bedding, moist. 57% gravel, 29% sand, 10% silt, 4% clay.
	No recovery for this interval.
SC	Gravelly Sand with abundant clay/Clayey Sand with abundant gravel - very pale orange (10YR8/2) to light brown (5YR6/4), maximum gravel diameter .18', average .08', fine- to coarse-grained sand, well graded, angular to sub-rounded, medium plasticity, gravel is primarily caliche coated quartzite with trace arkosic arenite, sand contains abundant calcrete/caliche, quartz, some rock fragments, no apparent bedding, moist. 26% gravel, 43% sand, 5% silt, 26% clay.
	No recovery for this interval.
SM/gm	Gravelly Sand with some silt and clay - light brown (5YR5/6), maximum gravel diameter > .25', average .13', fine- to coarse-grained sand, well graded, gravel is rounded, sand is angular to sub-rounded, low plasticity, gravel is primarily quartzite with trace weathered granite at 4.9' and weathered arkosic arenite at 8.9', sand contains abundant quartz, iron stain, some rock fragments, feldspar, trace dark minerals, biotite, muscovite, no apparent bedding, physical appearance of sandy gravel, moist. 33% gravel, 42% sand, 16% silt, 9% clay.
	No recovery for this interval.
SM/gm	Gravelly Sand with some silt and clay - light brown (5YR5/6), as described above.
	No recovery for this interval.
SM/gm	Gravelly Sand with some silt and clay - light brown (5YR5/6), as described above.
	No recovery for this interval.

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 36.5	GROUND ELEVATION (FT): 5967.90	PROJECT NUMBER: 002/RI	LOG OF BORING NUMBER:
NORTH:	749607.79	AREA: NE TRENCHES	CASING DIAMETER (IN): 2.0	GEOLOGIST: J.P. O'BRIEN	20791
EAST:	2086851.43	LOCATOR NUMBER: H13	BOREHOLE DIAMETER (IN): 10.0	DATE DRILLED: 03/31/92	

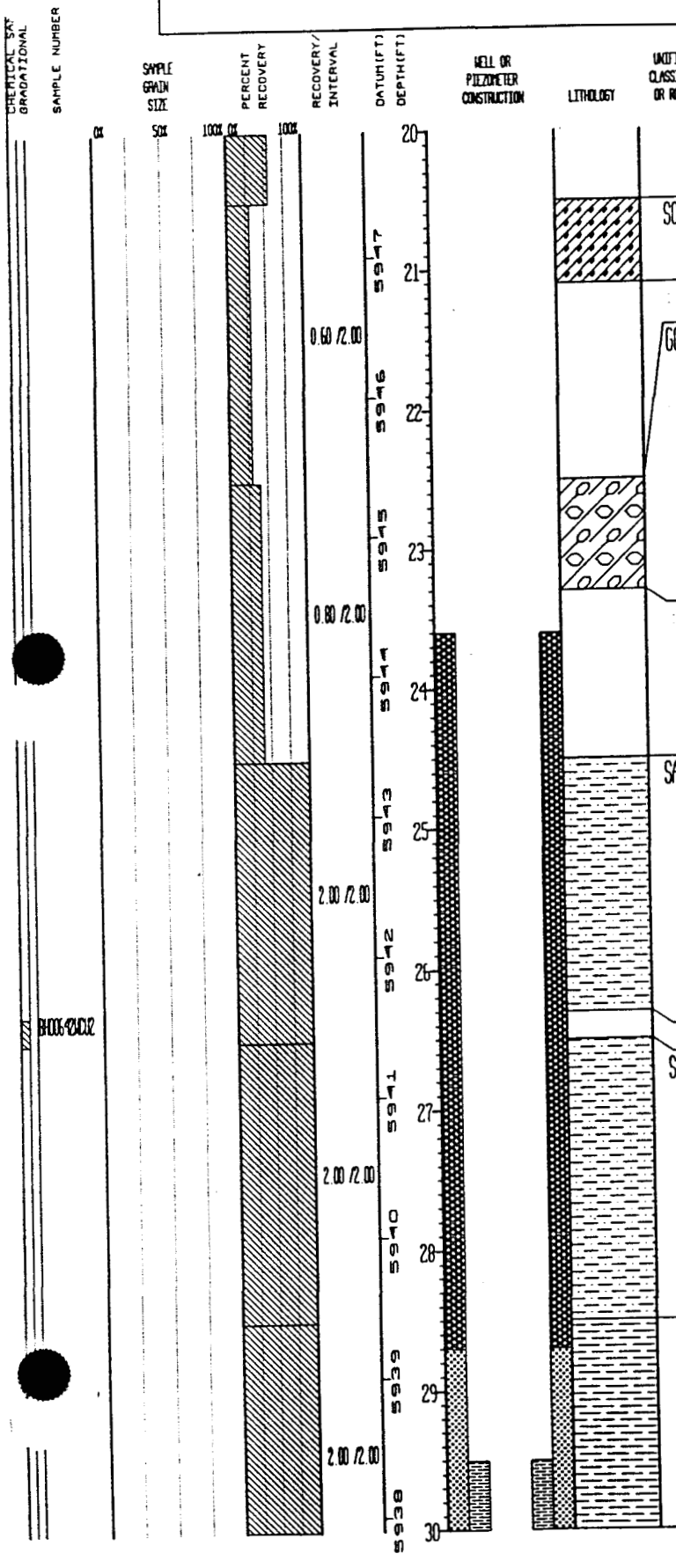
REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 28.7 FT. - 23.6 FT. BACKFILL MATERIAL: BENTONITE 37.9 FT. - 36.5 FT

CHEMICAL SAMP GRADATIONAL	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:	Gravelly Sand with some clay and silt - moderate brown (5YR4/4), as described below.
	B00K-0A002			1.00 /2.00	5957	11				VOA sample obtained from this interval.
										No recovery for this interval.
					5956	12			SC:	Gravelly Sand with some clay and silt - moderate brown (5YR4/4), maximum gravel diameter .23', average .18', fine- to coarse-grained sand, well graded, angular to sub-rounded, low plasticity, gravel is primarily quartzite with trace arkosic arenite at 10.9' and 17.5', sand contains abundant quartz, some rock fragments, iron stain, dark minerals, mica, trace calcrete/caliche (kaolinized feldspar?), dark blotches of carbonaceous material? product?, increased sand content at 18.5-19.1' and 20.5-21.1', no apparent bedding, wet to saturated. 27% gravel, 46% sand, 12% silt, 15% clay.
				1.00 /1.50	5955	13				
					5954	14				No recovery for this interval.
				0.00 /1.50						
					5953	15			SC:	Gravelly Sand with some clay and silt - moderate brown (5YR4/4), as described above.
										No recovery for this interval
				0.50 /2.00	5952	16				
					5951	17			SC:	Gravelly Sand with some clay and silt - moderate brown (5YR4/4), as described above.
				0.80 /1.50	5950	18				No recovery for this interval
					5949	19			SC:	Gravelly Sand with some clay and silt - moderate brown (5YR4/4), as described above.
				1.10 /2.00	5948	20				No recovery for this interval.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 36.5	GROUND ELEVATION (FT):	5967.90	PROJECT NUMBER:	002/RI
NORTH: 749607.79	AREA: NE TRENCHES	CASING DIAMETER (IN):	2.0	GEOLOGIST:	J.P. O'BRIEN
EAST: 2086851.43	LOCATOR NUMBER: H13	BOREHOLE DIAMETER (IN):	10.0	DATE DRILLED:	03/31/92

LOG OF BORING NUMBER: 20791

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 28.7 FT. - 23.6 FT. BACKFILL MATERIAL: BENTONITE 37.9 FT. - 36.5 FT.



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
SC	Gravelly Sand with some clay and silt - moderate brown (5YR4/4), as described above.
	No recovery for this interval.
GC	Sandy Gravel with some clay and silt - moderate yellowish brown (10YR5/4), maximum gravel diameter .16', average .06', fine- to coarse-grained sand, well graded, gravel is rounded, sand is angular to sub-rounded, low plasticity, gravel is primarily quartzite, some yellowish gray (5Y7/2) silty clay clasts (bedrock rip-up clast), arkosic arenite, granite, sand contains abundant quartz, rock fragments, some iron staining, feldspar, dark minerals, gravel is imbricated near base of unit, saturated. 49% gravel, 29% sand, 7% silt, 15% clay. Top of bedrock at 24.5 ft.
	No recovery for this interval.
SANDY CLAYSTONE	Sandy Claystone - yellowish gray (5Y7/2) to light olive gray (5Y5/2), very fine- to medium-grained, moderately sorted, sub-rounded, approximately 5% porosity, argillaceous cement, slightly to moderately friable, abundant quartz, trace dark minerals, iron stained and mottled throughout, iron oxide nodules at 25.0', 25.5' and 26.1', color change to light gray (N4) at 27.5', moist to wet. 24% sand, 5% silt, 71% clay.
	VOA sample obtained from this interval.
SANDY CLAYSTONE	Sandy Claystone - yellowish gray (5Y7/2) to light olive gray (5Y5/2), as described above.
CLAYSTONE	Claystone with some sand - olive gray (5Y4/1), very fine- to medium-grained, well sorted, sub-rounded, approximately 4% porosity, argillaceous cement, slightly friable, abundant quartz, trace dark minerals, mottled to thinly/thickly laminated, carbonaceous material throughout and along laminea, moist. 12% sand, 3% silt, 85% clay.

STATE PLANE COORDINATE	TOTAL DEPTH (FT): 36.5	GROUND ELEVATION (FT): 5967.90	PROJECT NUMBER: 002/RI	LOG OF BORING NUMBER
NORTH: 749607.79	AREA: NE TRENCHES	CASING DIAMETER (IN): 2.0	GEOLOGIST: J.P. O'BRIEN	20791
EAST: 2086851.43	LOCATOR NUMBER: H13	BOREHOLE DIAMETER (IN): 10.0	DATE DRILLED: 03/31/92	

REMARKS: HOLLOW-STEM AUGER. BENTONITE SEAL 28.7 FT. - 23.6 FT. BACKFILL MATERIAL: BENTONITE 37.9 FT. - 36.5 FT.

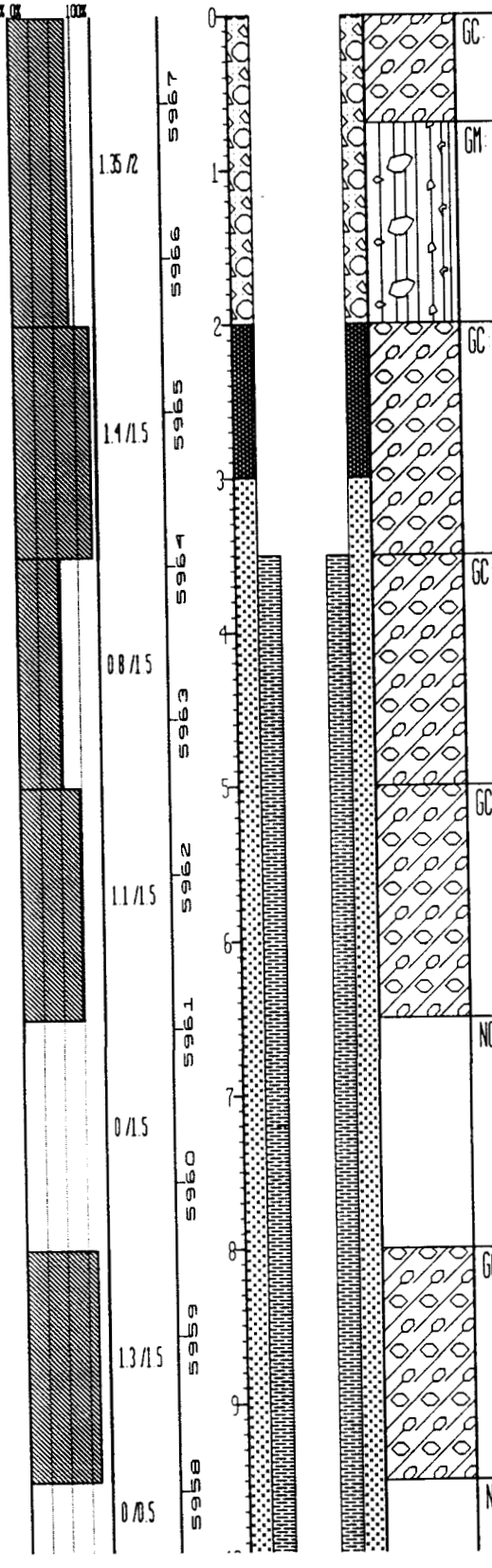
CHEMICAL SAP GRADATIONAL	SAMPLE NUMBER	SAMPLE GRAIN SIZE	PERCENT RECOVERY	RECOVERY/INTERVAL	DATUM (FT)	DEPTH (FT)	WELL OR PIEZOMETER CONSTRUCTION	LITHOLOGY	UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
		0% 50%	100% 0% 100%	2.00/2.00	5937	30 31				
				2.00/2.00	5936	32				
				2.00/2.00	5935	33				SANDY CLAYSTONE: Sandy Claystone with some silt - yellowish gray (5Y7/2) to dark yellowish orange (10YR6/6) where iron stained, very fine- to fine-grained, well sorted, sub-angular to sub-rounded, approximately 3% porosity, argillaceous cement, slightly friable, abundant quartz, trace iron staining, dark minerals, thickly laminated to thinly bedded, carbonaceous material along laminea, iron nodule at 34.9', iron staining 32.4-33.8' and 34.5-36.0', moist. 26% sand, 6% silt, 68% clay.
				2.00/2.00	5934	34				
					5933	35				
					5932	36				
					5931	37				Total depth at 36.5 ft.
					5930	38				
					5929	39				
					5928	40				

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 30.3	GROUND ELEVATION (FT):	5967.56	PROJECT NUMBER:	667.11
NORTH: 749415	AREA: MOUND AREA	CASING DIAMETER (IN):	2 ID	GEOLOGIST:	DAT
EAST: 2086308	LOCATOR NUMBER: N9	BOREHOLE DIAMETER (IN):	7.5	DATE DRILLED:	09/09/87
REMARKS: Hollow Stem Auger.					

LOG OF BORING NUMBER: 17-87

CHEMICAL SAMPLE DEPTH
GRADATIONAL SAMPLE DEPTH
SAMPLE NUMBER

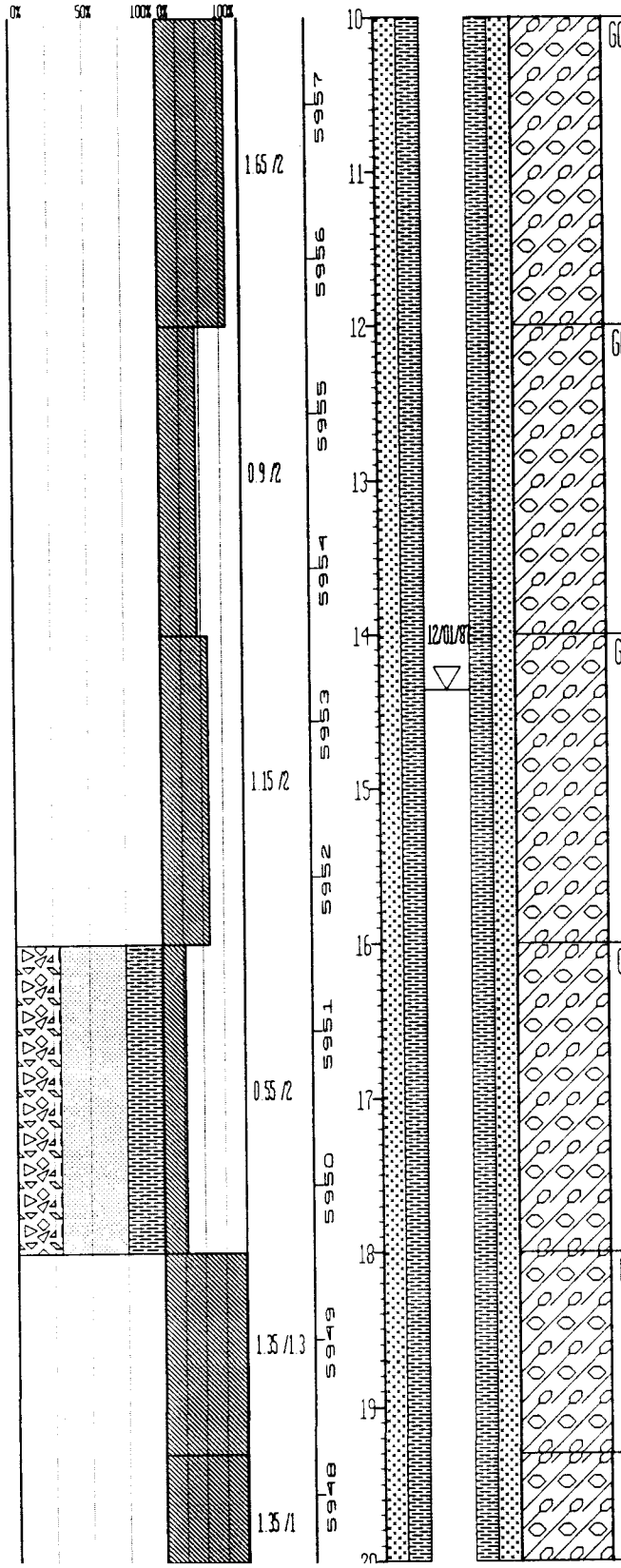
SAMPLE GRAIN SIZE (0% – 50%) | PERCENT RECOVERY (100% OK – 100%) | RECOVERY/INTERVAL | DATUM (FT) | DEPTH (FT) | WELL OR PIEZOMETER CONSTRUCTION | LITHOLOGY | UNIFIED SOILS CLASSIFICATION OR ROCK TYPE | DESCRIPTION



UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
GC	SANDY GRAVEL - moderate brown (10YR 4/2), angular to sub-angular, max. size = 5 cm., some silt, some clay, some roots.
GM	Gravelly Clay - dark reddish brown (10R 3/4), mod. plast., some sand, (VFG - MG), some silt.
GC	Calcareous Clayey Gravel - moderate orange pink (5YR 8/4), angular to sub-angular, mod. - well graded, max size = 4.5 cm., some sand, FG - VCG.
GC	Same as above.
GC	Same as above, dark yellowish orange (10YR 6/6), max. size of gravel = 2 cm.
NO SAMPLE	
GC	Same as above.
NO SAMPLE	

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 30.3	GROUND ELEVATION (FT):	5967.56	PROJECT NUMBER:	667.11	LOG OF BORING NUMBER:
NORTH:	749415	AREA: MOUND AREA	CASING DIAMETER (IN):	2 ID	GEOLOGIST:	DAT	17-87
EAST:	2086308	LOCATOR NUMBER: N9	BOREHOLE DIAMETER (IN):	7.5	DATE DRILLED:	09/09/87	
REMARKS: Hollow Stem Auger.							

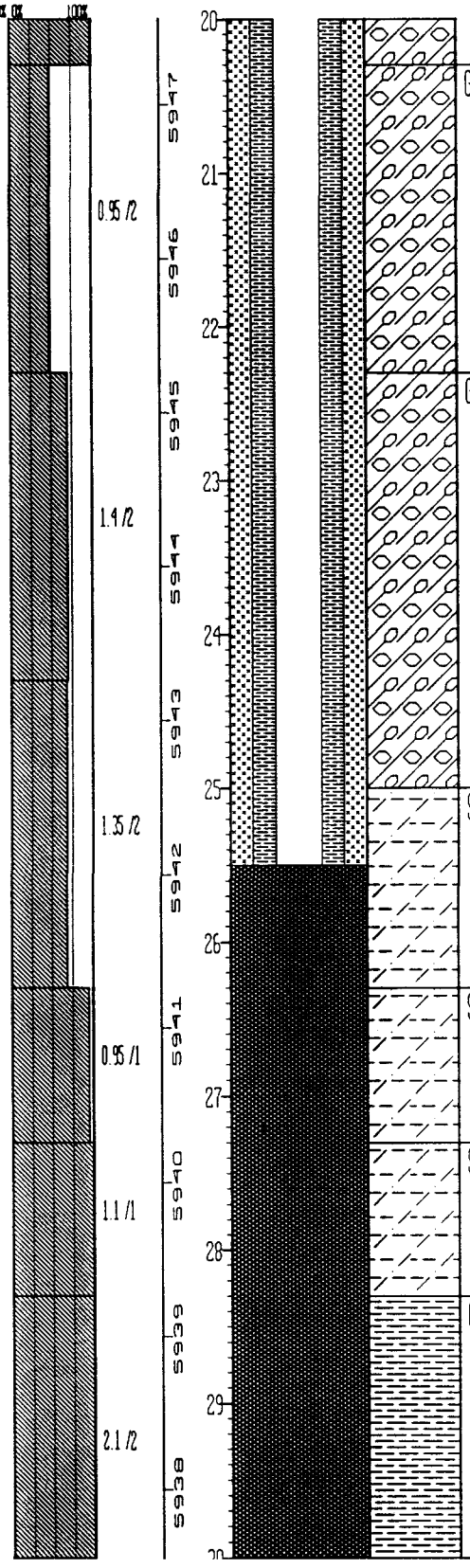
CHEMICAL SAMPLE DEPTH
GRADATIONAL SAMPLE DEPTH
SAMPLE NUMBER
SAMPLE GRAIN SIZE (0% – 50% – 100%)
PERCENT RECOVERY (0% – 100%)
RECOVERY/INTERVAL
DATUM (FT)
DEPTH (FT)
WELL OR PIEZOMETER CONSTRUCTION
LITHOLOGY
UNIFIED SOILS CLASSIFICATION OR ROCK TYPE
DESCRIPTION



GC	Sandy Clayey Gravel - light brown (5YR 5/6), angular to sub-angular, mod. - well graded, max. size = 5 cm., some silt, floury texture, slightly calcareous. Bottom of interval is consolidated, grading is moderate, contains trace of biotite
GC	Same as above, no biotite
GC	Same as above, not calcareous
GC	Same as above, floury texture.
GC	Same as above.
GC	Same as above.

STATE PLANE COORDINATE:		TOTAL DEPTH (FT): 30.3	GROUND ELEVATION (FT):	5967.56	PROJECT NUMBER:	667.11	LOG OF BORING NUMBER:
NORTH:	749415	AREA: MOUND AREA	CASING DIAMETER (IN):	2 ID	GEOLOGIST:	DAT	17-87
EAST:	2086308	LOCATOR NUMBER: N9	BOREHOLE DIAMETER (IN):	7.5	DATE DRILLED:	09/09/87	
REMARKS: Hollow Stem Auger.							

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

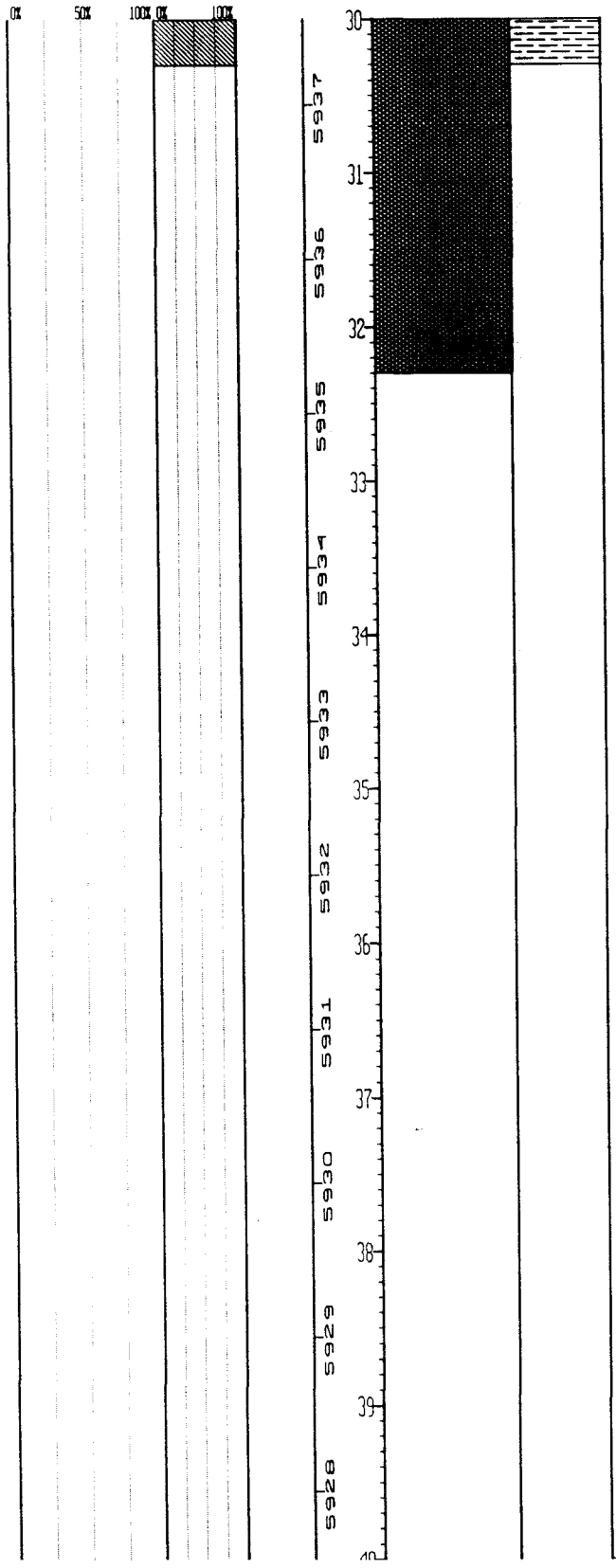


UNIFIED SOILS CLASSIFICATION OR ROCK TYPE	DESCRIPTION
GC:	Sandy Clayey Gravel - light brown (5YR 5/6), angular to sub-angular, mod. - well graded, max. size = 6 cm., some silt.
GC:	Same as above, dark yellowish orange (10YR 6/6). Bottom 4 in., moderate yellowish brown (10YR 5/4).
SILTY CLAYSTONE:	Top of Bedrock Pale yellowish orange (10YR 8/6), high plast., some VFG sand.
SILTY CLAYSTONE:	Same as above. Mottled coloring of very light gray (N8) and dark yellowish orange, plast. is moderate.
SILTY CLAYSTONE:	Same as above, mod. - high plast.
CLAYSTONE:	Light brownish gray (5YR 6/1), mod. - high plast., some silt, iron staining as mottles. Note: No water encountered during drilling.

STATE PLANE COORDINATE:	TOTAL DEPTH (FT): 30.3	GROUND ELEVATION (FT):	5967.56	PROJECT NUMBER:	667.11
NORTH: 749415	AREA: MOUND AREA	CASING DIAMETER (IN):	2 ID	GEOLOGIST:	DAT
EAST: 2086308	LOCATOR NUMBER: N9	BOREHOLE DIAMETER (IN):	7.5	DATE DRILLED:	09/09/87
REMARKS: Hollow Stem Auger					

LOG OF BORING NUMBER: 17-87

CHEMICAL SAMPLE DEPTH
GRADATIONAL 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



APPENDIX B

STEP DRAWDOWN TESTS

SITE 1

STEP DRAWDOWN TEST

SITE 1

STEP-DRAWDOWN TEST

PW20891, 4/28/92

Step-Site 1
4/28/92

Advanced Sciences, Inc.
405 Urban Street Suite 401
Lakewood, Colorado 80228
(303) 980-0036 FAX (303) 980-1206

DAILY REPORT

Report No. _____

Site Name: AQTest Site No. 1 Project No.: 208 Task 050132
Field Representative(s) RMZ, RT, MGW Day: 1 Date: 4/28/92

Time On Site: From: 9:30 To: ____ From: ____ To: ____ From: ____ To: ____

Weather: Sunny, Warm

Equipment In Use: OVA, PH/Cond, WL measurer, data logger, XD

Visitors:

Work In Progress/Completed:

Well #	Time	OVA(Bos.)	W.L.	
				29.38 @ 12:55
				29.38 @ 12:[illegible]
PW20891	10:20	4.5/9	~~28.45~~ 29.42	29.34 @ 11:45
OB20991	10:25	26.3/9.9	29.48	
OB21091	10:25	0.9/8.0	28.35	
3687	10:42	0.9/0.0	29.68	

DATA LOGGER #	WELL	OUTPUT	XD
1007	3587	1	1035[illegible]
"	PW20891	2	35[illegible]604
975	OB20991	1	3[illegible]
"	3687	2	[illegible]
1019	OB21091	1	200[illegible]

Special Conditions/Corrective Work Required:

Reviewed By: _____ Date: _____

ADVANCED SCIENCES, INC.

Step 1 PW20892

Step Test

Pump Well Step Drawdown Test

Herty
1:08 no flow
1:10 no flow
~~1:20 " "~~
1:25 " "
13:25 dirty water

Step 1 & 2

1 min 07 sec - 4 qts

1 min 15 sec - 4 qts Time 13:32

1 min 11 sec - 4 qts

1 min 16 sec - 4 qts.

1 min 29 sec - 4 qts

1 min 29 sec 4 qts. Time 13:43

Herty Begin Step 3

175 - 13:45

36.5 sec	4 qts.	Time 13:47	
32.0 sec	4 qts.	Time 13:48	
37.0 sec	4 qts.	Time 13:49	
38.0 sec	4 qts.	Time 13:50	
38.0 sec	4 qts	Time 13:52	-1.58 gpm
36.0 sec	4 qts.	Time 14:00	
36.0 sec	4 qts.	Time 14:01	
37.0 sec	4 qts.	Time 14:02	1.667 gpm

ph = 7.01
Temp 25° C
Conductivity meter will not calibrate

PROJECT_____ CALC._____ SHT._____ OF_____
BY_____ DATE 4/28/92 CHKD_____ DATE_____ PROJECT NO._____

Q Site 1 Steptest

Page 2

ADVANCED SCIENCES, INC.

39.0	4 qts	2:15 - 2:20
35	"	
38	"	
38.5	"	
40	4 qts	14:40 - 46
39	"	
39	"	

PROJECT_____ CALC._____ SHT._____ OF_____

BY _____ DATE _____ CHKD _____ DATE _____ PROJECT NO. _____

9/28/92

AQUIFER PUMPING TEST DATA SHEET

DATE 9\28\92 PERSON RECORDING DATA Pmm

WELL # PW20891

HYDROSTRATIGRAPHIC UNIT Sandstone No. 1

~~SCREENED~~ OPEN INTERVAL 18 ft to 64 ft

STATIC WATER LEVEL 29.34 ft TOPC PUMPING WELL I.D. 2" in

DISTANCE TO PUMPING WELL X ft N.A.

Flow meter: 41103.1 at t=

TEST START TIME ___:___:___

f=111

~~ELAPSED~~ TIME (Units)	TRANS	WATER LEVEL (Units)	Q (pumping well) (Units)	
				TOT = 4113.0 @ t=
1315	29.03			PUMP ON @ 35 f=100
.15			29.60	
1321			29.41	PUMP OFF
1322				PUMP ON INC Q
1322.30			29.53	f=111
1323				PUMP OFF NO Q
				f=125
.0 1324 PUMP ON				INC Q
.1 1325		30.05		f=135
.				FLOW NOTED
etc.				

ADVANCED SCIENCES, INC.

Step-Site 1
4/28/92

SS #1
P208-91

t	Time	WL	Remarks
1.5	1325.30	30.15	
2.5	1326.30	30.25	
4	1328	29.82	valver to tank inc head on pump
5	1329	29.75	
5.5	1329.30		line to 150
6	1330	30.17	
7	1331	30.41	
8	1332	30.59	
9	1333	30.666	
10	1334	30.70	
16	1340	30.82	
19	1343	30.86	
21.5	1345.30		inc f to 173
22	1346	31.80	
23	1347	32.60 ? ad ? meas	
25.5	1349.30	32.38	
27	1351	32.44	
36	1400	32.81	
51	1415	33.11	
61	1425	33.25	
69	1433	33.34	
96	1500	33.48	
104	1508	33.52	
119	1523		inc f to 200 Q = 1 gal/29 sec
121	1525		adj. value ↓ Q = 1/29 sec
122	1526		adj. value ↓ Q = 1/35 sec
	1527		adj. value ↓ Q = 1/40 sec
126	1530		Shut down generator
	1604	30.22	
	1629	29.95	130.23
	1642	29.93	

PROJECT_____ CALC. 4/28/92 SHT.____ OF ____
BY____ DATE____ CHKD____ DATE____ PROJECT NO.____

Step - site 1
4/28/92

AQUIFER PUMPING TEST DATA SHEET

DATE 4 \ 28 \ 92 PERSON RECORDING DATA Pmy

WELL # OB 209 91

HYDROSTRATIGRAPHIC UNIT Sandstone No. 1

SCREENED INTERVAL 18.5 ft to 65 ft

STATIC WATER LEVEL 29.48 ft TOPS PUMPING WELL I.D. 2" in

DISTANCE TO PUMPING WELL 6.2' ft

TEST START TIME ____:____:____

1,00 Hz @ 1320
111 Hz @ 1322
125 Hz @ 1325
135 Hz @ 1324
150 Hz @ 1329

ELAPSED TIME (Units)	WATER LEVEL (Units)	THAT	Q (pumping well) (Units)
1312		29.38	
1313		29.38	
1326		29.38	

.
.
.
etc.

Step-one
4/28/92

ADVANCED SCIENCES, INC.

#9
175 H2
@1345

OB20991

Time	Trans	Water Level Ind
1335	29.38	
1340	29.38	
1347	29.38	
1355	29.38	
1356		31.25
1427	29.38	
1429		32.02
1510	CHANGED TRANSDUCER 32.35	32.34
1513	32.39	
1606		30.36
1634	30.28	30.09

Recovery

PROJECT_____ CALC._____ SHT._____ OF_____
BY_____ DATE_____ CHKD_____ DATE_____ PROJECT NO._____

4/28/92

AQUIFER PUMPING TEST DATA SHEET

DATE 4\28\92 PERSON RECORDING DATA RMM

WELL # OB21091

HYDROSTRATIGRAPHIC UNIT Sandstone No. 1

SCREENED INTERVAL 17.0 ft to 63.8 ft

STATIC WATER LEVEL 28.35 ft PUMPING WELL I.D. _____ in

DISTANCE TO PUMPING WELL 20.7' ft

TEST START TIME _____:_____:_____

ELAPSED TIME (Units)	WATER LEVEL (Units) FROM TOPC	THAT	Q (pumping well) (Units)
1313		28.27	
1331		28.42	

.

.

.

etc.

TOPC = Top of protective casing

(4011)(AQTEST)(10/29/91)

Step - [illegible]
4/28/92

ADVANCED SCIENCES, INC.

OB21091

TIME	TRANS	WATER LEVEL IND
1335	28.58	
1340	28.68	
1348	28.89	
1357	29.32	29.35
1427	29.81	
1431		29.82
1513	30.12	30.15
1608		29.05
1635	28.81	28.86

PROJECT_____ CALC._____ SHT._____ OF_____
BY_____ DATE_____ CHKD_____ DATE_____ PROJECT NO._____

4/28/92

AQUIFER PUMPING TEST DATA SHEET

DATE 4\28\92 PERSON RECORDING DATA RMJ

WELL # 3687

HYDROSTRATIGRAPHIC UNIT Sandstone # 1

SCREENED INTERVAL _____ft to _____ft

STATIC WATER LEVEL 29.26 ft TOPC PUMPING WELL I.D. 2" in

DISTANCE TO PUMPING WELL 10.4' ft

TEST START TIME _____:_____:_____

ELAPSED TIME (Units)	WATER LEVEL (Units)	TRANS	Q (pumping well) (Units)
1312		29.58	
1312		29.57	
1326		29.59	
1329		29.63	

.

.

.

etc.

4/28/92

ADVANCED SCIENCES, INC.

3687

~~WATER LEVEL IND~~

Time	TRANS	
1335	29.73	
1340	29.82	
1347	29.97	
1354	30.22	30.29
1429	30.84	
1428		30.90
1513	3119	Recovery
1611		30.40
1632	30.11	30.24
1640	30.10	30.17

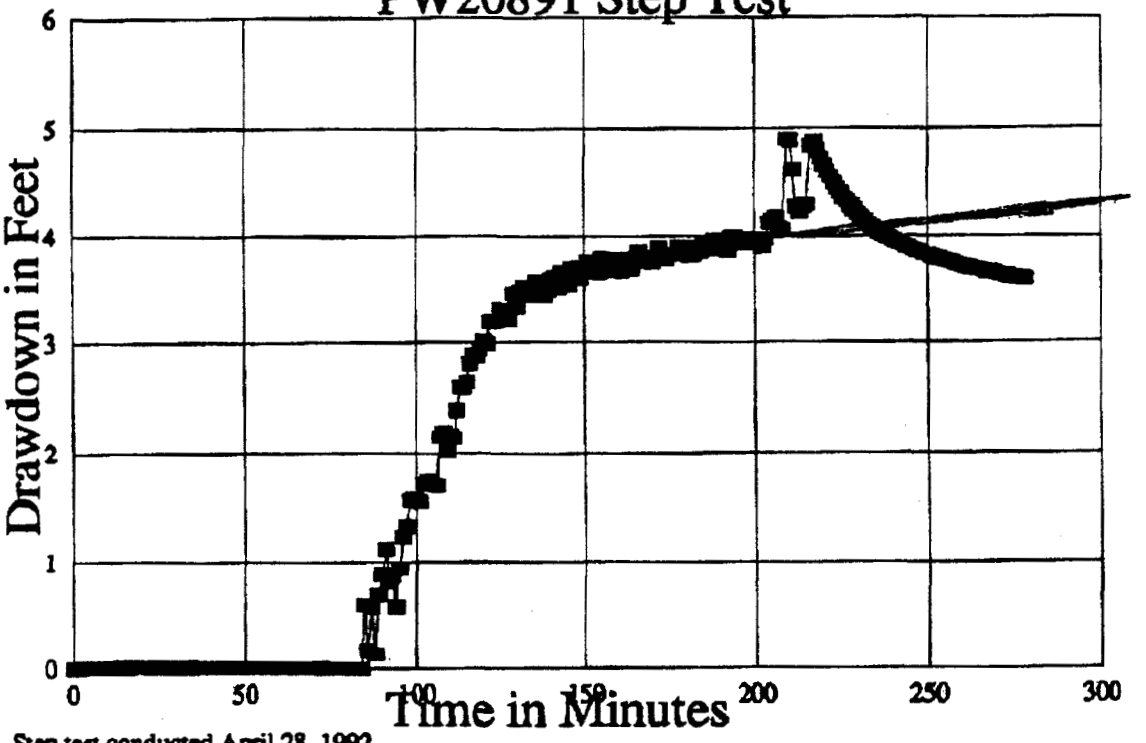
PROJECT_____ CALC._____ SHT._____ OF_____

BY_____ DATE_____ CHKD_____ DATE_____ PROJECT NO._____

sandy (2)

Test Site No. 1

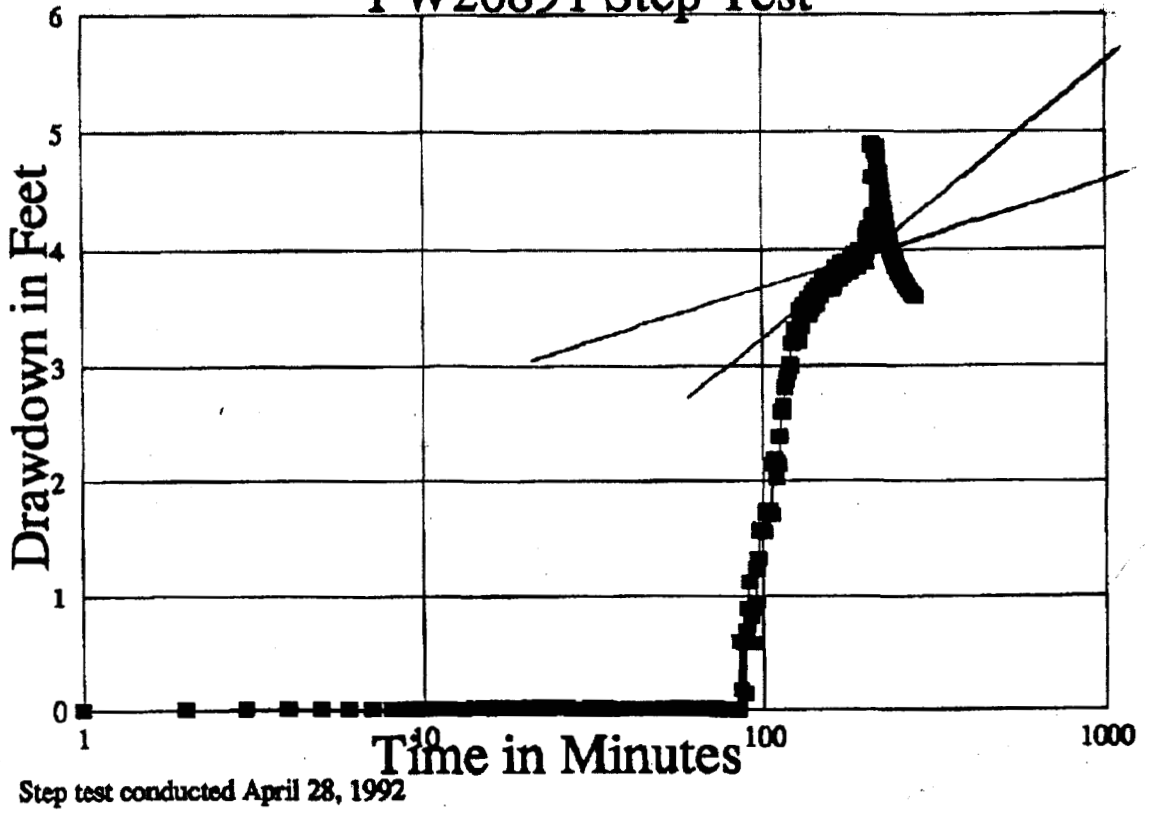
PW20891 Step Test



Step test conducted April 28, 1992

Test Site No. 1

PW20891 Step Test



Step test conducted April 28, 1992

SITE 2

STEP DRAWDOWN TEST

SITE 2

STEP-DRAWDOWN TEST

ALLUVIAL WELL OB2091, 5/10/92

Advanced Sciences, Inc.
405 Urban Street Suite 401
Lakewood, Colorado 80228
(303) 980-0036 FAX (303) 980-1206

DAILY REPORT

Report No. _____

Site Name: Aq. Site No. 2 Project No.: Task
Field Representative(s) RMZ, GCE Day: WED. Date: 6/10/92

Time On Site: From: 7:00 AM To: ____ From: ____ To: ____ From: ____ To: ____

Weather: Clear, Sunny, 60°
Equipment in Use: OVM, pH meter, Orion SC. meter, Grundfos Pump, Transducers + Data Loggers, Generator.

Visitors:

Work in Progress/Completed:
ARRIVED ON Site at 7:00 a.m. to set-up.

7:40 TOOK STATIC WATER LEVEL MEASUREMENTS.

NOTE - DRAINAGE DITCH A FEW FEET TO NORTH

INSTALLED GROUND WIRE TO PUMPING WELL XD.
THIS REQUIRED REMOVAL OF THE PUMP ETC.
SUCCESSFUL ATTACHMENT OF GROUND WIRE TO XD AS SHOWN AND TO LOGGER AS SHOWN.
09:10 RESET REFERENCE FOR 202 TO REFLECT CHANGES CAUSED BY XD WORK.
09:20 ALL DATA LOGGERS DOWNLOADED. WATER LEVEL MEASUREMENTS TAKEN
~~Special Conditions/Corrective Work Required:~~ FILES ARE ...05.PRN
THIS IS CONSIDERED BACKGROUND DATA.

1236 STARTED STEP TEST BY CALIBRATING
PUMP WOULD NOT START UNTIL Hz WAS BUMPED TO OVER 350 Hz. GOT A PUMPING RATE OF ~ 0.145 gpm AT 123 Hz
SET TO 300 ml in 49 sec for a pumping rate of 0.1 gpm w/ Hz SET AT 123 Hz on controller
1238 BUCKET 52.84 FOR 300 ml.
1240 Bucket 51.60 For 300 ml
1306 RETURN TO SITE — DISCUSSION w/ WCFS HAS CAUSED A DELAY →

Reviewed By: _____ Date: _____

ALLUVIAL
STEP TEST

Advanced Sciences, Inc.
405 Urban Street Suite 401
Lakewood, Colorado 80228
(303) 980-0036 FAX (303) 980-1206

DAILY REPORT

Report No. _____

Site Name: _____ Project No.: Task
Field Representative(s) _____ Day: _____ Date: 6/10/92

Time On Site: From: ____ To: ____ From: ____ To: ____ From: ____ To: ____

Weather: _____

(GOAL WAS 30 MINUTES)

~~1320~~
1317 PUMP ADJUSTMENT — MAY HAVE INADVERTENTLY TURNED OFF FOR A MINUTE
1320 ORIGINAL RATE WAS AT 123 Hz
1322 ADJUST TO 148 Hz
1323 BUCKET 22.86 FOR 300 ml
1324 ADJUST TO 13[illegible] Hz
1325 BUCKET 32.37 sec 300 ml
1326 BUCKET 31.90 sec 300 ml
~~1335 BUCKET~~
1350 W.L. TAPE IS NOT FUNCTIONING
1400 BUCKET 33.24 sec 300 ml
(RATE IS 133 Hz)
1423 NOW 170 Hz ; test = 17.59
1425 NEW STEP = 0.29 gpm AT 170 Hz
1458 225 Hz ; test = 16.20 secs
242 Hz test = 9.69 sec
1502 test 10.70
1503 260 Hz 9.90, 9.89
1504 280 Hz (.55 gpm) 8.99, 9.12
1506 DOWNLOAD * .. 06APRN
1526 — RECOVERY PUMP SHUT DOWN
1647 STOP 20291/20191 + DOWNLOAD * ... 06APRN

C=?

~~SORRY~~

1422 (131 Hz) VARIES A LITTLE

New STEP

Reviewed By:

STEP TEST

Aquifer Pumping Test Data Sheet

Date: 06/10/92 Person Recording Data RMZ

Pumping Well No. OB20291

Hydrostratigraphic Unit ALLUVIUM (Qrf)

~~Screened~~ filter Interval 16.0 ft to 33.3 ft

Static Water Level 23.93 ft Pumping Well ID 2" in

Distance to Pumping Well _____ ft

Test Start Time: ____:____:____

Time	Name	Tape	Brand	XD	OVA	SC	pH	T	Q	Remarks
0752	GCE/RMZ	23.93	EI BL.							
0756		(23.90)	"	24.11						LOGGER
0906	"	23.90	"	24.63						RESET W/O DOWNLOA
	DISCREPANCY DUE TO REMOVAL OF XD TO									TO 23.90
	INSTALL GROUND WIRE TO XD									
0912	"			23.90						
0936	"	23.91	"	23.92						
DOWNLOAD HERMIT 20291105.PRN AT [redacted] 0945										
LOGGER WAS SET A 1 HR (linear readings) NOW SET										
TO LOG. PAIRED W/ 20191										
	START ~~STEP TEST~~									
1118		24.76		PUMP TEST => SET PUMP.						
1122		24.87								
1204		24.35		SHUT PUMP DOWN TO RECOVER BEFORE						
1236		23.99		INITIATING STEP TEST						
1238		24.14							0.1 gpm	
1238		24.16								
1241		24.18								
1318		24.12		24.08						

1317 → PUMP ADJUSTMENT ↑ ARTIFICIALLY INDUCED? GCE MAY HAVE BUMPED PUMP SWITCH

Reviewed By: _____ Date: _____

Aquifer Pumping Test Data Sheet

Date: 6/10/92 Person Recording Data _____

Observation Well No. OB2Ø291

Hydrostratigraphic Unit _____

Screened Interval _____ ft to _____ ft

Static Water Level _____ ft Pumping Well ID _____ in

Distance to Pumping Well _____ ft

Test Start Time: _____:_____:_____

Time	Name	Tape	Brand	XD	OVA	Q	Remarks
1335	GCE	24.50	IT GUE				
1350			NOT WORKING	24.51			
1411				24.58			
1425		—		24.78		0.29 ~~gpm~~	STEP 0.29 gpm
1429				24.88			
1431				24.95			
1436				25.06			
1441				25.10 — ?			
STEP 1447				25.15		0.55	TO 280 Hz 1458
1506				26.71			
1509				27.38			
1514				28.47			
1518				29.32			
1526	RECOVERY						Pump ~~Down~~ off
1647				25.22			

Reviewed By: _____ Date: _____

STEP TEST

Aquifer Pumping Test Data Sheet

Date: 06/10/92 Person Recording Data RMZ

Observation Well No. OB20191

Hydrostratigraphic Unit KaSS

~~Screened~~ Filter Interval 34.1 ft to 59.0 ft

Static Water Level 23.80 ft Pumping Well ID 24 in

Distance to Pumping Well _____ ft

Test Start Time: _____:_____:_____

Time	Name	Tape	Brand	XD	OVA	Q	Remarks
0750	K2/GE	EI-blue	23.80	~~[illegible]~~			
~~[illegible]~~				~~[illegible]~~			
0756	"		"	23.83			
0927	"	23.82	"	23.85			
DOWNLOAD LOGGER TO 20105.PRN AT ~~[illegible]~~ 0945							
1228		23.84					
	START STEP TEST						
1351		NOT WORKING		23.60			
1440				23.71			
1447				23.72			
1509				23.74			
1513				23.78			
1515				~~23~~.84			
1647				25.54			

Reviewed By: _____ Date: _____

SITE 1 (?)

Aquifer Pumping Test Data Sheet

Date: 06/10/92 Person Recording Data RMM

Observation Well No. OB 20491

Hydrostratigraphic Unit Alluvium (Qrf)

~~Screened~~ Filter Interval 16.0 ft to 33.0 ft (?)

Static Water Level 23.96 ft Pumping Well ID 2" in

Distance to Pumping Well _____ ft

Test Start Time: ____:____:____

Time	Name	Tape	Brand	XD	OVA	Q	Remarks
0753	RJ/BLE	23.96	BLUE EI				
0858	"	~~[illegible]~~	"	23.98			
0930	23.96	~~23.97~~	"	23.99			
DOWNLOAD TO 20405, PRN: ~~[illegible]~~ AT 0947							
LOGGER RESET FROM 1 hr linear to log. Paired w/ 21191							
1229		24.01					
	START STEP TEST						
1439				5.48			
1446				5.47			
1449				5.46			
1512				5.40			
1619				5.48			

Reviewed By: _____ Date: _____

STEP TEST

Aquifer Pumping Test Data Sheet

Date: 06 / 10 / 92 Person Recording Data TMT

Observation Well No. OB211 91

Hydrostratigraphic Unit KASS (No. 1)

~~Screened~~ Filter Interval 34 ft to 59 ft (?)

Static Water Level 23.83 ft Pumping Well ID 2" in

Distance to Pumping Well _____ ft

Test Start Time: ____:____:____

Time	Name	Tape	Brand	XD	OVA	Q	Remarks
0755	RJ/GE	23.83	EI-BL				
0758	RJ/GE	~~23.86~~		23.86			
0929	"	23.84	"	23.86			
DOWNLOAD	TO	21105.	PRN	AT	0947		
1228		23.87					
	START	STEP	TEST				
~~1352~~							
1449				6.25			
1510				6.22			
1619				6.23			

Reviewed By: _____ Date: _____

SITE 1651

Aquifer Pumping Test Data Sheet

Date: 06/10/92 Person Recording Data RMZ

Observation Well No. 5691

Hydrostratigraphic Unit Alluvium (Qrf)

~~Screened~~ Filter Interval 23.88 ft to 35.2 ft

Static Water Level _____ ft Pumping Well ID 2" in

Distance to Pumping Well _____ ft

Test Start Time: ____:____:____

Time	Name	Tape	Brand	XD	OVA	Q	Remarks
0756	RZ/GE	EI-BLUE	23.88				
0759	"	"		23.92			
0933	"	"	23.88	23.93			
DOWNLOAD TO 569105.PRN AT 1006							
LOGGER RESET FROM lne linear to log. Paired w/11491							
1231		23.93					
	START	STEP TEST					
1448				24.08			
1612				24.03			

Reviewed By: _____ Date: _____

STEP TES 1

Aquifer Pumping Test Data Sheet

Date: 06/10/92 Person Recording Data RMZ

Observation Well No. 11491

Hydrostratigraphic Unit Alluvium (Qrf)

~~Screened~~ Filter Interval 8.0 ft to 25.3' ft

Static Water Level 24.38 ft Pumping Well ID 2" in

Distance to Pumping Well _____ ft

Test Start Time: ____:____:____

Time	Name	Tape	Brand	XD	OVA	Q	Remarks
0801	RZ GE	24.38	EI-BLUE				
0759	"		"	24.42			
0933	"	24.40	"	24.44			
DOWNLOAD TO 11405.PRN AT 1006							
1229		24.42					
	START STEP TEST						
1448				24.17			
1632				24.49			

Reviewed By: _____ Date: _____

STEP TEST

Aquifer Pumping Test Data Sheet

Date: 06/10/92 Person Recording Data RMZ

Observation Well No. 12491

Hydrostratigraphic Unit Kass (No. 1)

~~Screened~~ Filter Interval _____ ft to _____ ft (?)

Static Water Level 23.75 ft Pumping Well ID 2" in

Distance to Pumping Well _____ ft

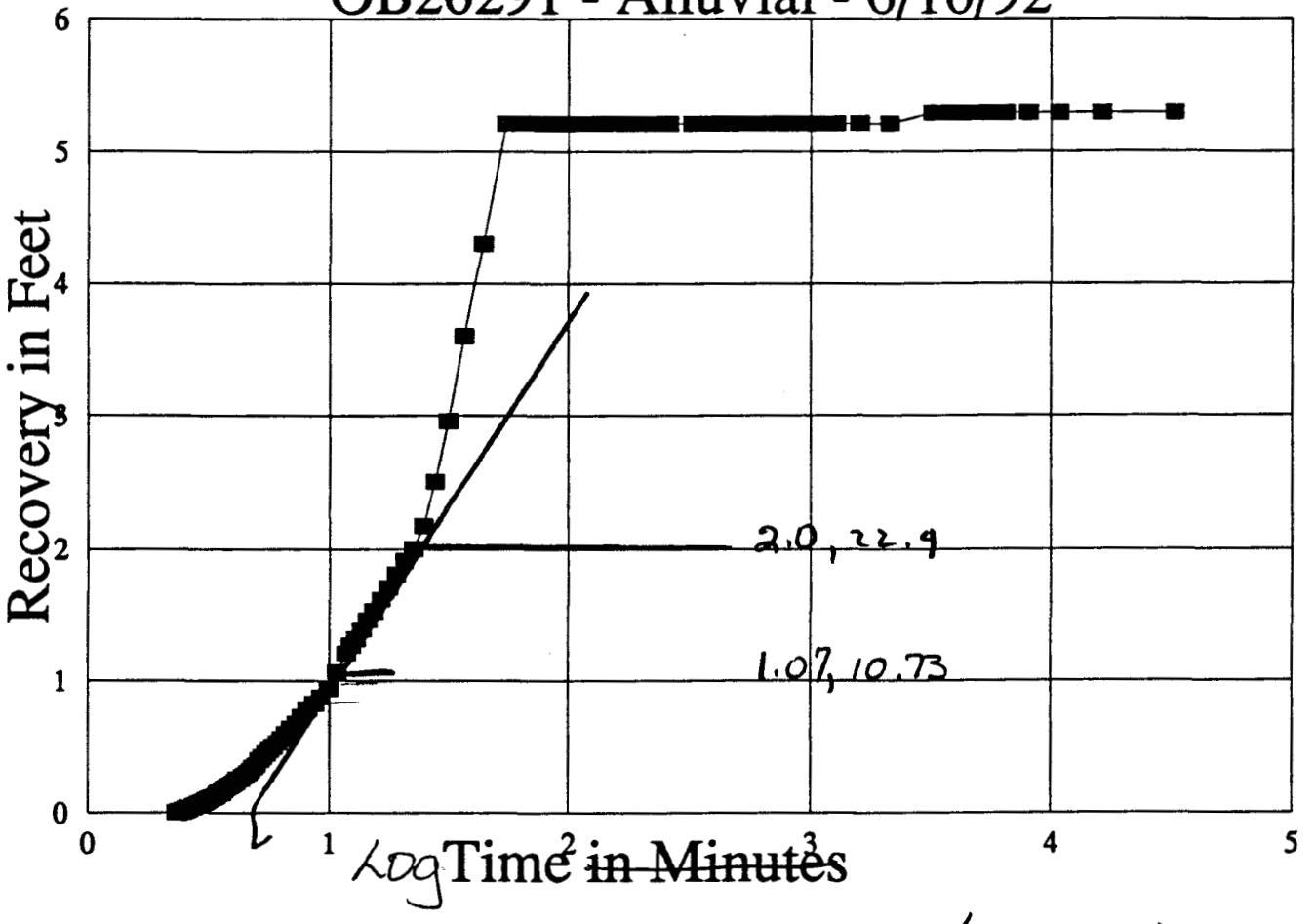
Test Start Time: ____:____:____

Time	Name	Tape	Brand	XD	OVA	Q	Remarks
0803	RZ/GB	23.75	EI BLUE				
0932	"	23.76		23.78			
DOWNLOAD TO 12/05. PRN AT 0959							
LOGGER RESET FROM 1 hr linear TO log							
1231		23.79					
	START STEP TEST						
16:24				23.81			

Reviewed By: _____ Date: _____

Site No. 2 Step Test

OB20291 - Alluvial - 6/10/92



$$T = \frac{264\,Q}{s\,\log(t_2/t_1)} = \frac{264\,(.55\text{ gpm})}{.93 * \log(22.4-10.73)} =$$

$$T = 146 \text{ gpd/ft},\ K = 5.7\times10^{-4}\text{ cm}$$

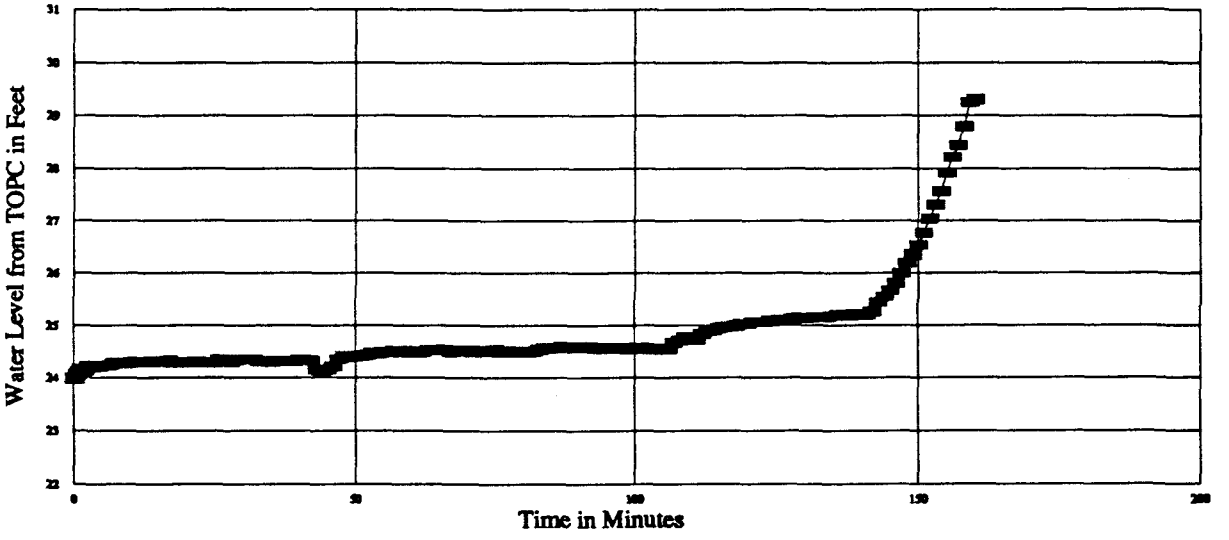
$$u = \frac{r^2 S}{4Tt} = \frac{(5/12)^2(.1)}{4(19.5\text{ ft}^2/\text{d})(2\text{ days})} = 0.00011 \quad ,\ W(u) \cong 8.63$$

$$Q = \frac{4\pi T(s)}{W(u)} = \frac{4\pi(19.5\text{ ft}^2/\text{d})(2.75')}{8.63} = 78\text{ ft}^3/\text{day}$$

$$= .41\text{ gpm}$$

Step-Drawdown Test-Site 2

OB20291



SITE 2

STEP-DRAWDOWN TEST

BEDROCK WELL OB20191, 6/12/92

5600 S. QUEBEC ST. SUITE 307D
ENGLEWOOD, COLORADO 80111
ph. (303) 779-0314
Fax. (303) 779-0341

Daily Report

Report No. _____

Project: RFP AQUIFER PUMP TEST SITE 2 Project No: 9208.05.01.32

Field Representative(s) GRANT EVENSON Day: _____ Date: 6/12/92
ROSE Z.

Time On Site: From: 0630 To: _____ From: _____ To: _____ From: _____ To: _____

Weather: 60°, SUNNY

Equipment In Use:

Visitors:

Work In Progress/Completed:

0630 ARRIVAL ONSITE (TRAILER) + PREPARATION
0645 PROVIDE RADIO FOR REIDEL
0700 ROSE Z. ARRIVAL
0703 OPEN WELLS
0705 CALIBRATE OVM
0707 - 0710 MONITORING BREATHING ZONE AT ALL WELL HEADS — N.D.
~~[illegible]~~
0800 - 10:00 ATTEMPT TO DECON PUMP BY PUMPING IN 5 gal container failed. DISSASSEMBLED PUMP AND MANUALLY DECONNED. HOOKED UP DIAPHRAM PUMP TO DECON TUBING.

Special Conditions/Corrective Work Required:

1000 - 1015 GROUND TRANSDUCER TO OB20191 AND INSTALLED PUMP TO A DEPTH OF ≈50.0' X D AT 39' (FROM TOPC). BEGIN STEP

ALLOW TO RECOVER,

1608 - ~~[illegible]~~ 1701 STOP DATALOGGERS, TAKE TAPE READINGS AND DOWNLOAD HERMITS; I HAVE SAVED 2 FILES FOR EACH WELL FOR THE PERIOD; STEP 0 (xxx9107.prn) IS DRAWDOWN, STEP 1 (xxx9107a.prn) IS DRAWDOWN + RECOVERY. OB20491 HAS NO DATA (SEE NOTES). ALL RESET TO LINEAR AND 60 MINUTE RATE.

Reviewed By: _____ Date: _____

Advanced Sciences, Inc.
405 Urban Street Suite 401
Lakewood, Colorado 80228
(303) 980-0036 FAX (303) 980-1206

INSTRUMENT CALIBRATION LOG

Site Name: RFP AQ PUMP TEST **Date:** 6/12/92

Project: 9208.05.01.32 **Time:** 0705 hrs

CALIBRATION INFORMATION

Instrument: TE MODEL 580B OVM

Serial Number: 580B-30012-237

Calibrant: 100 ppm ISOBUTYLENE

RESULTS

100 ppm ✓ GOE ✓

WORK TO BE PERFORMED

GENERAL REMARKS

Note: This form will remain with the instrument and a copy is to be place in project file and be maintained there for a period of not less than one year.

By: _____ **Page** ___ **of** ___

RFSHINST-CAL

Aquifer Pumping Test Data Sheet

Date: 06/12/92 Person Recording Data RMZ

Pumping Well No. OB 20191

Hydrostratigraphic Unit Aiap. Ss

Screened Interval _____ ft to _____ ft

Static Water Level 22.95 ft **Pumping Well ID** _____ in
Pump In

Distance to Pumping Well _____ ft

Test Start Time: ____:____:____

Time	Name	Tape	Brand	XD	OVA	SC	pH	T		Remarks
0709	RMZ	23.98	Hazco	NA	0					Before pump install
1042	RMZ	22.95	Hazco	N/A	0					
1045	GE	23.02	Hazco	N/A	0					
1050	RMZ	23.26	Hazco	N/A						← 11:05 START
1115 1116		~~24.98~~ ~~25.03~~		24.98 25.03						
1117		~~25.04~~		~~25.04~~						
1118	GE	2550								
1118				25.25						
1120		25.54								
1120				25.28						
1121				25.30						
1124				~~24.13~~						
1124				~~24.12~~						
~~1132~~ 1133				~~24.13~~						
1125		132 Hz		14 sec	100ml ~~11~~ ml	≈ ~~.14~~ .11 ppm				
1126				~~24.13~~						
1127				~~24.14~~						
1127				27.02						
1128				27.11						
1129				27.36						
1129				27.43						

move to LAH 6/12/92 20291

move to LAH 6/12/92 20291

RMZ

~~See other side~~ LAH 6/12/92

Reviewed By: _____ **Date:** _____

Continuation of Aquifer Pumping Test Data Sheet

Pumping Well No. 20191 Date 6/12/92
Site No.
Crew RMZ, GCE, UAH
Weather Sunny 75°
Equipment

Time	Name	Tape	Brand	XD	OVA	SC	pH	T	Q	Remarks
1129				27.54						
1133				28.40						
1136	GCE	29.70		~~x~~						
1136	GCE	29.76		29.31						
1137				29.46						
1139					22sec	100 ml		132 hz		= .075 gpm
1139				29.66						
1140				29.75						Rate fell
1146				30.39						
1149				30.43						
1149					33sec	100 ml		132 Hz		= .05 gpm
1153				30.28						Pump Quit
1157					12.5sec	100 ml		198 Hz		Δ'd valve + upped Hz
1159				31.29						= .13 gpm
1203				32.36						
1207				32.84						
1209				14 sec	100 ml			198 Hz		0.12 gpm
1212				33.50						
1213				33.60						
1213				33.68						
1214				33.83						
1216				33.96						
1218				34.20						
1222 1223	Pump Off									
1615		24.62		~~24.66~~ 24.53						DOWN LOAD STEP 0 20191 0 7a.prn STOP HERMIT
										STEP 1 20191 0 7a.prn
										ref = 24.62
1635				24.62						restart at 1635 hrs

LINEAR RATE = 60 minutes

Reviewed By: Date:

Aquifer Pumping Test Data Sheet

Date: 06/12/92 Person Recording Data RMG

Observation Well No. OB20291

Hydrostratigraphic Unit Alluvium - Qrf

Screened Interval _____ ft to _____ ft

Static Water Level 24.05 ft (Pump In / Pump Out) Pumping Well ID _____ in

Distance to Pumping Well _____ ft

Test Start Time: ____:____:____

Time	Name	Tape	Brand	XD	OVA	Q	Remarks
1106	RMG	Hydro	24.05	NA	0		OVA = Breathing Zone
	Pump in	WELL	- will remove				
1047	GE/RZ	24.06	Hazco	NA			Set This ref
1119				24.12			
1120				24.13			
1121				24.13			
~~1146~~ LAH				~~24.11~~ LAH			
1124 1124				24.13 24.12			
1125 1125				24.13			
1126				24.13			
1127 1127				24.14			
1137				24.13			
1615		24.02		24.00			STOP DOWNLOAD → 2029107 STEP 0 → 2029107a STEP 1
							RESTART LINEAR 60 min
							ref = 24.02
1635				24.02			time = 1635

Reviewed By: _____ Date: _____

Aquifer Pumping Test Data Sheet

Date: 6 / 12 / 92 Person Recording Data _____

Observation Well No. 12491

Hydrostratigraphic Unit _____

Screened Interval _____ ft to _____ ft

Static Water Level 23.86 ft Pumping Well ID _____ in

Distance to Pumping Well _____ ft

Test Start Time: _____:_____:_____

Time	Name	Tape	Brand	XD	OVA	Q	Remarks
10:33	Rmz	23.86	Hazco				
1701		24.14		24.13			STOP DATALOGGER
							DOWNLOAD → 1249107 STEP 0 → 1249107a STEP 1
1713				24.14			restart at 1713 hrs
							ref = 24.14
							LINEAR, RATE =
							60 MINUTES

Reviewed By: _____ Date: _____

Aquifer Pumping Test Data Sheet

Date: 06/12/92 Person Recording Data RMZ

Observation Well No. OB21A1

Hydrostratigraphic Unit Arapahoe Ss

Screened Interval _____ ft to _____ ft

Static Water Level 23.89 ft Pumping Well ID _____ in

Distance to Pumping Well _____ ft

Test Start Time: ____:____:____

Time	Name	Tape	Brand	XD	OVA	Q	Remarks
1019	RMZ	23.89	Hizco				
1622		24.08		24.06			STOPPED FILE DOWNLOAD 2119107.prn STOP
							2119107a.prn STOP
1654				24.08			restart at 1654 hrs
							ref = 24.08
							↓
							LINEAR, RATE = 60 MINUTES

Reviewed By: _____ Date: _____

STEPT TEST

PAGE 1/1

Aquifer Pumping Test Data Sheet

Date: 06/12/92 Person Recording Data Rmy

Observation Well No. OB20491

Hydrostratigraphic Unit Qsg. Gs. Alluvium

Screened Interval _____ ft to _____ ft

Static Water Level 24.11 ft Pumping Well ID 2" in

Distance to Pumping Well _____ ft

Test Start Time: _____:_____:_____

Time	Name	Tape	Brand	XD	OVA	Q	Remarks
1016	Rmy	24.11	Hayco		0		
1621		24.07					INPUT 2 (20491) IS INACTIVE, WHY?
							IT RECOGNIZES ONLY 1 INPUT,
							BAD HERMIT?
							MOST LIKELY THE
							"JUMPER" CABLE
							BUT HOW? BECAME
							DISCONNECTED.
							NO, THIS IS NOT
							THE CASE, WILL HAVE
							NO BACKGROUND DATA
							FOR THE PERIOD;
							6-12-92 → 6-15-92
							AT LEAST.
							AND NO STEP TEST DATA
							6/12/92.

Reviewed By: _____ Date: _____

Aquifer Pumping Test Data Sheet

Date: 06 / 12 / 92 Person Recording Data Rmy

Observation Well No. 56-91

Hydrostratigraphic Unit Alluvium Qrf

Screened Interval _____ ft to _____ ft

Static Water Level 24.04 ft Pumping Well ID _____ in

Distance to Pumping Well _____ ft

Test Start Time: _____:_____:_____

Time	Name	Tape	Brand	XD	OVA	Q	Remarks
9:15	Rmy	24.04	Hazco		0		
1631		24.00		23.99			STOP DATA LOGGER DOWNLOAD 569107.prn test 569107a.prn test
1703				24.00			restart ref at = 24.00 1703
							LINEAR; RATE = 60 minute

Reviewed By: _____ Date: _____

Aquifer Pumping Test Data Sheet

Date: 06/12/92 Person Recording Data Rmy

Observation Well No. 1149

Hydrostratigraphic Unit Alluvium Qvf

Screened Interval _____ ft to _____ ft

Static Water Level 24.54 ft Pumping Well ID _____ in

Distance to Pumping Well _____ ft

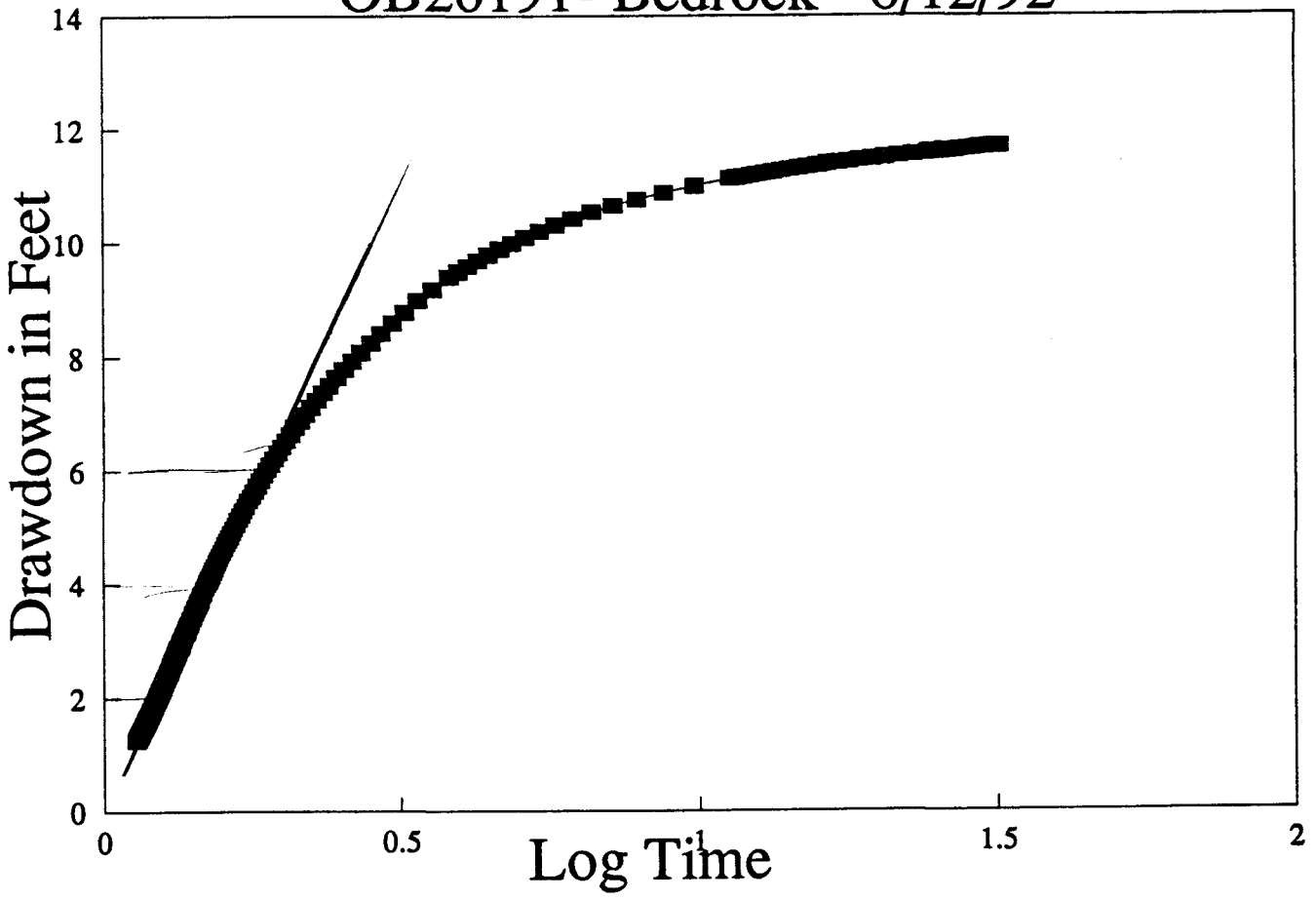
Test Start Time: ____:____:____

Time	Name	Tape	Brand	XD	OVA	Q	Remarks
1910	Rmy	24.54	Hzp		0		
1631		24.50		24.49			STOP PUMP IT down load 1149107.prn STOP 1149107a.prn STOP
1703				24.50			restart datalogger
							at 1703 vof = 24.50
							LINEAR; RATE = 60 minute

Reviewed By: _____ Date: _____

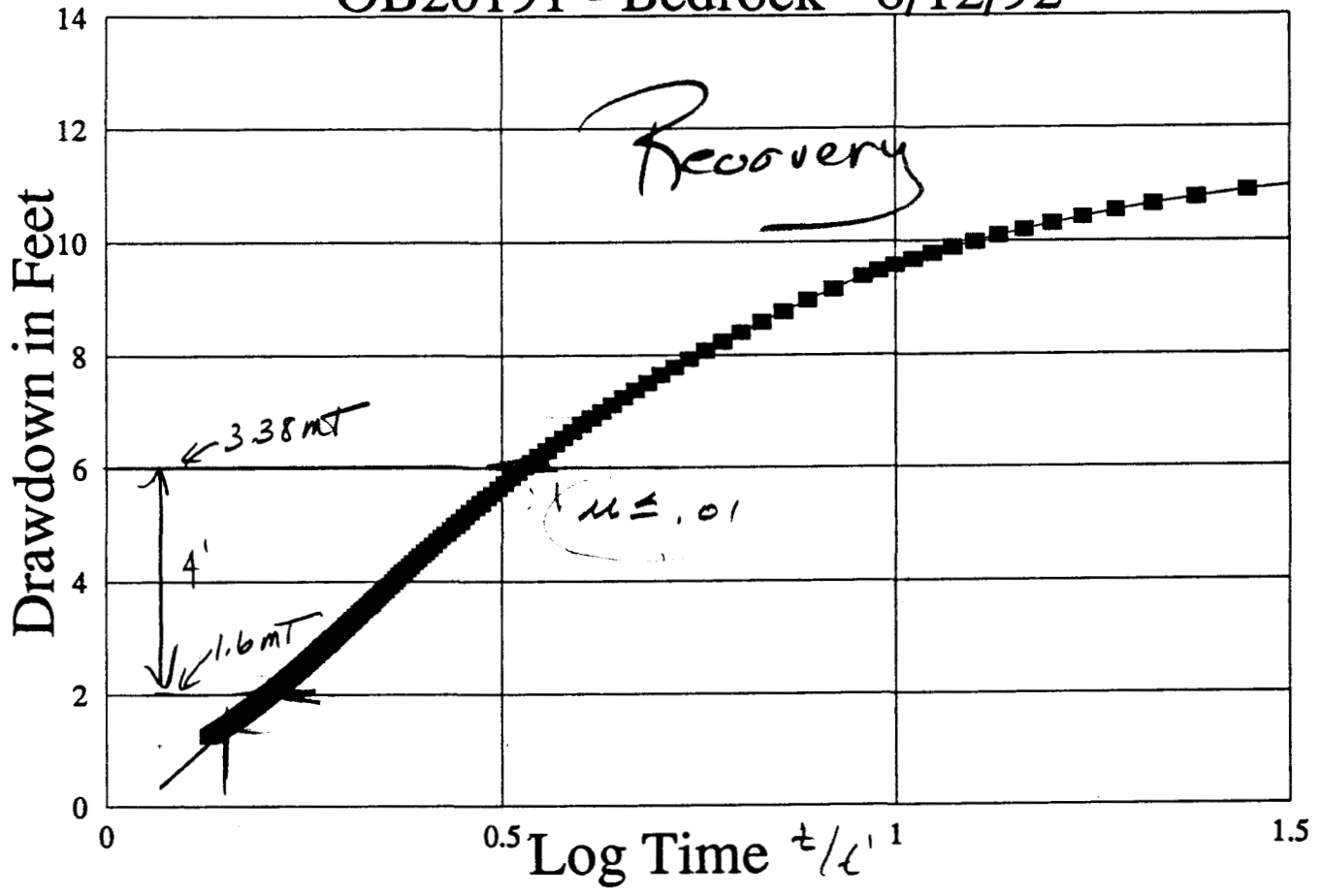
Site No.2 Step Test

OB20191- Bedrock - 6/12/92



Site no. 2 Step Test

OB20191 - Bedrock - 6/12/92



$$T = \frac{264\,Q}{\Delta s \,\lg\left(t_2/t_1\right)} = \frac{264\,Q}{4'(.25)}$$

Q = .13 gpm, T = 34.3 gpd/ft, K = 2.4 x 10^-5 cm/s

Q = .07 gpm, T = 18.45 gpd/ft, K = 3.96 x 10^-5 cm/s

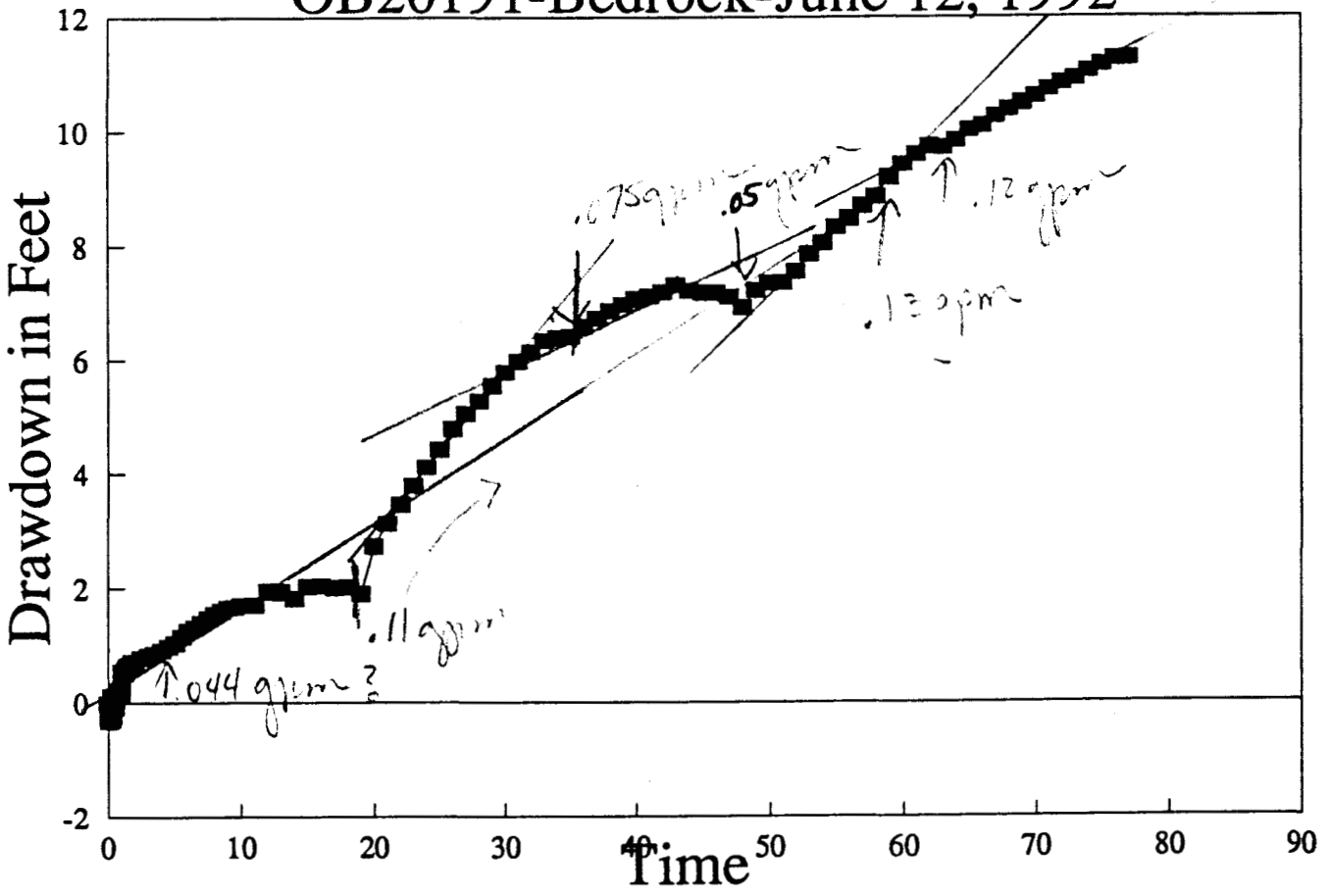
Q = .04 gpm, T = 10.5 gpd/ft, K = 2.3 x 10^-5 cm/s

Q = .10 gpm, T = 26.4 gpd/ft, K = 5.7 x 10^-5 cm/s

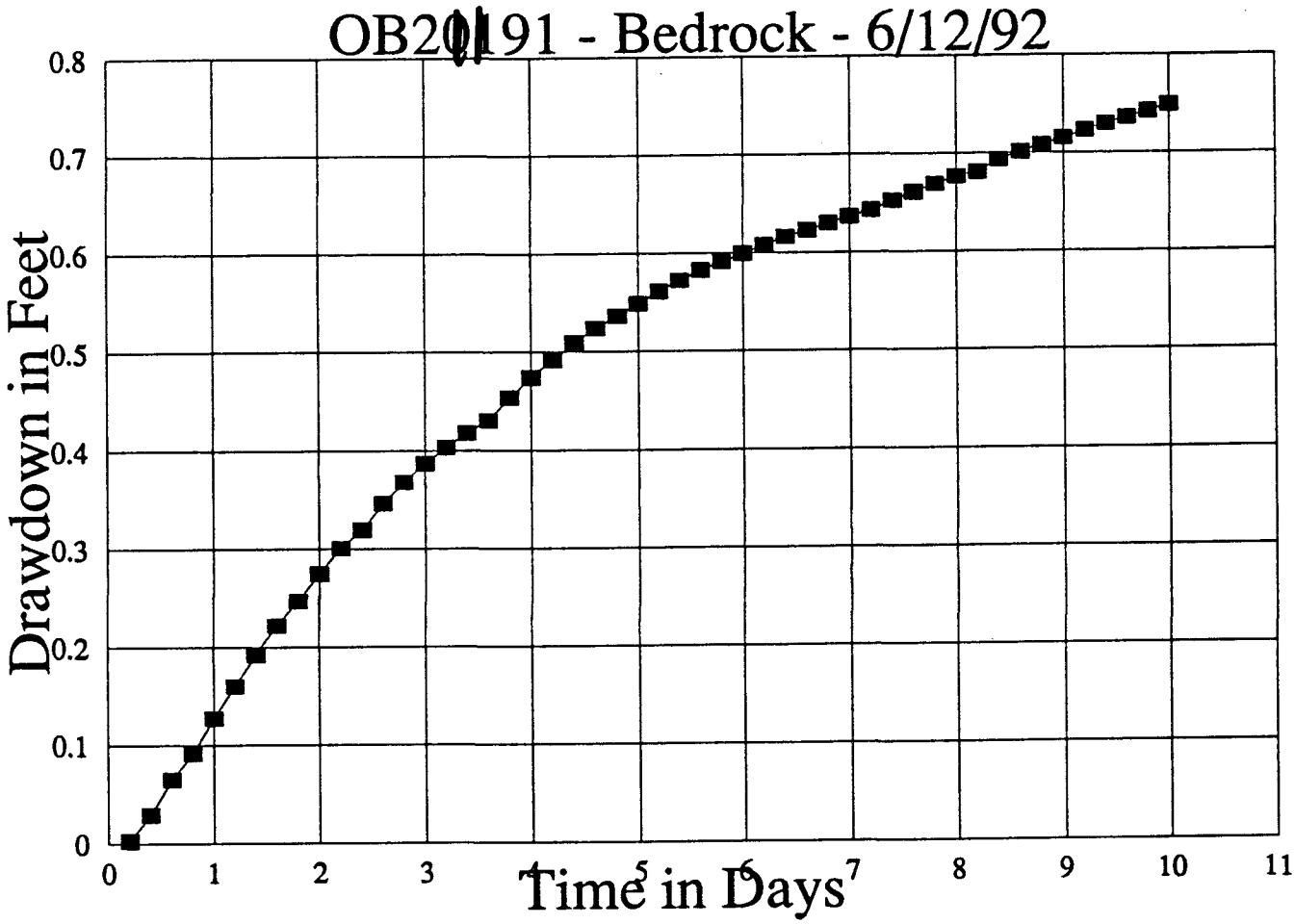
b = 22 ft,

Site No. 2 Step Test

OB20191-Bedrock-June 12, 1992



Site no. 2



T = 3.48 ft²/d

b = 22'

K = -5 cm/s

r = 10' from pumping well 201-91.

Q = .08 gpm

ADVANCED SCIENCES, INC.

① AT $r = 10'$, 3 days $= t$, $Q = .08$ gpm $= 15.4$ ft^3/day, $T = 3.48$ ft^2/day

- $u = \frac{r^2 S}{4Tt} = \frac{(10')^2(.1)}{4(3.48 ft^2/d)\,3 days} = .36$

$W_u(.36) = .8$

- $s = \frac{Q}{4\pi T}(.8) = \frac{15.4 ft^3/day\,(.8)}{4\pi(3.48 ft^2/d)} = .28$

Background drawdown $= .1047$ ft/day
Corrected $s = .0706$ ft

PROJECT_____ CALC._____ SHT.____ OF____
BY____ DATE____ CHKD____ DATE____ PROJECT NO._____

SITE 3

STEP DRAWDOWN TEST

SITE 3

STEP-DRAWDOWN TEST

PW20691, 4/14/92

(1)

RMZ, MGW, TRT

Advanced Sciences, Inc.
405 Urban Street Suite 401
Lakewood, Colorado 80228
(303) 980-0036 FAX (303) 980-1206

DAILY REPORT

Report No. _____

Site Name: RFP AQPT 206 (PW) Project No.: 20805013 Task 2

Field Representative(s) RMZ, MGW, TRT Day: _____ Date: 4/14/92

Time On Site: From: ____ To: ____ From: ____ To: ____ From: ____ To: ____

Weather: 7-10 mph NNW, CLOUDY

Equipment in Use: OVM, YD, HERMIT DATA LOGGER, WATER LEVEL MONITOR, WATER LEVEL MEASURER, GRUNDFOS PUMP, 200V Generator, gasoline fueled.

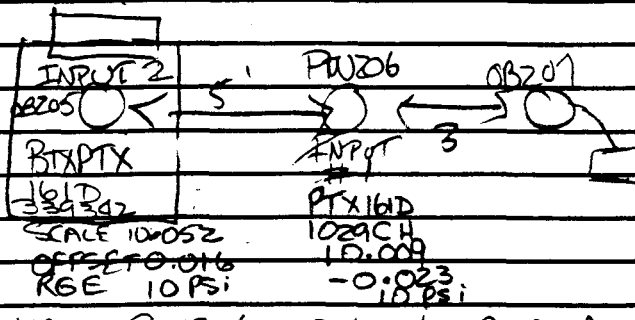
Visitors: _____

Work in Progress/Completed:

PURPOSE: STEP DRAWDOWN, SITE NO. 3 (ACLW.)

Pump - PW20691 OBSERVE OB20591 + OB20191 (CLST)

DATA LOGGER #975



OVM PW206 = 3.6 to 0.0 AFTER 30secs } IN THE CASING
OB205 = 71.0 to 20.0 ppm
OB207 = 0.

BOTH 206 + 205 ZERO AT BREATHING ZONE.

Special Conditions/Corrective Work Required:

PW206	WLM = 9.29'	FROM TPC.		TD FROM TPC	27.24'
OB205	WLM = 9.24'	"	"	" " "	26.86'
OB207	WLM = 33.70'	"	"	" " "	38.91'

66:6 OBSERVER: CD.

MEASURED Q by using beaker + stop watch.
FLOW TOO SMALL FOR FLOWMETER

Reviewed By: _____ Date: _____

Step Test - Site 100.5
Raming

ADVANCED SCIENCES, INC.

(2)

4/14/92
RMZ
MGW
T&T

TIME	PW206 #1	OB205 #2	REMARKS
0	9.12'	9.29'	Pump set at ≈ 25.0 cable, tubing & cord tied at ≈ 5.0 intervals. XD set at ≈ flow meter initial reading = 4111.3g.
1440	9.34		
1443	- Started Datalogger -		
1445	9.35		
1446	- Started pump C 205 Hz -		
1447	- 99 Hz on pump -		
1448	19.9		
1450	18.5		
1450	- 110 Hz on pump - decreased flow value -		
1451	18.22		
1453	18.36		
1454	- Decreased flow value 90% off		
1456	17.72		
1457	- Increased flow value 85% off		
1458	17.64		
1459			200 mL 32.25 SEC.
1501	17.32		200 mL 33.03 SEC.
1504		9.38	
1506	16.92		
1507			200 mL 29 SEC.
1510	15.94		200 mL 56.15 SEC.
1513	- 140 Hz pump rate		
1514			200 mL 17.4 SEC.
1515			200 mL 41.4 SEC.
1516			200 mL 20.55 SEC.
1517	16.86		
1517			200 mL 24.92 SEC.
1521	16.02		
1528	15.18		
1529	14.92		
1531			200 mL 44.0 SEC.
1532	14.75		
1534	14.36		
1535	- Stopped pumping		
1537	.75	9.38	
1538	13.92 1.5 gpm		
1540	12.24 72.18		
1555	10.06 0.14		
1558		9.34	
1559	9.86		

PROJECT_____ CALC._____ SHT.____ OF____
BY____ DATE_____ CHKD_____ DATE_____ PROJECT NO._____

7/14

Step Test - Site No.3 (3)
Raining Cont'd

ADVANCED SCIENCES, INC.

Time	PW	OB	Remarks
1605	9.67		
1606	-Started pumping 14/ 4/2		
1607	10.12	1min	200mL 34SEC.
1608	10.49	2min	200mL 34SEC.
1609	10.84		200mL 36SEC.
1610	11.06		200mL 35SEC.
1611	11.32		200mL 38SEC.
1615	11.84		
1617			200mL 41SEC
1618	-Increased flow value 85% off		
1619	13.15		200mL 12SEC
1620	13.68		200mL 25SEC
1622	13.85		200mL 26SEC.
1624			200mL 28SEC.
1625	14.13		
1626	14.30		200mL 27SEC
1626			200mL 27SEC
1629		9.39	200mL 28SEC.
1630	-Stopped pumping		
1641	-Stopped XD		

$$\frac{200mL}{36SEC.} = 333 mL/mt = \frac{1L}{1000L} \times \frac{1ft^3}{27.3L} \times \frac{7.48g}{1ft^3} = 0.09 gpm$$

$$\frac{200mL}{25SEC.} = \frac{480mL}{mT} = \frac{480L}{mT} \times \frac{1L}{1000mL} \times \frac{1ft^3}{27.3L} \times \frac{7.48g}{1ft^3} = 0.13 gpm$$

$$\frac{200mL}{30SEC.} = \frac{400mL}{mT} = 0.11 gpm$$

SKW

PROJECT_____ CALC._____ SHT._____ OF_____
BY_____ DATE 4/14/92 CHKD_____ DATE_____ PROJECT NO._____

Site No. 3 step Test

4/15/92 - Recovery

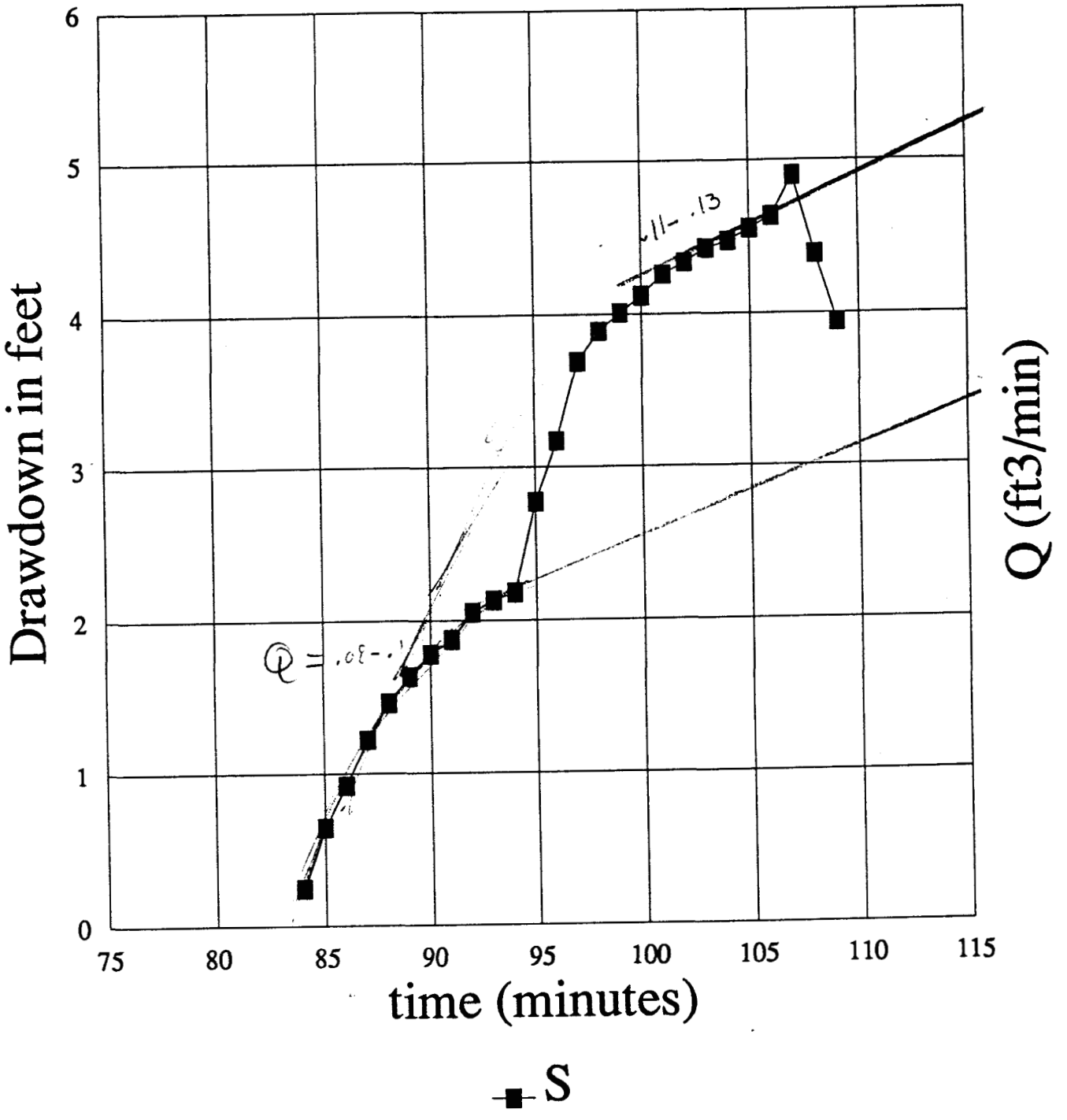
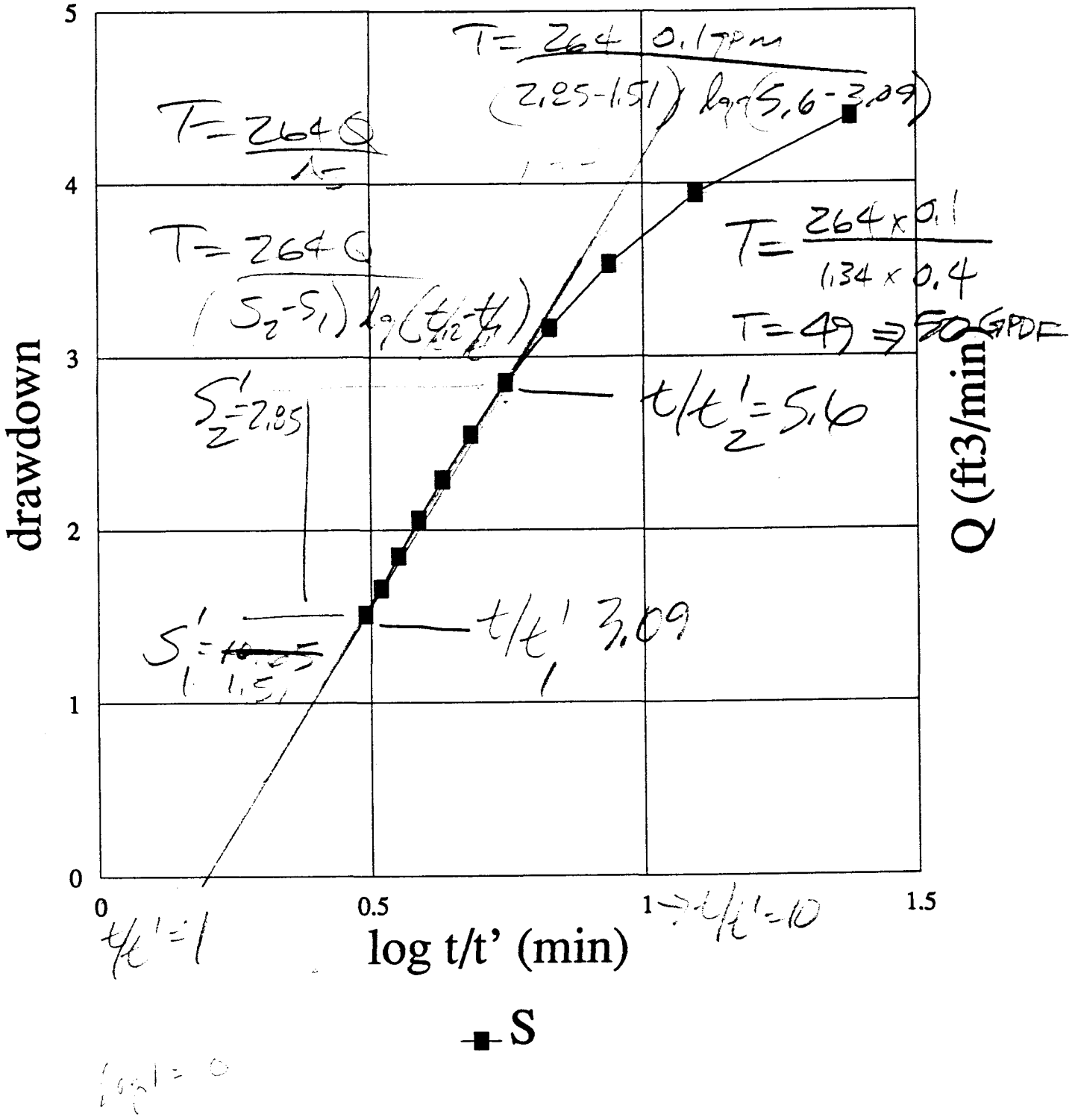
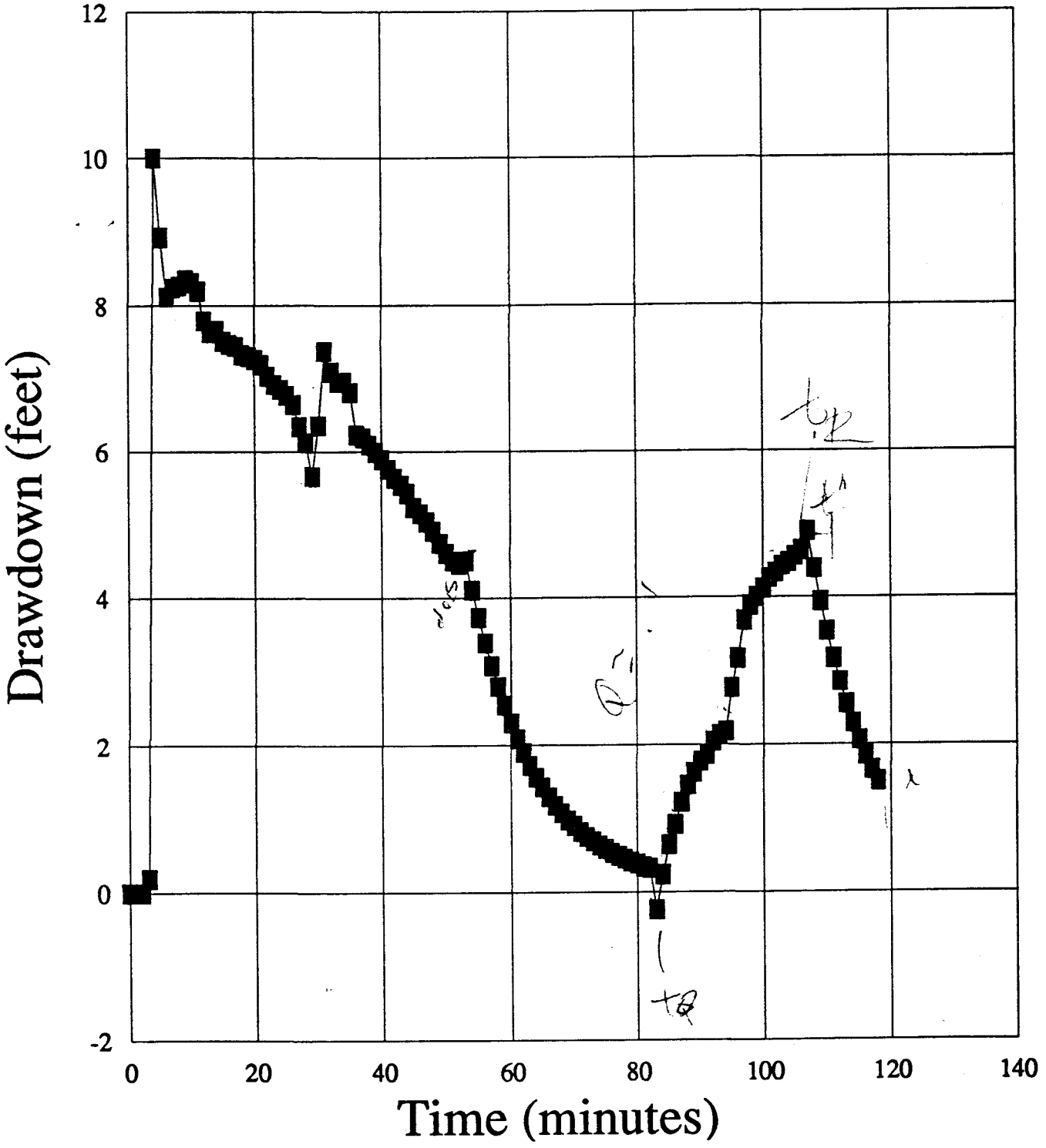


Figure 2.3

Site No. 3 step Test

4/15/92 - Recovery



Site No. 3 Step Test

April 15, 1992