BACKGROUND GEOCHEMICAL CHARACTERIZATION REPORT

U.S. DEPARTMENT OF ENERGY

Rocky Flats Plant
Golden, Colorado

9 OCTOBER 1989

Rockwell International
Aerospace Operations
Rocky Flats Plant

Volume II - Appendices

DRAFT

REVIEWED FOR CLASSIFICATION/UCNI
By [illegible]
Date 4/21/92

ADMIN RECORD

APPENDIX A

LITHOLOGIC LOGS

REVIEWED FOR CLASSIFICATION/UCNI
By
Date

LOG OF BOREHOLE

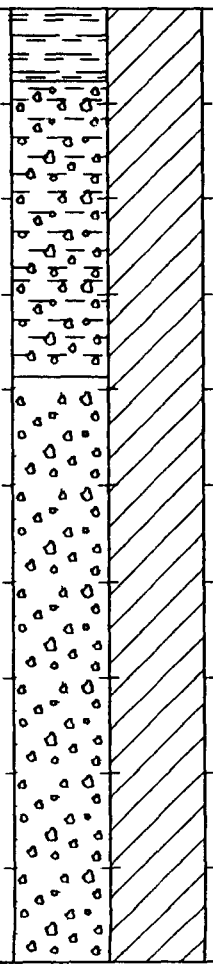
QA BY/DATE *Jane Bupman / 7-17-89*
LOCATION Rocky Flats Plant, Background
COORDINATES N31,599 94 E15,183,24 (RFP)
TOTAL DEPTH 54 6'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 9, 10, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY R R Crifasi
GEOLOGIST

BOREHOLE/WELL NO 01-89P/BH01-89
GROUND SURFACE ELEVATION 6121 8'
WATER LEVEL ENCOUNTERED 43 6'
STATIC 22 92' (6/28/89)
DRILLER K Parker HELPER A Rodriguez
DRILLING FLUID None
CHECKED BY *Jane Bupman*
SITE MANAGER

CEARP MANAGER

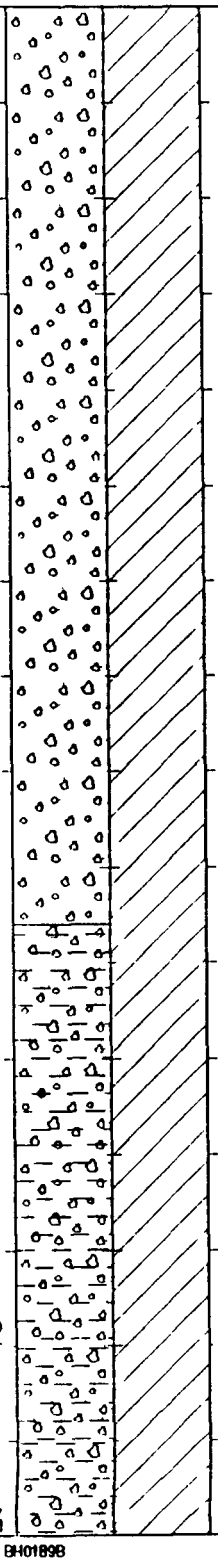
COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-0 3' SAMPLE Recovered 0 95/1 6' = 59%. 0 0-0 4'. CLAYEY SILT: dusky yellowish brown (10 YR 2/2), 60% clay; 20% silt; 10% sand; 10% gravel; unsorted, abundant roots and plant material; loose; non-effervescent with HCl, light moist. **ROCKY FLATS ALLUVIUM** 0.3-0 95' CLAYEY GRAVEL moderate brown (5 YR 4/4), 60% clay; 30% gravel, 10% sand and silt; unsorted; occasional roots and plant material, moderately plastic, non-effervescent, light moist 1.6-3 6' SAMPLE Recovered 1 6/2 0' = 80%. 1.6-1 9' CLAYEY GRAVEL same as above 1.9-3.2': GRAVELLY SAND. light brown (5 YR 5/6), angular clasts; 60% gravel; 20% sand, 20% silt and clay, angular; loose; dry. 3 6-5 6' SAMPLE Recovered 1 65/2.0' = 83%. 3 6-5 25'· SANDY GRAVEL. same as above	0 0-3 0' SAMPLE BH01890003 3 6-8 55' SAMPLE BH01890309

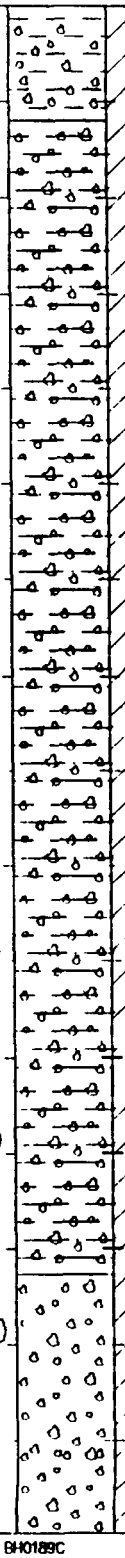
BH0189A

WELL NO 01-89P/BH01-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			5 6-7 7' SAMPLE Recovered 1 8/2 0' = 90% 5 6-7 4' SANDY GRAVEL light brown (5 YR 6/4), 60% gravel, 20% sand, 20% silt and clay, unsorted, angular to subangular, unconsolidated, loose, dry 7 6-9 6' SAMPLE Recovered 0 95/2 0' = 48% 7 6-8 55' SANDY GRAVEL same as above 9 6-11 6' SAMPLE Recovered 1 75/2 0' = 88% 9 6-9 8' SANDY GRAVEL same as above 9 8-11 35' SANDY GRAVELLY CLAY dark yellowish orange (10 YR 6/6), 50% clay, 25% sand, 25% gravel, subangular to subrounded clasts, medium plastic, slightly moist 11 6-13 6' SAMPLE Recovered 1 2/2 0' = 60% 11 6-12 8' GRAVELLY CLAYEY SAND light brown (5 YR 5/6), 50% sand, 25% clay, 25% gravel, medium dense, unconsolidated, weathered clasts, dry	9 6-15 4' SAMPLE BH01890915

BH01898

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 16 17 18 19 20 21			13 6-15 6' SAMPLE Recovered 1 8/2 0' = 90% 13 6-15 4' GRAVELLY SANDY SILT light brown (5 YR 5/6), 50% silt, 25% sand, 25% gravel, medium dense, loosely consolidated, dry--appears gradational from above 15 6-17 6' SAMPLE Recovered 1 5/2 0' = 75% 15 6-17 1' SANDY GRAVELLY CLAY· light brown (5 YR 5/6), 50% clay, 25% gravel, 25% sand, slightly plastic, loosely consolidated, no effervescence to HCl, dry 17 6-19 2' SAMPLE Recovered 1 3/1 6' = 81% 17 6-18 9' SANDY GRAVELLY CLAY same as above 19 2-19 6' SAMPLE Recovered 0 1/0 4' = 25% 19 2-19 6' SANDY GRAVELLY CLAY same as above 19 6-21 6' SAMPLE Recovered 0 7/2 0' = 35% 19 6-20 3' GRAVEL light brown (5 YR 5/6), 75% gravel to 0 2 ft , 15% clay, 10% sand and silt, unsorted, subrounded, subangular; loose; dry	15 6-20 3' SAMPLE BH01891521

BH0189C

WELL NO 01-89P/BH01-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			21 6-23 6' SAMPLE Recovered 0 8/2.0' = 40%. 21 6-22 4' GRAVEL light brown (5 YR 5/6), 75% gravel, 15% clay, 10% sand and silt; subrounded to subangular; loose to slightly consolidated, dry	21 6-26 5' SAMPLE BH01892127
22			23 6-25 6' SAMPLE Recovered 0 9/2.0' = 45% 23 6-24.5' GRAVEL same as above	
			25.6-27 6' SAMPLE Recovered 0 9/2 0' = 45%. 25.6-26 5' GRAVEL same as above.	
23			27 6-29 6' SAMPLE Recovered 0 9/2.0' = 45% 27 6-29 6' GRAVEL same as above	22 92'
				29 5-35 6' SAMPLE BH01893036
24				
25				
26				
27				
28				
29				

BH0189D

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			29 6-31 7' SAMPLE Recovered 0 5/2 1' = 24% 29 5-31 7' CLAYEY GRAVEL light brown (5 YR 5/6), poorly sorted, subrounded, gravel to 0 1', medium plasticity, moist	
30			31 7-33 6' SAMPLE Recovered 1 31/2 0' = 66% 31 7-33 6' CLAYEY GRAVEL light brown (5 YR 5/6), unsorted, subangular, loosely consolidated, light moist	
31			33 6-35 6' SAMPLE Recovered 2 2/2 0' = 110% 33 6-34 9' CLAYEY GRAVEL light brown (5 YR 5/6), unsorted, abundant sand, subrounded, gravel to 0 15', moderately consolidated, light moist 34 9-35 6' GRAVELLY CLAY grayish orange pink (5 YR 7/2), slightly silty, very plastic, dense, light moist	
32			35 6-37 6' SAMPLE. Recovered 2 2/2.0' = 110% 35.6-37 6' GRAVELLY CLAY same as above	35 6-37 6' SAMPLE BH01893638
33				
34				
35				
36				
37				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			37 6-39 6' SAMPLE Recovered 1 6/2 0' = 80%. 37 6-39 6' GRAVELLY CLAYEY SAND moderate reddish brown (10 YR 4/6), unsorted, subangular, loose to moderate plastic; light moist	37 6-42 6' SAMPLE BH01893844
38			39 6-41 6' SAMPLE Recovered 1 6/2 0' = 80% 39 6-41 6' GRAVELLY CLAYEY SAND same as above, gravel to 0 25'	
			41 6-43 6' SAMPLE Recovered 1 0/2 0' = 50% 41 6-43 6' GRAVELLY CLAYEY SAND: same as above	
39			43 6-45 6 SAMPLE Recovered 1 7/2 0' = 85% 43 6-45 6' GRAVELLY CLAYEY SAND moderate yellowish brown (10 YR 5/4), gravel to 0 2', subrounded, fairly sorted, moderate plasticity, wet at 43 6'	43 6-47 5' SAMPLE BH01894448
40				
41				
42				
43				▽ 43 6'
44				
45				

BH01B5F

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			45 6-47 6' SAMPLE Recovered 0 9/2 0' = 45% 45 6-47 6' GRAVELLY CLAYEY SAND same as above	
46			47 6-49 6' SAMPLE Recovered 2 2/2 0' = 110% 47 6-48 5' GRAVELLY CLAYEY SAND moderate yellowish brown (10 YR 5/4), gravel to 0 1', moderate plasticity, fairly sorted, wet	
47			48 5-49 6' CLAYSTONE pale brown (5 YR 5/2) to medium gray (N 5), some moderate reddish brown (10 R 4/6), highly plastic, no HCl reaction	
48			49 6-51 6' SAMPLE Recovered 2 2/2 0' = 110% 49 6-51 6' CLAYSTONE medium gray (N 5), highly plastic, massive, no HCl reaction	
49			51 6-52 6' SAMPLE Recovered 0 5/1 0' = 50% 51 6-52.6' CLAYSTONE light olive gray (5 Y 6/1), very plastic, consolidated, damp	
50			52 6-53 6' SAMPLE Recovered 1 9/1 0' = 190%. 52 6-53 6' CLAYSTONE same as above	
51				
52				
53				

WELL NO 01-89P/BH01-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
53			53 6-54 6' SAMPLE Recovered 1 9/1 0' = 190% CLAYSTONE same as above TOTAL DEPTH = 54 6'	
54				
55				
56				
57				
58				
59				
60				
61				

BH0189H

LOG OF BOREHOLE

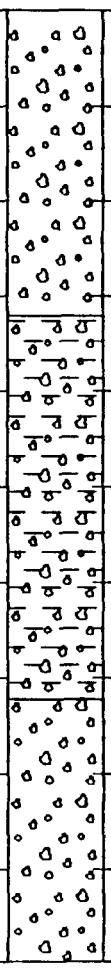
QA BY/DATE J B Burman 16-27-89
LOCATION Rocky Flats Plant, Background
COORDINATES N31,600 11 E15,183 13 (RFP)
TOTAL DEPTH 54 0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 15, 16, and 17, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K E Miller
GEOLOGIST

BOREHOLE/WELL NO 01-89A
GROUND SURFACE ELEVATION 6122 1'
WATER LEVEL ENCOUNTERED 48 0'
STATIC 21 71' (6/14/89)
DRILLER K Parker HELPER P Mesa
DRILLING FLUID None
CHECKED BY J B Burman
SITE MANAGER

CEARP MANAGER

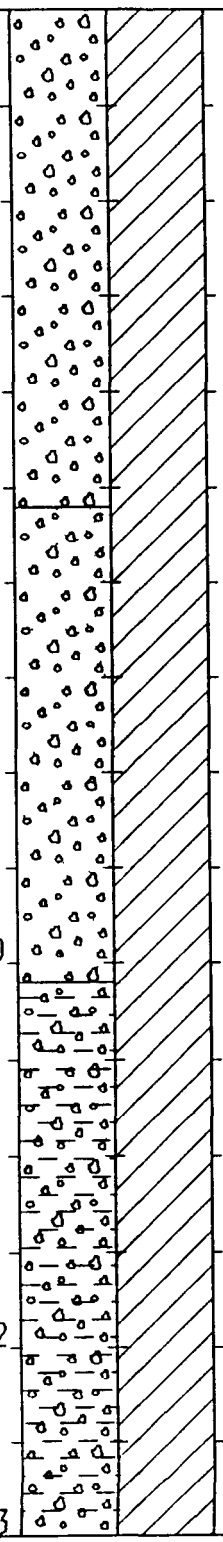
COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** **0 0-1 6' SAMPLE** Recovered 0.9/1.6' = 56%. GRAVEL AND SAND· dusky red (5 R 3/4); poorly sorted; quartzite to 4 cm; unconsolidated; damp. **ROCKY FLATS ALLUVIUM** **1 6-3 6' SAMPLE.** Recovered 2 2/2.0' = 110%. GRAVELLY CLAY. moderate reddish brown (10 R 4/6), plastic; quartzite--subangular; broken; trace quartz sand, moderately consolidated; damp. **3.6-5 6' SAMPLE** Recovered 1 4/2 0' = 70%. GRAVEL: moderate orange pink (10 R 7/4), trace silt; unconsolidated; unsorted; large quartzite, angular; broken (to 5cm); quartz sand; dry	

0189A

WELL NO 01-89A

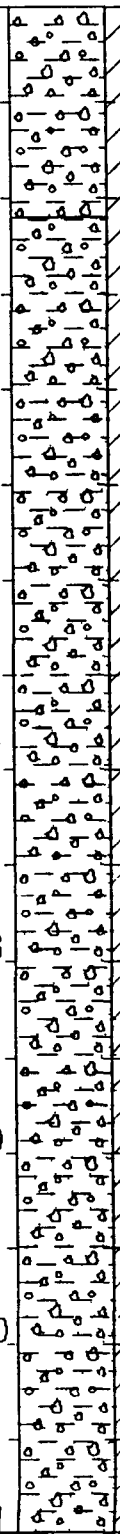
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			5 6-7 6' SAMPLE Recovered 1 2/2 0' = 60% GRAVEL same as 3 6-5 6', less gravel, more silt 7 6-9 1' SAMPLE Recovered 2 0/1 5' = 133% GRAVEL AND SAND moderate reddish orange (10 R 6/6), quartzite to 4 cm; angular, fine to coarse (2 0-0 0 phi) quartz sand, unconsolidated; dry 9 1-10 1' SAMPLE Recovered 1 0/1 0' = 100% GRAVEL AND SAND same as above 10 1-12 1' SAMPLE Recovered 1 6/2 0' = 80% CLAYEY GRAVEL moderate brown (5 YR 4/4), mottles of dark yellowish orange (10 YR 6/6), trace sand, quartzite to 3 cm, subangular, moderately plastic, semi-consolidated, damp 12 1-14 1' SAMPLE Recovered 1 7/2 0' = 85% CLAYEY GRAVEL same as above	

0189b

WELL NO 01-89A

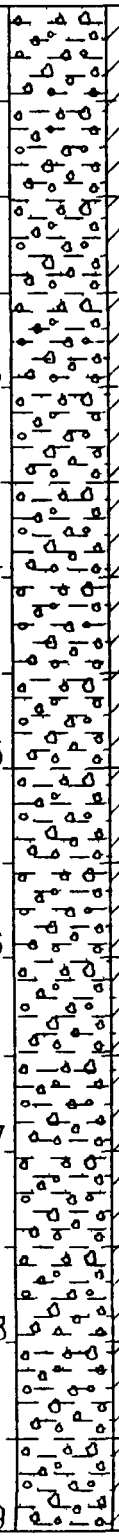
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 16 17 18 19 20 21			14 1-16 1' SAMPLE Recovered 1 2/2 0' = 60% SANDY CLAYEY GRAVEL light brown (5 YR 6/4), coarse to fine-grained quartz sand, quartzite, gravel, angular, broken (to 3 cm), 20-25% clay, unconsolidated, dry 16 1-18 1' SAMPLE Recovered 1 2/2 0' = 60% SANDY CLAYEY GRAVEL same as above 18 1-20 1' SAMPLE Recovered 1 9/2 0' = 95% 18 1-18 8' SANDY CLAYEY GRAVEL same as above 18 8-20 0' SANDY CLAYEY GRAVEL same as 16 1-18 1', more silt, less gravel, dry 20 1-22 1' SAMPLE Recovered 1 9/2 0' = 95% CLAYEY SANDY GRAVEL light brown (5 YR 5/6), quartzite, subangular, broken, K-feldspar, coarse to fine quartz sand, unconsolidated, non-plastic, damp	

0189c

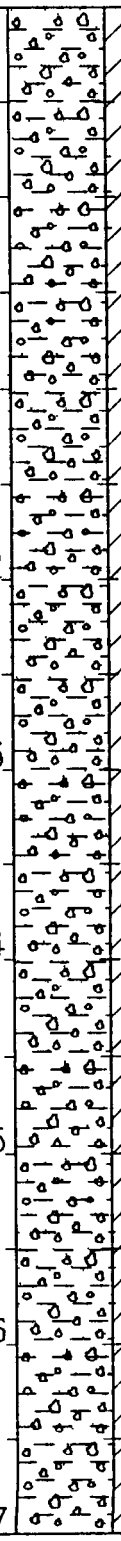
WELL NO 01-89A

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21 22 23 24 25 26 27 28 29			22 1-23 1' SAMPLE Recovered 1 5/1 0' = 150% CLAYEY SANDY GRAVEL same as above 23 1-24 1' SAMPLE Recovered 1 0/1 0' = 100% CLAYEY SANDY GRAVEL same as 20 1-22 1', less clay, dry 24 1-26 1' SAMPLE Recovered 1 8/2 0' = 90% CLAYEY SANDY GRAVEL same as 20 1-22 1' 26 1-27 1' SAMPLE Recovered 1 5/1 0' = 150% CLAYEY SANDY GRAVEL same as 20 1-22 1', moderate brown (5 YR 3/4), less clay, darker, moist 27 1-28 1' SAMPLE Recovered 1 0/1 0' = 100% CLAYEY SANDY GRAVEL same as above Note 28 1-29 0' No sample, drilling with center bit, slough wet	21 71'

0189d

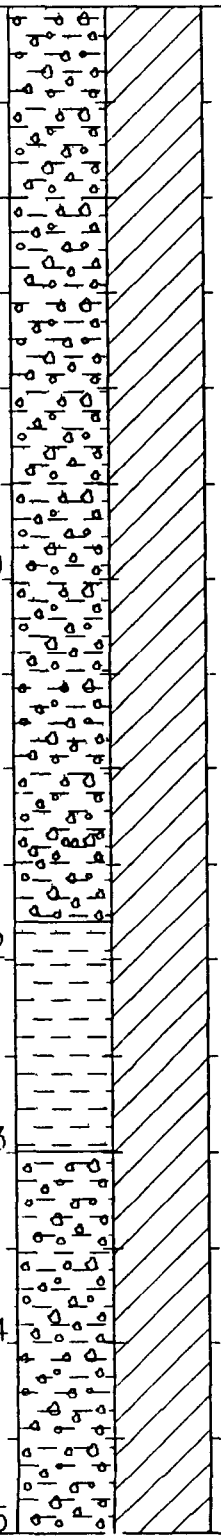
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29 30 31 32 33 34 35 36 37			29 0-29 6' SAMPLE Recovered 0 6/0 6' = 100% CLAYEY SANDY GRAVEL light brown (5 YR 5/6), quartzite to 3 cm, angular, broken, coarse to fine quartz sand, subrounded, semi-consolidated, moderately plastic, moist Note 29 6-31 5' No sample, drilling with center bit, large boulders indicated by drilling response 31 5-33 0' SAMPLE Recovered 1 6/1 5' = 106% CLAYEY SANDY GRAVEL same as 29 0-29 6' Note 33 0-41 0' No sample, drilled with center bit, pushing boulders with augers	

0189e

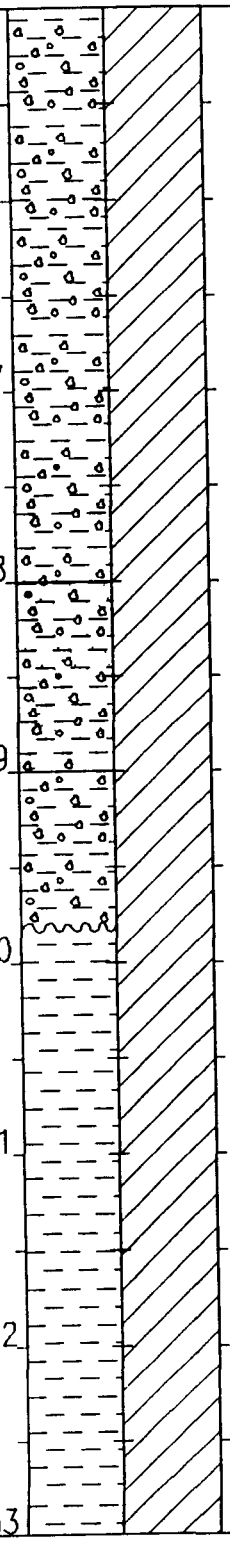
WELL NO 01-89A

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37 38 39 40 41 42 43 44 45			41 0-42 0' SAMPLE Recovered 1 3/1 0' = 130% 41.0-41 8' CLAYEY SANDY GRAVEL same as 29 0-29 6' 41 8-42 0' CLAYEY SAND moderate yellowish brown (10 YR 5/4), well sorted, coarse to fine (2 0-0 5 phi) sand, consolidated, moderately plastic, damp 42 0-43 0' SAMPLE Recovered 1 9/1 0' = 190% CLAYEY SAND same as 41 8-42 0', grading to pale olive (10 Y 6/2), mottles dark yellowish orange (10 YR 6/6), trace gravel, quartzite, K-feldspar, angular, damp 43 0-44 0' SAMPLE Recovered 1 6/1 0' = 160% CLAYEY GRAVEL moderate yellowish brown (10 YR 5/4), quartzite to 3 cm; subangular, K-feldspar, semi-consolidated, subplastic, damp 44 0-45 0' SAMPLE Recovered 1 4/1 0' = 140% CLAYEY GRAVEL same as 43 0-44 0', more gravel, dry	

01891

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			45 0-46 0' SAMPLE Recovered 1 0/1 0' = 100% CLAYEY GRAVEL same as 43 0-44 0', mottles of dark yellowish orange (10 YR 6/6), more gravel, quartzite, K-feldspar, subangular, broken, dry 46 0-47 0' SAMPLE Recovered 1 0/1 0' = 100% CLAYEY GRAVEL same as above 47 0-48 0' SAMPLE Recovered 1 0/1 0' = 100% CLAYEY GRAVEL same as above 48 0-49 0' SAMPLE Recovered 1 3/1 0' = 130% CLAYEY SANDY GRAVEL moderate yellowish brown (10 YR 5/4), coarse to fine quartz sand, 55% quartzite gravel, subangular, broken; semi-consolidated; non-plastic, wet 49 0-51 0' SAMPLE Recovered 1 8/2 0' = 90%. 49 0-49 8' CLAYEY GRAVEL same as 45 0-46 0' 49 8-50 8' CLAYSTONE pale olive (10 Y 6/2) mottles of dark yellowish orange (10 YR 6/6), plastic, consolidated, damp 51 0-52 0' SAMPLE Recovered 0 0/1 0' = 0% Note Sample fell from the tube due to hammering of tube in augers 52 0-53 0' SAMPLE Recovered 1.2/1 0' = 120%. CLAYSTONE same as 49 8-50 8'	▽ 48 0'
46				
47				
48				
49				
50				
51				
52				
53				

0189g

WELL NO 01-89A

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
53			53 0-54 0' SAMPLE Recovered 0 0/1 0' = 0% Note Drilled 1 0' with sample tube stuck in lock box No recovery	
54			TOTAL DEPTH = 54 0'	
55				
56				
57				
58				
59				
60				
61				

0189h

LOG OF BOREHOLE

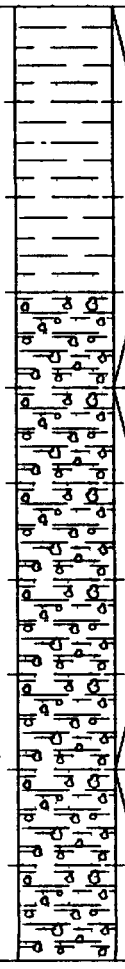
QA BY/DATE Janell Bryman 19-28-89
LOCATION Rocky Flats Plant, Background
COORDINATES N31,676 84' E16,017 21 (RFP)
TOTAL DEPTH 52 0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED April 12 through April 17, 1989
DRILLING METHOD Air rotary, percussion hammer
LOGGED BY K W Van Allen
GEOLOGIST

BOREHOLE/WELL NO 02-89/BH02-89
GROUND SURFACE ELEVATION 6105 9'
WATER LEVEL ENCOUNTERED 32 0'
STATIC 13 6' (6/14/89)
DRILLER P Wiebe HELPER T. Parino, C. Devrous
DRILLING FLUID Clear potable water
CHECKED BY Janell Bryman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 1 0/2 0' = 50% 0.0-0 3' SILTY SAND- moderate brown (5YR 3/4), some (20%) coarse to fine quartzose gravel, (25%) silt, (55%) coarse to fine-grained quartzose sand, poorly sorted, subangular to subrounded, unconsolidated, some organics, moist	0 0-2 0' SPLIT SPOON SAMPLE 24,24,19,20 0 0-3 0' SAMPLE BH02890003
1				
2			**ROCKY FLATS ALLUVIUM** 0 3-1 0' SILTY SAND same as above, moderate brown (5 YR 4/4), no organics, subangular to subrounded	
3			2 0-4 0' SAMPLE Recovered 1.0/2 0' = 50% SILTY TO CLAYEY SAND AND GRAVEL dark reddish brown (10 R 3/4), (45%) coarse to fine-grained quartzose sand, (35%) coarse to fine-grained quartzose gravel, (25%) silt/clay, poorly sorted, subangular to subrounded, unconsolidated, moist ,	2 0-4 0' SPLIT SPOON SAMPLE 10;18,28,44
4			4 0-6 0' SAMPLE Recovered 1.0/2.0' = 50%. SILTY TO CLAYEY SAND AND GRAVEL same as above, more gravel content at 4 5 to 5 0'	4 0-6 0' SPLIT SPOON SAMPLE 40,100(6")
5				

BH0289A

WELL NO 02-89/BH02-89

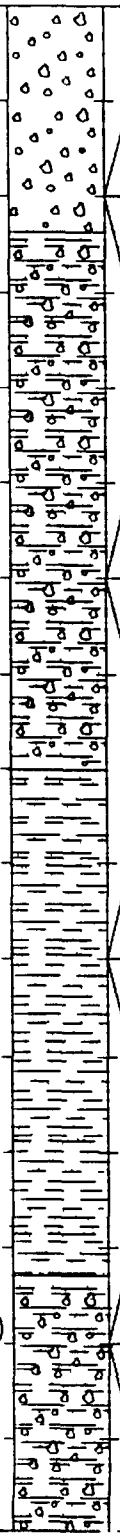
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			6 0-8 0' SAMPLE Recovered 0 7/0 9' = 78% SILTY TO CLAYEY SAND AND GRAVEL same as above, moderate brown (5 YR 4/4)	6 0-8 0' SPLIT SPOON SAMPLE 40,100(5")
6			8 0-10 0' SAMPLE Recovered 1 3/1 3' = 100% SILTY TO CLAYEY SAND AND GRAVEL same as above	8 0-10 0' SPLIT SPOON SAMPLE 24,54,74(4 5")
				3 0-9 0' SAMPLE BH02890309
7			10 0-12 0' SAMPLE Recovered 0 8/0 6' = 133% SILTY TO CLAYEY SAND AND GRAVEL same as above	10 0-12 0' SPLIT SPOON SAMPLE 30,100(1")
8			12.0-14 0' SAMPLE Recovered 0 3/0 5' = 60% GRAVEL moderate brown (5 YR 4/4), some (20%) silt, (80%) coarse to fine-grained quartzose gravel, poorly sorted, subangular to subrounded, unconsolidated, moist	12 0-14 0' SPLIT SPOON SAMPLE 100(6")
9				
10				
11				
12				
13				

BH02898

WELL NO 02-89/BH02-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 16 17 18 19 20 21			**14 0-16 0' SAMPLE** Recovered 0 9/16 0' = 75% 14 0-14 2' GRAVEL same as above 14 2-14 9' SILTY TO CLAYEY SAND AND GRAVEL. moderate brown (5 YR 4/4), (40%) coarse to fine-grained quartzose sand, (35%) coarse to fine quartzose gravel, (25%) silt/clay, poorly sorted, subangular to subrounded, unconsolidated, moist **16 0-18 0' SAMPLE** Recovered 1 0/1 0' = 100% SILTY TO CLAYEY SAND AND GRAVEL same as above **18 0-20 0' SAMPLE** Recovered 1 5/1 6' = 93% SILTY TO CLAYEY SAND pale yellowish brown (10 YR 6/2), (75%) silt/clay, fairly sorted, subangular to subrounded, unconsolidated, moist **20 0-22 0' SAMPLE** Recovered 1 1/1 2' = 92% SILTY TO CLAYEY SAND AND GRAVEL same as material above 17 0', moist	▼ 13 6' 14 0-16 0' SPLIT SPOON SAMPLE 15,73,100(3") 9 0-15 0' SAMPLE BH02890915 BH02890915FB 16 0-18 0' SPLIT SPOON SAMPLE 34,100(6") 18 0-20 0' SPLIT SPOON SAMPLE 13,22,100(5") 20 0-22 0' SPLIT SPOON SAMPLE 21;54,100(3") 16 0-21 1 SAMPLE BH02891521 BH02891521D

BH0289C

WELL NO 02-89/BH02-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			22 0-24 0' SAMPLE Recovered 0 3/0 8' = 38% SILTY TO CLAYEY SAND AND GRAVEL same as above, moderate brown (5 YR 4/4)	21 1-28 7' SAMPLE BH02892130 22 0-24 0' SPLIT SPOON SAMPLE 32,100(4")
22			24 0-26 0' SAMPLE Recovered 0 0/0 8' = 0% COBBLE No recovery	24 0-26 0' SPLIT SPOON SAMPLE 8,100(3")
23			26 0-28 0' SAMPLE Recovered 0 6/0 7' = 86% SILTY TO CLAYEY SAND AND GRAVEL same as above, moderate brown (5 YR 4/4)	26 0-28 0' SPLIT SPOON SAMPLE 16,100(3")
24			28 0-30 0' SAMPLE Recovered 0 7/1 2' = 58% SILTY TO CLAYEY SAND AND GRAVEL same as above, damp	28 0-30 0' SPLIT SPOON SAMPLE 22,52,100(3")
25				
26				
27				
28				
29				

BH02890

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			30 0-32 0' SAMPLE Recovered 0 6/0 9' = 67% SILTY TO CLAYEY SAND AND GRAVEL same as above	30 0-32 0' SPLIT SPOON SAMPLE 10,100(5")
30			32 0-34 0' SAMPLE Recovered 1 1/0 9' = 122% SILTY TO CLAYEY SAND AND GRAVEL same as above, wet	32 0-34 0' SPLIT SPOON SAMPLE 32,100(5") 34 0-36 0' SPLIT SPOON SAMPLE 7,15,15,43
31				30 0-36 0' SAMPLE BH0289036
32			34 0-36 0' SAMPLE Recovered 2 0/2 0' = 100% SILTY TO SAND AND GRAVEL same as above, more clayey below 35 9', moist to wet 36 0-38 0' SAMPLE Recovered 2 0/2 0' = 100% 36 0-37 2' SILTY TO CLAYEY SAND AND GRAVEL same as above, wet 37 2-38 0' SILTY CLAY AND SAND moderate brown (5 YR 4/4), (65%) silt/clay, (35%) medium to fine-grained quartzose sand, fairly sorted, unconsolidated, wet	▽ 32 0' 36 0-38 0' SPLIT SPOON SAMPLE 7,20,19,24
33				
34				
35				
36				
37				

WELL NO 02-89/BH02-89

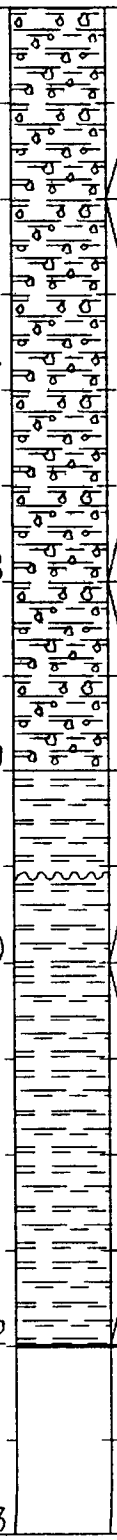
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			38 0-40 0' SAMPLE Recovered 0 7/0 8' = 88% SILTY TO CLAYEY SAND AND GRAVEL same as material above 37 2', wet	38 0-40 0' SPLIT SPOON SAMPLE 65,100(4")
38			40 0-42 0' SAMPLE Recovered 1 3/1 4' = 93% SILTY TO CLAYEY SAND AND GRAVEL same as above, dark yellowish brown (10 YR 4/2) and light olive gray (5 Y 5/2)	40-0 -42 0' SPLIT SPOON SAMPLE 9,43,100(5")
39			42 0-44 0' SAMPLE Recovered 1 1/0 9' = 122% SILTY TO CLAYEY SAND AND GRAVEL same as above, moderate brown (5 YR 4/4)	42 0-44 0' SPLIT SPOON SAMPLE 25,100(5") 36 0-41 3' SAMPLE BH02893642
40			44 0 46 0' SAMPLE Recovered 1 0/0 9' = 111% SILTY TO CLAYEY SAND AND GRAVEL. same as above	44 0 46 0' SPLIT SPOON SAMPLE 21,100(5")
41				
42				
43				
44				
45				

BH02BSF

WELL NO 02-89/BH02-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			46 0-48 0' SAMPLE Recovered 1 2/1 3' = 92% SILTY TO CLAYEY SAND AND GRAVEL same as above	46 0-48 0' SPLIT SPOON SAMPLE 12,76,100(4")
46			48 0-50 0' SAMPLE Recovered 1 6/2 0' = 80% 48 0-49 0' SILTY CLAY AND GRAVEL same as above, mottled 49 0-49 6' SILTY CLAY AND SAND. moderate yellowish brown (10 YR 4/2), (80%) silt/clay (20%) fine-grained sand, well sorted, unconsolidated, massive, mottled, less than with depth, moist to wet	48 0-50 0' SPLIT SPOON SAMPLE 17,51,70,30 42 0-47 2' SAMPLE BH02894248
47			49 0-50 0' SILTY CLAYSTONE Note No recovery, observed cuttings and noted drilling rate to determine bedrock contact	
48			50 0-52 0' SAMPLE Recovered 0 0/2 0' = 0% SILTY CLAYSTONE moderate brown (5 YR 4/4), trace fine-grained sand Note Observed cuttings to determine lithology	50 0-52 0' SPLIT SPOON SAMPLE 5,7,39,34
49			TOTAL DEPTH 52 0'	
50				
51				
52				
53				

BH0289G

LOG OF BOREHOLE

QA BY/DATE Janell Burman 16-27-89
LOCATION Rocky Flats Plant, Background
COORDINATES N30,794.80 E15,266.77 (RFP)
TOTAL DEPTH 50 4'

DRILLING COMPANY Boyles Brothers
DATE DRILLED April 25 and 26, 1989
DRILLING METHOD Rotary Percussion Hammer
LOGGED BY K W Van Allen
GEOLOGIST

BOREHOLE/WELL NO 03-89/BH03-89
GROUND SURFACE ELEVATION 6122 0'
WATER LEVEL ENCOUNTERED 45 0'
STATIC 19 05' (6/14/89)
DRILLER P Wiebe HELPER C. Devrous; M. Butterfield
DRILLING FLUID Air, potable water below 48.5' to 50.4'
CHECKED BY Janell Burman
SITE MANAGER

CEARP MANAGER

COMMENTS Logged cuttings from air-rotary percussion hammer drilling for entire borehole

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			**TOPSOIL**	
1			0 0-3 0' CUTTINGS SILTY SAND grayish red (5 R 4/2), (55%) coarse to fine-grained quartzose sand, some (20%) coarse to fine quartzose gravel, (25%) silt, occasional cobbles, poorly sorted, unconsolidated, damp	0 0-3 0' SAMPLE BH03890003
			ROCKY FLATS ALLUVIUM	
2			3 0-5 0' CUTTINGS SILTY TO CLAYEY SAND moderate brown (5 YR 4/4 to 5 YR 3/4), (55%) coarse to fine-grained quartzose sand, (25%) silt, some (20%) coarse to fine quartzose gravel, occasional cobbles, poorly sorted, unconsolidated, moist	3 0-9 0' SAMPLE BH03890309 BH03890309D
3				
4				
5				

0389A

WELL NO 03-89/BH03-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			5 0-6 0' CUTTINGS SAND moderate yellowish brown (10 YR 5/4) to pale yellowish brown (10 YR 6/2), (90%) medium to fine-grained quartzose sand, trace (5%) coarse-grained quartzose sand, trace (5%) silt, well sorted, unconsolidated, moist	
6			6 0-6 5' CUTTINGS SILTY SAND light brown (5 YR 6/4), (65%) medium to fine-grained quartzose sand, trace (10%) coarse-grained quartzose sand, fairly sorted, unconsolidated, damp	
			6 5-8 5' CUTTINGS SILTY SAND same as above, moderate yellowish brown (10 YR 5/4)	
7			8 5-12 0' CUTTINGS SILTY SAND moderate brown (5 YR 4/4), (55%) coarse to fine-grained quartzose sand, (25%) silt, some (20%) coarse to fine quartzose gravel, poorly sorted, unconsolidated, moist	9 0-15 0' SAMPLE BH03890915
8			12 0-14 0' CUTTINGS SAND moderate yellowish brown (10 YR 5/4), (90%) coarse to fine-grained sand, trace (5%) coarse-grained quartzose sand, trace (5%) silt, fairly sorted, unconsolidated, damp	
9				
10				
11				
12				
13				

0389B

WELL NO 03-89/BH03-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 0-20 0' CUTTINGS SILTY SAND moderate brown (5 YR 4/4), (55%) coarse to fine-grained quartzose sand, (25%) silt, some (20%) coarse to fine quartzose gravel, poorly sorted, unconsolidated, moist	15 0-21 0' SAMPLE BH03891521
14			20 0-28 0' CUTTINGS SILTY SAND moderate brown (5 YR 4/4) to moderate yellowish brown (10 YR 5/4), (55%) coarse to fine-grained quartzose sand, (25%) silt, some (20%) coarse to fine quartzose gravel, poorly sorted, unconsolidated, moist	21 0-27 0' SAMPLE BH03892127
15				
16				
17				
18				
19				19 05'
20				
21				

0389C

WELL NO 03-89/BH03-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			28 0-28 5' CUTTINGS CLAYEY SILT moderate yellowish brown (10 YR 5/4), trace fine-grained sand, very dense, moist	
22			28 5-29 0' CUTTINGS CLAYEY TO SILTY SAND dark yellowish brown (10 YR 4/2), (55%) coarse to fine-grained quartzose sand, (25%) silt, some (20%) coarse to fine quartzose gravel, fairly sorted, unconsolidated, damp	
23				
24				
25				
26				
27				
28				
29				

0389D

WELL NO 03-89/BH03-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29 30 31 32 33 34 35 36 37			29 0-35 0' CUTTINGS SILTY SAND pale yellowish brown (10 YR 8/2) to moderate yellowish brown (10 YR 5/4), (55%) coarse to fine-grained quartzose sand, (25%) silt, some (20%) coarse to fine quartzose gravel, fairly sorted, unconsolidated, damp 35 0-39 0' CUTTINGS SILTY SAND same as above, moderate brown (5 YR 4/4), moist	27.0-33 0' SAMPLE BH03892733 33.0-39 0' SAMPLE BH03893339 BH03893339FB

0389E

WELL NO 03-89/BH03-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			39 0-45 0' CUTTINGS SILTY TO CLAYEY SAND dark yellowish brown (10 YR 4/2), (55%) coarse to fine-grained quartzose sand, (25%) silt/clay, some (20%) coarse to fine quartzose gravel, poorly sorted, unconsolidated, moist to very moist	39 0-45 0' SAMPLE BH03893945
38				
39				
40				
41				
42				
43				
44				
45				45 0'

0389F

WELL NO 03-89/BH03-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			45 0-48 5' CUTTINGS SILTY GRAVEL AND SAND dark yellowish brown (10 YR 4/2), (45%) coarse to fine quartzose gravel, (35%) coarse to fine-grained quartzose sand, (25%) silt, poorly sorted, unconsolidated, wet	45 0-48 5' SAMPLE BH03894548
46			48 5-50 4' CUTTINGS SILTY CLAYSTONE light brown (5 YR 6/4), trace (10%) fine-grained sand, consolidated	
47			TOTAL DEPTH = 50 4'	
48				
49				
50				
51				
52				
53				

0389G

LOG OF BOREHOLE

QA BY/DATE Janice Burman / 7-26-89
LOCATION Rocky Flats Plant, Background
COORDINATES N30,852 38 E16,077 58 (RFP)
TOTAL DEPTH 56 0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED April 28 and May 1, 1989
DRILLING METHOD Rotary Percussion Hammer
LOGGED BY K W Van Allen, R I Thun
GEOLOGIST

BOREHOLE/WELL NO 04-89/BH04-89
GROUND SURFACE ELEVATION 6105 9'
WATER LEVEL ENCOUNTERED 38 0'
STATIC 7 75' (6/15/89)
DRILLER P Wiebe HELPER T Parmo, C Devroux
DRILLING FLUID Air, injected potable water 27 0-40 0'
CHECKED BY Janice Burman
SITE MANAGER

CEARP MANAGER

COMMENTS Borehole advanced using air rotary percussion hammer drilling, logged cuttings

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			**TOPSOIL**	
1			0.0-0 4' CUTTINGS SILTY SAND AND GRAVEL grayish red (5 YR 4/2), (25%) silt, (35%) coarse to fine quartzose gravel, (40%) coarse to fine-grained quartzose sand; poorly sorted, subrounded to subangular; plant roots unconsolidated, damp	0 0-3 0' SAMPLE BH04890003
			ROCKY FLATS ALLUVIUM	
2			0.4-4 5'· CUTTINGS SILTY SAND moderate brown (5 YR 4/4), (25%) silt, some (20%) coarse to fine quartzose gravel, (55%) coarse to fine-grained quartzose gravel, poorly sorted; subrounded to subangular; unconsolidated, moist.	3 0-9 0' SAMPLE BH04890309
3			4 5-8 0' CUTTINGS SILTY SAND. same as above, moderate yellowish brown (10 YR 5/4)	
4				
5				

0489A

WELL NO 04-89/BH04-89

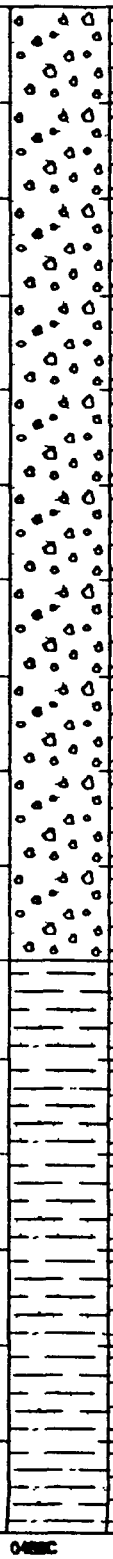
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			8 0-8 5' CUTTINGS SAND light brown (5 YR 6/4), trace (10%) silt, (85%) medium to fine-grained quartzose sand, trace (5%) coarse-grained quartzose sand, fairly sorted, subrounded to subangular, unconsolidated, damp	
6			8 5-10 5' CUTTINGS GRAVELLY SILTY SAND moderate brown (5 YR 4/4), (25%) coarse to fine-grained quartzose gravel, (25%) silt, (50%) coarse to fine-grained quartzose sand, poorly sorted, subrounded to subangular, unconsolidated, damp	9 0-15 0' SAMPLE BH04890915 BH04890915D
7			10 5-12 0' CUTTINGS SAND pale yellowish brown (10 YR 6/2), trace (10%) silt, trace (10%) fine quartzose gravel, (80%) coarse to fine-grained quartzose sand, fairly sorted, subrounded to subangular, unconsolidated, damp	
8			12.0-15 0'' CUTTINGS SAND AND GRAVEL pale yellowish brown (10 YR 6/2), trace (10%) silt, (35%) coarse to fine-grained quartzose sand; poorly sorted, subrounded to subangular, unconsolidated, damp	▼ 7 75'
9				
10				
11				
12				
13				

0489B

WELL NO 04-89/BH04-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 16 17 18 19 20 21			15 0-18 0′ CUTTINGS SAND AND GRAVEL same as above, dark yellowish brown (10 YR 4/2), moist 18 0-21 0′ CUTTINGS SILTY SAND moderate brown (5 YR 4/4), (25%) silt, some (20%) coarse to fine quartzose gravel, (55%) coarse to fine-grained sand, poorly sorted, subrounded to subangular, unconsolidated, moist	15 0-21 0′ SAMPLE BH04891521

WELL NO 04-89/BH04-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			21 0-25 0' CUTTINGS SILTY SAND pale yellowish brown (10 YR 6/2) to moderate brown (10 YR 4/4), (25%) silt, some (20%) fine quartzose gravel, (55%) coarse to fine-grained quartzose sand, fairly sorted, subrounded to subangular, unconsolidated, damp	21 0-27 0' SAMPLE BH04892127 BH04892127FB
22			25 0-27 0' CUTTINGS GRAVELLY SILTY SAND moderate brown (5 YR 4/4), (25%) coarse to fine quartzose gravel, (25%) silt, (50%) medium-grained quartzose sand, fairly sorted, subrounded to subangular, unconsolidated, moist	27 0-33 0' SAMPLE BH04892733
23				
24				
25				
26				
27				
28				
29				

WELL NO 04-89/BH04-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			27 0-35 5' CUTTINGS SILTY SAND moderate brown (5 YR 4/4), (25%) silt, trace (10%) coarse to fine granitic/quartzose gravel, (65%) coarse to fine-grained quartzose sand, poorly sorted, subrounded to subangular, unconsolidated, moist	33 0-33 5' SAMPLE BH04893335
30				
31				
32				
33				
34				
35				
36				
37				

WELL NO 04-89/BH04-89

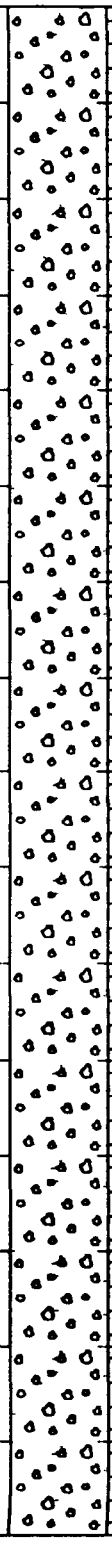
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			35 5-38 0' CUTTINGS CLAYEY SILT moderate brown (5 YR 4/4), trace (10%) coarse to fine quartzose gravel, some (15%) fine-grained quartzose sand, (25%) clay, well sorted, unconsolidated, wet	35 5-38 0' SAMPLE BH04893538
38			38 0-40 0' CUTTINGS CLAYEY SILT AND SAND moderate yellowish brown (10 YR 5/4), some (15%) coarse to fine quartzose gravel, (35%) coarse to fine-grained quartzose sand, 50% clay/silt; poorly sorted, subrounded to subangular, unconsolidated, wet	▽ 38 0'
39				
40				
41				
42				
43				
44				
45				

0489F

WELL NO 04-89/BH04-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45 46 47 48 49 50 51 52 53			40 0-54 0' CUTTINGS SANDY GRAVEL moderate yellowish brown (10 YR 5/4), (25%) coarse to fine quartzose/granitic sand, (75%) coarse to fine-grained quartzose/granitic gravel, poorly sorted, subrounded to subangular, unconsolidated, wet	38 0-40 0' SAMPLE BH04893840 40 0-46 0' SAMPLE BH04894046 46 0'-52 0' SAMPLE BH04894652 52 0-54 0' SAMPLE BH04895254

0488C

WELL NO 04-89/BH04-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
53				
			54 0-56 0' CUTTINGS SILTY CLAYSTONE yellowish gray (5 Y 7/2) to light olive gray (5 Y 5/2), trace fine-grained sand, weathered, consolidated	
54				
			TOTAL DEPTH = 56 0'	
55				
56				
57				
58				
59				
60				
61				

0489H

LOG OF BOREHOLE

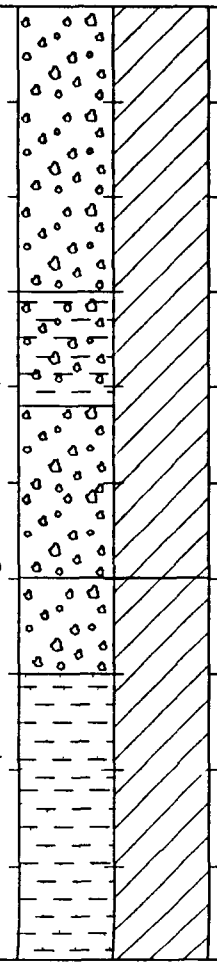
QA BY/DATE Ruth Monroe 6-19-89
LOCATION Rocky Flats Plant, Background
COORDINATES N41857 55 E20445 99 (RFP)
TOTAL DEPTH 33 51'

DRILLING COMPANY Boyles Brothers
DATE DRILLED February 22 and February 23, 1989 (03/08/89)
DRILLING METHOD Hollow Stem Auger
LOGGED BY K E Miller (P.M. Smith)
GEOLOGIST

BOREHOLE/WELL NO 05-89/BH05-89
GROUND SURFACE ELEVATION 5968 4'
WATER LEVEL ENCOUNTERED 20 1'
STATIC 19 93' (6/7/89)
DRILLER K Parker; M Baker HELPER T Rodriguez; K Martin
DRILLING FLUID None
CHECKED BY Jerry Berman
SITE MANAGER

CEARP MANAGER

COMMENTS Due to changes in the sampling scheme, BH05-89 was offset and redrilled from 0 0'-3 0' in order to obtain a composite sample of that interval.

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			REDRILL TOPSOIL 0 0-1 5' SAMPLE Recovered 1 15/1 5' = 76% 0 0-0 95' ORGANIC SILT dusky brown (5 YR 2/2), 90% silt, roots, vegetation, boulders, moist ROCKY FLATS ALLUVIUM 0 95-1 15' SILTY SANDY CLAY dark reddish brown (10 R 3/4), very coarse, silty, gravelly (up to 3mm), unconsolidated, moderate plasticity, no reaction with HCl, dry to moist 1 5-3 0' SAMPLE Recovered 1 3/1 5' = 86% 1 5-2 8' SILTY SANDY CLAY same as above TOTAL DEPTH = 3 0' ROCKY FLATS ALLUVIUM 0 0-1 5' SAMPLE Recovered 1 1/1 5' = 73% GRAVEL moderate brown (5 YR 4/4), clay matrix, vegetation in top, quartzite, granite and K-feldspar, angular, broken, unconsolidated, moist. 1 5-3 5' SAMPLE Recovered 1 6/2 0' = 80% 1 5-2 1' CLAY AND GRAVEL dark reddish brown (10 R 3/4), approximately 50%-50%, plastic, semi-consolidated, quartzite to 3 cm, damp 2 1-3 1' GRAVEL grayish orange pink (10 R 8/2), clay matrix, consolidated, broken angular pieces of quartzite and granite, plastic, damp	0 0-2 8' SAMPLE BH05890003R 0 0-3 1' SAMPLE BH05890003

0589BRA

WELL NO 05-89/BH05

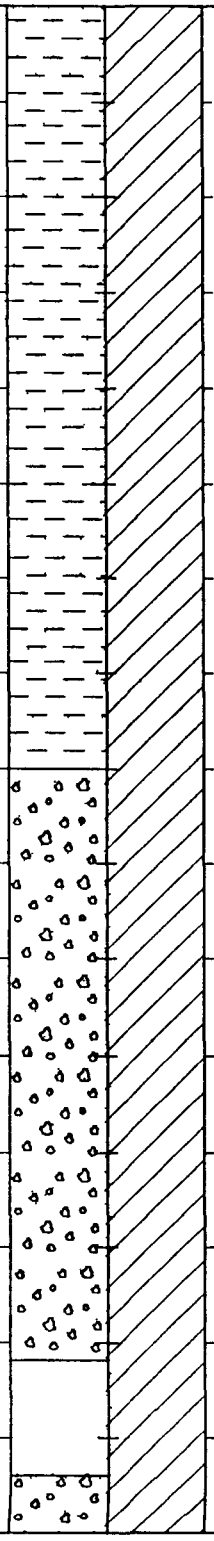
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			3 5-5 5' SAMPLE Recovered 0 85/2 0' = 42 5%. CLAY AND SAND. moderate brown (5 YR 4/4), clay; plastic, sand coarse-grained, poorly sorted; consolidated to semiconsolidated, damp.	
6			5 5-7 5' SAMPLE Recovered 0.80/2.0' = 40%. CLAY AND SAND: same as 3 5-5 5'	
7			7 5-9 5' SAMPLE. Recovered 0.90/2.0' = 45%. CLAYEY SAND: light brown (5 YR 5/6), smaller cobbles, 60% sand, poorly sorted, coarse-grained; semiconsolidated; 1 5 to - 5 phi, quartz, damp.	3 5-8 4' SAMPLE BH05890308 BH05890308D
8			9 5-11 5' SAMPLE Recovered 1 5/2.0' = 75% CLAYEY SAND: same as 7 5-9 5' 11 5-13 5' SAMPLE Recovered 1 2/2.0' = 60% CLAYEY SAND: same as 7 5-9 5' except small lenses of silt, grayish orange pink (5 YR 7/2); small piece of carbon like material black (N 1/0).	9 5-12 7' SAMPLE BH058990913
9				
10				
11				
12				
13				

0589BRB

WELL NO 05-89/BH05

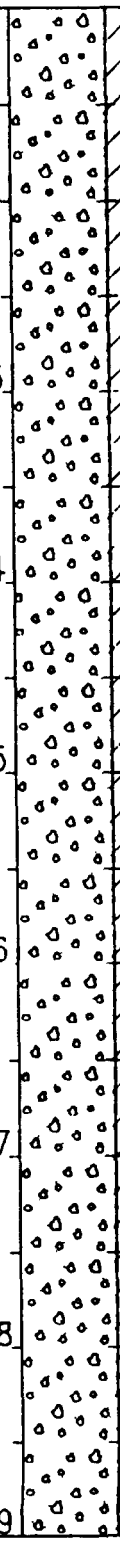
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			13 5-15 5' SAMPLE Recovered 2 1/2 0' = 105% SANDY CLAY pale yellowish orange (10 YR 8/6), 35% sand, very plastic, consolidated, sand unsorted, subangular to subrounded, coarse, moist 15 5-17 5' SAMPLE Recovered 2 0/2 0' = 100% 15 5-17 0' SANDY CLAY same as 13 5-15 5' 17 0-17 5' GRAVEL AND SAND very pale orange (10 YR 8/2), quartz and granite to 7 cm, broken, angular to subangular, semiconsolidated, sand-coarse, subrounded, poorly sorted, damp 17 5-19 5' SAMPLE Recovered 1 6/2 0' = 80% GRAVEL AND SAND same as 15 5-17 5' except more gravel 19 5-21 5' SAMPLE Recovered 1 2/2 0'= 60% 19 5-20 1' GRAVEL AND SAND same as 17 0-17 5' 20 1-20 7' SAND light brown (5 YR 6/4), some gravel, 20-25%, quartzite, subangular to angular, sand moderately sorted, quartz, subrounded, 1 5 to - 5 phi, very wet	13 5-17 0' SAMPLE BH05891317 19 93' 20 1'
14				
15				
16				
17				
18				
19				
20				
21				

0589BRC

WELL NO 05-89/BH05

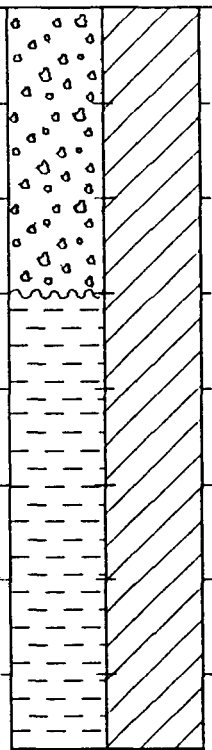
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21 22 23 24 25 26 27 28 29			21 5-23 5 SAMPLE Recovered 2 0/2.0' = 100%. GRAVEL AND SAND medium brown (5 YR 4/4), moderately consolidated, quartzite and K-feldspar to 3 cm; subangular to angular, broken up, sand, poorly sorted, quartz, 5 to - 5 phi; very wet 23 5-25 5' SAMPLE Recovered 2 0/2 0' = 100% GRAVEL AND SAND same as 21 5-23 5' except small portion of clay in shoe dusky yellow (5 Y 6/4), wet 25 5-26 0' SAMPLE Recovered 0 5/0 5' = 100% GRAVEL AND SAND same as 23 5-25 5' 26 0-28 0'SAMPLE Recovered 2 0/2 0' = 100%. GRAVEL AND SAND same as 25.5-26 0' except not as wet.	17 0-23 0' SAMPLE BH05891723 23 5-25 5' SAMPLE BH05892325 BH05890222FB

WELL NO 05-89/BH05

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			28 0-30 0' SAMPLE Recovered 1 75/2 0' = 87 5% GRAVEL AND SAND same as 25 5-26 0' very wet	25 5-30 0' SAMPLE BH05892530
30			30.0-31 5' SAMPLE Recovered 1 0/1 5' = 66% Drilled to 31 0, lost sample, went back in with a catcher; pushed down 0 5' Recovered 1 0' of CLAYSTONE, and noticed a change in drilling at 30.5' Called contact of Arapahoe Formation at 30.5' CLAYSTONE medium light gray (N 6/0), with mottles moderate yellow (5 Y 7/6), plastic, consolidated, damp.	
31			31 5-33 0 SAMPLE Recovered 1 3/1 5' = 86%	
32			TOTAL DEPTH WITH PLOPPER = 33 51'	
33				
34				
35				
36				
37				



0589BRE

LOG OF BOREHOLE

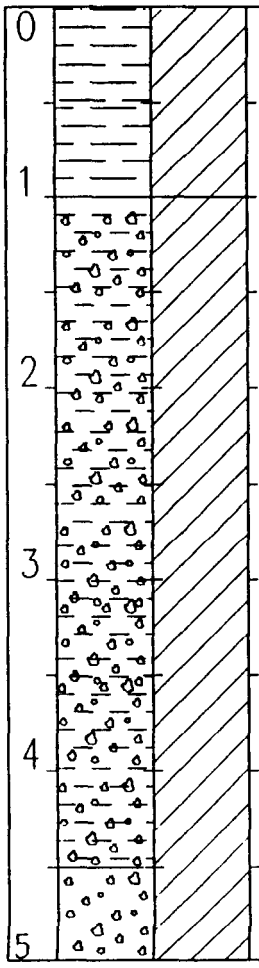
QA BY/DATE Ruth Morrow 6-19-89
LOCATION Rocky Flats Plant, Background
COORDINATES N42256 66 E21069 70 (RFP)
TOTAL DEPTH 35 7'

BOREHOLE/WELL NO 06-89/BH06-89
GROUND SURFACE ELEVATION 5960 1'
WATER LEVEL ENCOUNTERED 22.9'
STATIC 21 91' (6/7/89)
DRILLER K Parker; M Baker HELPER T Rodriguez; K Martin
DRILLING FLUID None
CHECKED BY Janice Bupman
SITE MANAGER

DRILLING COMPANY Boyles Brothers
DATE DRILLED February 28, 1989 (03/09/89)
DRILLING METHOD Hollow Stem Auger
LOGGED BY K E Miller (P.M. Smith)
GEOLOGIST

CEARP MANAGER

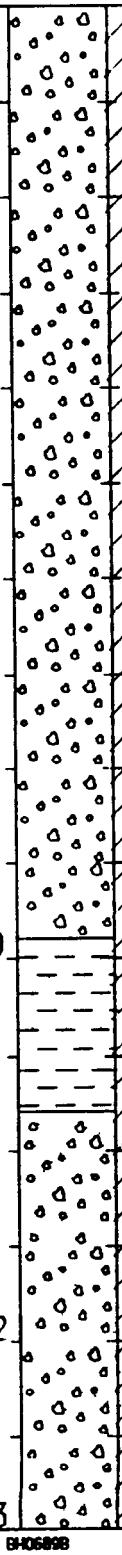
COMMENTS Top 1 0' removed with shovel and discarded prior to sampling. Due to changes in the sampling scheme, BH06-89 was offset and redrilled from 0 0' to 3 0' in order to obtain a composite sample of that interval

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			REDRILL TOPSOIL 0 0-1 5' SAMPLE Recovered 0 8/1 5' = 53% 0 0-0 8' ORGANIC SILT grayish brown (5 YR 3/2), non-stratified, 95% gravel, poorly sorted, pebbles, cobbles, slightly moist ROCKY FLATS ALLUVIUM 1 5-3 0' SAMPLE Recovered 0 4/1 5' = 27% 1 5-1 9' CLAY dark reddish brown (10 R 3/4), blocky, large quartzite boulder, weathered pebbles throughout, gravel, poorly sorted, no reaction with HCl, stiff, moist TOTAL DEPTH = 3 0' ROCKY FLATS ALLUVIUM 1 0-2 8' SAMPLE Recovered 1 7/1 8' = 94% GRAVELLY CLAY dark reddish brown (10 R 3/4), trace sand, consolidated, plastic, quartzite to 3 cm, subangular, damp 2 8-4 5' SAMPLE Recovered 1 7/1 7' = 100% GRAVELLY CLAY same as 1 0-2 8' except more gravel and bigger cobbles of quartzite, very dry	0 0-1 9' SAMPLE BH06890003 BH06890003FB 1 0-4 5' SAMPLE BH06890104
1				
2				
3				
4				
5				

BH0689A

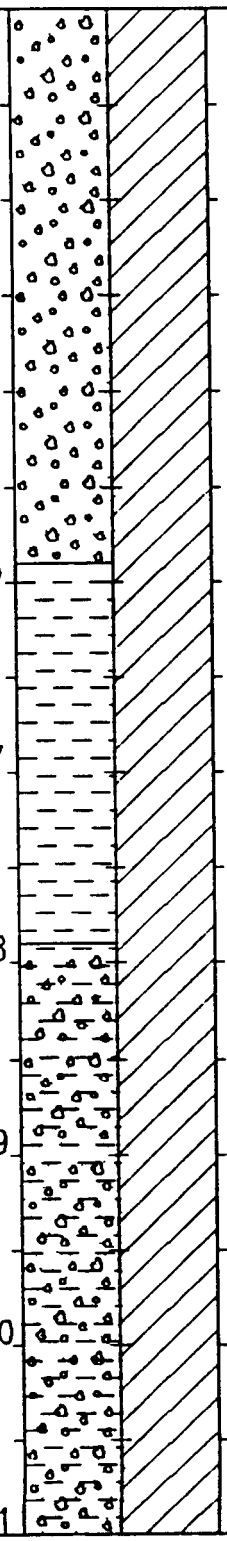
WELL NO 06-89/BH06-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			4 5-5 9' SAMPLE Recovered 1 6/1 4' = 114%. GRAVEL grayish orange pink (10 YR 8/2), quartzite to 6 cm, angular; broken; trace silt, sand; unsorted; coarse, dry. 5 9-7 9' SAMPLE Recovered 1 2/2.0' = 60%. GRAVEL. same as 4 5-5.9' except more sand and silt, dry 7 9-9 9' SAMPLE Recovered 1 3/2 0' = 65%. GRAVEL same as 4 5-5.9' except small lens of clay dark yellowish brown (10 YR 4/2), plastic, consolidated, dry 9 9-11 9' SAMPLE Recovered 2 2/2.0' = 110%. 9 9-10 8' SANDY CLAY: moderate yellowish brown (10 YR 3/4), sand; well sorted, 1 5-1 0 phi, subangular, rounded; damp. 10 8-11 9' SANDY GRAVEL. moderate brown (5 YR 4/4), sand; poorly sorted; unconsolidated, damp. 11 9-13 9' SAMPLE Recovered 1 7/2.0' = 85% SANDY GRAVEL same as 10 8-11 9'	4 5-9 2' SAMPLE BH06890410 9 9-15 9' SAMPLE BH06891016

BH06890

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			13 9-15 9' SAMPLE Recovered 2 2/2 0' = 110%. SANDY GRAVEL same as 10 8-11 9' except more silt, moist	15 9-17 9' SAMPLE BH06891618
14			15 9-17 9' SAMPLE Recovered 2 2/2 0' = 110% CLAY pale olive (10 Y 6/2), with mottles of moderate yellow (5 Y 7/6), trace gravel, sand; gravel, quartzite to 2 cm, angular; broken sand, quartz, subrounded, consolidated, plastic, damp	
15			17 9-19 9' SAMPLE Recovered 2 2/2 0' = 110% SANDY CLAYEY GRAVEL moderate brown (5 YR 4/4), grading to pale olive (10 Y 6/2); sand poorly sorted, subrounded to subangular; quartz; clay, plastic, consolidated, gravel 60%, quartzite; some weathering; moist	17 9-23 9' SAMPLE BH06891824
16			19 9-21 9' SAMPLE Recovered 1 2/2 0' = 60% SANDY CLAYEY GRAVEL same as 17 9-19 9'	
17				
18				
19				
20				
21				



BH0689C

WELL NO 06-89/BH06-89

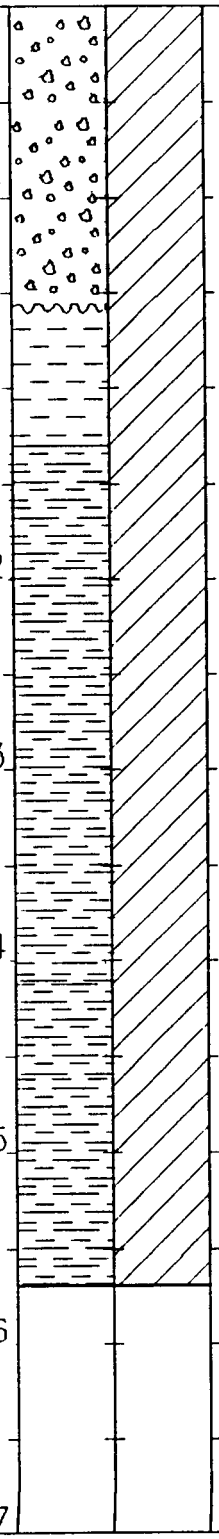
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			21 9-23 9' SAMPLE Recovered 2 0/2 0' = 100% SANDY CLAYEY GRAVEL same as 17 9-19 9' except wet at 22.9'	
22			23 9-25 9' SAMPLE Recovered 1 9/2 0' = 95% SAND AND GRAVEL pale olive (10 Y 6/2), trace clay, poorly sorted, moderately consolidated, quartzite, K-feldspar, subangular, sand 1 0 to - 5 phi, coarse to fine, quartz, saturated	21 91'
23			25 9-27 9' SAMPLE Recovered 0 9/2 0' = 45% SAND AND GRAVEL same as 23 9-25 9'	22 9'
24			27 9-29 9' SAMPLE Recovered 1 5/2 0' = 75% SAND AND GRAVEL same as 23 9-25 9' except some clay at tip	23 9-29 4' SAMPLE BH06892430
25				
26				
27				
28				
29				

BH06890

WELL NO 06-89/BH06-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			29 9-32 4' SAMPLE 29 9-30 6' SAND AND GRAVEL same as 27 9-29 9' 30.6-31 3' CLAYSTONE dusky yellow (5 Y 6/4), consolidated, plastic, damp 32 4-33 9' SAMPLE Recovered 2 0/1 5' = 125% SILTY CLAYSTONE pale olive (10 Y 6/2), plastic, consolidated, damp 33 9-34 9' SAMPLE Recovered 2 0/1 0' = 200% SILTY CLAYSTONE same as 32 4-33 9' 34 9-35 9' SAMPLE Recovered 2 2/1 0' = 220% SILTY CLAYSTONE same as 32.4-33 9' TOTAL DEPTH WITH PLOPPER 35 7'	
30				
31				
32				
33				
34				
35				
36				
37				

BH0689E

LOG OF BOREHOLE

QA BY/DATE Rick Monroe
LOCATION Rocky Flats Plant, Background
COORDINATES N42781 02 E21921 46 (RFP)
TOTAL DEPTH 34 4'

BOREHOLE/WELL NO 07-89/BH07-89
GROUND SURFACE ELEVATION 5946 1'
WATER LEVEL ENCOUNTERED 20 0'
STATIC 19 12' (6/6/89)
DRILLER K Parker; M Baker HELPER T Rodriguez; K Martin
DRILLING FLUID None
CHECKED BY
SITE MANAGER
CEARP MANAGER

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 1, 1989 (03/08/89)
DRILLING METHOD Hollow Stem Auger
LOGGED BY K E Miller (P M Smith)
GEOLOGIST

COMMENTS Upper 1 0' soil removed and discarded, not sampled
Due to changes in the sampling scheme, BH07-89 was offset and redrilled from 0 0'-3 0' in order to obtain a composite sample of that interval

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			**REDRILL**	
			TOPSOIL	
1			0 0-1 5' SAMPLE Recovered 1 4/1 5' = 93% 0 0-0 2' SILTY SANDY CLAY grayish brown (5 YR 2/2), grass, roots, vegetation, unconsolidated, gravelly, pebbles, moist	0 0-2 9' SAMPLE BH07890003
			ROCKY FLATS ALLUVIUM	
2			0 2-1 4' SILTY SANDY CLAY dark reddish brown (10 R 3/4), sandy, unconsolidated grading into firm plastic clay, dry	
			1 5-3 0' SAMPLE Recovered 1 4/1 5' = 93% 1 5-2 9' SILTY SANDY CLAY same as above	
3			**TOTAL DEPTH = 3 0'**	
			ROCKY FLATS ALLUVIUM	
4			1 0-3 0' SAMPLE Recovered 1 7/2 0' = 85% GRAVELLY CLAY dark reddish brown (10 R 3/4), gravel, quartzite to 3 cm, subangular, consolidated, plastic, trace silt, caliche at tip, strong HCl reaction, damp	1 0-2 7' SAMPLE BH07890103
			3 0-5 0' SAMPLE Recovered 1 6/2 0' = 80% CALICHE moderate orange pink (10 R 7/4), some gravel, 25%, quartzite, subangular, unconsolidated, strong HCl reaction, very dry	3 0-6 3' SAMPLE BH07890306
5				

0789BRA

WELL NO 07-89/BH07-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			5 0-6 5' SAMPLE Recovered 1 6/1 5' = 106%. 5 0-6 3' CALICHE same as 3 0-5.0' 6 3-6 5' SAND AND GRAVEL pale red (10 R 6/2), approximately 50%/50%, trace silt, unconsolidated, angular pieces of quartzite; sand; subangular to rounded, very dry 6 5-8 0' SAMPLE Recovered 1 5/1 5' = 100% 6 5-7 5' SAND AND GRAVEL same as 6 3-6 5' except trace clay; slight effervescence. 7 5-8 0' GRAVEL grayish orange pink (10 R 8/2), trace silt and sand; gravel 85%; quartzite; subangular, unconsolidated; very dry 8 0-10 0' SAMPLE Recovered 0 0/2 0' = 0%. Encountered large cobbles; lost recovery due to hard drilling; no cuttings. 10 0-12 0' SAMPLE Recovered 0 3/2 0' = 15%. SAND AND GRAVEL same as 6 3-6.5' 12.0-14 0' SAMPLE Recovered 1 5/2 0' = 75%. GRAVELLY SAND. moderate yellowish brown (10 YR 5/4), trace silt, gravel to 5 cm; quartzite; sand; subrounded, 2 0-0 0 phi, unconsolidated, dry	6 3-10 3' SAMPLE BH07890612 12 0-17 7' SAMPLE BH07891218

0789BRB

WELL NO 07-89/BH07-89

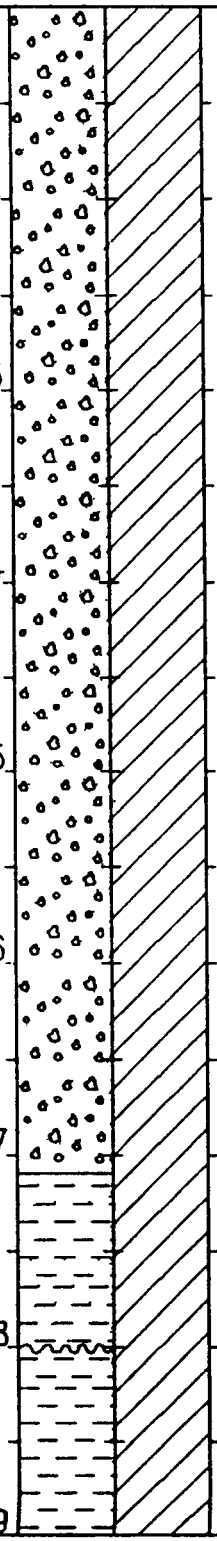
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 0-16 0' SAMPLE Recovered 1 9/2 0' = 95% GRAVELLY SANDY CLAY dusky yellow (5 Y 6/4), grading to grayish orange (10 YR 7/4), large quartzite to 5 cm, subangular, sand, poorly sorted, subangular, unconsolidated, damp	
14			16 0-18 0' SAMPLE Recovered 1 7/2 0' = 85%. GRAVELLY SANDY CLAY same as 14 0-16 0' except darker, moderate brown (5 YR 4/4)	
15			18 0-20 0' SAMPLE Recovered 0 6/2 0' = 30% GRAVELLY SANDY CLAY same as 14 0-16 0' except trace silt	18 0-23 0' SAMPLE BH07891824
16			20 0-22 0' SAMPLE Recovered 1 0/2 0' = 50% GRAVEL AND SAND moderate brown (5 YR 4/4), quartzite and K-feldspar to 3 cm, subangular, broken, sand, unsorted, coarse to fine quartz, subangular to subrounded, semiconsolidated, wet	
17				
18				
19				19 12'
20				20 0'
21				

0789BRC

WELL NO 07-89/BH07-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			22 0-24 0' SAMPLE Recovered 1 0/2 0' = 50% GRAVEL AND SAND same as 20 0-22 0' 24 0-26 0' SAMPLE Recovered 2 0/2.0' = 100% GRAVEL AND SAND same as 20 0-22 0' 26 0-28 0' SAMPLE Recovered 1 5/2 0' = 75% 26 0-27 1' GRAVEL AND SAND same as 20 0-22 0' 27 1-27 5' CLAYEY SAND moderate yellowish brown (10 YR 5/4), coarse to fine sand,, subrounded, quartz, 2 0-1 0 phi, consolidated, wet 28 0-30 0' SAMPLE Recovered 0 0/2 0' = 0% CLAYSTONE dusky yellow (5 Y 6/4), plastic, consolidated, damp Note Small piece of claystone in sample run, drilling change at 28 0'	24 0-26 0' SAMPLE BH07892426
22				
23				
24				
25				
26				
27				
28				
29				

0788ND

WELL NO 07-89/BH07-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			30 0-31 0' SAMPLE Recovered 1 6/1 0' = 160% CLAYSTONE dusky yellow (5 Y 6/4); some mottling of dark yellowish orange (10 YR 6/6), plastic, consolidated, damp.	
30			31 0-32 0' SAMPLE Recovered 1 6/1 0' = 160% CLAYSTONE same as 30 0-31.0' except more silt	
			32 0-33 0' SAMPLE Recovered 1 6/1 0' = 160%. CLAYSTONE same as 30 0-31 0' except more silt	
31			33 0-40 0' SAMPLE Recovered 1 4/1.0' = 140%. CLAYSTONE same as 30.0-31 0'	
			TOTAL DEPTH = 34 4'	
32				
33				
34				
35				
36				
37				

LOG OF BOREHOLE

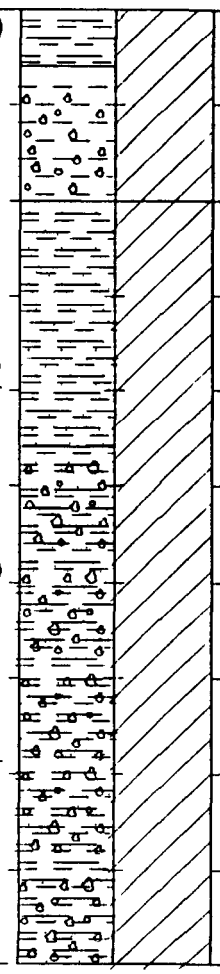
QA BY/DATE Rick Minow / 6 21-89
LOCATION Rocky Flats Plant, Background
COORDINATES N43,199 87 E22,617 22 (RFP)
TOTAL DEPTH 27 8'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 7, 1989 (03/08/89)
DRILLING METHOD Hollow Stem Auger
LOGGED BY K W Van Allen (P M Smith)
GEOLOGIST

BOREHOLE/WELL NO 08-89/BH08-89
GROUND SURFACE ELEVATION 5936 1
WATER LEVEL ENCOUNTERED 18.3'
STATIC 18 91' (6/5/89)
DRILLER R Sharp, M Baker HELPER P Mesa, K Martin
DRILLING FLUID None
CHECKED BY Jarell Berman
SITE MANAGER

CEARP MANAGER

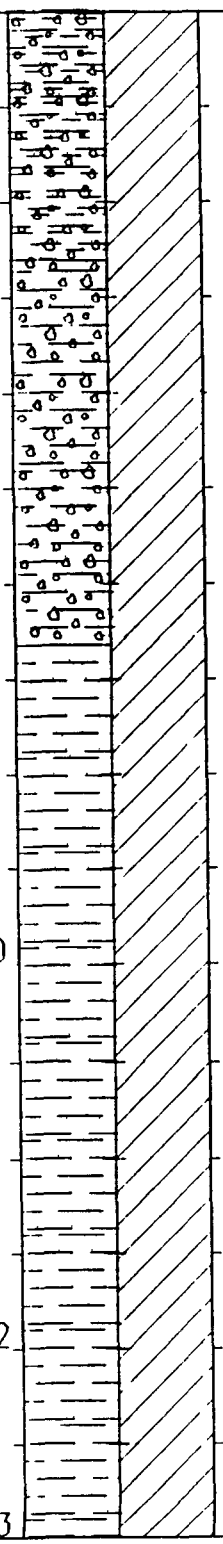
COMMENTS Upper 1 0' was removed and discarded, no sample Due to changes in the sampling scheme, BH 08-89 was offset and redrilled from 0 0'-3 0' in order to obtain a composite sample of that interval

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			REDRILL TOPSOIL 0 0-1 5' SAMPLE Recovered 1 1/1 5' = 73% 0 0-0 3' SILTY CLAY gray brown (5 YR 3/2), organic, vegetation, silty, roots, moist 0 3-1 1' GRAVELLY CLAY dark reddish brown (10 R 3/4), sandy, broken quartzose boulder, moist 1 5-3 0' SAMPLE Recovered 0 6/1 5' = 40% 1 5-2 1' GRAVELLY CLAY same as above, large boulder (0 2') quartzose in bottom TOTAL DEPTH = 3 0' ROCKY FLATS ALLUVIUM 1 0-2 3' SAMPLE Recovered 1 1/2 3' = 48% SANDY SILTY CLAY dark reddish brown (10 R 3/4), (25%) coarse to fine quartzose sand, some (20%) coarse to fine quartzose gravel, subangular to subrounded, poorly sorted, unconsolidated, massive, no HCl reaction, moist 2 3-4 3' SAMPLE Recovered 1 5/2 0' = 75% SANDY SILTY CLAY AND GRAVEL moderate brown (5 YR 4/4, 3/4), (25%) coarse to fine quartzose sand, (40%) coarse to fine quartzose gravel, subangular, poorly sorted, unconsolidated, massive, no HCl reaction, moist	0 0-2 1' SAMPLE BH08890003 1 0-6 1' SAMPLE BH08890106 BH08890106D BH08890306FB

BH0889A

WELL NO 08-89/BH 08-89

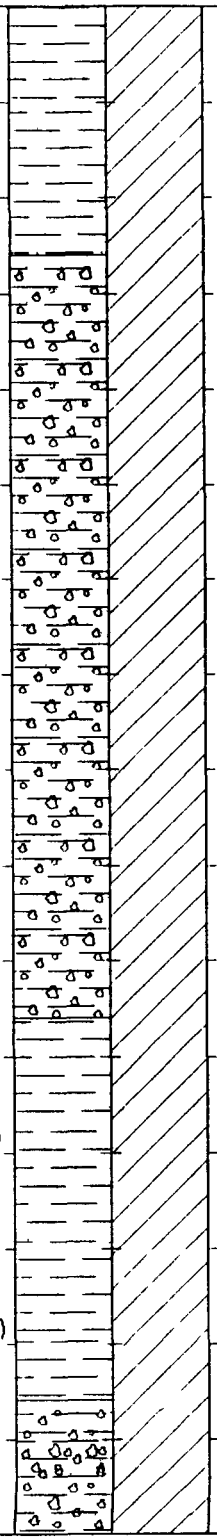
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			4 3-6 3' SAMPLE Recovered 1 8/2 0' = 90% SANDY SILTY CLAY AND GRAVEL moderate brown (5 YR 4/4, 5/4, 3/4), same as above	
6			6 3-8 3' SAMPLE Recovered 0 8/2 0' = 40%. SILTY SAND AND GRAVEL. moderate brown (5 YR 4/4), (25%) silt; (50%) coarse to fine quartzose sand; (35%) coarse to fine quartzose gravel, subangular to subrounded; poorly sorted; unconsolidated, massive; no HCl reaction, moist	6 3-7 1' SAMPLE BH08890608
7			8 3-10 3' SAMPLE Recovered 1 0/2.0' = 50% SILTY SAND moderate brown (5 YR 4/4), (25%) silt, some (20%) coarse to fine quartzose gravel; (55%) coarse to fine quartzose sand; subrounded to subangular, poorly sorted, unconsolidated; massive, no HCl reaction; moist.	8 3-13 7' SAMPLE BH08890814
8			10 3-12 3' SAMPLE Recovered 0 9/2.0' = 45%. SILTY SAND: same as above	
			12 3-14 3' SAMPLE Recovered 1 4/2.0' = 70% SILTY SAND. same as above	
9				
10				
11				
12				
13				

BH08898

WELL NO 08-89/BH 08-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 16 17 18 19 20 21			**14 3-16 3' SAMPLE** Recovered 0 9/2 0' = 45% SILTY SAND AND GRAVEL dark yellowish brown (10 YR 4/2), (50%) coarse to fine quartzose sand, (35%) coarse to fine quartzose gravel, subangular to subrounded, poorly sorted, unconsolidated, massive, no HCl reaction, moist **16 3-18 3' SAMPLE** Recovered 0 7/2 0' = 35% SILTY SAND AND GRAVEL moderate brown (5 YR 4/4), same as above, very moist **18 3-20 3' SAMPLE** Recovered 1 0/2.0' = 50%. SILTY SAND same as above, less gravel (20%), wet **20 3-22 3' SAMPLE** Recovered 0 9/2 0' = 45% SILTY SAND AND GRAVEL moderate brown (5 YR 4/4), same as 14 3-16 3', wet	14 3-19 3' SAMPLE BH08891420 20 3-21 2' SAMPLE BH08892022 18 3' 18 91'

BH0889C

WELL NO 08-89/BH 08-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			**22.3-24 3' SAMPLE** Recovered 1 6/2 0' = 80%. 22.3-22 8' SILTY SAND AND GRAVEL same as 20 3-22 3', wet	
22			22.8-24 3' SILTY CLAYSTONE. medium light gray (N 6/0), trace (5%) fine sand; slightly mottled; massive, medium plasticity, no HCl reaction, moist	
23			**24 3-26 3' SAMPLE** Recovered 2 2/2 0 = 110% SILTY CLAYSTONE. medium light gray (N 6/0) and moderate brown (5 YR 4/4), heavily mottled, same as above	
24			**26 3-27 8' SAMPLE** Recovered 2 0/2 0' = 100% SILTY CLAYSTONE medium dark gray (N 4/0), trace (< 5%) fine sand, low plasticity, not mottled, same as above.	
25			**TOTAL DEPTH = 27 8'**	
26				
27				
28				
29				

BH08890

LOG OF BOREHOLE

QA BY/DATE Janet Burman 7-26-89
LOCATION Rocky Flats Plant, Background
COORDINATES N42,275 09 E24,169 13 (RFP)
TOTAL DEPTH 19 55'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 2, 1989 (03/09/89)
DRILLING METHOD Hollow Stem Auger
LOGGED BY K W Van Allen (P M Smith)
GEOLOGIST

BOREHOLE/WELL NO 09-89/BH10-89
GROUND SURFACE ELEVATION 5883 1'
WATER LEVEL ENCOUNTERED None
STATIC None (4/19/89)
DRILLER R Sharp, M Baker HELPER P Mesa, K Martin
DRILLING FLUID None
CHECKED BY Janet Burman
SITE MANAGER

CEARP MANAGER

COMMENTS Upper 1 0' soil removed and discarded, not sampled
Due to changes in the sampling scheme, BH10-89 was offset and redrilled from 0 0-3 0' in order to obtain a composite sample of that interval

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			**REDRILL**	
			TOPSOIL	
			0 0-1 5' SAMPLE Recovered 1 5/1 5' = 100% 0 0-0 75' ORGANIC SILT brownish black (5 YR 2/1), unconsolidated, dry	0 0-2 6' SAMPLE BH10890003
1			**COLLUVIUM**	
			0 75-1 5' SILTY SANDY CLAY very dusky red (10 R 2/2), cobbles, quartzose pebbles, unconsolidated, soft	
2			1 5-3 0' SAMPLE Recovered 1 1/1 5' = 73% 1 5-3 0 SANDY SILTY CLAY same as above	
			TOTAL DEPTH = 3 0'	
3			**TOPSOIL**	
			1 0-2 5' SAMPLE Recovered 2 1/1 5' = 114% 1 0-1 5' SILTY CLAY very dark dusky red (10 R 2/2), some (20%) coarse to fine quartzose sand, roots, medium plasticity, moist	1 0-6 5' SAMPLE BH10890106 BH10890106D
4			**COLLUVIUM**	
			1 5-2 5' SILTY CLAY grayish brown (5 YR 3/2), some (20%) coarse to fine quartzose sand, medium plasticity, no HCl reaction, moist	
5				

0989BRA

WELL NO 09-89/BH10-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			2 5-4 5' SAMPLE Recovered 2 1/2 0' = 105% SILTY CLAY moderate brown (5 YR 4/4), some (20%) coarse to fine quartzose sand, trace (10%) coarse to fine quartzose gravel, subrounded to subangular, massive, unconsolidated, no HCl reaction, moist	
6			4 5-6 5' SAMPLE Recovered 2 2/2 0' = 110% SILTY CLAY same as above except slightly mottled, moist	
7			6 5-8 5' SAMPLE Recovered 2 1/2 0' = 105% 6.5-7 5' SILTY CLAY same as above, moist	7 5-13 5' SAMPLE BH10890713
8			7 5-8 5' SANDY SILTY CLAYSTONE dusky yellow (5 Y 6/4), and light olive gray (5 Y 5/2), (30%) fine sand, mottled; low plasticity, moist 8 5-10 5' SAMPLE Recovered 2 0/2 0' = 100% 8 5-10 0' SANDY SILTY CLAYSTONE same as above, moist	
9			10.0-10 5' SILTY CLAYSTONE medium gray (N 5/0), trace fine sand, consolidated, massive, no HCl reaction, moist 10 5-12 5' SAMPLE Recovered 2 1/2 0' = 105% SILTY CLAYSTONE medium dark gray (N 4/0), and dark gray (N 3/0), trace fine sand, occasional root fossils, coal inclusions, consolidated, massive, no HCl reaction, moist	
10				
11				
12				
13				

WELL NO 09-89/BH10-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			12 5-14 5 SAMPLE Recovered 2.0/2.0' = 100% SILTY CLAYSTONE olive gray (5 Y 4/1), trace fine sand; consolidated; massive, no HCl reaction, moist	13 5-19 5' SAMPLE BH10891319
14			14 5-16 5' SAMPLE Recovered 2 2/2 0' = 110%. 14 5-15 7' SILTY CLAYSTONE: same as above, moist. 15 7-16 5'. SILTY CLAYSTONE: medium dark gray (N 4/0), and moderate brown (5 YR 3/4); trace fine sand; slightly fissile; slightly carbonaceous; consolidated, moist.	
15			16 5-18 5' SAMPLE Recovered 2 1/2 0' = 105%. SILTY CLAYSTONE olive gray (5 Y 4/1), trace fine sand, (10%), consolidated, massive; no HCl reactions; moist	
16			18 5-19 5' SAMPLE Recovered 1 3/1 0' = 130%. SILTY CLAYSTONE· same as above; moist	
17			TOTAL DEPTH = 19 55'	
18				
19				
20				
21				

LOG OF BOREHOLE

QA BY/DATE Rick Morrow/8-21-89
LOCATION Rocky Flats Plant, Background
COORDINATES N43,725 60 E23,447 44 (RFP)
TOTAL DEPTH 24 5'

BOREHOLE/WELL NO BH09--89
GROUND SURFACE ELEVATION 5920 8'
WATER LEVEL ENCOUNTERED 16 5'
STATIC N/A
DRILLER K Parker; M Baker HELPER T Rodriguez, K Martin
DRILLING FLUID None
CHECKED BY James Burman
SITE MANAGER

CEARP MANAGER

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 2, 1989 (03/08/89)
DRILLING METHOD Hollow Stem Auger
LOGGED BY K E. Miller, (P M Smith)
GEOLOGIST

COMMENTS Borehole backfilled with volclay grout to 5 0' of surface, borehole topped off with Portland Type 1 cement Upper 1 0' removed and discarded, no sample

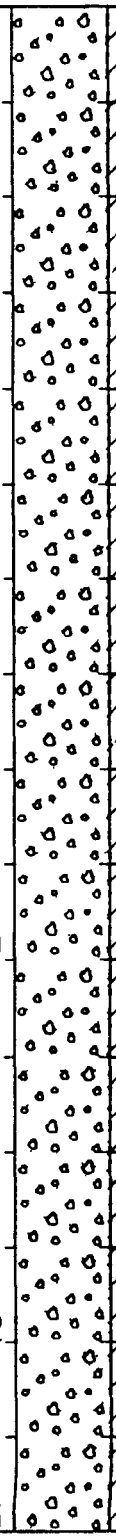
Due to changes in the sampling scheme, BH09-89 was offset and redrilled from 0 0'-3 0' in order to obtain a composite sample of that interval

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			REDRILL TOPSOIL 0 0-1 5' SAMPLE Recovered 0 95/1 5' = 63% 0 0-0 85' SILTY CLAY grayish brown (5 YR 3/2), organic, vegetation, grass, roots, quartzose boulders (4mm), moist	0 0-2 8' SAMPLE BH09890003
1			ROCKY FLATS ALLUVIUM 0 85-0 95' SANDY CLAY dusky brown (5 YR 2/2), gravelly, unconsolidated, trace sand (<10%), moist	
2			1 5-3 0 SAMPLE Recovered 1 3/1 5' = 86% 1 5-2 8' GRAVEL dusky brown (5 YR 2/2), gravelly, quartzose pebbles 80% (3-4mm), some sand and clay, unconsolidated, iron stained, moist	
3			TOTAL DEPTH = 3 0' ROCKY FLATS ALLUVIUM 1 0-3 0' SAMPLE Recovered 1 8/2 0' = 90% GRAVELLY CLAY very dusky red (10 R 2/2), to dark reddish brown (10 R 3/4), 25% gravel, quartzite, some roots and vegetation, clay, plastic, consolidated, damp	1 0-4 0' SAMPLE BH09890104
4				
5				

BH0989A

WELL NO BH09-89

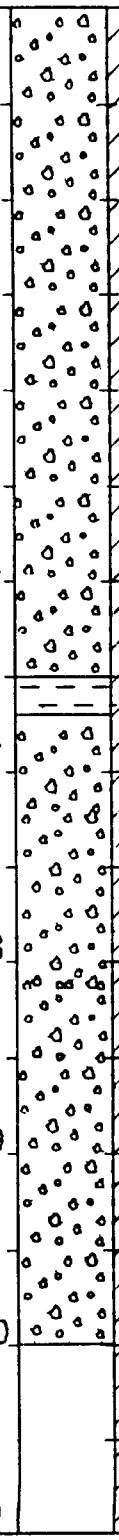
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			3 0-5 0' SAMPLE Recovered 1 9/2 0' = 95% 3 0-4 0' GRAVELLY CLAY same as 1 0-3 0' except less gravel 4 0-4 9' GRAVEL moderate orange pink (10 R 7/4), weathered quartzite to 5 cm, angular, broken, trace silt, unconsolidated, dry 5 0-7 0' SAMPLE Recovered 2 1/2 0' = 105% GRAVEL AND SAND grayish orange (10 YR 7/4), to moderate orange pink (10 R 7/4), trace clay, quartzite and K-feldspar to 4 cm, subangular to angular, sand--coarse to fine-grained; poorly sorted, 2 0 to - 5 phi quartz, strong reaction to HCl, unconsolidated, dry 7 0-9 0' SAMPLE Recovered 2 1/2 0' = 105% GRAVEL AND SAND same as 5 0-7 0' 9 0-10 0' SAMPLE Recovered 0 9/1 0' = 90% GRAVEL AND SAND. grayish orange pink (10 R 8/2), trace silt, quartzite to 5 cm; broken, angular, sand--course to fine-grained; quartz, unconsolidated, no HCl reaction, dry 10 0-12 0' SAMPLE Recovered 1 2/2 0' = 65% GRAVEL AND SAND darker grayish orange (10 YR 7/4), same as 9 0-10 0', more sand, damp 12 0-14 0' SAMPLE Recovered 1 0/2 0' = 50% GRAVEL AND SAND same as 10 0-12 0'	4 0-9 9' SAMPLE BH09890410 BH09890410D 10 0-14 8' SAMPLE BH09891016

BH0989B

WELL NO BH09-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 0-16 0' SAMPLE Recovered 0 8/2 0' = 40% GRAVEL AND SAND same as 10 0-12 0', more sand, slightly wet 16 0-18 0' SAMPLE Recovered 0 7/2 0' = 35% 16 0-16 5' GRAVEL AND SAND same as 10 0-12 0', wet 16 5-16 7' CLAYEY SAND pale olive (10 Y 6/2), well sorted, fine-grained, consolidated, moist 18 0-20 0' SAMPLE Recovered 0 4/2 0' = 20% GRAVEL AND SAND same as 16 0-16 5', wet 20 0-22 5' SAMPLE Recovered 0 0/2 5' = 0% 20.0-22 0' no sample recovered	16 0-18 4' SAMPLE BH09891620 16 5'
14				
15				
16				
17				
18				
19				
20				
21				

BH0989C

WELL NO BH09-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21				
22			22 0-22 5' CLAYSTONE dusky yellow (5 Y 6/4), plastic, consolidated, damp NOTE no method sample tube recovery, however, did collect sample from outside of core barrel 22 5-23 5' SAMPLE Recovered 0 0/1 0' = 0%. CLAYSTONE same as 20 0-22 0', stuck in shoe with piece of quartzite.	
23			23 5-24 5' SAMPLE Recovered 0 9/1 0' = 90% CLAYSTONE pale olive (10 Y 6/2), consolidated, plastic, damp.	
24			MEASURED TOTAL DEPTH AT 24 5'	
25				
26				
27				
28				
29				

BH0989D

LOG OF BOREHOLE

QA BY/DATE Ruth Monroe/6-21-89
LOCATION Rocky Flats Plant, Background
COORDINATES N44,655.14 E23,771.64 (RFP)
TOTAL DEPTH 46.0'

DRILLING COMPANY Bayles Brothers
DATE DRILLED March 22-23, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY R.T. Treat
GEOLOGIST

BOREHOLE/WELL NO 10-89/BH11-89
GROUND SURFACE ELEVATION 5806 5'
WATER LEVEL ENCOUNTERED 11 5', 29 9'
STATIC 5 41' (5/5/89)
DRILLER K Parker HELPER A Boday
DRILLING FLUID None
CHECKED BY James Bugman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 1 9/2 0' = 95% 0 0-0 9' CLAY dusky yellowish brown (10 YR 2/2), abundant roots, trace very fine-grained sand, low plasticity, stiff, weakly cemented, moist **COLLUVIUM** 0 9-1 9' CLAY dusky brown (5 YR 2/2), few scattered roots, low plasticity, weakly cemented, poorly consolidated, moist 2 0-4 0' SAMPLE Recovered 1 9/2 0' = 95% 2 0-3 0' CLAY same as above 3 0-3 9' CLAY pale brown (5 YR 5/2), caliche spots, low plasticity, moderately cemented, few scattered roots, very stiff, damp 4 0-6 0' SAMPLE Recovered 2 0/2 0' = 100% CLAY pale yellowish brown (10 YR 6/2) to pale brown (5 YR 5/2), trace gravel, well consolidated, low to medium plasticity, caliche spotted, very stiff, damp	

BH1189A

WELL NO 10 83/BH11-83 LOG OF BOREHOLE PAGE 2 OF 7

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			**6 0-8 0' SAMPLE** Recovered 1 8/2.0' = 90%. CLAY same as above, some spots of iron oxide staining.	▼ 5 41'
6			**8 0-10 0' SAMPLE** Recovered 2 0/2 0' = 100% CLAY· grayish brown (5 YR 3/2) with moderate iron oxide stains, spots of dusky brown (5 YR 2/2) lignite deposits; medium plasticity; moderately cemented, very stiff, damp	
7			**10 0-12 0' SAMPLE** Recovered 1 7/2 0' = 85% CLAY brownish gray (5 YR 4/1) to light olive gray (5 Y 5/2), iron oxide staining, lignite spots, weakly cemented to highly consolidated, moderate brown (5 YR 4/4) to a dark yellowish brown (10 YR 4/2) extremely hard conglomerate at 11.5-11 7', moist to wet	
8			**12 0-14 0' SAMPLE** Recovered 2 0/2 0' = 100% CLAY light gray (N 7/0) to light olive gray (5 Y 5/2), medium plasticity, weakly cemented, stiff; somewhat blocky, severely iron oxide stained, homogeneous; moist	
9				
10				
11				7 11 5'
12				
13				

BH1189B

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 16 17 18 19 20 21			14 0-16 0' SAMPLE Recovered 2 0/2 0' = 100%. CLAY light gray (N 7/0) to medium light gray (N 6/0), highly weathered displaced claystone, medium plasticity, iron oxide streaked; some very fine-grained sand; homogeneous; weakly cemented, stiff, moist. 16 0-18 0' SAMPLE Recovered 2 0/2 0' = 100% CLAY. same as above; more lignite streaks and strings. 18 0-20 0' SAMPLE Recovered 2 0/2 0' = 100%. CLAY· medium light gray (N 6/0) to light olive gray (5 Y 5/2), with blotches of light olive brown (5 Y 5/6) and moderate olive brown (5 Y 4/4), trace fine-grained sand; moderately cemented; medium to low plasticity; stiff; moist 20.0-22 0' SAMPLE Recovered 1 8/2.0' = 90%. CLAY: pale yellowish brown (10 YR 6/2), light brown (5 YR 5/6), iron oxide staining--pale brown (5 YR 5/2), medium plasticity, weakly consolidated, numerous lignite strings and pockets; blocky stiff; moist.	

WELL NO 10-89/BH11-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			22 20-23 0' SAMPLE Recovered 1 3/1 0' = 130%. CLAY same as above; light gray (N 7/0).	
22			23.0-25 0' SAMPLE Recovered 2 0/2 0' = 100%. CLAY light gray (N 7/0) to medium light gray (N 6/0), some streaks light olive gray (5 Y 5/2); medium to highly plastic; blocky; slightly oxide stained, moderately cemented; stiff; moist	
23			25.0-27 0' SAMPLE Recovered 2.0/2.0' = 100%. CLAY· same as above; some very fine-grained sand; trace gravel (0 05-1 5mm); subrounded to subangular; medium to low plasticity; moist.	
24			27 0-29 0' SAMPLE Recovered 2 0/2 0' = 100%. CLAY. light gray (N 7/0) to medium light gray (N 6/0), medium to high plasticity; moderately consolidated, stiff; numerous lignite spots, moist.	
25				
26				
27				
28				
29				

BH1189D

WELL NO 10-89/BH11-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			29 0-30 0' SAMPLE Recovered 1 0/1 0' = 100% 29 0-29 9' CLAY same as above, heavy lignite spots 29 9-30 0' GRAVEL conglomerate gravels, non plastic, severely oxide stained; highly cemented, weakly consolidated, fine-grained sand, wet	
30			30 0-32 0' SAMPLE Recovered 0 0/2.0' = 0%	29 9'
			32.0-32 5' SAMPLE Recovered 0 0/0 5' = 0%	
31			32 5-33 0' SAMPLE Recovered 0 0/0 5' = 0%	
			33.0-34 0' SAMPLE Recovered 0 0/1 0' = 0%	
32			34 0-35 0' SAMPLE Recovered 1 0/1 0' = 100% CLAYSTONE medium gray (N 5/0) to medium light gray (N 6/0), medium plasticity, severely oxide stained; blocky; poorly consolidated, medium hard, weathered, moist	34 5-41 0' SAMPLE BH11893541
33			35 0-36 0' SAMPLE Recovered 0 4/1 0' = 40% CLAYSTONE same as above	
			36 0-37 0' SAMPLE Recovered 2 0/1 0' = 200% CLAYSTONE same as above	
34				
35				
36				
37				

BH11BOE

WELL NO 10-89/BH11-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			37 0-39 0' SAMPLE Recovered 2.0/2 0' = 100% CLAYSTONE: dark gray (N 3/0), medium plasticity, weakly cemented, blocky; moist.	
38			39 0-40 0' SAMPLE Recovered 1 3/1 0' = 130% CLAYSTONE: dark gray (N 3/0), medium plasticity, hard; moderately consolidated, damp	
			40.0-42 0' SAMPLE Recovered 2 2/2.0' = 110% CLAYSTONE: same as above, dark gray (N 3/0) to grayish black (N 2/0)	41 0-46 0' SAMPLE BH11894146
39			42 0-44 0' SAMPLE Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above	
			44 0-46 0' SAMPLE Recovered 2 0/2.0' = 100% CLAYSTONE same as above	
40				
41				
42				
43				
44				
45				

BH11BBF

WELL NO 10-89/BH11-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45				
			TOTAL DEPTH = 46.0'	
46				
47				
48				
49				
50				
51				
52				
53				

BH11B9C

LOG OF BOREHOLE

QA BY/DATE Rick Morrow/6-21-94
LOCATION Rocky Flats Plant, Background
COORDINATES N44,616 73 E20,500 44 (RFP)
TOTAL DEPTH 32.1'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 22-23, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY J.E. Marks
GEOLOGIST

BOREHOLE/WELL NO 11-89/BH12-89
GROUND SURFACE ELEVATION 5826 1'
WATER LEVEL ENCOUNTERED None
STATIC None (5/15/89)
DRILLER M Baker HELPER K Martin
DRILLING FLUID None
CHECKED BY Janell Bergman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 2 1/2 0' = 105% 0 0-0 5' CLAY dark yellowish brown (10 YR 4/2), abundant vegetation--roots, slight caliche cement, trace gravel, medium to high plasticity, consolidated, soft, moist **COLLUVIUM** 0 5-2 0' SILTY CLAY same as above, less vegetation--roots, more silt, slightly drier, trace gravel up to 3 cm, angular, quartzite 2 0-3 0' SAMPLE Recovered 1 0/1 0' = 100% CLAY olive gray (5 Y 4/1), (15%) silt, some gravel up to 4 cm, angular, quartzite, trace vegetation--roots, some caliche, weakly effervesces, consolidated, moderately hard, slightly moist 3 0-5 0' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAY dusky yellow (5 Y 6/4) to light olive gray (5 Y 5/2), (30%) gravel up to 6 cm, angular, quartzite, cobble encountered at 4 5', trace caliche cemented, trace vegetation--roots, semiconsolidated, moderately hard, friable, dry	0 0-3 0' SAMPLE BH12890003 3 0-6 8' SAMPLE BH12890307

BH1289A

WELL NO 11-89/BH12-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			5 0-7 0' SAMPLE Recovered 1 8/2 0' = 90% SILTY CLAY dusky yellow (5 Y 6/4) to light olive gray (5 Y 5/2), (20%) gravel up to 5 cm, subrounded to angular; quartzite, no plasticity, consolidated yet friable, dry 7 0-9 0' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAY light olive brown (5 Y 5/6), abundant gravel up to 8 cm, cobble, rounded; quartzite, some iron staining; trace caliche, low to medium plasticity, stiff; consolidated, hard; moist to slightly moist 9 0-11 0' SAMPLE Recovered 0 9/2 0' = 45% SILTY CLAY moderate yellowish brown (10 YR 5/4), gravel up to 6 cm, rounded to angular, quartzite; moderate plasticity, consolidated to semi-consolidated, soft, moist 11 0-13 0' SAMPLE Recovered 1 2/2 0' = 60%. SILTY CLAY dark yellowish orange (10 YR 6/6), (15%) gravel up to 2 cm, subangular, quartzite, trace caliche, effervesces, medium plasticity, consolidated to semi-consolidated, moderately soft, moist	9 0-15 0' SAMPLE BH12890915

BH12898

WELL NO 11-89/BH12-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 16 17 18 19 20 21			13 0-15 0' SAMPLE Recovered 2 3/2.0' = 115% SILTY CLAY same as above, moderate yellowish brown (10 YR 5/4) 15 0-17 0' SAMPLE. Recovered 2 2/2.0' = 110%. 15.0-15 5' SILTY CLAY· same as above. 15.5-16 0' SANDY CLAY. moderate brown (5 YR 4/4), abundant iron staining; unsorted sand (1 5-0 0 phi), angular to subangular; (20%) gravel up to 6 5 cm; mostly small, some cobble-sized; angular; quartzite; semiconsolidated; moist. 16.0-17 0' CLAY· dark yellowish orange (10 YR 6/6), (10%) gravel up to 3 cm; subrounded; quartzite; moderate plasticity; consolidated; moderately hard; moist 17 0-19 0' SAMPLE Recovered 1 5/2 0' = 75% SILTY CLAY light olive brown (5 Y 5/6); abundant iron staining--light brown (5 YR 5/6), iron stained along fractures; no gravel, consolidated; moderately hard; slightly moist to dry. 19 0-21 0' SAMPLE Recovered 1 65/2.0' = 82.5%. SILTY CLAY· light olive gray (5 Y 5/2) to light olive brown (5 Y 5/6), iron stained on fractures--light brown (5 YR 5/6); trace very small gravel; quartzite and granite; stratified; no plasticity, consolidated; moderately hard, almost dry.	15 0-20 65' SAMPLE BH12891521 BH12891521D

WELL NO 11-89/BH12-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21 22 23 24 25 26 27 28 29			21 0-23 0' SAMPLE Recovered 1 3/2 0' = 65% SILTY CLAY dark yellowish brown (10 YR 4/2), gravel in places up to 4 cm, subangular; granite; abundant iron staining in bottom 0 4'--light brown (5 YR 5/6), unconsolidated, hard, slightly moist to dry 23 0-25 0' SAMPLE Recovered 2 1/2 0' = 105%. 23 0-23 4' SILTY CLAY same as above 23 4-25 0' CLAYSTONE light olive gray (5 Y 5/2), trace iron staining--light brown (5 YR 5/6), no gravel; trace calcium carbonate cement; consolidated; hard; dry 25 0-27 0' SAMPLE Recovered 1 4/2.0' = 70%. 25.0-26 0' CLAYSTONE. light olive gray (5 Y 5/2), (10%) silt, consolidated, hard, dry. 26 0-26 4' CLAYSTONE olive gray (5 Y 3/2), (10%) silt, consolidated, hard, dry. 27.0-29 0' SAMPLE Recovered 1 9/2 0' = 95% CLAYSTONE light olive gray (5 Y 5/2), weathered in places--iron stained--moderate yellowish brown (10 YR 5/4), mottled colors, iron carbonate (siderite), iron concretions up to 3 cm, consolidated, hard, dry	23 4-29 4' SAMPLE BH12892329

BH1289D

WELL NO 11-89/BH12-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			29 0-30 0' SAMPLE Recovered 1 9/1 0' = 190%. 29 0-29 9' CLAYSTONE dark yellowish brown (10 YR 4/2); (10%) silt in places, trace plant debris--iron stained; abundant iron staining; pyrite crystals up to 2 mm; consolidated; hard; dry. 29.9-30 0' SANDY SILTSTONE. yellowish gray (5 Y 8/1) to light olive gray (5 Y 6/1); very fine-grained sand (4.0-3.5 phi); rounded; iron stained pyrite specks throughout; iron stained plant debris--dark yellowish orange (10 YR 6/6); some mica flakes; consolidated; hard; not friable; dry	29 0-29 9' SAMPLE BH12892930
30			30.0-32 0' SAMPLE Recovered 2 0/2 0' = 100% SANDY SILTSTONE: same as above	29 9-32 0' SAMPLE BH12893032
31			TOTAL DEPTH WITH PLOPPER = 32 1'	
32				
33				
34				
35				
36				
37				

BH1289E

LOG OF BOREHOLE

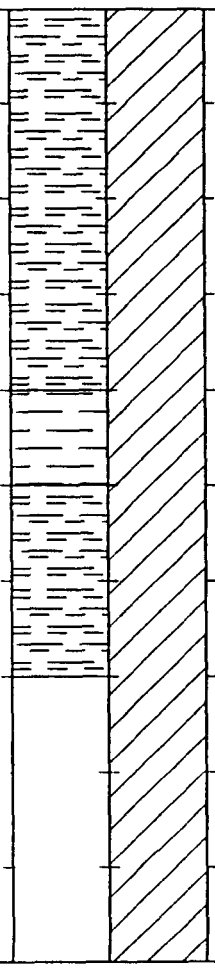
QA BY/DATE Janet Buxman 6-27-89
LOCATION Rocky Flats Plant, Background
COORDINATES N44,573 89 E20,501 49 (RFP)
TOTAL DEPTH 16.2'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 22, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY J.E. Marks
GEOLOGIST

BOREHOLE/WELL NO BH12-89A
GROUND SURFACE ELEVATION 5825 6'
WATER LEVEL ENCOUNTERED None
STATIC N/A
DRILLER M Baker HELPER K Martin
DRILLING FLUID None
CHECKED BY Janet Buxman
SITE MANAGER

CEARP MANAGER

COMMENTS Borehole abandoned. Filled with volclay grout to within 5' of ground surface then topped off with Portland Type I cement.

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 1 8/2 0' = 90% 0 0-1 1' SILTY CLAY dark yellowish brown (10 YR 4/2), abundant vegetation--roots, very organic-rich at top, abundant gravel up to 2 cm between 0 0' and 0 3', angular, quartzite, medium plasticity, stiff, consolidated, moist **COLLUVIUM** 1 1-1 8' SILTY CLAY pale yellowish brown (10 YR 6/2), some vegetation--roots, trace caliche stringers, consolidated, moderately hard, dry 2 0-3 5' SAMPLE Recovered 1 7/1 5' = 113% 2 0-2 5' SILT pale yellowish brown (10 YR 6/2), abundant caliche cement, effervesces, unconsolidated, friable, dry 2 5-3 5' CLAYEY SILT moderate yellowish brown (10 YR 5/4), (10%) sand, very fine-grained, abundant mica flakes, abundant caliche cement, gravel in bottom of run; subangular, quartzite, platy texture, consolidated, hard; dry Note 3 5-5 4' Drilled with center bit No sample taken.	

BH1289AA

WELL NO BH12-89A

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			5 4-6 0' SAMPLE Recovered 0 9/0 6' = 150% 5 4-5 6' CLAYEY SILT moderate yellowish brown (10 YR 5/4), caliche cement, trace gravel up to 3 cm; angular; quartzite; dry 5.6-6.0': CLAYEY SILT WITH CALICHE ZONE. very pale orange (10 YR 8/2) interlayered with moderate yellowish brown (10 YR 5/4), stratified; slight iron staining; effervesces profusely; trace gravel; very fine-grained; consolidated; dry. Note: 6.0-7 0' Drilled with center bit. No sample taken. 7 0-9 0' SAMPLE Recovered 2 1/2.0' = 105%. 7 0-7 4' CLAY. light olive gray (5 Y 5/2); (10%) silt; (20%) gravel at bottom; up to 4 cm; rounded; quartzite; abundant iron staining--dark yellowish orange (10 YR 6/6); unconsolidated, dry. 7 4-9 0' SILTY SANDY CLAY· pale yellowish brown (10 YR 6/2), iron stained throughout--light brown (5 YR 5/6); iron stained in fracture; caliche cemented throughout; trace gravel up to 1 cm; angular; quartzite; (30%) sand; very fine-grained (4.0-3 0 phi), consolidated; moderately hard; dry 9 0-11 0' SAMPLE Recovered 2 2/2.0' = 110% 9 0-9 7' SILTY SANDY CLAY same as above. 9 7-11 0'. SILTY SANDY CLAY· pale yellowish brown (10 YR 6/2) to dark yellowish brown (10 YR 4/2), abundant iron staining in fractures--moderate reddish brown (10 R 4/6), trace gravel in places throughout the core; up to 1 5 cm; quartzite; more clay toward the bottom, trace caliche cement, stratified layering, consolidated, hard; dry 11 0-13 0' SAMPLE Recovered 1 9/2.0' = 95%. SANDY SILTY CLAY same as above; less sand, more silt; laminated, stratified; abundant caliche cement, trace fine gravel throughout; small; consolidated; hard, dry	

BH1289AB

WELL NO BH12-89A

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			13 0-14 0' SAMPLE Recovered 1 2/1 0' = 120%. SANDY SILTY CLAY: pale yellowish brown (10 YR 6/2), iron stained in fracture--moderate brown (5 YR 4/4); some gravel up to 5 cm throughout; subrounded; quartzite; consolidated; hard; dry	
14			Note: 14 0-16.2' Drilled with center bit. No sample taken.	
15			TOTAL DEPTH WITH PLOPPER = 16 2'	
16				
17				
18				
19				
20				
21				

BH12B9AC

LOG OF BOREHOLE

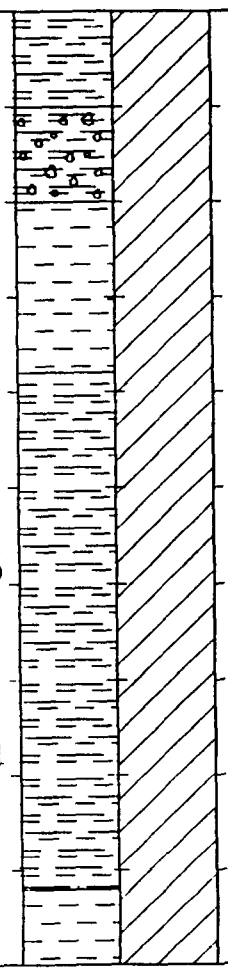
QA BY/DATE Janell Burman 6-27-89
LOCATION Rocky Flats Plant, Background
COORDINATES N44,092.75 E22,254.49 (RFP)
TOTAL DEPTH 19 2'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 10, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY J E Marks
GEOLOGIST

BOREHOLE/WELL NO 12-89/BH13-89
GROUND SURFACE ELEVATION 5859 4'
WATER LEVEL ENCOUNTERED None
STATIC None (5/15/89)
DRILLER M Baker HELPER K Martin
DRILLING FLUID None
CHECKED BY Janell Burman
SITE MANAGER

CEARP MANAGER

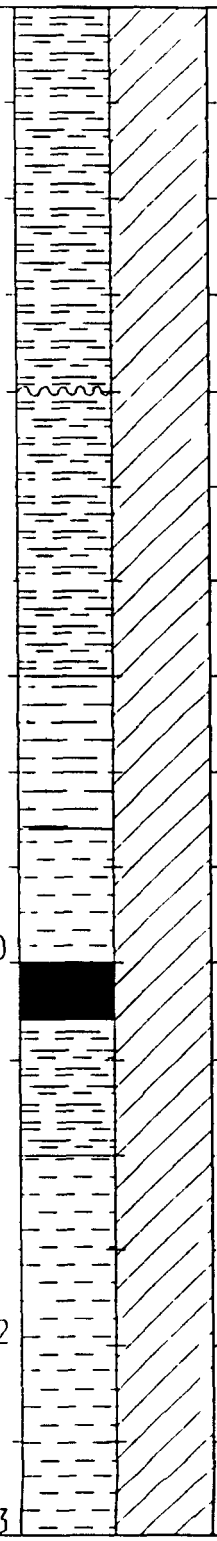
COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 1 9/2 0' = 95% 0.0-0 5' SILTY CLAY blackish red (5 R 2/2), 5% subrounded quartzite gravel, 20% vegetation roots, slight plasticity, unconsolidated, slightly moist **COLLUVIUM** 0 5-1 0' GRAVELLY SILTY CLAY moderate yellowish brown (10 YR 5/4), subangular to subrounded quartzite gravel, some vegetation roots, slight plasticity, unconsolidated, moist 1 0-1 9' CLAY moderate yellowish brown (10 YR 5/4), slightly silty, some vegetation roots, consolidated, slightly moist 2 0-4 0' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAY light olive brown (5 Y 5/6), mottled with dark yellowish brown (10 YR 4/2), trace coarse sand to gravel, caliche specks and stringers, consolidated at bottom, slightly moist 4 0-5 0' SAMPLE Recovered 1 1/1 0' = 110% 4 0-4 6' SILTY CLAY dark yellowish brown (10 YR 4/2), caliche stringers--very pale orange (10 YR 8/2), some vegetation roots, consolidated, slightly moist 4 6-5 0' CLAY pale yellowish brown (10 YR 6/2), gravel piece in shoe, up to 0 05', subrounded, quartzite, caliche stringers, consolidated, hard, slightly moist to dry	0 0-3 0' SAMPLE BH13890003 3 0-7 0' SAMPLE BH13890307

BH1389A

WELL NO 12-89/BH13-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			5 0-7 0' SAMPLE Recovered 2 1/2 0' = 105% SILTY CLAY light olive brown (5 Y 5/6), almost sandy toward bottom -- coarse silt, rounded quartzite gravel piece, caliche in small fractures, iron stained, consolidated; slightly moist. 7 0-9 0'SAMPLE Recovered 2 2/2 0' = 110% 7 0-8 5' SANDY SILTY CLAYSTONE light olive gray (5 Y 5/2), iron stained--moderate brown (5 YR 4/4), black organic specks, sandy in places; consolidated, slightly moist 8 5-9 0' SILTY SANDSTONE pale yellowish brown (10 YR 6/2) to light gray (N 7/0), mottled; clayey in places; iron stained, black organic specks--root casts; tight, semi-consolidated; friable; slightly moist 9 0-11 0' SAMPLE Recovered 2 1/2 0' = 105% 9 0-9 3'· SILTY SANDSTONE same as above 9 3-10 0' CLAYSTONE olive gray (5 Y 4/1), fissile, silty in part, organic stringers--root casts, no plasticity, semi-consolidated, friable; moist 10 0-10 3' LIGNITE black (N 1/0), blocky, consolidated yet friable, slightly moist 10 3-11 0'. SILTY CLAYSTONE light olive gray (5 Y 5/2), root casts--black and iron stained, light olive brown (5 Y 5/6), no plasticity, consolidated, moderately hard, slightly moist. 11 0-13 0' SAMPLE Recovered 2 1/2 0' = 105% CLAYSTONE brownish gray (5 YR 4/1), organic in part--olive black (5 Y 2/1), iron stained in small fractures--light olive brown (5 Y 5/6), semi-consolidated yet friable, almost dry	7 0-9 3' SAMPLE BH13890709 10 7-15 0' SAMPLE BH13891015 BH13891015D

BH1389B

WELL NO 12-89/BH13-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 16 17 18 19 20 21			13 0-15 0' SAMPLE Recovered 2 1/2 0' = 105% CLAYSTONE· light olive gray (5 Y 5/2); iron stained in fractures--dark yellowish orange (10 YR 6/6), silty in part; no plasticity; consolidated, moderately hard, almost dry to bone dry 15 0-17 0' SAMPLE Recovered 2 2/2.0' = 110% SILTY CLAYSTONE. pale yellowish brown (10 YR 6/2), sandy in part; large 0 8' iron stained fracture--moderate brown (5 YR 4/4), consolidated; dry 17 0-19 0' SAMPLE. Recovered 2 2/2.0' = 110% 17.0-18.7' SILTY CLAYSTONE pale yellowish brown (10 YR 6/2), sandy in part throughout, same as above with iron stained fractures 18 7-19 0' SILTY SANDY CLAYSTONE Same as above, 30% sand TOTAL DEPTH MEASURED WITH TAPE = 19 2'	15 0-19 2' SAMPLE BH13891519

BH1389C

LOG OF BOREHOLE

QA BY/DATE Rick Monroe 6-21-89
LOCATION Rocky Flats Plant: Background
COORDINATES N44,338 93 E23,567 14 (RFP)
TOTAL DEPTH 20.3'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 15 to March 16, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY J.E. Marks
GEOLOGIST

BOREHOLE/WELL NO 13-89/BH14-89
GROUND SURFACE ELEVATION 5846 0'
WATER LEVEL ENCOUNTERED None
STATIC None (5/12/89)
DRILLER M Baker HELPER K Martin
DRILLING FLUID None
CHECKED BY Janice Bergman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 2 0/2 0' = 100% 0 0-1 2' SILTY CLAY dusky brown (5 YR 2/2), 5% gravel up to 3 cm, rounded, quartzite, abundant vegetation roots, unconsolidated, slightly moist **COLLUVIUM** 1 2-2 0' SILTY CLAY moderate yellowish brown (10 YR 5/4), trace small gravel, rounded, trace vegetation roots, moderately plastic, consolidated, moderately hard, slightly moist 2 0-4 0' SAMPLE Recovered 1 8/2 0' = 90% SILTY CLAY moderate olive brown (5 Y 4/4), trace small gravel, rounded, trace vegetation roots, caliche stringers below 3 0'--efferveses, grayish pink (5 R 8/2), highly weathered, moderately plastic, consolidated, moderately hard, slightly moist grades to dry with depth 4 0-5 0' SAMPLE Recovered 1 4/1 0' = 140% SILTY CLAY light olive gray (5 Y 5/2), iron stained--light olive brown (5 Y 5/6), mottled, abundant caliche stringers--pinkish gray (5 Y 8/1), highly weathered, small iron nodules, trace vegetation roots, almost dry	0 0-3.0' SAMPLE BH14890003 3 0-7 0' SAMPLE BH14890307

BH1489A

WELL NO 13-89/BH14-89

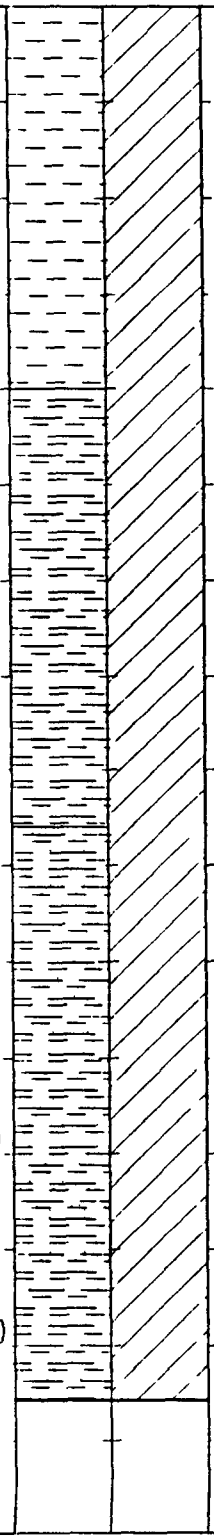
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			5 0-7 0' SAMPLE Recovered 2 3/2 0' = 115% 5 0-5 9' SANDY CLAY medium light gray (N 6/0) grading to dark yellowish orange (10 YR 6/6), iron stained, mottled; very fine-grained sand (3.5-3 0 phi), subrounded; quartzose, consolidated, moderately hard, friable, moist. 5 9-7 0' SILTY CLAY light olive brown (5 Y 5/6), mottled, abundant caliche in fractures; 5% gravel up to 3 cm, subrounded; quartzite; small iron nodules, highly weathered, slight to no plasticity, consolidated; moderately hard, slightly moist	
6				
7			7 0-9 0'SAMPLE Recovered 2 1/2 0' = 105% 7 0-8 2' CLAY light brown (5 Y 5/6), small gravel pieces; subrounded to rounded, quartzite, iron nodules, highly weathered and oxidized, moderate plasticity, consolidated, moderately hard, moist	8 2-14 2' SAMPLE BH14890814
8			8 2-9 0' SANDY CLAYSTONE light gray (N 7/0), iron stained--light olive brown (5 Y 5/6), mottled, 40% sand, very fine-grained (3 5-3 0 phi), quartzose, weathered, consolidated yet easily friable, moist	
9			9 0-11 0' SAMPLE Recovered 2 1/2 0' = 105% 9 0-9 8' SANDY CLAYSTONE same as above 9 8-11 0' CLAYSTONE light olive gray (5 Y 5/2), some iron staining--light olive brown (5 Y 5/6), consolidated, moderately hard, moist	
10			11 0-13 0' SAMPLE Recovered 2 2/2 0' = 110% CLAYSTONE· dark yellowish brown (10 YR 4/2); trace silt, unweathered, consolidated, moderately hard, moist	
11				
12				
13				

BH14898

WELL NO 13-89/BH14-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 16 17 18 19 20 21			13 0-15 0' SAMPLE Recovered 2 2/2 0' = 110% CLAYSTONE pale brown (5 YR 5/2), fractured yet minimum to no staining, no plasticity, consolidated, moderately hard, slightly moist to dry 15 0-17 0' SAMPLE Recovered 2.1/2.0' = 105%. SILTY CLAYSTONE: dusky yellow (5 Y 6/4) to light olive brown (5 Y 5/6), trace very fine-grained sand (4 0-3.5 phi), more silty and sandy toward the bottom; dark manganese oxide stringers--dusky yellowish brown (10 YR 2/2) and iron oxide in fractures--moderate brown (5 YR 4/4), fractured in part, consolidated yet moderately soft, slightly moist. Note: Measured total depth with plopper; adjust depth 17 3-19 3' SAMPLE Recovered 2 1/2 0' = 105% CLAYEY SANDSTONE AND SILTSTONE: olive gray (5 Y 3/2), light gray (N 7/0), mottled; manganese oxide stain--black (N 1/0), iron stained in places--dark yellowish orange (10 YR 6/6), interbedded siltstone and sandstone, abundant sand throughout, oblique layering in the core; consolidated; moderately hard, almost dry 19 3-20 3' SAMPLE Recovered 1 1/1 0' = 110% CLAYEY SANDSTONE AND SILTSTONE same as above TOTAL DEPTH MEASURED WITH PLOPPER = 20 3'	14 2-17 0' SAMPLE BH14891417 17 0-20 3' SAMPLE BH14891720

BH1489C

LOG OF BOREHOLE

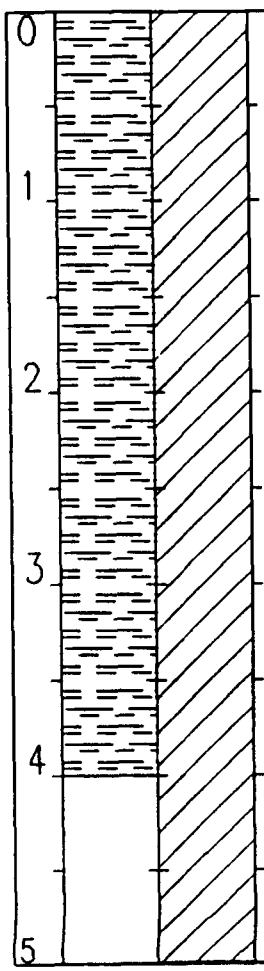
QA BY/DATE Rick Morrow 6-21-99
LOCATION Rocky Flats Plant, Background
COORDINATES N44,419 20 E23,550 92 (RFP)
TOTAL DEPTH 8 0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 15, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY J.E. Marks
GEOLOGIST

BOREHOLE/WELL NO BH14-89A1
GROUND SURFACE ELEVATION 5834.6'
WATER LEVEL ENCOUNTERED None
STATIC N/A
DRILLER M Baker HELPER K Martin
DRILLING FLUID None
CHECKED BY Janet Brennan
SITE MANAGER

CEARP MANAGER

COMMENTS Abandoned hole because of poor recovery

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 2.0/2 0' = 100% 0.0-1 2' SILTY CLAY dusky yellowish brown (10 YR 2/2), abundant vegetation roots, slight to moderate plasticity, consolidated, yet soft; moist **COLLUVIUM** 1 2-2 0' SILTY CLAY dark yellowish brown (10 YR 4/2), trace (5%) small gravel, subrounded; quartzite; abundant roots, consolidated; moderately hard; moist. 2.0-4 0' SAMPLE Recovered 1 0/2.0' = 50% SILTY CLAY: light olive gray (5 Y 5/2), iron stained-- light olive brown (5 Y 5/6); caliche-- bluish white (5 B 9/1), some gravel up to 3 cm; angular to subrounded, quartzite; vegetation roots; caliche in part--effervesces, moderately plastic, consolidated; moderately hard, slightly moist 4 0-5 0' SAMPLE Recovered 0 0/1 0' = 0%	

1489A1A

WELL NO 13-89/BH14-89A1

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			5.0-7.0' SAMPLE Recovered 0.0/2.0' = 0%.	
6			7.0-8.0' SAMPLE Recovered 0.0/1.0' = 0%.	
7			TOTAL DEPTH = 8.0'	
8				
9				
10				
11				
12				
13				

1489A1B

LOG OF BOREHOLE

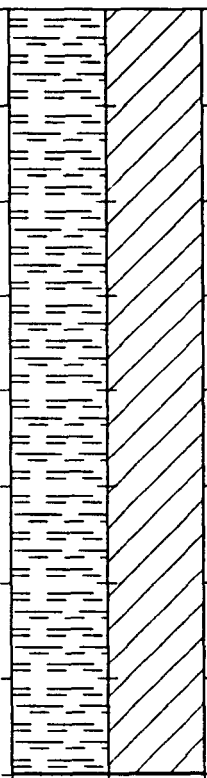
QA BY/DATE Rick Monow / 6 21-89
LOCATION Rocky Flats Plant, Background
COORDINATES N44,426.56 E23,548.26 (RFP)
TOTAL DEPTH 4 0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 15, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY J E Marks
GEOLOGIST

BOREHOLE/WELL NO BH14--89A2
GROUND SURFACE ELEVATION 5834 1'
WATER LEVEL ENCOUNTERED None
STATIC N/A
DRILLER M Baker HELPER K Martin
DRILLING FLUID None
CHECKED BY [signature]
SITE MANAGER

CEARP MANAGER

COMMENTS Abandoned hole because of large gravel

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 1.9/2 0' = 95%. 0 0-0 9' SILTY CLAY dusky yellowish brown (10 YR 2/2), abundant vegetation roots, moderate plasticity, semi-consolidated, soft, moist **COLLUVIUM** 0 9-1 9' SILTY CLAY olive gray (5 Y 4/1), mottled, iron stained--moderate yellowish brown (10 YR 5/4), abundant caliche specks--effervesces, pinkish gray (5 YR 8/1), 5% gravel up to 3 cm, rounded, quartzite, abundant vegetation roots, moderate plasticity, consolidated, moderately hard, moist 2 0-4 0' SAMPLE Recovered 1 7/2 0' = 85% SILTY CLAY light olive gray (5 Y 5/2) to light olive brown (5 Y 5/6), highly weathered, abundant caliche--effervesces--white (N 9/0), sandy in places, trace gravel up to 4 cm, subangular to angular, quartzite, slight plasticity, consolidated, moderately hard, moist **TOTAL DEPTH = 4 0'**	

1489A2A

LOG OF BOREHOLE

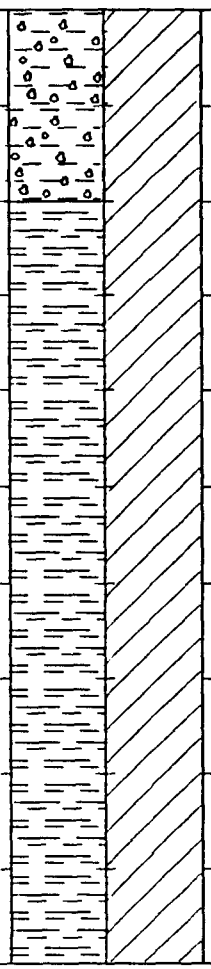
QA BY/DATE J B Buzman 10-29-89
LOCATION Rocky Flats Plant, Background
COORDINATES N34,321.96 E22,207.35 (RFP)
TOTAL DEPTH 34 5'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 7, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K E Miller
GEOLOGIST

BOREHOLE/WELL NO 14-89/BH 15-89
GROUND SURFACE ELEVATION 5866 8'
WATER LEVEL ENCOUNTERED None
STATIC None (5/11/89)
DRILLER K Parker HELPER
DRILLING FLUID None
CHECKED BY J B Buzman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 1 7/2.0' = 85% 0.0-1 0' GRAVELLY CLAY olive gray (5 Y 4/1); vegetation; roots; gravel (3 cm) quartzite, consolidated, damp **COLLUVIUM** 1 0-1 7' SILTY CLAY olive gray (5 Y 4/1), plastic, consolidated, damp 2 0-4 0' SAMPLE Recovered 1 9/2 0' = 95% SILTY CLAY moderate olive brown (5 Y 4/4), plastic, consolidated, light effervescence HCl; damp 4 0-6 0' SAMPLE Recovered 2 0/2.0' = 100%. SILTY CLAY. same as 2 0-4 0' except trace sand, some mottling moderate yellow (5 Y 7/6); slight calcareous; HCl reaction; damp.	0 0-3 0' SAMPLE BH15890003 3 0-9 0' SAMPLE BH15890309
1				
2				
3				
4				
5				

BH1589A

WELL NO 14-89/BH 15-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			6 0-8 0' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAY same as 4 0-6 0' except large piece (4 cm) of quartz; rounded	
6			8 0-10 0' SAMPLE. Recovered 2 0/2.0' = 100% SILTY CLAY same as 6 0-8 0' except no gravel, strong HCl reaction, damp	9 0-15 0' SAMPLE BH15890915
7			10 0-12 0' SAMPLE Recovered 2 0/2 0' = 100%. SILTY CLAY light olive brown (5 Y 5/6), some (20%) gravel, quartzite, K-feldspar, subangular; consolidated, plastic, damp	
8			12.0-14 0' SAMPLE Recovered 2.2/2 0' = 110% SILTY CLAY: same as 10 0-12 0' except trace gravel quartzite, dark yellowish orange (10 YR 6/6) stains and mottling, consolidated, plastic, slight effervescence HCl, damp	
9				
10				
11				
12				
13				

BH15890

WELL NO 14-89/BH 15-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 0-16 0' SAMPLE Recovered 2 2/2 0' = 110% SILTY CLAY same as 12 0-14 0', trace gravel, damp	15 0-21 0' SAMPLE BH15891521
14			16 0-18 0' SAMPLE Recovered 2 1/2.0' = 105% SILTY CLAY light olive brown (5 Y 5/6) grading to pale olive (10 Y 6/2), streaks of dark yellowish orange (10 YR 6/6), plastic consolidated, damp	
15			18 0-20 0' SAMPLE Recovered 2 2/2.0' = 110% SILTY CLAY same as 16 0-18 0' except large quartzite (2-4 cm), angular, broken, damp.	
			20 0-22 2' SAMPLE Recovered 2 1/2 0' = 105% SILTY CLAY same as 18 0-20 0'	
16				
17				
18				
19				
20				
21				

BH1589C

WELL NO 14-89/BH 15-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			22 0-24 0' SAMPLE Recovered 2 2/2 0' = 110% 22 0-22 3' SILTY CLAY light olive brown (5 Y 5/6), trace gravel, consolidated	22 0-28 3' SAMPLE BH15892228
22			22.3-24 0' SANDY SILTY CLAYSTONE light olive brown (5 Y 5/6), streaks black (N 1/0) and dark yellowish orange (10 YR 6/6); very consolidated, plastic, sand very fine, damp	
23			24 0-26 0' SAMPLE Recovered 2 2/2 0' = 110% SANDY SILTY CLAYSTONE same as 22 3-24 0' except more silt, less plastic, slightly friable, consolidated, more sand, very fine, dry	
24			26 0-28 0' SAMPLE Recovered 2 2/2 0' = 110% SANDY SILTY CLAYSTONE same as 24 0-26 0' except sandstone nodules dark yellowish orange (10 YR 6/6), platy, friable, moderately consolidated, less plasticity, dry	
25			28 0-30 0' SAMPLE Recovered 2 20/2 0' = 110%. SANDY SILTY CLAYSTONE same as 26 0-28 0' except grading to medium gray (N 5/0), grading to less weathered, dry	28 3-34 3' SAMPLE BH15892834
26				
27				
28				
29				

BH1589D

WELL NO 14-89/BH 15-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			30 0-32 0' SAMPLE Recovered 2 2/2 0' = 110% SANDY SILTY CLAYSTONE. same as 26.0-28.0' except medium gray (N 5/0), dry	
30			32 0-34 0' SAMPLE Recovered 2 2/2 0' = 110% SANDY SILTY CLAYSTONE same as above; medium gray (N 5/0), less sand; dry	
			34 0-34 5' SAMPLE Recovered 1 0/0 5' = 200% SANDY SILTY CLAYSTONE same as above	34 0-34 5' SAMPLE FIELD BLANK BH15890307FB
31			TOTAL DEPTH WITH PLOPPER = 34 5'	
32				
33				
34				
35				
36				
37				

BH150BE

LOG OF BOREHOLE

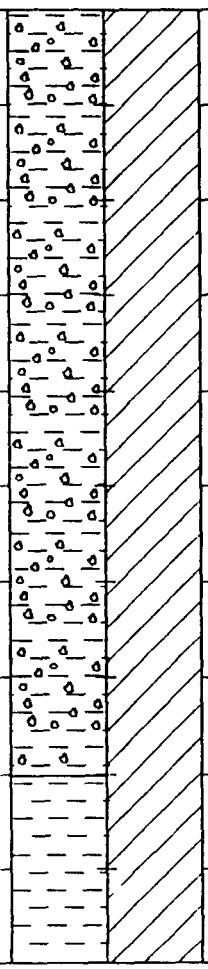
QA BY/DATE J B Burman / 9-29-89
LOCATION Rocky Flats Plant, Background
COORDINATES N32,873.07 E18,514.33 (RFP)
TOTAL DEPTH 33 0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED April 5, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY R T Treat
GEOLOGIST

BOREHOLE/WELL NO 15-89/BH16-89
GROUND SURFACE ELEVATION 6025 6'
WATER LEVEL ENCOUNTERED 10 8', 18 0'
STATIC 1 17'(5/04/89)
DRILLER K Parker HELPER R. Orr
DRILLING FLUID None
CHECKED BY Farell Burman
SITE MANAGER

CEARP MANAGER

COMMENTS

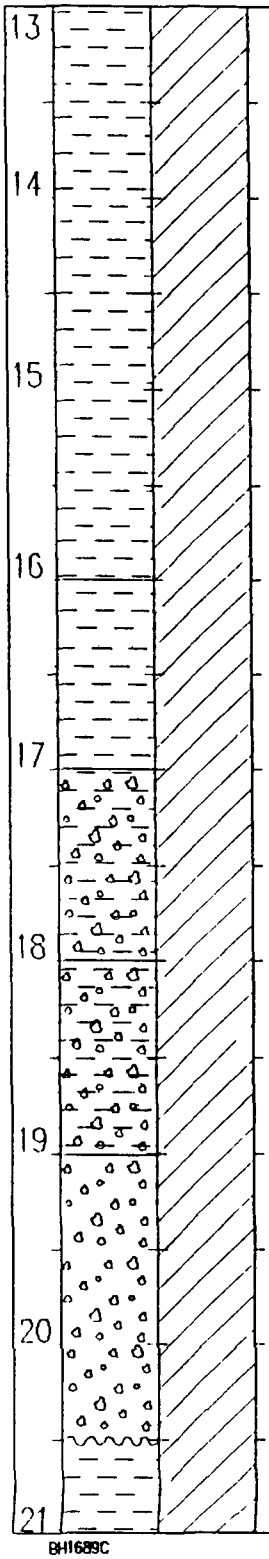
DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0.0-2 0' SAMPLE. Recovered 1.2/2.0' = 60% 0.0-1 0'· GRAVELLY CLAY dusky brown (5 YR 2/2), abundant roots; low plasticity, weakly cemented, poorly consolidated; medium stiff, moist **COLLUVIUM** 1.0-1 2' CLAY AND GRAVEL moderate yellowish brown (10 YR 5/4) to pale yellowish brown (10 YR 6/2), gravel (2 0 mm to 5 5 mm), angular, subangular; quartzite composition; medium plasticity; stiff; moderately cemented; moist 2 0-4 0' SAMPLE Recovered 1 8/2 0' = 90% CLAY AND GRAVEL same as above; trace roots; trace sand, fine-grained (3 0-2 5 phi). 4 0-6 0' SAMPLE Recovered 2 0/2 0' = 100% CLAY: light brown (5 YR 5/6) to moderate yellowish brown (10 YR 5/4), some pale yellowish brown (10 YR 6/2), some gravel (1 25 mm to 3.25 mm), angular, subangular; stiff; moderately cemented; well consolidated; low to medium plasticity; moist	0 0-3 0' SAMPLE BH16890003 ▼ 1 17' 3 0-9 0' SAMPLE BH16890309

BH1689A

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			**6 0-8 0' SAMPLE.** Recovered 2 0/2.0' = 100%. CLAY same as above; sandy clay lense noted at 6.5-7 0', dark yellowish orange (10 YR 6/6) and light brown (5 YR 5/6); streaks of pale yellowish brown (10 YR 6/2); gravel (0.25 mm to 2 50 mm); subangular; subrounded, fine to scattered medium-grained sand (3.0-1 0 phi). **8 0-10 0' SAMPLE.** Recovered 1 2/2.0' = 60%. CLAY: pale brown (5 YR 5/2) to pale yellowish brown (10 YR 6/2); streaked with dark yellowish orange (10 YR 6/6); trace gravel, oxide stained; medium plasticity; moderately cemented; medium stiff to stiff; slightly moist. **10.0-12 0' SAMPLE.** Recovered 2.0/2.0' = 100%. 10.0-10.8'· CLAY: same as above; medium plastic. 10.8-11 3' SANDY CLAY: light brownish gray (5 YR 6/1) to brownish gray (5 YR 4/1); moderate yellowish brown (10 YR 5/4); fine-grained sand (3.5-2.5 phi), weakly cemented; scattered gravel; subrounded; subangular; medium plastic; wet. 11.3-12.0'· CLAY: same as 10 0-10.8', moist. **12.0-14 0' SAMPLE.** Recovered 1 3/2.0' = 65%. CLAY moderate brown (5 YR 3/4) to light brown (5 YR 5/6), some gravel; trace sand; medium stiff; low plasticity; gravel (1 25 mm to 3 0 mm), subrounded; angular; subangular; moist.	**9 2-13 3' SAMPLE** BH16890915 ▽ 10 8'

WELL NO 15-89/BH16-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 0-15 0' SAMPLE Recovered 0 0/1 0' = 0% Note 15 0-16 0' drilled with center bit	
14			16 0-17 0' SAMPLE Recovered 1 0/1 0' = 100% SANDY CLAY pale yellowish brown (10 YR 6/2), moderate yellowish brown (10 YR 5/4) and dark yellowish brown (10 YR 6/6), some gravel (1.0 to 3 75mm), very fine to fine-grained (3 5-2 0 phi), subangular, angular, subrounded, low plasticity, weakly cemented, well sorted, poorly consolidated, very moist to moist	16 0-19 0' SAMPLE BH16891519
15			17 0-18 0' SAMPLE Recovered 1 0/1 0' = 100% GRAVEL AND CLAY same as above, more gravel, some sand, oxide stained	
16			18 0-19 0' SAMPLE Recovered 1 0/1 0' = 100% SANDY GRAVELLY CLAY dark yellowish orange (10 YR 6/6), moderate yellowish brown (10 YR 5/4), light brown (5 YR 6/4), very fine to scattered fine-grained (3 5-2 0 phi), gravel (1 50 mm to 2 75 mm), subangular, angular, few subrounded, weakly cemented, low to non-plasticity, medium stiff, wet	
17			19 0-21 0' SAMPLE Recovered 2 0/2 0' = 100% 19 0-20.5 SAND AND GRAVEL color same as above, fine to very coarse-grained (2 5-0 0 phi), gravel (0 50 mm to 3 25 mm), angular, subangular and subrounded, weakly to non-cemented; poorly consolidated, wet	
18				▽ 18 0'
19			20.5-21 0' CLAYSTONE pale yellowish brown (10 YR 6/2) to dark yellowish orange (10 YR 6/6), moderately cemented, low plasticity, oxide stained, homogeneous, massive, weathered, moist	20 5-26 5' SAMPLE BH16892127
20				
21				

BH1689C

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21 22 23 24 25 26 27 28 29			21 0-23 0' SAMPLE. Recovered 2 0/2 0' = 100%. CLAYSTONE: pale yellowish brown (10 YR 6/2) to light brownish gray (5 YR 4/1) to light gray (N 7/0); moderately oxide stained, medium plasticity; massive, homogeneous, blocky; medium hard; moderately consolidated; weathered; moist. 23.0-25 0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above 25.0-27.0' SAMPLE. Recovered 2.0/2.0' = 100% CLAYSTONE: light gray (N 7/0) to medium light gray (N 6/0); some streaks of moderate reddish brown (10 YR 4/6); oxide stained; medium plasticity, homogeneous; massive; blocky; medium hard, moderately consolidated, slightly moist 27.0-29 0' SAMPLE Recovered 2.0/2.0' = 100% CLAYSTONE: same as above; trace sand in thin beds; very fine-grained; medium to slightly oxide stained.	26 5-32 5' SAMPLE BH16892733

WELL NO 15-89/BH16-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			**29 0-31.0' SAMPLE.** Recovered 2.0/2.0' = 100%. CLAYSTONE- medium light gray (N 6/0) to medium gray (N 5/0); slightly oxide stained streaks; medium plasticity, homogeneous; massive; moderately cemented; medium hard; blocky; weathered, damp.	
30			**31 0-33.0' SAMPLE.** Recovered 2.0/2 0' = 100%. CLAYSTONE: same as above; thin streaks very fine-grained sandstone; weathered; damp.	
31			**TOTAL DEPTH 33 0'**	
32				
33				
34				
35				
36				
37				

BH16B9E

LOG OF BOREHOLE

QA BY/DATE J B Burman / 9-24-89
LOCATION Rocky Flats Plant, Background
COORDINATES N33,804 66 E20,373 64 (RFP)
TOTAL DEPTH 25 5'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 28, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY R T Treat
GEOLOGIST

BOREHOLE/WELL NO 16-89/BH17-89
GROUND SURFACE ELEVATION 5907 5'
WATER LEVEL ENCOUNTERED None
STATIC None (5/16/89)
DRILLER K Parker HELPER A Boday
DRILLING FLUID None
CHECKED BY Jarl Burman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-1 6' SAMPLE Recovered 1 7/1 6' = 106% 0.0-0 6': CLAY· dusky brown (5 YR 2/2), abundant roots; low plasticity; weakly cemented; medium stiff; moist **COLLUVIUM** 0.6-1 6'· CLAY dusky brown (5 YR 2/2) to moderate yellowish brown (10 YR 5/4); scattered roots, slightly calcareous, medium plasticity; moderately cemented, moist 1 6-3 6' SAMPLE Recovered 0.6/2.0' = 30%. CLAY dark yellowish brown (10 YR 4/2) to moderate yellowish brown (10 YR 5/4), slightly calcareous; medium plasticity, stiff; trace of gravel up to 45mm; subangular to angular, with few subrounded; weakly cemented; moist. 3.6-5 6' SAMPLE. Recovered 2.0/2.0' = 100%. CLAY: pale yellowish brown (10 YR 6/2) with pale brown (5 YR 5/2) and moderate yellowish brown (10 YR 5/4), medium plasticity; some gravel, range 0.05mm up to 4.24mm; angular; subangular with few subrounded; trace fine-grained sand (3.0-2 5 phi), medium stiff; moderately cemented; moist	0 0-2 1' SAMPLE BH17890003 3 6-6 0' SAMPLE BH17890306

BH1789A

WELL NO 16-89/BH17-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			5 6-7 6' SAMPLE Recovered 0 5/2 0' = 25% CLAY: same as above	
6			7 6-9 6' SAMPLE Recovered 0 0/2.0' = 0%. 9 6-10 0' SAMPLE Recovered 0.0/0.4' = 0% 10 0-11 5' SAMPLE Recovered 0 0/1 5' = 0%	
7			11 5-12 0' PUSHED SPLIT SPOON SAMPLE Recovered 0 0/0 5' = 0%. Note: 12 0-13 5' Drilled with center bit. No samples taken.	
8				
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10				
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12				
13				

BH17B9B

WELL NO 16-89/BH17-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			**13 5-14 5' SAMPLE** Recovered 1 0/1 0' = 100%. CLAYSTONE· medium gray (N 5/0), medium plasticity, blocky; weakly cemented, medium hard, slightly oxide stained; weathered, damp.	**13 5-19 5' SAMPLE** BH17891319 BH17891319D
14			**14 5-16 5' SAMPLE** Recovered 2.0/2 0' = 100%. CLAYSTONE· medium gray (N 5/0), varying from gray (N 7/0) to dark yellowish orange (10 YR 6/6), severely oxide stained, weakly cemented; medium hard; medium plasticity, weathered.	
15			**16 5-18 5' SAMPLE** Recovered 2.0/2 0' = 100% CLAYSTONE same as above.	
16			**18 5-20 5' SAMPLE** Recovered 2.0/2.0' = 100% CLAYSTONE: same as above, some fine-grained sand; slightly to moderately oxide stained, weathered	**19 5-25 5' SAMPLE** BH17891925 BH17890328FB
17			**20.5-22.5' SAMPLE** Recovered 2.0/2.0' = 100%. CLAYSTONE same as above, trace to some very fine-grained sand; moderately to slightly oxide stained, weakly cemented, hard, medium to low plasticity, weathered, damp	
18				
19				
20				
21				

BH1789C

WELL NO 16-89/BH17-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			22.5-24 5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: pale yellowish brown (10 YR 6/2) to brownish gray (5 YR 4/1), streaks and pockets of severly oxide staining; some very fine-grained sand to sandy; low to non-plasticity; weakly cemented, medium hard; weathered; damp.	
22			24.5-25 5' SAMPLE. Recovered 1 0/1.0' = 100%. SANDY CLAYSTONE: same as above	
23			TOTAL DEPTH = 25 5'	
24				
25				
26				
27				
28				
29				

BH17B9D

LOG OF BOREHOLE

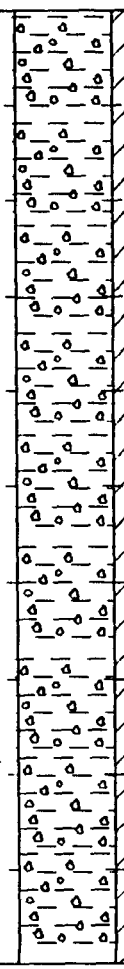
QA BY/DATE J B Berman 19-29-89
LOCATION Rocky Flats Plant, Background
COORDINATES N33,364 04 E18,357 65 (RFP)
TOTAL DEPTH 49 0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 29-31, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY R T Treat
GEOLOGIST

BOREHOLE/WELL NO 17-89 BR/BH18-89
GROUND SURFACE ELEVATION 6024 6'
WATER LEVEL ENCOUNTERED 17 5'
STATIC 6 54' (6/05/89)
DRILLER K Parker HELPER A Boday
DRILLING FLUID None
CHECKED BY Jarrell Berman
SITE MANAGER

CEARP MANAGER

COMMENTS



DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			**TOPSOIL**	
			0.0-1 3' SAMPLE. Recovered 0.8-1 3' = 62% 0.0-0 7' CLAY, GRAVELS AND COBBLES grayish black (N 2/0); trace sand; abundant roots, low plasticity; weakly cemented, medium stiff, very moist 0.7-0 8' CLAY moderate brown (5 YR 4/4), some gravel (0.75-7 5 mm), trace cobbles, some sand, low plasticity; medium stiff, weakly cemented, moist	0 0-0 8' SAMPLE BH18890003
1				
2			**COLLUVIUM**	
			1.3-3 3' SAMPLE. Recovered 0.0/2.0' = 0%.	
			3 3-4 3' SAMPLE Recovered 0 5/1 0' = 50% CLAY AND GRAVEL· moderate brown (5 YR 4/4) to dark yellowish brown (10 YR 5/4); gravel (0.5 mm to 4 0mm), subangular to angular, few subrounded, some sand, medium to coarse-grained (2.0-0 0 phi), medium to low plasticity; weakly cemented, medium stiff, moist.	3 3-7 3' SAMPLE BH18890307
3				
			4.3-5 3' SAMPLE Recovered 1 0/1 0' = 100% CLAY AND GRAVEL moderate brown (5 YR 4/4), light brown (5 YR 5/6) to dark yellowish orange (10 YR 6/6) and light brown (5 YR 6/4), gravel (0 25 mm to 2.75 mm); some fine to medium-grained sand, weakly cemented; medium stiff; poorly consolidated, moist	
4				
5				

BH1889A

WELL NO 17-89BR/BH18-89 LOG OF BOREHOLE PAGE 2 OF 7

DEPTH FT	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			5 3-7 3' SAMPLE Recovered 0 4/2 0' =20% CLAY AND GRAVEL same as above	
6			7 3-8 5' SAMPLE Recovered 1 2/1 2' = 100% 7 3-7 5' CLAY AND GRAVEL same as above	7 5-13 5' SAMPLE BH18890713
				▼ 6 54'
7			7 5-8 5' CLAYSTONE dark yellowish orange (10 YR 6/6), moderate yellowish brown (10 YR 5/4), pale yellowish brown (10 YR 6/2), moderately cemented, medium hard, homogeneous, severely oxide stained, low to medium plasticity, highly weathered, moist	
			8 5-9 5' SAMPLE Recovered 1 0/1 0' = 100% CLAYSTONE same as above	
8			9 5-11 5' SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE pale yellowish brown (10 YR 6/2), dark yellowish orange (10 YR 6/6), and medium light gray (N 6/0), medium plasticity, weakly cemented, homogeneous, blocky, moderately oxide stained, medium hard, weathered, slightly moist	
9			11 5-13 5' SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE same as above, trace sand to sandy below 13 0', low to non-plastic, weakly cemented, weathered, slightly moist	
10				
11				
12				
13				

BH1889B

WELL NO 17-89BR/BH18-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			13 5-15 5' SAMPLE Recovered 2 0/2 0' = 100% SANDSTONE light gray (N 7/0), dark yellowish orange (10 YR 6/6) to pale yellowish brown (10 YR 6/2), medium-grained sand (2 0-1 5 phi) and finer-grained, weakly cemented, some silt, poorly consolidated, moderately oxide stained, non-plastic, medium hard, weathered, damp	13 5-19 5' SAMPLE BH18891319
14			15 5-17 5' SAMPLE Recovered 2 0/2 0' = 100% SANDSTONE same as above	
15			17 5-19 5' SAMPLE Recovered 2 0/2 0' = 100% SANDSTONE same as above, wet	
16			19 5-21 5' SAMPLE Recovered 1 8/2 0' = 90% SANDSTONE pale yellowish brown (10 YR 6/2) to light brown (5 YR 5/6), and dark yellowish orange (10 YR 6/6), very fine to medium-grained sand (3 5-1 5 phi), some clayey lenses, weakly cemented, well sorted, medium hard, severely oxide stained, weathered	
17				17 5'
18				
19				
20				
21				

BH18B9C

WELL NO 17-89BR/BH18-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			21 5-23 5' SAMPLE Recovered 2 0/2 0' = 100% SILTY SANDSTONE pale yellowish brown (10 YR 6/2), light brown (5 YR 5/6) and dark yellowish orange (10 YR 6/6), weakly to moderately cemented, medium hard, well sorted, fine-grained sand (2 5-2 0 phi), weathered, moist 23 5-25 5' SAMPLE Recovered 2 0/2 0' = 100% SANDSTONE yellowish gray (5 Y 7/2) to grayish orange (10 YR 7/4), some silt, fine-grained sand (2 5-2 0 phi) and finer; weakly cemented, well sorted, medium hard, weathered, moist to slightly moist, 25 5-27 5' SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE same as above, damp Note 27 5-28 0' drilled with center bit No samples taken 28 0-29 0' SAMPLE Recovered 1 0/1 0' = 100% SANDSTONE grayish orange (10 YR 7/4), streaks of light brown (5 YR 5/6); fine to medium-grained sand (3 0 to 1 0 phi), well sorted, weakly cemented, hard; poorly consolidated, highly weathered, very moist	
22				
23				
24				
25				
26				
27				
28				
29				

WELL NO 17-89BR/BH18-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29 30 31 32 33 34 35 36 37			29 0-30 0' SAMPLE Recovered 1 0/1 0' = 100% SANDSTONE same as above, claystone lense at 29 7 29 9', medium dark gray (N 4/0), dark yellowish orange (10 YR 6/6) and oxide stained, medium plasticity, moderately cemented, hard; highly weathered, slightly moist to moist 30 0-31 0' SAMPLE Recovered 1 0/1 0' = 100%. SANDSTONE same as above, very moist to wet 31 0-32 0' SAMPLE Recovered 1 0/1 0' = 100% SANDSTONE dark yellowish orange (10 YR 6/6), light brown (5 YR 5/6), moderate yellowish brown (10 YR 5/4), very fine to medium-grained (3 5 1 5 phi), well sorted; weakly to non-cemented, non-plastic, hard; highly weathered, very moist 32 0-33 0' SAMPLE Recovered 0 7/1 0' = 70% SANDSTONE light gray (N 7/0) to dark yellowish orange (10 YR 6/6); moderate oxide stained, very fine-grained (3 5-3 0 phi), well sorted, trace claystone, weakly cemented, hard, highly weathered, moist. 33 0-34 0' SAMPLE Recovered 1 0/1 0' = 100%. SANDSTONE same as above 34 0-35 0' SAMPLE Recovered 1 0/1 0' = 100%. SANDSTONE dark yellowish orange (10 YR 6/6) streaks of very light gray (N 6/0) and light grays (N 7/0), fine to medium-grained (2 5 1 5 phi), weakly cemented, well sorted, hard to moderately hard, highly weathered, very moist 35 0-36 0' SAMPLE. Recovered 0 8/1 0' = 80%. SANDSTONE same as above 36 0-37 0' SAMPLE Recovered 1 0/1 0' = 100% SANDSTONE light brown (5 YR 5/6) to dark yellowish orange (10 YR 6/6), streaks of light gray (N 7/0) to very light gray (N 8/0), fine to medium-grained (3 0-1 5 phi), well to poorly sorted, weakly to non-cemented, hard, highly weathered, moist	

BH18BRE

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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			37 0-38 0' SAMPLE Recovered 1 0/1 0' = 100% SANDSTONE color same as above some streaks of medium light gray (N 6/0), well sorted, weakly cemented, trace siltstone; hard, highly weathered, moist	
38			38 0-39 0' SAMPLE Recovered 1 0/1 0' = 100%. SANDSTONE dark reddish brown (10 R 3/4), medium-grained (2 0-1 0 phi) -- rounded, very coarse-grained (0 5 - 1 0 phi) -- rounded and subrounded, weakly cemented to non-cemented, poorly sorted, highly weathered; wet	
39			39 0-40 0' SAMPLE Recovered 1 01 0' = 100% SANDSTONE moderate yellowish brown (10 YR 5/4), streaks of dark yellowish brown (10 YR 6/6) and light brown (5 YR 5/6), very fine to medium-grained (3 5-1 0 phi), non-cemented, well sorted, highly weathered, very moist	
40			40 0-41 0' SAMPLE Recovered 1 0/1 0' = 100% SANDSTONE same as above; saturated.	
41			41 0-42 0' SAMPLE Recovered 0 9/1 0' = 90%. SANDSTONE. moderate brown (5 YR 4/4) to light brown (5 YR 5/6), some streaks of dark yellowish orange (10 YR 6/6), medium to coarse-grained (2 0-0 5 phi), rounded and subrounded, weakly to non-cemented, well to poorly sorted, hard, weathered, medium dark gray (N 4/0) at bottom of run, wet	
42			43 0-44 0' SAMPLE Recovered 0 4/1 0' = 40% SANDSTONE moderate reddish brown (10 R 4/6), moderate yellowish brown (10 YR 5/4), streaks of pale yellowish brown (10 YR 6/4) and light gray (N 1/0), small rounded gravel (0 25 mm), very fine to coarse-grained (3 5-0 0 phi), moderate to weakly cemented; conglomeratic; non-plastic; hard to very hard, moist	
43			44 0-45 0' SAMPLE Recovered 0 2-1 0' = 20% CLAYSTONE brownish black (5 YR 2/1), medium plasticity, moderately cemented; moderately consolidated, hard, slightly moist to damp	
44				
45				

WELL NO 17-89BR/BH18-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			Note: 45 0-46 5' drilled with center bit No samples taken	
46			46 5-47 5' SAMPLE Recovered 1 0/1 0' = 100%. SANDY SILTSTONE medium dark gray (N 4/0), very fine-grained (4 0-3 5 phi), massive; homogeneous, well cemented, hard, unweathered, damp.	
47			47 5-49 0 SAMPLE Recovered 1 5/1 5' = 100% SILTSTONE AND SANDSTONE medium dark gray (N 4/0), streaks of medium light gray (N 6/0), homogeneous, massive, hard; well consolidated; unweathered, damp.	
48			TOTAL DEPTH = 49 0'	
49				
50				
51				
52				
53				

BH1889G

LOG OF BOREHOLE

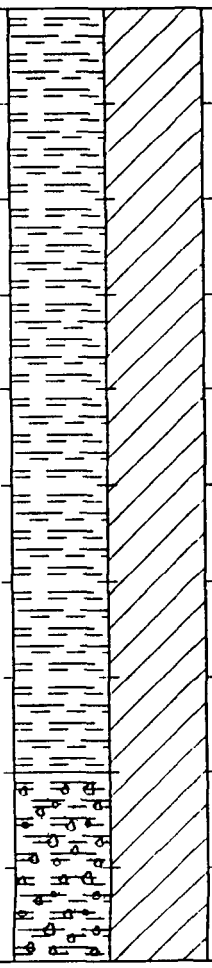
QA BY/DATE Frank Monowi 6 21 89
LOCATION Rocky Flats Plant, Background
COORDINATES N40,124.54 E16,414.83 (RFP)
TOTAL DEPTH 22 0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 28, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K W Van Allen
GEOLOGIST

BOREHOLE/WELL NO 18-89
GROUND SURFACE ELEVATION 5978.3'
WATER LEVEL ENCOUNTERED 4 0'
STATIC 1 24' (4/25/89)
DRILLER R Sharp HELPER P Mesa
DRILLING FLUID None
CHECKED BY Jack Bergman
SITE MANAGER

CEARP MANAGER

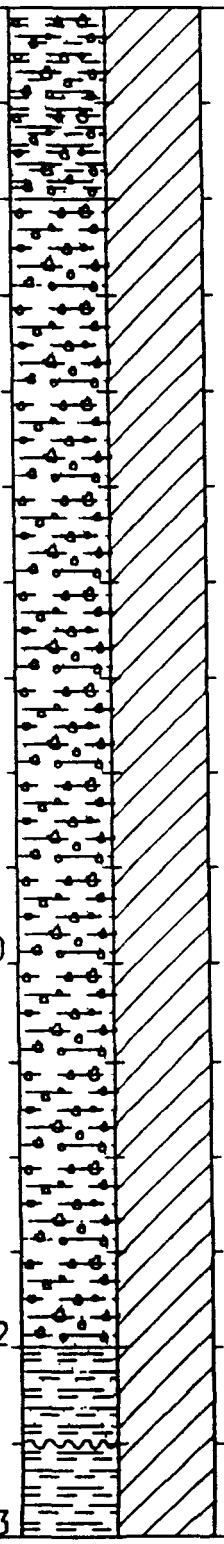
COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAY brownish black (5 YR 2/1), trace (5%) coarse to fine-grained sand, organics, roots to 0 4', massive, unconsolidated, no HCl reaction, moist **VALLEY FILL ALLUVIUM** 2 0-4 0' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAY grayish black (N 2/0), some (20%) coarse to fine quartzose sand, poorly sorted, organics, roots, unconsolidated, massive, no HCl reaction, moist 4 0-6 0' SAMPLE Recovered 1 0/2 0' = 50% SILTY TO CLAYEY SAND AND GRAVEL olive gray (5 Y 4/1) to dusky yellowish brown (10 YR 2/2), (40%) coarse to fine-grained quartzose sand, (35%) coarse to fine quartzose gravel, (25%) silt/clay, poorly sorted, subangular to subrounded, unconsolidated, massive, no HCL reaction, wet	1 24' 4 0'

1889A

WELL NO 18-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			6 0-8 0' SAMPLE Recovered 1 5/2 0' = 75% SILTY SAND AND GRAVEL olive gray (5 Y 4/1), (40%) coarse to fine-grained quartzose sand, (35%) coarse to fine quartzose gravel, (25%) silt, poorly sorted, subangular to subrounded, organics, unconsolidated, massive, no HCl reaction, wet 8 0-10 0' SAMPLE Recovered 1 4/2 0' = 75% SILTY SAND AND GRAVEL same as above 10 0-12 0' SAMPLE Recovered 0 6/2 0' = 30% SILTY SAND AND GRAVEL same as above, grading to moderate brown (5 YR 4/4) at 10 5' Note Soil change noted below 11 0' by driller 12 0-14 0' SAMPLE Recovered 1 3/2 0' = 65% 12 0-12 5' SILTY TO CLAYEY SAND moderate brown (5 YR 4/4), (50%) coarse to fine-grained sand, some (20%) coarse to fine gravel, (30%) silty/clay, poorly sorted, unconsolidated, massive, no HCl reaction, wet 12 5-13 3' SILTY CLAYSTONE light olive gray (5 Y 6/1) to olive gray (5 Y 4/1) with some moderate brown (5 YR 4/4), trace fine-grained sand, slightly mottled, consolidated, massive, no HCl reaction, moist	
6				
7				
8				
9				
10				
11				
12				
13				

WELL NO 18-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 0-16 0' SAMPLE Recovered 2 2/2 0' = 110% SILTY CLAYSTONE· light olive gray (5 Y 5/2), trace fine-grained sand; very slightly mottled; unconsolidated, massive; no HCl reaction, moist	
14			16 0-17 0' SAMPLE Recovered 2 0/1 0' = 200% SILTY CLAYSTONE same as above.	
			17 0-18 0' SAMPLE Recovered 2 2/1 0' = 220% SILTY CLAYSTONE. same as above	
15			18 0-19 0' SAMPLE Recovered 0 0/1 0' = 0%	
			Note Unable to retain sample, perhaps pushed cobble after removal and reinstallation of augers.	
16			19 0-20 5' SAMPLE Recovered 2 0/1 5' = 133%. SILTY CLAYSTONE moderate brown (5 YR 4/4) and dark yellowish brown (10 YR 4/2), mottled; trace fine-grained sand, unconsolidated; massive; moist	
			20 5-22 0' SAMPLE Recovered 2 0/1 5' = 133% SILTY CLAYSTONE dark gray (N 3/0) and moderate brown (5 YR 4/4), trace fine-grained sand, mottled, unconsolidated; massive, no HCl reaction; moist	
17				
18				
19				
20				
21				

1889C

WELL NO 18-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21				
			TOTAL DEPTH = 22 0'	
22				
23				
24				
25				
26				
27				
28				
29				

18890

LOG OF BOREHOLE

QA BY/DATE Rick Munroe 6-21-87
LOCATION Rocky Flats Plant, Background
COORDINATES N40,864.32 E17,161.65 (RFP)
TOTAL DEPTH 16 4'

DRILLING COMPANY Boyles Brothers
DATE DRILLED April 4, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K W Van Allen
GEOLOGIST

BOREHOLE/WELL NO 19 89
GROUND SURFACE ELEVATION 5939 5'
WATER LEVEL ENCOUNTERED 4 7'
STATIC 4 27' (4/25/89)
DRILLER R Sharp HELPER P Mesa
DRILLING FLUID None
CHECKED BY Jarrell Bergman
SITE MANAGER

CEARP MANAGER

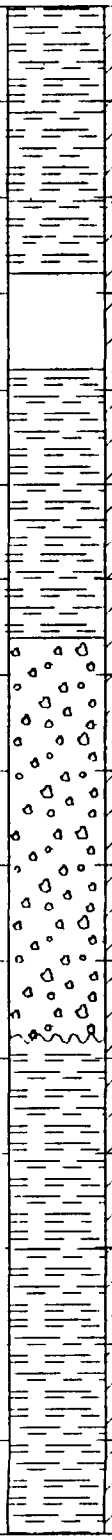
COMMENTS Offset approximately 150 feet east of original borehole location (19-89A)

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			**TOPSOIL**	
			0 0-2 2' SAMPLE Recovered 0 3/2 2' = 14% SANDY SILTY CLAY black (N 1/0), (75%) silt/clay, (25%) coarse to fine-grained quartzose sand, organics, roots, low plasticity, unconsolidated, massive, wet	
1			**VALLEY FILL ALLUVIUM**	
			2 2-4 4' SAMPLE Recovered 1 0/2 2' = 45% SILTY CLAY AND SAND black (N 1/0), (65%) silt/clay, (35%) coarse to fine-grained quartzose sand, organics, roots, low plasticity, unconsolidated, massive, wet	
2			4 4-6 4' SAMPLE Recovered 1 8/2 0' = 90% 4 4-4 6' SILTY CLAY AND SAND same as above 4 6-6 2' SILTY TO CLAYEY SAND dark gray (N 3/0), (65%) coarse to fine-grained quartzose sand, (25%) silt/clay, trace (10%) coarse to fine quartzose gravel, poorly sorted, subangular to subrounded, unconsolidated, wet	
3				
4				▼ 4 27' ▽ 4 7'
5				

1989A

WELL NO 19-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			6 4-8 4' SAMPLE Recovered 1 8/2 0' = 90% 6 4-6 9' SAND medium gray (N 5/0), (90%) coarse to fine-grained quartzose sand, trace (10%) silt, poorly sorted, subangular to subrounded, unconsolidated, wet 6 9-8 2' SILTY CLAY dark gray (N 3/0), some (20%) coarse to fine-grained quartzose sand, unconsolidated, massive, medium plasticity, wet 8 4-10 4' SAMPLE Recovered 1 0/2 0' = 50% SAND AND GRAVEL medium gray (N 5/0), (50%) coarse to fine-grained quartzose sand, (40%) coarse to fine quartzose gravel, trace (10%) silt, poorly sorted, subangular to subrounded, unconsolidated, wet 10 4-12 4' SAMPLE Recovered 2 2/2 0' = 110% SILTY CLAYSTONE medium dark gray (N 4/0) to dark gray (N 3/0), trace fine-grained sand, consolidated, massive, no HCl reaction, wet 12 4-14 4' SAMPLE Recovered 2 2/2 0' = 110% SILTY CLAYSTONE same as above	

1989B

WELL NO 19-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 4-16 4' SAMPLE Recovered 2 2/2 0' = 110% SILTY CLAYSTONE same as above, carbonaceous, moist	
14			TOTAL DEPTH = 16 4'	
15				
16				
17				
18				
19				
20				
21				

1989C

LOG OF BOREHOLE

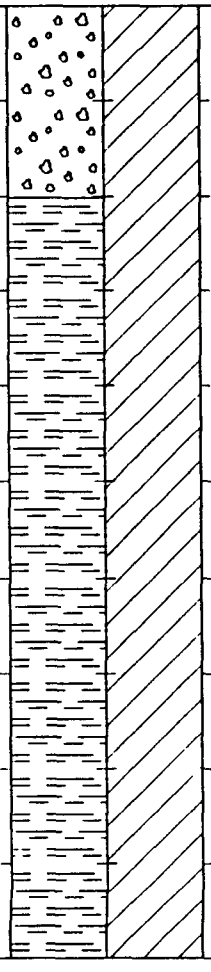
QA BY/DATE Rick Minnow 10-21-89
LOCATION Rocky Flats Plant, Background
COORDINATES N44,414.51 E20,812.14 (RFP)
TOTAL DEPTH 19.4'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 28, 1989, March 31, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY J.E. Marks, K.W. Van Allen
GEOLOGIST

BOREHOLE/WELL NO 20-89
GROUND SURFACE ELEVATION 5770.9'
WATER LEVEL ENCOUNTERED 7.0'
STATIC 7.02'(4/24/89)
DRILLER M. Baker, R. Sharp HELPER K. Martin, P. Mesa
DRILLING FLUID None
CHECKED BY Jarell Burman
SITE MANAGER

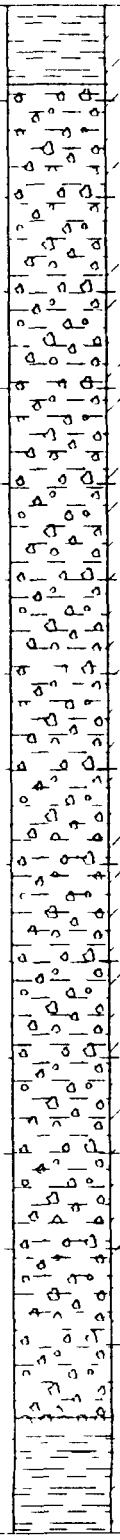
CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			TOPSOIL Note 0.0-1.0' Gravel drilled with center bit No samples taken 1.0-2.0' SAMPLE Recovered 0.5/1.0' = 50% SILTY CLAY dusky yellowish brown (10 YR 2/2), (20%) gravel up to 2 cm, rounded, quartzite, abundant vegetation--roots, organic-rich, unconsolidated, soft, slightly moist to moist Note 2.0-3.0' Drilled with center bit No samples taken VALLEY FILL ALLUVIUM 3.0-5.0' SAMPLE Recovered 0.5/2.0' = 25% SILTY CLAY dark yellowish brown (10 YR 4/2), (10%) unsorted sand, subangular, trace gravel up to 4 cm, rounded to subangular, trace vegetation--roots, organic-rich, consolidated, moderately hard, almost dry	

2089A

WELL NO 20-89 LOG OF BOREHOLE PAGE 2 OF 3

DEPTH FT	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			5 0-6 0' SAMPLE Recovered 1 0/1 0' = 100% 5 0-5 4' SILTY CLAY same as above 5 4-6 0' GRAVELLY SANDY CLAY dark yellowish brown (10 YR 4/2), unsorted sand, coarse to fine-grained, subrounded, gravel up to 3 cm, unsorted, subrounded to angular, quartzite and granite, no plasticity, consolidated yet friable, moderately hard, almost dry 6 0-8 0' SAMPLE Recovered 1 0/2 0' = 50% 6 0-6 8' GRAVELLY SANDY CLAY dark yellowish brown (10 YR 4/2), some fine gravel, rounded, no plasticity, semi-consolidated to consolidated, friable, dry 6 8-7 0' GRAVELLY SANDY CLAY same as above, gravel up to 4 cm, subrounded to angular, granite--light red (5 R 6/6) to moderate reddish orange (10 R 6/6), weathered, wet at bottom of shoe 8 0-10 0' SAMPLE Recovered 0 0/2 0' = 0% Note Wet sand on outside of shoe 10 0-12 0' SAMPLE Recovered 0 2/2 0' = 10% Very gravelly with cobbles, no recovery except in retainer 12 0-12 9' SAMPLE Recovered 0 7/0 9' = 78% Note 12 0-12 4' Pushed cobble in front of augers 12 4-12 7' SILTY CLAYSTONE olive black (5 Y 2/1), trace fine-grained sand, semi-consolidated, massive, low plasticity, no HCl reaction, moist to wet 12 9-14 4' SAMPLE Recovered 1 4/1 5' = 93% SILTY CLAYSTONE olive black (5 Y 2/1) and light olive gray (5 Y 6/1), carbonaceous, trace fine-grained sand, consolidated, massive, no HCl reaction, moist	7 0 ▼ 7 02'

2089B

WELL NO 20-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 4-16 4' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAYSTONE olive gray (5 Y 4/1) to medium gray (N 5/0), no carbonaceous features, trace fine-grained sand, consolidated, massive; no HCl reaction, moist.	
14			16 4-18 4' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAYSTONE same as above, dark gray (N 3/0)	
15			18 4-19 4' SAMPLE Recovered 1 2/1 0' = 120% SILTY CLAYSTONE same as above	
			TOTAL DEPTH = 19 4'	
16				
17				
18				
19				
20				
21				

2089C

LOG OF BOREHOLE

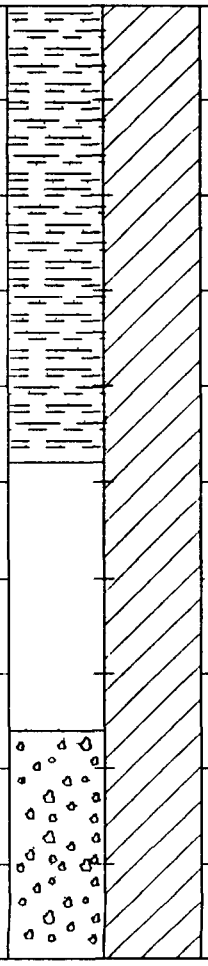
QA BY/DATE Rick V Morrow / 6/21/89
LOCATION Rocky Flats Plant, Background
COORDINATES N45,126 22 E22,633 57 (RFP)
TOTAL DEPTH 16 8'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 31, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K W Van Allen
GEOLOGIST

BOREHOLE/WELL NO 21-89
GROUND SURFACE ELEVATION 5723 6'
WATER LEVEL ENCOUNTERED 2 0'
STATIC 3 56' (4/26/89)
DRILLER R Sharp HELPER P Mesa
DRILLING FLUID None
CHECKED BY Janell Burrian
SITE MANAGER

CEARP MANAGER

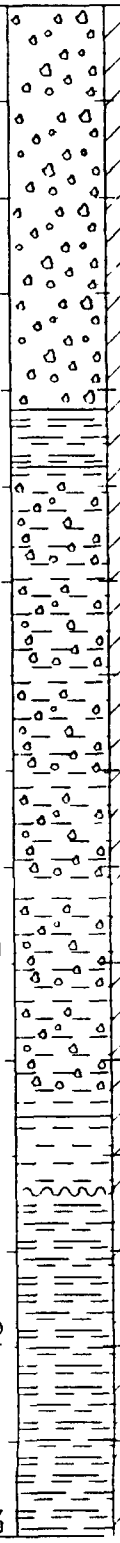
COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 4' SAMPLE Recovered 2 2/2 4' = 92% 0 0-1 3' SANDY SILTY CLAY dusky brown (5 YR 2/2), (75%) silt/clay, (25%) coarse to fine-grained quartzose sand, poorly sorted, some organics, unconsolidated, massive, moist **VALLEY FILL ALLUVIUM** 1 3-2 2' SILTY TO CLAYEY SAND dark yellowish brown (10 YR 4/2), (75%) coarse to fine-grained quartzose sand, (25%) silt/clay, fairly sorted, subangular to subrounded, unconsolidated, massive, moist 2 4-4 8' SAMPLE Recovered 0 4/2 4' = 17% SAND dark yellowish brown (10 YR 4/2), (90%) coarse to fine-grained quartzose sand, trace (10%) silt, fairly sorted, subangular to subrounded, unconsolidated, wet 4 8-6 8' SAMPLE Recovered 0 8/2 0' = 40% SAND AND GRAVEL dark yellowish brown (10 YR 4/2), (55%) coarse to fine-grained quartzose sand, (35%) coarse to fine quartzose gravel, trace (10%) silt, poorly sorted, subangular to subrounded, stratified, unconsolidated, wet	▽ 2 0' ▼ 3 56'

2189A

WELL NO 21-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			6 8-8 8' SAMPLE Recovered 0 6/2 0' = 30% 6 8-7 1' SAND AND GRAVEL same as above, wet 7 1-7 4' SILTY CLAY medium gray (N 5/0) and moderate brown (5 YR 4/4), some (20%) medium to fine-grained sand, unconsolidated, massive, mottled, medium plasticity, wet, interbedded gravels below 7 4' 8 8-10 8' SAMPLE Recovered 0 0/2 0' = 0% Note Pushed cobble, no recovery Driller noted gravelly layers interbedded with clays 10 8-12 8' SAMPLE Recovered 0 7/2 0' = 35% 10 8-11 2' SANDY CLAY olive gray (5 Y 4/1), (75%) silt/clay, (25%) coarse to fine-grained quartzose sand, poorly sorted, subangular to subrounded, unconsolidated, massive, wet 11 2-11 5' SILTY CLAYSTONE olive gray (5 Y 4/1), trace fine-grained sand, slightly mottled, consolidated, massive, moist 12 8-14 8' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAYSTONE olive gray (5 Y 4/1) and dark gray (N 3/0), trace fine-grained sand, plant fossils, carbonaceous, consolidated, massive, moist	

2189B

WELL NO 21-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			**14 8-16 8' SAMPLE** Recovered 0 0/2 0' = 0% SILTY CLAYSTONE Sample slipped out of sampler, unable to recover sample material	
14			**TOTAL DEPTH = 16 8'**	
15				
16				
17				
18				
19				
20				
21				

2189C

LOG OF BOREHOLE

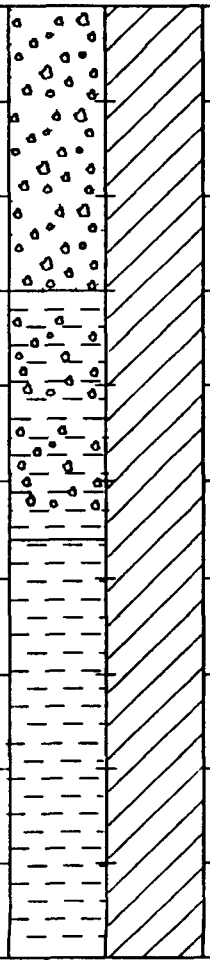
QA BY/DATE J B Burman 10-2-89
LOCATION Rocky Flats Plant, Background
COORDINATES N34,264 35 E15,145 64 (RFP)
TOTAL DEPTH 8.0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 8, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY R.R. Crifasi
GEOLOGIST

BOREHOLE/WELL NO 22-89
GROUND SURFACE ELEVATION 6045 4'
WATER LEVEL ENCOUNTERED 1 5'
STATIC 2 15' (4/26/89)
DRILLER K Parker HELPER T Rodriguez
DRILLING FLUID None
CHECKED BY J.B. Burman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**VALLEY FILL ALLUVIUM** **0.0-1.5' SAMPLE** Recovered 1.5/1.5' = 100%. SANDY GRAVEL. dusky yellowish brown (10 YR 2/2), gradational to dusky brown (5 YR 2/2), gravel (65%), sand (20%), silt and clay (15%), unconsolidated, medium plastic; roots; wet at 1.5' **1 5-3 0' SAMPLE** Recovered 0 8/1 5' = 53%. 1.5-2 8' CLAYEY GRAVEL: same as above; dark yellowish brown (10 YR 2/2) **ARAPAHOE/LARAMIE FORMATION** 2.8-3 0'. CLAYSTONE. grayish orange (10 YR 7/4), clay; very slightly silty; highly plastic; occasional roots, moist; effervescent with HCl (contact also based on drilling behavior, obvious change at 2 8') **3.0-5 0' SAMPLE** Recovered 2 2/2 0' = 110%. CLAYSTONE: grayish orange (10 YR 7/4); clay; very slightly silty; highly plastic; occasional roots; slight effervescence with HCl, moist.	▽ 1 5' ▼ 2 15'

2289BRA

WELL NO 22-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			5 0-7 0' SAMPLE Recovered 2 2/2.0' = 110% CLAYSTONE. same as above, light gray (N 7/0) with light olive brown (5 Y 5/6) stain	
6			7 0-8 0' SAMPLE Recovered 1.2/1 0' = 120%. Claystone: light gray (N 7/0), light olive brown (5 Y 5/6) staining increasing in bottom 0 5', very slightly silty; highly plastic; no effervescence with HCl, slightly moist.	
7			TOTAL DEPTH = 8 0'	
8				
9				
10				
11				
12				
13				

22[illegible]

LOG OF BOREHOLE

QA BY/DATE James Suyman 17-26-89
LOCATION Rocky Flats Plant, Background
COORDINATES N31,715 79 E23,104 08 (RFP)
TOTAL DEPTH 17 5'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 17, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K W Van Allen
GEOLOGIST

BOREHOLE/WELL NO 23-89
GROUND SURFACE ELEVATION 5832 3'
WATER LEVEL ENCOUNTERED 6 0'
STATIC 5 04' (4/26/89)
DRILLER R Sharp HELPER T Rodiguez
DRILLING FLUID None
CHECKED BY James Suyman
SITE MANAGER

CEARP MANAGER

COMMENTS Boring originally identified as 37-89 BRA3 Unable to drill past 17 5', abandoned and set alluvial well (23-89) on March 21, 1989

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 2 0/2 0' = 100% 0 0-1 5' SILTY CLAY dusky yellowish brown (10 YR 2/2), some (20%) coarse to fine quartzose sand, poorly sorted, subangular to subrounded, organics, roots to 0 5', unconsolidated, no HCl reaction, moist **VALLEY FILL ALLUVIUM** 1 5-2 0' SILTY CLAY same as above, no organics, moist 2 0-4 0' SAMPLE Recovered 1 5/2 0' = 75% SILTY CLAY same as above, some (20%) coarse to fine quartzose gravel, poorly sorted, subangular to subrounded, unconsolidated, moist 4 0-6 0' SAMPLE Recovered 1 9/2 0' = 95% SILTY CLAY same as above, dark yellowish brown (10 YR 4/2) and moderate brown (5 YR 4/4)	

2389A

WELL NO 23-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5				5.04'
6			6.0-8.0' SAMPLE Recovered 2.0/2.0' = 100% SILTY TO CLAYEY SAND dark yellowish brown (10 YR 4/2) to olive gray (5 Y 4/1), (50%) medium to fine-grained sand, (40%) silt/clay, (10%) coarse-grained sand, well sorted, unconsolidated, massive, moist to wet	6.0'
7			8.0-10.0' SAMPLE Recovered 2.2/2.0' = 110% SILTY CLAYSTONE moderate brown (5 YR 4/4) and light olive gray (5 Y 6/1), heavily mottled, trace fine-grained sand, consolidated, striated, calcareous, moist 10.0-12.0' SAMPLE Recovered 2.2/2.0' = 110% SILTY CLAYSTONE same as above	
8			12.0-14.0' SAMPLE Recovered 2.2/2.0' = 110% SILTY CLAYSTONE same as above	
9				
10				
11				
12				
13				

2389B

WELL NO 23-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 0-15 5' SAMPLE Recovered 2 0/1 5' = 133% SILTY CLAYSTONE same as above, higher silt content	
14			15 5-17 5' SAMPLE Recovered 2 4/2.0' = 120%. SILTY CLAYSTONE same as above, iron concretions, no HCl reaction	
15			TOTAL DEPTH = 17 5'	
16				
17				
18				
19				
20				
21				

2389C

LOG OF BOREHOLE

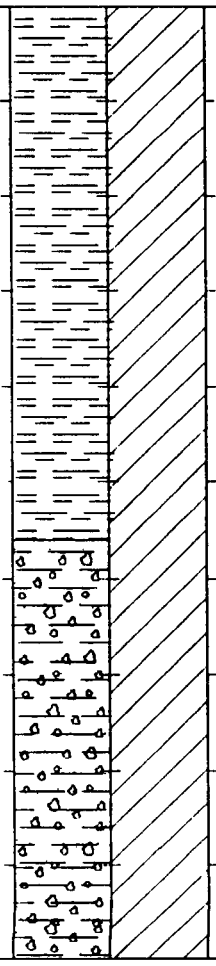
QA BY/DATE Rick Morrow 11 89
LOCATION Rocky Flats Plant, Background
COORDINATES N32,824 94 E26,406 34 (RFP)
TOTAL DEPTH 16 5'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 16, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K W Van Allen
GEOLOGIST

BOREHOLE/WELL NO 24-89
GROUND SURFACE ELEVATION 5730 8'
WATER LEVEL ENCOUNTERED 6 9'
STATIC 3 50' (4/27/89)
DRILLER R Sharp HELPER T Rodriquez
DRILLING FLUID None
CHECKED BY Janell Burgoran
SITE MANAGER

CEARP MANAGER

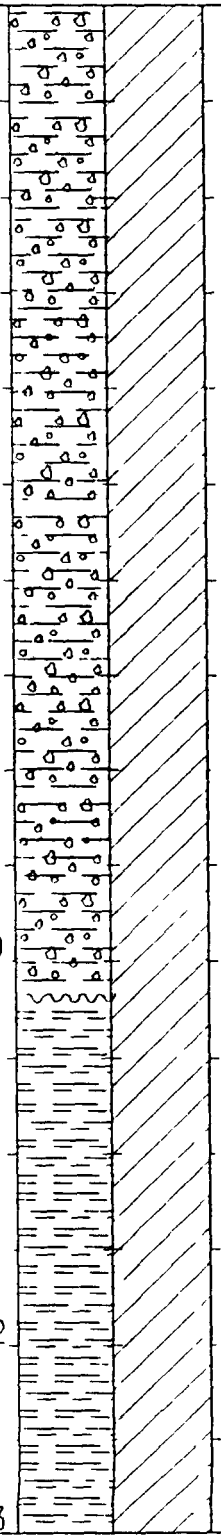
COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 1' SAMPLE Recovered 1 5/2 1' = 71% SILTY CLAY dusky yellowish brown (10 YR 2/2), some (20%) coarse to fine quartzose sand, some (20%) coarse to fine quartzose gravel, poorly sorted, subangular to subrounded, roots in upper 0 3', no HCl reaction, unconsolidated, moist **VALLEY FILL ALLUVIUM** 2 1-4 2' SAMPLE Recovered 2 0/2 0' = 100% 2 1-2 8' SILTY CLAY same as above, no organics, moist 2 8-4 2' SILTY SAND AND GRAVEL dark yellowish brown (10 YR 4/2), (40%) coarse to fine quartzose sand, (35%) coarse to fine quartzose gravel, (25%) silt, poorly sorted, subangular to subrounded, unconsolidated, no HCl reaction, moist 4 2-6 2' SAMPLE Recovered 2 0/2 0' = 100% SILTY SAND AND GRAVEL same as above, also trace (5%) clay, moist	▼ 3 50'

2489A

WELL NO 24-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			6 2-8 2' SAMPLE Recovered 1 3/2 0' = 65% SILTY SAND AND GRAVEL same as above, moderate brown (5 YR 4/4), wet below 6 9' 8 2-10 2' SAMPLE Recovered 0 6/2 0' = 30% SILTY SAND AND GRAVEL same as above, wet soil change at approximately 10 2' according to driller 10 2-12 2' SAMPLE Recovered 0 0/2 0' = 0% Note Pushed cobble ahead of augers Driller noted material to be claystones Residual claystone material along outside portion of sampler 12 2-14 2' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAYSTONE olive gray (5 Y 4/1) and moderate brown (5 YR 4/4), mottled, trace fine sand, massive, consolidated, no HCl reaction, moist	▽ 6 9'

2489BRB

WELL NO 24-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 2-16 2' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAYSTONE same as above, moist	
14				
15				
16			TOTAL DEPTH = 16 5'	
17				
18				
19				
20				
21				

24-89BRC

LOG OF BOREHOLE

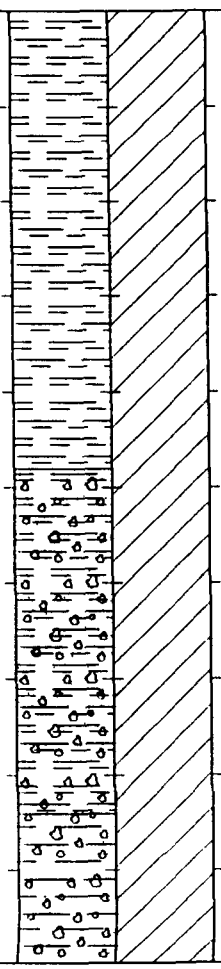
QA BY/DATE Farrell Bryman / 7-26-99
LOCATION Rocky Flats Plant, Background
COORDINATES N32,347 94 E28,146 31 (RFP)
TOTAL DEPTH 12.4'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 22, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K W Van Allen
GEOLOGIST

BOREHOLE/WELL NO 25-89
GROUND SURFACE ELEVATION 5686 2'
WATER LEVEL ENCOUNTERED 6 5'
STATIC 2 25' (4/27/89)
DRILLER R Sharp HELPER P Mesa
DRILLING FLUID None
CHECKED BY Farrell Bryman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 2' SAMPLE Recovered 2 2/2 2' = 100% 0 0-2 0' SILTY CLAY dusky brown (5 YR 2/2), trace (10%) coarse to fine-grained sand, organics, roots to 2 0', medium plasticity; unconsolidated, no HCl reaction, moist **VALLEY FILL ALLUVIUM** 2 0-2 2' SILTY CLAY same as above, grayish brown (5 YR 3/2), no organics 2 2-4 2' SAMPLE Recovered 2 0/2 0' = 100% 2 2-2 4' SILTY CLAY same as above 2 4-4 2' SILTY TO CLAYEY SAND AND GRAVEL dark yellowish brown (10 YR 4/2), (40%) coarse to fine quartzose sand, (35%) coarse to fine quartzose gravel, (25%) silt/clay, poorly sorted, subangular to subrounded, unconsolidated, massive, no HCl reaction, moist 4 2-6 4' SAMPLE Recovered 1 6/2 2' = 73% SILTY SAND AND GRAVEL· same as above, moderate brown (5 YR 4/4), (40%) coarse to fine quartzose sand, (35%) coarse to fine quartzose gravel, (25%) silt, damp	▼ 2 25'

2589A

WELL NO 25-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			6 4-8 4' SAMPLE Recovered 1 5/2 0' = 75% 6 4-7 4' SILTY SAND AND GRAVEL same as above; moderate yellowish brown (10 YR 5/4), wet	
6			7 4-7 9' SILTY CLAYSTONE moderate yellowish brown (10 YR 5/4) and light olive gray (5 Y 6/1), trace fine-grained sand, mottled, massive, weathered, no HCl reaction; moist	▽ 6 5'
7			8 4-10 4' SAMPLE Recovered 0 0/2 0' = 0% SILTY CLAYSTONE no sample recovered; pushed cobble ahead of augers	
			10 4-12 4' SAMPLE Recovered 2 2/2 0' = 110% SILTY CLAYSTONE. same as 7 4-7 9', light olive gray (5 Y 6/1) with moderate brown (5 YR 4/4), some mottling, moist to wet	
8			TOTAL DEPTH = 12 4'	
9				
10				
11				
12				
13				

2589B

LOG OF BOREHOLE

QA BY/DATE [illegible] 6-21-89
LOCATION Rocky Flats Plant, Background
COORDINATES N29,260 92 E30,864 52 (RFP)
TOTAL DEPTH 8.9'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 22, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K.W. Van Allen
GEOLOGIST

BOREHOLE/WELL NO 26-89
GROUND SURFACE ELEVATION 5601 2'
WATER LEVEL ENCOUNTERED None
STATIC None (5/10/89)
DRILLER R Sharp HELPER P Mesa
DRILLING FLUID None
CHECKED BY [illegible]
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			TOPSOIL 0 0-2 3' SAMPLE Recovered 2 3/2 3' = 100% 0 0-1 3' SILTY CLAY dusky yellowish brown (10 YR 2/2), trace (10%) coarse to fine-grained sand, organics, roots to 0 3', unconsolidated, no HCl reaction, moist VALLEY FILL ALLUVIUM 1 3-2 3' SILTY CLAY same as above, brownish black (5 YR 2/1) and light gray (N 7/0), organics 2 3-4 6' SAMPLE Recovered 2 3/2 3' = 100% 2 3-3 7' SILTY CLAY same as above 3 7-4 6' SILTY CLAY dark yellowish brown (10 YR 4/2) and dusky yellowish brown (10 YR 2/2), trace (10%) fine gravel, trace coarse to fine-grained sand, poorly sorted, mottled, medium plasticity, unconsolidated, calcareous, moist 4 6-6 6' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAY moderate brown (5 YR 4/4) and light olive gray (5 Y 6/1), some (20%) medium-grained sand, poorly sorted, medium plasticity, calcareous, unconsolidated, mottled, moist	

2689A

WELL NO 26-89

LOG OF BOREHOLE

DEPTH FT	GRAPH LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			6 6-8 6' SAMPLE Recovered 2 2/2 0' = 110% SILTY CLAYSTONE TO CLAYEY SILTSTONE light gray (N 7/0), light olive gray (5 Y 5/2) and dark yellowish brown (10 YR 4/2), trace fine-grained sand, mottled, consolidated, massive, calcareous, moist Note 8 6-8 9' No sample taken Advanced borehole for proper screen depth TOTAL DEPTH = 8 9'	
6				
7				
8				
9				
10				
11				
12				
13				

LOG OF BOREHOLE

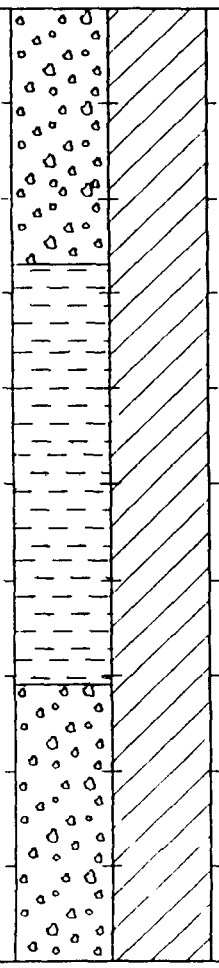
QA BY/DATE Rick Morrow 6-19-89
LOCATION Rocky Flats Plant, Background
COORDINATES N41868 42 E20466 34 (RFP)
TOTAL DEPTH 46 70'

DRILLING COMPANY Boyles Brothers
DATE DRILLED February 20, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K E Miller
GEOLOGIST

BOREHOLE/WELL NO 27-89 BR
GROUND SURFACE ELEVATION 5968 0'
WATER LEVEL ENCOUNTERED 22 30'
STATIC None (5/24/89)
DRILLER K Parker HELPER T Rodriguez
DRILLING FLUID None
CHECKED BY Jarell Burman
SITE MANAGER

CEARP MANAGER

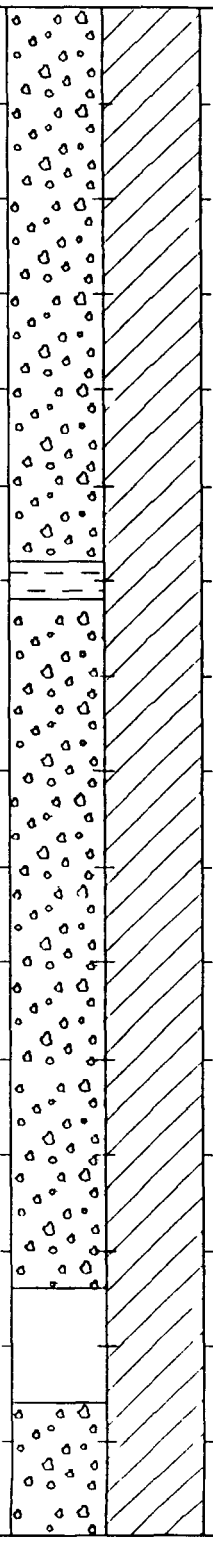
COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			TOPSOIL 0 0-2 3' SAMPLE Recovered 1 35/2 3' = 59% 0 0-0 85' GRAVEL very dusky red (10 R 2/2), quartzite cobbles to 6 cm, angular to sub-angular, roots, unconsolidated, some sand, very slightly damp ROCKY FLATS ALLUVIUM 0 85-1 35' GRAVEL grayish orange pink (10 R 8/2), quartzite cobbles to 6 cm, some granite cobbles, angular, unconsolidated, very slightly damp 2 3-4 3' SAMPLE Recovered 2 0/2 0' = 100% 2 3-3 55' SANDY CLAY moderate reddish brown (10 R 4/6), 30% sand, quartz, 2 0-1 5 phi, angular, poorly sorted, trace gravel, slightly damp 3 55-4 3' GRAVEL grayish orange pink (10 R 8/2), large cobbles to 6 cm, very angular, small lens of organic almost coal like, brownish black (5 YR 2/1), iron stains, moderate yellow (5 Y 7/6), non-plastic, slightly damp	

2789BRA

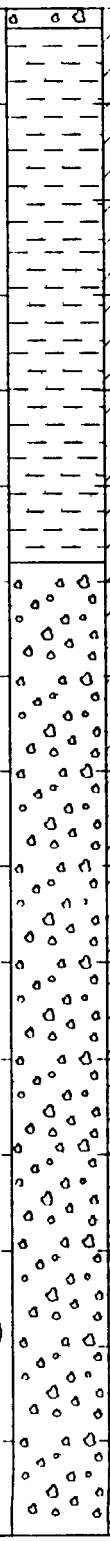
WELL NO 27-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			4 3-6 3' SAMPLE Recovered 2 0/2 0' = 100% GRAVEL grayish orange pink (10 R 8/2), trace sand, angular to sub-angular, large cobbles of K-feldspar and quartzite, to 6 cm, will effervesce, cobbles broken, angular, poorly sorted, unconsolidated, slightly damp 6 3-8 3' SAMPLE Recovered 1 7/2 0' = 85% 6 3-7 9' GRAVEL grayish orange pink (10 R 8/2), trace sand, unconsolidated, poorly sorted, large cobbles of K-feldspar and quartzite, micaceous weathering, 85% gravel, angular to sub-angular, non-calcareous, slightly damp 7 9-8 1' CLAY dusky yellow (5 Y 6/4), plastic, slightly damp 8 3-10 3' SAMPLE Recovered 2 0/2 0' = 100% SAND AND GRAVEL light brown (5 YR 6/4), trace clay, 40% sand, 40% gravel, quartz and K-feldspar up to 5 cm, sub-angular, non-calcareous, very weathered, sand poorly sorted, lens of carboniferous material, non-plastic, slightly damp 10 3-12 3' SAMPLE Recovered 2 0/2 0' = 100% 10 3-11 7' GRAVEL AND SAND same as 8 3-10 3' 11 7-12 3' SAND pale yellowish orange (10 YR 8/6), poorly graded, sub-angular, sub-rounded, 0 5-1 0 phi, slightly damp	

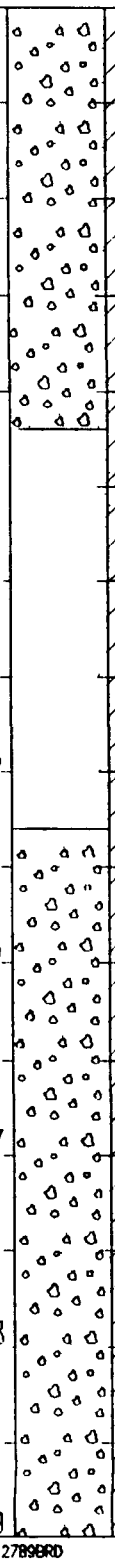
WELL NO 27- 87 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 16 17 18 19 20 21			12 3-14 3' SAMPLE Recovered 2 0/2 0' = 100% 12 3-13 1' GRAVEL moderate brown (5 YR 3/4), some sand, 20%, poorly sorted, sub-angular to sub-rounded, large K-feldspar and quartzite cobbles, angular to sub-angular, slight plasticity, slightly damp 13 1-14 3' SANDY CLAY dark yellowish orange (10 YR 6/6), small lenses of silt, fine to medium grained, very plastic, consolidated, slightly damp 14 3-16 3' SAMPLE Recovered 2 0/2 0' = 100% 14 3-15 9' SANDY CLAY same as 13 1-14 3' 15 9-16 3' GRAVEL AND SAND pale olive (10 Y 6/2), sub-angular to angular, K-feldspar and quartzite, trace sand, poorly sorted, damp 16 3-18 3' SAMPLE Recovered 1 0/2 0' = 50% GRAVEL AND SAND light brown (5 YR 6/4), 45% gravel, 45% sand, trace clay, small lens of hard sandstone nodules, moderate brown (5 YR 3/4), poorly sorted, unconsolidated, damp 18 3-20 3' SAMPLE Recovered 1 4/2 0' = 70% GRAVEL AND SAND same as 16 3-18 3'	

WELL NO 27-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21 22 23 24 25 26 27 28 29			20 3-22 3' SAMPLE Recovered 1 4/2 0' = 70% 20 3-21 1' GRAVEL AND SAND light brown (5 YR 6/4), 45% sand and 45% gravel, trace clay, silt, sand poorly sorted and graded, subangular to subrounded, gravel, K-feldspar and quartzite, angular, non-consolidated, non-calcareous, very moist 21 1-21 7' GRAVEL AND SAND same as above except small lens of light olive (10 Y 5/4), organic material, similar to olivine, not as wet 22 3-24 3' SAMPLE Recovered 1 7/2 0' = 85% 22 3-23 2' GRAVEL AND SAND same as 20 3-22 3 23 2-24 0' SAND light brown (5 YR 6/4), fine to very fine-grained, well sorted, subangular to subrounded, quartz, 1 5-1 0 phi, wet 24 3-26 3' SAMPLE Recovered 2 0/2 '0 = 100% 24 3-25 3' SAND same as 23 2-24 0' 25 3-26 3' GRAVEL AND SAND moderate orange pink (5 YR 8/4), gravel 45%, cobbles of K-feldspar and quartzite to 6 cm, sand 45-50%, poorly sorted, unconsolidated, non-calcareous, trace clay in shoe medium gray (N 5/0), very wet 26 3-28 3' SAMPLE Recovered 1 6/2 0' = 80% GRAVEL AND SAND same as 25 3-26 3', except no clay	▽ 22 3'

27B9BRD

WELL NO 27-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			28 3-30 3' SAMPLE Recovered 1 4/2 0' = 70% GRAVEL AND SAND same as 26 3-28 3'	
30			30 3-32 3 SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE yellowish gray (5 Y 7/2), some iron stains and streaks, pale yellowish orange (10 YR 8/6), very plastic, consolidated, damp	
31			32 2-34 3' SAMPLE Recovered 2 2/2 0' = 110% CLAYSTONE SAME AS 30 3-32 3' except a few more mottles, and iron staining	
32			34 3-36 3' SAMPLE Recovered 2 2/2 0' = 110% CLAYSTONE same as 32 3-34 3' except more iron stains, dark yellowish orange (10 YR 6/6)	
33				
34				
35				
36				
37				

WELL NO 27-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			36 3-38 3' SAMPLE Recovered 1 5/2 0' = 75% CLAYSTONE same as 34 3-36 3', highly weathered 38 3-40 3' SAMPLE Recovered 2 2/2 0' = 110% CLAYSTONE same as 36 3-38 3', except trace sand base intensely weathered at 40 3' 40 3-42 3' SAMPLE Recovered 1 4/2 0' = 70% CLAYSTONE olive gray (5 Y 4/1), consolidated, very plastic, unweathered, dry 42 3-44 3' SAMPLE Recovered 1 5/2 0' = 75% CLAYSTONE same as 40 3-42 3'	
38				
39				
40				
41				
42				
43				
44				
45				

WELL NO 27-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			44 3-46 3' SAMPLE Recovered 1 5/2 0' = 75% CLAYSTONE same as 40 3-42 3'	
46			TOTAL DEPTH = 46 7' WITH PLOPPER AFTER REAMING	
47				
48				
49				
50				
51				
52				
53				

2789BRG

LOG OF BOREHOLE

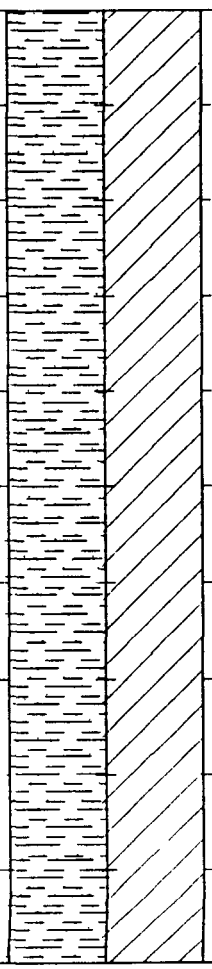
QA BY/DATE [signature] 8-1-87
LOCATION Rocky Flats Plant, Background
COORDINATES N42258 71 E21087 88 (RFP)
TOTAL DEPTH 52 6'

DRILLING COMPANY Boyles Brothers
DATE DRILLED 2/22/89 through 2/23/89
DRILLING METHOD Hollow Stem Auger
LOGGED BY K W Van Allen
GEOLOGIST

BORFHOLE/WFIL NO 28-89 BR
GROUND SURFACE ELEVATION 5959 7'
WATER LEVEL ENCOUNTERED 22 4'
STATIC 38 06' (6/19/89)
DRILLER R Sharp HELPER P Mesa
DRILLING FLUID None
CHECKED BY [signature]
SITE MANAGER

CEARP MANAGER

COMMENTS Original well location approximately 8' north of 28-89 BR

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 1' SAMPLE Recovered 1 3/2 1' = 62% SANDY SILTY CLAY grayish brown (5 YR 3/2), some poorly sorted coarse to fine quartzose sand (30%), coarse to fine quartzose gravel, subangular to subrounded, low plasticity, unconsolidated, massive, no HCl reaction, moist **ROCKY FLATS ALLUVIUM** 2 1-4 1' SAMPLE Recovered 2 0/2 0' = 100% SILTY TO CLAYEY SAND moderate brown (5 YR 4/4, 5 YR 3/4), coarse to fine quartzose sand (50%), silt/clay (35%), some (15%), coarse to fine quartzose gravel, subangular to angular, unconsolidated, massive, no HCl reaction, moist 4 1-6 1' SAMPLE Recovered 1 9/2 0' = 95% SILTY TO CLAYEY SAND pale yellowish brown (10 YR 6/2), poorly sorted coarse to fine quartzose sand (50%), coarse to fine gravel (20%), subangular, unconsolidated, massive, slight to high HCl reaction, caliche at 5 9', dry	

2889BRA

WELL NO 28-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			6 1-8 1' SAMPLE Recovered 1 3/2 0' = 65% SILTY TO CLAYEY SAND pale yellowish brown (10 YR 6/2), poorly sorted coarse to fine quartzose sand (50%), coarse to fine quartzose gravel (20%), subangular, unconsolidated, massive, high HCl reaction, caliche at 6, 1', dry to moist	
6			8 1-10 1' SAMPLE Recovered 0 9/2 0' = 45% SANDY CLAYEY SILT moderate yellowish brown (10 YR 5/4), some (20%) well sorted coarse to fine quartzose sand, trace coarse to fine quartzose gravel, subangular to subrounded, unconsolidated, massive, no HCl reaction, dry	
7			10 1-12 1' SAMPLE Recovered 1 1/2 0' = 55% SILTY TO CLAYEY SAND moderate yellowish brown (10 YR 5/4), poorly sorted coarse to fine quartzose sand (50%), some silt/clay, some coarse to fine quartzose gravel, subangular to subrounded, unconsolidated, massive, no HCl reaction; moist	
8				
9				
10				
11				
12				
13				

2889BRB

WELL NO 28-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 16 17 18 19 20 21			12 1-14 1' SAMPLE Recovered 1 9/2 0' = 95% SILTY TO CLAYEY SAND moderate brown (5 YR 4/4), poorly sorted coarse to fine quartzose sand (60%), some coarse to fine quartzose gravel, subangular to subrounded (20%), some silt/clay, unconsolidated, massive, no HCl reaction, very moist 14 1-16 1' SAMPLE Recovered 1 4/2 0' = 70% SANDY SILTY CLAY moderate yellowish brown (10 YR 5/4), and dark yellowish brown (10 YR 4/2), fairly sorted coarse to fine quartzose sand, trace coarse to fine quartzose gravel 10%, subrounded to subangular, some silt/clay, unconsolidated, massive, mottled, no HCl reaction, moist 16 1-18 1' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAY moderate yellowish brown (10 YR 5/4), dark yellowish brown (10 YR 4/2), and light olive gray (5 Y 6/1), trace poorly sorted to coarse to fine quartzose sand (15%), subangular to subrounded, medium plasticity, massive, mottled, no HCL reaction , moist 18 1-20 1' SAMPLE Recovered 1 8/2.0' = 90% SILTY TO CLAYEY SAND dark yellowish brown (10 YR 4/2), poorly sorted coarse to fine quartzose sand (50%), trace coarse to fine quartzose gravel (15%), subangular to subrounded, unconsolidated, massive, no HCl reaction, moist 20 1-22 1' SAMPLE Recovered 1 0/2 0' = 50% SILTY TO CLAYEY SAND moderate yellowish brown (10 YR 5/4), poorly sorted coarse to fine quartzose sand (50%), trace coarse to fine quartzose gravel (15%), subrounded to subangular, some silt/clay, unconsolidated, massive, no HCl reaction, moist	

WELL NO 28-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21 22 23 24 25 26 27 28 29			**22 1-24 1' SAMPLE** Recovered 1 7/2 0' = 85% SILTY TO CLAYEY SAND moderate yellowish brown (10 YR 5/4), poorly sorted coarse to fine quartzose sand (50%), trace coarse to fine quartzose gravel, subangular to subrounded, some silt/clay, unconsolidated, massive, no HCl reaction, very moist 24 1-24 5' No sample Large boulder **24 5-26 1' SAMPLE** Recovered 0 9/1 6' = 56% SILTY SAND pale yellowish brown (10 YR 6/2), poorly sorted coarse to fine quartzose sand (60%), some coarse to fine quartzose gravel (20%), subangular to subrounded, some silt, unconsolidated, massive, no HCl reaction, moist to wet **26 1-28 1' SAMPLE** Recovered 1 0/2 0' = 50% SILTY SAND pale yellowish brown (10 YR 6/2), same as above, no HCl reaction, wet **28 1-30 1' SAMPLE** Recovered 1 4/2 0' = 70% GRAVELLY SAND pale yellowish brown (10 YR 6/2), moderate yellowish brown (10 YR 5/4) below 28 8', poorly sorted coarse to fine quartzose sand (60%), some coarse to fine quartzose gravel (30%), subangular to subrounded, some silt/clay, unconsolidated, massive, oxidized, no HCl reaction, wet	▽ 22 4'

2889BRD

WELL NO 28-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29				
30			30 1-32 1' SAMPLE Recovered 1 7/2 0' = 85% SILTY CLAYSTONE moderate yellowish brown (10 YR 5/4) and light olive gray (5 Y 6/1), trace fine sand (5%), no HCl reaction, medium plastic, mottled, moist. 32 1-34 1 SAMPLE Recovered 2 2/2 0' = 110% SILTY CLAYSTONE greenish gray (5 GY 6/1), and light olive gray (5 Y 6/1), trace fine sand (5%), no HCL reaction, mottled, moist	
31			34 1-36 1' SAMPLE Recovered 2 2/2 0 = 110% SILTY CLAYSTONE moderate yellowish brown (10 YR 5/4), and light olive gray (5 Y 6/1), trace fine sand (5%), no HCl reaction, mottled, medium plastic, moist	
32			36 1-38 1' SAMPLE Recovered 2 0/2, 0' = 100% SILTY CLAYSTONE same as above, moist	
33				
34				
35				
36				
37				

2889BRE

WELL NO 28-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			38 1-40 1' SAMPLE Recovered 2 0//2 0' = 100% SILTY CLAYSTONE dark yellowish brown (10 YR 4/2), and light olive gray (5 Y 6/1), trace fine sand (5%), occasional iron concretions, no HCl reaction, damp below 40.0'	
38			40 1-41 1' SAMPLE Recovered 1 4/1 0' = 140% SILTY CLAYSTONE same as above; wet from 40 6 to 41 1	
39			41 1-42 1 SAMPLE Recovered 1 2/2 0' = 120% SILTY CLAYSTONE same as above, no HCl reaction; moist	
40			42 1-43 1' SAMPLE Recovered 1 2/1 0' = 120% SILTY CLAYSTONE same as above, moderate HCl reaction, moist	
41			43 1-44 1' SAMPLE Recovered 1 5/1 0' = 150% SILTY CLAYSTONE same as above, no HCl reaction, moist	
42			44 1-45 1' SAMPLE Recovered 1 3/1 0' = 130% SILTY CLAYSTONE same as above, below 44 9', olive gray (5 Y 4/1), trace fine sand, no HCl reaction, moist	
43				
44				
45				

2889BRF

WELL NO 28-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			45 1-46 1 SAMPLE Recovered 1 4/1 0' = 140% SILTY CLAYSTONE· olive gray (5 Y 4/1), trace fine sand, consolidated, medium plastic, moist	
46			46 1-47 6' SAMPLE Recovered 1 5/1 5 = 100% CLAYSTONE olive gray (5 Y 3/2), and dark gray (5 Y N3), trace sand, no HCl reaction, mottled, massive, moist	
47			47 6-49 1' SAMPLE Recovered 1 5/1 5' = 100% CLAYSTONE dark gray (5 Y N3), trace sand, no HCl reaction, moist	
			49 1-51 1' SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE Same as above, damp	
48			51 1-52 6' SAMPLE Recovered 1 5/1 5' = 100% CLAYSTONE same as above	
			TOTAL DEPTH 52 6'	
49				
50				
51				
52				
53				

28899RG

LOG OF BOREHOLE

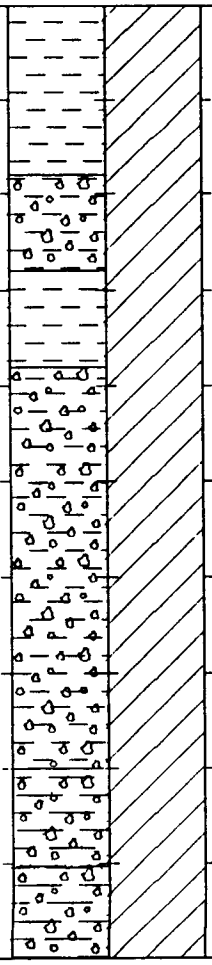
QA BY/DATE Rick Morrow 6-19-89
LOCATION Rocky Flats Plant, Background
COORDINATES N42267 59 E21087 28 (RFP)
TOTAL DEPTH 45 0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED February 20, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY J E Marks/K Van Allen
GEOLOGIST

BOREHOLE/WELL NO 28-89 BRA
GROUND SURFACE ELEVATION 5959 8'
WATER LEVEL ENCOUNTERED None
STATIC N/A
DRILLER M Baker HELPER P Mesa
DRILLING FLUID None
CHECKED BY Jarell Burson
SITE MANAGER

CEARP MANAGER

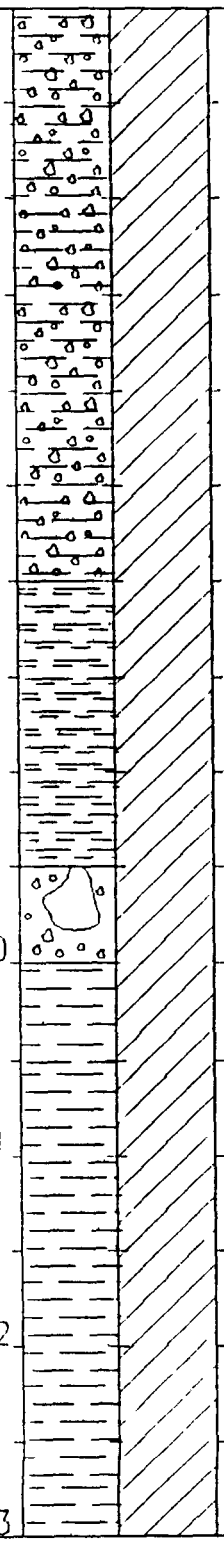
COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 1 9/2 0' = 95% 0 0-0 9' CLAY grayish red (5 R 4/2), 10% gravel, subangular, quartzite, abundant roots, friable, frozen, moist 0 9-1 4' CLAYEY GRAVEL grayish red (5 R 4/2), gravel up to 0 75', angular to subrounded, quartzite vegetation roots, friable, frozen, moist **ROCKY FLATS ALLUVIUM** 1 4-1 9' CLAY moderate reddish brown (10 R 4/6), 10% gravel, very fine-grained - up to 0 10 in the shoe, angular, quartzite, consolidated, moist 2 0-4 0' SAMPLE Recovered 2 0/2 0' = 100% 2 0-2 7' GRAVELLY CLAY moderate reddish brown (10 R 4/6), gravel up to 0 15', angular, quartzite, consolidated, yet friable, moist 2 7-4 0' CLAYEY GRAVEL light olive brown (5 Y 5/6) to light brown (5 YR 6/4), mottled, gravel up to 0 15', angular, quartzite, 10% silt, iron stained in part, slightly moist	

2889ABRA

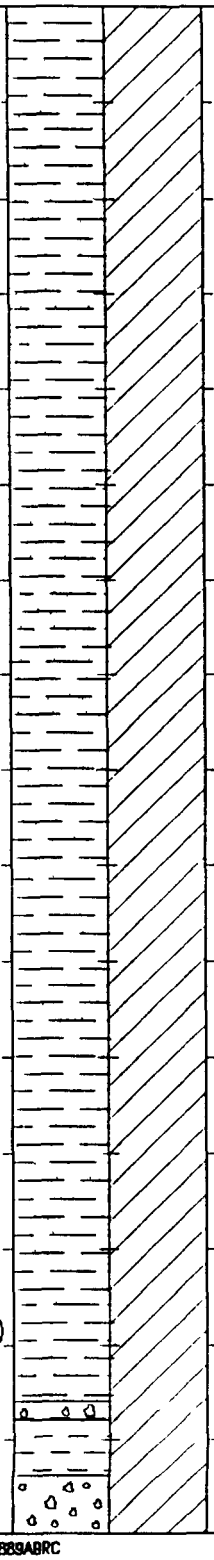
WELL NO 28-89 BRA

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			4 0-6 0' SAMPLE Recovered 2 0/2 0' = 100% GRAVELLY SILTY SAND grayish orange (10 YR 7/4); poorly sorted sand and gravel, subangular to subrounded quartzose and feldspathic, unconsolidated, homogeneous, slight HCl reaction, damp 6 0-8 0' SAMPLE Recovered 2 0/2 0' = 100% 6 0-7 9' SILTY GRAVELLY SAND same as above 7 9-8 0' SILTY SAND AND GRAVEL dark yellowish orange (10 YR 6/6), sand-fairly sorted, subrounded to subangular, quartzose, oxidized, unconsolidated, no HCl reaction, damp 8 0-9 5' SAMPLE Recovered 1 7/1 5' = 113% SILTY TO CLAYEY SAND moderate yellowish brown (10 YR 5/4), poorly sorted, sand--subangular to subrounded quartzose, trace gravel, angular, granitic, unconsolidated, no HCl reaction, damp 9 5-10 0' CENTER BIT DRILLING TO REMOVE LARGE BOULDER - NO SAMPLE - GRAVEL 10 0-12 0' SAMPLE Recovered 1 5/2 0' = 75% SILTY SAND same as above, slight HCl reaction at 11 5', moist 12 0-14 0' SAMPLE Recovered 1 7/2 0' = 85% SILTY SAND same as above, no HCl reaction	

WELL NO 28-89 BRA

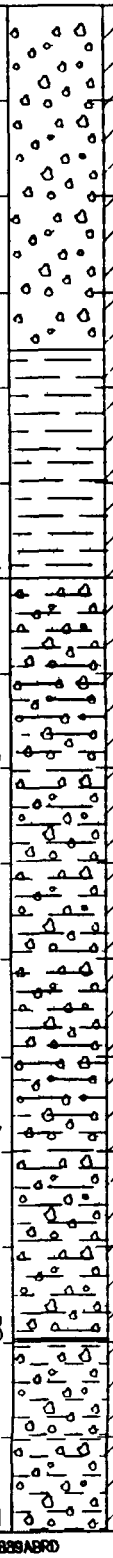
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 0-16 0' SAMPLE Recovered 2 0-2 0' = 100% SILTY SAND· light brown (5 YR 5/6) and moderate yellowish brown (10 YR 5/4), poorly sorted; subangular to subrounded, quartzose, some gravel, angular, quartzite, stratified, mottled, moist 16 0-18 0' SAMPLE Recovered 1 8/2 0' = 90% SILTY SAND pale yellowish brown (10 YR 6/2), fairly sorted, subangular to subrounded, quartzose, some gravel, angular, quartzite; unconsolidated, homogeneous; no HCl reaction; moist 18 0-20 0' SAMPLE Recovered 1 8/2 0' = 90% SILTY SAND pale yellowish brown (10 YR 6/2) to grayish orange (10 YR 7/4), mottled, fine to coarse-grained, poorly sorted, well graded, subangular, 10% gravel throughout up to 0 15', clayey in places, friable; almost saturated	
14				
15				
16				
17				
18				
19				
20				
21				

E

WELL NO 28-89 BRA

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21 22 23 24 25 26 27 28 29			20 0-22 0' SAMPLE Recovered 1 7/2 0' = 85% 20 0-20 3' SILTY SAND same as above 20 3-20 4' GRAVEL angular, quartzite 20 4-20 7' CLAYEY SAND pale olive (10 Y 6/2), iron stained in part - light brown (5 YR 5/6), fine-grained, subrounded, quartzose, slightly moist to moist 20 7-21.7' GRAVELLY SAND pale olive (10 Y 6/2), coarse to fine-grained sand, unsorted, quartzose; gravel up to 0 15', angular, quartzite, 10% clay; consolidated, slightly moist 22 0-24 0' SAMPLE Recovered 1 5/2 0' = 75% 22 0-22 8' GRAVELLY SAND same as above, moist 22 8'-23 5' SILTY SAND light brown (5 Y 5/6), coarse to fine-grained; unsorted, angular to subangular, 10% gravel, subangular, semi-consolidated to friable, slightly moist 24 0-26 0' SAMPLE Recovered 1 5/2 0' = 75% SILTY SANDY GRAVEL yellowish gray (5 Y 7/2) to dark yellowish orange (10 YR 6/6), mottled, gravel up to 0 15', angular, quartzite; coarse to fine-grained sand; unsorted; subangular· friable; slightly moist to moist 26 0-28 0' SAMPLE Recovered 0 0/2 0' = 0% 28.0-29 0' SAMPLE. Recovered 1 0/1 0' = 100% CLAYEY SANDY GRAVEL grayish orange (10 YR 7/4), gravel up to 0 10', angular, mostly quartzite, coarse to fine-grained sand, poorly sorted, angular to subangular, unconsolidated, friable, moist	

2889ABRD

WELL NO 28-89 BRA

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			29 0-31 0' SAMPLE Recovered 2 1/2 0' = 105% 29 0-30 2' CLAYSTONE light olive gray (5 Y 6/1) grading down to dark yellowish orange (10 YR 6/6), lensed, plastic, consolidated, moist 30 2-31 0' CLAYSTONE same as above, consolidated - not lensed	
30			31 0-33 0' SAMPLE Recovered 2 2/2 0' = 110% CLAYSTONE light olive gray (5 Y 6/1), iron stained, dark yellowish orange (10 YR 6/6), organic black specks (N 1/0), dark iron nodule at 31 9'-up to 0 05' - dusky brown (5 YR 2/2), consolidated, not saturated, slightly moist	
31			33 0-34 5' SAMPLE Recovered 1 6/1 5' = 107%. CLAYSTONE dark yellowish orange (10 YR 6/6) to light olive gray (5 Y 6/1), black organic specks (N 1/0), consolidated, slightly moist	
32			34 5-36 0' SAMPLE Recovered 1 7/1 5' = 113% CLAYSTONE light olive gray (5 Y 5/2) to iron stained light olive brown (5 Y 5/6), iron stained at 35 2 to 35 3' -- light brown (5 Y 5/6), highly weathered, iron nodules, lensed, semi-consolidated, friable, moist	
33			36 0-37 5' SAMPLE Recovered 1 6/1 5' = 107% CLAYSTONE pale yellowish brown (10 YR 6/2), iron stained -- moderate yellowish brown (10 YR 5/4), iron nodules up to 0 05; grayish brown (5 YR 3/2), weathered, small fractures near the bottom, consolidated, hard, moist	
34				
35				
36				
37				

2000MBRE

WELL NO 28-89 BRA

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			37 5-39.0 SAMPLE Recovered 2 2/1 5' = 147% CLAYSTONE light olive gray (5 Y 5/2) to medium light gray (N 6/0), dark iron staining -- moderate brown (5 YR 4/4), fractured, thin caliche zone at 38 1-38.2', effervesces, semi-consolidated, lensed, moist	
38			39 0-40 5' SAMPLE Recovered 1 5/1 5' = 100% CLAYSTONE· moderate yellowish brown (10 YR 5/4) to medium light gray (N 6/0), fractured-gray color not the iron color, silty in part; iron nodules, highly weathered, consolidated to medium hard; slightly moist	
39			40 5-42 0 SAMPLE Recovered 1 8/1 5' = 120% CLAYSTONE medium gray (N 5/0) to light olive gray (5 Y 5/2), silty in part at top; organic pieces, iron concentrations at 41 8' up to 0 075', consolidated, slightly moist	
40			42 0-43 5' SAMPLE Recovered 1 9/1 5' = 127% CLAYSTONE same as above; moderately hard	
			43 5-45 0 SAMPLE Recovered 1 5/1 5' = 100% CLAYSTONE· olive gray (5 Y 3/2); same as above; slightly weathered	
41			TOTAL DEPTH = 45 0'	
42				
43				
44				
45				

2889ABRF

LOG OF BOREHOLE

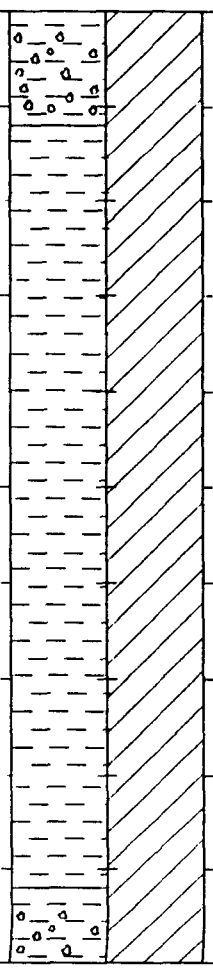
QA BY/DATE Ruth Monroe, 6-19-89
LOCATION Rocky Flats Plant, Background
COORDINATES N42806 76 E21964 89 (RFP)
TOTAL DEPTH 45 5'

DRILLING COMPANY Boyles Brothers
DATE DRILLED January 27, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY J E Marks
GEOLOGIST

BOREHOLE/WELL NO 29-89 BR
GROUND SURFACE ELEVATION 5945 7'
WATER LEVEL ENCOUNTERED 18 4'
STATIC None (5/25/89)
DRILLER R Sharp HELPER P Mesa
DRILLING FLUID None
CHECKED BY
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 3' SAMPLE Recovered 1 7/2 3' = 74% 0 0-0 5' CLAYEY GRAVEL blackish red (5 R 2/2), 30% clay, up to 0 2', unsorted angular, granite, vegetative roots, unconsolidated, moist 0 5-0 6' CLAYEY GRAVEL Same as above except grayish pink (5 R 8/2), light zone no fizzing with HCl 0 6-1 7' CLAY dark reddish brown (10 R 3/4), light stringers, 10% gravel, subrounded, some vegetative roots, consolidated; hard, moist 2 3-4 6' SAMPLE Recovered 2 0/2 3' = 87% 2 3-2 6' CLAY Same as above except slightly moist 2 6-4 3' CLAY moderate orange pink (5 Y 8/4), caliche zone; unstratified, some loose sand, subangular, some gravel at 4 0-4 3' (subangular, unconsolidated), roots down to 3 3, consolidated, moderately hard, dry	No HNu readings were taken

2989BRA

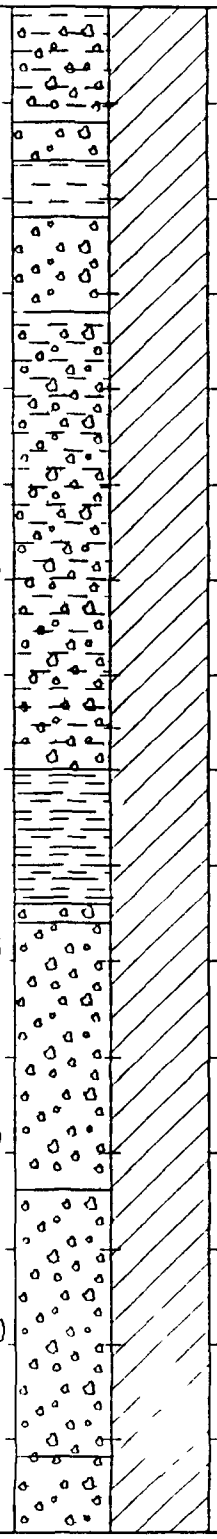
WELL NO 29-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			ROCKY FLATS ALLUVIUM 4 6'-6 6' SAMPLE Recovered 2 0/2 0' = 100% 4 6-5 2' CLAYEY GRAVEL very pale orange (10 Y 8/2) to grayish orange pink (5 Y 5/2), 20% clay matrix, some silt, slight fizz with HCl, gravel--subangular to subrounded, quartzite; unconsolidated, soft, dry 5 2-5 4' CALICHE same as above except caliche zone; consolidated; dry 5 4-5 9' CLAYEY SANDY GRAVEL light brown (5 Y 5/6), 10% coarse sand (-0 5 to -1 0 phi) subrounded; pebble size gravel; subrounded; moderately sorted, unconsolidated, dry 5 9-6 6' CLAYEY GRAVEL medium gray (N 5/0) to medium light gray (N 6/0), clay matrix, grayish pink (5 R 8/2), gravel--up to 0 15', angular, quartzite, unconsolidated, dry 6 6-8 6' SAMPLE Recovered 1 7/2 0' = 85% 6 6-7 3' SANDY GRAVEL light brown (5 Y 5/6), gravel-angular, medium light gray (N 6/0), quartzite, coarse sand (-0 5 to -0 0 phi), unsorted, angular to subangular, some silt, unconsolidated, soft 7 3-7 5' GRAVEL medium gray (N 5/0), angular to subangular; quartzite· unconsolidated 7 5-7 8' SANDY CLAY· light olive gray (5 Y 5/2), very fine-grained (3 5-3 0 phi) subrounded, consolidated, not plastic, hard 7 8-8 3' CLAYEY GRAVEL light olive gray (5 Y 5/2) to light gray (N 5/0), subangular, quartzite, clay matrix, medium plasticity, slightly moist 8 6-10 6' SAMPLE Recovered 1 2/2 0' = 60% 8 6-9 8' SILTY SANDY GRAVEL pale red (10 R 6/2), unsorted, coarse sand, subangular, gravel up to 0 15', angular to subangular, quartzite, unconsolidated, slightly moist 10 6-12 6' SAMPLE Recover 1 3/2 0' = 65% 10 6-11 9' GRAVELLY SAND light brown (5 YR 6/4), very coarse sand, sand silt, unstratified, cobbles, angular to subangular, quartzite, unconsolidated, slightly moist	

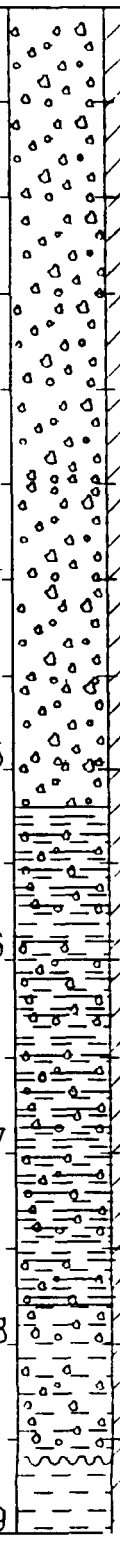
WELL NO 29-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 16 17 18 19 20 21			12 6-14 6' SAMPLE Recovered 1 5/2 0' = 75% 12 6-13 6' CLAYEY SANDY GRAVEL moderate yellow brown (10 YR 5/4), gravel up to 0 1', subrounded to subangular, slight plasticity, unconsolidated, moist to slightly moist 13 6-13 8' GRAVEL medium gray (N 5/0), rounded, quartzite 13 8-14 1' SANDY CLAY moderate yellow brown (10 YR 5/4), 10% fine gravel, some mica flakes, consolidated 14 1-14 2' GRAVEL up to 0 2', subrounded, quartzite 14 6-16 6 SAMPLE Recovered 1 0/2 0' = 50% CLAYEY SANDY GRAVEL dusky yellow (5 Y 6/4), to medium light gray (N 6/0), cobbles up to 0 2', quartzite 10% very fine sand at the bottom; unsorted, medium plasticity, slightly moist to moist 16 6-18 6' SAMPLE Recovered 1 6-2 0' = 80% 16 6-17 0' CLAYEY SANDY GRAVEL light brown (5 YR 6/4), iron staining, up to 0 05'; angular, quartzite, unconsolidated· slightly moist 17 0-17 7' SILTY CLAY yellow gray (5 Y 7/2); not plastic to slightly plastic, 10% very fine sand, mica flakes, 10% gravel, subrounded, pink granite, semiconsolidated, moist 17 7-17 8' GRAVEL medium gray (N 5/0), angular, quartzite 17 8-18 2' GRAVELLY SAND pale red (10 R 6/2), coarse sand, well graded/unsorted, subrounded to subangular, mostly quartz, some small gravel, subangular to subrounded, unconsolidated, moist to almost wet 18.6-20 6' SAMPLE Recovered 0 9-2 0' = 45% 18 6-19 2' GRAVELLY SAND· same as above except slightly more gravel, angular to subangular, wet 19 2-19 5' GRAVEL medium light gray (N 6/0), cobble up to 0 2', subangular, quartzite, unconsolidated, wet 20 6-22 6' SAMPLE Recovered 0 4/2 0' = 20% 20 6-21 0' SANDY GRAVEL pale red (5 R 6/2), gravel up to 0 2', subangular to subrounded quartzite, coarse sand (-0 0 to -0 5 phi) unsorted, subrounded unconsolidated wet	▽ 18 4'

2989BRC

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21 22 23 24 25 26 27 28 29			<u>22.6-24 6' SAMPLE</u> Recovered 1 3/2 0' = 65% 22 6-23 6' GRAVELLY SAND· dark yellow orange (10 YR 6/6), very coarse sand; unsorted, subangular; quartz, gravel up to 0 1', slight clay in part, unconsolidated; saturated/wet 23 6-23 9' SANDY GRAVEL light brown (5 YR 5/6), iron staining, gravel, angular, quartzite; coarse sand, subangular, unconsolidated; wet <u>24 6-26 6' SAMPLE.</u> Recovered 1 3/2 0' = 65% 24 6-25 2' SANDY GRAVEL moderate yellow brown (10 YR 5/4); coarse sand; unsorted; subangular; unconsolidated, wet 25 2-25 9' CLAYEY SILTY GRAVEL light brown (5 YR 5/6), gravel, angular, quartzite; some sand, consolidated; moderately hard, wet <u>26 6-28 6' SAMPLE</u> Recovered 0 8-2 0' = 40% Poor recovery due to large rock in the sampler; sample squeezed up around it 27 8-28 6' CLAY AND GRAVEL Clay--light brownish gray (5 YR 6/1), some iron staining, light brown (5 YR 5/6), gravel, medium light gray (N 6/0), up to 0 05', subrounded quartzite, consolidated, medium plasticity; medium hard; slightly wet	

WELL NO 29-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			28 6-30 5' SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE pale olive (10 Y 6/2), slight iron staining, plastic, consolidated, hard, wet	
30			30 5-32 5' SAMPLE Recovered 2 2/2 0' = 110% CLAYSTONE light brown (5 YR 5/6),some black (N 1/0), organic, some ironing staining, gradational change in color toward bottom (pale yellow brown (10 YR 6/2)), swelling clay, slight plasticity, very consolidated, hard, slightly wet	
31			32 5-34 5' SAMPLE Recovered 2 1/2 0' = 105% CLAYSTONE pale yellow brown (10 YR 6/2), ironstaining in part, some silt, unstratified, hard, very consolidated, slightly moist	
32			34 5-36 5' SAMPLE Recovered 2 3/2 0' = 115% 34 5-35 3' CLAYSTONE pale yellowish brown (10 YR 6/2), to moderate yellowish brown (10 YR 5/4), -- iron staining, slightly silty, consolidated; hard, slightly moist 35 3-36 5' CLAYSTONE same as above except less iron staining -- moderate dark gray (N 4/0), dark organic blotches in part -- dark gray (N 3/0)	
33				
34				
35				
36				
37				

WELL NO 29-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			36 5-38 5' SAMPLE Recovered 2 1/2 0' = 105% CLAYSTONE same as above; brownish gray (5 YR 4/1), iron staining -- moderate reddish orange (10 R 6/6), small organic pieces, slightly weathered, moist to wet	
38			38 5-40 5 ' SAMPLE Recovered 2 1/2 0' = 105% CLAYSTONE· sand as above; iron stain at top -- light olive gray (5 Y 5/2), brownish gray (5 YR 4/1) at bottom, fractures with iron staining, wet	
39			40 5-42 5' SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE same as above; brownish gray (5 YR 4/1), at top to more iron staining at bottom -- light olive gray (5 YR 5/2), organic in part	
40			42 5-44 5' SAMPLE Recovered 2 0/2 0' = 100% 42 5-43 5 CLAYSTONE same as above, gradational to 43 5 43 5-44 5' SILTY SANDSTONE light olive gray (5 Y 5/2), some staining -- light olive (10 Y 5/4); very fine grained	
41				
42				
43				
44				
45				

WELL NO 29-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			44 5-45 5' SAMPLE Recovered 1 0/1 0' = 100% SILTY SANDSTONE same as above TOTAL DEPTH 45 5'	
46				
47				
48				
49				
50				
51				
52				
53				

2999RG

LOG OF BOREHOLE

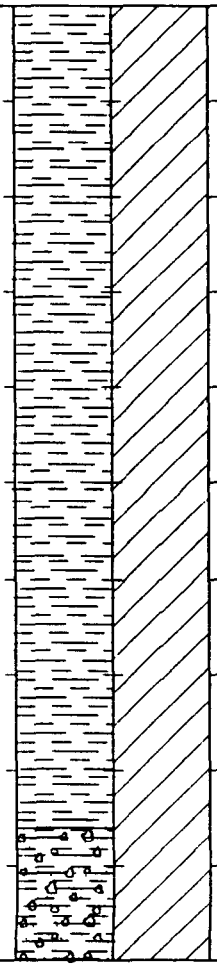
QA BY/DATE Ruth Morrow 6-19-89
LOCATION Rocky Flats Plant, Background
COORDINATES N43221 96 E22658 39 (RFP)
TOTAL DEPTH 43 7'

DRILLING COMPANY Boyles Brothers
DATE DRILLED February 27, 1989
DRILLING METHOD 3-1/4" ID Hollow Stem auger
LOGGED BY K W Van Allen
GEOLOGIST

BOREHOLE/WELL NO 30-89 BR
GROUND SURFACE ELEVATION 5935 2'
WATER LEVEL ENCOUNTERED 18.0'
STATIC None (5/22/89)
DRILLER R Sharp HELPER P Mesa
DRILLING FLUID None
CHECKED BY Janell Brysman
SITE MANAGER

CEARP MANAGER

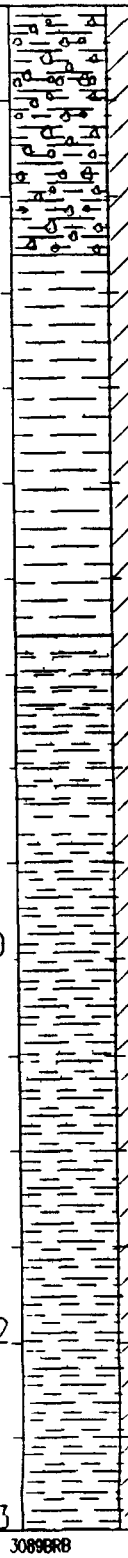
COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			TOPSOIL 0 0-2 1' SAMPLE Recovered 1 7/2 1' = 81% SILTY CLAY grayish brown (5 YR 3/2), some (20%) coarse to fine quartzose sand, subangular to subrounded, trace (10%) coarse to fine quartzose gravel, unconsolidated, massive, no HCl reaction, gradates to dark reddish brown (10 R 3/4) below 0 5 feet, moist ROCKY FLATS ALLUVIUM 2 1-4 3' SAMPLE Recovered 2 2/2 2' = 100% CLAYEY SILT light brown (5 YR 6/4), poorly sorted, trace (10%) coarse to fine quartzose sand, trace (10%) coarse to fine quartzose gravel, subrounded to subangular, unconsolidated, stratified, strong, HCl reaction, damp	

3089BRA

WELL NO 30-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			4 3-6 3' SAMPLE Recovered 1 9/2 0' = 95% CLAYEY TO SILTY GRAVELLY SAND pale yellowish brown (10 YR 6/2), poorly sorted, (50%) coarse to fine quartzose sand, (25%) coarse to fine quartzose gravel, subangular to subrounded, unconsolidated, massive, strong HCl reaction, damp 6 3-8 3' SAMPLE Recovered 1 4/2 0' = 70% SILTY SAND moderate yellowish brown (10 YR 5/4), poorly sorted (60%) coarse to fine quartzose sand, some (20%) coarse to fine-gravel, subangular to subrounded, unconsolidated, massive, strong HCl reaction, damp 8 3-10 3' SAMPLE Recovered 1 0/2 0' = 50%. SILTY TO CLAYEY SAND moderate brown (5 YR 4/4), poorly sorted, (50%) coarse to fine quartzose sand, some (25%) coarse to fine quartzose gravel, subrounded to subangular, unconsolidated, massive, only slight HCl reaction at 9 3 feet, damp 10 3-12 3' SAMPLE Recovered 1 0/2 0' = 50% SILTY TO CLAYEY SAND same as above, no HCl reaction, moist	

3089BRB

WELL NO 30-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			**12 3-14 3' SAMPLE** Recovered 0 8/2 0' = 40% SILTY TO CLAYEY SAND moderate brown (5 YR 4/4), poorly sorted (50%) coarse to fine quartzose sand, some (25%) coarse to fine quartzose gravel, subangular to subrounded, unconsolidated, massive, no HCl reaction, moist to damp	
14			**14 3-16 3' SAMPLE** Recovered 2 0/2 0' = 100% SILTY TO CLAYEY SAND same as above, moist.	
15			**16 3-18 3' SAMPLE** Recovered 1 3/2 0' = 65% SILTY TO CLAYEY SAND same as above, very moist	
16			**18 3-20 3' SAMPLE** Recovered 0 8/2 0' = 40% SILTY TO CLAYEY SAND same as above, very moist to wet	
17				
18				▽ 18 0'
19				
20				
21				

3089BRC

WELL NO 30-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			20 3-22 3' SAMPLE Recovered 1 6/2 0'= 80% SILTY TO CLAYEY SAND same as above, wet	
22			22 3-24 3' SAMPLE Recovered 1 4/2 0' = 70% SILTY TO CLAYEY SAND same as above, very moist to wet	
23			24 3-26 3' SAMPLE Recovered 2 2/2 0' = 120% CLAYSTONE medium light gray (N 6/0); trace fine sand, consolidated, massive, no HCl reaction, medium plasticity, moist	
24			26 3-28 3' SAMPLE Recovered 1 3/2 0' = 65% CLAYSTONE pale yellowish brown (10 YR 6/2), and light olive gray (5 Y 5/2), mottled, moist	
25			28 3-29 3' SAMPLE Recovered 1 2/1 0' = 120% CLAYSTONE same as above, moist	
26				
27				
28				
29				

3089BRD

WELL NO 30-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			29 3-30 3' SAMPLE Recovered 1 0/1 0' = 100% CLAYSTONE pale yellowish brown (10 YR 6/2) and light olive gray (5 Y 5/2), mottled, moist	
30			30 3-31 3' SAMPLE Recovered 0 9/1 0' = 90% CLAYSTONE same as above, moist	
			31 3-32 3' SAMPLE Recovered 2 5/1 0' = 25% CLAYSTONE medium dark gray (N 4/0), trace fine sand, consolidated, massive, medium plasticity; no HCl reaction, moist	
31			32 3-33 3' SAMPLE Recovered 1 5/1 0' = 150% CLAYSTONE. moderate brown (5 YR 4/4), and medium gray (N 5/0), consolidated, massive, mottled, no HCl reaction; moist	
32			33 3-34 3' SAMPLE Recovered 2 0/1 0' = 200% CLAYSTONE same as above, moist	
			34 3-35 3' SAMPLE Recovered 1 7/1 0' = 170% CLAYSTONE same as above; wet	
33			35 3-36 3' SAMPLE Recovered 1 5/1 0' = 150% CLAYSTONE same as above, wet	
			36 3-37 3' SAMPLE Recovered 1 7/1 0' = 170% CLAYSTONE grayish black (N 2/0), same as above, wet	
34				
35				
36				
37				

30BSBRE

WELL NO 30-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			37 3-38 3' SAMPLE Recovered 0 9/1 0' = 90% CLAYSTONE grayish black (N 2/0), and moderate brown (5 YR 3/4), trace fine sand; mottled; consolidated; massive, moist	
38			38 3-39 3' SAMPLE Recovered 1.2/1.0' = 120%. CLAYSTONE light olive gray (5 Y 5/2), and moderate olive brown (5 Y 4/4), trace fine sand, mottled, consolidated, massive, moist	
39			39 3-40 3' SAMPLE Recovered 1 0/1 0' = 100% CLAYSTONE light olive gray (5 Y 5/2) and moderate olive brown (5 Y 4/4), trace fine sand, mottled, consolidated, massive, moist	
40			40 3-41 3' SAMPLE Recovered 1 2/1 0' = 120% CLAYSTONE same as above; no HCl reaction; moist	
41			42 3-43 7' SAMPLE Recovered 1 5/1 5' = 100% CLAYSTONE dark gray (N 3/0), trace fine sand, consolidated, massive, moist	
42			TOTAL DEPTH = 43 7'	
43				
44				
45				

LOG OF BOREHOLE

QA BY/DATE Farrell Bryman 17-19-89
LOCATION Rocky Flats Plant, Background
COORDINATES N43,755 65 E23,487 29 (RFP)
TOTAL DEPTH 37 75'

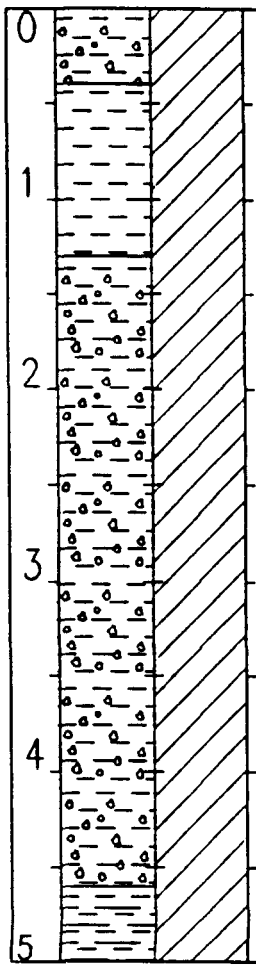
DRILLING COMPANY Boyles Bros.
DATE DRILLED February 8, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY J E Marks
GEOLOGIST

BOREHOLE/WELL NO 31-89 BR
GROUND SURFACE ELEVATION 5920 5'
WATER LEVEL ENCOUNTERED 18 6'
STATIC 18 92' (5/24/89)
DRILLER R. Sharp HELPER H. McCree
DRILLING FLUID None
CHECKED BY Farrell Bryman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED



TOPSOIL

0 0-2 3' SAMPLE
Recovered 2 2/2 3 = 96%
0 0-0 4' GRts
GRAVELLY CLAY grayish brown (5 YR 3/2), gravel up to 0 075', unsorted, subangular, quartzite and K-feldspar, frozen, vegetation roots, unconsolidated, moist
0 4-1 3' CLAY grayish brown (5 YR 3/2) to dark reddish brown (10 R 3/4), vegetation roots, slight plasticity, consolidated, moderately hard, moist, frozen

ROCKY FLATS ALLUVIUM

1 3-2 2' CLAY AND GRAVEL moderate reddish brown (10 R 4/6), unsorted, angular to subangular, slight plasticity, semiconsolidated, moist

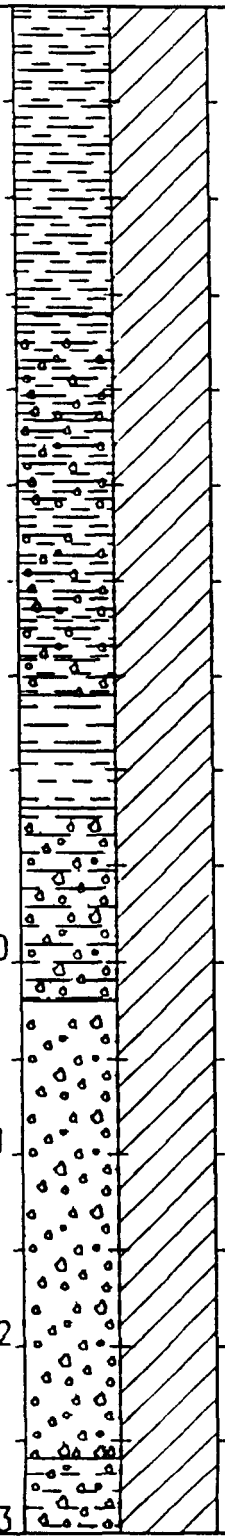
2 3-4 6' SAMPLE
Recovered 2 3/2 3' = 100%
2 3-3 9' CLAY and GRAVEL dark reddish brown (10 R 3/4), gravel up to 0 1' angular, mostly quartzite, some granite, moderate plasticity, consolidated to semiconsolidated, moderately hard, moist
3 9-4 6' CLAYEY GRAVEL moderate orange pink (5 YR 8/4), gravel up to 0 15', angular, quartzite, caliche cemented - fizzes with HCl, semi-consolidated, moist

4 6-6 6' SAMPLE
Recovered 2 0/2 0= 100%
4 6-5 8' SILTY CLAY light brown (5 YR 6/4), trace reddish brown (10 R 4/6), trace sand and gravel, sand-angular, unsorted, caliche cemented, fizzed with HCl, consolidated, slightly moist

3189BRA

WELL NO 31-89 BR

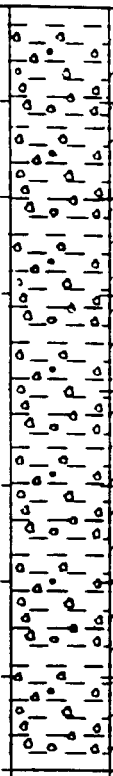
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			4 6-6 6' SAMPLE (CONT'D) 5 8-6 6' SILTY CLAY moderate orange pink (5 YR 8/4), same as above but some gravel up to 0 15', angular, quartzite, dry 6 6-8 6' SAMPLE Recovered 1 1/2 0' = 55% CLAYEY SILTY GRAVEL mottled, grayish pink (5 YR 8/2), light brown (5 YR 6/4), trace pale green (10 G 6/2), gravel up to 0 20', subrounded to angular, quartzite, some grayish red (5 R 4/2), unconsolidated, dry 8 6-10 6' SAMPLE Recovered 1 6/2 0 = 80% 8 6-8 9' SILTY SAND light brown (5 YR 5/6), very fine to coarse grained, unsorted, subrounded to subangular, friable, slightly moist 8 9-9 2' SANDY CLAY very pale yellow (10 YR 8/2), to light brown (5 YR 5/6), some silt, slightly moist 9 2-10 2' GRAVELLY SILTY SAND light brown (5 YR 5/6), sand, unsorted, subangular, mostly quartz, gravel up to 0 05', very friable, slightly moist. 10 6-12 6' SAMMPLE Recovered 1 0/2 0' = 50%. GRAVELLY SAND pale reddish brown (10 R 5/4), some silt, fine to coarse grained sand, unsorted, subrounded, friable, gravel up to 0 2', angular, quartzite - pale red, (10 R 6/2), and medium gray (N 5/0), slightly moist	

J189BRB

WELL NO 31-89 BR

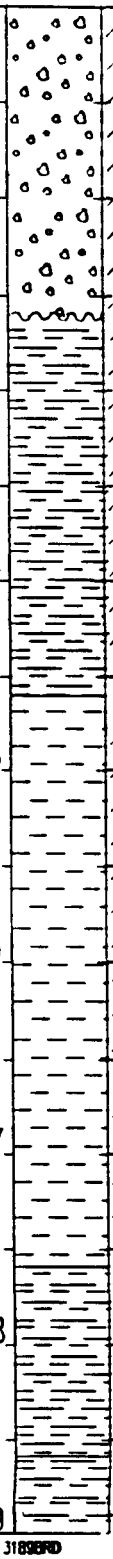
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			12 6-14 6' SAMPLE Recovered 1 1/2 0 = 55% SANDY CLAYEY GRAVEL pale yellowish brown (10 YR 6/2), gravel up to 0 2', angular, pink granite and quartzite, fine to coarse grained sand, subangular, unsorted, slightly moist 14 6-16 6' SAMPLE Recovered 1 2/2 0' = 60% SANDY CLAYEY GRAVEL same as above, gravel - subangular to angular, moist 16 6-18 6' SAMPLE Recovered 1 2/2 0' = 60% 16 6-17 0' same as above; slightly moist 17 0-17 8' SAND moderate yellowish brown (10YR 5/4), coarse, unsorted, subrounded to rounded; friable, vadose capillary zone, slightly moist to wet. 18 6-20 6' SAMPLE Recovered 0 9/2 0' = 45% SANDY GRAVEL moderate yellowish brown (10 YR 5/4), gravel up to 0 2', subrounded, fine to very coarse grained sand; unsorted, subrounded, unconsolidated, wet 20 6-22 6' SAMPLE Recovered 0 7/2 0' = 35% GRAVELLY SAND same as above except more sand, less gravel, at bottom, slight clay in shoe	
14				
15				
16				
17				
18				
19				18 6' 18 92'
20				
21				

3189BRC

WELL NO 31-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			22 6-24 6' SAMPLE Recovered 2.3/2 0 = 115% SILTY CLAYSTONE pale yellowish brown (10 YR 6/2), some iron staining, dark yellowish orange (10 YR 6/6), mottled, slight black organic around 24 0' (N 1/0), thinly layered, consolidated; moderately hard, expanding clay, wet 24 6'-26 6' SAMPLE Recovered 2 3/2 0' = 115% CLAYSTONE pale yellowish brown (10 YR 6/2), some iron staining, moderate yellowish brown (10 YR 5/4), expandable clay, wet 26 6-27 6' SAMPLE Recovered 1 2/1 0 = 120% CLAYSTONE light olive gray (5 Y 6/1) iron staining in part , moderate yellowish brown (10 YR 5/4), slightly silty, weathered, moderately hard, consolidated, wet 27 6-28 6' SAMPLE Recovered 1 5/1 0 = 150% SILTY CLAYSTONE pale yellowish brown (10 YR 6/2), iron staining, dark yellowish orange (10 YR 6/6), weathered, hard, consolidated, wet 28 6-29 6' SAMPLE Recovered 1 2/1 0 = 120% SANDY SILTY CLAYSTONE light olive gray (5 Y 5/2), iron staining prevalent at top; dark yellowish orange (10 YR 6/6), platy-lensed, very fine grained sand (4 0-3 5phi), subrounded to rounded, quartz, semiconsolidated, wet	
22				
23				
24				
25				
26				
27				
28				
29				

3189BRD

WELL NO 31-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			29 6-30 6' SAMPLE Recovered 1 4/1 0' = 140% SANDY SILTY CLAYSTONE light olive gray (5 Y 5/2), to dusky yellow (5 Y 6/4), blocky to platy, semiconsolidated, friable, wet	
30			30 6-31 6' SAMPLE Recovered 1 3/1 0 = 130% SANDY CLAYEY SILTSTONE light olive gray (5 Y 5/2) to dusky yellow (5 Y 6/4), tight, consolidated, wet	
31			31 6-32 6' SAMPLE Recovered 0.8/1 0 = 80% CLAYEY SILSTONE light olive gray, (5 Y 5/2), some iron staining; light olive brown (5 Y 5/6), consolidated, moist	
32			32 6-33 6'SAMPLE Recovered 1 2/1 0' = 120% SANDY CLAYEY SILTSTONE light olive gray (5 Y 5/6), iron stained, in part, very fine grained (4 0-3 5phi), quartz, moderate to consolidated, wet	
33			33 6-34 6' SAMPLE Recovered 1 1/1 0' = 110% SILTY CLAYSTONE olive gray (5 Y 3/2), mottled, slight iron stain; light olive brown (5 Y 5/6), moderately hard, consolidated, wet	
34			34 6-35 6' SAMPLE Recovered 1 1/1 0' = 110% SANDY SILTSTONE light olive brown (5 Y 5/6), to medium gray (N 5/0), mottled, some clay, lignite stringers around 34 9-35 2' (black - N 1/0), consolidated to semiconsolidted, wet	
35			35 6-36 6' SAMPLE Recovered 1 2/1 0' = 120% SANDY SILTSTONE same as above except no iron stain; light olive gray (5 Y 4/2), to medium gray (N 5/0), black organic specs (N 1/0), consolidated, wet	
36				
37				

31BBRE

WELL NO 31-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			36 6-37 3 SAMPLE Recovered 0 7/0 7' = 100% SILTY SANDSTONE and CLAYSTONE medium dark gray (N 4/0) to black (N 1/0), very fine grained (4 0-3 5phi), subrounded, quartz, laminated in part, patches of clay separated horizontally from the sandstone, lignite stringers; moderately hard, semiconsolidated; wet TOTAL DEPTH 37 75' WITH PLOPPER AFTER REAMING	
38				
39				
40				
41				
42				
43				
44				
45				

3189BRF

LOG OF BOREHOLE

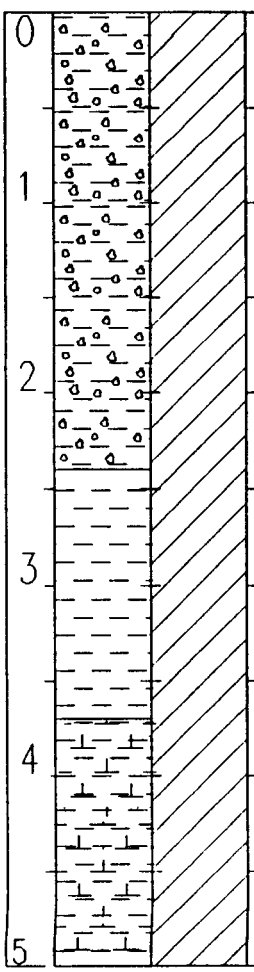
QA BY/DATE Jewell Bryman 17-19 89
LOCATION Rocky Flats Plant, Background
COORDINATES N42,792.37 E21,944.19 (RFP)
TOTAL DEPTH 203.0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED 01/25/89, 02/23-03/02/89
DRILLING METHOD Hollow Stem Auger 0.0-39 20; Rotary Core 40.0'-203'
LOGGED BY K E Miller, R T Treat
GEOLOGIST

BOREHOLE/WELL NO 32-89 BR
GROUND SURFACE ELEVATION 5946 2"
WATER LEVEL ENCOUNTERED 17 60'
STATIC 136 77' (6/27/87)
DRILLER K Parker, P Bushkovski HELPER P Bushkovski, H McCree
DRILLING FLUID 0 0-40 0' None, 40 0-203 0' Water
CHECKED BY Jewell Bryman
SITE MANAGER

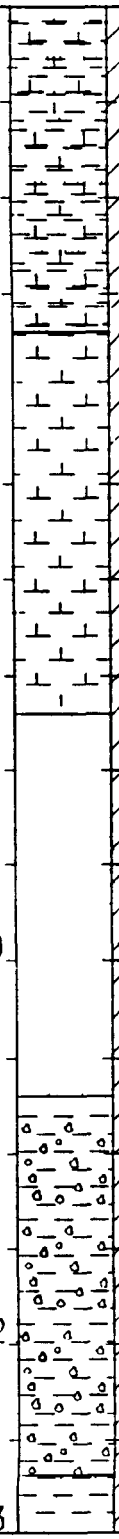
CEARP MANAGER

COMMENTS Surface casing set on January 26, 1989, cemented on January 27, 1989, by K E Miller

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			**TOPSOIL** 0 0-1 7' SAMPLE Recovered 1 7/1 7' = 100% 0 0-1 1' CLAYEY GRAVEL moderate brown (5 YR 3/4), clayey, non-calcareous, gravels, quartzite and K-feldspar ~ 40% gravel - 5 cm in diameter, some roots, moist **ROCKY FLATS ALLUVIUM** 1 1-1 7' GRAVEL AND CLAY grayish orangish pink (10 R 8/2), non-calcareous clay 10-15% Clay moderate brown (5 YR 3/4), Gravel poorly sorted, size to 8 cm, angular to subangular, dry 1 7-3 7' SAMPLE Recovered 1 5/2 0' = 75% 1 7-2 4' GRAVEL AND CLAY Same as 1 1-1 7', dry 2 4-3 2' CLAY grayish red (5 YR 5/2), weathered K-feldspars, some micaceous gravels, +60% gravels, weathered, bottom 0 65' is clay with 15% small gravel (1 2-2mm), caliche in base of shoe, effervesces with Hcl, bottom 0 65'damp 3 7-5 2' SAMPLE Recovered 1 5/1 5' = 100% CALCAREOUS CLAY moderate orangish pink (5 YR 8/4), some small gravel 20-30%, 20% clay, poorly sorted, angular to subangular, strong HCl reaction, dry	
1				
2				
3				
4				
5				

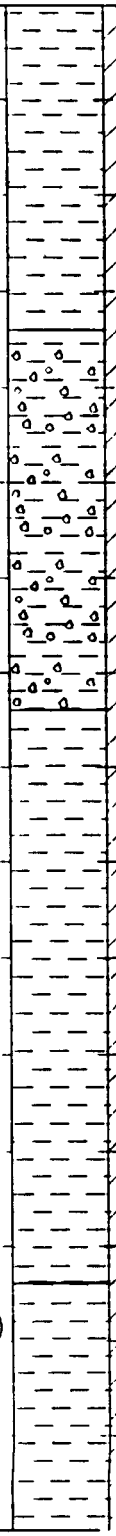
3289BRA

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			5 2-6 7' SAMPLE Recovered 0 65/1 5' = 43% CALCAREOUS CLAY description same as 3 7-5 2', damp. 6 7-8 7' SAMPLE Recovered 0 4/2 0' = 20% CALICHE very unconsolidated, same description as 5 2-6 7', damp 8 7-10 7' SAMPLE Recovered 1 5/2 0' = 75% SAND moderate yellowish brown (10 YR 5/4), clay 10%, sand 75%, gravel 15%, small to large pebbles, poorly sorted, some quartz, non-calcareous, clay, damp 10 7-12 7' SAMPLE Recovered 1 0/2 0' = 50%. CLAY AND GRAVEL moderate reddish brown (10 YR 4/6), clay 60%, gravel and sand 40%, some quartzite, angular to subangular, damp.	

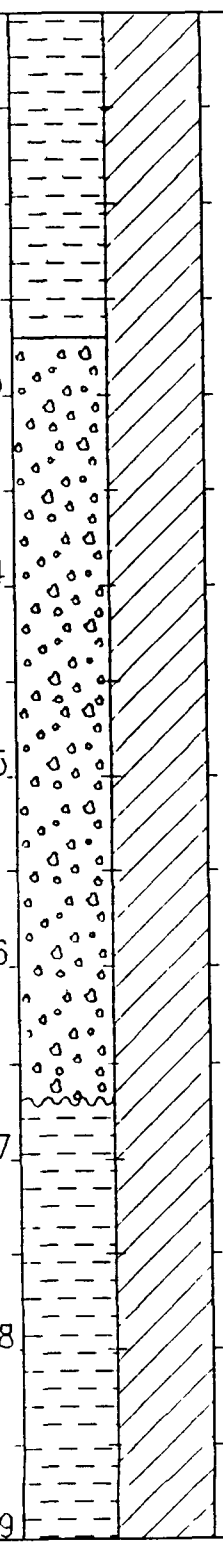
WELL NO 32-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			12 7-14 7' CUTTINGS Recovered 0 0/2 0' = 0% SANDY CLAY pale brown (5 YR 5/2), 30% gravel, moist 14 7-16 7' SAMPLE Recovered 1 3/2 0' = 65% GRAVELLY CLAY moderate yellowish brown (10 YR 5/4), 30% gravels, 70%, clay, poorly sorted, quartzites and weathered K-feldspar, moist 16 7-18 7' SAMPLE Recovered 1 4/2 0' = 70% CLAY moderate brown (5 YR 4/4), some gravel up to 5 cm Top 0 85' coarser, poorly sorted, bottom section finer grained, moist 18 7-20 7' SAMPLE Recovered 1 45/2 0' = 72 5% CLAY moderate brown (5 YR 4/4), some gravel, pale yellowish brown (10 YR 6/2), 0 1-3cm, some sand, non-calareous, very damp to moist	
14				
15				
16				
17				17 60'
18				
19				
20				
21				

3289BRC

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21 22 23 24 25 26 27 28 29			20 7-22 7 SAMPLE Recovered 2 0/2 0' = 100% CLAYEY SAND yellowish gray (5 YR 7/2), some mottling, coarse sand ~30% clay, poorly sorted; moist 22 7-24 7' SAMPLE Recovered 0 9/2 0' = 45% SAND AND GRAVEL dark yellowish orange (10 YR 6/5), sand matrix, poorly sorted, gravel, subangular; some clay (20%), very wet 24 7-26 7 SAMPLE Recovered 1 2/2 0' = 60% SAND AND GRAVEL same as 22 7-24 7', wet. 26 7-28 7' SAMPLE Recovered 0 0/2 0' = 0% Estimation of contact at 28 5' due to what was noted in 24 7-26 7' sample, and what 28.7-30 7' sample showed, and based on drilling behaviors	

WELL NO 32-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			28 7-30 7' SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE moderate yellowish brown (10 YR 5/4) highly weathered, no bedding Some mottling, some quartzite grains Damp.	
30			30 7-32 7' SAMPLE Recovered 2 0/2 0 = 100% CLAYSTONE Some bedding, description same as 28 7-30 7'	
31			32 7-34 7' SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE moderate yellowish brown (10 YR 5/4) more towards slightly weathered, some streaking noticed, damp.	
32			34 7-36 2' SAMPLE Recovered 2 0/1 5' = 133%. CLAYSTONE olive gray (5 YR 4/1), slight gradation from 32.7-34 7, slightly weathered, no mottles, damp	
33				
34				
35				
36				
37				

3289BRE

WELL NO 32-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37 38 39 40 41 42 43 44 45			36 2-37 7' SAMPLE Recovered 2 0/1 5' = 133%. CLAYSTONE same as 34 7-36 2' 37 7-39 2' SAMPLE Recovered 2 0/1 5' = 133%. CLAYSTONE olive gray (5 YR 4/1), slightly weathered, no mottling; some iron streaking consolidated, damp. Note Began coring at 40 0' 40 2-41 5' SAMPLE Recovered 0 0/1 5' = 0%. RQD 0 0/0 0' = 0% CLAYSTONE medium dark gray (N 4/0), medium plasticity 41 5-42 5' SAMPLE Recovered 0 3/1 0' = 30% RQD 0 0/0 3' = 0% SANDY CLAYSTONE medium gray (N 5/0) to medium dark gray (N 4/0), very fine-grained sand, low plasticity, soft, poorly cemented, slightly weathered, damp 42 5-43 5' SAMPLE Recovered 0 0/1 0' = 0%. RQD 0 0/0 0' = 0% 43 5-44 5' SAMPLE Recovered 0 0/1 0' = 0% RQD 0 0/0 0' = 0% 44 5-45 5' SAMPLE Recovered 0 0/1 0' = 0% RQD 0 0/0 0' = 0%	

WELL NO 32-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			45 5-46 5' SAMPLE Recovered 0 0/1 0' = 0% RQD 0 0/0 0' = 0%	
46			46 5-48 5' SAMPLE Recovered 0 35/2.0' = 17 5% RQD 0 35/0 35' = 100% SILTSTONE medium dark gray (N 4/0), homogeneous, poorly cemented, low plasticity, soft, slightly weathered; damp	
47			48 5-51 5' SAMPLE Recovered 2 0/3 0' = 67% RQD 1 7/2 0' = 85% CLAYSTONE medium light gray (N 6/0) to medium gray (N 4/0), poorly cemented, medium plasticity, homogeneous, soft, slightly weathered, damp	
48			51 5-53 5' SAMPLE Recovered 3 0/2 0' = 150% RQD 2 0/3 0' = 67% (Recovered 1 0' from previous run) CLAYSTONE same as above	
49				
50				
51				
52				
53				

WELL NO 32-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
53			53 5-56 0' SAMPLE Recovered 2 0/2 5 = 80% RQD 1 6/2 0' = 80% CLAYSTONE medium dark gray (N 4/0), homogeneous, medium bedding, low plasticity, damp	
54			56 0-58 0' SAMPLE Recovered 1 8/2 0' = 90% RQD 1.4/1.8' = 78%. CLAYSTONE same as above, blocky and low to medium plasticity, damp	
55			58 0-62 0' SAMPLE Recovered 4 5/4 0' = 113% RQD 4 2/4 5' = 93% CLAYSTONE medium gray (N 5/0) to medium dark gray (N 4/0), some silt, homogeneous, low to medium plasticity, poorly cemented, lignite streak at 60.3', damp	
56				
57				
58				
59				
60				
61				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
61			62 0-66 0' SAMPLE Recovered 4 0/4 0' = 100% RQD 2 6/4 0' = 65% SILTY CLAYSTONE medium dark gray (N 4/0), thin lenses of medium gray (N 5/0), trace of fine-grained sand noted at 65 8', consolidated, low plasticity, homogeneous, unweathered, damp	
62			66.0-70 0' SAMPLE Recovered 4 3/4 0' = 108% RQD 3 2/4 3' = 74% 66 0-66.7' SANDY SILTSTONE medium gray (N 5/0), non-plastic, very fine-grained sand, unweathered, moist 66 7-70 0' SILTY CLAYSTONE medium dark gray (N 4/0), homogeneous, blocky, low to medium plasticity, hard, consolidated, unweathered, damp	
63				
64				
65				
66				
67				
68				
69				

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
69			70 0-74 0' SAMPLE Recovered 3 4/4 0' = 85% RQD 1 9/3 4' = 56% SANDY SILTSTONE medium gray (N 5/0) to medium dark gray (N 4/0) to grayish black (N 2/0), very fine-grained sand, layered, none to low plasticity, lignite pockets, consolidated, unweathered, damp	
70			74 0-78 0' SAMPLE Recovered 4 6/4 0' = 115% RQD 3 1/4 6' = 67% (Recovered 0 6' from previous run) SANDY SILTSTONE medium dark gray (N 4/0), low plasticity, homogeneous, some slickensides noted, very fine-grained sand, consolidated, unweathered, damp	
71				
72				
73				
74				
75				
76				
77				

WELL NO 32-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
77				
			78 0-82 0' SAMPLE Recovered 4 2/4 0' = 105% RQD 4 2/4 2' = 100% SANDY SILTSTONE medium light gray (N 6/0) to medium gray (N 5/0), non-plastic, same as above	
78				
			82 0-86 0' SAMPLE Recovered 4 0/4 0' = 100% RQD 3 5/4 0' = 88% SANDY SILTSTONE same as above	
79				
80				
81				
82				
83				
84				
85				

3289BRK

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
85			86 0-90 0' SAMPLE Recovered 4 0/4 0' = 100% RQD 1 9/4 0' = 48% 86 0-88 5' SANDY SILTSTONE same as above 88 5-90 0' CLAYEY SILTSTONE medium dark gray (N 4/0) to dark gray (N 3/0), some sand, lensed, homogeneous, low to medium plasticity, consolidated, few scattered lignite pockets, moist to damp 90 0-94 0' SAMPLE Recovered 1 5/4.0' = 38%. RQD 1 5/1 5' = 100%. CLAYEY SILTSTONE same as above	
86				
87				
88				
89				
90				
91				
92				
93				

LOG OF BOREHOLE

DEPTH (F)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
93			94 0-96 0' SAMPLE Recovered 4 5/2 0' = 225% RQD 1 6/4 5' = 36% (Recovered 2 5' from previous run) CLAYEY SILTSTONE medium dark gray (N 4/0) to dark gray (N 3/0), with some very fine-grained sand, low to medium plasticity, lensed, consolidated, medium hard, unweathered, damp	
94			96 0-100 0' SAMPLE Recovered 4 0/4 0'= 100% RQD 4 0/4 0' = 100% CLAYEY SILTSTONE same as above	
95			100 0-104 0' SAMPLE Recovered 4 0/4 0' = 100% RQD 1 6/4 0' = 40% CLAYEY SILTSTONE same as above, trace of sand	
96				
97				
98				
99				
100				
101				

WELL NO 32-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
101			104 0-108 0' SAMPLE Recovered 4 0/4 0'= 100% RQD 1 9/4 0' = 48% CLAYEY SILTSTONE same as above	
102			108 0-113 0' SAMPLE Recovered 4 7/5 0' = 94% RQD 3 9/4 7' = 83% CLAYEY SILTSTONE dark gray (N 3/0) to lenses of grayish black (N 2/0), trace very fine-grained sand, massive, layered, well consolidated, hard, low to medium plasticity, damp	
103				
104				
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107				
108				
109				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
109			113 0-117 0' SAMPLE Recovered 3 4/4 0' = 85% RQD 1 9/3 4' = 56% CLAYEY SILTSTONE dark gray (N 3/0), lenses of grayish black (N 2/0), traces of fine sand, low to medium plasticity, massive, well consolidated, hard, occasional slickensides apparent, unweathered, damp	
110				
111				
112				
113				
114				
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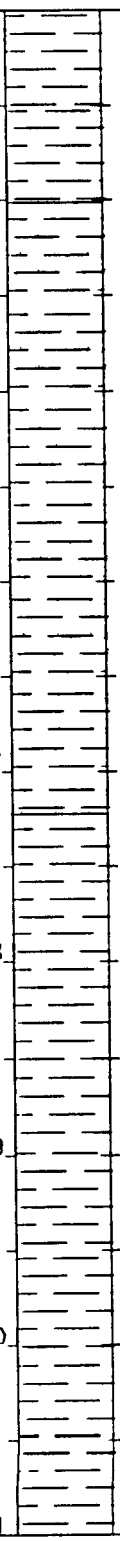
116				
117				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
117			117 0-121 0' SAMPLE Recovered 4 6/4 0' = 115% RQD 4 0/4 6' = 87% SILTY CLAYSTONE dark gray (N 3/0), some very fine-grained sand interbedded, medium plasticity, blocky, hard, consolidated, unweathered, damp	
118			121 0-125 0' SAMPLE Recovered 2 8/4 0' = 70% RQD 1 9/2 8' = 68% SILTY CLAYSTONE dark gray (N 3/0), pockets of grayish black (N 2/0), minor traces of fine-grained sand, lignite pocketed, low plasticity, massive, consolidated, hard, unweathered; damp	
119				
120				
121				
122				
123				
124				
125				

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
125			125 0-129 0' SAMPLE Recovered 4 8/4 0' = 120% RQD 4 0/4 8' = 83% 125 0-127 1' SILTSTONE AND SANDSTONE medium gray (N 5/0) to medium light gray streaked (N 6/0), very fine-grained sand, Vfl (4 0-3 5), non-plastic, moderately cemented, thin streaks of lignite pockets, homogeneous, damp to moist, 127 1-129 0' SILTSTONE medium dark gray (N 4/0) with spots of medium gray (N 5/0), sandy fine-grained, low plasticity, homogeneous, consolidated, hard, small lignite pockets, unweathered, damp 129 0-133 0' SAMPLE Recovered 2 1/4 0' = 53% RQD 2 0/2 1' = 95% CLAYEY SILTSTONE dark gray (N 3/0), low plasticity, homogeneous, consolidated, unweathered, damp	
126				
127				
128				
129				
130				
131				
132				
133				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
133 134 135 136 137 138 139 140 141			133 0-135 0' SAMPLE Recovered 3 9/2 0' = 195%. RQD 1 1/3 9' = 28% 133 0-134.0' SILTSTONE dark gray (N 3/0), thin pockets of medium gray (N 5/0), sandy and clayey, consolidated, homogeneous, medium hard, damp 134 0-135.0' SILTSTONE AND SANDSTONE medium gray (N 5/0), medium dark gray (N 4/0), pockets of medium light gray (N 6/0), very fine-grained sand, lignite streaked, cemented, non-plastic, unweathered, damp 135 0-139 0' SAMPLE Recovered 2 5/4 0' = 63% RQD 2 1/2 5' = 84% 135 0-137 2' SILTSTONE AND SANDSTONE· same as above 137 2-137.5' CLAYSTONE dark gray (N 3/0), medium to high plasticity, blocky, homogeneous, unweathered, damp. 139 0-141 0' SAMPLE Recovered 2 5/2 0' = 125% RQD 2 0/2 5' = 80% SILTSTONE dark gray (N 3/0) to grayish black (N 2/0), some very fine-grained sand; minor pockets of lignite, massive, homogeneous, low plasticity, hard, somewhat blocky, consolidated, damp	134 0-137 2' GEOTECHNICAL SAMPLE (Hydrometer Analysis) 3289134137 17% Sand 83% Silt and Clay 136 77'

3289BRR

WELL NO 32-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
141			141 0-145 0' SAMPLE Recovered 3 8/4 0' = 95% RQD 3 3/3 8' = 87% CLAYEY SILTSTONE dark gray (N 3/0) to grayish black (N 2/0), trace sand, very fine-grained; low to medium plasticity, hard, consolidated, damp.	
142			145.0-149 0' SAMPLE Recovered 4 2/4 0' = 105% RQD 4 0/4 2' = 95% CLAYEY SILTSTONE same as above	
143				
144				
145				
146				
147				
148				
149				

3289BRS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
149			149 0-153 0' SAMPLE Recovered 3 4/4 0' = 85% RQD 1 6/3 4' = 47% CLAYEY SILTSTONE. grayish black (N 2/0) to occasionally dark gray (N 3/0), clayey, traces very fine-grained sand, low plasticity, scattered lignite strings, homogeneous, massive, hard, unweathered; damp.	
150			153 0-157 0' SAMPLE Recovered 4 6/4 0' = 115% RQD 3 6/4 6' = 78% CLAYEY SILTSTONE same as above	
151				
152				
153				
154				
155				
156				
157				

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
157			157 0-161 0' SAMPLE Recovered 4 0/4 0' = 100% RQD 3 85/4 0' = 96%. CLAYEY SILTSTONE medium dark gray (N 4/0) to dark gray (N 3/0), streaks of grayish black (N 2/0), trace very fine-grained sand, low to medium plasticity; massive, hard, consolidated, well cemented; unweathered, damp. 161 0-165 0' SAMPLE Recovered 4 2/4 0' = 105% RQD 4 0/4 2' = 95% CLAYEY SILTSTONE same as above	
158				
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165				

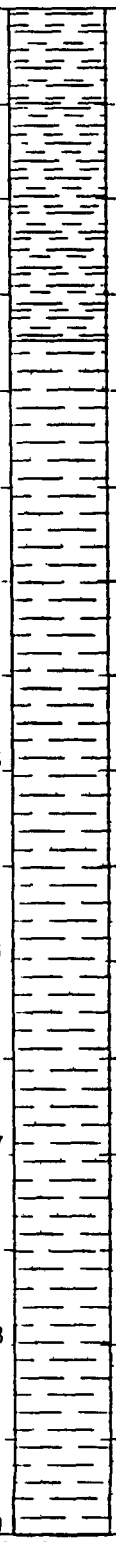
DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
165			165 0-169 0' SAMPLE Recovered 3 7/4 0' = 93%. RQD 2 5/3 7' = 68% SILTSTONE· same as above; some claystone	
166			169 0-173 0' SAMPLE Recovered 4 0/4 0' = 100%. RQD 2 6/4 0' = 65%. SILTSTONE medium dark gray (N 4/0) to dark gray (N 3/0) with some thin beds of medium gray (N 5/0), some sand, low plasticity, homogeneous, hard, well cemented, few small lignite strings, unweathered, damp.	
167				
168				
169				
170				
171				
172				
173				

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
173			173 0-177 0' SAMPLE Recovered 4 0/4 0' = 100% RQD 4 0/4 0' = 100%. SILTSTONE medium dark gray (N 4/0) to dark gray (N 3/0), numerous clay pockets of light brown (5 YR 5/6), some sand; sandy lenses; hard, massive, well cemented, lignite pockets, low plasticity, unweathered damp 177 0-181 0' SAMPLE Recovered 4 0/4 0' = 100% RQD 3 4/4.0' = 85% SILTSTONE· same as above; numerous slickensided surfaces.	
174				
175				
176				
177				
178				
179				
180				
181				

WELL NO 32-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
181 182 183 184 185 186 187 188 189			181 0-185 0' SAMPLE Recovered 3 8/4.0' = 95%. RQD 3.2/3 8' = 84% 181 0-182.7' CLAYEY SILTSTONE grayish black (N 2/0); clayey; homogeneous, medium plasticity, hard; well cemented, unweathered, damp 182.7-184 8' SANDY SILTSTONE medium dark gray (N 4/0) to medium light gray (N 6/0), sandy; very fine-grained; considerably more sand at 184 5', massive; well cemented, hard, occasional light brown (5 YR 6/4) streaked clay pockets, damp 185.0-189 0' SAMPLE Recovered 4 0/4 0' = 100%. RQD 4 0/4 0' = 100% SILTY SANDSTONE medium gray (N 5/0) to medium light gray (N 6/0), thin streaks of dark gray (N 3/0), very fine-grained sands, non-plastic, well consolidated, hard; damp to moist	185 0-192 0' GEOTECHNICAL SAMPLE (Hydrometer Analysis) 3289185192 ~~Results~~ 18% sand 82% silt and clay

3289BRX

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
189			189 0-193 0' SAMPLE Recovered 4 0/4 0' = 100% RQD 3.9/4 0' = 98%. 189 0-192.5' SANDSTONE AND SILTSTONE medium dark gray (N 4/0), thin pockets of medium light gray (N 6/0) and grayish black (N 2/0); black (N 1/0) lignite pockets and stringers; very fine-grained sand; non-plastic, hard, well consolidated, thin bedded; unweathered; damp. 192.5-193 0'· SANDY SILTSTONE same as above, very fine-grained sand; lignite throughout. 193 0-197 0' SAMPLE Recovered 2 7/4 0' = 68%. RQD 2 2/2 7' = 81%. 193 0-193.6' SANDY SILTSTONE medium gray (N 5/0) to medium dark gray (N 4/0), sandy; very fine-grained sand; scattered lignite streaks and pockets; non-plastic; poorly cemented, medium hard, unweathered, damp 193 6-195 7' SANDY CLAYSTONE medium dark gray (N 4/0), pockets of medium light gray (N 6/0), sandy; medium plasticity, blocky, hard, weakly to well cemented, unweathered, moist to damp.	
190				
191				
192				
193				
194				
195				
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197				

WELL NO 32-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
197			197 0-199 0' SAMPLE Recovered 0 55/2 0' = 28% RQD 0 0/0 55' = 0%. CLAYSTONE dark gray (N 3/0), homogeneous; medium plasticity, blocky; medium hard, consolidated, unweathered, damp.	
198			199 0-200 0' SAMPLE. Recovered 0 0/0 0' = 0%. RQD 0.0/0 0' = 0%.	
			200 0-201 0' SAMPLE. Recovered 1.7/1.0' = 170%. RQD 0 7/1.7' = 41%.	
199			CLAYSTONE: dark gray (N 3/0), medium plasticity, homogeneous; blocky; medium hard, consolidated; unweathered, damp.	
			201 0-203 0' SAMPLE Recovered 2 0/2.0' = 100% RQD 0 9/2 0' = 45%.	
200			SILTY CLAYSTONE. dark gray (N 3/0), silty, traces of sand; medium plasticity, moderately consolidated, homogeneous, medium hard, unweathered, damp.	
			TOTAL DEPTH 203 0'	
201				
202				
203				
204				
205				

32B9BRZ

LOG OF BOREHOLE

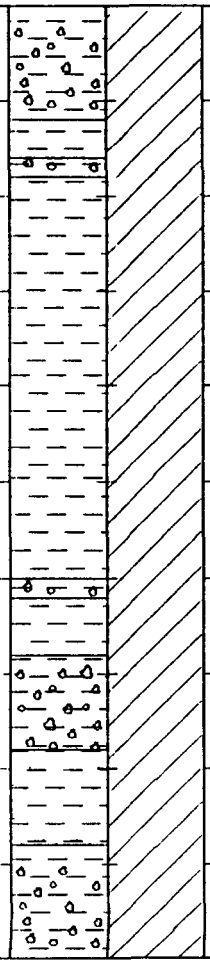
QA BY/DATE Lenna Ebell 8-1-89
LOCATION Rocky Flats Plant, Background
COORDINATES N43,211 47 E22,635 78 (RFP)
TOTAL DEPTH 159 8'

DRILLING COMPANY Boyles Brothers
DATE DRILLED 01/25/89 - 01/26/89
DRILLING METHOD Hollow Stem Auger 0.0-40 7' Rotary Core 40.7'-159.8'
LOGGED BY J Marks, R T Treat
GEOLOGISTS

BOREHOLE/WELL NO 33-89 BR
GROUND SURFACE ELEVATION 5935 8'
WATER LEVEL ENCOUNTERED 18 5'
STATIC 98 26' (6/29/89)
DRILLER R Sharp HELPER P Mesa
DRILLING FLUID None 0 0-40 7', Water 40 7'-159 8'
CHECKED BY James Surman
SITE MANAGER

CEARP MANAGER

COMMENTS Surface casing set at 37 35' on 01/26/89 by J E Marks

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 2' SAMPLE Recovered 1 15/2 2' = 52% 0 0-0 6' GRAVELLY CLAY moderate brown (5 YR 3/4), unstratified, 5% sand, gravel, subrounded, unsorted, vegetation roots; frozen, semi consolidated, caliche zone at 0 5-0 6' with trace sand, moist **ROCKY FLATS ALLUVIUM** 0 6-0 8' CLAY moderate brown (10 R 4/6), unstratified, 10% gravel, moist 0 8-0 9' GRAVELLY CLAY grayish orange (10 YR 7/5), light zone-- does not fizz with HCl, 10% coarse-grained sand, gravel, poorly sorted, subangular, quartzite, hard, moist 0 9-1 15' CLAY same as 0 6-0 8' 2 2-4 4' SAMPLE Recovered 2 2/2 2' = 100% 2 2-3 0' CLAY same as above 3 0-3 1' GRAVELLY CLAY moderate red brown (10 R 4/6), poorly sorted, subangular to subrounded, quartzite, semi-consolidated, moist 3 1-3 4' CLAY moderate red brown (10 R 4/6), medium plasticity, unsorted, moist 3 4-3 9' CLAYEY GRAVEL moderate yellow brown (10 YR 5/4), unsorted to medium sorted, subangular, slightly moist 3 9-4 4' SANDY CLAY caliche zone, pale yellow brown (10 YR 8/6), clay matrix, some gravel, subrounded, dry	No HNu readings were taken

3389BRA

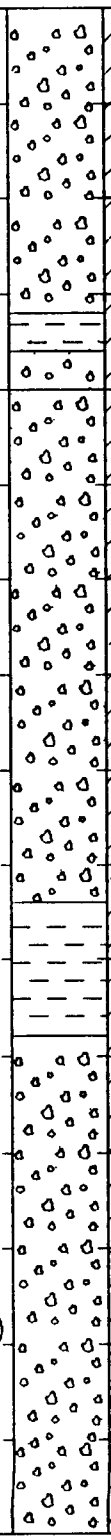
WELL NO 33-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			4 4-6 4' SAMPLE Recovered 2 0/2 0' = 100%. 4 4-6 4' CLAYEY GRAVEL. light brown (5 YR 6/4), up to 0 15' gravel, unsorted, subangular to subrounded; quartzite, clay matrix; effervesces with HCl unconsolidated, dry 6 4-8 4' SAMPLE Recovered 1 9/2.0' = 95% 6 4-7 2' CLAYEY GRAVEL: mottled color, pale yellow brown (10 YR 6/2), subangular, quartzite, dry 7 2-7 3' CLAY grayish orange - pink (10 YR 8/3), moderately hard, dry 7 3-8 0' GRAVEL light brown (5 YR 6/4), to slightly pink, some clay, slight sand, quartzite, not calcium carbonate cemented; very dry 8 0-8 3' GRAVEL same as above except iron staining; some clay; moderate yellow brown (10 YR 5/4), very dry 8 4-10 4' SAMPLE Recovered 0 0/2 0'= 0% 10 4-12 4' SAMPLE Recovered 0 0/2 0' = 0%.	

3389BRB

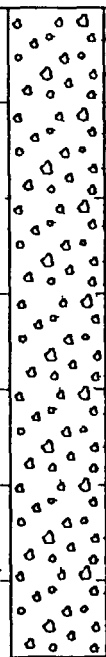
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 16 17 18 19 20 21			**12 4-14 4' SAMPLE** Recovered 0 7/2 0'= 35% GRAVEL. grayish red (5 YR 4/2), some sand, very fine-grained, 3 large cobbles up to 0 15' in diameter, quartzite, 1 pink granite cobble, subangular to angular, unsorted, unconsolidated; dry **14 4-16 4' SAMPLE** Recovered 1 2/2.0'= 60%. 14 4-14 6' GRAVEL granite cobble, light red (5 Y 6/6), subangular, unconsolidated, weathered; dry 14 6-14 8' SANDY CLAY light brown (5 YR 6/4), medium-grained (2 0-1 5 phi), unsorted, subangular clay--slight plasticity, unconsolidated, dry 14 8-15 0' GRAVEL medium light gray (N 6/0), cobbles; angular, quartzite, unconsolidated; dry 15 0-15 6' SANDY GRAVEL moderate yellow brown (10 YR 5/4); cobble size, unsorted, subangular to angular; unconsolidated, dry **16.4-18 4' SAMPLE** Recovered 1 5/2 0'= 75% 16 4-17 7' SANDY GRAVEL light brown (5 YR 5/6), slightly silty, some clay, cobbles up to 0 2', unsorted; subangular, quartzite, unconsolidated, slightly moist 17.7-17 9' CLAY yellow gray (5 YR 7/2), some sand, slightly moist **18 4-20 4' SAMPLE** Recovered 0 5/2 0' = 25% SANDY GRAVEL. pale yellow brown (10 YR 7/2), coarse sand (-0 5 to -0 0 phi), unsorted, subangular, quartzite, some clay, unconsolidated, wet	▽ 18 5'

3389BRC

WELL NO 33-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			20 4-22 4' SAMPLE Recovered 1 4/2 0' = 70% SANDY GRAVEL light brown (5 YR 5/6), coarse sand (-0 5 to -1 0 phi), unsorted; subangular; quartzite, some clay, unconsolidated, wet	
22			22.4-24 4' SAMPLE. Recovered 0 7/2.0' = 35% 22 4-24 4' SANDY GRAVEL same as 20 4-22.4'	
			24 4-26 4' SAMPLE Recovered 0 0/2 0' = 0%	
23			26 4-28 4' SAMPLE Recovered 0.0/2 0' = 0%	
			Due to change in drilling sound and rate - alluvium bedrock contact at ~ 28.5	
24			28 4-30 4' SAMPLE Recovered 0.0/2 0' = 0% SAND grayish orange (10 YR 7/4), coarse-grained sand, subangular; unsorted, wet	
25				
26				
27				
28				
29				

3389BRD

WELL NO 33-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			30 4-32 4' SAMPLE Recovered 0 0/2.0' = 0% 32 4-33 4' SAMPLE Recovered 0 0/2 0' = 0%. 33 4-34 7' SAMPLE Recovered 0 0/1 3' = 0% 34 7-36 7' SAMPLE Recovered 2 1/2 0' = 105% 34 7-35 5' CLAYSTONE. moderate yellowish brown (10 YR 5/4), unstratified, highly plastic, consolidated, moderately hard-hard, weathered, wet. 35 5-36 7' CLAYSTONE light olive gray (5 Y 5/2), same as above	
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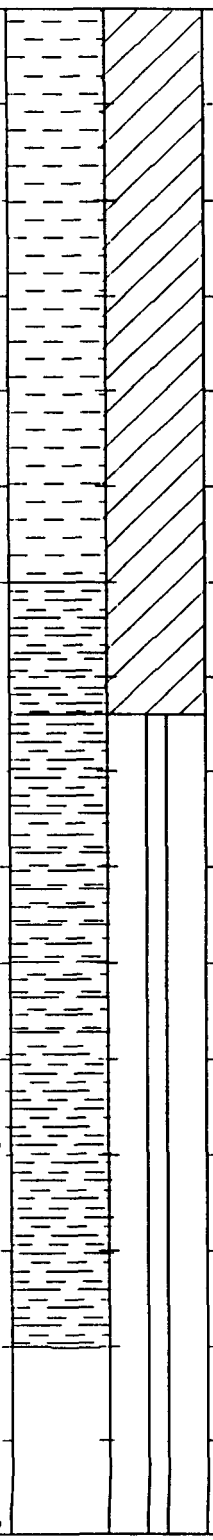
31				
32				
33				
34				
35				
36				
37				

3389BRE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37 38 39 40 41 42 43 44 45			36 7-38 7' SAMPLE Recovered 2 2/2.0'= 110% 36.7-38 7' CLAYSTONE dark olive gray (5 Y 4/2), some iron staining light olive brown (5 Y 5/6), unstratified, highly plastic; unweathered, wet, (same as above) 38 7-40 7' SAMPLE Recovered 2 0/2.0' = 100%. 38.7-40 0' CLAYSTONE dark gray (N 3/0), to olive gray (5 Y 2/1), lignite stringers with organic wood pieces (black with slight iron staining), consolidated, medium plasticity; unweathered; hard, wet 40 0-40 7' SILTY CLAYSTONE medium dark gray (N 4/0), to dusky yellow (5 Y 6/4), slight iron staining, silty in part, consolidated, medium plasticity; unweathered, hard, wet 40 7-44 0' SAMPLE Recovered 3 5/3 3' = 106% RQD 3 3/3 5' = 94% SILTY CLAYSTONE medium light gray (N 6/0), medium gray (N 5/0) to a medium dark gray (N 4/0), iron oxide, medium plasticity, consolidated, medium hard to hard, unweathered, moist to damp	

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			44 0-47 0' SAMPLE Recovered 0 0/3 0' = 0% RQD 0 0/0 0' = 0%.	
46			47 0-48 0' SAMPLE Recovered 0 0/0 0' = 0% RQD 0 0/0 0' = 0%.	
47			48 0-50 0' SAMPLE Recovered 0 3/2.0' = 15% RQD 0 0/0.0' = 0% CLAYSTONE: medium dark gray (N 4/0); slightly silty medium plasticity, consolidated; hard, unweathered, damp.	
48			50 0-52 0' SAMPLE Recovered 1 0/2 0' = 95% RQD 1 5/1 9' = 79% CLAYSTONE medium dark gray (N 4/0), slightly silty medium plasticity, abundant lignite pockets, hard, unweathered, damp	
49				
50				
51				
52				
53				

WELL NO 33-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
53			52 0-55 0' SAMPLE Recovered 3 0/3 0' = 100% RQD 3 0/3 0' = 100% 52 0-53 8' CLAYSTONE· dark gray (N 4/0), silty to very sandy at bottom, low plasticity, hard; unweathered, damp. 53.8-55 0'. SANDY SILTSTONE. light gray (N 7/0), non-plastic, fine-grained sands Vfl (4 0-3 5 phi) hard; unweathered, slightly damp	
54			55 0-55 3' SAMPLE Recovered 0.3/0 3' = 100% RQD 0 0/0 3' = 0% SANDY SILTSTONE same as above, medium dark gray N 4/0)	
55			55 3-59 3' SAMPLE Recovered 2 1/4 0' = 53% RQD 1 8/2 1' = 86% 55 3-57 1' SANDY SILTSTONE same as above 57 1-57 4' SILTY CLAYSTONE dark gray (N 3/0), low plasticity, lignite pockets, medium hard, moist to damp.	
56				
57				
58				
59				
60				
61				

3389BRH

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
61			59 3-62 3' SAMPLE Recovered 0 0/3 0' = 0% RQD 0 0/0 0' = 0%	
62			62 3-63 3' SAMPLE Recovered 0 3/1 0' = 30% RQD 0 0/0 3' = 0%. CLAYSTONE· dark gray (n 3/0), slightly silty, low plasticity; medium hard, blocky, slightly weathered, moist.	
63			63 3-67 3' SAMPLE Recovered 2 9/4 0' = 73%. RQD 2 1/2 9' = 72% CLAYSTONE dark gray (N 3/0), to a grayish black (N 2/0), medium plasticity; lignite streaked, blocky, slicksided in upper 12", medium hard, moist.	
64			67 3-69 0' SAMPLE Recovered 0 0/1 7' = 0% RQD 0 0/0 0' = 0%	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
69			69 0-73 0' SAMPLE Recovered 1 0/4 0' = 25% RQD 0 0/1 0' = 0% CLAYSTONE dark gray (N 3/0), to grayish black (N 2/0), medium plastic, some lignite steaks, blocky; medium hard, moist	
70			73 0-74 0' SAMPLE Recovered 0 3/1 0' = 30%. RQD 0.0/0 3' = 0% CLAYSTONE grayish black (N 2/0), lignite; low plasticity, poorly cemented; blocky; slightly weathered, moist.	
71			74 0-76 0' SAMPLE Recovered 2 6/2 0' = 130%. RQD 1 1/1 1' = 100% CLAYSTONE dark gray (N 3/0), trace of sand, lignite stringers; medium plasticity; poorly cemented; blocky; slightly weathered, damp.	
72				
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
77			76 0-78 0' SAMPLE Recovered 1 1/2 0' = 55% RQD 1 1/1 1' = 100% CLAYSTONE same as above, fine-grained sand at bottom at 78'	
78			78 0-80 0' SAMPLE Recovered 1 6/2 0' = 80% RQD 1 6/1 6' = 100% SILTSTONE AND CLAYSTONE dark gray (N 3/0), trace of fine-grained sand, low plasticity, poorly cemented, consolidated, hard, unweathered, damp	
79			80 0-82 0' SAMPLE Recovered 1 8/2 0' = 90% RQD 1 8/1 8' = 100% SILTSTONE: same as above except some sand	
80			82 0-84 0' SAMPLE Recovered 2 0/2 0' = 100% RQD 2.0/2 0' = 100% SANDY SILTSTONE. medium dark gray (N 4/0), fine-grained sand Vfl (4 0-3 5 phi), well cemented, low to non plastic, unweathered, damp	
81				
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84				
85				

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
85			**84 0-87 0' SAMPLE** Recovered 3 0/3 0' = 100% RQD 1 9/3 0' = 63% 84 0-84 8' SANDY SILTSTONE same as above 84 8-87 0' CLAYEY SILTSTONE medium dark gray (N 4/0); trace of sand, low to medium plasticity, consolidated, unweathered, damp **87 0-91 0' SAMPLE** Recovered 4 0/4 0' = 100% RQD 4 0/4 0' = 100% CLAYEY SILTSTONE same as above	
86				
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93				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
93 94 95 96 97 98 99 100 101			**91 0-95 0' SAMPLE** Recovered 4 0/4 0' = 100% RQD 4 0/4 0' = 100%. CLAYEY SILTSTONE· dark gray (N 3/0), trace of very fine-grained sand; moderately cemented; low to medium plasticity, consolidated; hard, blocky, lignite seam noted @ 91 8-92 0' (1/2" wide), unweathered; damp to slightly damp. **95 0-98 0' SAMPLE** Recovered 2 8/3 0' = 93% RQD 1 8/2 8' = 64% 95 0-96 6' CLAYSTONE. dark gray (N 3/0) medium plasticity, blocky, consolidated, damp. 96 6-97 8' SILTSTONE AND SANDSTONE· medium light gray (N 6/0), to medium gray (N 5/0), fine-grained sand Vfl (4 0-3 5 phi) non-plastic, consolidated; damp. **98 0-100 5' SAMPLE** Recovered 2 5/2 5' = 100% RQD 1 8/2 5' = 72% SILTSTONE medium dark gray (N 4/0), some fine-grained sand, poorly to well cemented, unweathered, damp	

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
101			100 5-104 0' SAMPLE Recovered 3 5/3 5' = 100% RQD 3 5/3 5' = 100% CLAYEY SILTSTONE. dark gray (N 3/0),trace fine-grained sand; low plasticity; consolidated; blocky; unweathered, damp.	
102			104 0-108 0' SAMPLE Recovered 4 3/4 0' = 107% RQD 4 0/4 3' = 93% CLAYSTONE grayish black (N 2/0), to a medium dark gray (N 4/0), low to medium plasticity; blocky lignite noted in upper 1 6' of run, poorly cemented, moist	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
109			108 0-111 0' SAMPLE Recovered 0 0'/3.0' = 0% RQD 0 0/0 0' = 0% 111 0-111 7' SAMPLE Recovered 0 0/0 7' = 0%. RQD 0 0/0 0' = 0% 111 7-112 0' SAMPLE Recovered 0 0/0.3' = 0% RQD 0 0/0 0' = 0% 112 0-114 0' SAMPLE Recovered 0 4/2 0' = 20%. RQD 0 0/0.4' = 0% CLAYSTONE medium dark gray (N 4/0), medium plasticity, blocky; weathered; moist. 114 0-116 0' SAMPLE Recovered 2.0/2 0' = 100% RQD 1 1/2 0' = 55% CLAYEY SILTSTONE dark gray (N 3/0) to grayish black (N 2/0) lignite string noted at 115.7', damp. 116 0-117 0' SAMPLE Recovered 1 0/1 0' = 100% RQD 1 0/1 0' = 100% SANDY SILTSTONE medium dark gray (N 4/0) to medium gray (N 5/0), very fine-grained sand Vfl (4 0-3 5 phi) lignite pockets; medium hard, damp	
110				
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
117			**117 0-121 0' SAMPLE** Recovered 4 0/4 0' = 100% RQD 4 0/4.0' = 100% CLAYEY SILTSTONE. medium dark gray (N 4/0), low plasticity, slicksided streak noted 118-118 2', occasional lignite pockets, unweathered, damp	
118			**121 0-125 0' SAMPLE** Recovered 3 4/4 0' = 85%. RQD 1.9/3.4' = 56%. CLAYEY SILTSTONE same as above except grayish black (N 2/0) to dark gray (N 3/0)	
119				
120				
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LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
125			125 0-127 0' SAMPLE Recovered 1 9/2 0' = 95% RQD 1 35/1 9' = 71% CLAYEY SILTSTONE same as above with trace of sand	
126			127 0-131 0' SAMPLE. Recovered 2 2/4 0' = 55% RQD 1 1/2 2' = 50% CLAYEY SILTSTONE. medium dark gray (N 4/0) to dark gray (N 3/0) low plasticity, non-stratified, homogeneous, consolidated, unweathered; damp.	
119			131 0-132 0' SAMPLE Recovered 1 0/1 0' = 100% RQD 0 01/1 0' = 0% CLAYEY SILTSTONE. same as above	
128			132 0-134 0' SAMPLE Recovered 3 0/2 0' = 150% RQD 1 8/3.0' = 60%. 132 0-132 8' CLAYEY SILTSTONE medium dark gray (N 4/0) to dark gray (N 3/0), low plasticity, non-stratified, homogeneous; consolidated; unweathered, damp 132.8-134.0' SANDSTONE AND SILTSTONE: medium dark gray (N 4/0) to medium gray (N 5/0), fine- grained sand Vfl (4.0-3 5 phi) consolidated, hard, unweathered, damp	
129				
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132				
133				

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
133			134 0-138 0' SAMPLE Recovered 2 8//4 0' = 70%. RQD 2 3/2 8' = 82%. SANDSTONE AND SILTSTONE. same as 132.8-134 0' except sandstone and siltstone thinly bedded.	
134			138 0-140 5' SAMPLE. Recovered 1 1/2 5' = 44% RQD 0 8/1 1' = 73% SANDY SILTSTONE: dark gray (N 3/0); non-plastic, very fine-grained; few noted lignite streaks, well cemented, hard, unweathered, slightly damp.	
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141				

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
141 142 143 144 145 146 147 148 149			140 5-142 5' SAMPLE Recovered 1 4/2 0' = 75%. RQD 1 5/1 5' = 100%. SILTSTONE some sand; dark gray (N 3/0); low plasticity, homogeneous, well cemented; hard, slightly damp 142 4-145 5' SAMPLE Recovered 2 8/3.0' = 93% RQD 2.8/2 8' = 100% SILTY SANDSTONE dark gray (N 3/0) to a (N 5/0) fine-grained, hard, well consolidated, thin streaks of light gray (N 7/0) sands; unweathered; slightly damp 145 5-149 8' SAMPLE Recovered 4 0/4 3' = 93% RQD 4 0/4 0' = 100% 145.5-146 0'. SILTY SANDSTONE. same as above. 146.0-149 9' CLAYEY SILTSTONE dark gray (N 3/0) to light gray (N 7/0) numerous small pockets of fine-grained sand, small lignite pockets; hard, consolidated, slightly damp	

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
149			149 8-153 8' SAMPLE Recovered 4 0/4 0' = 100% RQD 3 2/4 0' = 80%. SANDY SILTSTONE dark gray (N 3/0) to thin streaks of light gray (N 7/0) non plastic, very fine-grained sands; well consolidated, hard, slightly damp 153 8-155 8' SAMPLE Recovered 2.0/2.0' = 100% RQD 2 0/2 0' = 100% SANDY SILTSTONE· same as above	
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157				

WELL NO 33-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
157			**155 8-159 8' SAMPLE** Recovered 4 0-4 0' = 100% RQD 3 9/4 0' = 98% SANDY SILTSTONE. thin streaks of clay pockets, dark gray (N 3/0) to grayish black streaks of (N 2/0) very fine-grained sand, non to low plasticity, hard, well consolidated, small lignite pockets; slightly damp.	
158				
			TOTAL DEPTH = 159 8'	
159				
160				
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163				
164				
165				

3389BRU

LOG OF BOREHOLE

QA BY/DATE Janice Guzman 11-29-89
LOCATION Rocky Flats Plant, Background
COORDINATES N43,740.80 E23,469.07 (RFP)
TOTAL DEPTH 168'

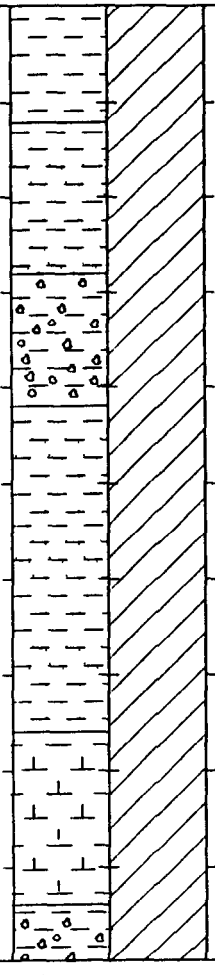
BOREHOLE/WELL NO 34-89 BR
GROUND SURFACE ELEVATION 5920 9'
WATER LEVEL ENCOUNTERED 15 60'
STATIC 77 02' (6/16/89)
DRILLER K Parker, P Bushkovski HELPER T Rodriguez, H McCree

DRILLING COMPANY Boyles Brothers
DATE DRILLED January 27,30, 1989 (03/08/89-03/10/89)
DRILLING METHOD Hollow Stem Auger 0 0-42 0', Rotary Core 42 0-168 0'
LOGGED BY K E Miller, R T Treat
GEOLOGIST

DRILLING FLUID 0.0-42 0' None, 42 0-168 0' Water
CHECKED BY Janice Guzman
SITE MANAGER

CEARP MANAGER

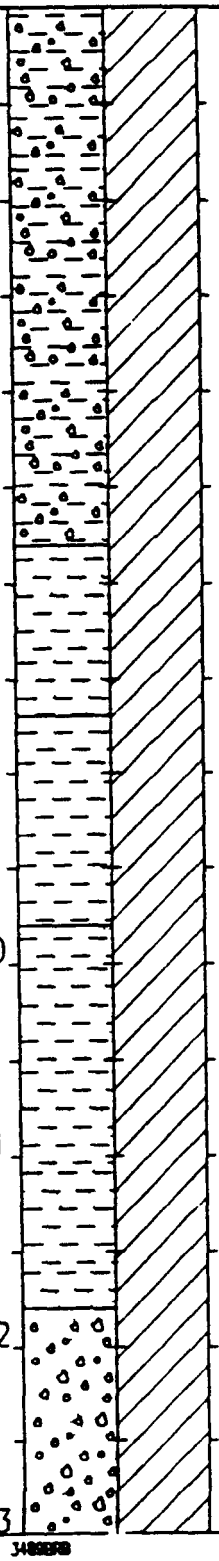
COMMENTS Surface casing set on January 31, 1989, cemented on February 8, 1989 by K E Miller to 42 00'

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-1 8' SAMPLE Recovered 1 8/1 8' = 100% 0 0-0 6' TOPSOIL grayish brown (5 YR 3/2), roots, organic material, unconsolidated, some clay, dry 0 6-1 4' SANDY CLAY moderate brown (5 YR 4/4), roots, small gravel, unconsolidated; 80% clay, 20% sand, dry 1 4-1 8' CLAYEY GRAVEL grayish orangish pink (5 YR 7/2), gravel and moderate brown (5 YR 4/4), clay, poorly sorted, angular, gravel size 1 cm-6 cm **ROCKY FLATS ALLUVIUM** 1 8-3 8' SAMPLE Recovered 1 6/2 0' = 80% 1 8-2 1' GRAVELLY CLAY grayish orangish pink (5 YR 7/2), 70% gravel, some pebbles, poorly sorted, unconsolidated; 1 5-2 0 cm, subrounded, dry 2 1-2 9' SANDY CLAY moderate brown (5 YR 4/4), 85% clay, consolidated, damp 2 9-3 4' CLAYEY SAND dark yellowish orange (10 YR 6/6), to grayish orangish pink (5 YR 7/2), calcareous, unconsolidated at bottom, fine to coarse grained sand, 40% gravel, quartzite and K-feldspars, angular to subangular, 2cm-3cm, dry 3 8-5 8' SAMPLE Recovered 2 0/2 0' = 100% 3 8-4 7' CALICHE grayish orangish pink (5 YR 7/2), 50% clay, 40% gravel, 10% sand, unconsolidated, poorly sorted, gravel 2 0-4 0cm, angular, quartzite, K-feldspars, will effervesce, dry	

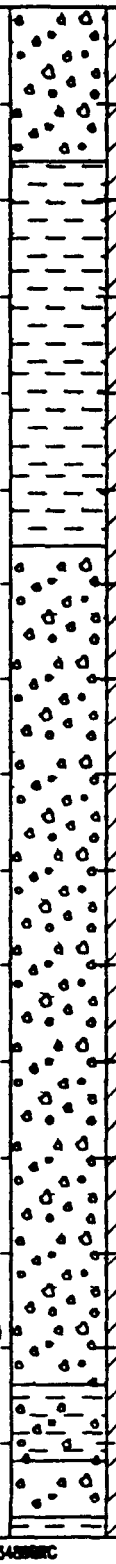
3489BRA

WELL NO 34-89 BR

LOG OF BOREHOLE

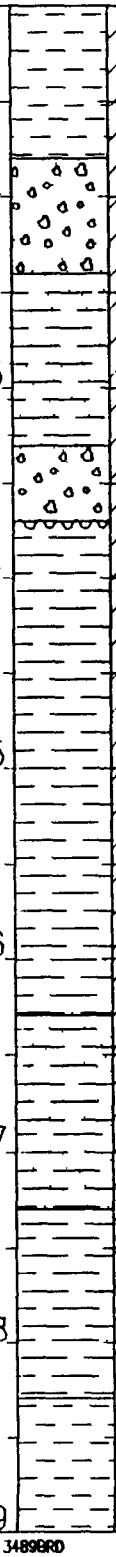
DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			4 7-5 8' GRAVELLY CLAY moderate yellowish brown (10 YR 5/4), 80% clay, 20% gravel, effervesces, some streaking, unconsolidated, size to 5 cm; dry 5 8-7 8' SAMPLE Recovered 0 65/2 0' =32.5% CLAY AND GRAVEL. moderate brown (5 YR 4/4), sand matrix, poorly sorted, calcareous clay, unconsolidated, quartzites to 6cm; angular to sub-angular, damp. 7 8-9 8' SAMPLE Recovered 1 6/2 0' = 80% 7 8-8 7' CLAYEY SAND. grayish orangish pink (10 YR 7/4), sand matrix, quartz grains; subangular, poorly sorted, consolidated, damp 8 7-9 4' CLAY moderate brown (5 YR 3/4), some mottling and streaks, small calcareous lens, effervesces, iron staining, 1 0-0 5 phi, K-feldspars, quartz and biotite noted; damp. 9 8-11 8' SAMPLE Recovered 1 5/2.0' = 75%. SANDY CLAY moderate brown (5 YR 4/4), sand poorly sorted, quartz grains 1 0/0.5 phi, poorly cemented, gravel, unconsolidated; subangular, damp. 11 8-13 8' SAMPLE Recovered 0 9/2.0' = 45%. GRAVELLY SAND. moderate yellowish brown (10 YR 5/4), to 6 cm; quartzite, sand matrix, 0 0 to - 5 phi quartz, some k-feldspars, grainy; very unconsolidated, poorly sorted, subangular to subrounded clay portion, damp	

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 16 17 18 19 20 21			13 8-15 8' SAMPLE Recovered 1 1/2.0' = 55%. SAND AND CLAY. moderate brown (5 YR 3/4), sand matrix, very unconsolidated, poorly sorted, grains to -1 0 phi, quartz; no effervescence, large gravel to 7 cm quartzite and K-feldspars; angular, damp. 15 8-17 8' SAMPLE Recovered 1 0/2.0' = 50%. SANDY GRAVEL pale yellowish brown (10 Y 6/2), sand poorly sorted quartz, gravel 30%, K-feldspars and quartzite; angular to subangular size 0.5-2.0 cm clay at bottom of shoe; moderate brown (5 YR 4/4), consolidated, very wet 17 8-19 8' SAMPLE Recovered 1.3/2.0' = 65%. GRAVELLY SAND· dark yellowish orange (10 YR 6/6), sand poorly sorted, 1 0 to -1 0 phi unconsolidated, gravel 40%, quartzite and K-feldspars, size to 6 cm angular to subangular, very wet 19 8-21 8' SAMPLE Recovered 1 3/2.0' = 65%. 19 8-20 2' SANDY GRAVEL moderate yellowish brown (10 YR 5/0), gravel 65%, K-feldspars and quartzite, subangular to rounded sand 35%, unconsolidated, wet 20 2-20 6' CLAY AND GRAVEL moderate yellowish brown (10 YR 5/4), gravel 40%, subrounded, 3 0-4 0 cm, consolidated, damp 20 6-20 9' SANDY GRAVEL same as 19 8-20 3' 20 9-2 1' CLAY: dusky yellow (5 Y 6/4), interbedded sand quartz, non calcareous 80% clay; consolidated, damp.	▽ 15 6'

WELL NO 34-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21 22 23 24 25 26 27 28 29			21 8-23 3' SAMPLE Recovered 1 5/1 5' = 100% 21 8-22 4' GRAVEL AND SAND moderate yellowish brown (10 YR 5/4), poorly sorted, quartzite and K-feldspars, angular to subrounded, unconsolidated, sand, quartz grains 1 5 to -1 0 phi, wet. 22 4-23 3' SILTY SAND moderate yellowish brown (10 YR 5/4), very fine grained quartz; some clay; high plastic, unconsolidated, slightly damp 23 3-24 3' SAMPLE Recovered 1 1/1 0' = 110% 23 3-23 7' GRAVEL AND SAND moderate brown (5 YR 4/4), unconsolidated, gravel 60%, angular to subangular, sand 40%, poorly sorted 23 7-24 3' SILTSTONE pale yellowish brown (10 YR 6/2), mottling, very fine grained, consolidated, Fe streaks, dark yellowish orange (10 YR 6/6), damp 24 3-25 3' SAMPLE Recovered 1 9/1 0' = 190% SILTSTONE light olive gray (5 Y 6/1), trace clay, consolidated, very fine grained, does not ribbon, slightly damp 24 3-26 3' SAMPLE Recovered 2 0/1 0' = 200% Same as 24 3-25 3' 26 3-27 3' SAMPLE Recovered 1 6/1 0' = 160% SILTY SANDSTONE light gray (N 7/0), no coarse grains, consolidated, some staining, damp 27 3-28 3' SAMPLE Recovered 1 2/1 0' = 120% SILTSTONE medium light gray (N 6/0), trace clay, fine grained, some streaking, damp 28 3-29 3' SAMPLE Recovered 2 0/1 0' = 200% CLAYSTONE medium gray (N 5/0) trace silt, highly weathered, consolidated, damp	

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WELL NO 34-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			29 3-30 4' SAMPLE Recovered 2 0/1 0' = 200%. CLAYSTONE same as 28 3-29 3'	
30			30 3-31 3' SAMPLE Recovered 1 5/1.0' = 150% CLAYSTONE· light olive brown (5 Y 5/6); consolidated, plastic, highly weathered, damp.	
			31 3-32 3' SAMPLE Recovered 2 0/1 0' = 200% CLAYSTONE same as 30 3-31 3'	
31			32 2-33 3' SAMPLE Recovered 1 1/1 0' = 110% CLAYSTONE olive gray (5 Y 3/2), no streaking; mottling, consolidated, base of intensely weathered, damp	
			33 3-34 3' SAMPLE Recovered 1 3/1 0' = 180% CLAYSTONE same as 32.3-33 3'	
32			34 3-35 3' SAMPLE Recovered 2.0/1 0' = 200% CLAYSTONE. same as 32.3-33 3'	
			35 3-36 3' SAMPLE Recovered 1 2/1 0' = 120%. CLAYSTONE olive gray (5 Y 3/2); trace sand; some Fe streaking, no banding, consolidated, damp.	
33			36 3-37 3' SAMPLE Recovered 1 4/1 0' = 140% SANDSTONE medium gray (N 5/0), trace clay and silt, very fine grained, banding, some lignite noted, cemented, dry	
34				
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36				
37				

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			37 3-38 3' SAMPLE Recovered 1 0/1 0' = 100% SANDY SILTSTONE medium gray (N 5/0), some nodules of silt, well cemented silt, unconsolidated, friable, interbedded sand, fining downward, dry	
38			38 3-39 3' SAMPLE Recovered 1 0/1 0' = 100% SILTSTONE medium gray (N 5/0), fining upward, well cemented friable nodules, unconsolidated, very dry	
39			39 3-40 3 SAMPLE Recovered 1 6/1 0' = 160% 39 3-39 8' SILTSTONE medium dark gray (N 4/0), nodules very friable and unconsolidated, fine grained, fining upward, dry 39 8-40 3' CLAYSTONE medium dark gray (N 4/0), plastic, consolidated to unconsolidated, damp	
40			40 3-41 3' SAMPLE Recovered 1 2/1 0' = 120% SILTSTONE medium dark gray (N 4/0), very fine grained, lightly consolidated, sub-plastic, damp	
41			41 3-42 0' SAMPLE Recovered 0 7/0 7' = 100% Same as 40 3-41 3' NOTE 42 0-43 0' 7 7/8" diameter rotary drilled	
42			43 0-45 0' CORE SAMPLE Recovered 0 75/2 0' = 38% RQD 0 0/0 75' = 0% SILTY SANDSTONE light gray (N 7/0) to medium light gray (N 6/0), very fine-grained homogeneous sand Vfl (4 0-3 5 phi) to fl (3 0-2 5 phi), well sorted, poorly cemented, moderately hard, non-plastic, very moist to moist	
43				
44				
45				

WELL NO 34-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			45 0-47 0' CORE SAMPLE Recovered 0 0/2 0' = 0% RQD 0 0/0 0' = 0% 47 0-49 0' CORE SAMPLE Recovered 0 0/2 0' = 0% RQD 0 0/0 0' = 0% 49 0-51 0' CORE SAMPLE Recovered 1 55/2 0' = 78%. RQD 1 55/1 55' = 100% CLAYSTONE dark gray (N 3/0) to grayish black (N 2/0), some sand, very fine-grained sand Vfl (4 0-3 5 phi), low plasticity, moderately cemented, unweathered, medium hard, damp 51 0-55 0' CORE SAMPLE Recovered 3 0/4 0' = 75% RQD 2 7/3 0' = 90% SILTY CLAYSTONE dark gray (N 3/0), trace very fine-grained sand, low plasticity, homogeneous, hard, moderately cemented, blocky, damp	
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3489BRG

WELL NO 34-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
53			55 0-57 0' CORE SAMPLE Recovered 1 7/2 0' = 85% RQD 1 7/1 7' = 100% SILTSTONE medium gray (N 5/0) to medium dark gray (N 4/0), strings and pockets of grayish black (N 2/0) lignite, some very fine-grained sand, homogeneous, low to non-plastic, hard, well cemented, unweathered, damp	
54			57 0-58 0' CORE SAMPLE Recovered 0 5/1 0' = 50% RQD 0 5/0 5' = 100% SANDY SILTSTONE same as above, non-plastic, somewhat coarser grained sands	
55			58 0-62 0' CORE SAMPLE Recovered 3 3/4 0' = 83% RQD 1 7/3 3' = 52% SILTSTONE medium dark gray (N 4/0), blotches and strings of grayish black (N 2/0) lignite, some sand to slightly clayey, homogeneous, low plasticity, well cemented, hard, unweathered, damp	
56				
57				
58				
59				
60				
61				

WELL NO 34-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
61			62 0-66 0' CORE SAMPLE Recovered 3.4/4 0' = 85%. RQD 2 05/3 4' = 60% SILTSTONE same as above, some sand. 66 0-70 0' CORE SAMPLE Recovered 3.9/4 0' = 98% RQD 3 7/3.9' = 95%. SANDY SILTSTONE· medium dark gray (N 4/0) to dark gray (N 3/0); homogeneous, very fine-grained sand, hard; well cemented; layered; unweathered; damp.	
62				
63				
64				
65				
66				
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68				
69				

3489BR1

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
69			70 0-74 0' CORE SAMPLE Recovered 4 0/4 0' = 100% RQD 3 1/4 0' = 78%. SILTSTONE same as above, some sand	
70			74 0-78 0' CORE SAMPLE Recovered 4 0/4 0' = 100% RQD 3 75/4 0' = 94% CLAYEY SILTSTONE dark gray (N 3/0) to a medium dark gray (N 4/0), some very fine-grained sand, low plasticity, homogeneous, massive, moderately cemented, hard, unweathered, damp.	
71				
72				
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77				

WELL NO 34-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
77				77 02'
			78 0-82 0' CORE SAMPLE Recovered 4 0/4 0' = 100% RQD 3 7/4 0' = 93% CLAYEY SILTSTONE same as above, traces of sand	
78			82 0-86 0' CORE SAMPLE Recovered 0 0/4 0' = 0% RQD 0 0/0 0' = 0%	
79				
80				
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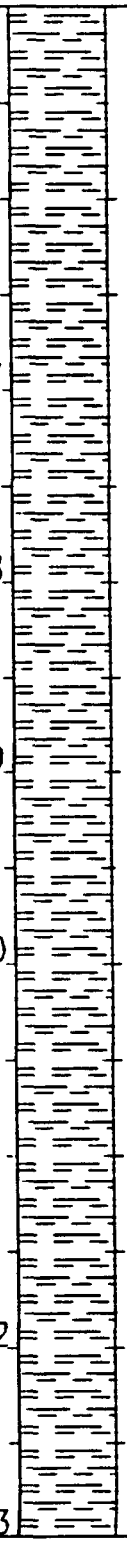
83				
84				
85				

3489BRK

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
85			86 0-87 0' CORE SAMPLE Recovered 5 0/1 0' = 500% RQD 4 5/5 0' = 90% CLAYEY SILTSTONE dark gray (N 3/0) to medium dark gray (N 4/0), trace sand, low to medium plasticity, hard, massive, homogeneous, blocky, unweathered, damp 87 0-91 0' CORE SAMPLE Recovered 4 0/4 0' = 100% RQD 3 6/4 0' = 90% CLAYEY SILTSTONE same as above 91 0-95 0' CORE SAMPLE Recovered 4 5/4 0' = 113% RQD 1 8/4 5' = 45% CLAYEY SILTSTONE same as above	
86				
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93				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
93			95 0-99 0' CORE SAMPLE Recovered 0 0/4 0' = 0% RQD 0 0/0.0' = 0%. 99 0-100 0' CORE SAMPLE Recovered 5 0/1 0' = 500% RQD 4 8/5 0' = 96%. SANDY SILTSTONE same as 86 0-87 0' 100.0-104 0' CORE SAMPLE Recovered 4 0/4 0' = 100%. RQD 2.75/4 0' = 69% SANDY SILTSTONE: medium gray (N 5/0) to medium dark gray (N 4/0), same as above	
94				
95				
96				
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98				
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100				
101				

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
101			104 0-108 0' CORE SAMPLE Recovered 4 0/4 0' = 100% RQD 4 0/4 0' = 100% 104 0-106 6' SANDY SILTSTONE same as above 106 6-108 0' CLAYSTONE medium gray (N 5/0), some medium light gray (N 6/0), homogeneous, blocky, highly plastic, well to moderately cemented, massive, hard to medium hard, damp 108 0-112 0' CORE SAMPLE Recovered 1 5/4 0' = 38% RQD 1 5/1 5' = 100% CLAYSTONE same as above	
102				
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
109			112 0-114 0' CORE SAMPLE Recovered 5 2/2 0' = 260% RQD 4 8/5 2' = 92%. CLAYSTONE same as above.	
110			114 0-118 0' CORE SAMPLE Recovered 2 0/4 0' = 50%. RQD 1 65/2 0' = 83% SILTSTONE· dark gray (N 3/0) to blotches of grayish black (N 2/0) lignite strings; trace to some sand, low plasticity; scattered fragments of a medium light gray (N 6/0); highly cemented; extremely hard, well cemented; damp.	
111				
112				
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114				
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117				

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
117			118 0-120 0' CORE SAMPLE Recovered 3 3/2 0' = 165% RQD 3 0/3 3' = 91% CLAYEY SILTSTONE same as above, trace sand 120 0-124 0' CORE SAMPLE Recovered 3 6/4 0' = 90% RQD 3 3/3 6' = 92% 120 0-121 2' CLAYEY SILTSTONE. grayish black (N 2/0; moderate lignite present 121.2-123 6' SILTY SANDSTONE· medium light gray (N 6/0) to medium gray (N 5/0), non-plastic, massive, fine-grained, hard, well cemented, damp	
118				
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
125			124 0-128 0' CORE SAMPLE Recovered 2 5/4 0' = 63%. RQD 0 4/2 5' = 16% SILTSTONE-SANDSTONE medium light gray (N 4/0) to medium gray (N 5/0) with occasional blotches of grayish black (N 2/0), lignite strings and blotches, poorly to well cemented, layered, hard, non-plastic, very moist to damp	126 0-130 0' GEOTECHNICAL SAMPLE (Hydrometer analysis) 3489126130 55% SAND 45% SILT AND CLAY
126			128 0-131 0' CORE SAMPLE Recovered 1 2/3 0' = 40% RQD 0 9/1 2' = 75%. SILTSTONE medium gray (N 4/0) to dark gray (N 3/0), some sand, massive, homogeneous, non-plastic; poorly cemented to well cemented, damp	
127			131 0-135 0' CORE SAMPLE Recovered 4 2/4 0' = 105% RQD 2 75/4 2' = 65% CLAYEY SILTSTONE: dark gray (N 3/0), low to medium plasticity, massive, homogeneous, moderately cemented, somewhat blocky, hard, unweathered, damp	
128				
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133				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
133			135 0-139 0' CORE SAMPLE. Recovered 4 0/4 0' = 100%. RQD 3 7/4 0' = 93%. CLAYSTONE AND SILTSTONE: grayish black (N 2/0) to a dark gray (N 3/0); some lenses of medium gray (N 5/0); medium plasticity, homogeneous; strings and pockets of lignite, well cemented, hard; massive; well consolidated; blocky; damp.	
134			139 0-143 0' CORE SAMPLE Recovered 3.8/4.0' = 95% RQD 3 1/3 8' = 82%. CLAYSTONE AND SILTSTONE. same as above; trace sand	
135				
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141				

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
141			143 0-147 0' CORE SAMPLE Recovered 0 0/4 0' = 0%. RQD 0 0/0 0' = 0%. SILTY CLAYSTONE grayish black (N 2/0) to dark gray (N 3/0), homogeneous, massive, blocky, low to medium plasticity, hard, well cemented, consolidated, unweathered, slightly damp	
142			147 0-148 0' CORE SAMPLE Recovered 5 0/1 0' = 500% RQD 4 0/5 0' = 80%. SILTY CLAYSTONE. grayish black (N 2/0) to dark gray (N 3/0), homogeneous, low to medium plasticity, massive; hard, well cemented, unweathered, slightly damp	
143			148 0-152 0' CORE SAMPLE Recovered 4 0/4 0' = 100% RQD 3 8/4 0' = 95% CLAYEY SILTSTONE dark gray (N 3/0), few grayish black streaks and pockets of (N 2/0) lignite, trace very fine-grained sand, low plasticity, hard, homogeneous; massive; slightly damp.	
144				
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147				
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149				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
149			152 0-156 0' CORE SAMPLE Recovered 4 0/4 0' = 100%. RQD 3 5/4 0' = 88% SANDY SILTSTONE dark gray (N 3/0), spots of grayish black (N 2/0) lignite, few scattered blotches of light brown (5 Y 5/6), no HCl reaction, massive, non-plastic, homogeneous, hard, well cemented; damp 156.0-160 0' CORE SAMPLE Recovered 4 0/4.0' = 100%. RQD 3 8/4 0' = 95%. SANDY SILTSTONE same as above	
150				
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157				

WELL NO 34-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
157			160 0-164 0' CORE SAMPLE Recovered 4 0/4 0' = 100% RQD 3 2/4 0' = 80%. SILTSTONE· same as above, trace sand.	
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164				
165				

3489BRU

WELL NO 34-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
165			164 0-168 0' CORE SAMPLE Recovered 4 0/4 0' = 100% RQD 3 8/4 0' = 95% CLAYEY SILTSTONE dark gray (N 3/0) to lensed grayish black (N 2/0) with continuing specks of light brown (5 Y 5/6), no HCl reaction, homogeneous, low plasticity, massive, hard, unweathered, damp	
166				
			TOTAL DEPTH· 168 00'	
167				
168				
169				
170				
171				
172				
173				

34BBBRV

LOG OF BOREHOLE

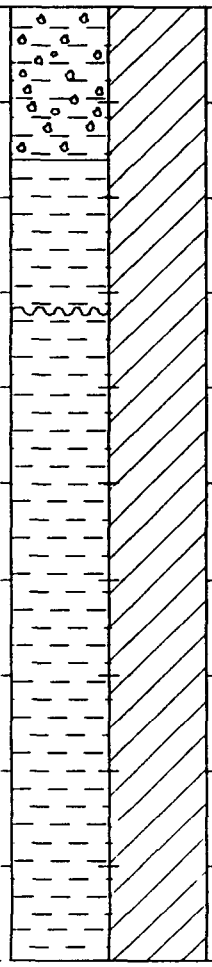
QA BY/DATE Jarell Burman 7-24-89
LOCATION Rocky Flats Plant, Background
COORDINATES N41,904.59 E24,227.96 (RFP)
TOTAL DEPTH 217.8'

DRILLING COMPANY Boyles Brothers
DATE DRILLED 02/14/89, 03/29-31/89, 04/03/89
DRILLING METHOD Hollow Stem Auger 0.0-39.5' Rotary Core 39.5-217.8'
LOGGED BY J.E. Marks, K.E. Miller
GEOLOGIST

BOREHOLE/WELL NO 35-89 BR
GROUND SURFACE ELEVATION 5877.6'
WATER LEVEL ENCOUNTERED None
STATIC 111.56' (7/6/89)
DRILLER R. Sharp, P. Bushkovski HELPER P. Mesa, H. McCree
DRILLING FLUID None 0.0'-39.5', Water 39.5'-217.8'
CHECKED BY Jarell Burman
SITE MANAGER

CEARP MANAGER

COMMENTS Surface casing set by J.E. Marks on February 17, 1989 to 39.50'

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0.0-2.2' SAMPLE Recovered 1.8/2.2' = 82% 0.0-0.8' GRAVELLY CLAY very dusky red (10 R 2/2), gravel up to 0.07', subrounded, unconsolidated, vegetative roots, frozen, moist **COLLUVIUM** 0.8-1.6' CLAY dark yellowish brown (10 YR 4/2), 10% gravel, subangular, quartzite, consolidated, vegetative roots, frozen, moist 1.6-1.8' CLAYSTONE dusky yellowish brown (10 YR 2/2), consolidated, moist 2.2-4.3' SAMPLE Recovered 2.0/2.1' = 95% 2.2-3.1' CLAYSTONE medium dark gray (N 4/0), slightly weathered with iron stain, trace vegetative roots, consolidated, moist 3.1-4.2' CLAYSTONE same as above, gradual color change to olive gray (5 Y 4/1)	

3589BRA

WELL NO 35-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			4 3-6 3- SAMPLE Recovered 2.0/2 0' = 100%. CLAYSTONE. olive gray (5 Y 4/1), to brownish gray (5 YR 4/1), caliche and lignite coal stringers, barely weathered, consolidated; moist	
6			6 3-8 3' SAMPLE Recovered 2 0/2.0 = 100% CLAYSTONE. light olive gray (5 Y 5/2), slightly weathered with small fractures, consolidated; moist	
7			8 3-10 3' SAMPLE Recovered 2.0/2 0' = 100% CLAYSTONE. olive gray (5 Y 3/2), iron stained in part - light brown (5 YR 5/6), black organic flakes (N 1/0), not plastic; consolidated; moderately friable, moist	
8			10 3-12 3' SAMPLE Recovered 2 2/2 0' = 110%. CLAYSTONE· light olive gray (5 Y 5/2), to olive gray (5 Y 3/2), iron stained in part - light brown (5 Y 5/6); caliche stringers toward the bottom; consolidated yet friable; slightly moist.	
9				
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11				
12				
13				

WELL NO 35-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			12 3-14 3' SAMPLE Recovered 2 1/2 0' = 105%. CLAYSTONE olive gray (5 Y 3/2), organic black specks (N 1/0); slightly weathered to not weathered, consolidated; moderately hard, slightly moist	
14			14 3-16 3' SAMPLE Recovered 2 2/2 0' = 110%. CLAYSTONE light olive gray (5 Y 5/2), moderately weathered; abundant iron staining - yellowish orange (10 YR 6/6), black organic wood chips (N 1/0); friable to moderately consolidated, slightly moist.	
15			16 3-18 3' SAMPLE Recovered 1 9/2 0' = 95%. CLAYSTONE light olive brown (5 Y 5/6), abundant fractures with iron staining - light brown (5 YR 5/6); caliche stringer at 17 3' to 17 5', mostly consolidated, slightly moist	
16			18 3-20 3' SAMPLE Recovered 2 1/2.0' = 105%. CLAYSTONE light olive gray (5 Y 5/2); abundant fractures with iron staining - dark yellowish orange (10 YR 6/6); consolidated, yet not hard, slightly moist	
17				
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21				

WELL NO 75-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			20 3-22 3' SAMPLE Recovered 2 1/2.0' = 105%. CLAYSTONE. dark yellowish brown (10 YR 4/2), abundant fractures light brown (5 Y 5/6), consolidated; slightly moist.	
22			22 3-24 3' SAMPLE Recovered 2 2/2.0' = 110%. CLAYSTONE pale brown (5 YR 5/2), abundant vertical fractures - light brown (5 Y 5/6); consolidated; almost dry	
23			24 3-26 3' SAMPLE Recovered 2 2/2.0' = 110%. CLAYSTONE same as above; fractures 0 8' long; caliche - thin fractures; effervesces	
24			26 3-28 3' SAMPLE Recovered 2 0/2 0 = 100%. CLAYSTONE same as above; less iron stained fractures; organic lignite stringers.	
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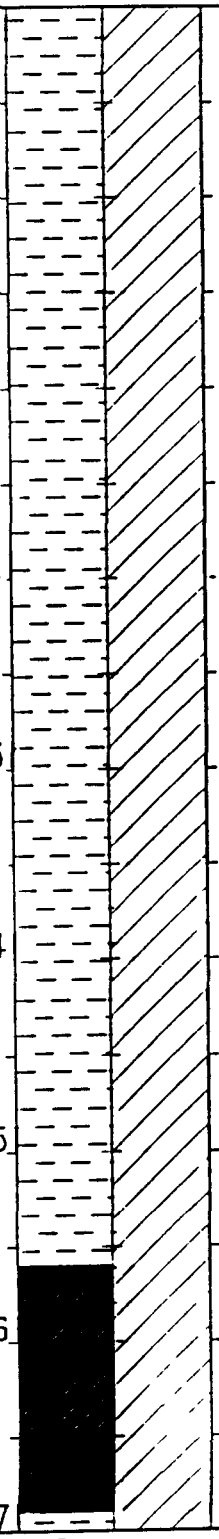
DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29 30 31 32 33 34 35 36 37			28.3-30 3' SAMPLE Recovered 2.1/2.0' = 105% CLAYSTONE· medium dark gray (N 4/0); abundant fractures; light brown (5 YR 5/6), abundant organic lignite - black (N 1/0); caliche speckles; effervesces; slightly moist. 30 3-32.3' SAMPLE Recovered 2.2/2.0' = 110%. CLAYSTONE: olive gray (5 Y 3/2), 0 6' fractures - iron stained - light brown (5 YR 5/6); lignite organic stringers; friable, almost dry. 32.3-34 3' SAMPLE Recovered 2.1/2 0' = 105%. 32.2-33 4 CLAYSTONE: olive gray (5 Y 3/2); 0 8' fracture; iron stained; light brown (5 YR 5/6), organic stringers, black (N 1/0), consolidated, moderately hard except on fractures; slightly moist to dry 33.4-34 3' CLAYSTONE same as above except no fracture 34.3-36 3' SAMPLE. Recovered 2.2/2.0' = 110%. 34.3-35 6'. CLAYSTONE: dusky yellowish brown (10 YR 2/2); to moderate brown (5 YR 4/4); organic rich; vertical fracture - 1 7' long; iron stained; moderate brown (5 YR 4/4), consolidated; slightly moist. 35.6-36.3' LIGNITE black (N 1/0); vertical caliche fractures - white (N 9/0); about 0 03' wide; amber crystals up to 0 02', conchoidal fractures; brittle, dry; base of highly weathered arapahoe claystone at 36.3'	

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37 38 39 40 41 42 43 44 45			36 3-38 3' SAMPLE Recovered 2 1/2 0' = 105% 36 3-36 9' LIGNITE same as above except no fractures 36 9-38 3' CLAYSTONE dusky yellowish brown (10 YR 2/2), slight iron staining, light brown (5 YR 5/6), little to no fractures, organic rich, consolidated, slightly moist 38 3-38 9' SAMPLE Recovered 1 1/0 6' = 180% CLAYSTONE olive gray (5 Y 3/2), same as above, no fractures 40 5-44 0' SAMPLE Recovered 3 2/3 5' = 91% RQD 1 2/3 2' = 37 5% CLAYSTONE dark gray (N 3/0), trace silt - interbedded, moderately plastic, consolidated, damp 44 0-48 0' SAMPLE Recovered 3 9/4 0' = 97 5% RQD 1 7/3 9' = 43 5% CLAYSTONE same as above, carbonaceous, lignite bands, damp	

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45 46 47 48 49 50 51 52 53			48 0-52 0' SAMPLE Recovered 2 9/4 0' = 72 5% RQD 0 7/2 9' = 24% SANDY SILTY CLAYSTONE. medium dark gray (N 4/0), interbedded lignite bands, (30%) very fine-grained sand; (20%) silt, no plasticity, consolidated, dry 52 0-55 8' SAMPLE Recovered 2 0/3 8' = 53% RQD 1 7/2 0' = 85% 52.0-52 7' CLAYEY SILTY SANDSTONE medium dark gray (N 4/0), very fine-grained, (20%) silt, (25%) clay, no plasticity, interbedded lignite--black (N 1/0), consolidated, damp 52 7-54 0' CLAYEY SANDSTONE medium dark gray (N 4/0), trace silt, no plasticity, consolidated, very fine-grained (2 5-3 0 phi), non-calcareous, damp	

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
53			55 8-59 8' SAMPLE Recovered 3 4/4 0' = 85% RQD 2 0/3 4' = 59% 55 8-56 3' CLAYEY SANDSTONE same as above 56 3-59 2' SILTY CLAYSTONE medium dark gray (N 4/0), lignite bands--black (N 1/0), no plasticity, consolidated, damp	
54			59 8-63 8' SAMPLE Recovered 3 0/4 0' = 75% RQD 1 7/3 0' = 57% 59 8-61 9' SILTY CLAYSTONE same as above 61 9-62 5' SANDY SILTY CLAYSTONE medium dark gray (N 4/0), very fine-grained, no plasticity, consolidated, damp 62 5-63 0' SILTY CLAYSTONE medium dark gray (N 4/0), trace sand, very fine-grained, no plasticity, no effervescence, consolidated, lignite bands, black (N 1/0), damp	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
61			63 8-67 8' SAMPLE Recovered 3 4/4 0' = 85% RQD 2 9/3 4' = 85% 63 8-64 4' SILTY CLAYSTONE same as above 64 4-67 2' SANDY SILTY CLAYSTONE medium dark gray (N 4/0), interbedded sandstone nodules--yellowish gray (5 Y 7/2), very fine-grained, interbedded lignite bands up to 3 cm, black (N 1/0), non-calcareous, no plasticity, consolidated, damp 67 8-71 8' SAMPLE Recovered 3 1/4 0' = 77 5% RQD 0 7/3 1' = 22% 67 8-68 8' SANDY SILTY CLAYSTONE same as above 68 8-70 9' SILTY CLAYSTONE medium dark gray (N 4/0), interbedded sandstone lenses up to 0 1', very fine-grained, lignite nodules to 2 cm, black (N 1/0), trace fine-grained sand, damp	
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LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
69			71 8-75 8' SAMPLE Recovered 3 0/4 0' = 75% RQD 1 6/3 0' = 53% SILTY CLAYSTONE medium dark gray (N 4/0), interbedded lignite, trace very fine-grained quartz sand, no plasticity, consolidated, damp	
70			75 8-79 8' SAMPLE Recovered 5 1/4 0' = 127% RQD 3 2/5 1' = 63% SILTY CLAYSTONE same as above, more silt, interbedded iron nodules--dark yellowish orange (10 YR 6/6), less lignite, trace sand, dry	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
77			79 8-81 8' SAMPLE Recovered 2 4/2 0' = 120% RQD 0 0/2 4' = 0% 79 8-80 6' SILTY CLAYSTONE same as above 80 6-81 8' SANDY SILTY CLAYSTONE medium dark gray (N 4/0), very fine-grained quartz, no effervescence; no plasticity, consolidated, carbonaceous, lignite pieces--black (N 1/0), dry 81 8-85 8' SAMPLE Recovered 4 0/4 0' = 100%. RQD 2 3/4 0' = 57% SILTY CLAYSTONE medium dark gray (N 4/0), trace very fine-grained sand, interbedded, no plasticity, consolidated, less lignite, linear fractures, damp	
78				
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
85			85 8-89 8' SAMPLE Recovered 3 8/4 0' = 95%. RQD 2 6/3 8' = 68% 85 8-86 3' SILTY CLAYSTONE same as above 86 3-86 9' SILTY SANDY CLAYSTONE medium dark gray (N 4/0), very fine-grained, lignite bands, vertical, no plasticity, consolidated, dry 86 9-89 6' SILTY CLAYSTONE same as 81 8-85 8', more sand and sandstone nodules--yellowish gray (5 Y 8/1), interbedded layers of lignite, dry 89 8-93 8' SAMPLE Recovered 4 1/4 0' = 102% RQD 3 0/4 1' = 73% 89 8-91 6' SILTY CLAYSTONE same as above 91 6-93 8' SILTY CLAYSTONE same as above, interbedded siltstone nodules--yellowish gray (5 Y 7/2), some lignite--black (N 1/0), trace very fine-grained sand, dry	
86				
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93				

WELL NO 35-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
93			93 8-97 8' SAMPLE Recovered 3 2/4 0' = 80% RQD 2 6/3 2' = 82% SILTY CLAYSTONE same as above 97 8-101 8' SAMPLE Recovered 1 8/4 0' = 45% RQD 1 1/1 8' = 61% SILTY CLAYSTONE same as above, moderately plastic, slightly more carbonaceous, dry	
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98				
99				
100				
101				

3589BRM

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
101			101 8-103 8' SAMPLE Recovered 0 7/2 0' = 35% RQD 0 7/0 7' = 100% SILTY CLAYSTONE. same as above	
102			103 8-104 8' SAMPLE Recovered 1 9/1.0' = 190% RQD 0 0/1 0' = 0% SILTY CLAYSTONE same as 97 8-101 8', less silt, dark gray (N 3/0).	
103			104 8-107 8' SAMPLE Recovered 3 3/3.0' = 110% RQD 2 6/3 3' = 79% 104 8-106 0' SILTY CLAYSTONE same as above, trace fine-grained sand 106 0-107 2' SANDY SILTY CLAYSTONE medium dark gray (N 4/0), fine-grained quartz, well cemented--silica, no plasticity, consolidated, interbedded siltstone nodules, lignite bands, damp 107 2-107 8' CLAYEY SILTY SANDSTONE medium dark gray (N 4/0), very fine-grained (2 5-1 5 phi), non-calcareous; well cemented, no plasticity, consolidated, wet	
104			107 8-111 8' SAMPLE Recovered 0 3/4 0' = 7 5% RQD 0 0/0 3' = 0% SILTY CLAYEY SANDSTONE same as above	106.0-112 0' GEOTECHNICAL SAMPLE (Hydrometer Analysis) 3589106112 24% Sand 76% Silt and Clay
105				
106				
107				
108				
109				

3589BRN

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
109			111 8-112 8' SAMPLE Recovered 3 3/1 0' = 330% RQD 2 0/3 3' = 61% SILTY SANDSTONE medium gray (N 5/0), fine to medium-grained (2 0-1 0 phi), no plasticity, consolidated, trace clay, non-calcareous, increase in silt content with depth, wet Note Excess recovery due to retrieval of lost core from previous run 112 8-116 8' SAMPLE Recovered 3.6/4 0' = 82 5% RQD 2 9/3 6' = 81% SILTY CLAYSTONE medium dark gray (N 4/0), moderately plastic, trace fine-grained sand, lignite, interbedded siltstone nodules; consolidated, damp 116 8-120 8' SAMPLE Recovered 3 1/4 0' = 77 5% RQD 3 1/3 1' = 100% SILTY CLAYSTONE same as above, trace very fine-grained sand	▼ 111 56'
110				
111				
112				
113				
114				
115				
116				
117				

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
117			120 8-124 8' SAMPLE Recovered 4 5/4 0' = 112% RQD 3 1/4 5' = 69% SILTY CLAYSTONE same as above, less silt, chert nodules to 2 cm, moderate yellowish brown (10 YR 5/4), dry	
118			124 8-128 8' SAMPLE Recovered 4 5/4 0' = 112% RQD 4 2/4 5' = 93% 124 8-128 0' SILTY CLAYSTONE same as above, medium light gray (N 6/0), less chert, dry 128 0-128 8' SILTY SANDSTONE brownish black (5 YR 2/1), fining upwards, very fine-grained (3 5-2 5 phi) from 128 0-128 8, no plasticity, consolidated, non-calcareous, very good contact at 128 0' seen, dip +/- 10, lignite pieces noted in shoe, black (N 1/0), damp	
119				
120				
121				
122				
123				
124				
125				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
125			128 8-132 8' SAMPLE Recovered 3 1/4 0' = 77 5% RQD 2 7/3 1' = 87% 128 8-129 3' SILTY SANDSTONE same as above 129 3-130 1' SILTY SANDY CLAYSTONE medium gray (N 5/0), very fine-grained, interbedded sandstone lenses, no plasticity, consolidated, dry 130 1-131 9' SILTY CLAYSTONE medium gray (N 5/0), trace fine-grained sand, no plasticity, unconsolidated, interbedded siltstone nodules, dry 132 8-136 8' SAMPLE Recovered 3 5/4 0' = 87 5%' RQD 2 5/3 5' = 71% SILTY CLAYSTONE same as above, more silt	
126				
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132				
133				

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
133			136 8-140 8' SAMPLE Recovered 4 6/4 0' = 115% RQD 3 0/4 6' = 65% SILTY CLAYSTONE same as above, grading to brownish black (5 YR 2/1), much more carbonaceous, lignite bands--black (N 1/0), dry	
134			140 8-144 8' SAMPLE Recovered 3 8/4 0' = 95% RQD 1 9/3 8' = 50% 140 8-141 6' SILTY CLAYSTONE dark gray (N 3/0), low plasticity, consolidated, platy, highly carbonaceous, damp 141 6-144 6' SILTY CLAYSTONE medium gray (N 5/0), interbedded plant fossils, highly carbonaceous, no plasticity, (35%) silt, trace very fine-grained sand, non-calcareous, consolidated, very hard, dry	
135				
136				
137				
138				
139				
140				
141				

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
141			144 8-148 8' SAMPLE Recovered 0 2/4 0' = 5% RQD 0 0/0 2' = 0% SILTY CLAYSTONE. same as 141 6-144 6'	
142			148 8-149 8' SAMPLE Recovered 4 2/1 0' = 420% RQD 0 0/4 2' = 0% SILTY CLAYSTONE same as 141 6-144 6', grading to medium dark gray (N 4/0), less silt, interbedded lignite bands, dry	
143				
144				
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146				
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149				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
149			149 8-153 8' SAMPLE Recovered 1 0/4 0' = 25% RQD 0 0/1 0' = 0% SILTY CLAYSTONE. same as above	
150			153 8-155 8' SAMPLE Recovered 5 0/2 0' = 250% RQD 0 0/5.0' = 0%. SILTY CLAYSTONE medium dark gray (N 4/0), grading to medium gray (N 5/0), interbedded siltstone lenses, platy, hard, no plasticity, consolidated, dry	
151			155 8-159 8' SAMPLE Recovered 3 5/4 0' = 87 5% RQD 3 1/3 5' = 88% 155 8-158 8' SILTY CLAYSTONE same as above 158 8-159 3' SANDY SILTY CLAYSTONE medium gray (N 5/0), very fine-grained sand, non-calcareous, no plasticity, consolidated, dry	
152				
153				
154				
155				
156				
157				

3589BRT

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
157			159 8-163 8' SAMPLE Recovered 4 6/4 0' = 115% RQD 2 9/4 6' = 63% 159 8-160 3' SANDY SILTY CLAYSTONE same as above 160 3-163.8' SILTY CLAYSTONE same as 153 8-155 8' 163 8-167 8' SAMPLE Recovered 0 0/4 0' = 0% RQD 0 0/0 0' = 0% Note No sample recovered	
158				
159				
160				
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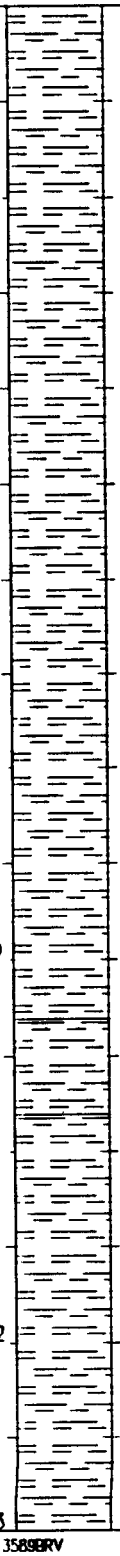
162				
163				
164				
165				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
165			167 8-168 3' SAMPLE Recovered 4 0/0 5, = 800% RQD 0 0/4 0' = 0% CLAYEY SILTSTONE medium gray (N 5/0),(35%) clay, interbedded chert nodules, very hard, consolidated, interbedded lignite streaks, fossiliferous, no plasticity, dry Note Excess recovery due to retrieval of lost core from last run. 168 3-170 8' SAMPLE Recovered 2 8/2 5' = 112% RQD 1 8/2 8' = 64% 168 3-170 3' CLAYEY SILTSTONE same as above 170 3-170 8' SANDY CLAYEY SILTSTONE medium dark gray (N 4/0) to medium gray (N 5/0), very fine grained sand, non-calcareous, highly carbonaceous, interbedded chert nodules, very hard, dry 170 8-174 8' SAMPLE Recovered 4 2/4 0' = 105% RQD 3 5/4 2' = 83%. SILTY CLAYSTONE medium dark gray (N 4/0), trace very fine-grained sand, moderately plastic, consolidated, highly carbonaceous, lignite bands, interbedded chert nodules, dry	
166				
167				
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170				
171				
172				
173				

WELL NO 35-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
173			174 8-177 8' SAMPLE Recovered 2 5/3 0' = 83% RQD 2 0/2 5' = 80% SILTY CLAYSTONE. same as above	
174			177 8-181 8' SAMPLE Recovered 0 3/4 0' = 7 5% RQD 0 0/0 3' = 0% SILTY CLAYSTONE same as above	
175				
176				
177				
178				
179				
180				
181				

3589BRW

WELL NO 35-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
181			181 8-182 8' SAMPLE Recovered 3 1/1 0' = 310% RQD 2 7/3 1' = 87% SILTY CLAYSTONE medium gray (N 5/0), interbedded lignite bands, non-calcareous, no plasticity, consolidated, small chert nodules, dry	
182			182 8-185 8' SAMPLE Recovered 3 1/3 0' = 103% RQD 2 8/3 1' = 90% 182 8-185 1' SILTY CLAYSTONE same as above 185 1-185 8' SANDY CLAYSTONE. medium gray (N 5/0) grading to medium dark gray (N 4/0), trace silt, very fine-grained quartz sand; silica cement, consolidated, no plasticity, dry	
183			185 8-189 8' SAMPLE Recovered 4 4/4 0' = 110% RQD 4 0/4 4' = 91% CLAYEY SANDSTONE medium gray (N 5/0), (35%) clay, interbedded lignite bands, very fine-grained sand (3 0 phi), non-calcareous, no plasticity, consolidated, dry	
184				
185				
186				
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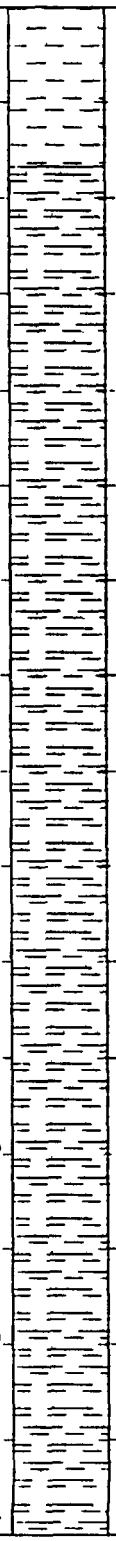
188				
189				

3589BRX

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
189			189 8-193 8' SAMPLE Recovered 4 1/4 0' = 102% RQD 3 5/4 1' = 85% CLAYEY SILTY SANDSTONE medium gray (N 5/0), interbedded clay layers up to 0 2', dark gray (N 3/0), very fine-grained, siltstone nodules, non-plastic, very hard, consolidated, well bedded, wet at top and bottom, portion at 191 0-191 7' dry 193 8-197 8' SAMPLE Recovered 4 0/4 0' = 100% RQD 3 6/4 0' = 90% 193 8-195 9' SANDY SILTY CLAYSTONE medium gray (N 5/0), very fine-grained, lignite stringers, very hard, consolidated, non-plastic, non-calcareous; dry 195 0-197 8' SANDY SILTY CLAYSTONE same as above, more clay, less sand, medium dark gray (N 4/0), consolidated, hard, non-plastic, lignite stringers, dry	
190				
191				
192				
193				
194				
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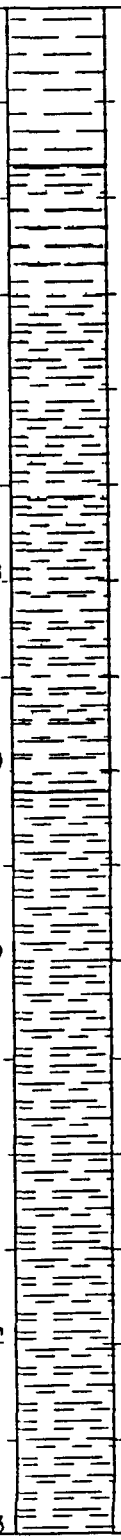
196				
197				

3589BRY

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
197 198 199 200 201 202 203 204 205			197 8-201 8' SAMPLE Recovered 4 2/4 0' = 105% RQD 3.8/4 2' = 90%. 197 8-201 0' SANDY SILTY CLAYSTONE: same as above, less sand, highly carbonaceous, dry 201 0-201 8' SILTY CLAYEY SANDSTONE medium gray (N 5/0), very fine to fine-grained sand; non-calcareous; non-plastic, consolidated, interbedded lignite; very hard, dry 201 8-205 8' SAMPLE Recovered 4 0/4 0' = 100% RQD 3 8/4 0' = 95% SILTY SANDSTONE medium gray (N 5/0), trace clay very fine to fine-grained (3 0-1 0 phi) sand; non-calcareous, interbedded lignite stringers; very hard, well cemented, well sorted; non-plastic, wet	

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
205 206 207 208 209 210 211 212 213			205 8-209 8' SAMPLE Recovered 3 9/4 0' = 97 5% RQD 3 0/3 9' = 77% 205 8-208 8' SILTY SANDY CLAYSTONE medium gray (N 5/0), consolidated, very hard, no plasticity, very fine-grained sand, interbedded lignite bands, dry 208 8-209 1' LIGNITE black (N 1/0), unconsolidated, non-plastic, soft, platy, dry 209 1-209 8' SILTY CLAYSTONE medium gray (N 5/0), non-plastic, hard, consolidated, lignite streaks, trace very fine-grained sand, dry 209 8-213 8' SAMPLE Recovered 4 0/4 0' = 100% RQD 3 1/4 0' = 77 5%. SILTY CLAYSTONE· same as above, more silt, dry	

WELL NO 35-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
213			213 8-217 8' SAMPLE Recovered 4 1/4 0' = 102% RQD 3 4/4 1' = 83% SILTY CLAYSTONE same as above	
214			TOTAL DEPTH = 217 8'	
215				
216				
217				
218				
219				
220				
221				

3589BRZB

LOG OF BOREHOLE

QA BY/DATE Janell Bryman/7-26-89
LOCATION Rocky Flats Plant, Background
COORDINATES N42,344 56 E25,382 07 (RFP)
TOTAL DEPTH 107 0'

DRILLING COMPANY Boyles Bros
DATE DRILLED February 2 and March 21, 22, 1989
DRILLING METHOD Hollow Stem Auger 0 0-49 6'; Rotary Core 49 6'-106 9'
LOGGED BY K E Miller
GEOLOGIST

BOREHOLE/WELL NO 36-89 BR
GROUND SURFACE ELEVATION 5826 9'
WATER LEVEL ENCOUNTERED None
STATIC 88 74' (6/27/89)
DRILLER K Parker, P Bushkovski HELPER T Rodriguez, H McCree
DRILLING FLUID None 0.0-49.60', Water 49.6'-106.9'
CHECKED BY Janell Bryman
SITE MANAGER

CEARP MANAGER

COMMENTS Surface casing set to 49 6' by K E Miller on February 17, 1989

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-1 5' SAMPLE Recovered 1 3-1 5' = 86 6% 0 0-0 4' ORGANIC CLAY very dusky red (10 R 2/2), very unconsolidated, organic materials, roots and grass, dry **COLLUVIUM** 0.4-1 5' CLAY very dusky red (10 R 2/2), trace gravel, quartzite, 1-3 cm, very angular; trace sand, fine to coarse grained, subangular, dry 1 5-3 5' SAMPLE Recovered 1 9/2 0' = 95% CLAY dark yellowish brown (10 YR 4/2), trace gravel, calcareous, strongly reactive HCl, still some rooting, caliche streak cementing, very light gray (N 8/0), consolidated; subplastic, damp 3 5-5 5' SAMPLE Recovered 2.0/2 0' = 100%. 3 5-3 7' CLAY same as 1 5-3 5' 3.7-5 5' same as 1 5-3 5' except no gravel noted; highly weathered, no rooting, dry	

3689BRA

WELL NO 36-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			5 5-7 5' SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE. medium gray (N 5/0), very much fractured, caliche fractures, and iron staining fractures; dark yellowish orange (10 YR 6/6), platy, subplastic, very weathered; very dry. 7 5-9 5' SAMPLE Recovered 2.0/2 0' = 100%. 7 5-7.9' SAND AND CLAY olive gray (5 Y 4/1), unconsolidated, coarse grained, 2 0 to -1 0 phi, quartzose; lignite black (N 1/0), noted, very dry 7 9-9 5' CLAYSTONE same as 5 5-7 5' 9.5-11 5' SAMPLE Recovered 2.0/2.0' = 100% CLAYSTONE same as 5 5-7 5' 11 5-13 5' SAMPLE. Recovered 2.0/2.0' = 100% CLAYSTONE same as 5 5-7 5', also iron fracture stains; highly weathered, dry	

3689BRB

WELL NO 36-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			13 5-15 5' SAMPLE Recovered 2 0/2.0' = 100% CLAYSTONE same as 5 5-7 5' 15 5-17 5' SAMPLE Recovered 2 0/2.0' = 100%. CLAYSTONE· same as 5.5-7 5', except longer fractures up to 0.5'. 17.5-19 5' SAMPLE Recovered 1 9/2 0' = 95% CLAYSTONE olive gray (5 Y 3/2), very platy, consolidated to subconsolidated, subplastic, still intensely weathered, very dry 19 5-21 5' SAMPLE Recovered 2 0/2 0' = 100% 19 5-20 5' CLAYSTONE same as 17 5-19 5' 20.5-21 5' CLAYSTONE dusky brown (5 YR 2/2), black lignite streaks (N 1/0), consolidated; fractured, very platy, some silt-like lenses; very dry	
14				
15				
16				
17				
18				
19				
20				
21				

3689BRC

WELL NO 36-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			21 5-23 5' SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE same as 19 5-20 5'	
22			23 5-25 5' SAMPLE Recovered 2.0/2.0' = 100% CLAYSTONE. same as 19 5-20 5'	
			25 5-27 5' SAMPLE Recovered 2 0/2 0' = 100%. CLAYSTONE same as 19 5-20 5', except more weathered and some note of caliche type cementation; very dry	
23			27 5-29 5' SAMPLE Recovered 2 0/2.0' = 100% CLAYSTONE same as 25 5-27 5', except highly weathered, caliche, very dry	
24				
25				
26				
27				
28				
29				

3689BRD

WELL NO 36-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			29 5-31 5' SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE. same as 25 5-27 5', except no calcareous cement noted 31 5-33 5' SAMPLE Recovered 2 0/2 0 = 100% CLAYSTONE same as 29 5-31 5'. 33 5-35 5' SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE same as 29 5-31 5', except more silt now. 35 5-37 5' SAMPLE Recovered 2 0/2 0' = 100%. CLAYSTONE light brown (5 YR 6/4), trace of silt and lignite; subplastic, very large fractures; rough, iron stained, dark yellowish orange (10 YR 6/6), consolidated to semi-consolidated; very dry	
30				
31				
32				
33				
34				
35				
36				
37				

3689BRE

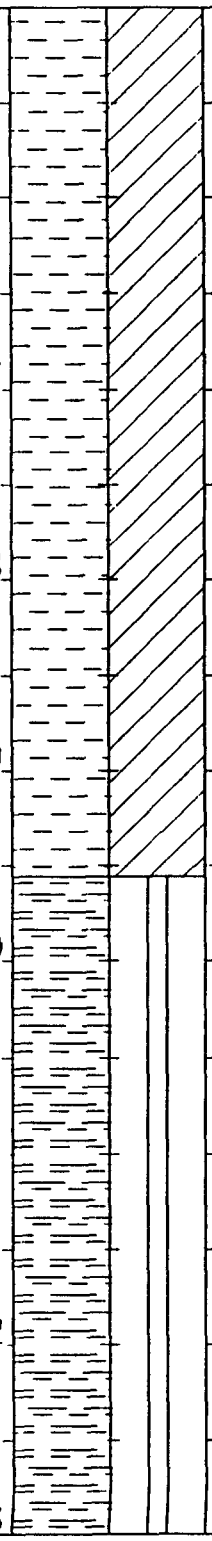
WELL NO 36-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			**37 5-39 5' SAMPLE** Recovered 2 0/2.0' = 100% CLAYSTONE light olive gray (5 Y 5/2), trace of silt, horizontal and vertical fractures, iron staining, dark yellowish orange (10 YR 6/6), consolidated; subplastic, very dry	
38			**39 5-41 5' SAMPLE** Recovered 2.0/2 0' = 100% CLAYSTONE· olive gray (5 Y 3/2), trace silt, less fracturing; more consolidated, plastic, dry	
39			**41 5-43 5' SAMPLE** Recovered 2 0/2 0' = 100% CLAYSTONE· same as 39 5-41 5', except some lignite seen, a few vertical fractures, iron stained	
40			**43 5-45 5' SAMPLE** Recovered 2 0/2 0' = 100% CLAYSTONE olive gray (5 Y 3/2), trace silt, some mottling; less fractures, some lignite, consolidated, plastic, base highly weathered at 43.5', dry.	
41				
42				
43				
44				
45				

3689BRF

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45 46 47 48 49 50 51 52 53			**45 5-47 5' SAMPLE** Recovered 2.0/2.0' = 100% CLAYSTONE AND SILTSTONE olive gray (5 Y 3/2), platy, some siltstone nodules, friable, some lignite present; less fractures, very dry **47.5-49.5' SAMPLE** Recovered 2.0/2.0' = 100%. CLAYSTONE AND SILTSTONE: same as 45 5-47 5' **50.7-53.2' SAMPLE** Recovered 2 8/2.5' = 112%. RQD 1 9/2.8' = 68%. SILTY CLAYSTONE: olive gray (5 Y 4/1); grading to medium dark gray (N 4/0), mottles dark yellowish orange (10 YR 6/6), plastic, consolidated, damp. **53 2-55 2' SAMPLE** Recovered 1.5/2.0' = 75%. RQD 0.0/1.5' = 0%. SILTY CLAYSTONE: medium dark gray (N 4/0), iron nodules of moderate yellow (5 Y 7/6); more silt than previous run; moderately plastic, consolidated; dry	

WELL NO 36-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
53			55 2-59-2' SAMPLE. Recovered 3.75/4 0' = 94% RQD 1 3/3 75' = 35% SILTY CLAYSTONE. medium gray (N 5/0), mottles of medium yellow (5 Y 7/6, consolidated, moderately plastic, damp.	
54			59 2-61 2' SAMPLE Recovered 1 8/2.0' = 90%. RQD 0 0/1.8' = 0%. SILTY SANDSTONE: medium gray (N 5/0), fractured, very fine-grained (2.5-2 0 phi); semi-consolidated; no plasticity, calcareous cement, dry	
55			61 2-65 2' SAMPLE Recovered 2 8/4 0' = 70%. RQD 0 4/2.8' = 14% 61 2-61.7'· SILTY SANDSTONE same as 59 2-61 2' 61 7-64 0' SILTY CLAYSTONE. same as 55 2-59 2'.	
56				
57				
58				
59				
60				
61				

3689BRH

WELL NO 36-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
61			65 2-69 2' SAMPLE Recovered 4 5/4 0' = 112% RQD 2.1/4 5' = 47%. SILTY CLAYSTONE. same as 61 7-64 0'; trace sand; fine-grained; dry. 69 2-73.2' SAMPLE Recovered 2 0/4 0' = 50%. RQD 0 7/2.0' = 35% SANDY SILTY CLAYSTONE: medium dark gray (N 4/0), fine-grained sand (20%), semi-consolidated, no plasticity, some fracturing, dry.	
62				
63				
64				
65				
66				
67				
68				
69				

3689BR1

WELL NO 36-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
69			**73 2-75 2' SAMPLE** Recovered 2 0/2.0' = 100% RQD 1.1/2.0' = 55%. SILTY CLAYSTONE medium dark gray (N 4/0); semi-consolidated; no plasticity, fractured bedding; semi-friable, fine lignite nodules, dry.	
70			**75 2-79 2' SAMPLE** Recovered 3.3/4 0' = 82.5% RQD 1 1/1.3' = 33% SILTY CLAYSTONE same as above, trace fine-grained sand; carbonaceous; dry	
71				
72				
73				
74				
75				
76				
77				

3689BRJ

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
77			79 2-80 2' SAMPLE Recovered 1 7/1 0' = 170% RQD 0 45/1 7' = 26% SILTY CLAYSTONE· same as above, trace sand, dry	
78			80 2-84 7' SAMPLE Recovered 3 7/4 5' = 82% RQD 2 6/3 7' = 70% SILTY CLAYEY SANDSTONE: medium dark gray (N 4/0), good fractures; very fine-grained (3 5-3 0 phi), hard, friable; no plasticity, semi-consolidated, wet	80 2-95 1' GEOTECHNICAL SAMPLE (Hydrometer Analysis) 36898095 9% sand 91% silt and clay
79			84 7-88 9' SAMPLE Recovered 4 0/4 2' = 95%. RQD 2 3/4 0' = 57 5% SILTY CLAYEY SANDSTONE same as above, more silt.	
80				
81				
82				
83				
84				
85				

WELL NO 36-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
85			**88 9-92 9' SAMPLE** Recovered 3.6/4 0' = 90% RQD 0 0/3 6' = 0% SILTY SANDSTONE medium dark gray (N 4/0), interbedded claystone to 0 2', siltstone nodules, very friable, good interbedding, moist	
86			**92 9-96 9' SAMPLE** Recovered 3 8/4.0' = 95%. RQD 0.0/3 8' = 0%. 92.9-95.1'· SILTY SANDSTONE same as above 95 1-96.7'· CLAYSTONE. dark gray (N 3/0), siltstone (98.0-98.4'); plastic; fractured; semi-consolidated, moist	
87				
88				88 74'
89				
90				
91				
92				
93				

3689BRL

WELL NO 36-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
93			96 9-100 9' SAMPLE Recovered 4 2/4 0' = 105% RQD 2 5/4 2' = 59% SILTY CLAYSTONE dark gray (N 3/0), moderately plastic, interbedded dark gray (N 3/0) siltstone (98 0-98 4'), fine-grained, semi-consolidated, layered; damp.	
94			100 9-104 9' SAMPLE Recovered 1 0/4 0' = 25% RQD 1 0/1 0' = 100% SILTY CLAYSTONE same as above	
95				
96				
97				
98				
99				
100				
101				

3689BRM

WELL NO 36-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
101			**104 9-106 9' SAMPLE** Recovered 3 0/2 0' = 150% RQD 0 0/3.0' =0% SILTY CLAYSTONE same as 96 9-100 0', interbedded silt and siltstone nodules at 105 2-105.6', damp.	
102				
			TOTAL DEPTH = 107 0'	
103				
104				
105				
106				
107				
108				
109				

3689BRN

LOG OF BOREHOLE

QA BY/DATE [illegible] / 9/8/89
LOCATION Rocky Flats Plant, Background
COORDINATES N31,688.14 E23,092.28 (RFP)
TOTAL DEPTH 641.0'

BOREHOLE/WELL NO 37-89 BR
GROUND SURFACE ELEVATION 5833.0'
WATER LEVEL ENCOUNTERED 4.0'
STATIC 11.57' (6/23/89)
DRILLER T. Parmo, P. Bushkovski HELPER C. Devrous, K. Martin, H. McCree
DRILLING FLUID 0.0-11.5' Air, 11.5-29.0' None, 29.0-641.0' Water
CHECKED BY [illegible]
SITE MANAGER

CEARP MANAGER

DRILLING COMPANY Boyles Brothers
DATE DRILLED April 19-20, April 27, May 10, 1989
DRILLING METHOD Rotary Percussion Hammer 0.0-15.5, Hollow Stem Auger 15.5-29.0, Rotary Core 29.0-222.0', Rotary 222.0-641.0'
LOGGED BY K.W. Van Allen, J.E. Marks
GEOLOGIST

COMMENTS Percussion drilling to 15.5', collected continuous samples with hollow stem auger from 15.5' to 29.0'. Surface casing set to 29.0' on 04/21/89 by K.W. Van Allen

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			**TOPSOIL** 0.0-1.0' CUTTINGS SILTY CLAY dusky yellowish brown (10 YR 2/2), some (20%) coarse to fine-grained sand, trace (10%) coarse to fine quartzose gravel; occasional cobbles, some organics, moist **VALLEY FILL ALLUVIUM** 1.0-5.0' CUTTINGS SILTY TO CLAYEY SAND AND GRAVEL dusky yellowish brown (10 YR 2/2), (40%) coarse to fine-grained quartzose sand, (35%) coarse to fine quartzose gravel, (25%) silt/clay, occasional cobbles, poorly sorted; moist, wet below 4' 5.0-10.5' CUTTINGS SILTY SAND AND GRAVEL pale yellowish brown (10 YR 6/2), (40%) coarse to fine-grained quartzose sand, (35%) coarse to fine quartzose gravel, occasional cobbles, poorly sorted, moist	▽ 4.0'
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3789BRA

WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			10 5-15 5' CUTTINGS SILTY CLAYSTONE dark yellowish brown (10 YR 4/2), trace fine-grained sand, weathered, consolidated, damp	
6				
7				
8				
9				
10				
11				11 57'
12				
13				

37B9BRB

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			15 5-17 0' SAMPLE Recovered 2 0/1 5' = 133%. SILTY CLAYSTONE dark yellowish brown (10 YR 4/2) and moderate yellowish brown (10 YR 5/4), trace fine-grained sand; consolidated, slightly weathered; moist	
14			17 0-18 5' SAMPLE Recovered 2 0/1 5' = 133%. SILTY CLAYSTONE same as above; damp	
15			18 5-20 0' SAMPLE Recovered 1 5/1.5' = 100% SILTY CLAYSTONE: same as above; also olive gray (5 Y 4/1)	
16			20 0-22 0' SAMPLE Recovered 2 0/2 0' = 100% CLAYEY SILTSTONE olive gray (5 Y 4/1) and moderate brown (5 YR 4/4), trace fine-grained sand, stratified, weathered, consolidated, damp	
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21				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21 22 23 24 25 26 27 28 29			22 0-24 0' SAMPLE Recovered 1 8/2.0' = 90% CLAYEY SILTSTONE olive gray (5 Y 4/1), trace fine-grained sand, massive, consolidated, base of highly weathered claystone at 24 0', moist. 24 0-26 0' SAMPLE Recovered 1 5/2 0' = 75% SILTY CLAYSTONE medium dark gray (N 4/0), trace fine-grained sand; consolidated, massive, unweathered; moist 26 0-27 0' SAMPLE Recovered 1 5/1 0' = 150% SILTY CLAYSTONE same as above 27 0-29 0' SAMPLE Recovered 1 5/2 0' = 75%. SILTY CLAYSTONE: same as above, damp to moist.	

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			30 0-34 0' SAMPLE Recovered 4 3/4 0' = 107% RQD 4 1/4 3' = 95% 30 0-30 6' CLAYSTONE olive gray (5 Y 3/2), some iron-staining--light brown (5 YR 5/6), slightly weathered, good plasticity; consolidated, moderately soft; moist to damp 30 6-34 0' SILTY SANDSTONE: olive gray (5 Y 4/1) to medium gray (N 5/0), fine-grained sand (2.0-4.0 phi), well sorted; quartzose; abundant silt in places, some organic pieces--black (N 1/0), unweathered; consolidated; moderately soft; wet. 34 0-38 0' SAMPLE Recovered 3 9/4 0' = 48% RQD 3 3/3 9' = 85%. SILTSTONE AND SANDSTONE olive gray (5 Y 4/1) to medium gray (N 5/0), interbedded; very sandy in places and very silty in places, abundant organic pieces and specks in places, unweathered, consolidated, moderately soft, wet	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37 38 39 40 41 42 43 44 45			38 0-42 0' SAMPLE Recovered 2.0/4.0' = 50%. RQD 1 3/2 0' = 65% 38 0-39 8' SILTY SANDSTONE light olive gray (5 Y 6/1) to medium gray (N 5/0), very fine-grained sand (4 0-3 5 phi), well sorted; very silty in places, very carbonaceous toward the bottom; abundant lignite pieces throughout--black (N 1/0), unweathered; consolidated; moderately soft; wet. 39 8-40 0'· CLAYEY SANDY SILTSTONE: dusky yellowish brown (10 YR 2/2); interbedded, very carbonaceous; abundant organic pieces and specks--brownish black (5 YR 2/1); consolidated; moderately hard, damp 42 0-44 0' SAMPLE Recovered 2 7/2 0' = 135%. RQD 2.1/2 7' = 78%. 41 3-42 2' CLAYEY SANDY SILTSTONE same as above 42 2-44 0' SANDY CLAYEY SILTSTONE olive gray (5 Y 4/1), less carbonaceous, interbedded, trace organic pieces and specks; consolidated, moderately hard, damp 44 0-48 0' SAMPLE Recovered 3 9/4 0' = 98%. RQD 3 3/3 9' = 85% SANDY CLAYEY SILTSTONE same as above, abundant lignite pieces in places--black (N 1/0)	

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45 46 47 48 49 50 51 52 53			48 0-52 0' SAMPLE Recovered 3 8/4 0' = 95% RQD 2 9/3 8' = 76% SANDY CLAYEY SILTSTONE olive gray (5 Y 4/1), interbedded, abundant organic pieces in places--brownish black (5 Y 2/1), trace light clay discoloration around 49 2'--light brown (5 YR 6/4), consolidated, moderately hard; damp. 52 0-55 0' SAMPLE Recovered 3.7/3.0' = 123%. RQD 3 1/3.7' = 84%. Note: Excess core recovered from previous run. 51 3-52.0' CLAYEY SANDY SILTSTONE: same as above, less clay and more sand 52 0-52 1' SIDERITE moderate yellowish brown (10 YR 5/4), effervesces on powdered surface, very hard, consolidated, (Recovered from last run), dry 52 1-55.0' CLAYEY SANDY SILTSTONE: same as 51 3-52 0', interbedded, abundant organic pieces and manganese oxide specks--dusky brown (5 YR 2/2), some clay discoloration in places--grayish orange (10 YR 7/4), consolidated, moderately soft; damp.	

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
53			55 0-59 0' SAMPLE Recovered 4 2/4 0' = 105%. RQD 3 4/4 2' = 81%. CLAYEY SILTSTONE. olive gray (5 Y 3/2), interbedded, 10% very fine-grained sand in places, abundant organic surfaces and pieces--grayish black (N 2/1), trace clay discoloration in places--grayish orange (10 YR 7/4), consolidated; moderately hard, damp.	
54				
			59 0-63 0' SAMPLE Recovered 3 8/4 0' = 95%. RQD 3 6/3 8' = 95%. CLAYEY SANDY SILTSTONE· olive gray (5 Y 4/1), interbedded, highly stratified; very sandy in places; abundant organic pieces and surfaces--olive black (5 Y 2/1), trace clay discoloration--grayish orange (10 YR 7/4), does not effervesce, consolidated, moderately hard, damp.	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
61			**63 0-67 0' SAMPLE** Recovered 4 0/4 0' = 100%. RQD 3 8/4 0' = 95% CLAYEY SANDY SILTSTONE: same as above, more organic pieces, clay, specks and discoloration; possibly vugs; some chert or siderite concretions up to 2 cm; hard	
62			**67 0-71 0' SAMPLE** Recovered 4 0/4 0' = 100%. RQD 3.6/4.0' = 90%. SANDSTONE AND SILTSTONE: olive gray (5 Y 4/1), thinly interbedded; varved; very fine-grained sand (4.0-3 5 phi); well sorted; quartzose, 10% clay throughout, very sandy in places, trace clay discoloration--grayish orange (10 YR 7/4); trace organic specks; consolidated, moderately hard; damp to wet	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
69			**71 0-75 0' SAMPLE** Recovered 2 6/4 0' = 65%. RQD 0 5/2 6' = 19% CLAYEY SILTY SANDSTONE· olive gray (5 Y 4/1); interbedded; varved, very sandy throughout; very fine-grained (4 0-3 5 phi), well sorted, abundant organic specks--olive black (5 Y 2/1), consolidated yet friable, moderately soft; wet	
70			**75 0 78 0' SAMPLE** Recovered 3 3/3.0' = 110% RQD 2.5/3 3' = 76% SILTY SANDSTONE light olive gray (5 Y 6/1), interbedded; varved, dark and light in places--heavy minerals--mica flakes; platy--breaks on beds; very fine-grained sand (4 0-3.5 phi), well sorted, trace organic specks, 15 to 20 degree dip in the beds, consolidated, friable; soft, wet.	
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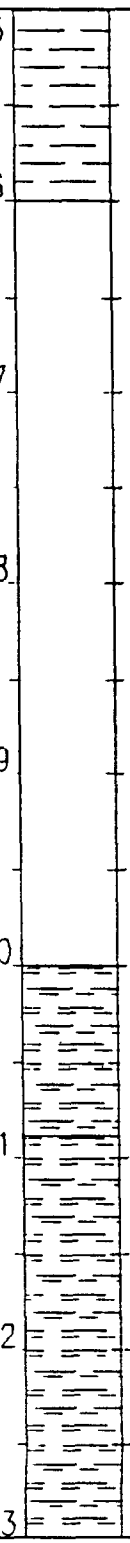
DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
77 78 79 80 81 82 83 84 85			**78 0-82 0' SAMPLE** Recovered 4 2/4 0' = 105%. RQD 3 6/4 2' = 86% SILTY SANDSTONE light olive gray (5 Y 6/1), interbedded, varved, dark to light olive gray (5 Y 4/1), fine-grained sand (3.0-2 5 phi), well sorted; quartzose; some dark minerals, organic pieces and surfaces--olive black (5 Y 2/1), approximately 15 degree dip, consolidated, friable; moderately soft, wet. **82 0-86 0' SAMPLE** Recovered 4 3/4 0' = 108% RQD 3 8/4 3' = 88% SILTY SANDSTONE medium gray (N 5/0) to olive black (5 Y 2/1) in places, varved with dark and light layers; very fine-grained sand (3 0-2 5 phi), well sorted, mostly quartz, trace clay/siderite discolorations and concretions in part, grayish orange (10 YR 7/4), moderately hard; slight to no effervescence, very carbonaceous and clayey in shoe--dusky brown (5 YR 2/2), consolidated, moderately soft, wet	**84 0-89 0' GEOTECHNICAL SAMPLE** (Hydrometer Analysis) 3789BR8489 23% sand 77% silt/clay

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
85			**86 0-90 0' SAMPLE** Recovered 3 8/4 0' = 95%. RQD 3 1/3.8' = 82%. SANDSTONE: medium gray (N 5/0); almost conglomeratic looking at the top--soft sediment deformation, coarse to fine-grained sand; mostly quartzose; gradational changes, very silty in part--more toward the bottom, (10%) clay; abundant lignite stringers up to 8 cm thick--olive black (5 Y 2/1), clay and siderite nodules up to 3 cm--yellowish gray (5 Y 7/2) to grayish orange (10 YR 7/4), trace effervescence; hard, consolidated; friable; moderately soft, damp to wet **90 0-94 0' SAMPLE** Recovered 1 1/4 0' = 28% RQD 0 6-1 1' = 55% SANDY CLAYEY SILTSTONE· olive gray (5 Y 4/1) to medium gray (N 5/0), trace organic pieces--olive black (5 Y 2/1), and clay-siderite discoloration; no plasticity, consolidated, moderately hard, damp.	
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92				
93				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
93 94 95 96 97 98 99 100 101			94 0-95 0' SAMPLE Recovered 4 1/1 0' = 410% RQD 3 2/4 1' = 78% 90.9-94 8' SILTY CLAYSTONE dark greenish gray (5 G 4/1), trace organic stringers; slight to no plasticity, moderately hard; damp to dry 94 8-95 0 SILTY CLAYSTONE: brownish black (5 YR 2/1), dull, very carbonaceous, slight plasticity, moderately hard; damp to dry. 95 0-99 0' SAMPLE Recovered 4 3/4 0' = 108%. RQD 4 3/4 3' = 100% 95 0-96 0' SILTY CLAYSTONE same as above, olive black (5 Y 2/1). 96.0-99 0' CLAYEY SILTSTONE: olive gray (5 Y 4/1) to dark greenish gray (5 G 4/1), glauconitic, trace organic pieces; trace clay discoloration up to 3 mm--vugs, consolidated, moderately hard; damp. 99 0-103 ' SAMPLE Recovered 3.9/4 0' = 98%. RQD 3 7/3 9' = 95%. 99 0-101 7' SANDY SILTSTONE greenish gray (5 G 6/1) to medium light gray (N 6/0), fairly homogeneous; very sandy in places--especially toward the bottom, very fine-grained (4.0-3.5 phi), well sorted, well cemented with silica, consolidated, hard, damp 101 7-103 0' SILTY SANDSTONE. same as above, more sand and less silt, gradational contact.	

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
101			**103 0-107 0' SAMPLE** Recovered 3 0/4 0' = 75% RQD 2 2/3 0' = 73% SILTY SANDSTONE: medium light gray (N 6/0), varved dark to light; soft sediment deformation in bedding planes; very silty toward bottom; some lignite pieces--very dusky red (10 R 2/2), very well cemented with silica--more so at bottom, consolidated; hard; damp.	
102				
			107.0-110 0' SAMPLE Recovered 2 9/3 0' = 97%. RQD 1 8/2 9' = 62%. CLAYEY SILTSTONE medium dark gray (N 4/0) to olive gray (5 Y 4/1), 10% sand in places; very fine-grained (4 0-3 5 phi), more clayey toward bottom, varved near top; trace organic surfaces--trace slickensides, trace siderite nodules up to 5 mm; well cemented, dense, consolidated; moderately hard, damp to dry	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
109			**110 0-113 0' SAMPLE** Recovered 3 1/3 0' = 103% RQD 1 9/3 1' = 61% CLAYEY SILTSTONE olive gray (5 Y 4/1), fairly homogeneous; massive in part, no plasticity, moderately hard; damp to dry	
110			**113.0-117 0' SAMPLE** Recovered 4.4/4.0' = 110% RQD 2.6/4 4' = 59%. 113 0-116.5' SILTY SANDSTONE greenish gray (5 G 6/1), fairly homogeneous; very fine-grained sand; well sorted, quartzose, thin vertical lignite stringers toward top--olive black (5 Y 2/1), consolidated yet friable; moderately soft; wet 116 5-117 0' SILTY CLAYSTONE. olive gray (5 Y 4/1), gradational contact, soft, damp	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
117 118 119 120 121 122 123 124 125			117 0-121 0' SAMPLE Recovered 4 2/4 0' = 105% RQD 3 2/4 2' = 76%. 117 0-118 3' SILTY CLAYSTONE: same as above, lignite surfaces in part 118.3-119.0' SILTY SANDSTONE light gray (N 7/0), very fine-grained (4.0-3 5 phi); tight; consolidated; soft; wet 119 0-121 0' SILTY CLAYSTONE same as 116.5 to 118 3', approximately 10 degree dip of beds; slight plasticity, consolidated; moderately hard; damp 121 0-125 0' SAMPLE Recovered 4 3/4 0' = 108%. RQD 3 5/4 3' = 81%. SILTY CLAYSTONE: olive gray (5 Y 4/1) to (5 Y 3/2), massive, unstratified; very silty in part, trace organic pieces; slight plasticity, consolidated, moderately hard, damp	

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
125			125.0-129 0' SAMPLE. Recovered 2.9/4 0' = 73%. RQD 2 6/2 9' = 90% CLAYEY SILTSTONE· olive gray (5 Y 4/1), massive, very carbonaceous throughout; abundant lignite pieces, hard, damp.	
126			129 0-132 0' SAMPLE Recovered 3.3/3 0' = 110%. RQD 0.6-3 3' = 18%. CLAYEY SILTSTONE olive gray (5 Y 2/1), very carbonaceous in part, 10% sand in part; trace clay discoloration--possibly vugs--light brown (5 YR 6/4), very clayey near bottom--moderate plasticity, abundant organic pieces near bottom, slight plasticity overall; consolidated, moderately soft, damp	
127				
			132 0-136 0' SAMPLE Recovered 3 9/4 0' = 98% RQD 3 5/3 9' = 90%. CLAYEY SILTSTONE· olive gray (5 Y 3/2), massive; very clayey in places; 5% very fine-grained sand; some clay vugs between 133.0-134 2--grayish orange (10 YR 7/4), trace organic pieces; consolidated, moderately hard, dry	
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3789brq

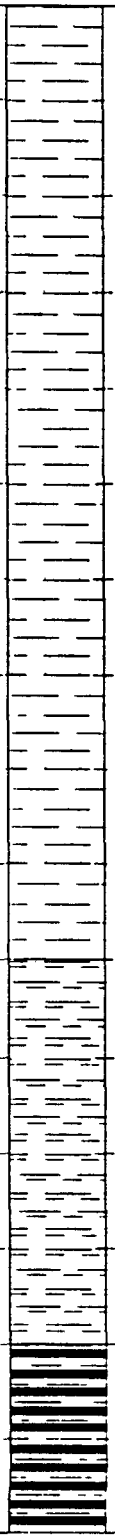
WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
133 134 135 136 137 138 139 140 141			136 0-140 0' SAMPLE Recovered 4 0/4 0' = 100% RQD 3 8/4.0' = 95%. 136.0-138 0' SILTY CLAYSTONE: olive gray (5 Y 4/1), massive; moderately hard; damp 138 0-138 2' LIGNITE olive black (5 Y 2/1), moderately soft, damp. 138 2-140 0' CLAYEY SILTSTONE: olive gray (5 Y 4/1); abundant organic pieces; trace clay vugs in part--grayish orange (10 YR 7/4), pyrite crystals up to 2mm; iron-stained, weathered; moderately hard; dry. 140 0-143 0' SAMPLE Recovered 0 0/3 0' = 0%	

3789BRR

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
141 142 143 144 145 146 147 148 149			143 0-144 0' SAMPLE Recovered 3 8/1 0' = 380%. RQD 3 6/3 8' = 95% CLAYEY SILTSTONE olive gray (5 Y 4/1) to dark greenish gray (5 G 4/1), massive; fairly homogeneous, 10% sand in places; trace lignite stringers and pieces up to 2 cm thick--olive black (5 Y 2/1), no plasticity; moderately hard, damp to dry 144 0-148 0' SAMPLE Recovered 0.8/4.0' = 20%. RQD 0 4/0.8' = 50% CLAYEY SILTSTONE: same as above, less silt, more clay 148 0-149 0' SAMPLE Recovered 4 3/1 0' = 430% RQD 4 3/4 3' = 100%. SANDSTONE AND SILTSTONE. olive gray (5 Y 4/1) to medium gray (N 5/0), fairly massive, gradual variations of sand and silt percentages; very fine-grained sand (4 0-3 5 phi), mostly quartzose; very silty throughout; trace organic pieces; trace iron/clay discoloration; well cemented, moderately hard, not easily friable, damp	

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
149 150 151 152 153 154 155 156 157			149 0-153 0' SAMPLE Recovered 3.2/4 0' = 80%. RQD 2 9/3 2' = 91% 149 0-150 6' SANDSTONE AND SILTSTONE same as above, very carbonaceous in part 150.6-152.2'· SANDY SILTSTONE. olive gray (5 Y 4/1), massive, 10% clay throughout, trace organic pieces and specks--some iron-stained; moderately hard, damp to dry 153 0-157 0' SAMPLE Recovered 4 1/4.0' = 103% RQD 3 5/4 0' = 88%. 153.0-154 0' SANDY SILTSTONE same as above. 154 0-156 0' CLAYEY SILTSTONE olive gray (5 Y 4/1), very carbonaceous, especially toward bottom, abundant lignite pieces, gradational contacts; consolidated, moderately hard, damp 156 0-157 0' LIGNITE-RICH SILTSTONE. olive black (5 Y 2/1), 15% clay, abundant lignite pieces, dull, trace vitreous, moderately soft, damp	

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
157			157 0-161 0' SAMPLE Recovered 4 5/4 0' = 113% RQD 3 8/4 5' = 84% 157 0-157.5' LIGNITE-RICH SILTSTONE: same as above 157.5-161 0' CLAYEY SILTSTONE: olive gray (5 Y 4/1) to dark greenish gray (5 G 4/1), abundant lignite stringers--brownish black (5 YR 2/1); fairly carbonaceous toward top; fairly massive toward bottom; moderately hard; damp to dry 161 0-165 0' SAMPLE Recovered 4 0/4 0' = 100%. RQD 3 8/4 0' = 95% SANDY SILTSTONE olive gray (5 Y 4/1), very fine-grained sand, 10% clay throughout; abundant lignite pieces in part--dusky brown (5 YR 2/2), trace clay discoloration up to 2 cm--grayish orange (10 YR 7/4), moderately hard; damp to almost wet	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
165			165 0-169 0' SAMPLE Recovered 0 4/4 0' = 10%. RQD 0 0/0.4' = 0%. CLAYEY SILTSTONE. same as above, less sand; more clay	
166			169 0-170 0' SAMPLE Recovered 4 1/1.0' = 410% RQD 2.2/4.1' = 54%. CLAYEY SILTSTONE olive gray (5 Y 4/1), abundant siderite nodules throughout, up to 4 cm--extremely hard, trace lignite/organic pieces--olive black (5 Y 2/1), moderately hard, damp.	
167			170 0-174 0' SAMPLE Recovered 4 0/4 0' = 100% RQD 3 8/4 0' = 95%. 170.0-172.4' CLAYEY SILTSTONE same as above, 15% sand in places, some clay discoloration and siderite nodules. 172.4-174 0' SILTY SANDSTONE light olive gray (5 Y 6/1) to olive gray (5 Y 4/1); storm laminations/varved; fairly homogeneous; fine-grained sand (2 5-4 0 phi), quartzose, trace organic specks, moderately hard, friable, damp to wet.	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
173			**174 0-178 0' SAMPLE** Recovered 4 0/4 0' = 100% RQD 3 5/4 0' = 88% SILTY SANDSTONE same as above; very silty in places, especially near bottom, wet. **178 0-182 0' SAMPLE** Recovered 4 0/4 0' = 100% RQD 3 9/4 0' = 98% SILTSTONE AND SANDSTONE olive gray (5 Y 4/1) to medium gray (N 5/0), interbedded, very fine-grained sand (4 0-3 0 phi); mostly quartz; some organic pieces; well cemented, tight, moderately hard; damp to wet	
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181				

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
181			**182.-186 0' SAMPLE** Recovered 4 2/4 0' = 105% RQD 4 0/4 0' = 100% SILTY SANDSTONE olive gray (5 Y 4/1) to light olive gray (5 Y 6/1), fairly homogeneous; very fine-grained sand (4 0-3.0 phi); well sorted, mostly quartz, very silty in places; some organic specks and pieces, tight, consolidated yet friable, moderately hard, wet	
182			**186 0-190 0' SAMPLE.** Recovered 4 0/4 0' = 100%. RQD 3 3/4 0' = 83%. SILTY SANDSTONE same as above; more silty toward bottom, hard; wet.	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
189				
			190 0-194 0' SAMPLE Recovered 4 0/4 0' = 100%. RQD 3 3/4 0' = 83%. SILTY SANDSTONE: olive gray (5 Y 4/1) to medium gray (N 5/0), very silty in places, abundant siderite nodules and very sandy from 192.0 to 192 5, consolidated, friable, moderately hard to moderately soft; wet.	
190				
			194 0-198 0' SAMPLE Recovered 3 4/4 0' = 85% RQD 3.4/3 4' = 100%. 194 0-195.9' SILTY SANDSTONE: olive gray (5 Y 4/1) to greenish gray (5 GY 6/1), fairly massive; storm varved in part; very fine-grained sand (4 0-3 5 phi), well sorted, mostly quartz, moderately hard, damp to dry 195 9-197 4' SANDY CLAYEY SILTSTONE olive gray (5 Y 4/1) to dark greenish gray (5 G 4/1), interbedded clay and silt, blocky in part, gradational contact, diagonal cleavage in several places, approximately 30-45 degrees; moderately hard, damp to dry	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
197 198 199 200 201 202 203 204 205			**198 0-202 0' SAMPLE** Recovered 4 4/4 0' = 110%. RQD 4 4/4 4' = 100%. 197 6-201 0' CLAYSTONE AND SANDSTONE. olive gray (5 Y 4/1); interbedded; changes rapidly, storm varves; diagonal cleavage in part, fine-grained sand (2 5-4 0 phi), very carbonaceous in part; abundant organic pieces in places--olive black (5 Y 2/1), moderately hard to hard; damp. 201 0-202.0' SANDY SILTSTONE olive gray (5 Y 4/1), massive, 15% clay; moderately hard, damp to dry **202 0-206 0' SAMPLE** Recovered 3 4/4 0' = 85% RQD 3 4/3 4' = 100%. SANDY SILTSTONE olive gray (5 Y 4/1) to light olive gray (5 Y 6/1), interbedded, storm varved, fairly massive at bottom; trace clay discoloration--no effervescence--pale yellowish brown (10 YR 6/2), hard, damp to dry	

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
205			**206 0-210 0' SAMPLE** Recovered 4 7/4 0' = 118% RQD 4 6/4 7' = 98%. CLAYEY SANDY SILTSTONE· olive gray (5 Y 4/1) to dark greenish gray (5 G 4/1), interbedded in places--changes rapidly; storm varved in part; very fine-grained sand (4 0-3 5 phi), very clayey in places, trace organic surfaces--olive black (5 Y 2/1), siderite/clay nodules near top--grayish orange (10 YR 7/4); hard; damp to moist	
206				
			210 0-214 0' SAMPLE Recovered 3 9/4 0' = 98%. RQD 3 4/3.9' = 87%. SILTY SANDSTONE greenish gray (5 GY 6/1), interbedded--storm varved, soft sediment deformation; very fine-grained sand (4 0-3 5 phi), well sorted, quartzose, some mica flakes, trace lignite up to 2mm thick--diagonal through core about 0 4', tight, hard, damp.	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
213			**214 0-218 0' SAMPLE** Recovered 4 0/4 0' = 100% RQD 3 6/4 0' = 90% CLAYEY SANDY SILTSTONE: olive gray (5 Y 4/1), interbedded in part; fairly massive toward bottom, gradual changes in clay and sand percentage, hard; damp to dry	
214			**218 0-222 0' SAMPLE** Recovered 2 8/4 0' = 70%. RQD 2 6/2.8' = 93% CLAYEY SILTSTONE olive gray (5 Y 4/1) to dark greenish gray (5 GY 4/1), massive; homogeneous, blocky in part, slickensided in part--70 degrees from horizontal, trace organic stringers; no plasticity, moderately hard; damp to dry	
215			Note Sample in bottom of rods after tripping out of hole Recovered 1 2' of core CLAYEY SILTSTONE same as above, trace clay vugs up to 3mm--yellowish gray (5 Y 7/2)	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
221			222 0-225 0' CUTTINGS. SILTY CLAYSTONE (70%) olive gray (5 Y 4/1) to greenish gray (5 GY 6/1); 30% CLAYEY SILTSTONE. trace organic pieces--carbonaceous, trace siderite nodules up to 1 cm--moderate yellowish brown (10 YR 5/4), slightly effervesces when dry	
222			225.0-230 0' CUTTINGS CLAYEY SILTSTONE (60%) same as above; more siderite nodules, 40% SILTY CLAYSTONE.	
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LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
229			230 0-235 0' CUTTINGS SILTY CLAYSTONE. light olive gray (5 Y 5/2) to olive gray (5 Y 3/2), 15% lignite pieces--carbonaceous claystone, 5% siderite nodule pieces, gypsum crystal up to 1cm--no effervescense	
230			235 0-240 0' CUTTINGS SANDY CLAYEY SILTSTONE olive gray (5 Y 4/1), 60% silt, 30% clay, 10% sand, some to trace siderite nodules	
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WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
237			240 0-245 0' CUTTINGS CLAYEY SILTSTONE. olive gray (5 Y 4/1), carbonaceous, abundant lignite pieces, 10% sand	
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3789BRBE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
245			245 0-250 0' CUTTINGS SILTY CLAYSTONE. dark greenish gray (5 GY 4/1) to olive gray (5 Y 4/1), 15% siderite nodules--moderate yellowish brown (10 YR 5/4), trace organic pieces and surfaces.	
246			249 0-250 0' CUTTINGS. CLAYSTONE 10% silt, hard drilling	
			250 0-255 0' CUTTINGS. SILTY SANDSTONE olive gray (5 Y 4/1) to (5 Y 3/2), very fine-grained (4 0-3 5 phi), carbonaceous siltstone in part; 5% siderite, easy drilling	
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WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
253			255.0-260.0' CUTTINGS SANDY SILTSTONE olive gray (5 Y 4/1), fairly carbonaceous in pieces, fairly easy drilling.	
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37B9BRBG

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
261			260.0-265.0' CUTTINGS. SANDY SILTSTONE same as above, 20% clay, very sandy in pieces, 15% carbonaceous siltstone 265 0-270 0' CUTTINGS. SANDY SILTSTONE. same as above	
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3789BRBH

WELL NO 37-89 BR

LOG OF BORHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
269			270 0-275 0' CUTTINGS SILTY SANDSTONE olive gray (5 Y 4/1), 5-10% carbonaceous, moderately soft, no big pieces	
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3789BR01

LOG OF BORFHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
277			275 0-280 0' CUTTINGS. SANDY CLAYEY SILTSTONE. olive gray (5 Y 4/1), 0-5% carbonaceous/lignite, moderate plasticity in part, moderately hard.	
278			280 0-285 0' CUTTINGS SILTY SANDSTONE (70%). olive gray (5 Y 4/1) to dark greenish gray (5 GY 4/1), 30% SANDY CLAYEY SILTSTONE, 0-5% lignite	
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LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
285			285 0-290 0' CUTTINGS CLAYEY SILTSTONE· olive gray (5 Y 3/2), 10% very fine-grained sand; 0-5% carbonaceous claystone 290 0-293.0' CUTTINGS. CLAYEY SILTSTONE· same as above, moderately soft	
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LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
293			293.0-295 0' CUTTINGS SILTY SANDSTONE dark greenish gray (5 G 4/1), 30% SANDY CLAYEY SILTSTONE, olive gray (5 Y 4/1), moderately soft	
			295 0-300 0' CUTTINGS. SILTY SANDSTONE same as above, 5-10% carbonaceous claystone	
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WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
301			300 0-304 0' CUTTINGS SILTY SANDSTONE. same as above	
			304 0-305 0' CUTTINGS CARBONACEOUS CLAYSTONE. olive black (5 Y 2/1), harder drilling	
302			305 0-310 0' CUTTINGS. SILTY SANDSTONE light olive gray (5 Y 6/1), some sandy siltstone; carbonaceous, moderately soft, fairly quick drilling	
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WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
309			310 0-315 0' CUTTINGS. CARBONACEOUS CLAYSTONE olive gray (5 Y 3/2), abundant lignite pieces toward bottom, moderately hard	
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3789BRBN

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
317			315 0-320 0' CUTTINGS CARBONACEOUS CLAYSTONE. olive gray (5 Y 3/2), abundant lignite pieces. 320 0-325 0' CUTTINGS CLAYEY SILTSTONE. olive gray (5 Y 4/1), sandy siltstone in part, 10-15% lignite pieces	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
325			325 0-330.0' CUTTINGS SILTY CLAYSTONE medium dark gray (N 4/0), 10% SILTY SANDSTONE--greenish gray (5 G 6/1), very fine-grained; easily friable, trace carbonaceous/lignite	
326			330 0-335 0' CUTTINGS. SILTY CLAYSTONE same as above	
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WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
333			335 0-340 0' CUTTINGS CLAYEY SILTSTONE olive gray (5 Y 4/1), 15% sand; 5% carbonaceous claystone, flat flakes; moderately soft	
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LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
341			340 0-345 0' CUTTINGS CLAYEY SILTSTONE. olive gray (5 Y 4/1), 20% lignite pieces; very carbonaceous in part, very hard	
342			345 0-350 0' CUTTINGS SILTY CLAYSTONE. medium dark gray (N 4/0), some very carbonaceous--olive black (5 Y 2/1), trace siderite pieces--grayish orange (10 YR 7/4)	
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WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
349			350 0-355 0' CUTTINGS. CLAYEY SANDY SILTSTONE olive gray (5 Y 4/1) to greenish gray (5 G 6/1), trace siderite and lignite pieces.	
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3789BRBS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
357			355.0-360 0' CUTTINGS CLAYEY SILTSTONE· olive gray (5 Y 4/1), very carbonaceous in part--olive black (5 Y 2/1) 360.0-365 0' CUTTINGS SANDY SILTSTONE: dark greenish gray (5 G 4/1), 15% clay, very clayey in the mud.	
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LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
365			365 0-370 0' CUTTINGS SILTY CLAYEY SANDSTONE. olive gray (5 Y 4/1), very fine-grained sandstone abundant clay in mud matrix, 5% carbonaceous, small pieces 370 0-375 0' CUTTINGS CLAYEY SILTSTONE olive gray (5 Y 4/1); trace coal pieces; not many big pieces.	
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WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
373			375.0-380.0' CUTTINGS. CLAYEY SANDY SILTSTONE dark gray (N 3/0), very carbonaceous in part, 10% sandstone pieces	
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3789BRBV

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
381			380 0-385 0' CUTTINGS. CLAYEY SANDY SILTSTONE same as above, abundant coal pieces. 385 0-390 0' CUTTINGS. CLAYEY SANDY SILTSTONE AND LIGNITE olive gray (5 Y 4/1) to light olive gray (5 Y 6/1), very fine-grained sand (4 0-3 5 phi), 40% lignite pieces--black (N 1/0)	
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3789BRBW

WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
389			390 0-393 0' CUTTINGS CLAYEY SILTSTONE olive gray (5 Y 4/1), 30% carbonaceous claystone and lignite pieces	
390			393 0-395 0' CUTTINGS. SILTY CLAYSTONE. medium dark gray (N 4/0), very carbonaceous.	
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37B9BRBX

WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
397			395 0-400 0' CUTTINGS. SILTY CLAYSTONE· dark gray (N 3/0), very silty in pieces, some pieces very carbonaceous, 0-5% siderite--pale yellowish brown (10 YR 6/2), hard drilling	
398			400 0-405 0' CUTTINGS CLAYEY SILTSTONE· olive gray (5 Y 4/1), some pieces very sandy--greenish gray (5 G 6/1), trace siderite	
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3789BRBY

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
405			405 0-410 0' CUTTINGS CLAYEY SILTSTONE same as above, 10% lignite pieces 410 0-415 0' CUTTINGS CLAYEY SILTSTONE medium dark gray (N 4/0) to olive gray (5 Y 4/1), 5-10% lignite, small pieces	
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WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
413			415 0-420 0' CUTTINGS SILTY CLAYSTONE: olive gray (5 Y 4/1), 0-5% lignite pieces--small, some very plastic	
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LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
421			420 0-425 0' CUTTINGS. SILTY CLAYSTONE. olive gray (5 Y 4/1), 0-5% lignite, 0-5% siderite pieces. 425 0-430 0' CUTTINGS SILTY CLAYSTONE same as above, small pieces and chips	
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3789BRCB

WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
429			430 0-435 0' CUTTINGS SILTY CLAYSTONE olive gray (5 Y 4/1), 5% sandy siltstone--greenish gray (5 G 6/1)	
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3789BRCC

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
437 438 439 440 441 442 443 444 445			435 0-440 0' CUTTINGS CLAYEY SILTSTONE: olive gray (5 Y 4/1) to dark gray (N 3/0), 5% sandy siltstone, trace carbonaceous, moderately hard 440 0-445 0' CUTTINGS CLAYEY SILTSTONE: same as above, dark gray (N 3/0)	

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
445			445 0-450 0' CUTTINGS SILTY CLAYSTONE. olive gray (5 Y 4/1) to medium dark gray (N 4/0), 10-15% lignite pieces and carbonaceous clay 450.0-455 0' CUTTINGS. SILTY CLAYSTONE: olive gray (5 Y 4/1) to dark greenish gray (5 G 4/1), trace carbonaceous; moderately soft	
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LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
453			455 0-460 0' CUTTINGS CLAYSTONE· medium dark gray (N 4/0); 10% silt in some pieces; 0-5% carbonaceous pieces, low plasticity; moderately hard	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
461 462 463 464 465 466 467 468 469			460 0-465 0' CUTTINGS SILTY CLAYSTONE medium dark gray (N 4/0) to olive black (5 Y 2/1), very carbonaceous near the top 465.0-470 0' CUTTINGS SILTY CLAYSTONE: medium dark gray (N 4/0) to olive gray (5 Y 4/1), 0-5% lignite pieces; small pieces	

WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
469			470 0-475 0' CUTTINGS. SILTY CLAYSTONE. olive gray (5 Y 4/1), some very carbonaceous.	
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3789BRCH

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
477			475 0-480 0' CUTTINGS. SILTY CLAYSTONE. same as above, lignite surfaces on claystone 480.0-485 0' CUTTINGS. SILTY CLAYSTONE: olive gray (5 Y 4/1) to olive black (5 Y 2/1), some lignite pieces, moderately hard	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
485			485 0-490 0' CUTTINGS SILTY CLAYSTONE olive gray (5 Y 4/1) to dark greenish gray (5 G 4/1) trace lignite pieces. 490 0-495 0' CUTTINGS: SILTY CLAYSTONE: olive gray (5 Y 4/1) to dark greenish gray (5 GY 4/1), trace carbonaceous claystone	
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WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
493			495 0-500 0' CUTTINGS SILTY CLAYSTONE (70%) olive gray (5 Y 4/1), 30% SILTY SANDSTONE-- greenish gray (5 G 6/1), very fine-grained sand (4 0-3 5 phi), quartzose, 15% clay	
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3789BRCK

WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
501 502 503 504 505 506 507 508 509			500.0-505 0' CUTTINGS SILTY CLAYSTONE· olive gray (5 Y 4/1), trace lignite pieces. 505 0-510 0' CUTTINGS SILTY CLAYSTONE. olive gray (5 Y 4/1), trace organic pieces in clay matrix, trace sandy; drilling easier	

3789BRCL

WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
509			510.0-515.0' CUTTINGS CLAYEY SILTSTONE olive gray (5 Y 4/1), 10-15% lignite pieces; trace sandstone pieces.	
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LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
517			515 0-520 0' CUTTINGS CLAYEY SILTSTONE same as above; slightly carbonaceous 521 0-525.0' CUTTINGS. SILTY CLAYSTONE olive gray (5 Y 4/1) to olive black (5 Y 2/1), 5% silty sandstone--greenish gray (5 G 6/1), very fine-grained (3 0-4 0 phi), well sorted; trace clay discoloration--grayish orange (10 YR 7/4), large pieces	
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DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
525			525 0-530 0' CUTTINGS SILTY CLAYSTONE: same as above, some pieces very carbonaceous; 5% silty sandstone, trace siderite; large pieces	
526			530 0-535 0' CUTTINGS. CLAYEY SILTSTONE: olive gray (5 Y 4/1) to dark greenish gray (5 GY 4/1), 5% lignite/carbonaceous clay, lignite stringers in some pieces, 0-5% silty sandstone--greenish gray (5 GY 6/1), trace clay alteration/vugs--moderate orangish pink (5 YR 8/4)	
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WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
533			535 0-540 0' CUTTINGS. CLAYEY SANDY SILTSTONE olive gray (5 Y 4/1) to greenish gray (5 GY 6/1), very sandy in part (3.0-4 0 phi), very carbonaceous, trace lignite pieces and stringers in larger pieces	
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3789BRCP

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
541			540 0-545 0' CUTTINGS. SILTY SANDSTONE light olive gray (5 Y 6/1), no big pieces--lots of very fine-grained sand in the clay matrix; few large chunks of carbonaceous clayey siltstone--olive gray (5 Y 4/1) to olive black (5 Y 2/1)	
542			545 0-550 0' CUTTINGS SILTY SANDSTONE· light olive gray (5 Y 6/1), very fine-grained sand (3.0-4 0 phi), 10% sandy siltstone	
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WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
549			550 0-555 0' CUTTINGS. SANDY SILTSTONE dark greenish gray (5 GY 4/1), very clayey in pieces; trace siderite nodules	
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37B9BRCR

WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
557			555 0-560 0' CUTTINGS SANDY SILTSTONE same as above 556 0-560 0'· CUTTINGS. LIGNITE· black (N 1/0), 15% sandy siltstone; small chips, very hard, slow drilling. 560.0-565 0' CUTTINGS SILTY CLAYSTONE olive gray (5 Y 4/1), trace carbonaceous, no big pieces; slow drilling.	
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3789BRCS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
565			565 0-570 0' CUTTINGS SILTY CLAYSTONE: olive gray (5 Y 4/1) to dark greenish gray (5 GY 4/1), trace siderite pieces--grayish orange (10 YR 7/4), hard	
566			570 0-575 0' CUTTINGS SILTY CLAYSTONE: olive gray (5 Y 4/1) to olive black (5 Y 2/1), very carbonaceous in pieces, moderate plasticity; small pieces	
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WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
573			575 0-577 0' CUTTINGS SILTY CLAYSTONE. same as above	
574			577 0-580.0' CUTTINGS: SILTY SANDSTONE pale yellowish brown (10 YR 6/2) and very pale orange (10 YR 8/2), very fine-grained sandstone; mostly quartz, calcareous cement--effervesces; soft; friable, faster drilling	
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581				

37B9BRCU

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
581			580.0-585 0' CUTTINGS SILTY SANDSTONE same as above 585 0-590 0' CUTTINGS. SILTY SANDSTONE AND LIGNITE pale yellowish brown (10 YR 6/2), bluish white (5 B 9/1) and black (N 1/0); interbedded hard and soft drilling, very fine-grained sandstone (3.5-4 0 phi), well sorted; quartzose; calcareous cement--effervesces; 20% sandy siltstone--olive gray (5 Y 4/1), trace pyritic sandstone--dusky yellow (5 Y 6/4) associated with lignite and the hard drilling; trace sulfur pieces moderate yellow (5 Y 7/6); hard drilling at 585.0' and 588 5' for 0 2'	
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WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
589			590 0-595 0' CUTTINGS SILTY SANDSTONE AND LIGNITE same as above.	
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37B9BRCW

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
597			595 0-600.0' CUTTINGS. CLAYEY SILTSTONE: olive gray (5 Y 3/2), 15% very fine-grained silty sandstone--bluish white (5 B 9/1), calcareous cement; trace coarse-grained sand pieces (-0 5 to -1 0 phi), moderate reddish brown (10 YR 5/4).	
598			600 0-605 0' CUTTINGS: CLAYEY SILTSTONE AND SILTY SANDSTONE: 50% olive gray (5 Y 3/2) and 50% bluish white (5 B 9/1), very fine-grained sandstone (3.5-4 0 phi), well sorted; mostly quartz; 5% black minerals, calcareously cemented--effervesces; trace siderite nodules--dusky yellow (5 Y 6/4); soft drilling	
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LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
605			605 0-610 0' CUTTINGS. CLAYEY SILTSTONE AND SILTY SANDSTONE same as above; trace pyritic sandstone; soft drilling 610 0-615 0' CUTTINGS: SILTY CLAYSTONE. olive gray (5 y 4/1), 10% silty sandstone--bluish white (5 B 9/1); calcareously cemented; trace pyritic sandstone	
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WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
613			615 0-620 0' CUTTINGS SILTY CLAYSTONE· same as above; no pyritic sandstone, some very carbonaceous pieces--dusky yellowish brown (10 YR 2/2)	
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621				

3789BRCZ

WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
621 622 623 624 625 626 627 628 629			620 0-625 0' CUTTINGS SILTY CLAYSTONE AND SILTY SANDSTONE dark gray (N 3/0) and light gray (N 7/0), 50% very fine-grained sandstone; 10% clay, carbonaceous claystone. 625 0-629 0' CUTTINGS SILTY CLAYSTONE AND SILTY SANDSTONE. same as above 629 0-630 0' CUTTINGS. CARBONACEOUS CLAYSTONE dusky yellowish brown (10 YR 2/2); 10% silt; trace pyritic sandstone; moderate plasticity; hard drilling	

3789BRDA

WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
629			630 0-635 0' CUTTINGS CARBONACEOUS CLAYSTONE brownish gray (5 Y 4/1); 10-15% silt in part, trace pyritic sandstone, moderate plasticity, hard; slow drilling	
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3789BRDB

WELL NO 37-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
637			635.0-639 0' CUTTINGS CARBONACEOUS CLAYSTONE olive gray (5 Y 4/1) to olive black (5 Y 2/1), 0 5% lignite pieces, trace sandstone pieces-- greenish gray (5 G 6/1)	
638			639 0-641 0' CUTTINGS. CARBONACEOUS CLAYSTONE· same as above; 30% very fine-grained sandstone; slightly faster drilling.	
			TOTAL DEPTH = 641'	
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37898RDC

LOG OF BOREHOLE

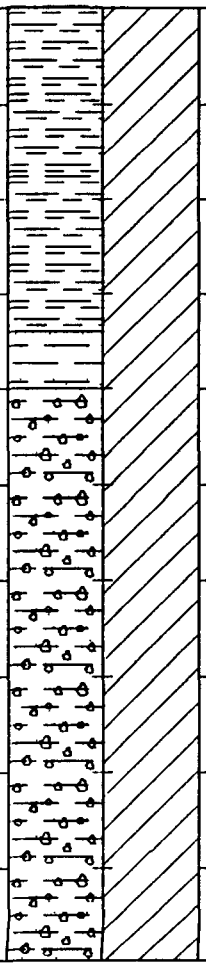
QA BY/DATE Jarrell Burman 17-17-89
LOCATION Rocky Flats Plant, Background
COORDINATES N31,699 33 E23,098 54 (RFP)
TOTAL DEPTH 12.0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 16, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K.W. Van Allen
GEOLOGIST

BOREHOLE/WELL NO 37-89P
GROUND SURFACE ELEVATION 5,832 3'
WATER LEVEL ENCOUNTERED 5 3'
STATIC 7 93' (6/28/89)
DRILLER R Sharp HELPER T Rodriguez
DRILLING FLUID None
CHECKED BY Jarrell Burman
SITE MANAGER

CEARP MANAGER

COMMENTS Converted to piezometer on March 17, 1989, after abandonment of borehole due to large boulders.

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 2.0/2.0' = 100% 0.0-1 7' SILTY CLAY dusky yellowish brown (10 YR 2/2), some (20%) coarse to fine quartzose sand, poorly sorted; organics, roots to 1 5'; unconsolidated, moist **VALLEY FILL ALLUVIUM** 1 7-2.0' SILTY SAND dusky brown (5 YR 2/2), (75%) coarse to fine quartzose sand, (25%) silt, poorly sorted, unconsolidated, moist 2.0-4 0' SAMPLE Recovered 1 5/2 0' = 75% SILTY SAND AND GRAVEL pale yellowish brown (10 YR 6/2), (40%) coarse to fine quartzose sand, (35%) coarse to fine quartzose gravel, (25%) silt, poorly sorted, unconsolidated, no HCl reaction, moist. 4 0-6 0' SAMPLE Recovered 1 5/2 0' = 75% SILTY SAND AND GRAVEL same as above; gradation to dark yellowish brown (10 YR 4/2); occasional pebbles, wet below 5 3'	

3789PA

WELL NO 37-89P

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			**6 0-8 0' SAMPLE** Recovered 0 6/2 0' = 30% SILTY SAND AND GRAVEL same as above; wet; poor recovery due to cobble **8.0-10 0' SAMPLE** Recovered 2.0/2.0' = 100%. SILTY SAND AND GRAVEL same as above; wet. **10.0-12 0' SAMPLE.** Recovered 1.7/2 0' = 85%. 10 0-10 8' SILTY SAND AND GRAVEL. same as above; wet. 10 8-12 0' SILTY CLAYSTONE: dark yellowish brown (10 YR 4/2) and medium light gray (N 7/0), trace fine-grained sand; mottled; massive, consolidated; no HCl reaction; moist. **TOTAL DEPTH = 12 0'**	▽ 5 3' ▼ 7 93'
6				
7				
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13				

3789PB

LOG OF BOREHOLE

QA BY/DATE Janet Buyman 16-27-89
LOCATION Rocky Flats Plant, Background
COORDINATES N31,700 57 E23,103 38 (RFP)
TOTAL DEPTH 17 8'

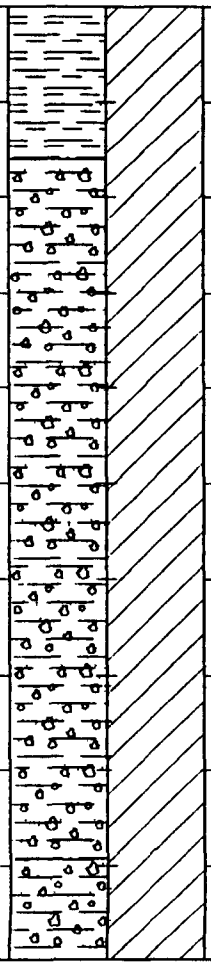
BORFHOLE/WELL NO 37-89 BRA1
GROUND SURFACE ELEVATION 5832 3'
WATER LEVEL ENCOUNTERED 5 1'
STATIC N/A

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 16, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K W Van Allen
GEOLOGIST

DRILLER R Sharp HELPER T Rodriguez
DRILLING FLUID None
CHECKED BY Janet Buyman
SITE MANAGER

CEARP MANAGER

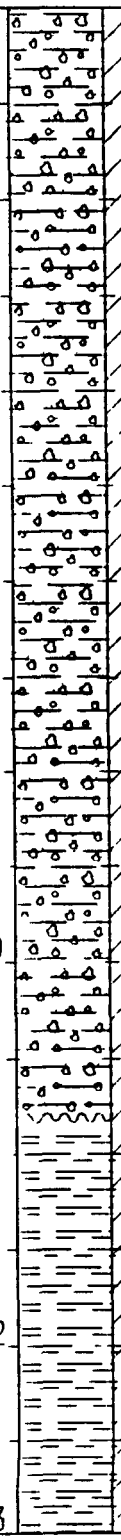
COMMENTS Abandoned borehole due to boulders and cobbles Borehole was backfilled with volclay grout to within 5' of ground surface then topped off with Portland Type 1 cement

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-1 8' SAMPLE Recovered 1 3/1 8' = 72% 0 0-0 8' SILTY CLAY dusky yellowish brown (10 YR 2/2), some (20%) coarse to fine quartzose sand, roots, organics, unconsolidated, no HCl reaction, moist **VALLEY FILL ALLUVIUM** 0 8-1 3' SILTY SAND AND GRAVEL dusky brown (5 YR 2/2), (40%) coarse to fine quartzose sand, (35%) coarse to fine quartzose gravel, (25%) silt, poorly sorted, subangular to subrounded, unconsolidated, no HCl reaction, moist 1.8-3 8' SAMPLE Recovered 0 8/2 0' = 40% SILTY SAND AND GRAVEL same as above, occasional cobbles or boulders 3 8-5 8' SAMPLE Recovered 1 3/2 0' = 65% SILTY SAND AND GRAVEL dark yellowish brown (10 YR 4/2), same as above, wet below 5 1'	

3789A1A

WELL NO 37-89 BRA1

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			**5 8-7 8' SAMPLE** Recovered 1 1/2 0' = 55%. SILTY SAND AND GRAVEL. same as above, wet **7 8-9 8' SAMPLE** Recovered 0.7/2.0' = 35%. SILTY SAND AND GRAVEL. same as above; wet. **9 8-11 8' SAMPLE** Recovered 0 0/2.0' = 0%. 9 8-10 8' SILTY SAND AND GRAVEL. pushed cobble ahead of augers--no sample recovery 10.8-11 8' CLAYSTONE. noted material change by drilling behavior **11 8-13 8' SAMPLE** Recovered 2.0/2 0' = 100% SILTY CLAYSTONE moderate brown (5 YR 4/4) and medium light gray (N 7/0), trace fine sand; mottled; consolidated, massive; no HCl reaction, moist.	51'

3789A1B

WELL NO 37-89 BRA1

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			**13 8-15 8' SAMPLE** Received 2 0/2 0' = 100%. SILTY CLAYSTONE. same as above, moist	
14			**15 8-17 8' SAMPLE** Recovered 2.0/2.0' = 100% SILTY CLAYSTONE: same as above, moist.	
15			**TOTAL DEPTH = 17 8'**	
16				
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18				
19				
20				
21				

37B9A1C

LOG OF BOREHOLE

QA BY/DATE Janell Burman / 6-27-89
LOCATION Rocky Flats Plant, Background
COORDINATES N31,710 60 E23,102 16 (RFP)
TOTAL DEPTH 12 0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 17, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K W Van Allen
GEOLOGIST

BOREHOLE/WELL NO 37-89 BRA2
GROUND SURFACE ELEVATION 5832 4'
WATER LEVEL ENCOUNTERED 5 3'
STATIC N/A
DRILLER R Sharp HELPER T Rodriquez
DRILLING FLUID None
CHECKED BY Janell Burman
SITE MANAGER

CEARP MANAGER

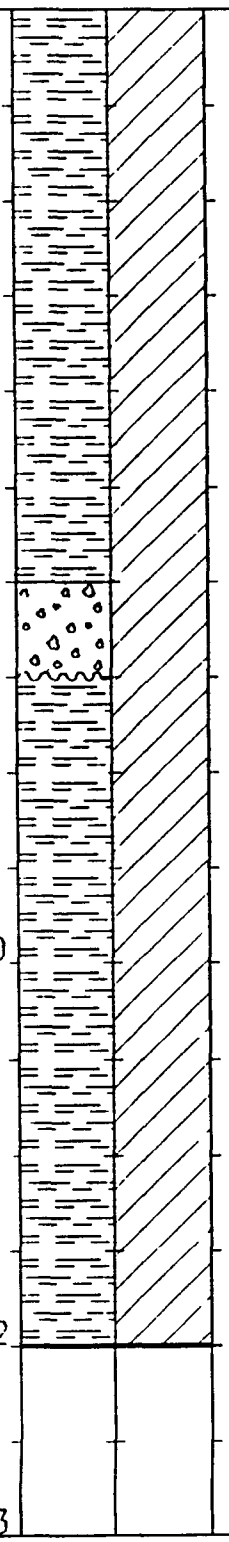
COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 2 0/2 0' = 100% 0 0-1 2' SILTY CLAY dusky yellowish brown (10 YR 2/2), some (20%) coarse to fine quartzose sand, organics, roots to 0 3', unconsolidated, no HCl reaction, moist **VALLEY FILL ALLUVIUM** 1 2-2 0' SILTY CLAY AND SAND dusky brown (5 YR 2/2), (65%) silt/clay, (35%) coarse to fine-grained sand, poorly sorted, subangular to subrounded, unconsolidated, no HCl reaction, moist 2 0-4 0' SAMPLE Recovered 1 7/2 0' = 85% SILTY CLAY AND SAND same as above, trace (10%) coarse to fine quartzose gravel, (35%) coarse to fine quartzose sand; (55%) silt/clay 4 0-6 0' SAMPLE Recovered 2 2/2 0' = 110%. SILTY CLAY same as above, light olive gray (5 Y 5/2) to olive gray (5 Y 4/1), some (20%) coarse to fine quartzose sand, some (20%) coarse to fine quartzose gravel, wet below 5 3'	
1				
2				
3				
4				
5				

3789A2A

WELL NO 37-89 BRA2

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			6 0-8 0' SAMPLE Recovered 2 0/2.0' = 100%. SILTY CLAY. olive gray (5 Y 4/1) and moderate brown (5 YR 4/4), some (20%) medium to fine-grained sand; mottled, unconsolidated; no HCl reaction; moist. 8 0-10 0' SAMPLE Recovered 2.0/2.0' = 100%. 8 0-8 5' SAND AND GRAVEL: olive gray (5 Y 4/1); (55%) coarse to fine quartzose sand; (35%) coarse to fine quartzose gravel, (10%) silt; poorly sorted; subangular to subrounded; wet. 8 5-10 0' SILTY CLAYSTONE· olive gray (5 Y 4/1) and moderate brown (5 YR 4/4), trace fine-grained sand; massive; consolidated; no HCl reaction; moist 10.0-12.0' SAMPLE Recovered 2.0/2 0' = 100% SILTY CLAYSTONE: moderate brown (5 YR 3/4, 5 YR 4/4) and medium light gray (N 6/0); trace fine-grained sand, heavily mottled; striated; calcareous; moist TOTAL DEPTH = 12 0'	▽ 5 3'
6				
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9				
10				
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12				
13				

3789A28

LOG OF BOREHOLE

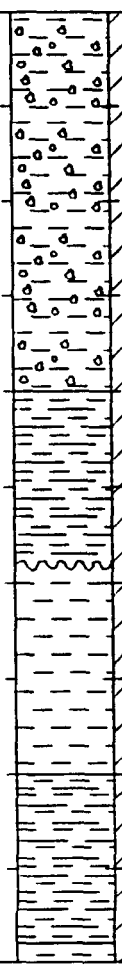
QA BY/DATE Janell Bergman. /7-26-89
LOCATION Rocky Flats Plant, Background
COORDINATES N41,797 90 E23,567 28 (RFP)
TOTAL DEPTH 132 7'

DRILLING COMPANY Boyles Bros
DATE DRILLED 02/13/89, 04/07/89 to 04/10/89
DRILLING METHOD Hollow Stem Auger 0 0-24 05' Rotary Core 24.05'-132.7'
LOGGED BY J E Marks
GEOLOGIST

BOREHOLE/WELL NO 38-89 BR
GROUND SURFACE ELEVATION 5901 4'
WATER LEVEL ENCOUNTERED None
STATIC 105 88' (6/23/87)
DRILLER R Sharp P Bushkovski HELPER P Mesa, H McCree
DRILLING FLUID None 0 0-24 4', Water 24 4-132 7'
CHECKED BY Janell Bergman
SITE MANAGER

CEARP MANAGER

COMMENTS Surface casing set to 24 4' by J E Marks on February 14, 1989

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 2 0/2 0' = 100% 0.0-0 7' GRAVELLY CLAY very dusky red (10 R 2/2), gravel up to 0 15', angular, some subrounded, quartzite, vegetation roots, unconsolidated, frozen, moist **COLLUVIUM** 0 7-2 0' GRAVELLY CLAY grayish brown (5 YR 3/2), gradually becoming more calcium carbonate cemented and drier, yellowish gray (5 Y 8/1), gravel- small up to 0 05', rounded, quartzite and granite, vegetation roots, consolidated; frozen; moist grading to dry 2 0-4 0' SAMPLE Recovered 2 0/2 0' = 100% 2 0-2 9' SILTY CLAY pale yellowish brown (10 YR 6/2), trace gravel, subrounded, granite, trace organics--grayish brown (5 YR 3/2); calcium carbonate cemented, effervesces with HCl, unconsolidated, dry 2 9-4 0' CLAYSTONE light olive gray (5 Y 5/2), to light gray (N 7/0), mottled; weathered, iron stained - light olive brown (5 Y 5/6), vegetation roots, calcium carbonate cemented; effervesces with HCl, consolidated, almost dry	
1				
2				
3				
4				
5				

3889BRA

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			1 0-6 0' SAMPLE Recovered 1 2/2 0' = 60% 4 0-4 9' SILTY CLAYSTONE yellowish gray (5 Y 7/2), 15% sand; fine grained (3 0-2 5' phi); subrounded; trace vegetation roots near the top; weathered· iron stained -- light olive brown (5 Y 5/6), semi to unconsolidated, dry to slightly moist 4 9-5 2' CLAYSTONE light olive gray (5 Y 6/1); 15% silt; trace iron stained and caliche stringers; consolidated; slightly moist 6 0-8.0' SAMPLE. Recovered 0 8/2 0' = 40% 6 0-6 3' CLAYSTONE· same as above 6 3-6 8' SILTY CLAYSTONE dark yellowish orange (10 YR 6/6), 15% sand, very fine grained (4 0-3 5 phi), slight vegetation roots, minor effervescence with HCl, friable, semi-consolidated; slightly moist 8 0-10 0' SAMPLE Recovered 1 7/2 0' = 88% 8 0-8 8' SILTY CLAYEY SANDSTONE· dark yellowish orange (10 YR 6/6) to light gray (N 7/0); weathered; iron stain; 2 5-2 0 phi; subrounded; quartz, friable; moist 8 8-9 7' CLAYSTONE· medium gray (N 5/0) to olive gray (5 Y 4/1); 10% silt; no plasticity; consolidated; slightly moist 10 0-12 0' SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE moderate yellowish brown (10 YR 5/4), iron stained, pale yellowish brown (10 YR 6/2), weathered, plastic; trace organic specks -- black (N 1/0), consolidated· slightly moist	

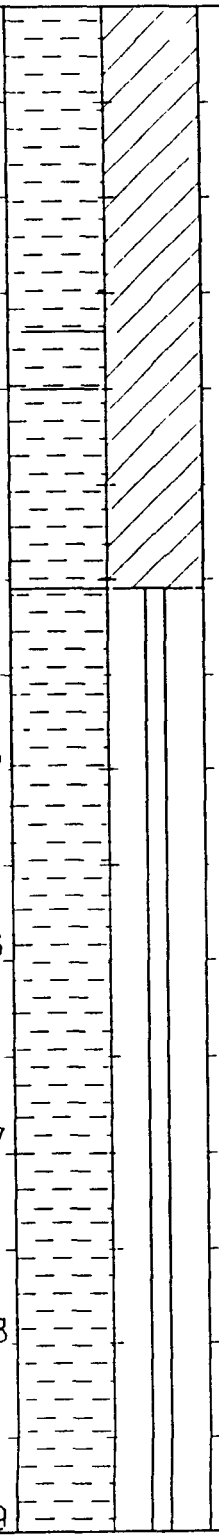
WELL NO 8-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			12 0-14 0' SAMPLE. Recovered 2 0/2 0' = 100% CLAYSTONE same as above light olive gray (5 Y 5/2), iron stained -- moderate brown (5 YR 4/4), slightly moist	
14			14.0-16 0' SAMPLE Recovered 2 1/2 0' = 105% CLAYSTONE light olive gray (5 Y 5/2), 10% silt; 10% sand in part; very fine grained (4 0-3 5 phi), trace black organic (N 1/0), weathered; consolidated, slightly moist	
15			16 0-18 0' SAMPLE Recovered 2 1/2 0' = 105% CLAYSTONE· olive gray (5 Y 4/1), trace sand, trace fractures dark yellowish orange (10 YR 6/6), weathered in part, slightly moist	
16			18 0-20 0' SAMPLE Recovered 2 2/2 0' = 110% 18 0-19 0' CLAYSTONE light olive gray (5 Y 5/2), 10% silt; black organic specks less weathered; slightly moist 19 0-20 0' CLAYSTONE iron stained--dark yellowish orange (10 YR 6/6) to medium gray (N 5/0), more weathered; 10% silt throughout· 10% sand in places· no plasticity· slightly moist	
17				
18				
19				
20				
21				

WELL NO 38-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21 22 23 24 25 26 27 28 29			20 0-22 0' SAMPLE Recovered 2 2/2 0' = 110% CLAYSTONE olive gray (5 Y 4/1), trace weathered iron staining light olive brown (5 Y 5/6), 10% silt throughout, organic specks in part black (N 1/0), no plasticity, moderately hard, consolidated, slightly moist 22 0-24 0' SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE light olive gray (5 Y 5/2), 10% silt throughout, trace sand throughout, organic black root castes, no plasticity, consolidated, hard, slightly moist to dry 22 7-23 0' SANDY CLAYSTONE light olive gray (5 Y 5/2), 3 5-3 0 phi, well sorted, suprounded to subangular, quartzose 23 0-24 0' CLAYSTONE same as 22 0 22 7' 25 3-27 7' SAMPLE Recovered 2 4/2 4' = 100% RQD 2 2/2 4' = 92% 25 3-25 5' CEMENT PLUG 25 5-27 5' CLAYSTONE light olive gray (5 Y 5/2) to dark olive gray, some iron staining associated with plant debris--dark yellowish orange (10 YR 6/6), some oxidized pyrite cubes up to 3mm--iron stained, fairly weathered, trace to moderate plasticity, consolidated, moderately hard, slightly moist 27 7-31 7' SAMPLE Recovered 1 8/4 0' = 45% RQD 1 8/1 8' = 100% CLAYSTONE olive gray (5 Y 4/1) to medium dark gray (N 4/0), blocky, some iron stained fractures -light brown (5 YR 5/6), some lignite plant debris grayish black (N 2/0), slightly weathered, no to slight plasticity, consolidated, moderately hard, slightly moist to dry	

3889BRD

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			31 7-33 7' SAMPLE Recovered 1 9/2 0' = 95% RQD 1 9/1 9' = 100% CLAYSTONE medium dark gray (N 4/0), unstratified, blocky texture, unweathered to slightly weathered, trace iron staining in places--dark yellowish orange (10 YR 6/6), trace to 10% silt, slight plasticity, consolidated, moderately hard, slightly moist to dry	
30			33 7-37 2' SAMPLE Recovered 3 3/3 5' = 94% RQD 3 3/3 3' = 100% 33 7-34 1' CLAYSTONE olive black (5 Y 2/1), unstratified, (0-5%) silt, organic-rich, trace iron stained pyrite cubes up to 2cm--moderate brown (5 YR 4/4), fresh--unweathered, slight plasticity, consolidated, moderately hard, slightly moist to dry	
31			34 1-37 2' CLAYSTONE olive gray (5 Y 4/1) to dark greenish gray (5 GY 4/1), slightly mottled, unstratified, glauconitic, (15%) silt, trace lignite with conchoidal fractures--black (N 1/0), fresh--unweathered, trace vugular porosity up to 3mm with clay alteration--no effervescence-grayish orange (10 YR 7/4), slight to no plasticity, consolidated, moderately hard, dry	
32				
33				
34				
35				
36				
37				

WELL NO 38-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			**37 2-41 7' SAMPLE** Recovered 4 0/4 5' = 89% RQD 2 5/4 0' = 62% CLAYSTONE same as above, (0 5%) silt, moderately plastic	
38			**41 7-45 7' SAMPLE** Recovered 4 0/4 0' = 100% RQD 4 0/4 0'= 100% CLAYSTONE olive gray (5 Y 4/1) to medium dark gray (N 4/0), unstratified, blocky texture, (0-5%) silt, black organic speckles, unweathered, slight plasticity, consolidated, moderately hard, dry	
39				
40				
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42				
43				
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45				

3889BRF

WELL NO 3-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			45 7-50 2' SAMPLE Recovered 1 7/4 5' = 38% RQD 1 3/1 7' = 76% CLAYSTONE olive gray (5 Y 4/1) to medium dark gray (N 4/0), blocky texture, unstratified, glauconitic, (0-5%) silt, slight plasticity, consolidated, hard, slightly moist to dry	
46			50 2-52 2' SAMPLE Recovered 3 0/2 0' = 150% RQD 1 8/3 0' = 60% CLAYSTONE olive gray (5 Y 4/1) to dark olive gray (5 Y 3/2), blocky, glauconitic, (0-5%) silt, several lignite stringers--black (N 1/0), organic rich, consolidated, moderately hard, dry	
47			Note Excess core recovery due to retrieval of lost core from previous run	
48			52 2-55 2' SAMPLE Recovered 1 7/3 0' = 57% RQD 1 7/1 7' = 100% CLAYSTONE olive gray (5 Y 3/2) to olive black (5 Y 2/1), organic rich, lignite stringers- black (N 1/0), (0-5%) silt, low plasticity, consolidated, hard, dry	
49				
50				
51				
52				
53				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
53			55 2-58 7' SAMPLE Recovered 4 2/3 5' = 120% RQD 3 3/4 2' = 79% 55 2-57 2' CLAYSTONE same as above 57 2-57 3' SILTSTONE dark gray (N 3/0), very fine-grained, quartz and calcium carbonate cemented--some effervescence, consolidated, strongly cemented, extremely hard, dry Note Excess core recovery due to retrieval of lost core from previous run 57 3-58 7' CLAYSTONE olive gray (5 Y 4/1), blocky texture, unstratified, (0 5%) silt, some organic lignite pieces--black (N 1/0), consolidated, moderately hard, dry 58 7-62 7' SAMPLE Recovered 0 0/4 0' = 0%	
54				
55				
56				
57				
58				
59				
60				
61				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
61			62 7-63 2' SAMPLE Recovered 1 0/0 5' = 200% RQD 0 4/1 0' = 40% CLAYSTONE olive black (5 Y 2/1), (0-5%) silt, medium plasticity, consolidated to semi-consolidated, moderately soft, slightly moist	
62			Note Excess core recovery due to retrieval of lost core from previous run	
			63 2-64 7' SAMPLE Recovered 1 5/1 5' = 100% RQD 1 5/1 5' = 100% CLAYSTONE olive gray (5 Y 3/2), (5-10%) silt, trace black lignite stringers, homogeneous, moderate plasticity, consolidated, moderately soft, slightly moist to dry	
63				
			64 7-66 7' SAMPLE Recovered 1 9/2 0' = 95% RQD 1 1/1 9' = 58% 64 7-65 6' CLAYSTONE same as above 65 6-66 6' CLAYSTONE dark greenish gray (5 G 4/1), glauconitic, homogeneous, unstratified, (0 5%) silt, moderate plasticity, consolidated, moderately hard, dry	
64				
			66 7-68 7' SAMPLE Recovered 1 8/2 0' = 90% RQD 1 3/1 8' = 72% CLAYSTONE same as above, hard	
65				
			68 7-72 2' SAMPLE Recovered 1 8/3 5' = 51% RQD 1 7/1 8' = 94% SILTY CLAYSTONE medium dark gray (N 4/0) to dark greenish gray (5 GY 4/1), homogeneous, (30%) silt, low plasticity, consolidated, moderately hard to hard, dry	
66				
67				
68				
69				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
69			72 2-75 7' SAMPLE Recovered 5 0/3 5' = 167% RQD 4 4/5 0' = 88% SILTY CLAYSTONE dark greenish gray (5 GY 4/1), glauconitic, homogeneous, unstratified, (40%) silt in part, low plasticity, consolidated, moderately hard, dry Note Excess core recovery due to retrieval of lost core from previous run 75 7-79 7' SAMPLE Recovered 3 4/4 0' = 85% RQD 3 1/3 4' = 91% SILTY CLAYSTONE dark greenish gray (5 GY 4/1) to medium dark gray (N 4/0), mostly homogeneous, progressively siltier toward bottom, very silty in places, some lignite stringers in part, horizontal manganese oxide surfaces--brownish black (5 YR 2/1), chert nodules toward bottom--hard--light brown (5 YR 6/4), consolidated, hard, slightly moist	
70				
71				
72				
73				
74				
75				
76				
77				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
77			79 7-84 2' SAMPLE Recovered 5 0/4 5' = 111% RQD 4 3/5 0' = 86% SILTY CLAYSTONE olive gray (5 Y 4/1), glauconitic; 45 degree fracture at 81 4'--clay alteration on surface--pale yellowish brown (10 YR 6/2), trace chert nodules throughout, manganese oxide on horizontal surfaces--grayish black (N 2/0), no to slight plasticity, consolidated, hard, dry Note Excess core recovery due to retrieval of lost core from previous run 84 2-88 2' SAMPLE Recovered 4 0/4 0' = 100% RQD 3 6/4 0' = 90% CLAYSTONE same as above, olive gray (5 Y 4/1), homogeneous, unstratified, less silt (15%), no chert nodules or manganese oxide on surfaces, moderate plasticity	
78				
79				
80				
81				
82				
83				
84				
85				

3889BRK

WELL NO 38-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
85			88 2-92 7' SAMPLE Recovered 0 0/4 5' = 0% 92 7-93 2' SAMPLE Recovered 0 3/0 5' = 60% RQD 0 0/0 3' = 0%. CLAYSTONE same as 84 2-88 2'	
86				
87				
88				
89				
90				
91				
92				
93				

3889BRL

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
93 94 95 96 97 98 99 100 101			93 2-93 7' SAMPLE Recovered 1 3/0 5' = 260% RQD 1 0/1 3' = 77% SILTY CLAYSTONE olive gray (5 Y 4/1), (30%) silt trace small lignite stringers--olive black (5 Y 2/1), no plasticity, consolidated, moderately hard, dry 93 7-96 7' SAMPLE Recovered 1 3/3 0' = 43% RQD 1 0/1 3' = 77% SILTY SANDSTONE dark greenish gray (5 G 4/1) to greenish gray (5 G 6/1), glauconitic, well sorted, very fine-grained sand (4 0-3 5 phi), very silty, tight, trace plant debris--olive black (5 Y 2/1), consolidated, moderately soft, moist to damp 96 7-99 7' SAMPLE Recovered 1 5/3 0' = 50% RQD 1 5/1 5' = 100% SILTY SANDSTONE same as above, dark greenish gray (5 GY 4/1), progressively siltier toward the bottom, moderately hard, damp 99 7-101 7' SAMPLE Recovered 5 0/2 0' = 250% RQD 4 7/5 0' = 94% SANDY SILTSTONE olive gray (5 Y 4/1), organic rich, unstratified, very fine-grained sand, (5-10%) clay, progressively more clayey and less sandy toward the bottom, some lignite stringers--brownish black (5 Y 2/1), resinous, consolidated, moderately hard, damp Note Excess core recovery due to retrieval of lost core from two previous runs	

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
101 102 103 104 105 106 107 108 109			101 7-105 7' SAMPLE Recovered 2 2/4 0' = 55% RQD 1 5/2 2' = 68% CLAYEY SILTSTONE olive gray (5 Y 4/1) to dark greenish gray (5 GY 4/1), (10%) very fine-grained sand (4 0-3 5 phi), quartzite, hard chert nodules up to 1 5cm; pale yellowish brown (10 YR 6/2), iron stained--moderate yellowish brown (10 YR 5/4), no plasticity, consolidated, moderately hard; damp 105 7-107 7' SAMPLE Recovered 3.9/2 0' = 195% RQD 3.0/3 9' = 77% 103.8-104 5' CLAYEY SANDY SILTSTONE: same as above, slightly more sand, trace clay lenses--light olive gray (5 Y 6/1), no effervescence. 104.5-105.5'. SILTY SANDSTONE dark greenish gray (5 GY 4/1), organic in part, progressively more sandy toward the bottom, moderate plasticity; consolidated, soft, damp. 105.5-107.7' SILTY SANDSTONE. dark greenish gray (5 GY 4/1) to greenish gray (5 GY 6/1), glauconitic, homogeneous, very fine-grained sand (4.0-3 5 phi), (10%) clay; tight, well cemented, consolidated, hard, damp Note Excess core recovery due to retrieval of lost core from previous run 107 7-111 7' SAMPLE Recovered 3 2/4 0' = 80% RQD 3 0/3 2' = 94% 107 7-108 4' SILTY SANDSTONE same as above, fine-grained (3 0-2 5 phi) 108 4-110 9' CLAYEY SANDY SILTSTONE olive gray (5 Y 3/2), fairly homogeneous, very fine-grained sand (4 0-3 5 phi), trace lignite pieces--olive black (5 YR 2/1), trace clay discoloration--yellowish gray (5 Y 7/2), no effervescence, consolidated, hard, damp	105 5-108 4' GEOTECHNICAL SAMPLE (hydrometer analysis) 3889105108 27% sand, 73% silt and clay ▼ 105 88'

3889BRN

WELL NO 38-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
109			111 7-115 7' SAMPLE Recovered 4 9/4 0' = 122% RQD 4 7/4 7' = 100%. SANDY SILTSTONE olive gray (5 Y 3/2), (15%) clay; some manganese oxide on horizontal surfaces--grayish black (N 2/0), consolidated, moderately hard, damp.	
110			115 7-119 7' SAMPLE Recovered 2.9/4 0' = 72%. RQD 2.6/2 9' = 90% SANDY SILTSTONE olive gray (5 Y 3/2), (25%) very fine-grained sand (4 0-3 5 phi); (10%) clay, moderately hard discolored clay lenses--yellowish gray (5 Y 7/2), consolidated, moderately hard, damp	
111				
112				
113				
114				
115				
116				
117				

3889BR0

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
117			119 7-122 7' SAMPLE Recovered 3 5/3 0' = 117%. RQD 2 4/3 5' = 69% 119 7-121 3' SANDY SILTSTONE same as above, chert nodules up to 3cm--brownish gray (5 YR 4/1) 121 3-122 7' CLAYEY SILTSTONE. olive gray (5 Y 3/2), unstratified; (10%) sand; gradational from clayey to sandy throughout; no to slight plasticity, consolidated, hard, damp.	
118				
			122 7-126 7' SAMPLE Recovered 4 5/4 0' = 112%. RQD 4 2/4 5' = 93%. 122.7-123 7'· CLAYEY SILTSTONE same as above, moderately hard. 123 7-126 7' SILTY CLAYSTONE. olive gray (5 Y 3/2), unstratified; homogeneous except gradual variations in silt and clay percentages; progressively siltier and 15% sand toward bottom; clay lenses up to 3cm--pale yellowish brown (10 YR 6/2), consolidated, moderately hard; damp	
119				
120				
121				
122				
123				
124				
125				

3889GRP

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
125			126 7-128 7' SAMPLE Recovered 1 0/2 0' = 50% RQD 0 0/1 0' = 0% SILTY CLAYSTONE. same as above, moderate plasticity	
126			128 7-132.7' SAMPLE Recovered 3 0/4 0' = 75% RQD 1 8/3 0' = 60%. SANDY CLAYEY SILTSTONE greenish gray (5 GY 6/1) to dark greenish gray (5 GY 4/1); very sandy in places, very fine-grained (4 0-3.5 phi), trace lignite stringers--olive black (5 Y 2/1), consolidated, moderately hard, damp	
127				
			TOTAL DEPTH = 132 7'	
128				
129				
130				
131				
132				
133				

LOG OF BOREHOLE

QA BY/DATE J B Burman / 9-29-89
LOCATION Rocky Flats Plant, Background
COORDINATES N34321 35 E22184 13 (RFP)
TOTAL DEPTH 42 4'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 7, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K W Van Allen
GEOLOGIST

BOREHOLE/WELL NO 39-89 BR
GROUND SURFACE ELEVATION 5867 5'
WATER LEVEL ENCOUNTERED None
STATIC None (5/24/89)
DRILLER R Sharp HELPER P Mesa
DRILLING FLUID None
CHECKED BY Jarell Burman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** **0.0-2.2' SAMPLE** Recovered 1.5/2 2' = 68%. 0.0-0.4' SILTY CLAY. olive black (5 Y 2/1); trace (5%) fine sand, low plasticity; organics; roots unconsolidated; moist. **COLLUVIUM** 0.4-2.3' SILTY CLAY light olive gray (5 Y 5/2), trace (<5%) fine sand; medium plasticity; massive; unconsolidated, no HCl reaction; moist. **2.2-4 4' SAMPLE** Recovered 2 0/2.0' = 100%. SILTY CLAY. same as above **4.4-6.4' SAMPLE.** Recovered 2 0/2.0' = 100%. CLAYEY SILT dark yellowish brown (10 YR 4/2), trace fine sand, calcareous, strong HCl reaction; low plasticity; massive; unconsolidated; moist	

3969BRA

WELL NO 39-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			6 4-8 4' SAMPLE Recovered 2 1/2.0' = 105% CLAYEY SILT dark yellowish brown (10 YR 4/4) and moderate brown (5 YR 4/4), mottled, same as above	
6			8 4-10 4' SAMPLE Recovered 2 0/2 0' = 100% CLAYEY SILT moderate yellowish brown (10 YR 5/4), same as above.	
7			10 4-12 4' SAMPLE Recovered 2 0/2 0' = 100% CLAYEY SILT. dark yellowish brown (10 YR 5/2), some (15%) coarse to fine quartzose sand; some (20%) coarse to fine quartzose gravel, subangular to subrounded; poorly sorted, unconsolidated, massive, no HCl reaction, damp	
8			12 4-14 4' SAMPLE Recovered 1 9/2 0' = 95%. CLAYEY SILT same as above, slightly calcareous, moist	
9				
10				
11				
12				
13				

3989BRB

WELL NO 39-89 BR

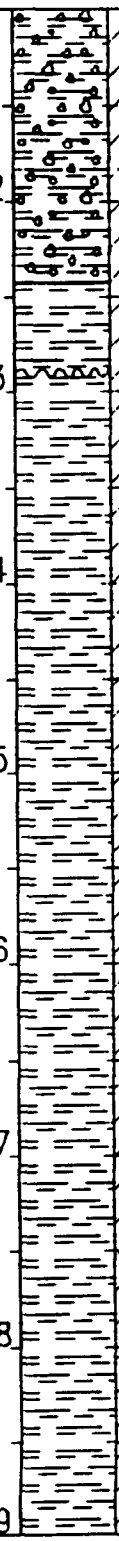
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 4-16 4' SAMPLE Recovered 2 0/2 0' = 100% CLAYEY SILT same as above 16 4-18 4' SAMPLE Recovered 2 0/2 0' = 100%. CLAYEY SILT same as above 18 2-20 4' SAMPLE Recovered 2 0/2 0' = 100% CLAYEY SILT same as above; coarse gravel or cobble at 20' 20 4-22 4' SAMPLE Recovered 1 6/2 0' = 80%. CLAYEY SILT AND GRAVEL. same as above, 40% coarse to fine gravel, subangular to subrounded, moist	
14				
15				
16				
17				
18				
19				
20				
21				

3000BRC

WELL NO 39-89 BR

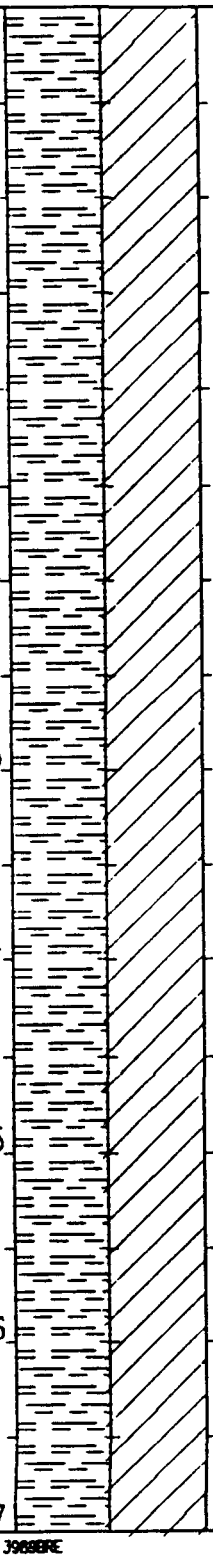
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			22 4-24 4' SAMPLE Recovered 2 0/2 0' = 100% 22.4-22.9' CLAYEY SILT same as above	
22			22 9-24 4' SILTY CLAYSTONE light olive gray (5 Y 6/1) and moderate brown (10 YR 5/4), some (20%) coarse to fine quartzose sand; mottled; medium plasticity, massive, moist	
			24 4-26 4' SAMPLE Recovered 1.9/2.0' = 95%. SILTY CLAYSTONE moderate brown (5 Y 4/4) and olive gray (5 Y 4/1), trace fine sand; mottled, consolidated, massive, no HCl reaction; moist	
23			26 4-28 4' SAMPLE Recovered 2 2/2.0' = 110% SILTY CLAYSTONE same as above	
24			28 4-30 4' SAMPLE Recovered 2 2/2 0' = 110% SILT CLAYSTONE medium dark gray (N 4/0) and moderate brown (5 Y 4/4), same as above	
25				
26				
27				
28				
29				

WELL NO 39-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			30 4-32 4' SAMPLE Recovered 2 2/2 0' = 110% SILTY CLAYSTONE dark gray (N 3/0), moderate brown (5 Y 4/4), and medium dark gray (N 4/0), mottled; consolidated; massive, no HCl reaction, moist.	
30			32 4-34 4' SAMPLE Recovered 2 2/2 0' = 110% SILTY CLAYSTONE: same as above, slightly carbonaceous; moist	
31			34 4-36 4' SAMPLE Recovered 2.0/2 0' = 110% SILTY CLAYSTONE: same as above	
32			36 4-38 4' SAMPLE Recovered 2.2/2 0' = 110% SILTY CLAYSTONE. same as above	
33				
34				
35				
36				
37				



3989BRE

WELL NO 39-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			38 4-40 4' SAMPLE. Recovered 2 2/2.0' = 110%. SILTY CLAYSTONE. olive gray (5 Y 4/1), dark gray (N 3/0) and moderate brown (5 Y 4/4); trace fine sand; mottled; consolidated; massive; moist.	
38			40 4-42 4' SAMPLE Recovered 2.1/2 0' = 105%. SILTY CLAYSTONE: same as above	
39			TOTAL DEPTH = 42 4'	
40				
41				
42				
43				
44				
45				

3989BRF

LOG OF BOREHOLE

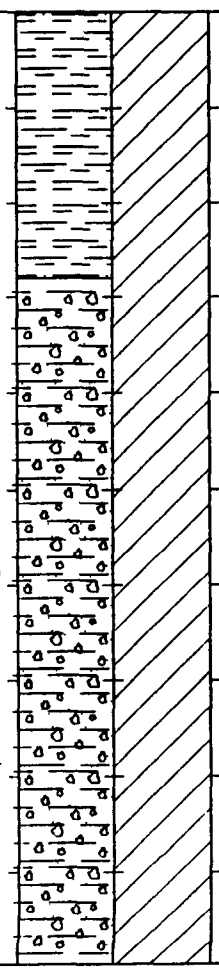
QA BY/DATE Rick Monroe / 6-21-89
LOCATION Rocky Flats Plant, Background
COORDINATES N32,815 29 E26,451 93 (RFP)
TOTAL DEPTH 29.1'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 15, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K.W. Van Allen
GEOLOGIST

BOREHOLE/WELL NO 40-89 BR
GROUND SURFACE ELEVATION 5730 6'
WATER LEVEL ENCOUNTERED None
STATIC None (5/22/89)
DRILLER R Sharp HELPER P Mesa
DRILLING FLUID None
CHECKED BY Janell Bergman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 0 7/2 0' = 35% SILTY CLAY dusky yellowish brown (10 YR 2/2), some (20%) coarse to fine quartzose sand, trace (10%) coarse to fine quartzose gravel; poorly sorted, subrounded to subangular, organics and plant roots, low plasticity, moist. **VALLEY FILL ALLUVIUM** 2 0-4 0' SAMPLE Recovered 1 2/2 0' = 60% SILTY SAND AND GRAVEL dark yellowish brown (10 YR 4/2), (40%) coarse to fine quartzose sand, (35%) coarse to fine quartzose gravel, (25%) silt, poorly sorted, subangular to subrounded, unconsolidated, calcareous, moist 4 0-6 0' SAMPLE Recovered 2 0/2 0' = 100% SILTY SAND AND GRAVEL same as above, grading to pale yellowish brown (10 YR 6/2), dry	

4089BRA

WELL NO 40-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			6 0-8 0' SAMPLE Recovered 2.0/2.0' = 100%. SILTY TO CLAYEY SAND· same as above; moderate yellowish brown (10 YR 5/4), (25%) silt/clay, moist. 8 0-10 0' SAMPLE Recovered 1 7/2.0' = 85%. 8.0-9 7'· SILTY CLAY. moderate yellowish brown (10 YR 5/4), some (20%) coarse to fine quartzose sand; trace (10%) coarse to fine quartzose gravel, poorly sorted; subangular to subrounded; iron concretions; weathered; massive; no HCl reaction; moist. 9 7-10.0'. SILTY CLAYSTONE· moderate yellowish brown (10 YR 5/4); trace fine sand; iron concretions; weathered; massive; consolidated; no HCl reaction; moist. 10.0-12 0' SAMPLE Recovered 2.0/2.0' = 100% SILTY CLAYSTONE: moderate yellowish brown (10 YR 5/4) and medium light gray (N 6/0), trace fine sand; occasional calcareous inclusions; iron concretions; weathered; consolidated; mottled; moist. 12.0-14 0' SAMPLE Recovered 1.6/2 0' = 80% SILTY CLAYSTONE same as above; moderate brown (5 YR 4/4, 10 YR 3/4), moist.	

4089BRB

WELL NO 40-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 0-16 0' SAMPLE Recovered 2 0/2 0' = 100%. SILTY CLAYSTONE same as above, moderate brown (5 YR 4/4), 5 YR 3/4) and light olive gray (5 Y 5/2), moist	
14			16 0-18 0' SAMPLE Recovered 2.0/2 0' = 100% SILTY CLAYSTONE same as above, except mostly light olive gray (5 Y 5/2), no HCl reaction, no iron concretions; moist.	
15			18 0-20 0' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAYSTONE. moderate brown (5 YR 4/4), light olive gray (5 Y 5/2) and medium gray (N 5/0), trace fine sand, mottled, weathered; consolidated, massive, no HCl reaction, moist	
16			20 0-22 0' SAMPLE Recovered 2 0/2 0' = 80% SILTY CLAYSTONE same as above, except trace moderate brown (5 YR 4/4), moist	
17				
18				
19				
20				
21				

40BBBRC

WELL NO 40-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			22 0-24 0' SAMPLE Recovered 1 7/2 0' = 85%. SILTY CLAYSTONE. same as 18 0-20 0', moist	
22			24 0-26 0' SAMPLE Recovered 2 0/2 0' = 100%. SILTY CLAYSTONE: same as above, except less mottled, less weathered, predominantly light olive gray (5 Y 5/2), moist	
23			26 0-28 0' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAYSTONE same as above, except predominantly moderate brown (5 YR 4/4), moist	
24			28 0-29 1' SAMPLE Recovered 1 4/1 1' = 127% SILTY CLAYSTONE. same as above, also medium gray (N 5/0), moist.	
25				
26				
27				
28				
29				

WELL NO 40-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29				
			TOTAL DEPTH = 29.1'	
30				
31				
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40BSBRE

LOG OF BOREHOLE

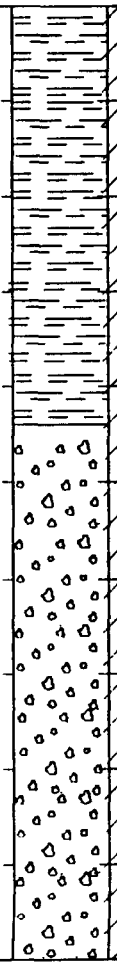
QA BY/DATE Janell Bryman / 7-26-89
LOCATION Rocky Flats Plant, Background
COORDINATES N32,799.24 E26,481.33 (RFP)
TOTAL DEPTH 109 1'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 13 and April 18, 1989
DRILLING METHOD Hollow Stem Auger 0.0-49 4', Rotary Core 49.4-109.1
LOGGED BY K W Van Allen, J E Marks
GEOLOGIST

BOREHOLE/WELL NO 41-89 BR
GROUND SURFACE ELEVATION 5,729 70'
WATER LEVEL ENCOUNTERED None
STATIC 39 14' (6/23/89)
DRILLER R Sharp, P Bushkovski HELPER P Mesa, H McCree
DRILLING FLUID None 0.0-49.4', Water 49.4'-109.1'
CHECKED BY Janell Bryman
SITE MANAGER

CEARP MANAGER

COMMENTS Offset from 41-89 BRA approximately 10' east Surface casing set to 49 4' by K W Van Allen on March 13, 1989

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			**TOPSOIL** 0 0-2 2' SAMPLE Recovered 0 6/2 2' = 27% 0 0-0 6' SILTY CLAY dusky yellow brown (10 YR 2/2), some (20%) coarse to fine quartzose sand, poorly sorted, subrounded, organics, low plasticity, moist **ROCKY FLATS ALLUVIUM** 0 6-2 2' SILTY CLAY dark yellowish brown (10 YR 4/2), same as above, less organics 2 2-4 4' SAMPLE Recovered 1 5/2 2' = 68% SAND AND GRAVEL pale yellowish brown (10 YR 6/2), (50%) coarse to fine quartzose sand, (40%) coarse to fine quartzose gravel, (10%) silt, poorly sorted; subangular to subrounded; slightly calcareous; unconsolidated, moist 4 4-6 4' SAMPLE Recovered 1 1/2 0' = 55% SAND AND GRAVEL same as above, dry	
1				
2				
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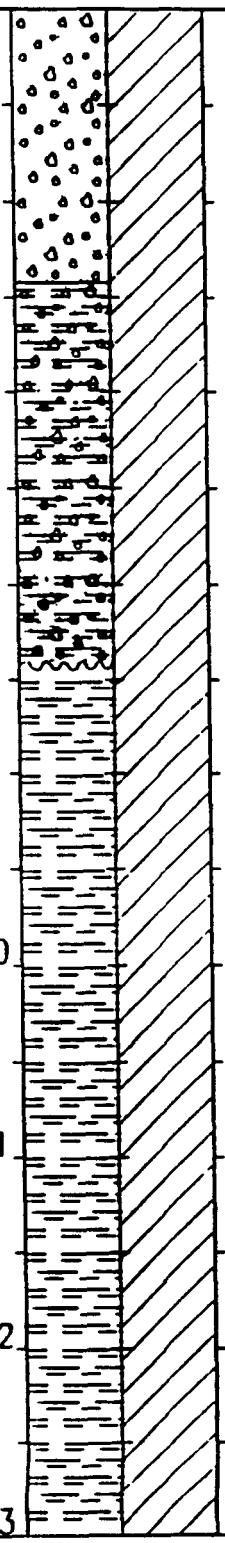
4189BRA

WELL NO 41-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			**6 4-8.4' SAMPLE.** Recovered 2.2/2.0' = 110%. SILTY TO CLAYEY SAND AND GRAVEL: moderate yellowish brown (10 YR 5/4); (40%) coarse to fine quartzose sand; (35%) coarse to fine quartzose gravel; poorly sorted; subangular to subrounded; unconsolidated; massive; moist. **8.4-10 4' SAMPLE.** Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: moderate yellowish brown (10 YR 5/4); trace fine sand; weathered; iron concretions; moist. **10.4-12 4' SAMPLE.** Recovered 1.7/2.0' = 85%. SILTY CLAYSTONE: same as above; medium light gray (N 6/0); mottled. **12.4-14 4' SAMPLE.** Recovered 1.2/2.0' = 60%. SILTY CLAYSTONE: dark yellowish brown (10 YR 4/2) and light olive gray (5 Y 6/1); same as above.	

4189BRB

WELL NO 41-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 4-16 4' SAMPLE. Recovered 2.0/2.0' = 100%. 14.4-14 9'· SILTY CLAYSTONE: same as above 14.9-16.4': SILTY CLAYSTONE· same as above; olive gray (5 Y 4/1); less weathered. 16.4-18.4' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: same as above; except dark yellowish brown (10 YR 4/2) and light olive gray (5 Y 6/1). 18.2-20.4' SAMPLE. Recovered 1.9/2.0' = 95%. SILTY CLAYSTONE: same as above. 20.4-22.4' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYEY SILTSTONE: light olive gray (5 Y 6/1) and moderate brown (5 YR 4/4); some (20%) fine sand; mottled; massive; consolidated; no HCl reaction; moist.	
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41BBRC

WELL NO 41-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			22.4-24.4' SAMPLE. Recovered 1.7/2.0' = 85%. SILTY CLAYSTONE: olive gray (5 Y 4/1), trace fine sand; slightly mottled; massive; consolidated; weathered; no HCl reaction; moist.	
22			24.4-26.4' SAMPLE Recovered 1.9/2.0' = 95%. SILTY CLAYSTONE: dark yellowish brown (10 YR 4/2) and moderate brown (5 Y 4/4); same as above; iron concretions; moist-damp.	
23			26.4-28.4' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: same as above; olive gray (5 Y 4/1), damp.	
			28.4-30 4' SAMPLE. Recovered 1.7/2.0' = 85%. SILTY CLAYSTONE: same as above; medium dark gray (N 4/0); highly weathered; moist.	
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4189BRD

WELL NO 41-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			<u>30.4-32.4' SAMPLE.</u> Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: same as above; slightly calcareous. <u>32.4-34.4' SAMPLE.</u> Recovered 1.0/2.0' = 50%. SILTY CLAYSTONE: same as above. <u>34.4-36.4' SAMPLE.</u> Recovered 1.7/2.0' = 85%. SILTY CLAYSTONE: same as above. <u>36.4-38.4' SAMPLE.</u> Recovered 1 6/2.0' = 80%. 36.4-37.4'· SILTY CLAYSTONE: same as above. 37.4-38.4' SILTY CLAYSTONE· grayish black (N 2/0); trace fine sand; carbonaceous; consolidated; massive; no HCl reaction; moist.	
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WELL NO 41-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			**38 4-40 4' SAMPLE** Recovered 1 6/2 0' = 80% SILTY CLAYSTONE dark yellowish brown (10 YR 4/2), moderate brown (5 Y 4/4), olive gray (5 Y 4/1) and medium dark gray (N 4/0), same as 34 4-36.4'	
38			**40 4-42 4' SAMPLE** Recovered 0 9/2.0' = 45% SILTY CLAYSTONE same as above, olive gray (5 Y 4/1), weathered	
39			**42 4-44 4' SAMPLE** Recovered 2 0/2 0' = 100% 42 4-43.4' SILTY CLAYSTONE moderate brown (5 YR 4/4) and dark gray (N 3/0), weathered, same as above 43.4-44.4' SILTY CLAYSTONE. dark gray (N 3/0), unweathered, carbonaceous, same as above.	▼ 39 14'
40			**44 44-46 4' SAMPLE.** Recovered 2 0/2.0' = 100%. SILTY CLAYSTONE same as above.	
41				
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45				

4188BRF

WELL NO 41-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			**46 4-48 4' SAMPLE** Recovered 1 0/2.0' = 50%. SILTY CLAYSTONE same as above **48.4-49 4' SAMPLE** Recovered 1 4/1 0' = 140%. SILTY CLAYSTONE· same as above **49 8-53 8'SAMPLE** Recovered 0.2/4 0' = 5% RQD 0 0/0.2' = 0%. SILTY CLAYSTONE: dark gray (N 3/0) to olive gray (5 Y 4/1); homogeneous, trace carbonaceous in part; consolidated; moderately hard; damp to dry	
46				
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53				

4189BRG

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
53			**53 8-54 8' SAMPLE** Recovered 1 6/1 0' = 160% RQD 0.7/1 6' = 44% SILTY CLAYSTONE: same as above	
54			**54 8-57 8' SAMPLE** Recovered 2 7/3 0' = 90% RQD 1 5/2.7' = 56%. SILTY CLAYSTONE. olive gray (5 Y 4/1), homogeneous; (0-5%) fine-grained sand in places; trace organic pieces in part--olive black (5 Y 2/1), no HCl reaction; slight plasticity, moderately hard; damp.	
55			**57 8-61 8' SAMPLE** Recovered 3 0/4 0' = 75%. RQD 2.7/3.0' = 90%. 57 8-60.0' CLAYEY SILTSTONE· olive gray (5 Y 4/1), trace clay vugs up to 2mm--yellowish gray (5 Y 2/2); (10%) sand, very fine-grained (4 0-3.5 phi); trace organic stringers--olive black (5 Y 2/1), moderately hard; damp. 60 0-60.8'. SILTY CLAYSTONE: olive gray (5 Y 4/1) to olive black (5 Y 2/1), abundant lignite pieces--black (N 1/0), carbonaceous throughout; consolidated; moderately hard, damp.	
56				
57				
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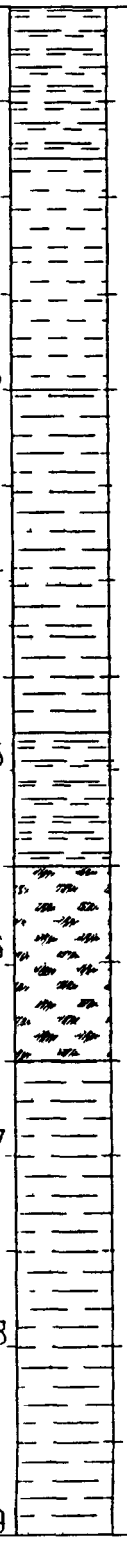
DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
61 62 63 64 65 66 67 68 69			61 8-64 8' SAMPLE Recovered 3 0/3.0' = 100%. RQD 1 6/3.0' = 53%. 61 8-63.0' CLAYSTONE· brownish black (5 YR 2/1), very carbonaceous throughout; (15%) silt; abundant lignite lenses--black (N 1/0), moderate plasticity, semi-consolidated; moderately soft, damp. 63.0-64.3' SANDY SILTSTONE. dark greenish gray (5 GY 4/1) to greenish gray (5 GY 6/1); grades into sandstone toward bottom. 64 3-64 8': SILTY SANDSTONE same as above; very fine-grained sand (4 0-3 5 phi), quartzose; some mica flakes, consolidated; friable, slightly moist to damp. 64.8-68.8' SAMPLE Recovered 2.1/4 0' = 52%. RQD 0.8/2.1' = 38%. 64.8-65.5'· SILTY CLAYSTONE olive gray (5 Y 4/1) to olive black (5 Y 2/1); carbonaceous throughout, some organic-rich layers; moderately hard; damp. 65.5-66 5' CHERT dark yellowish brown (10 YR 4/2); trace organic pieces--olive gray (5 Y 3/2); vertical fracture with calcium carbonate cement; consolidated, very hard; dry 66.5-66.9'· SANDY SILTSTONE dark greenish gray (5 G 4/1) to medium gray (N 5/0), glauconitic; trace small organic pieces--olive gray (5 Y 4/1), consolidated; moderately hard; damp. 68.8-70 8' SAMPLE Recovered 2 0/2 0' = 100%. RQD 1 2/2 0' = 60% SANDY SILTSTONE· same as above, dark greenish gray (5 G 6/1) to greenish gray (5 G 4/1), very sandy in places; dirty thin lenses approximately 1 mm thick, trace organic pieces and specks--olive black (5 Y 2/1).	

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
69			70 8-74 8' SAMPLE Recovered 4 0/4 0' = 100% RQD 2 5/4 0' = 62%. 70.8-73 2' SANDY SILTSTONE same as above, dark greenish gray (5 GY 4/1) 73 2-74 8'· SILTSTONE AND SANDSTONE· olive gray (5 Y 4/1), homogeneous; very fine-grained sand (4.0-3.5 phi), tight; extremely well cemented, calcium carbonate cemented--effervesces, consolidated; very hard, dry.	
70				
71			74.8-78 8' SAMPLE Recovered 4 2/4 0' = 105% RQD 2.9/4 2' = 69% 74.8-75.8'. SILTSTONE AND SANDSTONE. same as above 75 8-78 8' SANDSTONE. light olive gray ((5 Y 6/1) to olive black (5 Y 2/1), thinly laminated beds of heavy dark mineral sands and light, less than 1 mm thick, well sorted very fine-grained sands (4.0-3.5 phi), rounded; quartzose, some mica flakes, (20%) silt throughout, consolidated yet friable, moderately soft, damp to moist.	74 9-84 0' GEOTECHNICAL SAMPLE (Hydrometer Analysis) 41897584 15% sand 85% silt and clay 76 2-77 0' GEOTECHNICAL SAMPLE (Hydrometer Analysis) 41897677 53% sand 47% silt and clay
72				
73				
74				
75				
76				
77				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
77				
			78 8-82 8' SAMPLE Recovered 3 2/4 0' = 80% RQD 2.8/3 2' = 88%. SANDSTONE: same as above; coarse-grained in places; some small clay lenses--yellowish gray (5 Y 7/2); some dark organic pieces--olive black (5 Y 2/1), thin organic surface--manganese oxide--very dusky red (10 R 2/2), wet.	
78				
			82.8-87 3' SAMPLE Recovered 4 6/4 5' = 102%. RQD 4 6/4 6' = 100% 82.8-84.4'. SANDY SILTSTONE. olive gray (5 Y 4/1), thinly laminated (light to dark) in places; very sandy in places; organic pieces in part--grayish brown (5 YR 3/2), consolidated; moderately hard, damp.	
79				
			84 4-85.4'· SILTY SANDSTONE. light olive gray (5 Y 6/1), (10%) clay in places; abundant organic horizontal surfaces--leaves--grayish brown (5 YR 3/2), consolidated; moderately hard yet friable; wet.	
80			85.4-87 3' CLAYEY SILTSTONE: olive gray (5 Y 4/1) to dark gray (N 3/0), some organic pieces; manganese oxide horizontal surfaces--blackish red (5 R 2/2), hard, damp	
81				
82				
83				
84				
85				

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
85			**87 3-91 8' SAMPLE** Recovered 2 1/4 5' = 47% RQD 0 6/2 1' = 28%. CLAYEY SANDY SILTSTONE: olive gray (5 Y 3/2) to light olive gray (5 Y 6/1), varved in places; thinly laminated color changes; very fine-grained sand (4 0-3.5 phi), trace organic pieces in part, moderately hard; damp.	
86				
			91 8-93 8' SAMPLE Recovered 1.1/2 0' = 55% RQD 0 4/1 1' = 72%. CLAYEY SILTSTONE: olive gray (5 Y 3/2); laminated-varved, small light clay lenses--yellowish gray (5 Y 7/2), carbonaceous toward bottom; semi-consolidated; moist.	
87				
88				
89				
90				
91				
92				
93				

WELL NO 41-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
93			93 8-96 8' SAMPLE Recovered 1 3/3 0' = 43%. RQD 0 35/1 3' = 27% SILTY CLAYSTONE. olive black (5 Y 2/1); very carbonaceous, trace lignite pieces and partings-- black (N 1/0); semi-consolidated; moderately hard, moist	
94			96 8-99 8' SAMPLE Recovered 5 2/3 0' = 173% RQD 4 5/5 2' = 87%. CLAYEY SILTSTONE: olive gray (5 Y 4/1); massive; (5-10%) sand; some clay filled vugs-- light brown (5 YR 6/4), very carbonaceous toward bottom, consolidated, moderately hard, damp.	
95			99 8-103 8' SAMPLE Recovered 0 1/4 0' = 2 5%. RQD 0 0/0 1' = 0%. CLAYEY SILTSTONE same as above.	
96				
97				
98				
99				
100				
101				

4189BRM

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
101			**103 8-104 3' SAMPLE** Recovered 4 2/0 5' = 84% RQD 4 1/4 2' = 98% CLAYEY SILTSTONE· olive gray (5 Y 4/1), massive; trace organic specks--olive black (5 Y 2/1); trace clay vugs--yellowish gray (5 Y 7/2), very clay-rich toward the bottom, consolidated, moderately hard; damp.	
102			Note· Excess core recovery due to retrieval of lost core from previous run.	
103			**104 3-109 1' SAMPLE** Recovered 5 3/4 8' = 110% RQD 3.1/5 3' = 58% SILTY CLAYSTONE· olive gray (5 Y 4/1), organic pieces in part--olive black (5 Y 2/1), moderately hard, damp.	
104				
105				
106				
107				
108				
109				

4189BRN

WELL NO 41-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
109			TOTAL DEPTH = 109.1'	
110				
111				
112				
113				
114				
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116				
117				

4189BRO

LOG OF BOREHOLE

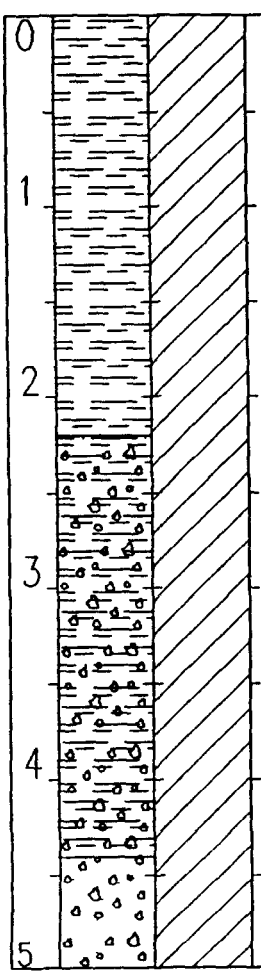
QA BY/DATE Rick Monow 6-19-89
LOCATION Rocky Flats Plant, Background
COORDINATES N32801 62 E26472 01 (RFP)
TOTAL DEPTH 55.4'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 9, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K.W. Van Allen
GEOLOGIST

BOREHOLE/WELL NO 41-89 BRA
GROUND SURFACE ELEVATION 5729 8'
WATER LEVEL ENCOUNTERED 6 0'
STATIC N/A
DRILLER R Sharp HELPER P Mesa
DRILLING FLUID None
CHECKED BY Janell Burman
SITE MANAGER

CEARP MANAGER

COMMENTS Borehole was backfilled to 5' below ground surface with volclay grout. Portland Type I cement to surface.

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 2'SAMPLE Recovered 1 0/2 2' = 86% 0.0-0.9' SILTY CLAY dusky yellowish brown (10 YR 2/2); some (20%) coarse to fine quartzose sand, some (20%) coarse to fine quartzose gravel, poorly sorted, subangular to subrounded, organics; low plasticity, unconsolidated, moist **VALLEY FILL ALLUVIUM** 0 9-1 9' SILTY CLAY dark yellowish brown (10 YR 4/2), same as above, no organics, no HCl reaction, moist 2 2-4 4' SAMPLE Recovered 1 1/2 2' = 50% SILTY CLAY AND GRAVEL dusky yellowish brown (10 YR 2/2), (35%) coarse to fine quartzose gravel, some (20%) coarse to fine quartzose sand; cobbles; subangular to subrounded; poorly sorted, unconsolidated, very dense, no HCl reaction; moist. 4 4-6 4' SAMPLE Recovered 0 7/2 0' = 35% SAND AND GRAVEL dark yellowish brown (10 YR 4/2), (50%) coarse to fine quartzose sand, (40%) coarse to fine quartzose gravel, trace (10%) silt, poorly sorted, subangular to subrounded, unconsolidated, moist	

4189ABRA

WELL NO 41-89 BRA

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			6 4-8 4' SAMPLE Recovered 0 3/2 0' = 15% SILTY CLAY moderate brown (5 YR 3/4) and light olive gray ((5 Y 6/1), mottled, mixed with coarse gravel or cobbles, some caliche below 6 7', unconsolidated, very moist	
6			8 4-10 4' SAMPLE Recovered 1 3/2 0' = 65% SILTY CLAY moderate brown (5 Y 3/4) and light olive gray (5 Y 6/1), mottled, trace (5%) coarse to fine sand, trace (10%) coarse to fine gravel, poorly sorted, subrounded, moist	6 0'
7			10 4-12 4' SAMPLE Recovered 2 2/2.0' = 110% SILTY CLAYSTONE same as above, trace fine sand; some iron concretions, moist	
8			12 4-14 4' SAMPLE Recovered 1 5/2 0' = 75%. SILTY CLAYSTONE same as above	
9				
10				
11				
12				
13				

4189ABRB

WELL NO 41-89 BRA

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 16 17 18 19 20 21			14 4-16 4' SAMPLE Recovered 2 2/2 0' = 110% 14 4-15 5' SILTY CLAYSTONE same as above 15 5-16 4' SILTY CLAYSTONE light olive gray (5Y 5/2) and olive gray (5 Y 3/2), slightly mottled, trace fine sand; consolidated, massive, no HCl reaction, moist 16 4-18 4' SAMPLE Recovered 1 8/2 0' = 90% SILTY CLAYSTONE slightly weathered, same as above 18 4-20 4' SAMPLE Recovered 1 9/2 0' = 95% SILTY CLAYSTONE olive gray (5 Y 3/2), trace fine sand, unweathered, consolidated, massive, moist	

41BBABRC

WELL NO 41-89 BRA

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			20 4-22 4' SAMPLE Recovered 2 0/2 0' = 100% CLAYEY SILTSTONE. light olive gray (5 Y 5/2) and moderate yellowish brown (10 YR 5/4), slightly weathered, stratified, consolidated, no HCl reaction, moist	
22			22 4-24 4' SAMPLE Recovered 2 0/2 0' = 100%. CLAYEY SILTSTONE same as above	
			24 4-25 6' SAMPLE Recovered 1 3/1 2' = 108% SILTY CLAYSTONE. dark yellowish brown (10 YR 4/2), weathered, trace fine sand; consolidated; massive, no HCl reaction, moist	
23			25 6-26 4' SAMPLE Recovered 1 1/0 8' = 137% SILTY CLAYSTONE· same as above, wet.	
			26 4-28 4' SAMPLE Recovered 1 7/2 0' = 85%. 26 4-27 9' SILTY CLAYSTONE same as above, moist 27 9-28 1' SILTY CLAYSTONE brownish gray (5 YR 4/1) and moderate brown (5 YR 4/4), slightly mottled, trace fine sand; consolidated, massive, no HCl reaction, moist	
24			28 4-30 4' SAMPLE Recovered 1 8/2 0', = 90%. SILTY CLAYSTONE same as above	
25				
26				
27				
28				
29				

WELL NO 41-89 BRA

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			30 4-32 4' SAMPLE Recovered 1 8/2 0' = 90% SILTY CLAYSTONE: olive gray (5 Y 4/1), mottled, trace fine sand; consolidated, massive, moist	
30			32.4-34 4'- SAMPLE Recovered 1 5/2 0' = 75%. 32.4-33.1' SILTY CLAYSTONE olive gray (5 Y 4/1) and moderate brown (5 YR 4/4), same as above 33.1-33.9' SILTY CLAYSTONE olive gray (5 Y 4/1), mottled; less weathered, trace fine sand; consolidated; massive; no HCl reaction; moist	
31			34 4-36 4' SAMPLE Recovered 2 0/2 0' = 100% 34 4-35 0' SILTY CLAYSTONE same as above; weathered 35.0-36.4'· SILTY CLAYSTONE· olive gray (5 Y 4/1), same as 33 1-33 9', moist	
32			36 4-38 4' SAMPLE Recovered 2 0/2.0' - 100%. 36.4-38.2' SILTY CLAYSTONE same as above. 38.2-38.4'. SILTY CLAYSTONE. medium dark gray (N 4/0) and dark yellowish brown (10 YR 4/1), mottled, same as above	
33				
34				
35				
36				
37				

4189ABRE

WELL NO 41-89 BRA

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37 38 39 40 41 42 43 44 45			38 4-40 4 SAMPLE Recovered 1 5/2.0' = 75%. SILTY CLAYSTONE: dark gray (N 3/0) and dark yellowish brown (10 YR 4/1), fractured, slightly mottled; trace fine sand, consolidated; massive, no HCl reaction; moist. 40 4-42 4' SAMPLE Recovered 1 6/2.0' = 80%. 40.4-41 7' SILTY CLAYSTONE same as above 41 7-42 0'· SILTY CLAYSTONE: olive gray (5 Y 4/1), mottled; same as above 42 4-44 4' SAMPLE Recovered 2 0/2 0' = 100% 42 4-43 4' SILTY CLAYSTONE same as above; base highly weathered at 43 4' 43 4-44 4' SILTY CLAYSTONE dark gray (N 3/0) and dark yellowish brown (10 YR 4/2), mottled, same as above, moist-damp. 44 4-46 4' SAMPLE Recovered 1 7/2.0' = 85%. SILTY CLAYSTONE. medium dark gray (N 4/0), lacks mottling, same as above	

4189ABF

WELL NO 41-89 BRA

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			46 4-48 4' SAMPLE Recovered 1 8/ 2.0' = 90% SILTY CLAYSTONE same as above	
46			48 4-50 4' SAMPLE Recovered 2 0/2.0' = 100% SILTY CLAYSTONE: same as above.	
			50 4-52 4' SAMPLE Recovered 1 4/2 0' = 70%. SILTY CLAYSTONE· same as above	
47			52 4-54 4' SAMPLE Recovered 2 0/2 0' = 100%. SILTY CLAYSTONE same as above, some fracturing	
48				
49				
50				
51				
52				
53				

41BBABRC

WELL NO 41-89 BRA

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
53			54 4-55 4' SAMPLE Recovered 1 0/1 0' = 100%. SILTY CLAYSTONE same as above TOTAL DEPTH = 55 4'	
54				
55				
56				
57				
58				
59				
60				
61				

4189ABRH

LOG OF BOREHOLE

QA BY/DATE J.O. Guyman / 9-29-89
LOCATION Rocky Flats Plant, Background
COORDINATES N33,804 20 E19,330 97 (RFP)
TOTAL DEPTH 28 2'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 29, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY K W Van Allen
GEOLOGIST

BOREHOLE/WELL NO 42-89 BR
GROUND SURFACE ELEVATION 5967 9'
WATER LEVEL ENCOUNTERED None
STATIC None (5/24/89)
DRILLER R Sharp HELPER P. Mesa
DRILLING FLUID None
CHECKED BY Jarrell Guyman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** **0.0-2 2' SAMPLE** Recovered 2.2/2.2' = 100% SILTY CLAY: brownish black (5 YR 2/1); some (20%) coarse to fine-grained quartzose sand; organic; roots to 0 4', unconsolidated; massive; no HCl reaction, moist. **2 2-4 2' SAMPLE** Recovered 2 0/2.0' = 100% 2.2-3.0' = SILTY CLAY. same as above. **COLLUVIUM** 3.0-4.2' SILTY CLAY: dark yellowish brown (10 YR 4/2), some (20%) coarse to fine-grained quartzose sand, some (20%) coarse to fine quartzose gravel; poorly sorted; subangular to subrounded; massive, unconsolidated; no HCl reaction; moist. **4 2-6 2' SAMPLE.** Recovered 0 5/2.0' = 25%. SILTY CLAY: same as above; higher gravel content; occasional cobbles or boulder; moist.	

4289BRA

WELL NO 42-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			**6 2-8 2' SAMPLE** Recovered 1 0/2.0' = 50% SILTY SAND: dark yellowish brown (10 YR 4/2); (55%) coarse to fine-grained quartzose sand; some (20%) coarse to fine quartzose gravel; (25%) silt; poorly sorted, subangular to subrounded; unconsolidated; no HCl reaction; dry	
6				
			8.2-10 2' SAMPLE Recovered 1.9/2.0' = 95%. SILTY CLAYSTONE: light olive gray (5 Y 6/1) to olive gray (5 Y 4/1), trace fine-grained sand; weathered; massive; consolidated; slightly calcareous, damp.	
7				
			10.2-12 2' SAMPLE Recovered 2 0/2.0' = 100%. SILTY CLAYSTONE: same as above; moderate yellowish brown (10 YR 5/4) and light gray (N 7/0); mottled, damp to moist	
8				
			12.2-14 2' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE same as above; moderate brown (5 YR 4/4) and light olive gray (5 Y 6/1); moist.	
9				
10				
11				
12				
13				

4289BRB

WELL NO 42-89 BR

LOG OF BOREHOLE

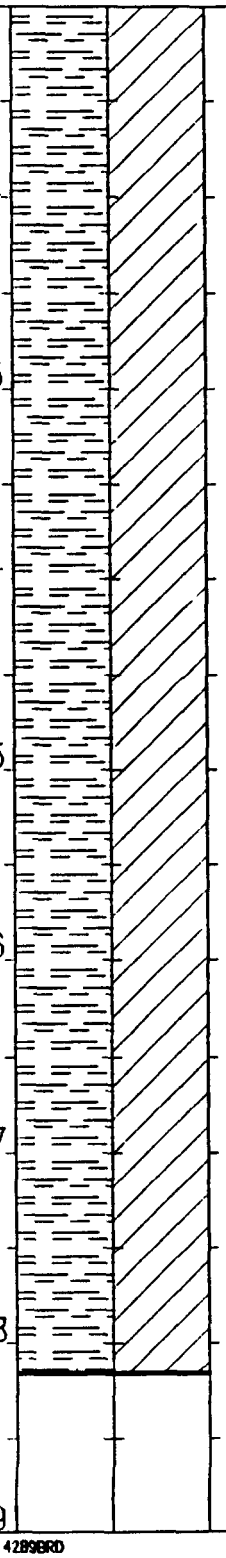
DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 2-16 2' SAMPLE Recovered 2.0/2 0' = 100%. SILTY CLAYSTONE same as above; dark yellowish brown (5 Y 4/4) and light olive gray (5 Y 6/1), moist	
14			16 2-18 2' SAMPLE. Recovered 2.0/2 0' = 100%. SILTY CLAYSTONE: same as above.	
			18 2-20 2' SAMPLE Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE· same as above; grading to olive gray (5 Y 4/1) and moderate brown (5 YR 4/4), occasional iron concretions.	
15			20 2-22 2' SAMPLE Recovered 2 0/2.0' = 100% SILTY CLAYSTONE: same as above	
16				
17				
18				
19				
20				
21				

4289BRC

WELL NO 42-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			**22.2-24 2' SAMPLE** Recovered 2.0/2 0' = 100% SILTY CLAYSTONE. same as above	
22			**24.2-26 2' SAMPLE** SILTY CLAYSTONE. same as above; predominantly moderate brown (5 YR 4/4), iron staining.	
23			**26.2-28.2' SAMPLE.** Recovered 2.2/2 0' = 110%. SILTY CLAYSTONE: same as above; medium dark gray (N 4/0) and moderate brown (5 YR 4/4), mottled; no HCl reaction.	
24			**TOTAL DEPTH 28 2'**	
25				
26				
27				
28				
29				



4289BRD

LOG OF BOREHOLE

QA BY/DATE J B Buyman 10-15-89
LOCATION Rocky Flats Plant, Background
COORDINATES N33,819 62 E19,347 76 (RFP)
TOTAL DEPTH 99 82'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 23 and April 4, 1989
DRILLING METHOD Hollow Stem Auger 0-36 5 Rotary Core 36.3-99.82'
LOGGED BY K W Van Allen, R I Thun
GEOLOGIST

BOREHOLE/WELL NO 43-89 BR
GROUND SURFACE ELEVATION 5965 6'
WATER LEVEL ENCOUNTERED None
STATIC None (6/23/89)
DRILLER R Sharp, P Bushkovski HELPER P Mesa; H McCree
DRILLING FLUID None, Water
CHECKED BY Jarell Buyman
SITE MANAGER

CEARP MANAGER

COMMENTS Set 5-5/8" O D steel casing to 36 5' and cemented on March 23, 1989

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** **0.0-2.2' SAMPLE** Recovered 1 7/2 2' = 77%. 0.0-0.7' SILTY CLAY: brownish black (5 YR 2/1), some (20%) coarse to fine-grained quartzose sand, trace (10%) coarse to fine quartzose gravel; poorly sorted, subrounded, organics; roots to 0 3'; unconsolidated; no HCl reaction; moist **COLLUVIUM** 0 7-1 7' SILTY CLAY same as above; dusky brown (5 YR 2/2); less organics. **2 2-4 3' SAMPLE** Recovered 2.2/2.1' = 105%. 1.7-2.8' SILTY CLAY same as above. 2.8-4 3' SILTY CLAY AND SAND same as above, moderate brown (5 YR 4/4) and dusky brown (5 YR 2/2), (45%) silt/clay; (35%) coarse to fine-grained quartzose sand, some (20%) coarse to fine-grained quartzose gravel **4 3-6 3' SAMPLE** Recovered 2 2/2 0' = 110% SILTY CLAY. same as 0.7-1.7', moist.	

4389BRA

WELL NO 13-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			**6 3-8 3' SAMPLE** Recovered 2 0/2 0' = 100% SILTY TO CLAYEY SAND AND GRAVEL moderate brown (5 YR 4/4), (40%) coarse to fine-grained quartzose sand; (35%) coarse to fine quartzose gravel; (25%) silt/clay, poorly sorted, subangular to subrounded, massive; unconsolidated, slightly calcareous, moist **8 3-10 3' SAMPLE** Recovered 0 3/2 0' = 15% SILTY CLAY· dark yellowish brown (10 YR 4/2) and light olive gray (5 Y 6/1), some (20%) coarse to fine-grained sand, mottled; unconsolidated, massive, calcareous, poorly sorted sand; moist **10.3-12 3' SAMPLE** Recovered 1 5/2 0' = 75% SILTY CLAYSTONE dark yellowish brown (10 YR 4/2) and moderate brown (5 YR 4/4), trace fine-grained sand; mottled, massive, consolidated, slightly calcareous, moist **12 3-14 3' SAMPLE** Recovered 2 0/2 0' = 100%. SILTY CLAYSTONE same as above; more weathered.	

4589BRB

WELL NO 13-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 3-16 3' SAMPLE Recovered 2 2/2 0' = 110% SILTY CLAYSTONE: same as above, iron concretions	
14			16 3-18 3' SAMPLE Recovered 2 2/2 0' = 110% SILTY CLAYSTONE. same as above, with occasional moderate brown (5 YR 4/4), slightly mottled, trace fine-grained sand, no iron concretions	
15			18 3-20 3' SAMPLE Recovered 2.2/2 0' = 110% SILTY CLAYSTONE same as above; mottled	
16			20 3-22 3' SAMPLE Recovered 2.2/2.0' = 110% SILTY CLAYSTONE same as above, mottled	
17				
18				
19				
20				
21				

4389BRC

WELL NO 13-89 BR

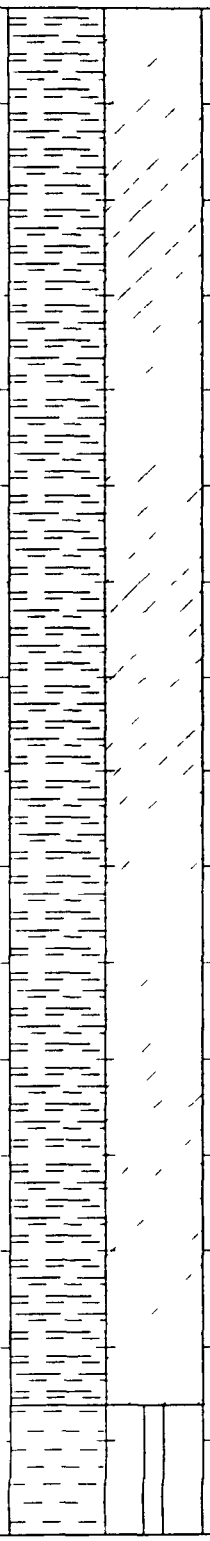
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			22 3-24 3' SAMPLE Recovered 2 2/2 0' = 110%. SILTY CLAYSTONE same as above, olive gray (5 Y 4/1) to medium gray (N 5/0), slightly mottled	
22			24 3-26 3' SAMPLE Recovered 2 1/2 0' = 105% 24 3-26 0' SILTY CLAYSTONE same as above 26.0-26 3' SILTY CLAYSTONE same as above, grading back to olive gray (5 Y 4/1), slightly mottled	
23			26 3-28 3' SAMPLE Recovered 2 2/2 0' = 110% SILTY CLAYSTONE same as above, dark yellowish brown (10 YR 4/2) and moderate brown (5 YR 4/4), slightly mottled	
24			28 3-30 3' SAMPLE Recovered 2 2/2 0' = 110%. SILTY CLAYSTONE same as above, medium dark gray (N 4/0) and moderate brown (5 YR 4/4), slightly mottled	
25				
26				
27				
28				
29				

4389BRD

WELL NO 13-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			30 3-32 3' SAMPLE Recovered 2 2/2 0' = 110% 30 3-32 0' SILTY CLAYSTONE same as above 32 0-32 3' SILTY CLAYSTONE medium dark gray (N 4/0) to dark gray (N 3/0), very slightly mottled, highly consolidated, massive, no HCl reaction, moist 32 3-34 3' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAYSTONE same as above, medium dark gray (N 4/0) and moderate brown (5 YR 4/4), mottled 34 3-36 3' SAMPLE Recovered 2 0/2 0' = 100% SILTY CLAYSTONE same as above, occasional moderate brown (5 YR 4/4), slightly mottled 36 0-40 0' SAMPLE Recovered 3 0/4 0' = 75% RQD 2 5/3 1 = 83% CLAYSTONE light olive gray (5 Y 5/2), trace organics, iron streaks, moderate yellow (5 Y 7/6), consolidated, homogeneous, damp	
30				
31				
32				
33				
34				
35				
36				
37				

WELL NO 43-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37 38 39 40 41 42 43 44 45			40 0-43 0' SAMPLE Recovered 3 1/3 0' = 103% RQD 2 7/3 1' = 87%. 40.0-41 2' CLAYSTONE. light olive gray (5 Y 5/2), 1 2' thick, gradational basal contact 41 2-43 0' SANDSTONE· light olive gray (5 Y 5/2); 1 8' thick, fine-grained, iron stains--moderate yellow (5 Y 7/6) throughout, consolidated; homogeneous, damp 43 0-47 0' SAMPLE. Recovered 3 9/4 0' = 97% RQD 3 85/3 9' = 99%. 43 0-44 3' SANDSTONE dusky yellow (5 Y 6/4), fine-grained, gradational basal contact. 44 3-46 9' CLAYSTONE· light olive gray (5 Y 5/2), non-malleable, iron staining--moderate yellow (5 Y 7/6), trace lignite, hard, damp	41 24-45 67' GEOTECHNICAL SAMPLE (Hydrometer Analysis) 43894145 4% Sand 96% Silt/Clay

WELL NO 13-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			47 0-51 0' SAMPLE Recovered 0 0/4 0' = 0% RQD 0 0/0 0' = 0% 51 0-51 5' SAMPLE Recovered 2 6/0 5' = 520% RQD 1 94/2 6' = 75% CLAYSTONE olive gray (5 Y 3/2), non-malleable, trace organics, homogeneous, damp 51 5-55 0' SAMPLE Recovered 4 05/3 51' = 116% RQD 3 2/4 05' = 79% 51 5-53 5' CLAYSTONE light olive gray (5 Y 5/2), gradational color, moist 53 5-55 0' CLAYSTONE olive gray (5 Y 3/2), some organics, calcium carbonate stringers--effervesces with HCl, moist	
46				
47				
48				
49				
50				
51				
52				
53				

4389BRG

WELL NO 15-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
53			55 0-59 0' SAMPLE Recovered 0 0/4 0' = 0% RQD 0 0/0 0' = 0% 59 0-59 5' SAMPLE Recovered 2 2/0 5' = 440% RQD 2 1/2 2' = 95% SANDY CLAYSTONE olive gray (5 Y 3/2), some lignite and organics, very fine-grained (3 5-3 0 phi), non-malleable, moist 59 5-63 0' SAMPLE Recovered 4 15/3 5' = 118% RQD 3 75/4 15' = 90% 59 5-61 5' SILTY CLAYSTONE olive gray (5 Y 4/1), some organics and lignite, gradational basal contact 61 5-63 0' CLAYSTONE dark greenish gray (5 GY 4/1), some silt, non-malleable, moist	
54				
55				
56				
57				
58				
59				
60				
61				

4389BRH

WELL NO 43-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
61			**63 0-67 0' SAMPLE** Recovered 3 75/4 0' = 94% RQD 3 75/3 75' = 100% CLAYSTONE dark greenish gray (5 GY 4/1), trace coal, some very fine-grained (3 5-3 0 phi) sandstone nodules (2 cm diameter) in bottom 0 6', non-calcareous, moist	
62			**67 0-71 0' SAMPLE** Recovered 3 1/4 0' = 77% RQD 2 84/3 1' = 92% 67 0-67 4' SANDSTONE olive gray (5 Y 4/1), very fine-grained (3 5-3 0 phi), gradational basal contact 67 4-70 1 CLAYSTONE olive gray (5 Y 4/1), some organics, non-malleable, moist	
63				
64				
65				
66				
67				
68				
69				

WELL NO 13-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
69			71 0-75 0' SAMPLE Recovered 4 4/4 0' = 110% RQD 3 9/4 4' = 89% SANDSTONE· light olive gray (5 Y 5/2), very fine-grained (3.5-3 0 phi), trace organics, homogeneous, non-malleable, hard, damp	
70			75 0-79 0' SAMPLE Recovered 3 83/4 0' = 96% RQD 3 58/3 83' = 93% SILTY SANDSTONE light olive gray (5 Y 5/2), very fine-grained (3/5-4 0 phi), some iron streaks--black (N 1/0), non-malleable, hard, moist to wet	
71				
72				
73				
74				
75				
76				
77				

4389BRJ

WELL NO 13-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
77			79 0-83 0' SAMPLE Recovered 3 9/4 0' = 97% RQD 3 9/3 9' = 100%. SILTY SANDSTONE olive gray (5 Y 3/2), very fine-grained (3 5-4 0 phi), trace organics, non-malleable, hard, damp	
78			83 0-87 0' SAMPLE Recovered 3 58/4 0' = 89% RQD 2 48/3 58' = 69% 83 0-85 1' SILTY SANDSTONE olive gray (5 Y 3/2), very fine-grained (3 5-4 0 phi), gradational basal contact 85 1-86 58' SANDY SILTSTONE olive gray (5 Y 3/2), 1 38' thick, trace organics, low plasticity, hard, damp	
79				
80				
81				
82				
83				
84				
85				

4389BRK

WELL NO 13-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
85			**87 0-91 0' SAMPLE** Recovered 1 95/4 0' = 49% RQD 1 85/1 95' = 95% 87 0-87 3' SILTSTONE olive gray (5 Y 3/2), 0 3' thick, gradational basal contact 87 3-88 95' CLAYSTONE olive gray (5 Y 3/2), 1 65' thick, some very fine-grained sand, trace organics, medium plasticity, hard; damp **91 0-93 0' SAMPLE** Recovered 3 65/2 0' = 182% RQD 3 2/3 65' = 88%. SILTY CLAYSTONE olive gray (5 Y 3/2), trace organics, low plasticity, hard, damp	
86				
87				
88				
89				
90				
91				
92				
93				

4389BRL

WELL NO 13-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
93			93 0-97 0' SAMPLE Recovered 4 08/4 0' = 102% RQD 3 85/4 08' = 94% CLAYSTONE olive gray (5 Y 3/2), some organics, low plasticity, hard, damp	
94			97 0-100 0' SAMPLE Recovered 3 25/3 0' = 108% RQD 1 1/3 25' = 34% 97.0-98 1' CLAYSTONE olive black (5 Y 2/1), some organics, with interbedded lignite and coal, gradational basal contact, moist 98 1-100 0' SILTSTONE olive gray (5 Y 4/1), 1 2' thick, trace organics, medium plasticity, hard, moist	
95				
			TOTAL DEPTH WITH PLOPPER = 99 82'	
96				
97				
98				
99				
100				
101				

4189BRM

LOG OF BOREHOLE

QA BY/DATE J B Burman 7-26-89
LOCATION Rocky Flats Plant, Background
COORDINATES N31,726.76 E23,109.08 (RFP)
TOTAL DEPTH 29.0'

BOREHOLE/WELL NO 44-89 BR
GROUND SURFACE ELEVATION 5832.0'
WATER LEVEL ENCOUNTERED 10.0'
STATIC 8.53' (5/31/89)
DRILLER T Parino HELPER C Devrous

DRILLING COMPANY Boyles Brothers
DATE DRILLED April 21 and 24, 1989
DRILLING METHOD Rotary Percussion Hammer; Hollow Stem Auger
LOGGED BY K W Van Allen
GEOLOGIST

DRILLING FLUID Air, Potable Water
CHECKED BY Jane Burman
SITE MANAGER

CEARP MANAGER

COMMENTS Drilled from ground surface to 10.0' with air rotary percussion hammer (logged cuttings), switched to hollow stem auger with moss system sampling from 10.0 to 29.0'

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			**VALLEY FILL ALLUVIUM** 0.0-6.0' CUTTINGS SILTY CLAY dusky yellowish brown (10 YR 2/2), some (20%) coarse to fine-grained quartzose sand, some (20%) coarse to fine quartzose gravel, occasional cobbles; (60%) silt/clay, unconsolidated, damp	
1				
2				
3				
4				
5				

4489ERA

WELL NO 44-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			6 0-10 0' CUTTINGS SILTY SAND pale to dark yellowish brown (10 YR 6/2, 10 YR 4/2), (75%) coarse to fine-grained quartzose sand, poorly sorted, unconsolidated, damp.	
6			10 0-11 5' SAMPLE Recovered 2 0/1.5' = 133%. SILTY CLAYSTONE· dark yellowish brown (10 YR 5/4), trace fine-grained sand, massive, consolidated, weathered, moist to wet	
7			11 5-13 5' SAMPLE. Recovered 2 0/2 0' = 100% SILTY CLAYSTONE same as above	
8				8 53'
9				
10				10 0'
11				
12				
13				

4489BRB

WELL NO 44-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			13.5-15 5' SAMPLE Recovered 2 0/2.0' = 100%. SILTY CLAYSTONE same as above 15 5-17 5' SAMPLE Recovered 2.0/2 0' = 100% SILTY CLAYSTONE. same as above; moist. 17 5-19 5' SAMPLE Recovered 2 0/2.0' = 100%. 17 0-19 0' SILTY CLAYSTONE same as above; medium dark gray (N 4/0) 19.0-19 5' CLAYEY SILTSTONE· dark yellowish brown (10 YR 4/2) and moderate yellowish brown (10 YR 5/4), trace fine-grained sand; weathered; stratified, semi-consolidated, moist. 19 5-21 5' SAMPLE Recovered 1 5/2 0' = 75%. CLAYEY SILTSTONE same as above	
14				
15				
16				
17				
18				
19				
20				
21				

4489BRC

WELL NO 44-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			**21.5-23 5' SAMPLE** Recovered 1 6/2.0' = 80%. CLAYEY SILTSTONE: olive gray (5 Y 4/1); trace fine-grained sand; weathered; stratified; semi-consolidated; moist	
22			**23 5-25 5' SAMPLE** Recovered 1 5/2 0' = 75%. CLAYEY SILTSTONE: same as above; consolidated.	
			25.5-27 0' SAMPLE Recovered 1.5/1.5' = 100% CLAYEY SILTSTONE. same as above	
23			**27.0-29 0' SAMPLE** Recovered 2.0/2.0' = 100% CLAYEY SILTSTONE: same as above; medium dark gray (N 4/0); damp.	
			TOTAL DEPTH = 29 0'	
24				
25				
26				
27				
28				
29				

4489BRD

LOG OF BOREHOLE

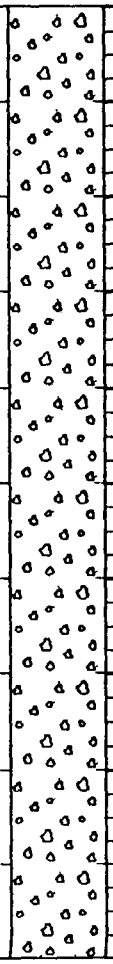
QA BY/DATE J B Burman 12-26-89
LOCATION Rocky Flats Plant, Background
COORDINATES N32,234 76–E15,235 37
TOTAL DEPTH 51 0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED May 4 and 5, 1989
DRILLING METHOD Air Rotary Percussion Hammer 0.0–35.0 Hollow Stem Auger 35.0–51.0'
LOGGED BY R A Chapuis
GEOLOGIST

BOREHOLE/WELL NO 45-89 BR
GROUND SURFACE ELEVATION 6115 8'
WATER LEVEL ENCOUNTERED None
STATIC None (5/24/89)
DRILLER P Wiebe HELPER T Parino, C Devrous
DRILLING FLUID
CHECKED BY J B Burman
SITE MANAGER

CEARP MANAGER

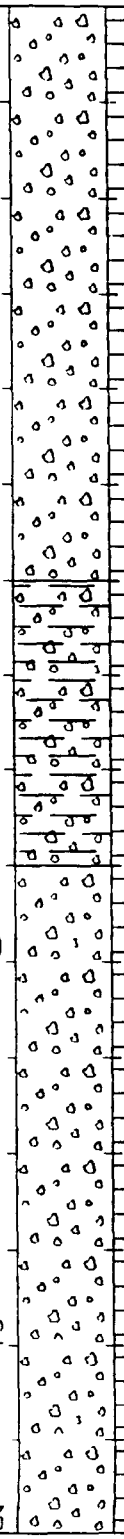
COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0.0-2 5'· CUTTINGS SAND AND GRAVEL dark reddish brown (10 R 3/4), (50%) poorly sorted gravel, (30%) fine to coarse-grained sand; (20%) silt; poorly sorted, unconsolidated, dry 2.5-8 0' CUTTINGS SAND AND GRAVEL moderate brown (5 Y 4/4) to greenish orange pink (5 YR 7/2), (50%) fine to coarse-grained sand; subangular to angular; quartzose; (25%) silt poorly sorted; (25%) gravel (up to 0 635 cm); dry	

4589BRA

WELL NO 45-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			8 0-9 5' CUTTINGS SILTY SAND AND GRAVEL. grayish pink (5 R 8/2) to yellowish gray (5 Y 8/4), (40%) fine to coarse-grained sand; angular to subrounded, quartzose, poorly sorted, (30%) gravel, (up to 0 635 cm), (30%) silt, non-plastic, unconsolidated, dry 9 5-14 8' CUTTINGS. SANDY GRAVEL moderate brown (5 YR 3/4), (60%) gravel, subrounded to rounded, (30%) fine to coarse-grained sand; angular to subrounded; (10%) silt, gravel (up to 2 54 cm), unconsolidated, very slightly damp	
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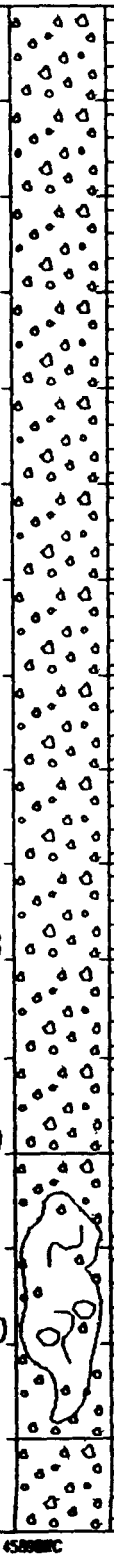
WELL NO 45-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14 8-20 5'· CUTTINGS: GRAVELLY SAND. moderate brown (5 YR 4/4); (70%) fine to coarse-grained sand; subangular to subrounded; poorly sorted; unconsolidated; (20%) fine to medium gravel, (up to 2.86 cm); (10%) silt; non-plastic fines; damp. 19.0-20.5'. Boulder.	
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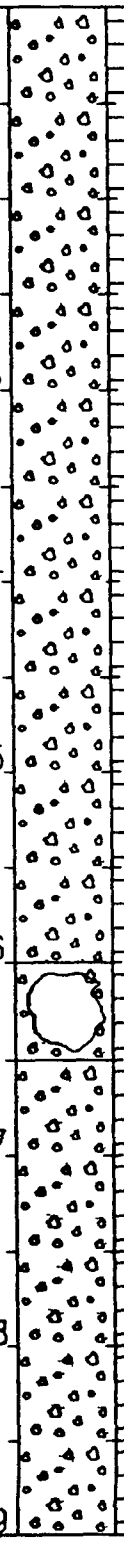
4580BIC

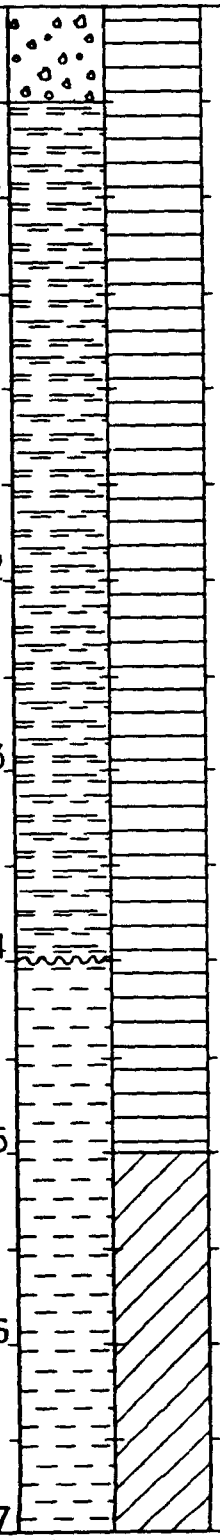
WELL NO 45-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21 22 23 24 25 26 27 28 29			20.5-26.0' CUTTINGS. SAND AND GRAVEL: moderate brown (5 YR 4/4), (45%) fine to coarse-grained sand; poorly sorted; subangular to subrounded; unconsolidated; (40%) fine to medium gravel, maximum size (3 81 cm); (15%) silt; non to low plasticity; dry 26.0-28.5'; CUTTINGS: SAND AND GRAVEL: moderate brown (5 YR 4/4); (50%) fine to coarse-grained sand; poorly sorted; subangular to subrounded; unconsolidated sand, (40%) gravel; fine, maximum size (.85 cm); (10%) silt; boulder 26.0-26.5'; slightly damp. 28.5-29.0.' CUTTINGS SAND AND GRAVEL: same as above; moist	

WELL NO 45-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			29.0-29 5' CUTTINGS: SAND AND GRAVEL: light brown (5 YR 5/6); (60%) fine to coarse-grained sand; poorly sorted; subangular to subrounded; unconsolidated sand; (30%) firm to medium gravel; maximum size 1 27 cm; (10%) silt; slightly moist. 29.5-34 0' CUTTINGS: SILTY CLAY. yellowish gray (5 Y 7/2); (80%) silty clay; (20%) fine gravel; low plasticity; dry. 34.0-35.0'· CUTTINGS. CLAYSTONE: yellowish gray (5 Y 7/2) to yellowish brown (10 YR 5/4); massive; consolidated. Note: Contact also based on change in drilling behavior. <u>35.0-37.0' SAMPLE</u> Recovered 2 0/2.0' = 100%. CLAYSTONE: same as above, pale yellowish brown (10 YR 6/2); slightly silty; damp.	
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WELL NO 45-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			**37.0-39 0' SAMPLE** Recovered 2.3/2.0- = 115%. CLAYSTONE· same as above; pale yellowish brown (10 YR 6/2) to light brown (5 YR 5/6); trace (5%) fine-grained sand; damp.	
38			**39.0-41 0' SAMPLE.** Recovered 1.9/2.0' = 95%. CLAYSTONE: same as above; no reaction to HCl; damp.	
			41.0-43.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; mottled; damp.	
39			**43 0-45 0' SAMPLE** Recovered 1.8/2.0' = 90%. CLAYSTONE: same as above.	
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WELL NO 45-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			45 0-47 0' SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE same as above	
46			47 0-49 0' SAMPLE Recovered 1 8/2 0' = 90% CLAYSTONE: same as above, moderate yellowish brown (10 YR 5/4) to dark yellowish brown (10 YR 4/2), (80%) claystone, (20%) very fine-grained sand, moldable, soft in part, crumbly in part, becoming more sandy in lower part; damp	
47			49 0-51 0' SAMPLE Recovered 1 6/2.0' = 80%. CLAYSTONE· same as above, no sand; damp.	
48			TOTAL DEPTH = 51 0'	
49				
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53				

4589BRG

LOG OF BOREHOLE

QA BY/DATE Janice Burman 6-27-89
LOCATION Rocky Flats Plant, Background
COORDINATES N44,664.12 E23,775.14 (RFP)
TOTAL DEPTH 38 6'

DRILLING COMPANY Boyles Brothers
DATE DRILLED March 17, 1989, March 21, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY J E Marks, R T Treat
GEOLOGIST

BOREHOLE/WELL NO 46-89/BH11-89
GROUND SURFACE ELEVATION 5806 4'
WATER LEVEL ENCOUNTERED 26.1'
STATIC None (5/05/89)
DRILLER M Baker, K Parker HELPER K Marlin, A Boday
DRILLING FLUID None
CHECKED BY Janice Burman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** 0 0-2 0' SAMPLE Recovered 1 8/2 0' = 90% 0 0-1 6' CLAY dusky brown (5 YR 2/2), abundant vegetation--roots, moderate plasticity, consolidated, soft, moist **COLLUVIUM** 1 6-1 8' SILTY CLAY dark yellowish brown (10 YR 4/2), trace gravel up to 2 cm, angular, quartzite, abundant vegetation--roots; slight plasticity; consolidated, moderately hard, slightly moist 2 0-4 0' SAMPLE Recovered 2 0/2 0' = 100% CLAY same as above, less silt, trace gravel and caliche stringers toward bottom, trace iron staining towards bottom--moderate brown (5 Y 4/4), moist 4 0-5 0' SAMPLE Recovered 1 0/1 0' = 100% CLAY pale yellowish brown (10 YR 6/2), trace silty in part, some vegetation--roots, trace iron staining--light brown (5 YR 5/6), dark specks--olive black (5 Y 2/1), abundant caliche stringers, very pale orange (10 YR 8/2), effervesces, consolidated, moderately hard, moist--feels almost wet Note Measured hole with plopper Total depth = 5 3' Adjusting the sample depths	0 0-3 0' SAMPLE BH11890003 3 0-9 0' SAMPLE BH11890309

4689A

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			5 3-7 3' SAMPLE Recovered 2 0/2.0' = 100% CLAY light olive gray (5 Y 5/2), trace vegetation--roots; trace caliche stringers; dark organic specks; more weathered towards bottom; iron stained--light brown (5 YR 5/6), consolidated; moderately hard, moist. 7 3-9 3' SAMPLE. Recovered 2 0/2 0' = 100%. CLAY. moderate yellowish brown (10 YR 5/4), iron stained in part--light brown (5 YR 5/6), highly weathered, dark organic specks and stems; consolidated; moderately soft; moist 9 3-11 3' SAMPLE Recovered 1 8/2 0' = 90% 9 3-10.9' CLAY light olive gray (5 Y 5/2), abundant iron staining, less weathered toward bottom--olive gray (5 Y 4/1), dark organic specks, moderate plasticity, consolidated, soft. 10.9-11.1' GRAVEL. 3cm x 3cm x 5cm, subrounded, translucent quartzite. 11 3-13 3' SAMPLE Recovered 2 2/2.0' = 110% 11 3-11 5' GRAVEL. cobble, subrounded, quartzite 11.5-13 3' CLAY dark yellowish brown (10 YR 4/2), iron stained--moderate brown (5 YR 4/4), trace gravel pieces, high plasticity; fat, consolidated; soft, moist	9 0-15 0' SAMPLE BH11890915 BH11890915D

46898

WELL NO 46-89/BH11-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			**13 3-15 3' SAMPLE** Recovered 2 0/2 0' = 100% CLAY same as above, trace caliche stringers, moderate plasticity	**15 0-21 0'** SAMPLE BH11891521
14			**15 3-17 3' SAMPLE** Recovered 2 1/2 0' = 105% CLAY dark yellowish brown (10 YR 4/2), abundant iron staining at bottom--light brown (5 YR 5/6), highly weathered, consolidated, moderately soft, moist	
15			**17 3-19 3' SAMPLE** Recovered 2 2/2 0' = 110% CLAY light olive gray (5 Y 5/2), silty in part, iron stained on fractures--moderate brown (5 YR 4/4), weathered, blocky texture; lean--no plasticity; consolidated; soft; moist.	
16			**19 3-21 3' SAMPLE** Recovered 1 9/2 0' = 95% CLAY light olive gray (5 Y 5/2), silty in part, iron stained on fractures--dark yellowish orange (10 YR 6/6), no plasticity, semi- consolidated, soft, slightly moist	
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4689C

WELL NO 46-89/BH11-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			21 3-23 3' SAMPLE Recovered 1 3/2 0' = 65% CLAY· same as above.	21 0-27 0' SAMPLE BH11892127
22			23.3-25 3' SAMPLE Recovered 2.0/2.0' = 100%. CLAY: light olive gray (5 Y 5/2) to olive gray (5 Y 3/2); consolidated; moist.	
23			25 3-27 3' SAMPLE Recovered 2.2/2 0' = 110%. 25.3-26.1' CLAY light olive gray (5 Y 5/2); silty in part; weathered, slight plasticity; consolidated; soft, moist 26.1-27 3' SANDY CLAY· light olive gray (5 Y 5/2) to light olive brown (5 Y 5/6), mottled; very fine-grained sand (4 0-3 5 phi), friable; wet.	27 0-33 0' SAMPLE BH11892733
24			27 3-29 3' SAMPLE Recovered 2 0/2 0' = 100%. SANDY CLAY· dark yellowish brown (10 YR 4/2); iron stained--moderate yellowish brown (10 YR 5/4); very fine-grained sand (4 0-3 5 phi), quartzose; trace small gravel to very coarse-grained sand; rounded, quartzite; dense iron concretion--moderate brown (5 YR 4/4), mica flakes; pieces--stringers of lignite; very plastic, consolidated; moderately hard, dripping wet.	
25				
26				▽ 26 1'
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46890

WELL NO 46-89/BH11-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29 30 31 32 33 34 35 36 37			29 3-30 3' SAMPLE Recovered 1 5/1 0' = 150% CLAY: light olive gray (5 Y 5/2), trace silty and fine-grained sand; mica flakes; black organic specks--lignite, consolidated, moderately hard; wet. 30 3-32 3' SAMPLE Recovered 1 3/2.0' = 65% CLAY light olive gray (5 Y 5/2), iron stained--dark yellowish orange (10 YR 6/6); gravel pieces up to 3 cm; rounded; granite, iron nodules; black lignite chunks; good plasticity; consolidated; hard to moderately soft; saturated - wet. 32.3-34 3' SAMPLE Recovered 0 0/2.0' = 0% Note: Claystone contact estimated based on drilling behavior. 34.3-36 3' SAMPLE Recovered 0.0/2 0' = 0%. 36.3-37 3' SAMPLE Recovered 0 0/1.0' = 0%.	

4688E

WELL NO 46-89/BH11-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			37 3-38 6' SAMPLE Recovered 0.0/1 3' = 0%.	
38			TOTAL DEPTH = 38 6'	
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4689F

LOG OF BOREHOLE

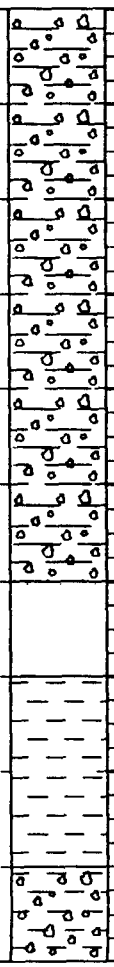
QA BY/DATE J.B. Burman / 9-24-89
LOCATION Rocky Flats Plant, Background
COORDINATES N30,851 28 E16,062 22 (RFP)
TOTAL DEPTH 24 8'

DRILLING COMPANY Boyles Brothers
DATE DRILLED May 18, 1989
DRILLING METHOD Air Rotary Percussion Hammer
LOGGED BY F Petersen
GEOLOGIST

BOREHOLE/WELL NO 47-89
GROUND SURFACE ELEVATION 6105 2'
WATER LEVEL ENCOUNTERED None
STATIC 4 96' (6/14/89)
DRILLER P Weibe HELPER C Devrous
DRILLING FLUID None
CHECKED BY J.B. Burman
SITE MANAGER

CEARP MANAGER

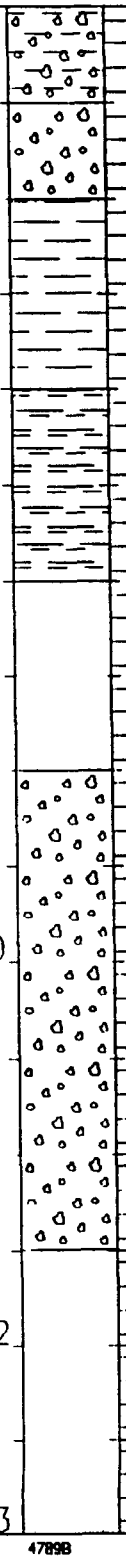
COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**ROCKY FLATS ALLUVIUM** 0.0-3 0' CUTTINGS SILTY GRAVEL, dark yellowish brown (10 YR 4/2); trace fine to coarse-grained sand, moderately sorted; subangular, roots; moist. 3 0-3 5' CUTTINGS. SAND: pale yellowish brown (10 YR 6/2), medium to very coarse-grained quartzose sand; some clay; trace gravel; moderately sorted, subangular, reddish mottling in clay, damp. 3.5-4 5' CUTTINGS CLAY moderate yellowish brown (10 YR 5/4), clay; some fine to coarse gravel, trace medium to coarse-grained sand; poorly sorted, angular to subangular; some gravel appears to be freshly broken; moist. 4.5-5 5' CUTTINGS. CLAYEY GRAVEL. moderate yellowish brown (10 YR 5/4); 35-40% clay; trace fine to coarse-grained sand; poorly sorted, angular to subangular; moist.	▼ 4 96'

4789A

WELL NO 47-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 9 10 11 12 13			5.5-6 0' CUTTINGS GRAVEL moderate brown (10 YR 5/4), some silt; trace fine to coarse-grained sand; trace clay; well sorted; angular to subangular; gravel--fine to coarse lithic fragments that seem freshly broken; moist. 6.0-7.0'· CUTTINGS: SILT light brown (5 YR 5/6); some fine to coarse-grained sand; well sorted; subangular; moist 7.0-8.0': CUTTINGS SILTY CLAY· dark yellowish orange (10 YR 6/6), 20-35% silt; some gravel, trace fine to medium-grained sand; moderately sorted; angular to subangular; clay balls; moist. 8.0-8.5' CUTTINGS. SAND: light brown (5 YR 6/4), some silt; trace clay, moderately sorted; angular to subangular; fine to medium-grained sand; dry. 8.5-9.0': CUTTINGS: SAND: light brown (5 YR 6/4); some gravel; some silt; moderately sorted; angular to subangular, dry 9 0-10 0' CUTTINGS GRAVEL pale yellowish brown (10 YR 6/2), some fine to coarse-grained sand; trace silt, moderately sorted, angular; gravel is fine to medium, dry 10.0-11 5' CUTTINGS GRAVEL. moderate yellowish brown (10 YR 5/4), some clay, poorly sorted, angular, moist 11 5-14 5' CUTTINGS SAND moderate yellowish brown (10 YR 5/4), some clay; trace silt; moderately sorted, angular to subangular, fine to coarse-grained sand, damp	

4789B

WELL NO 47-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14.5-16.0' CUTTINGS GRAVEL moderate yellowish brown (10 YR 5/4); some clay; moderately sorted; angular, moist.	
14			16.0-23.0'. CUTTINGS: SAND dark yellowish brown (10 YR 6/6); some clay; trace silt; moderately sorted; angular; fine to medium-grained sand; gravel observed when driller blows casing out, which indicates a possible 10% gravel content in this section; moist.	
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4789e

WELL NO 47-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			23.0-23 5' CUTTINGS. SILTY SAND: pale yellowish brown (10 YR 6/2); sand, some silt; trace clay; moderately sorted; subangular; dry	
22			23.5-24.8': CUTTINGS: SAND: moderate yellowish brown (10 YR 5/4); some clay; trace silt; moderately sorted; angular to subangular; may have a gravel content of 10% from 16-23' since gravel is blown out only when driller puts extra air to the casing; moist.	
			TOTAL DEPTH = 24 8'	
23				
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47890

LOG OF BOREHOLE

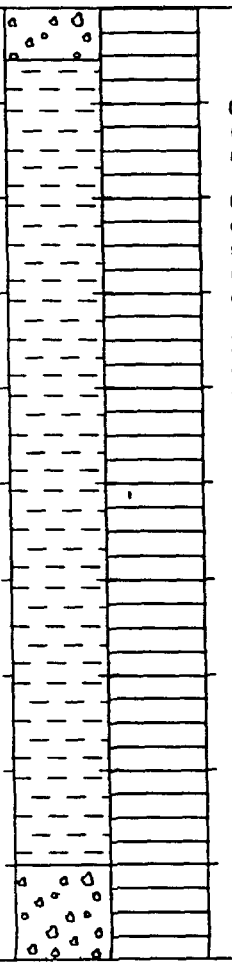
QA BY/DATE [signature] / 9/8/89
LOCATION Rocky Flats Plant, Background
COORDINATES N30,853.20 E16,092.40
TOTAL DEPTH 54.10'

DRILLING COMPANY Boyles Brothers
DATE DRILLED May 19-24, 1989
DRILLING METHOD Air Rotary/ Percussion Hammer
LOGGED BY F. S. Petersen
GEOLOGIST

BOREHOLE/WELL NO 48-89
GROUND SURFACE ELEVATION 6104.8'
WATER LEVEL ENCOUNTERED 10.6'
STATIC 7.50' (6/15/89)
DRILLER P. Weibe HELPER T. Parino
DRILLING FLUID None
CHECKED BY [signature]
SITE MANAGER

CEARP MANAGER

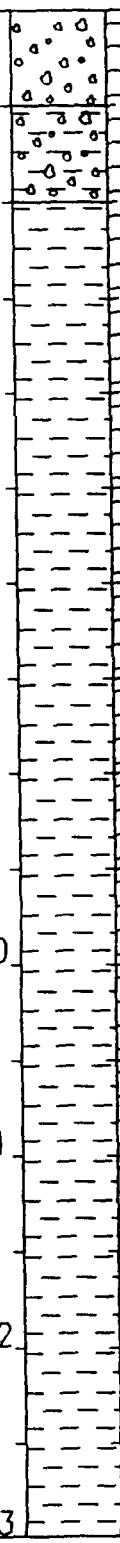
COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOP SOIL** 0.0-0.3' CUTTINGS GRAVEL. dark yellowish brown (10 YR 4/2), some clay, poorly sorted; subangular, roots and organic matter, moist. 0.3-3.0 CUTTINGS CLAY light brown (5 YR 5/6); clay comes out in stiff, very coarse balls, sand--schist and quartzite fragments, trace fine to very coarse-grained sand, poorly sorted; subangular, damp. 3.0-4.5' CUTTINGS CLAY moderate brown (5 YR 4/4), some medium to very coarse-grained sand; quartz, quartzite fragments and mica flakes, trace fine gravel, gravel comes out during annulus purge (<1%), gravel fragments to 1mm; poorly sorted subangular, clay balls smaller; damp. 4.5-5.5'. CUTTINGS. SAND AND GRAVEL: pale yellowish brown (10 YR 6/2), sand is fine to very coarse grained, fine gravel to 1mm: both show freshly broken edges and are quartz and quartzite, some clay, moderately sorted, angular to subangular, dry	

4889A

WELL NO 48-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			5 5-6.0'· CUTTINGS GRAVELLY CLAY moderate yellowish brown (10 YR 5/4), gravel is mostly quartzite with some schist fragments; commonly 0 5-1 0mm; largest up to 2mm, clay balls to 1mm during annulus purge; trace fine to very coarse-grained sand, moderately sorted, angular to subangular; damp overall, moist clay. 6.0-8.5' CUTTINGS. CLAY· moderate yellowish brown (10 YR 5/4), some fine to very coarse-grained sand; trace gravel; gravel generally 0 25 to 0.45mm; up to 1mm; trace mica; gravel fragments to 1 8mm (commonly 1mm) during annulus purge; moderately sorted; angular to subangular; sand and gravel are mostly quartzite and schist; moist. 8 5-13 0' CUTTINGS CLAY moderate yellowish brown (10 YR 5/4), some gravel, gravel is 0 25 to 2mm, commonly 0 5mm, mostly angular quartzite; a little schist; some fine to very coarse-grained sand, well sorted; angular to subangular, moist.	7 50'
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10				10 6'
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4889B

WELL NO 48-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			13 -20 0'· CUTTINGS· GRAVEL AND CLAY· moderate yellowish brown (10 YR 5/4), gravel is mostly quartzite, a little schist, commonly 0 8 to 1 0mm; up to 3mm, trace fine to very coarse-grained sand; moderately sorted; subangular to angular; moist	
14			20.0-23.0': CUTTINGS GRAVEL AND SILT moderate yellowish brown (10 YR 5/4); gravel consists of lithic fragments up to 4mm; commonly 0 5 to 1mm; some fine to very coarse-grained sand, trace clay; (8-10%), well sorted, subangular to angular, damp	
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WELL NO 48-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			23 0-28 0' CUTTINGS GRAVEL AND CLAY moderate yellowish brown (10 YR 5/4), gravel consists of lithic fragments as above, commonly 0.25 to 0 5mm, up to 1 5mm; some fine to very coarse grained sand, moderately sorted, subangular to angular; moist	
22			28.0-30.0' CUTTINGS CLAY moderate yellowish brown (10 YR 5/4), some fine to very coarse-grained sand, trace gravel, lithic fragments and gravel are a mix of quartzite; a little schist and mafics, 0 2 to 0 5mm average; to 0.8mm; sand is similar to gravel lithologically; trace silt, poorly sorted; subangular; moist.	
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WELL NO 48-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			30.0-36.0' CUTTINGS SAND· moderate brown (5 YR 4/4), sand is fine to very coarse grained but predominantly very coarse-grained, some clay; trace gravel, gravel is 0 2 to 0.5mm commonly, up to 0 8mm, lithic fragments; poorly sorted; subangular; moist	
30			36.0-40 0' CUTTINGS. CLAYEY GRAVEL moderate yellowish brown (10 YR 5/4), gravel is commonly 0 25 to 0.5mm, up to 1 5mm; trace fine to very coarse-grained sand, poorly sorted; angular, wet (from drill water)	
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37				

4308E

WELL NO 48-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			42.0-43 0' CUTTINGS CLAYEY SAND· moderate yellowish brown (10 YR 5/4), sand is medium to very coarse grained; some gravel, gravel is commonly 0.25 to 0.5mm; up to 0.8mm; lithic fragments, moderately sorted; angular; wet (from drill water)	
38			43.0-46 5' CUTTINGS CLAYEY GRAVEL. moderate yellowish brown (10 YR 5/4), gravel is 0.5 to 0.75mm commonly; up to 3mm (5-10% is 3mm); a lot of mafic lithic fragments; some medium to very coarse-grained sand, moderately sorted; angular; wet (from drill water)	
39				
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43				
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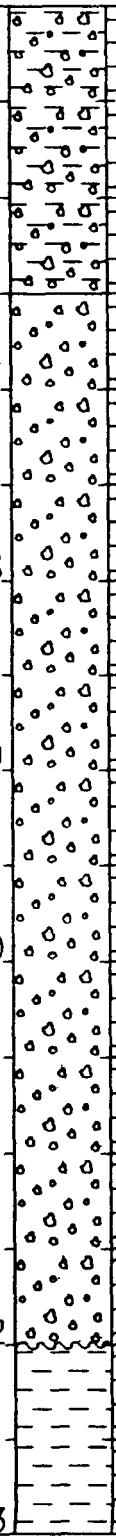
WELL NO 48-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			46.5-51.0'. CUTTINGS. GRAVELLY SAND. pale yellowish brown (10 YR 6/2), sand is predominantly medium-grained but ranges fine to very coarse-grained, approximately 20% very coarse, gravel commonly 1-3mm to 4mm but has 30% fine; some clay; moderately sorted, angular to subangular; wet (from drill water) 51 0 -52.0': CUTTINGS. SANDY GRAVEL pale yellowish brown (10 YR 6/2); gravel and sand same as above except for percentages; moderately sorted; angular to subangluar, little clay, wet	
46				
47				
48				
49				
50				
51				
52				
53				

4889G

WELL NO 48-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
53			52 0-54 10' CUTTINGS CLAYSTONE. grayish orange (10 YR 7/4), weathered, moderately plastic, occasional dark yellowish orange (10 YR 6/6), clast, wet (from drill water)	
54			TOTAL DEPTH = 54 10'	
55				
56				
57				
58				
59				
60				
61				

4889H

LOG OF BOREHOLE

QA BY/DATE J B Burman 19-29-89
LOCATION Rocky Flats Plant, Background
COORDINATES N30,851 28 E16,062 22
TOTAL DEPTH 48 2'

DRILLING COMPANY Boyles Brothers
DATE DRILLED May 15-16, 1989
DRILLING METHOD Air Rotary Percussion Hammer
LOGGED BY E M Hill
GEOLOGIST

BOREHOLE/WELL NO 49-89 BR
GROUND SURFACE ELEVATION 6024 9'
WATER LEVEL ENCOUNTERED 33 0'
STATIC 9 37' (6/14/89)
DRILLER P Wiebe HELPER T Parmo, C Devrous
DRILLING FLUID None
CHECKED BY J B Burman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			**COLLUVIUM** 0 0-3 0'· CUTTINGS: SILTY CLAYEY SAND: moderate yellowish brown (10 YR 5/4), very fine to coarse grained, angular; slightly damp to dry 3 0-4 0' CUTTINGS SILTY CLAY: moderate yellowish brown (10 YR 5/4), some very fine to coarse-grained sand, trace fine gravel, soft; moderately plastic, damp 4 0-5 0' CUTTINGS. CLAYEY SILT moderate yellowish brown (10 YR 5/4), some very fine to coarse-grained sand, dusty cuttings, 1-2 mm clay balls, slightly moist	
1				
2				
3				
4				
5				

4989BRA

WELL NO 49-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			5.0-6 5' CUTTINGS SAND, SILT AND CLAY: moderate brown (5 YR 4/4), very fine to coarse-grained sand; trace fine to coarse gravel; angular; granitic; slightly cohesive, damp becoming moist	
6			6.5-9.0': CUTTINGS: SILTY CLAYSTONE: moderate yellowish brown (10 YR 5/4); trace very fine to medium-grained sand; occasional iron-oxide flakes, fracture fillings; slightly plastic; soft; moist.	
7			9.0-13.0'· CUTTINGS. SILTY CLAYSTONE: light olive gray (5 Y 5/2); dark yellowish brown (10 YR 6/6) mottling; moderately plastic; very small cuttings; moist.	
8				
9				▼ 9 37'
10				
11				
12				
13				

49BBBRB

WELL NO 49-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			**13.0-17 0' CUTTINGS SILTY CLAYSTONE: light olive gray (5 Y 5/2); dark yellowish orange (10 YR 6/6) mottling; some streaks of medium dark gray (N 4/0); carbonaceous streaks; firm; moderately plastic; damp.**	
14			**17 0-32.0': CUTTINGS: SILTY CLAYSTONE: medium gray (N 5/0) and dark yellowish brown (10 YR 6/6); small pockets of very fine-grained clean sand; carbonaceous streaks; firm; moderately plastic; wet.**	
15				
16				
17				
18				
19				
20				
21				

4989BRC

WELL NO 13-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			**17.0-32.0' CUTTINGS. See previous page.**	
22				
23				
24				
25				
26				
27				
28				
29				

4989BRD

WELL NO 49-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			**32.0-33.0': CUTTINGS. SILTY CLAYSTONE: moderate yellowish brown (10 YR 5/4), occasional clayey very fine to medium-grained sand.**	
30			**33.0-38.0': CUTTINGS SANDSTONE: grayish yellow (5 Y 8/4); medium-grained, well sorted; subrounded; quartz; few mafics; few iron flecks; trace gravel--15-20 mm angular sandstone; infrequent silty clay balls; moderate yellowish brown (10 YR 5/4) and medium gray (N 4); soft:**	
			Note. Hole producing water.	
31				
32				
33				▽ 33.0'
34				
35				
36				
37				

4989BRE

WELL NO 49-89 BR

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			38.0-39.0': CUTTINGS. SANDSTONE: same as above; increasing iron cemented layers; hollow concretions of iron-rich material.	
38			39.0-40.0' CUTTINGS: SANDSTONE: same as above; medium-grained sand to medium-grained gravel; trace to some lithic fragments; increasing iron cementation; concretions. Discharge water reddish	
			40.0-43.0': CUTTINGS: SANDSTONE: same as above; some fine gravel; increasing silty claystone; olive gray (5 Y 4/1); hard, moderately plastic.	
39			43.5-45.0'. CUTTINGS. SANDSTONE. same as above; increasing claystone; olive gray (5 Y 4/1) and moderate yellowish brown (10 YR 5/4).	
40				
41				
42				
43				
44				
45				

WELL NO 19-89 BR

LOG OF BOREHOLE

DEPTH FT	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			**45.0-47.0': CUTTINGS. SILTY CLAYSTONE: medium dark gray (N 4/0); moderately plastic; hard.**	
			47 0-48.2' CUTTINGS: SILTY CLAYSTONE: same as above; some very fine to fine-grained sand.	
46			**TOTAL DEPTH = 48 2'**	
47				
48				
49				
50				
51				
52				
53				

1999BRG

LOG OF BOREHOLE

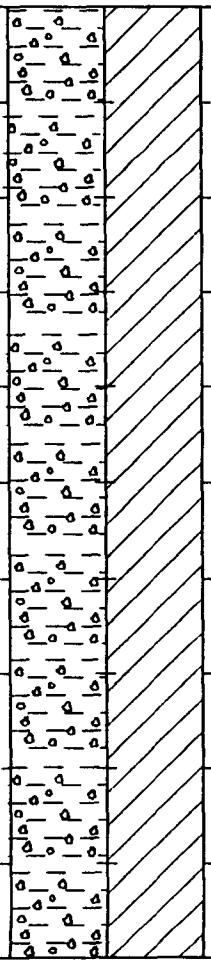
QA BY/DATE J. B. Seyman / 7-26 89
LOCATION Rocky Flats Plant, Background
COORDINATES N33374 00 E18357 88 (RFP)
TOTAL DEPTH 9 80'

DRILLING COMPANY Boyles Brothers
DATE DRILLED April 6, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY R T Treat
GEOLOGIST

BORFHOLE/WELL NO 50-89
GROUND SURFACE ELEVATION 6023 5'
WATER LEVEL ENCOUNTERED None
STATIC None (5/17/89)
DRILLER K Parker HELPER R Orr
DRILLING FLUID None
CHECKED BY J. B. Seyman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0 1 2 3 4 5			**TOPSOIL** **0 0-1 8' SAMPLE** Recovered 0 3/1 8' = 17%. CLAY: dusky brown (5 YR 2/2), gravelly; abundant roots; weakly cemented; medium stiff, poorly consolidated, moist. **1 8-3 8' SAMPLE** Recovered 0 0/2 0' = 0%. Note. numerous gravel and several cobbles present Note 3 8-4 8' drilled with center bit No samples taken. **4 8-5 8' SAMPLE** Recovered 1 0/1.0' = 100% CLAY light brown (5 YR 5/6) to moderate yellowish brown (10 YR 5/4), gravel (0.25 to 7 50 mm); fine to very coarse-grained sand (3.0-0 5 phi), moderately cemented, medium stiff; poorly sorted, low plasticity; moist	

5089A

WELL NO 50-89

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			5 8-7 8' SAMPLE Recovered 2 0/2 0' = 100% 5 8-6 2' GRAVELLY CLAY same as above, some sand	
6			6 2-7 8' CLAYSTONE dark yellowish orange (10 YR 6/6) to pale yellowish brown (10 YR 6/2), medium plasticity, massive, homogeneous, moderately cemented; medium hard; severely oxide stained, highly weathered, damp	
7			7 8-9 8' SAMPLE Recovered 2 0/2 0' = 100% CLAYSTONE same as above	
8			TOTAL DEPTH 9 8'	
9				
10				
11				
12				
13				

5089B

Project: Rocky Flats Plant

LOG OF BORING NO. 55-86

Date Drilled 9/29/86
Boring Method Casing Driver

Coordinates N 32259.5 E 15217.2
Ground Surface Elevation 6103.62

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	0			**ROCKY FLATS ALLUVIUM** 0-3.0'-Cuttings. BOULDERS: quartzite; dry. 3.0-4.0'-Cuttings. CLAY: light brown (5YR 5/4); silty; semi-plastic; unconsolidated; damp. 4.0-26.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); granite and quartzite pebbles, cobbles and boulders with coarse to very fine-grained sand; poorly sorted; unconsolidated; damp.			
	5						
	10						
	15					(06/08/89)	
	20						

Remarks Logged by: T. Gulliver

Checked by: [signature]

Project: Rocky Flats Plant

LOG OF BORING NO. 55-86

Date Drilled 9/29/86

Boring Method Casing Driver

Coordinates N 32259.5 E 15217.2

Ground Surface Elevation 6103.62

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	20						
	25			26.0-27.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4); granitic pebbles and cobbles with very fine-grained silty sand; poorly sorted; unconsolidated; damp.			
				27.0-32.0'-Cuttings. BOULDERS: granite and quartzite; damp.			
				32.0-33.0'-Cuttings. BOULDER: granitic; damp.			
	30			33.0-34.0'-Cuttings. SAND: pale yellowish brown (10YR 5/2) to pale brown (5YR 5/2), very fine-grained to very coarse-grained; silty; poorly sorted; rounded; damp.			
				34.0-35.5'-Cuttings. CLAY: moderate brown (10YR 4/4); sandy; very fine-grained; quartzite gravel at base; plastic; moist.			
	35			LARAMIE FORMATION			
				35.5-36.5'-Cuttings. CLAYSTONE: light olive gray (5Y 5/2) and dusky yellow (5Y 6/4); silty; plastic; moist.			
				TOTAL DEPTH: 36.5'			
	40						

Remarks Logged by: T. Gulliver

Checked by: [illegible]

APPENDIX B

WELL CONSTRUCTION SUMMARIES

WELL COMPLETION INFORMATION

QA By/Date Jarell Burman 14-15-89

Location Rocky Flats Plant, Background

Well No. 01-89A

Coordinates N 31600 11 E 15183 13 (RFP)

Elevation **Ground Surface** 6122.1'

Total Depth **Well** 51 35'

Top of Casing 6124.15'

Borehole 54 0'

Formation of Completion Rocky Flats Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

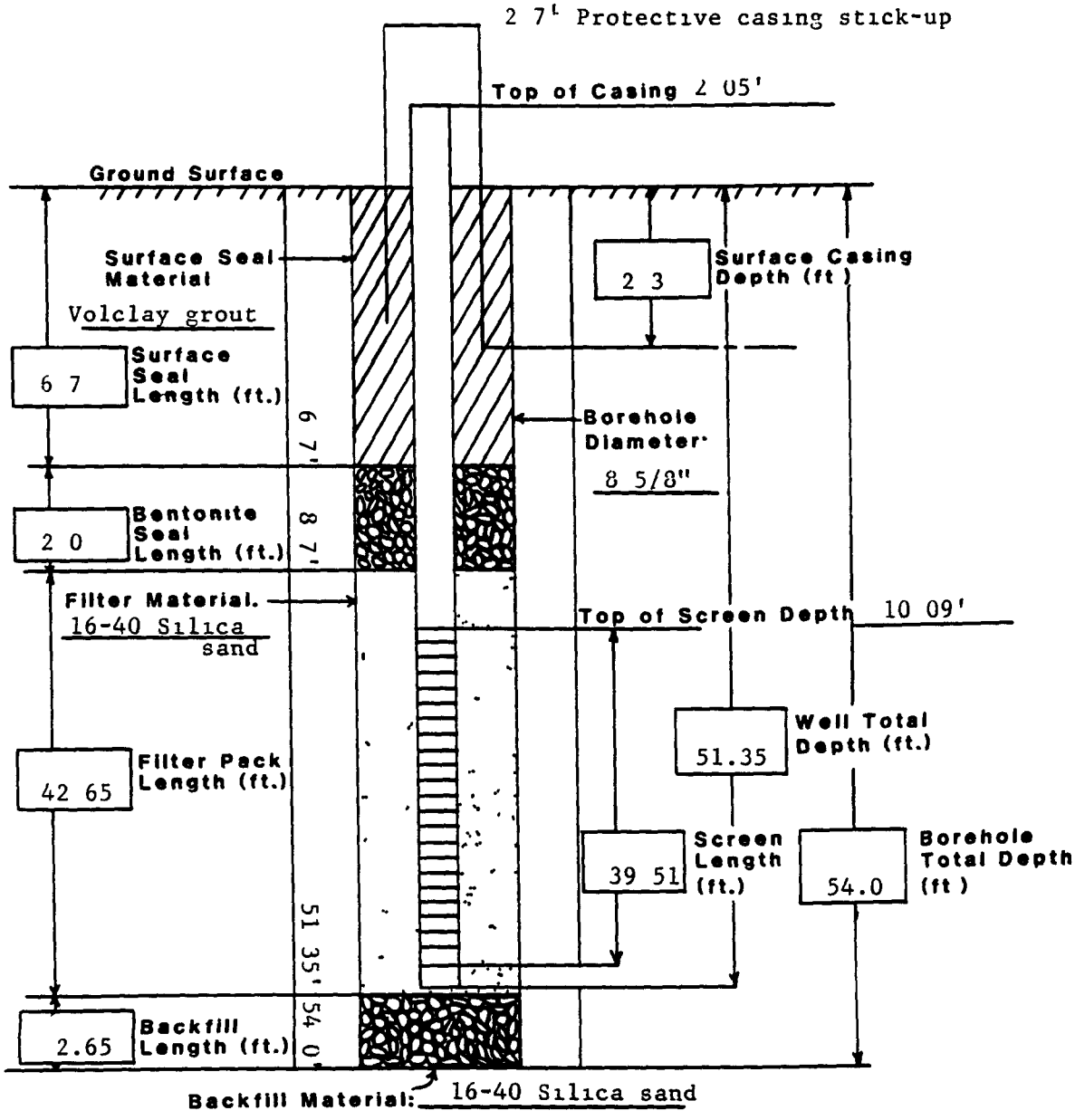
Date Installed 04/07/1989

Approved By Jarell Burman
Site Manager

Installed By K.W. Van Allen
Geologist

CEARP Manager

Comments No centralizer installed due to cased borehole Boring was drilled with 3 1/4" ID hollow stem augers then reamed with the ODEX.



WELL COMPLETION INFORMATION

QA By/Date Janell Bergman 7-17-89

Location Rocky Flats Plant, Background

Well No. 01-89P

Coordinates N 31599 94 E 15183 24 (RFP)

Elevation. Ground Surface 6121.8'

Total Depth: Well 38 26'

Top of Casing 6123 76 '

Borehole 54.6'

Formation of Completion Rocky Flats Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 1 5/16" O D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 5 5/8" O D.

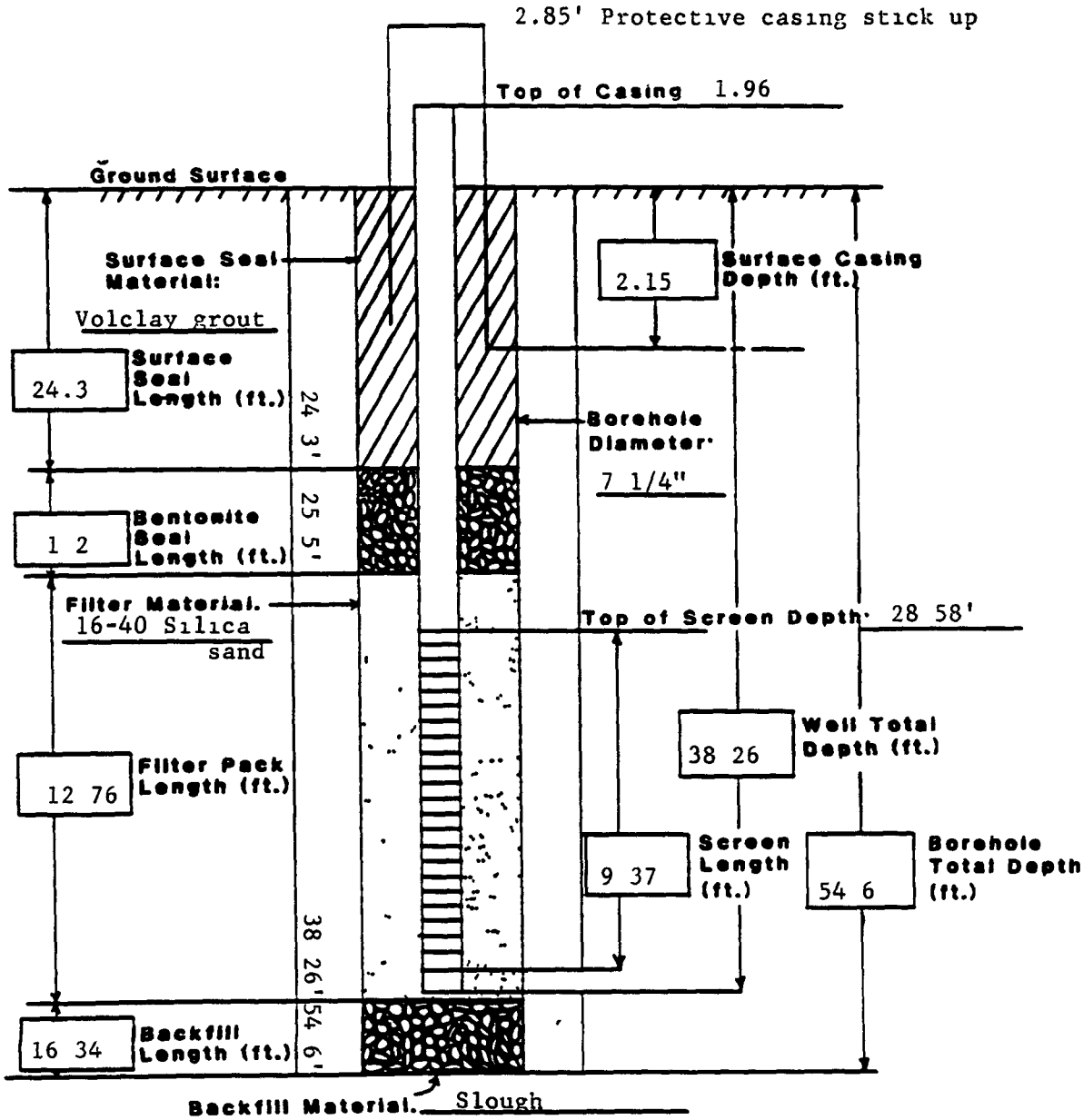
Date Installed 3/15, 3/19 & 3/21/1989

Approved By Janell Bergman
Site Manager

Installed By R A. Chapuis
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

QA By/Date Janell Burman 14-19-89

Location Rocky Flats Plant, Background

Well No. 02-89

Coordinates N 31676 84 E 16017 21 (RFP)

Elevation Ground Surface 6105.9'

Total Depth Well 51.25'

Top of Casing 6107.71'

Borehole 52 0'

Formation of Completion Rocky Flats Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O D.

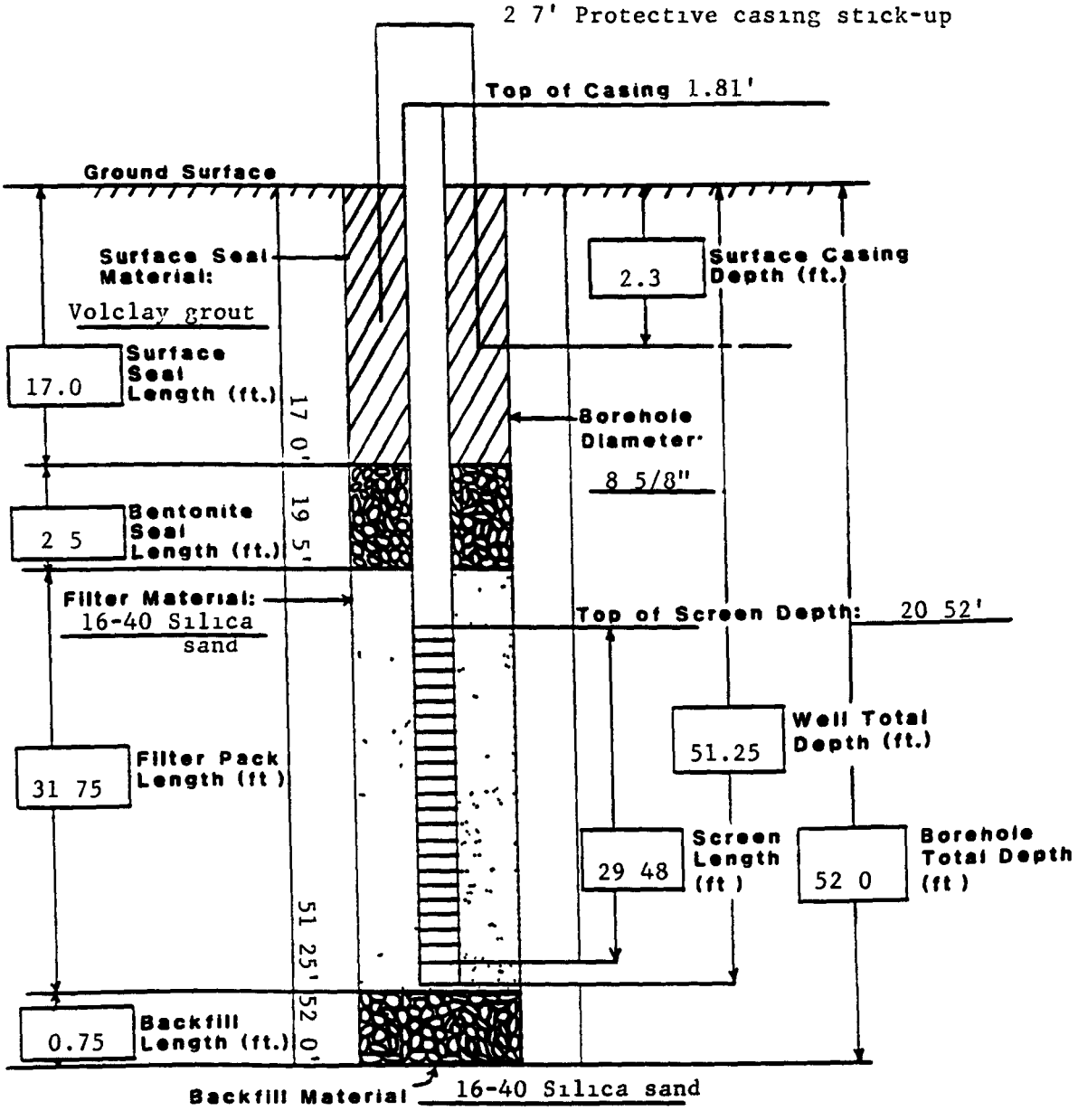
Date Installed 04/18/1989

Approved By Janell Burman
Site Manager

Installed By K W Van Allen
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

QA By/Date Jarell Burman 15-8-89

Location Rocky Flats Plant, Background

Well No 03-89

Coordinates N 30794 80 E 15266 77 (RFP)

Elevation **Ground Surface** 6122 0'

Total Depth **Well** 50 3'

Top of Casing 6124 0'

Borehole 50 4'

Formation of Completion Rocky Flats Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O D

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O D.

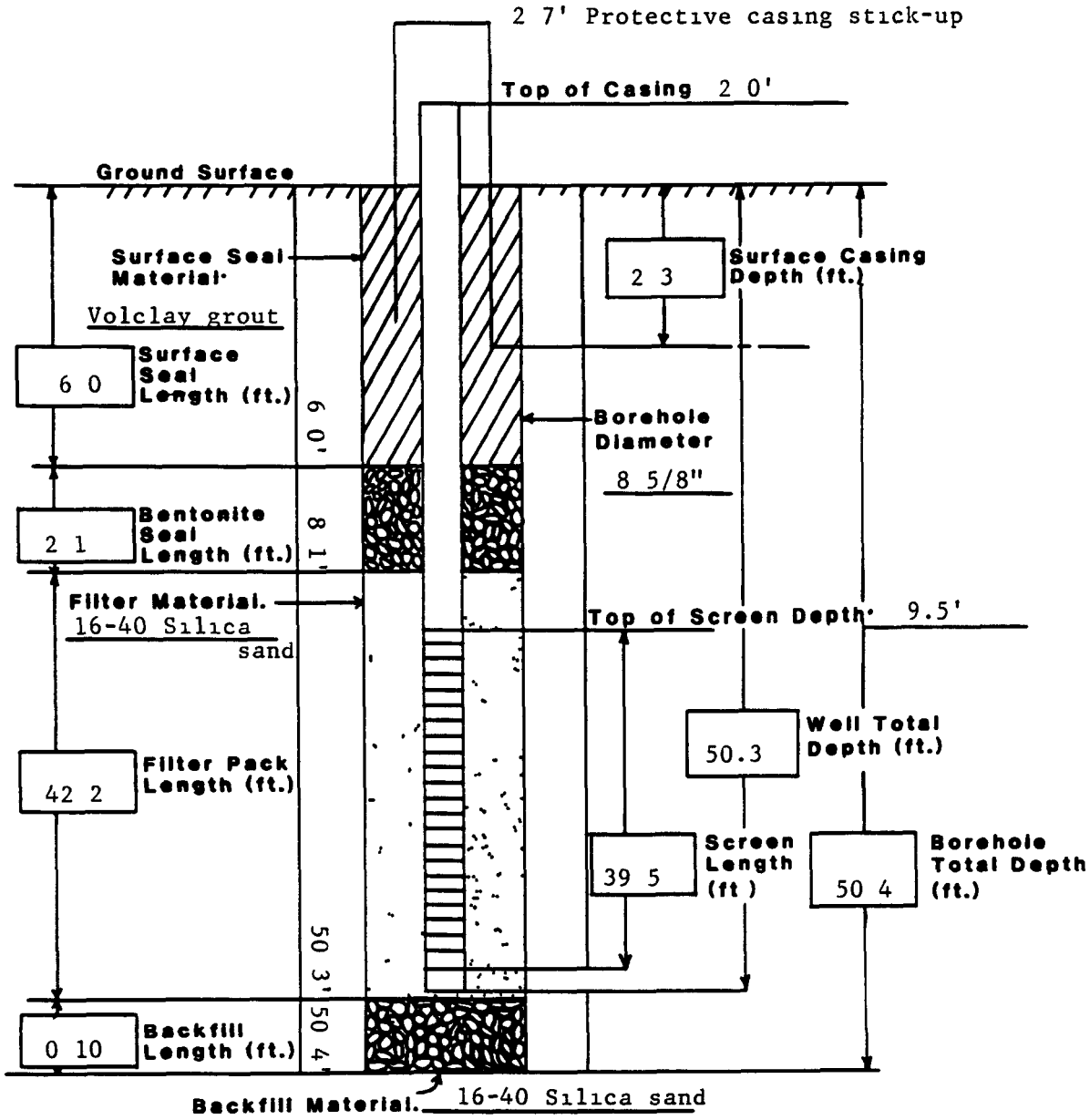
Date Installed 04/27/1989

Approved By Jarell Burman
Site Manager

Installed By K.W. Van Allen
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

QA By/Date Farrell Bergman 15-4-89

Location Rocky Flats Plant, Background

Well No. 04-89

Coordinates N 30852 38 E 16077 58 (RFP)

Elevation **Ground Surface** 6105 9'

Total Depth **Well** 55 7'

Top of Casing 6107 07'

Borehole 56 0'

Formation of Completion Rocky Flats Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O D.

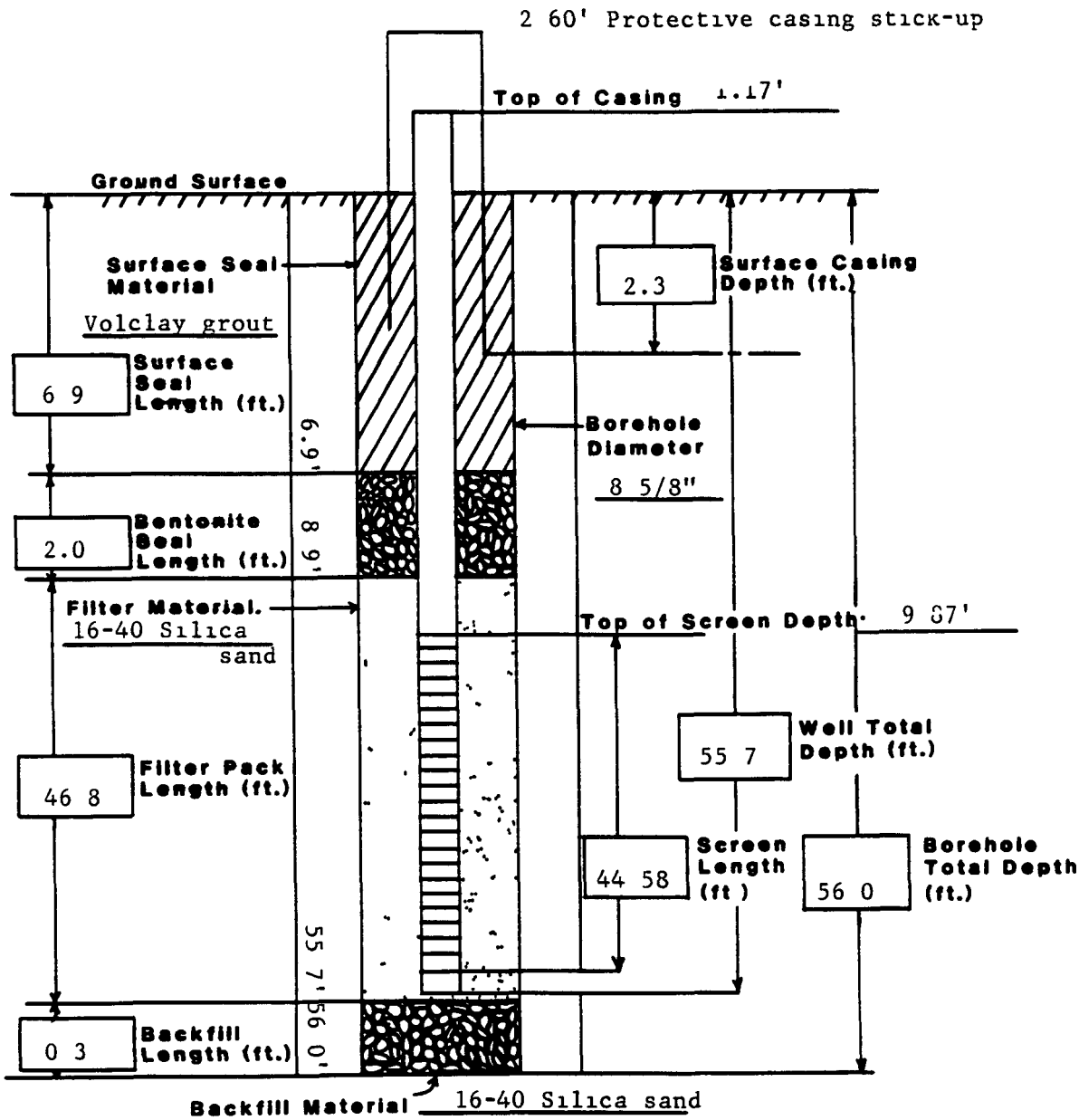
Date Installed 05/08/1989

Approved By Farrell Bergman
Site Manager

Installed By R.I Thun
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

QA By/Date Jarell Burman 12-27-89

Location Rocky Flats Plant, Background

Well No 05-89

Coordinates N 41857 55 E 20445.99 (RFP)

Elevation Ground Surface 5968.4'

Total Depth Well 33.31'

Top of Casing 5970.17'

Borehole 33 51'

Formation of Completion Rocky Flats Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

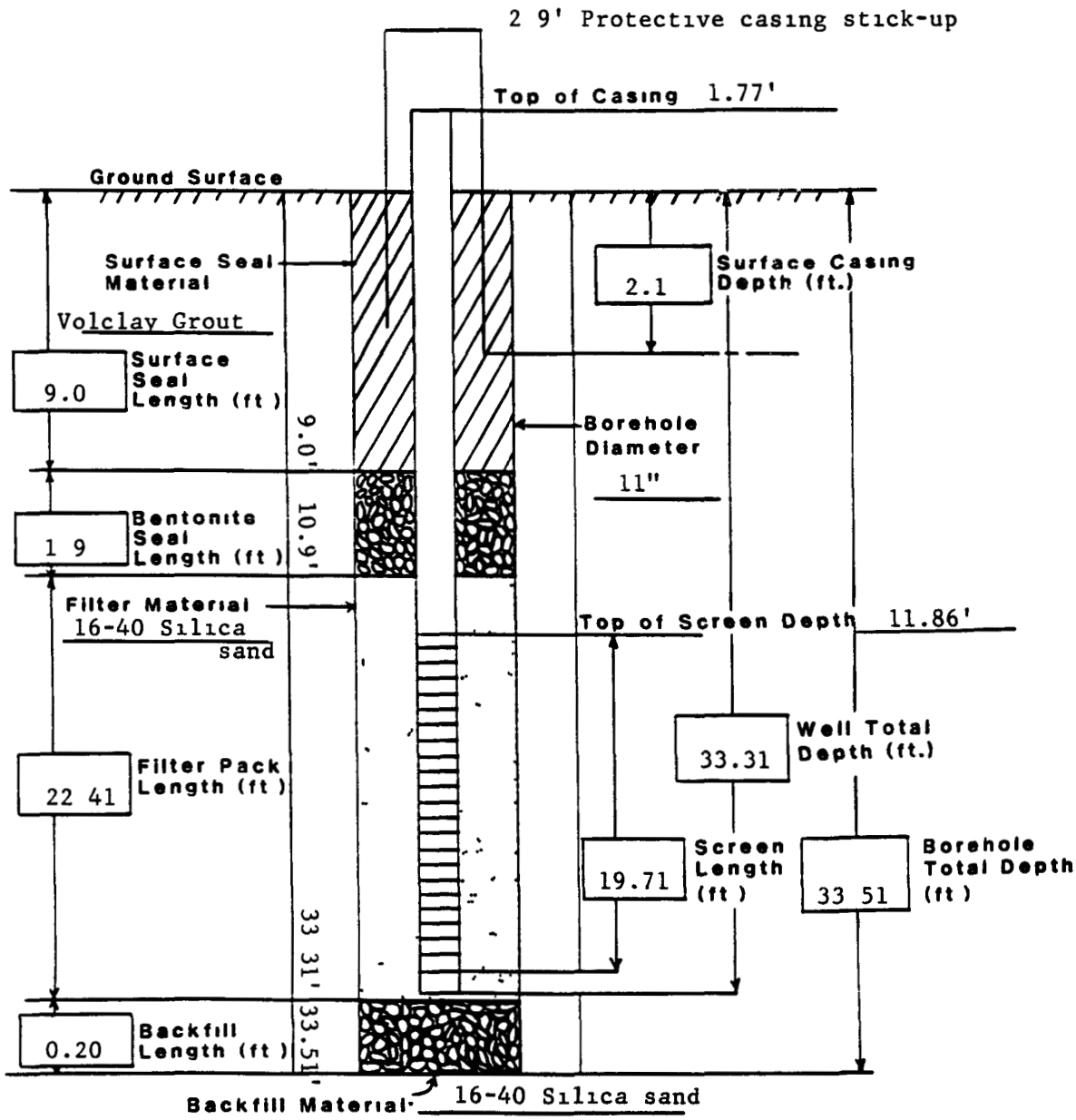
Date Installed 2/27/89

Approved By Jarell Burman
Site Manager

Installed By K.E Miller
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 31.77 to 30.67' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Jarell Burman 13-2-89

Location Rocky Flats Plant, Background

Coordinates N 42256 66 E 21069 70 (RFP)

Total Depth Well 32 8'

Borehole 35 7'

Well No 06-89

Elevation Ground Surface 5960.1'

Top of Casing 5961.94'

Formation of Completion Rocky Flats Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

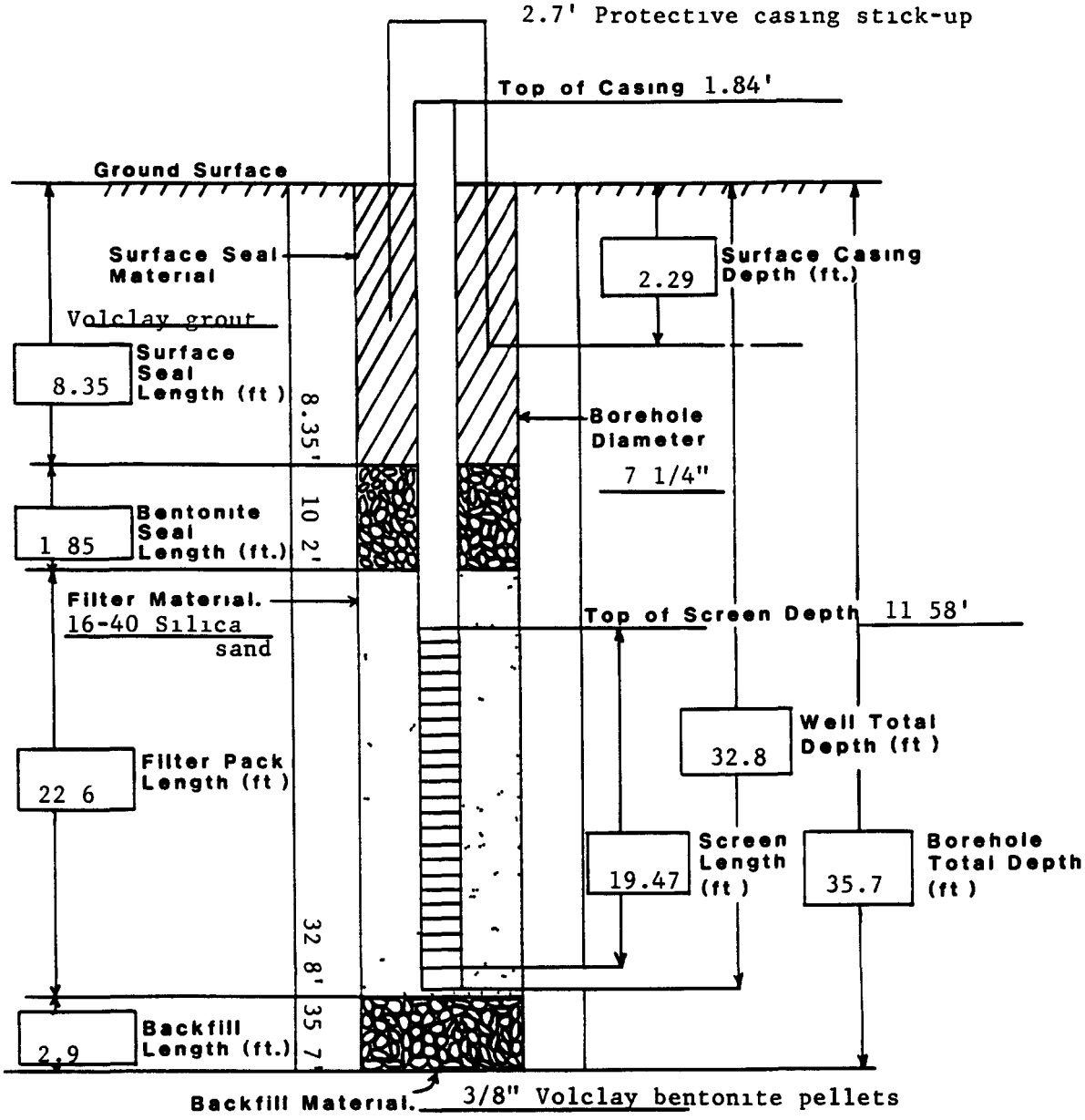
Date Installed 2/28 and 3/1/89

Installed By K.E. Miller
Geologist

Approved By Jarell Burman
Site Manager

CEARP Manager

Comments Set stainless steel centralizer from 30.0 to 31.1' below ground surface



WELL COMPLETION INFORMATION

QA By/Date [illegible] 3/6/89

Location Rocky Flats Plant, Background

Well No 07-89

Coordinates N 42781.02 E 21921.46 (RFP)

Elevation Ground Surface 5946.1'

Total Depth Well 30.47'

Top of Casing 5948.08'

Borehole 34 4'

Formation of Completion Rocky Flats Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

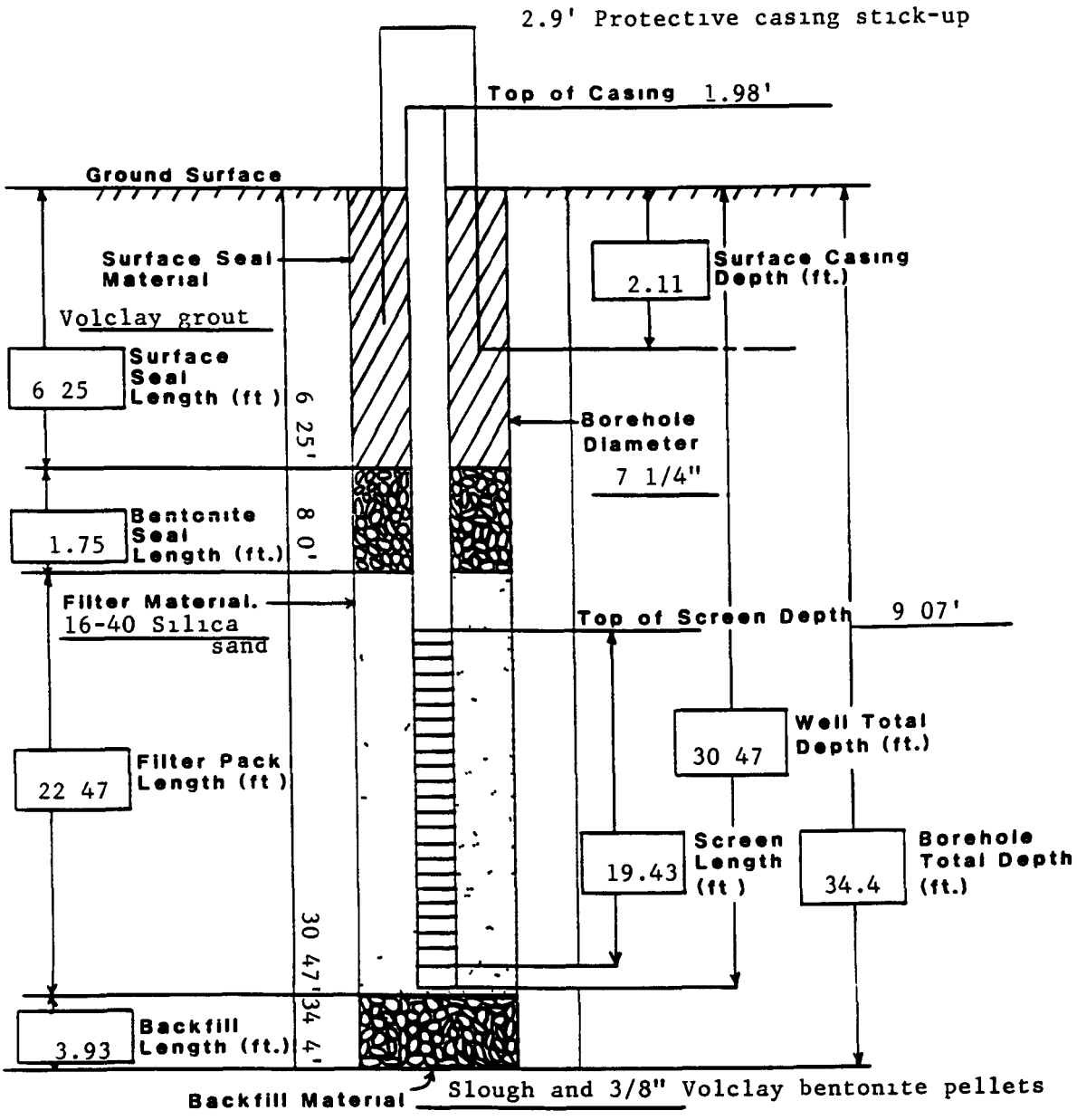
Date Installed 3/2/1989

Approved By [illegible]
Site Manager

Installed By K E. Miller
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 27.05 to 28.3' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Janelle Bergman 7-17-89

Location Rocky Flats Plant, Background

Well No. 08-89

Coordinates N 43199 87 E 22617 22 (RFP)

Elevation: Ground Surface 5936.1'

Total Depth: Well 24.7'

Top of Casing 5938.08'

Borehole 27 8'

Formation of Completion Rocky Flats Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

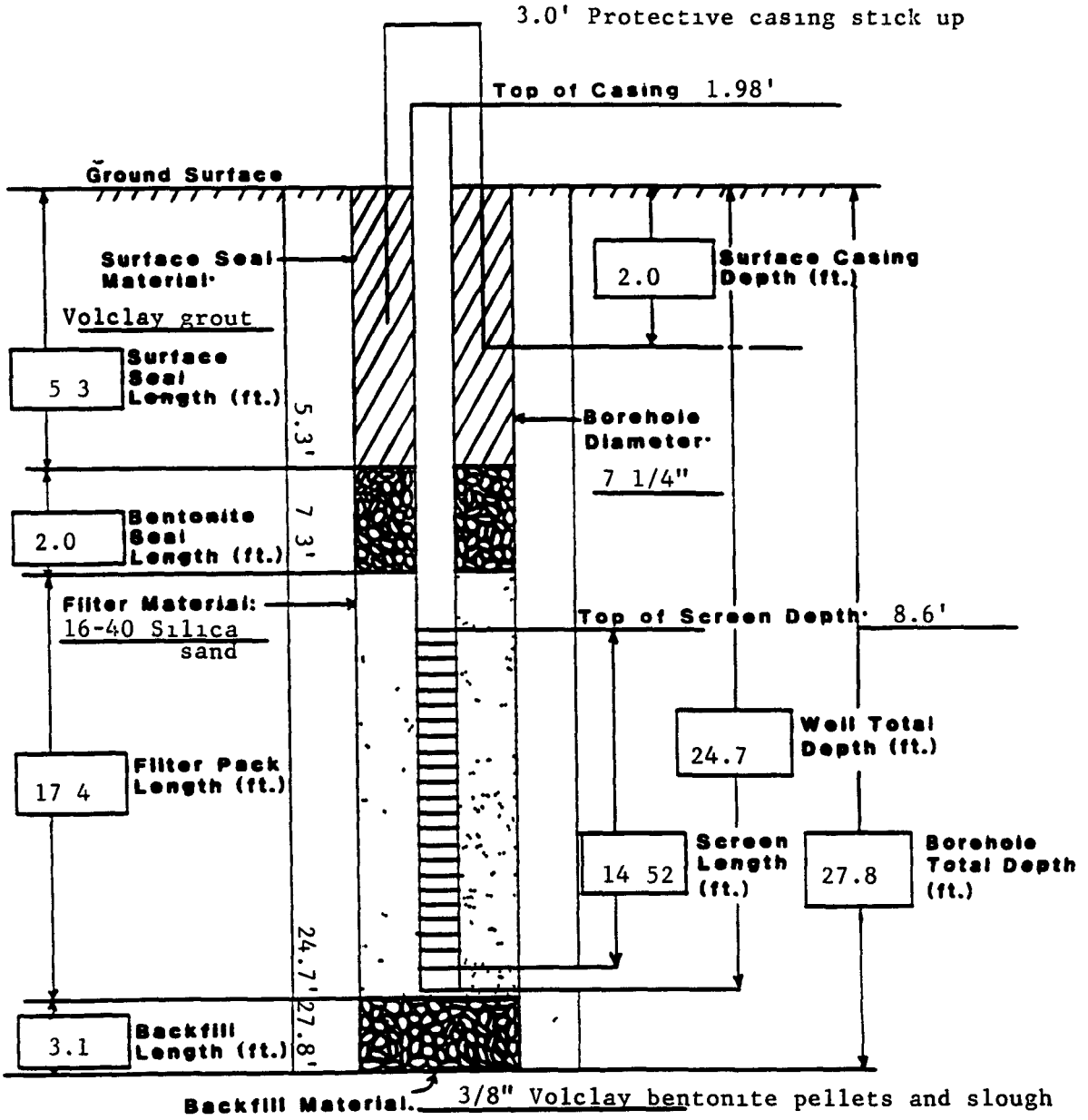
Date Installed 03/07/1989

Approved By Janelle Bergman
Site Manager

Installed By K.W. Van Allen
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 22.95' to 24 05' below ground surface



WELL COMPLETION INFORMATION

QA By/Date [illegible] / 3-3-89

Location Rocky Flats Plant Background

Well No 09-89

Coordinates N 42275 09 E 24169 13 (RFP)

Elevation Ground Surface 5883.1'

Top of Casing 5885.15'

Total Depth Well 9.6'

Borehole 19 55'

Formation of Completion Colluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

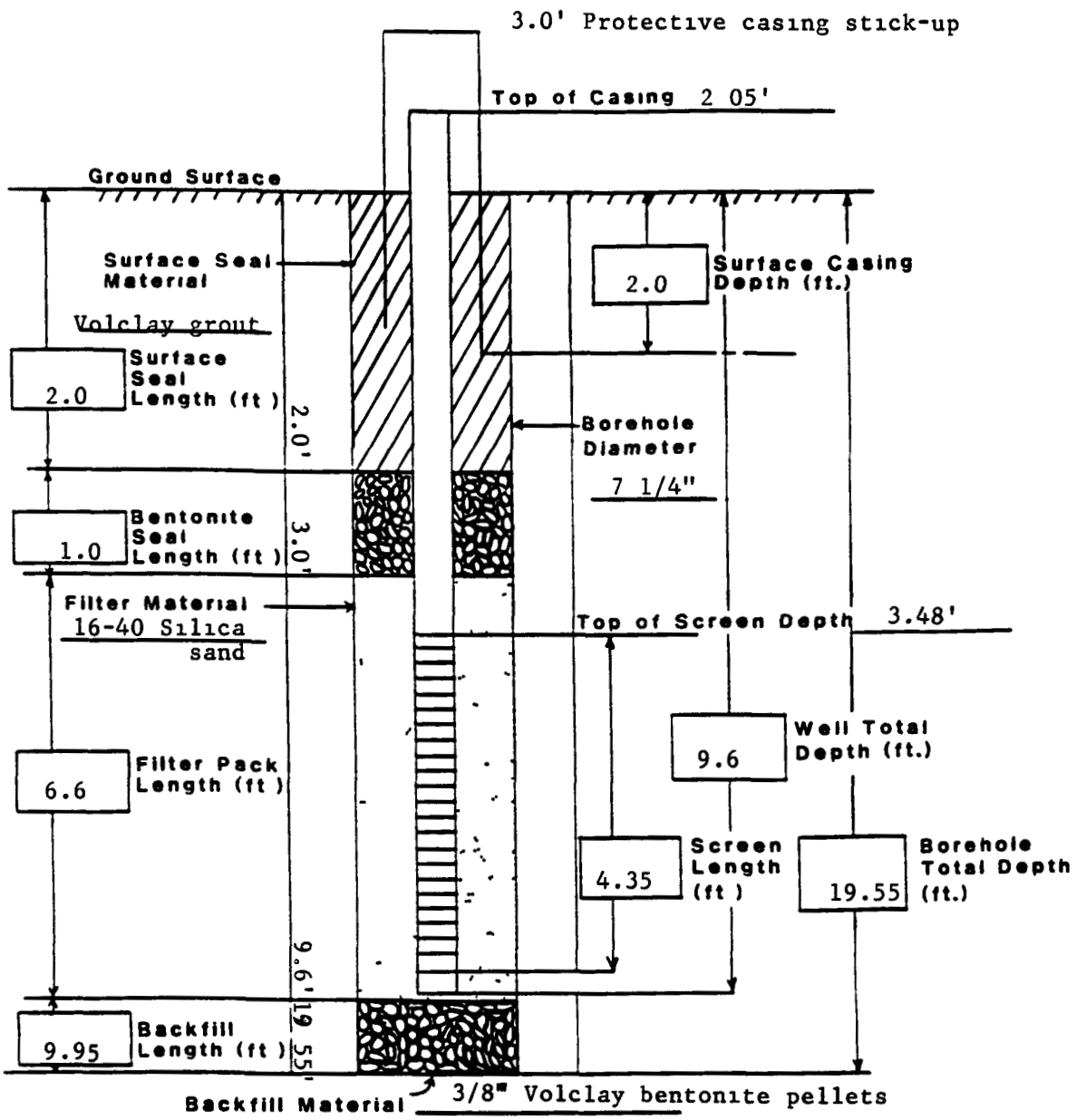
Date Installed 3/2/1989

Approved By [illegible]
Site Manager

Installed By K.W. Van Allen
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 7.25 to 8.4' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Jarrell Burman / 3-30-89

Location Rocky Flats Plant, Background

Well No 10-89

Coordinates N 44655.14 E 23771.64 (RFP)

Elevation Ground Surface 5806.5'

Top of Casing 5808 41'

Total Depth Well 36.5'

Borehole 46.0'

Formation of Completion Colluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

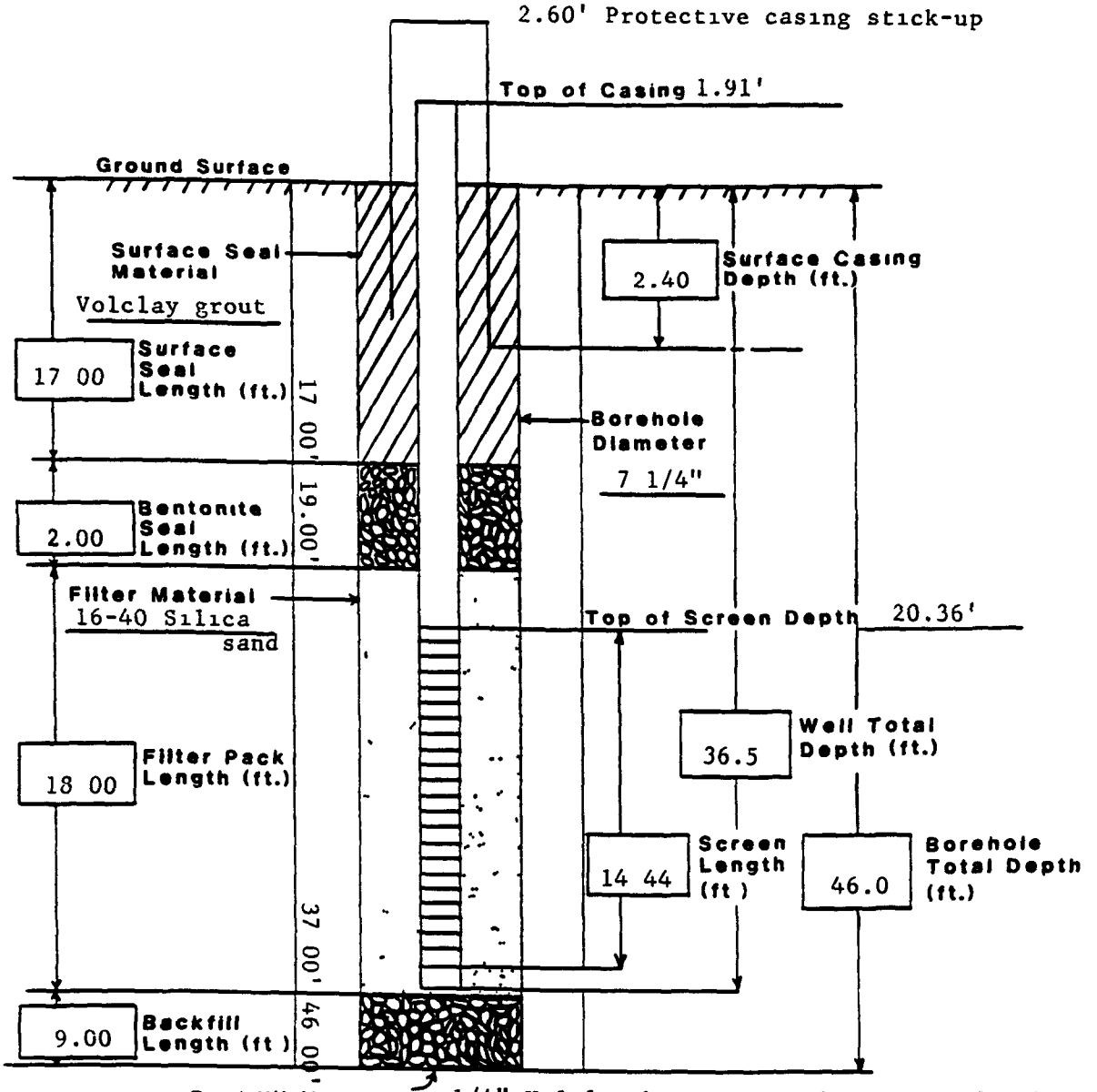
Date Installed 3/23/1989

Approved By Jarrell Burman
Site Manager

Installed By R.T. Treat
Geologist

CEARP Manager

Comments Set stainless steel centralizer at 33.8' to 35 0' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Farrell Berman 13-30-89

Location Rocky Flats Plant, Background

Well No 11-89

Coordinates N 44616.73 E 20500 44 (RFP)

Elevation Ground Surface 5826.1'

Total Depth Well 26.11'

Top of Casing 5827 80'

Borehole 32 10'

Formation of Completion Colluvium

Casing Material Schedule 80 PVC

Casing Diameter 2 3/8" O.D

Screen Material Schedule 80 10-slotted PVC

Surface Casing Diameter 5 5/8" O.D

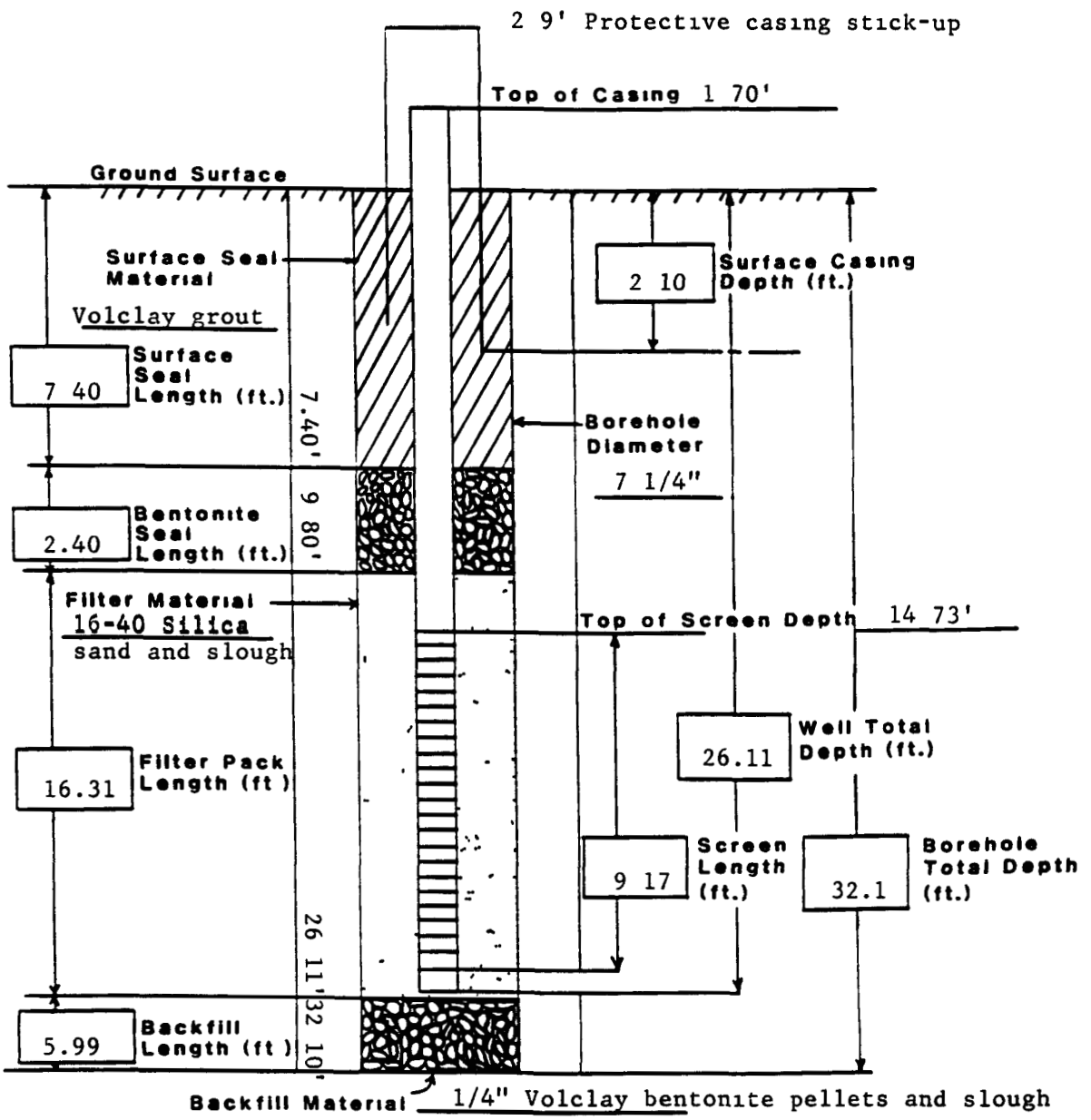
Date Installed 3/27 and 3/28/1989

Approved By Farrell Berman
Site Manager

Installed By J.E. Marks
Geologist

CEARP Manager

Comments Well construction inside 3 1/4" I.D. Hollow stem augers due to instability of borehole



WELL COMPLETION INFORMATION

QA By/Date Steven Sugman 17-17-89

Location Rocky Flats Plant, Background **Well No.** 12-89

Coordinates N 44092 75 E 22254 49 (RFP) **Elevation: Ground Surface** 5859.4'

Total Depth: Well 11 64' **Top of Casing** 5861 20'

Borehole 19 2'

Formation of Completion Colluvium/Weathered claystone

Casing Material Schedule 40 PVC **Casing Diameter** 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC **Surface Casing Diameter** 8 5/8" O.D.

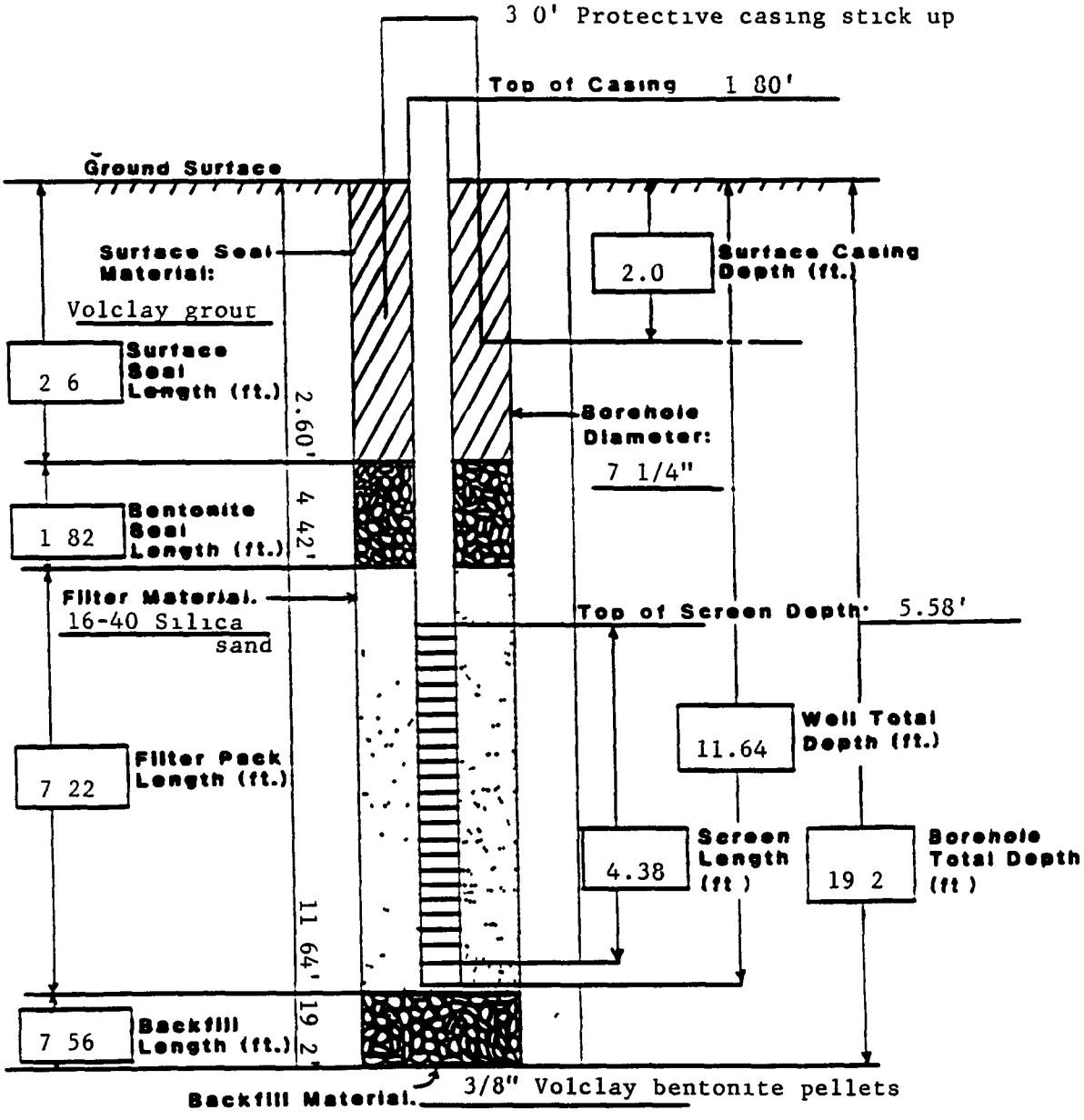
Date Installed 03/13/1989 **Approved By** Steven Sugman

Installed By J.E. Marks **Site Manager**

Geologist

CEARP Manager

Comments Set stainless steel centralizer from 10.0' to 11.21' below ground surface.



WELL COMPLETION INFORMATION

QA By/Date Janell Bryman 13-17-89

Location Rocky Flats Plant, Background

Well No 13-89

Coordinates N 44338.93 E 23567 14 (RFP)

Elevation Ground Surface 5846 0'

Total Depth Well 10.5'

Top of Casing 5847.68'

Borehole 20 3'

Formation of Completion Colluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O D

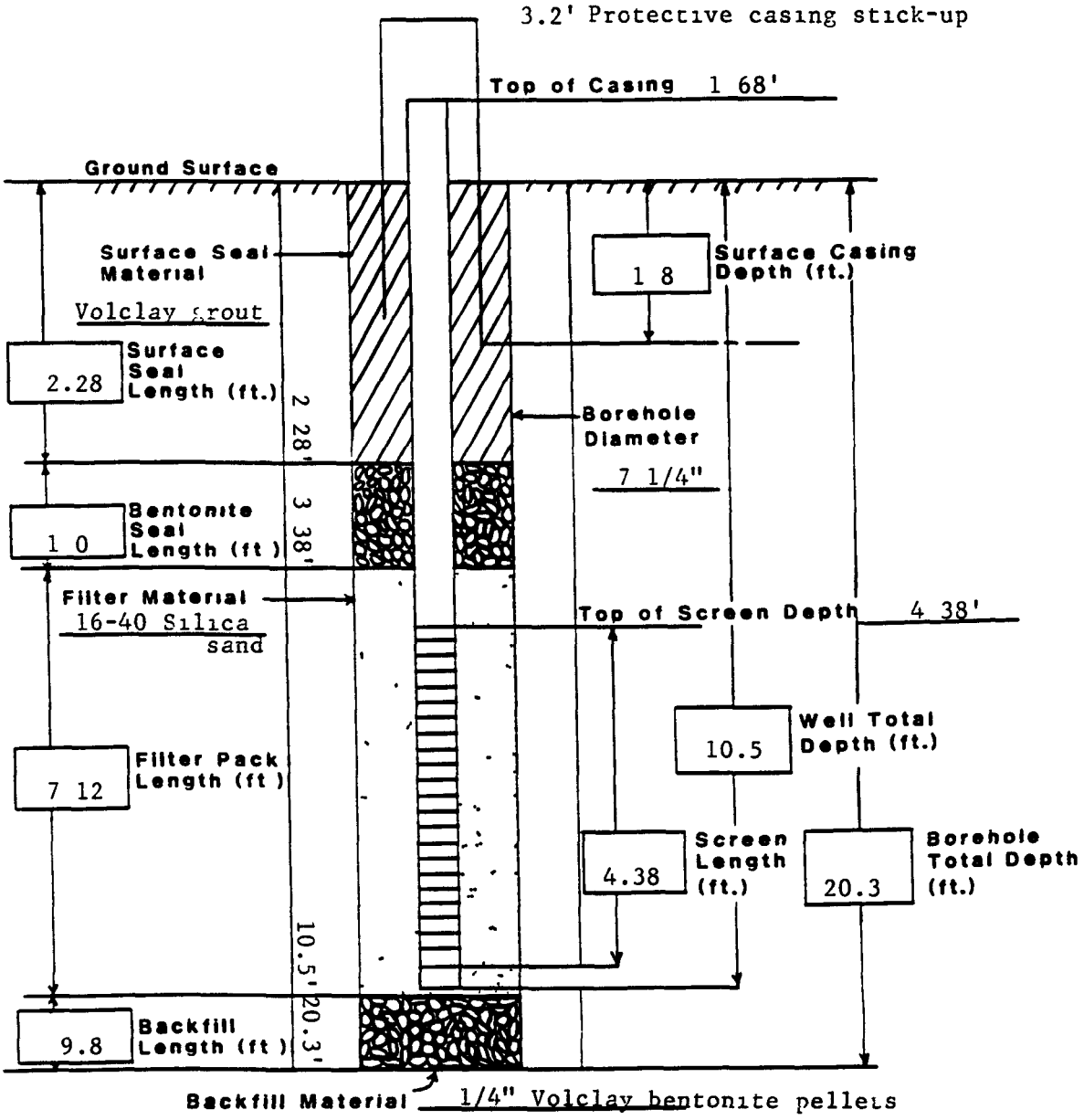
Date Installed 3/16/1989

Approved By Janell Bryman
Site Manager

Installed By J E Marks
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 8.8' to 9 03' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Jarrell Suyman 17-17-89

Location Rocky Flats Plant, Background **Well No.** 14-89

Coordinates N 34321 96 E 22207 35 (RFP) **Elevation. Ground Surface** 5866 8'

Total Depth· Well 24.45' **Top of Casing** 5868 83'

Borehole 34 50'

Formation of Completion Colluvium

Casing Material Schedule 40 PVC **Casing Diameter** 4 1/2" O D

Screen Material Schedule 40 10-slotted PVC **Surface Casing Diameter** 8 5/8" O.D.

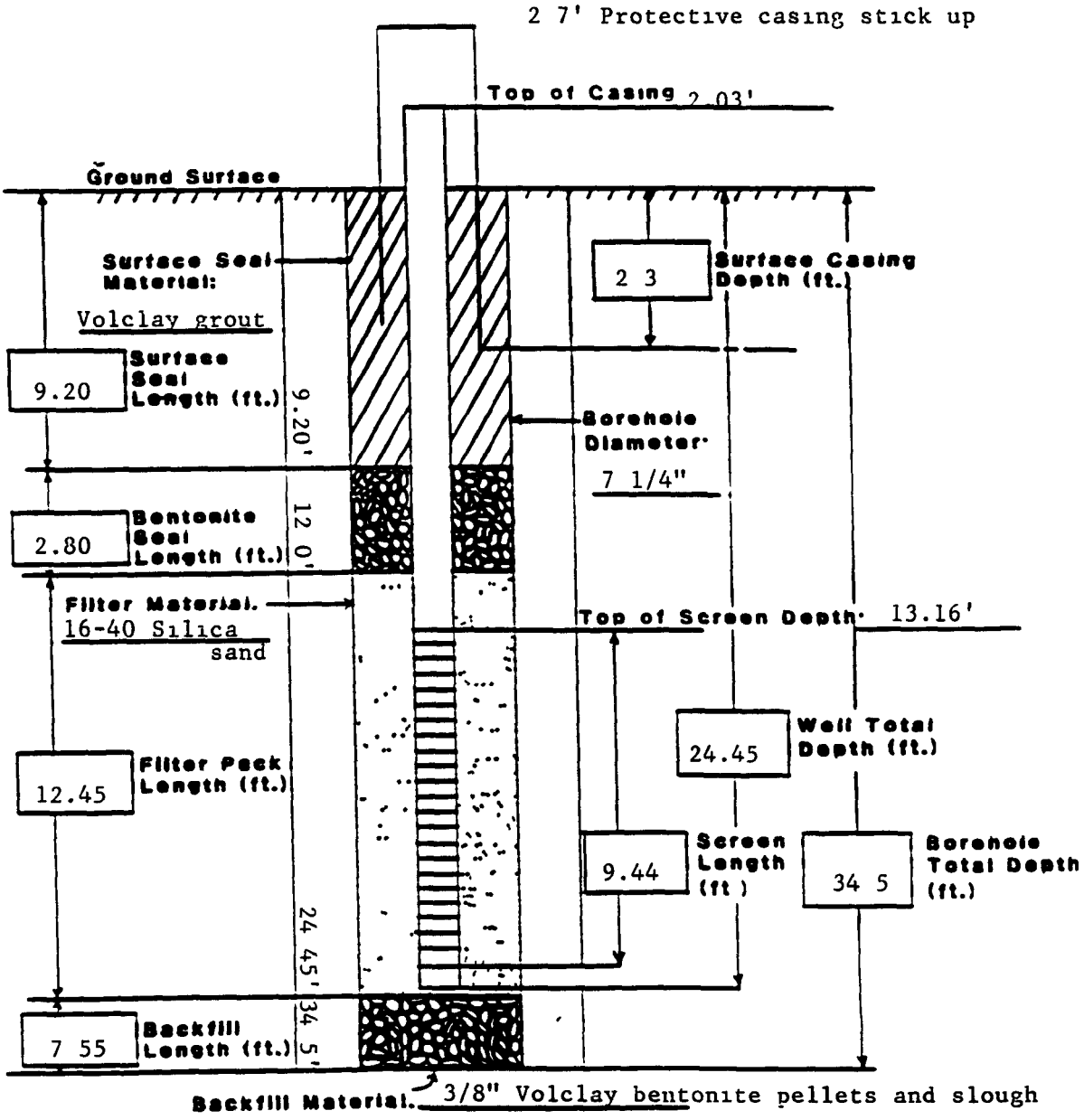
Date Installed 03/08/1989 **Approved By** Jarrell Suyman

Installed By K.E. Miller
Geologist

Site Manager

CEARP Manager

Comments Set stainless steel centralizer from 23.20' to 24.45' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Jarell Berman 14-7-89

Location Rocky Flats Plant, Background

Well No 15-89

Coordinates N 32873.07 E 18514 33 (PFP)

Elevation Ground Surface 6025 6'

Total Depth Well 22 65'

Top of Casing 6027.67'

Borehole 33 0'

Formation of Completion Colluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O D.

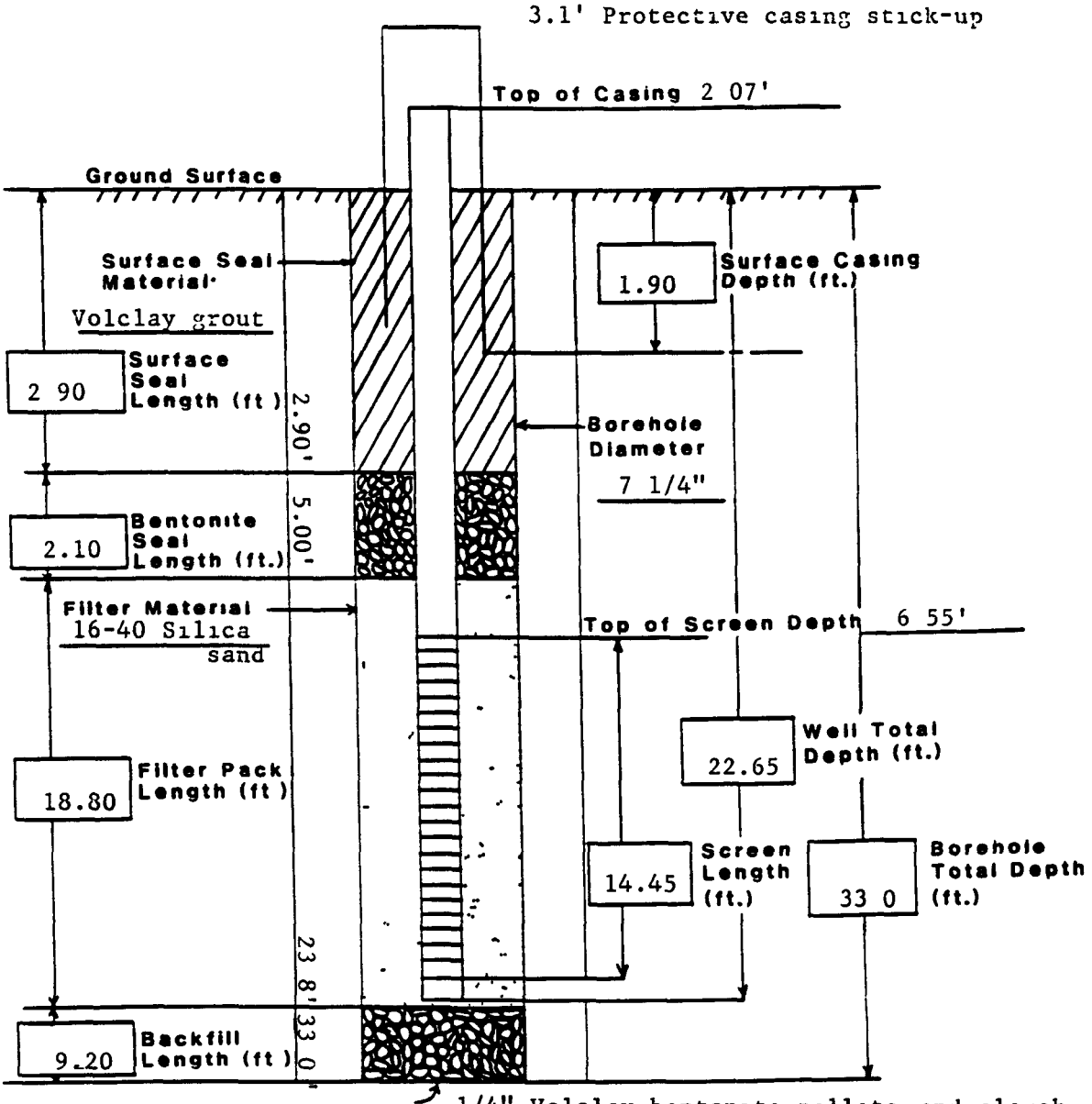
Date Installed 04/05/1989

Approved By Jarell Berman
Site Manager

Installed By R.T Treat
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 20 95' to 22.15' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Farell Burman 11-5-89

Location Rocky Flats Plant, Background

Well No 16-89

Coordinates N 33804.66 E 20373 64 (RFP)

Elevation Ground Surface 5907.5'

Top of Casing 5909 55'

Total Depth Well 15 0'

Borehole 25.5'

Formation of Completion Colluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

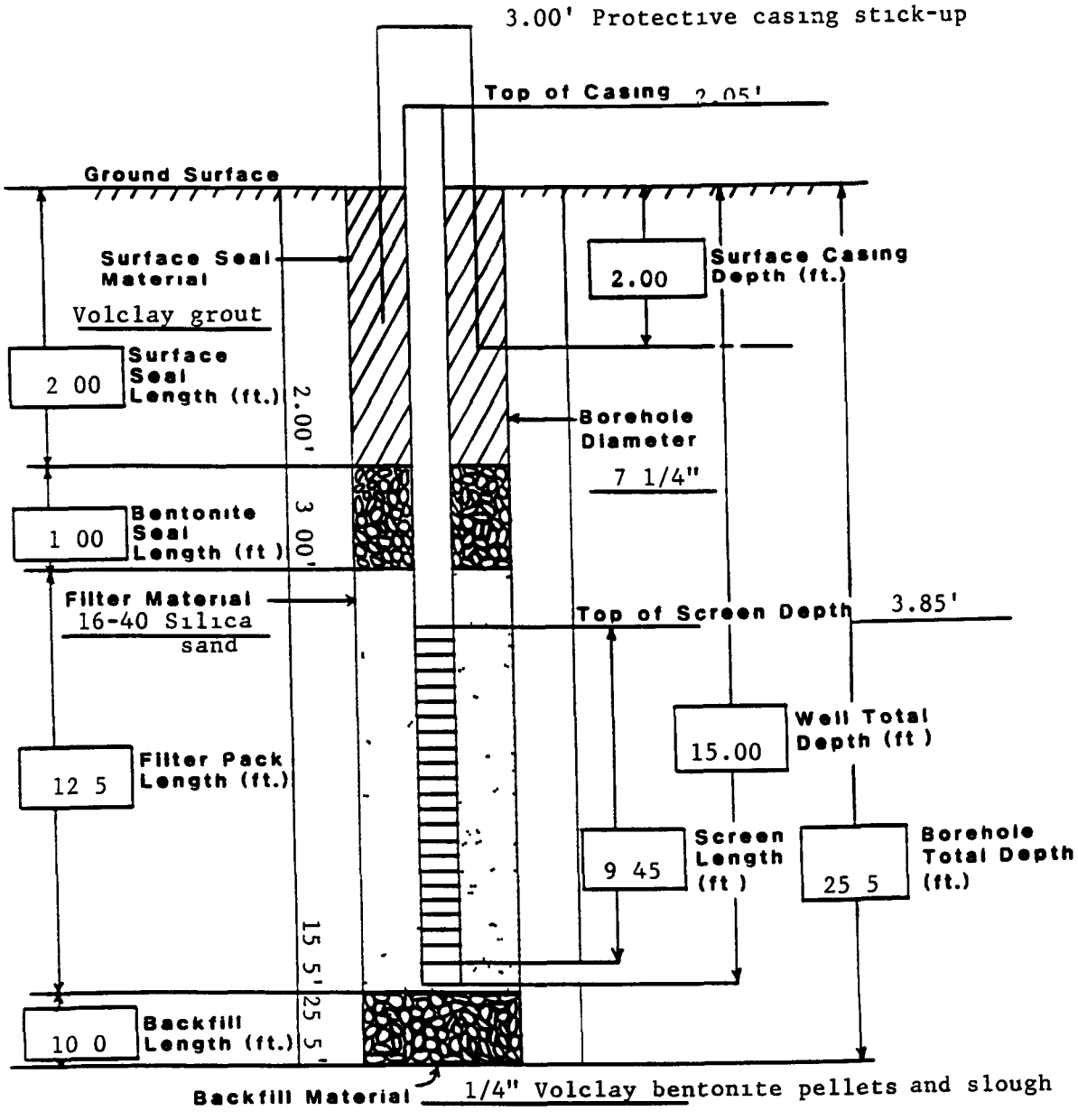
Date Installed 03/28/1989

Approved By Farell Burman
Site Manager

Installed By R.T. Treat
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 13 4' to 14.5' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Janell Burman 14-5-99

Location Rocky Flats Plant, Background

Well No 17-89BR

Coordinates N 33364.04 E 18357 65 (RFP)

Elevation Ground Surface 6024 6'

Total Depth Well 24 6'

Top of Casing 6026 49'

Borehole 49 0'

Formation of Completion Weathered sandstone

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

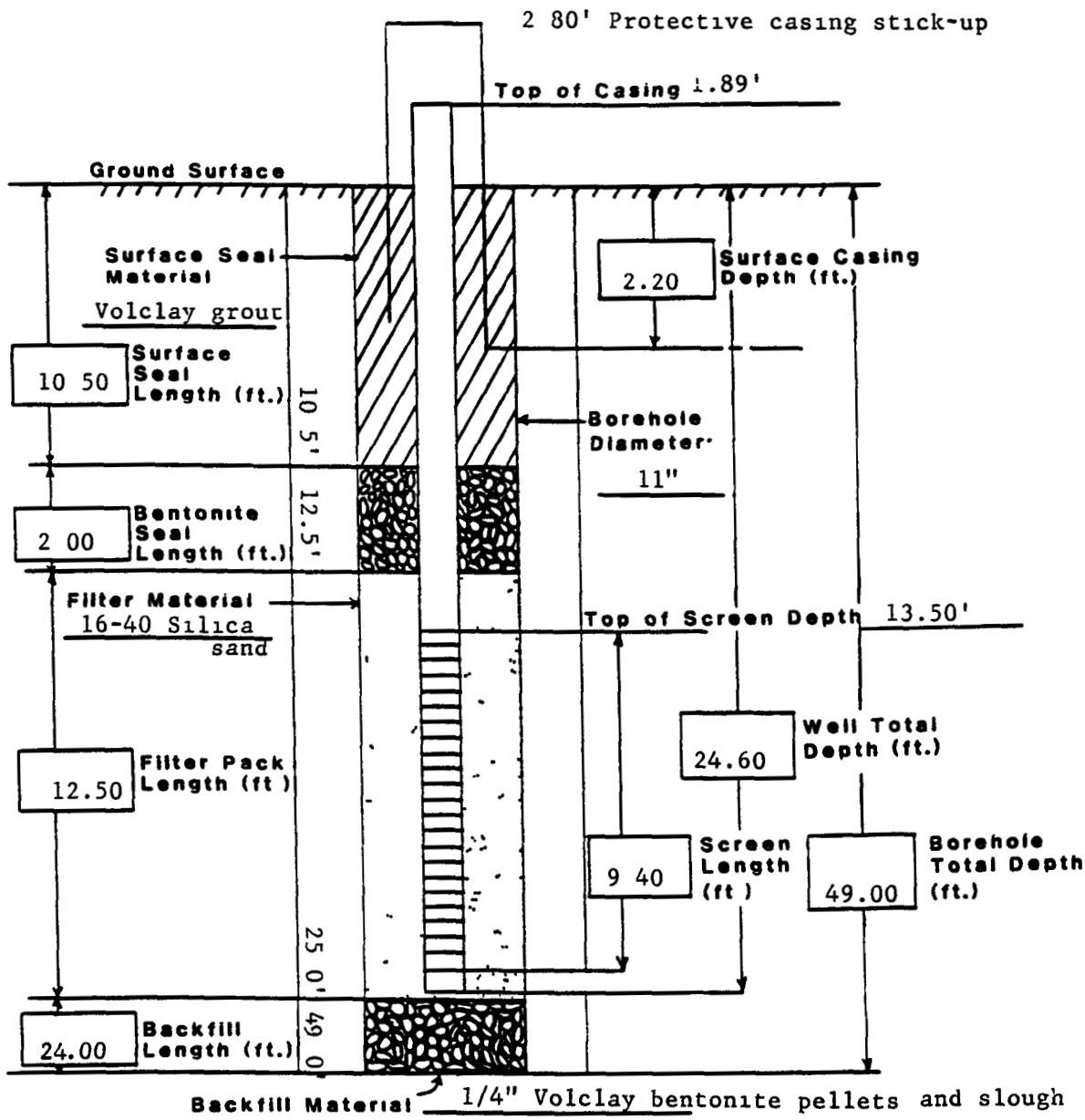
Date Installed 04/04/1989

Approved By Janell Burman
Site Manager

Installed By R.T. Treat
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

QA By/Date [illegible] 3-29-89

Location Rocky Flats Plant, Background

Well No 18-89

Coordinates N 40124 54 E 16414 83 (RFP)

Elevation Ground Surface 5978.3'

Total Depth Well 14 22'

Top of Casing 5980.06'

Borehole 22 0'

Formation of Completion Valley Fill Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

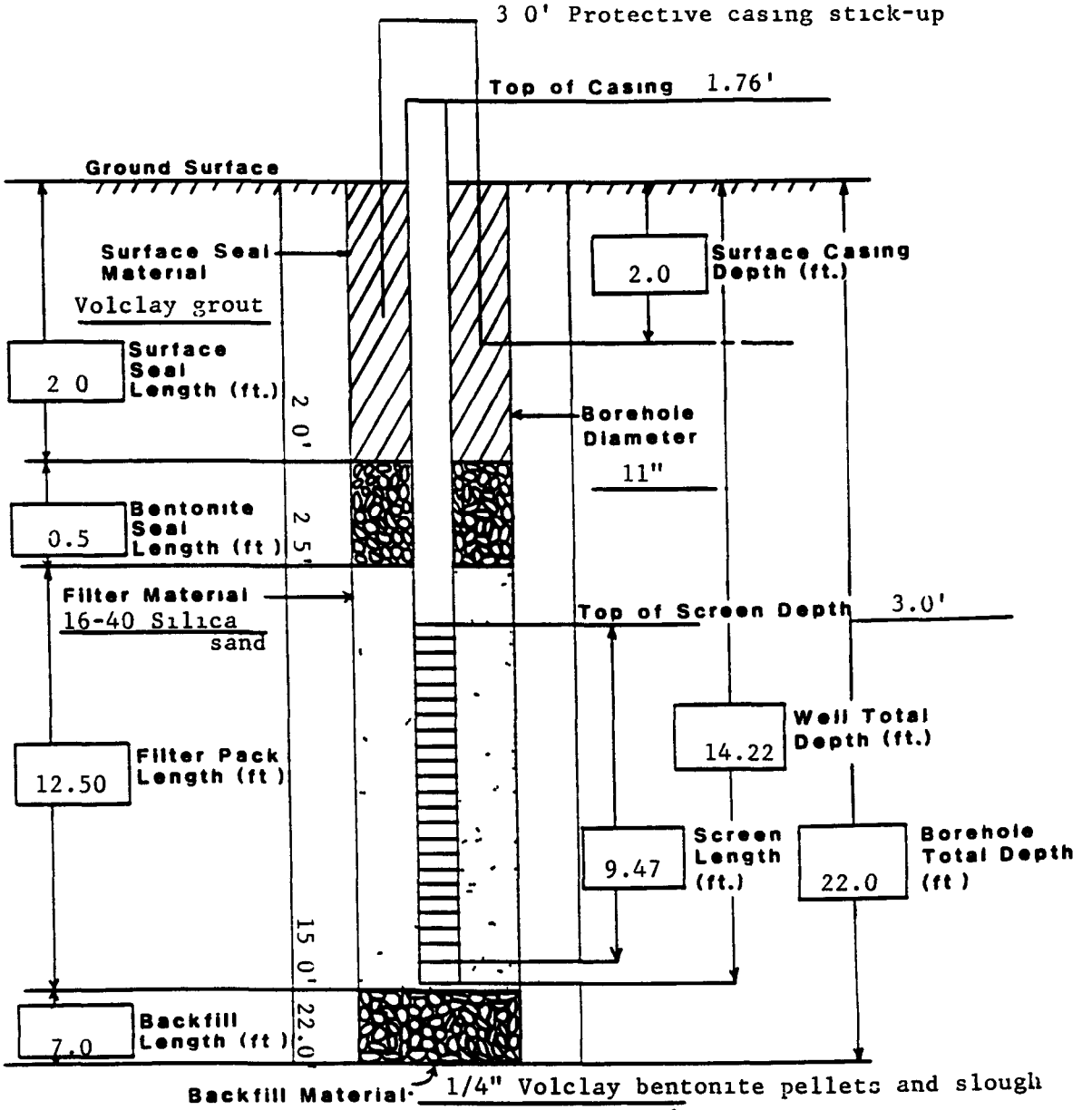
Date Installed 3/29/1989

Approved By [illegible]
Site Manager

Installed By K.W. Van Allen
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 12.57' to 13.57' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Farrell Bergman 14-5-89

Location Rocky Flats Plant, Background

Well No. 19-89

Coordinates N 40864.32 E 17161 65 (RFP)

Elevation **Ground Surface** 5939 5'

Total Depth **Well** 12 61'

Top of Casing 5941 18'

Borehole 16 4'

Formation of Completion Valley Fill Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O D.

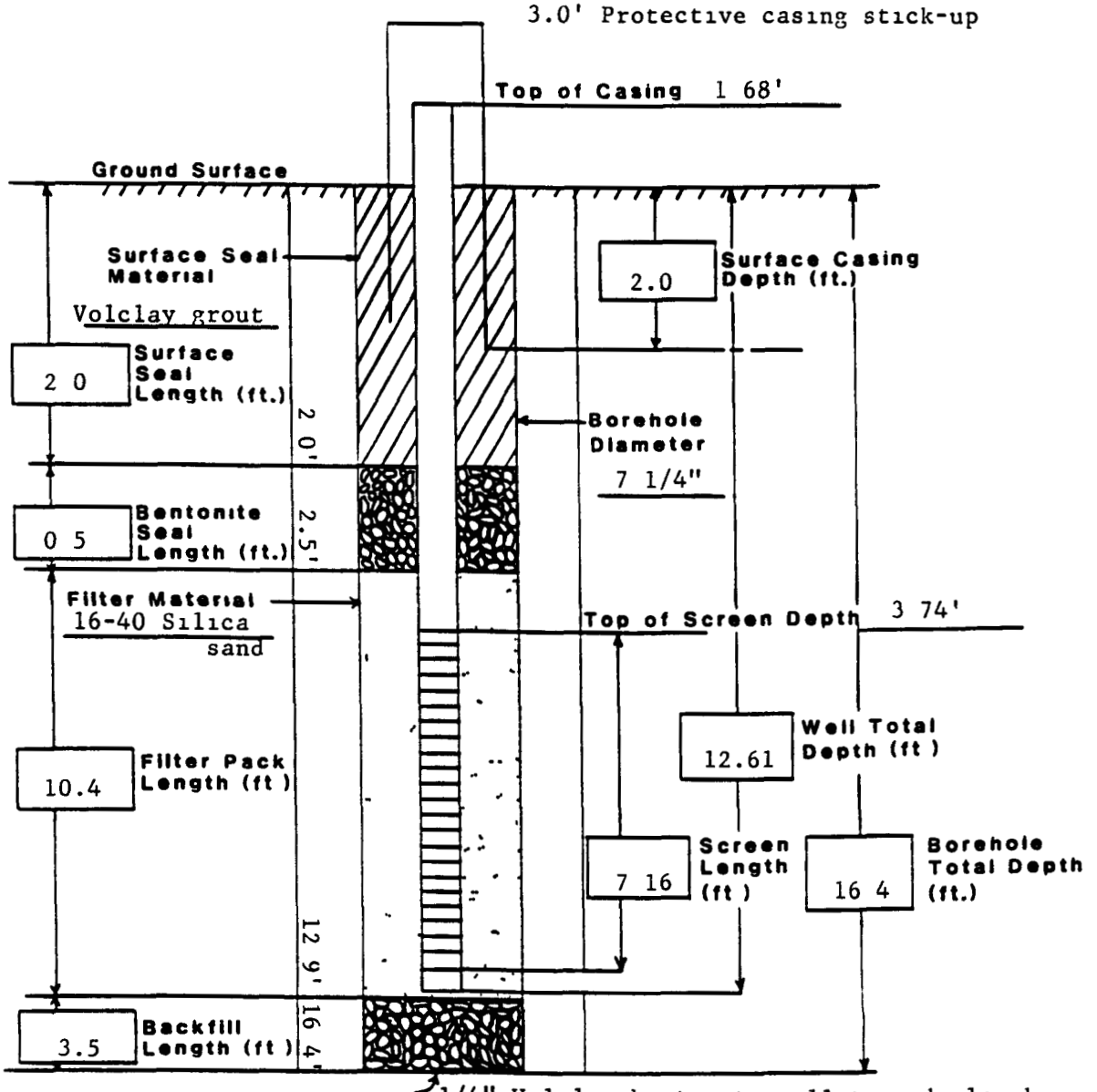
Date Installed 04/04/1989

Approved By Farrell Bergman
Site Manager

Installed By K W. Van Allen
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 11 01' to 12 06' below ground surface



Backfill Material 1/4" Volclay bentonite pellets and slough

WELL COMPLETION INFORMATION

QA By/Date Farrell Burman 14-3-89

Location Rocky Flats Plant, Background

Well No 20-89

Coordinates N 44414 51 E 20812 14 (RFP)

Elevation Ground Surface 5770.9'

Total Depth Well 14.65'

Top of Casing 5772.83'

Borehole 19 4'

Formation of Completion Valley Fill Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

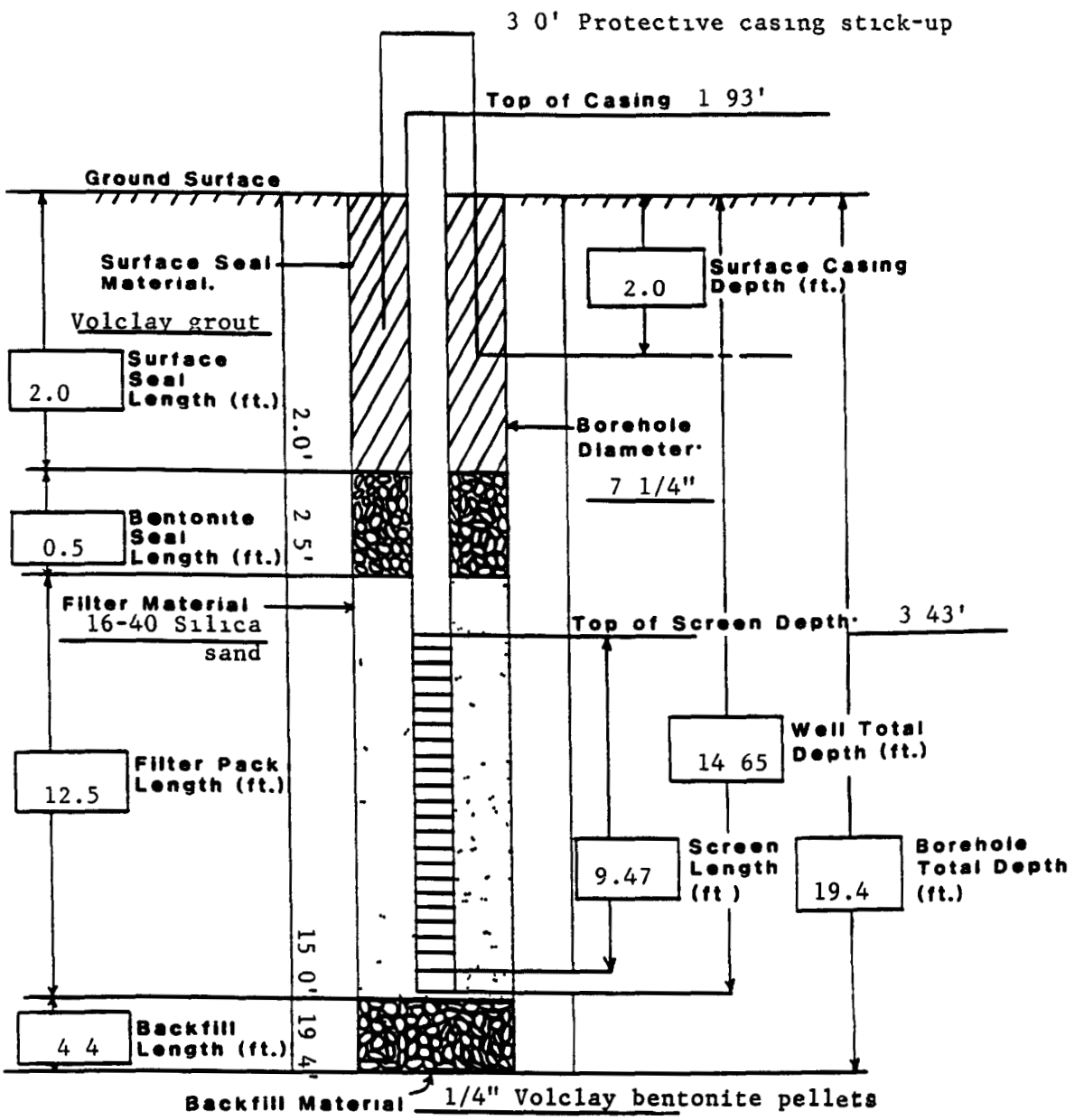
Date Installed 03/31/1989

Approved By Farrell Burman
Site Manager

Installed By K.W. Van Allen
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 12.98' to 14.11' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Jarell Burman 14-4-89

Location Rocky Flats Plant, Background

Well No. 21-89

Coordinates N 45126 22 E 22633 57 (RFP)

Elevation Ground Surface 5723 6'

Total Depth Well 13 4'

Top of Casing 5725 45'

Borehole 16.8'

Formation of Completion Valley Fill Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

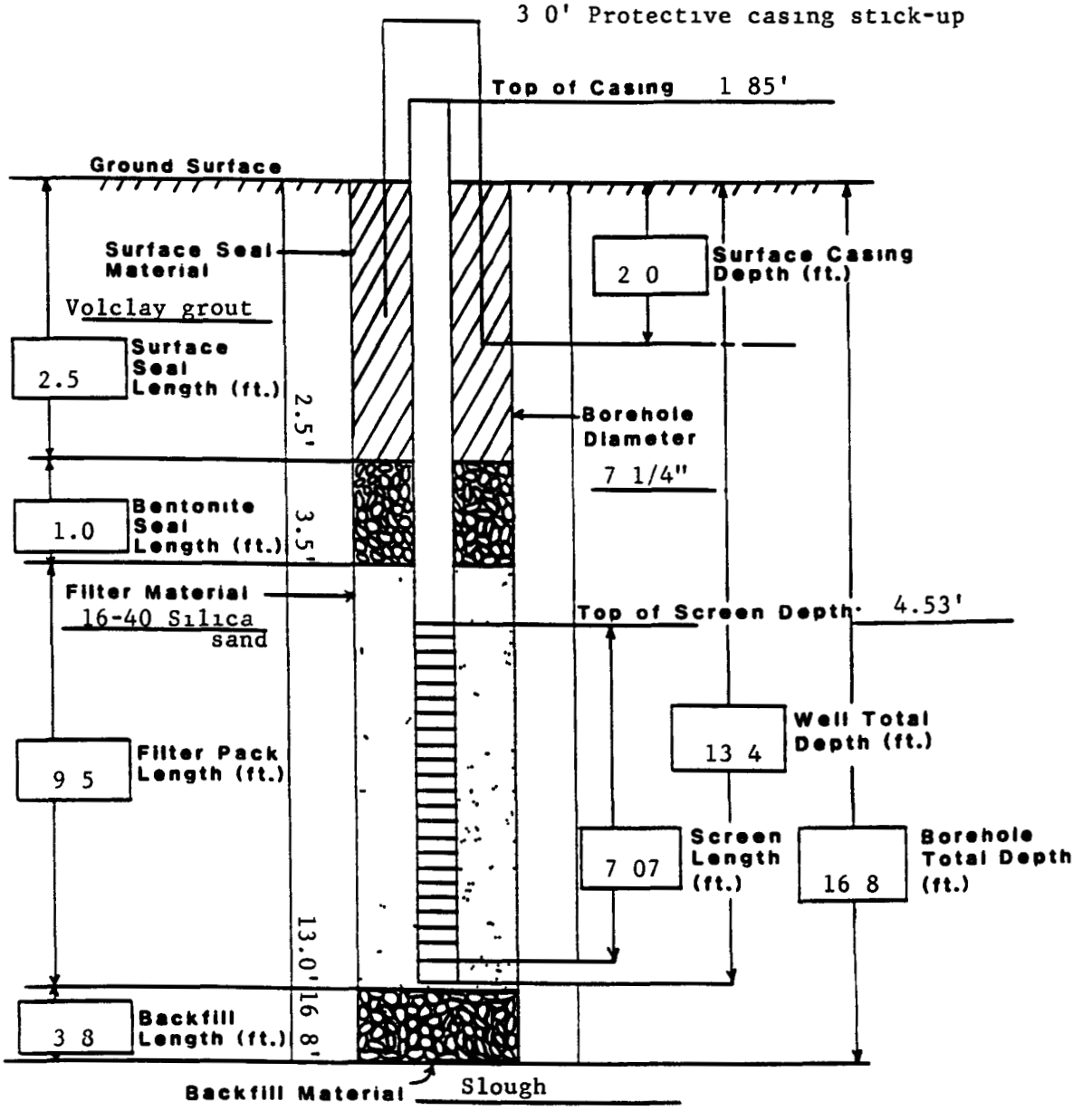
Date Installed 04/03/1989

Approved By Jarell Burman
Site Manager

Installed By K.W. Van Allen
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 11.85' to 12.8' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Jarell Burman 3/10/89

Location Rocky Flats Plant, Background

Well No 22-89

Coordinates N 34264 35 E 15145 64 (RFP)

Elevation **Ground Surface** 6045.4'

Total Depth **Well** 5.85'

Top of Casing 6047 07'

Borehole 8 0'

Formation of Completion Valley Fill Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O D

Screen Material Schedule 40 10-Slotted PVC

Surface Casing Diameter 8 5/8" O.D.

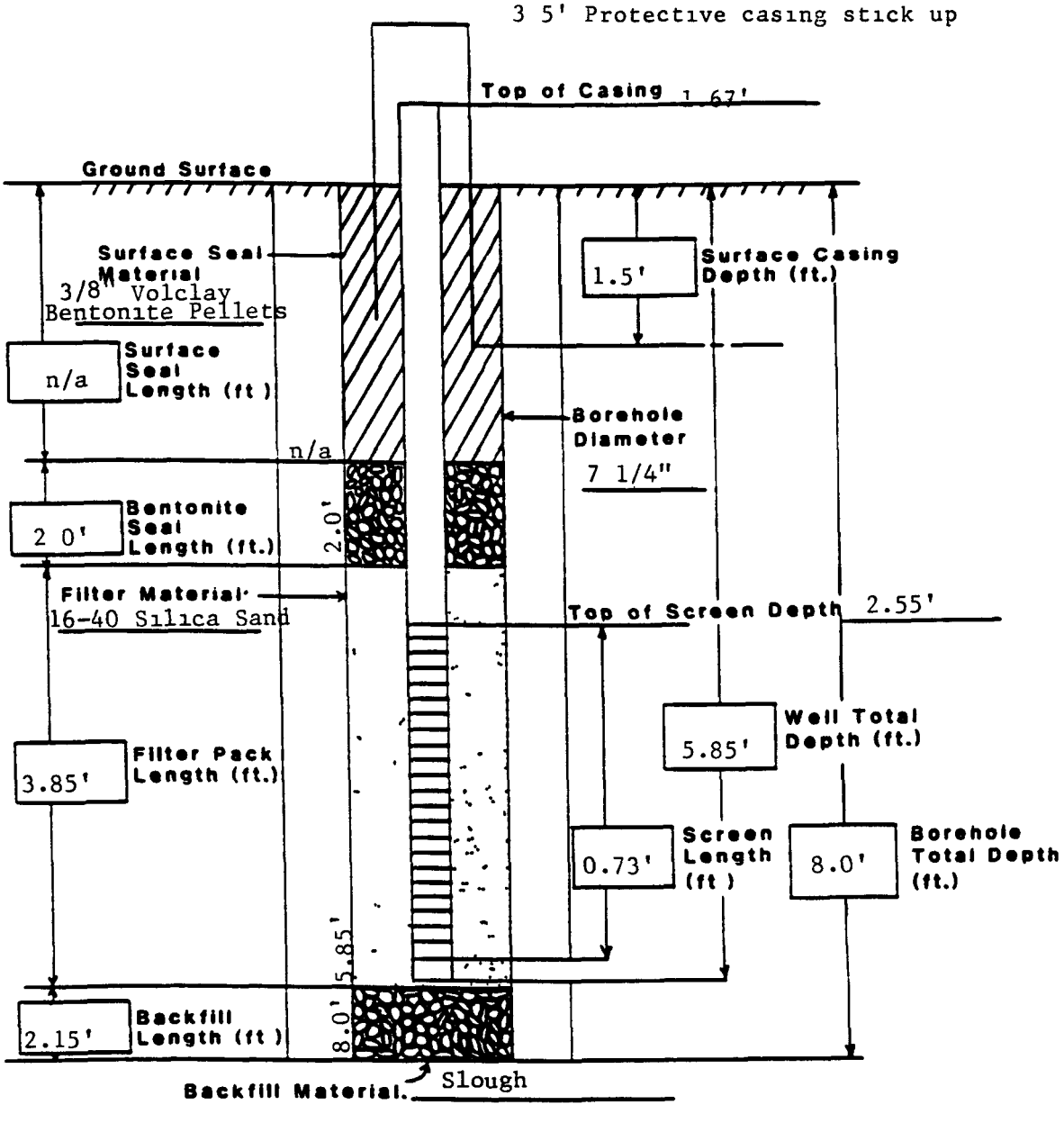
Date Installed

Approved By Jarell Burman
Site Manager

Installed By K.E. Miller
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

QA By/Date Janell Burgman 3-22-89

Location Rocky Flats Plant, Background

Well No. 23-89

Coordinates N 31715 79 E 23104 08 (RFP)

Elevation Ground Surface 5832 3'

Top of Casing 5834 17'

Total Depth Well 10.17'

Borehole 17 5'

Formation of Completion Valley Fill Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D

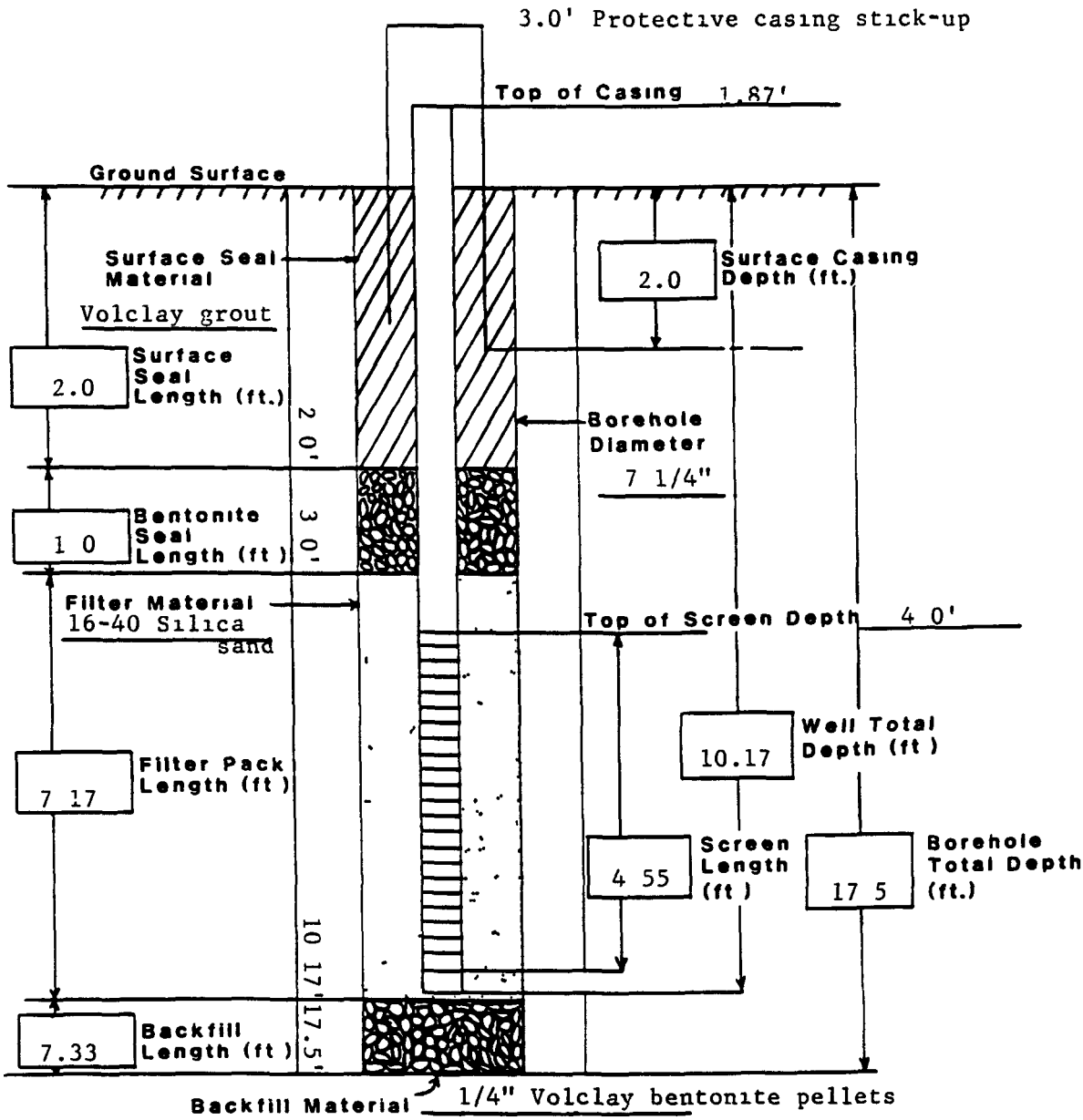
Date Installed 3/21/1989

Approved By Janell Burgman
Site Manager

Installed By K.W. Van Allen
Geologist

CEARP Manager

Comments Set stainless steel centralizer at 8 5' to 9 7' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Janell Burman 13-17-89

Location Rocky Flats Plant, Background

Well No 24-89

Coordinates N 32824.94 E 26406 34 (RFP)

Elevation Ground Surface 5730 8'

Total Depth Well 12.1'

Top of Casing 5733.16'

Borehole 16.5'

Formation of Completion Valley Fill Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

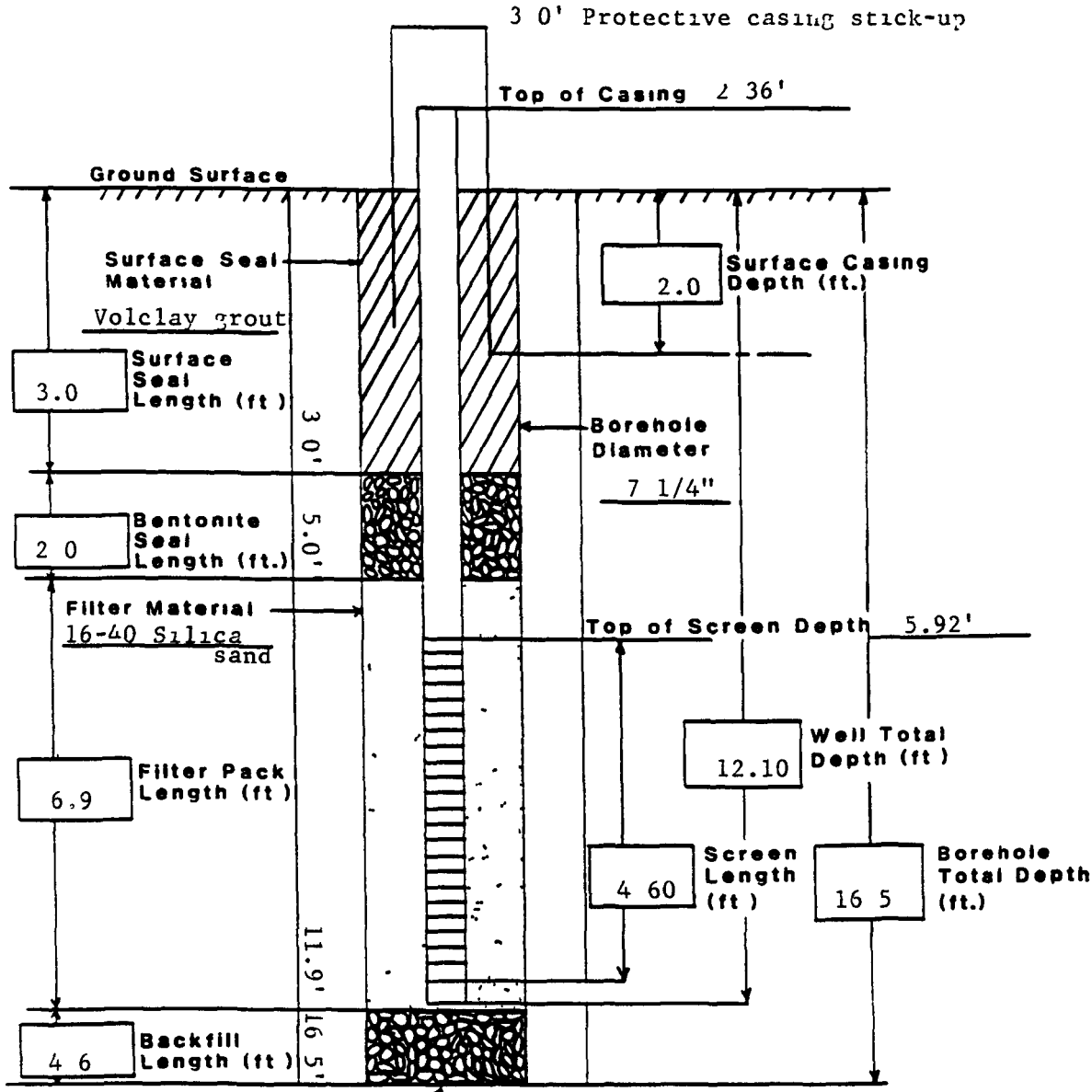
Date Installed 3/16/1989

Approved By Janell Burman
Site Manager

Installed By K.W. Van Allen
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 10.5' to 11.7' below ground surface.



WELL COMPLETION INFORMATION

QA By/Date Jarell Burman / 3-23-89

Location Rocky Flats Plant, Background

Well No 25-89

Coordinates N 32347 94 E 28146 31 (RFP)

Elevation Ground Surface 5686.2'

Total Depth Well 9 65'

Top of Casing ~~5688.15'~~

Borehole 12.4'

Formation of Completion Valley Fill Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

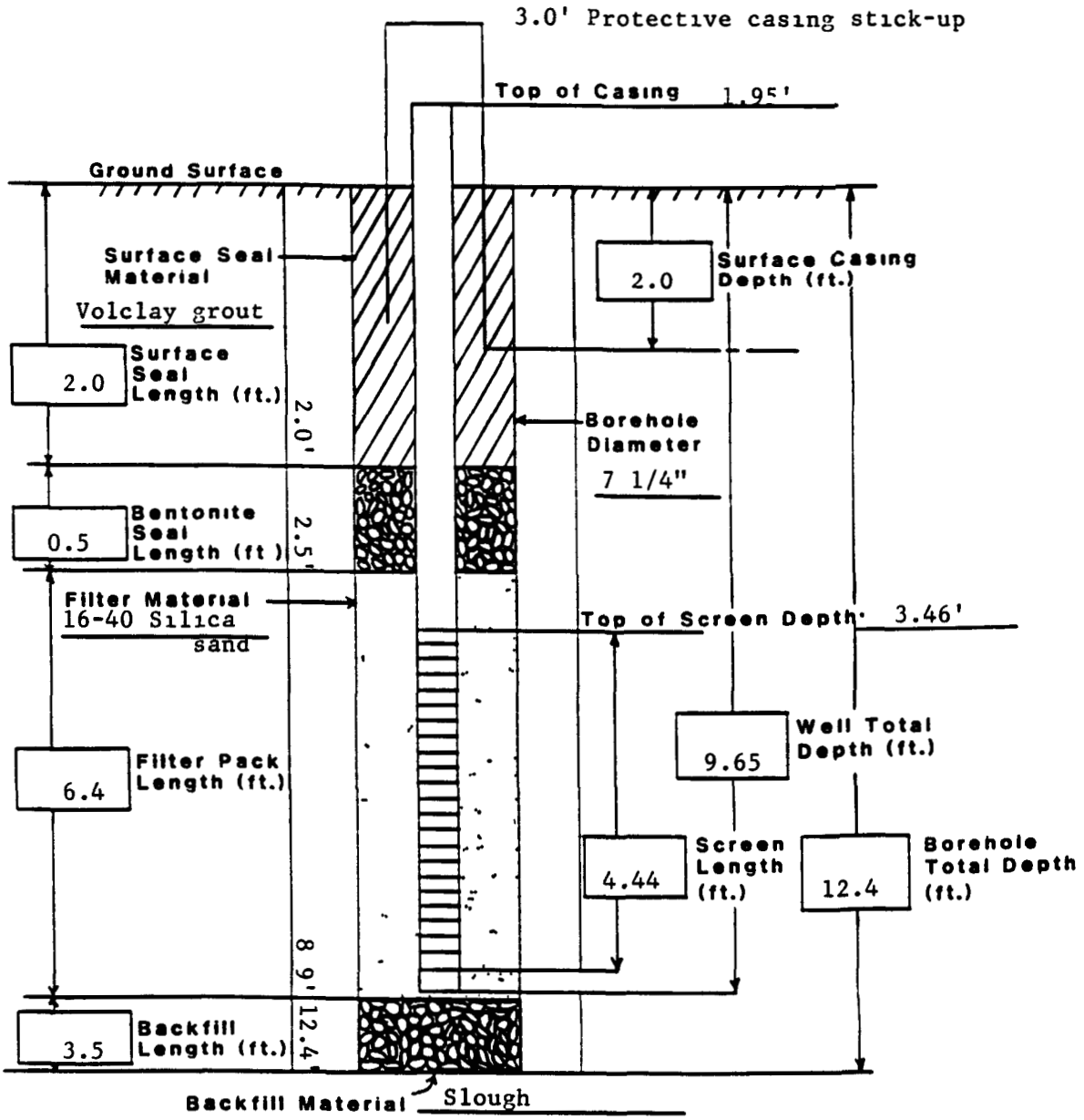
Date Installed 3/22/1989

Approved By Jarell Burman
Site Manager

Installed By K.W. Van Allen
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 8.0' to 9.1' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Jarell Burman 13-23-89

Location Rocky Flats Plant, Background

Well No 26-89

Coordinates N 29260 92 E 30864 52 (RFP)

Elevation Ground Surface 5601 2'

Total Depth Well 8.9'

Top of Casing 5602.93'

Borehole 8.9'

Formation of Completion Valley Fill Alluvium

Casing Material Schedule 80 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 80 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

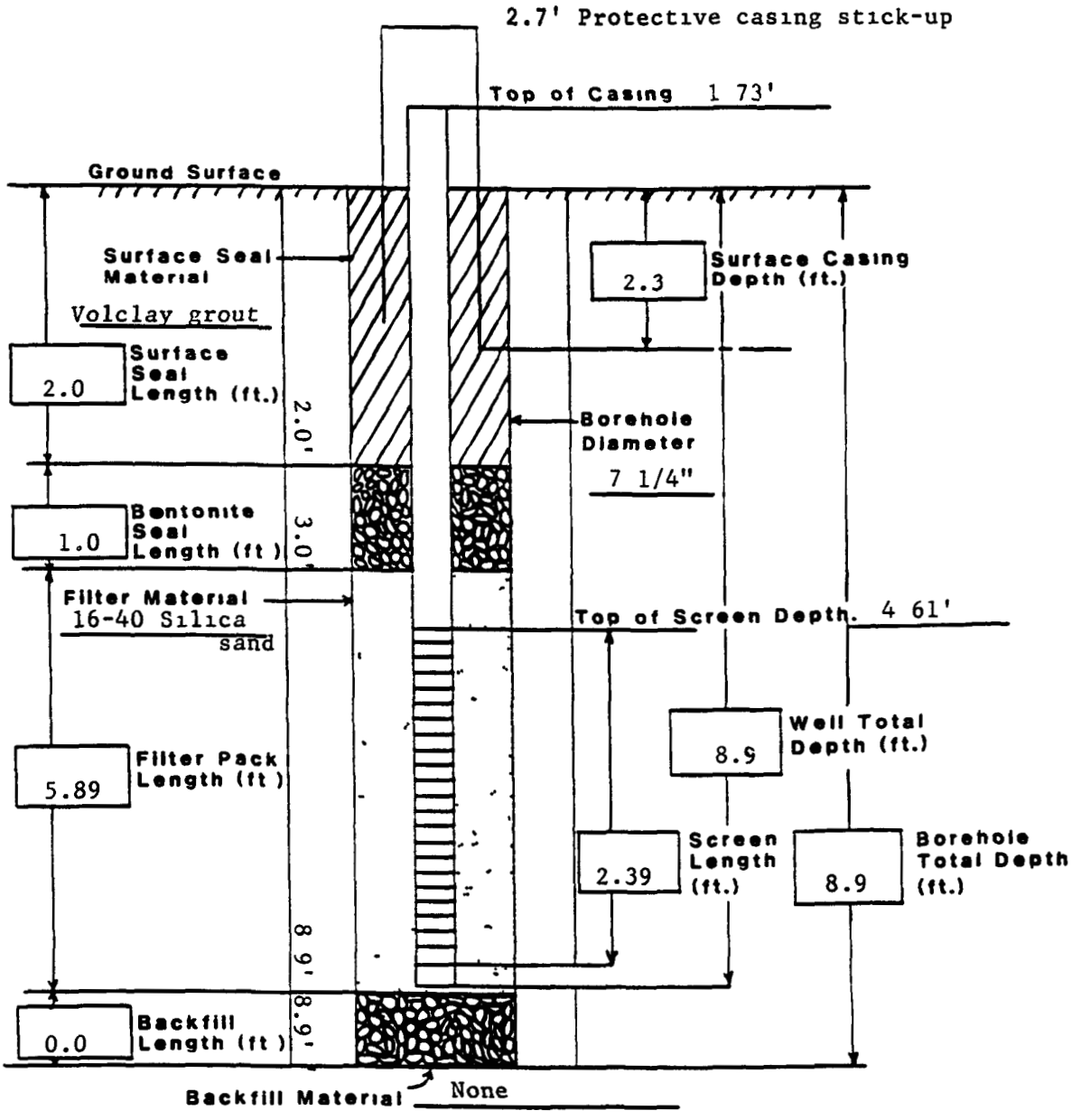
Date Installed 3/22/1989

Approved By Jarell Burman
Site Manager

Installed By K.W. Van Allen
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 7.1' to 8.3' below ground surface.



WELL COMPLETION INFORMATION

QA By/Date Jarell Burman / 2-23-89

Location Rocky Flats Plant, Background

Well No 27-89BR

Coordinates N 41868.42 E 20466.34 (RFP)

Elevation Ground Surface 5968 0'

Total Depth Well 46.47'

Top of Casing 5970 12'

Borehole 46 70'

Formation of Completion Weathered claystone

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

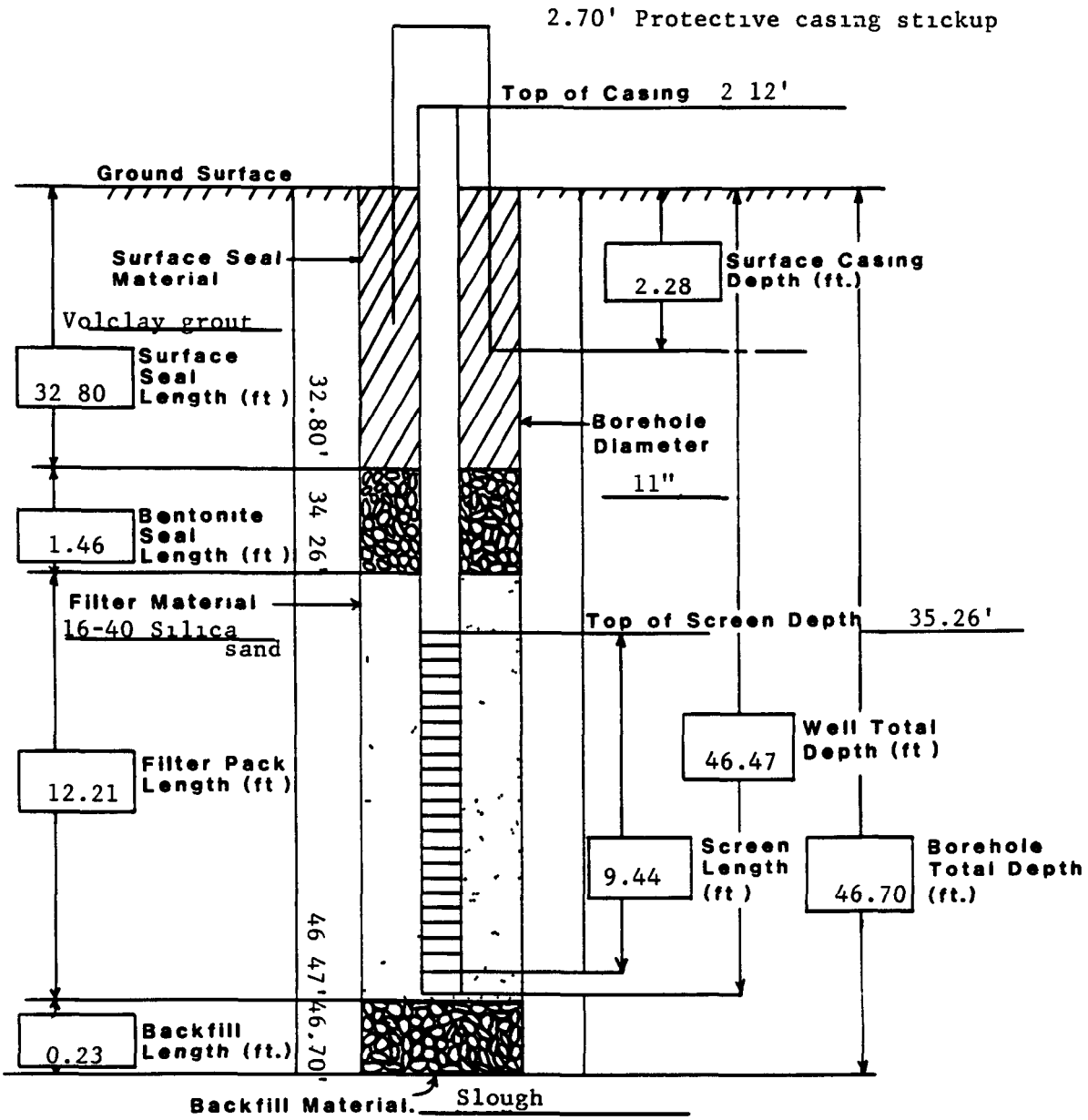
Date Installed 2/21 & 2/22/1989

Approved By Jarell Burman
Site Manager

Installed By K.E. Miller
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

QA By/Date Jarell Burman 12-24-87

Location Rocky Flats Plant, Background

Well No 28-89BR

Coordinates N 42258 71 E 21087 88 (RFP)

Elevation Ground Surface 5959.7

Total Depth Well 46.0'

Top of Casing 5961 59

Borehole 52 6'

Formation of Completion Weathered claystone

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O D.

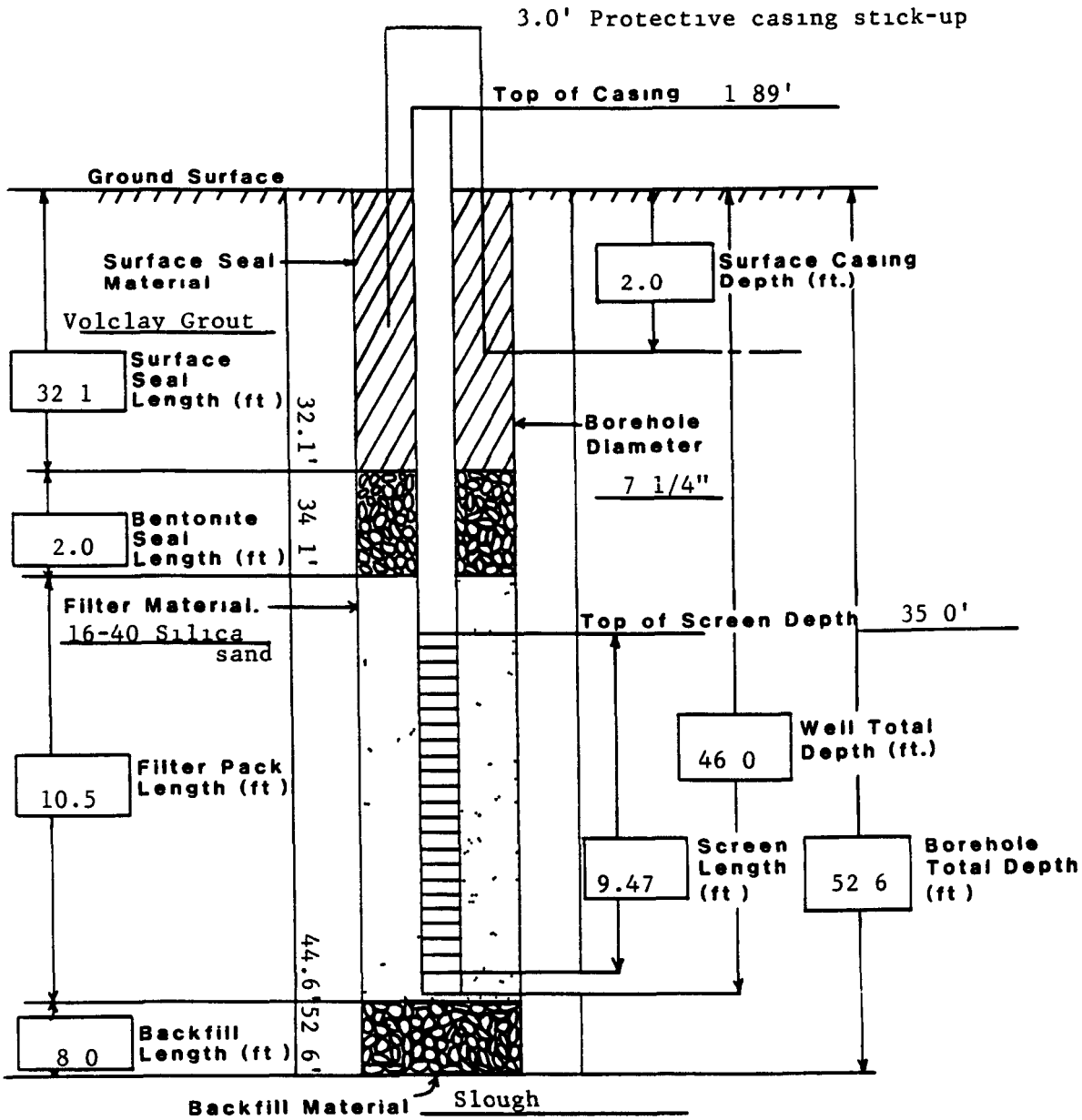
Date Installed 2/23/1989

Approved By Jarell Burman
Site Manager

Installed By K.W. Van Allen
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

QA By/Date Farrell Burman / 2-1-89

Location Rocky Flats Plant; Background

Well No. 29-89BR

Coordinates N 42806 76 E 21964 89 (RFP)

Elevation **Ground Surface** 5945.7'

Total Depth: **Well** 41.25'

Top of Casing 5947 71'

Borehole 45.5'

Formation of Completion Weathered claystone

Casing Material Schedule 40 PVC

Casing Diameter 4½" O.D.

Screen Material Schedule 40 10 slotted PVC

Surface Casing Diameter 8 5/8" O.D.

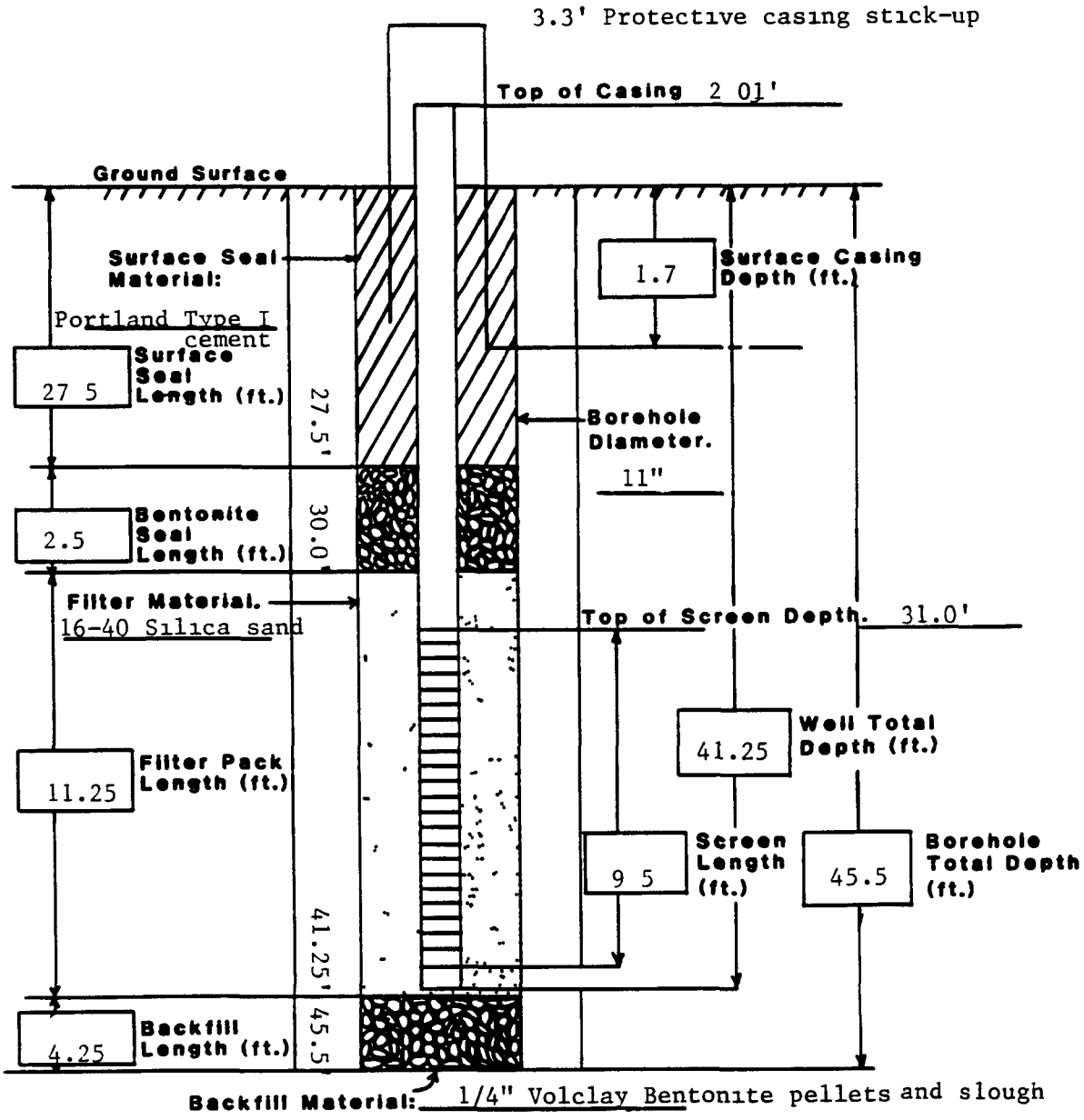
Date Installed 01/31/89

Approved By Farrell Burman
Site Manager

Installed By J.E. Marks
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

QA By/Date Farell Burman 15-2-89

Location Rocky Flats Plant, Background

Well No. 30-89BR

Coordinates N 43221.96 E 22658 39 (RFP)

Elevation Ground Surface 5935.2

Total Depth Well 40 94'

Top of Casing 5937.07

Borehole 43 7"

Formation of Completion Weathered claystone

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

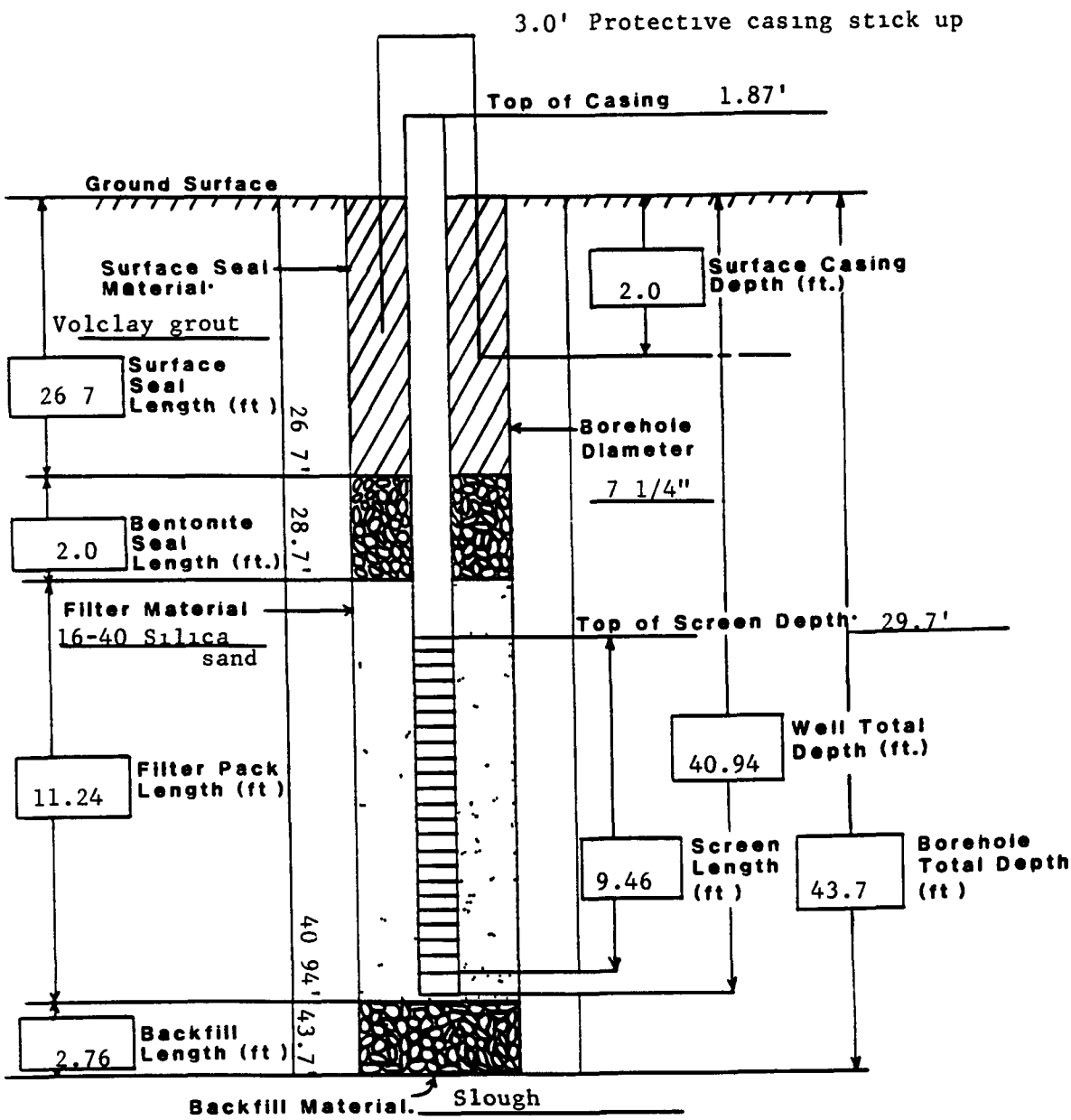
Date Installed 02/27/1989

Approved By Farell Burman
Site Manager

Installed By K.W. Van Allen
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

QA By/Date Jarell Burman / 2-10-89

Location Rocky Flats Plant; Background

Well No. 31-89BR

Coordinates N 43755 65 E 23487 29 (RFP)

Elevation **Ground Surface** 5920.5'

Total Depth **Well** 37.30'

Top of Casing 5922.45'

Borehole 37.75'

Formation of Completion Weathered claystone

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10 slotted PVC

Surface Casing Diameter 8 5/8" O.D.

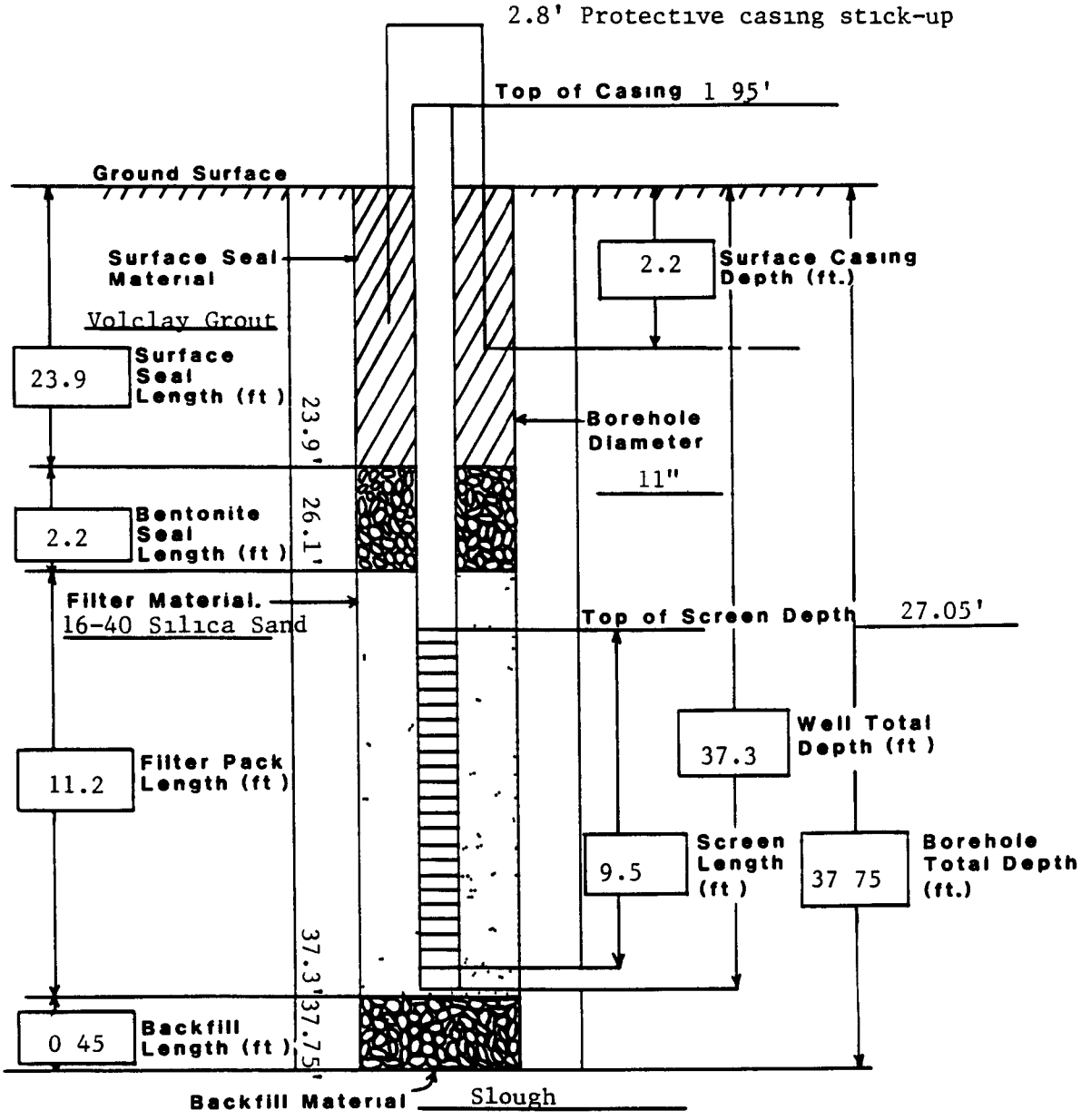
Date Installed 2/9/89

Approved By Jarell Burman
Site Manager

Installed By J.E. Marks
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

QA By/Date Farrell Symons 12-17-89

Location Rocky Flats Plant, Background **Well No.** 32-89BR

Coordinates N 42792.37 E 21944 19 (RFP) **Elevation: Ground Surface** 5946.2'

Total Depth: Well 140.84' **Top of Casing** 5948.28'

Borehole 203.0'

Formation of Completion Unweathered sandstone

Casing Material Schedule 30 PVC **Casing Diameter** 2 3/8" O D

Screen Material Schedule 80 10-slotted PVC **Surface Casing Diameter** 8 5/8" O.D

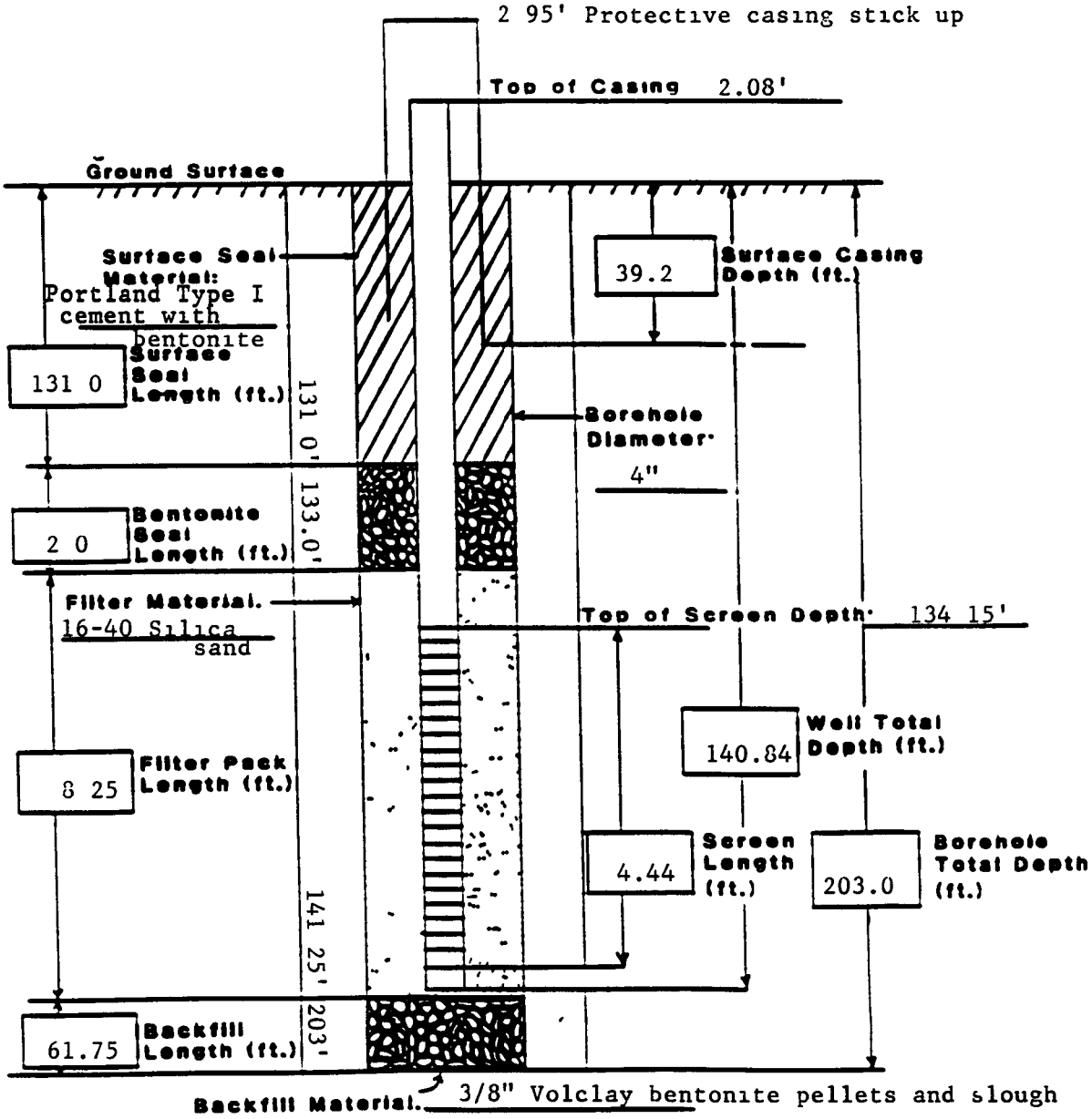
Date Installed 03/06/1989 **Approved By** Farrell Symons

Installed By R T. Treat **Site Manager**

Geologist

CEARP Manager

Comments Surface casing set to 39 20' on 01/26/1989 by K.E. Miller



WELL COMPLETION INFORMATION

QA By/Date Janell Burman 12-24-89

Location Rocky Flats Plant, Background

Well No 33-89BR

Coordinates N 43211 47 E 22635 78 (RFP)

Elevation Ground Surface 5935.8'

Total Depth Well 113 9'

Top of Casing 5937.69'

Borehole 159.8'

Formation of Completion Siltstone

Casing Material Schedule 80 PVC

Casing Diameter 2 3/8" O.D.

Screen Material Schedule 80 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

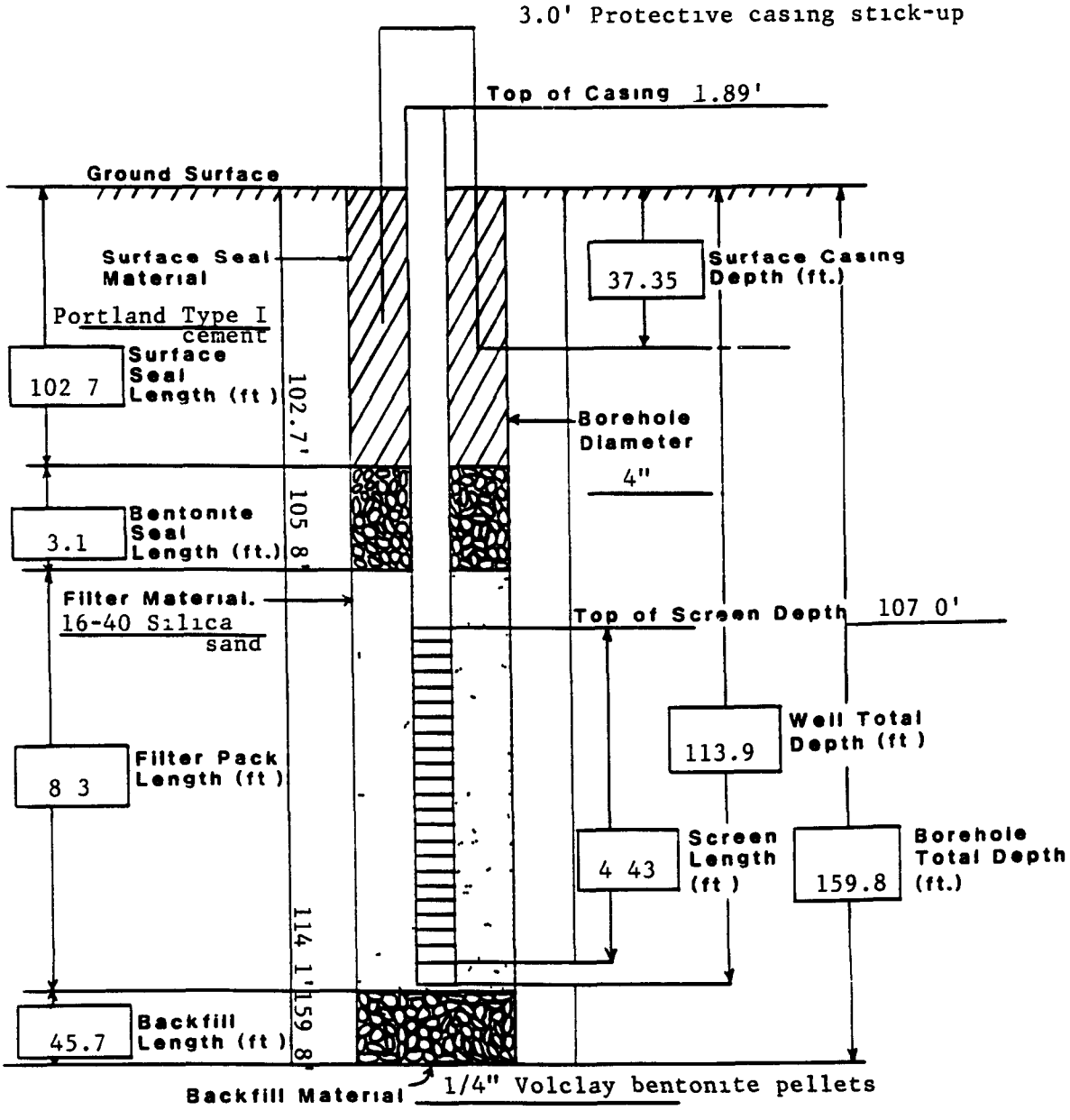
Date Installed 2/21/89 & 2/22/89

Approved By Janell Burman
Site Manager

Installed By K.W. Van Allen
Geologist

CEARP Manager

Comments Surface casing set to 37 35' by J.E. Marks on 1/27/89



WELL COMPLETION INFORMATION

QA By/Date Janell Burman 13-17-89

Location Rocky Flats Plant, Background

Well No 34-89BR

Coordinates N 43740 80 E 23469 07 (RFP)

Elevation Ground Surface 5920 9'

Total Depth Well 132.70'

Top of Casing 5922.78'

Borehole 168.00'

Formation of Completion Unweathered sandstone

Casing Material Schedule 80 PVC

Casing Diameter 2 3/8" O.D.

Screen Material Schedule 80 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

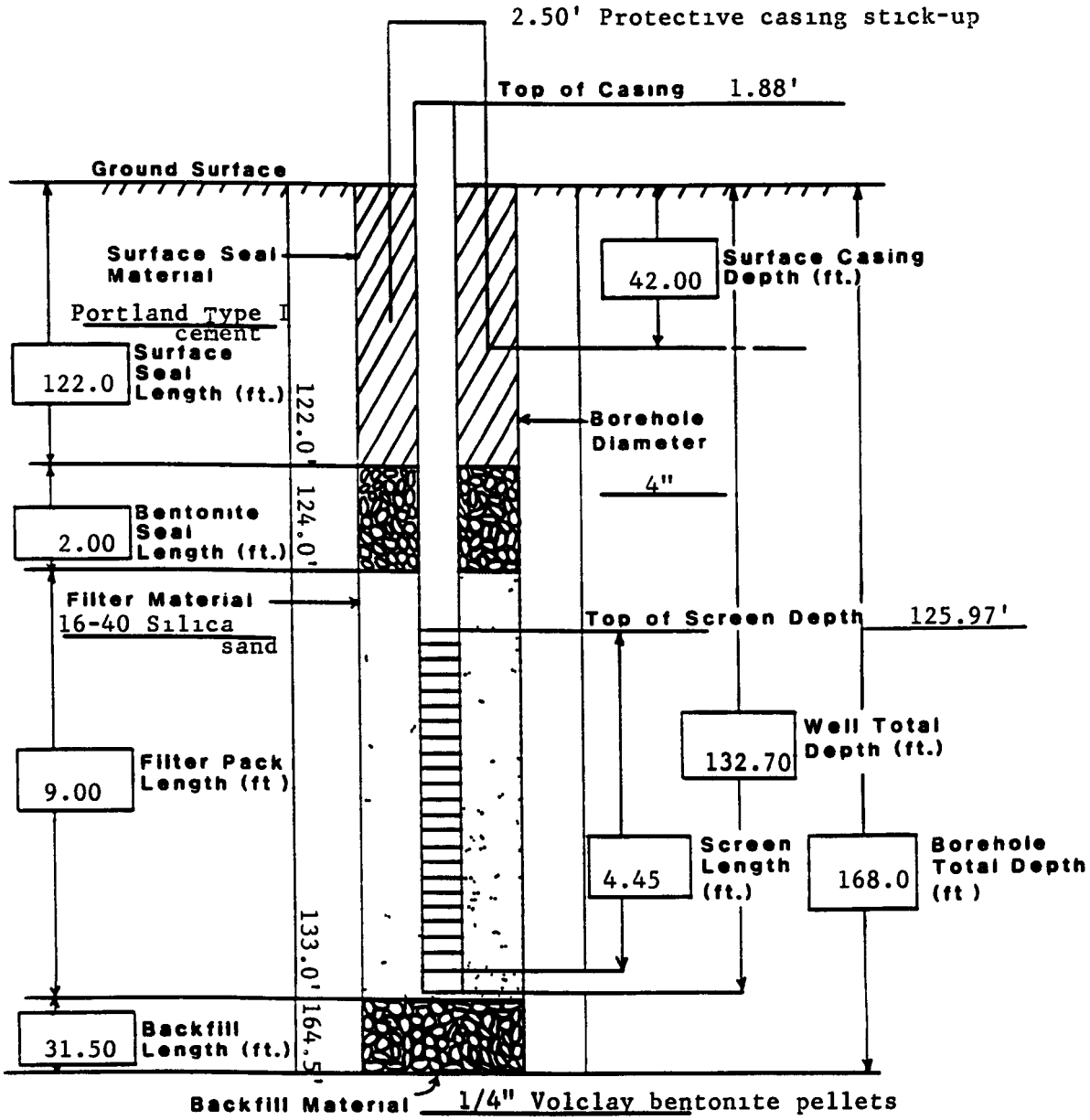
Date Installed 03/15/1989

Approved By Janell Burman
Site Manager

Installed By R. Treat
Geologist

CEARP Manager

Comments Surface casing set down to 42.00' on February 8, 1989 by K. Miller.



WELL COMPLETION INFORMATION

QA By/Date Jarrell Burman 14-10-89

Location Rocky Flats Plant, Background

Well No 35-89BR

Coordinates N 41904 59 E 24227 96 (RFP)

Elevation Ground Surface 5877 6'

Total Depth Well 115 23'

Top of Casing 5879.29'

Borehole 217 80'

Formation of Completion Unweathered sandstone

Casing Material Schedule 80 PVC

Casing Diameter 2 3/8" O.D.

Screen Material Schedule 80 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

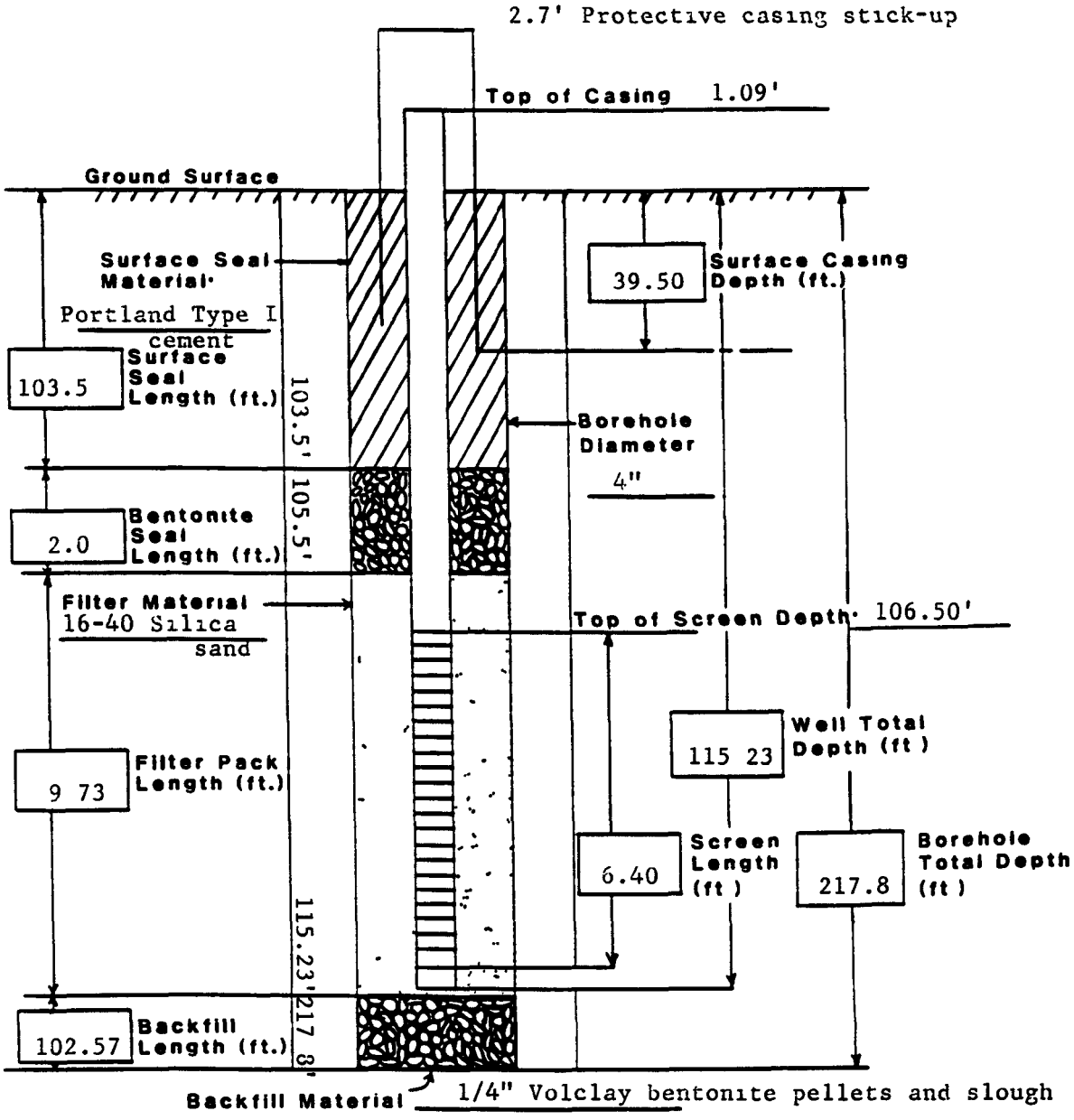
Date Installed 04/05 & 06/1989

Approved By Jarrell Burman
Site Manager

Installed By K.E. Miller
Geologist

CEARP Manager

Comments Surface casing set to 39.50' by J E. Marks on February 17, 1989



WELL COMPLETION INFORMATION

QA By/Date Farrell Burman / 3 29-89

Location Rocky Flats Plant, Background **Well No** 36-89BR

Coordinates N 42344.56 E 25382 07 (RFP) **Elevation Ground Surface** 5826.9'

Total Depth Well 97 62' **Top of Casing** 5828.86'

Borehole 107 0'

Formation of Completion Unweathered sandstone

Casing Material Schedule 80 PVC **Casing Diameter** 2 3/8" O.D.

Screen Material Schedule 80 10-slotted PVC **Surface Casing Diameter** 8 5/8" O D.

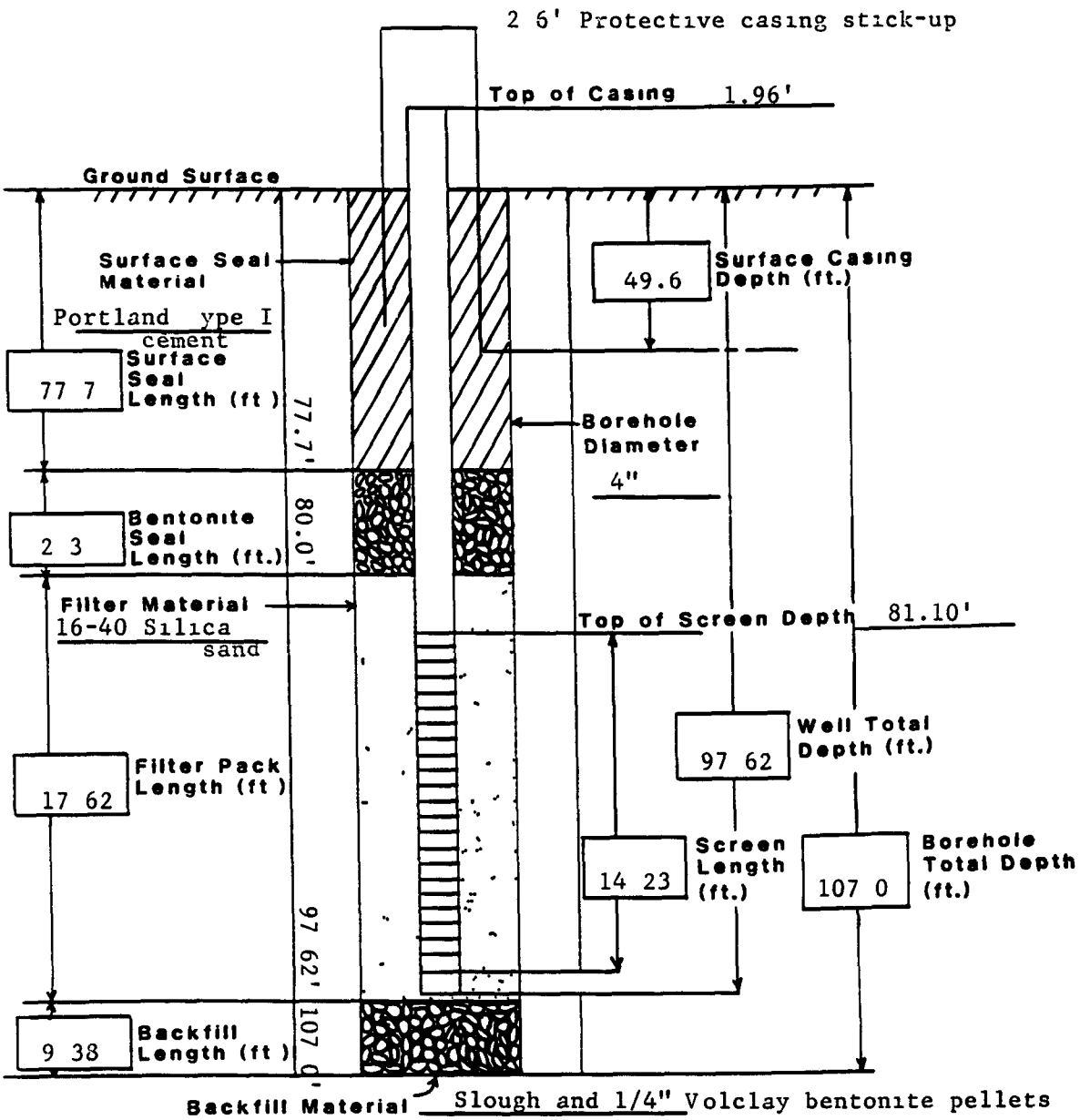
Date Installed 3/27 and 3/28/1989 **Approved By** Farrell Burman

Installed By K.E. Miller **Site Manager**

Geologist

CEARP Manager

Comments Set surface casing to 49.6' on 2/17/1989 by K.E. Miller



WELL COMPLETION INFORMATION

QA By/Date Janell Buyman 5-25-89

Location Rocky Flats Plant, Background

Well No 37-89BR

Coordinates N 31688 14 E 23092.28 (RFP)

Elevation **Ground Surface** 5833.0'

Total Depth **Well** 90 95'

Top of Casing 5835.18'

Borehole 641'

Formation of Completion Unweathered sandstone

Casing Material Schedule 80 PVC

Casing Diameter 2 3/8" O.D.

Screen Material Schedule 80 10-slotted PVC

Surface Casing Diameter 5 5/8" O D.

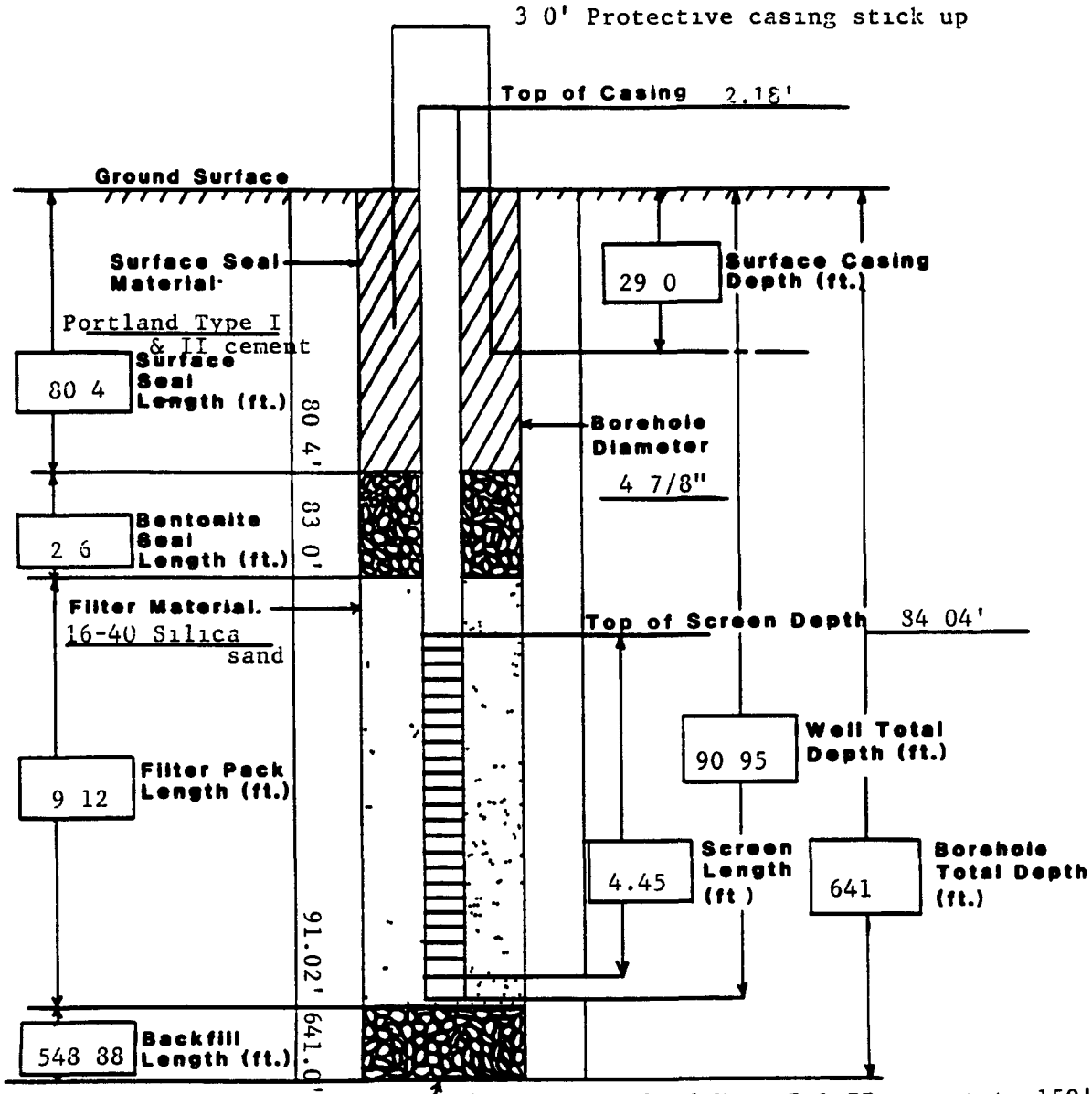
Date Installed 05/24 & 05/25/1989

Approved By Janell Buyman
Site Manager

Installed By J E. Marks
Geologist

CEARP Manager

Comments Surface casing set to 29 0' below ground surface by K. Van Allen on 04/21/1989



Backfill Material. Slough & Portland Type I & II cement to 150', 1/4" Volclay bentonite pellets 150' to 91.02', 1/4" Volclay bentonite pellets & 16-40 Silica sand 91.02' to 90.95'

WELL COMPLETION INFORMATION

QA By/Date Janell Bryman 17-17-89

Location Rocky Flats Plant, Background

Well No. 37-89P

Coordinates N 31699 33 E 23098 54 (RFP)

Elevation: Ground Surface 5832 3'

Total Depth: Well 9 52'

Top of Casing 5834.17'

Borehole 12 0'

Formation of Completion Valley Fill Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 1 5/16" O D

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 5 5/8" O.D

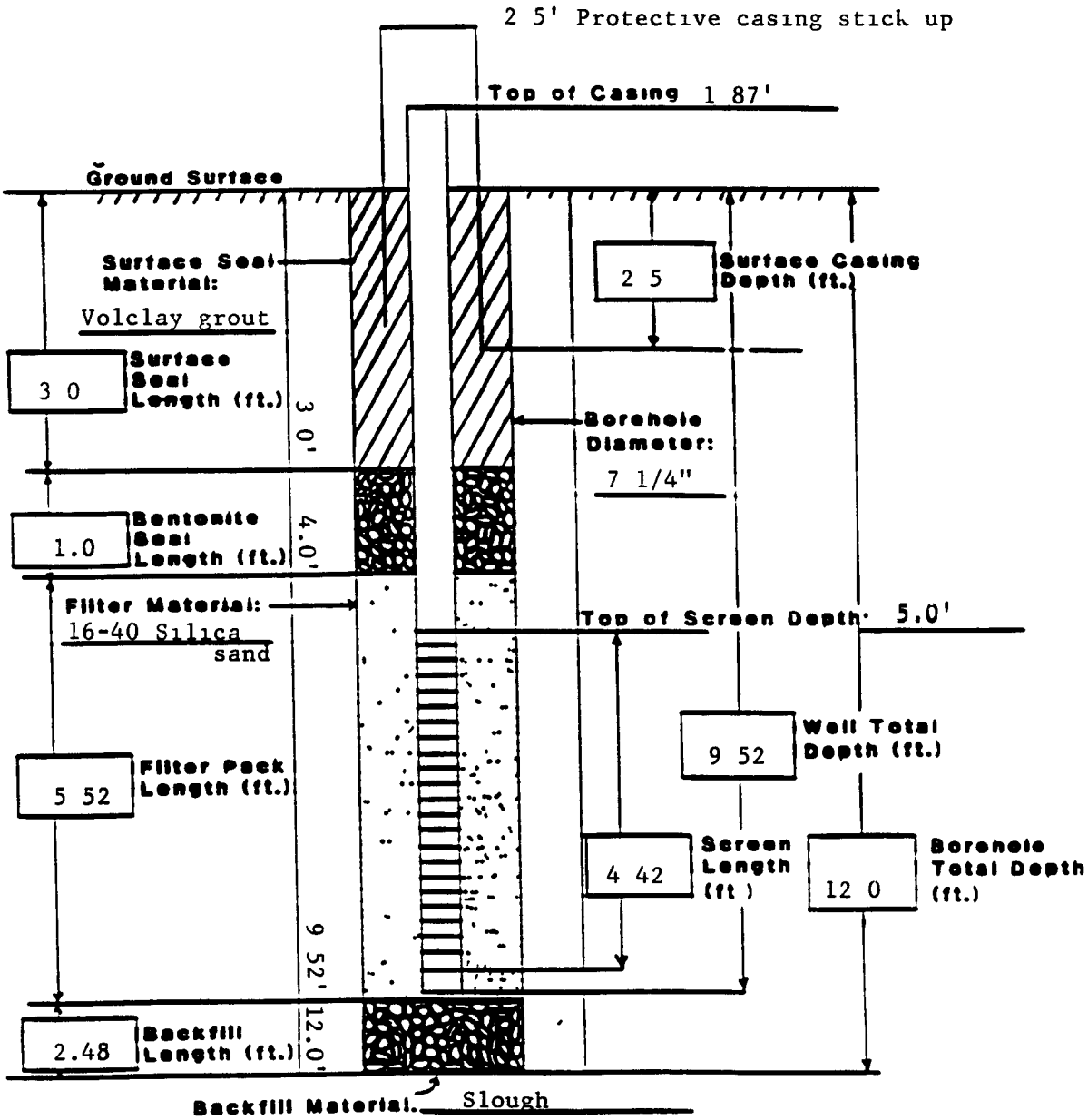
Date Installed 03/17/1989

Approved By Janell Bryman
Site Manager

Installed By K W Van Allen
Geologist

CEARP Manager

Comments Borehole abandoned on 3/16/89, converted to piezometer on 3/17/89
Placed piezometer into open borehole through slough No centralizer used



WELL COMPLETION INFORMATION

QA By/Date Janell Burman 4-17-89

Location Rocky Flats Plant, Background

Well No. 38-89BR

Coordinates N 41797 90 E 23567 29 (RFP)

Elevation Ground Surface 5901 4'

Total Depth Well 112 22'

Top of Casing 5902 82'

Borehole 132 7'

Formation of Completion Unweathered sandstone

Casing Material Schedule 80 PVC

Casing Diameter 2 3/8" O.D.

Screen Material Schedule 80 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

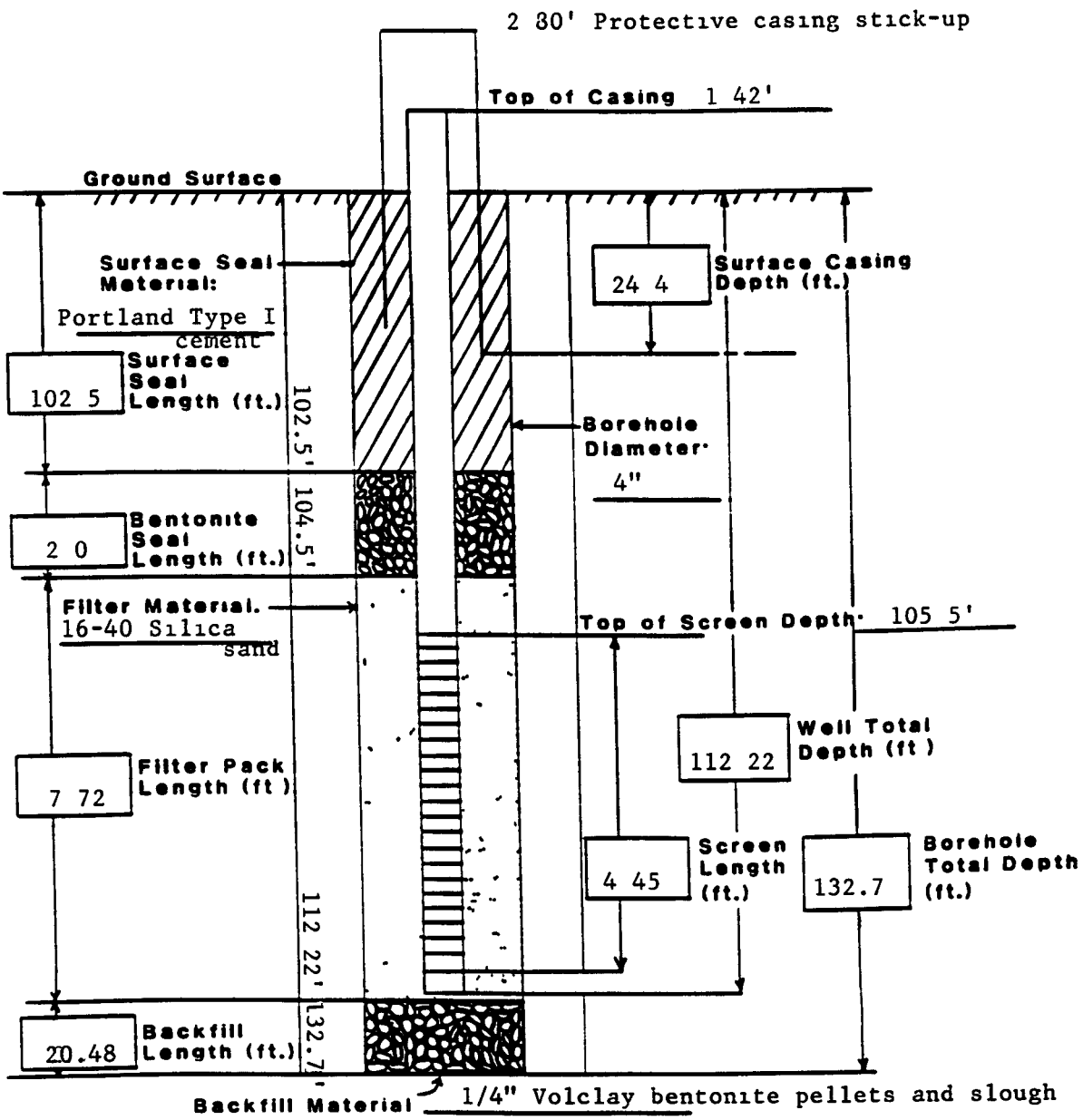
Date Installed 04/14/1989

Approved By Janell Burman
Site Manager

Installed By J.E Marks
Geologist

CEARP Manager

Comments Surface casing set to 24 4' by J E Marks on 2/14/1989



WELL COMPLETION INFORMATION

QA By/Date Janie Burman 13-9-89

Location Rocky Flats Plant, Background

Well No. 39-89BR

Coordinates N 34321 35 E 22184 13 (RFP)

Elevation Ground Surface 5867.5'

Total Depth Well 39 14'

Top of Casing 5869 56'

Borehole 42 4'

Formation of Completion Weathered claystone

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

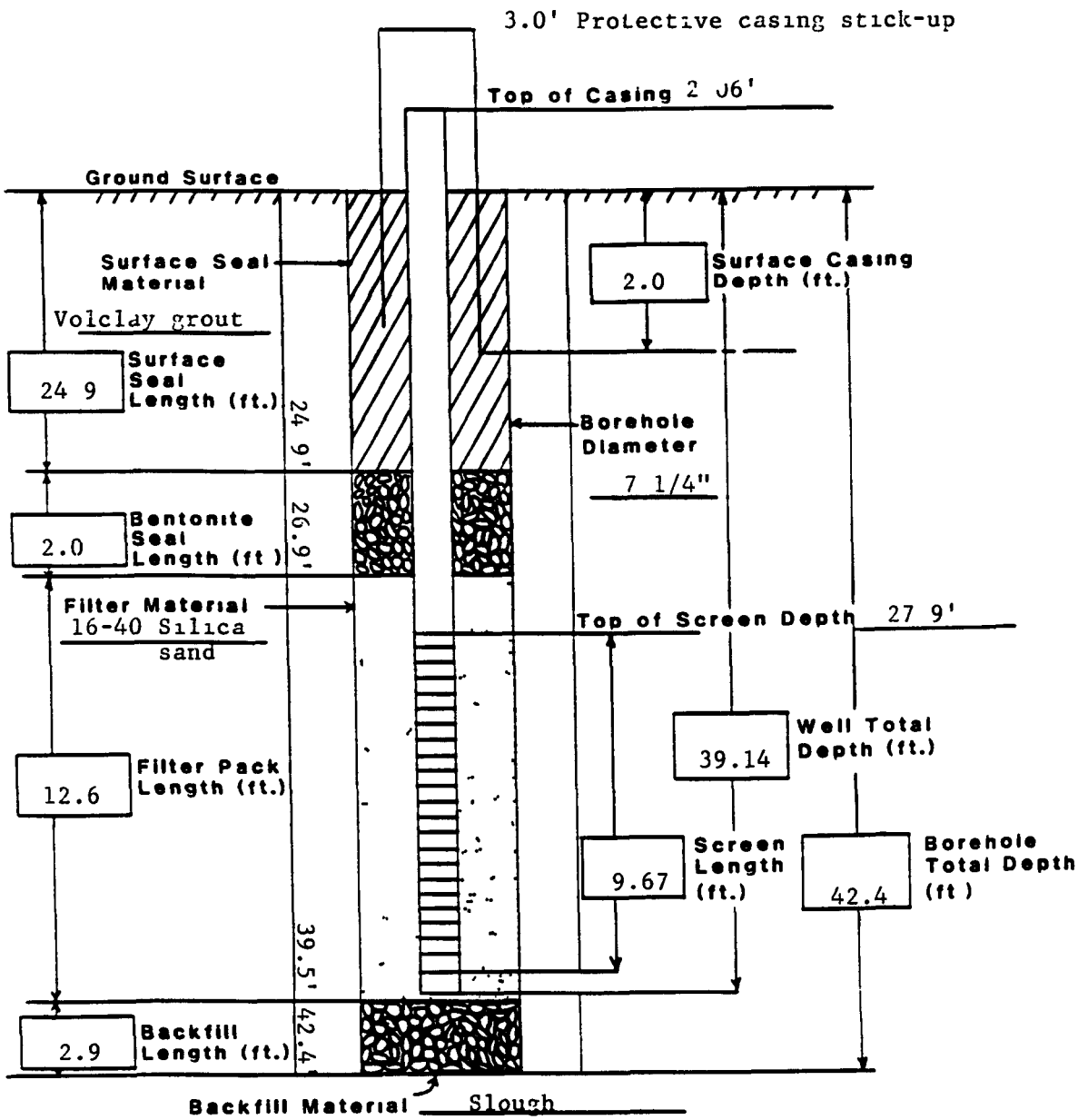
Date Installed 3/8/1989

Approved By Janie Burman
Site Manager

Installed By K W Van Allen
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 37.5' to 38 6' below ground surface.



WELL COMPLETION INFORMATION

QA By/Date Jarell Burman / 3-17-89

Location Rocky Flats Plant, Background

Well No 40-89BR

Coordinates N 32815 29 E 26457 93 (RFP)

Elevation Ground Surface 5730.6'

Total Depth Well 25 9'

Top of Casing 5732 56'

Borehole 29 1'

Formation of Completion Weathered claystone

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D

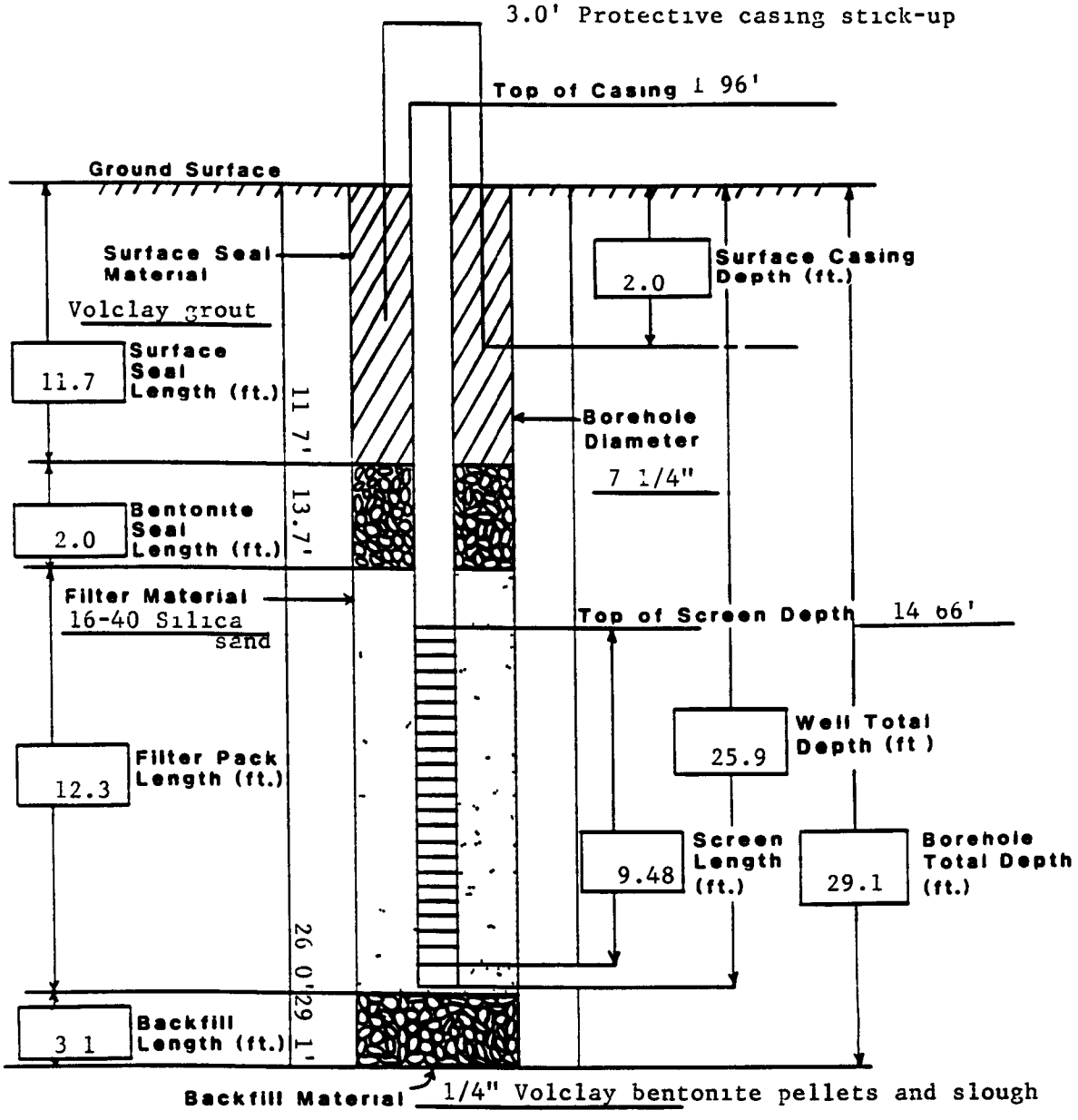
Date Installed 03/15/1989

Approved By Jarell Burman
Site Manager

Installed By K.W. Van Allen
Geologist

CEARP Manager

Comments Stainless steel centralizer placed at 24.2' to 25.3' below ground surface.



WELL COMPLETION INFORMATION

QA By/Date Farell Burman 14-24-89

Location Rocky Flats Plant, Background

Well No 41-89BR

Coordinates N 32799 24 E 26481 33 (RFP)

Elevation Ground Surface 5729 7'

Total Depth Well 86.25'

Top of Casing 5731.85'

Borehole 109 1'

Formation of Completion Unweathered sandstone

Casing Material Schedule 80 PVC

Casing Diameter 2 3/8" O D.

Screen Material Schedule 80 10-slotted PVC

Surface Casing Diameter 5 5/8" O.D.

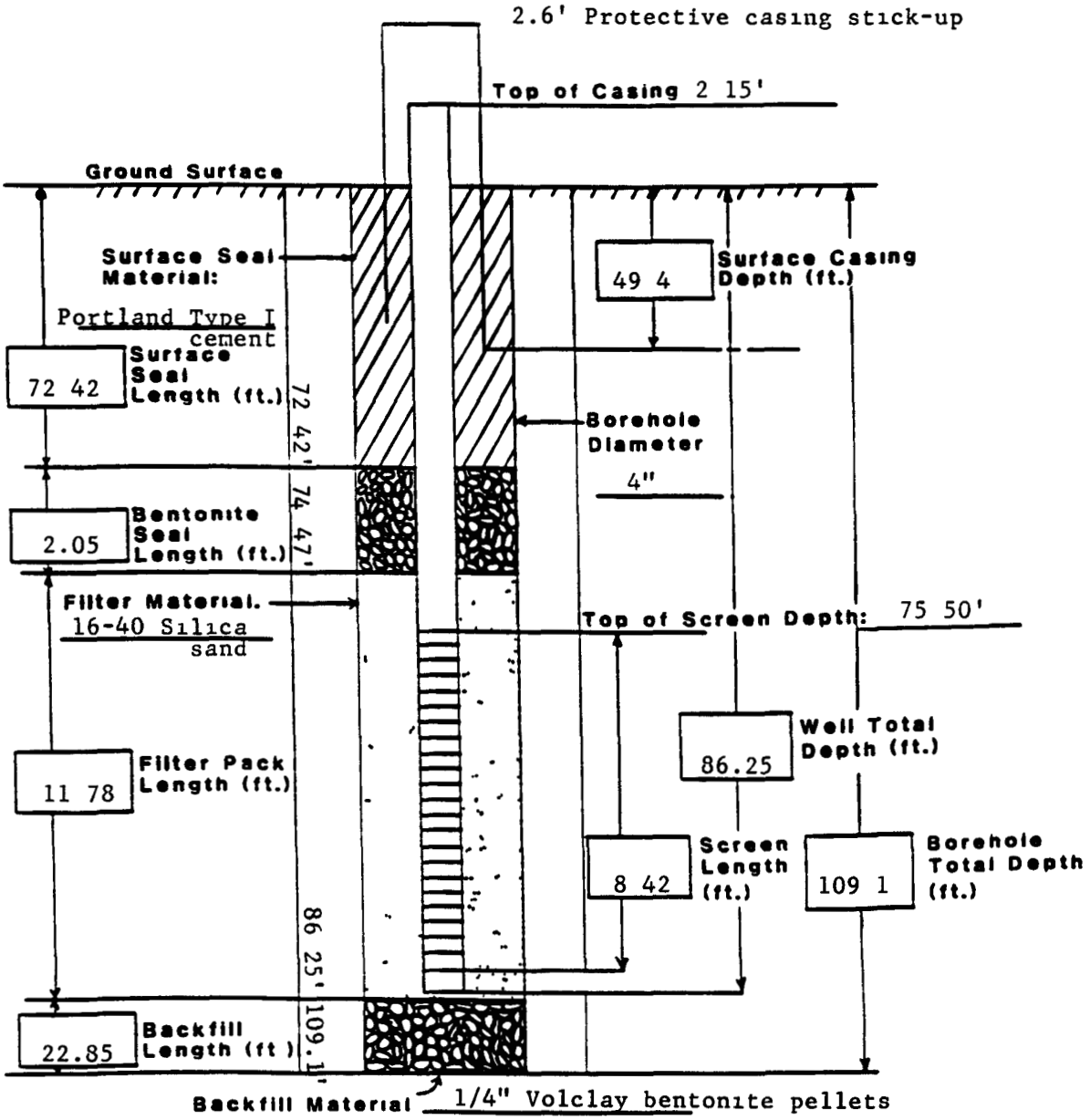
Date Installed 04/20/1989

Approved By Farell Burman
Site Manager

Installed By J.E. Marks
Geologist

CEARP Manager

Comments Surface casing set to 49.4' by K.W. Van Allen on 04/13/1989



WELL COMPLETION INFORMATION

QA By/Date [illegible] / 3-28-81

Location Rocky Flats Plant; Background

Well No 42-89BR

Coordinates N 33804.20 E 19330 97 (RFP)

Elevation Ground Surface 5967.9 '

Total Depth Well 24 45'

Top of Casing 5969.91'

Borehole 23 2'

Formation of Completion Weathered claystone

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O D

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

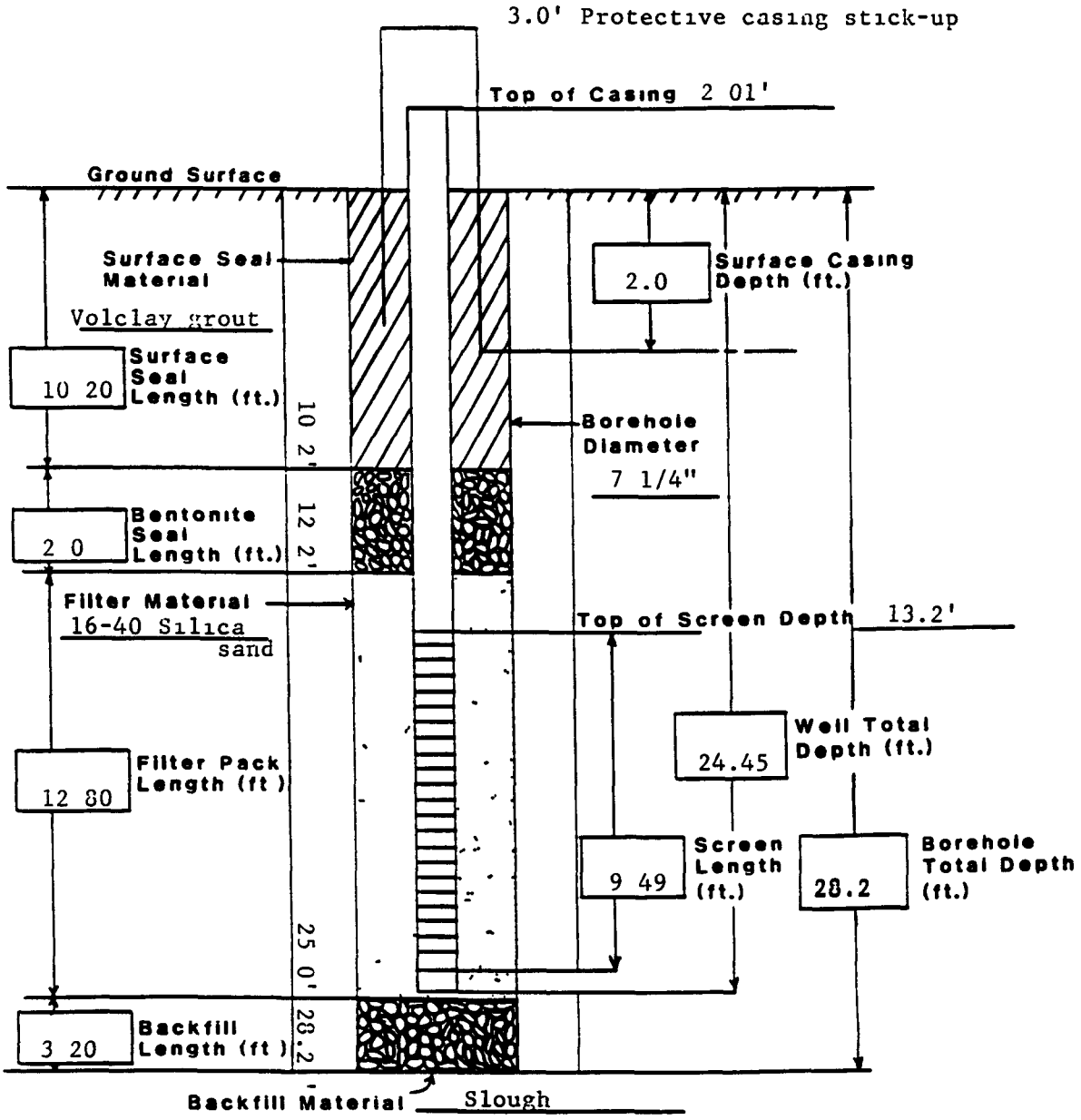
Date Installed 3/27/1989

Approved By [illegible]
Site Manager

Installed By K.W. Van Allen
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 22.7' to 23 8' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Jarell Burman 14-27-89

Location Rocky Flats Plant, Background

Well No. 43-89BR

Coordinates N 33819.62 E 19347.76 (RFP)

Elevation Ground Surface 5965 6'

Total Depth Well 48 0'

Top of Casing 5967.31'

Borehole 99 82'

Formation of Completion Unweathered sandstone

Casing Material Schedule 80 PVC

Casing Diameter 2 3/8" O.D.

Screen Material Schedule 80 10-slotted PVC

Surface Casing Diameter 8 5/8" O D.

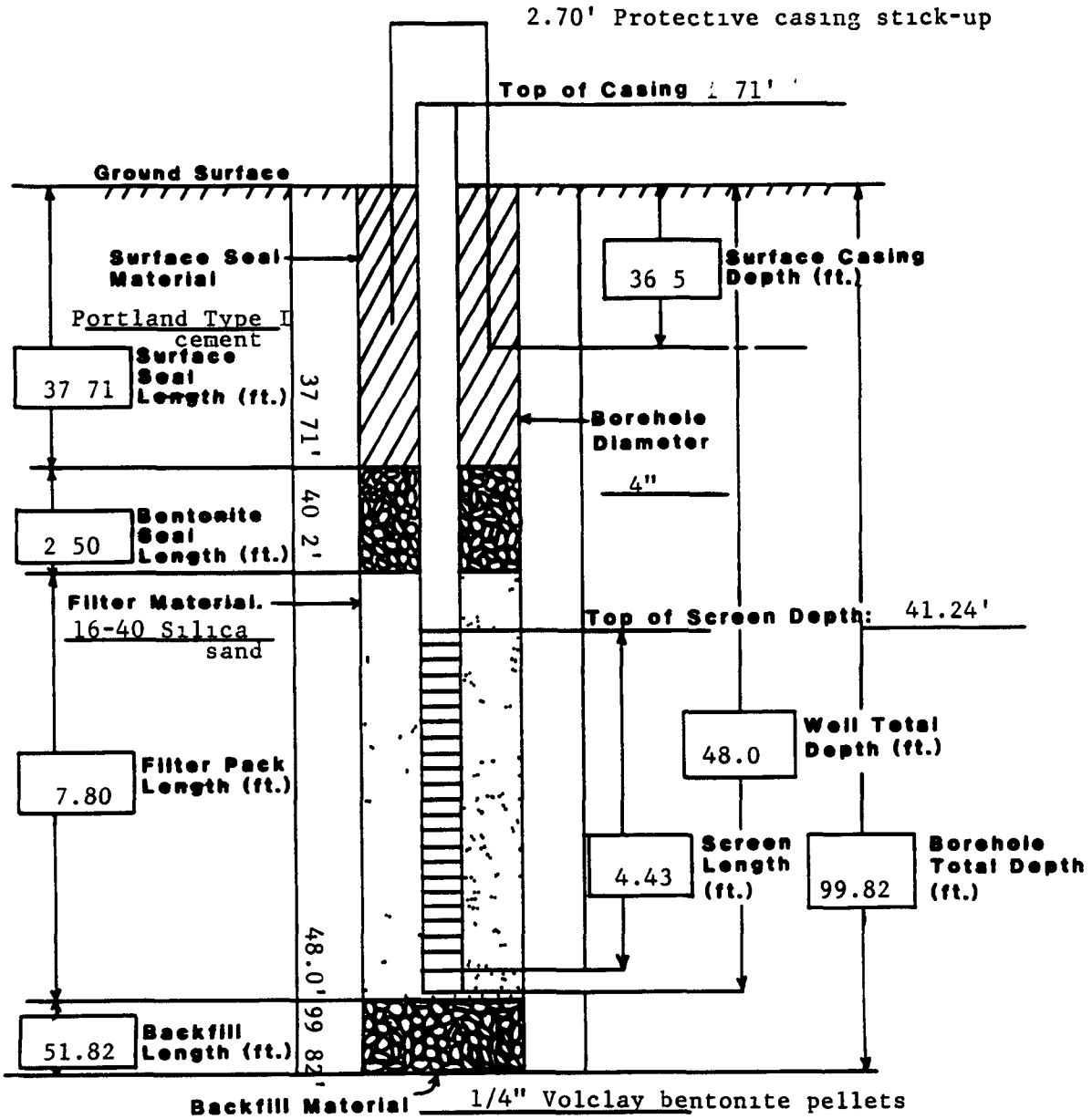
Date Installed 04/26/1989

Approved By Jarell Burman
Site Manager

Installed By R I. Thun
Geologist

CEARP Manager

Comments Surface casing set to 36 50' on 03/23/89 by K W Van Allen



WELL COMPLETION INFORMATION

QA By/Date Janell Burman 12-27-89

Location Rocky Flats Plant, Background

Well No. 44-89BR

Coordinates N 31726 76 E 23109.08 (RFP)

Elevation **Ground Surface** 5832.0'

Total Depth **Well** 26 3'

Top of Casing 5833 90'

Borehole 29 0'

Formation of Completion Weathered claystone

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 lo-slotted PVC

Surface Casing Diameter 8 5/8" O D.

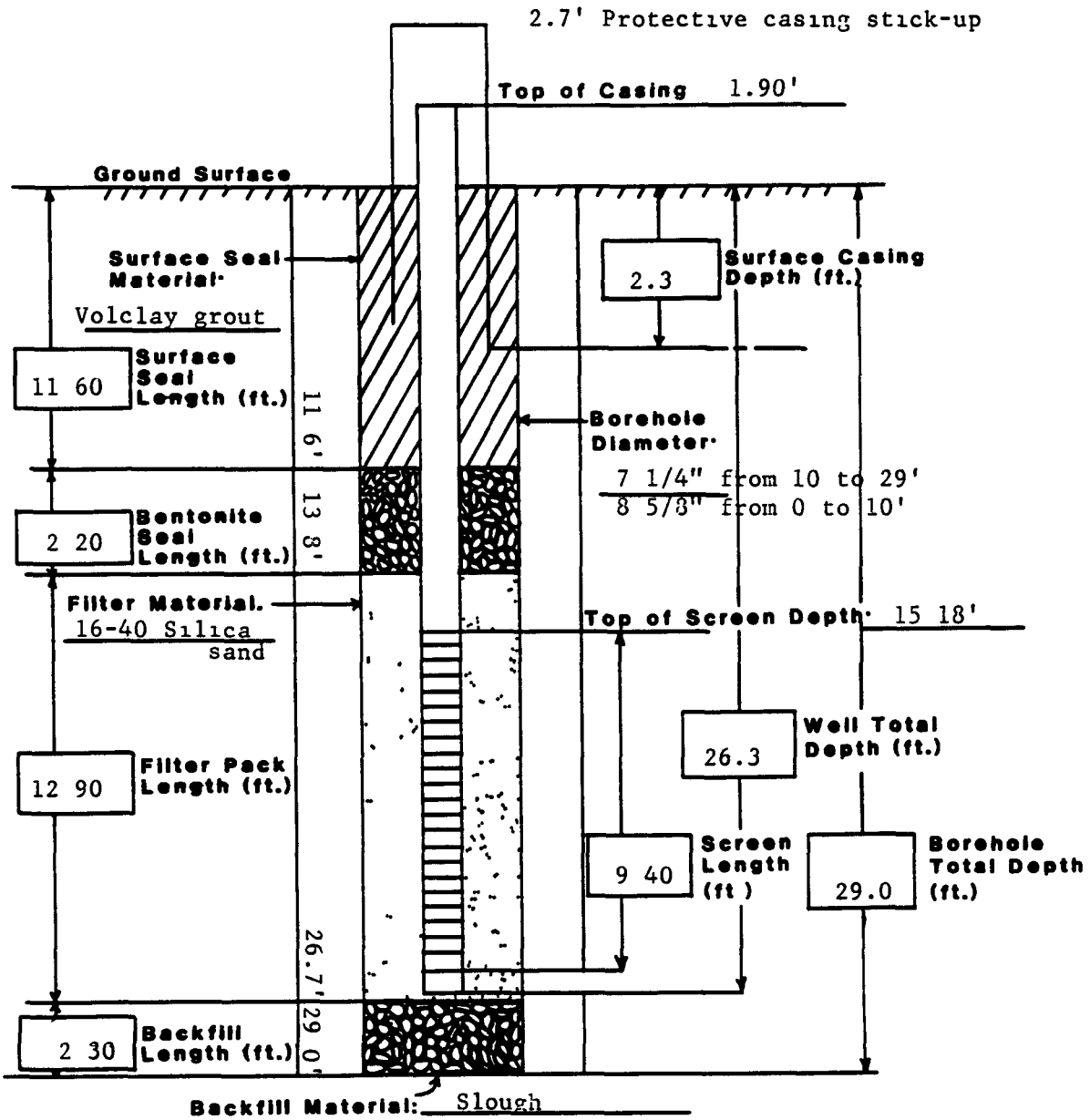
Date Installed 04/24/1989

Approved By Janell Burman
Site Manager

Installed By K.W Van Allen
Geologist

CEARP Manager

Comments Placed stainless steel centralizer from 24 7' to 25.8' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Farell Bergman 15-11-89

Location Rocky Flats Plant, Background

Well No 45-89BR

Coordinates N 32239 76 E 15235.37 (RFP)

Elevation Ground Surface 6115 8'

Total Depth· Well 50 05'

Top of Casing 117.67'

Borehole 51 0'

Formation of Completion Weathered claystone

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

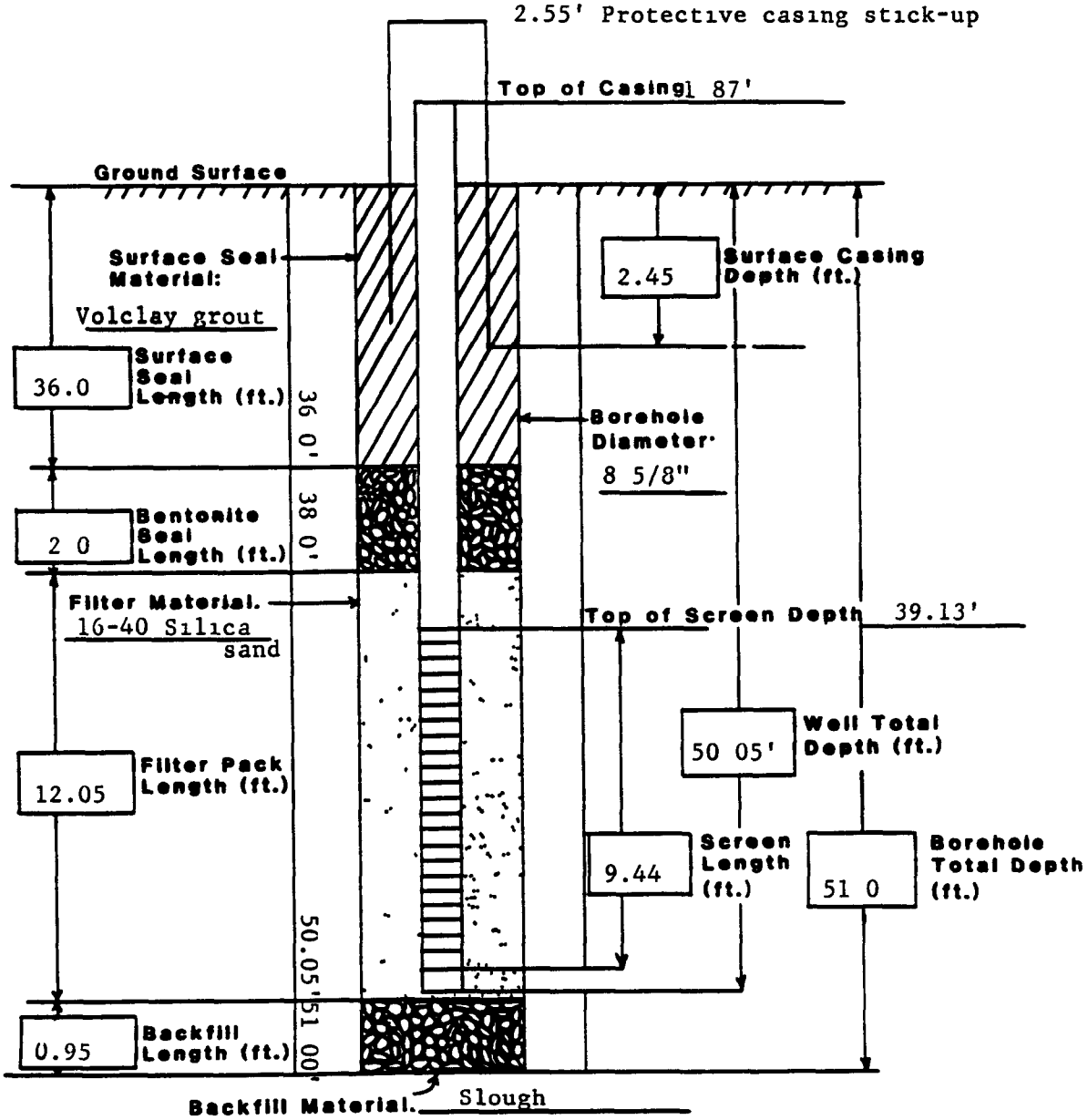
Date Installed 05/08/1989

Approved By Farell Bergman
Site Manager

Installed By R.I Thun
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

QA By/Date Farell Burman 13-29-99

Location Rocky Flats Plant, Background

Well No 46-89

Coordinates N 44664.12 E 23775 15 (RFP)

Elevation Ground Surface 5806.4'

Total Depth Well 18.00'

Top of Casing 5808 46'

Borehole 38 60'

Formation of Completion Colluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O D

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

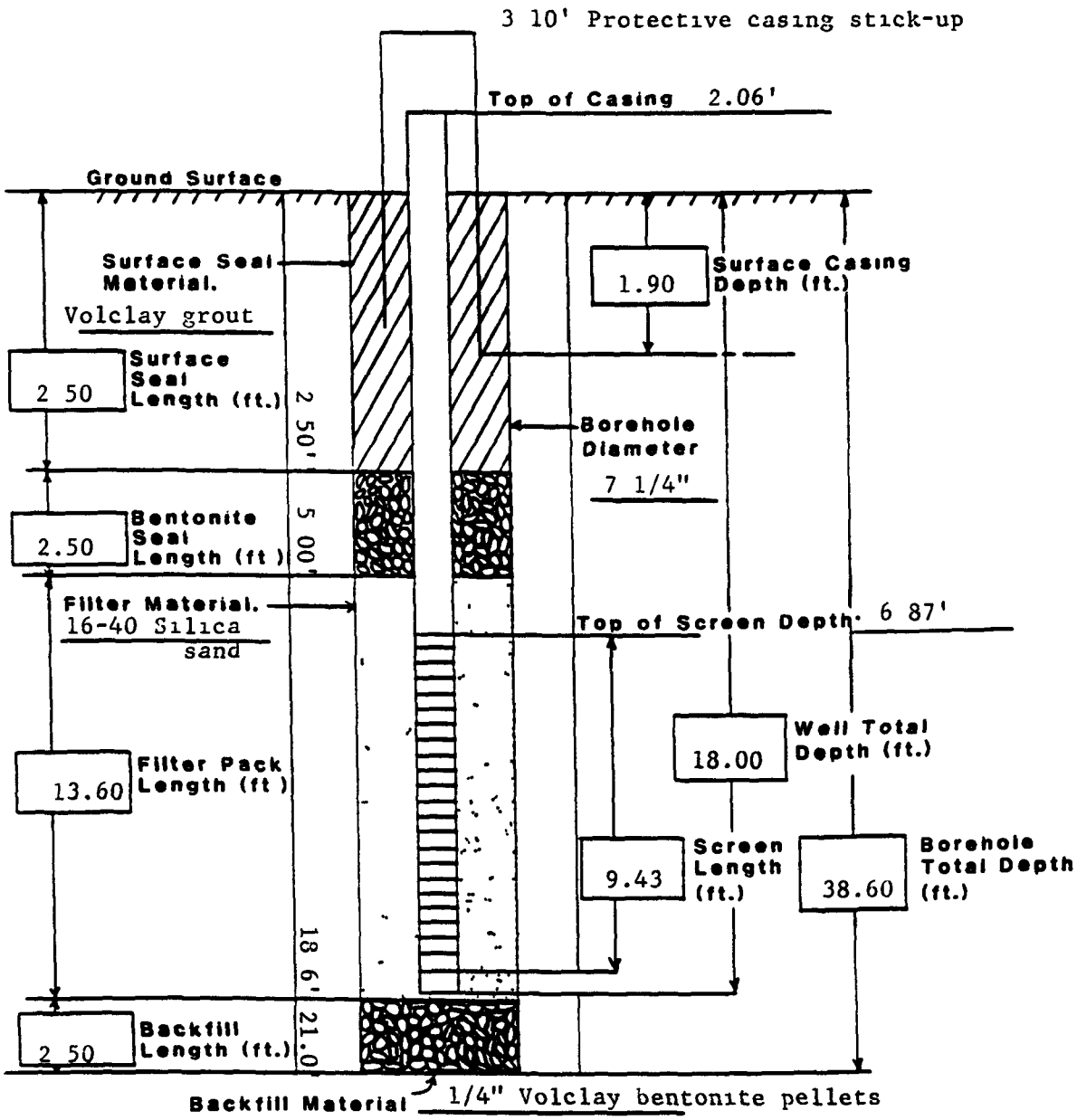
Date Installed 3/27/1989

Approved By Farell Burman
Site Manager

Installed By R.T. Treat
Geologist

CEARP Manager

Comments Set stainless steel centralizer at 16 3' to 17.5' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Janell Buyman 15-22-89

Location Rocky Flats Plant, Background

Well No 47-89

Coordinates N 30851 28 E 16062.22 (RFP)

Elevation **Ground Surface** 6105.2'

Total Depth: **Well** 23 75'

Top of Casing 6107 25'

Borehole 24 8'

Formation of Completion Rocky Flats Alluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

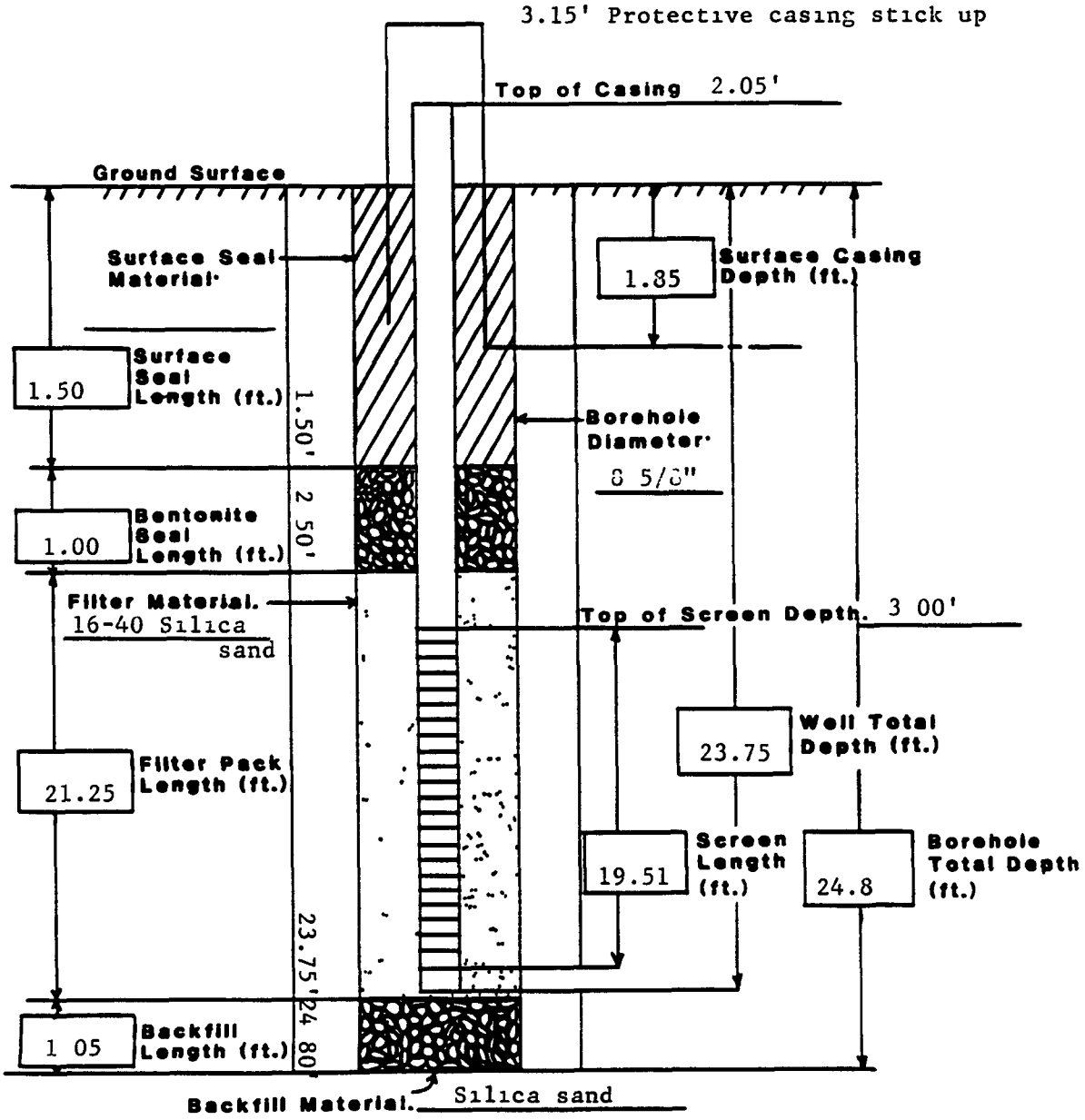
Date Installed 05/18/1989

Approved By Janell Buyman
Site Manager

Installed By S P Carpenter
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

QA By/Date [illegible] 12-29-89

Location Rocky Flats Plant, Background

Well No. 48-89

Coordinates N 30853 20 E 16092 (RFP)

Elevation Ground Surface 6104 3'

Total Depth: Well 53 72'

Top of Casing 6106 70'

Borehole 54 10'

Formation of Completion Rocky Flats Alluvium

Casing Material Scnedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

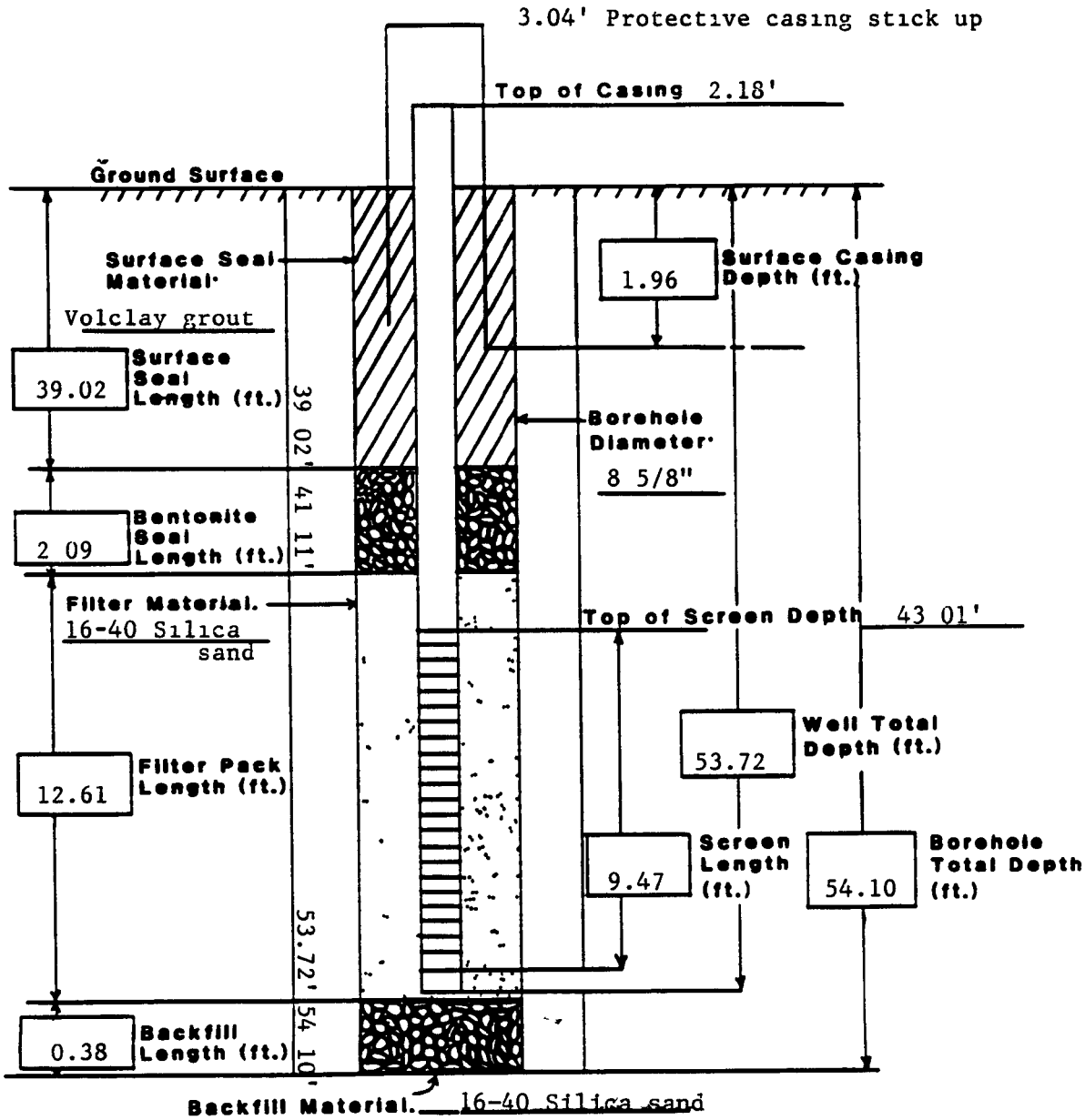
Date Installed 05/25/1989

Approved By [illegible]
Site Manager

Installed By F S. Peterson
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

QA By/Date Farell Burman 15-22-89

Location Rocky Flats Plant, Background

Well No. 49-89BR

Coordinates N 33357 04 E 18357 49 (RFP)

Elevation. Ground Surface 6024 9'

Total Depth· Well 46.75'

Top of Casing 6026.87'

Borehole 48 2'

Formation of Completion Weathered sandstone

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D

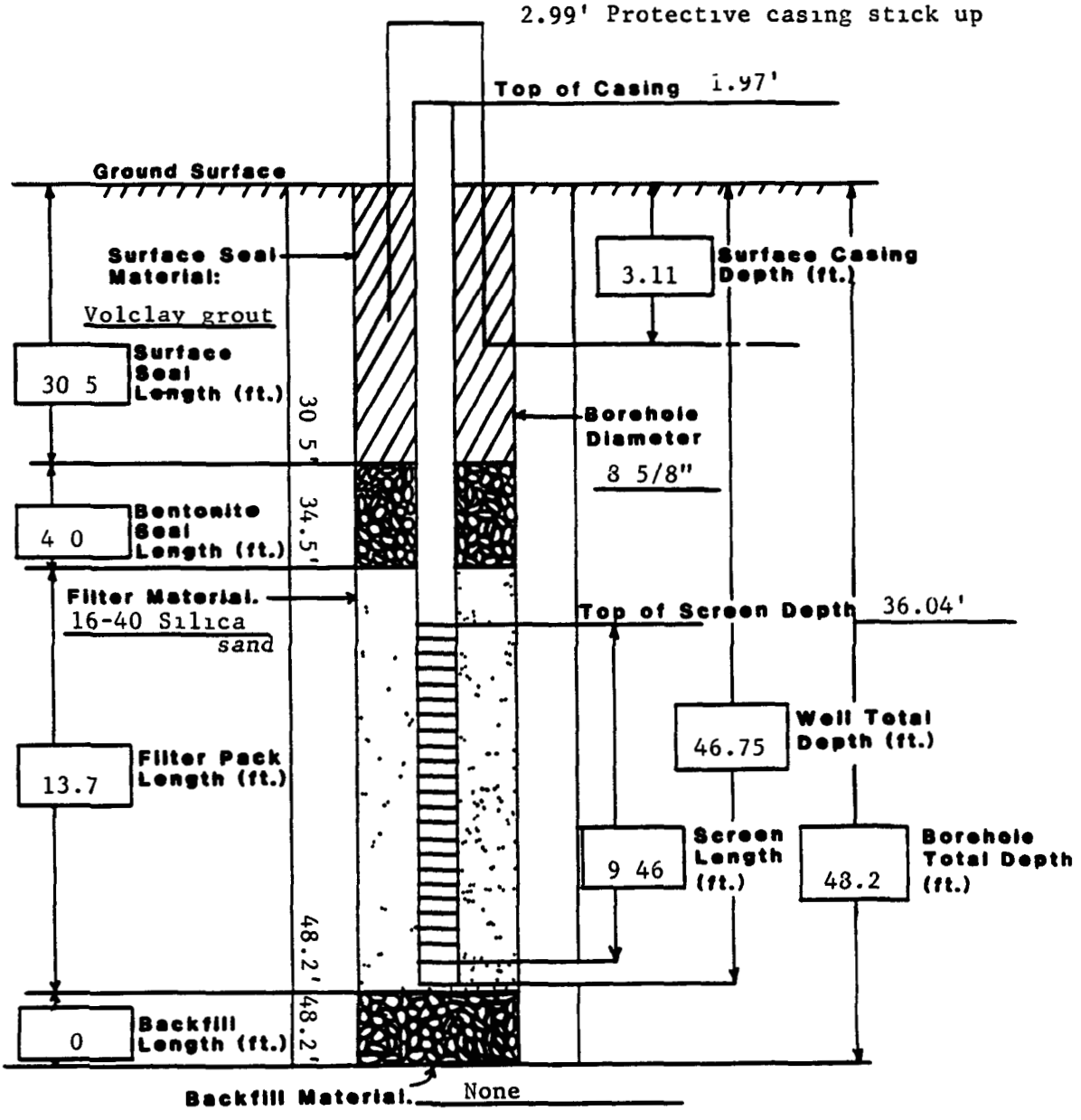
Date Installed 05/17/1989

Approved By Farell Burman
Site Manager

Installed By E M. Hill
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

QA By/Date Jarrel Burman 14-7-89

Location Rocky Flats Plant, Background

Well No. 50-89

Coordinates N 33374.00 E 18357.88 (RFP)

Elevation Ground Surface 6023.5'

Total Depth Well 8.50'

Top of Casing 6026.06'

Borehole 9.80'

Formation of Completion Colluvium

Casing Material Schedule 40 PVC

Casing Diameter 4 1/2" O.D.

Screen Material Schedule 40 10-slotted PVC

Surface Casing Diameter 8 5/8" O.D.

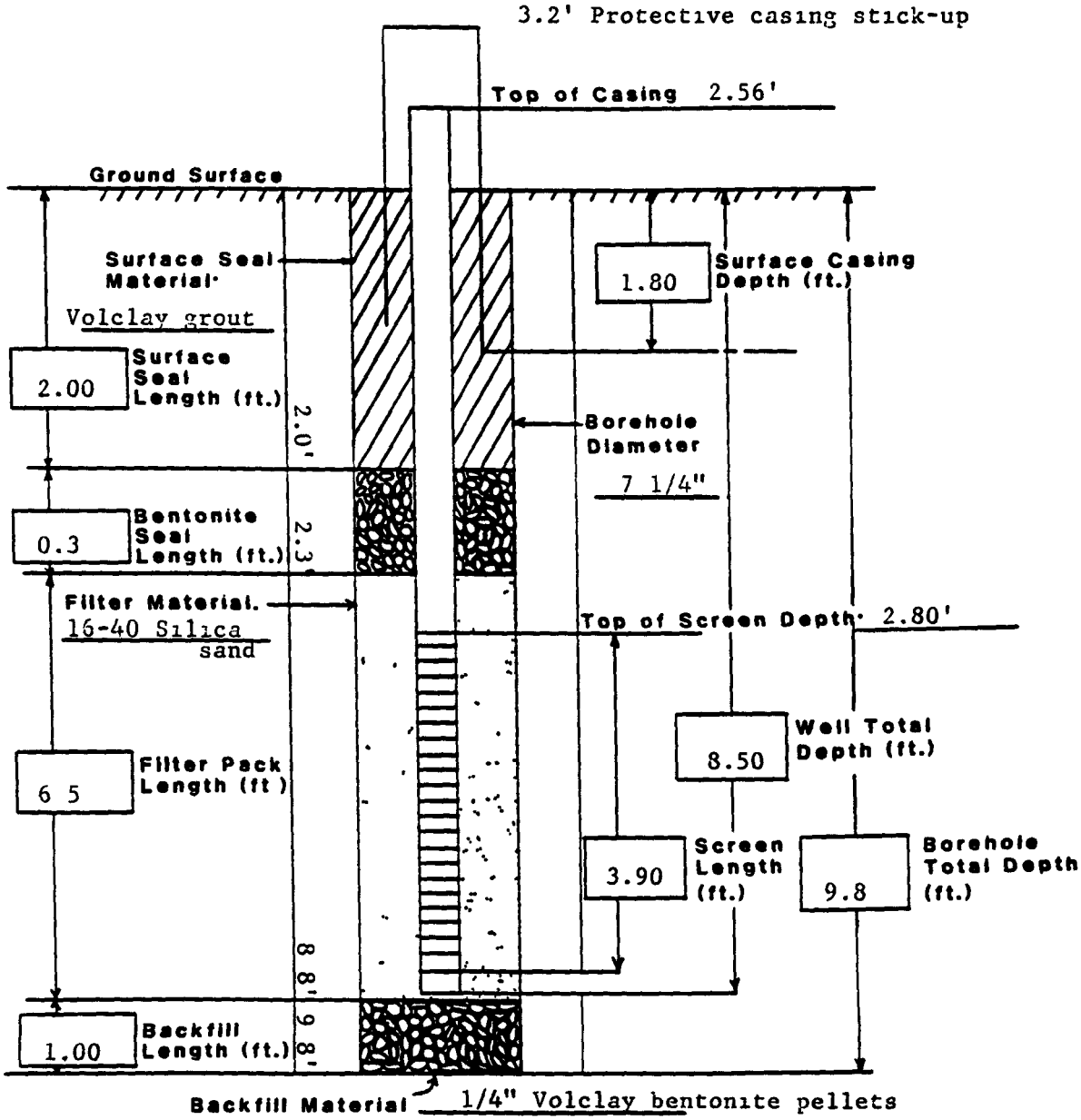
Date Installed 04/06/1989

Approved By Jarrel Burman
Site Manager

Installed By R.T. Treat
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 6.8' to 8.0' below ground surface

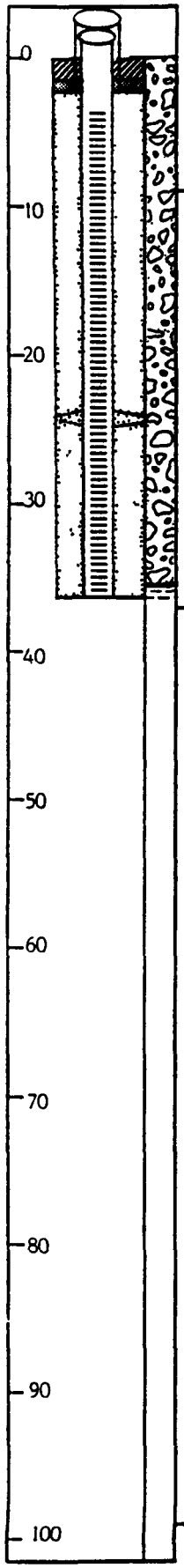


WELL 55-86

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS Rocky Flats Plant N 32259.45 E 15217.16 (RFP)

ELEVATION GROUND LEVEL 6103.62'
TOP OF CASING 6105.81'



LOCATION Golden, CO
PERSONNEL T Gulliver
PROJECT Rocky Flats Plant

DRILLING SUMMARY

TOTAL DEPTH Well. 36.39' Hole: 36.50'
BOREHOLE DIAMETER 5 5/8"

DRILLER Boyles Brothers Drilling Co
15865 W. 5th Avenue
Golden, CO (Arrow Drilling - Tom High)
RIG Casing advancer
BIT(S) Down hole hammer

DRILLING FLUID None

SURFACE CASING 5" x 4.75' steel w/ locking cap

WELL DESIGN:

BASIS GEOLOGIC LOG X GEOPHYSICAL LOG ___

CASING STRING(S): C=CASING S=SCREEN

0.00'	3.55'	C1			
3.55'	36.39'	S1			

CASING C1 2" I D Sch 5 type 316 stainless steel, threaded and flush jointed.

SCREEN S1 2" I D. Sch. 5 type 316 stainless steel, threaded and flush jointed. 0.010" wire wrap screen, 0.25' slip on bottom cap.

CENTRALIZERS Type 304 stainless steel
23.81' - 25.04'

FILTER MATERIAL 32-42 silica sand
2 48' - 36.50'

CEMENT Portland Type I
0.00' - 1 80'

OTHER 3/8" bentonite pellets
1.80' - 2.48'

CONSTRUCTION TIME LOG

TASK	START DATE 1986	START TIME	FINISH DATE 1986	FINISH TIME
DRILLING				
5 5/8" casing advancer	9/29	1120	9/29	1440
GEOPHYS. LOGGING.	—	—	—	—
CASING.				
2" stainless	9/29	1705	9/29	1710
FILTER PLACEMENT	9/29	1710	9/30	1100
CEMENTING	9/30	1105	9/30	1110
DEVELOPMENT.	10/2	1600	10/16	1600
OTHER				
Bentonite	9/30	1100	9/30	1105

WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

No water encountered during drilling.

Top of stainless steel casing: 2.20'