Final

Phase I RFI/RI Work Plan

Rocky Flats Plant
Present Landfill IHSS 114 and
Inactive Hazardous Waste Storage Area IHSS 203
(Operable Unit No. 7)

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

Environmental Restoration Program

December 1991

VOLUME II - APPENDICES

ADMIN RECORD

Reviewed for Classification/UCNI/OUO
By: Janet Nesheim, Derivative Classifier
DOE, EMCBC JN
Date: 11-04-08
Confirmed Unclassified, Not UCNI/Not OUO

REVIEWED FOR CLASSIFICATION/UCNI
By: George H. Setlock
Date: 8/27/92 UNU

OU07-A-000565

REPORT
101328

Final

Phase I RFI/RI Work Plan

Rocky Flats Plant
Present Landfill IHSS 114 and
Inactive Hazardous Waste Storage Area IHSS 203
(Operable Unit No. 7)

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

Environmental Restoration Program

December 1991

VOLUME II - APPENDICES

APPENDIX A

As-Built Drawings for 1974 and

1982 Remedial Construction

This is a
CONTROLLED DOCUMENT
EG&G — ROCKY FLATS PLANT
ENVIRONMENTAL MANAGEMENT DEPARTMENT

ROCKY FLATS PLANT Phase I RFI/RI Work Plan for Operable Unit 7 - Present Landfill IHSS 114 and Inactive Hazardous Waste Storage Area IHSS 203	Manual No.: Section No.: Organization:	21100-WP-OU 07.01 APPA, R0 Environmental Management

This is a REF Stamp

Title: Appendix A: As-Built Drawings for 1974 and 1982 Remedial Construction

Approved by:

12/6/91 Effective Date	T. P. O'Rourke Manager	6/23/92 Date

UNITED STATES ATOMIC ENERGY COMMISSION

ALBUQUERQUE OPERATIONS OFFICE
ROCKY FLATS AREA OFFICE
GOLDEN, COLORADO

DESIGN CRITERIA

SANITARY LANDFILL RENOVATIONS

DOW CHEMICAL U.S.A.
ROCKY FLATS DIVISION
BOX 888, GOLDEN, COLORADO

DOW AUTH. - 440555

INDEX OF DRAWINGS

SHEET NO.	DRAWING TITLE	DWG. NO.	REV.
1	COVER SHEET	D-27296-1	A
2	AREA PLOT	" -2	A
3	SAMPLING STRUCTURE & WATER DIVERSION DETAILS	" -3	A
4	LANDFILL RING & WATER DIVERSION DETAILS	" -4	B

CRITERIA
NOT FOR CONSTRUCTION

A	ORIGINAL ISSUE DESIGN CRITERIA	~		CM	440555

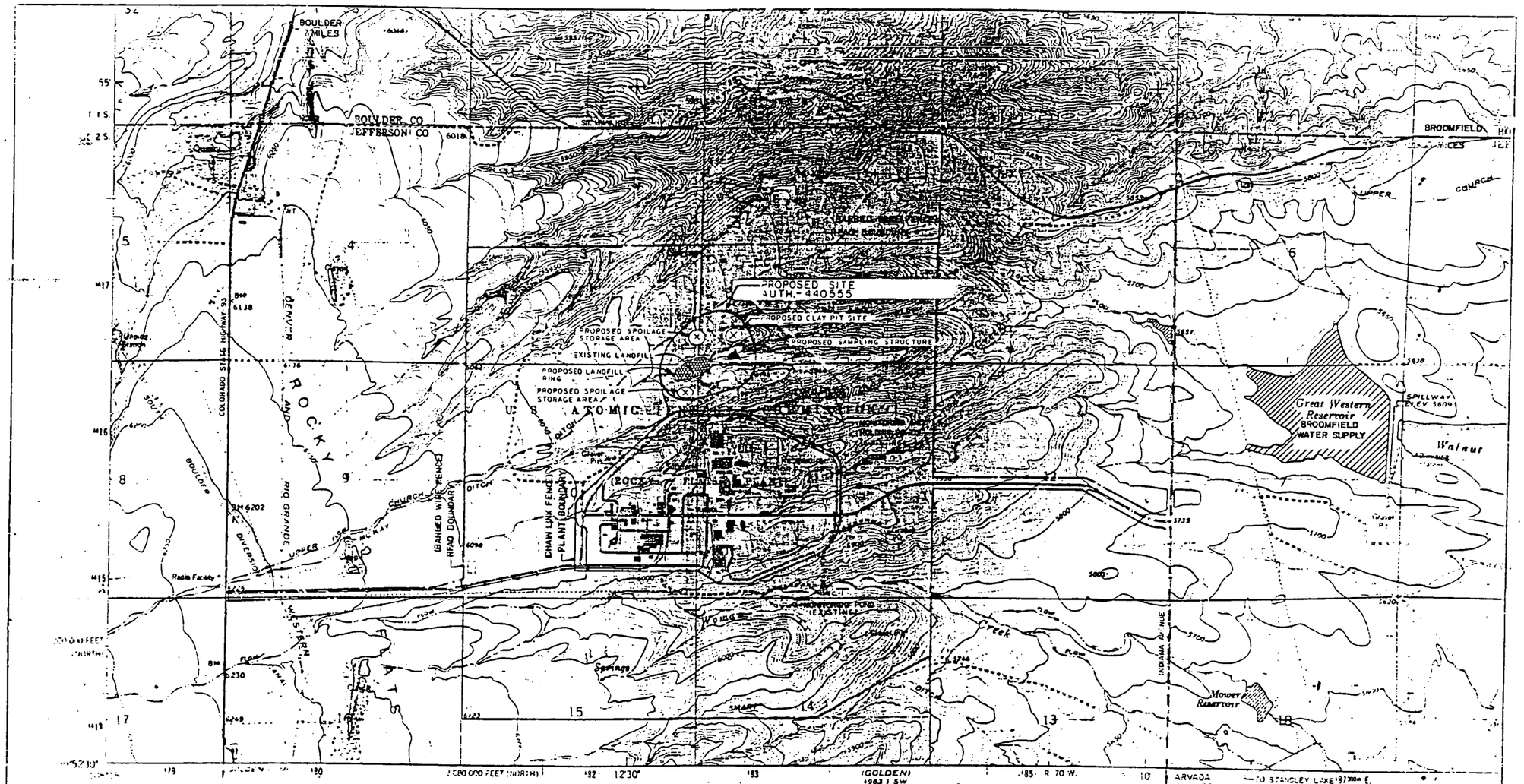
DESIGNED RICHTER 4-17-74
DRAWN DUMINAGE 4-17-74
CHECKED ~ ~

U. S. ATOMIC ENERGY COMMISSION
ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

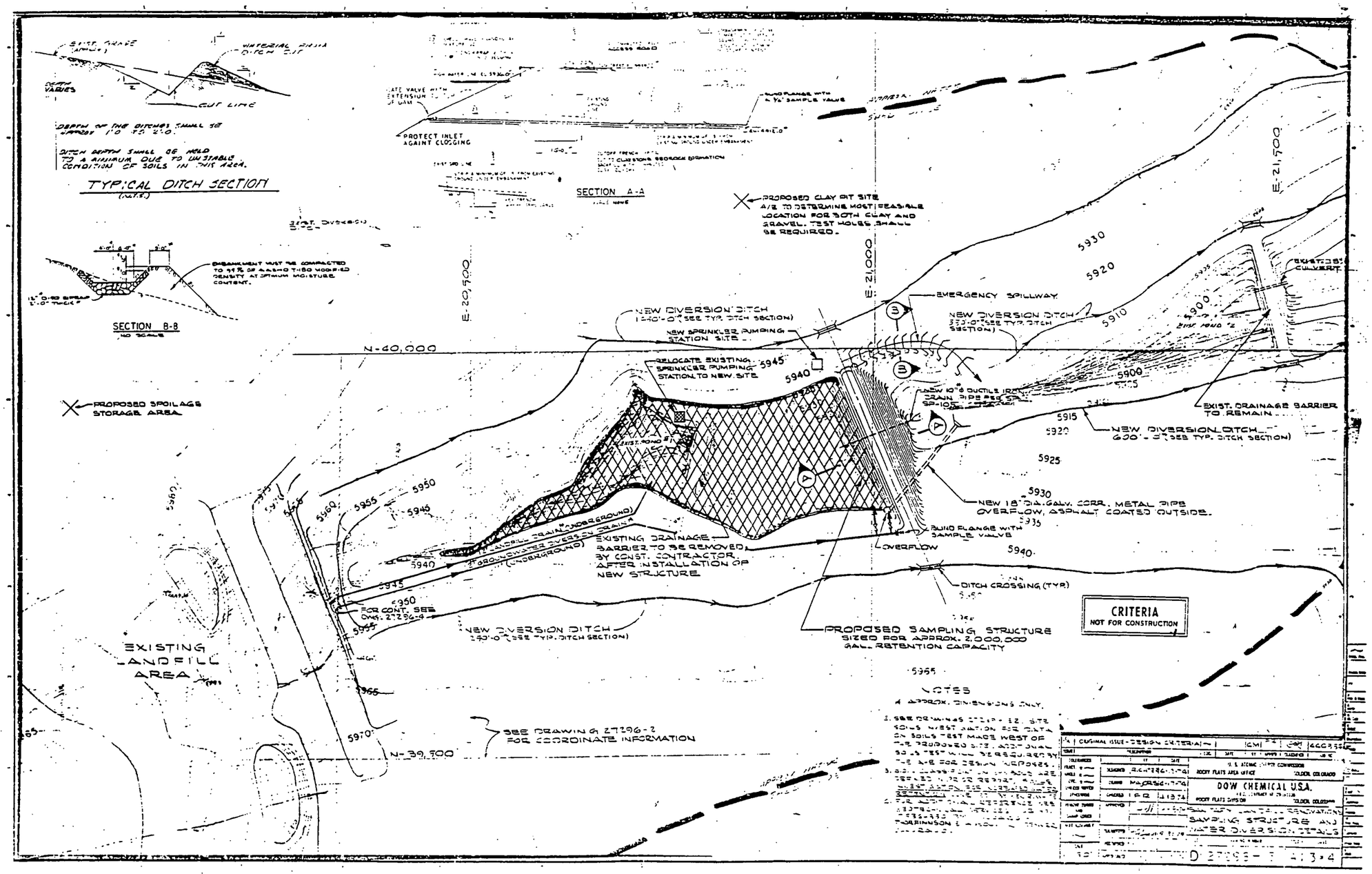
DOW CHEMICAL U.S.A.
ROCKY FLATS DIVISION GOLDEN, COLO. CO

SANITARY LANDFILL
RENOVATIONS
COVER SHEET

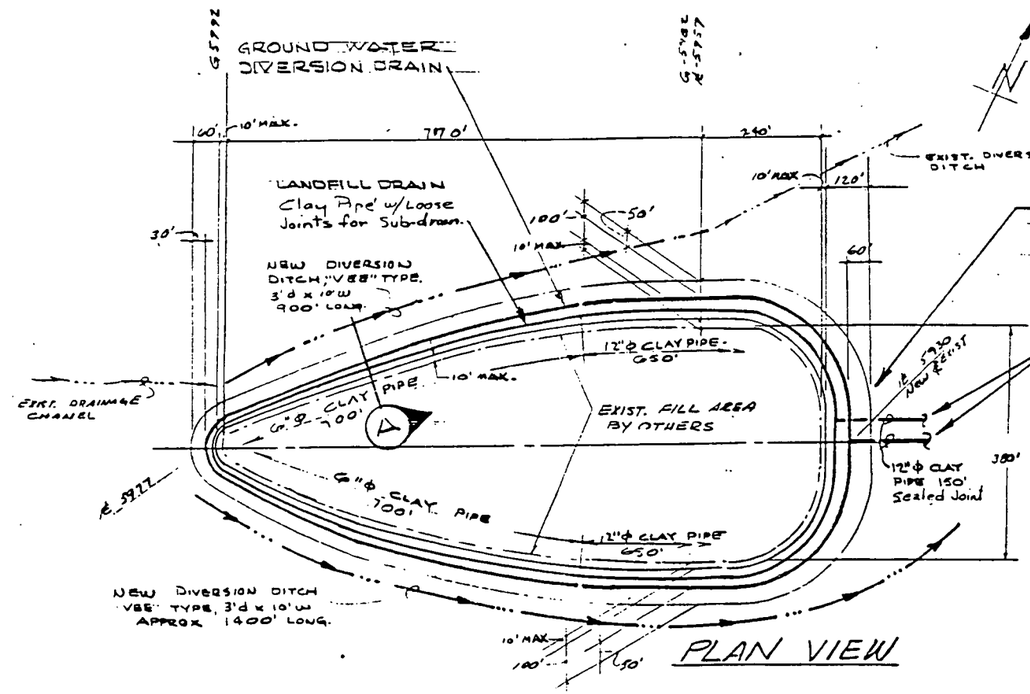
D 27296-1 A 1 of 4



1. POLYCONIC PROJECTION- 1927 NORTH AMERICAN DATUM 10,000 FT GRIDS BASED ON COLORADO COORDINATE SYSTEM, NORTH AND CENTRAL ZONES. 1000-METER UNIVERSAL TRANSVERSE MERCATOR GRID TICKS ALSO NOTED ON MAP EDGE
2. TOPOGRAPHY BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS TAKEN 1964 AND FIELD CHECKED 1965
3. THIS MAP IS A PHOTOGRAPHIC ENLARGEMENT OF THE USGS AND USC AND GS LOUISVILLE, COLORADO QUADRANGLE, 7.5 MINUTE SERIES



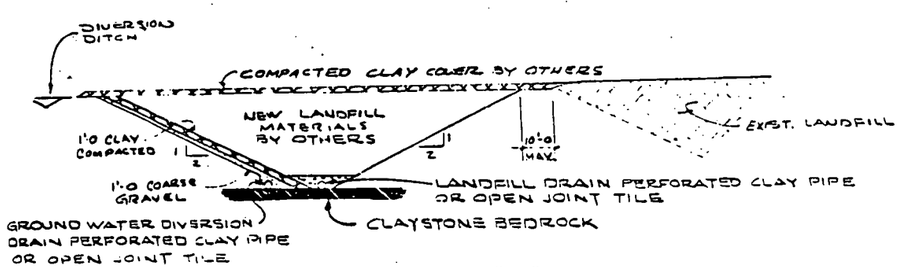
TYPICAL DITCH SECTION
SECTION A-A
SECTION B-B
PROTECT INLET AGAINST CLOGGING
PROPOSED CLAY PIT SITE
EMBANKMENT MUST BE COMPACTED TO 95% OF A ASHO T-180 MODIFIED DENSITY AT OPTIMUM MOISTURE CONTENT.
EMERGENCY SPILLWAY
NEW DIVERSION DITCH
NEW SPRINKLER PUMPING STATION SITE
RELOCATE EXISTING SPRINKLER PUMPING STATION TO NEW SITE
PROPOSED SPOILAGE STORAGE AREA
EXIST. DRAINAGE BARRIER TO REMAIN
NEW DIVERSION DITCH
NEW 18" DIA. GALV. CORR. METAL PIPE OVERFLOW, ASPHALT COATED OUTSIDE.
BLIND FLANGE WITH SAMPLE VALVE
OVERFLOW
EXISTING DRAINAGE BARRIER TO BE REMOVED BY CONST. CONTRACTOR AFTER INSTALLATION OF NEW STRUCTURE
DITCH CROSSING (TYP.)
PROPOSED SAMPLING STRUCTURE SIZED FOR APPROX. 2,000,000 GAL. RETENTION CAPACITY
NEW DIVERSION DITCH
EXISTING LANDFILL AREA
SEE DRAWING 27296-2 FOR COORDINATE INFORMATION
N-40,000
N-39,900
E-20,500
E-21,000
E-21,500
CRITERIA
NOT FOR CONSTRUCTION
NOTES
ORIGINAL ISSUE - DESIGN CRITERIA
U.S. ATOMIC ENERGY COMMISSION
ROCKY FLATS AREA OFFICE
COLDEN, COLORADO
DOW CHEMICAL U.S.A.
ROCKY FLATS DIVISION
COLDEN, COLORADO
SAMPLING STRUCTURE AND WATER DIVERSION DETAILS



CRITERIA
NOT FOR CONSTRUCTION

LEGEND

G xxx = EXIST. GRADE ELEV.
℄ xxx = FLOW LINE ELEV.



SECTION "A"

ISSUE	DESCRIPTION	LOC.	DATE	BY	APPR'D	CLASSIFIER	JOB NO.
B	ISSUED FOR DESIGN CRITERIA	~	4-30-74	CM	F.R.	[signature]	440555
A	ORIGINAL ISSUE-DESIGN CRITERIA	~	4-19-74	CM	F.R.	[signature]	440555

		BY	DATE
TOLERANCES FRACT. ± ~ ANGLE ± ~ DEC. ± ~ UNLESS NOTED OTHERWISE		RICHTER	4-17-74
	DRAWN	MAJORS	4-17-74
	CHECKED	F.R.	4-17-74
REMOVE BURRS AND SHARP EDGES	APPROVED	Lovell	4-17-74
NEXT ASSEMBLY ~	SUBMITTED	[signature]	4-30-74
	REC'M'DED		
SCALE: NO SCALE	APP'D (AEC)	[signature]	[illegible]

U. S. ATOMIC ENERGY COMMISSION
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

DOW CHEMICAL U.S.A.
A.E.C. CONTRACT AT (29-1)-1106
ROCKY FLATS DIVISION — GOLDEN, COLORADO

SANITARY LANDFILL RENOVATIONS
LANDFILL RING & WATER DIVERSION DETAILS

SIZE	DRAWING NUMBER	ISSUE	SHEET
B	27296 - 4	B	4 OF 4

UNITED STATES ATOMIC ENERGY COMMISSION

ALBUQUERQUE OPERATIONS OFFICE
ROCKY FLATS OFFICE
GOLDEN, COLORADO

SANITARY LANDFILL RENOVATIONS
ROCKY FLATS

ZEFF, COGORNO & SEALY INC., DENVER, COLORADO
TRI-CONSULTANTS INC., DENVER, COLORADO
HYDRO-TRIAD LTD., DENVER, COLORADO

I hereby certify that these plans for the SANITARY LANDFILL RENOVATIONS, ROCKY FLATS, were prepared under my direct supervision for the owners thereof.

RONALD L. HALLER, JR. REGISTERED PROFESSIONAL ENGINEER 5235 STATE OF COLORADO

Ronald L. Haller, Jr.
Registered Professional Engineer Colorado 5235

I hereby certify that on behalf of the UNITED STATES ATOMIC ENERGY COMMISSION, OWNER, whose Post Office address is,
Rocky Flats Area Office
P. O. Box 928
Golden, Colorado 80401
Do hereby approve & accept these plans for the SANITARY LANDFILL RENOVATIONS, ROCKY FLATS.

Assistant Manager For Construction
Approved on the 22 day of July, 1974.

INVITATION NO
292-75-3

INDEX OF SHEETS

LANDFILL TRENCH

1. GENERAL PLAN & SECTIONS	27317-1
2. PLAN & PROFILE 0-15+00	27317-2
3. PLAN & PROFILE 15+00-25+75	27317-3
4. PIPING PLANS & PROFILES	27317-4
5. SOUTH INTERCEPTOR DITCH	27317-5
6. NORTH INTERCEPTOR DITCH	27317-6

SAMPLING STRUCTURE

7. GENERAL PLAN-DAM & RESERVOIR	27318-1
8. PLAN, PROFILE & SECTIONS-DAM	27318-2
9. SPILLWAY & OUTLET-PLAN	27318-3
10. SPILLWAY & OUTLET-DETAILS	27318-4

GENERAL

11 TEST BORING & PIT LOCATION PLAN	27318-5
12. LOGS OF EXPLORATORY BORINGS & TEST PITS	27318-6

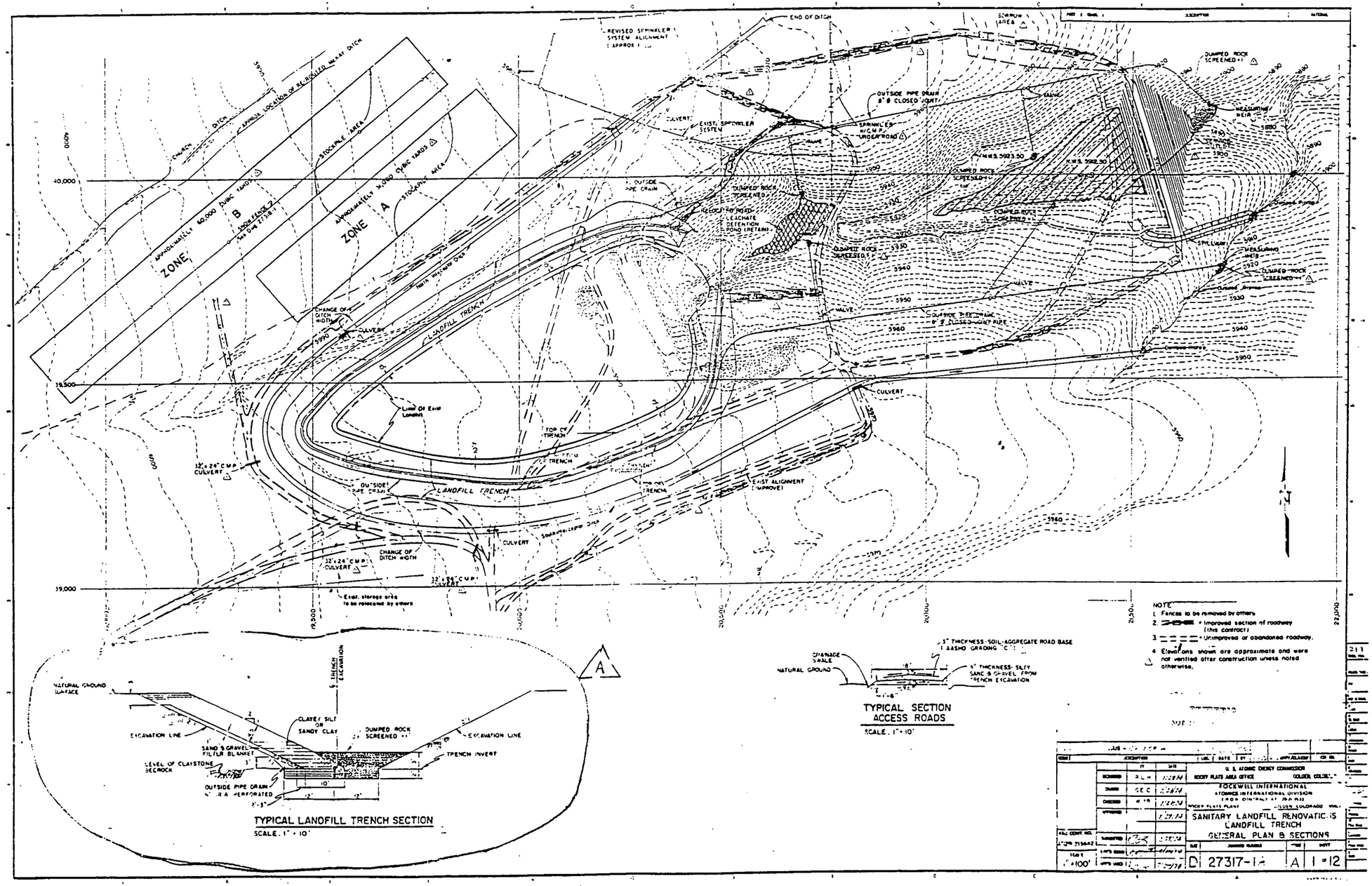
A ORIGINAL ISSUE 9-5-70 345614

U. S. ATOMIC ENERGY COMMISSION
ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

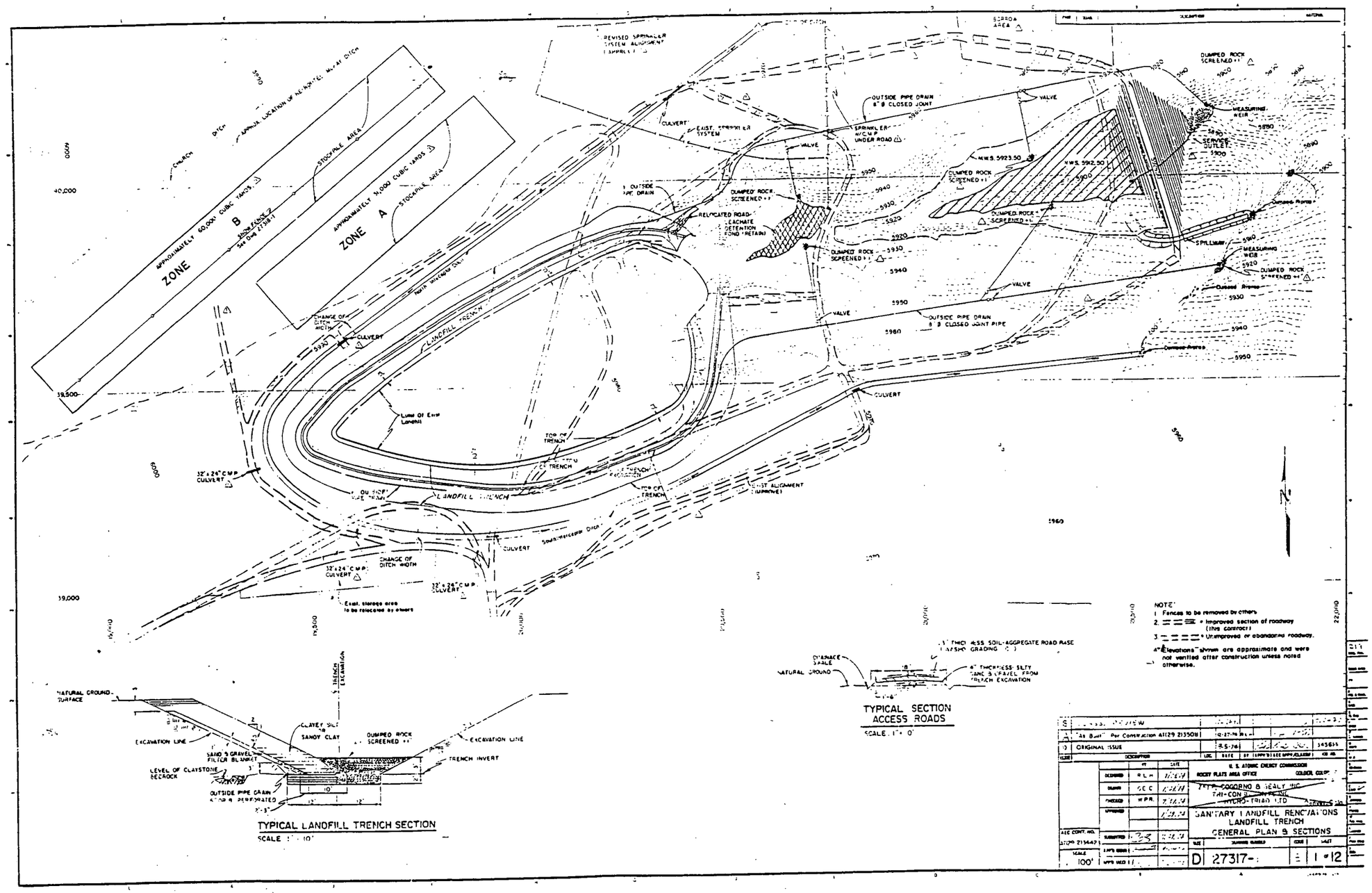
ZEFF, COGORNO & SEALY INC.
TRI-CONSULTANTS INC.
HYDRO-TRIAD LTD.

SANITARY LANDFILL RENOVATIONS
FACILITY NO 219
TITLE SHEET

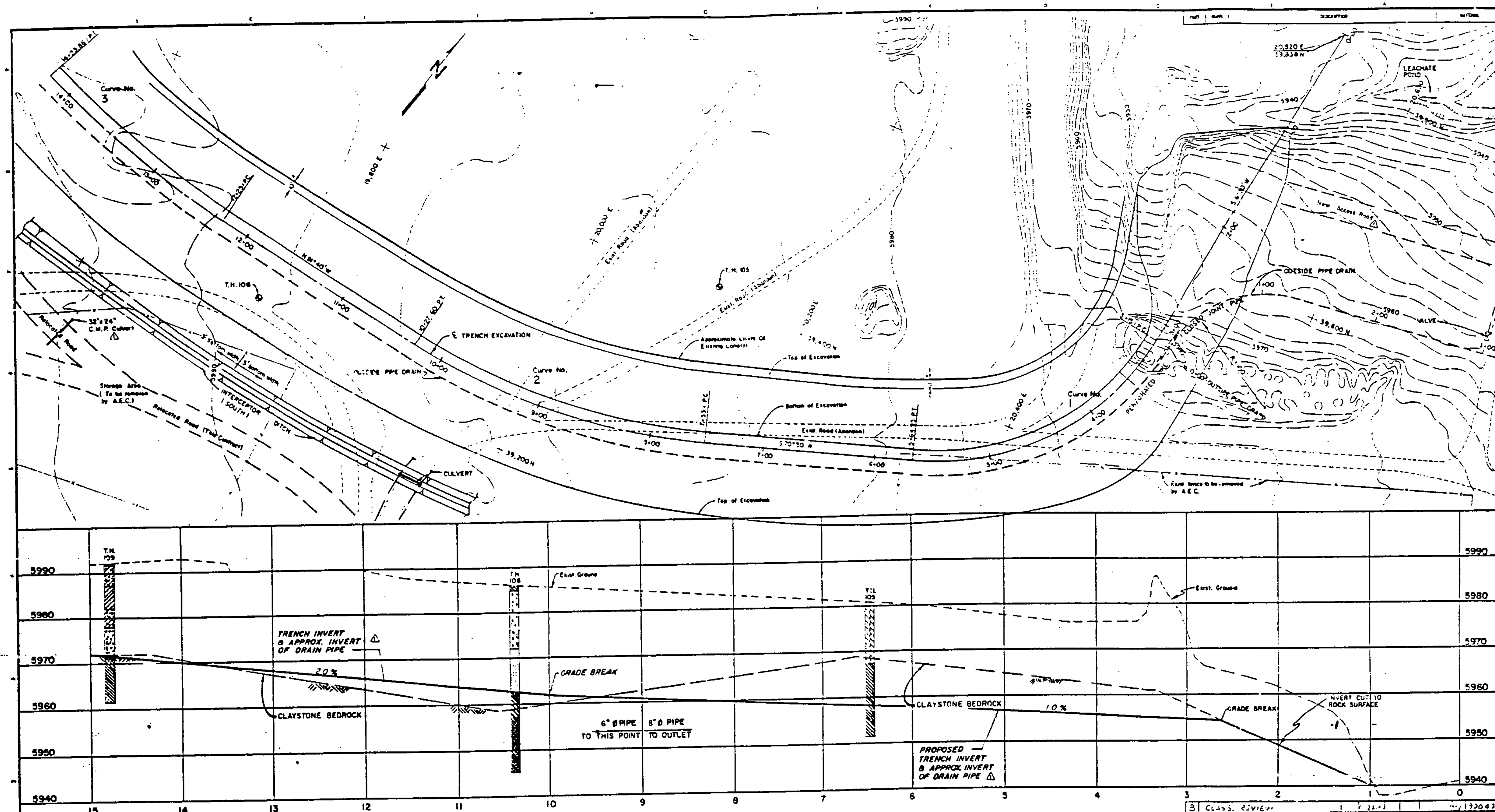
AEC CONT. NO. AT129-215442
SCALE NONE
D 27317-0 A



ZONE B
ZONE A
APPROXIMATELY 60,000 CUBIC YARDS
APPROXIMATELY 30,000 CUBIC YARDS
STOCKPILE AREA
CHURCH DITCH
APPROX. LOCATION OF RE-ROUTED McKAY DITCH
REVISED SPRINKLER SYSTEM ALIGNMENT (APPROX.)
END OF DITCH
BORROW AREA
OUTSIDE PIPE DRAIN 8" Ø CLOSED JOINT
SPRINKLER W/C.M.P. UNDER ROAD
CULVERT
EXIST. SPRINKLER SYSTEM
DUMPED ROCK SCREENED
RELOCATED ROAD
LEACHATE DETENTION POND (RETAIN)
M.W.S. 5923.50
N.W.S. 5912.50
MEASURING WEIR
SPILLWAY
CHANGE OF DITCH WIDTH
LANDFILL TRENCH
Limit Of Exist Landfill
TOP OF TRENCH
32"x24" C.M.P. CULVERT
EXIST. ALIGNMENT (IMPROVE)
Exist. storage area to be relocated by others
40,000
39,500
39,000
19,500
20,000
20,500
21,000
21,500
22,000
NOTE
1. Fences to be removed by others
2. = Improved section of roadway (this contract)
3. = Unimproved or abandoned roadway.
4. Elevations shown are approximate and were not verified after construction unless noted otherwise.
NATURAL GROUND SURFACE
EXCAVATION LINE
CLAYEY SILT OR SANDY CLAY
DUMPED ROCK SCREENED
SAND & GRAVEL FILTER BLANKET
LEVEL OF CLAYSTONE BEDROCK
OUTSIDE PIPE DRAIN
TRENCH INVERT
TYPICAL LANDFILL TRENCH SECTION
SCALE: 1" = 10'
CHAINAGE SWALE
NATURAL GROUND
3" THICKNESS SOIL-AGGREGATE ROAD BASE (AASHO GRADING "C")
4" THICKNESS SILTY SAND & GRAVEL FROM TRENCH EXCAVATION
TYPICAL SECTION ACCESS ROADS
SCALE: 1" = 10'
U. S. ATOMIC ENERGY COMMISSION
ROCKY FLATS AREA OFFICE
GOLDEN, COLORADO
ROCKWELL INTERNATIONAL
ATOMICS INTERNATIONAL DIVISION
ROCKY FLATS PLANT
GOLDEN, COLORADO
SANITARY LANDFILL RENOVATIONS
LANDFILL TRENCH
GENERAL PLAN & SECTIONS
D 27317-1
A
1 of 12



ZONE B
ZONE A
APPROXIMATELY 60,000 CUBIC YARDS
APPROXIMATELY 30,000 CUBIC YARDS
STOCKPILE AREA
CHURCH DITCH
LANDFILL TRENCH
CULVERT
32" x 24" C.M.P. CULVERT
CHANGE OF DITCH WIDTH
TOP OF TRENCH
EXIST. ALIGNMENT (IMPROVE)
OUTSIDE PIPE DRAIN 8" Ø CLOSED JOINT
SPRINKLER W/C.M.P. UNDER ROAD
RELOCATED ROAD
LEACHATE DETENTION POND (RETAIN)
DUMPED ROCK SCREENED +1"
VALVE
M.W.S. 5923.50
M.W.S. 5912.50
MEASURING WEIR
SERVICE OUTLET
SPILLWAY
OUTSIDE PIPE DRAIN 8" Ø CLOSED JOINT PIPE
Exist. storage area to be relocated by others
NATURAL GROUND SURFACE
EXCAVATION LINE
CLAYEY SILT OR SANDY CLAY
DUMPED ROCK SCREENED +1"
SAND & GRAVEL FILTER BLANKET
LEVEL OF CLAYSTONE BEDROCK
OUTSIDE PIPE DRAIN
TRENCH INVERT
TYPICAL LANDFILL TRENCH SECTION
SCALE 1" = 10'
TYPICAL SECTION ACCESS ROADS
SCALE 1" = 0'
NOTE:
1. Fences to be removed by others
2. = Improved section of roadway (this contract)
3. = Unimproved or abandoned roadway.
4. "Elevations" shown are approximate and were not verified after construction unless noted otherwise.
ORIGINAL ISSUE
U. S. ATOMIC ENERGY COMMISSION
ROCKY FLATS AREA OFFICE
COLDER, COLO.
SANITARY LANDFILL RENOVATIONS
LANDFILL TRENCH
GENERAL PLAN & SECTIONS
D 27317-
1 of 12



℄ CURVE DATA

1.
Δ = 64°20'
R = 222.6'
T = 140'
P.C. = 3+15.00
P.T. = 5+64.95

2.
Δ = 27°30'
R = 572.13'
T = 140'
P.C. = 7+53.00
P.T. = 10+27.60

3.
Δ = 15°00'
R = 759.58'
T = 100'
P.C. = 12+25.00
P.T. = 14+23.86

SCALES:
PLAN - 1" = 40'
PROFILE - 1" = 50' HORIZ
1" = 10' VERT.

NOTES.

1. PROFILE SHOWS INVERT OF TRENCH
2. SECTION OF COMPLETED TRENCH WITH CLAY BARRIER SHOWN ON DWG. 27317-1.
3. NORTH SIDE OF TRENCH SHOWN ON DWG. 27317-3.
4. CONTINUATION OF OUTSIDE PIPE DRAIN PROFILE SHOWN ON DWG. 27317-4.
5. INTERCEPTOR DITCH PROFILE SHOWN ON DWG 27317-5 & 6
6. ELEVATIONS SHOWN ARE APPROXIMATE AND WERE NOT VERIFIED AFTER CONSTRUCTION UNLESS NOTED OTHERWISE.

3	CLASS. REVIEW		1920436
Δ	"As Built", Per Construction AT(29-2)13508	12-29-74 RLM	
0	ORIGINAL ISSUE	3-5-74	345614

	BY	DATE
	RLM	7/29/74
	GEC	7/29/74
	WPR	7/29/74

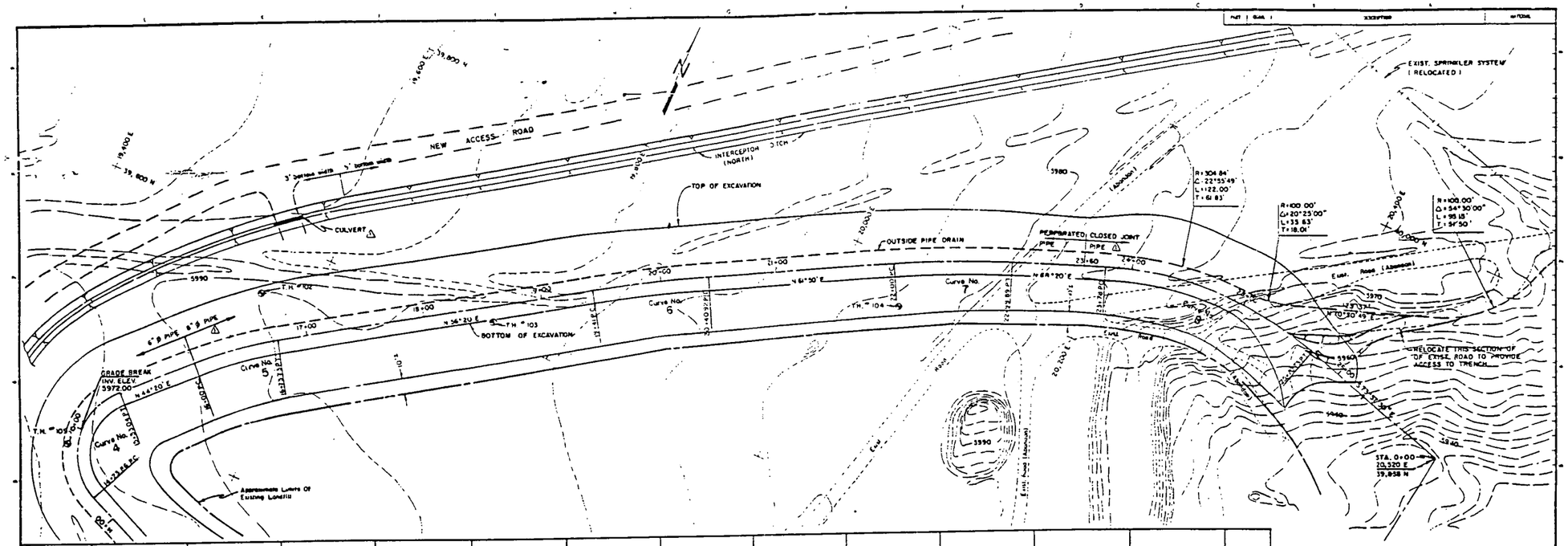
U. S. ATOMIC ENERGY COMMISSION
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ZEFF, COGORNO & SEALY INC.
TRI-CONSULTANTS INC.
HYDRO-TRIAD, LTD.

SANITARY LANDFILL RENOVATIONS
LANDFILL TRENCH
PLAN & PROFILE 0 TO 15+00

AEC CONT. NO. AT(29-2)13443
SCALE AS SHOWN

D 27317-2 — SHEET 2 of 12



℄ CURVE DATA

4.	5.	6.	7.	8.
Δ=111°00'	Δ=12°00'	Δ=5°30'	Δ=6°30'	Δ=37°42'30"
R=56.36'	R=332.03'	R=1040.94'	R=880.53'	R=292.84'
T=82.00'	T=37.00	T=50.00'	T=50.00'	T=100.30'
P.C.=14+23.86	P.C.=16+00.00	P.C.=19+41	P.C.=22+00	P.C.=23+78
P.T.=15+33.04	P.T.=16+73.73	P.T.=20+40.92	P.T.=22+99.89	P.T.=25+70.73

SCALES:
PLAN - 1" = 40'
PROFILE - 1" = 50' HORIZ
1" = 10' VERT

NOTES:
1. PROFILE SHOWS ONLY INVERT OF TRENCH
2. SECTION OF COMPLETED TRENCH WITH CLAY BARRIER SHOWN ON DWG. 27317-1
3. SOUTH SIDE OF TRENCH SHOWN ON DWG. 27317-2
4. CONTINUATION OF OUTSIDE PIPE DRAIN SHOWN ON DWG 27317-4
5. INTERCEPTOR DITCH PROFILE SHOWN ON DWG 27317-5 & 6.
6. ELEVATIONS SHOWN ARE APPROXIMATE AND WERE NOT VERIFIED AFTER CONSTRUCTION UNLESS NOTED OTHERWISE

E	CLASS. ISSUE	10-24-86		1000430
A	"As Built", Per Construction AT(29-2)3508	12-20-74	R.L.N.	
0	ORIGINAL ISSUE	6-5-74		345614

CODE	DESCRIPTION	IDENT.	DATE	BY	APPR'D	SEE APPR. ACCEPTANCE	JOB NO.

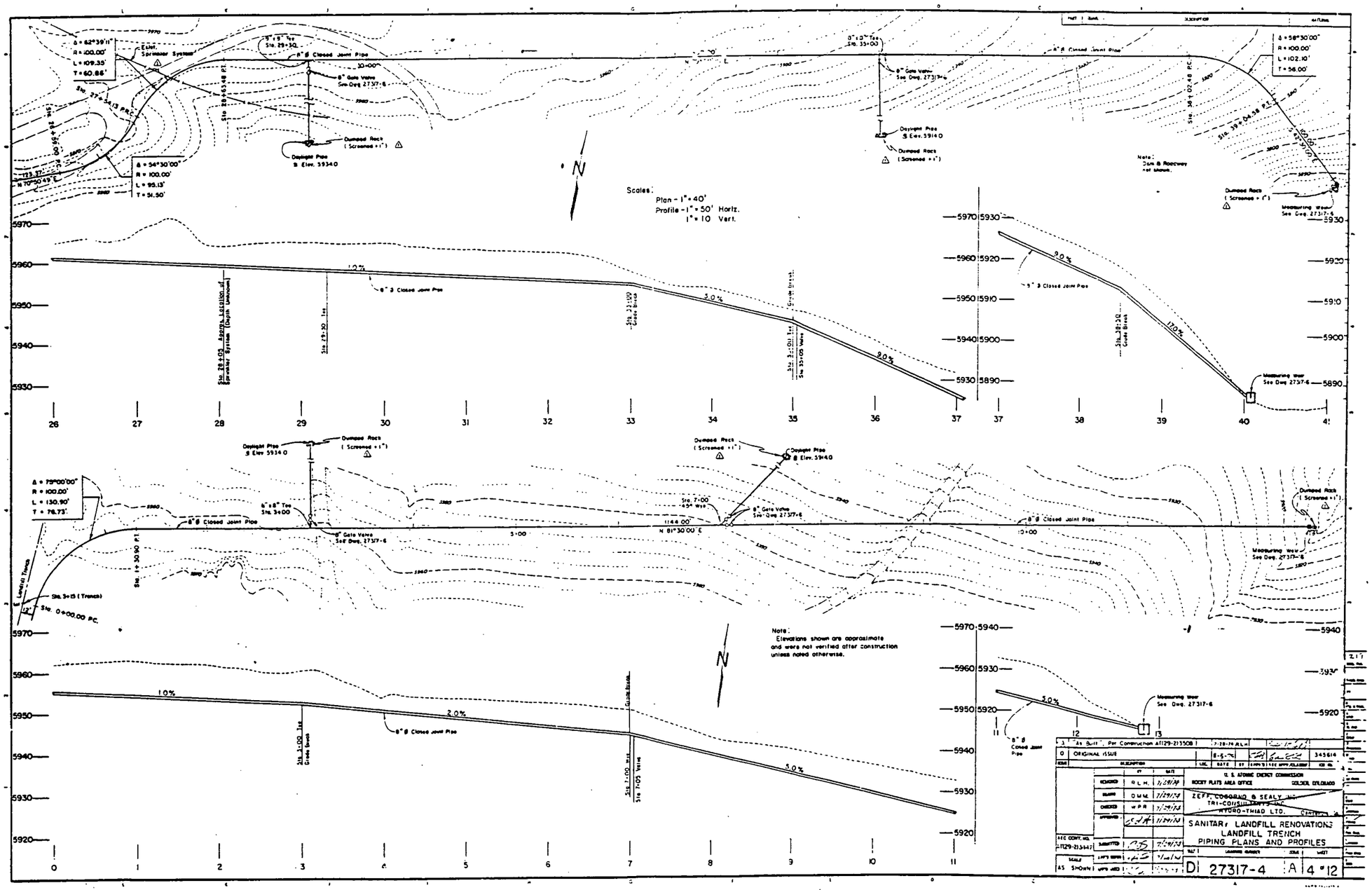
U. S. ATOMIC ENERGY COMMISSION
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

LOFT, SOCOBNO & SEALY
TPI-CONSULT
HYDRO-TECHNICAL LTD.

DESIGNED	R.L.H.	7/29/74	
DRAWN	G.E.C.	7/29/74	
CHECKED	W.P.R.	7/29/74	
APPROVED		7/29/74	
SUBMITTED	C.O.B.	7/29/74	
APPR'D BUREAU			
APPR'D AREA			

SANITARY LANDFILL RENOVATIONS
LANDFILL TRENCH
PLAN PROFILE 15+00 TO 25+75

AEC CONT. NO. AT(29-2)3442
SCALE AS SHOWN
SIZE D — DRAWING NO. 27317-3 — SHEET 3 OF 12



3	"As Built", Per Construction AT(29-2)3508	7-28-74	R.L.H.		
0	ORIGINAL ISSUE	8-5-74			345614

U. S. ATOMIC ENERGY COMMISSION
ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

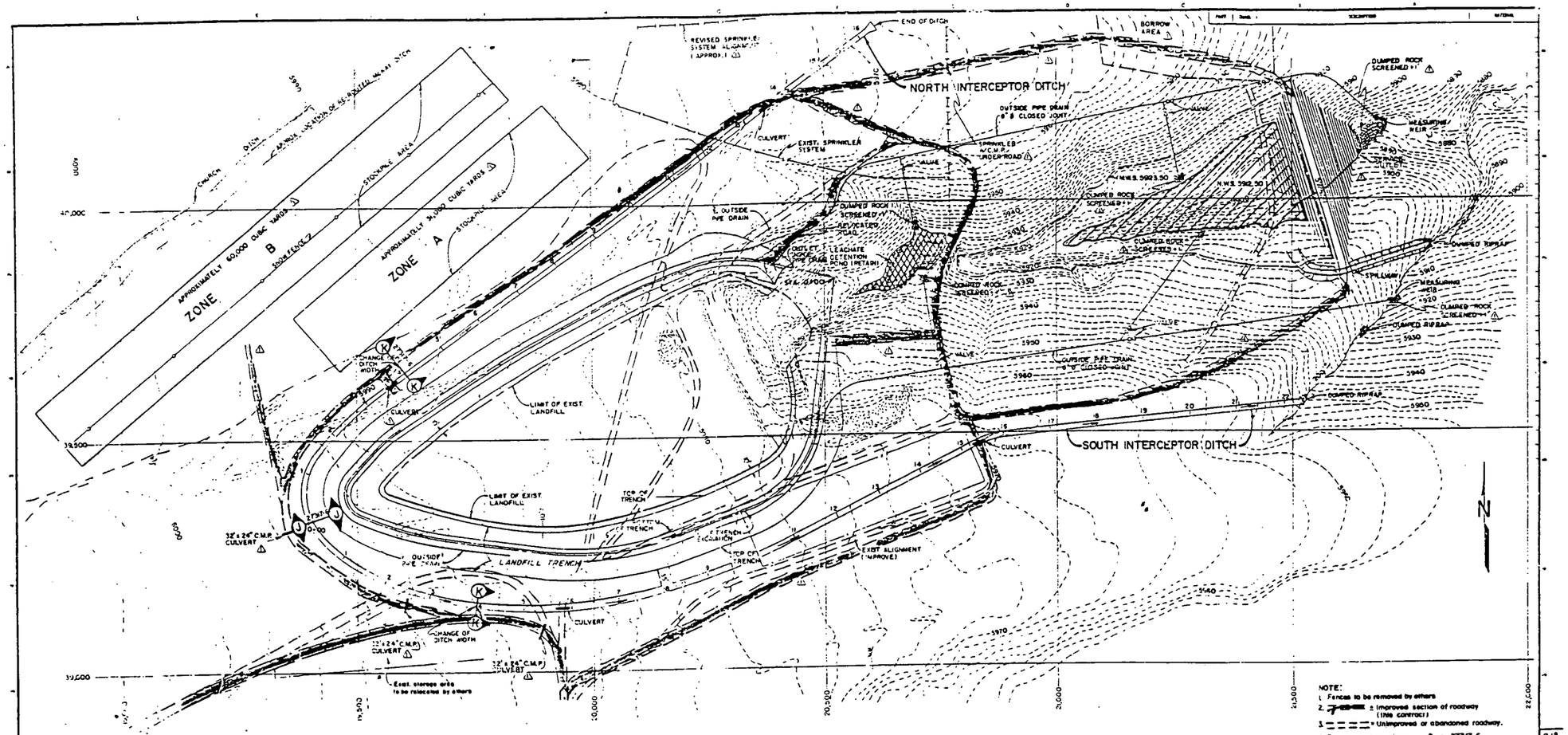
ZEFF, COGORNO & SEALY INC.
TRI-CONSULTANTS INC.
HYDRO-TRIAD LTD.

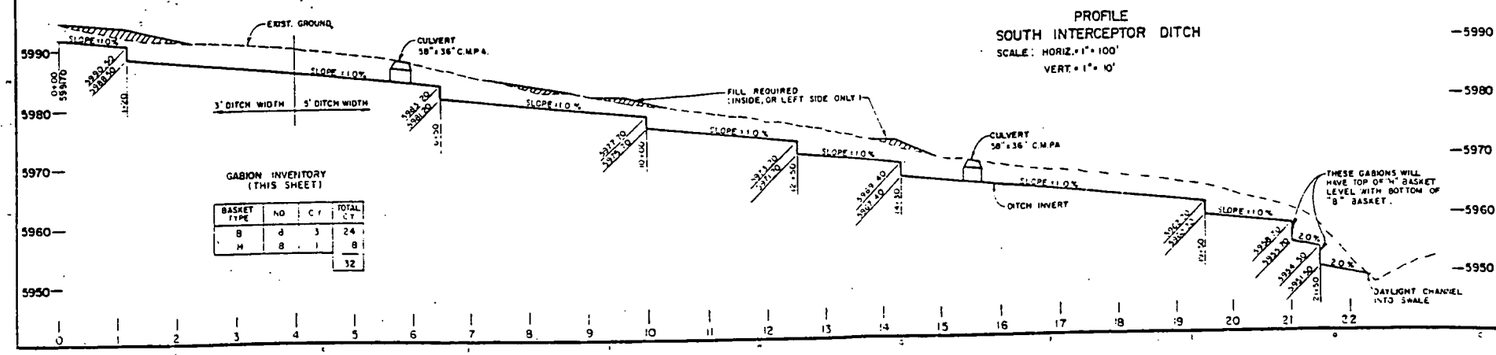
SANITARY LANDFILL RENOVATIONS
LANDFILL TRENCH
PIPING PLANS AND PROFILES

AEC CONT. NO. AT(29-2)3447

SCALE AS SHOWN

D 27317-4 A 4 of 12





GABION INVENTORY (THIS SHEET)

BASKET TYPE	NO	C.Y.	TOTAL C.Y.
B	8	3	24
H	8	1	8
			32

NOTE:

1. Fences to be removed by others
2. ± improved section of roadway (this contract)
3. = = = = = Unimproved or abandoned roadway.
4. For typ. ditch sections, see Dwg. 27317-6.
5. Gabions required at all drops in bottom of ditch.
6. See Dwg. 27317-6 for profile of North Interceptor Ditch.
7. For Gabion Details see Dwg. 27317-6.
8. See Dwg. 27317-6 For sections J-J & K-K.
9. △ All elevations shown are approximate and were not verified unless noted otherwise.

REV	DESCRIPTION	DATE	BY	APPROVALS
A	"As Built" Per Construction AT(29-2)3508	2-20-79	R.L.H.	AT(29-2)3508
0	ORIGINAL ISSUE	3-6-74		345604

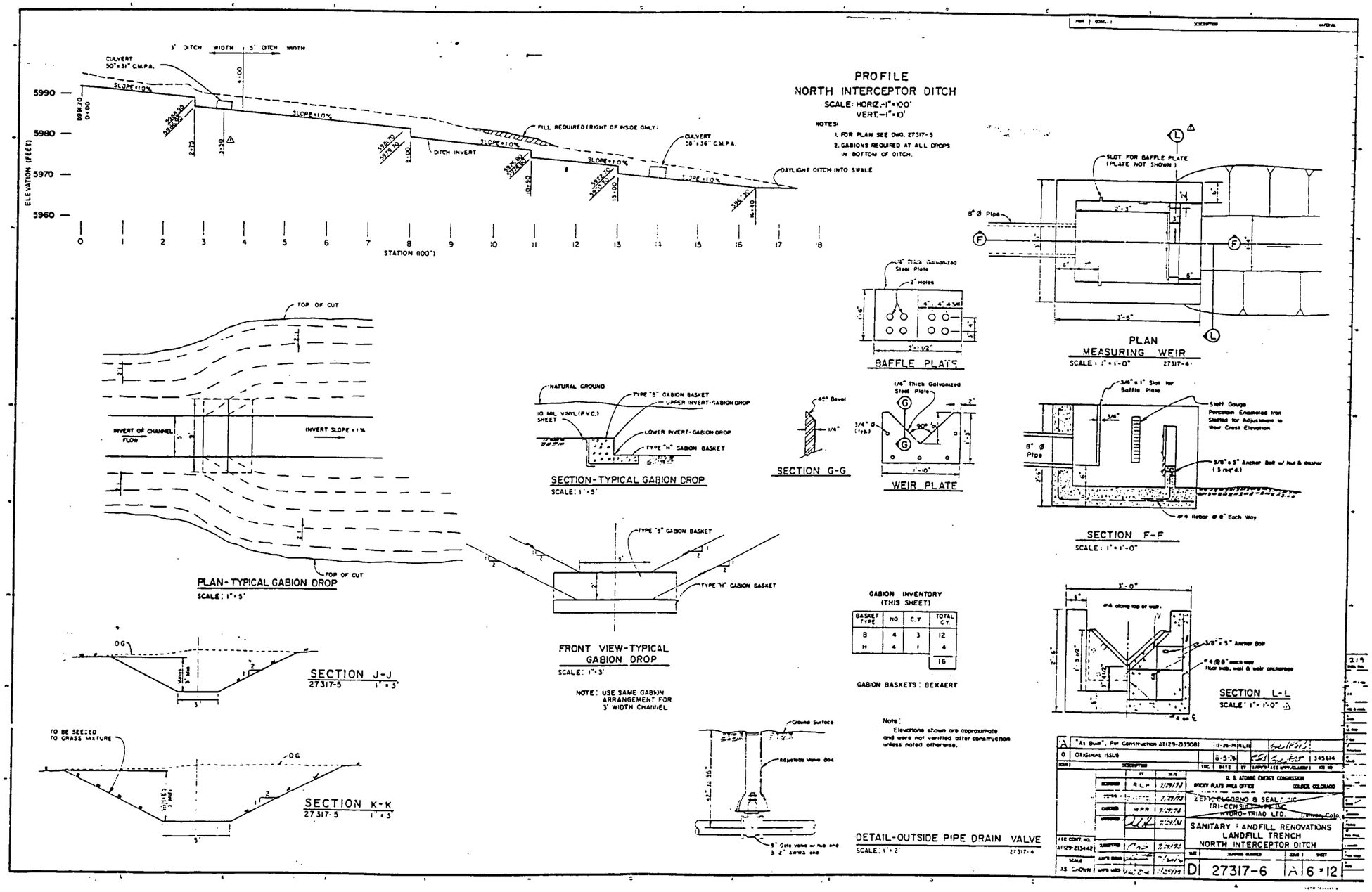
U. S. ATOMIC ENERGY COMMISSION
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

		DATE
DESIGNED	R.L.H.	7/19/73
DRAWN	S.E.C.	7/19/73
CHECKED	APR	7/19/73
APPROVED		7/19/73
SUBMITTED		7/19/73

ZEFF-GOGORNO & SEALY INC.
TRI-CONSULTANTS INC.
HYDRO-TRIAD LTD.

SANITARY LANDFILL RENOVATIONS
LANDFILL TRENCH
SOUTH INTERCEPTOR DITCH

AEC CONT. NO. AT(29-2)3442
SCALE AS SHOWN
LAYS SIZE D
DWG NO. 27317-5
REV A
SHEET 5 of 12


PROFILE
NORTH INTERCEPTOR DITCH
SCALE: HORIZ.-1"=100'
VERT.-1"=10'
NOTES:
1. FOR PLAN SEE DWG. 27317-5
2. GABIONS REQUIRED AT ALL DROPS IN BOTTOM OF DITCH.
ELEVATION (FEET)
STATION (100')
CULVERT 50"x31" C.M.P.A.
FILL REQUIRED (RIGHT OF INSIDE ONLY)
DITCH INVERT
CULVERT 58"x36" C.M.P.A.
DAYLIGHT DITCH INTO SWALE
PLAN
MEASURING WEIR
SCALE: 1"=1'-0"
27317-4
SLOT FOR BAFFLE PLATE (PLATE NOT SHOWN)
BAFFLE PLATE
WEIR PLATE
SECTION G-G
SECTION F-F
SCALE: 1"=1'-0"
SECTION L-L
SCALE: 1"=1'-0"
PLAN-TYPICAL GABION DROP
SCALE: 1"=5'
TOP OF CUT
INVERT OF CHANNEL FLOW
INVERT SLOPE = 1%
SECTION-TYPICAL GABION DROP
SCALE: 1"=5'
NATURAL GROUND
TYPE "B" GABION BASKET
UPPER INVERT-GABION DROP
LOWER INVERT-GABION DROP
TYPE "H" GABION BASKET
FRONT VIEW-TYPICAL GABION DROP
SCALE: 1"=3'
NOTE: USE SAME GABION ARRANGEMENT FOR 3' WIDTH CHANNEL
SECTION J-J
27317-5
SECTION K-K
27317-5
TO BE SEEDED TO GRASS MIXTURE
DETAIL-OUTSIDE PIPE DRAIN VALVE
SCALE: 1"=2'
27317-4
Note:
Elevations shown are approximate and were not verified after construction unless noted otherwise.
GABION INVENTORY (THIS SHEET)
BASKET TYPE | NO. | C.Y. | TOTAL C.Y.
B | 4 | 3 | 12
H | 4 | 1 | 4
16
GABION BASKETS: BEKAERT
"As Built", Per Construction AT(29-2)3508
ORIGINAL ISSUE
U. S. ATOMIC ENERGY COMMISSION
SANITARY LANDFILL RENOVATIONS
LANDFILL TRENCH
NORTH INTERCEPTOR DITCH
D 27317-6 A 6 of 12

UNITED STATES
DEPARTMENT OF ENERGY

ALBUQUERQUE OPERATIONS OFFICE
ROCKY FLATS AREA OFFICE

SANITARY LANDFILL EXTENSION SLURRY TRENCH

WRIGHT-McLAUGHLIN ENGINEERS
in conjunction with
A. G. WASSENAAR, INC.
2420 ALCOTT ST. DENVER, COLORADO

INDEX OF DRAWINGS

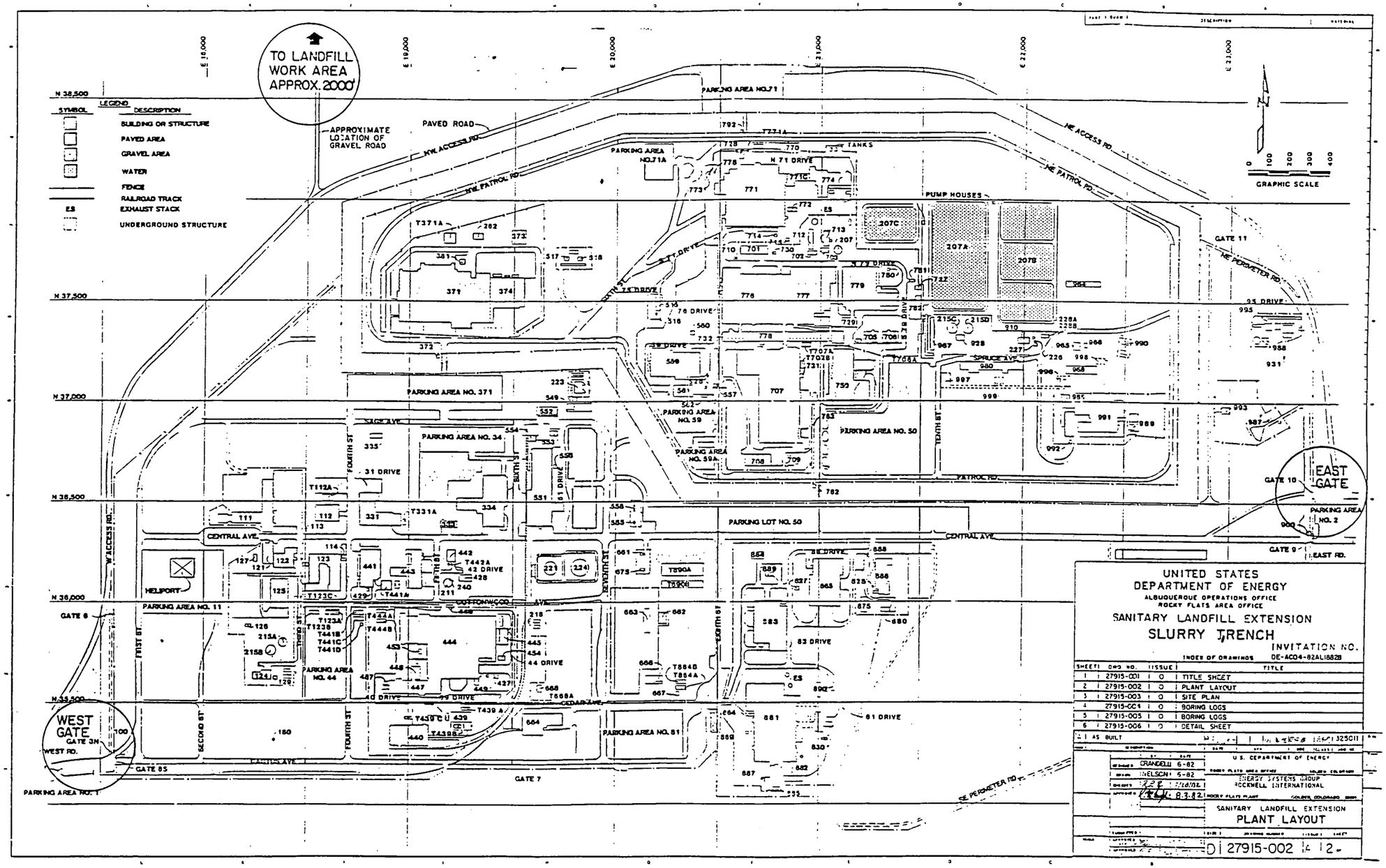
1. TITLE SHEET
2. PLANT LAYOUT
3. SITE PLAN
4. BORING LOGS
5. BORING LOGS
6. DETAIL SHEET

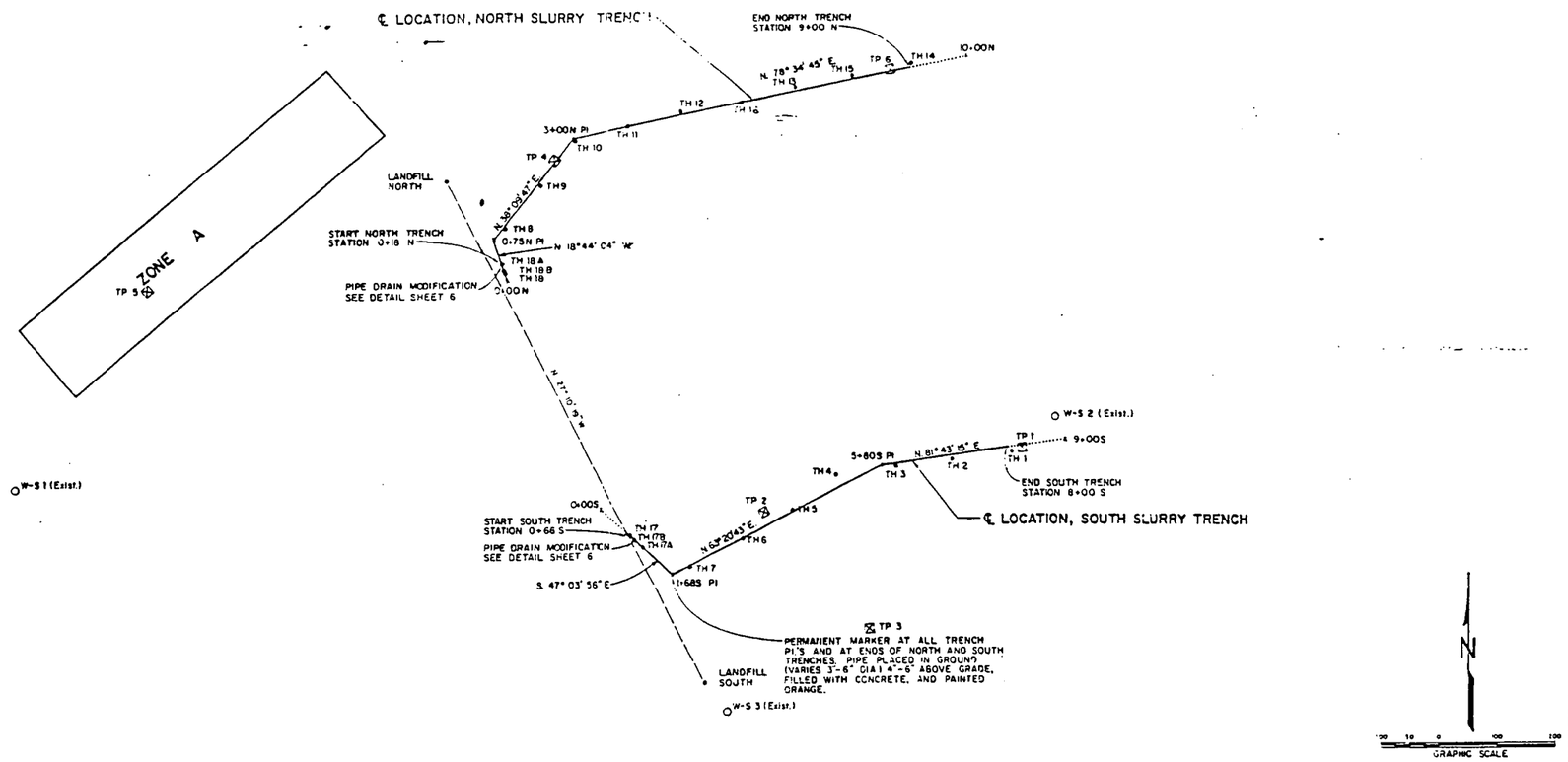
INVITATION NO.
DE-AC04-82AL18828

1	AS BUILT		
ISSUE	DESCRIPTION	BY	DATE
TOLERANCES FRACT ± ANGLE ± DEC ± UNLESS NOTED OTHERWISE	DESIGNED	CRANDELL	6-82
	DRAWN	NELSON	6-82
	CHECKED		7/1/82
	APPROVED		8-3-82
REMOVE BURRS AND SHARP EDGES			
HEAT ASSEMBLY			
DOE CONT NO	SUBMITTED		
	APPROVED A/E		
SCALE	APPROVED DOE		

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE — GOLDEN COLORADO
ENERGY SYSTEMS GROUP
ROCKWELL INTERNATIONAL
ROCKY FLATS PLANT — GOLDEN, COLORADO, 80401
SANITARY LANDFILL EXTENSION
TITLE SHEET

SIZE	DRAWING NUMBER	ISSUE	SHEET
D	27915-001	1	1 OF 6


TO LANDFILL WORK AREA APPROX. 2000'
APPROXIMATE LOCATION OF GRAVEL ROAD
PAVED ROAD
NW ACCESS RD.
NW PATROL RD.
NE ACCESS RD.
NE PATROL RD.
NE PERIMETER RD.
SE PERIMETER RD.
PUMP HOUSES
TANKS
PARKING AREA NO. 71
PARKING AREA NO. 71A
PARKING AREA NO. 371
PARKING AREA NO. 34
PARKING AREA NO. 59
PARKING AREA NO. 59A
PARKING AREA NO. 50
PARKING LOT NO. 50
PARKING AREA NO. 11
PARKING AREA NO. 44
PARKING AREA NO. 81
PARKING AREA NO. 1
PARKING AREA NO. 2
HELIPORT
CENTRAL AVE.
COTTONWOOD AVE.
CEDAR AVE.
SAGE AVE.
SPRUCE AVE.
PATROL RD.
EAST RD.
WEST RD.
GATE 6
GATE 7
GATE 8S
GATE 9
GATE 10
GATE 11
GATE 3N
WEST GATE
EAST GATE
GRAPHIC SCALE
LEGEND
SYMBOL
DESCRIPTION
BUILDING OR STRUCTURE
PAVED AREA
GRAVEL AREA
WATER
FENCE
RAILROAD TRACK
EXHAUST STACK
UNDERGROUND STRUCTURE
UNITED STATES
DEPARTMENT OF ENERGY
ALBUQUERQUE OPERATIONS OFFICE
ROCKY FLATS AREA OFFICE
SANITARY LANDFILL EXTENSION
SLURRY TRENCH
INVITATION NO.
INDEX OF DRAWINGS
DE-AC04-82AL18828
SHEET | DWG NO. | ISSUE | TITLE
1 | 27915-001 | 0 | TITLE SHEET
2 | 27915-002 | 0 | PLANT LAYOUT
3 | 27915-003 | 0 | SITE PLAN
4 | 27915-004 | 0 | BORING LOGS
5 | 27915-005 | 0 | BORING LOGS
6 | 27915-006 | 0 | DETAIL SHEET
AS BUILT
325011
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE
GOLDEN, COLORADO
ENERGY SYSTEMS GROUP
ROCKWELL INTERNATIONAL
ROCKY FLATS PLANT
GOLDEN, COLORADO
CRANDELL 6-82
NELSON 6-82
8-3-82
SANITARY LANDFILL EXTENSION
PLANT LAYOUT
D 27915-002 2



TEST HOLE COORDINATES

LOCATION	NORTH	EAST	ELEVATION
TH1	99949-5	21082-0	5986-8
TH2	99932-0	20981-5	5987-6
TH3	99919-0	20882-5	5989-6
TH4	99903-5	20781-5	5990-9
TH5	99888-5	20702-5	5992-5
TH6	99997-0	20615-5	5994-2
TH7	99948-5	20527-0	5996-5
TH8	99993-5	20401-5	5998-2
TH9	40018-0	20304-5	5998-4
TH10	40037-0	20206-0	5997-9
TH11	40126-0	20123-5	5997-5
TH12	40149-0	20110-5	5997-4
TH13	40184-0	20108-5	5988-7
TH14	40220-5	20086-5	5985-0
TH15	40203-5	20087-0	5986-9
TH16	40156-0	20017-5	5990-0
TH17	39980-0	20417-5	5994-7
TH17A	39993-5	20425-5	5993-7
TH17B	39980-0	20423-0	5994-5
TH18	39884-0	20202-5	5996-0
TH18A	39881-0	20197-0	5997-7
TH18B	39871-0	20200-0	5997-7

TEST PIT COORDINATES

LOCATION	NORTH	EAST	ELEVATION
TP 1	99949-0	21105-0	5986-2
TP 2	99944-5	20603-0	5992-5
TP 3	99958-0	20839-0	5990-5
TP 4	40081-0	20290-0	5996-9
TP 5	39835-0	19968-0	5997-7
TP 6	40210-0	20857-0	5986-5

STATION COORDINATES

STATION	NORTH	EAST	REMARKS
[illegible]	[illegible]	[illegible]	START OF N. TRENCH
STA 0+10N	[illegible]	[illegible]	PI
STA 1+00N	[illegible]	[illegible]	PI
STA 3+00N	[illegible]	[illegible]	
STA 10+00N	[illegible]	[illegible]	
STA 0+00S	[illegible]	[illegible]	
STA 1+00S	[illegible]	[illegible]	START OF S. TRENCH
STA 1+50S	[illegible]	[illegible]	PI
STA 1+80S	[illegible]	[illegible]	PI
STA 5+80S	[illegible]	[illegible]	
STA 9+00S	[illegible]	[illegible]	

BENCH MARK COORDINATES

	NORTH	EAST	ELEVATION
LANDFILL NORTH	40220-76	20101-95	5999-62
LANDFILL SOUTH	39190-55	20553-75	5986-57

NOTES:

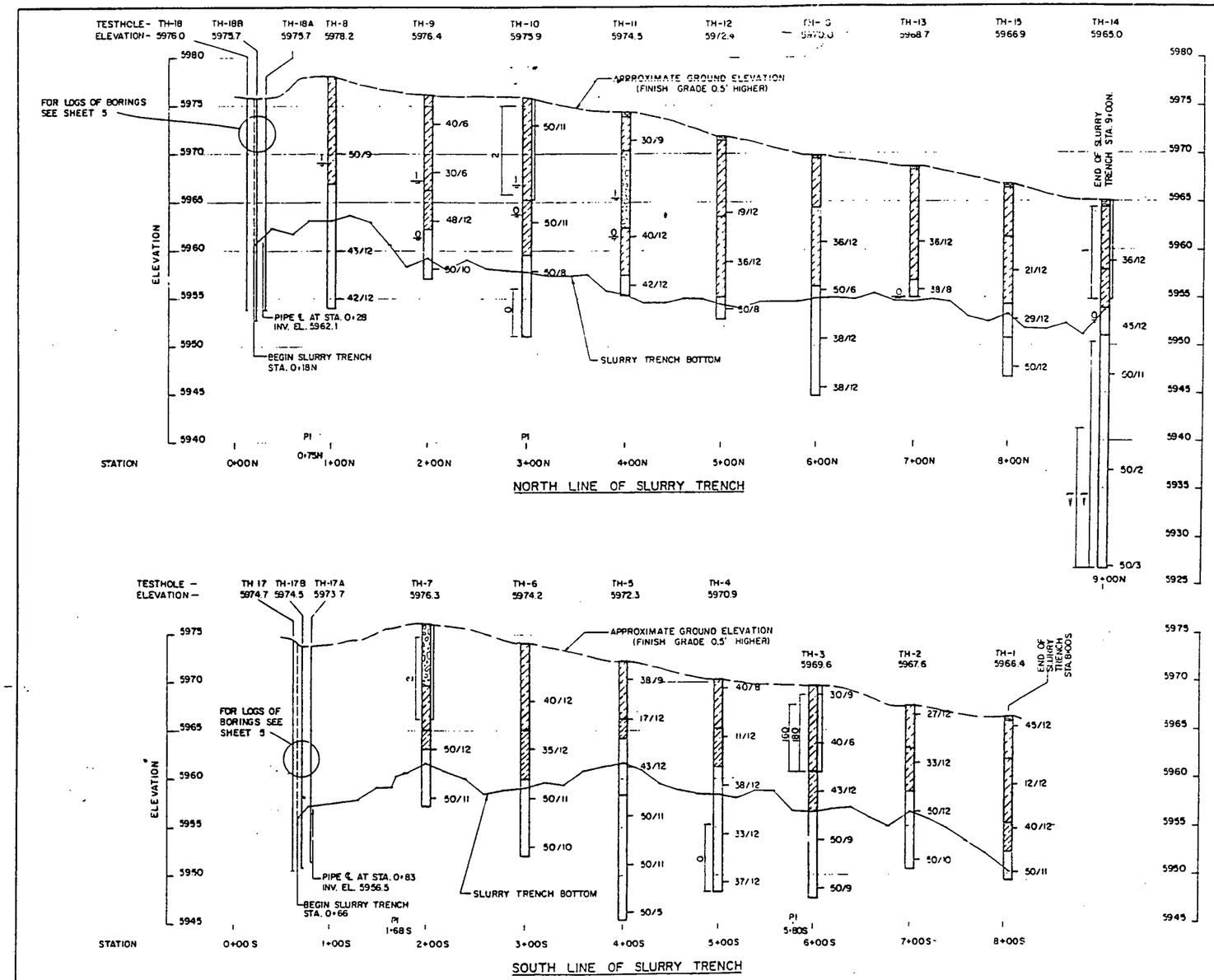
"LANDFILL NORTH" IS A #5 REBAR THAT PROJECTS 3" ABOVE THE GROUND, ON THE NORTH SIDE OF THE LANDFILL, 293' SOUTHEAST OF A CULVERT FOR THE NORTH INTERCEPTOR DITCH, ON THE MIDDLE OF THE BERM BETWEEN ROAD AND DITCH, 18' SOUTHEAST OF CENTER OF ROAD, 12' NORTHWEST OF CENTER OF DITCH.

"LANDFILL SOUTH" IS A #5 REBAR THAT PROJECTS 1" ABOVE THE GROUND, ON THE SOUTH SIDE OF THE LANDFILL, 121.5' SOUTH SOUTHEAST OF THE CENTER OF THE ROAD, 115.0' NORTH NORTHEAST OF THE NORTH MOLE OF A DOUBLE MARCH LINE MOLE, IN RANGE WITH THE WEST EDGE OF NORTH MOLE AND THE HIGHEST STALK OF THE 2ND CUPPLES.

NOTES:

EXISTING SITE CONDITIONS SHOWN AS LIGHT BACKGROUND
TOPOGRAPHIC ELEVATIONS ARE ONLY APPROXIMATE
● TH 1 TEST HOLE
⊠ TP 1 TEST PIT
O W-S1 GROUNDWATER MONITORING HOLE
····· COMPLETION OF ORIGINAL SURVEY LINE

A	AS BUILT	7 AUG 82	WESTCS. 4443 325011
	CESARE: 6-82	U.S. DEPARTMENT OF ENERGY	
	FRAQUA: 6-82	ENERGY SYSTEMS GROUP ROCKWELL INTERNATIONAL	
	7/10/82	ROCKY FLATS PLANT GOLDEN, COLORADO 80401	
	8-3-82	SANITARY LANDFILL EXTENSION	
1"=100'		SITE PLAN	
		D 27915-003 A 3	



PART	QUAN.	DESCRIPTION	MATERIAL

NOTE:
LEGEND ON SHEET 5

ISSUE	DESCRIPTION	BY	DATE
A	AS BUILT		3 AUG 82

DATE | DOE (CLASS) | JOB NO.
3 AUG 82 | RC 9 | 325011

TOLERANCES: FRACT. ± ; ANGLE DEG. ± ; UNLESS NOTED OTHERWISE

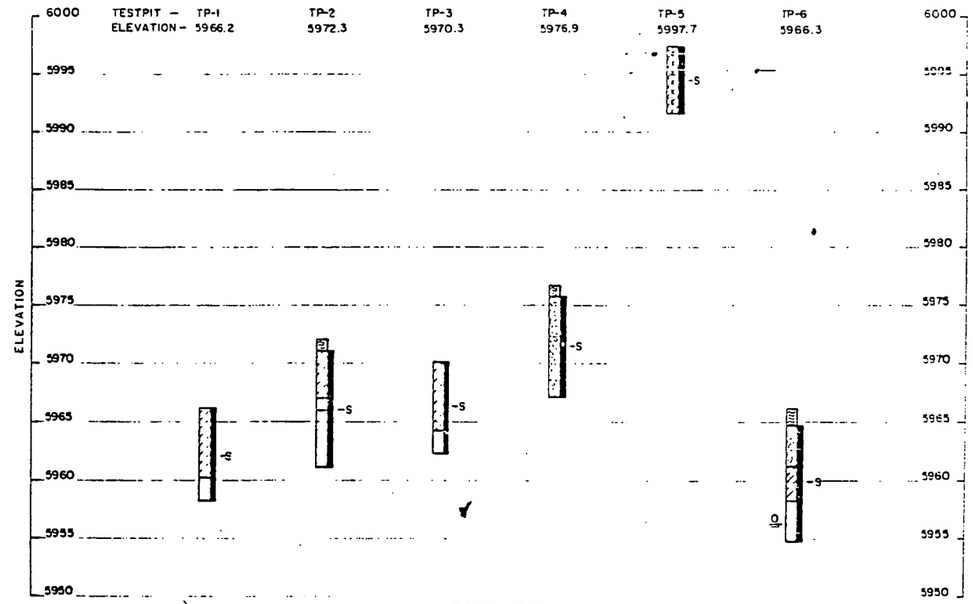
	BY	DATE
DESIGNED	CESARE	6-82
DRAWN	FRAGUA	6-82
CHECKED		7-26-82
APPROVED		8-5-82

REMOVE BURRS AND SHARP EDGES
NEXT ASSEMBLY
DOE CONT NO.
SCALE N/A
SUBMITTED
APPROVED BY
APPROVED DOE

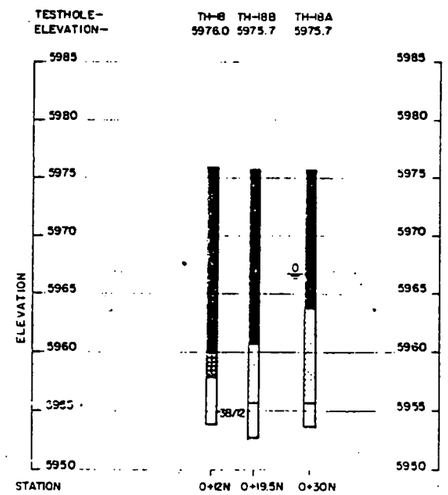
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO
ENERGY SYSTEMS GROUP
ROCKWELL INTERNATIONAL
ROCKY FLATS PLANT — GOLDEN, COLORADO
SANITARY LANDFILL EXTENSION

BORING LOGS

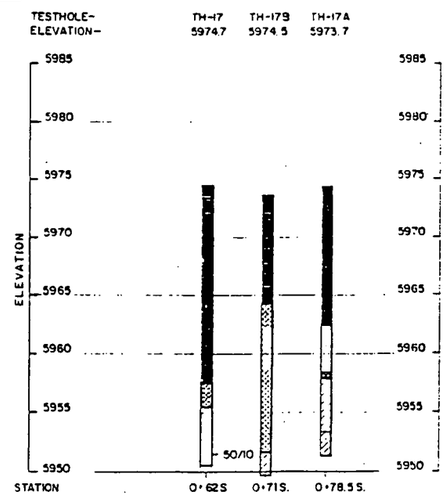
SIZE	DRAWING NUMBER	ISSUE	SHEET
D	27915-C04	A	4 OF



TEST PITS



NORTH TIE IN LINE



SOUTH TIE IN LINE

LEGEND:

TOPSOIL	ORGANIC, SANDY TO VERY SANDY, SILTY TO VERY SILTY, SOME GRAVELLS AND COBBLES, DRY TO MOIST, BROWN TO DARK BROWN (OL, CL, GL).
FILL	CLAY, SANDY TO VERY SANDY, GRAVELLY, SLIGHTLY SILTY, OCCASIONAL COBBLES AND BOULDERS, MOIST, RED-BROWN (CL, CL-CH, ZONE A BORROW AREA)
LANDFILL DEBRIS	SANDY, CLAYEY, SILTY, WITH WOOD, BRICK, GLASS, METAL AND GENERAL CONSTRUCTION DEBRIS, GENERALLY UNCONSOLIDATED (AF).
FILL	CLAYEY, SLIGHTLY SILTY, SLIGHTLY SANDY, SOFT TO MEDIUM STIFF, MOIST TO WET, BROWN TO GRAY (CL) (MODIFIABLE LINER MATERIAL FOR EXISTING LANDFILL TRENCH SECTION).
CLAY	ANELASTIC, VERY STIFF, SILTY, SANDY TO VERY SANDY WITH SAND LENSES, GRAVELLY WITH OCCASIONAL GRAVEL LENSES, OCCASIONAL COBBLES AND BOULDERS, CALCAREOUS, DRY TO MOIST, REDDISH BROWN TO DARK BROWN (CL, CL-SC, SC) (ROCKY FLATS ALLUVIUM, HIGHLY WEATHERED)
SAND	ANELASTIC, MEDIUM DENSE TO VERY DENSE, SILTY TO VERY SILTY, SLIGHTLY TO VERY CLAYEY WITH SANDY CLAY LENSES, GRAVELLY WITH GRAVEL LENSES, OCCASIONAL COBBLES AND BOULDERS, CALCAREOUS, MOIST TO WET, TAN TO BROWN TO OLIVE (SM, SM-SC, SC) (ROCKY FLATS ALLUVIUM, HIGHLY WEATHERED)
GRAVEL	VERY DENSE, SANDY TO VERY SANDY, CLAYEY, DRY TO MOIST, GRAY TO BROWN (GC, GC-GM) (ROCKY FLATS ALLUVIUM, HIGHLY WEATHERED)
GRAVEL	DENSE, SANDY, CLAYEY, GRAY, APPROXIMATELY 1/2" TO 1" DIAMETER (GM-GP) (MODIFIABLE LINER MATERIAL FOR LANDFILL TRENCH SECTION)
CLAY	ANELASTIC, VERY STIFF, SANDY WITH CLAYEY SAND LENSES, SILTY TO VERY SILTY, MOIST TO WET, GRAY TO GOLD TO OLIVE (CH, CL, SC-SM) (ARAPAHOE FORMATION, WEATHERED)
CLAYSTONE	HARD TO VERY HARD, WITH OCCASIONAL SANDSTONE AND SILTSTONE LENSES, SOME MINOR LIGNITE, MOIST TO WET, GRAY TO BROWN - (ARAPAHOE FORMATION)
CLAYSTONE	MEDIUM HARD, SANDY WITH OCCASIONAL SANDSTONE AND SILTSTONE LENSES, MOIST, OLIVE TO BROWN TO GOLD, ANELASTIC IN UPPER PORTION (ARAPAHOE FORMATION)
50/9	INDICATES THAT 50 BLOWS OF A 140 LB. WEIGHT IS NEEDED TO DRIVE A 2 INCH SAMPLER 9 INCHES
	INDICATES A GRADUAL CHANGE IN MATERIALS
B	INDICATES LARGE BULK SAMPLE OF MATERIAL TAKEN FROM DESIGNATED INTERVAL
2"	INDICATES AVERAGE COEFFICIENT OF PERMEABILITY OF 2 FEET PER YEAR FOR DESIGNATED INTERVAL AS DETERMINED BY A FALLING HEAD OR CONSTANT HEAD PERMEABILITY TEST. DETAILS OF TEST RESULTS ARE PRESENTED IN THE CONTRACT DOCUMENTS.
-S	DEPTH AND EXTENT OF BULK SAMPLE
	DEPTH AND EXTENT OF 2-INCH DIAMETER PVC PIEZOMETER

PART	QUAN.	DESCRIPTION	MATERIAL

A	AS BUILT		
SYM	DESCRIPTION		
TOLERANCES FRACT. ± ANGLE ± DEC. ±		BY	DATE
UNLESS NOTED OTHERWISE	DESIGNED	CESARE	6-82
	DRAWN	FRAGUA	6-82
REMOVE BURRS AND SHARP EDGES	CHECKED	RPP	7/20/82
	APPROVED		8-3-82
NEXT ASSEMBLY			
DOE CONT NO	SUBMITTED		
	APPROVED		
SCALE N/A	APPROVED DOE		

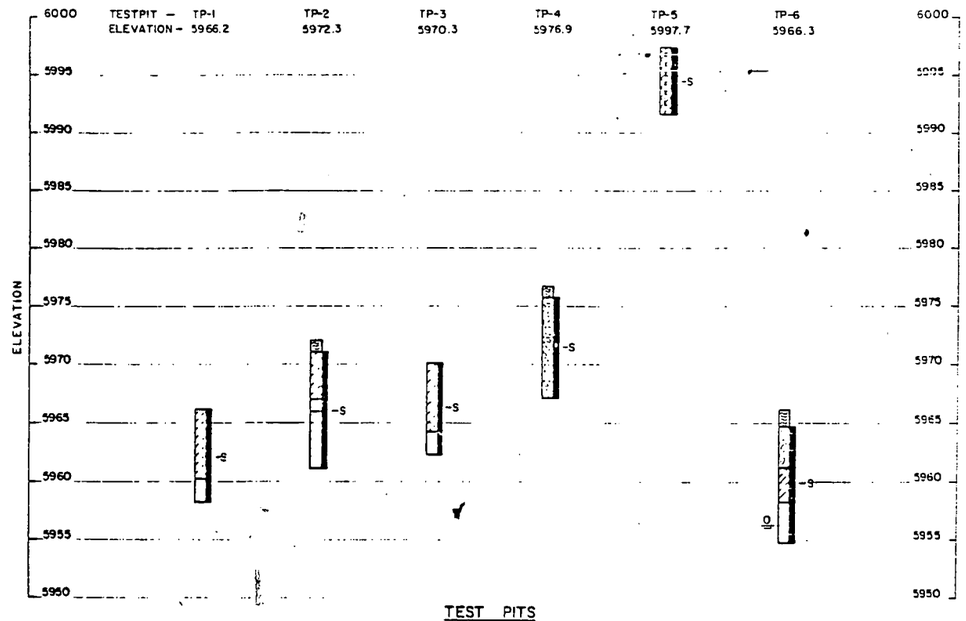
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

ENERGY SYSTEMS GROUP
ROCKWELL INTERNATIONAL
ROCKY FLATS PLANT GOLDEN, COLORADO 80401

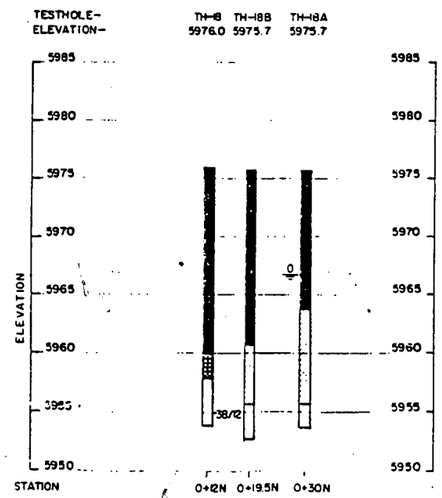
SANITARY LANDFILL EXTENSION

BORING LOGS

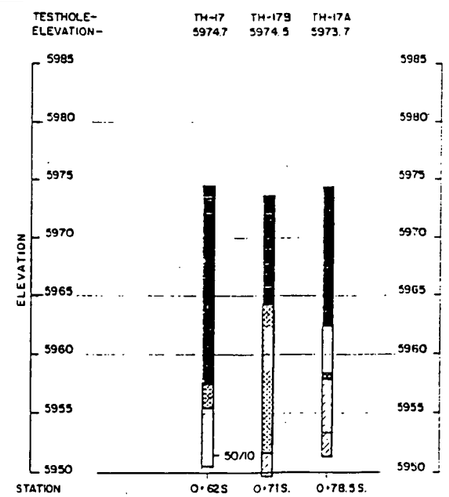
SIZE	DRAWING NUMBER	ISSUE	SHEET
D	27915-005	A	5 OF



TEST PITS



NORTH TIE IN LINE



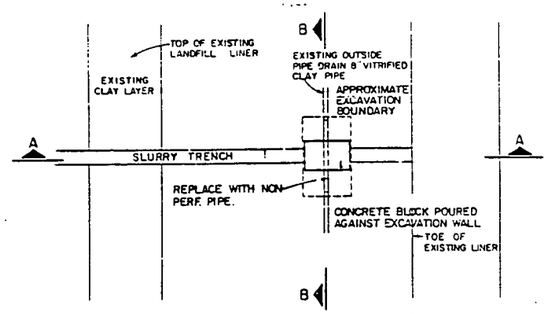
SOUTH TIE IN LINE

LEGEND:

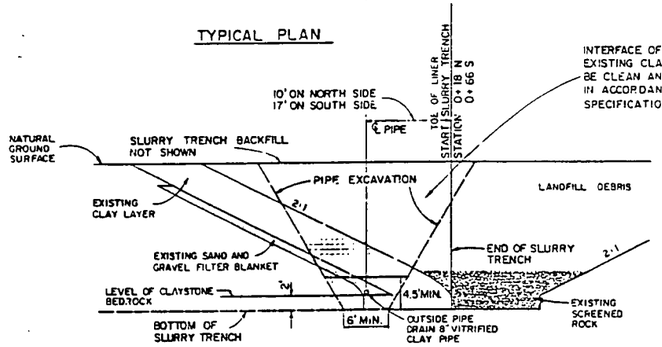
TOPSOIL	ORGANIC, SANDY TO VERY SANDY, SILTY TO VERY SILTY, SOME GRAVELLS AND COBBLES, DRY TO MOIST, BROWN TO DARK BROWN (OL, CL, CL).
FILL	CLAY, SANDY TO VERY SANDY, GRAVELLY, SLIGHTLY SILTY, OCCASIONAL COBBLES AND BOULDERS, MOIST, RED-BROWN (CL, CL-ML, ZONE A BORROW AREA)
LANDFILL DEBRIS	SANDY, CLAYEY, SILTY, WITH WOOD, BRICK, GLASS, METAL AND GENERAL CONSTRUCTION DEBRIS, GENERALLY UNCONSOLIDATED (AF).
FILL	CLAYEY, SLIGHTLY SILTY, SLIGHTLY SANDY, SOFT TO MEDIUM STIFF, MOIST TO WET, BROWN TO GRAY (CL) (MODIFIABLE LINER MATERIAL FOR EXISTING LANDFILL TRENCH SECTION).
CLAY	ANELASTIC, VERY STIFF, SILTY, SANDY TO VERY SANDY WITH SAND LENSES, GRAVELLY WITH OCCASIONAL GRAVEL LENSES, OCCASIONAL COBBLES AND BOULDERS, CALCAREOUS, DRY TO MOIST, REDDISH BROWN TO DARK BROWN (CL, CL-SC, SC) (MUCKY FLATS ALLUVIUM, HIGHLY WEATHERED)
SAND	ANELASTIC, MEDIUM DENSE TO VERY DENSE, SILTY TO VERY SILTY, SLIGHTLY TO VERY CLAYEY WITH SANDY CLAY LENSES, GRAVELLY WITH GRAVEL LENSES, OCCASIONAL COBBLES AND BOULDERS, CALCAREOUS, MOIST TO WET, TAN TO BROWN TO OLIVE (SM, SM-SC, SC) (MUCKY FLATS ALLUVIUM, HIGHLY WEATHERED)
GRAVEL	VERY DENSE, SANDY TO VERY SANDY, CLAYEY, DRY TO MOIST, GRAY TO BROWN (GC, GC-GM) (MUCKY FLATS ALLUVIUM, HIGHLY WEATHERED)
GRAVEL	DENSE, SANDY, CLAYEY, GRAY, APPROXIMATELY 1/2" TO 1" DIAMETER (GM-GC) (MODIFIABLE LINER MATERIAL FOR LANDFILL TRENCH SECTION)
CLAY	ANELASTIC, VERY STIFF, SANDY WITH CLAYEY SAND LENSES, SILTY TO VERY SILTY, MOIST TO WET, GRAY TO GOLD TO OLIVE (CH, CL, SC-SM) (ARAPAHOE FORMATION, WEATHERED)
CLAYSTONE	HARD TO VERY HARD, WITH OCCASIONAL SANDSTONE AND SILTSTONE LENSES, SOME MINOR LIGNITE, MOIST TO WET, GRAY TO BROWN - (ARAPAHOE FORMATION)
CLAYSTONE	MEDIUM HARD, SANDY WITH OCCASIONAL SANDSTONE AND SILTSTONE LENSES, MOIST, OLIVE TO BROWN TO GOLD, ANELASTIC IN UPPER PORTION (ARAPAHOE FORMATION)
50/9	INDICATES THAT 50 BLOWS OF A 140 LB. WEIGHT IS NEEDED TO DRIVE A 2 INCH SAMPLER 9 INCHES
	INDICATES A GRADUAL CHANGE IN MATERIALS
8	INDICATES LARGE BULK SAMPLE OF MATERIAL TAKEN FROM DESIGNATED INTERVAL
2x10⁻⁷	INDICATES AVERAGE COEFFICIENT OF PERMEABILITY OF 2 FEET PER YEAR FOR DESIGNATED INTERVAL AS DETERMINED BY A FALLING HEAD OR CONSTANT HEAD PERMEABILITY TEST. DETAILS OF TEST RESULTS ARE PRESENTED IN THE CONTRACT DOCUMENTS.
-S	DEPTH AND EXTENT OF BULK SAMPLE
	DEPTH AND EXTENT OF 2-INCH DIAMETER PVC PIEZOMETER

PART	QUAN	DESCRIPTION	MATERIAL

A	AS BUILT				
SYM	DESCRIPTION	DATE	DOE	CLASS	JOB NO.
TOLERANCES FRACT. ± ANGLE ± DEC. ±		BY	DATE	U.S. DEPARTMENT OF ENERGY ROCKY FLATS AREA OFFICE GOLDEN, COLORADO	
	DESIGNED	CESARE	6-82	ENERGY SYSTEMS GROUP ROCKWELL INTERNATIONAL	
UNLESS NOTED OTHERWISE	DRAWN	FRAGUA	6-82		
	CHECKED		7/15/82		
	APPROVED		8-3-82	ROCKY FLATS PLANT GOLDEN, COLORADO	
REMOVE BURRS AND SHARP EDGES				SANITARY LANDFILL EXTENSION	
NEXT ASSEMBLY				BORING LOGS	
DOE CONT NO.	SUBMITTED			SIZE / DRAWING NUMBER / ISSUE / SHEET	
SCALE N/A	APPROVED DOE			D 27915-005 A 5 OF	



TYPICAL PLAN

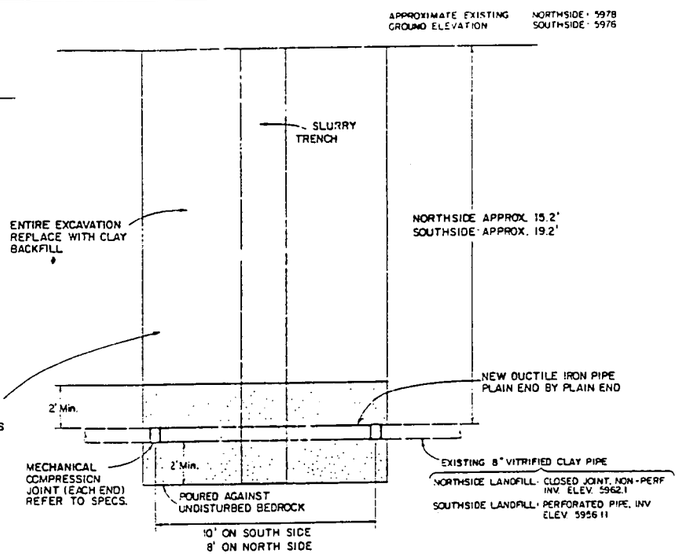


SECTION A-A

DRAIN PIPE - SLURRY TRENCH INTERSECTION

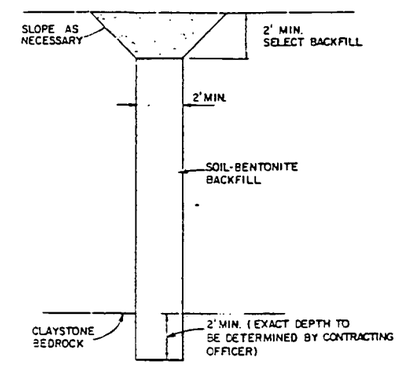
(TYPICAL DETAIL TWO LOCATIONS)

5 0 5 10 FEET



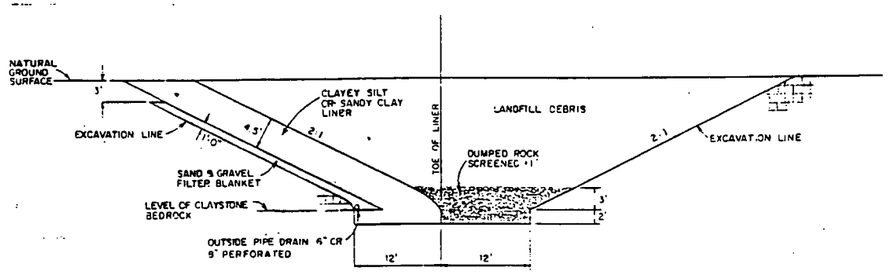
DRAIN PIPE REPLACEMENT SECTION B-B

0 1 2 3 4 5 FEET



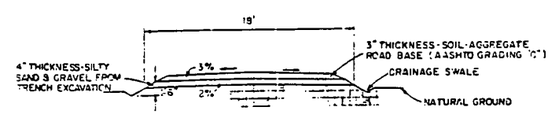
TYPICAL SLURRY TRENCH DETAIL

NOT TO SCALE



TYPICAL EXISTING LANDFILL LINER SECTION

5 0 5 10 FEET



TYPICAL SECTION ACCESS ROAD REPAIR

5 0 5 FEET

NOTE:

PEN SIZE INDICATES EXISTING

PEN SIZE INDICATES NEW

PART	QUAN.	DESCRIPTION	MATERIAL

A	AS BUILT			
ISSUE	DESCRIPTION	BY	DATE	
TOLERANCES FRACT ± ANGLE ± DEC ± UNLESS NOTED OTHERWISE	DESIGNED	CRANDEL	6-82	
	DRAWN	FRAGUA	6-82	
	CHECKED	RGC	7/12/82	
	APPROVED		7/12/82	
REMOVE BURRS AND SHARP EDGES				
NEXT ASSEMBLY				
DOE CONT NO	SUBMITTED			
	APPROVED			
SCALE SEE DETAIL	APPROVED			

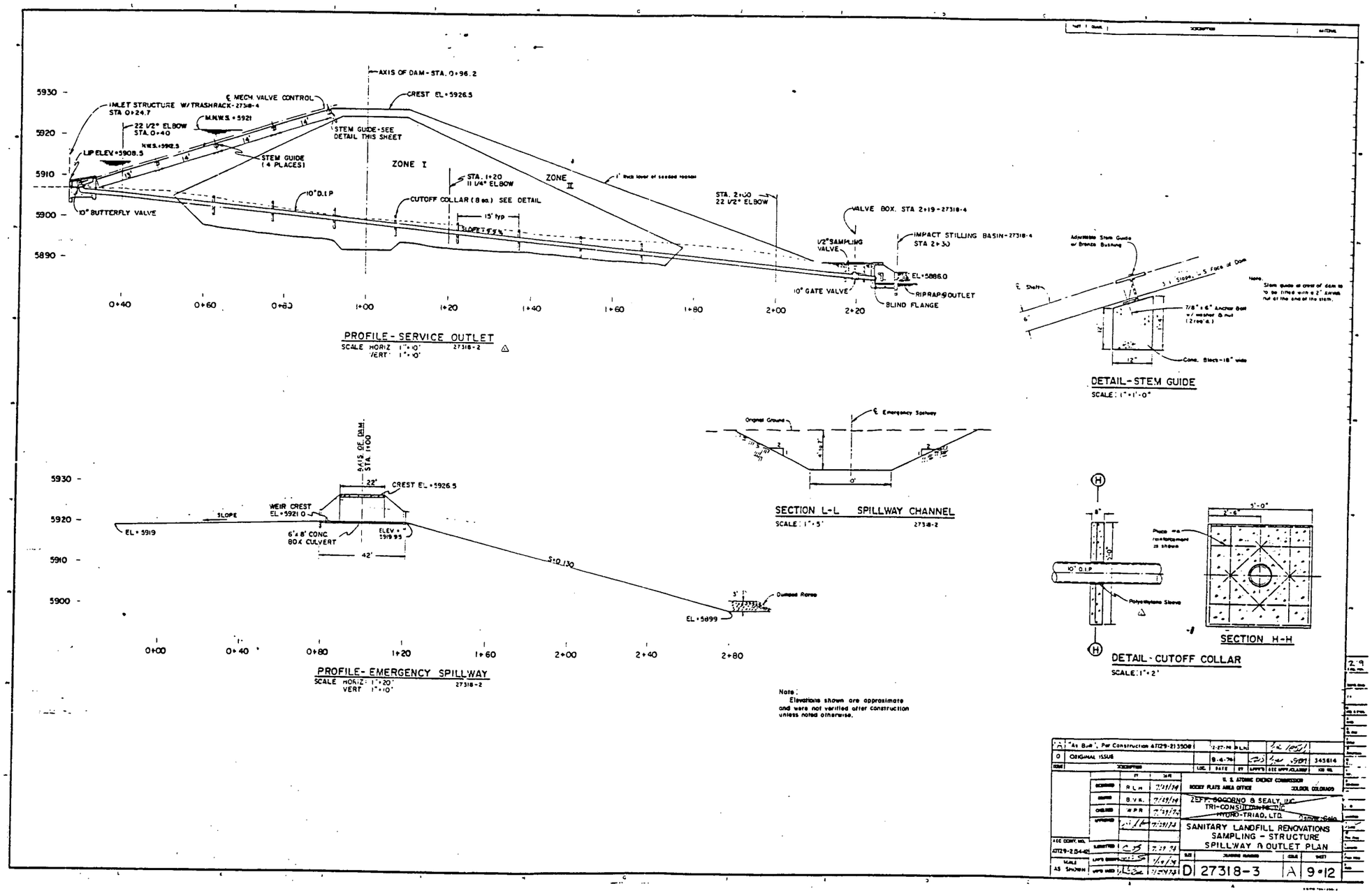
DATE | JOB (CLASS) JOB NO.

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN COLORADO

ENERGY SYSTEMS GROUP
ROCKWELL INTERNATIONAL
ROCKY FLATS PLANT GOLDEN, COLORADO

SANITARY LANDFILL EXTENSION
DETAIL SHEET

SIZE	DRAWING NUMBER	ISSUE	SHEET
D	27915-006	A	6 OF



PROFILE - SERVICE OUTLET
SCALE HORIZ 1" = 10' VERT 1" = 10'
27318-2

DETAIL - STEM GUIDE
SCALE: 1" = 1'-0"

SECTION L-L SPILLWAY CHANNEL
SCALE: 1" = 5'
27318-2

PROFILE - EMERGENCY SPILLWAY
SCALE HORIZ: 1" = 20' VERT 1" = 10'
27318-2

SECTION H-H

DETAIL - CUTOFF COLLAR
SCALE: 1" = 2'

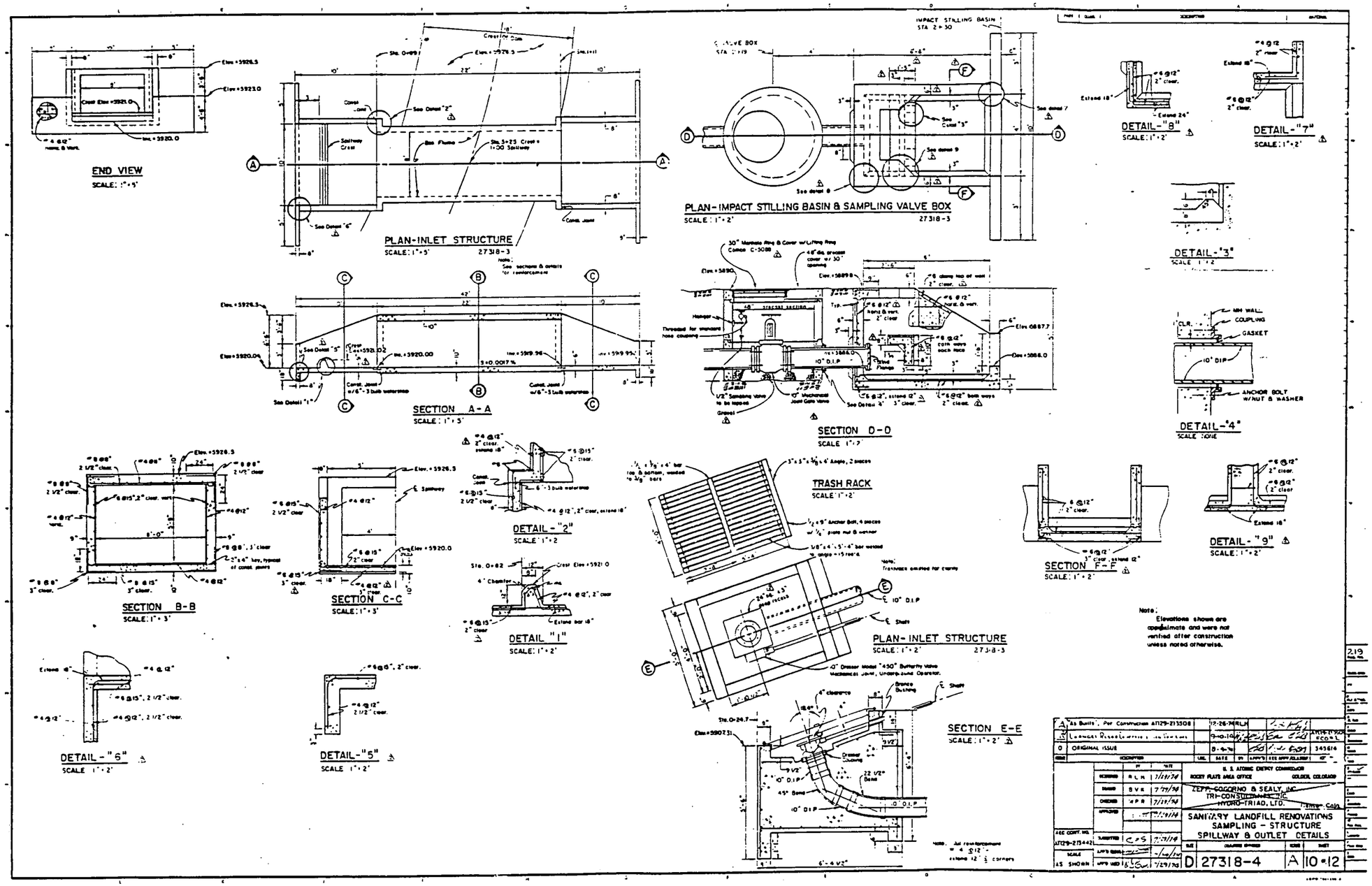
Note:
Elevations shown are approximate and were not verified after construction unless noted otherwise.

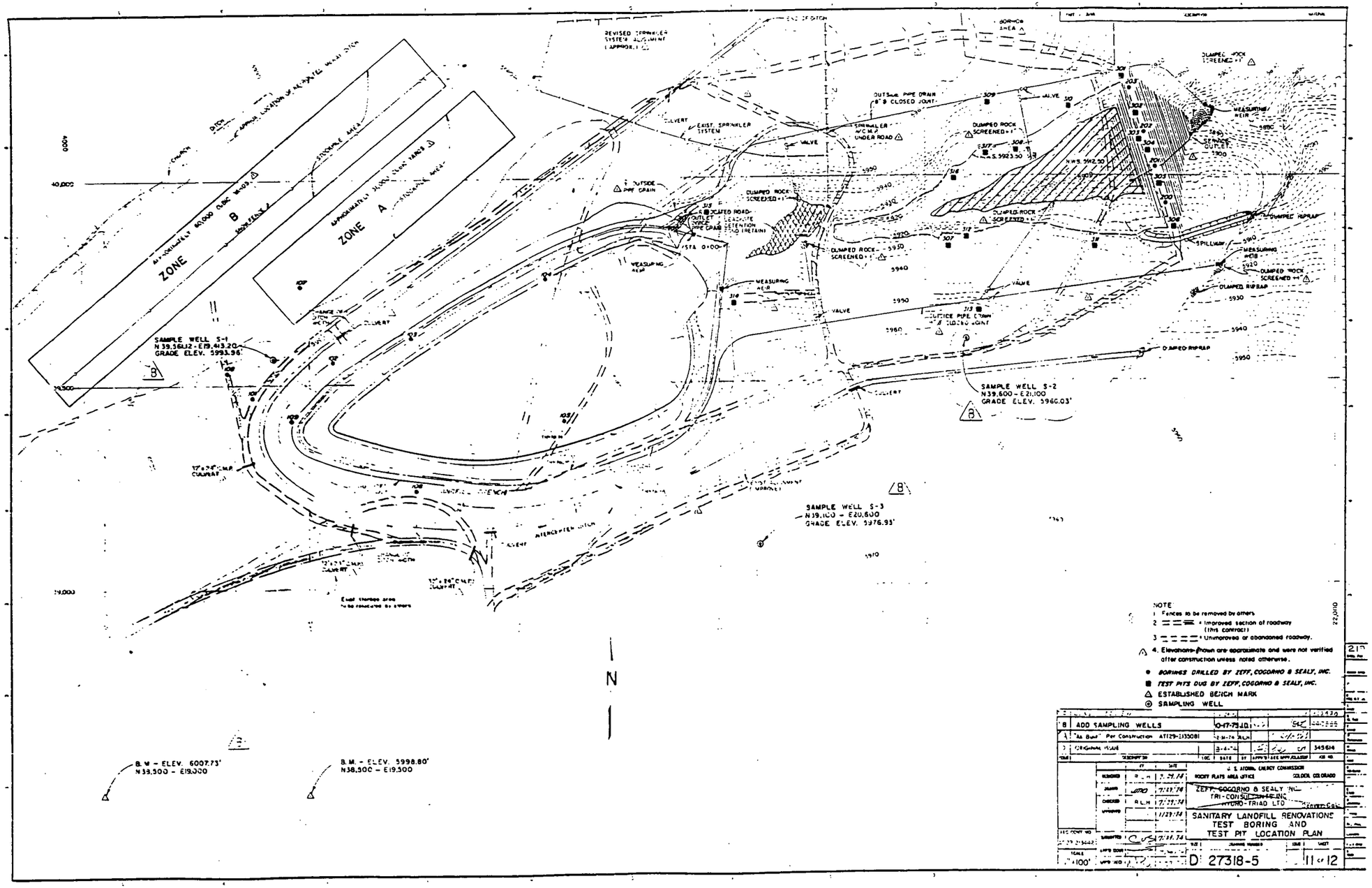
A	"As Built", Per Construction AT129-213508	12-27-74	R.L.H.		
0	ORIGINAL ISSUE	9-4-74			345614

U. S. ATOMIC ENERGY COMMISSION
ROCKY FLATS AREA OFFICE — COLORADO
ZEFF, GOGORNO & SEALY, INC.
TRI-CONSULTANTS, INC.
HYDRO-TRIAD, LTD.
Denver, Colo.

SANITARY LANDFILL RENOVATIONS
SAMPLING - STRUCTURE
SPILLWAY & OUTLET PLAN

AEC CONT. NO. AT129-2154-01
SCALE AS SHOWN
D 27318-3 A 9 of 12


END VIEW
SCALE: 1"=5'
PLAN-INLET STRUCTURE
SCALE: 1"=5'
27318-3
PLAN-IMPACT STILLING BASIN & SAMPLING VALVE BOX
SCALE: 1"=2'
27318-3
DETAIL-"8"
SCALE: 1"=2'
DETAIL-"7"
SCALE: 1"=2'
DETAIL-"3"
SECTION A-A
SCALE: 1"=5'
SECTION D-D
SCALE: 1"=2'
DETAIL-"4"
SCALE: NONE
SECTION B-B
SCALE: 1"=3'
SECTION C-C
SCALE: 1"=3'
DETAIL-"2"
SCALE: 1"=2'
DETAIL "1"
SCALE: 1"=2'
TRASH RACK
SCALE: 1"=2'
SECTION F-F
SCALE: 1"=2'
DETAIL-"9"
SCALE: 1"=2'
PLAN-INLET STRUCTURE
SCALE: 1"=2'
27318-3
SECTION E-E
SCALE: 1"=2'
DETAIL-"6"
SCALE: 1"=2'
DETAIL-"5"
SCALE: 1"=2'
Note:
Elevations shown are approximate and were not verified after construction unless noted otherwise.
A As Builts, Per Construction AT129-213508 12-26-74 RLH
0 ORIGINAL ISSUE 8-4-74 345614
U. S. ATOMIC ENERGY COMMISSION
ROCKY FLATS AREA OFFICE GOLDEN, COLORADO
ZEPP, GOGORNO & SEALY, INC.
TRI-CONSULTANTS, INC.
HYDRO-TRIAD, LTD.
SANITARY LANDFILL RENOVATIONS
SAMPLING - STRUCTURE
SPILLWAY & OUTLET DETAILS
AS SHOWN
D 27318-4 A 10-12


ZONE B
ZONE A
SAMPLE WELL S-1
N 39,561.12 - E19,413.20
GRADE ELEV. 5993.96'
SAMPLE WELL S-2
N39,600 - E21,100
GRADE ELEV. 5960.03'
SAMPLE WELL S-3
N39,100 - E20,600
GRADE ELEV. 5976.93'
B.M. - ELEV. 6007.73'
N38,500 - E19,000
B.M. - ELEV. 5998.80'
N38,500 - E19,500
N
NOTE:
1. Fences to be removed by others
2. = Improved section of roadway (this contract)
3. = Unimproved or abandoned roadway.
4. Elevations shown are approximate and were not verified after construction unless noted otherwise.
BORINGS DRILLED BY ZEFF, COGORNO & SEALY, INC.
TEST PITS DUG BY ZEFF, COGORNO & SEALY, INC.
ESTABLISHED BENCH MARK
SAMPLING WELL
ADD SAMPLING WELLS
"As Built" Per Construction AT(29-2)3508
ORIGINAL ISSUE
345614
U.S. ATOMIC ENERGY COMMISSION
ROCKY FLATS AREA OFFICE
GOLDEN, COLORADO
ZEFF, COGORNO & SEALY INC.
TRI-CONSULTANTS INC.
HYDRO-TRIAD LTD
SANITARY LANDFILL RENOVATIONS
TEST BORING AND
TEST PIT LOCATION PLAN
D 27318-5
11 of 12

Elevations shown are approximate and were not verified after construction unless noted otherwise.

● BORINGS DRILLED BY ZEFF, COGORNO & SEALY, INC

■ TEST PITS DUG BY ZEFF, COGORNO & SEALY, INC.

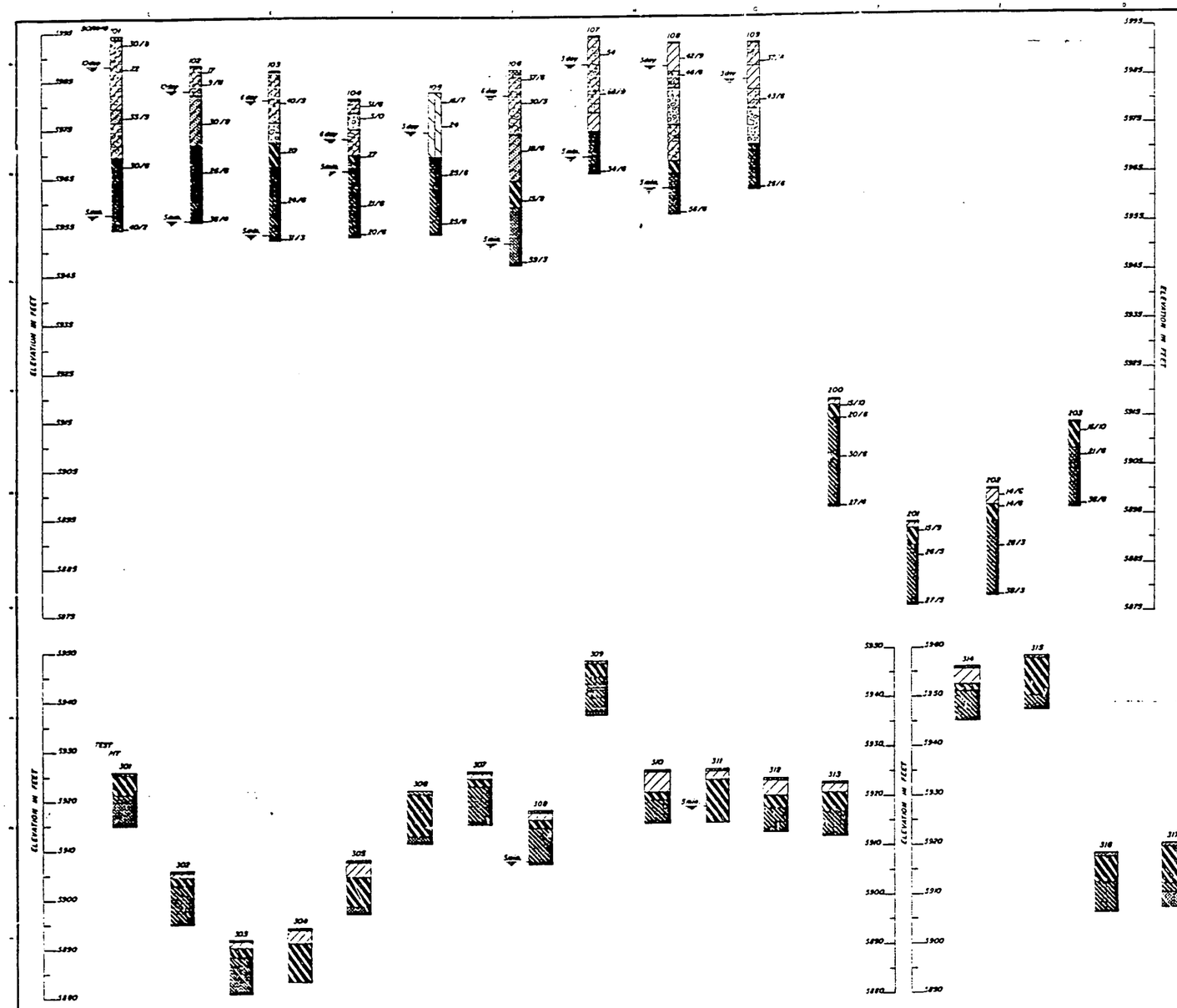
△ ESTABLISHED BENCH MARK

⊖ SAMPLING WELL

ROCKWELL INTERNATIONAL
ATOMICS INTERNATIONAL DIVISION

SANITARY LANDFILL RENOVATIONS
TEST BORING AND
TEST PIT LOCATION PLAN

D 27318-5- 11 12



LEGEND:

- TOPSOIL
- FILL - CLAY, SANDY WITH GRAVELS AND COBBLES
- SANITARY LANDFILL
- ALLUVIUM CONSISTING OF MIXTURES OF CLAYS, SANDS AND GRAVELS WITH RANDOM AMOUNTS OF COBBLES AND BOULDERS
- CLAY, SANDY TO VERY SANDY, SILTY, VERY STIFF, MEDIUM MOIST TO MOIST, BROWN, GRAVEL
- SAND, CLAYEY WITH CLAY LAYERS, MEDIUM DENSE TO DENSE, MEDIUM MOIST TO WET, RANDOM GRAVELS AND COBBLES
- SAND AND GRAVEL, DENSE TO VERY DENSE, MEDIUM MOIST TO WET, SOME COBBLES AND BOULDERS
- SAND AND GRAVEL, SLIGHTY CLAYEY TO CLAYEY, DENSE TO VERY DENSE, SOME COBBLES AND BOULDERS
- CLAY (SEVERELY WEATHERED CLAYSTONE), VERY STIFF, MOIST
- CLAYSTONE BEDROCK (SHALE), WEATHERED, MEDIUM HARD TO VERY HARD, MOIST, VARICOLORED, YELLOW, BROWN AND GRAY
- CLAYSTONE BEDROCK (SHALE), WEATHERED, HARD TO VERY HARD, MOIST, YELLOW AND GRAY
- WATER TABLE, TIME AFTER DRILLING

NOTES:

(1). THE BORINGS WERE DRILLED MAY 28 THROUGH JUNE 3, 1974, WITH A 4" DIAMETER, CONTINUOUS FLIGHT, POWER AUGER.

(2). THE TEST PITS WERE DUG MAY 30 AND 31, 1974 WITH A BACKHOE.

(3). 30 INDICATES THAT 30 BLOWS OF A 140-LB. HAMMER FALLING 30" WERE REQUIRED TO DRIVE THE SAMPLER 6".

(4). THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL.

(5). THE BORING LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED, AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

B	CLASS. REVIEW		06-24-83			900430
A	ORIGINAL ISSUE - AS BUILT		2-4-74			345814

U.S. ATOMIC ENERGY COMMISSION
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

DESIGNED R.L.H. 7/29/74
DRAWN J.M.D. 7/29/74
CHECKED R.L.H. 7/29/74
APPROVED 7/29/74
SUBMITTED 7/29/74
APP'D BUILDER 7/29/74
APP'D ARCH 7/29/74

ZERR-GOODRNO & SEALY, INC.
TRI-CONSULTANTS, INC.
HYDRO-TRIAD, LTD.
Denver, Colo.

SANITARY LANDFILL RENOVATIONS
LOGS OF EXPLORATORY BORINGS
AND TEST PITS

AEC CONT. NO. AT29-2(3-4-2)
SCALE 1"=10'
SIZE D — DRAWING NUMBER 27318-6 — REV. B — SHEET 12 of 12

219

This is a
CONTROLLED DOCUMENT
EG&G — ROCKY FLATS PLANT
ENVIRONMENTAL MANAGEMENT DEPARTMENT
This is a RED Stamp

ROCKY FLATS PLANT Phase I RFI/RI Work Plan for Operable Unit 7 - Present Landfill IHSS 114 and Inactive Hazardous Waste Storage Area IHSS 203	Manual No.: Section No.: Organization:	2100-WP-OU 07.01 APPB, R0 Environmental Management

Title: Appendix B: Real-Time Soil -Gas Survey, September 1987

Approved by:

12/6/91 Effective Date	T. P. O'Rourke Manager	6/23/92 Date

APPENDIX B

Real-Time Soil-Gas Survey,

September 1987

Chen & Associates
Consulting Geotechnical Engineers

96 South Zuni
Denver, Colorado 80223
303/744-7105

Casper
Colorado Springs
Ft. Collins
Glenwood Springs
Phoenix
Rock Springs
Salt Lake City
San Antonio

June 25, 1987

Subject: Soil-Gas Survey, 881 Hillside Site, Rocky Flats Plant, Golden, Colorado

Job No. 6 011 87

Mr. Tom Greengard
Rockwell International
North American Space Operations
Rocky Flats Plant
P.O. Box 464
Golden, Colorado 80402-0474

Dear Mr. Greengard:

As part of the quality assurance, quality control program for the soil-gas survey at the Hillside study site, blanks and sample duplicates were collected and analyzed alongside the regular soil-gas samples. For sample numbers 1 through 120 at the 881 Hillside area, there were two blanks and 13 sets of duplicate samples taken. The results of the blank and duplication data are shown on the attached tables. The numbering on these samples reflects the sequential numbering starting at 1 and going through 120 at the 881 Hillside site. The numbers above 120 and in parenthesis were numbers given by the lab to the duplicate wire and should not be confused with identical numbering given later to samples at other sites.

The blank samples showed no sign of contamination from either the lab preparation or the sample handling procedures. No detectable levels of DCE, TCA, CTC, TCE and PCE were found in either of the two blanks.

None of the thirteen duplicate sets for DCE, TCA or CTC show detectable ions. Duplicate deviations for PCE ranged from 0 to 1006 ion counts averaging 182. Nine of thirteen PCE duplicates had identical results of 0 or no ions detected. Duplicate deviations for TCE ranged from 0 to 352 averaging 27. Twelve of thirteen TCE duplicates had indentification values of zero ions detected. When plotted, the duplicate data shown on the data maps is averaged.

It is difficult to draw any significant conclusions about the duplicate samples due to the small size of the sample set. The results appear to indicate some scatter of values when high concentrations are detected.

If you have any questions on any of the QA/QC data, please give me a call.

Sincerely,

CHEN & ASSOCIATES, INC.

By_____
Kit Nielsen
Environmental Engineer

KN/eac
Rev. By: DRG
Encs.

ROCKY FLATS SOIL-GAS SURVEY
QA/QC RESULTS
HILLSIDE SITE SAMPLE # 1-120

DUPLICATE SAMPLES

SAMPLE #	DCE	TCA	CTC	TCE	PCE
32	0	0	0	0	965
(130)	0	0	0	0	209
50	0	0	0	0	0
(119)	0	0	0	0	0
65	0	0	0	0	0
(120)	0	0	0	0	0
77	0	0	0	0	0
78	0	0	0	0	0
93	0	0	0	0	0
(121)	0	0	0	0	0
98	0	0	0	0	0
(122)	0	0	0	0	0
101	0	0	0	0	0
(123)	0	0	0	0	0
104	0	0	0	0	0
(124)	0	0	0	0	0
107	0	0	0	0	0
(125)	0	0	0	0	0
110	0	0	0	0	155
(126)	0	0	0	0	455
114	0	0	0	0	0
(127)	0	0	0	0	0
115	0	0	0	0	1,006
(128)	0	0	0	0	0
116	0	0	0	0	968
(129)	0	0	0	352	1,271

(###) DENOTES LAB NUMBERING ON DUPLICATE SAMPLES

ROCKY FLATS SOIL-GAS SURVEY
QA/QC RESULTS
HILLSIDE SITE SAMPLE # 1 - 120

BLANK SAMPLES

SAMPLE #	DCE	TCA	CTC	TCE	PCE
17	0	0	0	0	0
44	0	0	0	0	0

Chen & Associates
Consulting Geotechnical Engineers

96 South Zuni
Denver, Colorado 80223
303/744-7105

Casper
Colorado Springs
Fort Collins
Glenwood Springs
Rock Springs
Salt Lake City
San Antonio

July 22, 1987

Subject: Soil-Gas Survey, 903 Pad, Mound, Fence Area, Rocky Flats Plant, Golden, Colorado

Job No. 6 011 87

Mr. Tom Greengard
Rockwell International
North American Space Operations
Rocky Flats Plant
P.O. Box 464
Golden, Colorado 80402-0474

Dear Mr. Greengard:

As part of the quality assurance, quality control program for the soil-gas survey at the 903 Pad, Mound and Fence Area study sites, blank and sample duplicates were collected and analyzed alongside the regular soil-gas samples. For sample location numbers 120 through 658 at the subject area, there were seven blanks and 41 duplicate samples taken. The results of the blank and duplication data are shown on the attached tables. The numbering on these samples reflects the sequential numbering staring at 120 and going through 658 at the subject site. The numbers in parenthesis were numbers given by the lab to the duplicate wire and should not be confused with identical numbering given to samples at other locations.

The blank samples showed no sign of contamination from either the lab preparation or the sample handling procedures. No detectable levels of DCE, TCA, CTC, TCE, and PCE were found in any of the seven blank samples.

None of the 41 duplicate sets showed detectable ions for either DCE or TCA. Nineteen of the duplicate sets showed no detectable presence of any of the five compounds analyzed. For the 22 duplicate sets of samples in which laboratory analysis detected either one or more of the compounds CTC, TCE or PCE, there are a total of 40 individual duplicate sets that are compared for the single compounds within the sample sets. The following table summarizes the deviation in the ion count when the individual duplicate sets are compared.

Deviation Magnitude	Number of Sets
0-100	4
100-200	8
200-500	11
500-1000	4
1000-5000	7
>5000	6

When plotted, the duplicate data shown on the data maps is averaged.

The amount of deviation observed in the samples generally is related to the magnitude of the compound concentration in the samples. The high concentration sample sets, 10,000 plus, vary at that magnitude. And likewise as the concentration decrease to lower magnitudes, the variance in the duplicates appears to occur at these magnitudes.

If you have any questions on any of the QA/QC data, please give me a call.

Sincerely,

CHEN & ASSOCIATES, INC.

By_____
Kit F. Nielsen
Environmental Engineer

KFN/eac
Rev. By: DRG
Encs.

ROCKY FLATS SOIL-GAS SURVEY
QA/QC RESULTS
903 PAD, MOUND, AND FENCE AREA
SAMPLE # 120 - 658

DUPLICATE SAMPLES

SAMPLE NUMBER	DCE	TCA	CTC	TCE	PCE
120	0	0	0	0	0
(314)	0	0	0	408	0
128	0	0	0	107	176
(332)	0	0	0	322	306
138	0	0	0	0	0
(315)	0	0	0	0	0
153	0	0	0	0	0
(333)	0	0	0	0	0
168	0	0	0	0	0
(317)	0	0	0	0	0
174	0	0	0	0	0
(318)	0	0	0	0	0
179	0	0	0	0	0
(319)	0	0	0	0	0
199	0	0	406	156	165
(320)	0	0	380	397	105
203	0	0	1,848	2,708	1,856
(321)	0	0	1,738	3,253	2,048
214	0	0	0	0	0
(322)	0	0	0	0	0
223	0	0	0	0	0
(323)	0	0	0	0	0
228	0	0	568	0	0
(324)	0	0	850	0	0
244	0	0	0	0	0
(325)	0	0	0	0	0
247	0	0	0	380	0
(326)	0	0	0	237	0

ROCKY FLATS SOIL-GAS SURVEY
QA/QC RESULTS
903 PAD, MOUND, AND FENCE AREA
SAMPLE # 120 - 658

DUPLICATE SAMPLES

SAMPLE NUMBER	DCE	TCA	CTC	TCE	PCE
259	0	0	800	23,546	37,706
(327)	0	0	587	17,158	32,102
264	0	0	0	0	0
(328)	0	0	0	0	0
290	0	0	539	2,124	25,094
(329)	0	0	3,156	6,201	73,030
292	0	0	594	196	6,580
(330)	0	0	1,572	847	14,749
306	0	0	408	0	4,466
(331)	0	0	967	0	9,776
320	0	0	0	0	0
(468)	0	0	0	0	0
322	0	0	0	863	0
(469)	0	0	0	0	0
343	0	0	1,724	732	23,564
(471)	0	0	390	116	5,540
358	0	0	1,811	819	16,679
(472)	0	0	2,634	1,024	21,882
384	0	0	0	0	0
(474)	0	0	0	0	0
406	0	0	0	196	12,318
(475)	0	0	0	337	9,546
414	0	0	0	389	0
(476)	0	0	0	326	0
416	0	0	0	754	155
(477)	0	0	0	1,484	122
422	0	0	0	1,008	0
423	0	0	0	13,636	0
426	0	0	0	0	0
(478)	0	0	0	0	0

ROCKY FLATS SOIL-GAS SURVEY
QA/QC RESULTS
903 PAD, MOUND, AND FENCE AREA
SAMPLE # 120 - 658

DUPLICATE SAMPLES

SAMPLE NUMBER	DCE	TCA	CTC	TCE	PCE
429	0	0	754	0	0
(479)	0	0	803	0	0
458	0	0	0	0	52,912
459	0	0	0	0	25,284
466	0	0	0	0	0
(480)	0	0	0	0	342
486	0	0	0	0	760
(650)	0	0	0	0	375
506	0	0	0	0	2,950
(651)	0	0	0	0	3,626
525	0	0	0	0	0
(652)	0	0	0	0	0
537	0	0	0	0	0
(653)	0	0	0	0	0
569	0	0	0	0	0
(654)	0	0	0	0	0
572	0	0	0	0	0
(655)	0	0	0	0	0
603	0	0	0	0	0
(656)	0	0	0	0	0
631	0	0	0	0	0
(657)	0	0	0	0	0
632	0	0	0	0	0
(658)	0	0	0	0	0

(###) LAB NUMBERING OF DUPLICATE SAMPLE

ROCKY FLATS SOIL-GAS SURVEY
QA/QC RESULTS
903 PAD, MOUND, AND FENCE AREA
SAMPLE # 120 - 658

FIELD BLANK DATA

SAMPLE NUMBER	DCE	TCA	CTC	TCE	PCE
308	0	0	0	0	0
314	0	0	0	0	0
360	0	0	0	0	0
395	0	0	0	0	0
442	0	0	0	0	0
507	0	0	0	0	0
565	0	0	0	0	0

Chen & Associates
Consulting Geotechnical Engineers

96 South Zuni
Denver, Colorado 80223
303/744-7105

Casper
Colorado Springs
Fort Collins
Glenwood Springs
Rock Springs
Salt Lake City
San Antonio

August 3, 1987

Subject: Estimated Cost for Additional Soil-Gas Installation Points and Slug Tests on Environmental Wells

Job No. 6 011 87

Rockwell International
Rocky Flats Plant
North American Space Operations
P.O. Box 464
Golden, Colorado 80402-0464

Attention: P.M. Backes, Subcontract Administrator

Gentlemen:

Chen & Associates is pleased to respond to your requisition of July 20, 1987, requesting 600 additional soil-gas sampling points and 40 slug tests.

The fee for installation, retrieval and analysis of 600 soil-gas sampling points for the compounds TCE, TCA, CCL_4, PCE, and DCE will be $90.00 per tube resulting in a total fee of $27,000.

The fee for conducting 40 slug tests and analyzing the data for transmissivity will be $9,823. This fee includes labor charges of approximately $8,000 for conducting the slug tests, and preparing and producing a letter report. The remainder of the fee, approximately $1,800, is for rental of slug test equipment, personal protective equipment and our environmental sampling van. Two important assumptions have been made in preparing our cost estimate for slug tests. First, the work will be conducted in a Level C or D protective clothing. Second, a sufficient number of wells can be tested to full 8-hour work days.

The total estimated fee for the items discussed above is $63,823. If you have any questions concerning this cost estimate breakdown, please feel free to contact me.

Sincerely,

CHEN & ASSOCIATES, INC.

By_____
David M. Jubenville, P.E.
Vice President and Manager
Waste Management Division

DMJ/eac

Chen & Associates
Consulting Geotechnical Engineers

96 South Zuni
Denver, Colorado 80223
303/744-7105

Casper
Colorado Springs
Ft. Collins
Glenwood Springs
Phoenix
Rock Springs
Salt Lake City
San Antonio

September 10, 1987

Subject: Real Time Soil-Gas, Rocky Flats Landfill, Rocky Flats Plant, Golden, Colorado

Job No. 6 011 87

Rockwell International
Rocky Flats Plant
North American Space Operations
P.O. Box 464
Golden, Colorado 80402-0464

Attention: Mr. Tom Greengard

As requested, Chen & Associates conducted a real time soil-gas survey at the Rocky Flats landfill on September 1 and 2, 1987. Twenty points were measured in the landfill for methane and hydrogen sulfide. The location of those points are shown on Figure 1.

Methane was analyzed by a Century OVA 128 flame ionization detector in the gas chromatography mode. Hydrogen sulfide was analyzed by a Photovac 10S50 gas chromatograph with a photoionization detector. The summary of the analyzed compounds are shown in Table I. All sample and QA/QC Photovac 10S50 chromatograms are shown in Attachment 1.

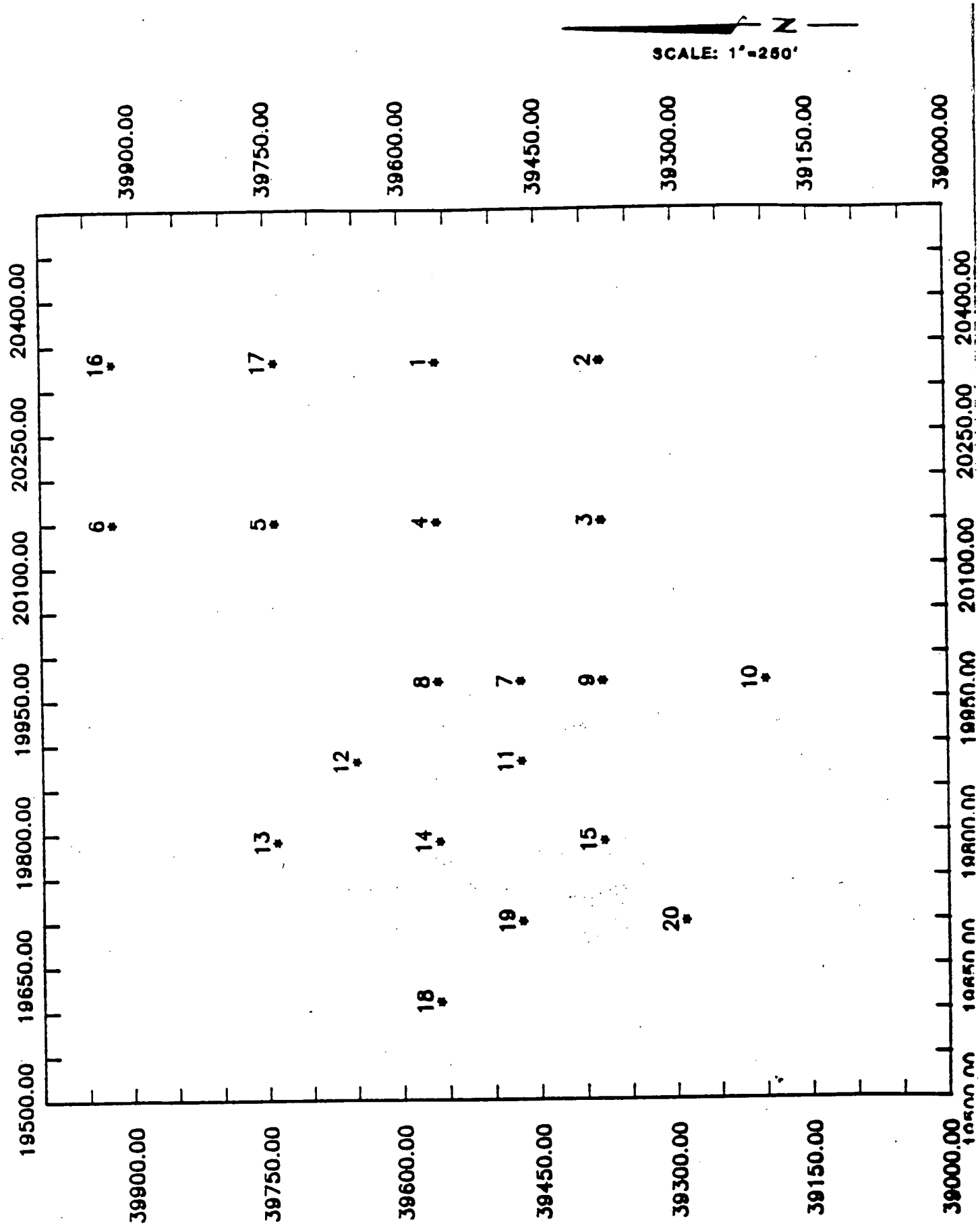
If you have any questions or if we may be of further service, please do not hesitate to contact us.

Sincerely,

CHEN & ASSOCIATES, INC.

By_____
David C. Constant

DCC/eac
Rev. By: DRG
Encs.



6 011 87	Chen & Associates	SOIL GAS SAMPLING POINTS	Fig. 1

TABLE I

SUMMARY OF HYDROGEN SULFIDE AND METHANE RESULTS

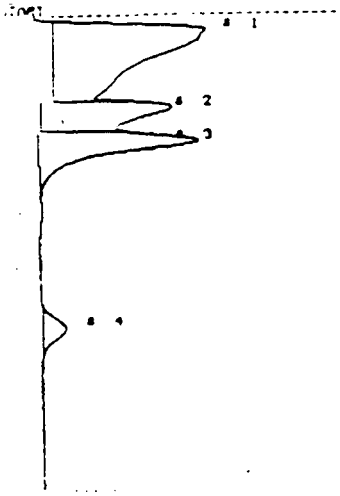
Soil-Gas Sampling Point	Location	Hydrogen Sulfide Value (ppm)	Methane Value (ppm)
1	N39560 E20330	0	0
2	N39380 E20330	0	0.2
3	N39380 E20150	0	0
4	N39560 E20150	0	0
5	N39740 E20150	0	0.4
6	N39920 E20150	0	0
7	N39740 E19970	0	0
8	N39560 E19970	0	0
9	N39380 E19970	0	0
10	N39200 E19970	0	0
11	N39470 E19880	0	0
12	N39650 E19880	0	0
13	N39740 E19790	0	0
14	N39560 E19790	0	0

TABLE I (cont.)

SUMMARY OF HYDROGEN SULFIDE AND METHANE RESULTS

Soil-Gas Sampling Point	Location	Hydrogen Sulfide Value (ppm)	Methane Value (ppm)
15	N39380 E19790	0	0
16	N39920 E20330	0	0
17	N39740 E20330	0	0
18	N39560 E19610	0	0
19	N39470 E19700	0	0
20	N39290 E19700	0	0

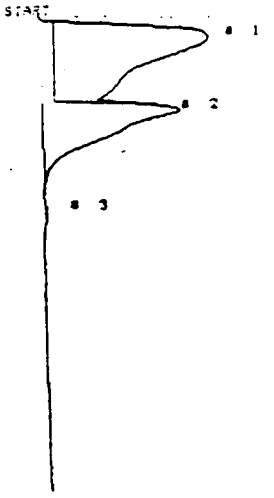
PHOTOVAC



SAMPLE RUN SEP 1 1987 10: 4
ANALYSIS # 27 ROCKY FLATS
TEMPERATURE 24 KMM OCC
GAIN 100 631187

PPM

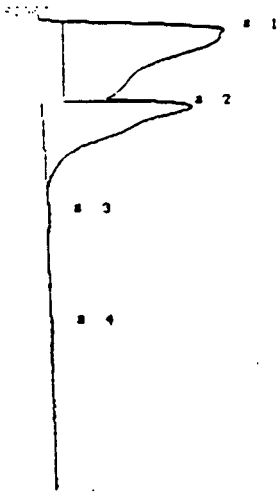
PHOTOVAC



SAMPLE RUN SEP 1 1987 10: 7
ANALYSIS # 28 ROCKY FLATS
TEMPERATURE 24 KMM OCC
GAIN 100 631187

Air Check

PHOTOVAC



SAMPLE RUN SEP 1 1987 10:10
ANALYSIS # 22 ROCKY FLATS
TEMPERATURE 22 KMM OCC
GAIN 100 621187

Sample Equipment Check

PHOTOVAC

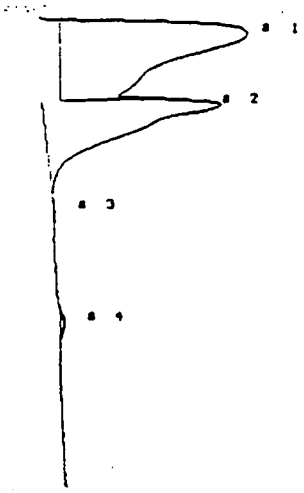
CALIBRATED PEAK 3.H2S

SAMPLE RUN SEP 1 1987 10: 5
ANALYSIS # 27 ROCKY FLATS
TEMPERATURE 24 KMM OCC
GAIN 100 631187

PPM

H_2S Calibration

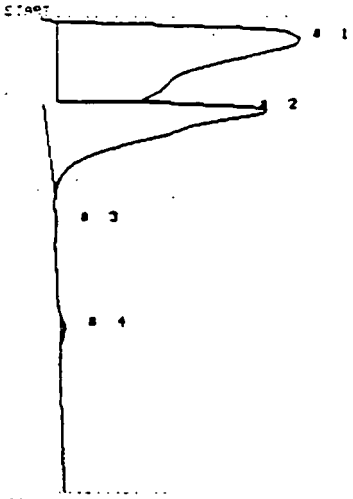
PHOTOVAC



SAMPLE RUN SEP 1 1987 10:20
ANALYSIS # 31 ROCKY FLATS
TEMPERATURE 24 KPA OCC
GAIN 100 601187

1

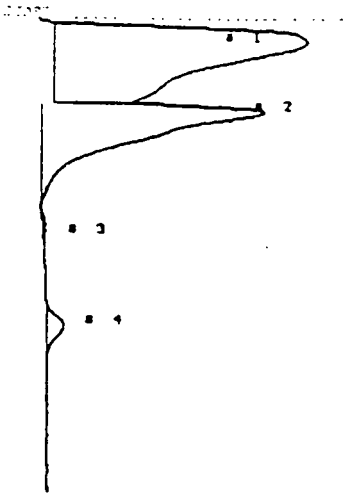
PHOTOVAC



SAMPLE RUN SEP 1 1987 10:29
ANALYSIS # 32 ROCKY FLATS
TEMPERATURE 24 KPA OCC
GAIN 100 601187

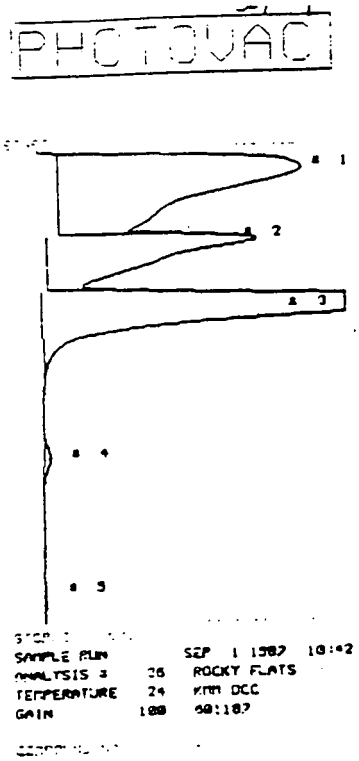
2

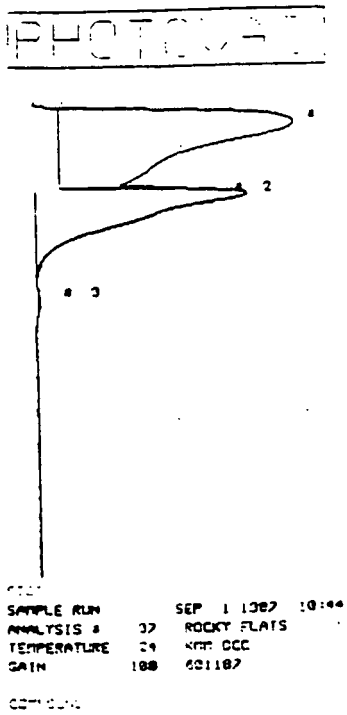
PHOTOVAC

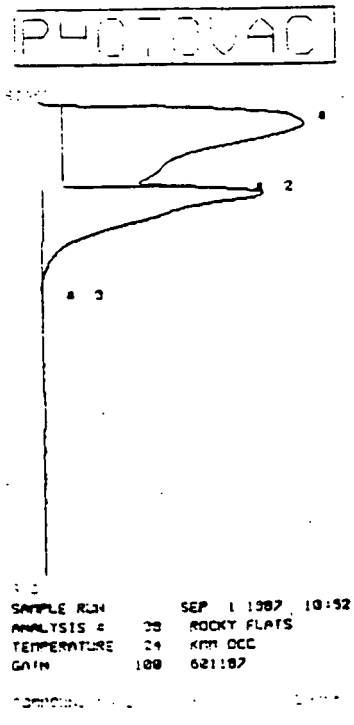


SAMPLE RUN SEP 1 1987 10:33
ANALYSIS # 33 ROCKY FLATS
TEMPERATURE 23 KPA OCC
GAIN 100 601187

3


PHOTOVAC
1
2
3
4
5
SAMPLE RUN SEP 1 1987 10:42
ANALYSIS # 26 ROCKY FLATS
TEMPERATURE 24 KMM OCC
GAIN 100 601187


2
3
SAMPLE RUN SEP 1 1987 10:44
ANALYSIS # 37 ROCKY FLATS
TEMPERATURE 24 KMM OCC
GAIN 100 601187

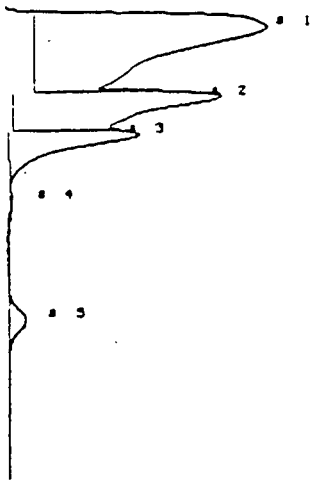

2
3
SAMPLE RUN SEP 1 1987 10:52
ANALYSIS # 28 ROCKY FLATS
TEMPERATURE 24 KMM OCC
GAIN 100 621187

Air Check

4

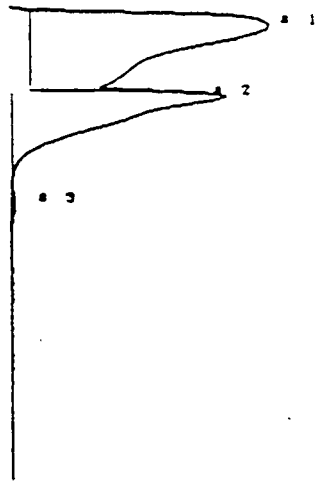
5

PHOTOVAC



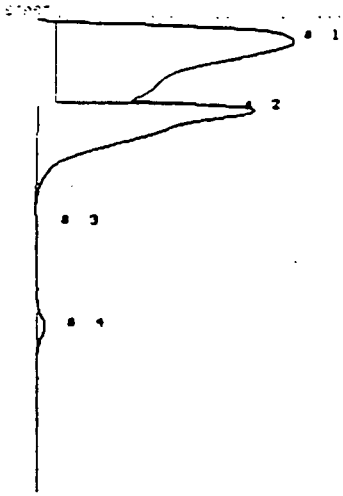
SAMPLE RUN SEP 1 1992 10:54
ANALYSIS # 39 ROCKY FLATS
TEMPERATURE 25 KMM OCC
GAIN 100 621187

PHOTOVAC



SAMPLE RUN SEP 1 1992 10:57
ANALYSIS # 40 ROCKY FLATS
TEMPERATURE 24 KMM OCC
GAIN 100 621187

PHOTOVAC



SAMPLE RUN SEP 1 1992 11:4
ANALYSIS # 41 ROCKY FLATS
TEMPERATURE 24 KMM OCC
GAIN 100 621187

PHOTOVAC

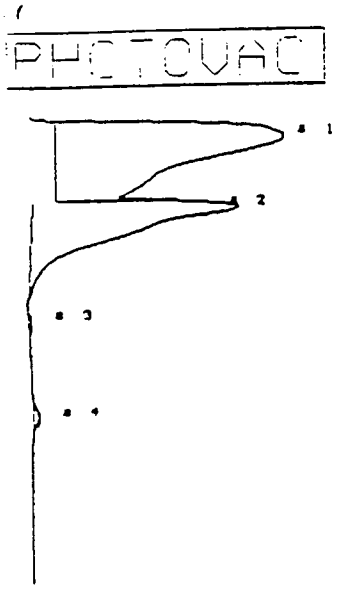
CALIBRATED PEAK 3.H2S

SAMPLE RUN SEP 1 1992 10:48
ANALYSIS # 38 ROCKY FLATS
TEMPERATURE 24 KMM OCC
GAIN 100 621187

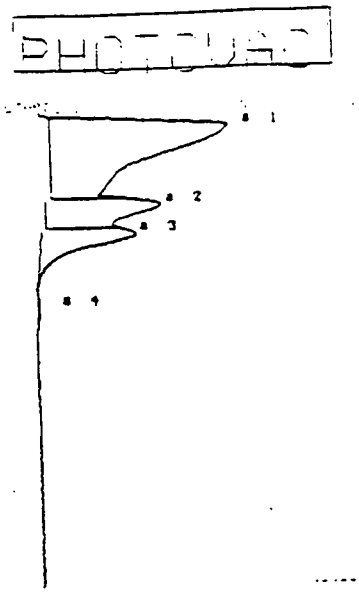
Air Check

6

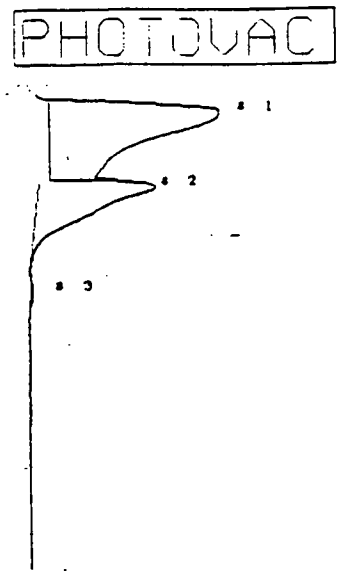
H_2S Calibration



SAMPLE RUN SEP 1 1987 11:14
ANALYSIS # 43 ROCKY FLATS
TEMPERATURE 25 KMM OCC
GAIN 100 601187



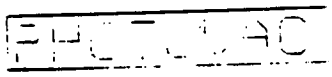
SAMPLE RUN SEP 2 1987 8:56
ANALYSIS # 6 ROCKY FLATS
TEMPERATURE 22 KMM OCC
GAIN 33 601187



SAMPLE RUN SEP 2 1987 8:52
ANALYSIS # 5 ROCKY FLATS
TEMPERATURE 21 KMM OCC
GAIN 100 601187

7

Air Check

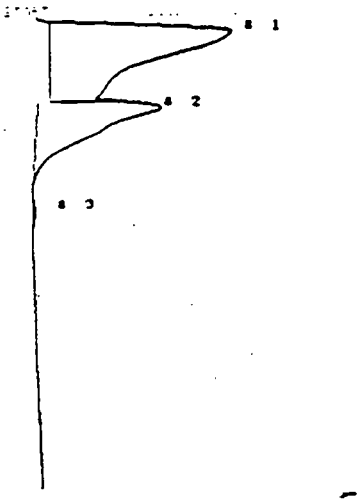


CALIBRATED PEAK 3.H2S

SAMPLE RUN SEP 2 1987 8:58
ANALYSIS # 6 ROCKY FLATS
TEMPERATURE 21 KMM OCC
GAIN 100 601187

H_2S Calibration

PHOTOVAC



GAIN 100 601187

COMPOUND NAME

Sampling Equipment Check

PHOTOVAC

START

STOP 0 40.0

SAMPLE RUN SEP 2 1987 10:44

ANALYSIS # 2 ROCKY FLATS

TEMPERATURE 27 KMM DCC

GAIN 100 601187

COMPOUND NAME	PEAK	R.T.	AREA/PPM	
UNKNOWN	1	3.2	4.5	US
UNKNOWN	2	12.0	2.4	US

Air Check

PHOTOVAC

START

STOP 0 60.0

SAMPLE RUN SEP 2 1987 10:47

ANALYSIS # 28 ROCKY FLATS

TEMPERATURE 1 601187

GAIN

COMPOUND NAME	PEAK	R.T.	AREA/PPM	
UNKNOWN	1	3.4	4.6	US
UNKNOWN	2	12.0	1.9	US
H2S	3	16.1	13.98	PPM
UNKNOWN	4	25.0	13.7	mVS

PHOTOVAC

SAMPLE RUN SEP 2 1987 10:48

ANALYSIS # 3 ROCKY FLATS

TEMPERATURE 28 KMM DCC

GAIN 100 601187

COMPOUND NAME	PEAK	R.T.	AREA/PPM	
UNKNOWN	1	3.4	4.6	US
UNKNOWN	2	12.0	1.9	US
H2S	3	16.1	9.999	PPM
UNKNOWN	4	25.0	13.7	mVS

PHOTOVAC

START

STOP @ 60.0

SAMPLE RUN SEP 2 1987 11: 0

ANALYSIS # 5 ROCKY FLATS

TEMPERATURE 30 KMM OCC

GAIN 100 681187

COMPOUND NAME	PEAK	R.T.	AREA/PPM
UNKNOWN	1	3.3	5.5 US
UNKNOWN	2	12.0	3.0 US
UNKNOWN	3	25.0	16.0 mVS
UNKNOWN	4	35.7	142.4 mVS

8

PHOTOVAC

START

STOP @ 60.0

SAMPLE RUN SEP 2 1987 10:50

ANALYSIS # 4 ROCKY FLATS

TEMPERATURE 30 KMM OCC

GAIN. 100 681187

COMPOUND NAME	PEAK	R.T.	AREA/PPM
UNKNOWN	1	3.3	5.2 US
UNKNOWN	2	12.0	2.1 US
UNKNOWN	3	25.3	15.7 mVS
UNKNOWN	4	36.5	31.5 mVS

9

PHOTOVAC

START

STOP @ 60.0

SAMPLE RUN SEP 2 1987 11: 6

ANALYSIS # 6 ROCKY FLATS

TEMPERATURE 32 KMM OCC

GAIN 100 681187

COMPOUND NAME	PEAK	R.T.	AREA/PPM
UNKNOWN	1	3.3	6.2 US
UNKNOWN	2	12.0	3.2 US
UNKNOWN	3	20.2	9.7 US
UNKNOWN	4	35.5	1.2 US

10

PHOTOVAC

START

STOP # 60.0
SAMPLE RUN SEP 2 1987 11:11
ANALYSIS # 8 ROCKY FLATS
TEMPERATURE 33 KMM DCC
GAIN 100 601187

COMPOUND NAME	PEAK	R.T.	AREA/PPM
UNKNOWN	1	3.1	7.1 US
UNKNOWN	2	12.0	3.7 US
UNKNOWN	3	25.7	25.9 mVS
UNKNOWN	4	35.2	14.1 mVS

11

PHOTOVAC

START

STOP # 60.0
SAMPLE RUN 9 SEPCKT [illegible] 11:17
TEMPERATURE 35 KMM DCC
GAIN 100 601187

COMPOUND NAME	PEAK	R.T.	AREA/PPM
UNKNOWN	1	3.2	10.7 US
UNKNOWN	2	11.8	4.5 US
UNKNOWN	3	5.5	15.1 mVS
UNKNOWN	4	84.9	10.2 mVS

12

START

STOP # 60.0
SAMPLE RUN SEP 2 1987 11: 9
ANALYSIS # 7 ROCKY FLATS
TEMPERATURE 32 KMM DCC
GAIN 100 601187

COMPOUND NAME	PEAK	R.T.	AREA/PPM
UNKNOWN	1	2.9	6.3 US
UNKNOWN	2	12.0	3.4 US
UNKNOWN	3	25.3	15.1 mVS

Air Check

PHOTOVAC

START

STOP @ 60.0
SAMPLE RUN SEP 2 1987 11:22
ANALYSIS # 18 ROCKY FLATS
TEMPERATURE 37 KMM OCC
GAIN 100 601187

COMPOUND NAME	PEAK	R.T.	AREA/PPM
UNKNOWN	1	3.4	13.1 US
UNKNOWN	2	11.9	5.0 US
UNKNOWN	3	25.4	38.3 mVS
UNKNOWN	4	33.6	59.9 mVS

13

PHOTOVAC

START

STOP @ 60.0
SAMPLE RUN SEP 2 1987 11:43
ANALYSIS # 18 ROCKY FLATS
TEMPERATURE 37 KMM OCC
GAIN 100 601187

COMPOUND NAME	PEAK	R.T.	AREA/PPM
UNKNOWN	2	3.5 8.8	2.8 US
UNKNOWN	3	12.1	1.3 US
UNKNOWN	4	14.4	2.2 US
UNKNOWN	5	25.7	30.3 mVS
UNKNOWN	6	34.4	65.1 mVS

14

PHOTOVAC

START

STOP @ 60.0
SAMPLE RUN SEP 2 1987 11:37

ANALYSIS # 17 ROCKY FLATS
TEMPERATURE 38 KMM OCC
GAIN 100 601187

COMPOUND NAME	PEAK	R.T.	AREA/PPM
UNKNOWN	2	8.8	8.8 US
UNKNOWN	3	12.0	1.2 US
H2S	4	14.4	11.41 ppm
H2S	5	16.5	14.31 ppm
UNKNOWN	6	25.1	20.7 mVS
UNKNOWN	7	34.3	45.7 mVS

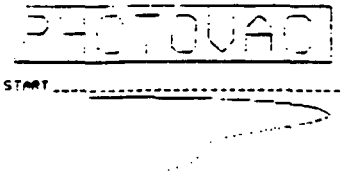
PHOTOVAC

CALIBRATION

SAMPLE RUN SEP 2 1987 11:38
ANALYSIS # 17 ROCKY FLATS
TEMPERATURE 37 KMM OCC
GAIN 100 601187

COMPOUND NAME	PEAK	R.T.	AREA/PPM
UNKNOWN	1	3.5	4.4 US
UNKNOWN	2	8.8	2.0 US
UNKNOWN	3	12.0	1.3 US
UNKNOWN	4	14.4	1.2 US
H2S	5	16.5	10.30 ppm
UNKNOWN	6	25.1	20.7 mVS
UNKNOWN	7	34.3	45.7 mVS

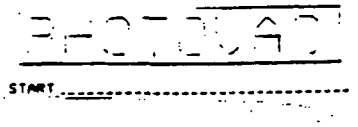
Air Check



STOP @ 60.0
SAMPLE RUN SEP 2 1987 12:11
ANALYSIS # 21 ROCKY FLATS
TEMPERATURE 35 KM DCC
GAIN 100 681187

COMPOUND NAME	PEAK	R.T.	AREA/PPM
UNKNOWN	1	3.3	6.1 US
UNKNOWN	2	12.0	3.1 US
UNKNOWN	3	22.9	25.5 mVS
UNKNOWN	4	35.0	179.6 mVS

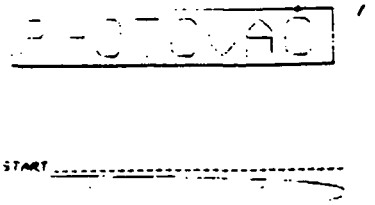
15



STOP @ 60.0
SAMPLE RUN SEP 2 1987 12:13
ANALYSIS # 22 ROCKY FLATS
TEMPERATURE 38 KM DCC
GAIN 100 681187

COMPOUND NAME	PEAK	R.T.	AREA/PPM
UNKNOWN	1	3.3	6.0 US
UNKNOWN	2	12.1	3.7 US
UNKNOWN	3	24.4	30.1 mVS
UNKNOWN	4	35.0	33.3 mVS
UNKNOWN	5	57.3	17.1 mVS

16



STOP @ 60.0
SAMPLE RUN SEP 2 1987 12:28
ANALYSIS # 23 ROCKY FLATS
TEMPERATURE 37 KM DCC
GAIN 100 681187

COMPOUND NAME	PEAK	R.T.	AREA/PPM
UNKNOWN	1	3.0	6.4 US
UNKNOWN	2	12.1	3.5 US
UNKNOWN	3	20.5	11.8 US
UNKNOWN	4	34.4	179.2 mVS

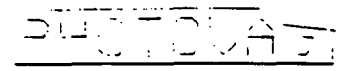
17

START

STOP 0 60.0

SAMPLE RUN		SEP 2 1987	12:28
ANALYSIS #	24	ROCKY FLATS	
TEMPERATURE	38	KMM OCC	
GAIN	100	681187	

COMPOUND NAME	PEAK	R.T.	AREA/PPM	
UNKNOWN	1	3.0	6.6	US
UNKNOWN	2	12.0	3.2	US
H2S	3	16.8	7.253	PPM
UNKNOWN	4	25.1	4.5	mVS
UNKNOWN	5	34.6	35.6	mVS

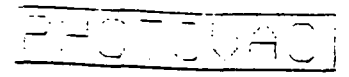


START

STOP 0 60.0

SAMPLE RUN		SEP 2 1987	12:31
ANALYSIS #	25	ROCKY FLATS	
TEMPERATURE	39	KMM OCC	
GAIN	100	681187	

COMPOUND NAME	PEAK	R.T.	AREA/PPM	
UNKNOWN	1	2.3	2.1	US
UNKNOWN	2	12.0	3.0	US
UNKNOWN	3	25.6	13.2	mVS

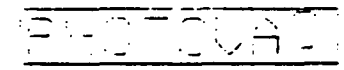


START

STOP 0 60.0

SAMPLE RUN		SEP 2 1987	12:35
ANALYSIS #	26	ROCKY FLATS	
TEMPERATURE	40	KMM OCC	
GAIN	100	681187	

COMPOUND NAME	PEAK	R.T.	AREA/PPM	
UNKNOWN	1	3.0	8.4	US
UNKNOWN	2	12.0	3.0	US
UNKNOWN	3	23.3	[illegible]	US
UNKNOWN	4	33.7	300.3	mVS



START

SAMPLE RUN		SEP 2 1987	12:23
ANALYSIS #	24	ROCKY FLATS	
TEMPERATURE	38	KMM OCC	
GAIN	100	681187	

COMPOUND NAME	PEAK	R.T.	AREA/PPM	
UNKNOWN	1	3.0	6.6	US
UNKNOWN	2	12.0	3.2	US
H2S	3	16.8	9.938	PPM
UNKNOWN	4	34.6	38.8	mVS

Air Check

H_2S Calibration

START

STOP # [illegible]
SAMPLE RUN SEP 2 1987 12:48
ANALYSIS # 28 ROCKY FLATS
TEMPERATURE 41 KMM DCC
GAIN 100 681187

COMPOUND NAME	PEAK	R.T.	AREA/PPM	
[illegible]	1	[illegible]	[illegible]	US
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	3	[illegible]	[illegible]	[illegible]
[illegible]	6	[illegible]	[illegible]	[illegible]

START

STOP # 60.0
SAMPLE RUN SEP 2 1987 12:30
ANALYSIS # 27 ROCKY FLATS
TEMPERATURE 41 KMM DCC
GAIN 100 681187

COMPOUND NAME	PEAK	R.T.	AREA/PPM	
UNKNOWN	1	3.0	3.3	US
UNKNOWN	2	12.3	4.2	US
UNKNOWN	3	25.6	42.7	mVS
UNKNOWN	4	34.0	25.8	mVS

START

STOP # 48.0
SAMPLE RUN SEP 2 1987 12:46
ANALYSIS # 29 ROCKY FLATS
TEMPERATURE 41 KMM DCC
GAIN 100 681187

COMPOUND NAME	PEAK	R.T.	AREA/PPM	
UNKNOWN	1	3.2	3.5	US
UNKNOWN	2	11.7	4.6	US
UNKNOWN	3	25.3	38.0	mVS
UNKNOWN	4	33.1	85.2	mVS

ANALYSIS # 28 ROCKY FLATS
SAMPLE RUN SEP

TEMPERATURE 41 KMM DCC
GAIN 100 681187

COMPOUND NAME	PEAK	R.T.	AREA/PPM	
UNKNOWN	1	[illegible]	[illegible]	US
UNKNOWN				
H2S	3	16.6	13.00	[illegible]
UNKNOWN	4	25.4	84.0	mVS
UNKNOWN	5	34.0	16.2	mVS
UNKNOWN	6	57.3	28.8	mVS

19

20

H_2S Calibration

Pump
~~Air~~ Check

PHOTOVAC

START

STOP @ 60.0
SAMPLE RUN SEP 2 1987 12:40
ANALYSIS # 30 ROCKY FLATS
TEMPERATURE 41 KMM DCC
GAIN 100 601187

COMPOUND NAME	PEAK	R.T.	AREA/PPM
UNKNOWN	1	3.1	10.6 US
UNKNOWN	2	11.3	34.7 MUS
UNKNOWN	3	25.5	34.7 MUS
UNKNOWN	4	33.2	6.6 MUS

Pump Check

This is a CONTROLLED DOCUMENT
EG&G — ROCKY FLATS PLANT
ENVIRONMENTAL MANAGEMENT DEPARTMENT
This is a RED Stamp

ROCKY FLATS PLANT Phase I RFI/RI Work Plan for Operable Unit 7 - Present Landfill IHSS 114 and Inactive Hazardous Waste Storage Area IHSS 203	Manual No.: Section No.: Organization:	21100-WP-OU-07.01 APPC-R0 Environmental Management

Title: Appendix C: Tritium Investigation Information

Approved by:

12/6/91	T. P. O'Rourke	6/23/92
Effective Date	Manager	Date

APPENDIX C

Tritium Investigation Documents

Internal Letter

Rockwell International

Date · November 23, 1987

No ·

TO (Name, Organization, Internal Address)
· W. F. Weston/T. C. Greengard
· Plutonium Operations
· Building 111

FROM (Name Organization, Internal Address, Phone)
Frank J. Blaha
Env. Compliance
Bldng T452F
7041

SUBJECT· RADIOACTIVE SOURCES IN ROCKY FLATS SANITARY LANDFILL

IDENTIFICATION OF RADIOACTIVE PROBLEMS IN LANDFILL

On September 30, 1973 tritium and strontium were detected at the drainage of the Rocky Flats sanitary landfill by the Lawrence Livermore Laboratories (LLL). Because of this finding, monitoring wells (called at the time environmental test holes) were installed in the landfilled waste to try to identify the sources of tritium and strontium.

STRONTIUM STUDY RESULTS

From September through January of 1973 the results for strontium showed large variations in concentration. The LLL sample that had been thought to be greatly elevated in strontium (34 pCi/L) was re-evaluated and found to be less concentrated (16 pCi/L) but above background levels. Background levels are considered to be approximately 1 - 2.5 pCi/L for strontium in water, based upon water samples taken in that time period from Rock Creek. Samples of groundwater/leachate from boreholes in the landfill were analyzed for strontium, and only one sample (from TH-4) appeared elevated in strontium at 7 pCi/L. All other samples of groundwater/leachate had strontium concentrations of less than 1

pCi/L. The detection limits of the method used to analyze for strontium at the time was 0.1 pCi/L. Strontium was analyzed in the landill ponds, drainages, and groundwater intercept system, and generally found at background levels. A table of strontium results is attached with strontium results from the landfill ponds in the period of 1973 - 1984. The data do not appear to indicate a problem with migration of strontium.

TRITIUM STUDY RESULTS

Results for tritium were more consistent. Monitoring wells were installed a number of different times resulting in approximately 57 wells installed directly in the landfilled waste or directly below the saturated waste materials by the end of the investigation. Elevated tritium readings were followed until the source of tritium had been fairly well identified. The tritium concentrations in the water near the tritium source were as high as 301,609 pCi/L at (TH-46).

The location of this tritium source is approximate Rocky Flats coordinates E:20,015; N:39535. The depth of the tritium source, total activity, configuration, and container, if any, are unknown. It was estimated in 1974 that the volume of waste containing the tritium source was dumped in approximately 1970.

The wells nearing the eastern end of the landfill exhibited decreasing tritium concentrations. Seeps of leachate at the eastern end of the landfill had tritium concentrations of 5,000 - 7,000 pCi/L in 1973/1974.

The current Derived Concentration Guide (DCG) (based on a DOE August 5, 1985 memorandum using DOE dose limit of 0.1 rem/yr to members of the public from all pathways, dose conversion factors given in the memorandum, and intake rates of 2.0 L/dy for water) for tritium is 2,000,000 pCi/L. The current USEPA and Colorado standard for tritium in drinking water is 20,000 pCi/L, the proposed EPA drinking water standard (based on a Sept. 30, 1986 Advanced Notice of Proposed Rulemaking and a risk equal to that from a dose rate of 4 mrem/yr) is 90,000 pCi/L. These criteria indicate that the leachate that was found downgradient of the sanitary landfill never exceeded the drinking water standard. The leachate in the immediate area of the tritium source never exceeded the DCG. These tritium levels which are found in the immediate area of the tritium source do not appear to represent a threat to human health or the environment unless tritium is found migrating out of the landfill.

CORRECTIVE ACTIONS OF 1974 AND MONITORING RESULTS

A number of options were evaluated in late 1973 and early 1974 for correction of the identified problems, including excavation of the tritium source. The selected action was the construction of the groundwater intercept system (or the "horseshoe system") around the landfill. The purpose of this system was to isolate the tritium source from the surrounding environment, and to drain as much groundwater out of the landfill as possible. This was accomplished by the construction of a clay wall to prevent the migration of

uncontaminated groundwater into the landfill. This clay wall redirected the groundwater to a perforated pipe for collection. This pipe was provided with a slope, and at the eastern limits of the expected fill the pipe became a solid wall sewer pipe. There were three options, depending on which valves were open, for drainage of this intercepted groundwater: to drain the water into a western pond, to drain the water into an eastern pond, or to have the water daylight below the dam for the eastern pond. The eastern pond is the pond that still exists. The western pond was intended for the management of leachate or contaminated groundwater. The intercepted groundwater was found to not be contaminated with tritium in early 1974 (tritium concentrations of 500 - 1,000 pCi/L, compared to background values of approximately 500 pCi/L). This water was therefore allowed to daylight below the dam for the eastern pond. Extensive monitoring of this water continued from 1974 to 1981 and identified no migration of contaminants.

The leachate and runoff water collected in the western leachate pond was found to contain 1800 - 7922 pCi/L of tritium in 1974. The tritium concentrations in this pond decreased with time (922 - 1365 pCi/L in 1977 and 490 - 886 pCi/L in 1980). Table 2, attached, contains the tritium concentrations found in the western pond. The western landfill pond was removed for expansion of the landfill in May/June of 1981.

The above data indicated that the tritium source was effectively separated from the environment and causing no environmental degradation beyond the immediate area of the tritium source.

IMPLICATIONS FOR 1987 AND LANDFILL CLOSURE

It is suggested that the tritium source be left in place and that long-term monitoring and maintenance of the landfill be committed to in the Closure Plan. These long-term activities at the landfill would include the construction of a sloped low permeability landfill cap, a small leachate collection system, and groundwater monitoring activities.

No benefits can be identified from excavation and disposal offsite of the tritium source unless all other potential sources of radioactivity and hazardous waste were also removed. This would include the excavation of all portions of the landfill used from 1968 until November 1986. If this were accomplished then the landfill could conceivably be closed as a non-RCRA regulated landfill.

The removal of the tritium source would be most effective if all potential sources of radioactivity were also removed. The removal of all potential sources of radioactivity from the landfill would include excavation of large sections of the landfill. The sanitary landfill was never intended for disposal of radioactive substances, but the criteria for identification of these materials has changed through the passage of time. Levels of radioactivity that were essentially undetectable in the mid 1970's are now quantifiable with our improved technology. Current indications are that the 1000 kg of sanitary sewage sludge deposited in the landfill from

August 1968 through February 1970 would be considered radioactive by today's standard. This material and would also require excavation in an attempt to rid the landfill of all sources of radioactivity. These activities would also need to be supplemented with a leachate collection system to drain all leachate from the landfill and treat it since the leachate is also potentially radioactive. After the effort and cost associated with the above activities, the landfill portions used from 1970 through November 1986 would still require long-term monitoring and maintenance due to the presence of RCRA defined hazardous wastes. These long-term monitoring and maintenance activities would probably be no different for a strictly hazardous waste regulated landfill as they would be for a hazardous waste landfill with some radioactive sources contained in it.

Based on currently available data and information, there appears to be no technical problems for leaving the potential sources of radioactivity in place. To date no migration of radioactivity has been identified downgradient or laterally from the landfill. This indicates that the potential radioactive sources are effectively contained in the landfill and that the landfill groundwater intercept system is apparently effective. The degradation of water quality within the landfilled waste is typical of landfills and should not represent a technical or regulatory problem as long as migration of contaminated groundwater out of the landfill is not identified. The drilling program currently underway will identify any migration of contaminated groundwater out of the landfill and

will help determine the effectiveness of the landfill groundwater intercept system in redirecting uncontaminated groundwater around the landfill. It is suggested that during closure activities a leachate collection system of modest design be installed in the eastern portion of the landfill to collect leachate for removal and treatment. This leachate collection system will prevent the build-up of a leachate head in the landfill that would force leachate out of the landfill final cover or cause leachate contamination of groundwater.

SUMMARY

The Colorado Department of Health (CDH) is not currently aware of the tritium source in the landfill or of the potentially radioactive sewage sludge contained in the landfill. All closure activities will be contingent upon CDH's approval. It is suggested that all discussions and plans submitted to the CDH pursue leaving these materials in the landfill and long-term monitoring and maintanence. This solution to the landfill closure problem will protect human health and the environment and should be acceptable to CDH.

Frank J. Blaha

Frank J. Blaha

cc:Daryl Hornbacher
Alan Schubert
Kirk McKinley
John Marschall
Gilbert Brill
Nancy Daugherty
Brent Lewis

.E 1

STRONTIUM IN LANDFILL PONDS

MO.	1984	1983	1982	1981	1980	1979	1978	1977	1976	1975	1974	1973
JAN.	n.a.[2]	0.5	<3	3.5 E 7.5 W	3.6 E <3 W	n.a.	n.a.	n.a.	n.a.			n.a.
FEB.	n.a.	<3	<3	<3 E <3 W	3.0 E 3.0 W	n.a. n.a.	n.a.	<3	n.a.			n.a.
MAR.	2.3	<3	n.a.	3.2 E 3.2 W	4.6 E <3 W	n.a.	7.2	<3	<3	NO DATA AVAILABLE	NO DATA AVAILABLE	n.a.
APR.	n.a.	2.4	n.a.	n.a.	<3 E <3 W	n.a.	5.7	<3	<3			n.a.
MAY	n.a.	n.a.	<3	<3	3.5 E <3 W	n.a.	n.a.	<3	3.5			n.a.
JUNE		n.a.	<3	4.2	4.3 E <3 W	n.a.	<3	<3	3.3			n.a.
JULY		n.a.	<3	<3	4.3 E <3 W	n.a.	3.3	<3	4			n.a.
AUG.		n.a.	<3	<3	3.5 E 2.1 W	3.2 E	<3	<3	4.5			n.a.
SEP.		n.a.	<3	<3	4.1 E 5.0 W	<3 E	n.a.	n.a.	3			n.a.
OCT.		7.9	<3	<3 3.4 W	4.4 E <3 W	4.3 E <3 W	<3	n.a.	3			16
NOV.		n.a.	<3	<3	3.6 E <3 W	5.8 E <3 W	3.6	n.a.	<10			16
DEC.		n.a.	0.6	<3	3.7 E <3 W	45 E <3 W	n.a.	n.a.	NS	3		n.a.

NOTES

(1) Results prior to April 1983 were for ^{89}Sr+ ^{90}Sr in most cases, exept for 1973 and units are pCi/l.
(2) n.a. means not analyzed.
(3) EPA Drinking Water Standard: ^{89}Sr=80pCi/l, ^{90}Sr=8pCi/l.
(4) Local Background for ^{90}Sr=2pCi/l.

TRITIUM IN WESTERN LANDFILL POND

MO.	1980	1979	1978	1977	1976	1975	1974	1973
JAN.	738	1316	1136	1365	1740	1143	n.a.	
FEB.	709	780	1368	922	1733	1429	n.a.	
MAR.	520	844	775	1303	1323	1837	7922	
APR.	886	886	944	1113	1431	924	n.a.	
MAY	639	805	956	818	1121	1445	n.a.	
JUNE	530	816	720	740	1172	984	5875	
JULY	546	694	953	856	1378	1520	4797	
AUG.	508	976	1022	983	1305	1258	3724	
SEP.	576	564	768	863	1143	1777	5056	34,00 39,00 57,00
OCT.	495	938	818	806	869	1762	3304	n.a.
NOV.	490	575	1033	812	1005	1553	1800	n.a.
DEC.	530	436	863	880	1067	1542	n.a.	n.a.

NOTES:
(1) Units are pCi/l.

TC6

ROCKY FLATS Environmental MASTER FILE

~~CM Lore~~
~~CH Dompier~~
~~Circulate Ecology~~
~~Council except Owen~~
~~MAT~~
~~GSW~~
~~Ret to → JFW~~

ES-376-74-101

INTERIM REPORT ON CORING AND SAMPLING THE ROCKY FLATS LANDFILL

EMFile extra copy

R. R. Gunning
M. A. Thompson

January 17, 1974

J. Seastone
J. B. Owen
M. A. Thompson/EMF File
J. F. Willging
IRF/Library

Key Words
Sanitary landfill
Wells
Water control
Drainage
Tritium
Americium
Plutonium
Gunning, R.R.
Thompson, M.A.
ES-376-74-101
Frontium

Reviewed for Classification/UCNI/OUO
By: Janet Nesheim, Derivative Classifier
DOE, EMCBC
Date: 11-04-08
Confirmed Unclassified, Not UCNI/Not OUO

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By [signature]
Date 4/18/91

INTRODUCTION

On September 20, 1973, tritium was detected at the drainage of the Rocky Flats sanitary landfill by the Lawrence Livermore Laboratories. Above background concentrations of americium-241 were also detected by LLL on the same sample. Subsequent analyses of duplicate samples by other agencies confirmed these analyses.

A dam was constructed at the east base of the landfill to contain the seepage, and a sampling program was initiated.

The EPA-Nevada laboratories on October 5, 1973, detected strontium-90 at the same location. These results were later reconfirmed by the EPA-Nevada Laboratories and by other agencies. Table I is a summary of the results of the initial sampling.

On October 11, 1973, the RFAO, USAEC requested that the seepage collected at the Landfill dam be analyzed on a daily basis for tritium, strontium-90[1], americium-241 (by gamma scan), plutonium-239, -240, a gamma scan and total long-lived alpha. In addition, coring of the landfill was initiated to determine concentrations of tritium, strontium-90, and americium-241 within the landfill and to possibly locate their source.

RESULTS

1. Landfill Pond – where is this?

   Only two significant strontium-90 results were detected at the landfill pond. They were 9.26 pCi/l on the composite sample for the week of November 26 through November 30, 1973, and 7.66 pCi/l for the week of December 10 through December 14, 1973.

   Figure I shows the monthly averages of daily analysis for tritium in the landfill pond from September 1, 1973, through December 31, 1973. The analysis for plutonium, americium, and total long-lived alpha during the period of October 15, 1973 through December 28, 1973, showed no results above background.[2]

2. Landfill Survey

   Twenty test holes designated TH-1 through TH-20 (Figure 2) were drilled through the landfill to a depth of 10 feet into the natural soil. Slotted plastic pipe was then placed in the test holes and water samples were taken. The analytical results on water samples from these locations for tritium, strontium-90, plutonium and a gamma scan are listed in Table II.

TABLE I

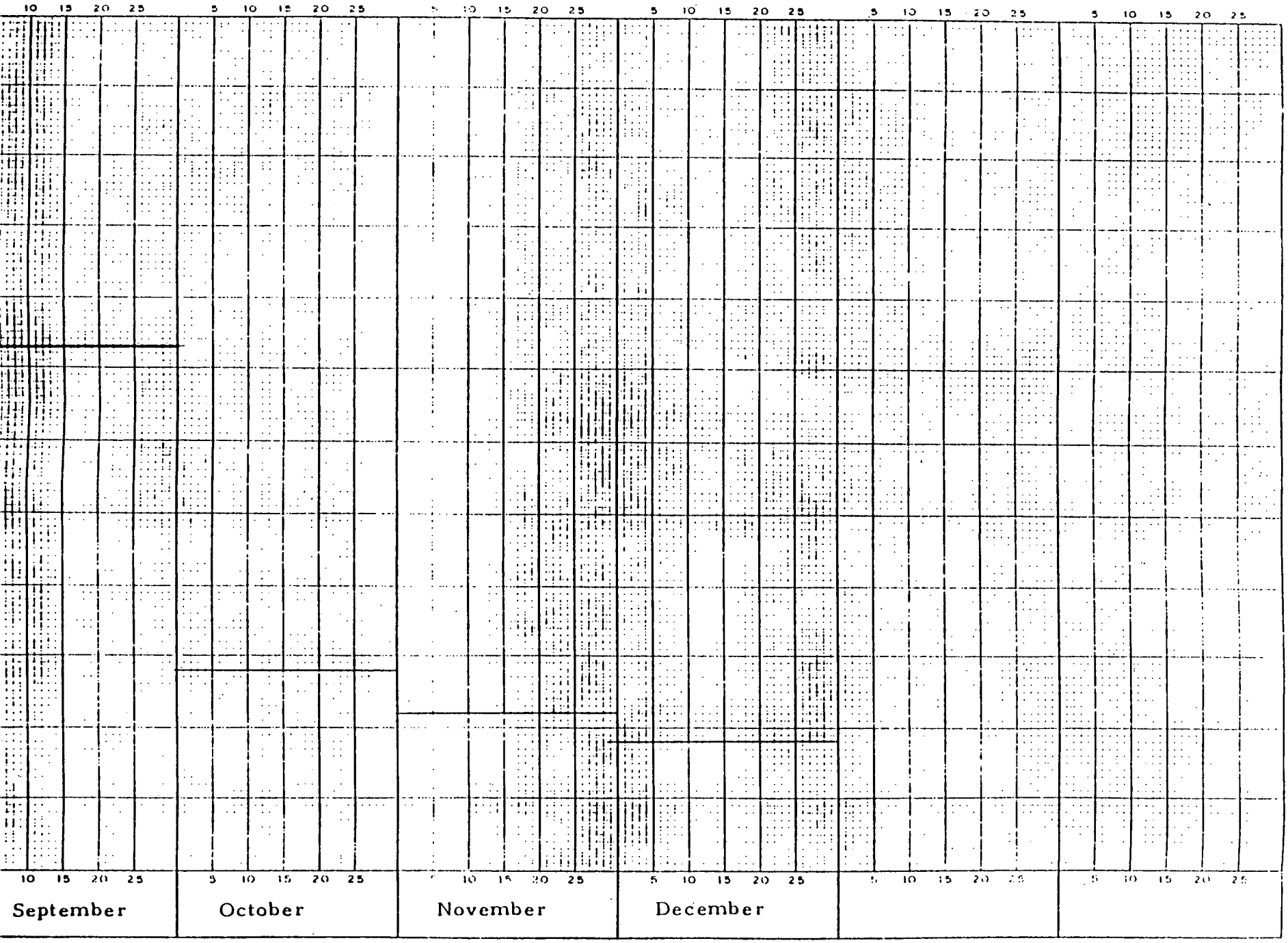
ANALYSIS OF NORTH LANDFILL DRAINAGE

(Sampled 9/20/73)

Date Results Received	Laboratory	Tritium (pCi/l)	Sr^{90} (pCi/l)	Am^{241} (pCi/l)
9/20/73	LLL	39,000		
	Sandia	57,900		
	LASL	34,900		
10/5/73	EPA		25.0	
10/18/73	EPA		7.8	
10/31/73	LLL			735(γ scan) 935 (wet chem.)
11/7/73	RF			122 (γ scan)
11/15/73	LLL		16.0	

6 MONTHS BY DAYS 358-139

FIGURE I. Average Tritium Concentration in Landfill Pond



Test holes TH-1, -3, -4, -5, -8, and -11 indicated tritium concentrations above background. The analyses of water samples from the remaining fourteen test holes showed no result above background. An additional 25 test holes (TH-21 through TH-34 and TH-45 through TH-55) were drilled in the general location of the high tritium and sampled for tritium only. These results are also shown in Table II. Concentrations as high as 301,609 pCi/l were detected in well TH-46. Limited resampling of wells in the area of high tritium concentrations has been completed and tritium appears to be moving as indicated by decreasing concentrations in TH-46 and apparent increasing concentrations in TH-2, -9, -10, and -12. These results are shown in Table III.

Listed in Table IV are the phenol and elemental analyses (by emission spectroscopy) results from the original 20 test holes. Due to insufficient sample, phenol was analyzed at only ten locations and elemental analyses were run on samples from only 18 of the original test holes.

Phenol concentrations above background were detected at all locations where sampled. Emission spectroscopy detected above background concentrations of elements such as Al, Ca, Fe, Mg, Na and Si at most locations.

Because above background strontium and americium values were detected in the drainage from the northeast side of the landfill, two additional wells (TH-2A and TH-2B) were drilled in the northeast section of the landfill and sampled. In addition, the north drainage was resampled. Analyses for strontium are not yet complete; however, an initial gamma scan (Table V) indicates a high americium concentration in well TH-2A

CONCLUSIONS AND RECOMMENDATIONS

Results to date of the sampling and analysis program suggest that a localized tritium source may exist in the landfill. The high concentrations appear to be in an area of the landfill used during 1970. Sufficient data is not available to speculate on the nature, origin, or type of source. Results from the north landfill drainage suggest the possibility of the presence of strontium and americium. The presence of americium can be explained by the past practice of burying sanitary sewage sludge containing small amounts of americium and plutonium in the landfill. It is somewhat surprising that above background amounts of plutonium and/or americium were not located in some of the landfill wells. The presence of strontium cannot yet be explained. The results are inconsistent in that strontium is sometimes

TABLE II

LANDFILL SAMPLES

nple tation	1973 Date Sampled	^3H pCi/l	Pu pCi/l	Sr-90 pCi/l	Gamma Scan - Counts/Sec >Bkg ± 2 σ keV 0-1885	59-81*	96-121	173-217	600-732	1104-1218	1266-1380
-1	11/15	11,600	< MDA	1.5	0.33	--	--	--	--	0.02	0.02
-2	11/15	<MDA	< MDA	<3.0	0.49	--	--	0.04	--	0.02	0.01
-3	11/16	6,028	< MDA	<MDA	0.40	--	0.02	0.01	0.09	--	0.03
-4	11/16	34,074	< 0.10	<MDA	0.40	--	0.06	--	0.05	0.02	0.01
-5	11/15	17,428	< MDA	3.0	0.36	--	0.05	0.03	0.02	--	0.01
-6	11/20	1,976	< MDA	1.2	0.20	0.01	--	--	0.02	0.02	0.02
-7	11/20	2,800	0.63	Lost	0.43	--	0.01	--	0.09	0.01	0.03
-8	11/29	28,215	< MDA	<MDA	<MDA	0.17	0.05	--	--	--	0.02
-9	11/20	2,134	0.06	<MDA	0.37 ± 0.23	< MDA	< MDA	< MDA	< MDA	< MDA	< MDA
-10	11/20	666	< MDA	<MDA	0.11 ± 0.22	< MDA	< MDA	< MDA	< MDA	< MDA	< MDA
-11	11/26	6,081	< MDA	0.13	0.85	0.05	0.08	0.02	0.05	0.01	--
-12	11/20	1,034	< MDA	<MDA	0.51 ± 0.23	0.11 ± 0.08	<MDA	< MDA	< MDA	< MDA	<MDA
-13	11/29	708	< MDA	<MDA	0.61	--	0.04	0.13	0.04	--	--
-14	11/20	3,123	0.48	<MDA	0.33	--	0.09	--	0.01	--	0.02
-15	11/29	1,930	< MDA	<MDA	0.54	--	0.02	0.11	0.08	0.02	--
-16	11/29	1,075	< MDA	<MDA	0.51	--	0.08	0.05	0.07	0.01	0.01
-17	11.20	370	< MDA	<MDA	0.14	0.02	--	--	--	0.02	--
-18	11/29	3,225	< MDA	1.72	0.72	--	0.08	0.08	0.06	0.02	0.02
-19	11/29	1,940	< MDA	<MDA	0.57	--	--	0.08	0.06	0.04	--
-20	11/15	1,915	< MDA	2.4	1.02	--	0.08	0.07	0.13	0.05	0.03
-21	11/29	886									
-22	11/30	164,150									
-23	11/29	30,597									
-24	11/29	4,644									
-25	11/25	14,599									
-26	11/29	6,675									
-27	11/29	17,128									
-28	11/29	28,213									
-29	11/29	7,964									

mericium concentrations as determined by gamma scan were less than MDA for all samples analyzed except for TH-12 which showe

TABLE II
(Continued)

ample ocation	1973 Date Sampled	^3H pCi/l	Pu pCi/l	Sr-90 pCi/l	Gamma scan - Counts/Sec >Bkg ± 2σ keV 0-1885	59-81	96-121	173-217	600-732	1104-1218	1266-1380
H-30	11/30	15,222									
H-31	11/30	34,209									
H-32	11/29	36,020									
H-33	11/30	28,732									
H-34	11/30	27,870									
H-45	12/6	201,678									
H-46	12/6	301,609									
H-47	12/6	73,405									
H-48	12/6	11,678									
H-49	12/18	258,499									
H-50	12/14	254,453									
H-51	12/14	215,264									
H-52	12/14	193,651									
H-53	12/14	73,097									
H-54	12/14	124,123									
H-55	12/18	219,367									

TABLE III

TRITIUM CONCENTRATION CHANGES

Sample Location	Date Sampled	Tritium pCi/l
TH-2	11/15/73	<MDA
TH-2	1/3/74	7540
TH-9	11/20/73	2134
TH-9	1/3/74	2638
TH-10	11/20/73	666
TH-10	1/3/74	910
TH-12	11/20/73	1034
TH-12	1/3/74	1695
TH-46	12/6/73	301,609
TH-46	1/3/74	214,199
TH-46	1/9/74	211,374
TH-46	1/15/74	208,611

TABLE IV

PHENOL CONCENTRATIONS AND
ELEMENTAL ANALYSIS OF WATER
FROM ROCKY FLATS LANDFILL

Lab. No. M73-1666

TABLE IV

Date 11/30/73

Page -1-

DOW CHEMICAL U.S.A.
Rocky Flats Division
_____ Laboratory

ANALYSIS REPORT

To Dr. Gunning Bldg. 123 Charge 317

cc: Dept.

File Ext.

Sample Description:

Sanitary Landfill samples

Results of Analyses or Tests:

Sample I. D.	Phenol (ppb)
TH-6	3
TH-8	340
TH-17	27
TH-14	150

Lab. No. M73-1651

TABLE IV
Page -2-

Date 11/30/73

DOW CHEMICAL U.S.A.
Rocky Flats Division
_____ Laboratory

ANALYSIS REPORT

To R. Gunning Bldg. 123 Charge 317

cc: _____ Dept. _____

File Ext. _____

Sample Description:

Sanitary Landfill samples

Results of Analyses or Tests:

Sample I. D.	Phenol (ppb)
TH-1	3500
TH-2	2000
TH-3	1900
TH-4	4400
TH-5	310
TH-20	10

Analysis By WBM Reported By

TABLE IV
Page -3-

THE DOW CHEMICAL COMPANY

Distribution _____ Date 12/12/75

ROCKY FLATS DIVISION

Water Samples- Well Waters

WATER ANALYSIS REPORT Month _____ Year _____ 81 GENERAL LABORATORY

REPORTED IN PPM

Element	TH 1	TH 2	TH 3
Ag	< 0.04	< 0.02	< 0.01
Al	> 500	170	180
As	< 2	< 0.9	< 0.7
B	0.8	5	4
Ba	8	5	4
Be	< 0.04	0.09	< 0.01
Bi	< 0.2	< 0.09	< 0.07
Ca	> 500	> 220	> 180
Cd	< 2	< 0.9	< 0.7
Ce	< 40	< 17	< 14
Co	0.8	0.3	0.3
Cr	0.8	0.2	0.1
Cs	20	< 2	< 1
Cu	2	0.2	0.1
Fe	> 500	> 220	> 180
Ge	< 0.2	< 0.09	< 0.07
Hg	< 0.4	< 0.2	< 0.1
K	500	220	130
Li	8	2	3
Mg	500	> 220	> 180
Mn	16	17	30
Mo	< 0.04	< 0.02	< 0.01
Na	500	> 220	> 180
Nb	< 0.2	< 0.9	< 0.7
Ni	0.4	0.5	0.1
P	< 2	< 0.9	< 0.7
Pb	1	0.2	0.7
Rb	8	0.9	< 1
Sb	< 0.4	< 0.2	< 0.1
Si	> 500	> 220	> 180
Sn	< 0.4	0.3	0.3
Sr	4	5	6
Ta	1	0.2	0.1
Te	< 4	< 2	< 1
Th	< 0.4	< 0.2	< 0.1
Ti	80	10	10
Tl	< 0.2	< 0.09	< 0.07
U	< 20	< 9	< 7
V	2	< 0.2	< 0.1
W	< 20	< 9	< 7
Zn	30	3	3
Zr	3	0.2	1

TABLE IV
Page -4-

M73-1031

THE DOW CHEMICAL COMPANY
ROCKY FLATS DIVISION

Distribution _____

Date 12/12/73

Water Samples-

WATER ANALYSIS REPORT

Month _____ Year _____

81 GENERAL LABORATORY

REPORTED IN PPM

Element	TH 4	TH 5	TH 20
Ag	< 0.03	< 0.003	< 0.01
Al	> 420	25	> 150
As	< 2	< 0.1	< 0.6
B	7	0.6	0.5
Ba	36	0.6	3
Be	0.03	< 0.003	< 0.01
Bi	< 0.2	< 0.01	< 0.06
Ca	> 420	> 40	150
Cd	< 2	< 0.1	< 0.6
Ce	< 30	< 3	< 11
Co	0.7	< 0.01	0.2
Cr	1	0.03	0.5
Cs	3	< 0.3	6
Cu	1	0.03	0.5
Fe	> 420	> 40	> 150
Ge	< 0.2	< 0.01	< 0.06
Hg	< 0.3	< 0.03	< 0.1
K	290	40	150
Li	15	0.3	1
Mg	> 420	> 140	100
Mn	30	3	11
Mo	< 0.03	< 0.003	0.6
Na	> 420	> 140	100
Nb	< 2	< 0.1	< 0.6
Ni	< 0.3	< 0.03	0.3
P	< 2	< 0.1	0.6
Pb	0.2	0.03	0.3
Rb	7	0.3	3
Sb	< 0.3	< 0.03	< 0.1
Si	> 420	> 140	> 150
Sn	3	0.1	0.2
Sr	7	0.6	< 0.1
Ta	< 0.3	0.06	0.3
Te	< 3	< 0.3	< 1
Th	< 0.3	< 0.03	< 0.1
Ti	30	1	34
Tl	< 0.2	< 0.01	< 0.06
U	< 16	< 1	< 6
V	1	< 0.03	1
W	< 16	< 1	< 6
Zn	13	0.6	10
Zr	3	0.2	0.9

TABLE IV
Page -5-

THE DOW CHEMICAL COMPANY

Distribution _____ Date 12/12/73

ROCKY FLATS DIVISION

Water Samples- Well Waters

WATER ANALYSES REPORT Month _____ Year _____ 81 GENERAL LABORATORY

REPORTED IN PPM

Element	TH 6	TH 8	TH 14	TH 17
Ag	< 0.03	< 0.003	< 0.003	< 0.003
Al	> 40	> 40	> 40	17
As	< 0.2	< 0.1	< 0.1	< 0.09
B	0.3	0.3	0.3	0.3
Ba	0.9	1	0.9	0.9
Be	< 0.003	< 0.003	< 0.003	< 0.003
Bi	< 0.02	< 0.01	< 0.01	< 0.009
Ca	19	> 40	> 40	> 20
Cd	< 0.2	< 0.1	< 0.1	< 0.09
Ce	< 3	< 3	< 3	< 2
Co	< 0.02	< 0.01	0.06	0.03
Cr	0.06	0.06	0.06	0.02
Cs	2	< 0.3	0.3	< 2
Cu	0.6	0.03	0.1	0.2
Fe	> 40	> 40	> 40	> 20
Ge	< 0.02	< 0.01	< 0.01	< 0.009
Hg	< 0.05	< 0.03	< 0.03	< 0.02
K	40	36	30	16
Li	0.6	0.3	0.3	0.1
Mg	40	> 40	> 40	> 20
Mn	0.3	3	3	9
Mo	< 0.003	< 0.003	< 0.003	< 0.002
Na	30	36	40	20
Nb	< 0.2	< 0.1	< 0.1	< 0.09
Ni	0.03	< 0.03	< 0.03	< 0.02
P	< 0.2	< 0.01	< 0.1	< 0.09
Pb	0.3	0.2	0.2	0.2
Rb	0.9	0.3	0.3	0.2
Sb	< 0.03	< 0.03	< 0.03	< 0.02
Si	> 40	> 40	> 40	> 20
Sn	0.2	0.06	0.2	0.2
Sr	0.2	0.08	0.06	0.5
Ta	< 0.03	0.06	0.06	0.07
Te	< 0.03	< 0.03	< 0.03	< 0.02
Th	< 0.03	< 0.03	< 0.03	< 0.02
Ti	6	2	3	1
Tl	< 0.02	< 0.01	< 0.01	< 0.009
U	< 2	< 1	< 1	< 0.9
V	0.3	< 0.03	0.1	0.02
W	< 2	< 1	< 1	< 0.9
Zn	3	0.3	1	0.3
Zr	0.2	0.2	0.2	0.1

TABLE IV

EASTMAN CHEMICAL COMPANY

Distribution _____ Date 12/14/75

ROCKY FLATS DIVISION

Water Samples-

WATER ANALYSIS REPORT Month _____ Year _____ 81 GENERAL LABORATORY

REPORTED IN PPM

Element	TH 10	TH 12	TH 7	TH 9
Ag	< 0.003	< 0.006	< 0.01	< 0.01
Al	< 30	< 60	28	< 120
As	< 0.1	< 0.3	< 0.6	< 0.6
B	0.1	0.5	2	0.1
Ba	1	3	6	5
Be	< 0.003	< 0.006	< 0.01	< 0.01
Bi	< 0.01	< 0.03	< 0.06	< 0.06
Ca	30	45	140	160
Cd	< 0.1	< 0.3	< 0.6	< 0.6
Ce	< 3	< 6	< 11	< 13
Co	< 0.01	0.2	< 0.06	< 0.06
Cr	0.05	0.01	0.1	0.3
Cs	0.5	1	1	1
Cu	0.3	0.6	0.06	0.9
Fe	> 30	70	> 140	> 160
Ge	< 0.01	< 0.03	< 0.06	< 0.06
Hg	< 0.03	< 0.06	< 0.1	< 0.1
K	33	70	100	160
Li	0.5	1	0.6	3
Mg	5	17	> 140	> 160
Mn	1	6	55	6
Mo	0.01	0.05	0.06	< 16
Na	20	50	> 140	115
Nb	< 0.1	< 0.3	< 6	< 0.6
Ni	0.05	0.2	< 0.1	0.4
P	0.2	0.4	< 6	0.6
Pb	1	0.4	0.7	0.5
Rb	0.8	2	< 1	4
Sb	< 0.03	< 0.06	0.1	< 0.1
Si	> 30	> 70	140	> 160
Sn	0.05	0.1	0.2	0.3
Sr	0.1	0.3	22	0.4
Ta	0.03	0.06	< 0.01	< 0.1
Te	< 0.03	< 0.06	< 0.01	< 0.1
Th	< 0.03	< 0.06	< 0.01	< 0.1
Ti	8	25	1	40
Tl	< 0.01	< 0.03	< 0.06	< 0.06
U	< 1	< 3	< 6	< 6
V	0.3	0.5	< 0.1	1
W	< 1	< 3	< 6	< 6
Zn	2	5	1	10
Zr	0.3	0.6	0.8	4

Water Samples- Well Water Samples

WATER ANALYSIS REPORT 81 GENERAL LABORATORY

Month _____ Year _____

REPORTED IN PPM

Element	TH 11	TH 16	TH 18	TH 19
Ag	< 0.004	< 0.001	< 0.02	< 0.002
Al	> 50	> 14	> 270	> 20
As	< 0.2	< 0.06	< 1.0	< 0.07
B	0.04	0.03	0.4	0.06
Ba	3.0	0.6	10.0	0.3
Be	< 0.004	< 0.001	< 0.02	< 0.002
Bi	< 0.02	< 0.006	< 0.1	< 0.007
Ca	> 50	14	130	> 20
Cd	< 0.2	< 0.06	< 1.0	< 0.07
Ce	< 4	< 1	< 20	< 2
Co	< 0.02	0.006	0.1	0.007
Cr	0.02	0.006	0.4	0.006
Cs	0.4	0.1	20	2
Cu	0.4	0.3	6.0	0.3
Fe	> 50	> 14	> 270	> 20
Ge	< 0.02	< 0.006	< 0.1	< 0.007
Hg	< 0.04	< 0.001	< 0.2	< 0.02
K	50	14	270	20
Li	0.8	2.0	4.0	0.2
Mg	> 50	> 14	210	> 20
Mn	2.0	0.3	10.0	2.0
Mo	0.01	< 0.001	0.2	0.002
Na	> 50	> 14	270	20
Nb	< 0.004	< 0.001	< 0.02	< 0.002
Ni	< 0.04	< 0.01	0.6	< 0.02
P	< 0.2	< 0.06	< 1.0	< 0.007
Pb	0.2	0.05	0.8	0.06
Rb	8.0	0.1	6.0	0.2
Sb	< 0.04	< 0.01	< 0.2	< 0.02
Si	> 50	> 14	270	> 20
Sn	0.08	0.01	0.2	0.3
Sr	0.8	0.06	1.0	0.2
Ta	< 0.04	< 0.01	< 0.2	0.02
Te	< 0.4	< 0.1	< 2.0	0.2
Th	< 0.04	< 0.01	0.2	< 0.02
Ti	4.0	2.0	80	2
Tl	< 0.02	< 0.006	< 0.1	< 0.0007
U	< 2.0	< 0.6	< 10.0	< 8.0
V	0.1	0.06	4.0	0.06
W	< 2.0	< 0.6	< 10.0	< 0.7
Zn	2.0	< 0.8	20	0.7
Zr	0.4	0.1	4.0	0.1

TABLE V

LANDFILL SAMPLES

Sample Location	Date Sampled	^3H pCi/l	Gamma Scan - Counts/Sec/kg ± 2σ keV 0-1885	59-81	96-121	173-217	600-732	1104-1218	1266-1380
North TH-2A	1/3/74	≤1572	4.61 ±0.26	0.17 ±0.08	0.36 ±0.08	0.40 ±0.08	0.39 ±0.06	0.07 ±0.03	0.09 ±0.0
South TH-2B	1/3/74	≤1163	0.46 ±0.23	--	--	0.16 ±0.07	0.10 ±0.05	--	0.03 ±0.0
North Drainage	1/3/74	≤2607	0.36 ±0.23	--	--	0.10 ±0.07	0.08 ±0.05	--	--

ISSUE	DESCRIPTION	LOC	DATE	BY	APPR'D	CLASSIFIER	JOB NO.
A	ORIGINAL ISSUE		1-2-74		CAG	SEC	440527

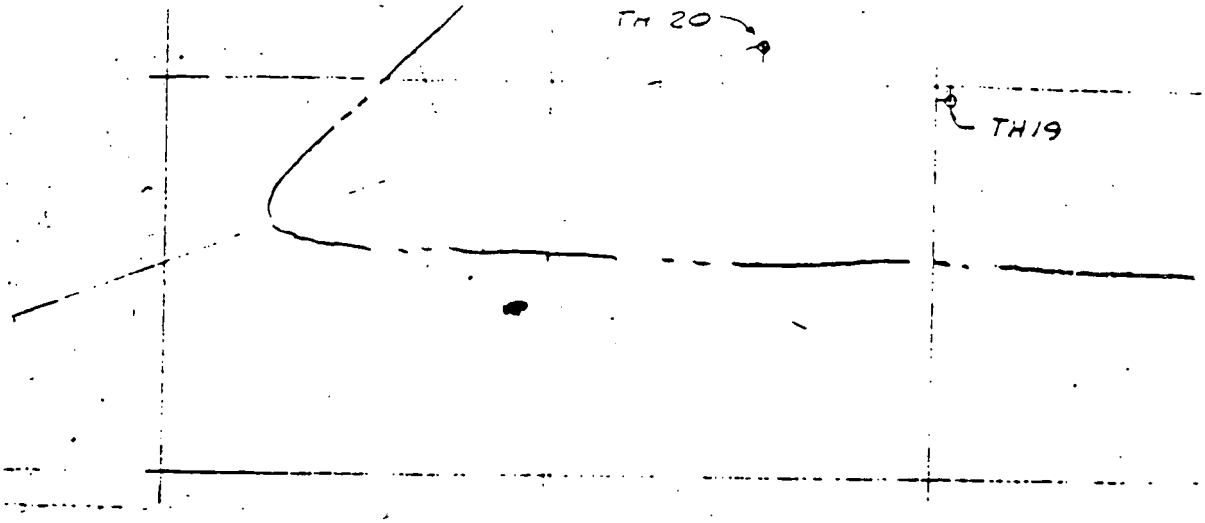
TOLERANCES		BY	DATE
FRACT. ±	DESIGNED	DAVIS	12/19/73
ANGLE ±			
DEC ±	DRAWN	DAVIS	12/20/73
UNLESS NOTED OTHERWISE	CHECKED	CAG	1-2-74
REMOVE BURRS AND SHARP EDGES	APPROVED	CA Henderson	1-2-74
NEXT ASSEMBLY	SUBMITTED		
SCALE 1" = 50'-0	REC'M'DED		
	APP'D (AEC)		

U S ATOMIC ENERGY COMMISSION
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

THE DOW CHEMICAL COMPANY
A.E.C. CONTRACT AT (29-1)-1106
ROCKY FLATS DIVISION — GOLDEN, COLORADO

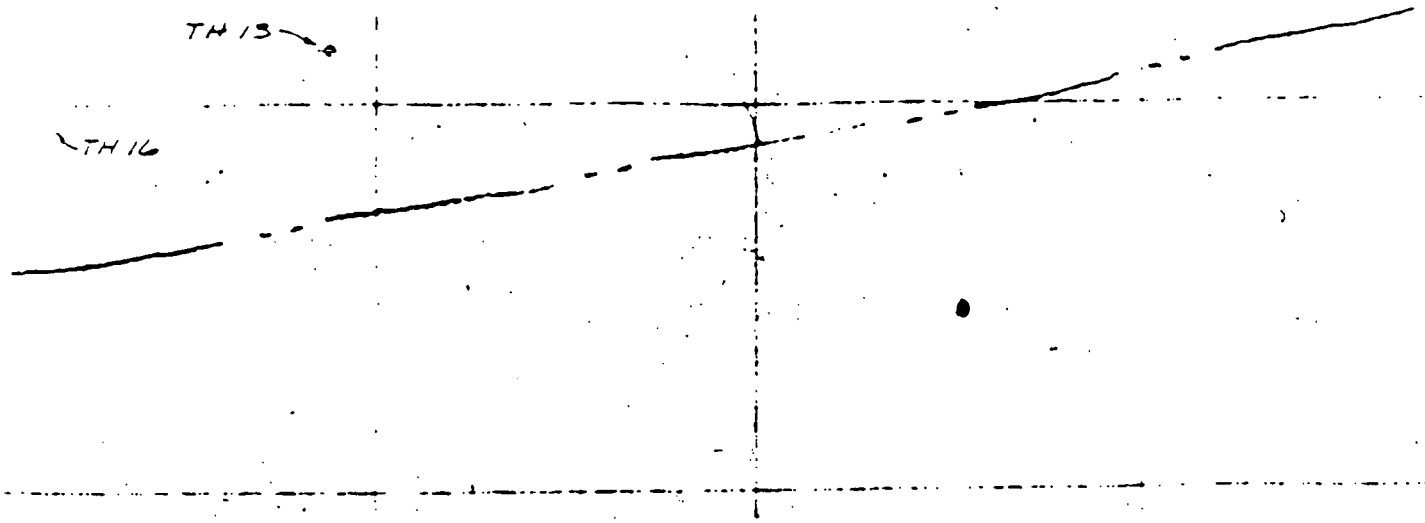
SITE SOIL INVESTIGATION-
SANITARY LANDFILL
TEST HOLE LOCATIONS

SIZE	DRAWING NUMBER	ISSUE	SHEET
D	27239 - 2	A	1 OF 1



TEST HOLE DATA

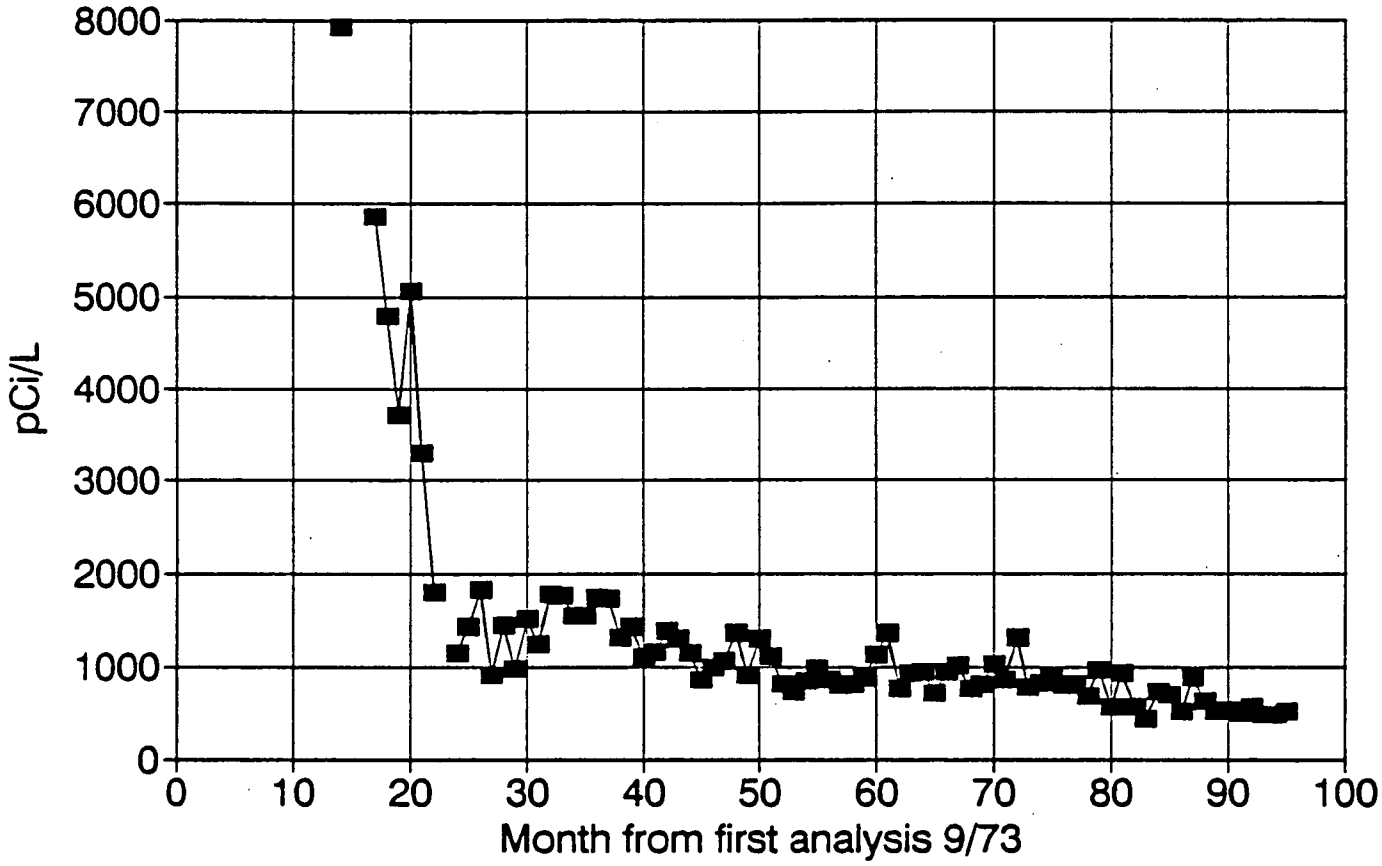
TEST HOLE NUMBER	PLANT COORDINATES	GRADE ELEV.
1	N39,599 - E20,172	5983.06
2	N39,697 - E20,214	5981.64
2-A	N39,741 - E20,191	5982.22
2-B	N39,666 - E20,229	5981.20
3	N39,554 - E20,278	5979.39
4	N39,508 - E20,186	5983.81
5	N39,580 - E20,112	5984.19
6	N39,708 - E20,125	5983.59
7	N39,488 - E20,088	5984.77
8	N39,548 - E20,015	5985.08
9	N39,640 - E20,041	5983.98
10	N39,454 - E20,003	5986.89
11	N39,516 - E19,924	5986.74
12	N39,605 - E19,942	5984.99
13	N39,414 - E19,888	5988.44
14	N39,471 - E19,835	5988.92
15	N39,547 - E19,847	5986.85
16	N39,395 - E19,815	5988.46
17	N39,441 - E19,750	5989.42
18	N39,489 - E19,775	5987.76
19	N39,397 - E19,704	5990.72
20	N39,408 - E19,654	5991.07
21	N39,468 - E19,692	5989.30
22	N39,531 - E19,976	5985.98
23	N39,511 - E20,028	5985.44
24	N39,588 - E20,002	5984.53
25	N39,565 - E20,063	5984.59
26	N39,502 - E20,142	5984.42
27	N39,527 - E20,129	5984.13
28	N39,622 - E20,115	5983.66
29	N39,586 - E20,149	5983.62
30	N39,637 - E20,177	[illegible]



TEST HOLE DATA (CONT.)

TEST HOLE NUMBER	PLANT COORDINATES	GRADE ELEV.
34	N39,487 - E20,213	5983.62
45	N39,540 - E19,971	5985.97
46	N39,532 - E19,984	5985.42
47	N39,521 - E19,979	5985.89
48	N39,527 - E19,965	5985.59
49	N39,539 - E19,984	5985.40
50	N39,545 - E19,982	5985.55
51	N39,537.5 - E19,978	5985.70
52	N39,541 - E19,988	5985.28
53	N39,535 - E19,989	5985.40
54	N39,536 - E19,995	5985.17
55	N39,550 - E19,994	5985.22

Tritium in Western Landfill Pond
1973 to 1980



INTERIM REPORT ON CORING AND SAMPLING
THE ROCKY FLATS LANDFILL
ES-376-74-101

LOCATION AND ELEVATION OF TEST HOLES DRILLED
TO LOCATE TRITIUM IN PRESENT LANDFILL
(* represent estimates taken from map)
(Rocky Flats Plant Coordinates)

	ID No.	NORTHING	EASTING	ELEVATION
1	1	39559	20172	5983.06
2	2	39697	20214	5981.64
3	2A	39741	20191	5982.22
4	2B	39666	20229	5981.20
5	3	39554	20278	5979.39
6	4	39508	20186	5988.81
7	5	39580	20112	5984.19
8	6	39708	20125	5983.59
9	7	39488	20088	5984.77
10	8	39548	20015	5985.08
11	9	39640	20041	5983.98
12	10	39454	20003	5986.89
13	11	39516	19924	5986.74
14	12	39605	19942	5984.99
15	13	39414	19888	5988.44
16	14	39471	19835	5988.92
17	15	39547	19847	5986.85
18	16	39395	19815	5988.46
19	17	39441	19750	5989.42
20	18	39489	19775	5987.76
21	19	39397	19704	5990.72
22	20	39408	19654	5991.07
23	21	39468	19692	5989.30
24	22	39531	19976	5985.98
25	23	39511	20028	5985.44
26	24	39588	20002	5984.53
27	25	39565	20063	5984.59
28	26	39502	20142	5984.42
29	27	39527	20129	5984.13
30	28	39622	20115	5983.66
31	29	39586	20149	5983.62
32	30	39637	20177	5983.44
33	31*	39562	20191	5983.18
34	32*	39615	20209	5982.08
35	33*	39527	20228	5982.6
36	34	39487	20213	5983.62
37	45	39540	19971	5985.97
38	46	39532	19984	5985.42
39	47	39521	19979	5985.89
40	48	39527	19965	5985.59
41	49	39539	19984	5985.40
42	50	39545	19982	5985.55
43	51	39537.5	19978	5985.70
44	52	39541	19988	5985.28
45	53	39535	19989	5985.40
46	54	39536	19995	5985.17
47	55	39550	19994	5985.22

This is a
CONTROLLED DOCUMENT
EG&G ROCKY FLATS PLANT
ENVIRONMENTAL MANAGEMENT DEPARTMENT
This is a RED Stamp

ROCKY FLATS PLANT
Phase I RFI/RI Work Plan for
Operable Unit 7 - Present Landfill
IHSS 114 and Inactive Hazardous
Waste Storage Area IHSS 203

Manual No.: 21100-WP-OU 07.01
Section No.: APPD, R0
Organization: Environmental Management

Title: Appendix D: Borehole Logs for Present Landfill Monitoring Wells

Approved by:

12/6/91
Effective Date

Manager

6/23/92
Date

APPENDIX D

Borehole Logs for

Present Landfill Monitoring Wells

Project:	Rocky Flats Plant	LOG OF BORING NO.	4-86
Date Drilled	4/24/86	Coordinates	
Boring Method	Hollow Stem Auger	Ground Surface Elevation	5645

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch) 20 40	Water Content (%) 20 40	Other Tests
	0			VALLEY FILL ALLUVIUM 0-0.7'. CLAY: dark brown; silty; trace granitic pebbles; moist. 0.7-1.5'. CLAY: medium to dark brown; some very fine-grained sand; moist. 1.5-2.7'. SAND: medium to dark brown; poorly sorted; fine to coarse; quartz and feldspar; silty clay partings; moist. 2.7-3.0'. CLAY: dark grayish brown; iron stains and trace granitic pebbles; silty; moist to wet. 3.0-8.0'-Sample. Recovered 1.7/5.0'=34%. 3.0-4.0'. CLAY: Same as above; moist to wet. 6.3-8.0'. CLAY: dark grayish brown; silty; iron stains and trace granitic pebbles; moist to wet. 8.0-10.5'-Sample. Recovered 0.7/2.5'=28%. 8.0-8.7'. CLAY: dark brown; silty; trace grading to some granitic cobbles; moist. 10.5-13.0'-Sample. Recovered 1.3/2.5'=52%. 11.7-12.2'. CLAY: medium to dark brown; some granitic pebbles and cobbles; sandy to gravelly; moist. Wet at 12.0'. 12.2-13.0'. CLAY: medium brown to medium gray; sandy to gravelly; some granitic pebbles and cobbles; iron staining; wet.			
	3						
	6						
	9						
	12						

Remarks Logged by: S. Paschke Checked by:

Project No. 106P06222	Hydro-Search, Inc.	Page 1 of 2

Project:	Rocky Flats Plant	LOG OF BORING NO. 4-86
Date Drilled	4/21/86	Coordinates
Boring Method	Hollow Stem Auger	Ground Surface Elevation 5645

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch) 20 40	Water Content (%) 20 40	Other Tests
	12			13.0-15.5'-Sample. Recovered 2.1/2.5'=84%. 13.0-14.7'. CLAY: medium gray; some fine to coarse sand and some granitic pebbles; iron staining; wet. 14.7-14.9'. CLAY: medium gray; some fine to coarse sand and granitic pebbles; iron staining; wet.			
	15			ARAPAHOE FORMATION 15.5-18.0'-Sample. Recovered 2.5/2.5'=100%. CLAYSTONE: medium gray; slightly sandy; moist.			
	18			TOTAL DEPTH: 18.0'			
	21						
	24						

Remarks Logged by: S. Paschke Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project: Rocky Flats Plant

LOG OF BORING NO. 5-86

Date Drilled 9/4/86

Boring Method Hollow Stem Auger

Coordinates

Ground Surface Elevation 5723

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	0			VALLEY FILL ALLUVIUM 0-2.0'-Sample. Recovered 2.0/2.0'=100%. GRAVEL: grayish red (10R 4/2) with very fine-grained sand; roots and grasses; poorly sorted; subangular; unconsolidate; weathered; dry. 2.0-4.0'-Sample. Recovered 0.8/2.0'=40%. GRAVEL: grayish red (10R 4/2) gravel and sand; quartzite and granite pebbles and cobbles; poorly sorted; angular; unconsolidate; dry.			
	2			4.5-6.0'-Sample. Recovered 1.5/2.0'=75%. 4.5-5.7'- SAND: dark yellowish brown (10YR 4/2) very fine-grained sand with some gray quartzite pebbles and cobbles; some light brown (5YR 5/6) areas; poorly sorted; sub-angular; unconsolidated; dry.			
	4			5.7-6.0'- CLAY: moderate yellowish brown (10YR 5/4) with several gray quartzite pebbles and cobbles; several white calcareous laminations; strong reaction with HCL; dry.			
	6			6.0-8.0'-Sample. Recovered 2.0/2.0'=100%. GRAVEL: several gray quartzite gravels and pebbles in a moderate yellowish brown (10YR 5/4) clay matrix; angular; poorly sorted; weathered; dry.			
	8						

Remarks Logged by: J. Bergren Checked by: _____

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO.	5-86
Date Drilled	4/21/86	Coordinates	
Boring Method	Hollow Stem Auger	Ground Surface Elevation	5723

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	8			8.0-9.0'-Sample. Recovered 0.6/2.0'=30%. CLAY: dark yellowish brown (10YR 4/2) and moderate yellowish brown (10YR 5/4) clay; few gravels (subrounded); unconsolidated; dry.			
				ARAPAHOE FORMATION			
	10			9.0 -10.0'-Sample. CLAYSTONE: Dark yellowish brown (10YR 4/2) and moderate yellowish brown (10YR 5/4) mottles; poorly consolidated; dry.			
				10.0-12.0'-Sample. Recovered 0.9/2.0'=45%. CLAYSTONE: dark yellowish brown (10YR 4/2) with abundant moderate yellowish brown (10YR 5/4) and light brown (5YR 5/6) mottles; no pebbles or inclusions; weathered; dry.			
	12			12.0-14.0'-Sample from augers. CLAYSTONE: light olive gray (5Y 5/2) and light brown (5YR 5/6) mottled clay; several iron stains; dry.			
	14			TOTAL DEPTH: 14.0'			
	16						

Remarks Logged by: J. Bergman Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project: Rocky Flats Plant

LOG OF BORING NO. 6-86

Date Drilled 9/4/86

Boring Method Hollow Stem Auger

Coordinates N 40588.1 E 23577.5

Ground Surface Elevation 5806.10

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	0			VALLEY FILL ALLUVIUM			
				0.0-2.0'-Sample. Recovered 0.4/2.0'=20%.			
				0-0.3'-Sample. TOPSOIL: grayish brown (5YR 3/2) fine- to coarse-grained sandy soil; contains grass and roots; poorly sorted; dry.			
	2.5			0.3-0.4'-Sample. GRAVEL: grayish brown (5YR 3/2) fine- to coarse-grained sand and gravel; friable; few quartzite pebbles; moderately well sorted; subrounded; unconsolidated; dry.			
				2.0-4.0'-Sample. Recovered 1.7/2.0'=85%. GRAVEL: pale brown (5YR 5/2) fine- to medium-grained sand and gravel; abundant quartzite pebbles and cobbles; poorly sorted; angular to subrounded; unconsolidated; dry.			
	5			4.0-6.0'. Recovered 0.2/2.0'=10%. (Shoe sample) GRAVEL: pale brown (5YR 5/2) sand and gravel; common quartzite cobbles and pebbles; poorly sorted; subangular; unconsolidated; dry.			
	7.5			6.0-8.0'-Sample. Recovered 0.4/2.0'=20%. CLAY: dark yellowish brown (10YR 4/2); very fine-grained with some quartzite grains; unconsolidated; slightly damp.			
				ARAPAHOE FORMATION			
				8.0-10.0'-Sample from bit. Recovered 0.2/2.0'=20%. CLAYSTONE: pale brown (5YR 5/2) with some light brown (5YR 5/6) staining; very fine-grained; dry.			
	10						

Remarks Logged by: J. Bergman

Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO. 6-86

Date Drilled 9/4/86 **Coordinates** N 40588.1 E 23577.5

Boring Method Hollow Stem Auger **Ground Surface Elevation** 5806.10

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch) 20 40	Water Content (%) 20 40	Other Tests
	10			10.0-12.0'-Sample. Recovered 0.8/2.0'=40%. CLAYSTONE: dark yellowish brown (10YR 4/2) with few light brown (5YR 5/6) mottles; unweathered; dry.			
				12.0-14.0'-Sample. Recovered 1.6/2.0'=80%. CLAYSTONE: grayish brown (5YR 3/2) with few light brown (5YR 5/6) mottles; homogenous; dry.			
	12.5						
				TOTAL DEPTH: 14.0'			
	15						
	17.5						
	20						

Remarks Logged by: J. Bergman Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project: Rocky Flats Plant

LOG OF BORING NO. 7-86

Date Drilled 9/23/86
Boring Method Hollow Stem Auger

Coordinates N 39869.8 E 20892.8
Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	0			VALLEY FILL ALLUVIUM 0-2.0'-Sample. Recovered 1.4/2.0'=70%. CLAY: grayish brown (5YR 3/2) with granitic pebbles; poorly sorted; subangular to subrounded; roots and organics common; damp. 2.0-4.0'-Sample. Recovered 0.2/2.0'=10%. GRAVEL: granitic pebbles in a grayish brown (5YR 3/2) clay matrix; poorly sorted; subangular to subrounded; few roots; unconsolidated; damp.			
	2			4.0-6.0'-Sample. Recovered 2.0/2.0'=100%. 4.0-5.0'. GRAVEL: quartzite and granite pebbles in a grayish brown (5YR 3/2) clay matrix; poorly sorted; subangular to subrounded; unconsolidated; damp.			
	4			ARAPAHOE FORMATION 5.0-6.0'-Sample. CLAYSTONE: light olive gray (5Y 5/2) with limonite staining and few willow roots; very fine-grained; damp.			
	6			6.0-8.0'-Sample. Recovered 2.3/2.0'=115%. CLAYSTONE: light olive gray (5Y 5/2) with dark yellowish orange (10YR 6/6) mottling occurring as bands (1/4" laminae); rare silty laminae; becomes more silt rich at base; rare dusky blue (5PB 3/2) swirl; poorly consolidated; damp.			
	8						

Remarks Logged by: C. Walker

Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project: Rocky Flats Plant

LOG OF BORING NO. 7-86

Date Drilled 9/23/86 **Coordinates** N 39869.8 E 20892.8

Boring Method Hollow Stem Auger **Ground Surface Elevation**

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	8			8.0-10.0'-Sample. Recovered 2.3/2.0'=115%. CLAYSTONE: light olive gray (5Y 5/2) with dark yellowish orange (10YR 6/6) mottling occurring as bands (1/4" laminae); common black organic particles throughout sample; sample is swirled with natural bedding disturbed; limonite (very dusky purple 5P 2/2) to 50% in lower 1.5'.			
	10			TOTAL DEPTH: 10.0'			
	12						
	14						
	16						

Remarks Logged by: C. Walker Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project: Rocky Flats Plant

LOG OF BORING NO. 8-86

Date Drilled 9/23/86, 10/20/86 - 10/23/86 **Coordinates** N 39859.2 E 20916.7

Boring Method Hollow Stem Auger/NC Core **Ground Surface Elevation**

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	0			**VALLEY FILL ALLUVIUM** 0-2.0'-Sample. Recovered 1.9/2.0'95%. 0.0-0.9'. GRAVEL: coarse grained sand to pebble sized grains in moderate brown to light brown (5YR 5/6) clay; roots; poorly sorted; unconsolidated; dry.			
	5			**ARAPAHOE FORMATION** 0.9 to 2.0'. CLAYSTONE: light olive gray (5Y5/2) with organics and some limonite staining; poorly consolidated; damp. 2.0-4.0'-Sample. Recovered 2.3/2.0'=115%. CLAYSTONE: light olive gray (5Y 5/2); silty; poorly consolidated; weathered; damp. 4.0-5.0'-Sample. Recovered 1.3/1.0'=130%. CLAYSTONE: light olive gray (5Y 5/2); approximately 30-40% limonite; poorly consolidated; weathered; damp. 5.0-7.0'-Sample. Recovered 2.0/2.0'=100%. CLAYSTONE: light olive gray (5Y 5/2) containing very little limonite; limonite percents decrease from 5.0 to 6.5' - at 6.5' core becomes less limonitic with incipient parting; blocky; slightly weathered; dry. 7.0-9.0'-Sample. Recovered 2.0/2.0'=100%. CLAYSTONE: light olive gray (5Y 5/2); weathered with 30-35% limonite; crumbly texture; dry.			
	10						
	15						
	20						

Remarks Logged by: C. Walker & L. Pivonka Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project: Rocky Flats Plant

LOG OF BORING NO. 8-86

Date Drilled 9/23/86, 10-20-86 - 10/23/86
Boring Method Hollow Stem Auger/NC Core

Coordinates N 39859.2 E 20916.7
Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	20			9.0-11.0'-Sample. Recovered 2.2/2.0'=110%. CLAYSTONE: light olive gray (5Y 5/2) with 20-40% limonite; crumbly from 9.0-9.3'; 9.3-11.0' sample is fairly consolidated with rare black organics; rare incipient parting; damp.			
	25			11.0-13.0'-Sample. Recovered 2.3/2.0'=115%. CLAYSTONE: light olive gray (5Y 5/2); up to 50% limonite; organics up to 10% with dusky blue (5PB 3/2) patches and bands; damp.			
	30			13.0-15.0'-Sample. Recovered 2.2/2.0'=110%. 13.0-13.8'. CLAYSTONE: light olive gray (5Y 5/2); up to 50% limonite. 13.8-15.0'. SHALE: grayish black (N/2); high black organic content with discontinuous coal seams (up to 1/8" thick); rare limonite laminae along parting; poorly consolidated; slightly damp.			
	35			15.0-17.0'-Sample. Recovered 2.3/2.0'=115%. CLAYSTONE: grayish black to black (N/2 to N/1) coaly shale and claystone; poorly and irregularly developed; poorly consolidated; up to 30% coal; organic percent decreases from 16.0-17.0' to dark gray claystone with 0.0-5.0% organics; dry.			
	40			17.0-19.0'-Sample. Recovered 2.3/2.0'=115%. CLAYSTONE: medium dark gray (N4); no reaction with HCL; poorly consolidated; dry.			

Remarks Logged by: C. Walker & L. Pivonka Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO.	8-86
Date Drilled	9/24/86, 10/20/86 - 10/23/86	Coordinates	N 39859.2 E 20916.7
Boring Method	Hollow Stem Auger/NC Core	Ground Surface Elevation	

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot) 20 40	Water Content (%) 20 40	Other Tests
	40			19.0-21.5'-Sample. Recovered 0.3/1.5'=20%. CLAYSTONE: medium dark gray (N 4/0); unweathered; some fine silt; wet.			
				21.5-26.5'-Sample. Recovered 3.8/5.0'=76%. CLAYSTONE: medium dark gray (N 4/0); unweathered; greasy; wet.			
	45			26.5-31.5'-Sample. Recovered 5.0/5.0'=100%. SANDY CLAYSTONE:medium dark gray (N 4/0); some very fine grained sand; trace of organic carbonaceous plant fossils; trace grayish orange (10YR 7/4) concretions (0.2-2.0 cm in diameter); wet			
	50			31.5-36.5'-Sample. Recovered 5.0/5.0'=100%. CLAYSTONE: medium gray (N 5/0) to black (N 1/0); greasy; organic rich layers; wet.			
				36.5-41.5'-Sample. Recovered 4.5/5.0'=90%. SILTY CLAYSTONE: medium dark gray (N 4/0); blocky; some silt; wet.			
	55			41.5-46.5' -Sample. Recovered 2.0/5.0'=40%. CLAYSTONE: dark gray (N 3/0); blocky, greasy; trace carbonaceous plant fossils; wet.			
				46.5-51.5'-Sample. Recovered 5.0/5.0'=100% SILTY CLAYSTONE: dark gray (N 3/0); blocky; some silt; trace carbonaceous plant fossils; wet.			
	60						

Remarks Logged by: C. Walker & L. Pivonka Checked by:

Project No. 106P06222	Hydro-Search, Inc.	Page 3 of 4

Project: Rocky Flats Plant

LOG OF BORING NO. 8-86

Date Drilled 9/24/86, 10/20/86 - 10/23/86 Coordinates N 39859.2 E 20916.7

Boring Method Hollow Stem Auger/NC Core Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Foot) 20 40	Water Content (%) 20 40	Other Tests
	60			51.5-53.5'-Sample. Recovered 2.0/2.0'=100%. SILTY CLAYSTONE: same as above; wet.			
				53.5-55.5'-Sample. Recovered 2.0/2.0'=100%. CLAYEY SANDSTONE: medium gray (N 5/0); fine-grained sandstone; wet.			
	65			55.5-56.5'-Sample. Recovered 1.0/1.0'=100% CLAYSTONE: grayish black (N 2/0); organic-rich; blocky; wet.			
				56.5-59.5'-Sample. Recovered 2.4/3.0'=80%. CLAYSTONE: same as above; wet.			
	70			59.5-61.5'- Sample. Recovered 2.0/2.0'=100%. SILTY SANDSTONE: medium gray (N 5/0); silty; fine-grained sandstone; some carbonaceous plant fossils; wet.			
				61.5-63.5'- Sample. Recovered 2.0/2.0'=100%. SILTY SANDSTONE: medium gray (N 4/0); silty, fine-grained; quartzose; wet.			
	75			63.5-66.5'-Sample. Recovered 3.0/3.0'=100%. SILTY CLAYSTONE: dark gray (N 3/0); blocky; some silt; wet.			
				66.5-71.5'- Sample. Recovered 3.5/5.0'=70% SILTY CLAYSTONE: same as above; wet.			
				TOTAL DEPTH: 71.5'			
	80						

Remarks Logged by: C. Walker & L. Pivonka Checked by: [illegible]

Project No. 106PU6222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO. 9-86
Date Drilled	9/24/86, 10/1/86, 10/2/86	Coordinates N 39246.2 E 19382.2
Boring Method	Casing Driver; Hollow Stem Auger; NC Core	Ground Surface Elevation

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 0-4.5'-Cuttings. GRAVEL: yellowish gray (5Y 7/2) quartzite pebbles and cobbles with silty sand; fines less than 5.0%; poorly sorted; angular; unconsolidated; dry.			
	5			4.5-5.5'-Cuttings. SAND: yellowish gray (5Y 7/2); very fine- grained; silty; moderately sorted; subrounded; unconsolidated; damp.			
				5.5-7.0'-Cuttings. GRAVEL: yellowish gray (5Y 7/2) sandy quartzite gravel (70%); silty; poorly sorted; angular to subrounded; unconsolidated; damp. 7.0-8.0'-Cuttings. No sample obtained.			
	10			8.0-15.0'-Cuttings. SAND: moderate brown (5YR 4/4); silty; fines 20-30%; poorly sorted; angular to subrounded; unconsolidated; damp.			
	15			15.0-20.0'-Cuttings. GRAVEL: moderate brown (5YR 4/4) with abundant quartzite; fines less than 5.0%; poorly sorted; unconsolidated; wet.			
	20						

Remarks Logged by: T. Murphy Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO. 9-86

Date Drilled 9/24/86, 10/1/86, 10/2/86 **Coordinates** N 39246.2 E 19382.2

Boring Method Casing Driver; Hollow Stem Auger; NC Core **Ground Surface Elevation**

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	20			20.0-21.0'-Cuttings. GRAVEL: light gray (N 7); fines <5%; poorly sorted; wet.			
				21.0-22.0'-Cuttings. SILT: yellowish gray (5Y 7/2) silt; unconsolidated; moist to wet.			
				ARAPAHOE FORMATION			
	25			22.0-27.0'-Cuttings. CLAYSTONE: light olive brown (5Y 5/6) and light olive gray (5Y 5/2); plastic; damp.			
				27.0-31.0'-Cuttings. SILTSTONE: light olive gray (5Y 5/2) clayey siltstone; semi-plastic; damp.			
	30			31.0-32.0'-Cuttings. CLAYSTONE: light olive gray (5Y 5/2) and light olive brown (5Y 5/6); semi-plastic; damp.			
				32.0-33.0'-Cuttings. CLAYSTONE: light olive gray (5Y 5/2); well laminated; semi-plastic; damp.			
				33.0-35.0'-Cuttings. CLAYSTONE: olive gray (5Y 3/2); laminated; semi-plastic; damp.			
	35						
				37.0-42.0'-Sample. Recovered 0.0/5.0'=0%.			
	40						

Remarks Logged by: T. Murphy Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO.	9-86
Date Drilled	9/24/86, 10/1/86, 10/2/86	Coordinates	N 39246.2 E 19382.2
Boring Method	Casing Driver; Hollow Stem Auger; NC Core	Ground Surface Elevation	

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch) 20 40	Water Content (%) 20 40	Other Tests
	40						
	45			42.0-47.0'-Sample. Recovered 2.9/5.0'=58%. CLAYSTONE: yellowish gray (5Y 7/2); mottled with dark yellowish orange (10YR 6/6) stains; trace silt; carbonaceous material throughout; subvertical fracture at 2.6'; core lined with limonite; moderately soft; damp.			
				47.0-51.5'-Sample. Recovered 0.0/4.5'=0%.			
	50			51.5-56.5'-Sample. Recovered 0.7/5.0'=14%. RQD 0.7/0.7'=100%. CLAYSTONE: yellowish gray (5Y 7/2); mottled with dark yellowish orange (10YR 6/6) stains; trace silt; carbonaceous material throughout; subvertical fracture at 2.6'; core lined with limonite; moderately soft; damp.			
	55			56.5-58.5'-Sample. Recovered 1.9/2.0'=95%. RQD 0.5/1.9'=26%. CLAYSTONE: dark gray (N 3); some silt; subvertical to vertical fractures filled with dark yellowish orange (10YR 6/6) limonite stain; ironstone concretion at bottom of core; firm; damp.			
	60			58.5-60.5'-Sample. Recovered 1.2/2.0'=60%. RQD 0.6/1.2'=50%. CLAYSTONE: dark gray (N 3); some silt; subvertical to vertical fractures filled with dark yellowish orange (10YR 6/6) limonite stain; firm; damp.			

Remarks Logged by: T. Murphy Checked by:

Project No. 106P06222	Hydro-Search, Inc.	Page 3 of 8

Project:	Rocky Flats Plant	LOG OF BORING NO.	9-86
Date Drilled	9/24/86, 10/1/86, 10/2/86	Coordinates	N 39246.2 E 19382.2
Boring Method	Casing Driver; Hollow Stem Auger; NC Core	Ground Surface Elevation	

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	60			60.5-65.5'-Sample. Recovered 2.6/5.0'=52%. RQD 2.6/2.6'=100%. CLAYSTONE: dark gray (N 3); silty; very fine-grained sand bed at 62.0'; hard; slightly calcareous; organic wood fragments throughout; firm; damp.			
	65			65.5-69.0'-Sample. Recovered 2.6/3.5'=74%. RQD 0.8/2.6'=31%. CLAYSTONE: dark gray (N 3); silty; firm; damp.		▽	
	70			69.0-74.0'-Sample. Recovered 3.0/5.0=60%. RQD 1.7/3.0'=57%. CLAYSTONE: dark gray (N 3); silty; organic wood fragments throughout; grades downward to dark greenish gray (5G 4/1) siltstone with very fine-grained sand laminations; firm; damp.			
	75			74.0-79.0'-Sample. Recovered 1.7/5.0'=34%. RQD 0.5/1.7'=29%. CLAYSTONE: dark gray (N 3) to dark greenish gray (5GY 4/1); interbedded silty claystone and claystone; beds are 0.2' thick; firm damp.			
	80						

Remarks Logged by: T. Murphy Checked by:

Project No. 106P06222	Hydro-Search, Inc.	Page 4 of 8

Project:	Rocky Flats Plant	LOG OF BORING NO. 9-86
Date Drilled	9/24/86, 10/1/86, 10/2/86	Coordinates N 39246.2 E 19382.2
Boring Method	Casing Driver; Hollow Stem Auger; NC Core	Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	80			79.0-84.0'-Sample. Recovered 3.3/5.0'=66%. RQD 2.6/3.3'=79%. CLAYSTONE: dark gray (N 3) to dark greenish gray (5GY 4/1); trace of very fine-grained sand; silty; woody organics; occasional vertical fracture with slickensides; firm; damp.			
	85			84.0-89.0'-Sample. Recovered 4.2/5.0'=84%. RQD 1.2/4.2'=29%. CLAYSTONE: dark gray (N 3) to medium dark gray (N 4); silty; layers of brownish gray (5YR 4/1) silt; occasional concretions; hard; slightly calcareous; organic wood fragments throughout; firm; damp.			
	90			89.0-94.0'-Sample. Recovered 4.5/5.0'=90%. RQD 3.5/4.5'=78%. SILTSTONE: dark gray (N 3) to medium dark gray (N 4); clayey; trace very fine-grained sand; very carbonaceous with woody fragments; slightly calcareous bed in upper section; very firm; damp.			
	95			94.0-99.0'-Sample. Recovered 4.1/5.0'=82%. RQD 2.4/4.1'=47%. SILTSTONE: dark gray (N 3) to medium dark gray (N 4); clayey; trace very fine-grained sand; very carbonaceous with woody fragments; slightly calcareous bed in upper section; very firm; damp.			
	100						

Remarks Logged by: T. Murphy Checked by: [illegible]

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO. 9-86
Date Drilled	9/24/86, 10/1/86, 10/2/86	Coordinates N 39246.2 E 19382.2
Boring Method	Casing Driver; Hollow Stem Auger; NC Core	Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	100			99.0-104.0'-Sample. Recovered 4.1/5.0'=82%. RQD 1.0/4.1'=24%. SILTSTONE: dark gray (N 3) to medium dark gray (N 4); clayey; trace very fine-grained sand; common concretions of pinkish gray (5YR 8/1) materials; very carbonaceous with woody fragments; slightly calcareous bed in upper section; laminations of siltstone with less clay; rip-ups; convoluted bedding; very firm; damp.			
	105			104.0-109.0'-Sample. Recovered 3.2/5.0'=64%. RQD 2.0/3.2'=62%. SILTSTONE: dark gray (N 3) to medium dark gray (N 4); clayey; trace very fine-grained sand; common concretions of pinkish gray (5YR 8/1) materials; very carbonaceous with woody fragments; slightly calcareous bed in upper section; laminations of siltstone with less clay; rip-ups; convoluted bedding; very firm; damp.			
	110			109.0-114.0'-Sample. Recovered 2.2/5.0'=44%. RQD 0/2.2'=0%. SILTSTONE: dark gray (N 3) to medium dark gray (N 4); clayey; trace very fine-grained sand; common concretions of pinkish gray (5YR 8/1) materials; very carbonaceous with woody fragments; non-calcarous rip-ups; convoluted bedding; very firm; damp.			
	115			114.0-119.0'-Sample. Recovered 4.6/5.0'=92%. RQD 3.4/4.6'=74%. SILTSTONE: dark gray (N 3); clayey; abundant carbonaceous material to 114.5'; greenish gray (5G 6/1); trace very fine-grained; firm to hard; damp.			
	120						

Remarks Logged by: T. Murphy Checked by:

Project No. 106P06222	Hydro-Search, Inc.	Page 6 of 8

Project:	Rocky Flats Plant	LOG OF BORING NO.	9-86
Date Drilled	9/24/86, 10/1/86, 10/2/86	Coordinates N 39246.2 E 19382.2	
Boring Method	Casing Driver; Hollow Stem Auger; NC Core	Ground Surface Elevation	

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch) 20 40	Water Content (%) 20 40	Other Tests
	120			119.0-124.0'-Sample. Recovered 4.6/5.0'=92%. RQD 0.6/4.6'=13%.			
				119.0-122.0'. SILTSTONE: dark gray (N 3); clayey; abundant carbonaceous material to 114.5'; greenish gray (5G 6/1); firm to hard; damp.			
				122.0-124.0'. SANDSTONE: greenish gray (5G 6/1); fine- to very fine-grained; silty; finely bedded; some carbonaceous material; moderately sorted; soft; wet.			
	125			124.0-129.0'-Sample. Recovered 4.5/5.0'=90%. RQD 0/4.5'=0%. SANDSTONE: medium gray (N 4); fine- to medium-grained silty sandstone; cross- bedded; carbonaceous laminations; sandstone alternates with sandy siltstone and clayey siltstone - 0.5' thick; moderately sorted; soft to moderately firm; wet.			
	130			129.0-134.0'-Sample. Recovered 2.5/5.0'=50%. RQD 1.3/2.5'=52%. SANDSTONE: medium gray (N 4); fine- to medium-grained; crossbedding; convoluted beds; well sorted; firm to hard;damp.			
				134.0-139.0'-Sample. Recovered 3.9/5.0'=78%. RQD 2.2/3.9'=56%.			
	135			134.0-136.1'. SANDSTONE: medium gray (N 4); fine- to medium-grained sand; convoluted beds; trace sand; well sorted; firm to hard; damp.			
				136.1-139.0'. SANDSTONE: medium gray (N 4); very fine-grained; silty; convoluted; cross-bedding; banded with carbonaceous laminations; moderately sorted; firm to hard; damp.			
	140						

Remarks Logged by: T. Murphy Checked by:

Project No. 106P06-222

Hydro-Search, Inc.

Project: Rocky Flats Plant

LOG OF BORING NO. 9-86

Date Drilled 9/24/86, 10/1/86, 10/2/86

Coordinates N 39246.2 E 19382.2

Boring Method Casing Driver; Hollow Stem Auger; NC Core

Ground Surface Elevation

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch) 20 40	Water Content (%) 20 40	Other Tests
	140			139.0-144.0'-Sample. Recovered 3.9/5.0'=78%. RQD 2.9/3.9'=74%. SILTSTONE: medium dark (N 3) to dark (N 4); clayey; few moderate brown (10YR 4/4) concretions; well sorted; firm; damp.			
				144.0-149.0'-Sample. Recovered 4.0/5.0'=80%. RQD 3.0/4.0'=75%. CLAYSTONE: dark gray (N 3); silty; carbonaceous; firm; damp.			
	145						
				TOTAL DEPTH: 149.2'			
	150						
	155						
	160						

Remarks Logged by: T. Murphy

Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project: Rocky Flats Plant

LOG OF BORING NO. 10-86

Date Drilled 9/24/86

Coordinates N 39223.9 E 19400.6

Boring Method Casing driver

Ground Surface Elevation

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 0.0-10.0'-Cuttings. GRAVEL: granitic pebbles and cobbles; fines less than 1.0%; poorly sorted; unconsolidated; dry.			
	5						
	10			10.0-11.0'-Cuttings. SAND: light olive gray (5Y 5/2) and moderate reddish brown (10R 4/6) fine- to coarse-grained sand; poorly sorted; subrounded; unconsolidated; damp.		▼	
				11.0-15.0'-Cuttings. SILT: moderate yellowish brown (10YR 5/4) gravelly sandy silt; granitic gravel 10%; poorly sorted; unconsolidated; damp.		▽	
	15			15.0-17.0'-Cuttings. GRAVEL: moderate yellowish brown (10 YR 5/4) silty gravel; poorly sorted; unconsolidated; damp.			
				17.0-23.0'-Cuttings. SILT: moderate yellowish brown (10YR 5/4) gravelly sandy silt; gravel 10-20%; poorly sorted; unconsolidated; damp.			
	20						

Remarks Logged by: T. Gulliver

Checked by: [illegible]

Project No. 106P06222

Hydro-Search, Inc.

Project: Rocky Flats Plant	LOG OF BORING NO. 10-86

Date Drilled 9/24/86 **Coordinates** N 39223.9 E 19400.6

Boring Method Casing driver **Ground Surface Elevation**

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/Inch) 20 40	Water Content (%) 20 40	Other Tests
	20						
				ARAPAHOE FORMATION 23.0-24.0'-Cuttings. SILTSTONE: light olive brown (5Y 5/6) sandy siltstone; well sorted; damp to moist. 24.0-27.0'-Cuttings. CLAYSTONE: light olive gray (5Y 5/2) and light olive brown (5Y 5/6) claystone; damp.			
	25						
				TOTAL DEPTH: 27.0'			
	30						
	35						
	40						

Remarks Logged by: T. Gulliver Checked by: [illegible]

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO.	45-86

Date Drilled 10/2/86 **Coordinates** N 37396.4 E 16363.1

Boring Method Casing Driver **Ground Surface Elevation** 6035.00'

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. GRAVEL: moderate brown (10YR 4/4); ~60% granitic pebbles and cobbles; 40% sand and silt; poorly sorted, unconsolidated; damp.			
				3.0-8.0'-Cuttings. GRAVEL: moderate brown (10YR 4/4); granite and quartzite pebbles and cobbles; <5% sand and silt; poorly sorted, unconsolidated; damp.			
	5						
				8.0-10.0'-Cuttings. GRAVEL: Same as above; moist.			
	10			10.0-14.5'-Cuttings. GRAVEL: Same as above; moist.			
	15			14.5-19.0'-Cuttings. BOULDERS: quartzite cobbles and boulders; poorly sorted; unconsolidated; damp.			
	20						

Remarks Logged by: T. Gulliver Checked by:

Project No. 106P06222

Hydro-Search, Inc.

Project:	Rocky Flats Plant	LOG OF BORING NO.	45-86
Date Drilled	10/2/86	Coordinates	N 37396.4 E 16363.1
Boring Method	Casing Driver	Ground Surface Elevation	

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	20			19.0-23.0'-Cuttings. GRAVEL: moderate brown (10YR 4/4); granitic pebbles and cobbles; sandy and silty; poorly sorted; unconsolidated; damp.			
				23.0-25.0'-Cuttings. GRAVEL: Same as above; damp.			
	25			25.0-28.0'-Cuttings. SAND: light olive gray (5Y 5/2); medium to coarse-grained; some granitic pebbles; poorly sorted; subrounded; unconsolidated; damp.			
				28.0-43.0'-Cuttings. GRAVEL: moderate brown (10YR 4/4); some silt and sand; poorly sorted; unconsolidated; wet.			
	30						
	35						
	40						

Remarks Logged by: T. Gulliver Checked by: [illegible]

Project No. 106P06222 | Hydro-Search, Inc. | Page 2 of 3

Project:	Rocky Flats Plant	LOG OF BORING NO.	45-86

Date Drilled 10/2/86 **Coordinates** N 37396.4 E 16363.1

Boring Method Casing Driver **Ground Surface Elevation**

Elev. (feet)	Depth (feet)	Sample Type	Graphic Log	Material Description	Penetration Resistance (Blows/inch) 20 40	Water Content (%) 20 40	Other Tests
	40			43.0-47.0'-Cuttings. GRAVEL: moderate brown (10YR 4/4); 20-30% sand and silt; poorly sorted; unconsolidated; wet.			
	45			ARAPAHOE FORMATION 47.0-55.0'-Cuttings. SILTSTONE: light olive brown (5Y 5/6); well sorted; damp.			
	50						
	55			TOTAL DEPTH: 55.0'			
	60						

Remarks Logged by: T. Gulliver Checked by:

Project No. 106P06222

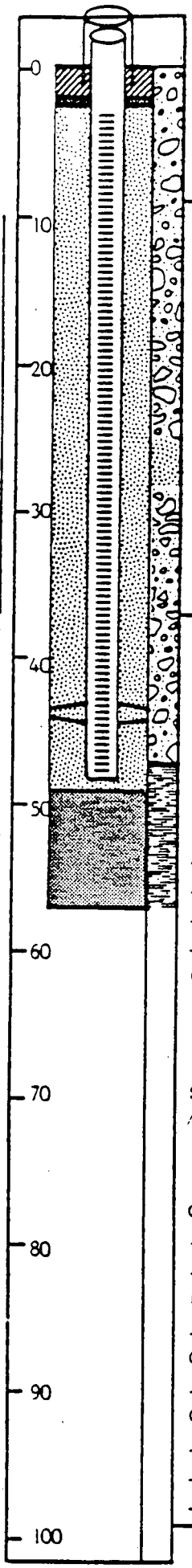
Hydro-Search, Inc.

WELL 45-86

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N 37396.4 E 16363.1

ELEVATION: GROUND LEVEL 6035.00'
TOP OF CASING 6036.97'



LOCATION Golden, CO
PERSONNEL T. Gulliver
PROJECT 106P06222 Rocky Flats Plant

DRILLING SUMMARY:

TOTAL DEPTH Well: 48.20' Hole: 57.00'
BOREHOLE DIAMETER 5 5/8"

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

DRILLING FLUID None

SURFACE CASING 5" x 4.5' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG ___

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

0.00' - 2.99'	C1	
2.99' - 48.20'	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' welded bottom cap.

CENTRALIZERS Type 304 stainless steel
43.47' - 44.70'

FILTER MATERIAL 32-42 silica sand
2.48' - 49.30'

CEMENT Portland Type I
0.00' - 1.80'

OTHER 3/8" bentonite pellets
1.80' - 2.48'
49.30' - 57.00'

CONSTRUCTION TIME LOG:

TASK	START DATE 1986	START TIME	FINISH DATE 1986	FINISH TIME
DRILLING:				
5 5/8" casing driver	10/2	0900	10/2	1515
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
2" stainless	10/3	0950	10/3	1000
FILTER PLACEMENT:	10/3	1000	10/3	1600
CEMENTING:	10/3	1605	10/3	1620
DEVELOPMENT:				
OTHER:				
Bentonite	10/3	0935	10/3	0950
	10/3	1600	10/3	1605

WELL DEVELOPMENT

See Well Development Summary Sheet

COMMENTS:

No water encountered during drilling.

Top of stainless steel casing: 1.97'

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area
Coordinates N 40158.03 E 21727.76
Total Depth 13.0'

Borehole/Well No. 40-87
Ground Surface Elevation 5882.69'
Water Level Encountered None
Static 3.30' (4/11/88)

Drilling Company Boyles Bros.
Date Drilled June 8, 1987
Drilling Method Hollow Stem Auger
Logged By J. Bergman
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid None
Checked By
Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**TOPSOIL** 0.0-2.0' SAMPLE. Recovered 0.6/2.0' = 30%. TOP SOIL: dark yellowish brown (10 YR 4/2); clayey; abundant roots and grasses; few moderate brown (5 YR 4/4) colorations; 2 gray quartzite pebbles; moist.	HNu background=0.2. OVA background=15. No readings above background.
5			**VALLEY FILL** 2.0-4.0' SAMPLE. Recovered 0.0/2.0' = 0%. No recovery due to rocks. Rock sound stopped at approximately 6'. 4.0-8.0' SAMPLE. Recovered 3.5/4.0' = 88%. 4.0-6.2': GRAVEL AND CLAY: moderate yellowish brown (10 YR 5/4) clay; abundant gray quartzite pebbles and cobbles; angular, unsorted.	
10			**ARAPAHOE FORMATION** 6.2-7.5': CLAYSTONE: moderate yellowish brown (10 YR 5/4); few pale brown (5 YR 5/2) mottles; abundant caliche; strongly effervesces in HCl; organic rich; sandy (patches of sand throughout 6.5-7.5'); weathered; damp.	
15				
20				

LOG OF BOREHOLE

Location- Rocky Flats Plant; Landfill Area
Coordinates N 40158.03 E 21727.76
Total Depth 13.0'

Borehole Well No. 40-87
Ground Surface Elevation 5882.69'
Water Level Encountered None
Static 3.30' (4/11/88)

Drilling Company Boyles Bros.
Date Drilled June 8, 1987
Drilling Method Hollow Stem Auger
Logged By J. Bergman
Geologist

Driller R. Sharp
Helper T. Merritt
Drilling Fluid None
Checked By
Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			8.0-10.5' SAMPLE. Recovered 3.0/2.5' = 120%. CLAYSTONE: grayish brown (5 YR 3/2); abundant light brown (5 YR 5/6) mottles and FeO concretions; abundant black organic fragments; sandy patches yellowish gray (5 Y 7/2) very fine-grained; weathered; silty; abundant caliche; moist.	
			10.5-13.0' SAMPLE. Recovered 3.2/2.5' = 124%. CLAYSTONE: dark yellowish brown (10 YR 6/2); sandy; few dark yellowish orange (10 YR 6/6) mottles at 11.5'; abundant black organic fragments in top 0.5'; decrease in sand content to less than 20% over 12.0-13.0'; weathered; damp.	
			TOTAL DEPTH: 13.0'.	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 40133.61 E 21725.75
Total Depth: 110.00'

Borehole/Well No.: 41-87BR
Ground Surface Elevation: 5882.78'
Water Level Encountered: None
Static: 41.83' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: June 9 and July 28-29, 1987
Drilling Method: 0.0' - 17.0' Hollow Stem Auger; 17.0' - 110.0' NC Core
Logged By: J. Bergman; K.D. Holliway, Geologist

Driller: R. Sharp/ P. Bushkovski
Helper: T. Merritt/ K. Parker
Drilling Fluid: 0.0'-17.0' None; 17.0'-110.0' Water
Checked By: _____ Site Manager
_____ CEARP Manager

Comments: Surface casing set June 9, 1987 to 17.0 feet by J. Bergman

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**VALLEY FILL ALLUVIUM** 0-2.0' SAMPLE. Recovered 1.3/2.0' = 65%. CLAY: dusky brown (5 YR 2/2) abundant roots and grasses; abundant gray quartzite pebbles and cobbles; trace light brown (5 YR 5/6) stains; damp to moist.	HNu background = 0.2. OVA background = 15. No readings above background.
5			2.0-4.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAY: pale yellowish brown (10 YR 6/2); abundant gray quartzite pebbles and cobbles; caliche in last 2"; trace light brown (5 YR 6/4) mottles; moist.	
10			4.0-7.0' SAMPLE. Recovered 3.0/3.0' = 100%. 4.0-4.5': CLAY: pale brown (5 YR 5/2); abundant light brown (5 YR 5/6) mottles; quartzite gravels; some caliche; damp.	
			ARAPAHOE FORMATION 4.5-7.0': CLAYSTONE: pale brown (5 YR 5/2); no cobbles; abundant light brown (5 YR 5/6) mottles; abundant organics; damp.	
15			7.0-9.5' SAMPLE. Recovered 2.5/2.5' = 100%. CLAYSTONE: pale brown (5 YR 5/2); abundant light brown (5 YR 5/6) mottles; consolidated; weathered; some caliche; abundant organics and FeO concretions; silty in bottom 0.5'; slightly damp.	
20				

LOG OF BOREHOLE

Location: Rocky Flats Plant: Landfill Area
Borehole/Well No.: 41-87BR (con't.)
Coordinates:
Ground Surface Elevation:
Total Depth:
Water Level Encountered:
Static:
Drilling Company:
Driller:
Date Drilled:
Helper:
Drilling Method:
Drilling Fluid:
Logged By: Geologist
Checked By: Site Manager
CEARP Manager
Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			9.5-12.0' SAMPLE. Recovered 2.4/2.5' = 96%. CLAYSTONE: pale yellowish brown (10 YR 6/2); few dark yellowish orange (10 YR 6/6) mottles; organic-rich; silty layer @ 11.0'; few fractures; weathered; damp.	20.85-30.50': Packer Test Interval # 8.
			12.0-14.5' SAMPLE. Recovered 2.8/2.5' = 115%. 12.0-12.2: same as above. 12.2-14.5': CLAYSTONE: moderate olive brown (5 Y 4/4); no mottles; few organics; consolidated; unweathered; slightly damp.	22.85-32.50': Packer Test Interval # 7, failed.
25			14.5-17.0' SAMPLE. Recovered 3.7/2.5' = 148%. CLAYSTONE: same as above but silty.	
30			15.7-18.5' SAMPLE. Recovered 1.3' rubber plug.	32.50-42.15': Packer Test Interval # 6.
			18.5-21.5' SAMPLE. Recovered 0.6/3.0 = 20%. CLAYSTONE: light olive gray (5 Y 5/2); trace silt; trace very fine-grained sand; trace iron staining in small fractures; indurated; weathered; damp.	
35			21.5-25.0' SAMPLE. Recovered 3.0/3.5' = 86%. CLAYSTONE: same as above, but more fractures; dark yellowish orange (10 YR 6/6) staining in fractures; damp.	
40				

LOG OF BOREHOLE

Location: Rocky Flats Plant: Landfill Area
Borehole/Well No. 41-87BR (con't.)
Coordinates
Ground Surface Elevation
Total Depth
Water Level Encountered
Static
Drilling Company
Driller
Date Drilled
Helper
Drilling Method
Drilling Fluid
Logged By
Geologist
Checked By
Site Manager
CEARP Manager
Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
40			25.0-28.5' SAMPLE. Recovered 2.15/3.5 = 61.5%. 25.0-25.8': CLAYSTONE: same as above. 25-8-27.15': CLAYSTONE: dusky yellowish brown (10 YR 2/2); unweathered; indurated; trace very fine-grained sand; trace dark yellowish orange (10 YR 6/6) iron staining; slightly damp.	41.55-51.20': Packer Test Interval # 5.
45			28.5-32.5' SAMPLE. Recovered 0.7/4.0' = 18%. CLAYSTONE: olive black (5 Y 2/1); same as above; damp.	
50			32.5-35.0' SAMPLE. Recovered 5.2/2.5 - 208%. SANDSTONE: olive black (5 Y 2/1); very fine-grained; well sorted; consolidated; indurated; possible plant fossils from 33.5-35.0'; some clay and silt; slightly damp.	53.05-62.70': Packer Test Interval # 4.
55			35.0-38.5' SAMPLE. Recovered 3.2/3.5 = 91%. SANDSTONE: olive black (5 Y 2/1); 3.5-4.0 Ø and finer-grained; fairly well sorted; consolidated; trace clay; some silt; possible plant fossils and imprints; slightly damp.	
60			38.5-43.0' SAMPLE. Recovered 4.3/4.5' = 96%. SANDSTONE: same as above, but less clay and fewer possible fossils.	

LOG OF BOREHOLE

Location: Rocky Flats Plant: Landfill Area

Borehole/Well No. 41-87BR (con't.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
60			43.0-47.5 SAMPLE. Recovered 1.9/4.5' = 42%. 43.0-44.1': SANDSTONE: same as above, but increased clay. 44.1-44.9' SANDSTONE: light gray (N 7/0) to trace olive black (5 Y 2/1); 3.5-4.0 phi to very fine-grained; fracture with black slightly glossy organics at 44.5'.	62.70-72.35': Packer Test Interval # 3.
65			47.5-50.5' SAMPLE. Recovered 1.9/3.0' = 63%. SANDSTONE: olive black (5 Y 2/1); 3.4-4.0 Ø and smaller; few organics; trace clay; slightly damp.	
70			50.5-53.0' SAMPLE. Recovered 2.5/2.5' = 100%. SANDSTONE: olive black (5 Y 2/1); some clay; some silt; becoming claystone with silt and sand from 51.2-52.3' and 52.4-53.0'; damp.	72.35-82.00': Packer Test Interval # 2.
			53.0-57.0' SAMPLE. Recovered 3.2/4.0' = 80%. CLAYSTONE: medium dark gray (N 4/0); trace very fine-grained sand; dry.	
75			57.0-61.0' SAMPLE. Recovered 0.9/4.0' = 23%. RQD = 0/4.0 = 0%. CLAYSTONE: dark gray (N 3/0); indurated; trace silt; damp.	
80				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole/Well No. 41-87BR (con't.)

Coordinates _____

Ground Surface Elevation _____

Total Depth _____

Water Level Encountered _____

Static _____

Drilling Company _____

Driller _____

Date Drilled _____

Helper _____

Drilling Method _____

Drilling Fluid _____

Logged By _____ Geologist

Checked By _____ Site Manager

_____ CEARP Manager

Comments _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
80			61.0-63.0' SAMPLE. Recovered 5.0/2.0' = 250%. RQD = 4.48/5.0 = 89.6%. CLAYSTONE: medium dark gray (N 4/0) to dark gray (N 3/0); trace silt; upper 3' mottled; damp.	82.0-91.65': Packer Test Interval # 1.
85			63.0-67.0' SAMPLE. Recovered 4.0/4.0 = 100%. RQD = 3.07/4.0 = 76.8%. 63.0-64.7': CLAYSTONE: dark gray (N 3/0) to dusky yellowish brown (10 YR 2/2): very fine-grained; trace silt; some plant leaf and stem fossils; damp. 64.7-67.0': SANDSTONE: medium gray (N 5/0) to medium dark gray (N 4/0); sand grades from very fine to 3.5-3.0 phi to 2.5-2.0 phi prominent at 66.50 to 67.0'; subangular to subrounded; fairly well sorted; some organics present to 66.50', then decreasing; some to no clays; damp to slightly moist.	
90			67.0-71.0' SAMPLE. Recovered 4.0/4.0 = 100%. RQD = 3.61/4.0 = 90.25%. 67.0-68.35': SANDSTONE: medium light gray (N 6/0); 2.0-3.0 phi; subrounded to subangular; fairly well sorted; trace clay; some silt; damp to slightly moist.	
95			68.35-68.85': SANDSTONE: same as above but olive black (5 Y 2/1); 3.5-4.0 phi some clay; some silt; lens of clay and plant organics (fossils) from 68.35-68.45'; damp. 68.85-70.25': SANDSTONE: same as above; moist.	
100				

LOG OF BOREHOLE

Location: Rocky Flats Plant: Landfill Area
Borehole/Well No.: 41-87BR (con't.)
Coordinates:
Ground Surface Elevation:
Total Depth:
Water Level Encountered:
Static:
Drilling Company:
Driller:
Date Drilled:
Helper:
Drilling Method:
Drilling Fluid:
Logged By: Geologist
Checked By: Site Manager
CEARP Manager
Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
100			70.25-71.0': SANDSTONE: olive black (5 Y 2/1) to medium dark gray (N 4/0); some organics; clay; 3.5-4.0 phi and very fine-grained.	
			71.0-73.5' SAMPLE. Recovered 0.0/2.5 = 0%.	
105			73.5-75.0' SAMPLE. Recovered 2.3/1.5' = 153%. RQD = 1.6/2.3 = 69.56%. CLAYSTONE AND SANDSTONE: medium dark gray (N 5/0) to dark gray (N 3/0); very fine-grained sand; occasional fossils (plant leaves and stems); some silt; damp.	
110			75.0-79.0' SAMPLE. Recovered 3.3/4.0' = 82.5%. RQD = 2.4/3.3' = 72.7%. CLAYSTONE: medium dark gray (N 5/0) to olive black (5 Y 2/1); very fine-grained sand; occasional fossils (plant leaves and stems), also a marine fossil at 76.0'; damp.	
115			79.0-82.0' SAMPLE. Recovered 3.0/3.0' = 100%. RQD = 2.20/3.0 = 73.3%. 79.0-79.6': CLAYSTONE: same as above; damp. 79.6-82.0': SANDSTONE; medium dark gray (N 5/0) to dark gray (N 3/0); trace clay; small lenses of claystone; sand 2.5-2.0 phi; fairly well sorted; damp.	
120				

LOG OF BOREHOLE

Location Rocky Flats Plant: Landfill Area

Borehole/Well No. 41-87BR (con't.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			82.0-86.0' SAMPLE. Recovered 4.0/4.0' = 100%. RQD = 4.0/4.0' = 100%. SANDSTONE: same as above except less clay; subangular to subrounded sand; occasional organics (plant fossils) throughout; damp to slightly moist.	
			86.0-90.0' SAMPLE. Recovered 4.0/4.0' = 100%. RQD = 4.0/4.0' = 100%. SANDSTONE: medium dark gray (N 5/0) to dark gray (N 3/0); 1.0-2.0 phi (fine to very fine); fairly well sorted, subrounded, mostly quartzose, trace feldspathic; occasional fossils (plant leaves and stems); damp to slightly moist.	
			90.0-94.0' SAMPLE. Recovered 3.56/4.0' = 90%. RQD 3.3/3.6 = 91.67%. SANDSTONE: same as above; damp to slightly moist.	
			94.0-98.0' SAMPLE. Recovered 4.4/4.0 = 110%. RQD = 4.24/4.4 = 96.36%. 94.0-96.5': CLAYSTONE, SANDSTONE AND SILTSTONE: same as above but very fine-grained sand; damp. 96.5-98.0: SANDSTONE: same as above, except fine-grained; damp.	

LOG OF BOREHOLE

Location Rocky Flats Plant: Landfill Area

Borehole/Well No. 41-87ER (con't.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			98.0-102.0' SAMPLE. Recovered 3.0/4.0' = 75%. RQD = 2.97/3.0 = 99%. 98.0-101.0': SANDSTONE: same as above; damp. 101.0-102.0': CLAYSTONE, SANDSTONE, SILTSTONE: medium dark gray (N 5/0); very fine-grained sand; damp.	
			102.0-106.0' SAMPLE. Recovered 5.0/4.0' = 125%. RQD = 4.0/5.0' = 80%. 102.0-106.0': CLAYSTONE, SANDSTONE, SILTSTONE: medium dark gray (N 5/0) to olive black (5 Y 2/1); very fine-grained sand.	
			106.0-110.0' SAMPLE. Recovered 4.4/4.0' = 110%. RQD = 1.31/4.4' = 42.05%. CLAYSTONE, SANDSTONE, SILTSTONE: same as above, damp.	
			TOTAL DEPTH: 110.0'.	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 40355.10 E 22430.99
Total Depth: 12.40'

Borehole Well No.: 42-87
Ground Surface Elevation: 5854.05'
Water Level Encountered: 2.0'
Static: 1.62' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: June 10, 1987
Drilling Method: Hollow Stem Auger
Logged By: J.B. Bergman
Geologist

Driller: R. Sharp
Helper: T. Merritt
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**TOPSOIL** 0.0-2.0' SAMPLE. Recovered 0.5/2.0' = 25%. TOP SOIL: dark yellowish brown (10 YR 4/2); clay rich; abundant roots and grasses; large gray quartzite cobbles and pebbles; moist.	HNu background = 0.6-0.4. No readings above background.
5			**VALLEY FILL ALLUVIUM** 2.0-4.0' SAMPLE. Recovered 0.9/2.0' = 45%. CLAY: same as above; no vegetation; wet. 4.0-7.4' SAMPLE. Recovered 2.9/3.4 = 85%. 4.0-6.1': CLAY AND GRAVEL: grayish orange pink (5 YR 7/2); abundant quartzite, granite, and schistose gravel, pebbles, and cobbles; unsorted; angular; wet.	
10			**ARAPAHOE FORMATION** 6.1-6.9': CLAYSTONE: moderate yellowish brown (10 YR 5/4); trace grayish brown (5 YR 3/2) stains; trace organics; damp.	
15			7.4-9.9' SAMPLE. Recovered 2.5/2.5 = 100%. CLAYSTONE: olive gray (5 YR 3/2); abundant moderate brown (5 YR 4/4) mottles; trace organics; consolidated; damp.	
20				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 40355.10 E 22430.99
Total Depth: 12.40'

Borehole/Well No.: 42-87
Ground Surface Elevation: 5854.05'
Water Level Encountered: 2.0'
Static: 1.62' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: June 10, 1987
Drilling Method: Hollow Stem Auger
Logged By: J.B. Bergman
Geologist

Driller: R. Sharp
Helper: T. Merritt
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			9.9-12.4' SAMPLE. Recovered 2.5/2.5' = 100%. CLAYSTONE: same as above.	
			TOTAL DEPTH: 12.40'	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39257.05 E 19431.75
Total Depth: 32.0'

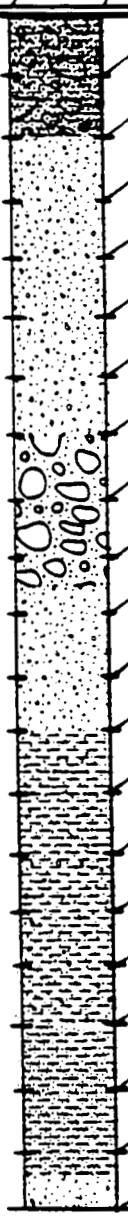
Borehole Well No.: 58-87
Ground Surface Elevation: 5995.10'
Water Level Encountered: None
Static: 7.20' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: November 17, 1987
Drilling Method: Hollow Stem Auger
Logged By: R. Treat
Geologist

Driller: T. High
Helper: B. Keeney
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**TOPSOIL** 0.0-2.0' SAMPLE. Recovered 1.2/2.0' = 60%. 0.0-0.25': TOP SOIL: dusky brown (5 YR 2/2) silty sand (3.0-2.5 Ø); numerous roots; scattered gravel; weakly cemented; moist. **ROCKY FLATS ALLUVIUM** 0.25-1.20': GRAVEL AND CLAYEY SAND: moderate brown (5 YR 4/4) to light brown (5 YR 5/6) and moderate reddish brown (10 R 4/6); moderately cemented; gravel, 4.50 mm and as small as 0.55 mm; subrounded and rounded and subangular; noted cobbles; sand ranges (3.0-2.5 Ø) up to (0.5-0.0 Ø); well sorted; light; moist. 2.0-4.0' SAMPLE. Recovered 0.3/2.0' = 15%. SAND AND GRAVEL: light brown (5 YR 6/4) and light brown (5 YR 5/6) to moderate brown (5 YR 4/4); rounded, subrounded, and subangular; well sorted, 0.50 mm to 5.0 mm with scattered cobbles; moderately cemented to weakly cemented; moist. 4.0-7.0' SAMPLE. Recovered 0.4/3.0 = 13%. SAND AND GRAVEL: pale yellowish brown (10 YR 6/2) to light brown (5 YR 6/4); several cobbles; soils appearing as above; light moist.	HNu background=0.0. OVA background = 0.0. Ludlum background = 0. 17.0-19.5': Readings on core: HNu: 112; OVA: 2.1.
5				
10				
15				
20				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Borehole/Well No.: 58-87 (con't.)
Coordinates:
Ground Surface Elevation:
Total Depth:
Water Level Encountered:
Static:
Drilling Company:
Driller:
Date Drilled:
Helper:
Drilling Method:
Drilling Fluid:
Logged By: Geologist
Checked By: Site Manager
CEARP Manager
Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			7.0-9.5' SAMPLE. Recovered 0.2/2.5 = 8%. GRAVEL: one subangular, quartzite gravel.	
			9.5-12.0' SAMPLE. Recovered 0.0/2.5 = 0%. Cuttings indicate sand and gravel as noted in previous runs.	
25			12.0-14.5' SAMPLE. Recovered 0.2/2.5 = 8%. CLAYEY SAND AND GRAVEL: light brown (5 YR 6/4) to (5 YR 5/6); fine-grained sand (2.5-2.0 Ø) weakly cemented; poorly sorted; subangular and subrounded gravel; moist.	27.5-29.5': Readings on core: HNu: 5.5; OVA: 0.0.
30			14.5-17.0' SAMPLE. Recovered 0.4/2.5' = 16%. CLAYEY SAND AND GRAVEL: moderate brown (5 YR 6/4) to light brown (5 YR 5/6); poorly sorted sand; fine-grained (2.5-2.0 Ø) with small gravel and scattered, large (5.25 mm) cobbles; weakly to moderately cemented; moist.	29.5-32.0': Readings in augers: HNu: 105; OVA: 50.
35			17.0-19.5' SAMPLE. Recovered 1.4/2.5 = 56%. CLAYEY SAND: varying brown as stated above; slightly clayey; weakly cemented; poorly sorted; fine- to medium-grained sands and gravel (ranging from 0.75 to 25 mm); subrounded; rounded with few subangular.	
40				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Borehole/Well No.: 58-87 (con't.)
Coordinates:
Ground Surface Elevation:
Total Depth:
Water Level Encountered:
Static:
Drilling Company:
Driller:
Date Drilled:
Helper:
Drilling Method:
Drilling Fluid:
Logged By: Geologist
Checked By: Site Manager
CERP Manager
Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			19.5-22.0' SAMPLE. Recovered 1.5/2.5' = 60%. 19.5-20.5': SAND AND GRAVEL: light brown (5 YR 5/6) to moderate yellowish brown (10 YR 5/4); poorly sorted sand (2.0-2.5 Ø) to (0.5-0.0 Ø) with gravel ranging 0.75 mm to 2.75 mm; subrounded; rounded; weakly cemented; moist. 20.5-21.0': SANDY CLAY: light brown (5 YR 6/4); few scattered gravel; fine- and medium-grained sands; low plastic; moist.	
			ARAPAHOE FORMATION	
			22.0-24.5' SAMPLE. Recovered 0.0/2.5 = 0%. Cuttings indicate weathered sandy claystone with gray and brown fine-grained sand.	
			24.5-27.0' SAMPLE. Recovered 0.0/2.5 = 0%.	
			27.0-27.5' SAMPLE. Center bit drill .	
			27.5-29.5' SAMPLE. Recovered 2.0/2.0 = 100%. SANDY CLAYSTONE: dark yellowish orange (10 YR 6/6) to moderate yellowish brown (10 YR 5/4) and light gray (N 7/0); fine-grained sand (3.0-2.5 Ø); low to medium plastic; massive; severely oxide (Fe) stained; moist.	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole/Well No.: 58-87 (con't.)

Coordinates:

Ground Surface Elevation:

Total Depth:

Water Level Encountered:

Static:

Drilling Company:

Driller:

Date Drilled:

Helper:

Drilling Method:

Drilling Fluid:

Logged By: Geologist

Checked By: Site Manager

CEARP Manager

Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			29.5-32.0' SAMPLE. Recovered 2.5/2.5 = 100%. CLAYEY SANDSTONE: light gray (N 7/0) to medium light gray (N 6/0); slightly to moderately oxide (Fe) stained; massive; low plastic; weakly to moderately cemented; fine-grained sand (2.5-2.0 Ø); moist.	
			TOTAL DEPTH: 32.0'.	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39257.06 E 19431.75
Total Depth: 26.0'

Borehole/Well No.: 59-87
Ground Surface Elevation: 5992.90'
Water Level Encountered: None
Static: 15.05' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: November 20, 1987
Drilling Method: Hollow Stem Auger
Logged By: J. Bacchus
Geologist

Driller: R. Sharp
Helper: T. Merritt
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ROCKY FLATS ALLUVIUM**	HNu background = 2.0-3.0. OVA background = 1.8.
			0-2.0' SAMPLE. Recovered 1.4/2.0' = 70%. CLAY: dark yellowish brown (10 YR 4/2), large angular quartzite clasts, coarse-grained sand; pockets of caliche; moist.	0.0-2.0': Readings on core: HNu: 1.6; OVA: 40.0; Ludlum: 0.
5			2.0-4.0' SAMPLE. Recovered 1.1/2.0' = 55%. CLAY: same as above except wood in the shoe.	2.0-4.0': Readings on core: HNu: 1.5; OVA: 20.0; Ludlum: 0.
			4.0-5.0' SAMPLE. Recovered 0.4/1.0 = 40%. WOOD: dusky brown (5 YR 2/2); frayed.	4.0-5.0': Readings on core: HNu: 1.3; OVA: 0; Ludlum: 0.
10			5.0-8.0' SAMPLE. Recovered 0.0/3.0' = 0%.	8.0-10.5': Readings on core: OVA: 29.0; Ludlum: 0.
			8.0-10.5' SAMPLE. Recovered 1.3/2.5 = 52%. 8.0-8.3': WOOD: same as above. 8.3-9.3': CLAY: dusky yellowish brown (10 YR 4/2), caliche, wood; sand, moist.	8.0-9.3': Readings in augers: OVA: off scale.
15			10.5-13.0' SAMPLE. Recovered 1.3/2.5 = 52%. 10.5-11.3': CLAY: same as above except the sample contains small cobbles, moist. 11.3-11.8': CLAY: light olive gray (5 Y 5/2), mottled with dark yellowish orange (10 YR 6/6) large subrounded pebbles, moist.	10.5-11.8': Readings on core: OVA: 1.2; Ludlum:0.
				10.5-11.8': Readings in augers: OVA off scale.
				12.8-14.9': Readings on core: OVA: 40; Ludlum: 0.
20			Total depth measured 12.8'. Adjust depth.	

LOG OF BOREHOLE

Location Rocky Flats Plant: Landfill Area

Borehole/Well No. 59-87 (con't.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			12.8-15.3' SAMPLE. Recovered 2.1/2.5' = 84%. 12.8-13.0': SAND: light olive gray (5 Y 5/2), large rounded pebbles, moist. 13.0-14.9': SAND: light brown (5 YR 5/6); coarse-grained; mottled with pale yellowish orange (10 YR 8/6) immature sand, high amount of k-feldspar and large angular quartz, small angular cobbles of quartzite, some clay; moist.	15.3-17.8': Readings on core: OVA: 13; Ludlum: 2. 17.8-20.5': Readings on core: OVA: 1.8; Ludlum: 5. 20.5-23.0': Readings on core: OVA: 6.8; Ludlum: 0. 23.0-25.5': Readings on core: OVA: 3.8; Ludlum: 0.
25			15.3-17.8' SAMPLE. Recovered 1.8/2.5 = 72%. SAND: same as above. Fill	
			17.8-20.5' SAMPLE. Recovered 1.8/2.5' = 72%. SAND; same as above.	
30			**ARAPAHOE FORMATION**	
			20.5-23.0' SAMPLE. Recovered 3.5/2.5' = 140%. CLAYSTONE: light olive gray (5 Y 5/2) mottled with dark yellowish orange (10 YR 6/6); sandy; blocky structure.	
35			23.0-25.5' SAMPLE. Recovered 2.8/2.5' = 112%. CLAYSTONE: same as above.	
			TOTAL DEPTH: 26.0'.	
40				

LOG OF BOREHOLE

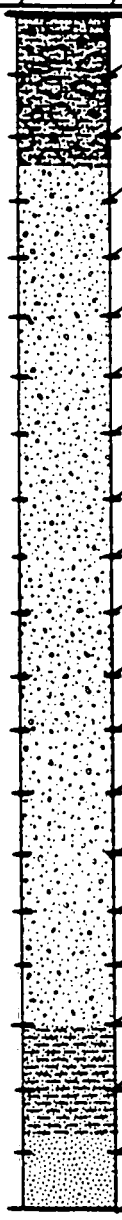
Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39951.63 E 19938.52
Total Depth: 32.0'

Borehole/Well No.: 60-87
Ground Surface Elevation: 5984.03'
Water Level Encountered: 19.3'
Static: 8.30' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: November 19, 1987
Drilling Method: Hollow Stem Auger
Logged By: R. Treat, Geologist

Driller: T. High
Helper: B. Keeney
Drilling Fluid: None
Checked By: _____ Site Manager
_____ CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ROCKY FLATS ALLUVIUM** 0.0-2.5' SAMPLE. Recovered 1.2/1.5' = 48%. GRAVEL AND SANDY CLAY: dusky brown (5 YR 2/2) to dark yellowish brown (10 YR 4/2) and moderate brown (5 YR 3/4); gravel ranging 0.25 mm up to cobble size, angular, subangular, and subrounded; weakly cemented; moist. 2.5-4.0' Center bit drill. 4.0-7.0' SAMPLE. Recovered 0.4/3.0' = 13%. SAND AND GRAVEL: light brown (5 YR 5/6); slightly silty; gravel to 4.75 mm, subrounded, subangular, much of quartzite composition; sand ranging (3.0-2.5 Ø) to scattered (2.0-1.5 Ø) weakly cemented, moist. 7.0-9.5' SAMPLE. Recovered 0.0/2.5' = 100%. Cuttings indicate same materials as above. 9.5-10.5' SAMPLE. Recovered 0.6/1.0' = 60%. SAND AND GRAVEL: light brown (5 YR 6/4) to moderate brown (5 YR 4/4) with angular and subangular gravel; range 0.25 mm to 2.75 mm with well sorted sand (2.5-2.0 Ø) to (0.5-1.0 Ø); slightly clayey; weakly cemented; moist.	HNu background = 0.3. OVA background = 0.0. Ludlum background = 0.0. 10.5': Readings in augers: OVA: 3.5; HNu: 210.
5				
10				
15				
20				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole/Well No.: 60-87 (cont'd.)

Coordinates: _____

Ground Surface Elevation: _____

Total Depth: _____

Water Level Encountered: _____

Static: _____

Drilling Company: _____

Driller: _____

Date Drilled: _____

Helper: _____

Drilling Method: _____

Drilling Fluid: _____

Logged By: _____ Geologist

Checked By: _____ Site Manager

_____ CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			10.5-12.0' SAMPLE. Recovered 0.7/1.5' = 47%. SAND AND GRAVEL: same as above.	22.0': Readings in augers: HNu = 3.2; OVA = 9.5.
			12.0-14.5' SAMPLE. Recovered 1.2/2.5 = 48%. SAND AND GRAVEL: moderate brown (5 YR 4/4) to pale yellowish brown (10 YR 6/2) and light brown (5 YR 6/4); well sorted sand; poorly sorted gravel with 0.25 mm to 3.25 mm; slightly clayey; weakly cemented; very moist at 12.5' to light moist.	
25			14.5-17.0' SAMPLE. Recovered 0.4/2.5' = 16%. SAND AND GRAVEL: same as above.	
30			17.0-19.5' SAMPLE. Recovered 2.5/2.5' = 100%. 17.0-18.6': CLAYEY SAND: moderate yellowish brown (10 YR 5/4) to light gray (N 7/0); sand range (3.0-2.5 Ø) some coarser-grained.; low plastic; moderately cemented; moist. 18.6-19.5': SAND: light brown (5 YR 5/6) fine to coarse-grained; slightly clayey; ranging (2.5-2.0 Ø to 0.5-1.0 Ø) with some small size scattered gravels; weakly cemented; very moist to wet at 19.3'.	
35			19.5-22.0' SAMPLE. Recovered 0.7/2.5' = 34%. SAND: light brown (5 YR 6/6) with (1.0-0.5 Ø) and finer-grained; weakly to non-cemented; poorly sorted; wet.	
40				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole Well No.: 60-87 (cont'd.)

Coordinates:

Ground Surface Elevation:

Total Depth:

Water Level Encountered:

Static:

Drilling Company:

Driller:

Date Drilled:

Helper:

Drilling Method:

Drilling Fluid:

Logged By: Geologist

Checked By: Site Manager

CEARP Manager

Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			22.0-24.5' SAMPLE. Recovered 2.5/2.5' = 100%. 22.0-24.3': SAND : light brown (5 YR 6/6) sand (2.0-1.5 Ø) with occasional scattered gravel, subangular, subrounded, non to weakly cemented, wet. 24.3-24.5': CLAYEY SAND: moderate brown (5 YR 4/4) with (3.0-2.5 Ø) to scattered (2.0-1.5 Ø) moderately cemented: poorly sorted; very moist.	
			24.5-27.0' SAMPLE. Recovered 0.4/2.5' = 16%. CLAY: dark yellowish orange (10 YR 6/6) pale yellowish brown (10 YR 6/2) with blotches of dusky brown (5 YR 2/2) to medium gray (N 6/0) and light gray (N 7/0); sandy; low to medium plastic; sand (2.5-2.0 Ø) small quartzite gravel to 0.75 mm; moderately cemented; moist.	
			27.0-29.0' SAMPLE. Recovered 1.1/2.0' = 55%. 27.0-27.2': CLAY: pale yellowish brown (10 YR 6/2) to dark yellowish brown (10 YR 4/2); slightly sandy; fine-grained sand; sand (2.5-2.0 Ø) moderately (Fe) oxide stained; medium plastic; moderately cemented; moist.	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole Well No.: 60-87 (cont'd.)

Coordinates:

Ground Surface Elevation:

Total Depth:

Water Level Encountered:

Static:

Drilling Company:

Driller:

Date Drilled:

Helper:

Drilling Method:

Drilling Fluid:

Logged By: Geologist

Checked By: Site Manager

CEARP Manager

Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			ARAPAHOE FORMATION	
			27.2-28.1': CLAYSTONE: light brown (5 YR 5/6) to predominantly light olive gray (5 Y 6/1); moderately oxide (Fe) stained; blocky and layered; massive; medium to highly plastic; fine-grained; slightly sandy; weathered; moist.	
			29.0-31.0' SAMPLE. Recovered 0.0/2.0' = 0%.	
			31.0-32.0 SAMPLE. Recovered 1.5/1.0' = 150%. CLAYSTONE: dark gray (N 3/0) with lignite seams; massive; moderately cemented; blocky; highly plastic; weathered; moist.	
			TOTAL DEPTH: 32.0'.	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39881.26 E 19974.80
Total Depth: 34.1'

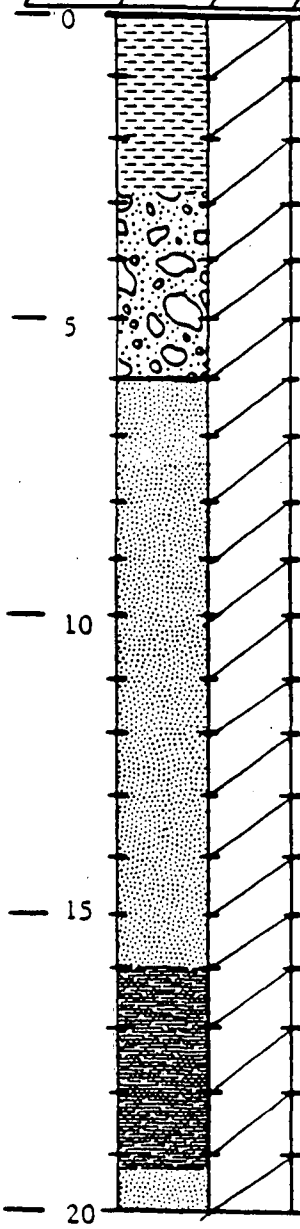
Borehole, Well No.: 61-87
Ground Surface Elevation: 5984.00'
Water Level Encountered: 19.3'; 21.3'
Static: 10.95' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: November 24, 1987
Drilling Method: Hollow Stem Auger
Logged By: J. Bacchus
Geologist

Driller: S. Bradfield
Helper: P. Mesa
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____



Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0–20			**ARTIFICIAL FILL/DISTURBED** 0.0-2.0' SAMPLE. Recovered 1.5/2.0' = 75%. 0.0-1.1': CLAY: dusky yellowish brown (10 YR 2/2); large angular clasts of quartzite; sand; roots; no HCl reaction; moist. 1.1-1.5': CLAY: same as above except dark reddish brown (10 YR 3/4); dry. 2.0-4.0' SAMPLE. Recovered 1.8/2.0' = 90%. 2.0-2.7': CLAY: same as above. 2.7-3.8': GRAVEL: pale reddish brown (10 R 5/4); clasts are supported by fine- to coarse-grained sand; no HCl reaction; dry. 4.0-6.0' SAMPLE. Recovered 1.9/2.0' = 95%. GRAVEL: same as above. **ROCKY FLATS ALLUVIUM** 6.0-8.0' SAMPLE. Recovered 1.8/2.0' = 90%. SAND: light brown (5 YR 5/6); fine-grained; large angular pebbles; coarse sand; silt; clay; no HCl reaction; slightly moist to dry. 8.0-10.0' SAMPLE. Recovered 1.3/2.0' = 65%. SAND: same as above except moist.	HNu Background=0.4 OVA Background=0.2 0.0-1.5': Readings on core: HNu = 0.4; OVA = 0.2; Ludlum = 0. 2.0-3.8': Readings on core: HNu = 0.6; OVA = 0.4; Ludlum = 1. 4.0-5.9': Readings on core: HNu = 0.6; OVA = 3.0; Ludlum = 1. 6.0': Readings in breathing zone: Hnu = 0.6; OVA = 0.6. 6.0': Readings in augers: HNu = 4.0; OVA = 30.0. 6.0-7.8': Readings on core: HNu = 0.6; OVA = 0.8; Ludlum = 1. 8.0-9.3': Readings on core: HNu = 0.6; OVA = 0.5; Ludlum = 2.

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area.
Borehole/Well No.: 61-87 (cont'd.)
Coordinates:
Ground Surface Elevation:
Total Depth:
Water Level Encountered:
Static:
Drilling Company:
Driller:
Date Drilled:
Helper:
Drilling Method:
Drilling Fluid:
Logged By: Geologist
Checked By: Site Manager
CEARP Manager
Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			10.0-12.0' SAMPLE. Recovered 0.8/2.0' = 40%. SAND: same as above.	10.0-10.8': Readings on core: HNu = 0.6; OVA = 0.2; Ludlum = 0.
			12.0-14.0' SAMPLE. Recovered 2.2/2.0' = 110%. SAND: pale olive (10 Y 6/2) mottled dark yellowish brown (10 YR 4/2) and light brown (5 YR 5/6); small angular cobbles, angular pebbles; coarse- and fine-grained sand; micaceous; very slight HCl reaction; moist.	12.0-14.0': Readings on core: HNu = 0.4; OVA = 0.6; Ludlum = 2.
25				14.0-15.3': Readings on core: HNu = 0.8; OVA = 1.0; Ludlum = 1.
			14.0-16.0' SAMPLE. Recovered 1.3/2.0' = 65%. SAND: light brown (5 YR 6/6); clay angular pebbles; small angular cobbles; no HCl reaction; slightly moist to dry.	16.0-18.0': Readings on core: HNu = 0.4; OVA = 0.6; Ludlum = 0.
30			16.0-18.0' SAMPLE. Recovered 2.1/2.0' = 105%. SAND AND SILT: moderate brown (5 YR 4/4); fine-grained sand; coarse sand; angular pebbles; small angular cobbles; no HCl reaction; moist.	18.0-19.8': Readings on core: HNu = 0.4; OVA = 0.6; Ludlum = 0.
			18.0-20.0' SAMPLE. Recovered 1.8/2.0' = 90%. 18.0-19.3': SAND AND SILT: same as above. 19.3-19.8': SAND: moderate brown (5 YR 4/4); grains are well rounded; some clay; some angular pebbles; wet.	20.0-21.8': Readings on core: HNu = 0.4; OVA = 1.2; Ludlum = 0.
35				22.0-22.6': Readings on core: HNu = 0.4; OVA = 0.8; Ludlum = 1.
40				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole Well No.: 61-87 (cont'd.)

Coordinates:

Ground Surface Elevation:

Total Depth:

Water Level Encountered:

Static:

Drilling Company:

Driller:

Date Drilled:

Helper:

Drilling Method:

Drilling Fluid:

Logged By: Geologist

Checked By: Site Manager

CEARP Manager

Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			20.0-22.0' SAMPLE. Recovered 1.8/2.0' = 90%. 20.0-21.3': CLAY: light olive gray (5 Y 5/2); mottled with dark yellowish orange (10 YR 6/6); clay; moist. 21.3-21.8': GRAVEL: dark yellowish orange (10 YR 6/6); small angular cobbles; coarse sand; clay; wet.	29.0-31.0': Readings on core: HNu = 36; OVA = 0.8; Ludlum = 0.
			22.0-24.0' SAMPLE. Recovered 0.6/2.0' = 30%. GRAVEL: same as above.	31.1-33.1': Readings on core: HNu = 120.0; OVA = 0.4; Ludlum = 0.
			24.0-26.0' SAMPLE. No recovery.	33.1-34.1': Readings on core: HNu = 40; OVA = 0.4; Ludlum = 0.
			26.0-28.0' SAMPLE. No recovery.	
			ARAPAHOE FORMATION	
			28.0-29.0' SAMPLE. No recovery. Drilled with center bit.	
			29.0-31.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: light olive gray (5 Y 5/2); stained with dark yellowish orange (10 YR 6/6); dense; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 61-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			Total depth measured 31.1'. Adjust depth.	
			31.1-33.1' SAMPLE.	
			Recovered 2.0/2.0' = 100%.	
			CLAYSTONE: same as above.	
			33.1-34.1' SAMPLE.	
			Recovered 1.0/1.0' = 100%.	
			CLAYSTONE: same as above.	
			TOTAL DEPTH: 34.1'	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39821.22 E 19999.70
Total Depth: 30.0'

Borehole/Well No.: 62-87
Ground Surface Elevation: 5984.16'
Water Level Encountered: 16.5'
Static: 11.50' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: November 24, 1987
Drilling Method: Hollow Stem Auger
Logged By: R.T. Treat
Geologist

Driller: T. High
Helper: B. Keeney
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ARTIFICIAL FILL/DISTURBED** 0.0-2.0' SAMPLE. Recovered 1.3/2.0' = 65%. CLAY: light brown (5 YR 5/6) to moderate brown (5 YR 4/4) with grayish brown (5 YR 3/2) blotches; fine-grained sand (3.0-2.5 Ø); small size gravel subrounded and rounded; some minor fragments of claystone; low plastic; weakly cemented; moist.	HNu Background=0.3 OVA Background=0.0 Ludlum background = 0.0
5			2.0-4.0' SAMPLE. Recovered 0.3/2.0' = 15%. CLAY AND GRAVEL: slightly sandy; moderate brown (5 YR 3/4) to varying light brown (5 YR 5/6) to grayish brown (5 YR 3/2); sand ranging from 3.0-3.5 Ø to 1.0-0.5 Ø; rounded and subrounded gravel; subangular gravel of quartzite composition; scattered cobbles; weakly cemented; poorly sorted; low plastic; moist.	9.5': Readings in augers: HNu = 75; OVA = 185. 9.5-10.5': Readings on core: HNu = 4.5; OVA = 12.5; Ludlum = 0.
10			**ROCKY FLATS ALLUVIUM** 4.0-7.0' SAMPLE. Recovered 0.0/3.0' = 0%. SAND AND GRAVEL: varying brown; slightly clayey; fine- to medium-grained sand; some scattered cobbles; poorly sorted; weakly cemented; moist. Description based on cuttings.	10.5-11.9': Readings on core: HNu = 0; OVA = 8.5; Ludlum = 0. 14.5': Readings in augers: HNu = 0; OVA = 1,000+.
15			7.0-8.0' SAMPLE. Center bit used.	
20				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole/Well No.: 62-87 (cont'd.)

Coordinates:

Ground Surface Elevation:

Total Depth:

Water Level Encountered:

Static:

Drilling Company:

Driller:

Date Drilled:

Helper:

Drilling Method:

Drilling Fluid:

Logged By: Geologist

Checked By: Site Manager

CEARP Manager

Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			8.0-9.5' SAMPLE. Recovered 0.0/1.5' = 0%.	
			9.5-10.5' SAMPLE. Recovered 1.3/1.0' = 130%. SAND AND GRAVEL: light brown (5 YR 6/4 and 5 YR 5/6); quartzose gravel (0.2 mm to 2.75 mm); few cobbles; slightly calcareous sand (3.0-2.5 Ø to 1.0-0.5 Ø); weakly cemented; moist.	
25			10.5-12.0' SAMPLE. Recovered 1.4/1.5' = 93%. SAND AND GRAVEL: slightly clayey; otherwise as stated in previous run.	
			12.0-14.5' SAMPLE. Recovered 2.2/2.5' = 88%. 12.0-12.4': CLAYEY SAND: light gray (N 7/0) to varying light brown (5 YR 6/4); fine-grained sand (3.0-2.5 Ø); moderately cemented; moist.	30.0': Readings in augers: HNu = 0; OVA = 75.
30			12.4-14.2': SAND AND GRAVEL: moderate brown (5 YR 4/4) to varying lighter brown (5 YR 5/6 and 5 YR 6/4); sand ranging from 2.0-1.5 Ø to 0.0-0.5 Ø; gravel ranging 0.25 mm to 2.50 mm; gravel subrounded, subangular, with few angular; weakly cemented; well sorted; moist.	
35				
40				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Borehole Well No.: 62-87 (cont'd.)
Coordinates:
Ground Surface Elevation:
Total Depth:
Water Level Encountered:
Static:
Drilling Company:
Driller:
Date Drilled:
Helper:
Drilling Method:
Drilling Fluid:
Logged By: Geologist
Checked By: Site Manager
CEARP Manager
Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			14.5-17.0' SAMPLE. Recovered 2.1/2.5' = 84%. SAND: moderate brown (5 YR 4/4) to some light brown (5 YR 5/6); slightly clayey; sand ranging from 3.0-2.5 Ø to scattered 1.5-1.0 Ø; some scattered gravel; weakly to non-cemented; very moist to wet at 16.5-16.7', then moist below.	
			17.0-19.5' SAMPLE. Recovered 2.5/2.5' = 100%. SAND: light brown (5 YR 5/6) to pale yellowish brown (10 YR 6/2) with light gray (N 7/0); fine-grained sand (3.0-2.5 Ø); non to weakly cemented; poorly sorted sand; rounded; slightly clayey to very clayey streaked; wet to very moist.	
			19.5-22.0' SAMPLE. Recovered 2.5/2.5' = 100%. 19.5-21.0': CLAY: light gray (N 7/0) with some pale yellowish browns (10 YR 6/2); highly plastic, moderately cemented; slightly sandy (3.0-2.5 Ø); moist. 21.0-22.0': SAND: moderate brown (5 YR 4/6); scattered gravel; fine- to medium-grained sand ranging from 2.5-2.0 Ø to 2.0-1.5 Ø; weakly cemented; very moist.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 62-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By
Geologist

Checked By
Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			22.0-24.5' SAMPLE. Recovered 2.5/2.5' = 100%. 22.0-22.5': SAND AND GRAVEL: light brown (5 YR 5/6); fine-, medium-, and coarse-grained sand ranging from 2.0-1.5 Ø to 0.5-1.0 Ø; small gravel (0.25 mm and to cobble size); weakly to non-cemented; well sorted sand and gravel; wet. 22.5-24.5': SANDY CLAY: light brown (5 YR 5/6) and light brownish gray (5 YR 6/1); fine-grained sand (3.0-2.5 Ø); moderately cemented; low to medium plastic; moist. 24.5-26.5' SAMPLE. Recovered 2.0/2.0' = 100%. 24.5-26.3': SANDY CLAY: varying brown with gray; fine-grained sand (3.5-3.0 Ø); moderately cemented; medium plastic; moist. ARAPAHOE FORMATION 26.3-26.5': CLAYSTONE: varying dark yellowish brown (10 YR 4/2) to light brown (5 YR 5/6); medium plastic; moderately cemented; weathered; moist. 26.5-27.5' SAMPLE. Recovered 1.5/1.0' = 150%. CLAYSTONE: varying brown and gray streaks; moderately oxide stained; moderately cemented; blocky; weathered; moist.	

BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole Well No.: 62-87 (cont'd.)

Coordinates:

Ground Surface Elevation:

Total Depth:

Water Level Encountered:

Static:

Drilling Company:

Driller:

Date Drilled:

Helper:

Drilling Method:

Drilling Fluid:

Logged By: Geologist

Checked By: Site Manager

CERP Manager

Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			27.5-28.5' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYSTONE: pale yellowish brown (10 YR 6/2) to pale brown (5 YR 5/2) and medium light gray (N 6/0); slightly sandy; fine-grained; moderately cemented; highly plastic; blocky; weathered; moist.	
			28.5-30.0' SAMPLE. Recovered 1.5/1.5' = 100%. CLAYSTONE: gray and brown; moderately to slightly oxide stained; massive; medium plastic; blocky; weathered; moist.	
			TOTAL DEPTH: 30.0'	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39738.07 E 20040.50
Total Depth: 30.0'

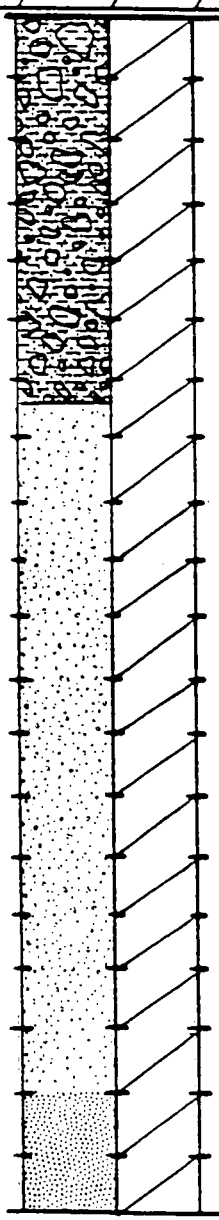
Borehole Well No.: 63-87
Ground Surface Elevation: 5985.42'
Water Level Encountered: 14.0'
Static: 13.56' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: November 30-December 1, 1987
Drilling Method: Hollow Stem Auger
Logged By: R.T. Treat
Geologist

Driller: S. Bradfield
Helper: P. Mesa
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0 5 10 15 20			**ARTIFICIAL FILL/DISTURBED** 0.0-2.0' SAMPLE. Recovered 0.4/2.0' = 30%. GRAVELLY CLAY: dusky yellowish brown (10 YR 2/2) to light brown (5 YR 5/6); asphalt and cobbles on or near surface; slightly sandy gravel; gravel subrounded to rounded; 0.50 mm to cobble size, poorly sorted sand; weakly cemented; moist. 2.0-4.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAY AND GRAVELS with small amount of claystone and small asphalt fragments noted; moderate brown (5 YR 3/4 and 5 YR 4/4) to light brown (5 YR 5/6 and 5 YR 6/4); gravel (3.75 mm) with scattered cobbles; poorly sorted sand and gravel; small amount of claystone; small amount asphalt fragments; moderately cemented; low to medium plastic; moist. 4.0-6.0' SAMPLE. Recovered 0.0/20.'=0%. 6.0-8.0' SAMPLE. Recovered 1.3/2.0' = 65%. 6.0-6.5': CLAY AND GRAVEL: same as above.	HNu Background=0.4 OVA Background=0.0 Ludlum background = 0.0 0.0-0.4': Reading on core: Hnu = 0; OVA = 1.4; Ludlum = 0. 2.0-4.0': Readings on core: HNu = 0; OVA = 0.8; Ludlum = 0. 6.0-7.3': Readings on core: Hnu = 0; OVA = 12.0; Ludlum = 0. 8.0': Reading in augers: HNu = 0; OVA = 1000+. 8.0-9.6': Readings on core: HNu = 7.5; OVA = 52; Ludlum = 0. 10.0-10.5': Readings on core: HNu = 0; OVA = 5.5; Ludlum = 0. 12.0-13.0': Readings on core: HNu = 86; OVA = 28; Ludlum = 0.

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Borehole, Well No.: 63-87 (cont'd.)
Coordinates:
Ground Surface Elevation:
Total Depth:
Water Level Encountered:
Static:
Drilling Company:
Driller:
Date Drilled:
Helper:
Drilling Method:
Drilling Fluid:
Logged By: Geologist
Checked By: Site Manager
CEARP Manager
Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			**ROCKY FLATS ALLUVIUM** 6.5-7.3': SAND AND GRAVEL: light brown (5 YR 5/6 and 5 YR 6/4) to some moderate brown (5 YR 4/6) sand (2.5-2.0 Ø); rounded and poorly sorted; gravel (0.35 mm to 3.00 mm); angular and subangular; weakly cemented; moist.	14.0-15.2': Readings on core: HNu = 14.5; OVA = 8.8; Ludlum = 0. 18.0-18.6': Readings on core: HNu = 10.2; OVA = 5.5; Ludlum = 0.
25			8.0-10.0' SAMPLE. Recovered 1.6/2.0' = 80%. SAND AND GRAVEL: moderate brown (5 YR 4/4) to multi-colored browns ranging from moderate yellowish brown (10 YR 5/4) to light brown (5 YR 5/6 and 5 YR 6/4); angular and subangular gravel (0.25 mm to scattered cobbles); sand fine-grained (3.5-3.0 Ø) to scattered (0.5-00 Ø); weakly cemented; dense; light moist.	19.0-20.2': Readings on core: HNu = 0; OVA = 4.2; Ludlum = 0. 21.0-21.7': Readings on core: HNu = 0; OVA = 16; Ludlum = 0.
30			10.0-11.0' SAMPLE. Recovered 0.5/1.0' = 50%. SAND AND GRAVEL: varying light brown (5 YR 5/6 and 5 YR 6/4); sand (3.0-2.5 Ø) with scattered larger grains and small cobbles; subangular, angular, and few rounded; poorly sorted; weakly to moderately cemented; light moist.	23.0-25.0': Readings on core: HNU = 0; OVA = 10; Ludlum = 0.
35			11.0-12.0' SAMPLE. Center bit used.	
			12.0-14.0' SAMPLE. Recovered 1.0/2.0' = 50%. SAND AND GRAVEL: same as above.	
40				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole Well No.: 63-87 (cont'd.)

Coordinates:

Ground Surface Elevation:

Total Depth:

Water Level Encountered:

Static:

Drilling Company:

Driller:

Date Drilled:

Helper:

Drilling Method:

Drilling Fluid:

Logged By: Geologist

Checked By: Site Manager

CEARP Manager

Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			14.0-16.0' SAMPLE. Recovered 1.2/2.0' = 60%. SAND AND GRAVEL: moderate yellowish brown (10 YR 5/4) to varying light brown (5 YR 5/6) and moderate brown (5 YR 4/4); fine- to coarse-grained sand ranging from 2.5-2.0 Ø to scattered (0.5-0.0 Ø); rounded; scattered gravel (0.55 mm up to 2.25 mm); rounded and subrounded; slightly clayey; wet at 14.0' to very moist.	
			16.0-18.0' SAMPLE. Recovered 0.0/2.0' = 0%. Cuttings appear as continuing sand and gravel deposits.	
			18.0-19.0' SAMPLE. Recovered 0.6/1.0' = 60%. SAND: moderate brown (5 YR 4/4) varying light brown (5 YR 5/6); medium- and coarse-grained sand (2.0-1.5 Ø to 0.5-0.06 Ø); small size scattered gravel; poorly sorted; very moist to moist.	
			19.0-21.0' SAMPLE. Recovered 1.2/2.0' = 60%. SAND: light brown (5 YR 5/6 and 5 YR 6/4) to medium brown (5 YR 4/4); slightly clayey to very clayey; medium- and coarse-grained to fine-grained sand (2.5-2.0 Ø); moderately cemented; very clayey; very moist to moist.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 63-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			21.0-23.0' SAMPLE. Recovered 0.7/2.0' = 35%. CLAYEY SAND: varying brown (5 YR 5/2); sand (2.5-2.0 Ø) with some scattered coarse-grained, small-size gravel (0.25 mm); low plastic; moderately cemented; moist.	
			23.0-25.0' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAY: varying with light brown (5 YR 5/6 and 5 YR 6/4) to moderate brown (5 YR 3/4); blotchy with dark yellowish orange (10 YR 6/6) to pale yellowish brown (10 YR 6/2); sand (3.0-2.5 Ø) with moist, coarse-grained (1.5-1.0 Ø); poorly sorted; moderately cemented; massive; low to medium plastic; stiff; moist.	
			ARAPAHOE FORMATION	
			25.0-27.0' SAMPLE. Recovered 2.0/2.0' = 100%.	
			CLAYSTONE: moderately oxide (Fe) stained browns of moderate yellowish browns (10 YR 5/4) with dark yellowish orange (10 YR 6/5) to predominantly light gray (N 7/0) to medium light gray (N 5/0); medium to highly plastic; moderately cemented; slightly calcareous streaked; massive; weathered; moist.	

OF
BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 63-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			27.0-29.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: medium gray (N 5/0) to medium dark gray (N 4/0); blocky; massive; now only slightly oxide (Fe) stained in thin streaks; medium to highly plastic; weathered; moist.	
			29.0-30.0' SAMPLE. Recovered 0.0/1.0' = 0%. CLAYSTONE: based on pieces in hollow stem auger; weathered.	
			TOTAL DEPTH: 30.0'	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39349.01 E 20162.23
Total Depth: 28.0'

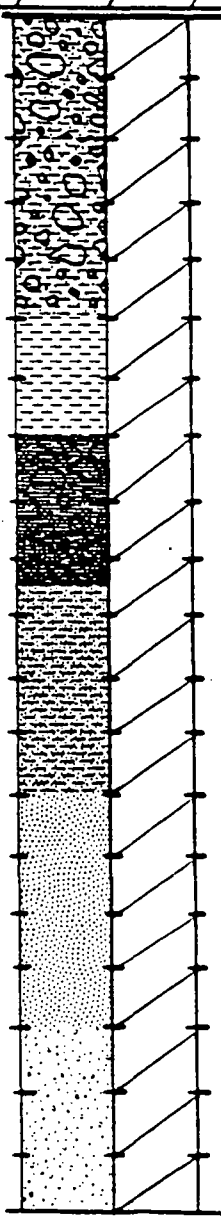
Borehole, Well No.: 64-87
Ground Surface Elevation: 5985.89'
Water Level Encountered: 14.5'
Static: 16.76' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: December 2-4, 1987
Drilling Method: Hollow Stem Auger
Logged By: R.T. Treat
Geologist

Driller: T. High
Helper: B. Keeney
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ARTIFICIAL FILL/DISTURBED** 0.0-2.0' SAMPLE. Recovered 0.0/2.0' = 0%. Cuttings appeared as clay with gravel; sandy; some asphalt fragments. 2.0-4.0' SAMPLE. Recovered 0.0/2.0' = 0%. 4.0-5.0' SAMPLE. Center bit used. 5.0-7.0' SAMPLE. Recovered 2.0/2.0' = 100%. 5.0-6.0': CLAY: moderate yellowish brown (10 YR 5/4); fine-grained sand with gravel; grayish brown (5 YR 3/2) to dusky brown (5 YR 2/2); slightly clayey, fine-, medium- and coarse-grained sand (1.0-2.5 Ø to 0.5-1.00 Ø); gravel 0.15 mm up to 1.75 mm; subrounded, angular, and angular; weakly cemented; poorly sorted gravel; well sorted sand; few scattered asphalt fragments; light moist.	HNu Background=0.2 OVA Background=0.0 Ludlum Background = 0 5.0-7.0': Readings on core: HNu = 2.5; OVA = 11; Ludlum = 0. 7.0-7.6': Readings on core: HNu = 15.5; OVA = 310; Ludlum = 0. 13.0-14.5': Readings on core: HNu = 0; OVA = 38; Ludlum = 0. 14.5-17.0': Readings on core: HNu = 0; OVA = 12.5; Ludlum = 0. 17.0-19.5': Readings on core: HNu = 0; OVA = 11.4; Ludlum = 0. 19.5-22.0': Readings on core: HNu = 0; OVA = 13.5; Ludlum = 0.
5				
10				
15				
20				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Borehole Well No.: 64-87 (cont'd.)
Coordinates:
Ground Surface Elevation:
Total Depth:
Water Level Encountered:
Static:
Drilling Company:
Driller:
Date Drilled:
Helper:
Drilling Method:
Drilling Fluid:
Logged By: Geologist
Checked By: Site Manager
CEARP Manager
Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			7.0-9.5' SAMPLE. Recovered 0.6/2.5' = 24%. SILTY SAND WITH GRAVEL: dusky brown (5 YR 2/2); sand ranging from 3.5-3.0 Ø to 2.0-1.5 Ø; weakly cemented; poorly sorted; gravel ranging from 0.25-0.75 mm; light moist. SPECIAL NOTE: During this run, most of the cuttings now appearing as a sanitary landfill deposit. Consisting of wood particles, insulated wire fragments, construction ribbon, surgical gloves, saranex suits, and assorted plastics.	22.0': Readings in augers: HNu = 18.4; OVA = 1,000+. 22.0-24.5': Readings on core: HNu = 0; OVA = 13.2; Ludlum = 0. 24.5-25.5': Readings on core: HNu = 0; OVA = 8.2; Ludlum = 0. 25.5-27.0': Readings on core: HNu = 0; OVA = 4.8; Ludlum = 0.
25			9.5-12.0' SAMPLE. Recovered 0.0/2.5' = 0%. Auger cuttings during this run now appearing as a CLAYEY SAND or a very SANDY CLAY: moderate olive brown (5 Y 4/4) to an olive gray (5 Y 3/2); fine-grained sand (3.0-2.5 Ø); scattered amounts of continued trash debris.	
30			12.0-13.0' SAMPLE. Center bit used.	
35			13.0-14.5' SAMPLE. Recovered 1.5/1.5' = 100%. SAND: moderate yellowish brown (10 YR 5/4) to dark yellowish orange (10 YR 6/6); well sorted sand ranging from 2.5-2.0 Ø to 0.0-0.5 Ø; rounded, subrounded, and some angular; weakly cemented; slightly clayey; moist to very moist at end.	
40				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole Well No.: 64-87 (cont'd.)

Coordinates: _____

Ground Surface Elevation: _____

Total Depth: _____

Water Level Encountered: _____

Static: _____

Drilling Company: _____

Driller: _____

Date Drilled: _____

Helper: _____

Drilling Method: _____

Drilling Fluid: _____

Logged By: _____ Geologist

Checked By: _____ Site Manager

_____ CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			14.5-17.0' SAMPLE. Recovered 2.5/2.5' = 100%. SAND: light brown (5 YR 5/6), moderate brown (5 YR 4/4) to pale yellowish brown (10 YR 6/2), and dark yellowish orange (10 YR 6/6); sand ranging from 3.5-3.0 Ø up to 2.0-2.5 Ø; weakly cemented; poorly sorted; clayey sand with coarse deposits noted from 16.5-17.0' and some scattered gravel below 16.5'; saturated sand at 14.5' to otherwise moist deposits.	
			17.0-19.5' SAMPLE. Recovered 2.5/2.5' = 100%. SAND AND GRAVEL: colors as stated in previous run; sand grain size as above and somewhat finer; poorly sorted; clayey to very clayey; scattered gravel ranging from 0.50 mm to a few 2.25 mm; weakly to moderately cemented; moist.	
			19.5-22.0' SAMPLE. Recovered 2.5/2.5' = 100%. 19.5-20.5': SAND AND GRAVEL: as noted in previous run. 20.5-22.0': SLIGHTLY SANDY CLAY: pale yellowish brown (10 YR 6/2) to light gray (N 6/0); scattered sand (2.0-1.5 Ø); moderately cemented; low plastic; moist.	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole Well No.: 64-87 (cont'd.)

Coordinates:

Ground Surface Elevation:

Total Depth:

Water Level Encountered:

Static:

Drilling Company:

Driller:

Date Drilled:

Helper:

Drilling Method:

Drilling Fluid:

Logged By: Geologist

Checked By: Site Manager

CEARP Manager

Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			22.0-24.5' SAMPLE. Recovered 2.5/2.5' = 100%. 22.0-23.3': CLAY: moderate yellowish brown (10 YR 5/4) to dark yellowish orange (10 YR 6/6) with some light brown (5 YR 5/6); fine-grained sand (3.0-2.5 Ø); low to medium plastic; moderately cemented; moist.	
			ARAPAHOE FORMATION	
			23.3-24.5': CLAYSTONE: light brown (5 YR 6/4 to 5 YR 5/6) to moderate brown (5 YR 4/4); sandy to very sandy streaks; fine-grained sand (3.0-2.5 Ø); moderately cemented; severely oxide stained; low plastic; poorly sorted; highly weathered; moist.	
			24.5-25.5' SAMPLE. Recovered 1.3/1.0' = 130%. CLAYEY SANDSTONE: dark yellowish orange (10 YR 6/6) to light brown (5 YR 5/6) and pale brown (5 YR 5/2); fine-grained sand (3.5-3.0 Ø to 3.0-2.5 Ø); severely oxide stained; weakly cemented; poorly sorted; weathered; moist.	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole Well No.: 64-87 (cont'd.)

Coordinates: _____

Ground Surface Elevation: _____

Total Depth: _____

Water Level Encountered: _____

Static: _____

Drilling Company: _____

Driller: _____

Date Drilled: _____

Helper: _____

Drilling Method: _____

Drilling Fluid: _____

Logged By: _____ Geologist

Checked By: _____ Site Manager

_____ CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			25.5-27.0' SAMPLE. Recovered 1.5/1.5' = 100%. CLAYEY SANDSTONE: yellowish orange (10 YR 6/6) to light brown (5 YR 5/6) with blotches of light gray (N 7/0); streaky; fine-grained sand (3.0-2.5 Ø to 2.5-2.0 Ø); weakly cemented; poorly sorted; massive; highly weathered; moist to very moist at bottom of run.	
			27.0-28.0' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYEY SANDSTONE: as noted in previous run.	
			TOTAL DEPTH: 28.0'	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39250.14 E 20200.22
Total Depth: 27.0'

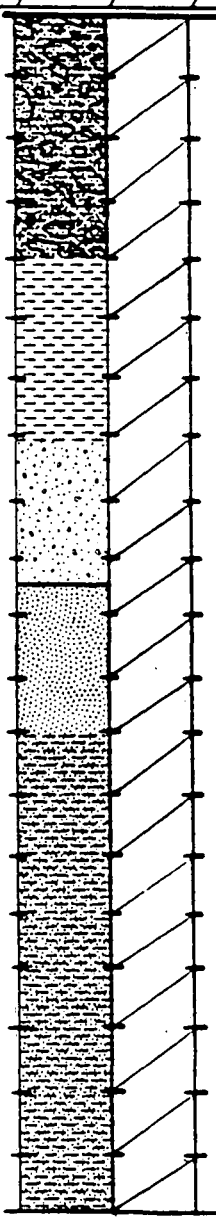
Borehole. Well No.: 65-87
Ground Surface Elevation: 5983.08'
Water Level Encountered: 14.0'
Static: 10.46' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: December 8-9, 1987
Drilling Method: Hollow Stem Auger
Logged By: R.T. Treat
Geologist

Driller: T. High
Helper: B. Keeney
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ARTIFICIAL FILL/DISTURBED** 0.0-2.0' SAMPLE. Recovered 1.4/2.0' = 70%. CLAYEY SAND AND GRAVEL: light brown (5 YR 5/6) to moderate brown (5 YR 4/4); ranging from 2.5-2.0 Ø to 0.0-0.5 Ø; rounded and subrounded gravel (0.50 mm to scattered cobbles); lower portion of sample is black (N 1/0) to dusky brown (5 YR 2/2); moist to damp. 2.0-4.0' SAMPLE. Recovered 1.6/2.0' = 80%. 2.0-2.5': CLAYEY SAND AND GRAVEL: as noted in previous run. 2.5-3.6': CLAY: light brown (5 YR 5/6 and 5 YR 6/4) to pale yellowish brown (10 YR 6/2) and dark yellowish orange (10 YR 6/5) with blotches of dusky brown (5 YR 2/2); some claystone and sandstone fragments; scattered gravel to 3.25 mm; angular; subangular; moist. 4.0-7.0' SAMPLE. Recovered 2.2/3.0' = 73%. CLAY: colors as stated above; sandy; little scattered gravel; more claystone fragments than above; low plastic; moderately cemented; moist.	OVA Background=0.8 HNu Background=0.2 Ludlum Background = 0 0.0-1.4': Readings on core: HNu = 0; OVA = 115. 2.0-3.6': Readings on core: HNu = 1.2; OVA = 210. 4.0-6.2': Readings on core: HNu = 1.4; OVA = 10. 7.0-8.3': Readings on core: HNu = 0.0; OVA = 95. 9.5-11.6': Readings on core: HNu = 0.0; OVA = 95. 12.0': Readings in augers: HNu = 0.0; OVA = 320; Gastech = 5% LEL. 12.0-14.1': Readings on core: HNu = 0.4; OVA = 92. 14.5-16.3': Readings on core: HNu = 0.0; OVA = 55.
5				
10				
15				
20				

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole, Well No.: 65-87 (cont'd.)

Coordinates: _____

Ground Surface Elevation: _____

Total Depth: _____

Water Level Encountered: _____

Static: _____

Drilling Company: _____

Driller: _____

Date Drilled: _____

Helper: _____

Drilling Method: _____

Drilling Fluid: _____

Logged By: _____ Geologist

Checked By: _____ Site Manager

_____ CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			7.0-9.5' SAMPLE. Recovered 1.3/2.5' = 52%. 7.0-7.1': CLAY: colors as noted above; moderately cemented; very sand; poorly sorted sand; moist. 7.1-8.3': SAND AND GRAVEL: pale yellowish brown (10 YR 6/2) to dark yellowish brown (10 YR 4/2); sand varying (2.0-1.5 Ø to scattered 0.5-1.0 Ø); poorly sorted gravel ranging from 0.25 mm to 1.75 mm; weakly to non-cemented; very clayey at base; light moist.	17.0-19.2': Readings on core: HNu = 0.0; OVA = 9.5.
25			ROCKY FLATS ALLUVIUM	19.5-22.0': Readings on core: HNu = 0.0; OVA = 8.8.
				22.0-24.0': Readings on core: HNu = 2.2; OVA = 38.
				24.0-25.0': Readings on core: HNu = 0.0; OVA = 35.
30			9.5-12.0' SAMPLE. Recovered 2.1/2.5' = 84%. SAND: moderate yellowish brown (10 YR 5/4) to varying light brown (5 YR 5/6) and (5 YR 6/4) to some mixed gray and light gray (N 6/0); severely oxide stained; weakly to moderately cemented; sand ranging (2.0-1.5 Ø with some scattered sand to 1.5-1.0 Ø); massive; slightly clayey to very clayey below 10.5'; moist.	25.0-26.0': Readings on core: HNu = 0.0; OVA = 5.5.
				26.0': Readings in augers: HNu = 0.7; OVA = 750; Gastech = 10% LEL .
35			12.0-14.5' SAMPLE. Recovered 2.1/2.5' = 84%. CLAYEY SAND: brown; continuing severely oxide stained; sand grading as above; moderately to weakly cemented; moist to very moist streak noted at 14.0'.	
40				

LOG
OF
BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 65-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CERP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			14.5-17.0' SAMPLE. Recovered 1.8/2.5' = 72%. CLAYEY SAND: light brown (5 YR 5/6) to moderate brown; yellowish (10 YR 5/4); severely oxide stained; medium-grained sand (3.0-2.5 Ø) to scattered (2.0-1.5 Ø); some subangular and subrounded gravel; weakly cemented; moist.	
			17.0-19.5' SAMPLE. Recovered 2.2/2.5' = 88%. CLAYEY SAND: scattered gravel ranging to 2.75 mm; subrounded to subangular with few rounded gravel; poorly sorted sand; weakly cemented; moist to very moist below 18.0'.	
			19.5-22.0' SAMPLE. Recovered 2.5/2.5' = 100%. 19.5-21.0': CLAYEY SAND: small amounts of scattered gravel; numerous sandstone fragments; highly to weakly cemented; severely oxide stained; fine-grained sand; wet to saturated.	
			ARAPAHOE FORMATION	
			21.0-22.0': SANDSTONE: very light gray (N 8/0) to light gray (N 7/0); fine-grained sand (3.0-2.5 Ø) weakly cemented; poorly sorted; highly weathered; saturated.	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area

Borehole Well No.: 65-87 (cont'd.)

Coordinates:

Ground Surface Elevation:

Total Depth:

Water Level Encountered:

Static:

Drilling Company:

Driller:

Date Drilled:

Helper:

Drilling Method:

Drilling Fluid:

Logged By: Geologist

Checked By: Site Manager

CERP Manager

Comments:

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			22.0-24.0' SAMPLE. Recovered 2.0/2.0' = 100%. SANDSTONE: medium light gray (N 6/0) to varying brown of moderate brown (5 YR 4/4) and pale yellowish brown (10 YR 6/2); slightly clayey to very clayey streaks; fine-grained sand (3.0-2.5 Ø) to (2.0-1.5 Ø); massive; moderately oxide stained; weakly cemented; highly weathered; very moist.	
			24.0-25.0' SAMPLE. Recovered 1.0/1.0' = 100%. 24.0-24.2': SANDSTONE: same as above. 24.2-25.0': SANDY CLAYSTONE: oderate yellowish brown (10 YR 5/4) to light brown (5 YR 6/4 and 5 YR 5/6) to brownish gray (5 YR 4/1) to light gray (N 7/0); medium plastic; moderately cemented; blocky; moist.	
			25.0-26.0' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY CLAYSTONE: color as stated above; medium plastic; moderately cemented; moist.	
			26.0-27.0' SAMPLE. Center bit used.	
			TOTAL DEPTH: 27.0'	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39170.27 E 20226.02
Total Depth: 23.0'

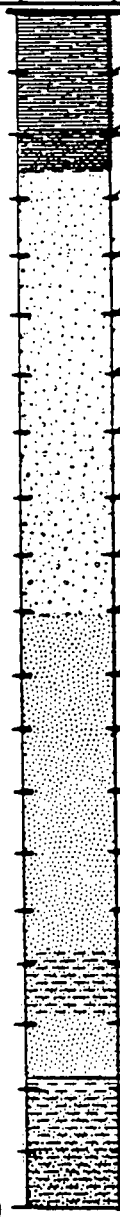
Borehole Well No.: 66-87
Ground Surface Elevation: 5981.90'
Water Level Encountered: 15.5'
Static: 8.90' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: November 23, 1987
Drilling Method: Hollow Stem Auger
Logged By: R. Treat
Geologist

Driller: T. High
Helper: B. Keeney
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**TOPSOIL** 0.0-2.0' SAMPLE. Recovered 0.4/2.0' = 20%. TOP SOIL: silty sand with gravel; dusky brown (5 YR 2/2); 2.0-1.3 Ø to 0.5-0.0 Ø sized sand with 0.50 mm to 2.75 mm gravel and scattered cobbles; weakly cemented; poorly sorted; light moist. **ROCKY FLATS ALLUVIUM** 2.0-4.0 SAMPLE. Recovered 1.8/2.0 = 90%. 2.0-2.5': SANDY CLAY AND GRAVEL: grayish brown (5 YR 3/2) with 1.5-1.0 Ø sand; gravel of subangular and angular with some subrounded to 3.25 mm; weakly cemented; moist. 2.5-3.8': SAND AND GRAVEL: light brown (5 YR 6/4) with (1.5-1.0 Ø) size sand and medium brown (5 YR 4/4) gravel ranging 0.25 mm to 2.75 mm with some cobbles; weakly cemented; light moist. 4.0-7.0' SAMPLE. Recovered 0.7/3.0 = 23%. SAND AND GRAVEL: same as above with several small cobbles. 7.0-9.5' SAMPLE. Recovered 0.0/2.5 = 0%. Cuttings indicating a sand with gravel and slightly clayey to clayey, moist. 9.5'-10.0' Center bit drill.	HNu Background = 0.5. OVA Background = 0.2. Ludlum Background = 0 No readings above background.
5				
10				
15				
20				

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 66-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			10.0-12.0' SAMPLE. Recovered 2.0/2.0' = 100%. SAND: moderate brown (5 YR 4/4) to light brown (5 YR 6/4) to some noticed light brownish gray (5 YR 6/1); very clayey with some scattered gravel; sand ranging (3.0-2.5 Ø) with scattered sand (1.0- 0.5 Ø); gravel consisting of 0.75 mm to scattered 2.50 mm; subrounded; subangular; weakly to moderately cemented; moist.	
25			12.0-14.5' SAMPLE. Recovered 2.5/2.5 = 100%. SAND: light brown (5 YR 5/6) and (5 YR 6/4); sand ranging (2.5-2.0 Ø) and (2.0-1.5 Ø) to (1.5-1.0 Ø) slightly clayey with some gravel; 3.00 mm gravel subangular, subrounded; moist to very moist.	
30			14.5-17.0' SAMPLE. Recovered 2.5/2.5 = 100%. 14.5-15.8': SAND: moderate brown (5 YR 4/4) with sand (2.5-2.0 Ø); gravel 1.50 mm to 2.55 mm; clayey with scattered gravel; weakly cemented; very moist to wet at 15.5-15.7'.	
35			15.8-16.8': SANDY CLAY: pale yellowish brown (10 YR 6/2) to brownish gray (5 YR 4/1) sand (3.0-2.5 Ø); poorly sorted; moderately cemented; moist. 16.8-17.0': SAND: moderate yellowish brown (10 YR 5/4) sand ranging (1.5-1.0 Ø) with some scattered larger particles; moist to very moist.	
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LOG
OF
BOREHOLE

Location Rocky Flats Plant; Landfill Area

Coordinates

Total Depth

Drilling Company

Date Drilled

Drilling Method

Logged By

Geologist

Borehole Well No. 66-87 (cont'd.)

Ground Surface Elevation

Water Level Encountered

Static

Driller

Helper

Drilling Fluid

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			17.0-18.0' SAMPLE. Recovered 1.0/1.0 = 100%. 17.0-17.8': SAND: pale yellowish brown (10 YR 6/2); fine-grained sand (3.0-2.5 Ø) slightly clayey; non-cemented; poorly sorted; wet.	
			ARAPAHOE FORMATION	
			17.8-18': CLAYSTONE: moderate yellowish brown (10 YR 5/4) to moderate brown (5 YR 4/4); severely oxide stained; fine-grained sand (3.5-3.0 Ø); moderately cemented; low plastic; weathered; very moist to moist.	
			18.0-19.0' SAMPLE. Recovered 2.3/1.0 = 230%. SANDY CLAYSTONE: light brown (5 YR 5/6) to moderate brown (5 YR 4/4); fine-grained sand (3.5-3.0 Ø) some noted light brownish gray (5 YR 6/1); medium plastic; blocky and somewhat layered; severely oxide stained; weathered; very moist to moist at 18.5'.	
			19.0-20.0' SAMPLE. Recovered 1.0/1.0 = 100%. SANDY CLAYSTONE: colors as noted in previous runs; fine-grained sand; blocky; medium plastic; remaining severely oxide stained; weathered; moist.	

LOG
OF
BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 66-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			20.0-21.0' SAMPLE. Recovered 1.0/1.0 = 100%. SANDY CLAYSTONE: as noted in previous runs; moderately cemented; highly weathered; moist.	
			21.0-22.0' SAMPLE. Recovered 1.3/1.0 = 130%. SANDY CLAYSTONE: light brown (5 YR 6/4) to pale yellowish brown (10 YR 6/2) to light gray (N 7/0) streaked; slightly sandy; fine-grained sand (3.5-3.0 Ø); moderately cemented; highly weathered; highly plastic; moist.	
			22.0-23.0' SAMPLE. Recovered 1.2/1.0' = 120%. CLAYSTONE: slightly sandy; medium if not highly plastic; moderately cemented; blocky; highly weathered; moist.	
			TOTAL DEPTH: 23.0'.	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 40182.78 E 20678.79
Total Depth: 21.40'

Borehole/Well No.: 67-87
Ground Surface Elevation: 5969.50'
Water Level Encountered: 12.1'
Static: 7.68' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: December 3, 1987
Drilling Method: Hollow Stem Auger
Logged By: J. Bacchus, Geologist

Driller: S. Bradfield
Helper: P. Mesa
Drilling Fluid: None
Checked By: _____ Site Manager
_____ CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ROCKY FLATS ALLUVIUM**	HNu background = 0.4. OVA background = 0.0. Ludlum background = 0.
			0.0-2.0' SAMPLE. Recovered 0.5/2.0' = 25%. CLAY: dark yellowish brown (10 YR 4/2); slight HCl reaction; sandy; large subrounded pebbles; moist.	0.0-2.0': HNu: 2.0; OVA: 0.4.
5			2.0-4.0' SAMPLE. Recovered 1.1/2.0' = 55%. 2.0-2.7: CLAY: dark reddish brown (10 R 3/4); contains coarse-grained sand and large pebbles; no HCl reaction; moist. 2.7-3.1': SAND: moderate orange pink (10 R 7/4); fine to coarse-grained; large angular pebbles; no HCl reaction.	2.0-3.1': HNu: 0.3; OVA: 0.4. 4.0-5.6': HNu: 0.8; OVA: 2.0.
10			4.0-6.0' SAMPLE. Recovered 1.6/2.0' = 80%. 4.0-4.8': CLAYEY SAND: reddish brown (10 R 6/4); angular pebbles; no HCl reaction; slightly moist. 4.8-5.6': SAND: moderate orange pink (10 R 7/4); no HCl reaction; angular cobbles and pebbles; dry.	6.0-8.0': HNu: 0.6; Ludlum: 0. 8.0-9.6': HNu: 0.4.
15			6.0-8.0' SAMPLE. Recovered 0.9/2.0' = 45%. SILTY SAND: grayish pink (5 R 8/2); small angular pebbles; no HCl reaction; dry.	OVA background: 1.2. 14.1-16.1': HNu: 0; OVA: 1.2. 16.1-17.0': HNu: 0; OVA: 1.0. 17.8-18.8': HNu: 0; OVA: 1.0. 18.8-19.8': HNu: 0.2; OVA: 0.8.
20				

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 67-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CERP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
20			8.0-10.0' SAMPLE. Recovered 1.6/2.0' = 80%. 8.0-9.1': SAND: moderate yellowish brown (10 YR 5/4); coarse-grained to fine-grained; angular pebbles; no HCl reaction; moist. 9.1-9.6': CLAY: pale olive (10 Y 6/2); dense; slightly sandy; no HCl reaction; slightly moist.	
25			10.0-12.0 SAMPLE. Recovered 2.0/2.0' = 100%. 10.0-11.5': CLAY: same as above except pockets of caliche and slight oxidation; moist. 11.5-12.0': CLAY: moderate reddish orange (10 R 6/6); slightly more sandy then upper clay; moist.	
30			Total depth measured at 12.1'. Adjust depth.	
			12.1-14.1' SAMPLE. Recovered 2.2/2.0' = 110%. SAND: pale olive (10 Y 6/2) stained moderate yellowish brown (10 YR 5/4); some clay; wet.	
35			14.1-16.1' SAMPLE. Recovered 1.3/2.0' = 65%. SAND: light bluish gray (5 B 7/1); stained with dark yellowish orange (10 YR 6/6); coarse-grained sand; high amount of clay; slightly moist.	
			16.1-17.1' SAMPLE. Recovered 0.9/1.0' = 90%. 16.1-16.4': SAND: same as above.	
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LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole Well No. 67-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			ARAPAHOE FORMATION	
			16.4-17.0': CLAYSTONE: light gray (N 7/0); coal; dense; moist.	
			Total depth measured 17.8'. Adjust depth.	
			17.8-18.8' SAMPLE. Recovered 1.8/1.0' = 180%. CLAYSTONE: same as above except stained with light brown (5 YR 5/6); blocky structure; moist to dry.	
			18.8-19.8' SAMPLE. Recovered 0.4/1.0' = 40%. CLAYSTONE: same as above.	
			19.8-21.3' SAMPLE. Recovered 2.2/1.5' = 147%. CLAYSTONE: same as above.	
			TOTAL DEPTH: 21.4'.	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 40163.59 E 20680.82
Total Depth: 20.0'

Borehole/Well No.: 68-87
Ground Surface Elevation: 5968.48'
Water Level Encountered: 11.15'
Static: 6.37' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: December 4, 1987
Drilling Method: Hollow Stem Auger
Logged By: J. Bacchus
Geologist

Driller: S. Bradfield
Helper: P. Mesa
Drilling Fluid: None
Checked By: _____
Site Manager

CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ROCKY FLATS ALLUVIUM**	HNu background = 0.2. OVA background = 1.4-1.8. Ludlum background = 0.
			0.0-2.0' SAMPLE. Recovered 1.8/2.0' = 90%. 0.0-1.1': GRAVEL: dark yellowish brown (10 YR 4/2) and dusky brown (10 YR 2/2); clay, silt, and sand; gravel is angular to subrounded; caliche; moist. 1.1-1.8': CLAY: moderate reddish brown (10 YR 4/6) with dark yellowish brown (10 YR 4/2); contains roots; angular pebbles; slight HCl reaction; dense; moist.	0.0-1.8': HNu: 0; OVA: 1.7.
5				2.0-2.8': HNu: 2.1; OVA: 1.5.
			2.0-4.0' SAMPLE. Recovered 0.8/2.0' = 40%. CLAY: same as above except no HCl reaction and more sandy.	4.0-4.7': HNu: 0; OVA: 1.4.
				6.0-6.8': HNu: 0.4; OVA: 0.1.
10			4.0-6.0 SAMPLE. Recovered 0.7/2.0' = 35%. CLAY: same as above except dry.	7.8-9.1': HNu: 0.2; OVA: 1.8.
			6.0-8.0' SAMPLE. Recovered 0.8/2.0' = 40%. SAND: light brown (5 YR 5/6); coarse; angular; pebbles and silt; no HCl reaction; dry, moist in shoe.	9.8-11.8': HNu: 0; OVA: 7.0.
				12.0-13.0': HNu: 0; OVA: 1.0.
15			Total depth measured 7.8'. Adjust depth.	14.0-15.8': HNu: 0; OVA: 1.2.
			7.8-9.8' SAMPLE. Recovered 1.3/2.0' = 65%. SAND: same as above except chunks of bedrock; moist to very moist at the bottom of the run.	15.9-16.9': HNu: 0; OVA: 0.8.
20				16.9-18.5': HNu: 0; OVA: 0.8.

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 68-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			9.8-11.8' SAMPLE. Recovered 2.2/2.0' = 110%. 9.8-10.05': SAND: same as above. 10.05-11.15': SANDY CLAY: pale olive (10 Y 6/2) stained with light brown (5 YR 5/6); mica; coal; quartzite; no HCl reaction; moist. 11.5-11.8': SAND: dark yellowish orange (10 YR 6/6); coarse angular quartzite cobbles; sand grains are very angular; feldspar; wet. Total depth measured 12.0'. Adjust depth. 12.0-14.0' SAMPLE. Recovered 1.0/2.0' = 50%. SAND: same as above. 14.0-16.0' SAMPLE. Recovered 1.8/2.0' = 90%. 14.0-15.3': SAND: same as above. ARAPAHOE FORMATION 15.3-15.5': SANDSTONE : light gray (N 7/0); some clay; subangular; clean sand; moist to wet. 15.5-15.8': CLAYSTONE: light gray (N 7/0) stained with dark yellowish orange (10 YR 6/6); blocky structure, slightly moist to dry. Total depth measured 15.9'. Adjust depth.	19.0-20.0': HNu: 0; OVA: 0.4.

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 68-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			15.9-16.9' SAMPLE. Recovered 1.2/1.0' = 120%. CLAYSTONE: light olive gray (5 Y 5/2); stained with dark yellowish orange (10 YR 6/6) and light brown (5 YR 5/6); blocky structure; coal; moist.	
			16.9-18.9' SAMPLE. Recovered 1.6/2.0' = 80%. CLAYSTONE: same as above.	
			Total depth measured 19.0'. Adjust depth.	
			19.0-20.0' SAMPLE. Recovered 1.5/1.0' = 150%. CLAYSTONE: same as above but slightly sandy; moist.	
			TOTAL DEPTH: 20.0'.	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39588.09 E 21098.79
Total Depth: 17.0'

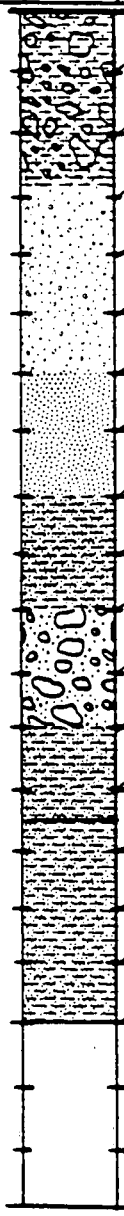
Borehole, Well No.: 70-87
Ground Surface Elevation: 5966.30'
Water Level Encountered: None
Static: 7.40' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: December 14, 1987
Drilling Method: Hollow Stem Auger
Logged By: R. Treat
Geologist

Driller: S. Bradfield
Helper: K. Parker
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ROCKY FLATS ALLUVIUM** 0.0-2.0' SAMPLE. Recovered 0.9/2.0' = 45%. CLAYEY GRAVEL: dusky brown (5 YR 2/2) to moderate brown (5 YR 4/4); slightly sandy; cobbles; gravel 0.25 mm to 2.25 mm; angular and subangular; moderately cemented; dense; moist. 2.0-4.0' SAMPLE. Recovered 1.8/2.0' = 90%. 2.0-2.8': SANDY CLAYEY GRAVEL : moderate brown (5 YR 4/4); fine and medium-grained sand ranging (2.5-2.0 Ø) up to (0.0-0.5 Ø) with 1.25 mm gravel, angular and subangular; scattered gravel; moderately cemented; poorly sorted; moist. 2.8-3.8': SAND AND GRAVEL: light brown (5 YR 6/4) to varying pale yellowish brown (10 YR 6/2); sand ranging (3.0-2.5 Ø) to (0.5-0.0 Ø); scattered gravel ranging 0.25 mm to 1.75 mm; gravel angular and subangular and few subrounded; poorly sorted; weakly cemented; light moist. 4.0-6.0' SAMPLE. Recorded 0.8/2.0' = 40%. GRAVELLY SAND: light brown (5 YR 6/4) to varying moderate brown (5 YR 4/4); sand (3.0-2.5 Ø) to (0.0-0.5 Ø); 1.25 mm scattered gravel subangular, subrounded, and angular; poorly sorted; weakly cemented; light moist.	HNU Background=1.0 OVA Background=0.2 Ludlum Background=0. No readings above background.
5				
10				
15				
20				

LOG OF BOREHOLE

Location Rocky Flats Plant: Landfill Area

Borehole/Well No. 70-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			6.0-8.0' SAMPLE. Recovered 0.7/2.0' = 35%. SAND: light brown (5 YR 6/4) sand ranging (2.5-2.0 Ø) to (0.5-1.0 Ø); scattered gravel 0.25 mm to 3.50 mm; angular and subangular; poorly sorted; weakly cemented; light, moist.	
			8.0-10.0' SAMPLE. Recovered 0.0/2.0' = 0%. Cuttings indicate clayey sand with some gravels.	
			10.0-12.0' SAMPLE. Recovered 0.014/2.0 = 0.12%. Sample retained as a large size gravel measuring 4.25 mm; subrounded.	
			12.0-14.0' SAMPLE. Recovered 2.0/2.0 = 100%. 12.0-13.5': CLAYEY SAND: moderate brown (5 YR 4/4) to varying light brown of (5 YR 5/6) to (5 YR 6/4) sand; fine-grained (3.0-2.5 Ø) and (2.5-2.0 Ø); poorly sorted, weakly cemented; moist.	
			ARAPAHOE FORMATION	
			13.5-14.0': CLAYEY SANDSTONE: pale yellowish brown (10 YR 6/2) to dark yellowish orange (10 YR 6/6) to light gray (N 7/0) streaked; grain size (2.5-2.0 Ø); subrounded and rounded; severely oxide stained; massive; poorly sorted; highly weathered; moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant: Landfill Area

Borehole/Well No. 70-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			14.0-16.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYEY SANDSTONE: varying brown and gray as noted in previous run; continued severely oxide stained; fine-grained sand (2.5-2.0 Ø); massive; moderately cemented; moist.	
			16.0-17.0' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY CLAYSTONE: medium dark gray (N 4/0); slightly weathered; fine-grained sands; massive; low plastic; blocky; moderately cemented; with thin oxide (Fe) streaks noted; moist.	
			TOTAL DEPTH: 17.0'	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 40339.90 E 20991.74
Total Depth: 18.5'

Borehole Well No.: 71-87
Ground Surface Elevation: 5963.39'
Water Level Encountered: 5.0'
Static: 4.62' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: December 10, 1987
Drilling Method: Hollow Stem Auger
Logged By: J. Bacchus
Geologist

Driller: S. Bradfield
Helper: K. Parker
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ROCKY FLATS ALLUVIUM** 0.0-2.0' SAMPLE. Recovered 0.6/2.0' = 30%. SOIL: grayish brown (5 YR 3/2); roots; angular pebbles; sand; caliche; moist. 2.0-4.0' SAMPLE. Recovered 1.1/2.0' = 55%. CLAYEY SAND: yellowish gray (5 Y 7/2); high amount of caliche; angular pebbles of quartzite and igneous rock; contains chunks of clay bedrock; slightly moist to dry. 4.0-5.0' SAMPLE. Recovered 0.6/1.0' = 60%. CLAYEY SAND: same as above except less clay and much more caliche. 5.0-7.0' SAMPLE. No recovery; drilled with center bit. Total depth measured 6.5'. Adjust depth. 6.5-8.5' SAMPLE. Recovered 1.5/2.0' = 75%. CLAYEY SILTY SAND: dark yellowish orange (10 YR 6/6); clasts of quartzite; no HCl reaction; wet on top of the run; very moist. Total depth measured 9.0'. Adjust depth.	OVA background=0.7 HNu background=0.4 No readings above background.
5				
10				
15				
20				

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 71-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			9.0-11.0' SAMPLE. Recovered 1.6/2.0' = 80%. 9.0-10.2': SANDY CLAY: dark yellowish orange (10 YR 6/6); large angular pebbles; small angular cobbles; no HCl reaction; moist to wet. 10.2-10.6': SANDY CLAY: light gray (N 7/0) stained with dark yellowish orange (10 YR 6/6); fine-grained sand; moderate HCl reaction; moist.	
			11.0-13.0' SAMPLE. Recovered 1.6/2.0' = 80%. 11.0-11.4': SANDY CLAY: same as above. 11.4-13.0': SANDY CLAY: light gray (N 7/0); stained with dark yellowish orange (10 YR 6/6); angular pebbles of feldspar and quartzite; moist to wet.	
			13.0-15.0' SAMPLE. Recovered 1.1/2.0' = 55%. 13.0-13.5': SANDY CLAY: same as above.	
			ARAPAHOE FORMATION	
			13.5-14.1': CLAYSTONE: light gray (N 7/0); stained with dark yellowish orange (10 YR 6/6); dense; moist.	
			15.0-17.0' SAMPLE. Recovered 1.1/2.0' = 55%. CLAYSTONE: same as above except contains coal; slightly moist.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 71-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			17.0-19.0' SAMPLE. Recovered 0.6/2.0' = 30%. CLAYSTONE: same as above. TOTAL DEPTH: 18.5'.	

LOG OF BOREHOLE

Location: Rocky Flats Plant; Landfill Area
Coordinates: N 39459.12 E 20855.24
Total Depth: 15.0'

Borehole/Well No.: 72-87
Ground Surface Elevation: 5969.11'
Water Level Encountered: 6.0'
Static: 2.13' (4/11/88)

Drilling Company: Boyles Bros.
Date Drilled: December 16, 1987
Drilling Method: Hollow Stem Auger
Logged By: R. Treat
Geologist

Driller: S. Bradfield
Helper: K. Parker
Drilling Fluid: None
Checked By: _____
Site Manager

_____
CEARP Manager

Comments: _____

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
0			**ROCKY FLATS ALLUVIUM** 0.0-2.0' SAMPLE. Recovered 1.8/2.0' = 90%. 0.0-0.3': CLAY AND GRAVEL: dusky brown (5 YR 2/2); scattered cobbles; subangular and subrounded gravel with numerous roots; moderately cemented; light moist. 0.3-1.8': SAND AND GRAVEL: grayish orange (10 YR 7/4) to some dark yellowish orange (10 YR 6/6); sand (2.5-2.0 Ø) to scattered (1.0-0.5 Ø); gravel ranging from 1.25 mm to 2.75 mm; subangular and subrounded; very calcareous; weakly cemented; moist.	HNu Background=0.6 OVA Background=1.2 Ludlum Background=0 0.0-1.8': Readings on core: HNu = 5.4; OVA = 4.2. 0.0-1.8': Direct hit sample: 72870000DH.
5				
			2.0-3.5' SAMPLE. Recovered 1.0/1.5' = 67%. SAND AND GRAVEL: very pale orange (10 YR 8/2) to some dark yellowish orange (10 YR 6/6) to light brown (5 YR 5/6); sand ranging (2.5-2.0 Ø) to scattered (0.5-0.0 Ø); gravel ranging 0.25 mm to 2.25 mm; subangular, subrounded, and few rounded; weakly cemented; poorly sorted; very calcareous; moist.	2.0-3.0': Readings on core: HNu = 0.0; OVA = 1.4. 2.0-3.0': Direct hit sample: 72870002DH. 4.0-5.0': Readings on core: HNu = 1.5; OVA = 0.0. 4.0-5.0': Direct hit/upper contact sample: 72870004UC.
10				
15			3.5-4.0' Center bit drill.	6.0-8.0': Water table/contact sample: 72870006WT.
			4.0-6.0' SAMPLE. Recovered 1.0/2.0' = 50%. SAND WITH SCATTERED GRAVEL: color as stated above; sand ranging (3.0-2.5 Ø) to scattered (1.0-0.5 Ø); gravel 1.00 mm and smaller; weakly cemented; poorly sorted; light moist.	8.0-10.0': Bedrock sample: 72870008BR.
20				

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 72-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			6.0-8.0' SAMPLE. Recovered 2.0/2.0' = 100%. 6.0-6.5': SAND AND SCATTERED GRAVELS: light brown (5 YR 5/6) to moderate brown (5 YR 4/4); sand (2.5-2.0 Ø) and (1.5-1.0 Ø); rounded; non-cemented; poorly sorted; wet at 6.0'.	13.0-13.6': Field screen readings: HNU = 0.4 (1.5); OVA = 0.0 (0.0).
			ARAPAHOE FORMATION	
			6.5-8.0': CLAYEY SANDSTONE: varying light brown (5 YR 5/6) and (5 YR 6/4) to moderate brown (5 YR 4/4) with pale yellowish brown (10 YR 6/2); sand (3.0-2.5 Ø); weakly to non-cemented; poorly sorted; moderately oxide (Fe) stained; highly weathered very moist to moist.	
			8.0-10.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYEY SANDSTONE: varying light brown (5 YR 6/4) and (5 YR 5/6), light brownish gray (5 YR 6/1), and brownish gray (5 YR 4/1); fine-grained sand of (3.5-3.0 Ø) low to possible medium plastic; hardened small calcite fragments; moderately cemented; poorly sorted; moderately oxide (Fe) stained; highly weathered, moist.	
			10.0-12.0' SAMPLE. Recovered 0.0/2.0' = 0%.	
			12.0-13.0' SAMPLE. Recovered 0.0/1.0' = 0%.	

LOG OF BOREHOLE

Location Rocky Flats Plant; Landfill Area

Borehole/Well No. 72-87 (cont'd.)

Coordinates

Ground Surface Elevation

Total Depth

Water Level Encountered

Static

Drilling Company

Driller

Date Drilled

Helper

Drilling Method

Drilling Fluid

Logged By

Geologist

Checked By

Site Manager

CEARP Manager

Comments

Depth Feet	Graphic Log	Sample Type	Lithologic Description	Samples Collected or Other Tests Performed
			13.0-15.0' SAMPLE. Recovered 0.6/2.0' = 30%. SANDY CLAYSTONE: medium gray (N 5/0); medium if not highly plastic; moderately cemented; fine-grained sand (3.5-3.0 Ø); weathered, moist.	
			TOTAL DEPTH: 15.0'.	

LOG OF BOREHOLE

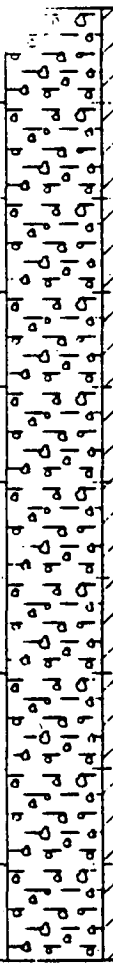
QA BY/DATE J. B. Bergman 12-19-90
LOCATION Rocky Flats Plant; Landfill Area
COORDINATES N39,332.69 E19,481.76 (RFP)
TOTAL DEPTH 27.5'

BOREHOLE/WELL NO. B106089
GROUND SURFACE ELEVATION 5993.3'
WATER LEVEL ENCOUNTERED 19.5'
STATIC 20.19' (10/13/89)
DRILLER K. Parker HELPER A. Boday
DRILLING FLUID None
CHECKED BY
SITE MANAGER

DRILLING COMPANY Boyles Brothers
DATE DRILLED May 8 and 18, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY R.T. Treat
GEOLOGIST

CEARP MANAGER

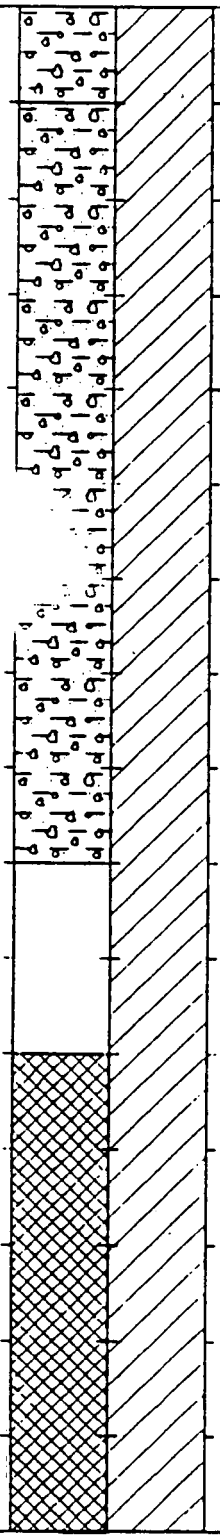
COMMENTS Dry ice was placed down hollow stem auger starting at 9.5' to neutralize the methane gases encountered down hole.

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
1 2 3 4 5			**ARTIFICIAL FILL** 0.0-1.5' SAMPLE. Recovered 1.2/1.5' = 80%. CLAYEY GRAVEL: light brown (5 YR 5/6), grayish brown (5 YR 3/2) and moderate yellowish brown (10 YR 5/4); some sand; gravel (0.10 mm to 4 1/2") with some asphalt; angular, subangular and few subrounded; weakly cemented; poorly consolidated; few roots; low to no plasticity; slightly moist. 1.5-3.5' SAMPLE. Recovered 0.25/2.0' = 12%. CLAYEY GRAVEL: same as above. 3.5-5.5' SAMPLE. Recovered 1.3/2.0' = 65%. CLAY AND GRAVEL: dusky brown (5 YR 2/2); pale brown (5 YR 5/2) and some light brown (5 YR 5/6); trash consisting of wood chips, dry wall, plywood chips; fine- and medium-grained sand; gravel (0.20 mm to 3.25 mm); weakly consolidated; non-plastic; medium stiff; moist.	HNU Background: 0.0 OVA Background: 1.0 Explosimeter was used during the drilling of this boring. All readings on cuttings, in breathing zone, on core, and in augers: 0.0; unless otherwise noted below. OVA was off scale in the augers and breathing zone during the entire drilling effort. TRIP BLANK SAMPLE TB0508898 0.0-1.2' SAMPLE (VOAs only) LF01890001 0.0-6.0' SAMPLE LF01890006 LF01890006FB 3.5-4.8' SAMPLE (VOAs only) LF01890305

06069A

WELL NO. B106089

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 9 10 11 12 13			5.5-7.5' SAMPLE. Recovered 1.2/2.0' = 60%. CLAY WITH SANDY GRAVEL: dusky brown (5 YR 5/2); pale brown (5 YR 5/2); wood fragments; paper; asphalt and gravel (0.25mm to 1.75 mm); very fine-grained sand (3.5-3.0 phi); weakly cemented; poorly consolidated; stiff; low plasticity; moist. 7.5-9.5' SAMPLE. Recovered 0.2/2.0' = 10%. CLAY WITH SANDY GRAVEL: same as above. Note: 9.5-10.5': Drilled with center bit. No sample recovery. 10.5-11.5' SAMPLE. Recovered 1.0/1.0' = 100%. LANDFILL DEBRIS: grayish black (N 2/0) to dusky brown (5 YR 2/2); paper; wood; some scattered gravel (0.25 mm); angular to subangular. 11.5-13.5' SAMPLE. Recovered 1.5/2.0' = 75%. LANDFILL DEBRIS: same as above; gravelly clay with glass; wire; wood and paper.	6.0-12.0' SAMPLE LF01890612 7.5-7.7' SAMPLE (VOAs only) LF01890709 10.5-11.5': Reading on core: OVA: 75 11.5-13.5': Readings on core: OVA: 55 HNu: 4.5 11.5-13.0' SAMPLE (VOAs only) LF01891214 12.0-15.7' SAMPLE LF01891218

060898

WELL NO. B106089

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 16 18 19 20 21			13.5-15.5' SAMPLE. Recovered 0.4/2.0' = 20%. LANDFILL DEBRIS: same as above. 15.5-17.5' SAMPLE. Recovered 0.2/2.0' = 10%. CLAY: moderate brown (5 YR 4/4) to grayish brown (5 YR 3/2); some wood; low plasticity; weakly cemented; moist. Fill 17.5-19.5' SAMPLE. Recovered 0.2/2.0' = 10%. CLAY: pale brown (5 YR 5/2) to grayish brown (5 YR 3/2); some gravel; weakly cemented; poorly consolidated; low plasticity; moist. ROCKY FLATS ALLUVIUM Fill 19.5-20.5' SAMPLE. Recovered 1.2/1.0' = 120%. CLAYEY SAND AND GRAVEL: pale yellowish brown (10 YR 6/2) to dark yellowish orange (10 YR 6/6); severely oxide stained; very fine-grained (3.5-3.0 phi) to fine-grained (2.5-2.0 phi) sand ;gravel (1.25 mm to 1.75 mm); subrounded; rounded; weakly cemented; very moist to moist. 20.5-21.5' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYEY SAND AND GRAVEL: dark yellowish orange (10 YR 6/6) to light brown (5 YR 5/6); gravel (1.25 mm to 2.25 mm); subangular; subrounded; fine-grained (2.5-2.0 phi) to coarse-grained (1.0-0.5 phi) sand; weakly cemented; poorly consolidated; medium dense; severely oxide stained; moist.	13.5-15.5': Reading on core: HNU: 2.5 15.5-17.5': Readings on core: HNu: 1.8 OVA: 3.0 15.5-15.7' SAMPLE (VOAs only) LF01891618 17.5-21.5' SAMPLE LF01891822 19.5-20.5': Reading on core: OVA: 2.4 19.5-20.5' SAMPLE (VOAs only) LF01892021 19.5' 20.19'

06089C

WELL NO. B106089

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%. 21.5-22.7': CLAYEY SAND AND GRAVEL: same as above.	21.5-23.5' SAMPLE (VOAs only) LF01892224
			ARAPAHOE/LARAMIE FORMATION	
22			22.7-23.5': CLAYSTONE: pale yellowish brown (10 YR 6/2); light olive gray (5 Y 5/2); massive; homogeneous; medium plasticity; medium hard; slightly oxide stained; moist.	22.7-27.3' SAMPLE LF01892327 LF01892327D
23			23.5-25.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; severely oxide stained at 23.5-24.5', then moderately to slightly stained in lower run; medium gray (N 5/0) to medium dark gray (N 4/0).	23.5-25.5' SAMPLE (VOAs only) LF01892426
24			25.5-27.5' SAMPLE. Recovered 1.8/2.0' = 90%. SANDY CLAYSTONE: same as above; more sand; slightly moist.	
			TOTAL DEPTH = 27.5'	
26				
27				
28				
29				

060890

LOG OF BOREHOLE

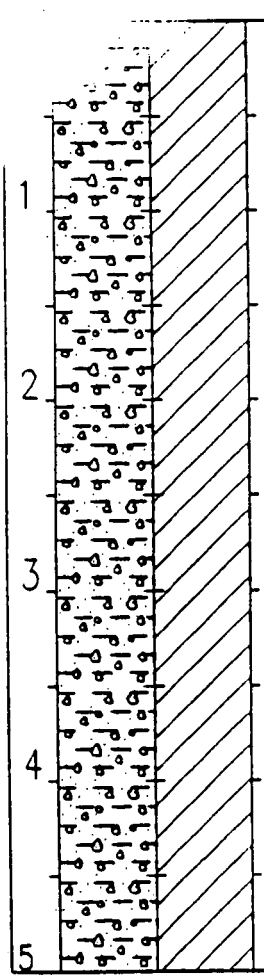
QA BY/DATE J. B. Berman 12-16-90
LOCATION Rocky Flats Plant: Landfill Area
COORDINATES N39,352.08 E20,202.58 (RFP)
TOTAL DEPTH 45.0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED May 24-25, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY S.P. Carpenter
GEOLOGIST

BOREHOLE/WELL NO. B206189
GROUND SURFACE ELEVATION 5984.5'
WATER LEVEL ENCOUNTERED 18.5'
STATIC 22.88' (09/27/89)
DRILLER K. Parker HELPER R. Orr
DRILLING FLUID None
CHECKED BY J. B. Berman
SITE MANAGER

CEARP MANAGER

COMMENTS Dry ice was placed in and around the auger to inhibit the ventilation on methane gas emanating from the landfill soils.

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
1 2 3 4 5			ARTIFICIAL FILL 0.0-1.0' SAMPLE Recovered 0.3/1.0' = 30%. SAND AND CLAY: moderate yellowish brown (10 YR 5/4); some 1 to 2 cm gravel; fine- to very coarse-grained sand; poor sorting; angular; quartzose; non-stratified; unconsolidated; non-cemented; loose; dry. 1.0-3.0' SAMPLE. Recovered 1.1/2.0' = 55%. GRAVELLY CLAYEY SAND: moderate yellowish brown (10 YR 5/4); fine- to very coarse-grained sand; 1 to 2 cm gravel; poor sorting; angular to subangular; quartzose; non-stratified; unconsolidated; non-cemented; loose; dry. 3.0-4.0' SAMPLE. Recovered 0.2/1.0' = 20%. SANDY GRAVELLY CLAY: pale yellowish brown (10 YR 6/2); fine- to coarse-grained sand; 2 to 7 cm gravel to trace pebbles; poor sorting; subangular; quartzose: non-stratified; unconsolidated; non-cemented; medium dense to loose; dry. 4.0-6.0' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY GRAVELLY CLAY: moderate yellowish brown (10 YR 5/4); fine- to very coarse-grained sand; 1 to 5 cm gravel; poor sorting; subangular; granite and quartzites; non-stratified; moderately consolidated; stiff; low plasticity; slightly calcareous; moist.	HNu Background: 0.0 OVA Background: 0.0 Explosimeter Background: 0.0 All readings on cuttings, in breathing zone, on core, and in augers: 0.0; unless otherwise noted below. TRIP BLANK SAMPLE TB052489B 0.0-2.0' SAMPLE (VOAs only) LF0289BR0002 0.0-2.1' SAMPLE LF0289BR0003 3.0': Readings in Auger: OVA: 200 Explosimeter: 15% LEL Reading on Core: OVA: 1.0 TRIP BLANK SAMPLE TB052589B 3.0-9.0' SAMPLE LF0289BR0309

LF0289A

WELL NO. B206189

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			**6.0-8.0' SAMPLE.** Recovered 1.4/2.0' = 70%. SANDY GRAVELLY CLAY: same as above; moderate yellowish brown (10 YR 5/4); moderate olive brown (5 Y 4/4); moderate reddish brown (10 YR 4/6); 1 to 8 cm gravel.	**4.0-6.0' SAMPLE** (VOAs only) LF0289BR0406
6			**8.0-10.0' SAMPLE.** Recovered 2.0/2.0' = 100%. SANDY GRAVELLY CLAY: same as above; moderate yellowish brown (10 YR 5/4) to black (N 1/0); 1 to 4 cm gravel; wood; plastic and metal debris.	**6.0'**: Readings in Auger: OVA: 1000.0 Explosimeter: 100% LEL Reading on cuttings: OVA: 10.0
7			**ROCKY FLATS ALLUVIUM** **10.0-12.0' SAMPLE.** Recovered 2.0/2.0' = 100%. CLAYEY SAND: grayish green (10 GY 5/2) to yellowish gray (5 Y 7/2); some iron-oxide stain--dark yellowish orange (10 YR 6/6); fine- to coarse-grained sand; 1 to 2 cm gravel; poor sorting; subangular; quartzose; slightly stratified to laminated; moderately consolidated; weakly cemented; medium dense; low plastic; moist.	**8.0-10.0' SAMPLE** (VOAs only) LF0289BR0810 **10.0-15.7' SAMPLE** LF0289BR1016
8			**12.0-14.0' SAMPLE.** Recovered 2.0/2.0' = 100%. CLAYEY SAND: light brown (5 YR 5/6); fine- to very coarse-grained sand; trace 1-2 cm gravel; poor sorting; subangular; quartzose lenses to non-stratified; moderately consolidated; weakly cemented; medium dense; low plastic; iron-oxide staining; moist.	**12.0-14.0' SAMPLE** (VOAs only) LF0289BR1214
10				
11				
12				
13				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			14.0-16.0' SAMPLE. Recovered 1.7/2.0' = 85%. CLAYEY SAND: same as above; dark yellowish orange (10 YR 6/6) to dark yellowish brown (10 YR 4/2); low to non-plastic; medium dense to dense.	
14			16.0-18.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYEY GRAVELLY SAND: light brown (5 YR 5/6) to moderate yellowish brown (10 YR 5/4); fine- to very coarse-grained sand; 1 to 2 cm gravel; poorly sorted; subangular; quartzose; slightly stratified; very thin (1/2 cm) clean sand lenses; moderately consolidated; weakly cemented; medium dense to dense; medium to low plastic; moist.	16.0-18.0' SAMPLE (VOAs only) LF0289BR1618 16.0-19.9' SAMPLE LF0289BR1620
15			18.0-20.0' SAMPLE. Recovered 1.9/2.0' = 95%. 18.0-18.5': CLAYEY GRAVELLY SAND: same as above. 18.5-19.9': SAND: dark yellowish orange (10 YR 6/6); trace silt; fine- to very coarse-grained sand; some (1 to 3 cm) gravel; poorly sorted; subangular; quartzose to arkosic; unconsolidated; non-stratified; non-plastic; medium dense; wet.	
16			20.0-22.0' SAMPLE. Recovered 2.0/2.0' = 100%. 20.0-20.9': SANDY GRAVELLY CLAY: dark yellowish orange (10 YR 6/6); fine- to coarse-grained sand; 1 to 8 cm gravel and pebbles; poorly sorted; subangular; granite and quartzite; non-stratified; moderately consolidated; non-cemented; medium plastic; very stiff to hard; a 4 cm sandy gravel lense at contact with claystone bedrock; very moist.	20.0-22.0' SAMPLE (VOAs only) LF0289BR2022 20.0-26.9' SAMPLE LF0289BR2127
18			ARAPAHOE LARAMIE/FORMATION 20.9-22.0': CLAYSTONE: light olive brown (5 Y 5/6) to light olive gray (5 Y 5/2); non-stratified; blocky; well consolidated; non-cemented; iron-oxide banding; hard; medium to high plastic; weathered; moist.	18.5'
19				
20				
21				

LF0289C

WELL NO. B206189

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			22.0-24.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; light to heavy iron-oxide staining at 23.9'.	
22			24.0-26.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; grayish brown (5 YR 3/2); pale yellowish brown (10 YR 6/2); grayish orange (10 YR 7/4); very mottled; abundant iron-oxide staining.	24.0-26.0' SAMPLE (VOAs only) LF0289BR2426
23			26.0-28.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; manganese oxide and iron-oxide staining; very thin silty sand interbeds.	22.88' 26.9-32.9' SAMPLE LF0289BR2733
			28.0-30.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; dark yellowish orange (10 YR 6/6); light olive gray (5 Y 5/2); dusky yellowish brown (10 YR 2/2); very hard to hard; no sand; mottled to 29.1'.	28.0-30.0' SAMPLE (VOAs only) LF0289BR2830
25				
26				
27				
28				
29				

LF0289D

WELL NO. B206189

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			**30.0-32.0' SAMPLE.** Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; light olive brown (5 Y 5/6); medium gray (N 5/0, light olive gray (5 Y 5/2); very mottled; high plastic; trace iron-oxide staining.	**30.0'**: Reading in Auger: Explosimeter: 20% LEL
30			**32.0-34.0' SAMPLE.** Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; olive gray (5 Y 4/1); light olive brown (5 Y 5/6); dark gray (N 3/0); laminated; dark gray zone due to manganese oxide staining.	**32.0-34.0'** SAMPLE (VOAs only) LF02898R3234
31			**34.0-35.0' SAMPLE.** Recovered 1.0/1.0' = 100%. CLAYSTONE: same as above; brownish black (5 YR 2/1); medium gray (N 5/0); medium dark gray (N 4/0); mottled.	
			35.0-36.0' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYSTONE: same as above; dark gray (N 3/0) to light olive gray (5 Y 6/1); slightly silty; trace very fine-grained sand; slightly mottled.	
			36.0-37.0' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYSTONE: same as above; medium gray (N 6/0) to medium dark gray (N 4/0); blocky to platy; very hard.	
33				
34				
35				
36				
37				

LF0289E

WELL NO. B206189

LOG OF BOREHOLE

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%. CLAYSTONE: same as above.	
38			38.0-39.0' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYSTONE: same as above; medium gray (N 5/0) to light gray (N 7/0).	
39			39.0-40.0' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYSTONE: same as above; dark gray (N 3/0) to light olive gray (5 Y 6/1); laminated, manganese oxide staining in discrete layers.	
			40.0-41.0' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYSTONE: same as above.	FIELD BLANK SAMPLE LF0289BR00FB
			41.0-42.0" SAMPLE Recovered 1.0/1.0' = 100% CLAYSTONE: same as above; brownish gray (5 YR 4/1) to medium dark gray (N 4/0).	
			42.0-43.0' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYSTONE: same as above; increasing silt content; increasing manganese oxide staining.	
41			43.0-44.0' SAMPLE. Recovered 0.4/1.0' = 40%. CLAYSTONE: same as above; trace very fine-grained sand.	
			44.0-45.0' SAMPLE. Recovered 0.0-1.0' = 0%.	
42			TOTAL DEPTH = 45.0'	
43				
44				
45				

LF0289F

LOG OF BOREHOLE

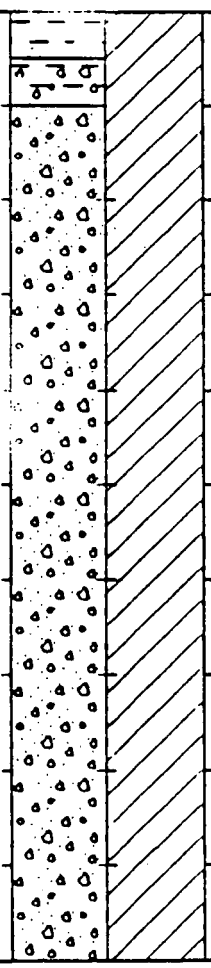
QA BY/DATE J.B. Burman 11-18-89
LOCATION Rocky Flats Plant; Landfill Area
COORDINATES N39,272.29 E20,465.42 (RFP)
TOTAL DEPTH 47.5'

DRILLING COMPANY Boyles Brothers
DATE DRILLED May 1 and 2, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY R.T. Treat
GEOLOGIST

BOREHOLE/WELL NO. B206289
GROUND SURFACE ELEVATION 5977.59'
WATER LEVEL ENCOUNTERED 12.5'
STATIC 30.52' (09/28/89)
DRILLER K. Parker HELPER R. Orr
DRILLING FLUID None
CHECKED BY J.B. Burman
SITE MANAGER

CEARP MANAGER

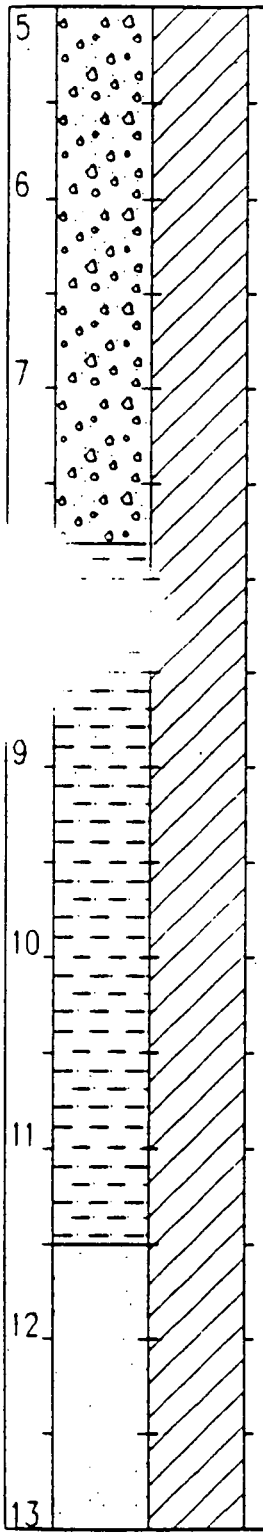
COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			ARTIFICIAL FILL 0.0-1.5' SAMPLE. Recovered 1.2/1.5' = 80%. 0.0-0.25': SANDY CLAY: pale yellowish brown (10 YR 6/2); trace to some gravel; fine-grained (3.0-2.5 phi) sand ; weakly cemented; poorly consolidated; medium stiff; very moist.	HNu Background: 0.0 OVA Background: 0.0 All readings on cuttings, in breathing zone, on core, and in augers: 0.0; unless otherwise noted below. 1.5': Reading in Auger: OVA: 0.2
1			TOP SOIL 0.25-0.50': CLAY AND GRAVEL: dusky brown (5 YR 2/2); gravel (0.75 mm to 3.50 mm); angular, subangular and few subrounded; poorly consolidated; abundant roots; slightly moist.	
3			ROCKY FLATS ALLUVIUM 0.50-1.20': SANDY GRAVEL: pale yellowish brown (10 YR 6/2); medium-grained (2.0-1.5 phi) to very coarse-grained (-0.5 to -1.0 phi) sand; gravel (0.25 mm to 4.75 mm); weakly cemented; poorly consolidated; non-plastic; dense; dry.	
4			1.5-3.5' SAMPLE. Recovered 1.3/2.0' = 65%. SANDY GRAVEL: dark reddish brown (10 R 3/4) to pale red (10 R 6/2); clayey (1.5-2.0') to trace clay (2.0-2.3'); fine-grained (3.0-2.5 phi) up to very coarse-grained (-0.5 to -1.0 phi) sand; gravel (0.15 mm to 2.10 mm); granite and quartzite; moderately cemented; medium dense; moderately consolidated; slightly damp.	3.5': Reading in Auger: OVA: 1.8
5				

LF0385A

WELL NO. B206289

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7			3.5-4.5' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY GRAVEL: same as above; some clay. Note: 4.5-5.5': Drilled with center bit. No sample recovery. 5.5-7.5' SAMPLE. Recovered 1.3/2.0' = 65%. SAND AND GRAVEL: dark yellowish orange (10 YR 6/6) to pale yellowish brown (10 YR 6/2); very fine-grained (3.5-3.0 phi) to very coarse-grained (0.0 to -0.5 phi) sand; gravel (0.25 mm to 2.25 mm); angular, subangular and few subrounded; quartzite and granite; weakly cemented; poorly consolidated; medium dense; non-plastic; slightly moist. 7.5-9.5' SAMPLE. Recovered 1.1/2.0' = 55%. 7.5-7.8': SAND AND GRAVEL: same as above. 7.8-8.6': CLAYEY SAND: light gray (N 7/0) to streaks of moderate brown (5 YR 4/4); fine-grained (3.0-2.5 phi) sand; moderately cemented; weakly consolidated; medium dense; low plasticity; moist.	3.5-4.5': Readings on core: OVA: 0.2 HNu: 4.5 4.5': Reading in Auger: OVA: 5.0 5.5-7.5': Reading on Core: OVA: 0.4 7.5-9.5': Reading on Core: OVA: 5.6 9.5': Readings in Auger: OVA: 250 HNu: 5.5
9 10 11			9.5-11.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYEY SAND: dark yellowish orange (10 YR 6/6) to pale yellowish brown (10 YR 6/2); very fine-grained (3.5-3.0 phi) to coarse-grained (0.5-0.0 phi) sand; gravel (0.25 mm to 1.75 mm); subangular, angular and some rounded; weakly cemented; poorly consolidated; medium dense; moist. 11.5-13.5' SAMPLE. Recovered 1.0/2.0' = 50%. SAND: moderate yellowish brown (10 YR 5/4); some gravel (0.25 mm to 1.50 mm); fine-grained (3.0-2.5 phi) to very coarse-grained (0.0 to -0.5 phi) sand; non-cemented; poorly consolidated; medium dense; wet.	9.5-11.5': Reading on Core: OVA: 2.2 11.5-13.5': Reading on Core: OVA: 12.4 13.5': Readings in Auger: OVA: 150 HNu: 2.2
12 13				▽ 12.5'

LFQ3898

WELL NO. B206289

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 17 18 19 20 21			13.5-14.5' SAMPLE. Recovered 1.0/1.0' = 100%. SAND: dark yellowish orange (10 YR 6/6) to light brown (5 YR 5/6); some gravel; non-cemented; weakly consolidated; loose; non-plastic; wet. 14.5-15.5' SAMPLE. Recovered 1.0/1.0' = 100%. 14.5-14.8': SAND: same as above. ARAPAHOE/LARAMIE FORMATION 14.8-15.5' CLAYSTONE: light gray (N 7/0) to medium light gray (N 6/0); highly plastic; moderately cemented to weakly cemented; medium hard; moist. 15.5-17.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: dark yellowish orange (10 YR 6/6) to streaks of pale yellowish brown (10 YR 6/2); trace fine-grained sand; highly plastic; moderately cemented; moderately consolidated; oxide stained; weathered; damp. 17.5'-19.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; less iron-stained. 19.5-21.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: light olive gray (5 Y 6/1); moderately cemented; highly plastic; medium hard; massive; homogeneous; blocky; slightly oxide stained; weathered; moist.	13.5-14.5': Reading on Core: OVA: 3.2 14.5': Readings in Auger: OVA: 85.0 HNU: 0.3 14.5-15.5': Reading on Core: OVA: 4.0 15.5': Readings in Auger: OVA: 18.0 HNU: 0.4 15.5-17.5': Reading on core: OVA: 2.0

LF03BBC

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21 22 23 25 26 27 28 29			21.5-23.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; light gray (N 7/0) to medium light gray (N 6/0); some sand to sandy lensed; moist. 23.5-25.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: light gray (N 7/0) to predominantly dark yellowish orange (10 YR 6/6); some fine-grained sand; medium plasticity; moderately cemented; moderately consolidated; medium hard; iron-stained; massive; homogeneous; weathered; moist. 25.5-27.5' SAMPLE. Recovered 0.0/2.0' = 0%. 27.5-28.5' SAMPLE. Recovered 2.0/1.0' = 200%. CLAYSTONE: medium light gray (N 6/0); trace fine-grained sand; massive; medium plasticity; homogeneous; moderately cemented and moderately consolidated; medium hard; slightly weathered; slightly moist. 28.5-29.5' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYSTONE: medium dark gray (N 4/0); some fine-grained sand; low plasticity; massive; homogeneous; weakly cemented; poorly consolidated; medium hard; slightly moist.	

WELL NO. B206289

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			29.5-30.5' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYSTONE: same as above; some fine-grained sand to sandy.	
30			30.5-31.5' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYSTONE: same as above; less sand and more weathered; oxide stained, lensed and streaked; moist.	
			31.5-33.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: dark gray (N 3/0); trace to some very fine-grained sand; massive; medium plasticity; moderately cemented; poorly consolidated; medium hard; slightly weathered; caliche lense noted at 33.2-33.25'; strongly reactive to HCl; very light gray (N 8/0); slightly moist.	30.52'
31				
32			33.5-34.5' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYSTONE: same as above; more very fine-grained sand.	
			34.5-35.5' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY SILTSTONE: medium gray (N 5/0); some clay; massive; homogeneous; very fine-grained (3.5-3.0 phi) sand; low plasticity; moderately cemented; moderately consolidated; hard to medium hard; damp.	34.5-35.5': Reading on Core: HNu: 2.0 35.5': Readings in Auger: OVA: 0.2 HNu: 10
			35.5-36.5' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY SILTSTONE: same as above.	36.5': Reading in Auger: OVA: 2.0
34			36.5-37.5' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY SILTSTONE: same as above; slightly weathered.	36.5-37.5': Reading on Core: OVA: 2.0 37.5': Readings in Auger: OVA: 1.8 HNu: 1.0
35				
28				
37				

LF0.3BE

WELL NO. B206289

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			37.5-38.5' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY SILTSTONE: same as above.	37.5-38.5': Readings on Core: OVA: 1.2 HNu: 0.2
38				38.5': Reading in Auger: HNu: 0.2
			38.5-39.5' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY SILTSTONE: same as above; more very fine-grained sand.	38.5-39.5': Reading on Core: HNu: 0.4
39				39.5': Reading in Auger: HNu: 1.0
			39.5-41.0' SAMPLE. Recovered 1.2/1.5' = 96%. SANDY SILTSTONE: medium gray (N 5/0); some clay; very fine-grained (3.5-3.0 phi) sand; blocky; massive; homogeneous; moderately cemented; moderately consolidated; some slickensides apparent; low plasticity; medium hard; unweathered; damp.	41.0': Reading in Auger: OVA: 1.0
			41.0-42.5' SAMPLE. Recovered 1.4/1.5' = 93%. SANDY TO SANDSTONE AND SILTSTONE: same as above; more very fine-grained sand.	41.0-42.5': Reading on Core: OVA: 1.8
41				42.5': Readings in Auger: OVA: 49.0 HNu: 4.0
			42.5-44.0' SAMPLE. Recovered 1.1/1.5' = 73%. SANDY SILTSTONE: same as above.	
42			44.0-45.5' SAMPLE. Recovered 1.5/1.5' = 100%. SILTSTONE: grayish black (N 2/0) to dark gray (N 3/0); some very fine-grained sand; abundant lignite; homogeneous; weakly cemented; moderately consolidated; blocky to massive; slightly moist.	
43				
44				
45				

LF0388F

WELL NO. B206289

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			45.5-46.5' SAMPLE. Recovered 1.0/1.0' = 100%. SILTSTONE: same as above; some more very-fine grained sand noted from 46-46.5'.	
46			46.5-47.5' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYEY SILTSTONE: same as above; trace sand.	47.5': Reading in Auger: OVA: 6.0
47			TOTAL DEPTH = 47.5'	
48				
49				
50				
51				
52				
53				

LF0389G

LOG OF BOREHOLE

QA BY/DATE J.B. Bullman / 11-27-87
LOCATION Rocky Flats Plant: Landfill Area
COORDINATES N39,566.50 E20,828.68 (RFP)
TOTAL DEPTH 20.0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED May 19, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY S.P. Carpenter
GEOLOGIST

BOREHOLE/WELL NO. B206389
GROUND SURFACE ELEVATION 5969.7'
WATER LEVEL ENCOUNTERED None
STATIC None (09/28/89)
DRILLER K. Parker HELPER A. Boday
DRILLING FLUID None
CHECKED BY J.B. Bullman
SITE MANAGER

CEARP MANAGER

COMMENTS Dry ice was used to eliminate the threat of explosion of the methane gas emanating from the landfill.

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
1 2 3 4 5			**ARTIFICIAL FILL** 0.0-2.2' SAMPLE. Recovered 1.7/2.0' = 85%. 0.0-0.7': SANDY CLAY: moderate yellowish brown (10 YR 5/4); some gravel; very stiff to stiff; moist. 0.7-1.7': GRAVELLY SAND AND CLAY: dusky yellowish brown (10 YR 2/2); medium dense, with asphalt and scattered metal debris; moist. 2.0-4.0' SAMPLE. Recovered 1.45/2.0' = 72%. SAND AND CLAY: dark yellowish brown (10 YR 4/2); some gravel; non-stratified; fine to coarse-grained sands; subangular; quartzites; medium dense; some paper and wood trash; moist. 4.0-6.0' SAMPLE. Recovered 0.9/2.0' = 45%. SAND AND CLAY: same as above.	HNu Background: 0.0 OVA Background: 0.0 Explosimeter Background: 0.0 All readings on cuttings, in breathing zone, on core, and in augers: 0.0; unless otherwise noted below. TRIP BLANK SAMPLE TB0519898 0.0-3.0' SAMPLE LF04890003 0.0-2.0': Reading on core: HNu: 0.3 0.0-1.7' SAMPLE (VOAs only) LF04890002 LF04890002D 2.0': Reading in Auger: OVA: 1.4 3.0-4.9' SAMPLE LF04890309 2.0-4.0' Reading on Core: HNu: 0.1

LF0488A

WELL NO. 3206389

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 10 11 12 13			6.0-8.0' SAMPLE. Recovered 0.0/2.0' = 0%. Note: 8.0-9.0': Drilled with center bit. No sample recovery. ROCKY FLATS ALLUVIUM 9.0-10.0' SAMPLE. Recovered 0.7/1.0' = 70%. SAND AND GRAVEL: dark yellowish orange (10 YR 6/6); clayey; non-stratified; homogeneous; very fine to very coarse-grained sand; poor sorting; subangular; quartzites; non-cemented; moderately consolidated; medium dense to dense; moist to slightly moist. Note: 10.0-12.0': Drilled with center bit. No sample recovery. 12.0-14.0' SAMPLE. Recovered 1.9/2.0' = 95%. 12.0-13.3': SAND AND GRAVEL: same as above. ARAPAHOE LARAMIE/FORMATION 13.3-13.9': CLAYSTONE: light olive gray (5 Y 6/1) to medium gray (N 5/0); some silt; trace sand; high to medium plasticity; moderately cemented; moderately consolidated; iron oxide stained; weathered; moist.	4.0-4.9' SAMPLE (VOAs only) LF04890406 4.0': Readings in Auger: OVA: 150 Explosimeter 5% LEL 4.0-6.0': Readings on Core: HNu: 2.0 OVA: 2.5 6.0': Readings in Auger: OVA: 7.5 Explosimeter 50% LEL 6.0-8.0': Reading on Core: HNu: 0.4 8.0': Readings in Auger: OVA: 1000 HNu: 0.4 Explosimeter: 7% LEL 9.0': Reading in Auger: OVA: 45 9.0-9.7' SAMPLE LF04890913 9.0-10.0': Reading on Core: OVA: 2.4 9.0-9.7' SAMPLE (VOAs only) LF04890910 10.0': Reading in Breathing Zone: OVA: 75 10.0': Readings in Auger: OVA: 1000 HNu: 1.2 Explosimter: 80% LEL 12.0-13.9' SAMPLE (VOAs only) LF04891214 12.0-14.0': Reading on Core: OVA: 0.4 14.0': Reading in Auger: OVA: 35

LF04898

WELL NO. B206389

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%. CLAYSTONE: same as above.	14.0-16.0': Reading on Core: OVA: 0.3
14			16.0-18.0' SAMPLE. Recovered 1.9/2.0' = 95%. CLAYSTONE: dark yellowish orange (10 YR 6/6) to light olive gray (5 Y 5/2); trace silt; laminated homogenous; medium to high plasticity; very hard; some iron oxide stain; highly weathered.	14.0-20.0' SAMPLE LF04891319 14.0-15.9' SAMPLE (VOAs only) LF04891416
15			18.0-20.0' SAMPLE. Recovered 2.1/2.0' = 105%. CLAYSTONE: same as above; increased iron oxide staining at 19.0-20.0'.	16.0-18.0': Reading on Core: OVA: 0.2 18.0': Reading in Auger: OVA: 45 20.0': Reading in Auger: OVA: 15
17			TOTAL DEPTH 20.0'	
18				
19				
20				
21				

LF0489C

LOG OF BOREHOLE

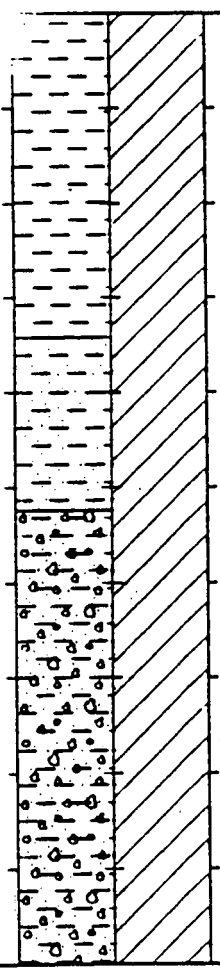
QA BY/DATE J.B. Burman 11-18-89
LOCATION Rocky Flats Plant: Landfill Area
COORDINATES N39,445.20 E20,865.79 (RFP)
TOTAL DEPTH 41.5'

DRILLING COMPANY Boyles Brothers
DATE DRILLED May 3, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY R.T. Treat
GEOLOGIST

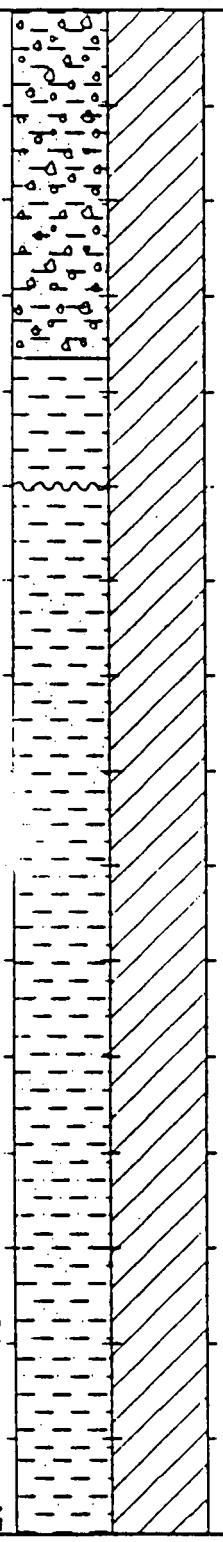
BOREHOLE/WELL NO. B206489
GROUND SURFACE ELEVATION 5969.14'
WATER LEVEL ENCOUNTERED None
STATIC 4.92' (09/27/89)
DRILLER K. Parker HELPER R. Orr
DRILLING FLUID None
CHECKED BY J.B. Burman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
1 2 3 4 5			**TOPSOIL** 0.0-1.5' SAMPLE. Recovered 1.25/1.5' = 83%. 0.0-0.4': CLAY: dusky brown (5 YR 2/2); some gravel; weakly cemented; poorly consolidated; medium stiff; abundant roots; moist. **ROCKY FLATS ALLUVIUM** 0.4-1.25': CLAY: dusky brown (5 YR 2/2); some gravel (0.25 mm to 4.75 mm); quartzite and granite; rounded, subrounded, and few subangular; weakly cemented; poorly consolidated; moist. 1.5-3.5' SAMPLE. Recovered 1.1/2.0' = 55%. 1.5-1.7': CLAY: same as above; some gravel. 1.7-2.6': CLAYEY SAND: grayish orange pink (10 R 8/2) and grayish pink (5 R 8/2); some gravel to gravelly (0.25 mm to 6.50 mm); angular, subangular, and few subrounded; fine-grained (3.0-2.5 phi) to coarse-grained (0.5-0.0 phi) sand; weakly cemented; poorly consolidated; very calcareous; moist. 3.5-5.5' SAMPLE. Recovered 1.0/2.0' = 50%. CLAYEY SAND AND GRAVEL: light brown (5 YR 6/4) to pale yellowish brown (10 YR 6/2); sand and gravel same as above; weakly cemented; poorly consolidated; medium dense; non-plastic; moist.	HNu Background: 0.0 OVA Background: 0.0 All readings on cuttings, in breathing zone, on core and in augers: 0.0; unless otherwise noted. 3.5': Reading in Auger: OVA: 4.6 5.5': Reading in Auger: OVA: 1.2 ▼ 4.92'

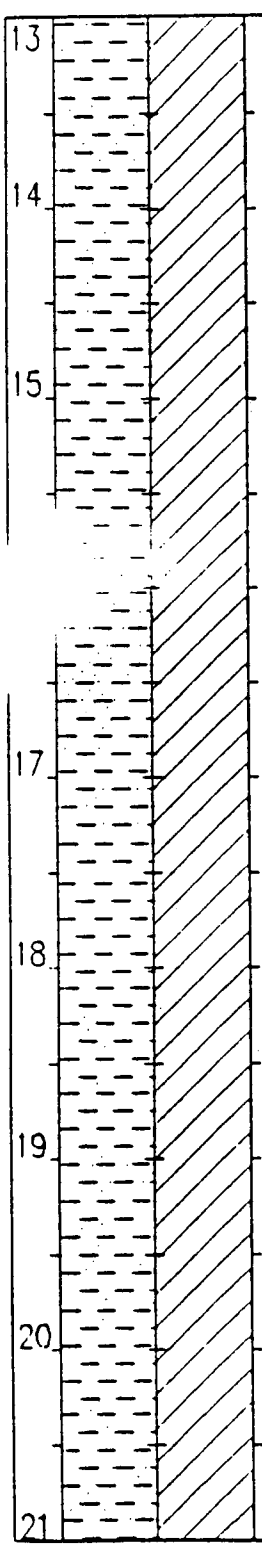
LF0588A

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 10 11 12 13			5.5-7.5' SAMPLE. Recovered 1.6/2.0' = 80%. 5.5-6.8': CLAYEY SAND AND GRAVEL: same as above. 6.8-7.1': CLAY: dark yellowish orange (10 YR 6/6); some gravel; trace fine-grained sand; moderately cemented; medium stiff; low plasticity; moist. ARAPAHOE/LARAMIE FORMATION 7.5-9.5' SAMPLE. Recovered 1.7/2.0' = 85%. CLAYEY SANDSTONE: light gray (N 7/0) to dark yellowish orange (10 YR 6/6); very fine-grained (4.0-3.0 phi) sand; weakly cemented; poorly consolidated; medium hard; oxide-stained at bottom; highly weathered; moist. 9.5-11.5' SAMPLE. Recovered 1.8/2.0' = 90%. SANDY CLAYSTONE: dark yellowish orange (10 YR 6/6) to streaks of pale yellowish brown (10 YR 6/2); severely oxide-stained; very fine-grained sand; blocky to layered; low to medium plasticity; highly weathered; moist. Note: 11.5-12.0': Drilled with center bit. No sample recovery. 12.0-13.5' SAMPLE. Recovered 1.5/1.5' = 100%. SANDY CLAYSTONE: same as above; trace sand.	9.5' Readings in Auger: HNU: 5.0 OVA: 34.0

UT0589B

WELL NO. B206489

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 17 18 19 20 21			13.5-15.5' SAMPLE. Recovered 1.8/2.0' = 90%. SANDY CLAYSTONE: medium light gray (N 6/0); very fine-grained sand; weakly cemented; moderately consolidated; medium hard; low to medium plasticity; homogeneous; blocky to layered; slightly weathered; slightly moist. 15.5-17.5' SAMPLE. Recovered 1.7/2.0' = 100%. SANDY CLAYSTONE: same as above. 17.5-19.5' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: same as above; dark yellowish orange (10 YR 6/6) and light brown (5 YR 5/6) to streaks of pale yellowish brown (10 YR 6/2); severely oxide-stained. 19.5-21.5' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: dark yellowish orange (10 YR 6/6) streaks of pale yellowish brown (10 YR 6/2); grading to some sand; severely oxide-stained; highly weathered; weakly cemented; poorly consolidated; moist.	15.5': Reading in Auger: OVA: 1.0

LF0588C

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 1.7/2.0' = 85%. CLAYSTONE: same as above; some to trace sand. 23.5-25.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: medium gray (N 5/0) to dark gray (N 3/0); streaks of pale yellowish brown (10 YR 6/2); massive; blocky; medium plasticity; moderately cemented and consolidated; homogeneous; slightly weathered; slightly moist. 25.5-27.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above. 27.5-29.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: greenish gray (5 GY 6/1) to light gray (N 7/0) and moderate yellowish brown (10 YR 5/4); trace sand to sandy lense at 28.5-28.8'; very fine-grained; moderately cemented; weakly consolidated; massive; homogeneous; low plasticity; slightly weathered; slightly moist.	

UF05890

WELL NO. B206489

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%. SANDY CLAYSTONE: same as above; more sand; very fine-grained (4.0-3.0 phi) sand lenses; moderately oxide-stained; slightly moist.	29.5': Reading in Auger: OVA: 1.3
30			31.5-33.5' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: dark yellowish orange (10 YR 6/6) to pale yellowish brown (10 YR 6/2) with steaks of light gray (N 6/0); very fine-grained sand; low plasticity; moderately cemented and consolidated; medium hard to hard lensed; massive; homogeneous; weathered; damp.	31.5' Reading in Auger: OVA: 1.0
31			33.5-35.5' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: medium gray (N 5/0); very fine-grained sand; massive; homogeneous; iron-oxide streaked; low plasticity; moderately cemented; moderately consolidated; slightly weathered; damp.	33.5' Reading in Auger: ova: 37.0
32			35.5-37.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; less sand.	
33				
34				
35				
36				
37				

U0588E

WELL NO. B206489

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			37.5-39.5' SAMPLE. Recovered 1.0/2.0' = 50%. CLAYSTONE: brownish gray (5 YR 4/1) to brownish black (5 YR 2/1); trace sand; lignite streaked; low plasticity; weakly cemented; poorly consolidated; slight iron-oxide stained; slightly weathered; damp.	37.5': Reading in Auger: OVA: 38.0
38			39.5-41.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: medium gray (N 5/0); medium dark gray (N 4/0); trace very fine-grained sand; homogeneous; massive; low plasticity; blocky; some iron streaks; slightly weathered; weakly to moderately cemented; damp.	39.5': Reading in Auger: OVA: 1.0
39			TOTAL DEPTH = 41.5'	
40				
42				
43				
44				
45				

LF0588F

LOG OF BOREHOLE

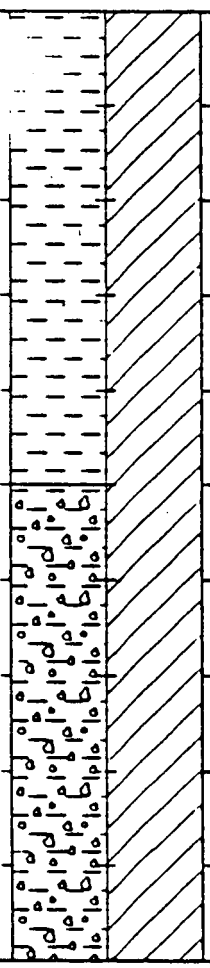
QA BY/DATE J.B. Burman 11-18-89
LOCATION Rocky Flats Plant: Landfill Area
COORDINATES N39,475.67 E21,023.37 (RFP)
TOTAL DEPTH 41.5'

DRILLING COMPANY Boyles Brothers
DATE DRILLED May 4 and 5, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY R.T. Treat
GEOLOGIST

BOREHOLE/WELL NO. B206589
GROUND SURFACE ELEVATION 5967.80'
WATER LEVEL ENCOUNTERED 27.5'
STATIC 7.30' (09/25/89)
DRILLER K. Parker HELPER R. Orr
DRILLING FLUID None
CHECKED BY J.B. Burman
SITE MANAGER

CEARP MANAGER

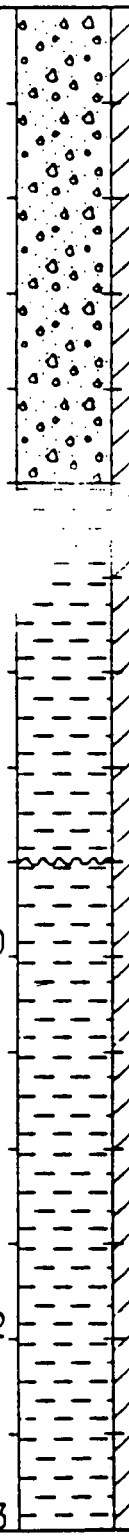
COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
1 2 3 4 5			TOPSOIL 0.0-1.5' SAMPLE. Recovered 0.5/1.5' = 33%. CLAY: dusky brown (5 YR 2/2) to moderate brown (5 YR 4/4); some gravel and scattered cobbles; low plasticity; abundant roots; weakly cemented; poorly consolidated; loose to medium stiff; slightly moist. ROCKY FLATS ALLUVIUM 1.5-3.5' SAMPLE. Recovered 1.3/2.0' = 65%. 1.5-2.5' CLAY: yellowish gray (5 Y 7/2); some sand and some gravel; very calcareous and highly effervescent to HCl; very fine- (3.5-3.0 phi) to fine-grained (3.0-2.5 phi) sand; gravel size: (0.15 to 1.25 cm); weakly cemented; low plasticity; poorly consolidated; moist. 2.5-2.8' CLAYEY SAND AND GRAVEL: fine- (3.0-2.5 phi) to very coarse-grained sand (0.0 to -0.5 phi); gravel (0.20 to 3.75 cm); quartzite and granitic origin; weakly cemented; poorly consolidated; subrounded to mostly subangular and angular; moist. 3.5-5.5' SAMPLE. Recovered 1.8/2.0' = 90%. 3.5-4.9' CLAYEY SAND AND GRAVEL: same as above. 4.9-5.3' SAND AND GRAVEL: grayish orange pink (5 YR 7/2) to light brown (5 YR 6/4); sand range fine- (2.5-2.0 phi) to very coarse-grained (-0.5 to -1.0 phi) sand; gravel size: (0.25 to 5.50 cm); subrounded; subangular and angular; weakly cemented; poorly consolidated; medium dense; non-plastic; slightly moist.	HNu Background: 0.0 OVA Background: 1.0 All readings on cuttings, in breathing zone, on core, and in augers: 0.0; unless otherwise noted below. 5.5': Readings in Auger: OVA: 4.0 HNu: 1.0

LF0688A

WELL NO. B206589

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 9 10 11 12 13			5.5-7.5' SAMPLE. Recovered 1.8/2.0' = 90%. SAND AND GRAVEL: same as above. 7.5-9.5' SAMPLE. Recovered 1.5/2.0' = 75%. CLAY: dark yellowish orange (10 YR 6/6) to pale yellowish brown (10 YR 6/2); fine- and medium-grained sands; gravel size: (0.20 cm to 0.75 cm); medium plastic; moderately cemented; medium stiff; slightly calcareous; moist. ARAPAHOE/LARAMIE FORMATION 9.5-11.5' SAMPLE. Recovered 1.0/2.0' = 50%. CLAYSTONE: pale yellowish brown (10 YR 6/2) to dark yellowish orange (10 YR 6/6); oxide stained; massive; homogeneous; moderately cemented; medium hard; medium plasticity; highly weathered; slightly moist. 11.5-13.5' SAMPLE. Recovered 1.2/2.0' = 60%. CLAYSTONE: same as above.	7.30'

LF06589B

WELL NO. B206589

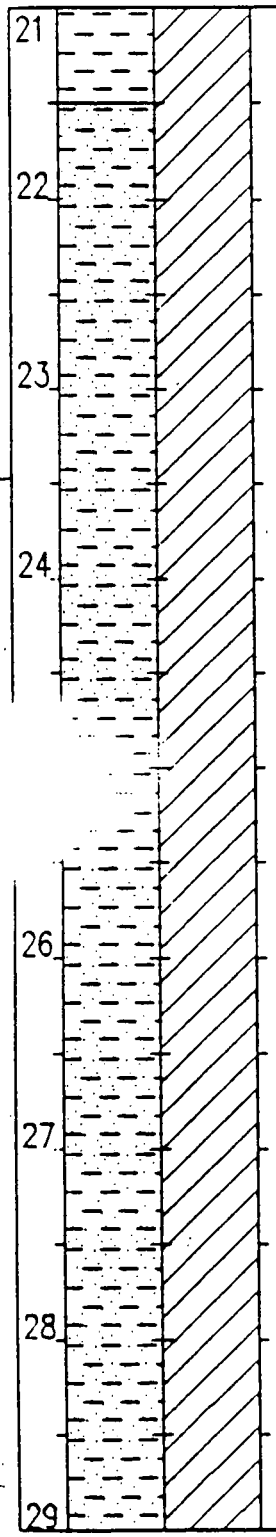
LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			13.5-14.5': Drilled with center bit. No sample recovered.	
			14.5-15.5' SAMPLE. Recovered 1.0/1.0' = 100%. CLAYSTONE: same as above; now more sand (3.5-3.0 phi).	14.5': Readings in Auger: OVA: 4.0 HNu: 8.0 15.5': Readings in Auger: OVA: 2.0 HNu: 1.0
14				
15			15.5-17.5' SAMPLE. Recovered 1.7/2.0' = 85%. SANDY CLAYSTONE: light gray (N 7/0) to dark yellowish orange (10 YR 6/6); very fine-grained sand (4.0-3.5 phi); low plasticity; moderately oxide stained; weakly to moderately cemented; medium hard; homogeneous; massive; blocky; slightly moist.	
			17.5-19.5' SAMPLE. Recovered 1.8/2.0' = 90%. SANDY CLAYSTONE: same as above.	
			19.5-21.5' SAMPLE. Recovered 1.5/2.0' = 75%. CLAYSTONE: same as above; now some sand and now severely oxide stained.	19.5': Readings in Auger: OVA: 6.0 HNU: 55.0
17				
18				
19				
20				
21				

LF0689C

WELL NO. B206589

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21 22 23 24 26 27 28 29			21.5-23.5' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: medium gray (N 5/0) to medium dark gray (N 4/0); sand (3.5-3.0 phi); massive; homogeneous; medium hard; blocky; moderately cemented; weakly to moderately consolidated; very sandy at 23.4-23.5'; moist. 23.5-25.5' SAMPLE. Recovered 1.6/2.0' = 80%. CLAYEY SANDSTONE: light brown (5 YR 5/6) to pale yellowish brown (10 YR 6/2); sand (3.5-3.0 phi) to (3.0-2.5 phi); weakly cemented; medium hard; non-plastic to low plasticity; more clay at bottom; moderately oxide stained; slightly moist. 25.5-27.5' SAMPLE. Recovered 1.2/2.0' = 60%. CLAYEY SANDSTONE: same as above. 27.5-29.5' SAMPLE. Recovered 1.0/2.0' = 50%. CLAYEY SANDSTONE: same as above.	23.5': Reading in Auger: HNu: 1.0 25.5': Readings in Auger: OVA: 10.0 HNu: 1.0 25.5-27.5': Reading on Core: HNu: 7.0 27.5': Readings in Auger: OVA: 22.0 HNu: 9.0 27.5-29.5': Reading on Core: HNu: 2.2 27.5'

BHLOGIA MB

WELL NO. B206589

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			<u>29.5-31.5' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYEY SANDSTONE: pale yellowish brown (10 YR 6/2) to dark yellowish orange (10 YR 6/6); streaks of light gray (N 7/0); oxide stained; sand (3.5-3.0 phi) to (3.0-2.5 phi); massive; homogeneous; non-plastic to low plasticity; moderately cemented; moderately weathered; moist. <u>31.5-33.5' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYEY SANDSTONE: same as above. <u>33.5-35.5' SAMPLE.</u> Recovered 2.0/2.0' = 100%. 33.5-34.5' CLAYEY SANDSTONE: same as above. 34.5-35.5' CLAYSTONE: light brown (5 YR 5/6); streaks of dark yellowish orange (10 YR 6/6); trace of fine-grained sand; low plasticity; medium hard; moderately consolidated; severely oxide stained; slightly moist. <u>35.5-37.5' SAMPLE.</u> Recovered 2.0/2.0' = 100%. CLAYSTONE: medium light gray (N 6/0) to medium gray (N 5/0); trace of very fine-grained sand; low plasticity; massive; homogeneous; slightly oxide stained; moderately consolidated; hard; slightly weathered; slightly moist.	<u>29.5'</u>: Readings in Auger: OVA: 35.0 HNu: 150

LF0688E

WELL NO. B206589

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: same as above; less iron-staining; slightly weathered to weathered. 39.5-41.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above. TOTAL DEPTH = 41.5'	
38				
39				
40				
42				
43				
44				
45				

LF0688F

LOG OF BOREHOLE

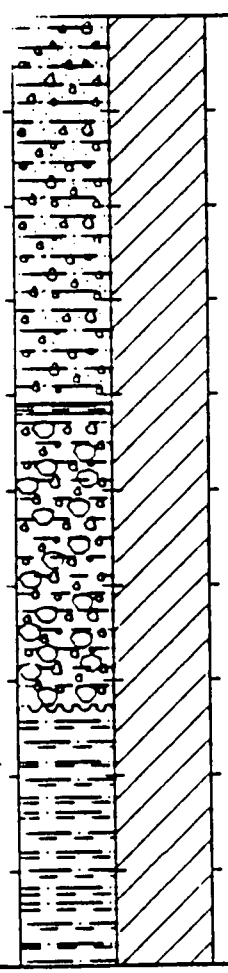
QA BY/DATE J.B. Burman / 11-18-89
LOCATION Rocky Flats Plant: Landfill Area
COORDINATES N39,605.08 E21,263.69 (RFP)
TOTAL DEPTH 21.7'

DRILLING COMPANY Boyles Brothers
DATE DRILLED April 28, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY E.M. Hill
GEOLOGIST

BORFHOLE/WELL NO. B206689
GROUND SURFACE ELEVATION 5959.31'
WATER LEVEL ENCOUNTERED None
STATIC 15.35' (09/19/89)
DRILLER K. Parker HELPER R. Orr
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
1 2 3 4 5			**TOPSOIL** 0.0-1.7' SAMPLE. Recovered 1.0/1.7' = 59%. SILT, SAND AND GRAVEL: grayish brown (5 YR 3/2); very fine to coarse-grained sand; fine to coarse gravel; subangular; granitic; very loose; humic; grass and roots; damp. 1.7-2.7' SAMPLE. Recovered 0.4/1.0' = 40%. 1.7-2.05': SILT, SAND AND GRAVEL: same as above. 2.05-2.10': SILTY CLAY: pale brown (5 YR 5/2); moderately plastic; soft; moist. 2.7-3.7' SAMPLE. Recovered 0.4/1.0' = 40%. GRAVEL, COBBLES AND CLAY: pinkish gray (5 YR 8/1); mottled with yellowish gray (5 Y 7/2); clay is plastic; high calcite content; sticky; silt; moist; soft. **ARAPAHOE/LARAMIE FORMATION** 3.7-5.7' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: light olive gray (5 Y 6/1); mottled with dark yellowish orange (10 YR 6/6); trace very fine to fine-grained sand; 1-2 mm lenses of caliche; highly weathered; very soft; moderately plastic; moist.	HNu Background: 0.0 OVA Background: 0.0 All readings on cuttings, core, breathing zone and in augers: 0.0; unless otherwise noted below. 1.7': Reading in Augers: OVA: 1.1 2.7': Reading in Augers: OVA: 0.4

LF06000A

WELL NO. B206689

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 10 11 12 13			5.7-7.7' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: brownish gray (5 YR 4/1); mottled with dark yellowish orange (10 YR 6/6); trace very fine to fine-grained sand; 1-40 mm lenses of caliche; blocky to fissile; highly weathered; very soft; moist. 7.7-9.7' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: light olive gray (5 Y 6/1); mottled with dark yellowish orange (10 YR 6/6); trace very fine to fine-grained sand; trace organics; few 1-2 mm caliche lenses; blocky; fractured; very soft; slightly moist. 9.7-11.7' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: same as above; few sandy silty claystone partings. 11.7-13.7' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: brownish gray (5 YR 4/1); mottled with light brownish gray (5 YR 6/1) and dark yellowish orange (10 YR 6/6); trace very fine to fine-grained sand; (< 1 mm) lignite partings; iron-filled fractures; blocky; highly weathered; very soft; damp.	9.7': Reading in Augers: OVA: 9.0

LF08888

WELL NO. B206689

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 17 18 19 20 21			13.7-15.7' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: brownish gray (5 YR 4/1); trace very fine to fine-grained sand; trace organics; few iron-filled fractures; trace calcite-filled fractures; soft; moderately weathered; blocky; moderately plastic; damp. 15.7-17.7' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: brownish gray (5 YR 4/1); trace very fine to fine-grained sand; occasional lignite partings; trace iron-stained fractures; blocky; moderately weathered; damp; soft. 17.7-19.7' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: same as above; blocky to fissile. 19.7-21.7' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: mottled light brownish gray (10 YR 6/1); brownish gray (10 YR 4/1); moderate yellowish brown (10 YR 5/4); trace very fine-grained sand; trace organics; blocky; moderately plastic; moderately weathered; soft; damp.	15.35'

WELL NO. B206689

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			TOTAL DEPTH = 21.7'	
22				
23				
24				
25				
26				
27				
28				
29				

UF08890

LOG OF BOREHOLE

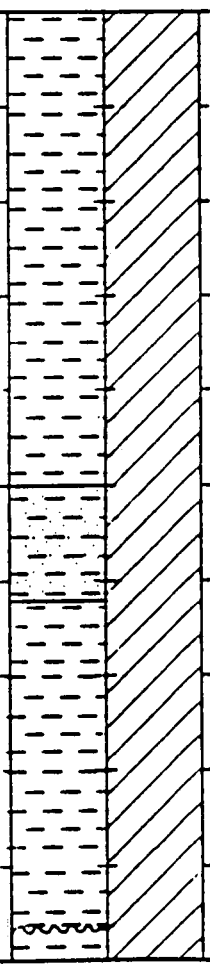
QA BY/DATE J.B. Burman / 11-18-89
LOCATION Rocky Flats Plant; Landfill Area
COORDINATES N39,836.16 E21,064.34 (RFP)
TOTAL DEPTH 30.0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED May 23, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY S.P. Carpenter
GEOLOGIST

BOREHOLE/WELL NO. B206789
GROUND SURFACE ELEVATION 5927.9'
WATER LEVEL ENCOUNTERED None
STATIC 11.08' (09/27/89)
DRILLER K. Parker HELPER A. Bodey
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			ARTIFICIAL FILL 0.0-2.0' SAMPLE. Recovered 1.5/2.0' = 75%. CLAY: moderate brown (5 YR 4/4); some fine to very coarse-grained sand; fill; poor sorting; angular to subangular; quartzites; non-stratified; uncemented; stiff; medium plastic; moist. 2.0-4.0' SAMPLE. Recovered 1.6/2.0 = 80%. 2.0-2.5':CLAY: dusty yellowish brown (10 YR 2/2); trace fine to coarse-grained sand; fill; poor sorting, subangular; quartzite; non-stratified; non-cemented; very stiff; medium plastic; moist. 2.5-3.1: SAND AND CLAY: dark yellowish orange (10 YR 6/6); trace gravel; medium to very coarse-grained sand; 1-4 cm gravel, poor sorting; subangular; granite-quartzite; non-stratified; weakly cemented, poor consolidation; medium dense; low plastic; moist. 3.1-3.6:CLAY: medium gray (N 5/0); trace sand to sandy at shoe; medium to very coarse-grained sand; fill; poor sorting; subangular; quartzose; slightly stratified; blocky; weakly cemented; high to medium plastic; abundant calcium carbonate; moist.	HNu Background: 0.0 OVA Background: 0.0 Explosimeter Background: 0.0 All readings on cuttings, in breathing zone, on core, and in augers: 0.0; unless otherwise noted below. TRIP BANK SAMPLE TB0523889B 0.0-3.0' SAMPLE LF0989BR0003 0.0-1.5' SAMPLE (VOAs only) LF0989BR0002 1.5-4.0': Reading in Auger: OVA: 10

LF0989A

WELL NO. B206789

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			4.0-6.0' SAMPLE. Recovered 1.9/2.0' = 95%. 4.0-4.8: CLAY: same as above with some gravel; fill.	4.0-5.9' SAMPLE (VOAs only) LF0989BR0406
6			ARAPAHOE/LARAMIE FORMATION 4.8-5.9:CLAYSTONE: medium gray (N 5/0) to dark yellowish orange (10 YR 6/6) color due to banding and marbling by iron oxide staining; non stratified; blocky; poorly cemented; medium hard; weathered; medium-high plastic; trace calcium carbonate; moist.	4.8-10.8' SAMPLE LF0989BR0511 LF0989BR0511D 5.9-6.0: Reading in Auger OVA: 10 4.8-8.0: Reading in Auger OVA: 5
7			6.0-8.0' SAMPLE. Recovered 2.0/2.0 = 100%. CLAYSTONE: light olive gray (5 Y 5/2) to dark yellowish orange (10 YR 6/6); some to trace very fine to fine-grained sand; rounded; well sorted, non stratified; blocky; weathered; medium hard to hard; medium high to high plastic; abundant iron oxide staining; moist.	8.0-10.0' SAMPLE (VOAs only) LF0989BR0810 LF0989BR0810D
8				10.8-16.8' SAMPLE LF0989BR1117 LF0989BR1117FB 12.0-14.0' SAMPLE (VOAs only) LF0989BR1214
10			8.0-10.0' SAMPLE. Recovered 2.0/2.0' = 100%. 8.0-8.3': SANDSTONE: dark yellowish orange (10 YR 6/6) to light gray (N 7/0); some clay; fine-grained sand; well sorted; rounded; non stratified; banded with iron oxide staining; slightly to poorly cemented; moderately to poorly consolidated; medium hard; weathered; low plastic; moist. 8.3-10.0': CLAYSTONE: olive gray (5 Y 4/1) banded dark yellowish orange (10 YR 6/6); trace silt; non stratified; homogeneous; blocky; well consolidated; weakly cemented; sightly weathered; medium to high plastic; iron oxide staining in part; moist.	
11			10.0-12.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; medium gray (N 5/0) and banded dark yellowish orange (10 YR 6/6)	11.08'
12			12.0-14.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; medium gray (N 5/0) to light olive brown (5 Y 4/4) with dark yellowish orange (10 YR 6/6) mottling.	
13				

LF0989B

WELL NO. B206789

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%. CLAYSTONE: same as above; medium gray (N 5/0) to light olive gray (5 Y 5/2) with occasional bands of iron oxide staining.	
14			16.0-18.0' SAMPLE Recovered 2.0/2.0' = 100%. CLAYSTONE:same as above; medium dark gray (N 4/0) with dark yellowish orange (10 YR 6/6); iron oxide staining.	16.0-18.0' SAMPLE (VOAs only) LF0989BR1618
15			18.0-20.0' SAMPLE. Recovered 2.0/2.0' = 100%. 18.0-18.4': CLAYSTONE: same as above 18.4-19.2': CLAYSTONE: dark yellowish orange (10 YR 6/6) to light brown (5 YR 5/6); very mottled; some fine to very fine-grained sand; non stratified; some platiness due to iron oxide cementation; well consolidated; hard; weathered; moist. 19.2-20.0': CLAYSTONE: same as 18.0-18.4'; light olive brown (5 Y 5/6) to medium gray (N 5/0)	
17			20.0-22.0' SAMPLE Recovered 2.0/2.0' = 100 %. CLAYSTONE: medium dark gray (N 4/0) to moderate olive brown (5 Y 4/4); banded coloring; trace of iron staining; non stratified; blocky; non cemented; well consolidated; high plastic; hard; slightly weathered; moist.	
18				
19				
20				
21				

LF0989C

WELL NO. B206789

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			22.0-24.0 SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; light olive gray (5 Y 5/2) to medium gray (N 5/0).	
22			24.0-26.0' SAMPLE. Recovered 2.0/2.0' = 100%. 24.0-25.6': CLAYSTONE: same as above; dark gray (N 4/0) 25.6-16.0': CLAYSTONE: same as above; light olive brown (5 Y 5/6) to dark gray (N 4/0); banded due to iron oxide staining.	
23			26.0-28.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; light olive brown (5 Y 5/6) grading to olive/black (5 Y 2/1).	
24				
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29				

UF08890

WELL NO. B206789

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			28.0-30.0' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above; light olive brown (5 Y 5/6) to medium dark gray (N 4/0).	
30			TOTAL DEPTH = 30.0'	
31				
33				
34				
35				
36				
37				

LF096BE

LOG OF BOREHOLE

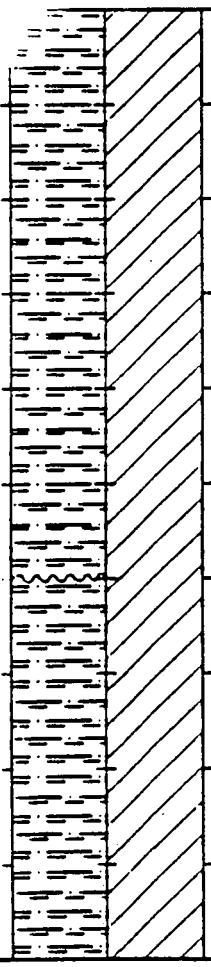
QA BY/DATE J. B. Burman 11-18-89
LOCATION Rocky Flats Plant: Landfill Area
COORDINATES N39,838.69 E21,684.46 (RFP)
TOTAL DEPTH 19.5'

DRILLING COMPANY Boyles Brothers
DATE DRILLED April 26 and 27, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY E.M. Hill
GEOLOGIST

BOREHOLE/WELL NO. B206889
GROUND SURFACE ELEVATION 5917.09'
WATER LEVEL ENCOUNTERED None
STATIC 14.79' (09/18/89)
DRILLER K. Parker HELPER R. Orr
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
1 2 3 4 5			COLLUVIUM 0.0-1.5' SAMPLE. Recovered 0.0/1.5' = 0%. Note: 2.5' cobble in shoe; no sample recovered. 1.5-3.5' SAMPLE. Recovered 2.0/2.0' = 100%. 1.5-3.0': SILTY CLAY: dark yellowish brown (10 YR 4/2); some very fine-to medium-grained subangular sand; fine roots; stiff damp. ARAPAHOE/LARAMIE FORMATION 3.0-3.5': SILTY CLAYSTONE: brownish gray (5 YR 4/1); laminated; frequent lignite layers, <1 mm; occasional calcite streaks; abundant iron-staining. 3.5-5.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: some very fine- to fine-grained sand at bottom of sample; blocky fractures; highly weathered; very soft; extensive iron-staining decreasing with depth; lignite layers, <1 m to 5 mm.	HNu Background: 0.0 OVA Background: 0.0 All readings on cuttings, on core, in breathing zone, and in augers: 0.0; unless otherwise noted below. 3.5': Readings in Auger: OVA: 0.6 3.5-5.5': Readings on Core: HNu: 0.2

LF1088A

WELL NO. B206889

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			5.5-7.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: some very fine-to fine-grained sand; angular; quartz; blocky fractures; highly weathered; very soft; occasional iron-stained fractures; few lignite layers (<1 mm).	5.5' Readings in Auger: HNU: 0.4 OVA: 6.0
6			7.5-9.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: brownish gray (5 YR 4/1); trace to some very fine- to fine-grained sand; laminated to no visible bedding; highly weathered; very soft; occasional iron-stained fractures; very few thin organic streaks; damp.	7.5-9.5': Readings on Core: OVA: 0.4 HNU: 0.2
7			9.5-11.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: brownish gray (5 YR 4/1); trace to some very fine to fine-grained sand; layer of extremely weathered sandstone; heavy iron-staining; continuous iron-filled fractures; blocky to laminated; moderately weathered; very soft; damp.	9.5': Readings in Auger: HNU: 105 OVA: 8.0
TOP OF GLACIAL			11.5-13.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: brownish gray (5 YR 4/1); trace very fine-grained sand; continuous iron-filled and very thin carbon-filled fractures; slightly weathered; soft.	
9				
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13				

U10898

WELL NO. B206889

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13 14 15 17 18 19 20 21			13.5-14.5' SAMPLE. Recovered 1.0/1.0' = 100%. SILTY CLAYSTONE: brownish gray (5 YR 4/1); trace very fine-grained sand; few continuous iron-filled fractures; moderately weathered; soft; damp. 14.5-16.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: brownish gray (5 YR 4/1); some very fine to fine-grained sand; 0.3' zone of laminated severely weathered sandier claystone; few continuous iron-filled fractures; moderately weathered; soft; damp. 16.5-18.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: trace to some very fine to fine-grained sand; grain size increasing with depth to sandy silty claystone; blocky; few iron-filled fractures; moderately weathered; grading to highly weathered with extensive fractures; iron-mottling; friable; trace organic spots in fractures; soft to very soft; damp. 18.5-19.5' SAMPLE. Recovered 1.0/1.0' = 100%. SILTY CLAYSTONE: brownish gray (5 YR 4/1); trace to some very fine to fine-grained sand; thin sand partings; top strongly weathered; fractured; friable; very soft grading to moderately weathered; blocky; few iron-filled and organic-filled fractures; soft; damp. TOTAL DEPTH = 19.5'	14.79'

LITOBBC

LOG OF BOREHOLE

QA BY/DATE J.B. Berman 11-18-89
LOCATION Rocky Flats Plant; Landfill Area
COORDINATES N40,160.69 E21,739.67 (RFP)
TOTAL DEPTH 23.6'

DRILLING COMPANY Boyles Brothers
DATE DRILLED April 19, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY R. T. Treat
GEOLOGIST

BOREHOLE/WELL NO. B206989
GROUND SURFACE ELEVATION 5882.42'
WATER LEVEL ENCOUNTERED None
STATIC 18.42' (09/18/89)
DRILLER K. Parker HELPER R. Orr
DRILLING FLUID None
CHECKED BY J.B. Berman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
1 2 3 4 5			**TOPSOIL** 0.0-1.6' SAMPLE. Recovered 1.5/1.6' = 94%. 0.0-0.8' CLAY: grayish brown (5 YR 3/2); some gravel (1.75 to 2.50 cm); subrounded and subangular; low plasticity; weakly cemented; poorly consolidated; abundant roots; moist. **VALLEY FILL ALLUVIUM** 0.0-1.5': CLAY: pale brown (5 YR 5/2) to pale yellowish brown (10 YR 6/2); some gravel; numerous roots; medium plasticity; weakly cemented; poorly consolidated; moist. 1.6-3.6' SAMPLE. Recovered 2.0/2.0' = 100%. CLAY: moderate brown (5 YR 3/4); some gravel to gravelly at bottom of sample; gravel (1.25 to 2.50 cm); subangular and subrounded; medium plasticity; moderately cemented; medium stiff; moist to very moist at 3.4 to 3.6'. 3.6-5.6' SAMPLE. Recovered 2.0/2.0' = 100%. CLAY: pale yellowish brown (10 YR 6/2) to pale brown (5 YR 5/2); some granitic and quartzite gravel; gravelly lense at 4.1' to 4.3'; (0.75 to 1.50 cm); subrounded; subangular; few scattered roots; slightly oxide-stained; medium plasticity; moderately cemented; moderately consolidated; moist.	HNu Background: 0.0 OVA Background: 0.0 All readings on cuttings, on core, in augers, and in breathing zone: 0.0; unless otherwise noted below.

LT1188A

WELL NO. B206989

LOG OF BOREHOLE

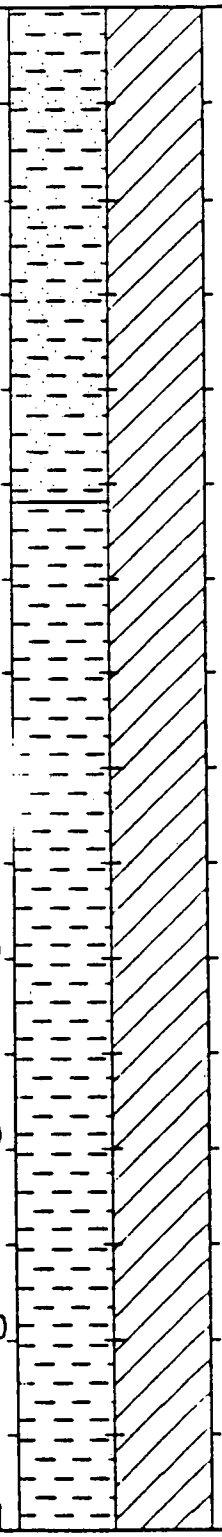
DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			5.6-7.6' SAMPLE. Recovered 2.0/2.0' = 100%. 5.6-6.0': SANDY CLAY: same as above; fine-grained sand.	8.6' Reading in Auger: HNu: 0.4
			ARAPAHOE/LARAMIE FORMATION	
6			6.0-7.6': SANDY CLAYSTONE: pale yellowish brown (10 YR 6/2); light brown (5 YR 5/6); fine-grained sand (3/0-2.5 phi); weakly cemented; low plasticity; lignite pockets; massive; homogeneous; medium hard; oxide stained; weathered; slightly moist.	
7			7.6-9.6' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: same as above.	
			9.6-11.6' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: same as above.	
8			11.6-13.6' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: same as above.	
			13.6-15.6' SAMPLE. Recovered 1.8/2.0' = 90%. SANDY CLAYSTONE: pale yellowish brown (10 YR 6/2) to grayish orange pink (5 YR 7/2) and pale brown (5 YR 5/2); fine-grained sand (3.5-2.5 phi); well sorted; low plasticity; weakly cemented; massive; homogeneous; poorly consolidated; medium hard; weathered; slightly moist.	15.6' Reading in Auger: HNu: 0.5
10				
11				
12				
13				

LF11898

WELL NO. B206989

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
13			15.6-17.6' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: medium light gray (N 6/0); massive; homogeneous; moderately cemented; medium hard to hard; medium plasticity; occasional thin oxide streaks or strings; blocky; slightly weathered; slightly moist.	
14			17.6-19.6' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same above.	
15			19.6-21.6' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above.	
16				
18				18.42'
19				
20				
21				



LF1188C

WELL NO. B206989

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21			21.6-23.6' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: same as above. TOTAL DEPTH = 23.6'	
22				
23				
24				
26				
27				
28				
29				

LF1189D

LOG OF BOREHOLE

QA BY/DATE Farrell Bergman /11-18-89
LOCATION Rocky Flats Plant; Landfill Area
COORDINATES N40,118.58 E21,741.54 (RFP)
TOTAL DEPTH 60.0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED April 21 and 24, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY R.T. Treat
GEOLOGIST

BOREHOLE/WELL NO. B207089
GROUND SURFACE ELEVATION 5883.07'
WATER LEVEL ENCOUNTERED 50.0'
STATIC 20.82' (09/07/89)
DRILLER K. Parker HELPER R. Orr
DRILLING FLUID None
CHECKED BY J. S. Bergman
SITE MANAGER

CEARP MANAGER

COMMENTS

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			TOPSOIL 0.0-1.5' SAMPLE. Recovered 1.5/1.5' = 100%. 0.0-0.5': CLAY: grayish brown (5 YR 3/2); some gravel; weakly cemented; poorly consolidated; low plasticity; abundant roots; slightly moist.	HNu Background: 0.0 OVA Background: 0.0 All readings on cuttings, on core, in breathing zone and augers: 0.0; unless otherwise noted below.
2			VALLEY FILL ALLUVIUM 0.5-1.5': CLAY: dusky brown (5 YR 2/2) to moderate brown (5 YR 4/4); some gravel; (0.50 to 2.50 cm); angular and subangular; granitic and quartzite; medium plasticity; weakly cemented; moderately consolidated; stiff; moist.	
3			1.5-3.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAY: moderate yellowish brown (10 YR 5/4) to light brown (5 YR 5/6); trace fine-grained sand; calcareous pockets; trace gravel; medium plasticity; moderately consolidated; moderately cemented; stiff; few roots; slightly moist.	3.5' Readings in Auger: HNu: 0.8; OVA: 2.0
4			3.5-5.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAY: moderate brown (5 YR 4/4) to light brown (5 YR 5/6) to moderate yellowish brown (10 YR 5/4); some fine-grained sand (3.0-2.5 phi); low plasticity; moderately cemented; moderately consolidated; lignite blotches; calcareous streaks; stiff; slightly moist.	5.5' Readings in Auger: HNu: 1.4; OVA: 12.0
5				

LF1289A

WELL NO. B207089

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5			5.5-7.5' SAMPLE. Recovered 2.0/2.0' = 100%. 5.5-6.0': SANDY CLAY: same as above.	7.5' Readings in Auger: HNu: 1.0; OVA: 10
6			ARAPAHOE/LARAMIE FORMATION 6.0-7.5': CLAYSTONE: pale yellowish brown (10 YR 6/2); light brown (5 YR 6/4); pale brown (5 YR 5/2); some fine-grained sand (3.0-2.5 phi); low plasticity; moderately cemented to weakly cemented; medium hard; lignite strings and blotches; weathered; slightly moist.	
7			7.5-9.5' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: same as above; more sand.	9.5' Readings in Auger: HNu: 5.0; OVA: 48.0
8			9.5-11.5' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: pale yellowish brown (10 YR 6/2) and pale brown (5 YR 5/2); some streaks light brown (5 YR 5/6); fine-grained sand (3.0-2.5 phi); weakly cemented; poorly consolidated; some oxide stained streaks; massive; homogeneous; weathered; slightly moist.	9.5' Readings in Breathing Zone: HNu: 2.2; OVA: 6.0
10			11.5-13.5' SAMPLE. Recovered 2.0/2.0' = 100%. CLAYSTONE: light gray (N 7/0) to medium light gray (N 6/0); some fine-grained sand (3.5-3.0 phi); low plasticity; massive; homogeneous; hard; moderately consolidated; slightly weathered; slightly moist.	
11				
12				
13				

U71289B

WELL NO. B207089

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 above. 15.5-17.5' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: pale yellowish brown (10 YR 6/2) to medium light gray (N 6/0); medium plasticity; moderately cemented; medium hard; slightly weathered--thin streaks or blotches; slightly moist. 17.5-19.5' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: same as above; damp. 19.5-21.5' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: same as above; less sand.	
14				
15				
17				
18				
19				
20				20.82'
21				

UF1288C

WELL NO. B207089

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
21 22 23 25 26 27 28 29			21.5-23.5' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: pale yellowish brown (10 YR 6/2); pale brown (5 YR 5/2) to medium light gray (N 6/0); fine- (4.0-3.5 phi) to very fine-grained sand (3.5-3.0 phi); low plasticity; weakly to moderately cemented; poorly consolidated; hard; massive; homogeneous; blocky in lenses; weathered; damp. 23.5-25.5' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: same as above; moderate brown (5 YR 3/4) to pale brown (5 YR 5/2); less sand; moderately oxide stained. 25.5-27.5' SAMPLE. Recovered 2.0/2.0 = 100%. SANDY CLAYSTONE: same as above; less oxide staining. 27.5-29.5' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: same as above; medium light gray (N 6/0); moderately cemented; well consolidated; low to medium plasticity; slightly damp.	

U12890

WELL NO. B207089

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29 30 31 33 34 35 36 37			29.5-31.5' SAMPLE. Recovered 2.0/2.0' = 100%. SANDY CLAYSTONE: medium dark gray (N 4/0) to medium light gray (N 6/0); fine-grained sand (3.5-3.0 phi); low plasticity; hard; moderately cemented; well consolidated; blocky; massive; homogeneous; unweathered; dry. 31.5-33.5' SAMPLE. Recovered 1.2/2.0' = 60%. SILTSTONE AND SANDSTONE: medium dark (N 4/0) to medium light gray (N 6/0); fine-grained sand (4.0-3.5 phi); moderately cemented; non-plastic; weakly consolidated; hard; massive; slightly damp. 33.5-35.5' SAMPLE. Recovered 1.0/2.0' = 50%. SILTSTONE AND SANDSTONE: same as above. 35.5-37.5' SAMPLE. Recovered 1.5/2.0' = 75%. SILTSTONE AND SANDSTONE: medium dark gray (N 4/0) to medium light gray (N 6/0); very fine grained-sand (4.0-3.5 phi) with thin clean sandstone streaks (0.3 cm); non-plastic; moderately cemented; hard; massive; well consolidated; dry.	

LF1289E

WELL NO. B207089

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			37.5-38.5' SAMPLE. Recovered 1.0/1.0' = 100%. SANDSTONE AND SILTSTONE: same as above; more sand (approximately 60%) with approximately 40% fines; slightly damp.	
38			38.5-39.5' SAMPLE. Recovered 0.0/1.0' = 0%.	
			39.5-41.5' SAMPLE. Recovered 0.0/2.0' = 0%.	
			41.5-42.5' SAMPLE. Recovered 0.0/1.0' = 0%.	
39			42.5-43.5' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY SILTSTONE: medium gray (N 5/0) to medium dark gray (N 4/0); very fine-grained sand (3.0-4.0 phi); massive; homogeneous; very hard; moderately cemented; moderately consolidated; unweathered; slightly damp.	
40			43.5-45.0' SAMPLE. Recovered 1.5/1.5' = 100%. SANDY SILTSTONE: same as above; thin lenses sandstone; more lignite strings and pockets; slightly damp.	
			45.0-46.0' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY SILTSTONE: same as above.	
42				
43				
44				
45				

LF1289F

WELL NO. B207089

LOG OF BOREHOLE

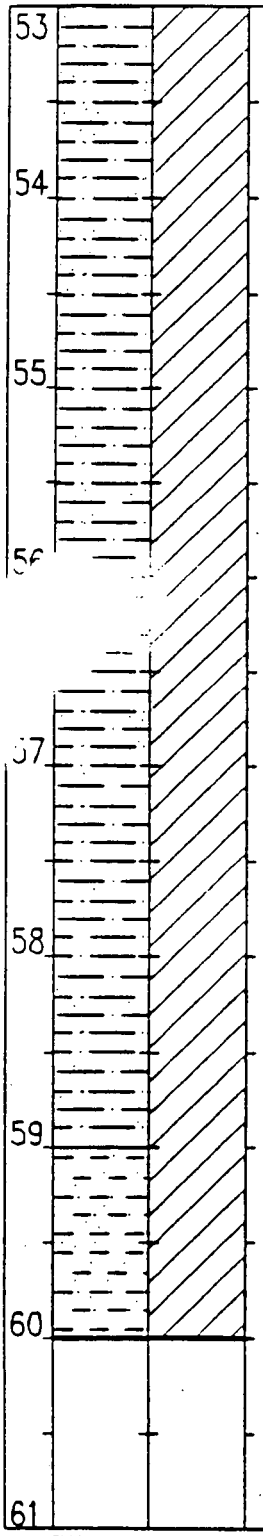
DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			46.0-47.0 SAMPLE. Recovered 1.0/1.0' = 100%. SANDY SILTSTONE: same as above.	
46			47.0-48.0' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY SILTSTONE: same as above.	47.0' Reading in Auger: HNU: 0.0; OVA: 2.0 ppm
			48.0-49.0' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY SILTSTONE: same as above; more very fine-grained sand.	
47			Note: 49.0-49.5': Drilled with center bit. No sample recovery.	
			49.5-51.5' SAMPLE. Recovered 2.0/2.0' = 100%. SANDSTONE AND SILTSTONE: dark gray (N 3/0) to grayish black (N 2/0); fine-grained sand (3.0-3.5 phi); massive; lignite pockets; homogeneous; low to non-plasticity; weakly consolidated; medium hard; moist to wet lense at 50'; saturated for less than 0.1'	
48			51.5-52.5' SAMPLE. Recovered 1.0/1.0' = 100%. SILTSTONE AND SANDSTONE: same as above; more silt; slightly moist.	
			52.5-53.5' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY SILTSTONE: same as above; less sand; damp.	
50				50.0'
51				
52				
53				

LF1288G

WELL NO. B207089

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
53			53.5-54.5' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY SILTSTONE: same as above; slightly damp.	
54			54.5-55.5' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY SILTSTONE: dark gray (N 3/0) to grayish black (N 2/0); fine-grained sand; massive; hard lenses; lignite strings and pockets; weakly consolidated; moderately cemented; damp.	
55			55.5-56.5' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY SILTSTONE: same as above.	
56			56.5-57.5' SAMPLE. Recovered 1.0/1.0' 100%. SANDY SILTSTONE: same as above.	
57			57.5-58.5' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY SILTSTONE: same as above;	
58			58.5-59.0' SAMPLE. Recovered 0.5/0.5' = 100%. SANDY SILTSTONE: same as above; more clay.	
59			59.0-60.0' SAMPLE. Recovered 1.0/1.0' = 100%. SANDY CLAYSTONE: dark gray (N 3/0); grayish black (N 2/0); blocky; medium plasticity; medium hard; homogeneous; massive; fine-grained sand; damp.	
60			TOTAL DEPTH = 60.0'	
61				



LOG OF BOREHOLE

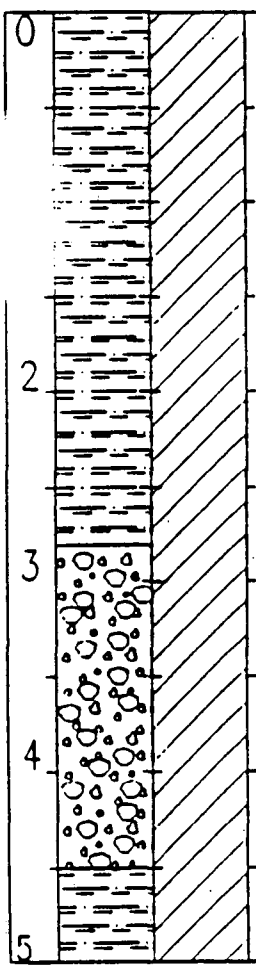
QA BY/DATE James O Burman / 11-18-89
LOCATION Rocky Flats Plant; Landfill Area
COORDINATES N40,107.10 E21,741.74 (RFP)
TOTAL DEPTH 259.0'

DRILLING COMPANY Boyles Brothers
DATE DRILLED June 7-13,1989
DRILLING METHOD Hollow Stem Auger 0.0-28.0; Rotary Core 28.0-259.0'
LOGGED BY E.M. Hill; H.G. Bienkowski
GEOLOGIST

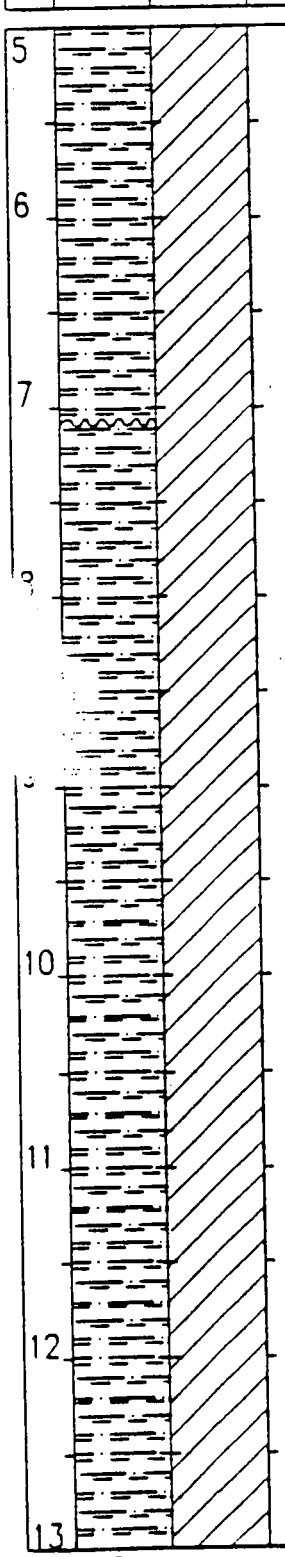
BOREHOLE/WELL NO. B207189
GROUND SURFACE ELEVATION 5884.8'
WATER LEVEL ENCOUNTERED None
STATIC 31.43' (09/08/89)
DRILLER P. Mesa; P. Bushkovski HELPER R. Orr; H. McCree
DRILLING FLUID 0.0-28.0' none; 28.0-259.0' water
CHECKED BY J.B. Burman
SITE MANAGER

CEARP MANAGER

COMMENTS Surface casing set at 28 feet below ground surface on 4/25/89 by E.M. Hill.

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
0			TOPSOIL 0.0-1.5' SAMPLE. Recovered 1.5/1.5' = 100%. 0.0-0.6': CLAYEY SILT: dusky brown (5 YR 2/2); trace fine to coarse angular gravel; firm; unconsolidated; 1 mm fleck of clayey material--dusky blue (5 PB 3/2); damp.	HNU Background: 0.0; OVA Background: 0.0; All readings on cuttings, core, in breathing zone and in augers: 0.0; unless otherwise noted.
2			COLLUVIUM 0.6-1.5': CLAYEY SILT: dusky yellowish brown (10 YR 2/2); trace fine to coarse angular quartz and granite gravel; stiff; no bedding; massive; abundant fine roots; damp.	
3			1.5-3.5' SAMPLE. Recovered 2.0/2.0' = 100%. 1.5-2.8': SILTY CLAY: dusky yellowish brown (10 YR 2/2); some angular or granitic fine to coarse gravel; cobbles; mottled; stiff; damp. 2.8-3.5': GRAVEL AND COBBLES: granitic; medium- to very coarse-grained; angular; dry; 0.2' layer of very stiff silty clay--damp.	3.5': Reading in Auger: OVA: 2.0
4			Note: 3.5-4.5': Drilled with center bit. No sample recovered. 4.5-5.5' SAMPLE. Recovered 0.4/1.0' = 40%. SILTY CLAY: light olive gray (5 Y 5/2); some fine to coarse subangular to angular gravel; granitic; highly mottled with orange; 1-2 mm black flecks, spots; firm; moderately plastic; moist.	
5				

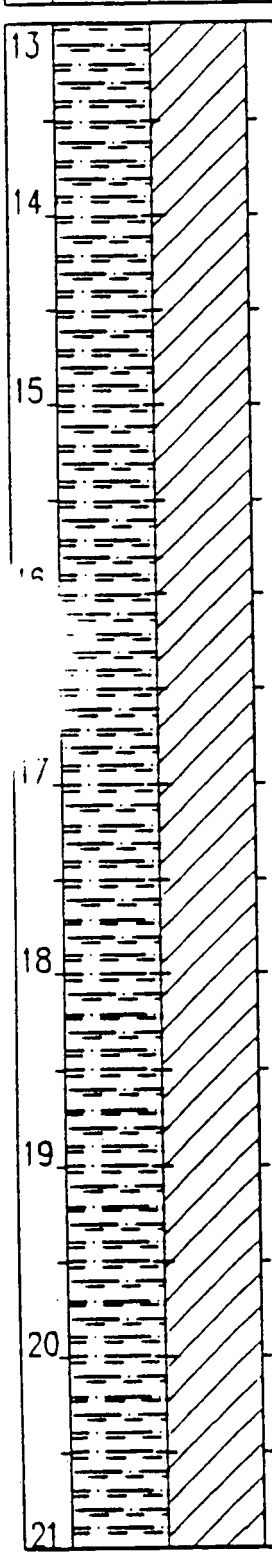
LF1388A

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%. SILTY CLAY AND CLAY: moderate yellowish brown (10 YR 5/4); medium gray (N 5/0); trace very fine-grained sand; calcareous streaks; thin carbonaceous streaks; stiff; moderately to highly plastic; laminated; damp. ARAPAHOE/LARAMIE FORMATION 7.1-7.5': SILTY CLAYSTONE AND CLAYSTONE: moderate yellowish brown (10 YR 5/4); medium gray (N 5/0); trace very fine-grained sand--increasing with depth; frequent <0.5 mm lignite layers; very soft; extremely weathered; laminated; heavy iron-staining. 7.5-9.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE TO SANDY SILTY CLAYSTONE: dark yellowish brown (10 YR 4/2); trace to some very fine- to fine-grained subangular sand; fining upward; orange iron streaks; frequent lignite streaks; calcareous pods and streaks; extremely weathered; damp. 9.5-11.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: some very fine- to fine-grained sand; heavy iron-staining; very thin lignite laminations; stiff; moderately plastic; clay layers; very soft; highly weathered; damp to moist. 11.5-13.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: brownish gray (5 YR 4/1); trace very fine-grained sand; soft; slightly weathered; blocky; few fractures throughout; iron and gypsum filled; damp.	

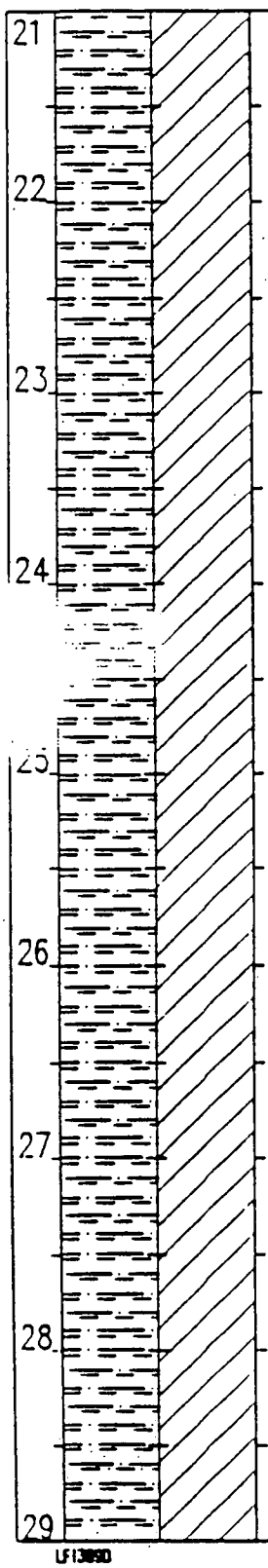
U13888

WELL NO. B207189

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			13.5-15.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: same as above; trace very fine-grained sand. 15.5-17.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: brownish gray (5 YR 4/1); trace very fine-grained sand; soft; slightly weathered; blocky; more frequent fractures; iron-filled; zone of silty clay; some sand; laminated; highly weathered; trace organic flecks; damp. 17.5-19.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: same as above; trace very fine- to fine-grained sand; moderately to slightly weathered; increasing to some sand at 19-19.5'. 19.5-21.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: dark yellowish brown (10 YR 4/2); trace to some very fine-grained sand; angular; laminated to lenticular; highly weathered; crumbly; iron-staining in streaks; damp.	19.5-21.5': Reading on Core: HNu: 2.2

LF138C

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%. SILTY CLAYSTONE: light brownish gray (10 YR 6/1) to pale yellowish brown (10 YR 6/2); trace very fine- to fine-grained sand; angular; blocky to laminated; iron-stained fractures; very soft; some mottling; damp. 23.5-25.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: brownish gray (5 YR 4/1); some very fine- to fine-grained sand; blocky; iron-filled fractures; trace 1 mm lignite streaks; slightly weathered; soft; damp. 25.5-27.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: dark yellowish brown (10 YR 4/2); trace very fine-grained sand; abundant fractures with iron-staining; moderately weathered; blocky; crumbly; soft; damp. 27.5-29.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE TO SANDY SILTY CLAYSTONE: same as above; medium dark gray (N 4/0); trace fine sand; grading to medium gray (N 5/0); slightly weathered; soft; few iron-filled fractures; slightly damp.	21.5-23.5' Reading on Core: OVA: 0.2

LF1309D

WELL NO. B207189

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
29			29.0-33.0' SAMPLE. Recovered 3.1/4.0' = 78%. RQD 2.6/3/1' = 84%. 29.0-30.3': CLAYSTONE: dark yellowish brown (10 YR 4/2); homogeneous; firm to moderately hard; no reaction to HCl; damp. 30.3-32.6': CLAYEY SILTSTONE: medium dark gray (N 4/0); homogeneous except for an organic rich claystone 31.65-31.9'; trace very fine-grained sand; moist.	
30				
31			33.0-36.0' SAMPLE. Recovered 4.1/3.0' = 137%. RQD 3.55/4.1' = 87%. 32.1-33.4': CLAYSTONE; olive gray (5 YR 4/1) and mottled; homogeneous; trace medium nodules; soft; plastic; no reaction to HCl; damp. 33.4-36.0': SILTSTONE: medium dark gray (N 4/0); homogeneous; trace very fine-grained sand; trace clay; no reaction to HCl; damp.	▼ 31.43'
32			36.0-37.0 SAMPLE. Recovered 1.1/1.0' = 110%. RQD 0.75/1.1' = 68%. CLAYEY SILTSTONE: medium dark gray (N 4/0); trace very fine-grained sand; firm to hard; no reaction to HCl; damp.	
33				
34				
35				
36				
37				

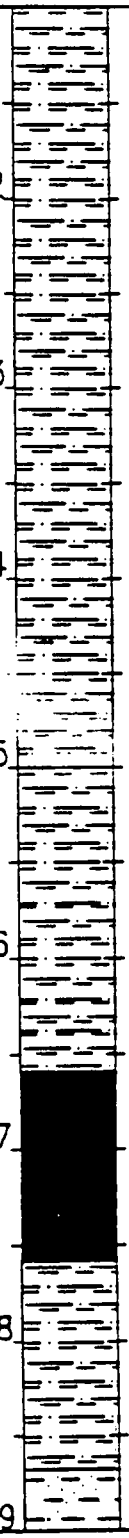
DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37			37.0-39.0' SAMPLE. Recovered 1.5/2.0' = 75%. RQD 0.8/1.5' = 53%. CLAYEY SILTSTONE: brownish gray (5 YR 4/1); to medium dark gray (N 4/0); homogeneous; trace very fine-grained sand; firm; no reaction to HCL; damp.	
38			39.0-43.0' SAMPLE. Recovered 3.9/4.0' = 98%. RQD 3.6/3.9' = 92%. SILTY CLAYSTONE: dark gray (N 3/0) to medium dark gray (N 4/0); homogeneous, trace very fine-grained sand; moderately hard to hard; no reaction to HCl; damp.	
39			43.0-47.0 SAMPLE. Recovered 1.4/4.0' = 35%. RQD 1.25/1.4' = 89%. CLAYEY SILTSTONE: dark gray (N 3/0) to medium dark gray (N 4/0); homogeneous; organic rich laminae at 44.3-44.4'; to trace very fine-grained sand; hard; no reaction to HCl; damp.	
41				
42				
43				
44				
45				

WELL NO. B207189

LOG OF BOREHOLE

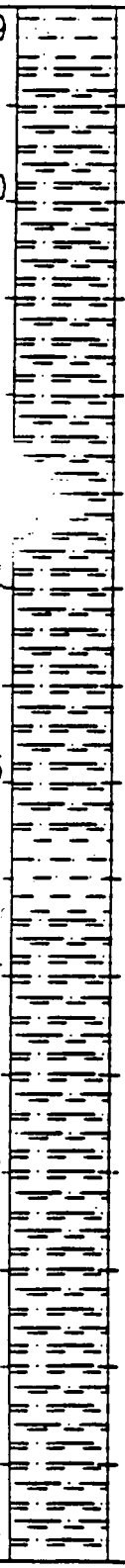
DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
45			47.0-49.0 SAMPLE. Recovered 4.6/2.0' = 230%. RQD 4.6/4.6' = 100%. CLAYEY SILTSTONE: dark gray (N 3/0) to brownish gray (5 YR 4/1); laminated; trace lignite stringers; trace to occasionally some very fine- to fine-grained sand; hard; no reaction to HCl; damp.	
46			49.0-53.0' SAMPLE. Recovered 4.0/4.0' = 100%. RQD 4.0/4.0' = 100%. CLAYEY SILTSTONE: dark gray (N 3/0) to brownish gray (5 YR 4/1); laminated; trace lignite stringers; trace to occasionally some very fine- to fine-grained sand; hard; no reaction to HCl; damp.	
47				
48				
50				
51				
52				
53				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
53			53.0-57.0 SAMPLE. Recovered 4.1/4.0' = 103%. RQD 2.9/4.1' = 71%. SILTY CLAY: dark gray (N 3/0); laminated; organic rich; some lignite stringers; trace very fine-grained sand; moderately hard; no reaction to HCl; damp.	
54			57.0-61.0 SAMPLE. Recovered 4.3/4.0' = 108%. RQD 4.3/4.3' = 100%. CLAYEY SILTSTONE: dark gray (N 3/0); laminated; organic rich in part; trace lignite stringers; trace very fine-grained sand; moderately hard to firm; no reaction to HCl; damp.	
55				
56				
58				
59				
60				
61				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
61			61.0-65.0 SAMPLE. Recovered 4.0/4.0' = 100%. RQD 3.5/4.0' = 88%. CLAYEY SILTSTONE: dark gray (N 3/0) to medium dark gray (N 4/0); laminated; organic rich above 61.5' with trace lignite stringers; moderately hard; no reaction to HCl; damp. 65.0-69.0 SAMPLE. Recovered 4.5/4.0' = 113%. RQD 4.3/4.5' = 96%. 65.0-66.6': SILTY CLAYSTONE: dark gray (N 3/0) to medium dark gray (N 4/0); laminated; organic rich; firm; no reaction to HCl; damp. 66.6-67.6': LIGNITE: brownish black (5 YR 4/1) to brownish gray (5 YR 2/1); fissile; firm; no reaction to HCl; damp. 67.6-68.7': SILTY CLAYSTONE: medium dark gray (N 4/0); organics decreasing with depth; hard; no reaction to HCl; damp. 68.7-69.0': SANDY CLAYSTONE: medium dark gray (N 4/0); homogeneous; very fine-grained, subrounded, well sorted sand; firm; damp.	
62				
63				
64				
65				
66				
67				
68				
69				

WELL NO. B207189

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
69 70 TOP OF SCREEN 71 72 73 74 75 BOTTOM OF SCREEN 76 77			<u>69.0-73.0' SAMPLE.</u> Recovered 4.0/4.0' = 100%. RQD 3.3/4.0' = 83%. 69.0-69.3': CLAYEY SANDSTONE: medium dark gray (N 4/0); very fine- to fine-grained; subrounded; well sorted; damp. 69.3-73.0': CLAYEY SILTSTONE: laminated; organic rich with lignite bed; 69.2-69.4; silty, very fine-grained sandstone bed 72.0-72.2; damp. <u>73.0-77.0 SAMPLE.</u> Recovered 2.5/4.0' = 63%. RQD 1.3/2.5' = 52%. 73.0-73.3': CLAYEY SILTSTONE: medium dark gray (N 4/0); laminated; waxy; hard; damp. 73.3-73.6': CLAYEY SANDSTONE: medium dark gray (N 4/0); very fine- to fine-grained; subrounded; well sorted; firm; no reaction to HCl, damp. 73.6-75.5': CLAYEY SILTSTONE: dark gray (N 4/0); fissile; organic rich; damp.	<u>70.98-75.43'</u>: Geotechnical sample (Hydrometer Analysis) LF13898R7075. 16% Sand 44% Silt 40% Clay

LF13891

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
77			77.0-80.0 SAMPLE. Recovered 4.0/3.0' = 133%. RQD 3.8/4.0' = 95%. 77.0-78.0': SILTY CLAYSTONE: dark gray (N 4/0); laminated; trace very fine-grained sand; firm; no reaction to HCl; moist. 78.0-80.0': CLAYEY SANDSTONE: dark gray (N 3/0) to medium dark gray (N 4/0); laminated; trace very fine-grained sand; moderately hard to firm, no reaction to HCl; moist.	
78				
79			80.0-83.0 SAMPLE. Recovered 4.5/3.0' = 150%. RQD 3.8/4.5' = 84%. 80.0-81.4': SILTY CLAYSTONE: brownish black (5 YR 2/1) to dark gray (N 3/0); laminated; organic rich with uppermost 0.5' lignite; organics decreasing downward, firm to moderately hard; no reaction to HCl; damp. 81.4-83.0': CLAYEY SILTSTONE: medium dark gray (N 4/0); homogeneous; breaks with concoidal fractures; hard to very hard; no reaction to HCl; damp.	
80				
			83.0-87.0 SAMPLE. Recovered 3.9/4.0' = 98%. RQD 3.7/3.9' = 95%. 83.0-85.1': CLAYEY SILTSTONE: medium dark gray (N 4/0); laminated; firm no reaction to HCl, damp. 84.1-86.9': SILTY SANDSTONE: dark gray (N 3/0) to brownish gray (5 YR 4/1); crossbedded; trace organics along crossbeds; very fine-grained; subrounded; well sorted; well consolidated (hard to very hard); no reaction to HCl; damp.	
82				
83				
84				
85				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
85			87.0-91.0 SAMPLE. Recovered 3.0/4.0' = 98%. RQD 1.7/3.9' = 44%. 87.0-89.0': SANDY SILTSTONE: medium dark gray (N 4/0); laminated; some silty sandstone stringers; some organic rich siltstone stringers; some clay; moderately hard; no reaction to HCl; damp. 89.9-90.9': SILTY CLAYEY SANDSTONE: medium dark gray (N 4/0) to brownish gray; (5 YR 4/1); laminated; very fine-grained; subrounded; well sorted; well consolidated (moderately hard to hard); no reaction to HCl; damp.	
86				
87			91.0-94.0 SAMPLE. Recovered 2.9/3.0' = 97%. RQD 2.4/2.9' = 83%. SILTY SANDSTONE: dark gray (N 3/0) to brownish gray (5 YR 4/1); laminated; poorly sorted, very fine-grained, silty, subrounded sands and moderately well sorted fine-grained, subrounded sands; trace organic rich sandstone; trace clayey sandstones; well consolidated; no reaction to HCl, damp.	
88				
90				
91				
92				
93				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
93				
94			94.0-98.0 SAMPLE. Recovered 3.8/4.0' = 95%. RQD 3.8/3.8' = 100%. 94.0-97.5': SILTY SANDSTONE; medium dark gray (N 4/0) to brownish grey (5 YR 4/1); very fine- to fine-grained; subrounded; moderately well sorted; trace lignite stringers; well consolidated; no reaction to HCl, damp. 97.5-97.8': LIGNITE: brownish black (5 YR 2/1); laminated; subfissile; no reaction to HCl; damp.	
95			98.0-102.0 SAMPLE. Recovered 4.1/4.0' = 103%. RQD 3.9/4.1' = 95%. 98.0-101.7': SILTY SANDSTONE: medium dark gray (N 4/0) to olive gray (5 Y 4/1); laminated; very fine- to fine-grained (fining downward); some sandstone clasts (rounded, medium pebbles); moderately well sorted; well consolidated; no reaction to HCl; damp. 101.7-102.0': CLAYEY SILTY SANDSTONE: alternating bands of medium gray (N 5/0) and dark gray (N 3/0); crossbedded; very fine-grained; well sorted; firm; damp.	
96				
97				
98				
99				
100				
101				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
101				
			102.0-106.0' SAMPLE. Recovered 3.5/3.5' = 100%. RQD 2.4/3.5' = 69%. CLAYEY SILTY SANDSTONE: alternating bands of medium gray (N 5/0) and dark gray (N 3/0); crossbedded; very fine- to fine-grained, well sorted; friable becoming well consolidated below 104.6'; no reaction to HCl; damp.	
102				
			106.0-110.0 SAMPLE. Recovered 4.0/4.0' = 100%. RQD 3.1/4.0' = 78%. 106.0-108.4': SILTY SANDSTONE: medium dark gray (N 4/0); faintly laminated; very fine- to fine-grained; moderately well sorted; rounded; well consolidated; no reaction to HCl; damp. 108.4-110.0': CLAYSTONE: dark gray (N 3/0) to brownish black (5 YR 2/1); homogeneous to subfissile; becoming organic rich at 109.1'; damp.	
103				
105				
106				
107				
108				
109				

LF1388n

WELL NO. B207189

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
109				
			110.0-114.0 SAMPLE. Recovered 4.3/4.0' = 110%. RQD 3.7/4.3' = 90% SILTY CLAYSTONE: dark gray (N 3/0) to brownish black (5 YR 2/1); subfissile; some very fine-grained sand in part; firm; no reaction to HCl; moist.	
110				
			114.0-118.0 SAMPLE. Recovered 3.8/4.0' = 95%. RQD 0.9/3.8' = 24%. SILTY CLAYSTONE: same as above.	
111				
112				
114				
115				
116				
117				

LF13896

WELL NO. B207189

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
117				
			118.0-122.0 SAMPLE. Recovered 3.8/4.0' = 95%. RQD 1.5/3.8' = 39%. 118.0-121.3': SILTY CLAYSTONE: same as above except for sandy claystone layer (118.5 to 118.7') with olive gray color (5 Y 4/1). 121.3-121.8 SILTY SANDSTONE: pale brown (5 YR 5/2); homogeneous; very fine- to fine-grained; moderately well sorted; subangular to subrounded; well consolidated; no reaction to HCl; damp.	
118				
			122.0-126.0 SAMPLE. Recovered 4.0/4.0' = 100%. RQD 3.8/4.0' = 95%. CLAYSTONE: dark gray (N 3/0); subfissle above 125.2'; homogeneous; waxy; very fine- to fine-grained; poorly sorted sandstone stringer at 123.1 to 123.2 and 125.1' depth, no reaction to HCl; moist.	
119				
120				
121				
122				
123				
124				
125				

LF1389

WELL NO. B207189

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
125				
			126.0-130.0 SAMPLE. Recovered 2.3/4.0' = 58%. RQD 1.8/2.3' = 78%. CLAYEY SILTSTONE: medium dark gray (N 4/0); homogeneous; some disseminated very fine-grained sand; moderately hard to hard; no reaction to HCl; damp.	
126				
			130.0-133.0 SAMPLE. Recovered 4.0/3.0' = 133%. RQD 2.9/4.0' = 73%. SILTY CLAYSTONE: brownish black (5 YR 2/1) to olive black (5 Y 2/1); subfissle to fissle; organic rich grading into clayey lignite at 129.9-130.3' trace very fine-grained sand in part; firm to moderately hard; no reaction to HCl; moist.	
127				
128				
130				
131				
132				
133				

LF1389

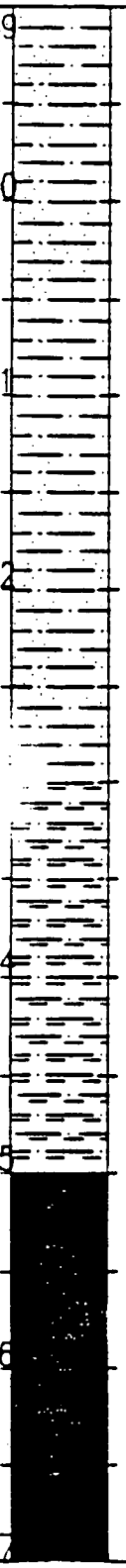
DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
133			133.0-137.0 SAMPLE. Recovered 4.1/4.0' = 103%. RQD 3.5/4.1' = 85%. 133.0-133.9'; SILTY CLAYSTONE: same as above except no lignite. 133.9-137.0': SANDY SILTSTONE: medium dark gray (N 4/0) to medium gray (N 4/0); homogeneous; disseminated very fine-grained sand; some clay above 135.1; interbedded very fine-grained sandstone below 136.5; moderately hard to hard; no reaction to HCl;damp.	
134				
135			137.0-141.0 SAMPLE. Recovered 4.2/4.0' = 105%. RQD 2.8/4.2' = 67%. 137.0-139.0': SILTY CLAYSTONE: medium dark gray (N 4/0) to dark gray (N 3/0); waxy; trace disseminated very fine-grained sand; firm; no reaction to HCl; damp. 139.0-141.0': SANDY CLAYEY SILTSTONE: medium dark gray (N 4/0) to dark gray (N 3/0); finely interbedded; some very fine-grained sandstone interbeds; moderately hard; no reaction to HCl; damp.	
136				
137				
138				
139				
140				
141				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
141			141.0-145.0 SAMPLE. Recovered 4.0/4.0' = 100%. RQD 3.5/4.0' = 88%. 141.0-141.9': CLAYEY SILTSTONE: medium dark gray (N 4/0) to dark gray (N 3/0); faintly laminated; trace to some very fine- to fine-grained disseminated sand; lignite stringer at base; moderately hard; no reaction to HCl; damp. 141.9-145.0': SANDSTONE AND SILTSTONE: medium gray (N 5/0) and dark gray (N 4/0); finely interbedded sandstones and siltstones; primarily sandstone at top becoming more siltstone at depth; very fine-grained, well sorted subrounded sands; no reaction to HCl; damp.	
142				
143			145.0-149.0 SAMPLE. Recovered 3.9/4.0' = 98%. RQD 3.9/3.9' = 100%. SILTY SANDSTONE: medium dark gray (N 4/0) and light olive gray (5 Y 6/1); possible soft sediment deformation; some interbeds of siltstone; very fine- to fine-grained; rounded; well sorted; well consolidated; no reaction to HCl; damp.	
145				
146				
147				
148				
149				

UT1.589a

WELL NO. B207189

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
149			149.0-153.0' SAMPLE. Recovered 3.7/4.0' = 93%. RQD 3.6/3.7' = 17%. 149.0-152.7': SILTY SANDSTONE: same as above. 153.0-157.0 SAMPLE. Recovered 3.7/4.0' = 93%. RQD 2.6/3.7' = 70%. 153.0-155.0': SILTY CLAYSTONE: dark gray (N 3/0); fissle; moderately hard; no reaction to HCl, damp. 155.0-156.7': LIGNITE: black (N 1/0) to brownish black (5 YR 2/1); fissle lignite, no reaction to HCl; damp.	
150				
151				
152				
154				
155				
156				
157				

UF130R

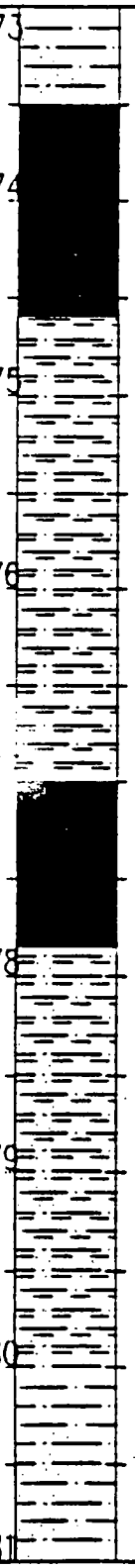
WELL NO. B207189

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
157			157.0-161.0 SAMPLE. Recovered 0.3/4.0' = 1%. RQD 0.0/0.3' = 0%. 157.0-157.3': CLAYSTONE: olive black (5 YR 2/1); organic rich; no reaction to HCl; damp.	
158			161.0-161.5 SAMPLE. Recovered 2.4/0.5' = 480%. RQD 0.4/2.4' = 20%. CLAYSTONE: medium dark gray (N 4/0); some organic material and silt at top decreasing downwards; firm; no reaction to HCl; damp.	
159			161.6-164.0 SAMPLE. Recovered 0.0/2.5' = 0%. RQD 0.0/2.5' = 0%.	
			164.0-165.0 SAMPLE. Recovered 3.5/1.0' = 350%. RQD 2.7/3.5' = 77%. CLAYSTONE: medium dark gray (N 4/0) to dark gray (N 3/0); trace organics; trace to some silt increasing downwards; soft to moderately hard; no reaction to HCl; damp. 163-165.0': SILTY SANDSTONE: dark gray (N 3/0) to brownish gray (5 YR 4/1); homogeneous; breaks along concoidal fractures; very fine- to fine-grained; subrounded; subangular; moderately well sorted; well consolidated; hard; no reaction to HCl; damp.	
161				
162				
163				
164				
165				

LF1389W

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
165			165.0-169.0 SAMPLE. Recovered 4.0/4.0' = 100%. RQD 4.0/4.0' = 100%. SILTY SANDSTONE: same as above except: natural subhorizontal silt filled fractures at 166' depth; some clay; moderately hard. 169.0-173.0 SAMPLE. Recovered 4.0/4.0' = 100%. RQD 3.7/4.0' = 93%. 169.0-171.8': SILTY SANDSTONE: same as above. 171.8-173.0': SANDY CLAYEY SILTSTONE: brownish gray (5 YR 4/1) to brownish black (5 YR 2/1); organic rich; trace lignite; trace interbeds of very fine- to fine-grained sandstone; moderately hard; no reaction to HCl; damp.	
166				
167				
169				
170				
171				
172				
173				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
173			173.0-177.0 SAMPLE. Recovered 2.3/4.0' = 58%. RQD 1.8/2.3' = 78%. 173.0-173.5': SILTY SANDSTONE: dark gray (N 3/0) to brownish gray (5 YR 4/1). 173.5-174.6': LIGNITE AND COAL: brownish black (5 YR 2/1) to black (N 1/0): subfissile to fissile: firm; no reaction to HCl; damp. 174.6-175.3': SILTY CLAYSTONE: dark gray (N 3/0); laminated; organic rich; moderately hard no reaction to HCl; damp. 177.0-180.0 SAMPLE. Recovered 2.0/3.0' = 97%. RQD 1.0/2.0' = 66%. 177.0-177.8': LIGNITE; brownish black (5 YR 2/1); fissle; trace coal; firm; damp. 177.8-179.9': CLAYEY SANDY SILTSTONE: medium dark gray (N 4/0); organic rich at top becoming less clayey and more sandy downward; very fine-grained, rounded sands; moderately hard to firm; damp. 180.0-184.0 SAMPLE. Recovered 3.9/4.0' = 98%. RQD 3.8/3.9' = 97%. SILTY SANDSTONE AND SANDY SILTSTONE: medium dark gray (N 4/0) to dark gray (N 3/0); SANDSTONE: very fine- to fine-grained, well sorted; subrounded; well consolidated; sandstone grading into SANDY SILTSTONE: some clay, disseminated very fine- to fine-grained sandstone laminae; hard to moderately hard; no reaction to HCl; damp.	
174				
175				
176				
178				
179				
180				
181				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
181				
			184.0-188.0 SAMPLE. Recovered 4.2/4.0' = 105%. RQD 3.4/4.2' = 81%. SILTY CLAYSTONE: dark gray (N 3/0); laminated; trace very fine- to fine-grained sandstone laminae; firm to moderately hard; no reaction to HCl; damp.	
182				
			188.0-192.0 SAMPLE. Recovered 2.6/4.0' = 65%. RQD 2.4/2.6' = 92%. SILTY CLAYSTONE: dark gray (N 3/0) to brownish black (5 YR 2/1); subfissle; trace very fine- to fine-grained sandstone laminae; some organics below 190' depth; firm to moderately hard; no reaction to HCl; damp.	
183				
185				
186				
187				
188				
189				

WELL NO. B207189

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
37				
			192.0-195.0 SAMPLE. Recovered 4.7/3.0' = 118%. RQD 4.7/4.7' = 100%. SILTY CLAYSTONE: same as above except: some organics above 191.2' depth; trace iron staining.	
190				
			195.0-199.0 SAMPLE. Recovered 0.0/4.0' = 0%. RQD 0.0/0.0'.	
191				
192				
194				
195				
196				
197				

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
197 198 199 200 202 203 204 205			199.0-199.5 SAMPLE. Recovered 3.0/0.5' = 600%. RQD 1.6/3.0' = 53%. 196.5-198.3': SILTY CLAYSTONE: dark gray (N 3/0) to brownish gray (5 YR 4/1); homogeneous to subfissle (associated with organics) trace organics; firm; no reaction to HCl; damp. 198.3-199.5': SANDSTONE: medium dark gray (N 4/0); very fine- to fine-grained; trace medium-grained; subrounded; moderately well sorted; some silt; consolidated; hard; no reaction to HCl; damp. 199.5-203.0 SAMPLE. Recovered 3.7/3.5' = 106%. RQD 3.7/3.7' = 100%. SANDSTONE: medium dark gray (N 4/0) to olive gray (5 Y 4/1); natural subvertical fractures throughout; staining and mineralization along fractures; very fine- to fine-grained; subrounded; well sorted; trace to some clay; well consolidated; hard to very hard; no reaction to HCl; damp. 203.0-207.0 SAMPLE. Recovered 4.1/4.0' = 102%. RQD 3.4/4.1' = 83%. CLAYEY SANDSTONE: crossbedded; trace natural fractures; with mineralization; very fine- to fine-grained; subrounded; well sorted; trace calcite cement in better developed sandstone stringers (HCl reaction); hard; damp.	

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LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
205				
			207.0-211.5' SAMPLE. Recovered 4.5/4.5' = 100%. RQD 4.5/4.5' = 100%. SILTY SANDSTONE: medium dark gray (N 4/0) to olive gray (5 Y 4/1); crossbedded; very fine- to fine-grained; subrounded; well sorted; silt decreases to trace below 210.2' depth; well consolidated; uncemented below 210.2' depth; no reaction to HCl; moist.	
206				
			211.5-216.0' SAMPLE. Recovered 4.1/4.5' = 91%. RQD 1.3/4.1' = 32%. SANDSTONE: medium gray (N 5/0); crossbedded; very fine- to fine-grained; subrounded; well sorted; consolidated; uncemented; no reaction to HCl; moist.	
207				
208				
210				
211				
212				
213				

LF1389zm

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
213			216.0-220.0 SAMPLE. Recovered 3.9/4.0' = 98%. RQD 3.0/3.0' = 100%. SANDSTONE: medium gray (N 5/0); very dark gray (N 3/0) to black (N 1/0) banding; crossbedded; laminated; black banding; fine- to very fine-grained; subrounded; well sorted; consolidated; hard; strong HCl reaction 216.3 to 217.0, none elsewhere; moist.	
214			220.0-224.0 SAMPLE. Recovered 4.0/4.0' = 100%. RQD 3.8/4.0' = 95%. SANDSTONE: same as above except; medium gray (N 4/0); no reaction to HCl; moist.	
215				
217				
218				
219				
220				
221				

WELL NO. B207189

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
221			224.0-228.0' SAMPLE. Recovered 3.9/4.9' = 98%. RQD 2.9/3.0' = 74%. SANDSTONE: medium dark gray (N 4/0); crossbedded with limited soft sediment deformation; black banded; very fine- to fine-grained; subrounded; well sorted; trace organics along laminae surfaces; consolidated; firm to moderately hard; no reaction to HCl; moist.	
222				
223			228.0-232.0' SAMPLE. Recovered 4.0/4.0' = 100%. RQD 3.3/4.0' = 83%. SANDSTONE: medium dark gray (N 4/0) and dark gray (N 3/0); same as above.	
224				
225				
226				
227				
228				
229				

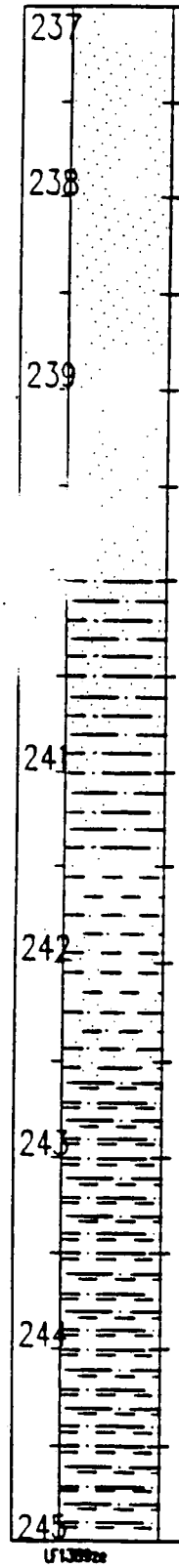
LF1389zc

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
229			232.0-236.0 SAMPLE. Recovered 4.0/4.0' = 100%. RQD 3.2/4.0' = 80%. SANDSTONE AND SANDY SILTSTONE: medium dark gray (N 4/0) to dark gray (N 3/0); crossbedded; SANDSTONE: very fine- to fine-grained; subrounded, well sorted; well sorted; some silt well consolidated. Interbedded siltstone: very fine-grained; subrounded, disseminated sand; trace claystone beds; hard; no reaction to HCl; damp.	
230				
			236.0-240.0 SAMPLE. Recovered 4.0/4.0' = 100%. RQD 4.0/4.0' = 100%. SANDSTONE: medium gray (N 4/0) to medium dark gray (N 4/0); crossbedded; trace organic rich; silty interbeds; trace iron staining; very fine- to fine-grained; subrounded; well sorted; well consolidated; no reaction to HCl; moist.	
231				
232				
233				
234				
235				
236				
237				

WELL NO. B207189

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
237				
238				
239				
241				
242				
243				
244				
245				



240.0-244.0' SAMPLE.
Recovered 2.6/4.0' = m65%.
RQD 2.0/2.6' = 77%.
240.0-241.5': SANDSTONE AND SILTY SANDSTONE: medium dark gray (N 4/0) to dark gray (N 3/0); crossbedded; trace claystone interbeds; trace organic rich siltstone interbeds; SANDSTONE: very fine- to fine-grained; subrounded; well sorted; well consolidated; SILTY SANDSTONE: very fine-grained; trace fine-grained; subrounded; well consolidated; no reaction to HCl; damp.
241.5-242.6': CLAYEY SANDY SILTSTONE: dark gray (N 4/0); homogeneous; trace natural fractures with organic material infilling; disseminated very fine- to trace fine-grained, subrounded sand; no reaction to HCl; damp.

244.0-247.0 SAMPLE.
Recovered 4.3/3.0' = 143%.
RQD 3.4/4.3' = 79%.
SILTY CLAYSTONE: dark gray (N 3/0) to brownish black (5 YR 2/1); faintly laminated; waxy; trace high angle open natural fractures (45 to 70° from horizontal); trace very fine- to fine-grained sand; grading to base to sandy, clayey, siltstone; moderately hard; no reaction to HCl; damp.

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
245			247.0-251.0 SAMPLE. Recovered 0.0/4.0' = 0%. RQD 0.0/0.0.	
246			251.0-251.5 SAMPLE. Recovered 4.5/0.5' = 900%. RQD 4.4/4.5' = 98%. SILTY CLAYSTONE: dark gray (N 3/0) to brownish black (5 YR 2/1); laminated; natural high angle open fractures (45 to 70° from horizontal); trace very fine-grained sand; organic rich below 249.0' depth; 0.1' lignite bed at base; moderately hard; no reaction to HCl; damp. SANDSTONE: medium gray (N 5/0); homogeneous; very fine-grained; subrounded; well sorted; consolidated; firm; no reaction to HCl; damp.	
247			251.5-255.0 SAMPLE. Recovered 3.5/3.5' = 100%. RQD 0.4/3.5' = 11%. 251.5-252.3': COAL AND LIGNITE.: black (N 1/0) and brownish black (5 YR 2/1); orthorhombic fracturing in coal; lignite; some clay; some silt; trace very fine-grained sand; moderately hard; no reaction to HCl; moist. 252.3-255.0': CLAYSTONE: grayish brown (5 YR 3/2) to dark gray (N 3/0); subfissle in part; waxy; organic rich above 254.0' depth; some silt in part; moderately hard; no reaction to HCl; damp.	
248				
250				
251				
252				
253				

WELL NO. B207189

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
253				
			255.0-259.0 SAMPLE. Recovered 3.7/4.0' = 93%. RQD 1.4/3.7' = 38%. SILTY CLAYSTONE: dark gray (N 3/0) to brownish black (5 YR 2/1); waxy; trace lignite; trace very fine-grained sand at base; firm to hard; no reaction to HCl; damp.	
254				
			TOTAL DEPTH = 259.0'	
255				
257				
258				
259				
260				
261				

U1389zq

LOG OF BOREHOLE

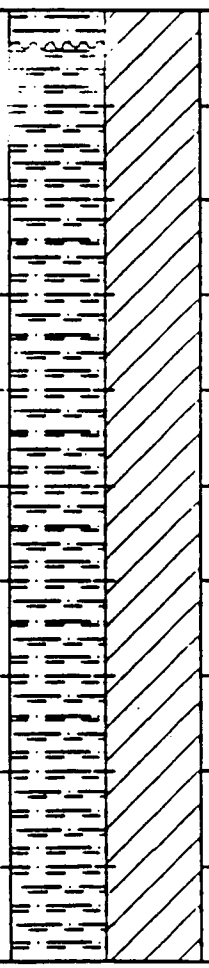
QA BY/DATE J.B. Burgman 11-18-87
LOCATION Rocky Flats Plant; Landfill Area
COORDINATES N40,284.53 E21,264.93 (RFP)
TOTAL DEPTH 19.5'

DRILLING COMPANY Boyles Brothers
DATE DRILLED April 27, 1989
DRILLING METHOD Hollow Stem Auger
LOGGED BY E.M. Hill; R.T. Treat
GEOLOGIST

BOREHOLE/WELL NO. B207289
GROUND SURFACE ELEVATION 5948.27'
WATER LEVEL ENCOUNTERED None
STATIC None (09/19/89)
DRILLER K. Parker HELPER R. Orr
DRILLING FLUID None
CHECKED BY J.B. Burgman
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 0.0-1.5' SAMPLE. Recovered 1.5/1.5' = 100%. 0.0-0.2': SILT: grayish brown (5 YR 3/2); humic; rooted; loose; damp. ARAPAHOE/LARAMIE FORMATION 0.2-1.5': SILTY CLAYSTONE: pale yellowish brown (10 YR 6/2); some very fine-grained sand; highly weathered; blocky; friable; frequent iron-staining in distinct fractures; very soft; damp. 1.5-3.5' SAMPLE. Recovered 1.9/2.0' = 95%. SILTY CLAYSTONE: pale yellowish brown (10 YR 6/2); abundant streaks and mottles--dark yellowish brown (10 YR 6/6); trace to some very fine- to fine-grained sand; highly weathered; very soft; few calcite streaks up to 3 mm; rooted; trace organic partings; blocky; friable; damp. 3.5-5.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: light olive gray (5 Y 6/1); mottled with dark yellowish orange (10 YR 6/6); moderately weathered; very soft; few calcite lenses; damp.	HNu Background: 0.0 OVA Background: 0.0 All readings on cuttings, core, breathing zone, and in augers: 0.0; unless otherwise noted below.

LF1488A

WELL NO. B207289

LOG OF BOREHOLE

DEPTH (FT)	GRAPHIC LOG	SAMPLE TYPE	LITHOLOGIC DESCRIPTION	SAMPLES COLLECTED OR OTHER TESTS PERFORMED
5 6 7 8 10 11 12 13			5.5-7.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: pale yellowish brown (10 YR 6/2); mottled with dark yellowish orange (10 YR 6/6)--decreasing with depth; trace very fine-grained sand; laminated lignite partings (< 1mm)--increasing with depth; highly weathered; very soft; damp. 7.5-9.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: pale yellowish brown (10 YR 6/2); occasional dark yellowish orange (10 YR 6/6) mottling; trace very fine-grained sand; few lignite partings; few very small calcite lenses; highly weathered; very soft; damp. 9.5-11.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: pale yellowish brown (10 YR 6/2) with occasional dark yellowish orange (10 YR 6/6) mottling and fractures; trace to some sand; few thin lignite partings and steaks; blocky to fissile; highly weathered; very soft; damp. 11.5-13.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: pale yellowish brown (10 YR 6/2); mottled with grayish orange (10 YR 7/4); trace to some very fine- to fine-grained sand; occasional (< 1 mm) lignite partings; iron-stained fractures; blocky; very soft; highly weathered; damp.	

top

LF14898

WELL NO. B207289

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: pale yellowish brown (10 YR 6/2); mottled with decreasing dark yellowish orange (10 YR 6/6); trace very fine- to fine-grained sand; iron-filled fractures; increasing lignite partings blocky to fissile; moderately weathered; very soft; damp.	
14			15.5-17.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: same as above.	15.5': Reading in Auger OVA: 6.5
BOTTOM MARKER			17.5-19.5' SAMPLE. Recovered 2.0/2.0' = 100%. SILTY CLAYSTONE: pale yellowish brown (10 YR 6/2) to medium gray (N 5/0); massive; homogeneous; blocky; iron-stained; medium hard; medium consolidated; medium plastic; damp.	19.5': Reading in Auger OVA: 0.8
15			TOTAL DEPTH = 19.5'	
17				
18				
19				
20				
21				

LF1489C

This is a
CONTROLLED DOCUMENT
EG&G — ROCKY FLATS PLANT
ENVIRONMENTAL MANAGEMENT DEPARTMENT
This is a RED Stamp

ROCKY FLATS PLANT Phase I RFI/RI Work Plan for Operable Unit 7 - Present Landfill IHSS 114 and Inactive Hazardous Waste Storage Area IHSS 203	Manual No.: Section No.: Organization:	21100-WP-OU-07.01 APPE, R0 Environmental Management

Title: Appendix E: Wells Construction Logs for Present Landfill Monitoring Wells

Approved by:

12/6/91	J. P. O'Rourke	6/23/92
Effective Date	Manager	Date

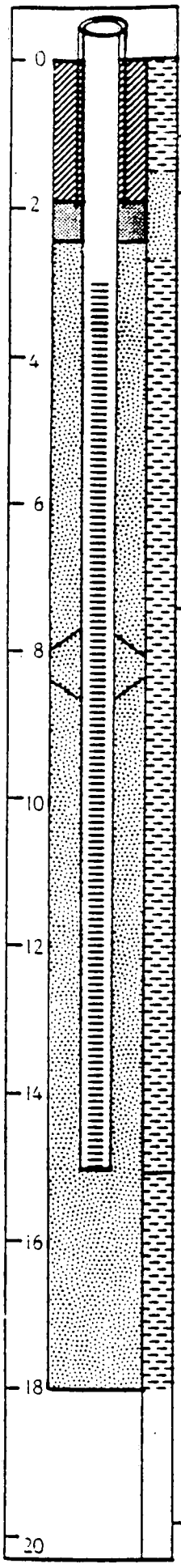
APPENDIX E

Well Construction Logs for

Present Landfill Monitoring Wells

WELL 4-86

WELL CONSTRUCTION SUMMARY



LOCATION Golden, CO

PERSONNEL S. Paschke

PROJECT 106P06222 Rocky Flats Plant

LOCATION or COORDS: N 40437.1 E 30774.2

ELEVATION: GROUND LEVEL 5636.60'

TOP OF CASING 5637.94'

DRILLING SUMMARY:

TOTAL DEPTH Well: 14.92' Hole: 18.00'

BOREHOLE DIAMETER 7¼"

DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue
Golden, CO (Doyle Styles)

RIG Mobile B-57

BIT(S) Blade bit

DRILLING FLUID None

SURFACE CASING 5" x 4' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG ___

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

0.00'	3.52'	C1
3.52'	14.92'	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, 0.020" wire wrap screen, 0.25' welded bottom cap.

CENTRALIZERS Centralizer placed approximately mid-point on screened interval.

FILTER MATERIAL 12-20 silica sand
2.40' - 18.00'

CEMENT Portland Type I
0.00' - 1.95'

OTHER 3/8" bentonite pellets
1.95' - 2.40'

CONSTRUCTION TIME LOG:

TASK	START DATE 1986	START TIME	FINISH DATE 1986	FINISH TIME
DRILLING:				
7¼" auger	4/24	1440	4/24	1600
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
2" stainless	4/24	1725	4/24	1730
FILTER PLACEMENT:	4/24	1730	4/24	1810
CEMENTING:	4/25	1010	4/25	1020
DEVELOPMENT:	8/29	1606	8/29	1606
OTHER:				
Bentonite	4/25	1000	4/25	1010

WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

Water encountered at 12.00' during drillin

Top of stainless steel casing: 1.34'

HYDRO-SEARCH RENO•DENVER

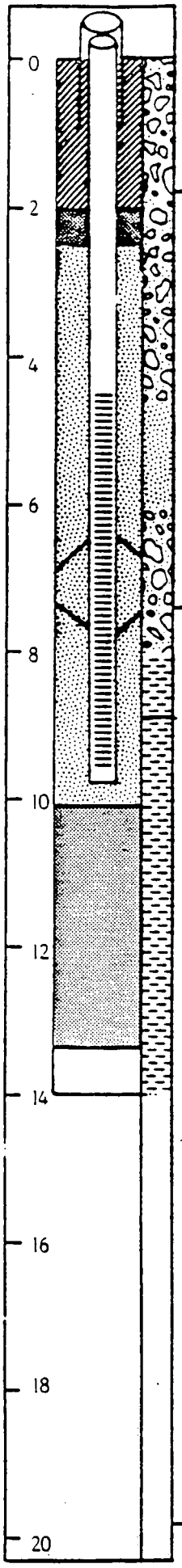
CONSULTING HYDROLOGISTS-GEOLOGIST

WELL 5-86

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N 40694.8 E 26699.7

ELEVATION: GROUND LEVEL 5720.07'
TOP OF CASING 5722.61'



LOCATION Golden, CO
PERSONNEL J. Bergman
PROJECT 106R6222 Rocky Flats Plant

DRILLING SUMMARY:

TOTAL DEPTH Well: 9.76' Hole: 14.0'
BOREHOLE DIAMETER 7¼"

DRILLER Boyles Brothers Drilling Co.
15365 W. 5th Avenue
Golden, CO (Tony Robinson)
RIG Acker
BIT(S) Bull nose bit

DRILLING FLUID None

SURFACE CASING 5" x 4' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG ___

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

0.0' - 4.40'	C1	
4.40' - 9.76'	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' welded bottom cap.

CENTRALIZERS Type 304 stainless steel.
6.54' - 7.71'

FILTER MATERIAL 32-42 silica sand
2.50' - 10.02'

CEMENT Portland Type I
0.00' - 2.00'

OTHER 3/8" bentonite pellets
2.00' - 2.50'
10.02' - 13.30'

CONSTRUCTION TIME LOG:

TASK	START DATE 1986	START TIME	FINISH DATE 1986	FINISH TIME
DRILLING:				
7¼" auger	9/4	1500	9/4	1635
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
2" stainless	9/5	1040	9/5	1045
FILTER PLACEMENT:	9/5	1045	9/5	1050
CEMENTING:	9/5	1100	9/5	1105
DEVELOPMENT:	9/8	1515	9/8	1515
OTHER:				
Bentonite	9/5	1050	9/5	1055
	9/5	1035	9/5	1040

WELL DEVELOPMENT

See Well Development Summary Sheets.

COMMENTS:

No water encountered during drilling.

Top of stainless steel casing: 2.54'

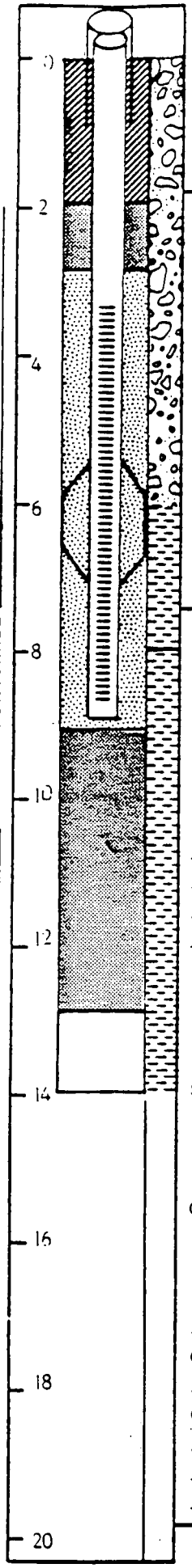
Cave from TD to 13.30'

WELL 6-86

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N 40588.1 E 23577.5

ELEVATION: GROUND LEVEL 5806.10'
TOP OF CASING 5808.58'



LOCATION Golden, CO
PERSONNEL J. Bergman
PROJECT 106PO6222 Rocky Flats Plant

DRILLING SUMMARY:

TOTAL DEPTH Well: 8.88' Hole: 14.0'
BOREHOLE DIAMETER 7½"

DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue
Golden, CO (Tony Robinson)
RIG Acker
BIT(S) Bull nose bit

DRILLING FLUID None

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

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG ___

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

0.0'	3.28'	C1			
3.28'	8.88'	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' welded bottom cap.

CENTRALIZERS Type 304 stainless steel
5.47' - 6.65'

FILTER MATERIAL 32-42 silica sand
9.10' - 2.75'

CEMENT Portland Type I
0.00' - 1.91'

OTHER 3/8" bentonite pellets
1.91' - 2.75'
9.10' - 12.90'

CONSTRUCTION TIME LOG:

TASK	START DATE 1986	START TIME	FINISH DATE 1986	FINISH TIME
DRILLING:				
7½" auger	9/4	0930	9/4	1140
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
2" stainless	9/4	1310	9/4	1312
FILTER PLACEMENT:	9/4	1312	9/4	1315
CEMENTING:	9/4	1340	9/4	1345
DEVELOPMENT:	9/8	1515	9/8	1515
OTHER:				
Bentonite	9/4	1315	9/4	1320
	9/4	1305	9/4	1310

WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

No water encountered during drilling.

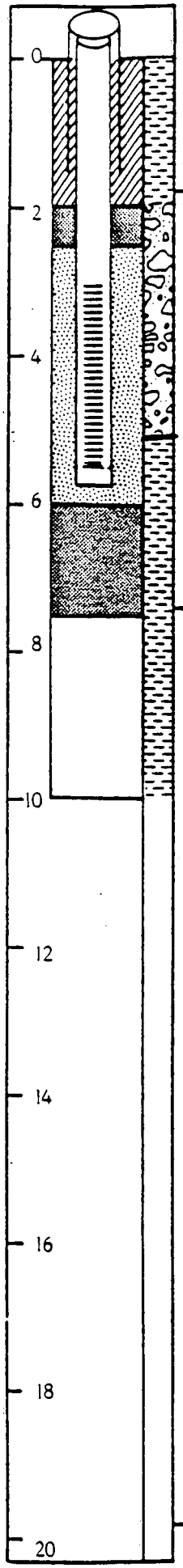
Top of stainless steel casing: 2.48'

Cave from TD to 12.90'

HYDRO-SEARCH RENO•DENVER CONSULTING HYDROLOGISTS-GEOLOGISTS

WELL 7-86

WELL CONSTRUCTION SUMMARY



LOCATION or COORDS: N 39869.8 E 20892.8

ELEVATION: GROUND LEVEL 5923.40' (est.)
TOP OF CASING 5925.66' (est.)

DRILLING SUMMARY:

TOTAL DEPTH Well: 5.74' Hole: 10.00'

BOREHOLE DIAMETER 7¼"

DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue
Golden, CO (Tony Robinson)

RIG Acker

BIT(S) Blade bit

DRILLING FLUID None

SURFACE CASING 5" x 4' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG ___

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

0.0'	-	3.0'	C1				
3.0'	-	5.74'	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' welded bottom cap.

CENTRALIZERS None

FILTER MATERIAL 32-42 silica sand
2.50' - 6.00'

CEMENT Portland Type I
0.00' - 2.00'

OTHER 3/8" bentonite pellets
2.00' - 2.50'
6.00' - 7.51'

CONSTRUCTION TIME LOG:

TASK	START DATE 1986	START TIME	FINISH DATE 1986	FINISH TIME
DRILLING:				
7¼" auger	9/23	0955	9/23	1045
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
2" stainless	9/23	1215	9/23	1220
FILTER PLACEMENT:	9/23	1220	9/23	1225
CEMENTING:	9/23	1230	9/23	1235
DEVELOPMENT:	9/29	1445	9/29	1445
OTHER:				
Bentonite	9/23	1225	9/23	1230
	9/23	1210	9/23	1215

WELL DEVELOPMENT

See Well Development Summary Sheets.

COMMENTS:

No water encountered during drilling.

Top of stainless steel casing: 2.26'

Cave from TD to 7.51'

LOCATION Golden, CO

PERSONNEL C. Walker

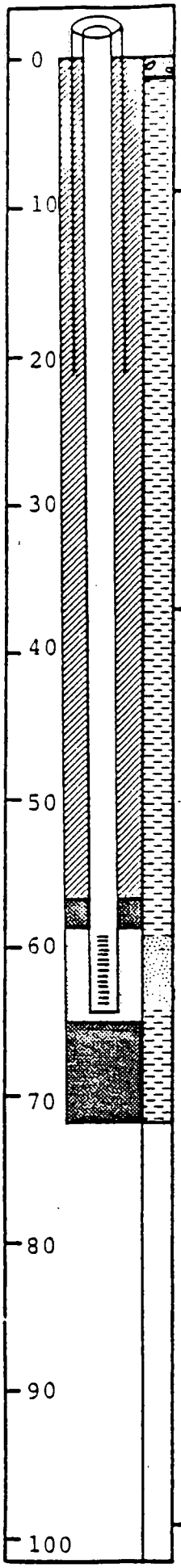
PROJECT 106PW6222 Rocky Flats Plant

WELL 8-86

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N 39859.3 E 20916.8

ELEVATION: GROUND LEVEL 5923.81' (est.)
TOP OF CASING 5925.81' (est.)



LOCATION Rocky Flats Plant
PERSONNEL C. Walker/L. Pivonka
PROJECT 106P06222

DRILLING SUMMARY:

TOTAL DEPTH Well: 63.80' Hole: 71.50'

BOREHOLE DIAMETER 0.00' - 18.35': 7½"
18.35' - 71.50: 4 3/4"

DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Ave., Golden, CO
(Tony Robinson, Jim Horn)

RIG 0.00' - 18.35': Acker; 18.35' - 71.50': Mobile B-57

BIT(S) 0.00' - 18.35': Blade bit;
18.35' - 71.50': Coring bit

DRILLING FLUID None

SURFACE CASING 5" x 20.85' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG ___

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

0.00'	18.35'	C1			
0.00'	59.08'	C2			
59.08'	63.79'	S1			

CASING: C1 5" I.D. steel surface casing
C2 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 wrapped screen, 0.25' welded bottom cap.

CENTRALIZERS None

FILTER MATERIAL 32-42 silica sand
58.00' - 64.30'

CEMENT Portland Type I
0.00' - 56.00'

OTHER 3/8" bentonite pellets
56.00' - 58.00'
64.30' - 71.50'

CONSTRUCTION TIME LOG:

TASK	START DATE 1986	START TIME	FINISH DATE 1986	FINISH TIME
DRILLING:				
7½" auger	9/24	0930	9/24	1135
NC Core	10/20	1049	10/20	1310
Reaming	10/22	1720	10/23	0920
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
5" steel	9/24	1315	9/24	1327
2" stainless	11/3	1243	11/3	1253
FILTER PLACEMENT:	11/3	1207	11/3	1340
CEMENTING:	11/3	1415	11/3	1500
DEVELOPMENT:	11/5	1515	11/13	0930
OTHER:				
Bentonite	11/3	1340	11/3	1410
	11/3	1143	11/3	1207
Packer testing	10/22	0900	10/22	1516
Cementing 5" steel	9/24	1330	9/24	1350

WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

No water encountered during drilling.

Top of stainless steel casing: 1.86'

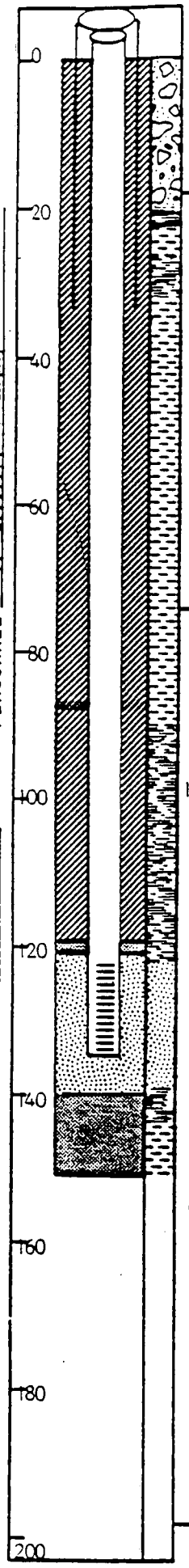
When drilling (with air and water) abundant bubbles surface in the adjacent pond near the rig. When drilling stops, the bubbling stops. Probable cause: (1) fractured bedrock from 20' - 30'.

WELL 9-86

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N 39246.2 E 19382.2

ELEVATION: GROUND LEVEL 5995.23' (est.)
TOP OF CASING 5999.64' (est.)



PROJECT 106P06222 Rocky Flats Plant
PERSONNEL T. Gulliver, T. Murphy
LOCATION Golden, CO

DRILLING SUMMARY:

TOTAL DEPTH Well: 135.35' Hole: 151.00'

BOREHOLE DIAMETER 0.00' - 35.00': 5 5/8"
35.00' - 151.00': 4 3/4"

DRILLER Boyles Brothers Drilling Co.
15865 W. 5th Avenue
Golden, CO (Tom High, Robert Roach)

RIG 0.00' - 35.00': casing advancer, 35.00' - 151.00': rafting

BIT(S) 0.00' - 35.00': down hole hammer
35.00' - 151.00': strata back coring bit, reaming

DRILLING FLUID 0.00' - 35.00': None
35.00' - 151.00': air/water mist

SURFACE CASING 5" x 35.0' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG X

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

0.00'	33.51'	C1			
0.00'	122.57'	C2			
122.57'	135.35'	S1			

CASING: C1 5" I.D. steel surface casing
C2 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' welded bottom cap.

CENTRALIZERS None (see comments)

FILTER MATERIAL 32-42 silica sand
121.20' - 140.50'

CEMENT Portland Type I
33.51' - 119.40'

OTHER 3/8" bentonite pellets
119.40' - 121.20'
140.50' - 151.00'

CONSTRUCTION TIME LOG:

TASK	START DATE	START TIME	FINISH DATE	FINISH TIME
DRILLING:	1986		1986	
5 5/8" casing advancer	9/24	0900	9/24	1615
NC Core	10/1	0826	10/2	1200
Reaming	10/6	1000	10/6	1230
GEOPHYS. LOGGING:	10/6	1336	10/7	1627
CASING:				
2" stainless	10/7	1218	10/7	1244
5" steel	9/24	0900	9/24	1615
FILTER PLACEMENT:	10/7	1414	10/7	1700
CEMENTING:	10/8	0900	10/8	1030
DEVELOPMENT:	10/14	0830	10/31	1400
OTHER:				
Bentonite	10/7	1710	10/17	1754
	10/7	0821	10/17	0850
Packer testing	10/2	1200	10/3	1700

WELL DEVELOPMENT

COMMENTS:

Water encountered at 105.37' during drilling on 10/8/86.
Top of stainless steel casing: 1.41'

Built well in NC rod: no centralizers used.

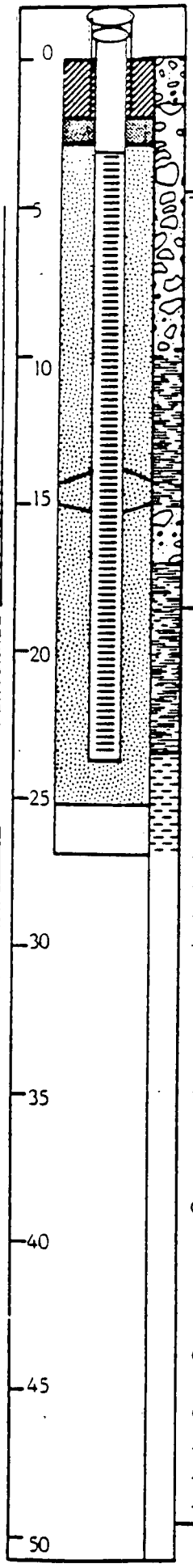
Geophysical logs:
SP - resistivity: 59.00' - 146.00'
Natural gamma: 0.00' - 147.00'

WELL 10-86

WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: N 39223.9 E 19400.6

ELEVATION: GROUND LEVEL 5995.02' (est.)
TOP OF CASING 5996.63' (est.)



LOCATION Golden, CO
PERSONNEL T. Gulliver
PROJECT 106106222 Rocky Flats Plant

DRILLING SUMMARY:

TOTAL DEPTH Well: 23.78' Hole: 27.00'
BOREHOLE DIAMETER 0.00' - 23.40': 5 5/8"
23.40' - 27.00': 5"
DRILLER Bovles 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' steel w/ locking cap

WELL DESIGN:

BASIS: GEOLOGIC LOG X GEOPHYSICAL LOG ___

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

0.00'	3.29'	C1			
3.29'	23.78'	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' welded bottom cap.

CENTRALIZERS Type 304 stainless steel
14.08' - 15.33'

FILTER MATERIAL 32-42 silica sand
2.80' - 25.50'

CEMENT Portland Type I
0.00' - 2.00'

OTHER 3/8" bentonite pellets
2.00' - 2.80'

CONSTRUCTION TIME LOG:

TASK	START DATE 1986	START TIME	FINISH DATE 1986	FINISH TIME
DRILLING:				
Casing advancer	9/24	1420	9/24	1600
GEOPHYS. LOGGING:	—	—	—	—
CASING:				
2" stainless	9/25	0900	9/25	0910
FILTER PLACEMENT:	9/25	0910	9/25	1300
CEMENTING:	9/25	1400	9/25	1410
DEVELOPMENT:	9/29	1345	10/16	1515
OTHER:				
Bentonite	9/25	1300	9/25	1305

WELL DEVELOPMENT

See Well Development Summary Sheet.

COMMENTS:

Water encountered at 10' during drilling.

Top of stainless steel casing: 1.61'

Cave from TD to 25.50'

Well No.: 45-86

WELL DEVELOPMENT SUMMARY SHEET

DATE	TIME	METHOD	VOLUME	APPEARANCE	COMMENTS
10-7-86	0915				1 Well Bore Volume = 4.24 gals. 10 Well Bore Volumes = 42.2 gals.
10-7-86	0915	Airlifted	4.2 gals.	Light to medium spray - lots of sand	7' of sand lifted out before reaching T.D.
10-8-86	1540	Bailed	12 gals.	Medium to dark brown, highly turbid, lots of sand	12/42.4 gals. purged to date
10-9-86	0700	Airlifted	4.2 gals.	Medium to dark brown spray	-----
10-9-86	1500	Bailed	16 gals.	Medium brown, clearing slightly	28/42.4 gals. purged to date
10-10-86	1410	Bailed	16 gals.	Bottom 3' - light brown, rest of well med. brown	44/42.4 gals. purged to date
10-14-86	1200	Bailed	12 gals.	Light to medium brown	56/42.4 gals. purged to date
10-15-86	0830	Airlifted	---	Medium brown mist - sandy	-----
10-15-86	1400	Bailed	25 gals.	Medium brown, clearing	81/42.4 gals. purged to date
10-16-86	1200	Bailed	---	Clear	Sampled

WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 40-87

Coordinates N 40158.03 E 21727.76

Elevation: Ground Surface 5882.69'

Total Depth: Well 6.70'

Top of Casing 5884.69'

Borehole 13.00'

Formation of Completion Valley Fill Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed June 9, 1987

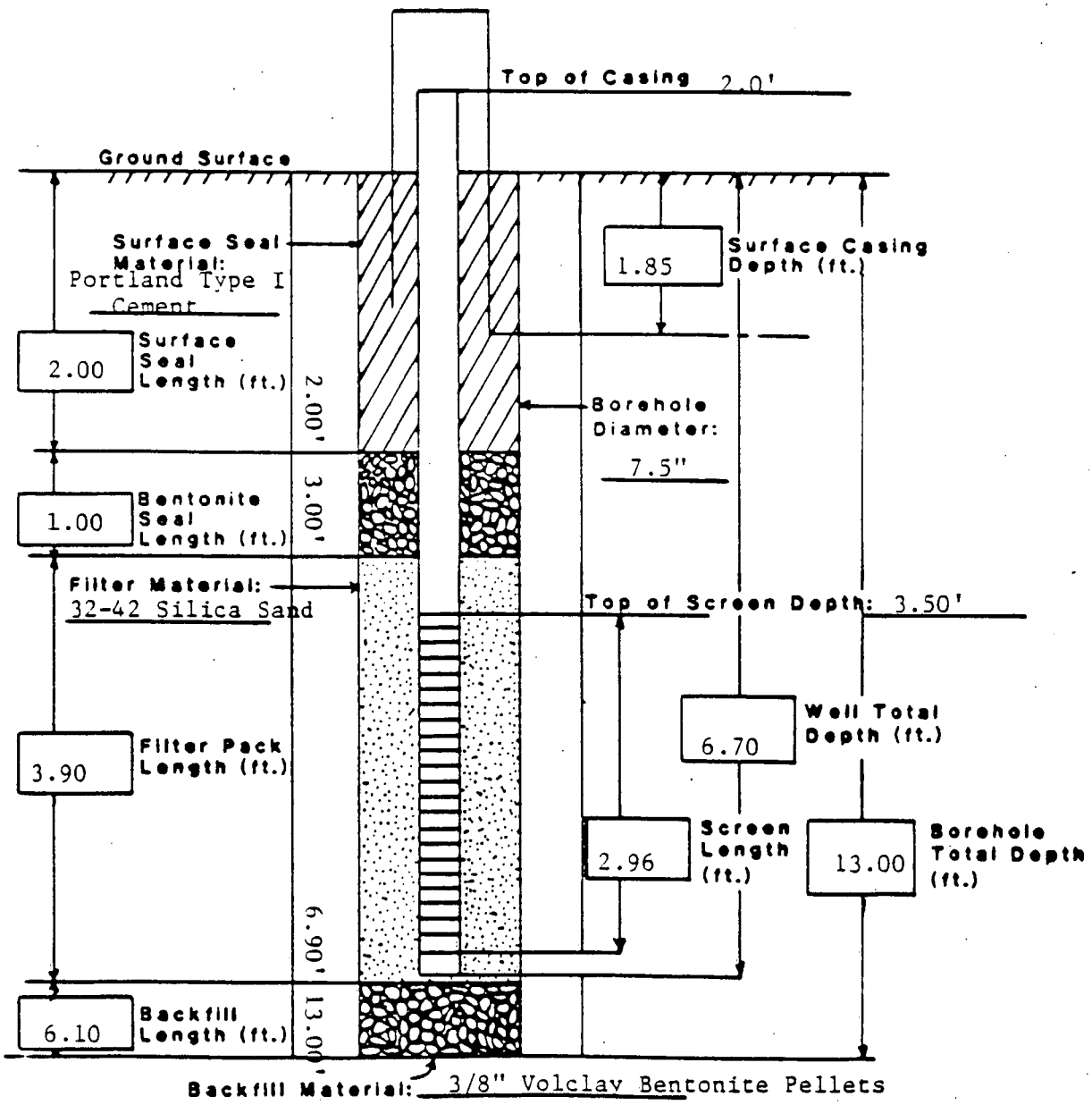
Approved By

Installed By J. Bergman
Geologist

Site Manager

CEARP Manager

Comments Centralizer at 3.96-5.15'



WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 41-87BR

Coordinates N 40133.61 E 21725.75

Elevation: Ground Surface 5882.78'

Total Depth: Well 94.03'

Top of Casing 5884.55'

Borehole 110.00'

Formation of Completion Arapahoe Formation

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed August 3, 1987

Approved By

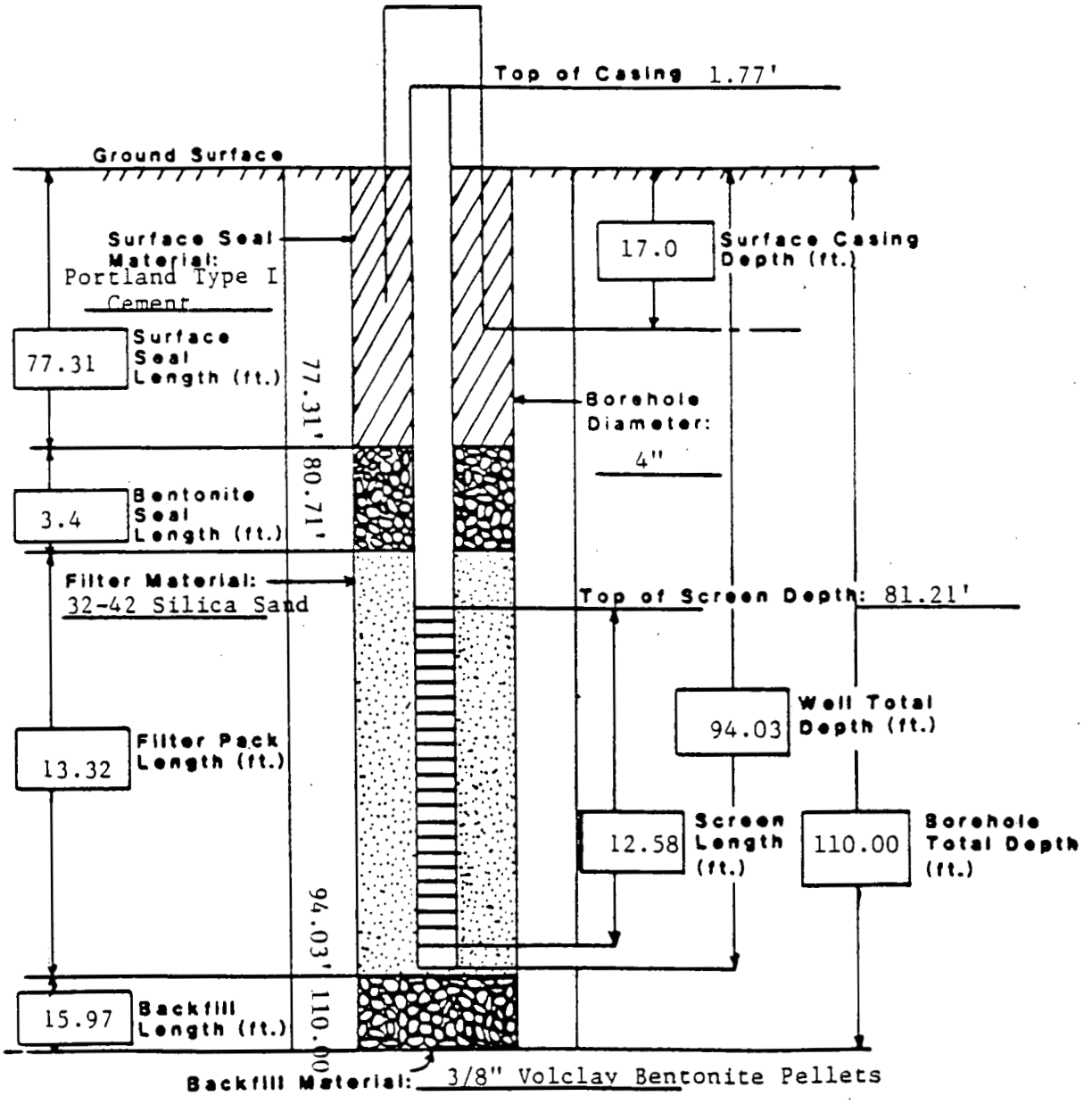
Site Manager

Installed By K.D. Holliway

Geologist

CEARP Manager

Comments Surface casing set to 17.0' by J.B. Bergman on June 9, 1987.



WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 42-87

Coordinates N 40355.10 E 22430.99

Elevation: Ground Surface 5854.05'

Total Depth: Well 6.60'

Top of Casing 5855.93'

Borehole 12.40'

Formation of Completion Valley Fill Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed June 10, 1987

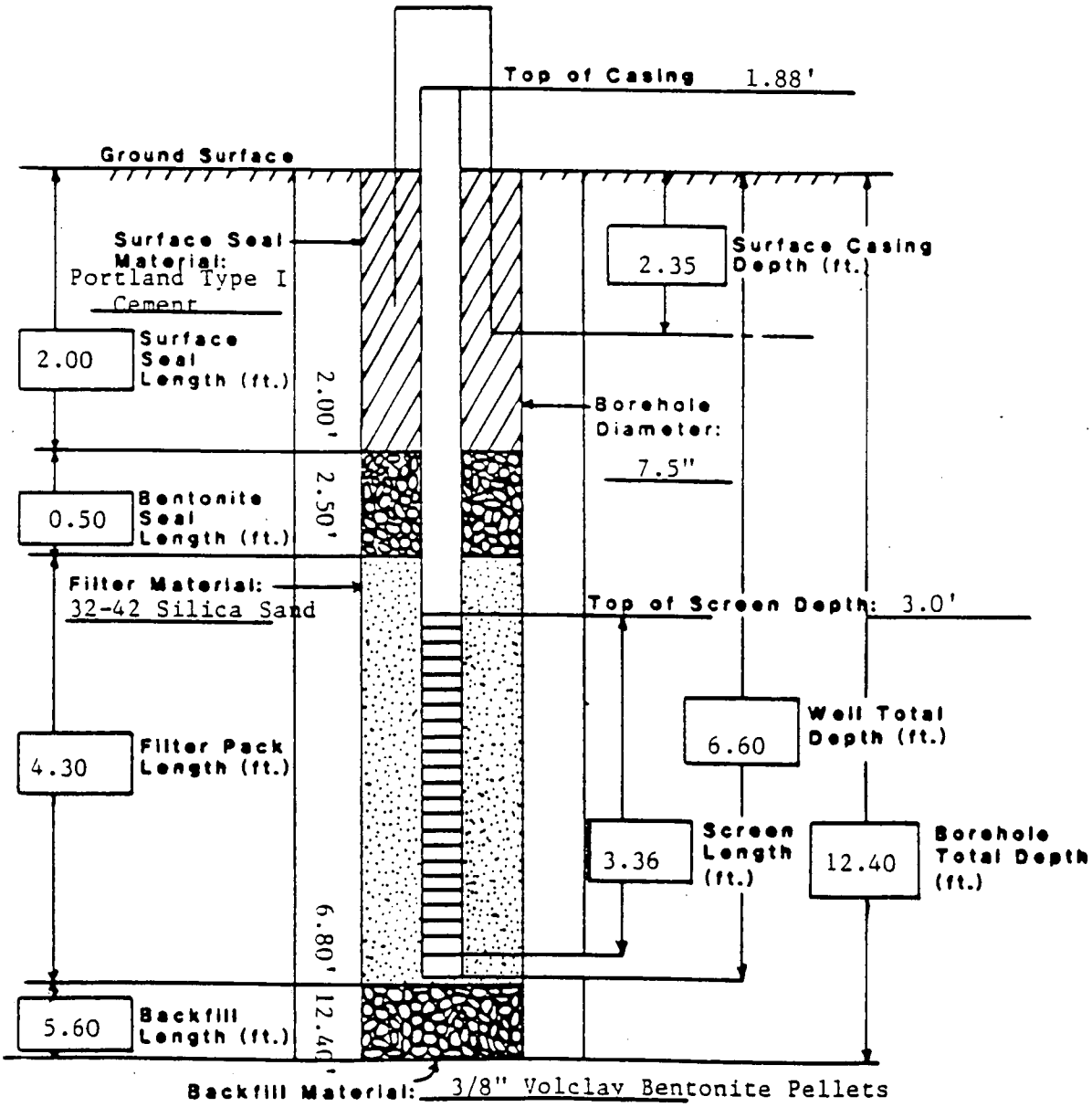
Approved By

Installed By J. Bergman
Geologist

Site Manager

CEARP Manager

Comments



WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 58-87

Coordinates N 39257.05 E 19431.75

Elevation: Ground Surface 5995.10'

Total Depth: Well 22.5'

Top of Casing 5996.75'

Borehole 32.0'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed November 18, 1987

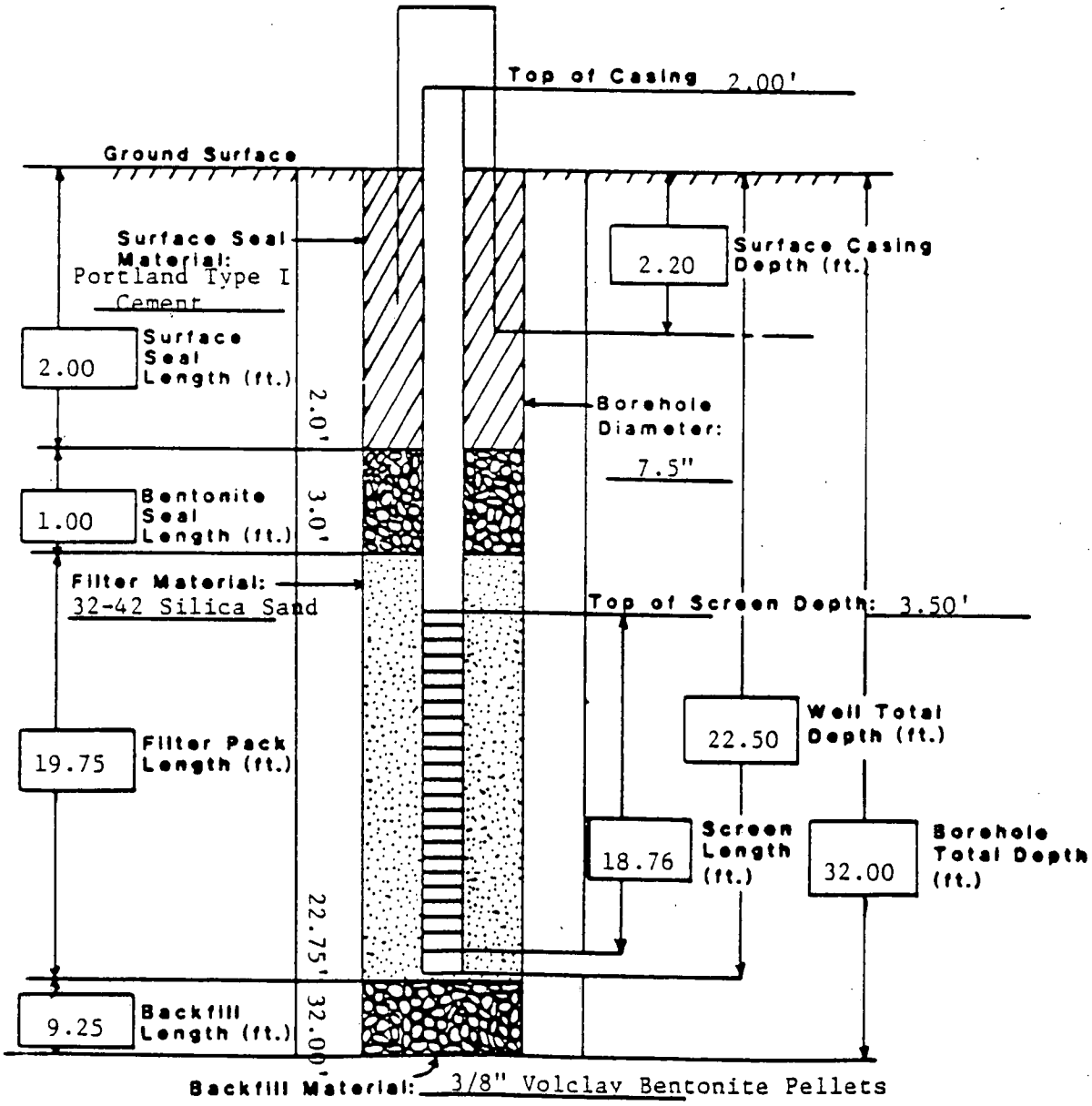
Approved By

Site Manager

Installed By R. Treat
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 59-87

Coordinates N 39336.25 E 19463.99

Elevation: Ground Surface 5992.90'

Total Depth: Well 21.20'

Top of Casing 5994.67'

Borehole 26.0'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed November 23, 1987

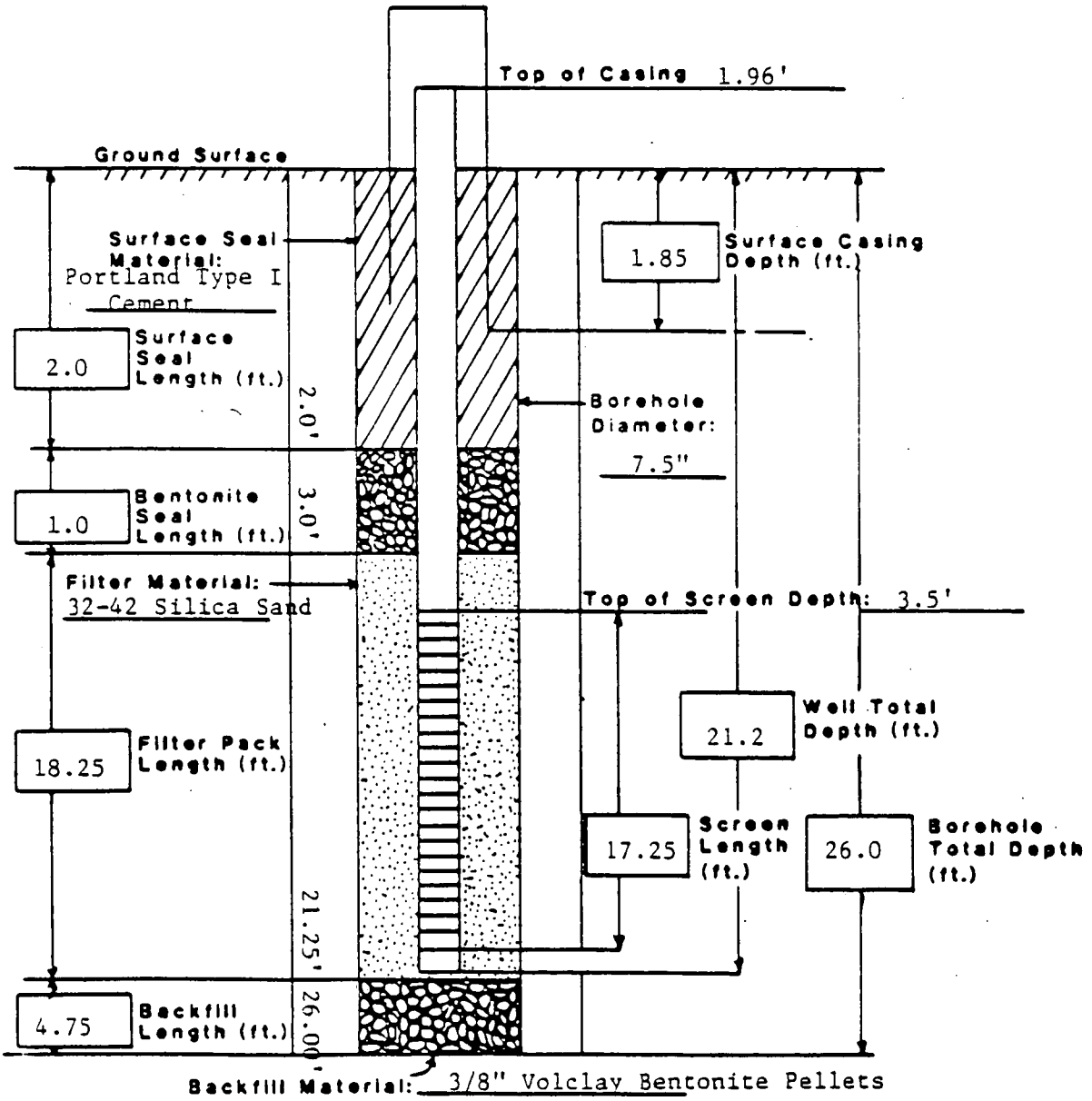
Approved By

Installed By J. Bacchus
Geologist

Site Manager

CEARP Manager

Comments



WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 60-87

Coordinates N 39951.63 E 19938.52

Elevation: Ground Surface 5984.03'

Total Depth: Well 27.7'

Top of Casing 5985.96'

Borehole 32.0'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

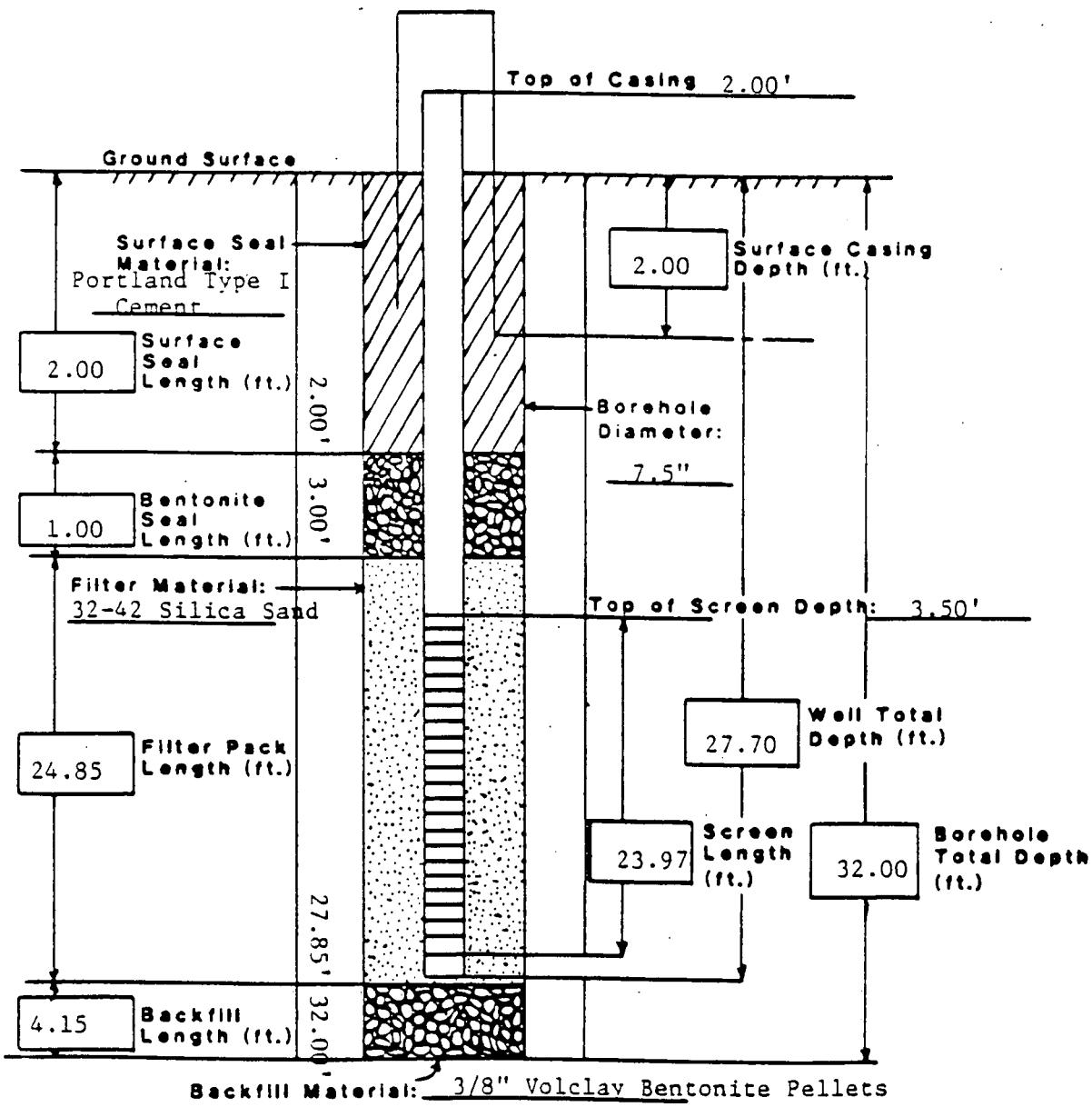
Date Installed November 20, 1987

Approved By _____ Site Manager

Installed By R. Treat, Geologist

_____ CEARP Manager

Comments _____



WELL COMPLETION INFORMATION

Location: Rocky Flats Plant; Landfill Area

Well No.: 61-87

Coordinates: N 39881.26 E 19974.80

Elevation: Ground Surface 5984.00'

Total Depth: Well 28.5'

Top of Casing 5985.75'

Borehole 34.0'

Formation of Completion: Rocky Flats Alluvium

Casing Material: Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter: 2" ID

Screen Material: 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter: 5" ID

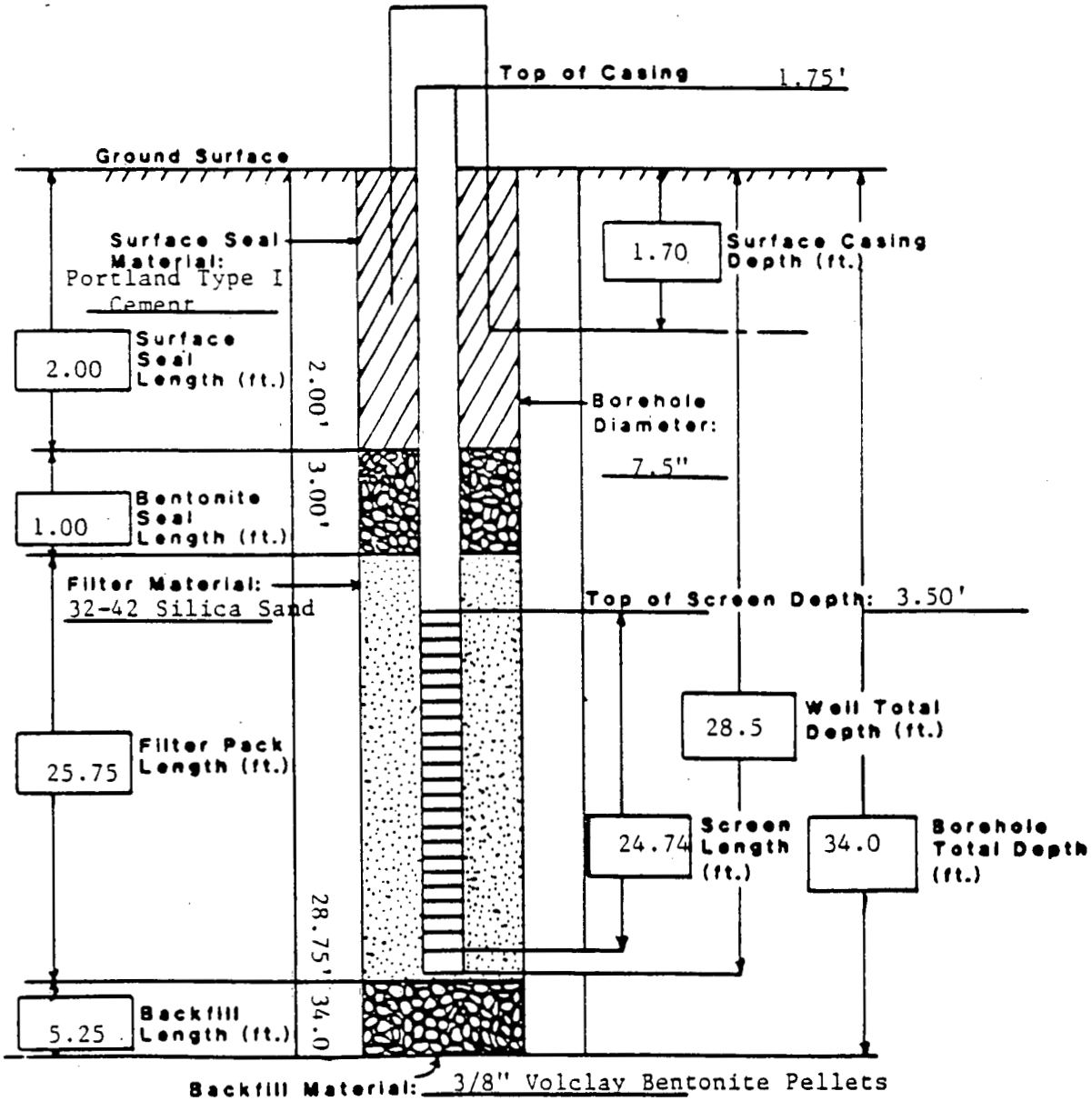
Date Installed: November 25, 1987

Approved By: _____ Site Manager

Installed By: J. Bacchus, Geologist

_____ CEARP Manager

Comments: _____



WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 62-87

Coordinates N 39821.22 E 19999.70

Elevation: Ground Surface 5984.16'

Total Depth: Well 26.80'

Top of Casing 5986.36'

Borehole 30.0'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed November 25, 1987

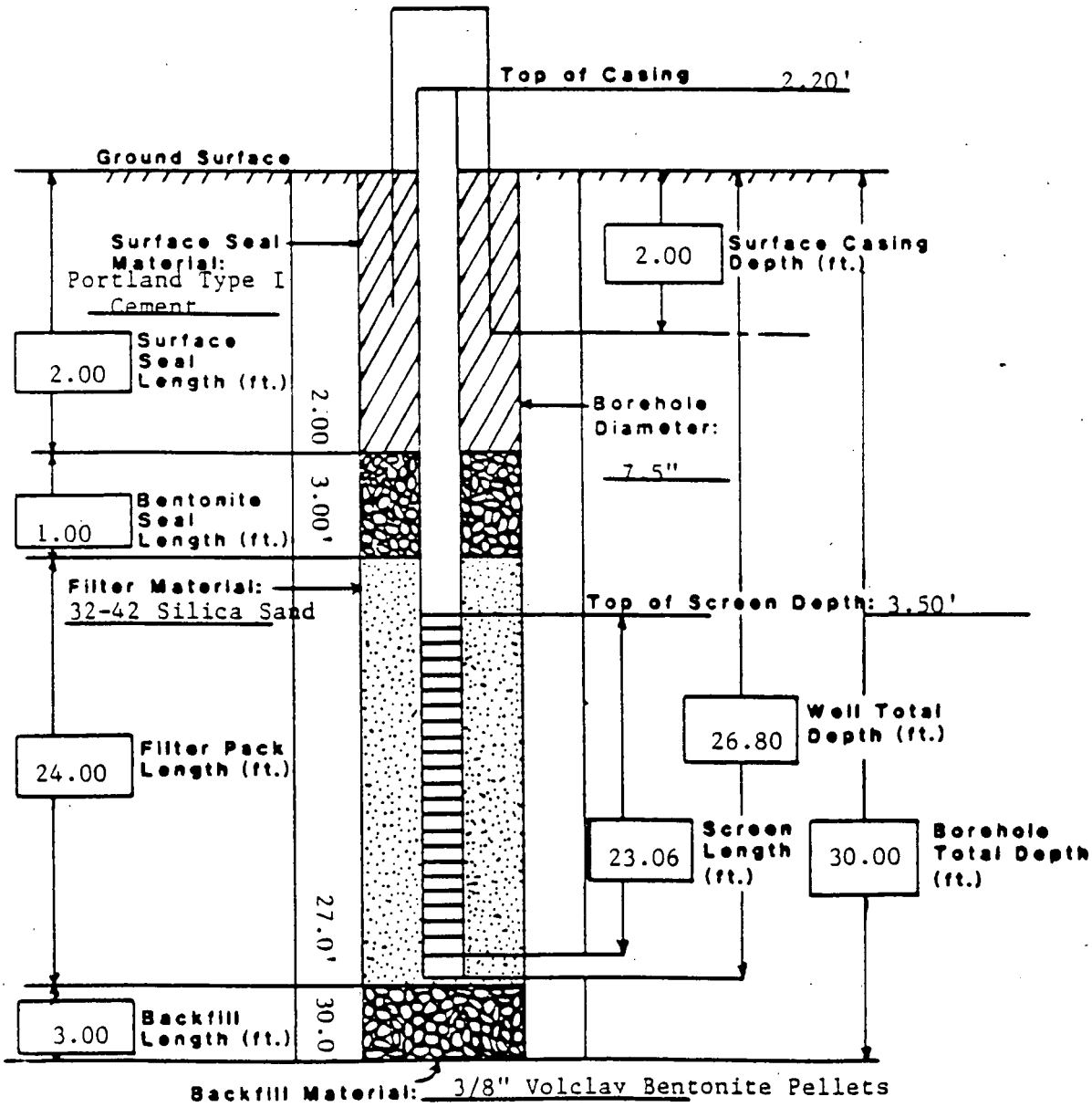
Approved By

Site Manager

Installed By R. Trear
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Coordinates N 39738.07 E 20040.50

Total Depth: Well 25.5'

Borehole 30.0'

Well No. 63-87

Elevation: Ground Surface 5985.42'

Top of Casing 5987.06'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed December 1, 1987

Approved By _____

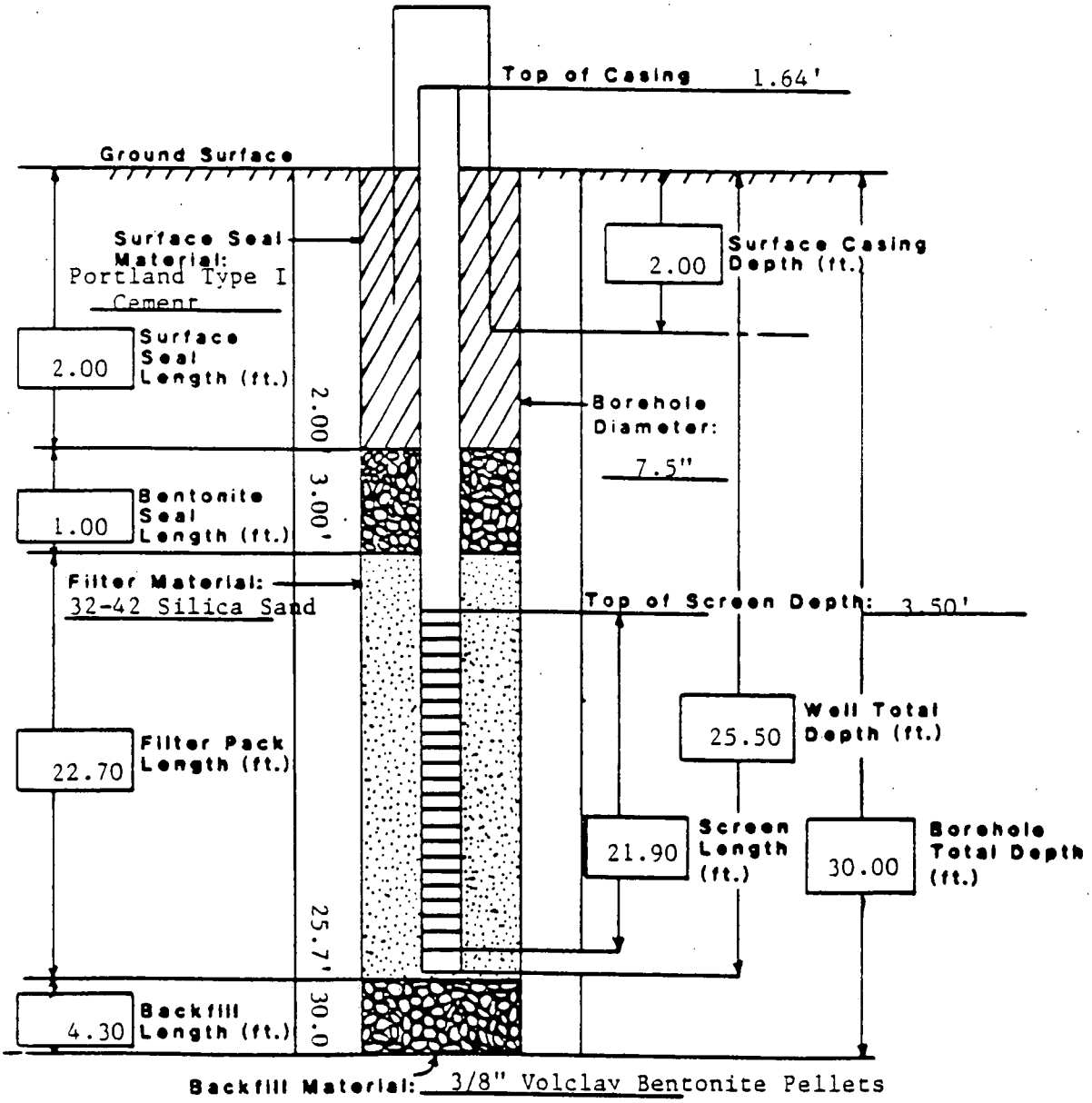
Site Manager

Installed By R. Treat

Geologist

CEARP Manager

Comments _____



WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 64-87

Coordinates N 39349.01 E 20162.23

Elevation: Ground Surface 5985.89'

Total Depth: Well 23.8'

Top of Casing 5987.33'

Borehole 28.0'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed December 4, 1987

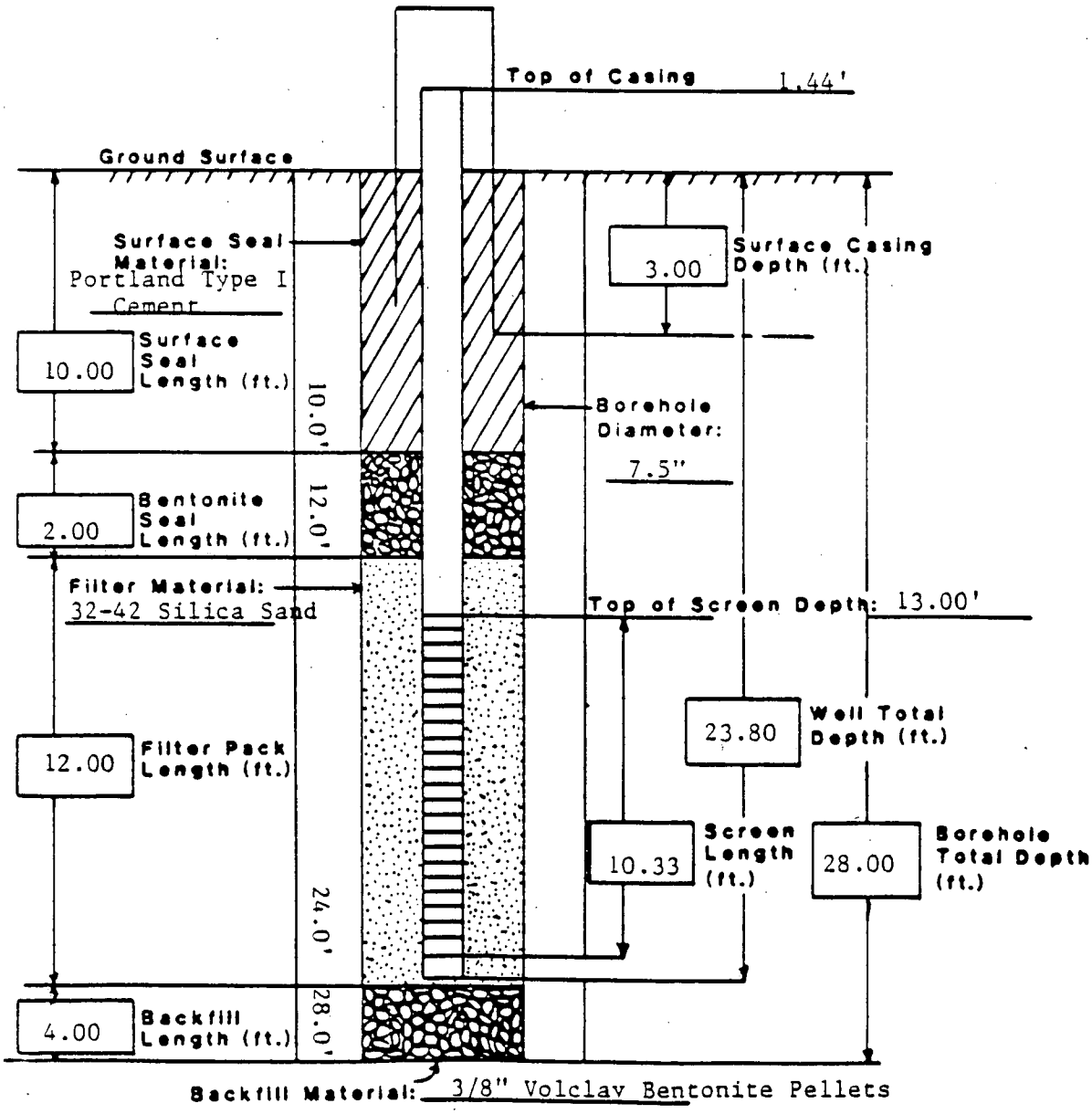
Approved By

Installed By R. Treat
Geologist

Site Manager

CEARP Manager

Comments



WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 65-87

Coordinates N 39250.14 E 20200.22

Elevation: Ground Surface 5983.08'

Total Depth: Well 24.2'

Top of Casing 5985.02'

Borehole 27.0'

Formation of Completion Rocky Flats Alluvium/ Weathered Arapahoe Formation

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed December 9,10, 1987

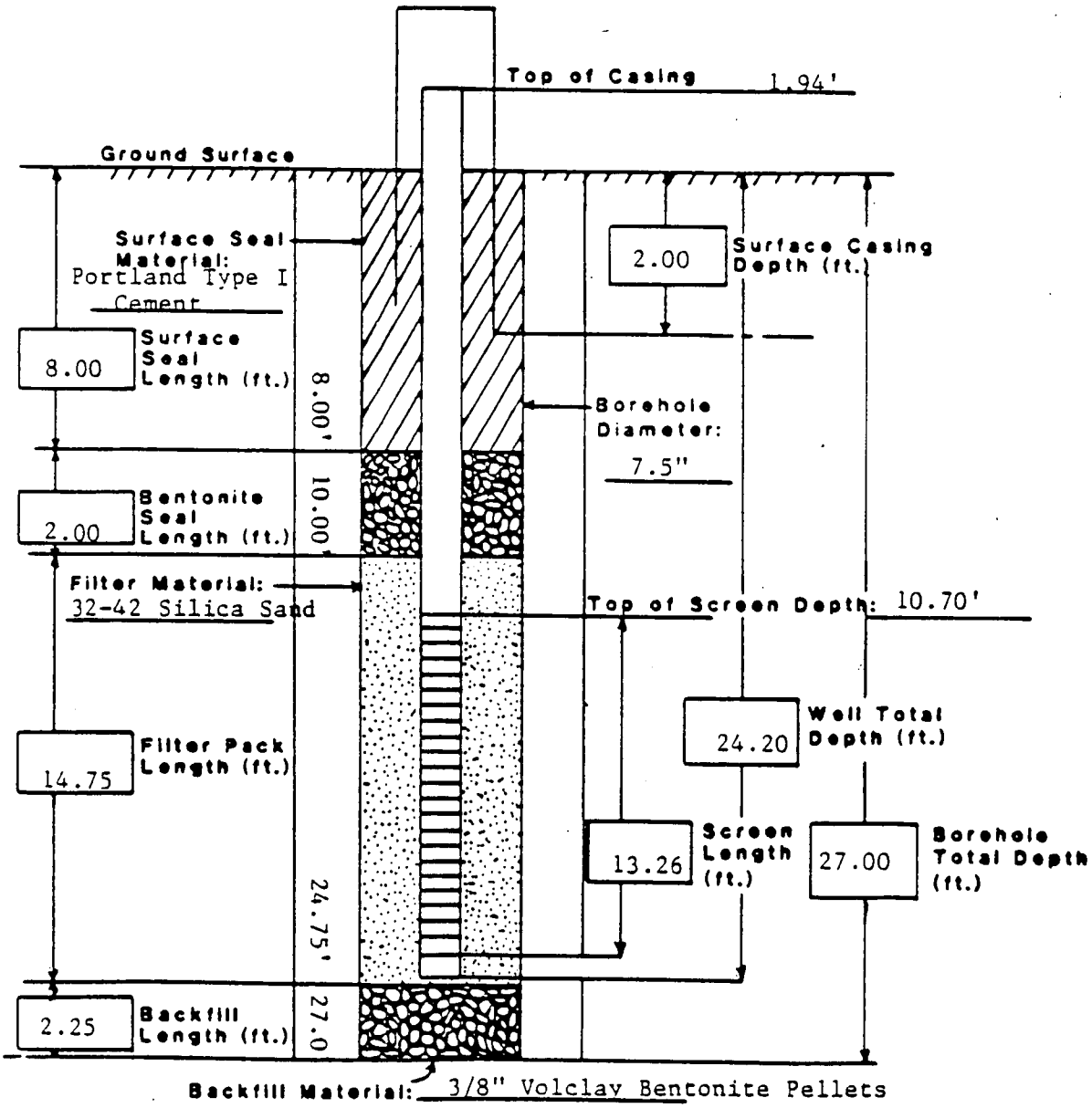
Approved By

Installed By R. Treat
Geologist

Site Manager

CEARP Manager

Comments



WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 66-87

Coordinates N 39170.26 E 20226.01

Elevation: Ground Surface 5981.90'

Total Depth: Well 18.20'

Top of Casing 5983.64'

Borehole 23.00'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed November 24, 1987

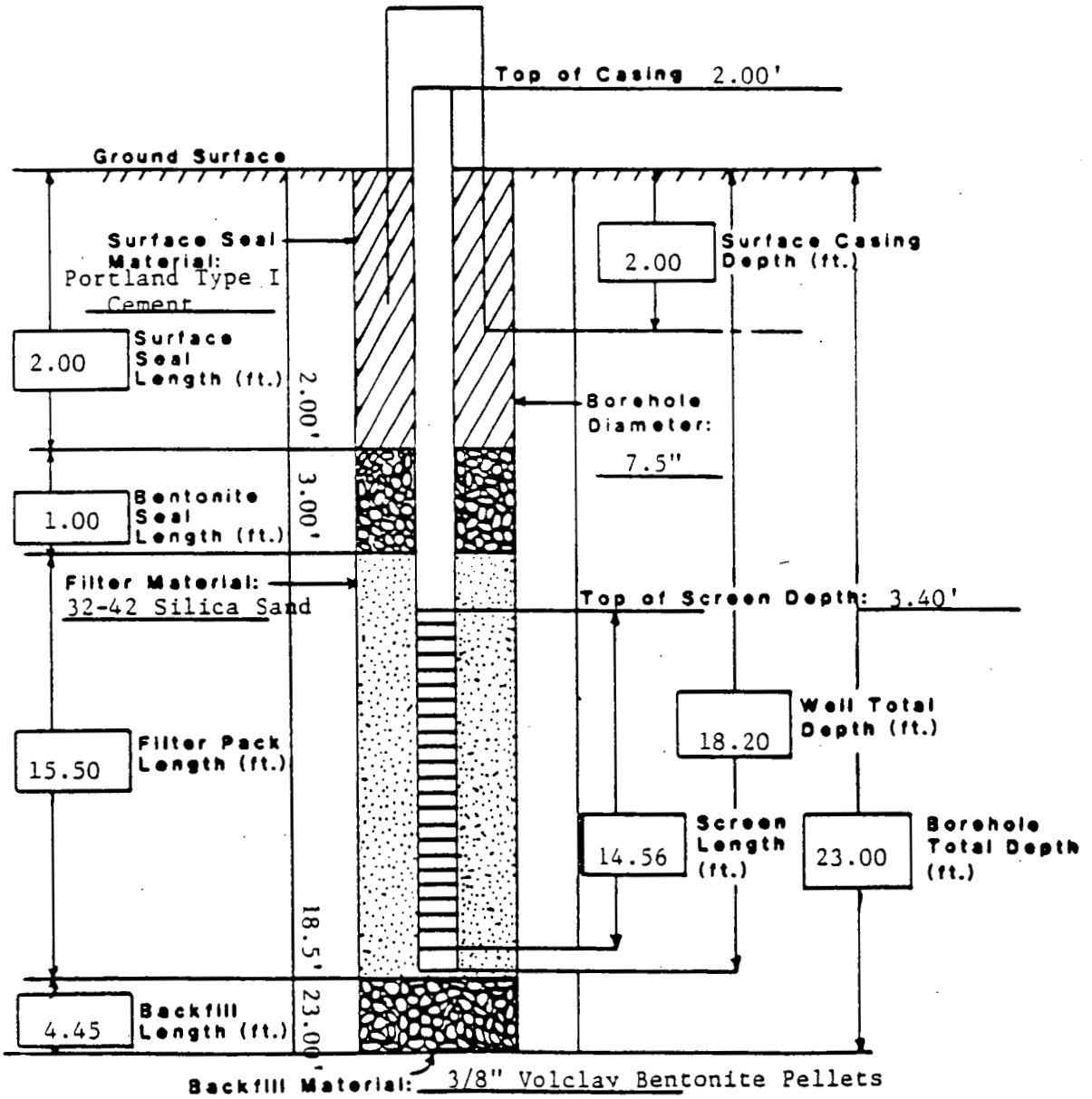
Approved By

Site Manager

Installed By R. Treat
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 67-87

Coordinates N 40182.78 E 20678.79

Elevation: Ground Surface 5969.50'

Total Depth: Well 16.8'

Top of Casing 5971.72'

Borehole 21.4'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed December 4, 1987

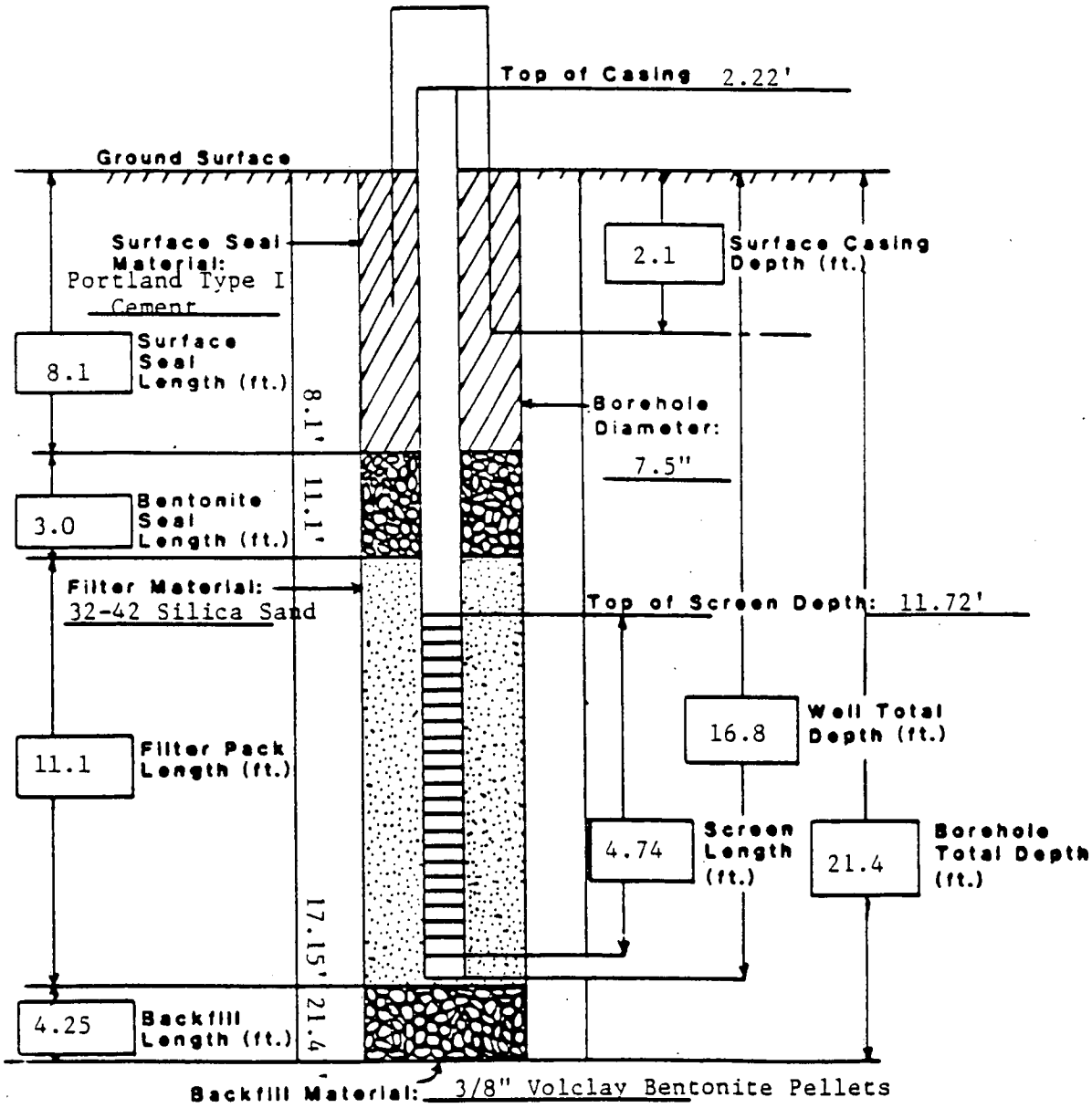
Approved By

Installed By J. Bacchus
Geologist

Site Manager

CEARP Manager

Comments



WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 68-87

Coordinates N 40163.59 E 20680.82

Elevation: Ground Surface 5968.48'

Total Depth: Well 16.0'

Top of Casing 5970.31'

Borehole 20.0'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed December 4 & 7, 1987

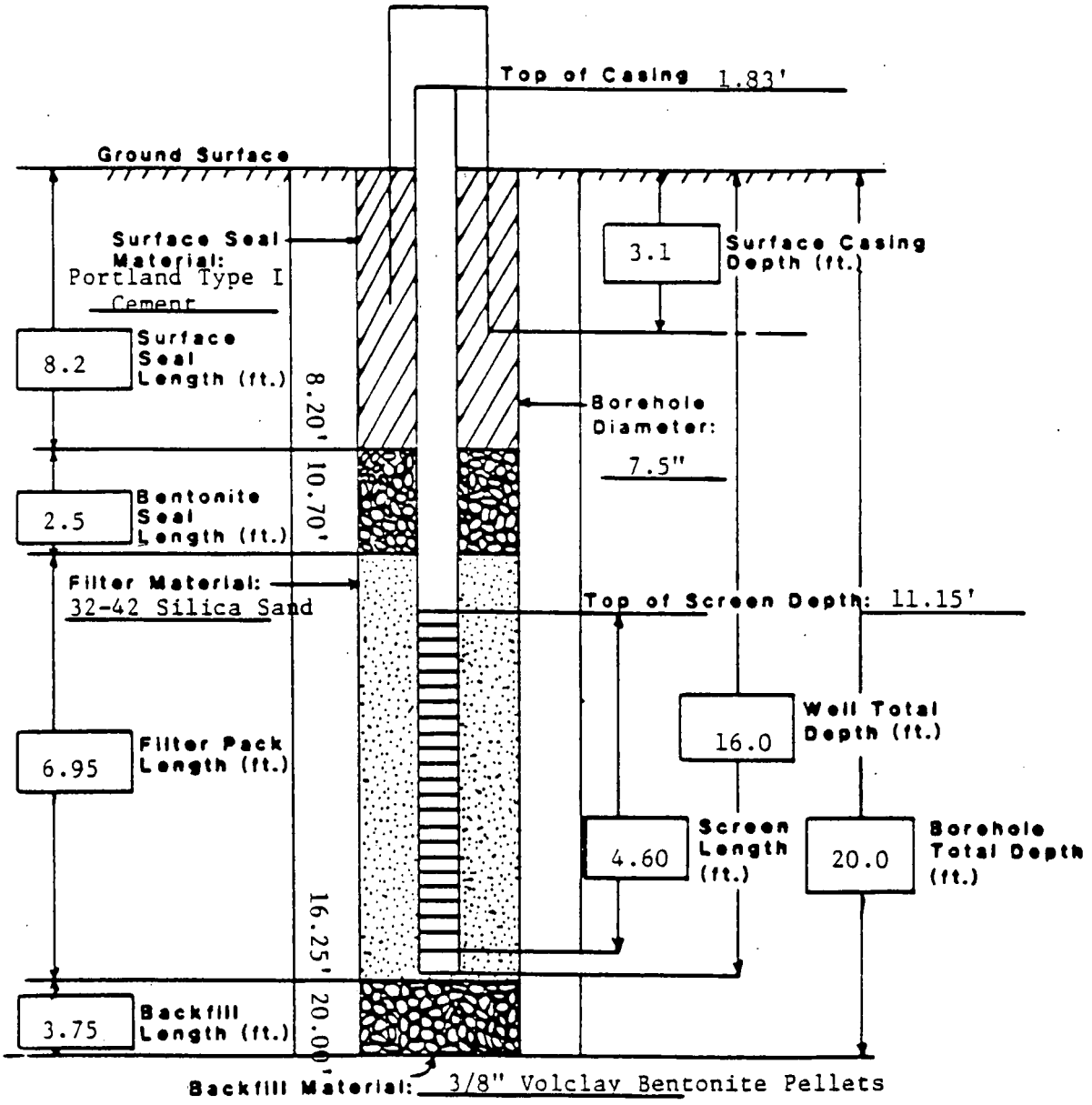
Approved By

Site Manager

Installed By J. Bacchus
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 70-87

Coordinates N 39588.09 E 21098.79

Elevation: Ground Surface 5966.30'

Total Depth: Well 16.5'

Top of Casing 5968.35'

Borehole 17.0'

Formation of Completion Rocky Flats Alluvium/ Weathered Arapahoe Formation

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed December 14, 1987

Approved By

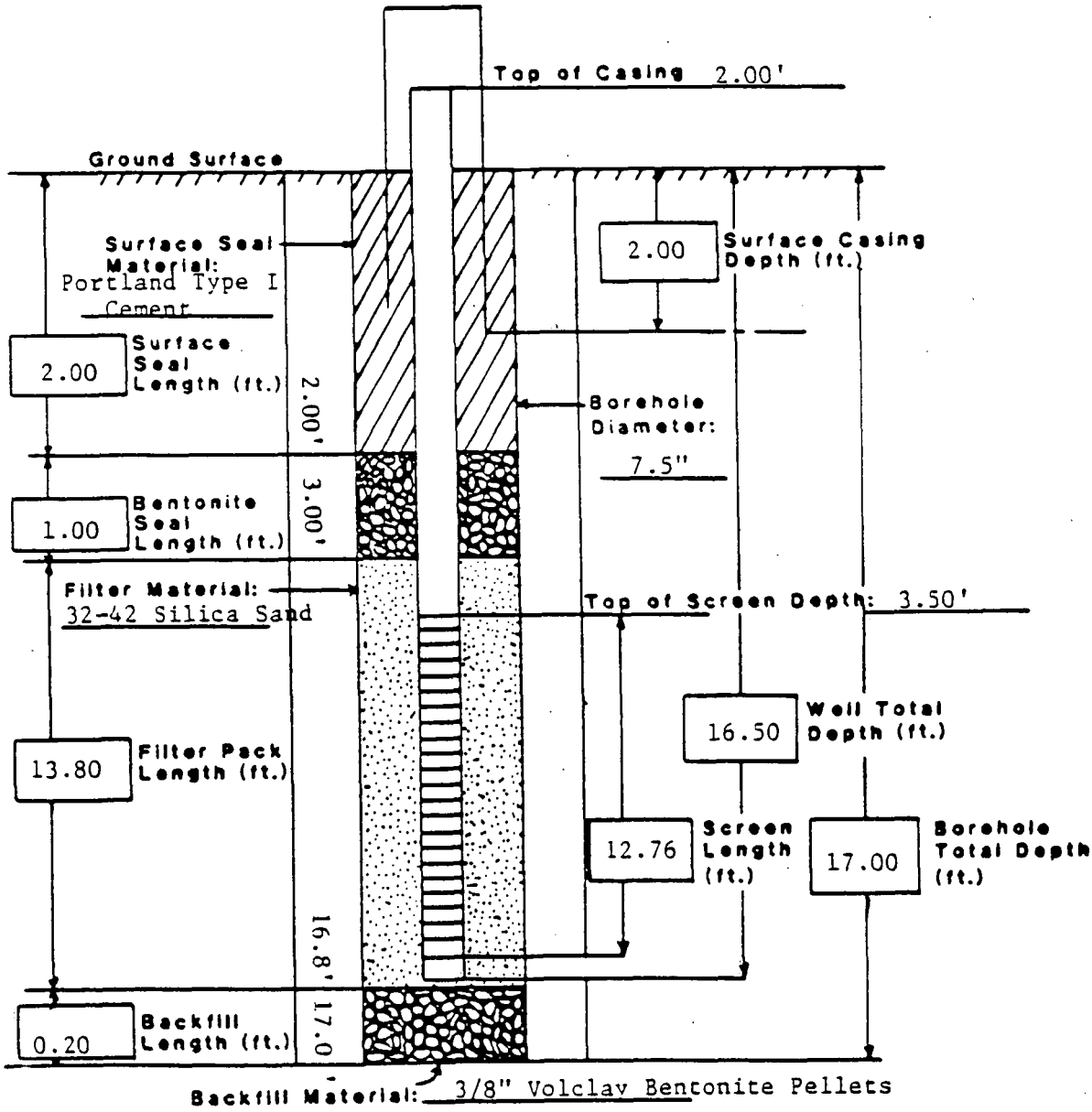
Site Manager

Installed By R. Treat

Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 71-87

Coordinates N 40339.90 E 20991.74

Elevation: Ground Surface 5963.39'

Total Depth: Well 13.85'

Top of Casing 5965.47'

Borehole 18.50'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

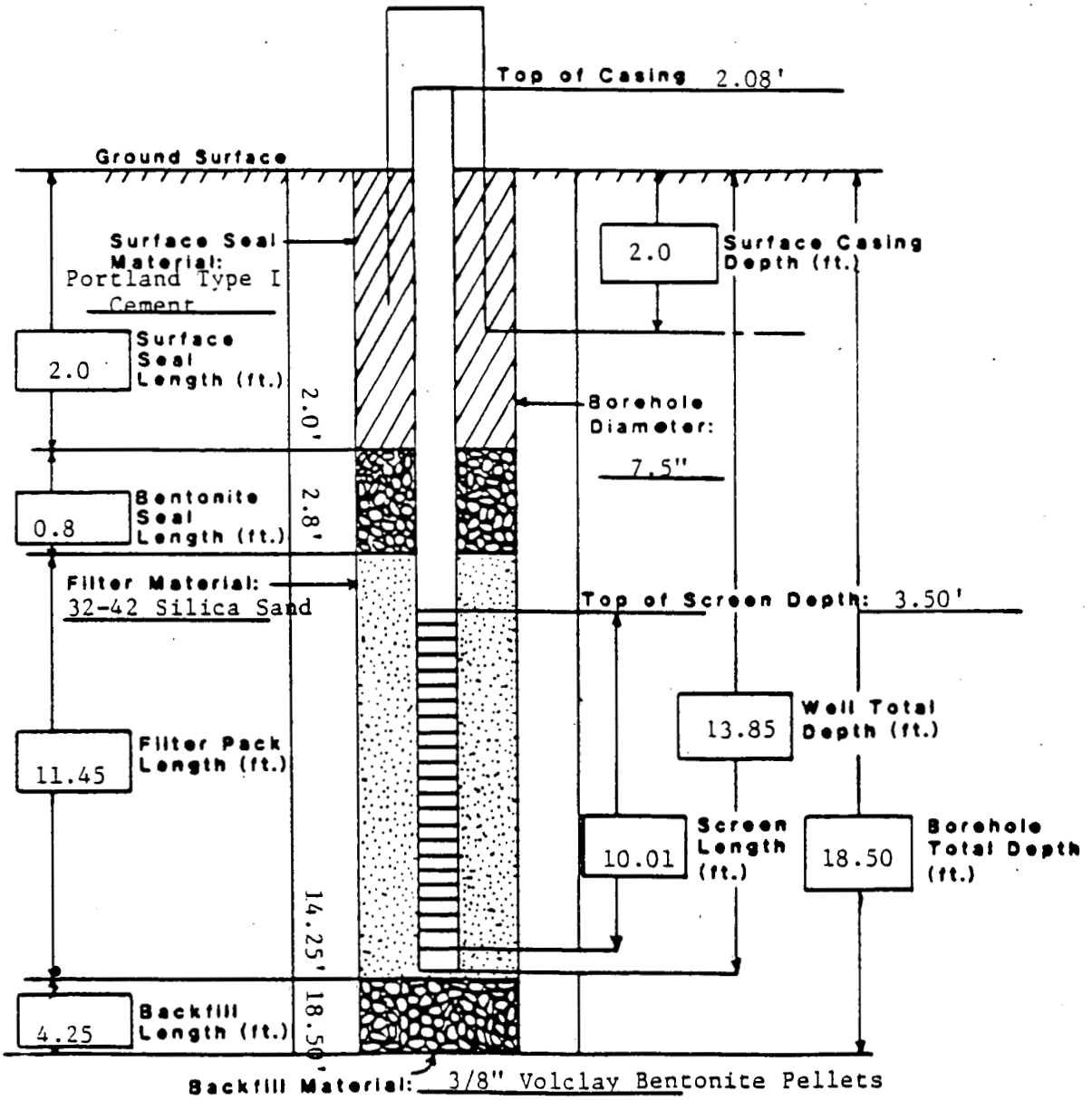
Date Installed December 11, 1987

Approved By _____ Site Manager

Installed By J. Bacchus Geologist

_____ CEARP Manager

Comments _____



WELL COMPLETION INFORMATION

Location Rocky Flats Plant; Landfill Area

Well No. 72-87

Coordinates N 39459.12 E 20855.24

Elevation: Ground Surface 5969.11'

Total Depth: Well 7.0'

Top of Casing 5971.18'

Borehole 15.0'

Formation of Completion Rocky Flats Alluvium

Casing Material Sch 5, Type 316, TFJ Stainless Steel

Casing Diameter 2" ID

Screen Material 0.010" wire wrap, Type 316, TFJ Stainless Steel

Surface Casing Diameter 5" ID

Date Installed December 17, 1987

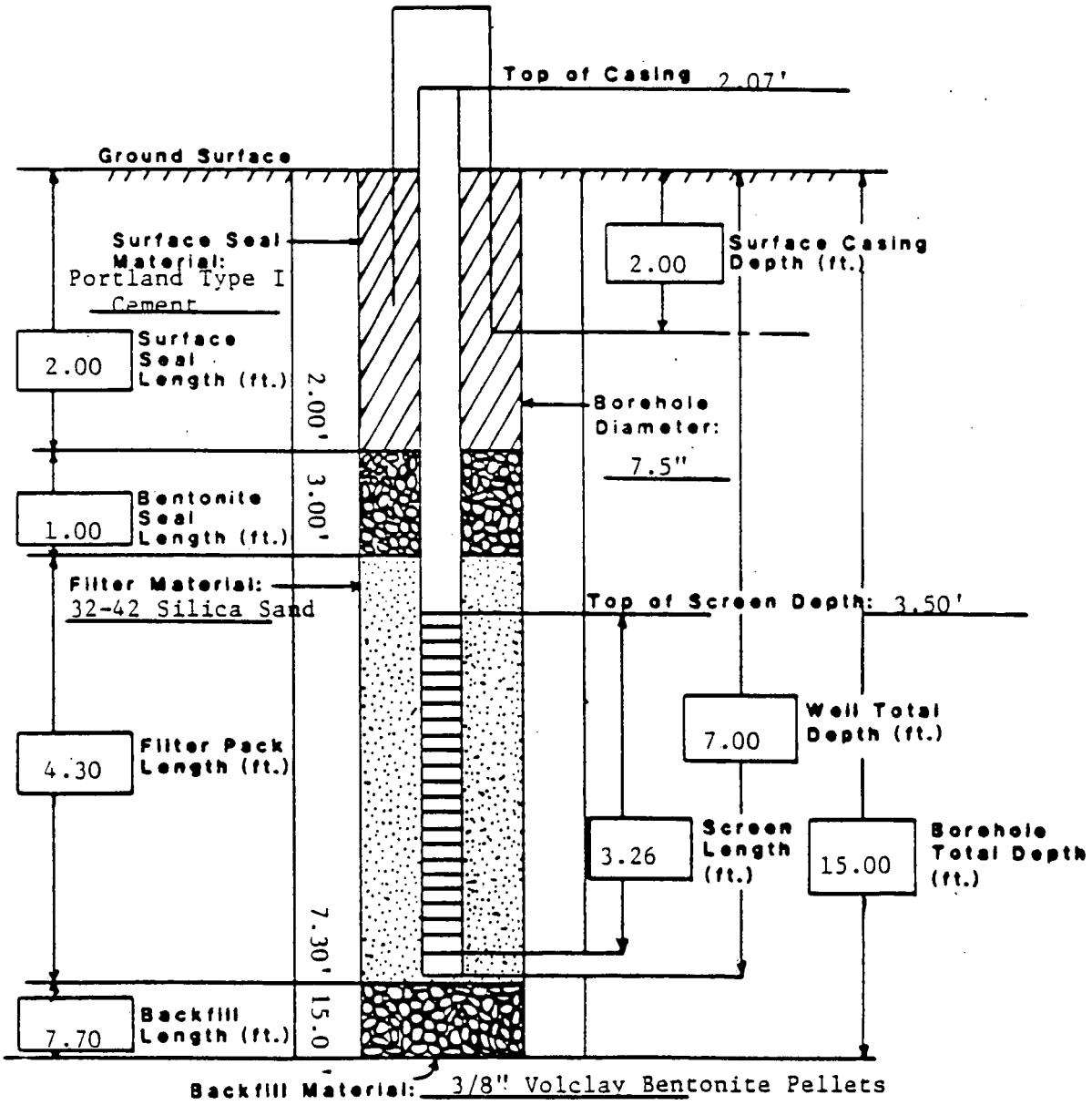
Approved By

Site Manager

Installed By R. Treat
Geologist

CEARP Manager

Comments



WELL COMPLETION INFORMATION

QA By/Date Karen Burman 15-19-99

Location Rocky Flats Plant; Landfill Area

Well No. B106089

Coordinates N 39332.69 E 19481.76 (RFP)

Elevation: Ground Surface 5993.3'

Total Depth: Well 24.47'

Top of Casing 5995.35'

Borehole 27.50'

Formation of Completion Rocky Flats Alluvium and Landfill

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.

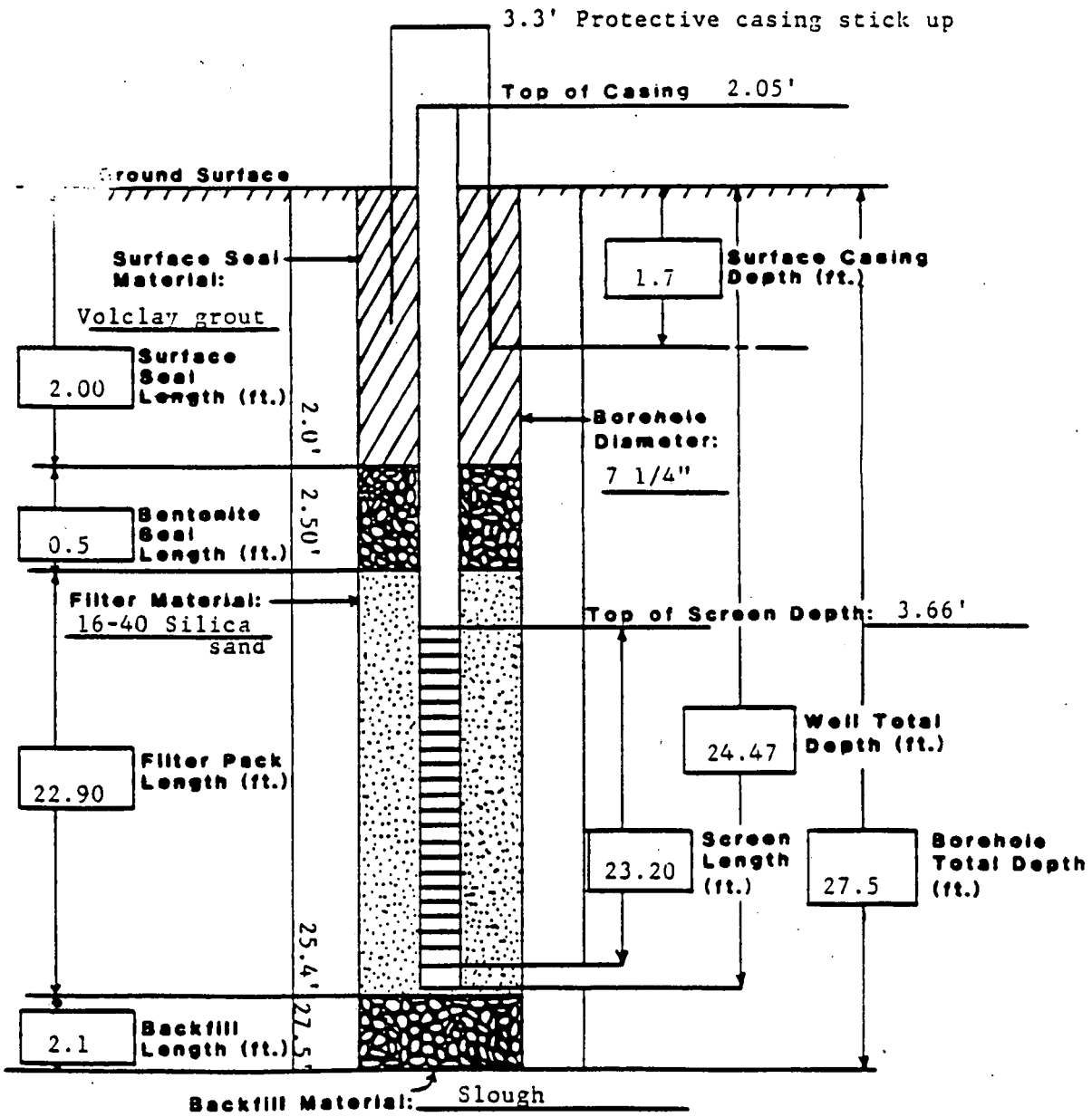
Date Installed 05/18/1989

Approved By Karen Burman
Site Manager

Installed By R.T. Treat
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 22.93' to 24.14' below ground surface.



WELL COMPLETION INFORMATION

QA By/Date Janell Burrian 10-2-89

Location Rocky Flats Plant; Landfill Area

Well No. 3206189

Coordinates N 39332.08 E 20202.58 (RFP)

Elevation: Ground Surface 5984.5'

Total Depth: Well 36.61'

Top of Casing 5986.57'

Borehole 45.0'

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.

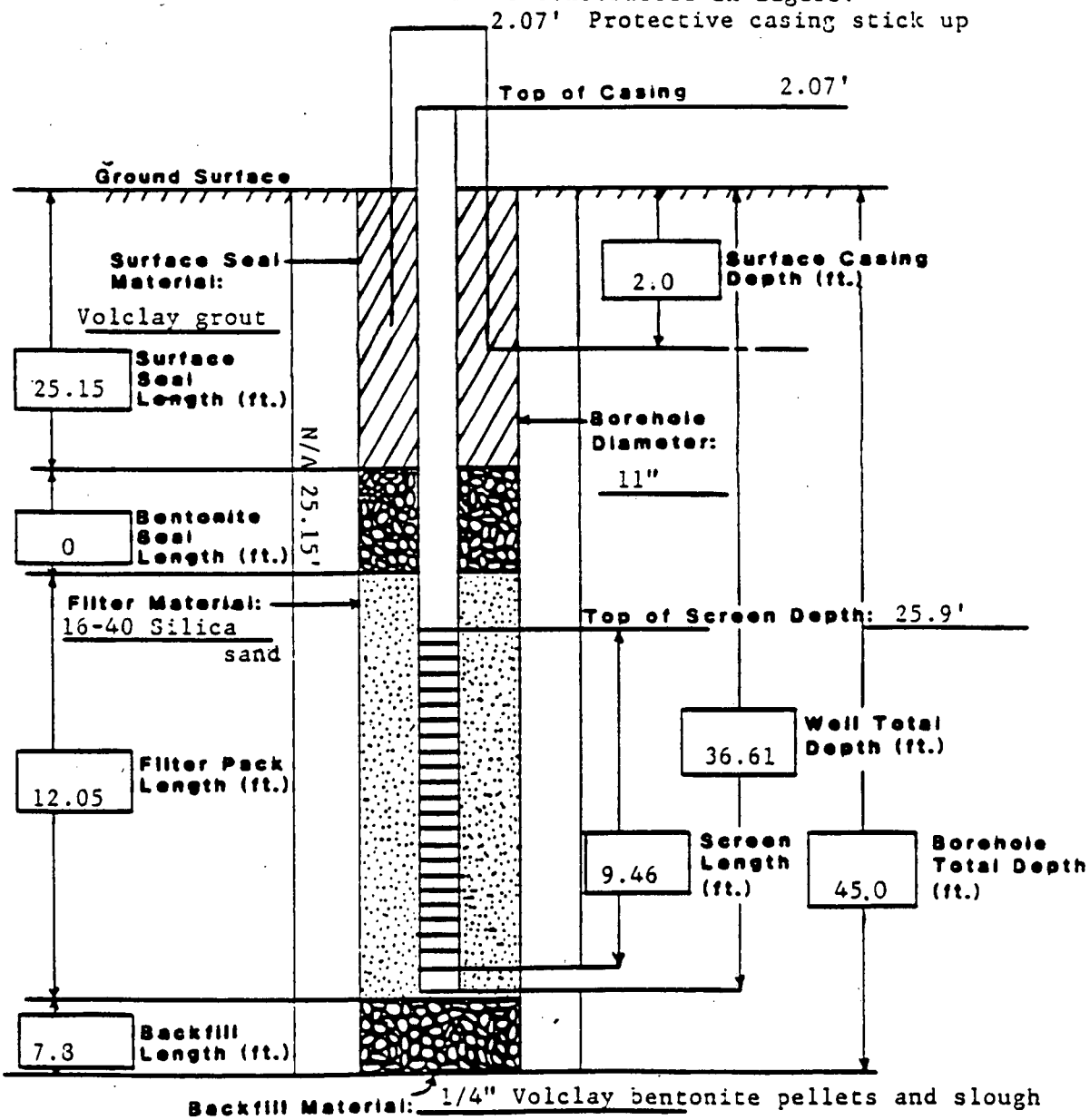
Date Installed 06/01/1989

Approved By Janell Burrian
Site Manager

Installed By S.P. Carpenter
Geologist

CEARP Manager

Comments Unable to set an upper bentonite pellet seal due to colloidial mixture above sand pack; volclay grout was placed above sand pack. No centralizer used. Well was constructed in augers.



Backfill Material: 1/4" Volclay bentonite pellets and slough

WELL COMPLETION INFORMATION

QA By/Date Farell Burman 15-2-89

Location Rocky Flats Plant; Landfill Area

Well No. B206289

Coordinates N 39272.29 E 20465.42 (RFP)

Elevation: Ground Surface 5977.59'

Total Depth: Well 43.05'

Top of Casing 5979.49'

Borehole 47.5'

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.

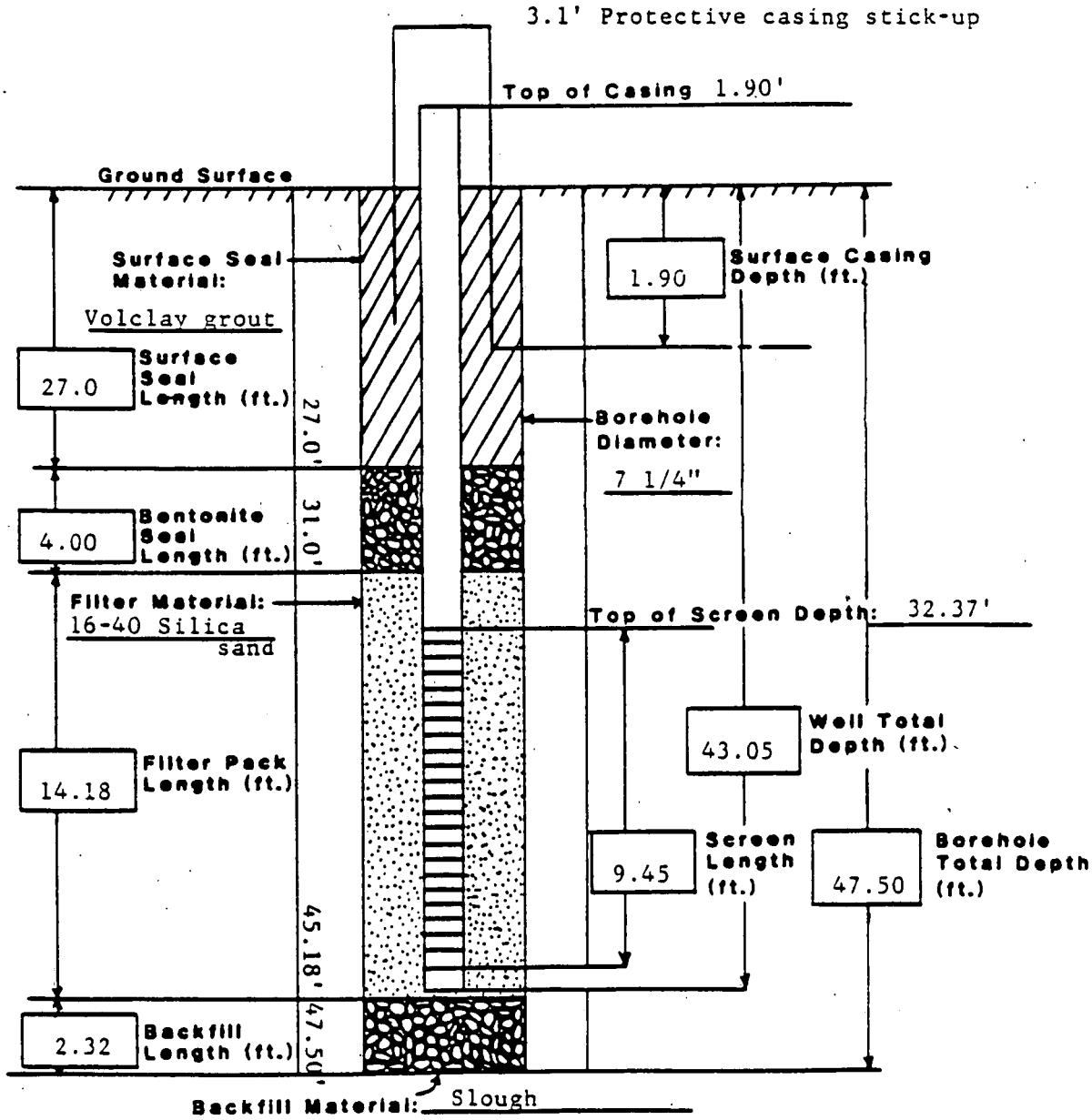
Date Installed 05/02/1989

Approved By Farell Burman
Site Manager

Installed By R.T. Treat
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 41.45' to 42.65' below ground surface.



WELL COMPLETION INFORMATION

QA By/Date Farell Burman 15-24-89

Location Rocky Flats Plant: Landfill Area **Well No.** 8206389

Coordinates N 39566.50 E 20828.68 **Elevation: Ground Surface** 5969.7'

Total Depth: Well 14.74' **Top of Casing** 5971.56'

Borehole 20.0'

Formation of Completion Rocky Flats Alluvium/Artifical Fill

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.

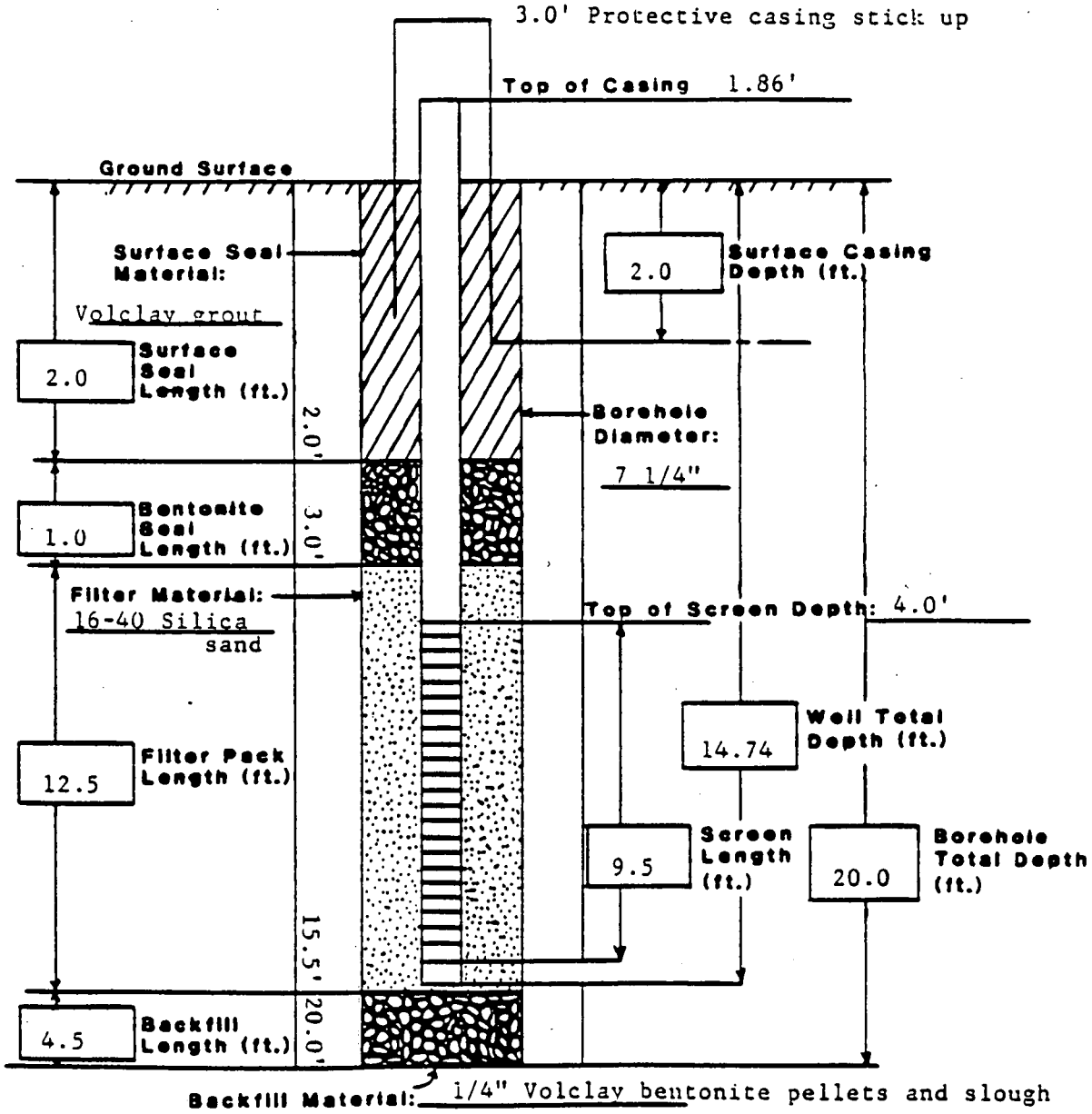
Date Installed 05/22/1989 **Approved By** Farell Burman

Installed By S.P. Carpenter **Site Manager**

Geologist

CEARP Manager

Comments Set stainless steel centralizer from 13.27' to 14.47' below ground surface.



WELL COMPLETION INFORMATION

QA By/Date Janell Burman 5-5-89

Location Rocky Flats Plant; Landfill Area

Well No. B206489

Coordinates N 39445.20 E 20865.79 (RFP)

Elevation: Ground Surface 5969.14'

Total Depth: Well 11.35'

Top of Casing 5971.46'

Borehole 41.50'

Formation of Completion Rocky Flats Alluvium/ 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.

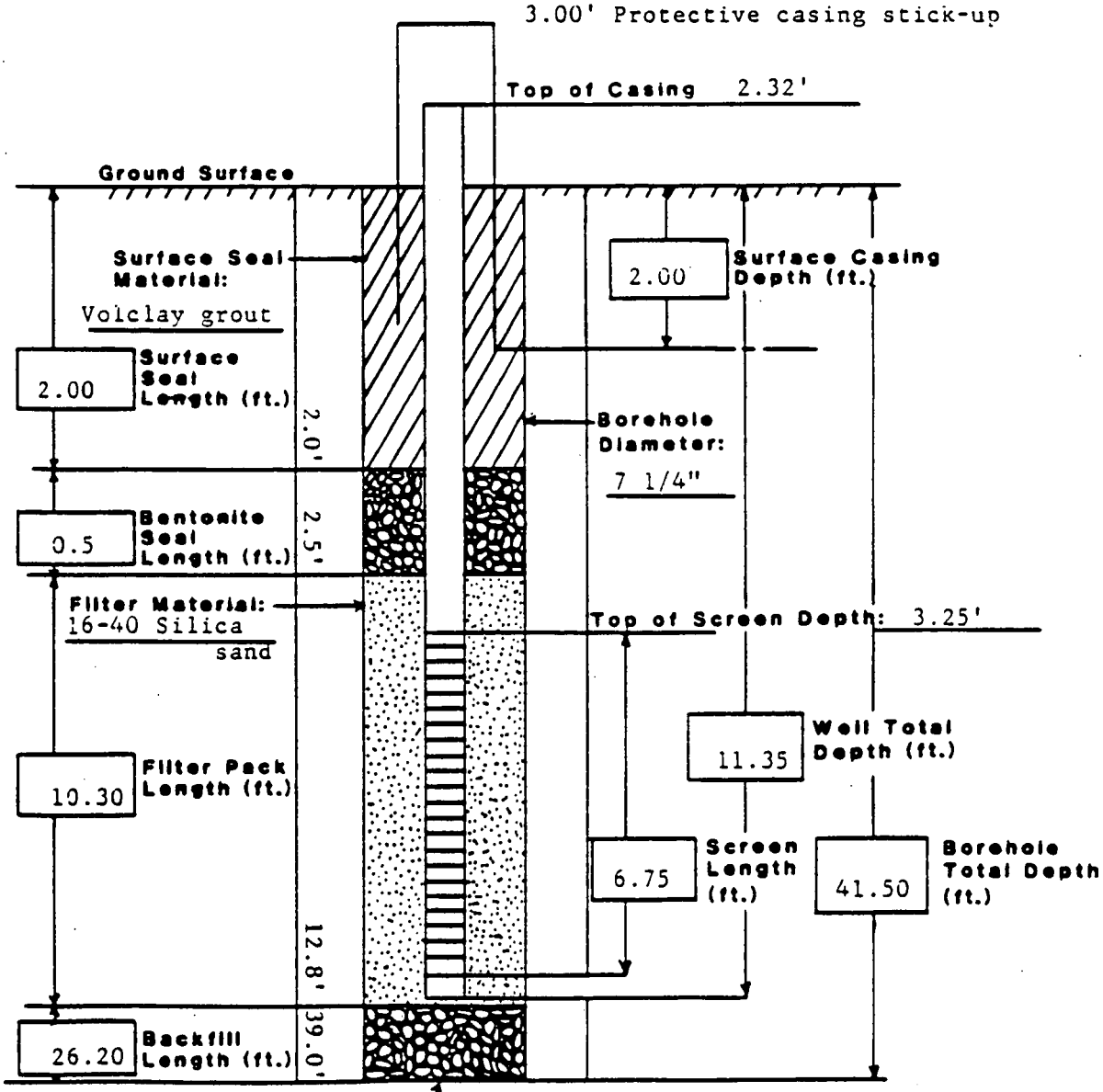
Date Installed 05/04/1989

Approved By Janell Burman
Site Manager

Installed By R.T. Treat
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 9.85' to 11.05' below ground surface.



Backfill Material: 1/4" Volclay bentonite pellets

WELL COMPLETION INFORMATION

QA By/Date Jane Burman / 5-10-89

Location Rocky Flats Plant; Landfill Area

Well No. B206589

Coordinates N 39475.67 E 21023.37 (RFP)

Elevation: Ground Surface 5967.80'

Total Depth: Well 36.24'

Top of Casing 5969.72'

Borehole 41.50'

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.

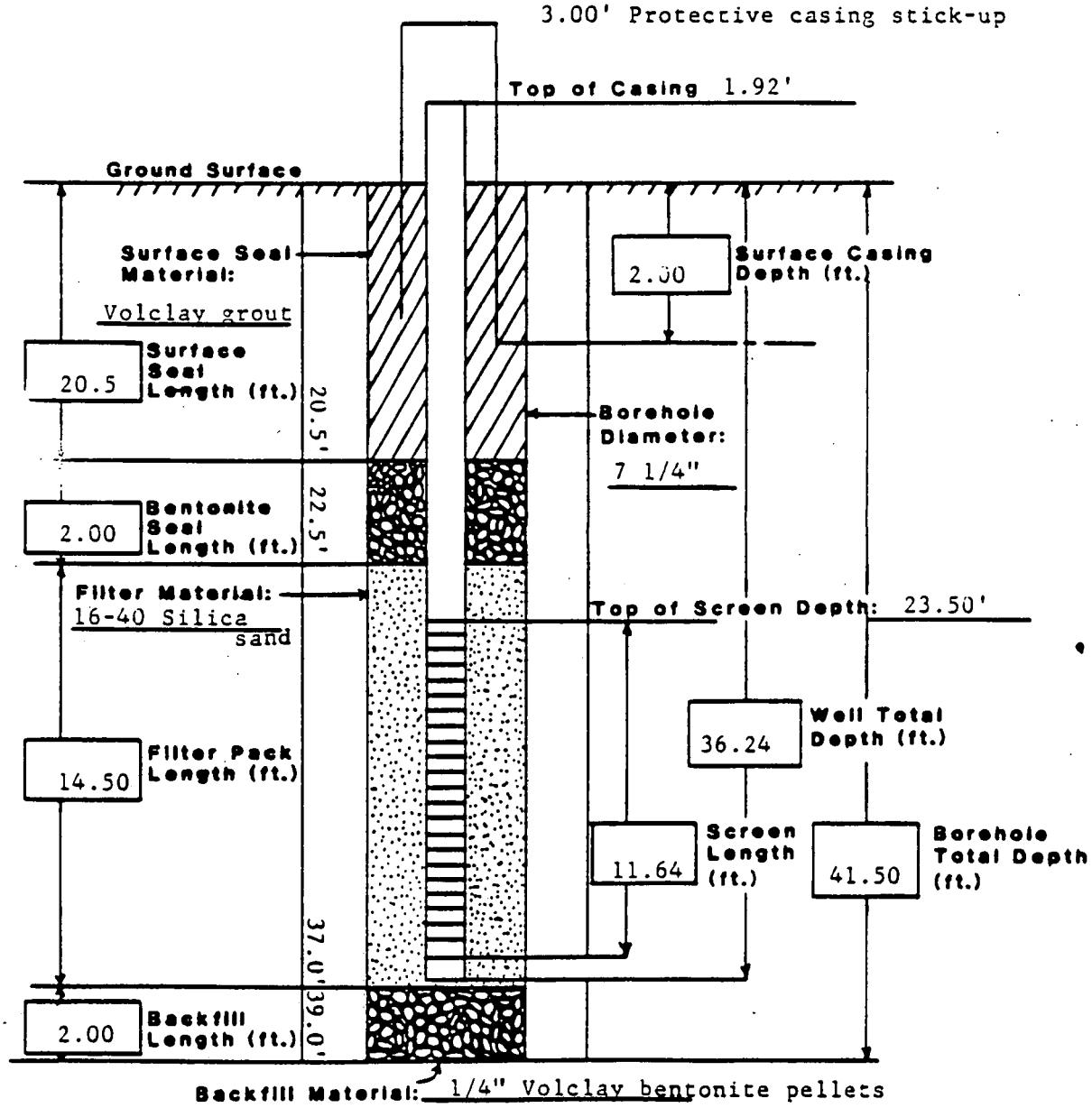
Date Installed 05/05/1989

Approved By Jane Burman
Site Manager

Installed By R.T. Treat
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 34.62' to 35.82' below ground surface.



Backfill Material: 1/4" Volclay bentonite pellets

WELL COMPLETION INFORMATION

QA By/Date Farell Burman 15-2-89

Location Rocky Flats Plant; Landfill Area **Well No.** B206689

Coordinates N 39605.08 E 21263.69 (RFP) **Elevation: Ground Surface** 5959.31'

Total Depth: Well 19.41' **Top of Casing** 5961.20'

Borehole 21.7'

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.

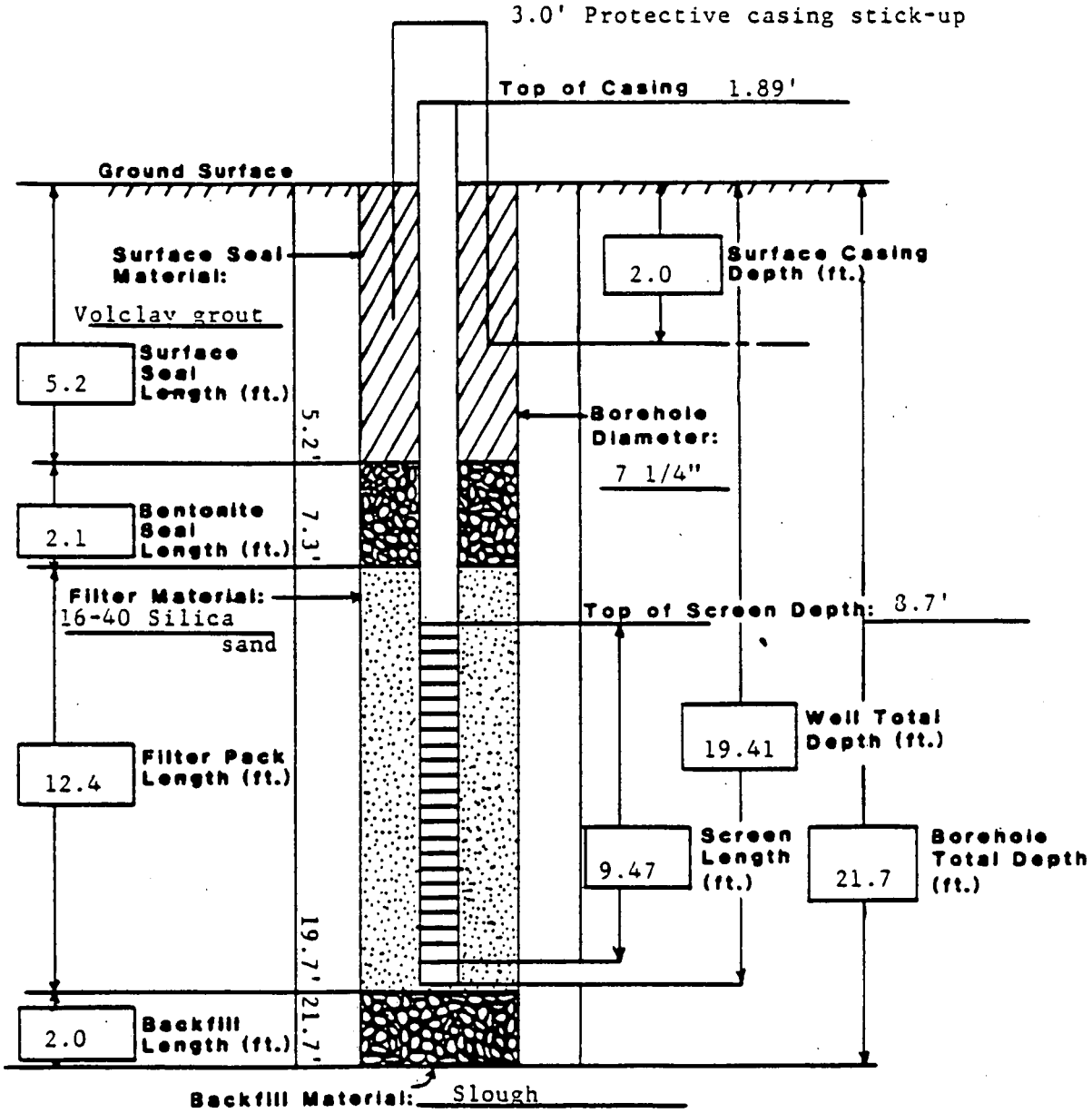
Date Installed 04/28/1989 **Approved By** Farell Burman

Installed By E.M. Hill **Site Manager**

Geologist

CEARP Manager

Comments Placed stainless steel centralizer from 18.09' to 19.29' below ground surface.



WELL COMPLETION INFORMATION

QA By/Date Jarell Burman 15-24-89

Location Rocky Flats Plant; Landfill Area

Well No. B206789

Coordinates N 39836.16 E 21064.34 (RFP)

Elevation: Ground Surface 5927.9'

Total Depth: Well 20.52'

Top of Casing 5930.19'

Borehole 30.0'

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.

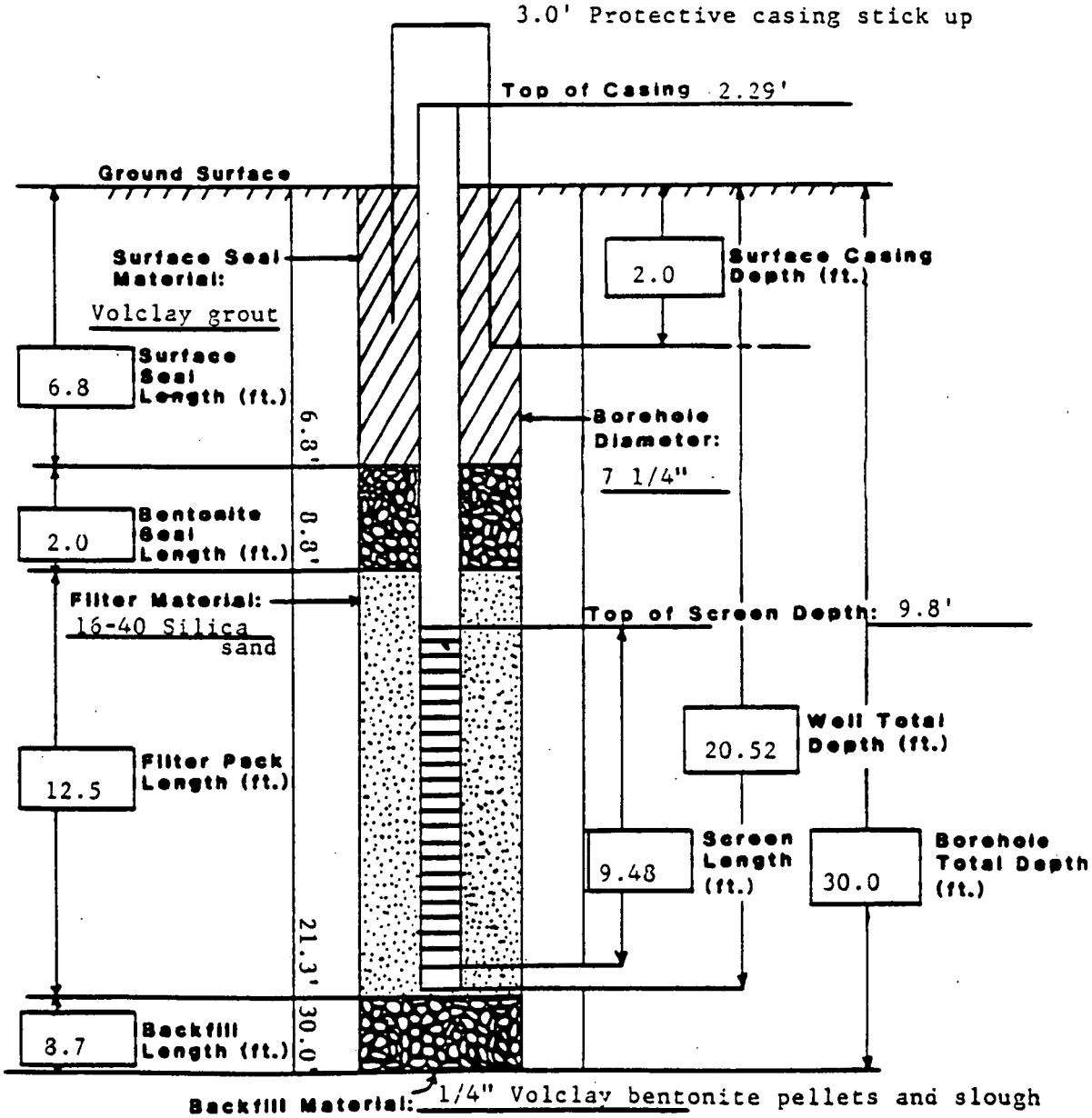
Date Installed 05/23/1989

Approved By Jarell Burman
Site Manager

Installed By S.P. Carpenter
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 19.01' to 20.24' below ground surface.



WELL COMPLETION INFORMATION

QA By/Date Jarell Burman 15-8-89

Location Rocky Flats Plant; Landfill Area

Well No. B206889

Coordinates N 39838.69 E 21684.46 (RFP)

Elevation: Ground Surface 5917.09'

Top of Casing 5919.15'

Total Depth: Well 18.2'

Borehole 19.5'

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.

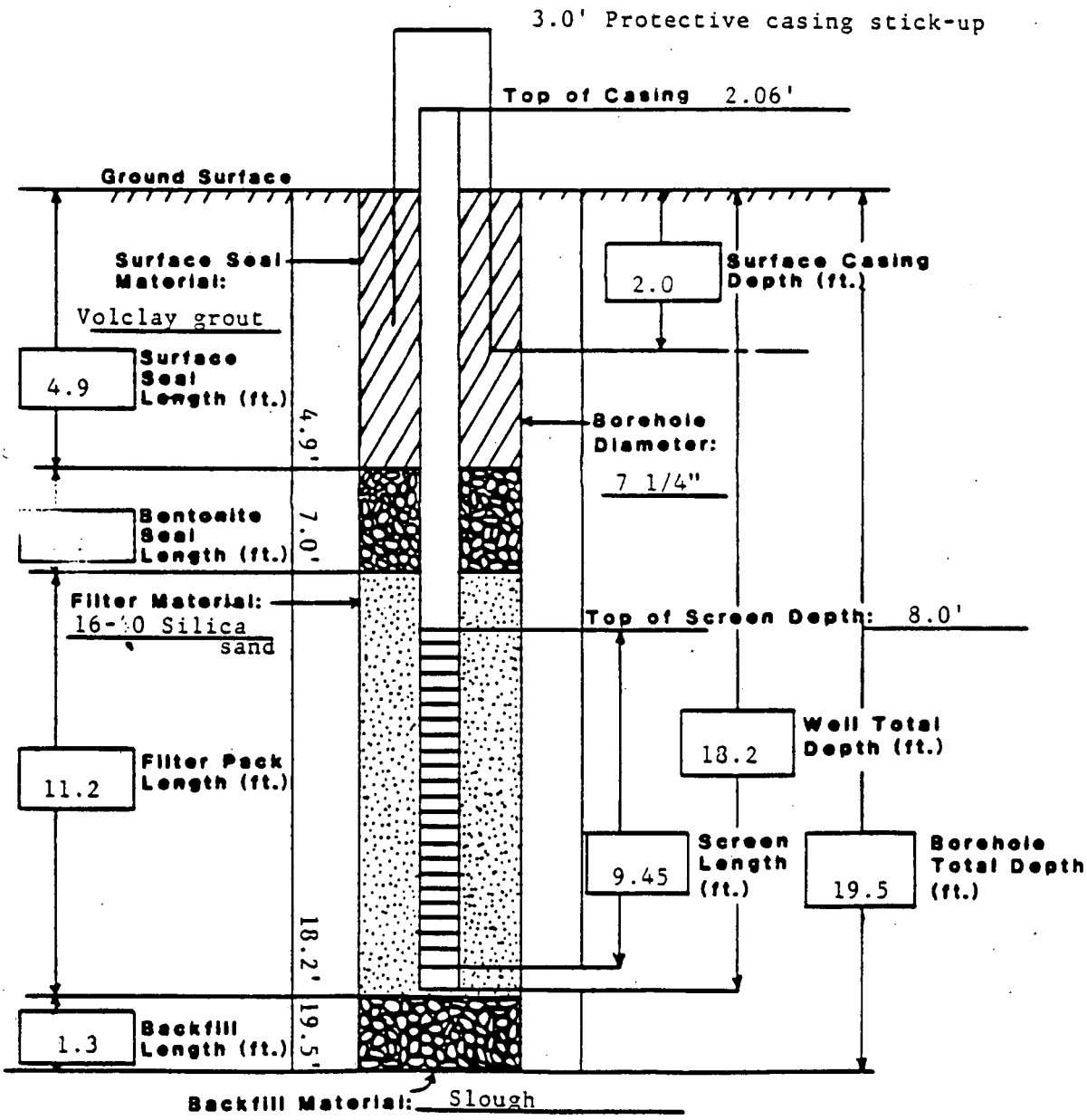
Date Installed 04/27/1989

Approved By Jarell Burman
Site Manager

Installed By E.M. Hill
Geologist

CEARP Manager

Comments Placed stainless steel centralizer from 16.75' to 18.0' below ground surface.



WELL COMPLETION INFORMATION

QA By/Date Farell Burman 14-24-89

Location Rocky Flats Plant; Land Fill Area

Well No. B206989

Coordinates N 40160.69 E 21739.67 (RFP)

Elevation: Ground Surface 5882.42'

Top of Casing 5884.32'

Total Depth: Well 22.5'

Borehole 23.6'

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.

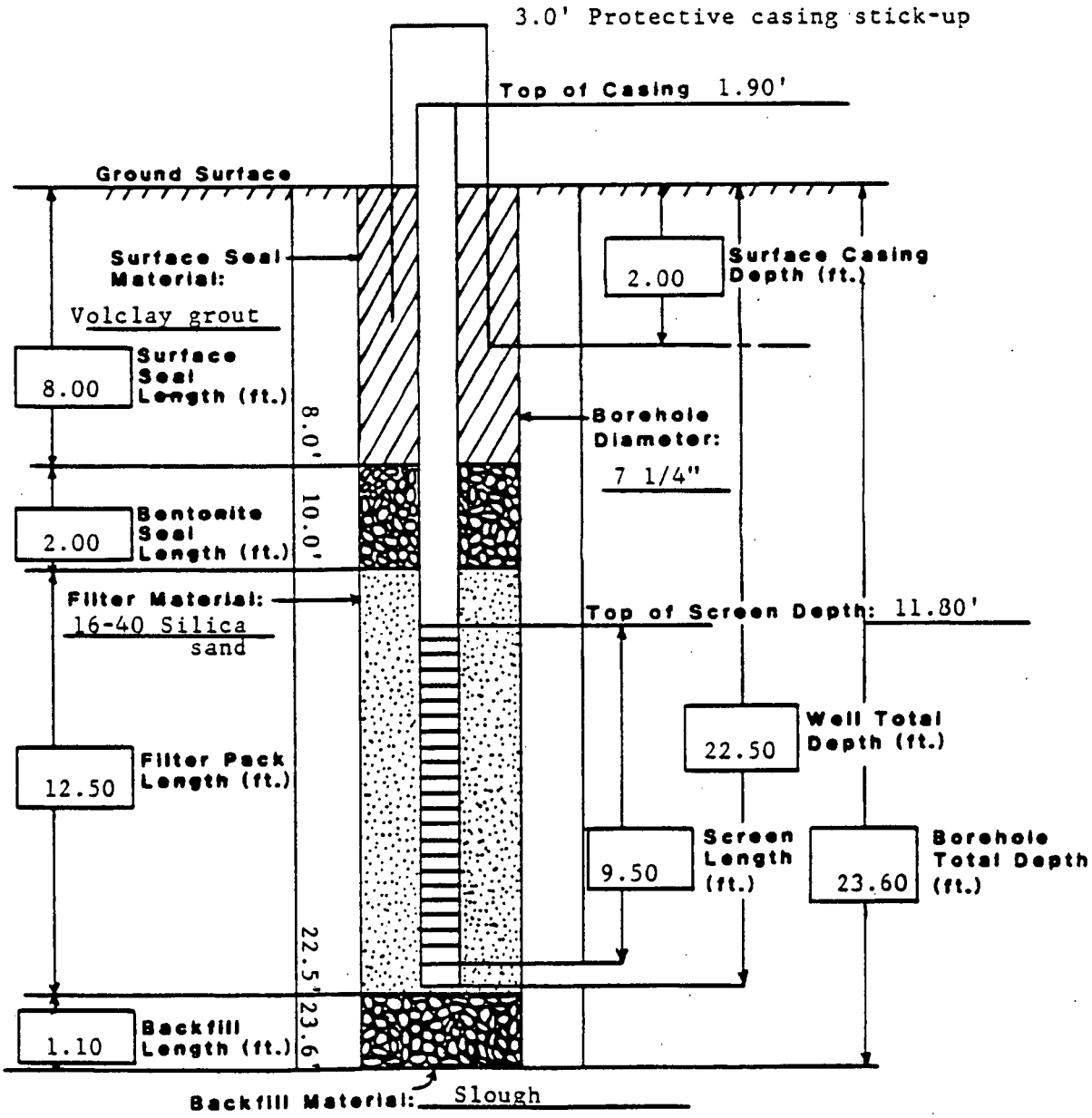
Date Installed 04/20/1989

Approved By Farell Burman
Site Manager

Installed By R.T. Treat
Geologist

CEARP Manager

Comments Set stainless steel centralizer from 21.10' to 22.30' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Jarell Burman 11-26-89

Location Rocky Flats Plant: Land Fill Area **Well No.** B207089

Coordinates N 40113.58 E 21741.54 (RFP) **Elevation: Ground Surface** 5883.07'

Total Depth: Well 54.0' **Top of Casing** 5884.95'

Borehole 60.0'

Formation of Completion Unweathered 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.

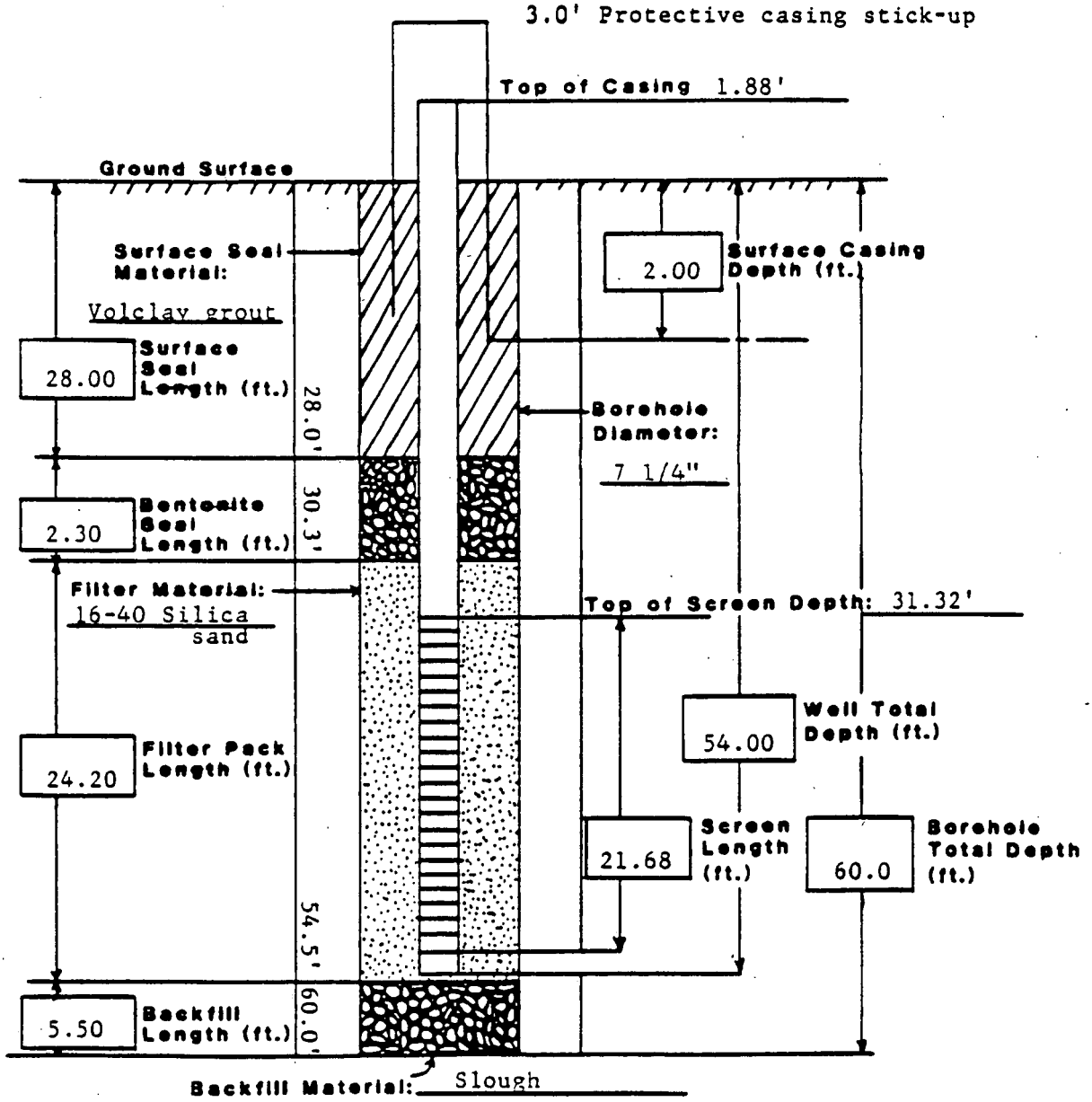
Date Installed 04/25/1989 **Approved By** Jarell Burman

Installed By R.T. Treat
Geologist

Site Manager

CEARP Manager

Comments Set stainless steel centralizer from 52.6' to 53.8' below ground surface



WELL COMPLETION INFORMATION

QA By/Date Farrell German 11-29-89

Location Rocky Flats Plant; Landfill Area **Well No.** B207189

Coordinates N 40107.09 E 21741.74 (RFP) **Elevation: Ground Surface** 5884.80'

Total Depth: Well 77.76' **Top of Casing** 5886.72'

Borehole 259' clayshale

Formation of Completion Unweathered Sandstone

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

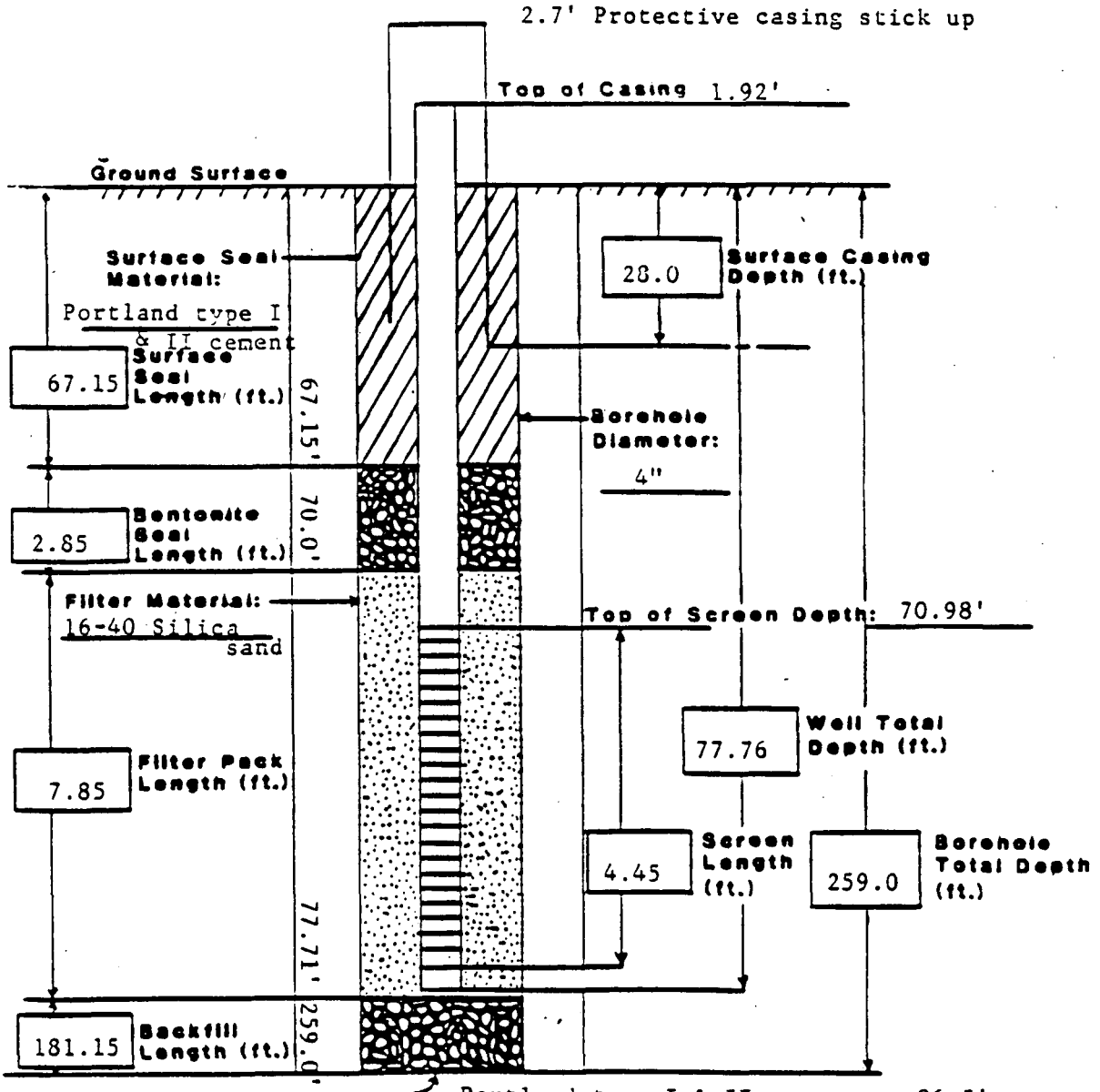
Screen Material Schedule 80 10-slotted PVC **Surface Casing Diameter** 5 5/8" O.D.

Date Installed 06/19 & 06/20/1989 **Approved By** Farrell German, Site Manager

Installed By H.G. Bienkowski, Geologist

CEARP Manager

Comments No centralizer used. Well was constructed inside drill rods.



Backfill Material: Portland type I & II cement to 86.5';
1/4" Voiclay bentonite pellets 86.5' to 77.85'
16-40 Silica sand from 77.85' to well lid

WELL COMPLETION INFORMATION

QA By/Date Jarell Bryman 14-28-89

Location Rocky Flats Plant; Landfill Area

Well No. B207289

Coordinates N 40284.53 E 21264.93 (RFP)

Elevation: Ground Surface 5948.27'

Total Depth: Well 15.89'

Top of Casing 5950.49'

Borehole 19.5'

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.

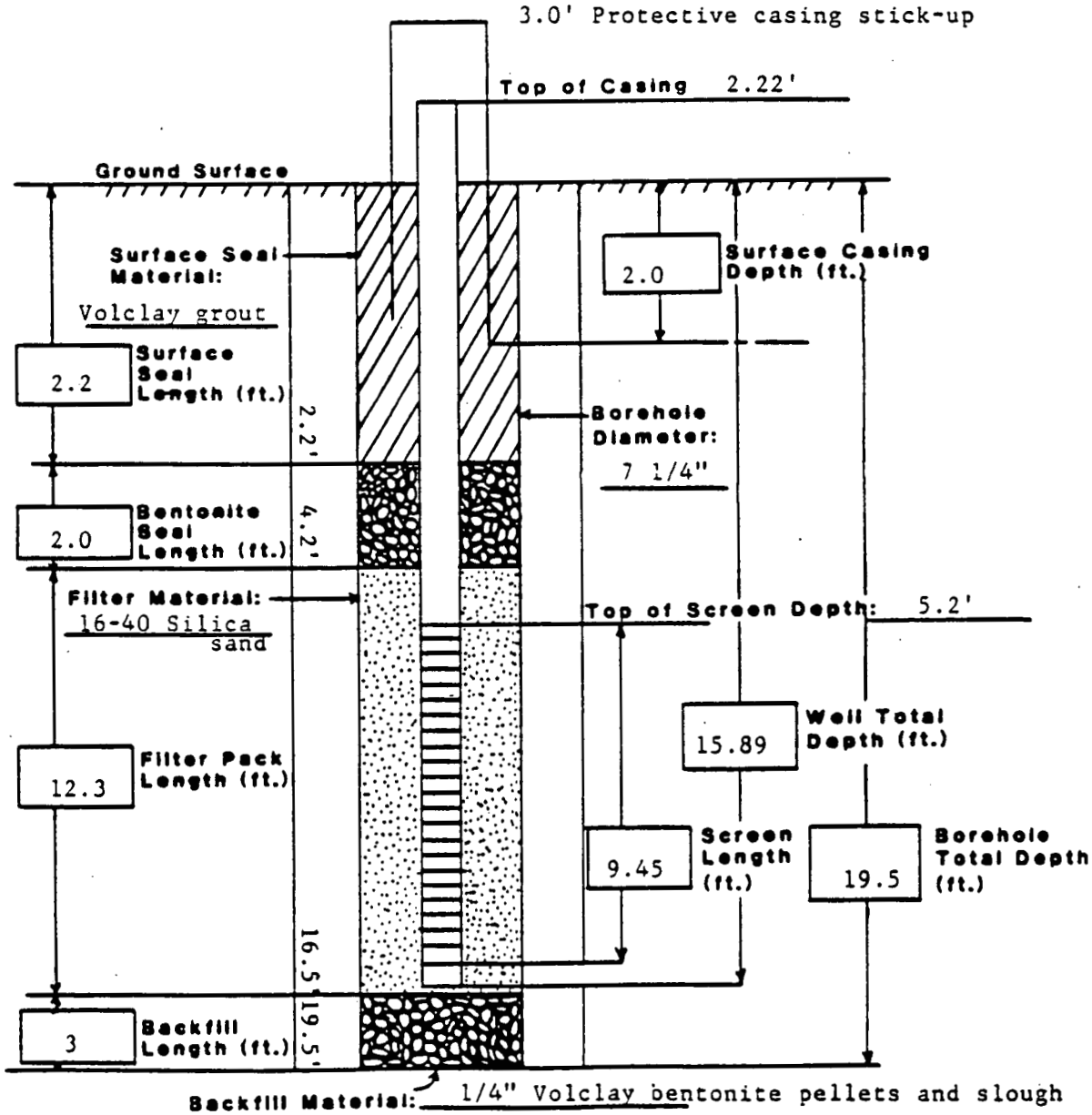
Date Installed 04/28/1989

Approved By Jarell Bryman
Site Manager

Installed By E.M. Hill
Geologist

CEARP Manager

Comments Placed stainless steel centralizer from 14.36' to 15.56' below ground surface



This is a CONTROLLED DOCUMENT
EG&G — ROCKY FLATS PLANT
ENVIRONMENTAL MANAGEMENT DEPARTMENT
This is a RED Stamp

ROCKY FLATS PLANT Phase I RFI/RI Work Plan for Operable Unit 7 - Present Landfill IHSS 114 and Inactive Hazardous Waste Storage Area IHSS 203	Manual No.: Section No.: Organization:	21100-WP-OU-07.01 APPF, R0 Environmental Management

Title: Appendix F: Analytical Data for Present Landfill Borehole Samples

Approved by:

12/6/91	G. P. O'Rourke	6/23/92
Effective Date	Manager	Date

APPENDIX F

Analytical Data for

Present Landfill Borehole Samples

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B106089	% SOLIDS	LF01890006	08-MAY-89	90.9		%			TRG	
		LF01891218	18-MAY-89	89.7		%			TRG	
		LF01890612	18-MAY-89	89		%			TRG	
		LF01892327D	18-MAY-89	85.6		%			TRG	
		LF01892327	18-MAY-89	85.9		%			TRG	
		LF01891822	18-MAY-89	87.7		%			TRG	
	NITRATE	LF01890006	08-MAY-89	15.9372					TRG	
		LF01891218	18-MAY-89	4.8697	U				TRG	
		LF01890612	18-MAY-89	4.8697	U				TRG	
		LF01892327D	18-MAY-89	5.3124	U				TRG	
		LF01891822	18-MAY-89	4.8697	U				TRG	
		LF01892327	18-MAY-89	5.3124	U				TRG	
	NITRATE/NITRITE	LF01890006	08-MAY-89	3.6		MG/KG		V	TRG	
		LF01891218	18-MAY-89	1.1	U	MG/KG		A	TRG	
		LF01890612	18-MAY-89	1.1	U	MG/KG		V	TRG	
		LF01892327D	18-MAY-89	1.2	U	MG/KG		A	TRG	
		LF01891822	18-MAY-89	1.1	U	MG/KG		A	TRG	
		LF01892327	18-MAY-89	1.2	U	MG/KG		A	TRG	
	SULFIDE	LF01890006	08-MAY-89	2	U	MG/KG		V	TRG	
		LF01891218	18-MAY-89	2.2		MG/KG		V	TRG	
		LF01890612	18-MAY-89	2	U	MG/KG		V	TRG	
		LF01892327	18-MAY-89	2.3		MG/KG		V	TRG	
		LF01891822	18-MAY-89	2	U	MG/KG		V	TRG	
		LF01892327D	18-MAY-89	2	U	MG/KG		V	TRG	
	pH	LF01890006	08-MAY-89	8.7		PHUNIT			TRG	
		LF01891218	18-MAY-89	7.9		PHUNIT			TRG	
		LF01890612	18-MAY-89	7.8		PHUNIT			TRG	
		LF01892327D	18-MAY-89	8		PHUNIT			TRG	
		LF01892327	18-MAY-89	8.2		PHUNIT			TRG	
		LF01891822	18-MAY-89	8.2		PHUNIT			TRG	

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B106089	ALUMINUM	LF01890006	08-MAY-89	10400		UG/G	45.6	A	TRG	A
		LF01891218	18-MAY-89	10300		UG/G	45.1	V	TRG	A
		LF01890612	18-MAY-89	11400		UG/G	45.7	V	TRG	A
		LF01892327D	18-MAY-89	9320		UG/G	44	V	TRG	A
		LF01891822	18-MAY-89	10100		UG/G	44.8	V	TRG	A
		LF01892327	18-MAY-89	8580		UG/G	46.5	V	TRG	A
	ANTIMONY	LF01890006	08-MAY-89	13.7	U	UG/G	13.7	V	TRG	A
		LF01891218	18-MAY-89	13.5	U	UG/G	13.5	A	TRG	A
		LF01890612	18-MAY-89	13.7	U	UG/G	13.7	A	TRG	A
		LF01892327D	18-MAY-89	13.2	U	UG/G	13.2	A	TRG	A
		LF01891822	18-MAY-89	13.4	U	UG/G	13.4	A	TRG	A
		LF01892327	18-MAY-89	13.9	U	UG/G	13.9	A	TRG	A
	ARSENIC	LF01890006	08-MAY-89	8.1		UG/G	4.6	A	TRG	A
		LF01891218	18-MAY-89	4.8		UG/G	2.3	V	TRG	A
		LF01890612	18-MAY-89	5		UG/G	2.3	A	TRG	A
		LF01892327D	18-MAY-89	2.7		UG/G	2.3	A	TRG	A
		LF01891822	18-MAY-89	14.1		UG/G	2.3	V	TRG	A
		LF01892327	18-MAY-89	2.5		UG/G	2.4	A	TRG	A
	BARIUM	LF01890006	08-MAY-89	103		UG/G	45.6	A	TRG	A
		LF01891218	18-MAY-89	102		UG/G	45.1	V	TRG	A
		LF01890612	18-MAY-89	110		UG/G	45.7	V	TRG	A
		LF01892327D	18-MAY-89	128		UG/G	44	V	TRG	A
		LF01892327	18-MAY-89	121		UG/G	46.5	V	TRG	A
		LF01891822	18-MAY-89	132		UG/G	44.8	V	TRG	A
	BERYLLIUM	LF01890006	08-MAY-89	2.9		UG/G	1.1	A	TRG	A
		LF01891218	18-MAY-89	3.2		UG/G	1.1	A	TRG	A
		LF01890612	18-MAY-89	3.4		UG/G	1.1	A	TRG	A
		LF01892327D	18-MAY-89	2.8		UG/G	1.1	A	TRG	A
		LF01892327	18-MAY-89	2.6		UG/G	1.2	A	TRG	A
		LF01891822	18-MAY-89	4		UG/G	1.1	A	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B106089	CADMIUM	LF01890006	08-MAY-89	1.1	U	UG/G	1.1	V	TRG	A
		LF01891218	18-MAY-89	1.1	U	UG/G	1.1	A	TRG	A
		LF01890612	18-MAY-89	1.1	U	UG/G	1.1	R	TRG	A
		LF01892327D	18-MAY-89	1.1	U	UG/G	1.1	R	TRG	A
		LF01892327	18-MAY-89	1.2	U	UG/G	1.2	R	TRG	A
		LF01891822	18-MAY-89	1.1	U	UG/G	1.1	R	TRG	A
	CALCIUM	LF01890006	08-MAY-89	9200		UG/G	1140	V	TRG	A
		LF01891218	18-MAY-89	13100		UG/G	1130	A	TRG	A
		LF01890612	18-MAY-89	10700		UG/G	1140	A	TRG	A
		LF01892327D	18-MAY-89	4320		UG/G	1100	A	TRG	A
		LF01892327	18-MAY-89	4950		UG/G	1160	A	TRG	A
		LF01891822	18-MAY-89	3040		UG/G	1120	A	TRG	A
	CESIUM	LF01890006	08-MAY-89	228	U	UG/G	228	V	TRG	A
		LF01891218	18-MAY-89	226	U	UG/G	226	V	TRG	A
		LF01890612	18-MAY-89	229	U	UG/G	229	V	TRG	A
		LF01892327D	18-MAY-89	220	U	UG/G	220	V	TRG	A
		LF01892327	18-MAY-89	232	U	UG/G	232	V	TRG	A
		LF01891822	18-MAY-89	224	U	UG/G	224	V	TRG	A
	CHROMIUM	LF01890006	08-MAY-89	11.7		UG/G	2.3	A	TRG	A
		LF01891218	18-MAY-89	13		UG/G	2.3	A	TRG	A
		LF01890612	18-MAY-89	13.8		UG/G	2.3	A	TRG	A
		LF01892327D	18-MAY-89	10.8		UG/G	2.2	A	TRG	A
		LF01892327	18-MAY-89	8.9		UG/G	2.3	A	TRG	A
		LF01891822	18-MAY-89	14.8		UG/G	2.2	A	TRG	A
	COBALT	LF01890006	08-MAY-89	11.4	U	UG/G	11.4	V	TRG	A
		LF01891218	18-MAY-89	11.3	U	UG/G	11.3	V	TRG	A
		LF01890612	18-MAY-89	11.4	U	UG/G	11.4	V	TRG	A
		LF01892327D	18-MAY-89	11	U	UG/G	11	V	TRG	A
		LF01892327	18-MAY-89	11.6	U	UG/G	11.6	V	TRG	A
		LF01891822	18-MAY-89	11.4		UG/G	11.2	A	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B106089	COPPER	LF01890006	08-MAY-89	15.4		UG/G	5.7	A	TRG	A
		LF01891218	18-MAY-89	9.9		UG/G	5.6	V	TRG	A
		LF01890612	18-MAY-89	9.7		UG/G	5.7	V	TRG	A
		LF01892327D	18-MAY-89	11.9		UG/G	5.5	V	TRG	A
		LF01891822	18-MAY-89	26.9		UG/G	5.6	A	TRG	A
		LF01892327	18-MAY-89	11.7		UG/G	5.8	V	TRG	A
	IRON	LF01890006	08-MAY-89	14100		UG/G	22.8	A	TRG	A
		LF01891218	18-MAY-89	12200		UG/G	22.6	A	TRG	A
		LF01890612	18-MAY-89	13100		UG/G	22.9	A	TRG	A
		LF01892327D	18-MAY-89	11100		UG/G	22	A	TRG	A
		LF01892327	18-MAY-89	10300		UG/G	23.2	A	TRG	A
		LF01891822	18-MAY-89	32500		UG/G	224	A	TRG	A
	LEAD	LF01890006	08-MAY-89	29.4		UG/G	5.8	A	TRG	A
		LF01891218	18-MAY-89	14		UG/G	4.6	A	TRG	A
		LF01890612	18-MAY-89	13.5		UG/G	5.7	A	TRG	A
		LF01892327D	18-MAY-89	17.3		UG/G	4.6	A	TRG	A
		LF01891822	18-MAY-89	11.8		UG/G	4.6	A	TRG	A
		LF01892327	18-MAY-89	19.3		UG/G	6	A	TRG	A
	LITHIUM	LF01890006	08-MAY-89	5.8		UG/G	2.3	V	TRG	A
		LF01890612	18-MAY-89	6.7		UG/G	2.3	V	TRG	A
		LF01892327D	18-MAY-89	3.4		UG/G	2.2	V	TRG	A
		LF01892327	18-MAY-89	2.8		UG/G	2.3	V	TRG	A
		LF01891822	18-MAY-89	6.3		UG/G	2.2	V	TRG	A
		LF01891218	18-MAY-89	6.6		UG/G	2.3	V	TRG	A
	MAGNESIUM	LF01890006	08-MAY-89	2330		UG/G	1140	A	TRG	A
		LF01890612	18-MAY-89	2140		UG/G	1140	V	TRG	A
		LF01892327D	18-MAY-89	2230		UG/G	1100	V	TRG	A
		LF01891218	18-MAY-89	2100		UG/G	1130	V	TRG	A
		LF01892327	18-MAY-89	2180		UG/G	1160	V	TRG	A
		LF01891822	18-MAY-89	2630		UG/G	1120	V	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B106089	MANGANESE	LF01890006	08-MAY-89	187		UG/G	3.4	A	TRG	A
		LF01890612	18-MAY-89	157		UG/G	3.4	A	TRG	A
		LF01892327D	18-MAY-89	202		UG/G	3.3	A	TRG	A
		LF01891218	18-MAY-89	135		UG/G	3.4	A	TRG	A
		LF01891822	18-MAY-89	396		UG/G	3.4	A	TRG	A
		LF01892327	18-MAY-89	197		UG/G	3.5	A	TRG	A
	MERCURY	LF01890006	08-MAY-89	.1	U	UG/G	.1	R	TRG	A
		LF01890612	18-MAY-89	1.6		UG/G	.12	A	TRG	A
		LF01892327D	18-MAY-89	.37		UG/G	.12	A	TRG	A
		LF01891822	18-MAY-89	.37		UG/G	.12	A	TRG	A
		LF01891218	18-MAY-89	.44		UG/G	.097	A	TRG	A
		LF01892327	18-MAY-89	.42		UG/G	.11	A	TRG	A
	MOLYBDENUM	LF01890006	08-MAY-89	8.5		UG/G	2.3	V	TRG	A
		LF01890612	18-MAY-89	7.3		UG/G	2.3	V	TRG	A
		LF01892327D	18-MAY-89	6		UG/G	2.2	V	TRG	A
		LF01891822	18-MAY-89	3.3		UG/G	2.2	V	TRG	A
		LF01892327	18-MAY-89	5.9		UG/G	2.3	V	TRG	A
		LF01891218	18-MAY-89	7.2		UG/G	2.3	V	TRG	A
	NICKEL	LF01890006	08-MAY-89	9.1	U	UG/G	9.1	R	TRG	A
		LF01890612	18-MAY-89	15.3		UG/G	9.1	A	TRG	A
		LF01892327D	18-MAY-89	10.6		UG/G	8.8	A	TRG	A
		LF01892327	18-MAY-89	11		UG/G	9.3	A	TRG	A
		LF01891218	18-MAY-89	15.9		UG/G	9	A	TRG	A
		LF01891822	18-MAY-89	35.6		UG/G	9	A	TRG	A
	POTASSIUM	LF01890006	08-MAY-89	1170		UG/G	1140	V	TRG	A
		LF01890612	18-MAY-89	1140	U	UG/G	1140	A	TRG	A
		LF01892327D	18-MAY-89	1100	U	UG/G	1100	A	TRG	A
		LF01891822	18-MAY-89	1120	U	UG/G	1120	A	TRG	A
		LF01891218	18-MAY-89	1130	U	UG/G	1130	A	TRG	A
		LF01892327	18-MAY-89	1160	U	UG/G	1160	A	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B106089	SELENIUM	LF01890006	08-MAY-89	11.1	U	UG/G	11.1	A	TRG	A
		LF01890612	18-MAY-89	5.7	U	UG/G	5.7	R	TRG	A
		LF01892327D	18-MAY-89	5.8	U	UG/G	5.8	R	TRG	A
		LF01892327	18-MAY-89	6	U	UG/G	6	R	TRG	A
		LF01891218	18-MAY-89	5.7	U	UG/G	5.7	R	TRG	A
		LF01891822	18-MAY-89	5.8	U	UG/G	5.8	R	TRG	A
	SILVER	LF01890006	08-MAY-89	2.3	U	UG/G	2.3	V	TRG	A
		LF01890612	18-MAY-89	2.5		UG/G	2.3	A	TRG	A
		LF01892327D	18-MAY-89	2.2	U	UG/G	2.2	A	TRG	A
		LF01892327	18-MAY-89	2.3	U	UG/G	2.3	A	TRG	A
		LF01891218	18-MAY-89	2.3	U	UG/G	2.3	A	TRG	A
		LF01891822	18-MAY-89	2.6		UG/G	2.2	A	TRG	A
	SODIUM	LF01890006	08-MAY-89	1140	U	UG/G	1140	V	TRG	A
		LF01890612	18-MAY-89	1140	U	UG/G	1140	V	TRG	A
		LF01892327	18-MAY-89	1160	U	UG/G	1160	V	TRG	A
		LF01891218	18-MAY-89	1130	U	UG/G	1130	V	TRG	A
		LF01891822	18-MAY-89	1120	U	UG/G	1120	V	TRG	A
		LF01892327D	18-MAY-89	1100	U	UG/G	1100	V	TRG	A
	STRONTIUM	LF01890006	08-MAY-89	228	U	UG/G	228	V	TRG	A
		LF01890612	18-MAY-89	229	U	UG/G	229	V	TRG	A
		LF01892327	18-MAY-89	232	U	UG/G	232	V	TRG	A
		LF01891218	18-MAY-89	226	U	UG/G	226	V	TRG	A
		LF01891822	18-MAY-89	224	U	UG/G	224	V	TRG	A
		LF01892327D	18-MAY-89	220	U	UG/G	220	V	TRG	A
	THALLIUM	LF01890006	08-MAY-89	4.1		UG/G	2.3	A	TRG	A
		LF01890612	18-MAY-89	2.3	U	UG/G	2.3	A	TRG	A
		LF01892327	18-MAY-89	2.4	U	UG/G	2.4	R	TRG	A
		LF01891218	18-MAY-89	2.3	U	UG/G	2.3	R	TRG	A
		LF01891822	18-MAY-89	2.3	U	UG/G	2.3	R	TRG	A
		LF01892327D	18-MAY-89	2.3	U	UG/G	2.3	R	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B106089	TIN	LF01890006	08-MAY-89	22.8	U	UG/G	22.8	V	TRG	A
		LF01890612	18-MAY-89	22.9	U	UG/G	22.9	V	TRG	A
		LF01892327D	18-MAY-89	22	U	UG/G	22	V	TRG	A
		LF01891218	18-MAY-89	22.6	U	UG/G	22.6	V	TRG	A
		LF01891822	18-MAY-89	22.4	U	UG/G	22.4	V	TRG	A
		LF01892327	18-MAY-89	23.2	U	UG/G	23.2	V	TRG	A
	VANADIUM	LF01890006	08-MAY-89	32.1		UG/G	11.4	A	TRG	A
		LF01890612	18-MAY-89	37.5		UG/G	11.4	A	TRG	A
		LF01892327D	18-MAY-89	28.6		UG/G	11	A	TRG	A
		LF01891218	18-MAY-89	34		UG/G	11.3	A	TRG	A
		LF01891822	18-MAY-89	93.4		UG/G	11.2	A	TRG	A
		LF01892327	18-MAY-89	25.4		UG/G	11.6	A	TRG	A
	ZINC	LF01890006	08-MAY-89	80		UG/G	4.6	A	TRG	A
		LF01890612	18-MAY-89	104		UG/G	4.6	A	TRG	A
		LF01892327D	18-MAY-89	44.6		UG/G	4.4	A	TRG	A
		LF01891822	18-MAY-89	40.7		UG/G	4.5	A	TRG	A
		LF01891218	18-MAY-89	469		UG/G	4.5	A	TRG	A
		LF01892327	18-MAY-89	38.2		UG/G	4.6	A	TRG	A
	CESIUM-137	LF01890006	08-MAY-89	0		PCI/G			TRG	
		LF01890006	08-MAY-89	0		PCI/G	.1		TRG	
		LF01890612	18-MAY-89	0		PCI/G	.1		TRG	
		LF01892327D	18-MAY-89	0		PCI/G	.1		TRG	
		LF01892327	18-MAY-89	0		PCI/G	.1		TRG	
		LF01891218	18-MAY-89	0		PCI/G	.1		TRG	
		LF01891822	18-MAY-89	0		PCI/G	.1		TRG	
	GROSS ALPHA PARTICLE RADIOACTI	LF01890006	08-MAY-89	18		PCI/G			TRG	
	GROSS BETA PARTICLE RADIOACTIV	LF01890006	08-MAY-89	25		PCI/G			TRG	
	PLUTONIUM-239	LF01890006	08-MAY-89	.02		PCI/G			TRG	

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B106089	RADIUM-226	LF01890006	08-MAY-89	.6		PCI/G			TRG	
	RADIUM-228	LF01890006	08-MAY-89	1.6		PCI/G			TRG	
	STRONTIUM-90	LF01890006	08-MAY-89	0		PCI/G			TRG	
	TRITIUM	LF01890006	08-MAY-89	.63		PCI/ML			TRG	
	URANIUM, TOTAL	LF01890006	08-MAY-89	1.7					TRG	
	URANIUM-233,-234	LF01890006	08-MAY-89	.9		PCI/G			TRG	
	URANIUM-235	LF01890006	08-MAY-89	0		PCI/G			TRG	
	URANIUM-238	LF01890006	08-MAY-89	.8		PCI/G			TRG	
	1,1,1-TRICHLOROETHANE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	1,1,2,2-TETRACHLOROETHANE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	1,1,2-TRICHLOROETHANE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B106089	1,1,2-TRICHLOROETHANE	LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	1,1-DICHLOROETHANE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	1,1-DICHLOROETHENE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	1,2-DICHLOROETHANE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B106089	1,2-DICHLOROETHYLENE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	1,2-DICHLOROPROPANE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	2-BUTANONE	LF01890709	08-MAY-89	530	J	UG/G	560		TRG	
		LF01890305	08-MAY-89	7	J	UG/G	12		TRG	
		LF01890001	08-MAY-89	12	U	UG/G	12		TRG	
		LF01892224	18-MAY-89	59	U	UG/G	59		TRG	
		LF01892021	18-MAY-89	12	U	UG/G	12		TRG	
		LF01891618	18-MAY-89	330		UG/G	61		TRG	
		LF01891214	18-MAY-89	220		UG/G	57		TRG	
		LF01892426	18-MAY-89	12	U	UG/G	12		TRG	
	2-HEXANONE	LF01890709	08-MAY-89	560	U	UG/G	560		TRG	
		LF01890305	08-MAY-89	12	U	UG/G	12		TRG	
		LF01890001	08-MAY-89	12	U	UG/G	12		TRG	
		LF01892224	18-MAY-89	59	U	UG/G	59		TRG	
		LF01892021	18-MAY-89	12	U	UG/G	12		TRG	
		LF01891214	18-MAY-89	40	J	UG/G	57		TRG	
		LF01891618	18-MAY-89	41	J	UG/G	61		TRG	
		LF01892426	18-MAY-89	12	U	UG/G	12		TRG	

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B106089	4-METHYL-2-PENTANONE	LF01890709	08-MAY-89	560	U	UG/G	560		TRG	
		LF01890305	08-MAY-89	12	U	UG/G	12		TRG	
		LF01890001	08-MAY-89	12	U	UG/G	12		TRG	
		LF01892224	18-MAY-89	59	U	UG/G	59		TRG	
		LF01892021	18-MAY-89	2	JB	UG/G	12		TRG	
		LF01891214	18-MAY-89	16	JB	UG/G	57		TRG	
		LF01891618	18-MAY-89	13	J	UG/G	61		TRG	
		LF01892426	18-MAY-89	12	U	UG/G	12		TRG	
	ACETONE	LF01890709	08-MAY-89	830		UG/G	560		TRG	
		LF01890305	08-MAY-89	39		UG/G	12		TRG	
		LF01890001	08-MAY-89	12	U	UG/G	12		TRG	
		LF01892224	18-MAY-89	59	U	UG/G	59		TRG	
		LF01892021	18-MAY-89	13	B	UG/G	12		TRG	
		LF01891618	18-MAY-89	990		UG/G	61		TRG	
		LF01891214	18-MAY-89	680	B	UG/G	57		TRG	
		LF01892426	18-MAY-89	12	U	UG/G	12		TRG	
	BENZENE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891214	18-MAY-89	7	J	UG/G	28		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	BROMODICHLOROMETHANE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	

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Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B106089	BROMOFORM	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	BROMOMETHANE	LF01890709	08-MAY-89	560	U	UG/G	560		TRG	
		LF01890305	08-MAY-89	12	U	UG/G	12		TRG	
		LF01890001	08-MAY-89	12	U	UG/G	12		TRG	
		LF01892224	18-MAY-89	59	U	UG/G	59		TRG	
		LF01891618	18-MAY-89	61	U	UG/G	61		TRG	
		LF01891214	18-MAY-89	57	U	UG/G	57		TRG	
		LF01892021	18-MAY-89	12	U	UG/G	12		TRG	
		LF01892426	18-MAY-89	12	U	UG/G	12		TRG	
	CARBON DISULFIDE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	CARBON TETRACHLORIDE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	

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Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B106089	CHLOROBENZENE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	CHLOROETHANE	LF01890709	08-MAY-89	560	U	UG/G	560		TRG	
		LF01890305	08-MAY-89	12	U	UG/G	12		TRG	
		LF01890001	08-MAY-89	12	U	UG/G	12		TRG	
		LF01892224	18-MAY-89	59	U	UG/G	59		TRG	
		LF01892021	18-MAY-89	12	U	UG/G	12		TRG	
		LF01891214	18-MAY-89	57	U	UG/G	57		TRG	
		LF01891618	18-MAY-89	61	U	UG/G	61		TRG	
		LF01892426	18-MAY-89	12	U	UG/G	12		TRG	
	CHLOROFORM	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	CHLOROMETHANE	LF01890709	08-MAY-89	560	U	UG/G	560		TRG	
		LF01890305	08-MAY-89	12	U	UG/G	12		TRG	
		LF01890001	08-MAY-89	12	U	UG/G	12		TRG	
		LF01892224	18-MAY-89	59	U	UG/G	59		TRG	
		LF01891618	18-MAY-89	61	U	UG/G	61		TRG	
		LF01891214	18-MAY-89	57	U	UG/G	57		TRG	
		LF01892021	18-MAY-89	12	U	UG/G	12		TRG	
		LF01892426	18-MAY-89	12	U	UG/G	12		TRG	

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Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B106089	DIBROMOCHLOROMETHANE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	ETHYLBENZENE	LF01890709	08-MAY-89	92	J	UG/G	280		TRG	
		LF01890305	08-MAY-89	5	J	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891618	18-MAY-89	10	J	UG/G	30		TRG	
		LF01891214	18-MAY-89	24	J	UG/G	28		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	METHYLENE CHLORIDE	LF01890709	08-MAY-89	220	J	UG/G	280		TRG	
		LF01890305	08-MAY-89	11		UG/G	6		TRG	
		LF01890001	08-MAY-89	27		UG/G	6		TRG	
		LF01892224	18-MAY-89	20	J	UG/G	29		TRG	
		LF01891618	18-MAY-89	28	JB	UG/G	30		TRG	
		LF01891214	18-MAY-89	25	JB	UG/G	28		TRG	
		LF01892021	18-MAY-89	4	JB	UG/G	6		TRG	
		LF01892426	18-MAY-89	15		UG/G	6		TRG	
	STYRENE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891618	18-MAY-89	7	J	UG/G	30		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	

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Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B106089	TETRACHLOROETHENE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890305	08-MAY-89	3	J	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01891214	18-MAY-89	8	J	UG/G	28		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	TOLUENE	LF01890709	08-MAY-89	350		UG/G	280		TRG	
		LF01890305	08-MAY-89	21		UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891214	18-MAY-89	71		UG/G	28		TRG	
		LF01891618	18-MAY-89	33		UG/G	30		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	TOTAL XYLENES	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890305	08-MAY-89	6		UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891214	18-MAY-89	14	J	UG/G	28		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	TRICHLOROETHENE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B106089	VINYL ACETATE	LF01890709	08-MAY-89	560	U	UG/G	560		TRG	
		LF01890001	08-MAY-89	12	U	UG/G	12		TRG	
		LF01890305	08-MAY-89	12	U	UG/G	12		TRG	
		LF01892224	18-MAY-89	59	U	UG/G	59		TRG	
		LF01891618	18-MAY-89	61	U	UG/G	61		TRG	
		LF01891214	18-MAY-89	57	U	UG/G	57		TRG	
		LF01892021	18-MAY-89	12	U	UG/G	12		TRG	
		LF01892426	18-MAY-89	12	U	UG/G	12		TRG	
	VINYL CHLORIDE	LF01890709	08-MAY-89	560	U	UG/G	560		TRG	
		LF01890305	08-MAY-89	12	U	UG/G	12		TRG	
		LF01890001	08-MAY-89	12	U	UG/G	12		TRG	
		LF01892224	18-MAY-89	59	U	UG/G	59		TRG	
		LF01891618	18-MAY-89	61	U	UG/G	61		TRG	
		LF01892021	18-MAY-89	12	U	UG/G	12		TRG	
		LF01891214	18-MAY-89	57	U	UG/G	57		TRG	
		LF01892426	18-MAY-89	12	U	UG/G	12		TRG	
	cis-1,3-DICHLOROPROPENE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	
	trans-1,3-DICHLOROPROPENE	LF01890709	08-MAY-89	280	U	UG/G	280		TRG	
		LF01890001	08-MAY-89	6	U	UG/G	6		TRG	
		LF01890305	08-MAY-89	6	U	UG/G	6		TRG	
		LF01892224	18-MAY-89	29	U	UG/G	29		TRG	
		LF01891214	18-MAY-89	28	U	UG/G	28		TRG	
		LF01891618	18-MAY-89	30	U	UG/G	30		TRG	
		LF01892021	18-MAY-89	6	U	UG/G	6		TRG	
		LF01892426	18-MAY-89	6	U	UG/G	6		TRG	

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206189	% SOLIDS	LF0289BR0003	24-MAY-89	93		%			TRG	
		LF0289BR1620	25-MAY-89	89		%			TRG	
		LF0289BR1016	25-MAY-89	83.5		%			TRG	
		LF0289BR0309	25-MAY-89	82.4		%			TRG	
		LF0289BR2733	25-MAY-89	82.1		%			TRG	
		LF0289BR2127	25-MAY-89	83.3		%			TRG	
	NITRATE	LF0289BR0003	24-MAY-89	4.8697	U				TRG	
		LF0289BR1620	25-MAY-89	4.8697	U				TRG	
		LF0289BR1016	25-MAY-89	5.3124	U				TRG	
		LF0289BR0309	25-MAY-89	5.3124	U				TRG	
		LF0289BR2733	25-MAY-89	5.3124	U				TRG	
		LF0289BR2127	25-MAY-89	5.3124	U				TRG	
	NITRATE/NITRITE	LF0289BR0003	24-MAY-89	1.1	U	MG/KG		V	TRG	
		LF0289BR1620	25-MAY-89	1.1	U	MG/KG		V	TRG	
		LF0289BR0309	25-MAY-89	1.2	U	MG/KG		V	TRG	
		LF0289BR1016	25-MAY-89	1.2	U	MG/KG		V	TRG	
		LF0289BR2733	25-MAY-89	1.2	U	MG/KG		V	TRG	
		LF0289BR2127	25-MAY-89	1.2	U	MG/KG		V	TRG	
	SULFIDE	LF0289BR0003	24-MAY-89	2	U	MG/KG		V	TRG	
		LF0289BR1620	25-MAY-89	2	U	MG/KG		V	TRG	
		LF0289BR0309	25-MAY-89	2	U	MG/KG		V	TRG	
		LF0289BR1016	25-MAY-89	2	U	MG/KG		V	TRG	
		LF0289BR2733	25-MAY-89	2	U	MG/KG		V	TRG	
		LF0289BR2127	25-MAY-89	2	U	MG/KG		V	TRG	
	pH	LF0289BR0003	24-MAY-89	8.5		PHUNIT			TRG	
		LF0289BR1620	25-MAY-89	7.8		PHUNIT			TRG	
		LF0289BR0309	25-MAY-89	8		PHUNIT			TRG	
		LF0289BR1016	25-MAY-89	8		PHUNIT			TRG	
		LF0289BR2733	25-MAY-89	7.7		PHUNIT			TRG	
		LF0289BR2127	25-MAY-89	7.7		PHUNIT			TRG	

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206189	ALUMINUM	LF0289BR2733	25-MAY-89	6800		UG/G	47.1		TRG	
		LF0289BR2127	25-MAY-89	6160		UG/G	45.9		TRG	
		LF0289BR1620	25-MAY-89	6480		UG/G	43.7		TRG	
		LF0289BR1016	25-MAY-89	9310		UG/G	44.3		TRG	
		LF0289BR0309	25-MAY-89	11400		UG/G	45.9		TRG	
	ANTIMONY	LF0289BR1620	25-MAY-89	13.1	U	UG/G	13.1		TRG	
		LF0289BR1016	25-MAY-89	13.3	U	UG/G	13.3		TRG	
		LF0289BR0309	25-MAY-89	13.8	U	UG/G	13.8		TRG	
		LF0289BR2733	25-MAY-89	14.1	U	UG/G	14.1		TRG	
		LF0289BR2127	25-MAY-89	15.2		UG/G	13.8		TRG	
	ARSENIC	LF0289BR2733	25-MAY-89	6.7		UG/G	2.4		TRG	
		LF0289BR2127	25-MAY-89	2.3	U	UG/G	2.3		TRG	
		LF0289BR1620	25-MAY-89	3.1		UG/G	2.2		TRG	
		LF0289BR1016	25-MAY-89	3.4		UG/G	2.2		TRG	
		LF0289BR0309	25-MAY-89	2.3	U	UG/G	2.3		TRG	
	BARIUM	LF0289BR1620	25-MAY-89	48.2		UG/G	43.7		TRG	
		LF0289BR1016	25-MAY-89	48.8		UG/G	44.3		TRG	
		LF0289BR0309	25-MAY-89	105		UG/G	45.9		TRG	
		LF0289BR2733	25-MAY-89	79		UG/G	47.1		TRG	
		LF0289BR2127	25-MAY-89	146		UG/G	45.9		TRG	
	BERYLLIUM	LF0289BR2733	25-MAY-89	2.6		UG/G	1.2		TRG	
		LF0289BR2127	25-MAY-89	3.3		UG/G	1.1		TRG	
		LF0289BR1620	25-MAY-89	3.2		UG/G	1.1		TRG	
		LF0289BR1016	25-MAY-89	3		UG/G	1.1		TRG	
		LF0289BR0309	25-MAY-89	3.7		UG/G	1.1		TRG	
	CADMIUM	LF0289BR1620	25-MAY-89	1.1	U	UG/G	1.1		TRG	
		LF0289BR0309	25-MAY-89	1.1	U	UG/G	1.1		TRG	
		LF0289BR1016	25-MAY-89	1.1	U	UG/G	1.1		TRG	
		LF0289BR2733	25-MAY-89	1.2	U	UG/G	1.2		TRG	
		LF0289BR2127	25-MAY-89	1.1	U	UG/G	1.1		TRG	

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206189	CALCIUM	LF0289BR2733	25-MAY-89	5860		UG/G	1180		TRG	
		LF0289BR2127	25-MAY-89	4590		UG/G	1150		TRG	
		LF0289BR1620	25-MAY-89	2290		UG/G	1090		TRG	
		LF0289BR1016	25-MAY-89	4520		UG/G	1110		TRG	
		LF0289BR0309	25-MAY-89	6660		UG/G	1150		TRG	
	CESIUM	LF0289BR1620	25-MAY-89	218	U	UG/G	218		TRG	
		LF0289BR1016	25-MAY-89	222	U	UG/G	222		TRG	
		LF0289BR0309	25-MAY-89	229	U	UG/G	229		TRG	
		LF0289BR2733	25-MAY-89	235	U	UG/G	235		TRG	
		LF0289BR2127	25-MAY-89	230	U	UG/G	230		TRG	
	CHROMIUM	LF0289BR2733	25-MAY-89	7.5		UG/G	2.4		TRG	
		LF0289BR2127	25-MAY-89	6.7		UG/G	2.3		TRG	
		LF0289BR1620	25-MAY-89	15.7		UG/G	2.2		TRG	
		LF0289BR0309	25-MAY-89	13.3		UG/G	2.3		TRG	
		LF0289BR1016	25-MAY-89	11.1		UG/G	2.2		TRG	
	COBALT	LF0289BR1620	25-MAY-89	10.9	U	UG/G	10.9		TRG	
		LF0289BR0309	25-MAY-89	11.5	U	UG/G	11.5		TRG	
		LF0289BR1016	25-MAY-89	13.1		UG/G	11.1		TRG	
		LF0289BR2733	25-MAY-89	11.8	U	UG/G	11.8		TRG	
		LF0289BR2127	25-MAY-89	24.4		UG/G	11.5		TRG	
	COPPER	LF0289BR2733	25-MAY-89	16.2		UG/G	5.9		TRG	
		LF0289BR2127	25-MAY-89	17.9		UG/G	5.7		TRG	
		LF0289BR1620	25-MAY-89	21.5		UG/G	5.5		TRG	
		LF0289BR0309	25-MAY-89	12.2		UG/G	5.7		TRG	
		LF0289BR1016	25-MAY-89	6.1		UG/G	5.5		TRG	
	IRON	LF0289BR1620	25-MAY-89	24600		UG/G	218		TRG	
		LF0289BR0309	25-MAY-89	13800		UG/G	22.9		TRG	
		LF0289BR1016	25-MAY-89	15000		UG/G	22.2		TRG	
		LF0289BR2733	25-MAY-89	8180		UG/G	23.5		TRG	
		LF0289BR2127	25-MAY-89	60700		UG/G	230		TRG	

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Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206189	LEAD	LF0289BR2733	25-MAY-89	24.9		UG/G	4.9		TRG	
		LF0289BR2127	25-MAY-89	26.1		UG/G	4.6		TRG	
		LF0289BR1620	25-MAY-89	4.5	U	UG/G	4.5		TRG	
		LF0289BR0309	25-MAY-89	9.4		UG/G	4.6		TRG	
		LF0289BR1016	25-MAY-89	7.5		UG/G	4.4		TRG	
	LITHIUM	LF0289BR1620	25-MAY-89	4.5		UG/G	2.2		TRG	
		LF0289BR0309	25-MAY-89	7.7		UG/G	2.3		TRG	
		LF0289BR1016	25-MAY-89	4.9		UG/G	2.2		TRG	
		LF0289BR2733	25-MAY-89	2.4	U	UG/G	2.4		TRG	
		LF0289BR2127	25-MAY-89	2.5		UG/G	2.3		TRG	
	MAGNESIUM	LF0289BR2733	25-MAY-89	1530		UG/G	1180		TRG	
		LF0289BR2127	25-MAY-89	1830		UG/G	1150		TRG	
		LF0289BR1620	25-MAY-89	1470		UG/G	1090		TRG	
		LF0289BR0309	25-MAY-89	2250		UG/G	1150		TRG	
		LF0289BR1016	25-MAY-89	2390		UG/G	1110		TRG	
	MANGANESE	LF0289BR1620	25-MAY-89	195		UG/G	3.3		TRG	
		LF0289BR0309	25-MAY-89	215		UG/G	3.4		TRG	
		LF0289BR1016	25-MAY-89	97.6		UG/G	3.3		TRG	
		LF0289BR2733	25-MAY-89	70.1		UG/G	3.5		TRG	
		LF0289BR2127	25-MAY-89	665		UG/G	3.4		TRG	
	MERCURY	LF0289BR2733	25-MAY-89	.44		UG/G	.12		TRG	
		LF0289BR2127	25-MAY-89	.12		UG/G	.1		TRG	
		LF0289BR1620	25-MAY-89	.33		UG/G	.1		TRG	
		LF0289BR1016	25-MAY-89	.4		UG/G	.11		TRG	
		LF0289BR0309	25-MAY-89	.24		UG/G	.11		TRG	
	MOLYBDENUM	LF0289BR1016	25-MAY-89	7.8		UG/G	2.2		TRG	
		LF0289BR0309	25-MAY-89	10.8		UG/G	2.3		TRG	
		LF0289BR2733	25-MAY-89	7.1		UG/G	2.4		TRG	
		LF0289BR1620	25-MAY-89	3.4		UG/G	2.2		TRG	
		LF0289BR2127	25-MAY-89	2.3	U	UG/G	2.3		TRG	

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206189	NICKEL	LF0289BR2733	25-MAY-89	9.4	U	UG/G	9.4		TRG	
		LF0289BR2127	25-MAY-89	63		UG/G	9.2		TRG	
		LF0289BR1620	25-MAY-89	34.7		UG/G	8.7		TRG	
		LF0289BR1016	25-MAY-89	11.7		UG/G	8.9		TRG	
		LF0289BR0309	25-MAY-89	14.5		UG/G	9.2		TRG	
	POTASSIUM	LF0289BR1016	25-MAY-89	1110	U	UG/G	1110		TRG	
		LF0289BR0309	25-MAY-89	1490		UG/G	1150		TRG	
		LF0289BR2733	25-MAY-89	1180	U	UG/G	1180		TRG	
		LF0289BR1620	25-MAY-89	1090	U	UG/G	1090		TRG	
		LF0289BR2127	25-MAY-89	1150	U	UG/G	1150		TRG	
	SELENIUM	LF0289BR2733	25-MAY-89	1.2	U	UG/G	1.2		TRG	
		LF0289BR2127	25-MAY-89	1.2	U	UG/G	1.2		TRG	
		LF0289BR1620	25-MAY-89	1.1	U	UG/G	1.1		TRG	
		LF0289BR1016	25-MAY-89	1.1	U	UG/G	1.1		TRG	
		LF0289BR0309	25-MAY-89	1.1	U	UG/G	1.1		TRG	
	SILVER	LF0289BR1016	25-MAY-89	2.2	U	UG/G	2.2		TRG	
		LF0289BR0309	25-MAY-89	2.3	U	UG/G	2.3		TRG	
		LF0289BR2733	25-MAY-89	2.4	U	UG/G	2.4		TRG	
		LF0289BR1620	25-MAY-89	2.5		UG/G	2.2		TRG	
		LF0289BR2127	25-MAY-89	6.5		UG/G	2.3		TRG	
	SODIUM	LF0289BR2733	25-MAY-89	1180	U	UG/G	1180		TRG	
		LF0289BR2127	25-MAY-89	1150	U	UG/G	1150		TRG	
		LF0289BR1620	25-MAY-89	1090	U	UG/G	1090		TRG	
		LF0289BR1016	25-MAY-89	1110	U	UG/G	1110		TRG	
		LF0289BR0309	25-MAY-89	1150	U	UG/G	1150		TRG	
	STRONTIUM	LF0289BR1016	25-MAY-89	222	U	UG/G	222		TRG	
		LF0289BR0309	25-MAY-89	229	U	UG/G	229		TRG	
		LF0289BR2733	25-MAY-89	235	U	UG/G	235		TRG	
		LF0289BR2127	25-MAY-89	230	U	UG/G	230		TRG	
		LF0289BR1620	25-MAY-89	218	U	UG/G	218		TRG	

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206189	THALLIUM	LF0289BR2733	25-MAY-89	2.4	U	UG/G	2.4		TRG	
		LF0289BR2127	25-MAY-89	2.3	U	UG/G	2.3		TRG	
		LF0289BR1620	25-MAY-89	2.2	U	UG/G	2.2		TRG	
		LF0289BR1016	25-MAY-89	2.2	U	UG/G	2.2		TRG	
		LF0289BR0309	25-MAY-89	2.3	U	UG/G	2.3		TRG	
	TIN	LF0289BR1016	25-MAY-89	22.2	U	UG/G	22.2		TRG	
		LF0289BR0309	25-MAY-89	22.9	U	UG/G	22.9		TRG	
		LF0289BR2733	25-MAY-89	23.5	U	UG/G	23.5		TRG	
		LF0289BR1620	25-MAY-89	21.8	U	UG/G	21.8		TRG	
		LF0289BR2127	25-MAY-89	23	U	UG/G	23		TRG	
	VANADIUM	LF0289BR2733	25-MAY-89	17.9		UG/G	11.8		TRG	
		LF0289BR1620	25-MAY-89	54.7		UG/G	10.9		TRG	
		LF0289BR2127	25-MAY-89	42.3		UG/G	11.5		TRG	
		LF0289BR1016	25-MAY-89	23.4		UG/G	11.1		TRG	
		LF0289BR0309	25-MAY-89	35.3		UG/G	11.5		TRG	
	ZINC	LF0289BR1016	25-MAY-89	9.5		UG/G	4.4		TRG	
		LF0289BR0309	25-MAY-89	24		UG/G	4.6		TRG	
		LF0289BR2733	25-MAY-89	22.3		UG/G	4.7		TRG	
		LF0289BR2127	25-MAY-89	143		UG/G	4.6		TRG	
		LF0289BR1620	25-MAY-89	35.3		UG/G	4.4		TRG	
	CESIUM-137	LF0289BR0003	24-MAY-89	0		PCI/G	.1		TRG	
		LF0289BR1016	25-MAY-89	0		PCI/G	.1		TRG	
		LF0289BR0309	25-MAY-89	0		PCI/G	.1		TRG	
		LF0289BR2733	25-MAY-89	0		PCI/G	.1		TRG	
		LF0289BR2127	25-MAY-89	0		PCI/G	.1		TRG	
		LF0289BR1620	25-MAY-89	0		PCI/G	.1		TRG	
	1,1,1-TRICHLOROETHANE	LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206189	1,1,1-TRICHLOROETHANE	LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
	1,1,2,2-TETRACHLOROETHANE	LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
		LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
	1,1,2-TRICHLOROETHANE	LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
	1,1-DICHLOROETHANE	LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
		LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
	1,1-DICHLOROETHENE	LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206189	1,2-DICHLOROETHANE	LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
	1,2-DICHLOROETHYLENE	LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
	1,2-DICHLOROPROPANE	LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
	2-BUTANONE	LF0289BR3234	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR2830	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR2022	25-MAY-89	12	U	UG/G	12	V	TRG	A
		LF0289BR1214	25-MAY-89	11	U	UG/G	11	V	TRG	A
		LF0289BR2426	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR0810	25-MAY-89	11	U	UG/G	11	V	TRG	A
		LF0289BR0406	25-MAY-89	12	U	UG/L	12	V	TRG	A
	2-HEXANONE	LF0289BR0810	25-MAY-89	11	U	UG/G	11	V	TRG	A
		LF0289BR0406	25-MAY-89	12	U	UG/L	12	V	TRG	A
		LF0289BR2830	25-MAY-89	12	U	UG/KG	12	V	TRG	A

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Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206189	2-HEXANONE	LF0289BR2022	25-MAY-89	12	U	UG/G	12	V	TRG	A
		LF0289BR1214	25-MAY-89	11	U	UG/G	11	V	TRG	A
		LF0289BR2426	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR3234	25-MAY-89	12	U	UG/KG	12	V	TRG	A
	4-METHYL-2-PENTANONE	LF0289BR3234	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR2830	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR2022	25-MAY-89	12	U	UG/G	12	V	TRG	A
		LF0289BR1214	25-MAY-89	11	U	UG/G	11	V	TRG	A
		LF0289BR2426	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR0810	25-MAY-89	11	U	UG/G	11	V	TRG	A
		LF0289BR0406	25-MAY-89	12	U	UG/L	12	V	TRG	A
	ACETONE	LF0289BR0406	25-MAY-89	2	JB	UG/L	12	A	TRG	A
		LF0289BR2830	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR2426	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR0810	25-MAY-89	11	U	UG/G	11	V	TRG	A
		LF0289BR1214	25-MAY-89	21	B	UG/G	11	A	TRG	A
		LF0289BR2022	25-MAY-89	14	B	UG/G	12	A	TRG	A
		LF0289BR3234	25-MAY-89	10	JB	UG/KG	12	A	TRG	A
	BENZENE	LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
	BROMODICHLOROMETHANE	LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A

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Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206189	BROMODICHLOROMETHANE	LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
	BROMOFORM	LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
	BROMOMETHANE	LF0289BR0406	25-MAY-89	12	U	UG/L	12	V	TRG	A
		LF0289BR2830	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR1214	25-MAY-89	11	U	UG/G	11	V	TRG	A
		LF0289BR2426	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR2022	25-MAY-89	12	U	UG/G	12	V	TRG	A
		LF0289BR0810	25-MAY-89	11	U	UG/G	11	V	TRG	A
		LF0289BR3234	25-MAY-89	12	U	UG/KG	12	V	TRG	A
	CARBON DISULFIDE	LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
	CARBON TETRACHLORIDE	LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
	CHLOROBENZENE	LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A

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Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206189	CHLOROBENZENE	LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
	CHLOROETHANE	LF0289BR2830	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR0810	25-MAY-89	11	U	UG/G	11	V	TRG	A
		LF0289BR2022	25-MAY-89	12	U	UG/G	12	V	TRG	A
		LF0289BR1214	25-MAY-89	11	U	UG/G	11	V	TRG	A
		LF0289BR0406	25-MAY-89	12	U	UG/L	12	V	TRG	A
		LF0289BR2426	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR3234	25-MAY-89	12	U	UG/KG	12	V	TRG	A
	CHLOROFORM	LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
	CHLOROMETHANE	LF0289BR2830	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR2426	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR1214	25-MAY-89	11	U	UG/G	11	V	TRG	A
		LF0289BR2022	25-MAY-89	12	U	UG/G	12	V	TRG	A
		LF0289BR0406	25-MAY-89	12	U	UG/L	12	V	TRG	A
		LF0289BR0810	25-MAY-89	11	U	UG/G	11	V	TRG	A
		LF0289BR3234	25-MAY-89	12	U	UG/KG	12	V	TRG	A
	DIBROMOCHLOROMETHANE	LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A

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Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206189	DIBROMOCHLOROMETHANE	LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
	ETHYLBENZENE	LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0810	25-MAY-89	4	J	UG/G	6	A	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
	METHYLENE CHLORIDE	LF0289BR3234	25-MAY-89	2	J	UG/KG	6	A	TRG	A
		LF0289BR2830	25-MAY-89	2	J	UG/KG	6	A	TRG	A
		LF0289BR2022	25-MAY-89	2	J	UG/G	6	A	TRG	A
		LF0289BR1214	25-MAY-89	3	J	UG/G	6	A	TRG	A
		LF0289BR0810	25-MAY-89	4	J	UG/G	6	A	TRG	A
		LF0289BR2426	25-MAY-89	2	J	UG/KG	6	A	TRG	A
		LF0289BR0406	25-MAY-89	4	J	UG/L	6	A	TRG	A
	STYRENE	LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
		LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
	TETRACHLOROETHENE	LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A

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Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
8206189	TOLUENE	LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
	TOTAL XYLENES	LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
	TRICHLOROETHENE	LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
	VINYL ACETATE	LF0289BR3234	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR2830	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR0810	25-MAY-89	11	U	UG/G	11	V	TRG	A
		LF0289BR1214	25-MAY-89	11	U	UG/G	11	V	TRG	A
		LF0289BR0406	25-MAY-89	12	U	UG/L	12	V	TRG	A
		LF0289BR2426	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR2022	25-MAY-89	12	U	UG/G	12	V	TRG	A
	VINYL CHLORIDE	LF0289BR2830	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR0406	25-MAY-89	12	U	UG/L	12	V	TRG	A
		LF0289BR0810	25-MAY-89	11	U	UG/G	11	V	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206189	VINYL CHLORIDE	LF0289BR1214	25-MAY-89	11	U	UG/G	11	V	TRG	A
		LF0289BR2022	25-MAY-89	12	U	UG/G	12	V	TRG	A
		LF0289BR2426	25-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF0289BR3234	25-MAY-89	12	U	UG/KG	12	V	TRG	A
	cis-1,3-DICHLOROPROPENE	LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
	trans-1,3-DICHLOROPROPENE	LF0289BR2830	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR0406	25-MAY-89	6	U	UG/L	6	V	TRG	A
		LF0289BR1214	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR0810	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2022	25-MAY-89	6	U	UG/G	6	V	TRG	A
		LF0289BR2426	25-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF0289BR3234	25-MAY-89	6	U	UG/KG	6	V	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206389	% SOLIDS	LF04890003	19-MAY-89	92.8		%			TRG	
		LF04890309	19-MAY-89	92.8		%			TRG	
		LF04890913	19-MAY-89	97		%			TRG	
		LF04891319	19-MAY-89	82.9		%			TRG	
	NITRATE	LF04890913	19-MAY-89	4.427	U				TRG	
		LF04891319	19-MAY-89	5.3124	U				TRG	
		LF04890003	19-MAY-89	4.8697	U				TRG	
		LF04890309	19-MAY-89	4.8697	U				TRG	
	NITRATE/NITRITE	LF04890003	19-MAY-89	1.1	U	MG/KG			TRG	
		LF04890309	19-MAY-89	1.1	U	MG/KG			TRG	
		LF04890913	19-MAY-89	1	U	MG/KG			TRG	
		LF04891319	19-MAY-89	1.2	U	MG/KG			TRG	
	SULFIDE	LF04890913	19-MAY-89	2	U	MG/KG			TRG	
		LF04891319	19-MAY-89	5		MG/KG			TRG	
		LF04890003	19-MAY-89	2	U	MG/KG			TRG	
		LF04890309	19-MAY-89	4		MG/KG			TRG	
	pH	LF04890003	19-MAY-89	8.1		PHUNIT			TRG	
		LF04890309	19-MAY-89	8.3		PHUNIT			TRG	
		LF04890913	19-MAY-89	7.9		PHUNIT			TRG	
		LF04891319	19-MAY-89	8		PHUNIT			TRG	
	ALUMINUM	LF04891319	19-MAY-89	7030		UG/G	46.5	V	TRG	A
		LF04890003	19-MAY-89	10800		UG/G	44.5	V	TRG	A
		LF04890913	19-MAY-89	8280		UG/G	42.2	V	TRG	A
		LF04890309	19-MAY-89	7620		UG/G	41.1	V	TRG	A
	ANTIMONY	LF04890003	19-MAY-89	13.4	U	UG/G	13.4	A	TRG	A
		LF04890913	19-MAY-89	12.7	U	UG/G	12.7	A	TRG	A
		LF04890309	19-MAY-89	12.3	U	UG/G	12.3	A	TRG	A
		LF04891319	19-MAY-89	13.9	U	UG/G	13.9	A	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206389	ARSENIC	LF04891319	19-MAY-89	2.8		UG/G	2.4	A	TRG	A
		LF04890003	19-MAY-89	3.5		UG/G	2.2	A	TRG	A
		LF04890913	19-MAY-89	3.1		UG/G	2.2	A	TRG	A
		LF04890309	19-MAY-89	2.9		UG/G	2	A	TRG	A
	BARIUM	LF04890003	19-MAY-89	154		UG/G	44.5	V	TRG	A
		LF04890913	19-MAY-89	58.4		UG/G	42.2	V	TRG	A
		LF04890309	19-MAY-89	56.5		UG/G	41.1	V	TRG	A
		LF04891319	19-MAY-89	93.5		UG/G	46.5	V	TRG	A
	BERYLLIUM	LF04891319	19-MAY-89	2.6		UG/G	1.2	A	TRG	A
		LF04890003	19-MAY-89	3.5		UG/G	1.1	A	TRG	A
		LF04890913	19-MAY-89	2.7		UG/G	1.1	A	TRG	A
		LF04890309	19-MAY-89	2.7		UG/G	1	A	TRG	A
	CADMIUM	LF04890003	19-MAY-89	1.1	U	UG/G	1.1	R	TRG	A
		LF04890309	19-MAY-89	1	U	UG/G	1	R	TRG	A
		LF04890913	19-MAY-89	1.1	U	UG/G	1.1	R	TRG	A
		LF04891319	19-MAY-89	1.2	U	UG/G	1.2	R	TRG	A
	CALCIUM	LF04891319	19-MAY-89	5290		UG/G	1160	V	TRG	A
		LF04890003	19-MAY-89	8680		UG/G	1110	V	TRG	A
		LF04890913	19-MAY-89	1770		UG/G	1060	V	TRG	A
		LF04890309	19-MAY-89	7180		UG/G	1030	V	TRG	A
	CESIUM	LF04890003	19-MAY-89	223	U	UG/G	223	V	TRG	A
		LF04890309	19-MAY-89	205	U	UG/G	205	V	TRG	A
		LF04890913	19-MAY-89	211	U	UG/G	211	V	TRG	A
		LF04891319	19-MAY-89	232	U	UG/G	232	V	TRG	A
	CHROMIUM	LF04891319	19-MAY-89	6.8		UG/G	2.3	V	TRG	A
		LF04890003	19-MAY-89	17.2		UG/G	2.2	V	TRG	A
		LF04890309	19-MAY-89	13		UG/G	2.1	V	TRG	A
		LF04890913	19-MAY-89	13.2		UG/G	2.1	V	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206389	COBALT	LF04890003	19-MAY-89	11.1	U	UG/G	11.1	V	TRG	A
		LF04890913	19-MAY-89	10.6	U	UG/G	10.6	V	TRG	A
		LF04890309	19-MAY-89	10.3	U	UG/G	10.3	V	TRG	A
		LF04891319	19-MAY-89	11.6	U	UG/G	11.6	V	TRG	A
	COPPER	LF04891319	19-MAY-89	11.5		UG/G	5.8	V	TRG	A
		LF04890003	19-MAY-89	15.8		UG/G	5.6	V	TRG	A
		LF04890309	19-MAY-89	10.4		UG/G	5.1	V	TRG	A
		LF04890913	19-MAY-89	5.3	U	UG/G	5.3	A	TRG	A
	IRON	LF04890003	19-MAY-89	15700		UG/G	22.3	V	TRG	A
		LF04890913	19-MAY-89	9950		UG/G	21.1	V	TRG	A
		LF04890309	19-MAY-89	11700		UG/G	20.5	V	TRG	A
		LF04891319	19-MAY-89	6950		UG/G	23.2	V	TRG	A
	LEAD	LF04890913	19-MAY-89	6.8		UG/G	4.3	V	TRG	A
		LF04891319	19-MAY-89	18.8		UG/G	4.8	V	TRG	A
		LF04890003	19-MAY-89	17.2		UG/G	2.2	A	TRG	A
		LF04890309	19-MAY-89	9.2		UG/G	4	V	TRG	A
	LITHIUM	LF04890003	19-MAY-89	7.2		UG/G	2.2	V	TRG	A
		LF04890913	19-MAY-89	6.2		UG/G	2.1	V	TRG	A
		LF04890309	19-MAY-89	5.5		UG/G	2.1	V	TRG	A
		LF04891319	19-MAY-89	2.3	U	UG/G	2.3	V	TRG	A
	MAGNESIUM	LF04891319	19-MAY-89	1590		UG/G	1160	V	TRG	A
		LF04890003	19-MAY-89	3190		UG/G	1110	V	TRG	A
		LF04890309	19-MAY-89	1890		UG/G	1030	V	TRG	A
		LF04890913	19-MAY-89	1540		UG/G	1060	V	TRG	A
	MANGANESE	LF04890003	19-MAY-89	209		UG/G	3.3	V	TRG	A
		LF04890913	19-MAY-89	63.3		UG/G	3.2	V	TRG	A
		LF04890309	19-MAY-89	147		UG/G	3.1	V	TRG	A
		LF04891319	19-MAY-89	26.1		UG/G	3.5	V	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206389	MERCURY	LF04891319	19-MAY-89	.12	U	UG/G	.12	V	TRG	A
		LF04890003	19-MAY-89	.12		UG/G	.12	V	TRG	A
		LF04890309	19-MAY-89	.23		UG/G	.098	V	TRG	A
		LF04890913	19-MAY-89	.11	U	UG/G	.11	V	TRG	A
	MOLYBDENUM	LF04890003	19-MAY-89	8.4		UG/G	2.2	A	TRG	A
		LF04890913	19-MAY-89	7.7		UG/G	2.1	A	TRG	A
		LF04890309	19-MAY-89	7		UG/G	2.1	A	TRG	A
		LF04891319	19-MAY-89	7.5		UG/G	2.3	A	TRG	A
	NICKEL	LF04891319	19-MAY-89	9.3	U	UG/G	9.3	A	TRG	A
		LF04890003	19-MAY-89	18.8		UG/G	8.9	A	TRG	A
		LF04890913	19-MAY-89	8.4	U	UG/G	8.4	A	TRG	A
		LF04890309	19-MAY-89	11		UG/G	8.2	A	TRG	A
	POTASSIUM	LF04890003	19-MAY-89	1630		UG/G	1110	V	TRG	A
		LF04890309	19-MAY-89	1140		UG/G	1030	A	TRG	A
		LF04890913	19-MAY-89	1110		UG/G	1060	A	TRG	A
		LF04891319	19-MAY-89	1160	U	UG/G	1160	A	TRG	A
	SELENIUM	LF04891319	19-MAY-89	6	U	UG/G	6	A	TRG	A
		LF04890003	19-MAY-89	5.4	U	UG/G	5.4	A	TRG	A
		LF04890913	19-MAY-89	5.4	U	UG/G	5.4	A	TRG	A
		LF04890309	19-MAY-89	5	U	UG/G	5	A	TRG	A
	SILVER	LF04890003	19-MAY-89	2.2	U	UG/G	2.2	A	TRG	A
		LF04890309	19-MAY-89	2.1	U	UG/G	2.1	A	TRG	A
		LF04890913	19-MAY-89	2.1	U	UG/G	2.1	A	TRG	A
		LF04891319	19-MAY-89	2.3	U	UG/G	2.3	A	TRG	A
	SODIUM	LF04891319	19-MAY-89	1160	U	UG/G	1160	V	TRG	A
		LF04890003	19-MAY-89	1110	U	UG/G	1110	V	TRG	A
		LF04890309	19-MAY-89	1030	U	UG/G	1030	V	TRG	A
		LF04890913	19-MAY-89	1060	U	UG/G	1060	V	TRG	A

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Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B20638v	STRONTIUM	LF04890003	19-MAY-89	223	U	UG/G	223	V	TRG	A
		LF04890913	19-MAY-89	211	U	UG/G	211	V	TRG	A
		LF04890309	19-MAY-89	205	U	UG/G	205	V	TRG	A
		LF04891319	19-MAY-89	232	U	UG/G	232	V	TRG	A
	THALLIUM	LF04891319	19-MAY-89	2.4	U	UG/G	2.4	R	TRG	A
		LF04890003	19-MAY-89	2.2	U	UG/G	2.2	R	TRG	A
		LF04890309	19-MAY-89	2	U	UG/G	2	R	TRG	A
		LF04890913	19-MAY-89	2.2	U	UG/G	2.2	R	TRG	A
	TIN	LF04890003	19-MAY-89	22.3	U	UG/G	22.3	A	TRG	A
		LF04890913	19-MAY-89	21.1	U	UG/G	21.1	A	TRG	A
		LF04890309	19-MAY-89	20.5	U	UG/G	20.5	A	TRG	A
		LF04891319	19-MAY-89	23.2	U	UG/G	23.2	A	TRG	A
	VANADIUM	LF04891319	19-MAY-89	14.8		UG/G	11.6	V	TRG	A
		LF04890003	19-MAY-89	41		UG/G	11.1	V	TRG	A
		LF04890913	19-MAY-89	26.8		UG/G	10.6	V	TRG	A
		LF04890309	19-MAY-89	34.6		UG/G	10.3	V	TRG	A
	ZINC	LF04890003	19-MAY-89	35.7		UG/G	4.5	V	TRG	A
		LF04890309	19-MAY-89	25.5		UG/G	4.1	V	TRG	A
		LF04890913	19-MAY-89	10.7		UG/G	4.2	A	TRG	A
		LF04891319	19-MAY-89	22.8		UG/G	4.6	V	TRG	A
	CESIUM-137	LF04891319	19-MAY-89	0		PCI/G	.1		TRG	
		LF04890003	19-MAY-89	0		PCI/G	.1		TRG	
		LF04890309	19-MAY-89	0		PCI/G	.1		TRG	
		LF04890913	19-MAY-89	0		PCI/G	.1		TRG	
	1,1,1-TRICHLOROETHANE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A

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Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206389	1,1,2,2-TETRACHLOROETHANE	LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	A	TRG	A
	1,1,2-TRICHLOROETHANE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
	1,1-DICHLOROETHANE	LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
	1,1-DICHLOROETHENE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
	1,2-DICHLOROETHANE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
	1,2-DICHLOROETHYLENE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A

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Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206389	1,2-DICHLOROPROPANE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A
	2-BUTANONE	LF04890002D	19-MAY-89	11	U	UG/KG	11	V	TRG	A
		LF04891416	19-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF04891214	19-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF04890406	19-MAY-89	11	U	UG/KG	11	A	TRG	A
		LF04890910	19-MAY-89	11	U	UG/KG	11	V	TRG	A
	2-HEXANONE	LF04890002D	19-MAY-89	11	U	UG/KG	11	V	TRG	A
		LF04890406	19-MAY-89	11	U	UG/KG	11	A	TRG	A
		LF04890910	19-MAY-89	11	U	UG/KG	11	V	TRG	A
		LF04891214	19-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF04891416	19-MAY-89	12	U	UG/KG	12	V	TRG	A
	4-METHYL-2-PENTANONE	LF04890002D	19-MAY-89	11	U	UG/KG	11	V	TRG	A
		LF04890406	19-MAY-89	2	J	UG/KG	11	A	TRG	A
		LF04891214	19-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF04891416	19-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF04890910	19-MAY-89	11	U	UG/KG	11	V	TRG	A
	ACETONE	LF04890002D	19-MAY-89	11	U	UG/KG	11	V	TRG	A
		LF04890910	19-MAY-89	9	J	UG/KG	11	A	TRG	A
		LF04891214	19-MAY-89	9	J	UG/KG	12	A	TRG	A
		LF04890406	19-MAY-89	19		UG/KG	11	A	TRG	A
		LF04891416	19-MAY-89	5	J	UG/KG	12	A	TRG	A
	BENZENE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206389	BROMODICHLOROMETHANE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
	BROMOFORM	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A
	BROMOMETHANE	LF04890002D	19-MAY-89	11	U	UG/KG	11	V	TRG	A
		LF04891214	19-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF04891416	19-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF04890406	19-MAY-89	11	U	UG/KG	11	A	TRG	A
		LF04890910	19-MAY-89	11	U	UG/KG	11	V	TRG	A
	CARBON DISULFIDE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
	CARBON TETRACHLORIDE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
	CHLOROBENZENE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
8206389	CHLOROETHANE	LF04890002D	19-MAY-89	11	U	UG/KG	11	V	TRG	A
		LF04890406	19-MAY-89	11	U	UG/KG	11	A	TRG	A
		LF04891214	19-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF04891416	19-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF04890910	19-MAY-89	11	U	UG/KG	11	V	TRG	A
	CHLOROFORM	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A
	CHLOROMETHANE	LF04890002D	19-MAY-89	11	U	UG/KG	11	V	TRG	A
		LF04891214	19-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF04891416	19-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF04890910	19-MAY-89	11	U	UG/KG	11	V	TRG	A
		LF04890406	19-MAY-89	11	U	UG/KG	11	A	TRG	A
	DIBROMOCHLOROMETHANE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
	ETHYLBENZENE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04890406	19-MAY-89	2	J	UG/KG	6	A	TRG	A
	METHYLENE CHLORIDE	LF04890002D	19-MAY-89	4	JB	UG/KG	6	A	TRG	A
		LF04890406	19-MAY-89	6	B	UG/KG	6	A	TRG	A
		LF04891214	19-MAY-89	6	B	UG/KG	6	A	TRG	A
		LF04891416	19-MAY-89	6	B	UG/KG	6	A	TRG	A
		LF04890910	19-MAY-89	3	JB	UG/KG	6	A	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
8206389	STYRENE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	2	J	UG/KG	6	A	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
	TETRACHLOROETHENE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	2	J	UG/KG	6	A	TRG	A
	TOLUENE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04890406	19-MAY-89	9		UG/KG	6	A	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
	TOTAL XYLENES	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04890406	19-MAY-89	3	J	UG/KG	6	A	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
	TRICHLOROETHENE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
	VINYL ACETATE	LF04890002D	19-MAY-89	11	U	UG/KG	11	V	TRG	A
		LF04890910	19-MAY-89	11	U	UG/KG	11	V	TRG	A
		LF04891214	19-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF04891416	19-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF04890406	19-MAY-89	11	U	UG/KG	11	A	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
B206389	VINYL CHLORIDE	LF04890002D	19-MAY-89	11	U	UG/KG	11	V	TRG	A
		LF04891214	19-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF04891416	19-MAY-89	12	U	UG/KG	12	V	TRG	A
		LF04890910	19-MAY-89	11	U	UG/KG	11	V	TRG	A
		LF04890406	19-MAY-89	11	U	UG/KG	11	A	TRG	A
	cis-1,3-DICHLOROPROPENE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A
	trans-1,3-DICHLOROPROPENE	LF04890002D	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891416	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04891214	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890910	19-MAY-89	6	U	UG/KG	6	V	TRG	A
		LF04890406	19-MAY-89	6	U	UG/KG	6	A	TRG	A

OU07: DRILL CUTTINGS ANALYTICAL DATA

Location Code	Parameter	Proj Sample No	Sample Date	Result	Q	Units	Det. Limit	Validation	Type Flag	Pkg. Valid.
8206789	% SOLIDS	LF0989BR0003	23-MAY-89	83.4		%			TRG	
		LF0989BR0511D	23-MAY-89	84.2		%			TRG	
		LF0989BR1117	23-MAY-89	83.8		%			TRG	
		LF0989BR0511	23-MAY-89	84.6		%			TRG	
	NITRATE	LF0989BR0003	23-MAY-89	5.3124	U				TRG	
		LF0989BR1117	23-MAY-89	5.3124	U				TRG	
		LF0989BR0511	23-MAY-89	5.3124	U				TRG	
		LF0989BR0511D	23-MAY-89	5.3124	U				TRG	
	NITRATE/NITRITE	LF0989BR0003	23-MAY-89	1.2	U	MG/KG		V	TRG	
		LF0989BR0511	23-MAY-89	1.2	U	MG/KG		V	TRG	
		LF0989BR1117	23-MAY-89	1.2	U	MG/KG		V	TRG	
		LF0989BR0511D	23-MAY-89	1.2	U	MG/KG		V	TRG	
	SULFIDE	LF0989BR0003	23-MAY-89	2	U	MG/KG		V	TRG	
		LF0989BR0511D	23-MAY-89	2	U	MG/KG		V	TRG	
		LF0989BR1117	23-MAY-89	2	U	MG/KG		V	TRG	
		LF0989BR0511	23-MAY-89	2	U	MG/KG		V	TRG	
	pH	LF0989BR0003	23-MAY-89	7.7		PHUNIT			TRG	
		LF0989BR1117	23-MAY-89	8.4		PHUNIT			TRG	
		LF0989BR0511D	23-MAY-89	8.6		PHUNIT			TRG	
		LF0989BR0511	23-MAY-89	9		PHUNIT			TRG	
	CESIUM-137	LF0989BR0511	23-MAY-89	0		PCI/G	.1		TRG	
		LF0989BR1117	23-MAY-89	0		PCI/G	.1		TRG	
		LF0989BR0511D	23-MAY-89	0		PCI/G	.1		TRG	

This is a
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EG&G — ROCKY FLATS PLANT
ENVIRONMENTAL MANAGEMENT DEPARTMENT
APPROVED
This is a RED Stamp

ROCKY FLATS PLANT Phase I RFI/RI Work Plan for Operable Unit 7 - Present Landfill IHSS 114 and Inactive Hazardous Waste Storage Area IHSS 203	Manual No.: 21100-WP-OU 07.01 Section No.: L Organization: Environmental Management	

Title: Appendix G: Present Landfill Groundwater Quality Data Exceeding Background

Approved by:

12/6/91	T. P. O'Rourke	6/23/92
Effective Date	Manager	Date

APPENDIX G

Present Landfill Groundwater Quality

Data Exceeding Background --

Uppermost Flow System

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS PLANT
GROUNDWATER QUALITY MONITORING - OPERABLE UNIT 7
UPPER FLOW SYSTEM - QUARTERS 1,2, and 3 - 1990

WELL IDENTIFICATION CODE: 0586

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
CALCIUM	62.590	315.000		5000.000	MG/L	15-MAY-90	G05860515020925	V
MAGNESIUM	16.090	249.000		5000.000	MG/L	15-MAY-90	G05860515020925	V
SODIUM	46.740	924.000		5000.000	MG/L	15-MAY-90	G05860515020925	V
TRICHLOROETHENE	5.000	8.000		5.000	UG/L	23-MAR-90	G05860390001	

WELL IDENTIFICATION CODE: 0686

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
CALCIUM	62.590	229.000		28.800	MG/L	17-MAY-90	G-0686-0516-02-1410	
		229.000		28.800	MG/L	17-MAY-90	G-0686-0516-02-1410	V
		229.000		5000.000	MG/L	17-MAY-90	G06860516021410	V
CHLORIDE	10.670	709.000		250.000	MG/L	17-MAY-90	G-0686-0516-02-1410	V
MAGNESIUM	16.090	88.900		19.400	MG/L	17-MAY-90	G-0686-0516-02-1410	
		88.900		19.400	MG/L	17-MAY-90	G-0686-0516-02-1410	V
		88.900		5000.000	MG/L	17-MAY-90	G06860516021410	V
MANGANESE	0.213	0.388		1.000	MG/L	17-MAY-90	G-0686-0516-02-1410	
		0.388		1.000	MG/L	17-MAY-90	G-0686-0516-02-1410	V
		0.388		15.000	MG/L	17-MAY-90	G06860516021410	V
MERCURY	0.000	0.001			MG/L	17-MAY-90	G-0686-0516-02-1410	

Report Date: 01-JUL-91

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS PLANT
GROUNDWATER QUALITY MONITORING - OPERABLE UNIT 7
UPPER FLOW SYSTEM - QUARTERS 1,2, and 3 - 1990

WELL IDENTIFICATION CODE: 0686

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
MERCURY	0.000	0.001			MG/L	17-MAY-90	G-0686-0516-02-1410	V
		0.001			MG/L	17-MAY-90	G06860516021410	V
NICKEL	0.043	0.401		5.500	MG/L	17-MAY-90	G-0686-0516-02-1410	
		0.401		5.500	MG/L	17-MAY-90	G-0686-0516-02-1410	V
		0.401		40.000	MG/L	17-MAY-90	G06860516021410	V
SODIUM	46.740	420.000		30.400	MG/L	17-MAY-90	G-0686-0516-02-1410	
		420.000		30.400	MG/L	17-MAY-90	G-0686-0516-02-1410	V
		420.000		5000.000	MG/L	17-MAY-90	G06860516021410	V
SULFATE	67.080	1170.000		500.000	MG/L	17-MAY-90	G-0686-0516-02-1410	V
TOTAL DISSOLVED SOLIDS	388.760	3000.000		10.000	MG/L	17-MAY-90	G-0686-0516-02-1410	
		3000.000		10.000	MG/L	17-MAY-90	G-0686-0516-02-1410	V

WELL IDENTIFICATION CODE: 0786

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
BICARBONATE AS CACO3	249.350	920.000			MG/L	02-FEB-90	G07860190001	
		620.000		10.000	MG/L	01-MAY-90	G-0786-0501-02-0950	
CALCIUM	62.590	295.000		5000.000	MG/L	31-JAN-90	G07860190001	V
CHLORIDE	10.670	410.000			MG/L	02-FEB-90	G07860190001	
		222.000		25.000	MG/L	01-MAY-90	G-0786-0501-02-0950	

Report Date: 01-JUL-91

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS PLANT
GROUNDWATER QUALITY MONITORING - OPERABLE UNIT 7
UPPER FLOW SYSTEM - QUARTERS 1,2, and 3 - 1990

WELL IDENTIFICATION CODE: 0786

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
IRON	0.944	3.760		100.000	MG/L	31-JAN-90	G07860190001	V
MAGNESIUM	16.090	94.700		5000.000	MG/L	31-JAN-90	G07860190001	V
NICKEL	0.043	0.795		40.000	MG/L	31-JAN-90	G07860190001	V
SODIUM	46.740	253.000		5000.000	MG/L	31-JAN-90	G07860190001	V
SULFATE	67.080	380.000			MG/L	02-FEB-90	G07860190001	
		206.000		100.000	MG/L	01-MAY-90	G-0786-0501-02-0950	
TOTAL DISSOLVED SOLIDS	388.760	2000.000			MG/L	02-FEB-90	G07860190001	
		1300.000		10.000	MG/L	01-MAY-90	G-0786-0501-02-0950	

WELL IDENTIFICATION CODE: 1086

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
NITRATE/NITRITE	3.430	4.300			MG/L	26-JAN-90	G10860190001	
		3.600			MG/L	24-SEP-90	GW00365IT	

WELL IDENTIFICATION CODE: 4287

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
CALCIUM	62.590	68.600		5000.000	MG/L	21-MAR-90	G42870390001	V

Report Date: 01-JUL-91

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS PLANT
GROUNDWATER QUALITY MONITORING - OPERABLE UNIT 7
UPPER FLOW SYSTEM - QUARTERS 1,2, and 3 - 1990

WELL IDENTIFICATION CODE: 5887

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
NITRATE/NITRITE	3.430	4.400			MG/L	30-JAN-90	G58870190001	
		4.300			MG/L	13-SEP-90	GW00374IT	
		3.800		2.000	MG/L	17-MAY-90	G-5887-0517-02-1218	
		3.800		2.000	MG/L	17-MAY-90	G-5887-0517-02-1218	V

WELL IDENTIFICATION CODE: 6087

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
ACETONE	10.000	10.000		10.000	UG/L	06-JUN-90	G-6087-0606-02-1344	
ALUMINUM	0.327	0.398		200.000	MG/L	28-AUG-90	GW00317IT	
BARIUM	0.200	0.214		9.700	MG/L	06-JUN-90	G-6087-0606-02-1344	
		0.214		9.700	MG/L	06-JUN-90	G-6087-0606-02-1344	V
LEAD	0.040	0.045		3.000	MG/L	28-AUG-90	GW00314IT	
NITRATE/NITRITE	3.430	8.200			MG/L	28-AUG-90	GW00312IT	
		7.800			MG/L	28-AUG-90	GW00313IT	
		4.600			MG/L	01-FEB-90	G60870290001	
		4.500		1.000	MG/L	06-JUN-90	G-6087-0606-02-1440	
		4.500		1.000	MG/L	06-JUN-90	G-6087-0606-02-1440	V
		4.400			MG/L	01-FEB-90	G60870290001D	
		4.300		1.000	MG/L	06-JUN-90	G-6087-0606-02-1344	
		4.300		1.000	MG/L	06-JUN-90	G-6087-0606-02-1344	V

Report Date: 01-JUL-91

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS PLANT
GROUNDWATER QUALITY MONITORING - OPERABLE UNIT 7
UPPER FLOW SYSTEM - QUARTERS 1,2, and 3 - 1990

WELL IDENTIFICATION CODE: 6087

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
TOTAL DISSOLVED SOLIDS	388.760	500.000			MG/L	01-FEB-90	G60870290001	
TRICHLOROETHENE	5.000	160.000		5.000	UG/L	06-JUN-90	FB-6087-0606-02-1226	
		22.000		5.000	UG/L	06-JUN-90	ER-6087-0606-02-1201	

WELL IDENTIFICATION CODE: 6187

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
NITRATE/NITRITE	3.430	5.100			MG/L	05-MAR-90	G61870390001	
		4.800			MG/L	05-MAR-90	G61870390001D	
		4.400		1.000	MG/L	08-MAY-90	G-6187-0508-02-1233	
		4.400		1.000	MG/L	08-MAY-90	G-6187-0508-02-1233	JA
		4.300		1.000	MG/L	08-MAY-90	G-6187-0508-02-1410	
		4.300		1.000	MG/L	08-MAY-90	G-6187-0508-02-1410	JA
		4.000			MG/L	23-JUL-90	GW001721T	

WELL IDENTIFICATION CODE: 6287

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
AMERICIUM-241	0.017	3.191			PCI/L	26-FEB-90	G62870290001D	
CESIUM-137	0.506	4.668			PCI/L	26-FEB-90	G62870290001	
NITRATE/NITRITE	3.430	5.200			MG/L	26-FEB-90	G62870290001D	
		4.400			MG/L	26-FEB-90	G62870290001	

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WELL IDENTIFICATION CODE: 6287

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
NITRATE/NITRITE	3.430	3.500			MG/L	23-AUG-90	GW002861T	
		3.500			MG/L	23-AUG-90	GW002891T	
URANIUM-233,234	0.100	1.870			PCI/L	26-FEB-90	G62870290001D	

WELL IDENTIFICATION CODE: 6387

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
1,2-DICHLOROETHYLENE	5.000	28.000		5.000	UG/L	18-MAY-90	G-6387-0518-02-0910	
		28.000		5.000	UG/L	18-MAY-90	G-6387-0518-02-1020	
ACETONE	10.000	19.000		10.000	UG/L	13-SEP-90	GW001991T	
BARIUM	0.200	0.508		200.000	MG/L	12-FEB-90	G63870290001D	
		0.421		200.000	MG/L	13-SEP-90	GW002011T	
		0.409		200.000	MG/L	13-SEP-90	GW001231T	
		0.399		5.400	MG/L	18-MAY-90	G-6387-0518-02-0910	
		0.399		5.400	MG/L	18-MAY-90	G-6387-0518-02-0910	V
		0.399		200.000	MG/L	18-MAY-90	G63870518020910	V
		0.397		5.400	MG/L	18-MAY-90	G-6387-0518-02-1020	
		0.397		5.400	MG/L	18-MAY-90	G-6387-0518-02-1020	V
		0.397		200.000	MG/L	18-MAY-90	G63870518021020	V
BICARBONATE AS CACO3	249.350	500.000			MG/L	12-FEB-90	G63870290001	
		408.000		10.000	MG/L	18-MAY-90	G-6387-0518-02-0910	
		408.000		10.000	MG/L	18-MAY-90	G-6387-0518-02-0910	V

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WELL IDENTIFICATION CODE: 6387

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
BICARBONATE AS CACO3	249.350	398.000		10.000	MG/L	18-MAY-90	G-6387-0518-02-1020	
		398.000		10.000	MG/L	18-MAY-90	G-6387-0518-02-1020	V
		380.000		1.000	MG/L	13-SEP-90	GW001231T	
		380.000		1.000	MG/L	13-SEP-90	GW002011T	
CALCIUM	62.590	129.000		28.800	MG/L	18-MAY-90	G-6387-0518-02-1020	
		129.000		28.800	MG/L	18-MAY-90	G-6387-0518-02-1020	V
		129.000		5000.000	MG/L	18-MAY-90	G63870518021020	V
		128.000		28.800	MG/L	18-MAY-90	G-6387-0518-02-0910	
		128.000		28.800	MG/L	18-MAY-90	G-6387-0518-02-0910	V
		128.000		5000.000	MG/L	18-MAY-90	G63870518020910	V
		121.000		5000.000	MG/L	12-FEB-90	G63870290001D	
		115.000		5000.000	MG/L	13-SEP-90	GW002011T	
		114.000		5000.000	MG/L	13-SEP-90	GW001231T	
CHLORIDE	10.670	48.300		5.000	MG/L	18-MAY-90	G-6387-0518-02-0910	V
		48.100		5.000	MG/L	18-MAY-90	G-6387-0518-02-1020	V
		41.000			MG/L	12-FEB-90	G63870290001	
		38.000			MG/L	13-SEP-90	GW002011T	
		37.000			MG/L	13-SEP-90	GW001231T	
IRON	0.944	13.000		16.700	MG/L	18-MAY-90	G-6387-0518-02-0910	
		13.000		16.700	MG/L	18-MAY-90	G-6387-0518-02-0910	V
		13.000		100.000	MG/L	18-MAY-90	G63870518020910	V
		11.000		16.700	MG/L	18-MAY-90	G-6387-0518-02-1020	
		11.000		16.700	MG/L	18-MAY-90	G-6387-0518-02-1020	V
		11.000		100.000	MG/L	18-MAY-90	G63870518021020	V

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WELL IDENTIFICATION CODE: 6387

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
IRON	0.944	5.290		100.000	MG/L	12-FEB-90	G63870290001D	
MAGNESIUM	16.090	25.100		19.400	MG/L	18-MAY-90	G-6387-0518-02-1020	
		25.100		19.400	MG/L	18-MAY-90	G-6387-0518-02-1020	V
		25.100		5000.000	MG/L	18-MAY-90	G63870518021020	V
		24.800		19.400	MG/L	18-MAY-90	G-6387-0518-02-0910	
		24.800		19.400	MG/L	18-MAY-90	G-6387-0518-02-0910	V
		24.800		5000.000	MG/L	18-MAY-90	G63870518020910	V
		21.100		5000.000	MG/L	13-SEP-90	GW00123IT	
		21.000		5000.000	MG/L	13-SEP-90	GW00201IT	
		19.300		5000.000	MG/L	12-FEB-90	G63870290001D	
MANGANESE	0.213	6.000		1.000	MG/L	18-MAY-90	G-6387-0518-02-0910	
		6.000		1.000	MG/L	18-MAY-90	G-6387-0518-02-0910	V
		6.000		15.000	MG/L	18-MAY-90	G63870518020910	V
		5.380		1.000	MG/L	18-MAY-90	G-6387-0518-02-1020	
		5.380		1.000	MG/L	18-MAY-90	G-6387-0518-02-1020	V
		5.380		15.000	MG/L	18-MAY-90	G63870518021020	V
		2.830		15.000	MG/L	13-SEP-90	GW00201IT	
		2.710		15.000	MG/L	12-FEB-90	G63870290001D	
		2.550		15.000	MG/L	13-SEP-90	GW00123IT	
MERCURY	0.000	0.001			MG/L	18-MAY-90	G-6387-0518-02-0910	
		0.001			MG/L	18-MAY-90	G-6387-0518-02-0910	V
		0.001			MG/L	18-MAY-90	G63870518020910	V
		0.001			MG/L	18-MAY-90	G-6387-0518-02-1020	
		0.001			MG/L	18-MAY-90	G-6387-0518-02-1020	V

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Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
MERCURY	0.000	0.001			MG/L	18-MAY-90	G63870518021020	V
TOTAL DISSOLVED SOLIDS	388.760	620.000		10.000	MG/L	18-MAY-90	G-6387-0518-02-0910	
		620.000		10.000	MG/L	18-MAY-90	G-6387-0518-02-0910	V
		576.000		10.000	MG/L	18-MAY-90	G-6387-0518-02-1020	
		576.000		10.000	MG/L	18-MAY-90	G-6387-0518-02-1020	V
		540.000			MG/L	12-FEB-90	G63870290001	
		510.000		10.000	MG/L	13-SEP-90	GW00201IT	
		500.000		10.000	MG/L	13-SEP-90	GW00123IT	
URANIUM-233,234	0.100	0.700			PCI/L	12-FEB-90	G63870290001	
VINYL CHLORIDE	10.000	17.000		10.000	UG/L	12-FEB-90	G63870290001D	
		11.000		10.000	UG/L	13-SEP-90	GW00123IT	
		11.000		10.000	UG/L	13-SEP-90	GW00201IT	

WELL IDENTIFICATION CODE: 6487

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
1,1-DICHLOROETHANE	5.000	10.000		5.000	UG/L	15-JUN-90	G64870615020948	V
		6.000		5.000	UG/L	21-SEP-90	GW00368IT	
1,2-DICHLOROETHYLENE	5.000	10.000		5.000	UG/L	21-SEP-90	GW00368IT	
ARSENIC	0.010	0.012		10.000	MG/L	21-SEP-90	GW00368IT	

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WELL IDENTIFICATION CODE: 6487

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
BARIUM	0.200	0.697		200.000	MG/L	21-SEP-90	GW00368IT	
		0.213		200.000	MG/L	14-FEB-90	G64870290001	V
BICARBONATE AS CACO3	249.350	270.000		1.000	MG/L	21-SEP-90	GW00368IT	
CALCIUM	62.590	93.300		5000.000	MG/L	21-SEP-90	GW00368IT	
CHLORIDE	10.670	66.000			MG/L	21-SEP-90	GW00368IT	
		36.000			MG/L	14-FEB-90	G64870290001	
COBALT	0.050	0.068		50.000	MG/L	21-SEP-90	GW00368IT	
IRON	0.944	57.100		100.000	MG/L	21-SEP-90	GW00368IT	
		3.480		100.000	MG/L	14-FEB-90	G64870290001	V
MAGNESIUM	16.090	17.300		5000.000	MG/L	21-SEP-90	GW00368IT	
MANGANESE	0.213	4.120		15.000	MG/L	21-SEP-90	GW00368IT	
		1.050		15.000	MG/L	14-FEB-90	G64870290001	V
NICKEL	0.043	0.063		40.000	MG/L	21-SEP-90	GW00368IT	
TOTAL DISSOLVED SOLIDS	388.760	440.000		10.000	MG/L	21-SEP-90	GW00368IT	

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WELL IDENTIFICATION CODE: 6587

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
1,1,1-TRICHLOROETHANE	5.000	19.000		5.000	UG/L	01-MAY-90	G65870501021529	V
		19.000		5.000	UG/L	01-MAY-90	G65870501021529	V
		14.000		5.000	UG/L	18-JUL-90	GW000191T	
1,2-DICHLOROETHYLENE	5.000	8.000		5.000	UG/L	18-JUL-90	GW000191T	
IRON	0.944	1.810		100.000	MG/L	01-MAY-90	G658705010215	V
		1.110		100.000	MG/L	18-JUL-90	GW000191T	
MANGANESE	0.213	0.584		15.000	MG/L	01-MAY-90	G658705010215	V
		0.567		15.000	MG/L	18-JUL-90	GW000191T	
		0.361		15.000	MG/L	22-MAR-90	G65870390001	V
NITRATE/NITRITE	3.430	4.600			MG/L	18-JUL-90	GW000191T	
TRICHLOROETHENE	5.000	26.000		5.000	UG/L	01-MAY-90	G65870501021529	V
		26.000		5.000	UG/L	01-MAY-90	G65870501021529	V
		23.000		5.000	UG/L	18-JUL-90	GW000191T	

WELL IDENTIFICATION CODE: 6687

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
1,1,1-TRICHLOROETHANE	5.000	18.000		5.000	UG/L	24-JUL-90	GW000261T	
		13.000		5.000	UG/L	12-MAR-90	G66870390001	V
		11.000		5.000	UG/L	02-MAY-90	G6687050201250	V
		11.000		5.000	UG/L	02-MAY-90	G6687050201250	V

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WELL IDENTIFICATION CODE: 6687

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
CALCIUM	62.590	208.000		5000.000	MG/L	02-MAY-90	G66870502021250	V
COPPER	0.048	0.053		25.000	MG/L	02-MAY-90	G66870502021250	V
MAGNESIUM	16.090	50.700		5000.000	MG/L	02-MAY-90	G66870502021250	V
NITRATE/NITRITE	3.430	4.300			MG/L	12-MAR-90	G66870390001	
TRICHLOROETHENE	5.000	18.000		5.000	UG/L	24-JUL-90	GW000261T	
		12.000		5.000	UG/L	02-MAY-90	G6687050201250	V
		12.000		5.000	UG/L	02-MAY-90	G6687050201250	V

WELL IDENTIFICATION CODE: 6787

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
ACETONE	10.000	22.000		10.000	UG/L	19-FEB-90	G67870290001	V
AMERICIUM-241	0.017	0.047			PCI/L	19-FEB-90	G67870290001	
COPPER	0.048	0.383		25.000	MG/L	22-MAY-90	G678705220211	V
NICKEL	0.043	0.097		40.000	MG/L	22-MAY-90	G678705220211	V
		0.062		40.000	MG/L	21-SEP-90	GW003691T	
TETRACHLOROETHENE	5.000	51.000		5.000	UG/L	22-MAY-90	G67870522021127	V
		51.000		5.000	UG/L	22-MAY-90	G67870522021127	V

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WELL IDENTIFICATION CODE: 6787

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
URANIUM-233,234	0.100	0.500			PCI/L	19-FEB-90	G67870290001	
ZINC	0.141	0.869		20.000	MG/L	22-MAY-90	G678705220211	V
		0.470		20.000	MG/L	21-SEP-90	GW00369IT	

WELL IDENTIFICATION CODE: 6887

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
COPPER	0.048	0.231		25.000	MG/L	31-JUL-90	GW00124IT	
NICKEL	0.043	0.084		40.000	MG/L	31-JUL-90	GW00124IT	
TETRACHLOROETHENE	5.000	27.000		5.000	UG/L	22-MAY-90	G-6887-0522-02-1400	
		27.000		5.000	UG/L	22-MAY-90	G68870522021400	V
		27.000		5.000	UG/L	22-MAY-90	G68870522021400	V
URANIUM-233,234	0.100	0.200			PCI/L	19-FEB-90	G68870290001	
ZINC	0.141	0.599		20.000	MG/L	31-JUL-90	GW00124IT	

WELL IDENTIFICATION CODE: 7087

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
BICARBONATE AS CACO3	249.350	260.000		1.000	MG/L	17-AUG-90	GW00239IT	

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WELL IDENTIFICATION CODE: 7087

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
CALCIUM	62.590	77.700		5000.000	MG/L	17-AUG-90	GW00239IT	
CHLORIDE	10.670	43.000			MG/L	17-AUG-90	GW00239IT	
MAGNESIUM	16.090	21.900		5000.000	MG/L	17-AUG-90	GW00239IT	
NITRATE/NITRITE	3.430	5.100			MG/L	17-AUG-90	GW00239IT	
SODIUM	46.740	60.200		5000.000	MG/L	17-AUG-90	GW00239IT	
SULFATE	67.080	87.000		2.000	MG/L	17-AUG-90	GW00239IT	
TOTAL DISSOLVED SOLIDS	388.760	510.000		10.000	MG/L	17-AUG-90	GW00239IT	

WELL IDENTIFICATION CODE: 7187

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
AMERICIUM-241	0.017	0.020			PCI/L	15-FEB-90	G71870290001	
CALCIUM	62.590	66.400		28.800	MG/L	27-APR-90	G-7187-0427-02-1147	
		66.400		28.800	MG/L	27-APR-90	G-7187-0427-02-1147	V
URANIUM-233,234	0.100	0.800			PCI/L	15-FEB-90	G71870290001	

WELL IDENTIFICATION CODE: 7287

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WELL IDENTIFICATION CODE: 7287

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
BICARBONATE AS CACO3	249.350	270.000			MG/L	20-FEB-90		
		270.000			MG/L	20-FEB-90	G72870290001	
		250.000		1.000	MG/L	17-JUL-90	GW000111T	
CALCIUM	62.590	86.300		5000.000	MG/L	17-JUL-90	GW000111T	
		84.000		5000.000	MG/L	20-FEB-90	G72870290001	V
CARBON TETRACHLORIDE	5.000	8.000		5.000	UG/L	20-FEB-90	G72870290001	V
COPPER	0.048	0.106		25.000	MG/L	20-FEB-90	G72870290001	V
		0.089		25.000	MG/L	17-JUL-90	GW000111T	
NICKEL	0.043	0.067		40.000	MG/L	20-FEB-90	G72870290001	V
TETRACHLOROETHENE	5.000	5.000		5.000	UG/L	20-FEB-90	G72870290001	V
TOTAL DISSOLVED SOLIDS	388.760	420.000			MG/L	20-FEB-90		
		420.000			MG/L	20-FEB-90	G72870290001	
TRICHLOROETHENE	5.000	50.000		5.000	UG/L	20-FEB-90	G72870290001	V
		47.000		5.000	UG/L	17-JUL-90	GW000111T	
URANIUM-233,234	0.100	1.000			PCI/L	20-FEB-90	G72870290001	
ZINC	0.141	0.645		20.000	MG/L	20-FEB-90	G72870290001	V
		0.298		20.000	MG/L	17-JUL-90	GW000111T	
		0.149		20.000	MG/L	30-APR-90	G72870430021410	V

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WELL IDENTIFICATION CODE: B106089

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
1,1,1-TRICHLOROETHANE	5.000	12.000		5.000	UG/L	07-AUG-90	GW00152IT	
1,1-DICHLOROETHANE	5.000	11.000		5.000	UG/L	07-AUG-90	GW00152IT	
1,2-DICHLOROETHYLENE	5.000	6.000		5.000	UG/L	07-AUG-90	GW00152IT	
ACETONE	10.000	11.000		10.000	UG/L	07-AUG-90	GW00152IT	
BARIUM	0.200	0.316		200.000	MG/L	30-MAY-90	LF01890530021910	V
IRON	0.944	4.040		100.000	MG/L	30-MAY-90	LF01890530021910	V
MANGANESE	0.213	1.060		15.000	MG/L	30-MAY-90	LF01890530021910	V

WELL IDENTIFICATION CODE: B206189

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
ALUMINUM	0.327	0.345		200.000	MG/L	22-MAR-90	GLF02890390001	V
BARIUM	0.200	0.330		200.000	MG/L	17-AUG-90	GW00242IT	
BICARBONATE AS CACO3	249.350	570.000		1.000	MG/L	17-AUG-90	GW00242IT	
		390.000			MG/L	22-MAR-90	GLF02890390001	
CALCIUM	62.590	130.000		5000.000	MG/L	17-AUG-90	GW00242IT	
		98.900		5000.000	MG/L	22-MAR-90	GLF02890390001	V

Report Date: 01-JUL-91

U.S. DEPARTMENT OF ENERGY
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WELL IDENTIFICATION CODE: B206189

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
CHLORIDE	10.670	64.000			MG/L	17-AUG-90	GW00242IT	
		51.000			MG/L	22-MAR-90	GLF02890390001	
MAGNESIUM	16.090	27.600		5000.000	MG/L	22-MAR-90	GLF02890390001	V
		26.500		5000.000	MG/L	17-AUG-90	GW00242IT	
NICKEL	0.043	0.044		40.000	MG/L	22-MAR-90	GLF02890390001	V
SILVER	0.004	0.006		10.000	MG/L	22-MAR-90	GLF02890390001	V
SODIUM	46.740	181.000		5000.000	MG/L	22-MAR-90	GLF02890390001	V
		125.000		5000.000	MG/L	17-AUG-90	GW00242IT	
SULFATE	67.080	140.000			MG/L	22-MAR-90	GLF02890390001	
		70.000		2.000	MG/L	17-AUG-90	GW00242IT	
TOTAL DISSOLVED SOLIDS	388.760	800.000		10.000	MG/L	17-AUG-90	GW00242IT	
		650.000			MG/L	22-MAR-90	GLF02890390001	

WELL IDENTIFICATION CODE: B206289

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
BICARBONATE AS CACO3	249.350	340.000			MG/L	09-MAR-90	GLF03890390001	
CALCIUM	62.590	68.800		5000.000	MG/L	01-JUN-90	LF0389BR05310	V

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WELL IDENTIFICATION CODE: B206289

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
MAGNESIUM	16.090	17.100		5000.000	MG/L	01-JUN-90	LF0389BR05310	V

WELL IDENTIFICATION CODE: B206389

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
BARIUM	0.200	0.594		200.000	MG/L	24-MAY-90	LF04890523021	V
BICARBONATE AS CACO3	249.350	550.000		1.000	MG/L	26-SEP-90	GW003731T	
CALCIUM	62.590	154.000		5000.000	MG/L	24-MAY-90	LF04890523021	V
CHLORIDE	10.670	21.000			MG/L	26-SEP-90	GW003731T	
CHLOROFORM	5.000	8.000		5.000	UG/L	24-MAY-90	LF04890523021144	V
		8.000		5.000	UG/L	24-MAY-90	LF04890523021144	V
IRON	0.944	5.500		100.000	MG/L	24-MAY-90	LF04890523021	V
MANGANESE	0.213	2.440		15.000	MG/L	24-MAY-90	LF04890523021	V
TETRACHLOROETHENE	5.000	51.000		5.000	UG/L	24-MAY-90	LF04890523021144	V
		51.000		5.000	UG/L	24-MAY-90	LF04890523021144	V
TOTAL DISSOLVED SOLIDS	388.760	540.000		10.000	MG/L	26-SEP-90	GW003731T	

WELL IDENTIFICATION CODE: B206489

Report Date: 01-JUL-91

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WELL IDENTIFICATION CODE: B206489

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
ACETONE	10.000	14.000		10.000	UG/L	20-FEB-90	GLF05890290001	V
BICARBONATE AS CACO3	249.350	310.000			MG/L	20-FEB-90	GLF05890290001	
CALCIUM	62.590	66.900		5000.000	MG/L	22-FEB-90	GLF05890290001	V
CHLORIDE	10.670	14.000			MG/L	20-FEB-90	GLF05890290001	
SODIUM	46.740	52.800		5000.000	MG/L	22-FEB-90	GLF05890290001	V
SULFATE	67.080	81.000			MG/L	20-FEB-90	GLF05890290001	
TOTAL DISSOLVED SOLIDS	388.760	400.000			MG/L	20-FEB-90	GLF05890290001	
TRICHLOROETHENE	5.000	46.000		5.000	UG/L	20-FEB-90	GLF05890290001	V
		25.000		5.000	UG/L	07-AUG-90	GW001531T	
		18.000		5.000	UG/L	31-MAY-90	LF0589BR0530021358	V
		18.000		5.000	UG/L	31-MAY-90	LF0589BR0530021358	V

WELL IDENTIFICATION CODE: B206589

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
BICARBONATE AS CACO3	249.350	410.000			MG/L	12-MAR-90	GLF06890390001	
		340.000		2.000	MG/L	12-JUN-90	LF06890611020900	V
CHLORIDE	10.670	75.200		5.000	MG/L	12-JUN-90	LF06890611020900	V

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WELL IDENTIFICATION CODE: B206589

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
CHLORIDE	10.670	63.000			MG/L	12-MAR-90	GLF06890390001	
TOTAL DISSOLVED SOLIDS	388.760	579.000		10.000	MG/L	12-JUN-90	LF06890611020900	V
		530.000			MG/L	12-MAR-90	GLF06890390001	

WELL IDENTIFICATION CODE: B206689

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
URANIUM-233,234	0.100	20.000			PCI/L	15-FEB-90	GLF0889290001	

WELL IDENTIFICATION CODE: B206789

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
CALCIUM	62.590	152.000		5000.000	MG/L	11-SEP-90	GW002141T	
		148.000		5000.000	MG/L	23-MAR-90	GLF09890390001	V
CHLORIDE	10.670	80.000			MG/L	11-SEP-90	GW002141T	
MAGNESIUM	16.090	42.900		5000.000	MG/L	11-SEP-90	GW002141T	
		39.900		5000.000	MG/L	23-MAR-90	GLF09890390001	V
NITRATE/NITRITE	3.430	7.700			MG/L	11-SEP-90	GW002141T	
SELENIUM	0.221	0.821		5.000	MG/L	11-SEP-90	GW002141T	

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WELL IDENTIFICATION CODE: B206789

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
SODIUM	46.740	141.000		5000.000	MG/L	11-SEP-90	GW00214IT	
		139.000		5000.000	MG/L	23-MAR-90	GLF09890390001	V
SULFATE	67.080	640.000		2.000	MG/L	11-SEP-90	GW00214IT	
TOTAL DISSOLVED SOLIDS	388.760	1200.000		10.000	MG/L	11-SEP-90	GW00214IT	

WELL IDENTIFICATION CODE: B206889

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
NITRATE/NITRITE	3.430	160.000			MG/L	08-FEB-90	GLF10890290001	

WELL IDENTIFICATION CODE: B206989

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
NITRATE/NITRITE	3.430	61.000			MG/L	07-FEB-90	GLF11890290001	

WELL IDENTIFICATION CODE: B207089

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
BICARBONATE AS CACO3	249.350	320.000			MG/L	08-FEB-90	GLF12890290001	
		280.000			MG/L	15-AUG-90	GW00236IT	
CALCIUM	62.590	139.000		5000.000	MG/L	08-FEB-90	GLF12890290001	V

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WELL IDENTIFICATION CODE: B207089

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
CHLORIDE	10.670	550.000			MG/L	08-FEB-90	GLF12890290001	
		540.000			MG/L	15-AUG-90	GW00236IT	
MAGNESIUM	16.090	41.800		5000.000	MG/L	08-FEB-90	GLF12890290001	V
SODIUM	46.740	475.000		5000.000	MG/L	08-FEB-90	GLF12890290001	V
SULFATE	67.080	570.000			MG/L	15-AUG-90	GW00236IT	
		520.000			MG/L	08-FEB-90	GLF12890290001	
TOTAL DISSOLVED SOLIDS	388.760	2000.000			MG/L	08-FEB-90	GLF12890290001	
		2000.000			MG/L	15-AUG-90	GW00236IT	

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WELL IDENTIFICATION CODE: 1086

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
ACETONE	10.000	42.000		10.000	UG/L	15-NOV-90	GW006751T	
		11.000		10.000	UG/L	15-NOV-90	GW006771T	
NITRATE/NITRITE	3.430	4.200		0.020	MG/L	15-NOV-90	GW006741T	
		4.100		0.020	MG/L	16-NOV-90	GW006761T	

WELL IDENTIFICATION CODE: 6087

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
BARIUM	0.200	0.258		200.000	MG/L	11-OCT-90	GW004811T	
CALCIUM	62.590	174.000		5000.000	MG/L	11-OCT-90	GW004811T	
		139.000		5000.000	MG/L	11-OCT-90	GW004821T	
MAGNESIUM	16.090	48.800		5000.000	MG/L	11-OCT-90	GW004821T	
		44.700		5000.000	MG/L	11-OCT-90	GW004811T	
NITRATE/NITRITE	3.430	8.300		0.020	MG/L	11-OCT-90	GW004831T	
		8.200		0.020	MG/L	11-OCT-90	GW004831T	
		8.200		0.020	MG/L	11-OCT-90	GW004861T	
SODIUM	46.740	118.000		5000.000	MG/L	11-OCT-90	GW004821T	
		113.000		5000.000	MG/L	11-OCT-90	GW004811T	

WELL IDENTIFICATION CODE: 6187

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WELL IDENTIFICATION CODE: 6187

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
NITRATE/NITRITE	3.430	4.800		0.020	MG/L	19-OCT-90	GW00531IT	
		4.800		0.020	MG/L	19-OCT-90	GW00534IT	

WELL IDENTIFICATION CODE: 6387

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
1,2-DICHLOROETHYLENE	5.000	10.000		5.000	UG/L	01-NOV-90	GW00582IT	
		9.000		5.000	UG/L	01-NOV-90	GW00579IT	
BARIUM	0.200	0.502		200.000	MG/L	01-NOV-90	GW00579IT	
		0.481		200.000	MG/L	01-NOV-90	GW00579IT	
		0.461		200.000	MG/L	01-NOV-90	GW00582IT	
BICARBONATE AS CACO3	249.350	390.000		1.000	MG/L	01-NOV-90	GW00579IT	
		390.000		1.000	MG/L	01-NOV-90	GW00582IT	
CALCIUM	62.590	128.000		5000.000	MG/L	01-NOV-90	GW00579IT	
		127.000		5000.000	MG/L	01-NOV-90	GW00582IT	
		126.188		5000.000	MG/L	01-NOV-90	GW00579IT	
CHLORIDE	10.670	38.000		0.200	MG/L	01-NOV-90	GW00579IT	
		35.000		0.200	MG/L	01-NOV-90	GW00582IT	
IRON	0.944	8.290		100.000	MG/L	01-NOV-90	GW00579IT	
		8.167		100.000	MG/L	01-NOV-90	GW00579IT	
		6.120		100.000	MG/L	01-NOV-90	GW00582IT	

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WELL IDENTIFICATION CODE: 6387

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
MAGNESIUM	16.090	23.100		5000.000	MG/L	01-NOV-90	GW00579IT	
		22.092		5000.000	MG/L	01-NOV-90	GW00579IT	
		21.900		5000.000	MG/L	01-NOV-90	GW00582IT	
MANGANESE	0.213	3.070		15.000	MG/L	01-NOV-90	GW00579IT	
		3.020		15.000	MG/L	01-NOV-90	GW00579IT	
		2.680		15.000	MG/L	01-NOV-90	GW00582IT	
TOTAL DISSOLVED SOLIDS	388.760	550.000		10.000	MG/L	01-NOV-90	GW00579IT	
		530.000		10.000	MG/L	01-NOV-90	GW00579IT	
		530.000		10.000	MG/L	01-NOV-90	GW00582IT	
VINYL CHLORIDE	10.000	11.000		10.000	UG/L	01-NOV-90	GW00582IT	
		10.000		10.000	UG/L	01-NOV-90	GW00579IT	

WELL IDENTIFICATION CODE: 6487

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
1,1-DICHLOROETHANE	5.000	6.000		5.000	UG/L	20-NOV-90	GW00751IT	
1,2-DICHLOROETHYLENE	5.000	9.000		5.000	UG/L	20-NOV-90	GW00751IT	

WELL IDENTIFICATION CODE: 6587

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation

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WELL IDENTIFICATION CODE: 6587

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
1,1,1-TRICHLOROETHANE	5.000	18.000		5.000	UG/L	17-OCT-90	GW00546IT	
TRICHLOROETHENE	5.000	21.000		5.000	UG/L	17-OCT-90	GW00546IT	

WELL IDENTIFICATION CODE: 6687

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
TRICHLOROETHENE	5.000	14.000		5.000	UG/L	06-DEC-90	GW00672IT	

WELL IDENTIFICATION CODE: 6787

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
NICKEL	0.043	0.076		40.000	MG/L	07-DEC-90	GW00785IT	

WELL IDENTIFICATION CODE: 7187

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
CALCIUM	62.590	66.800			MG/L	14-NOV-90	GW00623IT	

WELL IDENTIFICATION CODE: 7287

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
CALCIUM	62.590	77.500			MG/L	08-NOV-90	GW00659IT	

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WELL IDENTIFICATION CODE: 7287

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
COPPER	0.048	0.077			MG/L	08-NOV-90	GW00659IT	
NICKEL	0.043	0.045			MG/L	08-NOV-90	GW00659IT	
ZINC	0.141	0.433			MG/L	08-NOV-90	GW00659IT	

WELL IDENTIFICATION CODE: B106089

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
1,1-DICHLOROETHANE	5.000	5.000		5.000	UG/L	04-DEC-90	GW00781IT	
TETRACHLOROETHENE	5.000	5.000		5.000	UG/L	04-DEC-90	GW00781IT	

WELL IDENTIFICATION CODE: B206189

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
1,1-DICHLOROETHANE	5.000	5.000		5.000	UG/L	04-DEC-90	GW00782IT	

WELL IDENTIFICATION CODE: B206389

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
1,1-DICHLOROETHANE	5.000	8.000		5.000	UG/L	09-NOV-90	GW00647IT	
1,2-DICHLOROETHYLENE	5.000	26.000		5.000	UG/L	09-NOV-90	GW00647IT	

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WELL IDENTIFICATION CODE: B206389

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
CHLOROFORM	5.000	11.000		5.000	UG/L	09-NOV-90	GW00647IT	
TETRACHLOROETHENE	5.000	55.000		5.000	UG/L	09-NOV-90	GW00647IT	
TRICHLOROETHENE	5.000	84.000		5.000	UG/L	09-NOV-90	GW00647IT	

WELL IDENTIFICATION CODE: B206489

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
TRICHLOROETHENE	5.000	26.000		5.000	UG/L	20-NOV-90	GW00746IT	

WELL IDENTIFICATION CODE: B206589

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
BICARBONATE AS CACO3	249.350	350.000			MG/L	09-NOV-90	GW00649IT	
CALCIUM	62.590	92.100			MG/L	09-NOV-90	GW00649IT	
CHLORIDE	10.670	63.000			MG/L	09-NOV-90	GW00649IT	
MAGNESIUM	16.090	26.500			MG/L	09-NOV-90	GW00649IT	
SODIUM	46.740	70.100			MG/L	09-NOV-90	GW00649IT	
TOTAL DISSOLVED SOLIDS	388.760	599.000			MG/L	09-NOV-90	GW00649IT	

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WELL IDENTIFICATION CODE: B206689

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
CHLORIDE	10.670	83.000		0.200	MG/L	05-DEC-90	GW00784IT	
SULFATE	67.080	130.000		2.000	MG/L	05-DEC-90	GW00784IT	
TOTAL DISSOLVED SOLIDS	388.760	590.000		10.000	MG/L	05-DEC-90	GW00784IT	

WELL IDENTIFICATION CODE: B207089

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
BICARBONATE AS CACO3	249.350	290.000		1.000	MG/L	30-OCT-90	GW00612IT	
		280.000		1.000	MG/L	30-OCT-90	GW00612IT	
CALCIUM	62.590	143.000		5000.000	MG/L	30-OCT-90	GW00612IT	
		141.289		5000.000	MG/L	30-OCT-90	GW00612IT	
CHLORIDE	10.670	540.000		0.200	MG/L	30-OCT-90	GW00612IT	
		530.000		0.200	MG/L	30-OCT-90	GW00612IT	
CHROMIUM	0.020	0.024		10.000	MG/L	30-OCT-90	GW00612IT	
		0.021		10.000	MG/L	30-OCT-90	GW00612IT	
MAGNESIUM	16.090	42.134		5000.000	MG/L	30-OCT-90	GW00612IT	
		42.100		5000.000	MG/L	30-OCT-90	GW00612IT	
SILVER	0.004	0.011		10.000	MG/L	30-OCT-90	GW00612IT	

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WELL IDENTIFICATION CODE: B207089

Parameter	Background Limt	Result	Qualifier	Detection Limit	Units	Sample Date	Sample Number	Validation
SODIUM	46.740	394.000		5000.000	MG/L	30-OCT-90	GW006121T	
		383.620		5000.000	MG/L	30-OCT-90	GW006121T	
SULFATE	67.080	590.000		2.000	MG/L	30-OCT-90	GW006121T	
		560.000		2.000	MG/L	30-OCT-90	GW006121T	
TOTAL DISSOLVED SOLIDS	388.760	2100.000		10.000	MG/L	30-OCT-90	GW006121T	

Report Date: 25-JUN-91

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ROCKY FLATS PLANT Phase I RFI/RI Work Plan for Operable Unit 7 - Present Landfill IHSS 114 and Inactive Hazardous Waste Storage Area IHSS 203	Manual No.: Section No.: Organization:	TI21100-WP-OU 07A01 APPH, R0 Environmental Management

Title: Appendix H: Excerpts of the Phase II Geologic Characterization Data Acquisition Work Plan

Approved by:

12/6/91	T. P. O'Rourke	6/23/92
Effective Date	Manager	Date

APPENDIX H

Summary of Phase II

Geologic Characterization Data Acquisition Work Plan,

March 1991

The following summary of borehole drilling and data acquisition activities is based on information presented in the Phase II Geologic Characterization Data Acquisition Work Plan, March 1991.

Task 4 of the Work Plan is a multifunctional task involving borehole drilling, data acquisition, borehole plugging and/or well installation. Sixty-five boreholes are planned to be drilled to an approximate depth of 160 feet. The two boreholes planned in the vicinity of Operable Unit No. 7 are shown in Figure H-1. All boreholes will be continuously cored from the ground surface to total depth.

A full suite of geophysical logs will be run in each borehole. The logging suite will include:

(1) Temperature;
(2) Fluid Resistivity;
(3) Caliper;
(4) Spontaneous Potential;
(5) 16-inch Normal Resistivity;
(6) 64-inch Normal Resistivity;
(7) Natural Gamma Ray;
(8) Neutron;
(9) Gamma-gamma Density; and
(10) Sonic log (Delta-T only).

Following geophysical logging, up to 100 packer tests will be performed in the boreholes to estimate the hydraulic conductivity of selected subsurface zones.

Figure H-1

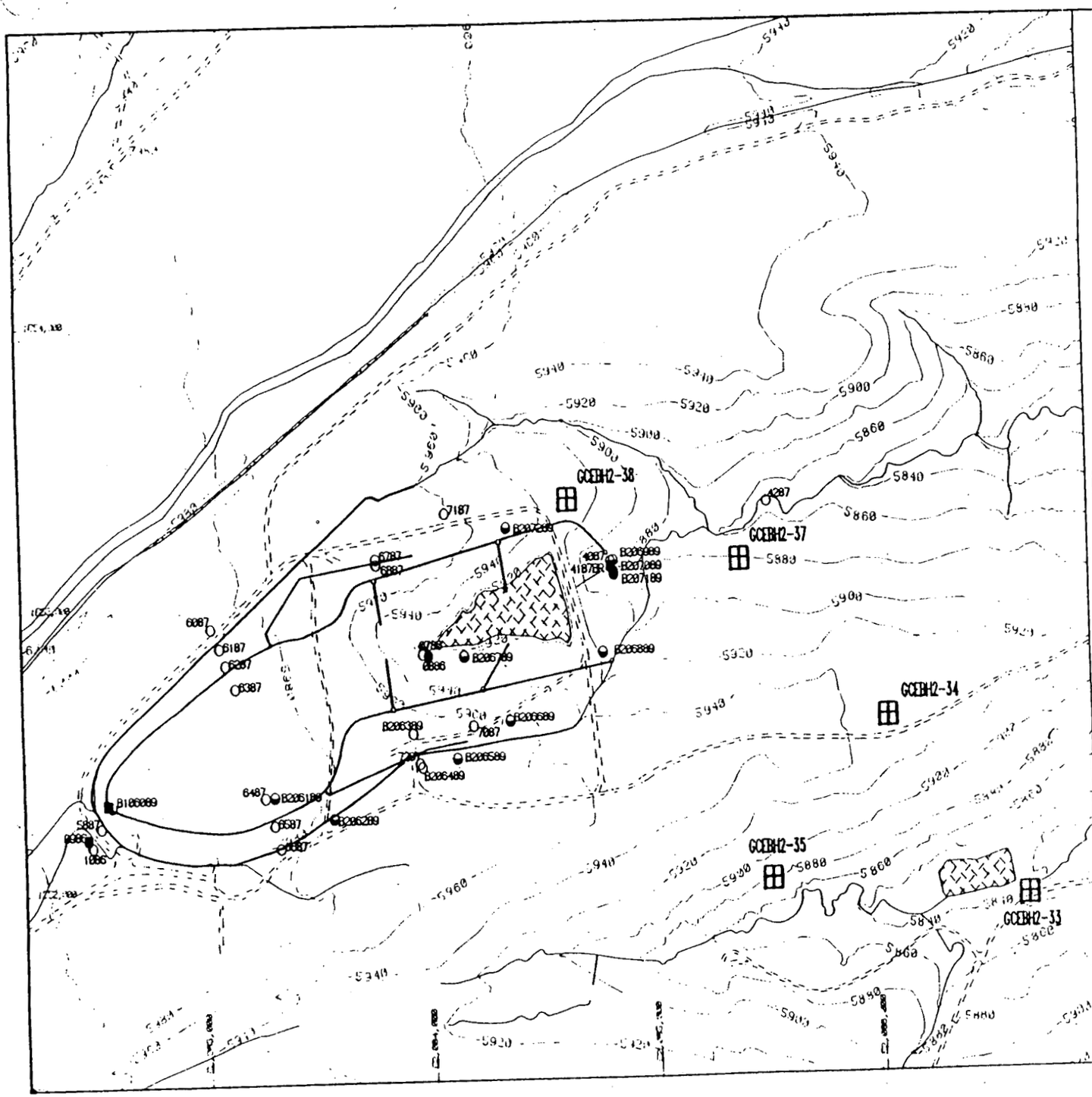
Map Showing Locations of

Selected Boreholes to be Drilled

under the Phase II

Geologic Characterization Data Acquisition Program

(not yet created)



EXPLANATION

- BOREHOLE LOCATION (APPROXIMATE)
- ALLUVIAL WELL
- WEATHERED BEDROCK WELL
- UNWEATHERED BEDROCK WELL
- DECOMMISSIONED WELL
- LANDFILL STRUCTURES
- DIRT ROADS
- STREAMS, DITCHES, DRAINAGE FEATURES
- SURFACE WATER IMPOUNDMENTS

N

0 feet 400 800

CONTOUR INTERVAL = 20 FEET

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

PHASE II GEOLOGIC CHARACTERIZATION

APPROXIMATE BOREHOLE LOCATIONS IN THE VICINITY OF OU7

Figure H-1