NOTICE

All drawings located at the end of the document.

Final
Phase III RFI/RI

Rocky Flats Plant
881 Hillside Area

(Operable Unit No. 1)

June 1994

ADMIN RECORD

A-OU01-000648

ERRATA

Text within Appendix A was xerographically reproduced in anticipation of a March submittal date and, therefore, reflects a footer date of March 1994. The appendix is as intended for this June 1994 submittal.

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Phase III
RFI/RI Report

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 7066-07

CLIENT/OWNER Weston

LOCATION Rocky Flats EG&G

BORING 10-25 SAMPLE CH #1 DEPTH 3'

FIELD DENSITY BY ...../...../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 2 1/8-INCH THREAD

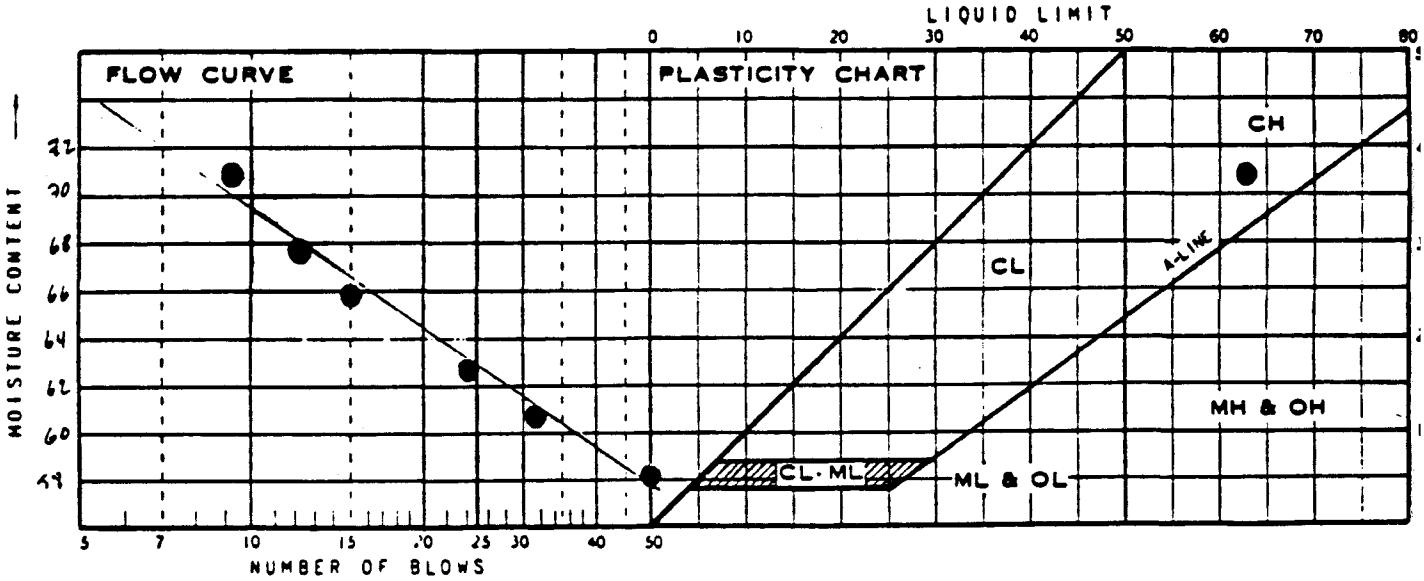
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY MH 2/15/92

DETERMINATION	1	2	3	4	5	6
DISH	2034	2030	2031			
WT OF DISH + WET SOIL g	8.33	9.18	8.90			
WT OF DISH + DRY SOIL g	6.94	7.51	7.26	—	—	—
WT OF MOISTURE g	1.49	1.67	1.64			
WT OF DISH g	1.03	1.03	1.02	—	—	—
WT OF DRY SOIL g	5.91	6.48	6.24			
MOISTURE CONTENT %	25.6	25.8	26.3			

LIQUID LIMIT ?

DETERMINATION	1	2	3	4	5	6
DISH	2032	2033	2034	2035	2036	2037
NUMBER OF BLOWS	50	31	24	15	12	9
WT OF DISH + WET SOIL g	13.75	12.43	12.64	14.50	14.42	12.56
WT OF DISH + DRY SOIL g	9.07	8.11	8.16	9.15	9.01	7.77
WT OF MOISTURE g	4.68	4.32	4.48	5.35	5.41	4.79
WT OF DISH g	1.03	1.02	1.02	1.03	1.03	1.02
WT OF DRY SOIL g	8.04	7.09	7.14	8.12	7.98	6.75
MOISTURE CONTENT %	58.2	60.9	62.7	65.9	67.8	70.0



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		62.9	25.9	37.0	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	10+75	SAMPLED	12-28-91
DEPTH	4.5'	DATE TESTED	02-04-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Rocky Flats/EG&G	DRY SIEVE	No

MOISTURE/DENSITY DATA

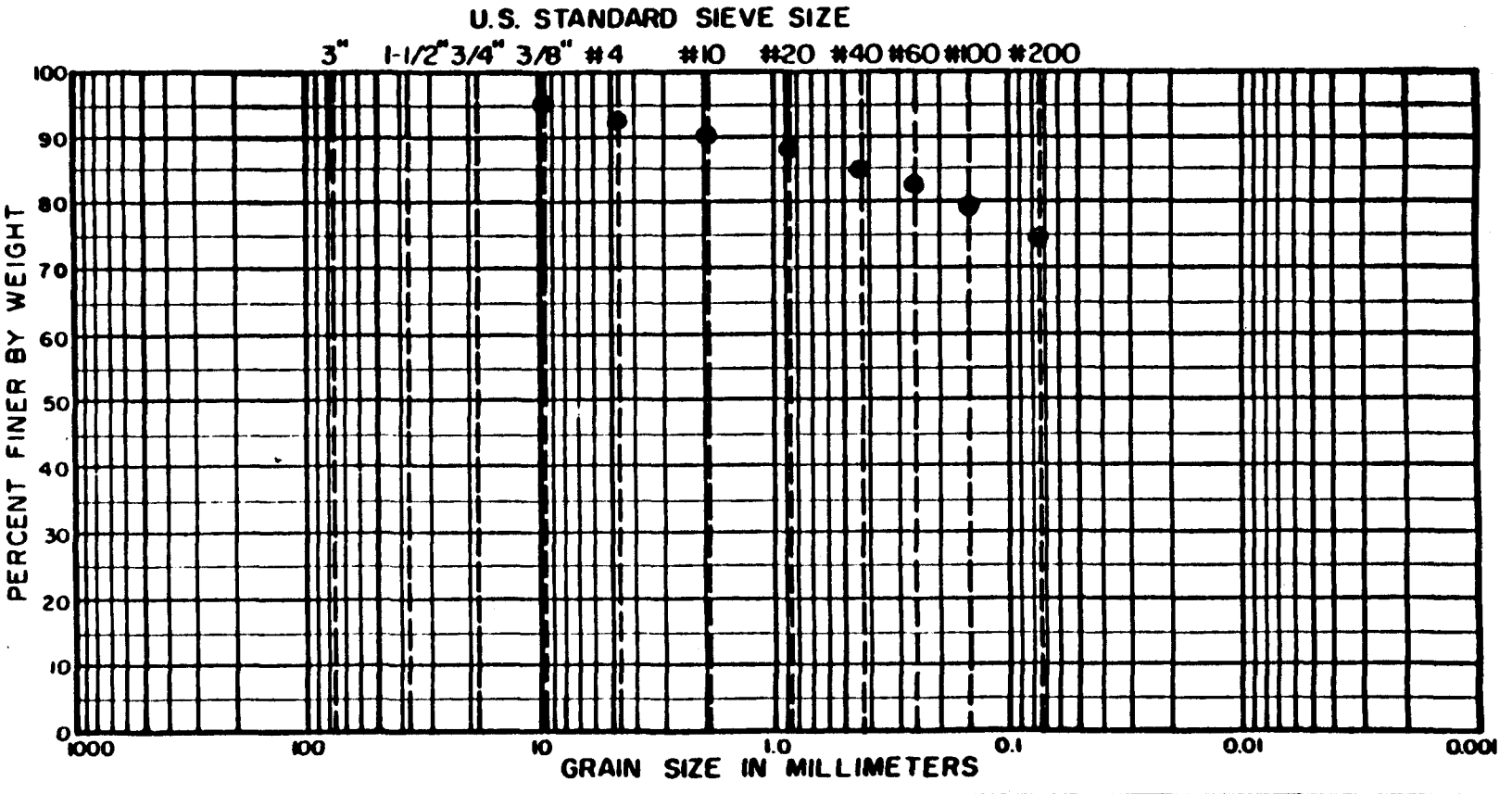
Wt. Soil & Ring(s) (g)	
Wt. Ring(s) (g)	
Wt. Soil (g)	
Wet Density PCF	
Wt. Wet Soil & Pan (g)	
Wt. Dry Soil & Pan (g)	
Wt. Lost Moisture (g)	
Wt. of Pan Only (g)	
Wt. of Dry Soil (g)	
Moisture Content %	
Dry Density PCF	

WASH SIEVE ANALYSIS

Wt. Wet Soil & Pan Before Washing (g)	
Wt. Dry Soil & Pan Before Washing (g)	202.7
Weight of Pan (g)	8.9
Wt. of Dry Soil Before Washing	193.8
Wt. Dry Soil & Pan After Washing (g)	57.5
Wt. of Dry Soil After Washing (g)	48.6
-#200 Wash. Out %	74.9

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	3.69	12.21	8.52	8.52	4.4	95.6
#4	3.81	8.27	4.46	12.98	6.7	93.3
#10	3.72	8.13	4.41	17.39	9.0	91.0
#20	3.76	8.87	5.11	22.50	11.6	88.4
#40	3.64	9.53	5.89	28.39	14.6	85.4
#60	3.74	8.82	5.08	33.47	17.3	82.7
#100	3.80	10.10	6.30	39.77	20.5	79.5
#200	3.69	12.51	8.82	48.59	25.1	74.9

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

LOCATION	DEPTH	CLASSIFICATION
10+75	4.5'	6.7% Gravel, 2.1% coarse, Gravelly Sandy Clay (CH) Rocky Flats / Fg [illegible] 10.3% Sandy Clay 7.9%

ADVANCED TERRA TESTING

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. [illegible]

CLIENT/OWNER WESTON

LOCATION _____

BORING 10S25 SAMPLE 6 7 DEPTH [illegible]

FIELD DENSITY BY ____/____/____

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

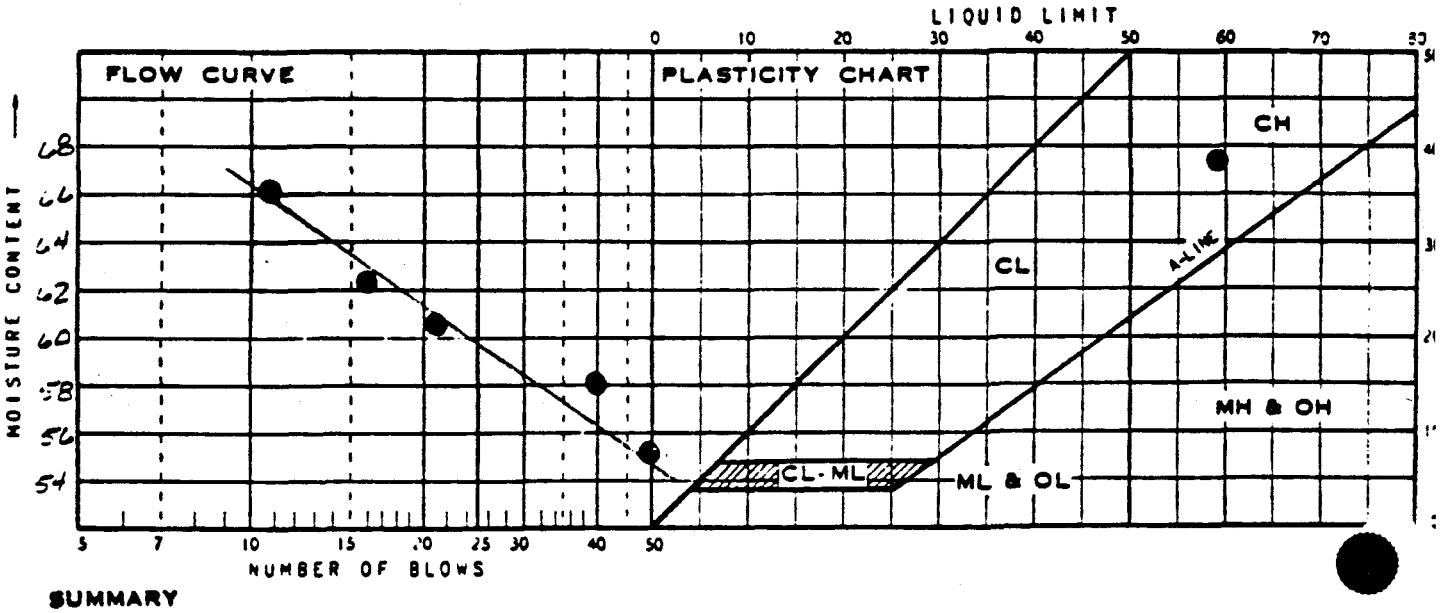
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SB 2/18/92

DETERMINATION	1	2	3	4	5	6
DISH	2046	2017	2010			
WT OF DISH + WET SOIL g	9.25	10.79	9.03			
WT OF DISH + DRY SOIL g	7.82	9.06	7.65	—	—	—
WT OF MOISTURE g	1.43	1.73	1.38			
WT OF DISH g	1.05	1.05	1.05	—	—	—
WT OF DRY SOIL g	6.77	8.01	6.60			
MOISTURE CONTENT %	21.1	21.6	20.9			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	320	2039	2070	2097	2044	
NUMBER OF BLOWS	50	40	21	16	11	
WT OF DISH + WET SOIL g	16.80	14.68	14.49	17.97	19.06	
WT OF DISH + DRY SOIL g	11.9	9.67	9.40	11.46	11.88	—
WT OF MOISTURE g	5.61	5.01	5.07	6.51	7.18	
WT OF DISH g	1.07	1.05	1.04	1.03	1.04	—
WT OF DRY SOIL g	10.12	8.62	8.36	10.43	10.84	
MOISTURE CONTENT %	55.4	58.1	60.6	62.4	66.2	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		57.8	21.2	36	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	10+75	SAMPLED	--
DEPTH	5.5'	DATE TESTED	02-92 TNU
SAMPLE NO.	C#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk/Jar	DRY SIEVE	No

MOISTURE/DENSITY DATA

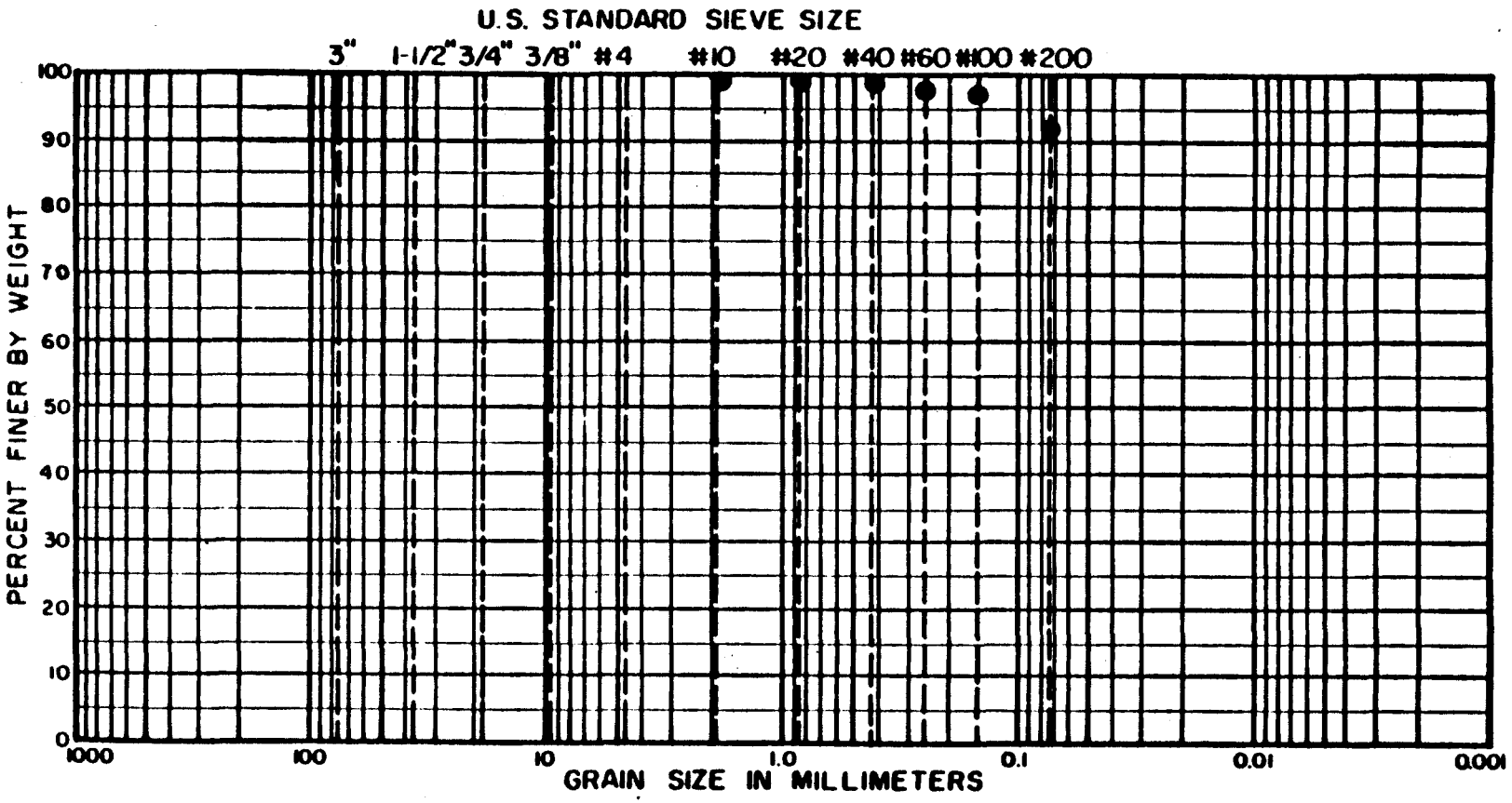
Wt. Soil & Ring(s) (g)	
Wt. Ring(s) (g)	
Wt. Soil (g)	
Wet Density PCF	
Wt. Wet Soil & Pan (g)	
Wt. Dry Soil & Pan (g)	
Wt. Lost Moisture (g)	
Wt. of Pan Only (g)	
Wt. of Dry Soil (g)	
Moisture Content %	
Dry Density PCF	

WASH SIEVE ANALYSIS

Wt. Wet Soil & Pan Before Washing (g)	
Wt. Dry Soil & Pan Before Washing (g)	172.1
Weight of Pan (g)	9.5
Wt. of Dry Soil Before Washing	162.7
Wt. Dry Soil & Pan After Washing (g)	21.9
Wt. of Dry Soil After Washing (g)	12.4
-#200 Wash. Out %	92.4

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	3.62	4.55	0.93	0.93	0.6	99.4
#20	3.74	4.65	0.91	1.84	1.1	98.9
#40	3.69	4.33	0.64	2.48	1.5	98.5
#60	3.63	4.12	0.49	2.97	1.8	98.2
#100	3.78	4.72	0.94	3.91	2.4	97.6
#200	3.69	12.21	8.52	12.43	7.6	92.4

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

LOCATION	DEPTH	CLASSIFICATION
10+75	5.5'	Rocky Flats Sand, Clay .6% coarse, .9% med, 6.1% fine Sand, 92.4% Clay

ADVANCED TERRA TESTING

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats EG+G
BORING 10-75 SAMPLE CH #1 DEPTH 5.5'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

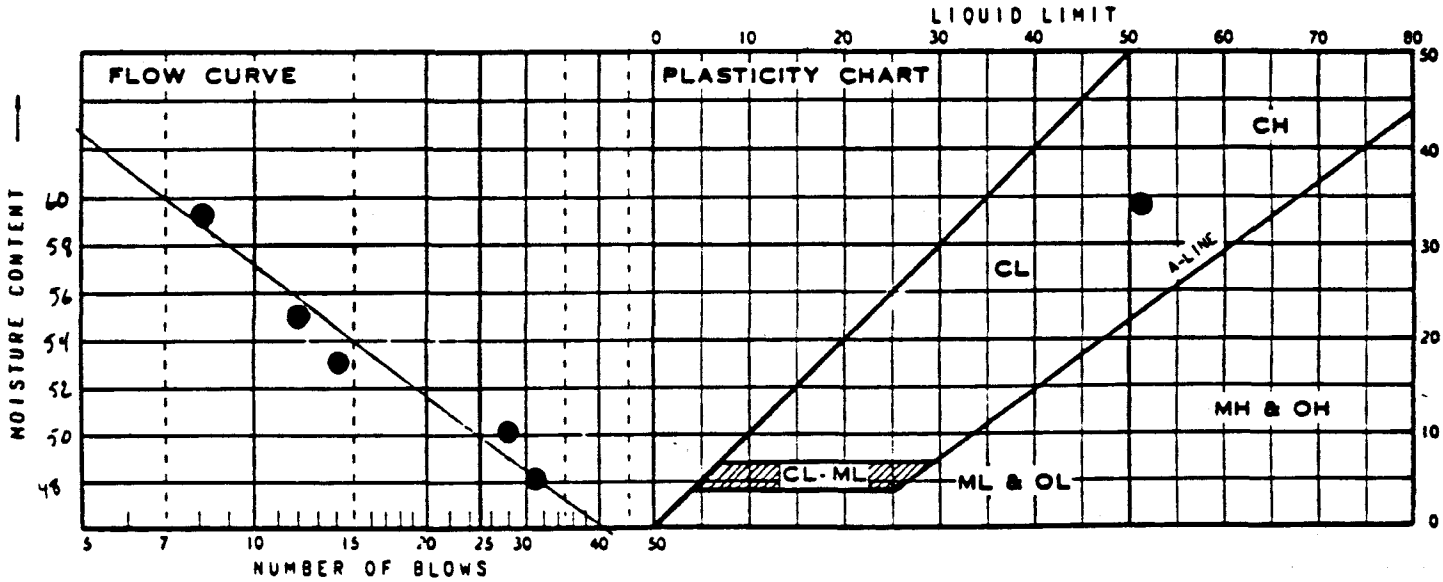
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DLA 2/15/92

DETERMINATION	? 1 ?	2	3	4	5	6
DISH	2038	2039	2040			
WT OF DISH + WET SOIL g	10.79	8.67	10.29			
WT OF DISH + DRY SOIL g	9.25	7.55	8.92	—	—	—
WT OF MOISTURE g	1.54	1.12	1.37			
WT OF DISH g	1.03	1.04	1.03	—	—	—
WT OF DRY SOIL g	8.22	6.51	7.89			
MOISTURE CONTENT %	18.7	17.2	17.4			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2041	2042	2043	2044	2045	
NUMBER OF BLOWS	31	28*	14	12	8*	
WT OF DISH + WET SOIL g	14.29	12.48	13.94	11.35	10.90	
WT OF DISH + DRY SOIL g	9.98	8.65	8.82	7.69	7.23	—
WT OF MOISTURE g	4.31	3.83	4.12	3.66	3.67	
WT OF DISH g	1.04	1.04	1.04	1.03	1.04	—
WT OF DRY SOIL g	8.94	7.61	7.78	6.66	6.19	
MOISTURE CONTENT %	48.2	50.3	53.0	55.0	59.3	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION
		51.6	17.3	34.3	CH

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	10+75	SAMPLED	12-28-91
DEPTH	8'	DATE TESTED	02-04-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Rocky Flats/EG&G	DRY SIEVE	No

MOISTURE/DENSITY DATA

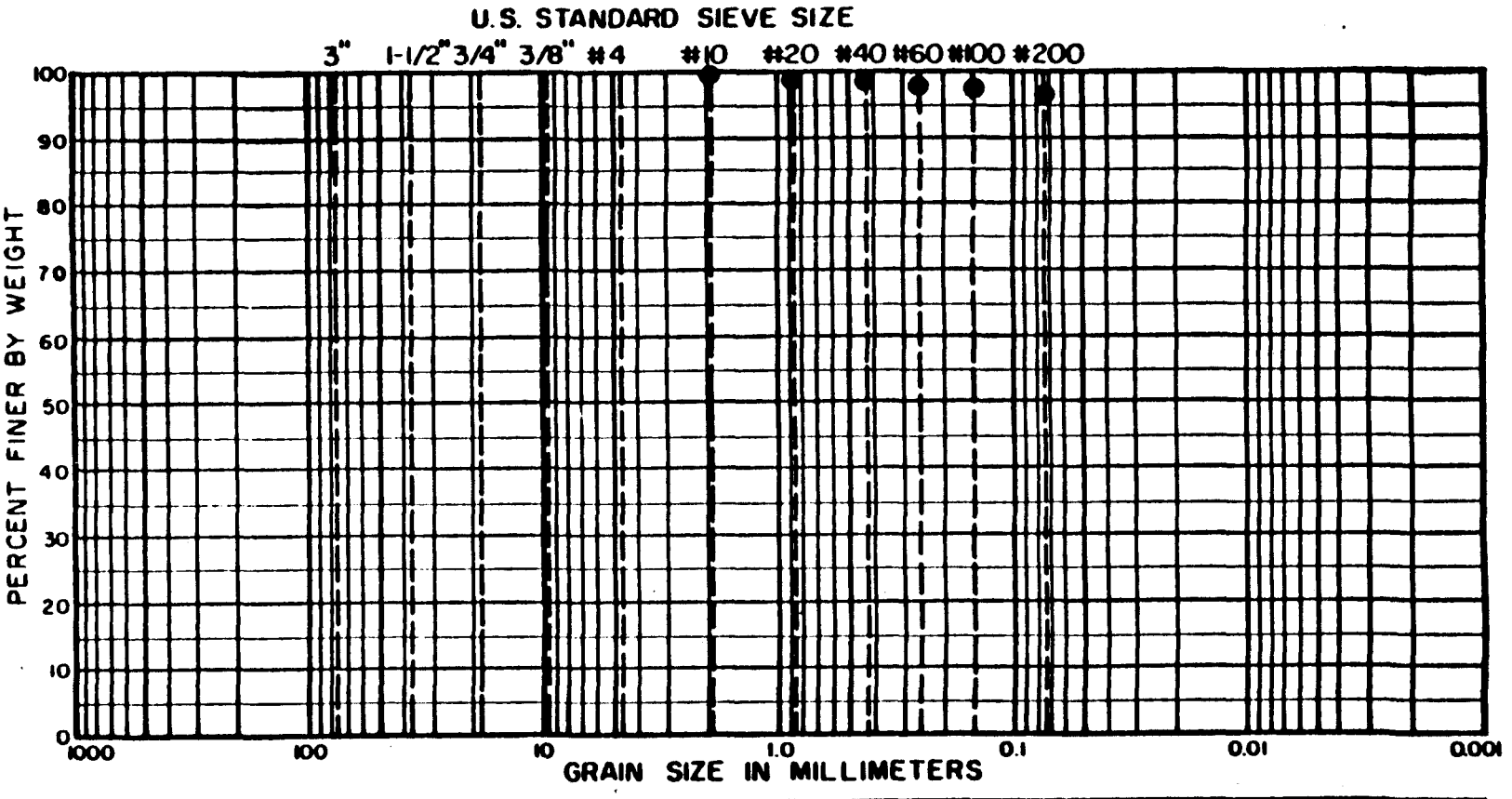
Wt. Soil & Ring(s) (g)	
Wt. Ring(s) (g)	
Wt. Soil (g)	
Wet Density PCF	
Wt. Wet Soil & Pan (g)	
Wt. Dry Soil & Pan (g)	
Wt. Lost Moisture (g)	
Wt. of Pan Only (g)	
Wt. of Dry Soil (g)	
Moisture Content %	
Dry Density PCF	

WASH SIEVE ANALYSIS

Wt. Wet Soil & Pan Before Washing (g)	
Wt. Dry Soil & Pan Before Washing (g)	199.1
Weight of Pan (g)	9.4
Wt. of Dry Soil Before Washing	189.6
Wt. Dry Soil & Pan After Washing (g)	13.3
Wt. of Dry Soil After Washing (g)	3.9
-#200 Wash. Out %	98.0

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	3.76	4.06	0.30	0.30	0.2	99.8
#20	3.64	4.71	1.07	1.37	0.7	99.3
#40	3.79	4.82	1.03	2.40	1.3	98.7
#60	3.77	4.38	0.61	3.01	1.6	98.4
#100	3.68	4.12	0.44	3.45	1.8	98.2
#200	3.76	4.19	0.43	3.88	2.0	98.0

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

LOCATION	DEPTH	CLASSIFICATION
10+75	8'	Rocky Fill / Eg Gravel, 2½" to big, 7% Sandy clay, 93% clay

ADVANCED TERRA TESTING

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2006-03

CLIENT/OWNER WESTON

LOCATION

BORING 10+25 SAMPLE ____ DEPTH 8'

(1)

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

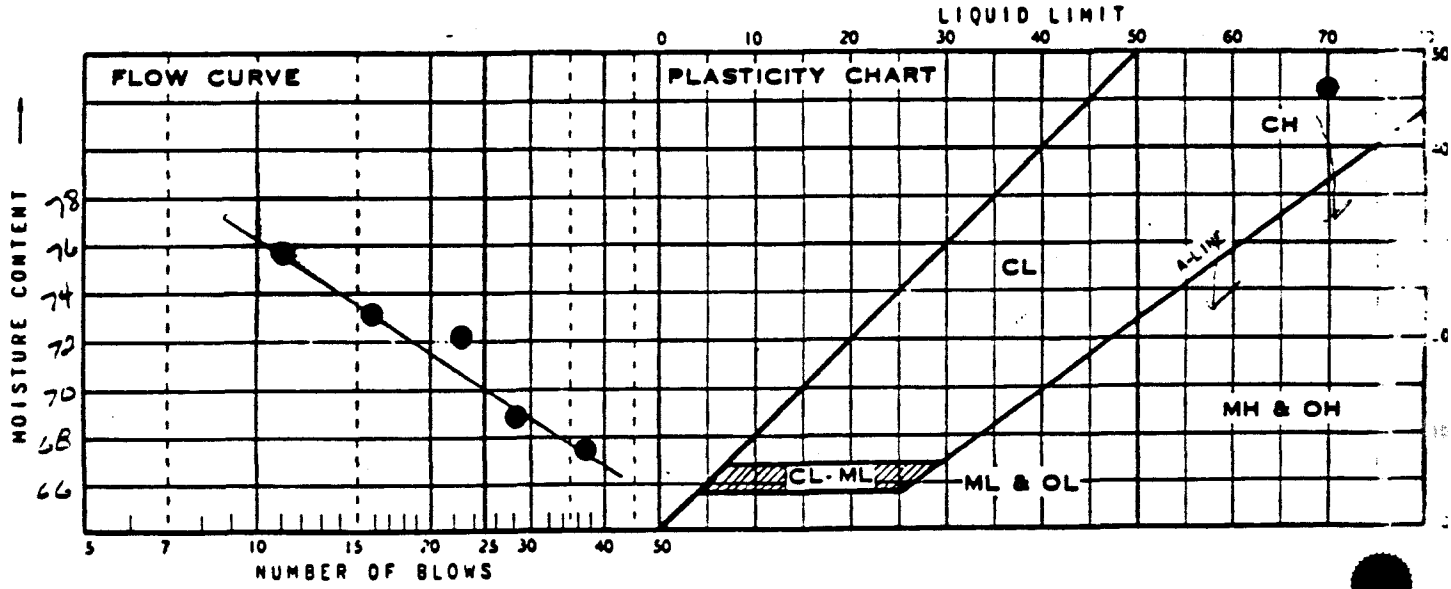
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SB 2/20/92

DETERMINATION	1	2	3	4	5	6
DISH	1C	2C	3C			
WT OF DISH + WET SOIL g	8.50	6.67	6.87			
WT OF DISH + DRY SOIL g	7.07	5.58	5.76	—	—	—
WT OF MOISTURE g	1.43	1.09	1.11			
WT OF DISH g	1.05	1.03	1.04	—	—	—
WT OF DRY SOIL g	6.02	4.55	4.72			
MOISTURE CONTENT %	23.8	23.9	23.5			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	4C	5C	6C	7C	8C	
NUMBER OF BLOWS	38	29	24	16	11	
WT OF DISH + WET SOIL g	14.41	13.00	14.89	13.07	14.12	
WT OF DISH + DRY SOIL g	9.02	8.12	9.08	7.99	8.51	—
WT OF MOISTURE g	5.39	4.88	5.81	5.08	5.67	
WT OF DISH g	1.04	1.04	1.03	1.04	1.03	—
WT OF DRY SOIL g	7.98	7.08	8.05	6.95	7.48	
MOISTURE CONTENT %	67.5	68.9	72.2	73.1	75.8	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION
		70.0	23.7	46.3	CH

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	10+75	SAMPLED	Rocky Flats
DEPTH	16'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan	(g)	47.12
Wt. Dry Soil & Pan	(g)	46.35
Wt. Lost Moisture	(g)	0.77
Wt. of Pan Only	(g)	3.23
Wt. of Dry Soil	(g)	43.12
Moisture Content	%	1.8

Wt. Hydrom. Sample Wet (g)	56.77
Wt. Hydrom. Sample Dry (g)	55.78

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	525.43
Weight of + #10 Before Washing (g)	1.08
Weight of + #10 After Washing (g)	0.45
Weight of - #10 Wet (g)	524.35
Weight of - #10 Dry (g)	515.77
Wt. Total Sample Dry (g)	516.22
Calc. Wt. "W" (g)	55.82
Calc. Mass + #10	0.05

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.45	0.45	0.45	0.1	99.9
#20	1.55	2.14	0.59	0.59	1.1	98.9
#40	1.55	2.20	0.65	1.24	2.3	97.7
#60	1.55	2.20	0.65	1.89	3.5	96.5
#100	1.54	2.46	0.92	2.81	5.1	94.9 91.5
#230	1.58	3.59	2.01	4.82	8.7	91.3

Silt. Clay (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Western

JOB NO. 2066-03

BORING NO.	10+75	SAMPLED	Rocky Flats/I
DEPTH	16'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

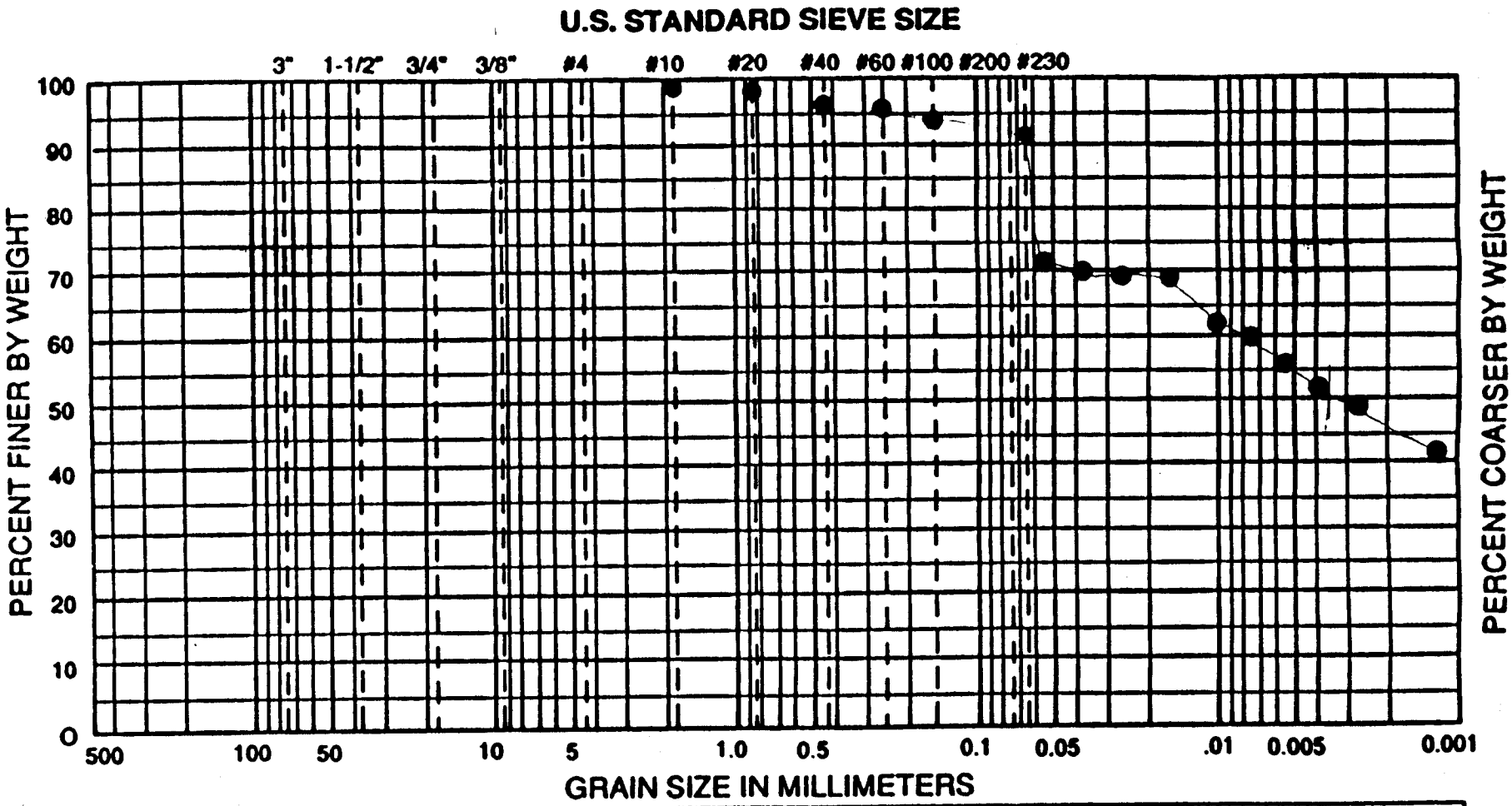
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.74	Temp. Coef. K	0.01313
Value of "a"	0.98	Wt. Dry Sample "W"	55.824
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	47.00	41.00	72.1	72.1	8.58	0.0544
1.0	46.00	40.00	70.4	70.4	8.75	0.0388
2.0	45.50	39.50	69.5	69.5	8.83	0.0276
5.0	45.00	39.00	68.6	68.6	8.91	0.0175
15.0	42.00	36.00	63.3	63.3	9.40	0.0104
30.0	40.50	34.50	60.7	60.7	9.65	0.0074
60.0	38.00	32.00	56.3	56.3	10.06	0.0054
120.0	36.00	30.00	52.8	52.8	10.39	0.0039
250.0	33.50	27.50	48.4	48.4	10.80	0.0027
1440.0	30.00	24.00	42.2	42.2	11.37	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 10+75 SAMPLE NO.: #6 DATE: 2-21-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
		SILTY CLAY w/ trace SAND (CH)
		ROCK FLATS

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2000-03
CLIENT/OWNER WESTON
LOCATION Rocky Flats IEG40
BORING 10+75 SAMPLE ____ DEPTH 16'

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

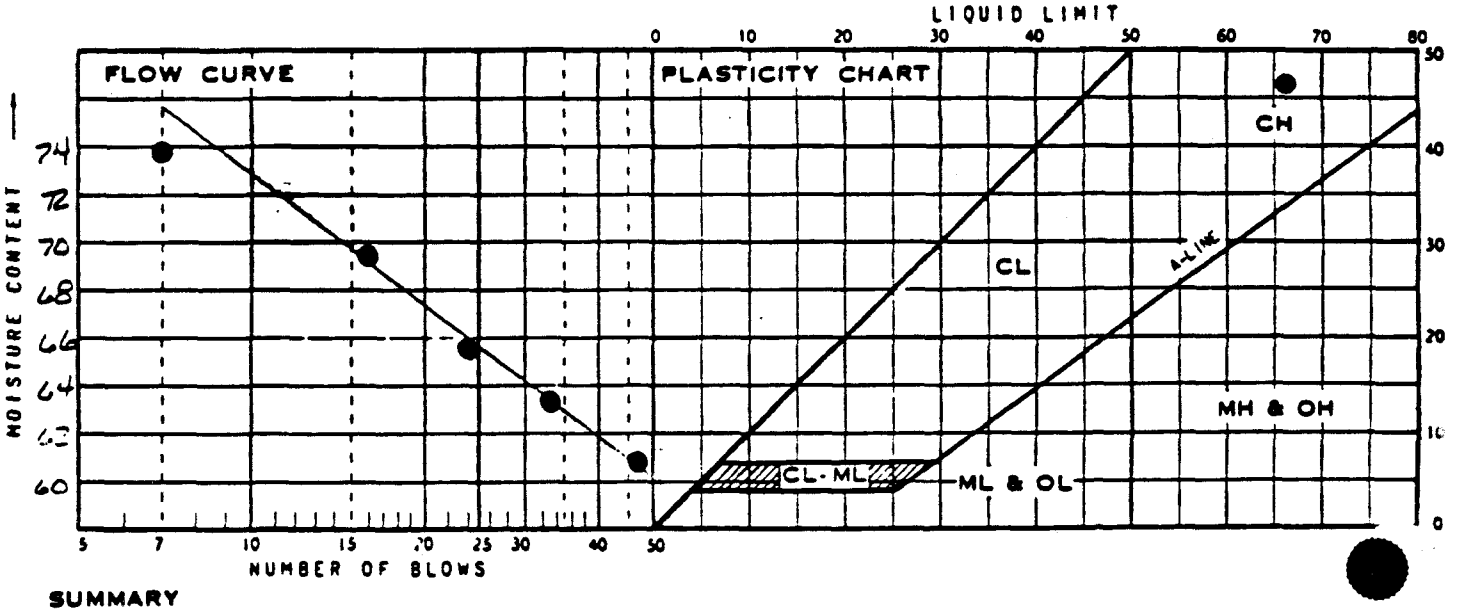
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DMW. 2.24.92

DETERMINATION	1	2	3	4	5	6
DISH	2067	24C	2065			
WT OF DISH + WET SOIL	8.66g	10.11g	9.86g			
WT OF DISH + DRY SOIL g	7.49	8.60	8.46	—	—	—
WT OF MOISTURE g	1.17	1.51	1.40			
WT OF DISH	1.02g	1.02g	1.04g	—	—	—
WT OF DRY SOIL g	6.47	7.57	7.42			
MOISTURE CONTENT %	18.1	20.0	18.9			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	3F-	2026	2073	2057	2071	2063
NUMBER OF BLOWS	47	28	33	24	16	7
WT OF DISH + WET SOIL	11.40g	15.55g	13.77g	16.43g	13.70g	19.07g
WT OF DISH + DRY SOIL g	9.35	—	8.82	10.32	8.51	11.41
WT OF MOISTURE g	5.05		4.95	6.11	5.19	7.66
WT OF DISH	1.06g	1.04g	1.03g	1.04g	1.04g	1.04g
WT OF DRY SOIL g	8.29		7.79	9.28	7.47	10.37
MOISTURE CONTENT %	60.9		63.5	65.8	69.5	73.9



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		65.8	19.0	46.8	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	10+75	SAMPLED	Rocky Flats
DEPTH	20.4'	DATE TESTED	02-21-92 TNU
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan	(g)	45.35
Wt. Dry Soil & Pan	(g)	44.86
Wt. Lost Moisture	(g)	0.49
Wt. of Pan Only	(g)	3.93
Wt. of Dry Soil	(g)	40.93
Moisture Content	%	1.2

Wt. Hydrom. Sample Wet	(g)	60.09
Wt. Hydrom. Sample Dry	(g)	59.38

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	492.13
Weight of + #10 Before Washing (g)	117.93
Weight of + #10 After Washing (g)	110.81
Weight of - #10 Wet (g)	374.20
Weight of - #10 Dry (g)	376.81
Wt. Total Sample Dry (g)	487.62
Calc. Wt. "W" (g)	76.84
Calc. Mass + #10	17.46

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	59.84	59.84	59.84	12.3	87.7
3/8"	0.00	37.69	37.69	97.53	20.0	80.0
#4	0.00	5.23	5.23	102.76	21.1	78.9
#10	0.00	8.05	8.05	110.81	22.7	77.3
#20	1.56	3.87	2.31	2.31	25.7	74.3
#40	1.55	4.24	2.69	5.00	29.2	70.8
#60	1.57	3.96	2.39	7.39	32.3	67.7
#100	1.55	5.09	3.54	10.93	36.9	63.1 >50
#230	1.57	8.06	6.49	17.42	45.4	54.6

Clay (CL)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	10+75	SAMPLED	Rocky Flats
DEPTH	20.4'	DATE TESTED	02-21-92 TN
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

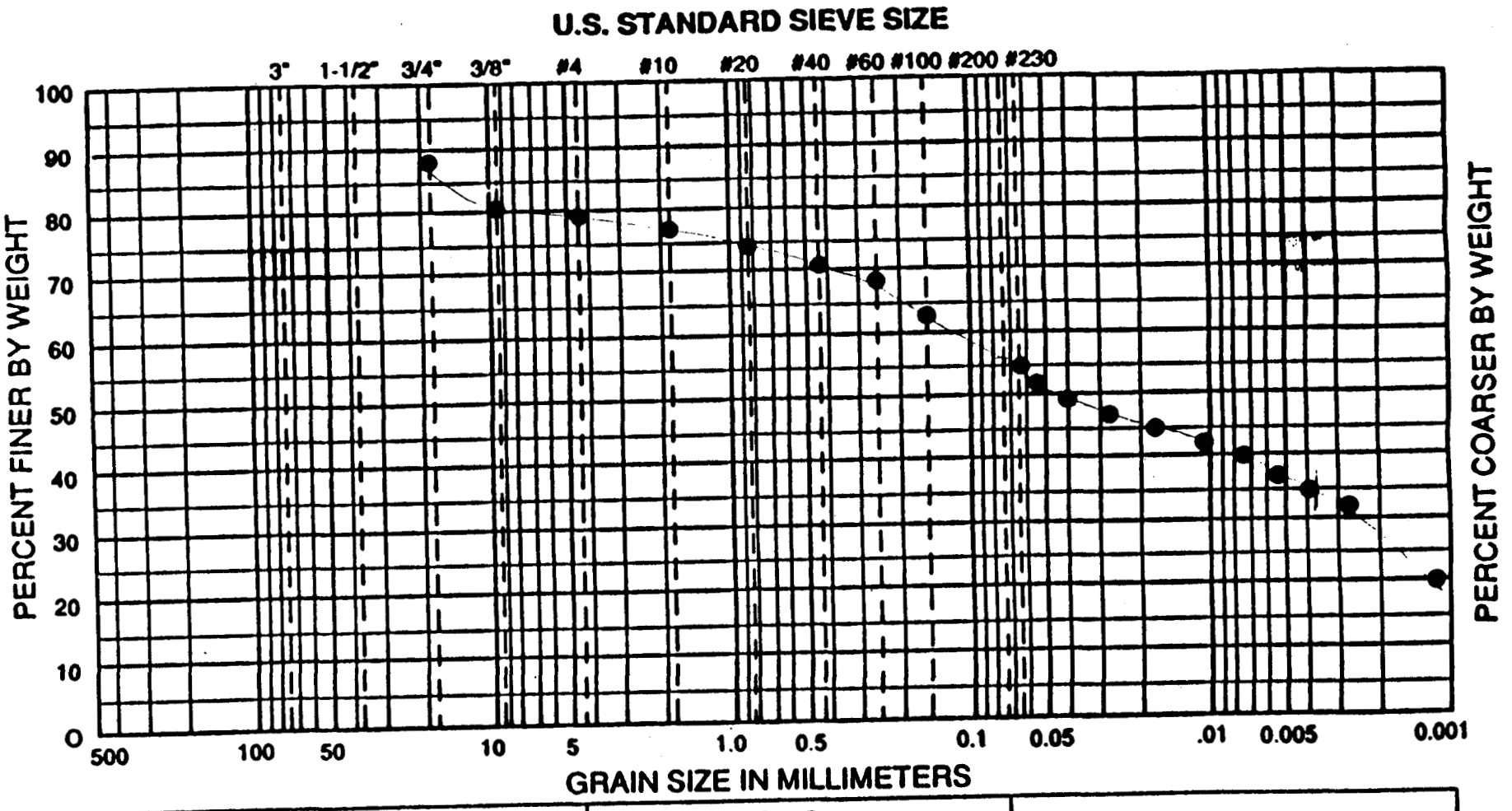
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.74	Temp. Coef. K	0.01313
Value of "a"	0.98	Wt. Dry Sample "W"	76.841
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	46.00	40.50	51.8	51.8	8.75	0.0549
1.0	43.50	38.00	48.6	48.6	9.16	0.0397
2.0	42.50	37.00	47.3	47.3	9.32	0.0283
5.0	40.50	35.00	44.7	44.7	9.65	0.0182
15.0	38.00	32.50	41.5	41.5	10.06	0.0108
30.0	36.50	31.00	39.6	39.6	10.30	0.0077
60.0	34.50	29.00	37.1	37.1	10.63	0.0055
120.0	33.00	27.50	35.1	35.1	10.88	0.0040
250.0	31.00	25.50	32.6	32.6	11.21	0.0028
1440.0	20.80	15.30	19.6	19.6	12.88	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 10+75 SAMPLE NO.: #6 DATE: 2/26/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	20.4	Rocky Flats CLAY (CH) w/ some sand, silt and gravel [illegible] 22% silt, 37% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2044-03

CLIENT/OWNER WESTON

LOCATION

BORING 10+75 SAMPLE C#6 DEPTH 20.4'

FIELD DENSITY BY...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

SAVE ALL MATERIAL

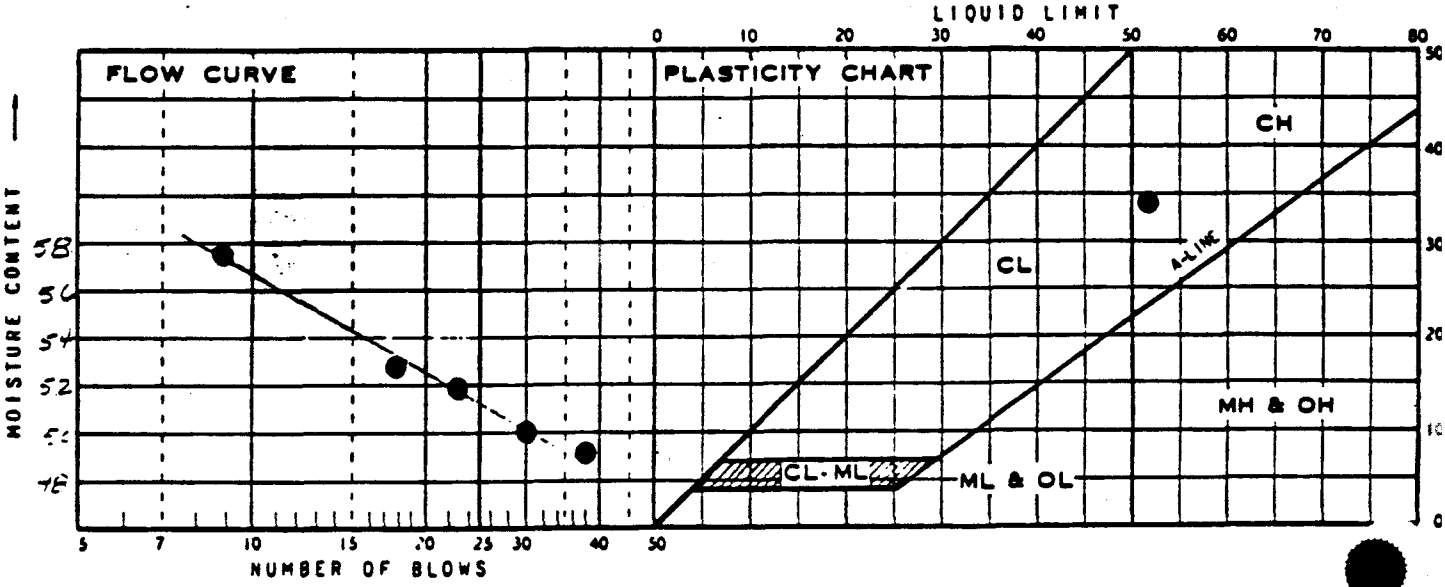
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SA 2/18/92

DETERMINATION	1	2	3	4	5	6
DISH	2008	2027	2012			
WT OF DISH + WET SOIL g	11.24	11.02	10.09			
WT OF DISH + DRY SOIL g	9.65	9.52	8.71	—	—	—
WT OF MOISTURE g	1.59	1.50	1.38			
WT OF DISH g	1.05	1.04	1.04	—	—	—
WT OF DRY SOIL g	8.60	8.48	7.67			
MOISTURE CONTENT %	18.5	17.7	18.0			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2023	2024	2002	2017	2005	
NUMBER OF BLOWS	38	30	23	18±	9	
WT OF DISH + WET SOIL g	17.48	18.31	18.54	18.78	17.88	
WT OF DISH + DRY SOIL g	12.06	12.53	12.56	12.64	11.73	—
WT OF MOISTURE g	5.42	5.78	5.98	6.14	6.15	
WT OF DISH g	1.04	1.05	1.04	1.03	1.05	—
WT OF DRY SOIL g	11.02	11.48	11.52	11.61	10.68	
MOISTURE CONTENT %	49.2	50.3	51.9	52.9	57.6	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		52	21	31	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Westcor

JOB NO. 2066-03

BORING NO.	10+75	SAMPLED	Rocky Flats
DEPTH	32.0'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	43.92
Wt. Dry Soil & Pan	(g)	43.42
Wt. Lost Moisture	(g)	0.50
Wt. of Pan Only	(g)	3.54
Wt. of Dry Soil	(g)	39.88
Moisture Content	%	1.3

Wt. Hydrom. Sample Wet (g)	60.11
Wt. Hydrom. Sample Dry (g)	59.36

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	471.89
Weight of + #10 Before Washing (g)	0.19
Weight of + #10 After Washing (g)	0.13
Weight of - #10 Wet (g)	471.70
Weight of - #10 Dry (g)	465.92
Wt. Total Sample Dry (g)	466.05

Calc. Wt. "W" (g)	59.38
Calc. Mass + #10	0.02

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.13	0.13	0.13	0.0	100.0
#20	1.56	2.19	0.63	0.63	1.1	98.9
#40	1.55	2.12	0.57	1.20	2.0	98.0
#60	1.55	2.04	0.49	1.69	2.9	97.1
#100	1.56	2.15	0.59	2.28	3.9	96.1
#230	1.55	2.86	1.31	3.59	6.1	93.9

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Westen

JOB NO. 2066-03

BORING NO.	10+75	SAMPLED	Rocky Flats
DEPTH	32.0'	DATE TESTED	02-12-92 TN
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

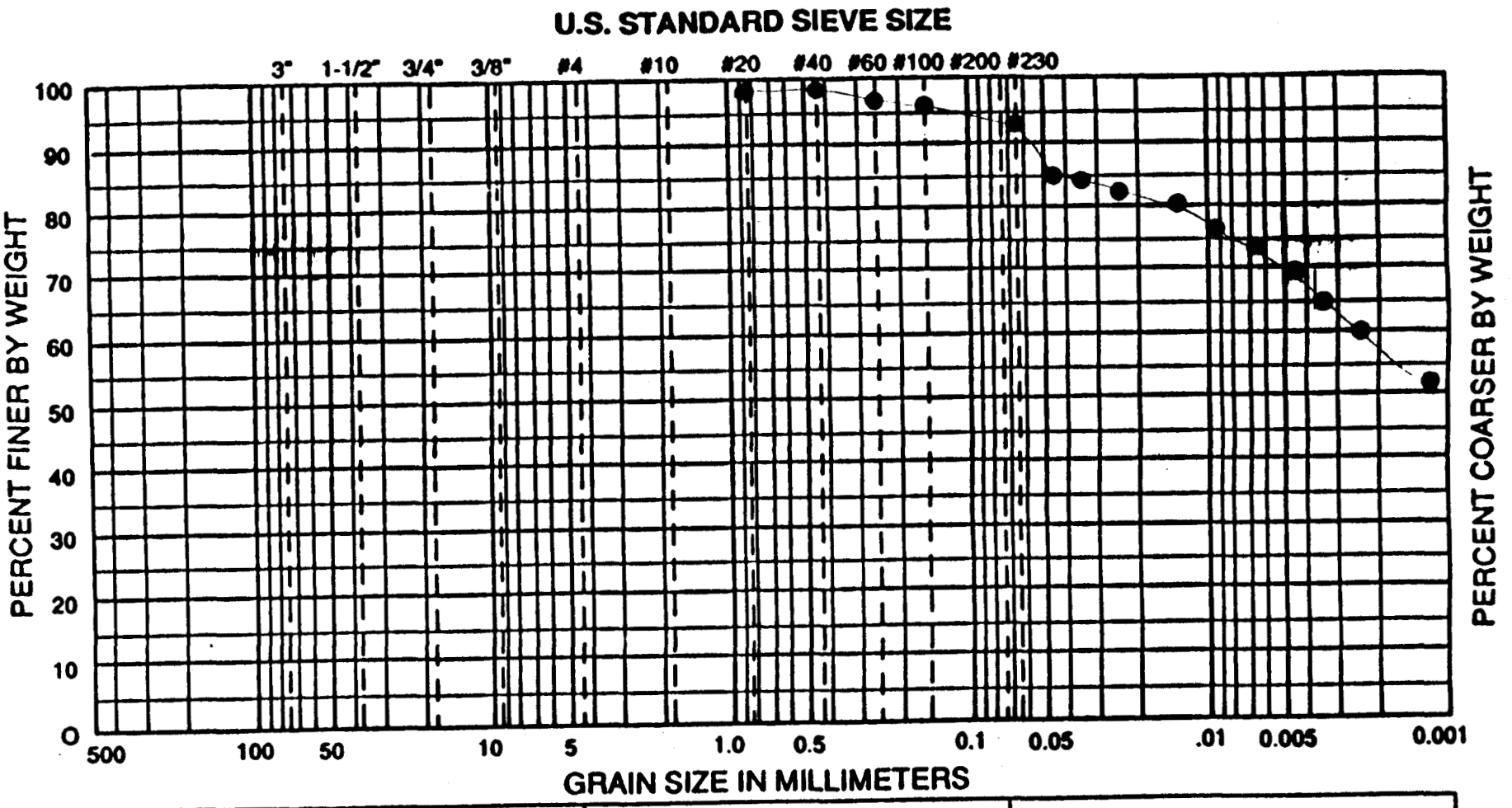
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.86	Temp. Coef. K	0.01271
Value of "a"	0.96	Wt. Dry Sample "W"	59.377
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	59.00	53.00	85.5	85.5	6.61	0.0462
1.0	58.00	52.00	83.9	83.9	6.78	0.0331
2.0	57.50	51.50	83.1	83.1	6.86	0.0235
5.0	56.00	50.00	80.7	80.7	7.11	0.0152
15.0	53.50	47.50	76.6	76.6	7.52	0.0090
30.0	52.00	46.00	74.2	74.2	7.76	0.0065
60.0	49.00	43.00	69.4	69.4	8.25	0.0047
120.0	46.50	40.50	65.3	65.3	8.66	0.0034
250.0	43.50	37.50	60.5	60.5	9.16	0.0024
1440.0	38.50	32.50	52.4	52.4	9.98	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 10+75 SAMPLE NO.: #6 DATE: 2-23-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	32.0'	Silty Clay (CH) w/ trace sand Rocky Flats 32% [illegible] 42% sand 29% Silt 66% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION

BORING 10+75 SAMPLE - - - - DEPTH 32'

6

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

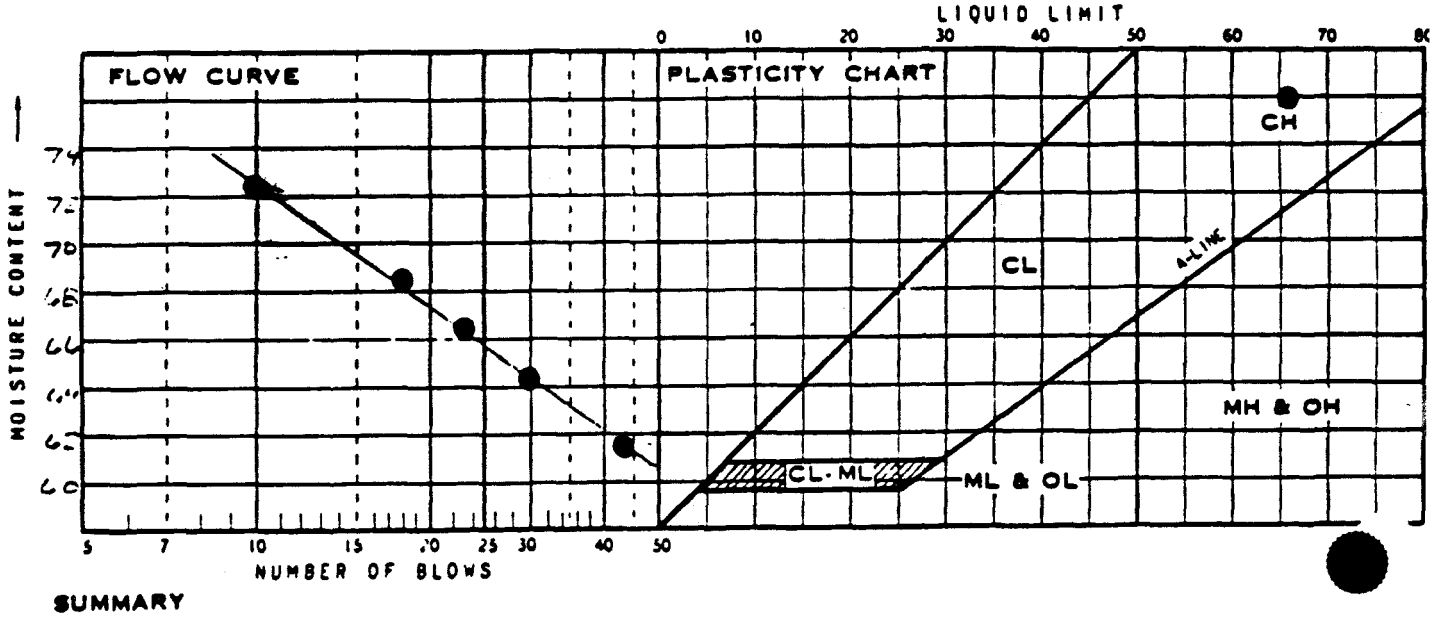
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY JR. 2/22/92.

DETERMINATION	1	2	3	4	5	6
DISH	2010	2030	2012			
WT OF DISH + WET SOIL g	7.10	6.84	8.07			
WT OF DISH + DRY SOIL g	6.06	5.84	6.86	—	—	—
WT OF MOISTURE g	1.04	1.00	1.21			
WT OF DISH g	1.05	1.05	1.04	—	—	—
WT OF DRY SOIL g	5.01	4.79	5.82			
MOISTURE CONTENT %	20.8	20.9	20.8			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	32C	2046	2037	2027	2044	
NUMBER OF BLOWS	44	30	23	18±	10±	
WT OF DISH + WET SOIL g	15.73	16.85	13.89	17.49	16.86	
WT OF DISH + DRY SOIL g	10.13	10.66	8.76	10.81	10.22	—
WT OF MOISTURE g	5.60	6.19	5.13	6.68	6.64	
WT OF DISH g	1.05	1.05	1.04	1.05	1.04	—
WT OF DRY SOIL g	9.08	9.61	7.72	9.76	9.18	
MOISTURE CONTENT %	61.7	64.4	66.5	68.4	72.3	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		65.8	20.8	45.0	CH	

ADVANCED TERRA TESTING

RAM

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	10+75	SAMPLED	Rocky Flats
DEPTH	47.5'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	59.66
Wt. Dry Soil & Pan	(g)	58.91
Wt. Lost Moisture	(g)	0.75
Wt. of Pan Only	(g)	3.83
Wt. of Dry Soil	(g)	55.08
Moisture Content	%	1.4
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	59.19

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	542.36
Weight of + #10 Before Washing (g)	62.73
Weight of + #10 After Washing (g)	60.57
Weight of - #10 Wet (g)	479.63
Weight of - #10 Dry (g)	475.32
Wt. Total Sample Dry (g)	535.89
Calc. Wt. "W" (g)	66.74
Calc. Mass + #10	7.54

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	46.54	46.54	46.54	8.7	91.3
3/8"	0.00	13.27	13.27	59.81	11.2	88.8
#4	0.00	0.70	0.70	60.51	11.3	88.7
#10	0.00	0.06	0.06	60.57	11.3	88.7
#20	1.56	2.05	0.49	0.49	12.0	88.0
#40	1.55	1.76	0.21	0.70	12.4	87.6
#60	1.55	1.66	0.11	0.81	12.5	87.5
#100	1.54	1.62	0.08	0.89	12.6	87.4
#230	1.55	1.67	0.12	1.01	12.8	87.2

37.5

Clay (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Westec

JOB NO. 2066-03

BORING NO.	10+75	SAMPLED	Rocky Flats
DEPTH	47.5'	DATE TESTED	02-12-92 TN
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.85	Temp. Coef. K	0.01273
Value of "a"	0.96	Wt. Dry Sample "W"	66.737
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	61.00	55.00	79.1	79.1	6.29	0.0451
1.0	60.50	54.50	78.4	78.4	6.37	0.0321
2.0	60.25	54.25	78.0	78.0	6.41	0.0228
5.0	60.00	54.00	77.7	77.7	6.45	0.0145
15.0	57.00	51.00	73.4	73.4	6.94	0.0087
30.0	55.00	49.00	70.5	70.5	7.27	0.0063
60.0	52.00	46.00	66.2	66.2	7.76	0.0046
120.0	48.00	42.00	60.4	60.4	8.42	0.0034
250.0	44.00	38.00	54.7	54.7	9.07	0.0024
1440.0	35.00	29.00	41.7	41.7	10.55	0.0011

Grain Diameter = K*(SQRT(L/T))

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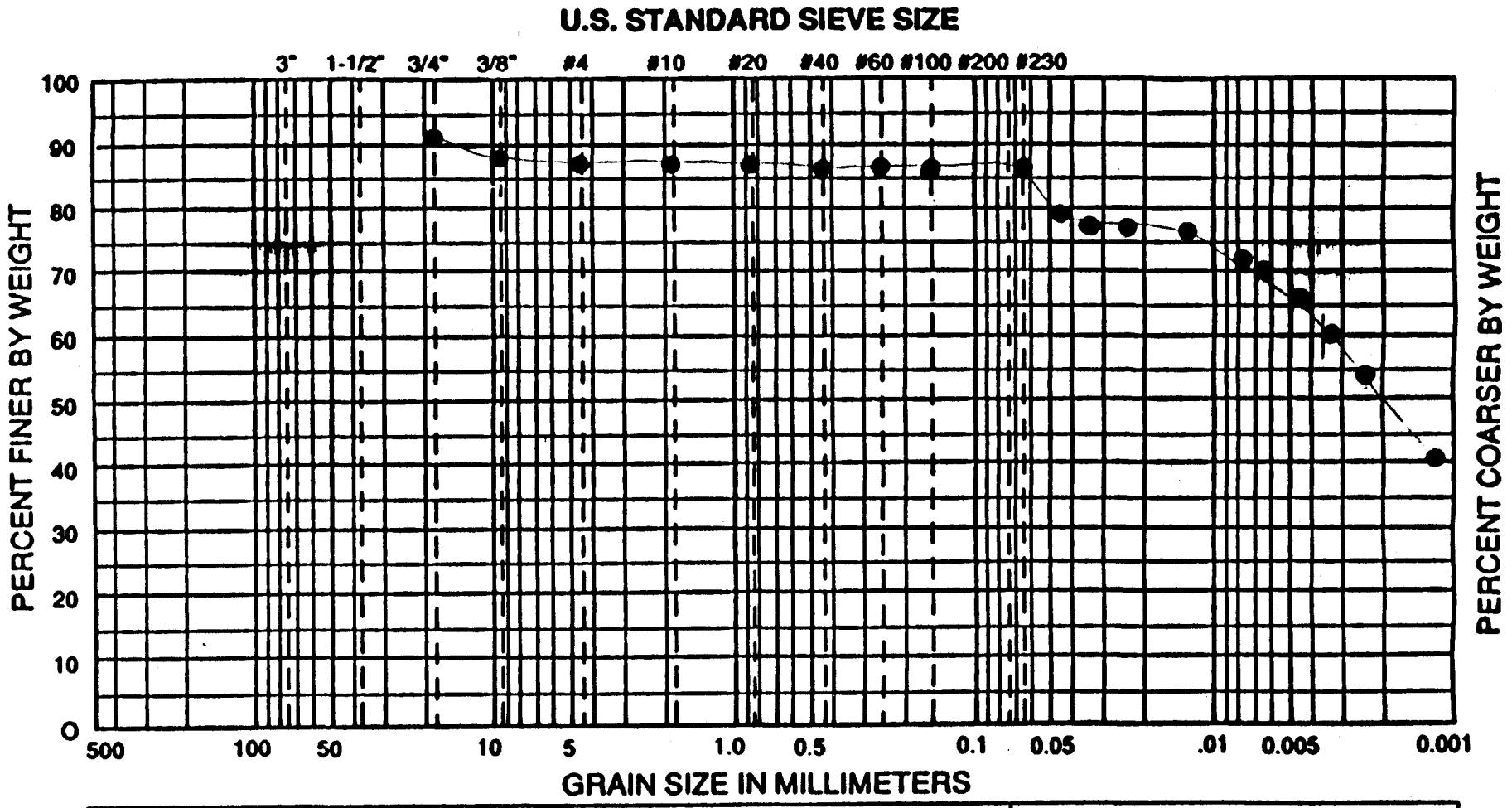


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 10+75 SAMPLE NO.: #6 DATE: 2-27-22 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	47.5'	11.5% Gravel, CLAY w/ some silt and gravel, FF SAND. Rocky Flats [illegible] 11.9% [illegible], 0.1% [illegible], 21.5% Silt, 66% Clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION _____

BORING 10+75 SAMPLE _____ DEPTH 47.5

(6)

FIELD DENSITY BY _____

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

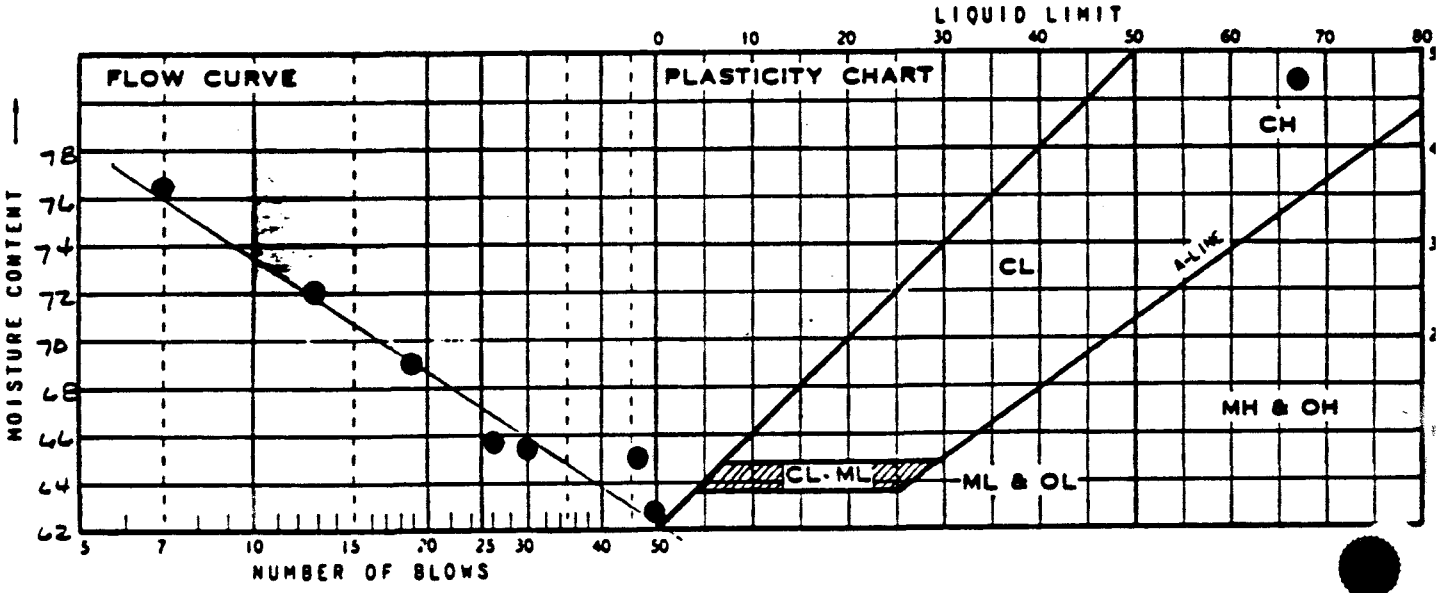
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY _____

DETERMINATION	1	2	3	4	5	6
DISH	4C	3C	11C			
WT OF DISH + WET SOIL	6.05 g	6.09 g	5.43 g			
WT OF DISH + DRY SOIL g	5.19	5.15 g	4.70 g	—	—	—
WT OF MOISTURE g	.86	.85	.73			
WT OF DISH g	1.04	1.04	1.03	—	—	—
WT OF DRY SOIL g	4.15	4.11	3.67			
MOISTURE CONTENT %	20.7	20.7	19.9			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	7C	37C	6C	5C	1C	2C
NUMBER OF BLOWS	50	47	30	26	19	13
WT OF DISH + WET SOIL	18.40 g	17.47 g	18.06 g	17.58 g	18.47 g	17.7 g
WT OF DISH + DRY SOIL g	11.70	11.01 g	11.32 g	11.02 g	11.36 g	10.77 g
WT OF MOISTURE g	6.70	6.48	6.74	6.56	7.11	7.02
WT OF DISH	1.04 g	1.07 g	1.03 g	1.05 g	1.05 g	1.03 g
WT OF DRY SOIL g	10.66	9.94 g	10.29	9.97 g	10.31	9.74 g
MOISTURE CONTENT %	62.9	65.2	65.5	65.8	69.0	72.1



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		67.2	20.4	46.8	CH	

ADVANCED TERRA TESTING

BM.

MECHANICAL ANALYSIS - SIEVE TEST DATA

BR

CLIENT Weston

JOB NO. 2066-03

BORING NO.	10+75	SAMPLED	Rocky Flats
DEPTH	64.0'	DATE TESTED	02-18-92 TNU
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	59.44
Wt. Dry Soil & Pan	(g)	58.59
Wt. Lost Moisture	(g)	0.85
Wt. of Pan Only	(g)	3.75
Wt. of Dry Soil	(g)	54.84
Moisture Content	%	1.5

Wt. Hydrom. Sample Wet (g)	60.00
Wt. Hydrom. Sample Dry (g)	59.08

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	59.08
Wt. Total Sample Dry (g)	59.08
Calc. Wt. "W" (g)	59.08
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.58	0.01	0.01	0.0	100.0
#40	1.56	1.57	0.01	0.02	0.0	100.0
#60	1.31	1.33	0.02	0.04	0.1	99.9
#100	1.31	1.33	0.02	0.06	0.1	99.9
#230	1.51	1.61	0.10	0.16	0.3	99.7

Silty Claystone

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Western

JOB NO. 2066-03

BORING NO.	10+75	SAMPLED	Rocky Flats
DEPTH	64.0'	DATE TESTED	02-18-92 TNU
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

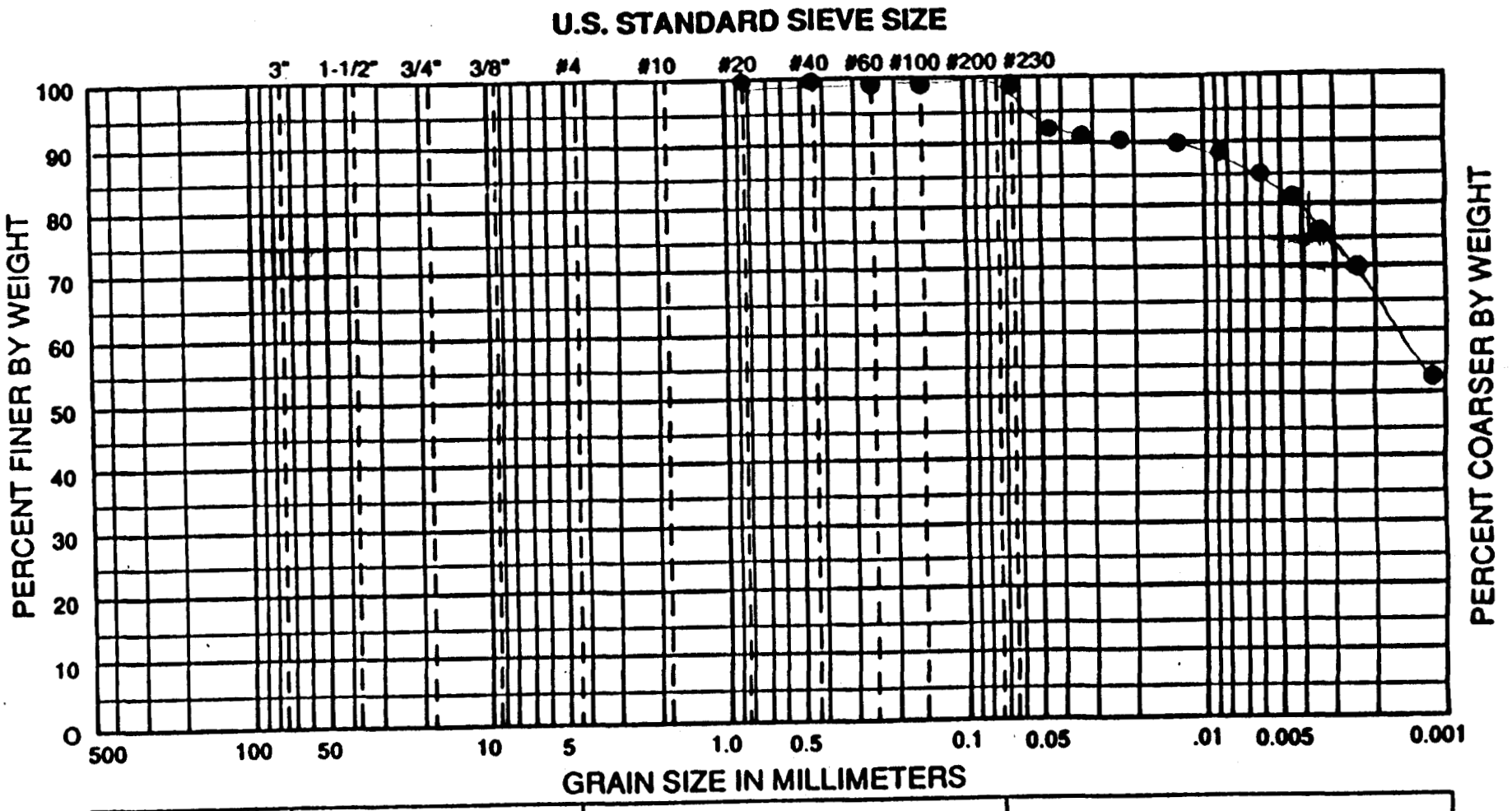
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.84	Temp. Coef. K	0.01278
Value of "a"	0.96	Wt. Dry Sample "W"	59.084
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	63.00	57.00	92.8	92.8	5.96	0.0441
1.0	62.50	56.50	92.0	92.0	6.04	0.0314
2.0	62.00	56.00	91.2	91.2	6.12	0.0224
5.0	61.50	55.50	90.4	90.4	6.20	0.0142
15.0	60.00	54.00	87.9	87.9	6.45	0.0084
30.0	58.50	52.50	85.5	85.5	6.70	0.0060
60.0	56.50	50.50	82.2	82.2	7.02	0.0044
120.0	53.00	47.00	76.5	76.5	7.60	0.0032
250.0	49.00	43.00	70.0	70.0	8.25	0.0023
1440.0	39.00	33.00	53.7	53.7	9.89	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 10+75 SAMPLE NO.: #6 DATE: 2-27-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	640'	SILTY CLAYSTONE w/ tr sand Rocky Flats .3% F Sa, 21.7% Si/Cl

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03
CLIENT/OWNER WESTON
LOCATION EC&G
BORING 10+75 SAMPLE - - - - DEPTH 64'

FIELD DENSITY BY - - - - - - / - - / - -

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

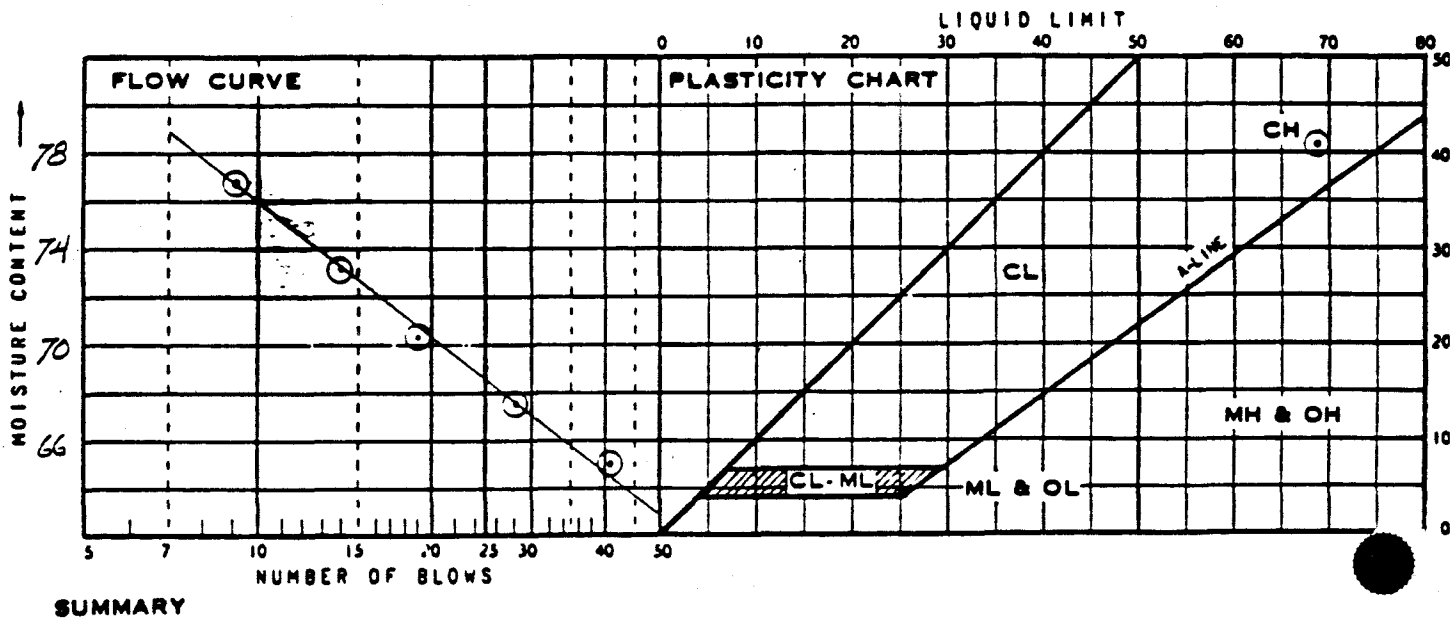
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DW 2/23/92

DETERMINATION	1	2	3	4	5	6
DISH	2003	51C	32C			
WT OF DISH + WET SOIL	7.02g	6.75g	7.05g			
WT OF DISH + DRY SOIL	5.72g	5.51g	5.76g	—	—	—
WT OF MOISTURE	1.30g	1.24g	1.29g			
WT OF DISH	1.03g	1.04g	1.02g	—	—	—
WT OF DRY SOIL	4.69g	4.47g	4.74g			
MOISTURE CONTENT	27.7	27.7	27.2			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	10C	2045	2039	2001	2021	
NUMBER OF BLOWS	41	28	19	14	9	
WT OF DISH + WET SOIL	16.54g	16.88g	17.47g	18.09g	18.91g	
WT OF DISH + DRY SOIL	10.42g	10.49g	10.69g	10.89g	11.15g	—
WT OF MOISTURE	6.12g	6.39g	6.78g	7.20g	7.76g	
WT OF DISH	1.03g	1.05g	1.05g	1.05g	1.04g	—
WT OF DRY SOIL	9.39g	9.44g	9.64g	9.84g	10.11g	
MOISTURE CONTENT	65.2	67.7	70.3	73.2	76.8	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		63.7	27.5	41.2	CH	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

DR

CLIENT Weston

JOB NO. 2066-03

BORING NO.	10+75	SAMPLED	Rocky Flats
DEPTH	65'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	47.19
Wt. Dry Soil & Pan	(g)	46.56
Wt. Lost Moisture	(g)	0.63
Wt. of Pan Only	(g)	3.67
Wt. of Dry Soil	(g)	42.89
Moisture Content	%	1.5

Wt. Hydrom. Sample Wet (g)	57.07
Wt. Hydrom. Sample Dry (g)	56.25

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	57.07
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	57.07
Weight of - #10 Dry (g)	56.25
Wt. Total Sample Dry (g)	56.25
Calc. Wt. "W" (g)	56.25
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.59	0.02	0.02	0.0	100.0
#40	1.31	1.34	0.03	0.05	0.1	99.9
#60	1.31	1.35	0.04	0.09	0.2	99.8
#100	1.50	1.67	0.17	0.26	0.5	99.5
#230	1.57	10.04	8.47	8.73	15.5	84.5

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	10+75	SAMPLED	Rocky Flats/I
DEPTH	65'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

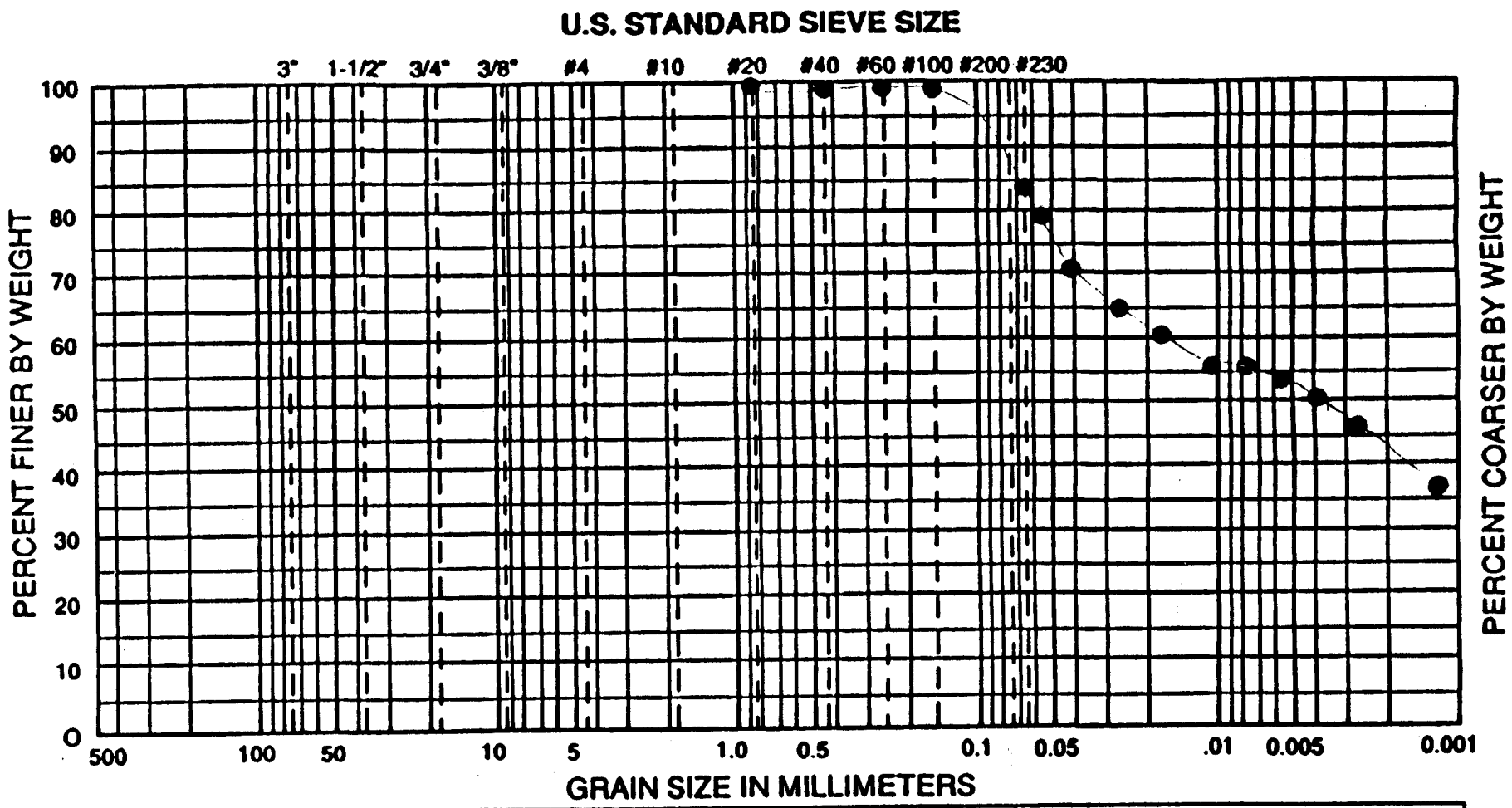
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.70	Temp. Coef. K	0.01328
Value of "a"	0.99	Wt. Dry Sample "W"	56.247
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	51.00	45.00	79.2	79.2	7.93	0.0529
1.0	46.50	40.50	71.3	71.3	8.66	0.0391
2.0	43.00	37.00	65.1	65.1	9.24	0.0285
5.0	41.00	35.00	61.6	61.6	9.57	0.0184
15.0	38.00	32.00	56.3	56.3	10.06	0.0109
30.0	38.00	32.00	56.3	56.3	10.06	0.0077
60.0	37.00	31.00	54.6	54.6	10.22	0.0055
120.0	35.00	29.00	51.0	51.0	10.55	0.0039
250.0	33.00	27.00	47.5	47.5	10.88	0.0028
1440.0	27.00	21.00	37.0	37.0	11.86	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 10+75 SAMPLE NO.: #6 DATE: 2-21-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	65'	Rocky Flats w/ some sand

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION _____

BORING 10+75 SAMPLE ____ DEPTH 6.5'

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

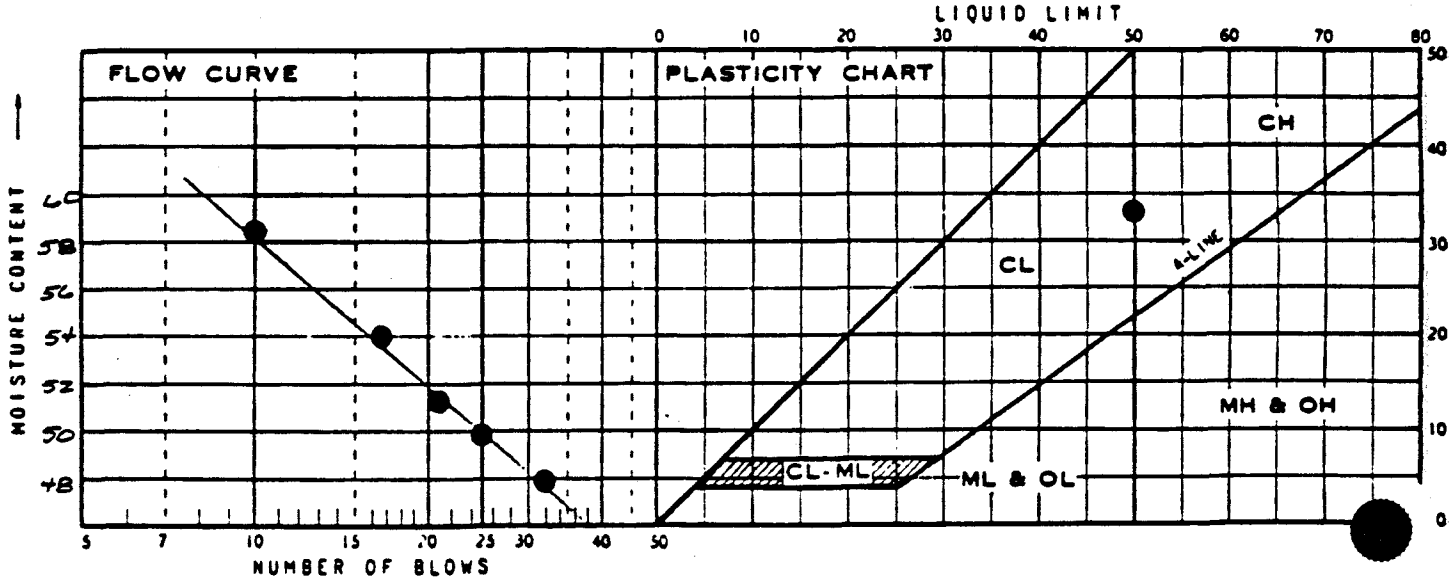
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 4/24/92

DETERMINATION	1	2	3	4	5	6
DISH	20C	19C	2027			
WT OF DISH + WET SOIL g	8.57	8.34	7.59			
WT OF DISH + DRY SOIL g	7.33	7.28	6.67	—	—	—
WT OF MOISTURE g	1.04	1.06	.97			
WT OF DISH g	1.02	1.02	1.06	—	—	—
WT OF DRY SOIL g	6.31	6.26	5.61			
MOISTURE CONTENT %	16.5	16.9	17.3			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	22C	23C	2075	2046	2010	
NUMBER OF BLOWS	32	25	21	17	10±	
WT OF DISH + WET SOIL g	16.27	19.03	16.54	14.92	19.57	
WT OF DISH + DRY SOIL g	11.33	13.05	11.28	10.06	12.74	—
WT OF MOISTURE g	4.94	5.98	5.26	4.86	6.83	
WT OF DISH g	1.03	1.05	1.04	1.07	1.05	—
WT OF DRY SOIL g	10.30	12.00	10.24	8.99	11.69	
MOISTURE CONTENT %	48.0	49.8	51.4	54.1	58.4	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		50.0	16.9	33.	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

PK

CLIENT Weston

JOB NO. 2066-03

BORING NO.	10+75	SAMPLED	Rocky Flats
DEPTH	67.9'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	43.74
Wt. Dry Soil & Pan	(g)	42.79
Wt. Lost Moisture	(g)	0.95
Wt. of Pan Only	(g)	3.69
Wt. of Dry Soil	(g)	39.10
Moisture Content	%	2.4

Wt. Hydrom. Sample Wet (g)	60.61
Wt. Hydrom. Sample Dry (g)	59.17

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.61
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.61
Weight of - #10 Dry (g)	59.17
Wt. Total Sample Dry (g)	59.17
Calc. Wt. "W" (g)	59.17
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.31	1.36	0.05	0.05	0.1	99.9
#40	1.56	1.64	0.08	0.13	0.2	99.8
#60	1.56	1.63	0.07	0.20	0.3	99.7
#100	1.56	1.68	0.12	0.32	0.5	99.5
#230	1.32	10.78	9.46	9.78	16.5	83.5

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	10+75	SAMPLED	Rocky Flats
DEPTH	67.9'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

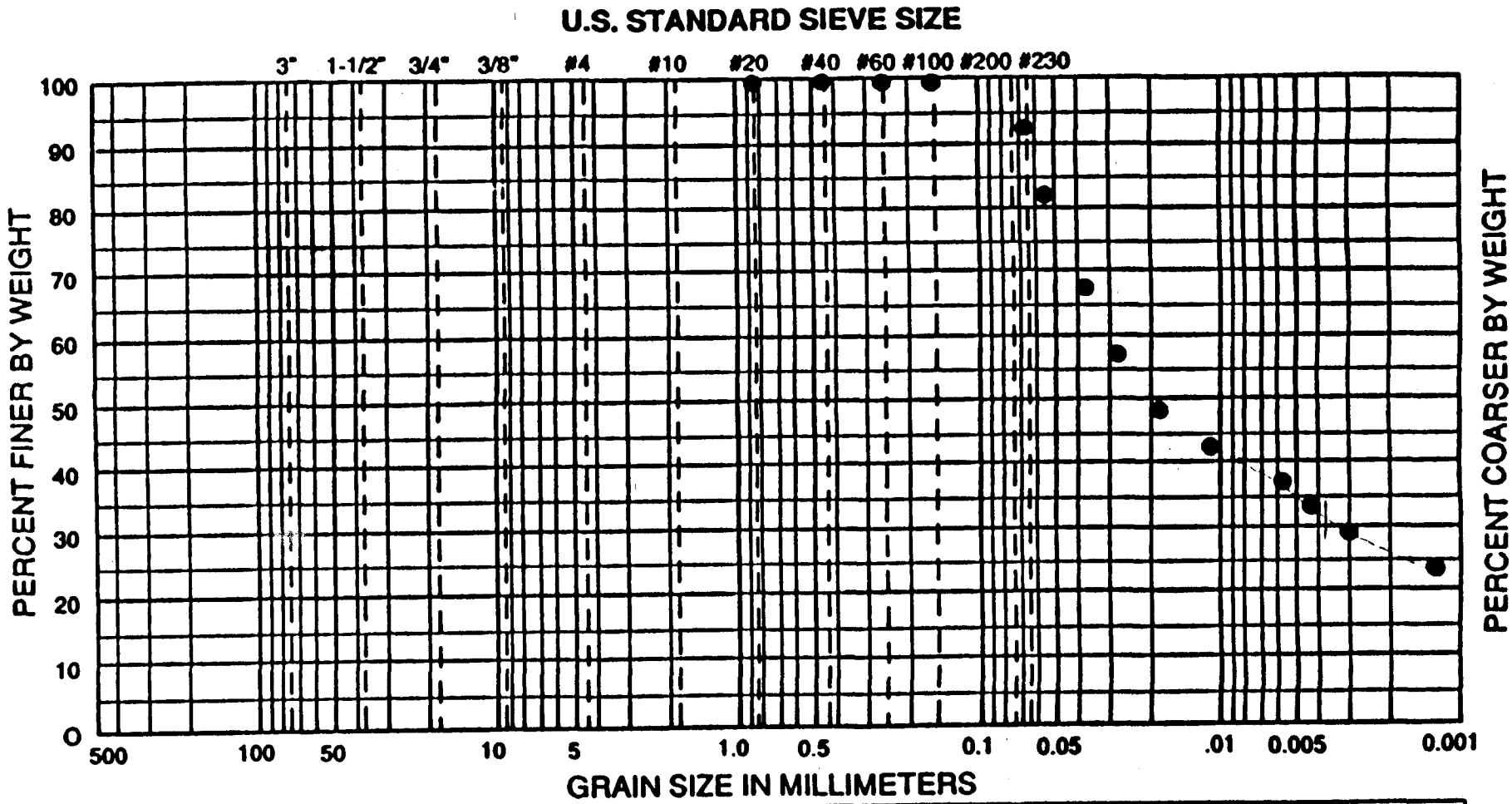
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.69	Temp. Coef. K	0.01332
Value of "a"	0.99	Wt. Dry Sample "W"	59.172
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	52.00	46.00	77.1	77.1	7.76	0.0525
1.0	46.00	40.00	67.1	67.1	8.75	0.0394
2.0	40.00	34.00	57.0	57.0	9.73	0.0294
5.0	35.00	29.00	48.6	48.6	10.55	0.0193
15.0	32.00	26.00	43.6	43.6	11.04	0.0114
30.0	30.00	24.00	40.2	40.2	11.37	0.0082
60.0	28.50	22.50	37.7	37.7	11.62	0.0059
120.0	26.50	20.50	34.4	34.4	11.94	0.0042
250.0	23.50	17.50	29.3	29.3	12.44	0.0030
1440.0	20.50	14.50	24.3	24.3	12.93	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY	
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 10 + 75 SAMPLE NO.: #6 DATE: 2-23-90 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
		Clay w/some sand

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. _____

CLIENT/OWNER WESTON

LOCATION _____

BORING 10+75 SAMPLE ____ DEPTH 67.9'

(6)

FIELD DENSITY BY _____

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

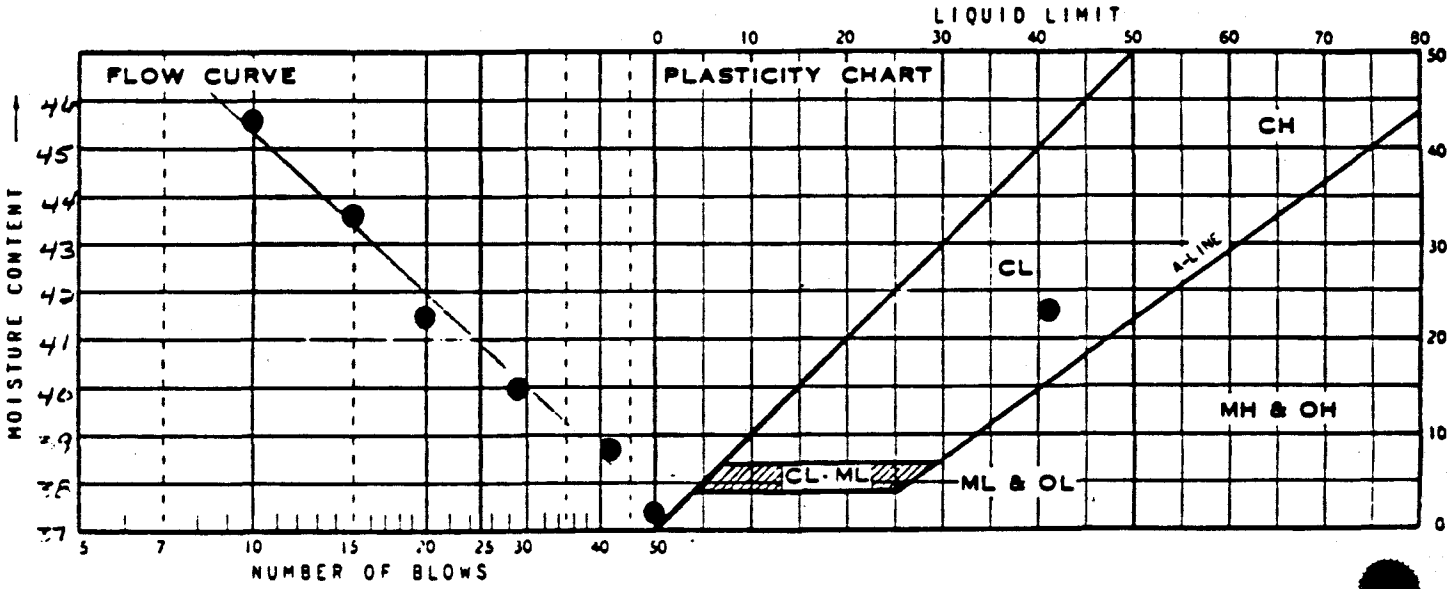
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY S.R. 2/22/92

DETERMINATION	1	2	3	4	5	6
DISH	2022	2065	2096			
WT OF DISH + WET SOIL g	9.82	8.84	8.11			
WT OF DISH + DRY SOIL g	8.50	7.65	7.05	—	—	—
WT OF MOISTURE g	1.32	1.19	1.06			
WT OF DISH g	1.06	1.04	1.05	—	—	—
WT OF DRY SOIL g	7.44	6.61	6.00			
MOISTURE CONTENT %	17.7	18.0	17.7			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2074	2075	2020	17 C	2026	2093
NUMBER OF BLOWS	50	41	29	20	15	10
WT OF DISH + WET SOIL g	15.65	15.90	15.70	16.17	14.86	16.11
WT OF DISH + DRY SOIL g	11.68	11.75	11.51	11.73	10.66	11.39
WT OF MOISTURE g	3.97	4.15	4.19	4.44	4.20	4.72
WT OF DISH g	1.03	1.04	1.04	1.03	1.03	1.03
WT OF DRY SOIL g	10.65	10.71	10.47	10.70	9.63	10.36
MOISTURE CONTENT %	37.3	38.8	40.0	41.5	43.6	45.6



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		40.9	17.8	23.1	CL	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+00	SAMPLED	Rocky Flats
DEPTH	2'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#4	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	57.26
Wt. Dry Soil & Pan	(g)	54.79
Wt. Lost Moisture	(g)	2.47
Wt. of Pan Only	(g)	3.64
Wt. of Dry Soil	(g)	51.15
Moisture Content	%	4.8
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	57.24

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	435.39
Weight of + #10 Before Washing (g)	29.33
Weight of + #10 After Washing (g)	21.53
Weight of - #10 Wet (g)	406.06
Weight of - #10 Dry (g)	394.80
Wt. Total Sample Dry (g)	416.33
Calc. Wt. "W" (g)	60.36
Calc. Mass + #10	3.12

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	6.97	6.97	6.97	1.7	98.3
#4	0.00	5.02	5.02	11.99	2.9	97.1
#10	0.00	9.54	9.54	21.53	5.2	94.8
#20	1.56	3.44	1.88	1.88	8.3	91.7
#40	1.55	4.30	2.75	4.63	12.8	87.2
#60	1.55	4.62	3.07	7.70	17.9	82.1
#100	1.56	5.75	4.19	11.89	24.9	75.1
#230	1.56	7.82	6.26	18.15	35.2	64.8

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	11+00	SAMPLED	Rocky Flats
DEPTH	2'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#4	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

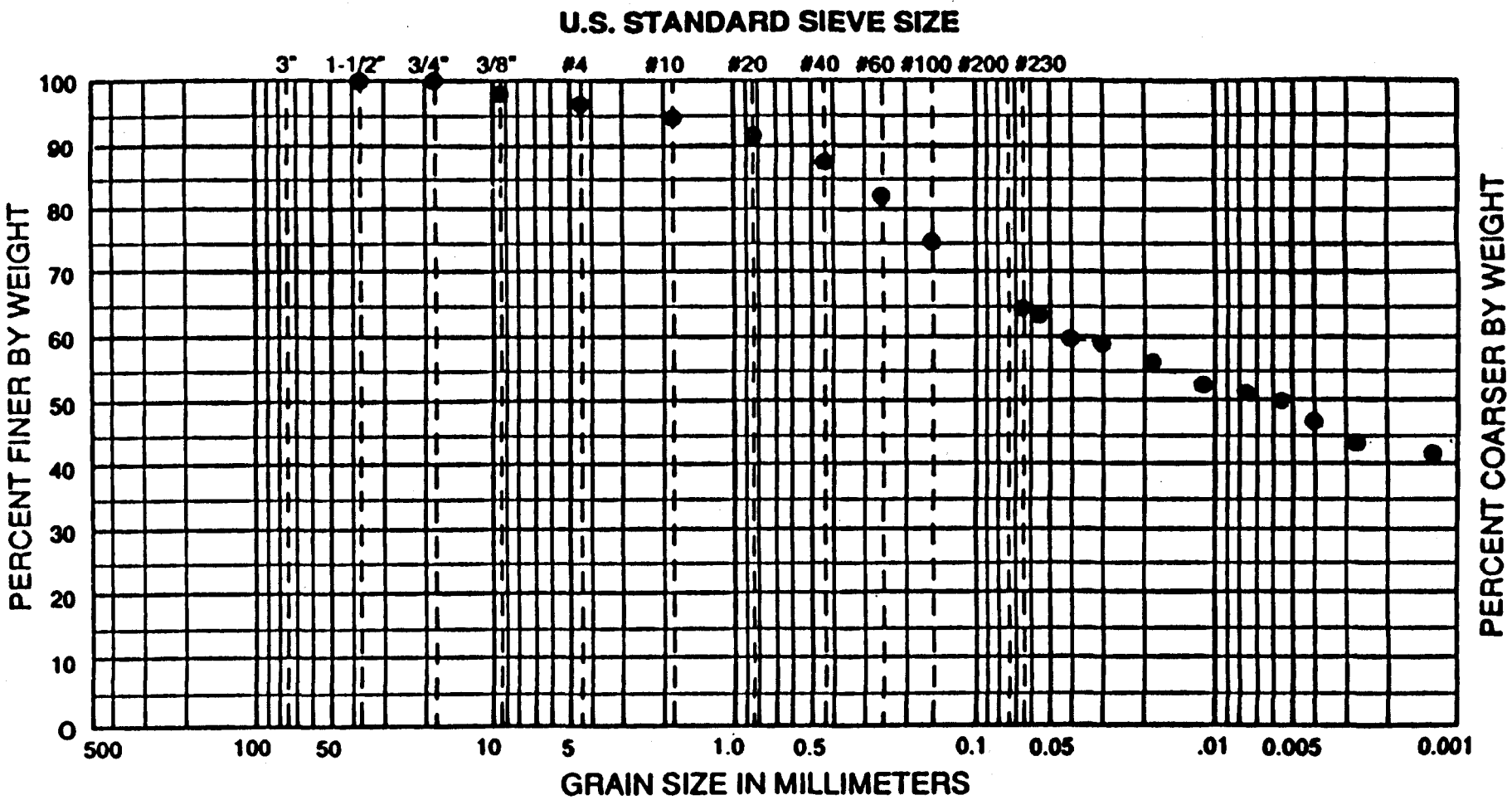
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.70	Temp. Coef. K	0.01312
Value of "a"	0.99	Wt. Dry Sample "W"	60.357
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	3.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	43.50	39.00	64.0	64.0	9.16	0.0561
1.0	41.00	36.50	59.9	59.9	9.57	0.0406
2.0	40.50	36.00	59.0	59.0	9.65	0.0288
5.0	39.00	34.50	56.6	56.6	9.89	0.0185
15.0	36.50	32.00	52.5	52.5	10.30	0.0109
30.0	35.75	31.25	51.3	51.3	10.43	0.0077
60.0	34.50	30.00	49.2	49.2	10.63	0.0055
120.0	33.00	28.50	46.7	46.7	10.88	0.0040
250.0	31.50	27.00	44.3	44.3	11.12	0.0028
1440.0	30.00	25.50	41.8	41.8	11.37	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+00 SAMPLE NO.: 4 DATE: 3 MAR 92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION SANDY
Rocky Flats	@ 2 ft	

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION

BORING 11+00 SAMPLE ____ DEPTH 2'

(4)

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

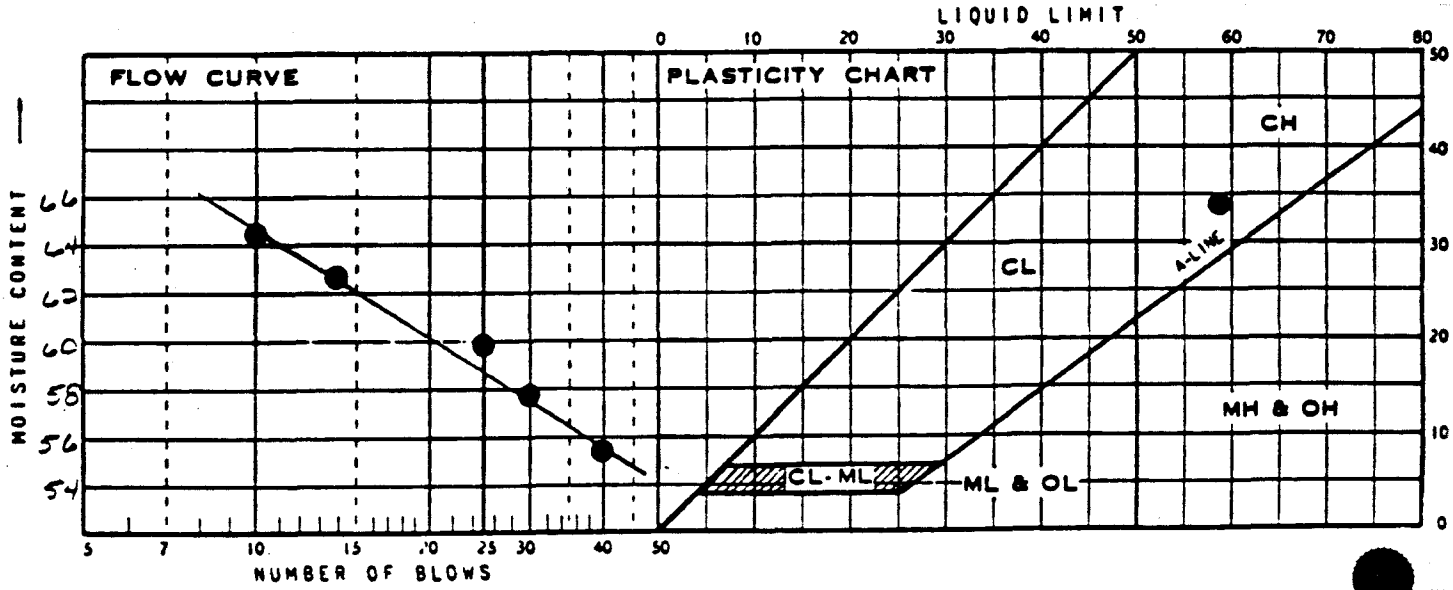
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SB 2/25/92

DETERMINATION	1	2	3	4	5	6
DISH	2027	2071	2013			
WT OF DISH + WET SOIL g	7.36	7.33	7.18			
WT OF DISH + DRY SOIL g	6.13	6.09	5.95	—	—	—
WT OF MOISTURE g	1.23	1.24	1.23			
WT OF DISH g	1.06	1.05	1.05	—	—	—
WT OF DRY SOIL g	5.07	5.04	4.90			
MOISTURE CONTENT %	24.3	24.6	25.1			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2006	2040	25 C	19 C	35 C	
NUMBER OF BLOWS	40	30	26	14	10	
WT OF DISH + WET SOIL g	18.62	18.06	16.85	14.08	17.63	
WT OF DISH + DRY SOIL g	12.34	11.80	10.93	9.04	11.13	—
WT OF MOISTURE g	6.28	6.24	5.92	5.04	6.50	
WT OF DISH g	1.04	1.04	1.04	1.02	1.06	—
WT OF DRY SOIL g	11.30	10.78	9.89	8.02	10.07	
MOISTURE CONTENT %	55.6	57.9	59.9	62.8	64.6	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		58.5	24.7	33.8	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+00	SAMPLED	Rocky Flats
DEPTH	6'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#4	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan	(g)	52.65
Wt. Dry Soil & Pan	(g)	50.97
Wt. Lost Moisture	(g)	1.68
Wt. of Pan Only	(g)	3.68
Wt. of Dry Soil	(g)	47.29
Moisture Content	%	3.6

Wt. Hydrom. Sample Wet (g)	60.00
Wt. Hydrom. Sample Dry (g)	57.94

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	452.46
Weight of + #10 Before Washing (g)	12.02
Weight of + #10 After Washing (g)	9.90
Weight of - #10 Wet (g)	440.45
Weight of - #10 Dry (g)	427.38
Wt. Total Sample Dry (g)	437.28
Calc. Wt. "W" (g)	59.28
Calc. Mass + #10	1.34

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	2.92	2.92	2.92	0.7	99.3
#10	0.00	6.98	6.98	9.90	2.3	97.7
#20	1.56	2.24	0.68	0.68	3.4	96.6
#40	1.31	4.14	2.83	3.51	8.2	91.8
#60	1.31	5.18	3.87	7.38	14.7	85.3
#100	1.56	7.33	5.77	13.15	24.4	75.6
#230	1.57	9.25	7.68	20.83	37.4	62.6

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+00	SAMPLED	Rocky Flats
DEPTH	6'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#4	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

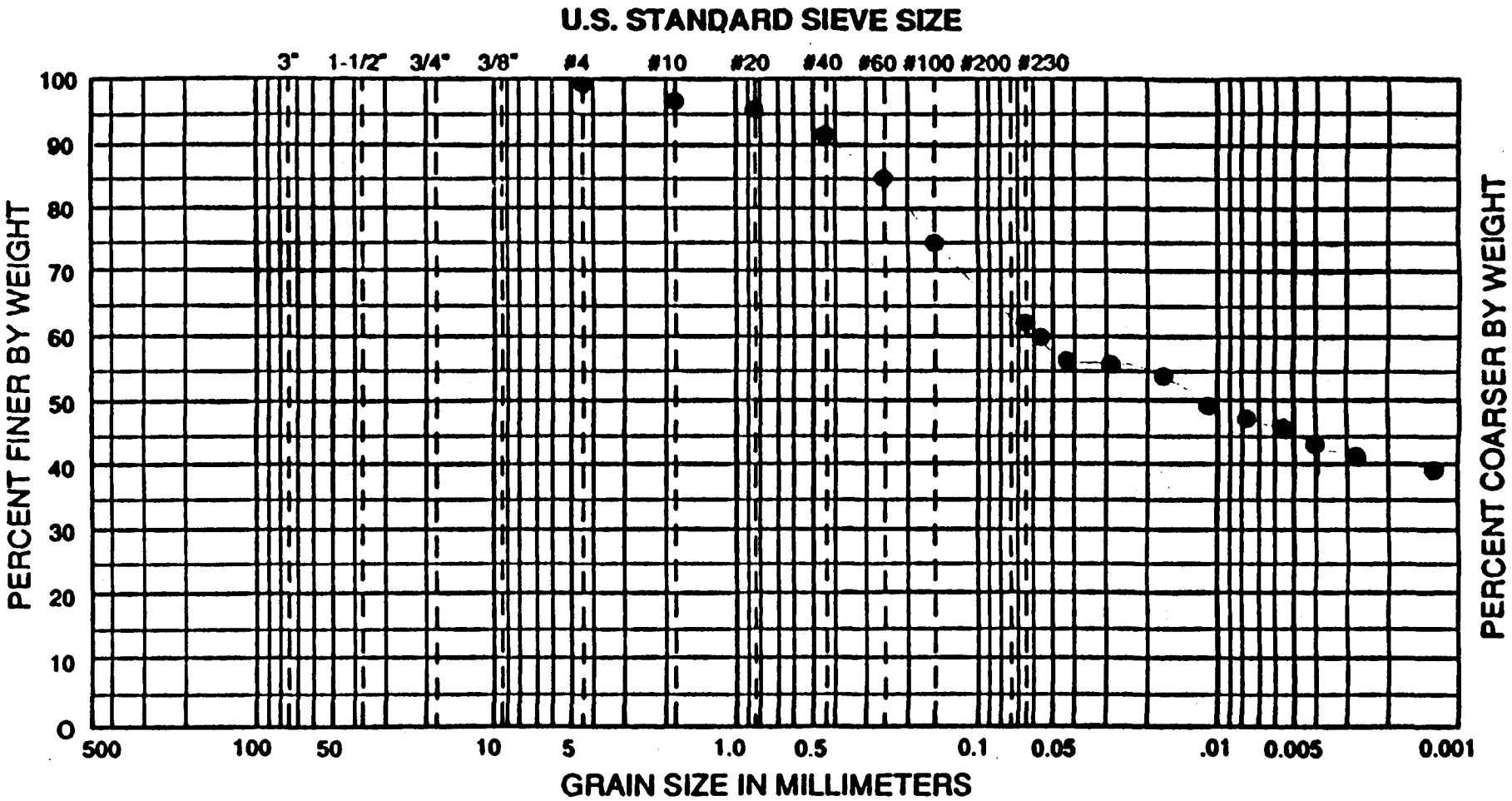
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.70	Temp. Coef. K	0.01312
Value of "a"	0.99	Wt. Dry Sample "W"	59.284
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	3.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	40.50	36.00	60.1	60.1	9.65	0.0576
1.0	38.50	34.00	56.8	56.8	9.98	0.0414
2.0	38.00	33.50	55.9	55.9	10.06	0.0294
5.0	37.00	32.50	54.3	54.3	10.22	0.0188
15.0	34.00	29.50	49.3	49.3	10.71	0.0111
30.0	33.00	28.50	47.6	47.6	10.88	0.0079
60.0	32.00	27.50	45.9	45.9	11.04	0.0056
120.0	31.00	26.50	44.3	44.3	11.21	0.0040
250.0	30.00	25.50	42.6	42.6	11.37	0.0028
1440.0	28.00	23.50	39.2	39.2	11.70	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+00 SAMPLE NO.: #4 DATE: 3-2-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	60'	[illegible]

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

CLIENT/OWNER WESTON

LOCATION _____

BORING 11+00 SAMPLE ____ DEPTH 6'

(4)

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

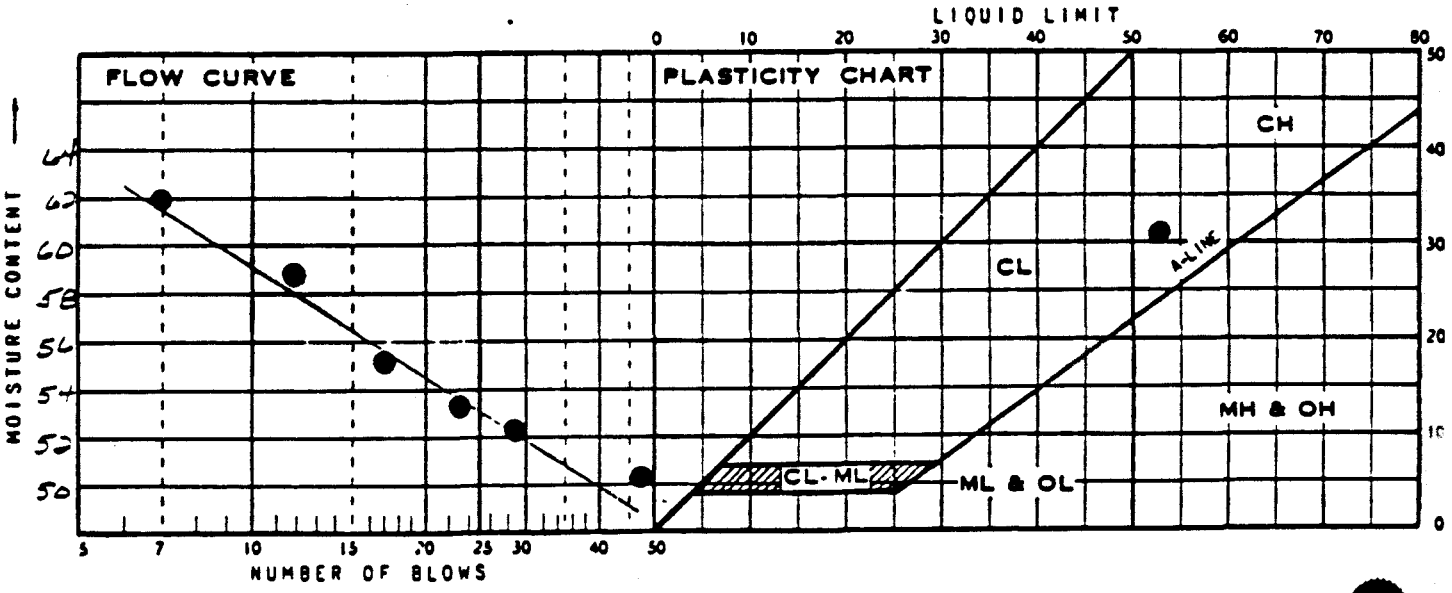
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 2/25/22

DETERMINATION	1	2	3	4	5	6
DISH	32 C	10 C	2021			
WT OF DISH + WET SOIL g	5.46	7.17	8.22			
WT OF DISH + DRY SOIL g	4.83	6.10	6.92	—	—	—
WT OF MOISTURE g	.83	1.07	1.30			
WT OF DISH g	1.02	1.03	1.05	—	—	—
WT OF DRY SOIL g	3.81	5.07	5.87			
MOISTURE CONTENT %	21.8	21.1	22.2			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2065	24 C	2067	2063	20 C	2030
NUMBER OF BLOWS	46	29	23	17	12	7
WT OF DISH + WET SOIL g	20.65	14.96	17.88	17.50	17.89	15.96
WT OF DISH + DRY SOIL g	14.08	10.17	12.00	11.53	11.64	10.25
WT OF MOISTURE g	6.57	4.79	5.88	5.77	6.25	5.71
WT OF DISH g	1.04	1.03	1.02	1.06	1.02	1.05
WT OF DRY SOIL g	13.04	9.14	10.98	10.47	10.62	9.20
MOISTURE CONTENT %	50.4	52.4	53.6	55.1	58.9	62.0



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		53.1	21.7	31.4	CH	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+00	SAMPLED	Rocky Flats
DEPTH	14'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#4	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	57.55
Wt. Dry Soil & Pan	(g)	54.36
Wt. Lost Moisture	(g)	3.19
Wt. of Pan Only	(g)	3.35
Wt. of Dry Soil	(g)	51.01
Moisture Content	%	6.3
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	56.47

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	543.24
Weight of + #10 Before Washing (g)	0.89
Weight of + #10 After Washing (g)	0.17
Weight of - #10 Wet (g)	542.55
Weight of - #10 Dry (g)	511.30
Wt. Total Sample Dry (g)	511.47
Calc. Wt. "W" (g)	56.49
Calc. Mass + #10	0.02

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.17	0.17	0.17	0.0	100.0
#20	1.55	1.94	0.39	0.39	0.7	99.3
#40	1.54	1.91	0.37	0.76	1.4	98.6
#60	1.55	1.77	0.22	0.98	1.8	98.2
#100	1.55	1.72	0.17	1.15	2.1	97.9
#230	1.57	1.95	0.38	1.53	2.7	97.3

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	11+00	SAMPLED	Rocky Flats
DEPTH	14'	DATE TESTED	02-24-92 TNT
SAMPLE NO.	#4	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

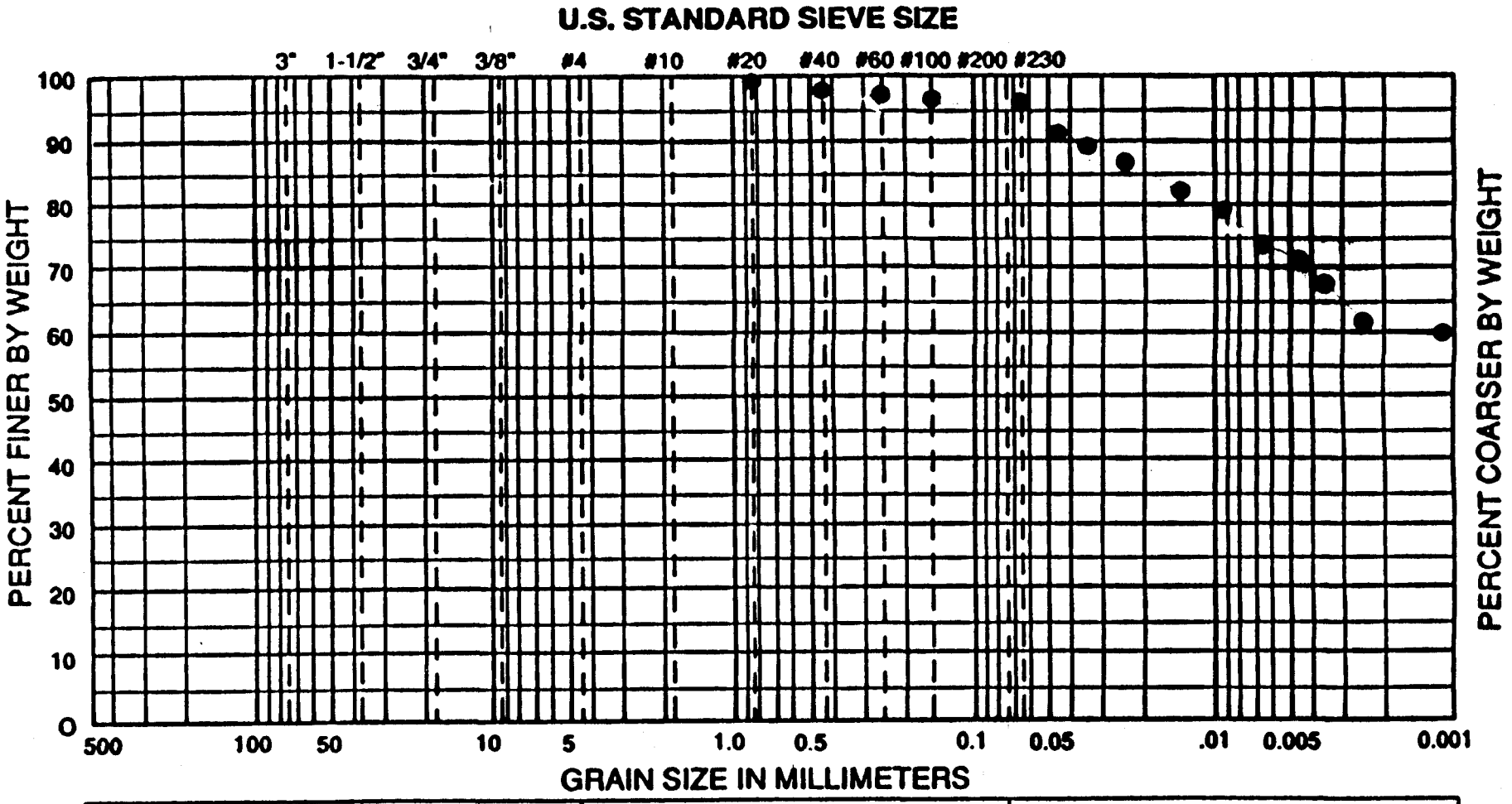
Hydrometer #	ASTM 152 H	Temp., Deg. C	23.0
Sp. Gr. of Soil	2.80	Temp. Coef. K	0.01261
Value of "a"	0.97	Wt. Dry Sample "W"	56.487
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	3.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	58.00	53.50	91.9	91.9	6.78	0.0464
1.0	56.50	52.00	89.3	89.3	7.02	0.0334
2.0	55.00	50.50	86.7	86.7	7.27	0.0240
5.0	53.25	48.75	83.7	83.7	7.56	0.0155
15.0	50.50	46.00	79.0	79.0	8.01	0.0092
30.0	48.00	43.50	74.7	74.7	8.42	0.0067
60.0	46.50	42.00	72.1	72.1	8.66	0.0048
120.0	44.00	39.50	67.8	67.8	9.07	0.0035
250.0	41.00	36.50	62.7	62.7	9.57	0.0025
1440.0	34.00	29.50	50.7	50.7	10.71	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+00 SAMPLE NO.: #4 DATE: 3-2-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	140'	

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. [illegible]

CLIENT/OWNER WESTON

LOCATION EG&G

BORING W100 SAMPLE ____ DEPTH 14'

(4)

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

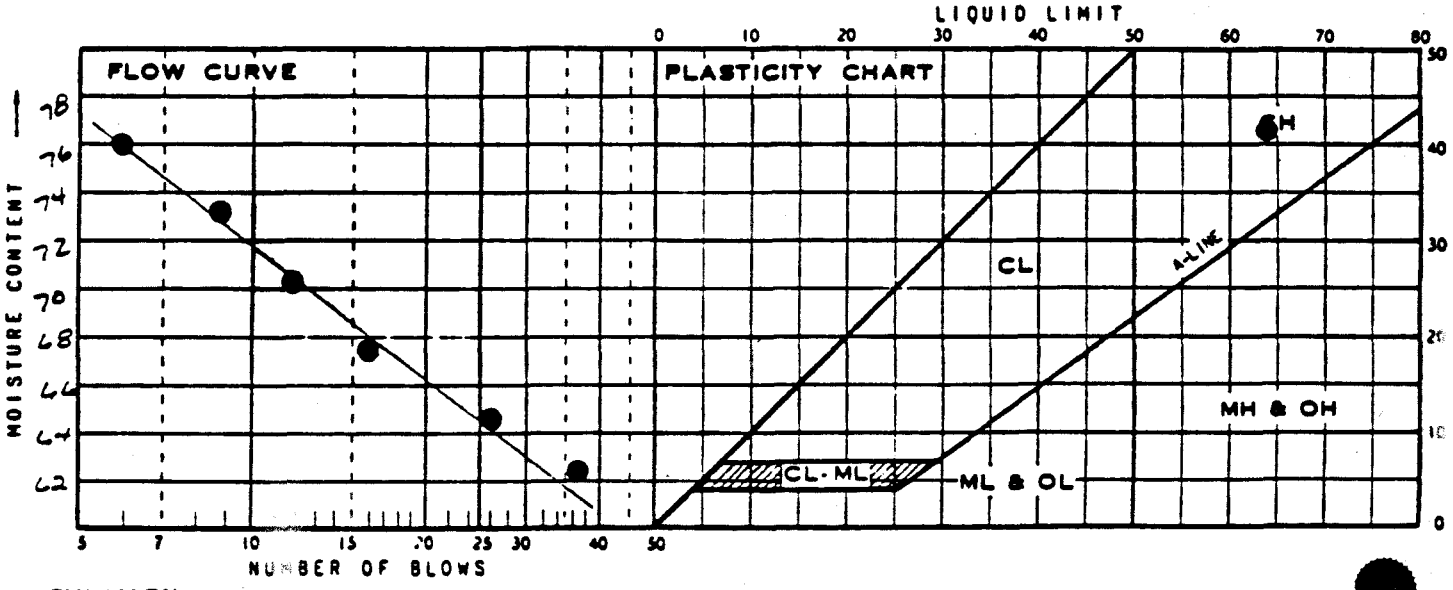
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 2/25/92

DETERMINATION	1	2	3	4	5	6
DISH	2060	12C	7C			
WT OF DISH + WET SOIL	9.08g	9.74g	11.04g			
WT OF DISH + DRY SOIL	7.67g	8.12g	9.24g	—	—	—
WT OF MOISTURE	1.47g	1.62g	1.80g			
WT OF DISH	1.03g	1.05g	1.05g	—	—	—
WT OF DRY SOIL	6.58g	7.07g	8.19g			
MOISTURE CONTENT %	22.3	22.9	22.0			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2045	2073	33C	43C	2051	2042
NUMBER OF BLOWS	37	26	16	12	9	6
WT OF DISH + WET SOIL	16.31g	17.81g	16.90g	16.42g	16.71g	18.8
WT OF DISH + DRY SOIL	10.44g	11.21g	10.51g	10.06g	10.08g	11.13g
WT OF MOISTURE	5.87g	6.60g	6.39g	6.36g	6.63g	7.67g
WT OF DISH	1.05g	1.03g	1.04g	1.03g	1.02g	1.04g
WT OF DRY SOIL	9.39g	10.18g	9.47g	9.03g	9.06g	10.09g
MOISTURE CONTENT %	62.5	64.8	67.5	70.4	73.2	76.0



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		67	22.1	45	CH	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+00	SAMPLED	Rocky Flats
DEPTH	19.5'	DATE TESTED	02-24-92 TN
SAMPLE NO.	#4	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan	(g)	50.93
Wt. Dry Soil & Pan	(g)	48.90
Wt. Lost Moisture	(g)	2.03
Wt. of Pan Only	(g)	3.61
Wt. of Dry Soil	(g)	45.29
Moisture Content	%	4.5

Wt. Hydrom. Sample Wet (g)	60.00
Wt. Hydrom. Sample Dry (g)	57.43

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	57.43
Wt. Total Sample Dry (g)	57.43
Calc. Wt. "W" (g)	57.43
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.56	1.57	0.01	0.01	0.0	100.0
#40	1.56	1.57	0.01	0.02	0.0	100.0
#60	1.57	1.59	0.02	0.04	0.1	99.9
#100	1.55	1.58	0.03	0.07	0.1	99.9
#230	1.55	1.84	0.29	0.36	0.6	99.4

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	11+00	SAMPLED	Rocky Flats
DEPTH	19.5'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#4	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

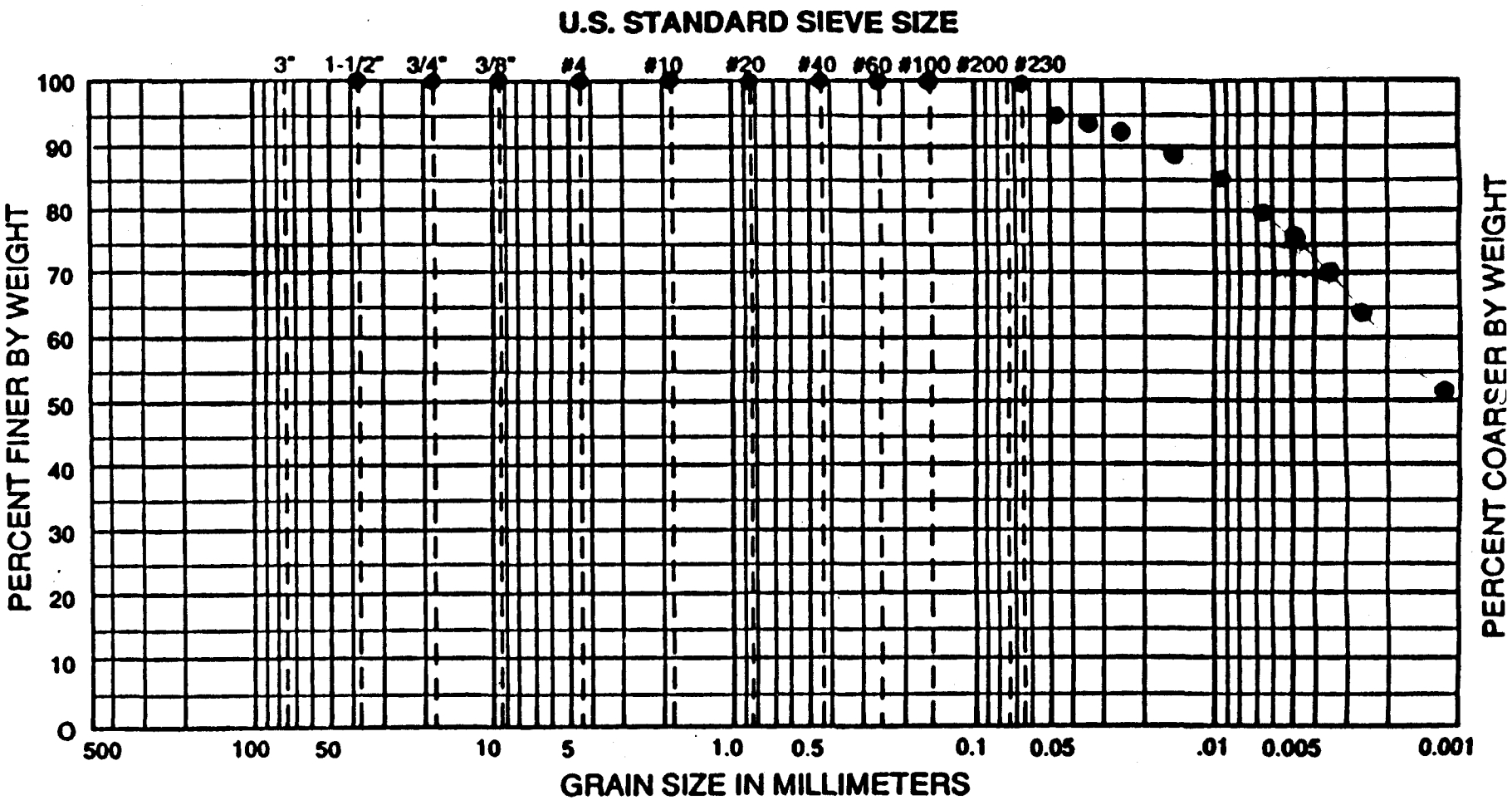
Hydrometer #	ASTM 152 H	Temp., Deg. C	23.0
Sp. Gr. of Soil	2.69	Temp. Coef. K	0.01301
Value of "a"	0.99	Wt. Dry Sample "W"	57.426
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	3.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	59.50	55.00	95.0	95.0	6.53	0.0470
1.0	58.50	54.00	93.3	93.3	6.70	0.0337
2.0	58.00	53.50	92.4	92.4	6.78	0.0240
5.0	56.00	51.50	89.0	89.0	7.11	0.0155
15.0	53.50	49.00	84.6	84.6	7.52	0.0092
30.0	50.50	46.00	79.5	79.5	8.01	0.0067
60.0	48.50	44.00	76.0	76.0	8.34	0.0048
120.0	45.00	40.50	70.0	70.0	8.91	0.0035
250.0	41.50	37.00	63.9	63.9	9.48	0.0025
1440.0	34.00	29.50	51.0	51.0	10.71	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+00 SAMPLE NO.: #4 DATE: 3 MAR 92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	@ 19.5 ft	

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

CLIENT/OWNER Weston

LOCATION Rocky Flats EG+G

BORING U-00 SAMPLE CA #4 DEPTH 19.5'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

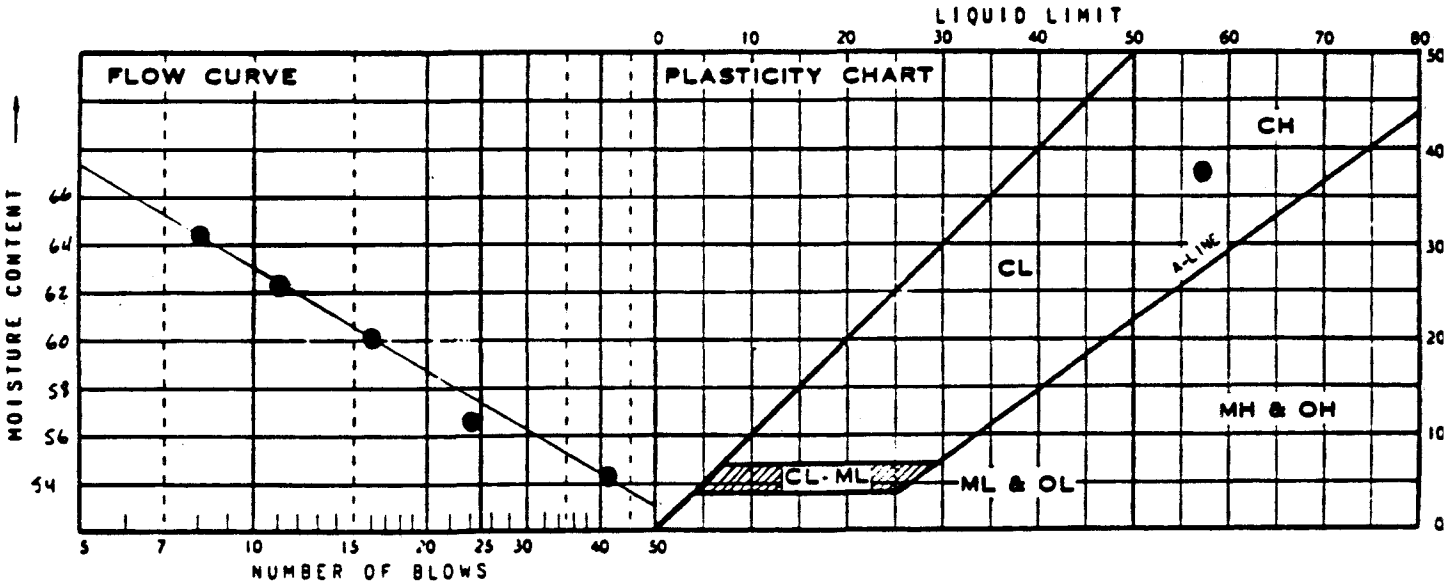
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY AJL 2/26/92

DETERMINATION	1	2	3	4	5	6
DISH	35C	24C	2003			
WT OF DISH + WET SOIL g	6.94	7.40	7.34			
WT OF DISH + DRY SOIL g	5.95	6.37	6.33	—	—	—
WT OF MOISTURE g	.99	1.03	1.01			
WT OF DISH g	1.08	1.05	1.06	—	—	—
WT OF DRY SOIL g	4.87	5.32	5.27			
MOISTURE CONTENT %	20.3	19.4	19.2			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2071	25C	12C	7C	32C	19C
NUMBER OF BLOWS	41	24	25	16	11	8
WT OF DISH + WET SOIL g	12.58	11.88	12.54	11.82	11.88	12.48
WT OF DISH + DRY SOIL g	8.52	7.97	8.32	7.78	7.71	8.00
WT OF MOISTURE g	4.06	3.91	4.22	4.04	4.17	4.48
WT OF DISH g	1.06	1.06	1.06	1.06	1.03	1.03
WT OF DRY SOIL g	7.46	6.91	7.26	6.72	6.68	6.97
MOISTURE CONTENT %	54.4	56.6	58.1	60.1	62.4	64.3



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		57.4	19.6	37.8	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+00	SAMPLED	Rocky Flats
DEPTH	24.5'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#4	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	54.42
Wt. Dry Soil & Pan	(g)	52.63
Wt. Lost Moisture	(g)	1.79
Wt. of Pan Only	(g)	3.68
Wt. of Dry Soil	(g)	48.95
Moisture Content	%	3.7

Wt. Hydrom. Sample Wet (g)	60.00
Wt. Hydrom. Sample Dry (g)	57.88

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	57.88
Wt. Total Sample Dry (g)	57.88
Calc. Wt. "W" (g)	57.88
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.55	1.57	0.02	0.02	0.0	100.0
#40	1.55	1.59	0.04	0.06	0.1	99.9
#60	1.55	1.63	0.08	0.14	0.2	99.8
#100	1.55	1.68	0.13	0.27	0.5	99.5
#230	1.55	3.15	1.60	1.87	3.2	96.8

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Western

JOB NO. 2066-03

BORING NO.	11+00	SAMPLED	Rocky Flats
DEPTH	24.5'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#4	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

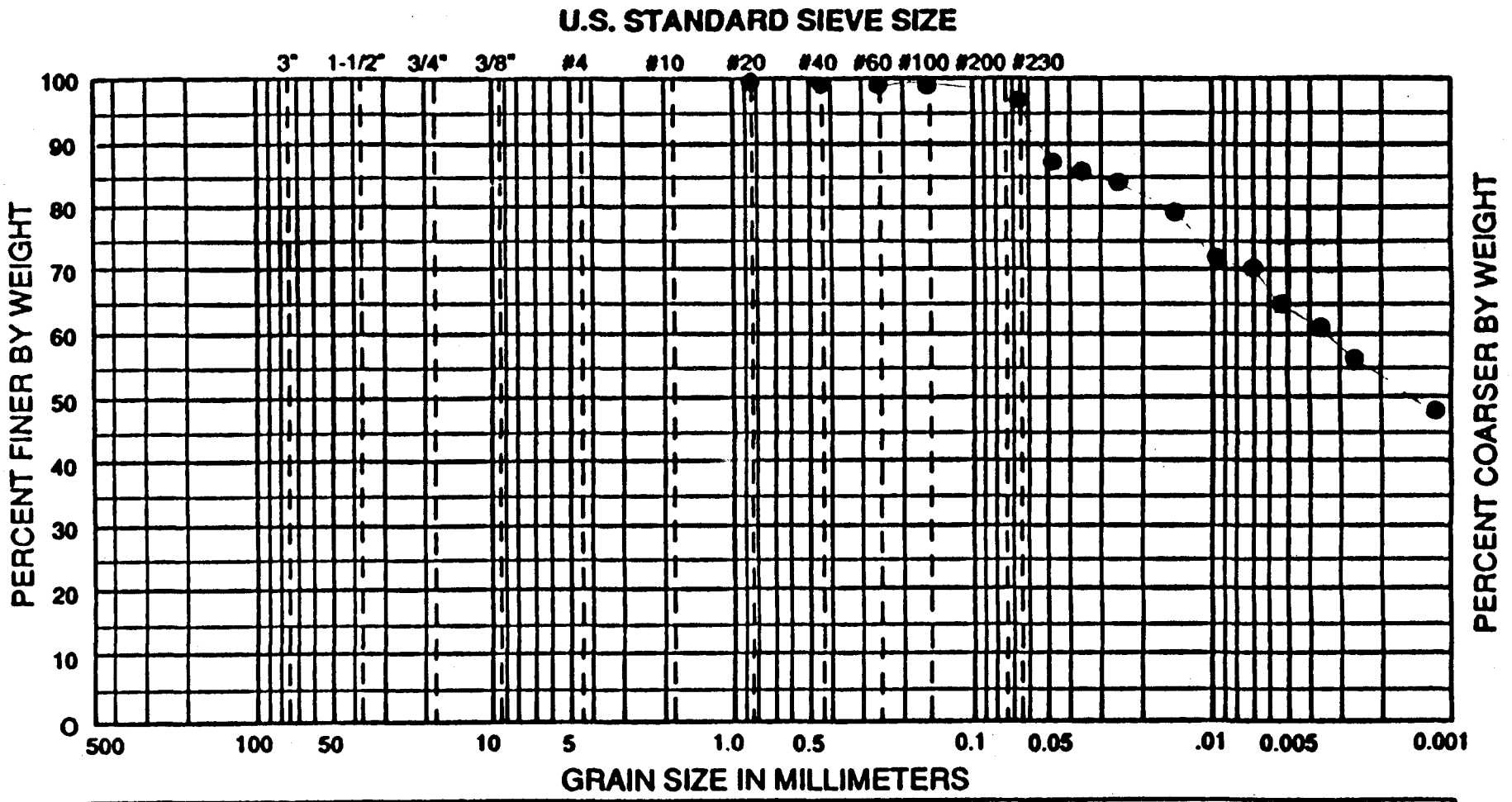
Hydrometer #	ASTM 152 H	Temp., Deg. C	23.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01293
Value of "a"	0.99	Wt. Dry Sample "W"	57.883
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	3.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	56.00	51.50	87.9	87.9	7.11	0.0487
1.0	55.00	50.50	86.2	86.2	7.27	0.0349
2.0	54.00	49.50	84.5	84.5	7.43	0.0249
5.0	51.00	46.50	79.4	79.4	7.93	0.0163
15.0	47.75	43.25	73.8	73.8	8.46	0.0097
30.0	46.00	41.50	70.8	70.8	8.75	0.0070
60.0	43.00	38.50	65.7	65.7	9.24	0.0051
120.0	40.50	36.00	61.4	61.4	9.65	0.0037
250.0	38.00	33.50	57.2	57.2	10.06	0.0026
1440.0	32.50	28.00	47.8	47.8	10.96	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+00 SAMPLE NO.: #4 DATE: 3-2-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION silty clay (CL)
Rocky Flats	24.5'	

FIELD CLASSIFICATION

LABORATORY CLASSIFICATION

CLIENT/OWNER Weston

LOCATION Rocky Flats EG-G

BORING 11-QQ SAMPLE CH 4 DEPTH 24.5

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

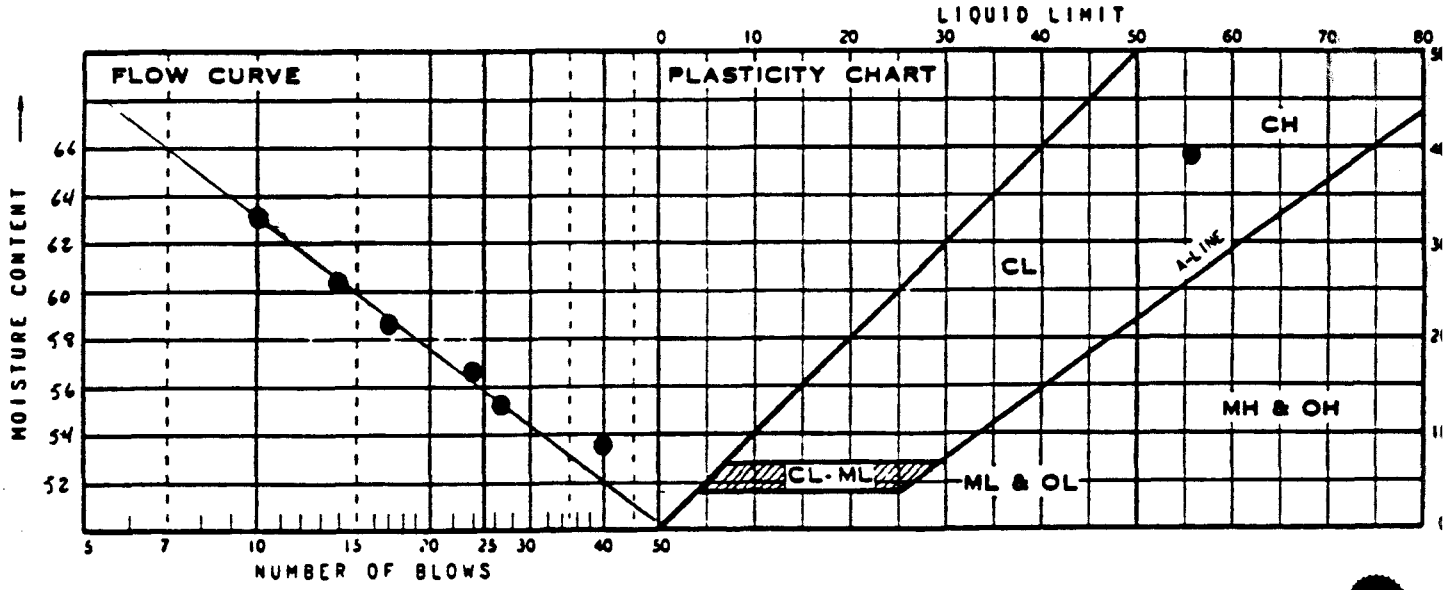
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY RW 2/26/92

DETERMINATION	1	2	3	4	5	6
DISH	2050	10C	33C			
WT OF DISH + WET SOIL g	5.25	5.97	6.04			
WT OF DISH + DRY SOIL g	4.67	5.25	5.34	—	—	—
WT OF MOISTURE g	.58	.72	.70			
WT OF DISH g	1.06	1.04	1.06	—	—	—
WT OF DRY SOIL g	3.61	4.21	4.28			
MOISTURE CONTENT %	16.1	17.1	16.4			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2042	2073	43C	2067	2069	2018
NUMBER OF BLOWS	40	27	24	17	14	10
WT OF DISH + WET SOIL g	12.59	11.85	12.20	11.31	11.47	11.56
WT OF DISH + DRY SOIL g	8.57	8.00	8.16	7.51	7.55	7.49
WT OF MOISTURE g	4.02	3.85	4.04	3.80	3.92	4.07
WT OF DISH g	1.08	1.05	1.04	1.04	1.05	1.06
WT OF DRY SOIL g	7.49	6.95	7.12	6.47	6.50	6.43
MOISTURE CONTENT %	53.7	55.4	56.7	58.7	60.3	63.3



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION
		55.9	16.5	39.4	CH

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Westen

JOB NO. 2066-03

BORING NO.	11+00	SAMPLED	Rocky Flats
DEPTH	55'	DATE TESTED	02-12-92 TNT
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	49.87
Wt. Dry Soil & Pan	(g)	49.67
Wt. Lost Moisture	(g)	0.20
Wt. of Pan Only	(g)	3.75
Wt. of Dry Soil	(g)	45.92
Moisture Content	%	0.4
Wt. Hydrom. Sample Wet	(g)	58.93
Wt. Hydrom. Sample Dry	(g)	58.68

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	58.93
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	58.93
Weight of - #10 Dry (g)	58.68
Wt. Total Sample Dry (g)	58.68
Calc. Wt. "W" (g)	58.68
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	0.00	0.00	0.00	0.00	0.0	100.0
#40	1.56	1.58	0.02	0.02	0.0	100.0
#60	1.57	1.64	0.07	0.09	0.2	99.8
#100	1.56	1.76	0.20	0.29	0.5	99.5
#230	1.58	36.06	34.48	34.77	59.3	40.7

SILTY SAND

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+00	SAMPLED	Rocky Flat
DEPTH	55'	DATE TESTED	02-12-92 T
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

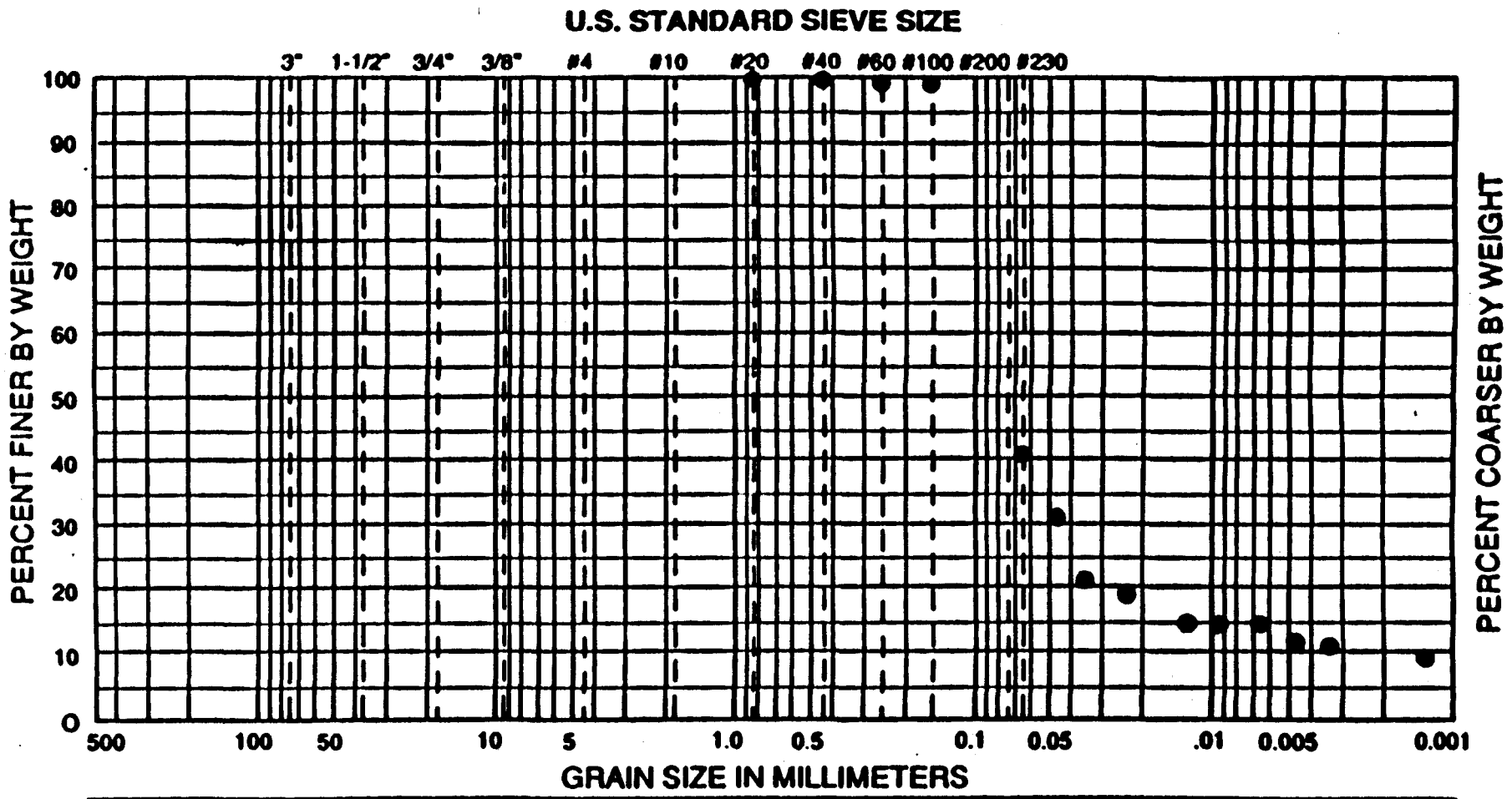
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.66	Temp. Coef. K	0.01344
Value of "a"	0.99	Wt. Dry Sample "W"	58.577
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	36.00	30.00	50.5	50.5	10.39	0.0613
1.0	25.50	19.50	32.8	32.8	12.11	0.0468
2.0	19.00	13.00	21.9	21.9	13.17	0.0345
5.0	17.00	11.00	18.5	18.5	13.50	0.0221
15.0	15.00	9.00	15.2	15.2	13.83	0.0129
30.0	15.00	9.00	15.2	15.2	13.83	0.0091
60.0	15.00	9.00	15.2	15.2	13.83	0.0065
120.0	13.75	7.75	13.0	13.0	14.04	0.0046
250.0	13.25	7.25	12.2	12.2	14.12	0.0032
1440.0	11.50	5.50	9.3	9.3	14.40	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+00 SAMPLE NO.: #6 DATE: 2-21-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	55'	Silty Sand w/ some clay Rocky Flats 45% f. Sand, 43% Silt, 12% Clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

CLIENT/OWNER WESTON

LOCATION _____

BORING 1100 SAMPLE ____ DEPTH 55' (4)

FIELD DENSITY BY ...../...../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR. 2/22/92

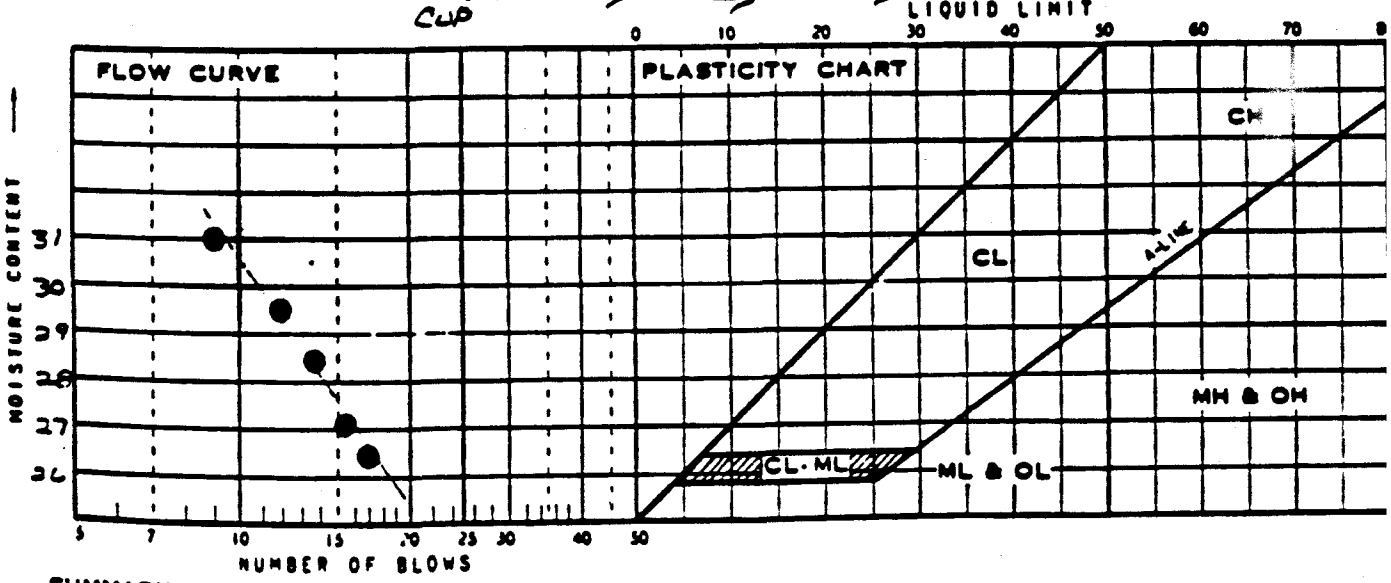
DETERMINATION	1	2	3	4	5	6
DISH	2040	2013	2043			
WT OF DISH + WET SOIL g	7.91	7.49	8.00			
WT OF DISH + DRY SOIL g	6.53	6.25	7.28	—	—	—
WT OF MOISTURE g	1.38	1.24	1.52			
WT OF DISH g	1.08	1.05	1.07	—	—	—
WT OF DRY SOIL g	5.45	5.20	6.21			
MOISTURE CONTENT %	25.3	23.9	25.5			

HARDLY ROLLED!

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2029	2072	2011	2008	CC	
NUMBER OF BLOWS	17	16±	15±	12	9±	
WT OF DISH + WET SOIL g	26.30	20.82	25.38	16.68	25.02	
WT OF DISH + DRY SOIL g	21.01	16.61	19.99	13.12	19.35	—
WT OF MOISTURE g	5.29	4.21	5.39	3.56	5.67	
WT OF DISH g	1.06	1.05	1.05	1.06	1.04	—
WT OF DRY SOIL g	19.95	15.56	18.94	12.06	16.31	
MOISTURE CONTENT %	26.5	27.1	28.5	29.5	31.0	

SLIDES IN CUP → → → →



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION
			24.9		

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

BK

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+00	SAMPLED	Rocky Flats
DEPTH	62.5'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	57.78
Wt. Dry Soil & Pan	(g)	55.75
Wt. Lost Moisture	(g)	2.03
Wt. of Pan Only	(g)	3.86
Wt. of Dry Soil	(g)	51.89
Moisture Content	%	3.9

Wt. Hydrom. Sample Wet (g)	60.00
Wt. Hydrom. Sample Dry (g)	57.74

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	57.74
Wt. Total Sample Dry (g)	57.74
Calc. Wt. "W" (g)	57.74
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.72	0.15	0.15	0.3	99.7
#40	1.57	1.64	0.07	0.22	0.4	99.6
#60	1.56	1.63	0.07	0.29	0.5	99.5
#100	1.56	1.65	0.09	0.38	0.7	99.3
#230	1.56	1.87	0.31	0.69	1.2	98.8

Silty Clay

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Westcor

JOB NO. 2066-03

BORING NO.	11+00	SAMPLED	Rocky Flats
DEPTH	62.5'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#6	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

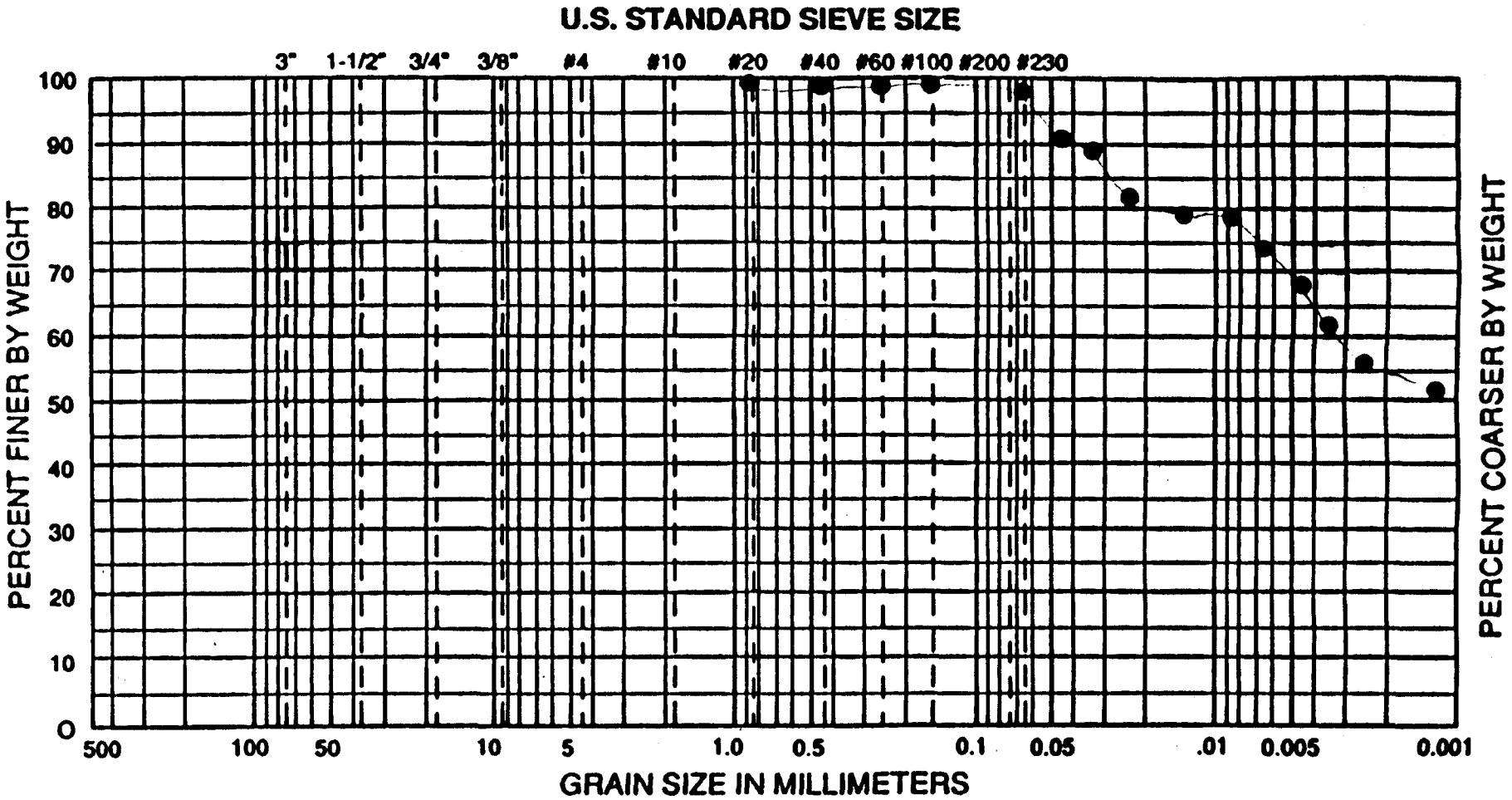
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.89	Temp. Coef. K	0.01260
Value of "a"	0.95	Wt. Dry Sample "W"	57.741
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	61.50	55.50	91.5	91.5	6.20	0.0444
1.0	60.00	54.00	89.0	89.0	6.45	0.0320
2.0	59.50	53.50	88.2	88.2	6.53	0.0228
5.0	57.50	51.50	84.9	84.9	6.86	0.0148
15.0	54.00	48.00	79.1	79.1	7.43	0.0089
30.0	51.00	45.00	74.2	74.2	7.93	0.0065
60.0	47.50	41.50	68.4	68.4	8.50	0.0047
120.0	43.50	37.50	61.8	61.8	9.16	0.0035
250.0	40.00	34.00	56.1	56.1	9.73	0.0025
1440.0	32.00	26.00	42.9	42.9	11.04	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11 +00 SAMPLE NO.: #6 DATE: 2-22-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	6.25'	SILTY Claystone w/ trace SAND. Rocky [illegible]

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

CLIENT/OWNER WESTON

LOCATION Rocky Flats / EG&G

BORING 1L+00 SAMPLE CH#6 DEPTH 62.5'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

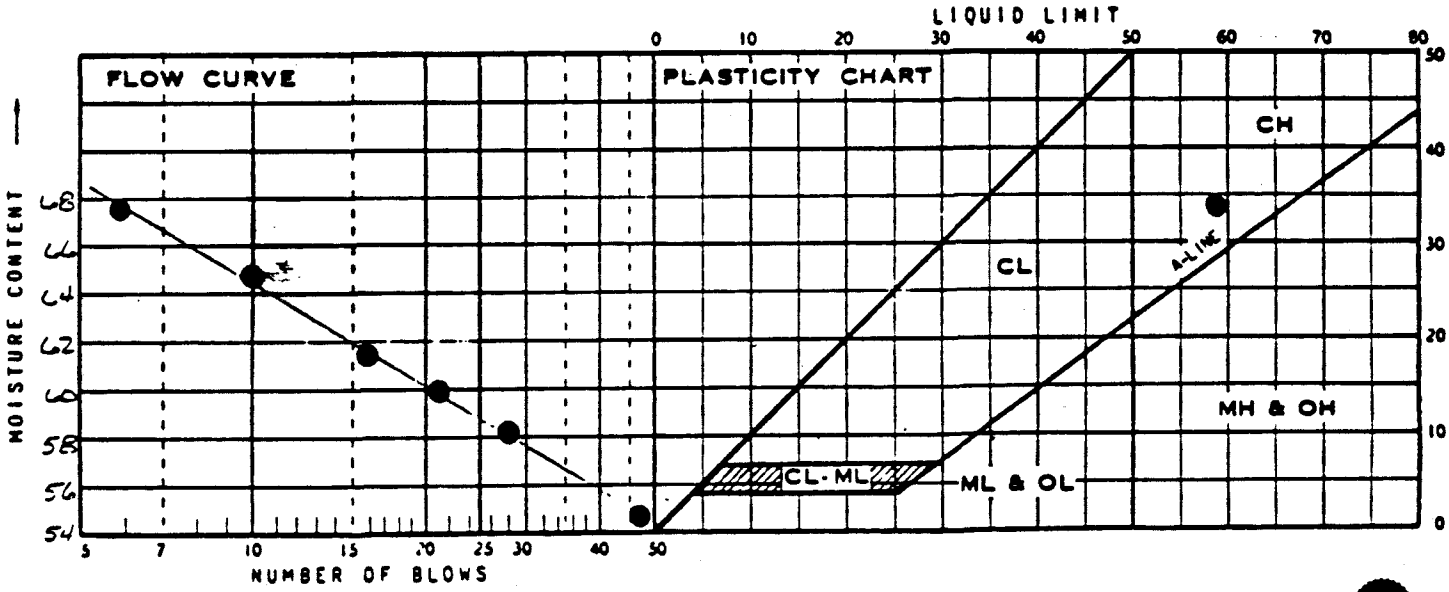
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DMW 2/28/92

DETERMINATION	1	2	3	4	5	6
DISH	33C	34C	35C			
WT OF DISH + WET SOIL	8.49g	8.22g	9.38g			
WT OF DISH + DRY SOIL g	6.99g	6.79	7.82	—	—	—
WT OF MOISTURE g	1.50	1.43	1.56			
WT OF DISH g	1.05g	1.03g	1.03g	—	—	—
WT OF DRY SOIL g	5.94	5.76	6.79			
MOISTURE CONTENT %	25.3	24.8	23.0			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	36C	37C	38C	39C	40C	41C
NUMBER OF BLOWS	46	28	21	16	10	6
WT OF DISH + WET SOIL	15.74g	15.17g	14.94g	16.09g	14.89g	12.48g
WT OF DISH + DRY SOIL g	10.54	9.96	9.73	10.55	9.44	7.85
WT OF MOISTURE g	5.20	5.21	5.21	5.54	5.45	4.63
WT OF DISH g	1.02g	1.01g	1.03g	1.02g	1.01g	1.02g
WT OF DRY SOIL g	9.52	8.95	8.70	9.33	8.40	6.83
MOISTURE CONTENT %	54.6	58.2	60.0	61.5	64.9	67.8



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		50.7	24.4	26.3	CH	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+10	SAMPLED	Rocky Flats
DEPTH	36'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#4	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	59.70
Wt. Dry Soil & Pan	(g)	57.60
Wt. Lost Moisture	(g)	2.10
Wt. of Pan Only	(g)	3.70
Wt. of Dry Soil	(g)	53.90
Moisture Content	%	3.9
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	57.75

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	514.43
Weight of + #10 Before Washing (g)	14.18
Weight of + #10 After Washing (g)	4.43
Weight of - #10 Wet (g)	500.25
Weight of - #10 Dry (g)	490.88
Wt. Total Sample Dry (g)	495.31
Calc. Wt. "W" (g)	58.27
Calc. Mass + #10	0.52

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	3.50	3.50	3.50	0.7	99.3
#10	0.00	0.93	0.93	4.43	0.9	99.1
#20	1.57	1.75	0.18	0.18	1.2	98.8
#40	1.56	1.63	0.07	0.25	1.3	98.7
#60	1.57	1.60	0.03	0.28	1.4	98.6
#100	1.57	1.61	0.04	0.32	1.4	98.6
#230	1.57	1.65	0.08	0.40	1.6	98.4

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	11+10	SAMPLED	Rocky Flats
DEPTH	36'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#4	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

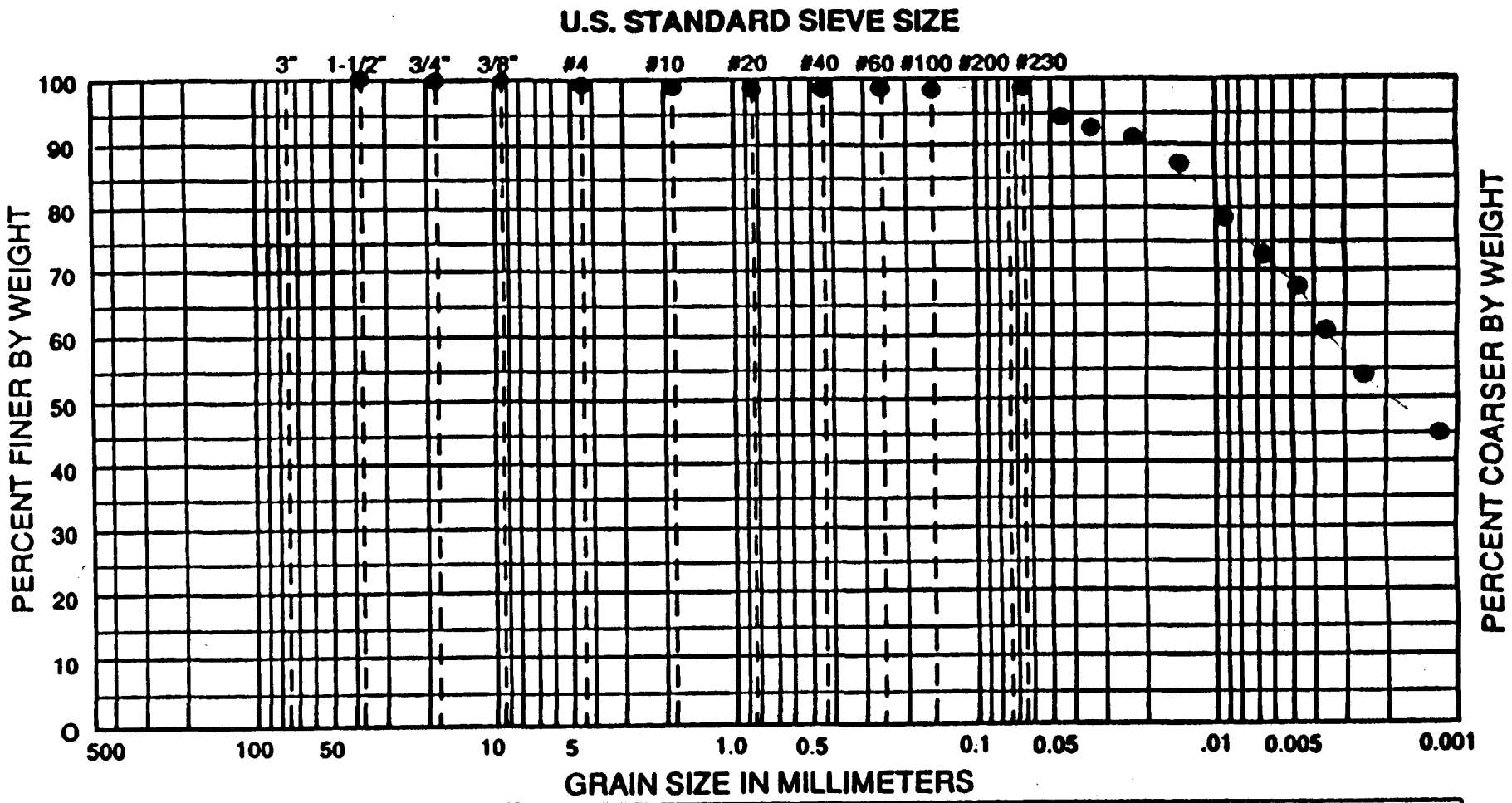
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.78	Temp. Coef. K	0.01278
Value of "a"	0.97	Wt. Dry Sample "W"	58.271
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	3.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	61.00	56.50	94.4	94.4	6.29	0.0453
1.0	60.00	55.50	92.8	92.8	6.45	0.0325
2.0	59.00	54.50	91.1	91.1	6.61	0.0232
5.0	56.50	52.00	86.9	86.9	7.02	0.0151
15.0	51.50	47.00	78.6	78.6	7.84	0.0092
30.0	48.00	43.50	72.7	72.7	8.42	0.0068
60.0	44.50	40.00	66.9	66.9	8.99	0.0049
120.0	40.50	36.00	60.2	60.2	9.65	0.0036
250.0	37.00	32.50	54.3	54.3	10.22	0.0026
1440.0	31.50	27.00	45.1	45.1	11.12	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+00 SAMPLE NO.: #4 DATE: 3 MAR 92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	@ 36 ft	Rocky Flats

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

CLIENT/OWNER Weston

LOCATION Rocky Flats EG&G

BORING 11-10 SAMPLE CH #4 DEPTH 36'

FIELD DENSITY BY _____

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

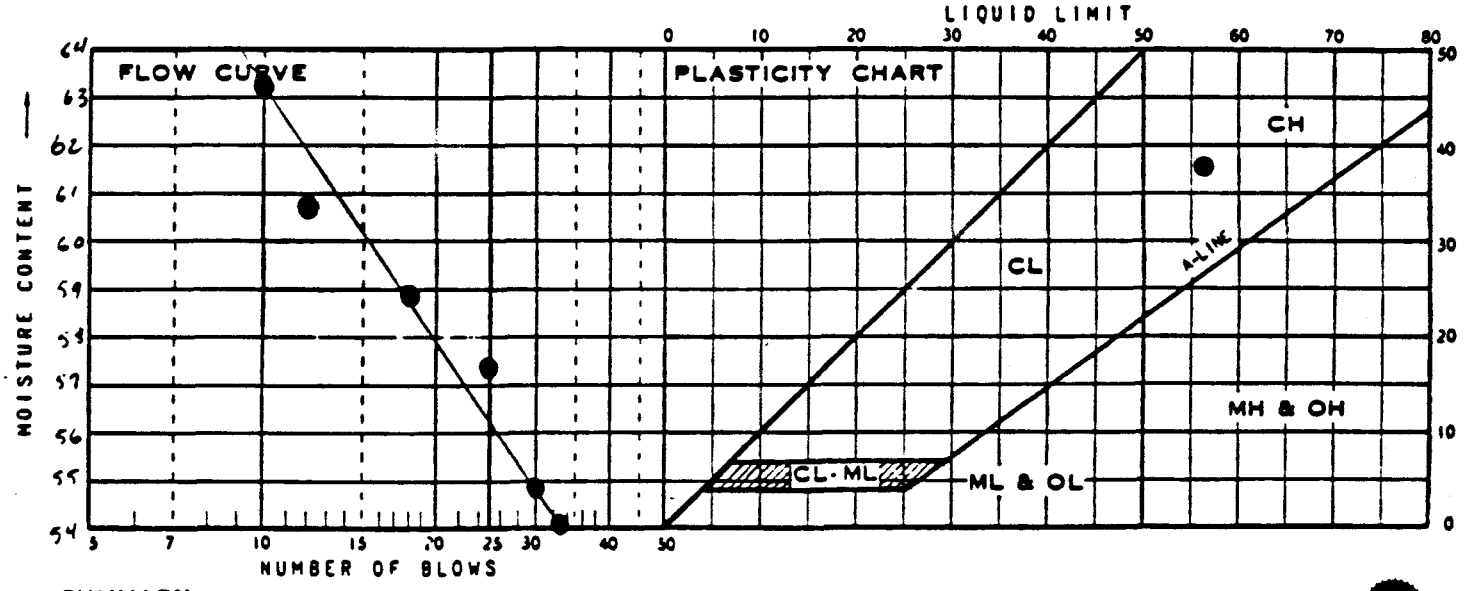
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DH 7/26/92

DETERMINATION	1	2	3	4	5	6
DISH	2061	2015	2025			
WT OF DISH + WET SOIL g	7.31	6.25	6.23			
WT OF DISH + DRY SOIL g	6.30	5.42	5.44	—	—	—
WT OF MOISTURE g	1.01	.83	.79			
WT OF DISH g	1.02	1.05	1.05	—	—	—
WT OF DRY SOIL g	5.28	4.37	4.39			
MOISTURE CONTENT %	19.1	19.0	19.0			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	40C	35C	37C	2053	2055	1C
NUMBER OF BLOWS	33	30	37	25	18	12
WT OF DISH + WET SOIL g	13.01	11.92	13.17	12.07	12.55	12.2[illegible]
WT OF DISH + DRY SOIL g	8.81	8.06	8.21	8.05	8.28	8.05
WT OF MOISTURE g	4.20	3.86	4.96	4.02	4.27	4.24
WT OF DISH g	1.04	1.03	1.01	1.04	1.03	1.06
WT OF DRY SOIL g	7.77	7.03	7.80	7.01	7.25	6.97
MOISTURE CONTENT %	54.1	54.9	55.9	57.3	58.9	60.8



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		56.3	18.7	37.6	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+10	SAMPLED	Rocky Flats
DEPTH	44'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#4	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	64.49
Wt. Dry Soil & Pan	(g)	61.82
Wt. Lost Moisture	(g)	2.67
Wt. of Pan Only	(g)	3.76
Wt. of Dry Soil	(g)	58.06
Moisture Content	%	4.6
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	57.36

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	497.19
Weight of + #10 Before Washing (g)	24.66
Weight of + #10 After Washing (g)	3.05
Weight of - #10 Wet (g)	472.53
Weight of - #10 Dry (g)	472.42
Wt. Total Sample Dry (g)	475.47
Calc. Wt. "W" (g)	57.73
Calc. Mass + #10	0.37

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	1.30	1.30	1.30	0.3	99.7
#10	0.00	1.75	1.75	3.05	0.6	99.4
#20	1.57	2.00	0.43	0.43	1.4	98.6
#40	1.57	2.24	0.67	1.10	2.5	97.5
#60	1.55	2.33	0.78	1.88	3.9	96.1
#100	1.56	2.67	1.11	2.99	5.8	94.2
#230	1.57	3.37	1.80	4.79	8.9	91.1

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+10	SAMPLED	Rocky Flats
DEPTH	44'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#4	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

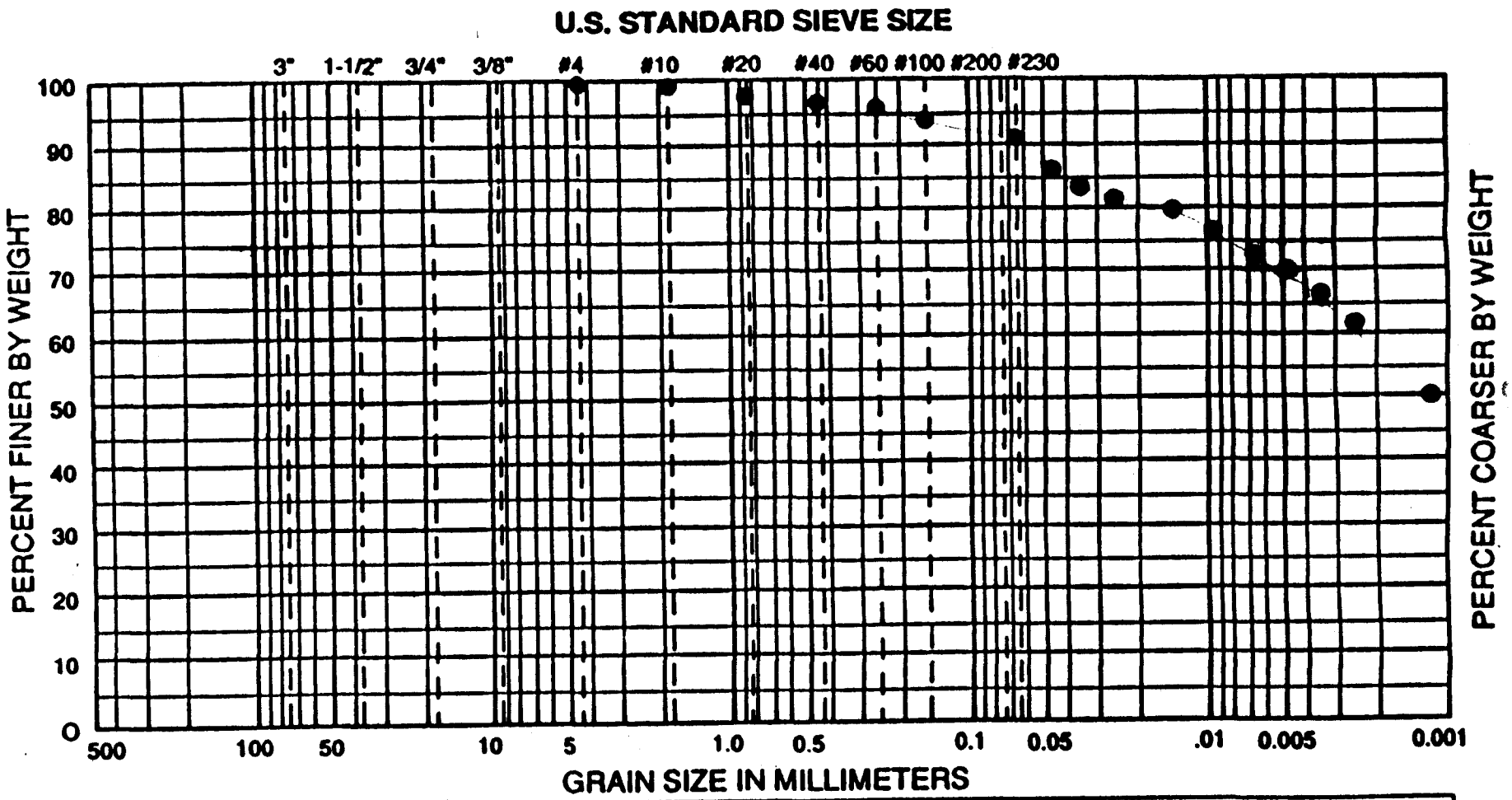
Hydrometer #	ASTM 152 H	Temp., Deg. C	23.0
Sp. Gr. of Soil	2.75	Temp. Coef. K	0.01279
Value of "a"	0.98	Wt. Dry Sample "W"	57.732
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	3.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	55.50	51.00	86.6	86.6	7.19	0.0485
1.0	54.50	50.00	84.9	84.9	7.35	0.0347
2.0	53.00	48.50	82.3	82.3	7.60	0.0249
5.0	52.00	47.50	80.6	80.6	7.76	0.0159
15.0	50.00	45.50	77.2	77.2	8.09	0.0094
30.0	48.00	43.50	73.8	73.8	8.42	0.0068
60.0	46.00	41.50	70.4	70.4	8.75	0.0049
120.0	43.50	39.00	66.2	66.2	9.16	0.0035
250.0	41.00	36.50	62.0	62.0	9.57	0.0025
1440.0	34.00	29.50	50.1	50.1	10.71	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+00 SAMPLE NO.: at 4 DATE: 3-2-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION (Clay silt)
Rocky Flats	44.0'	

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION

LABORATORY CLASSIFICATION

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats EG+G
BORING 1510 SAMPLE CH #4 DEPTH 44'

FIELD DENSITY BY

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

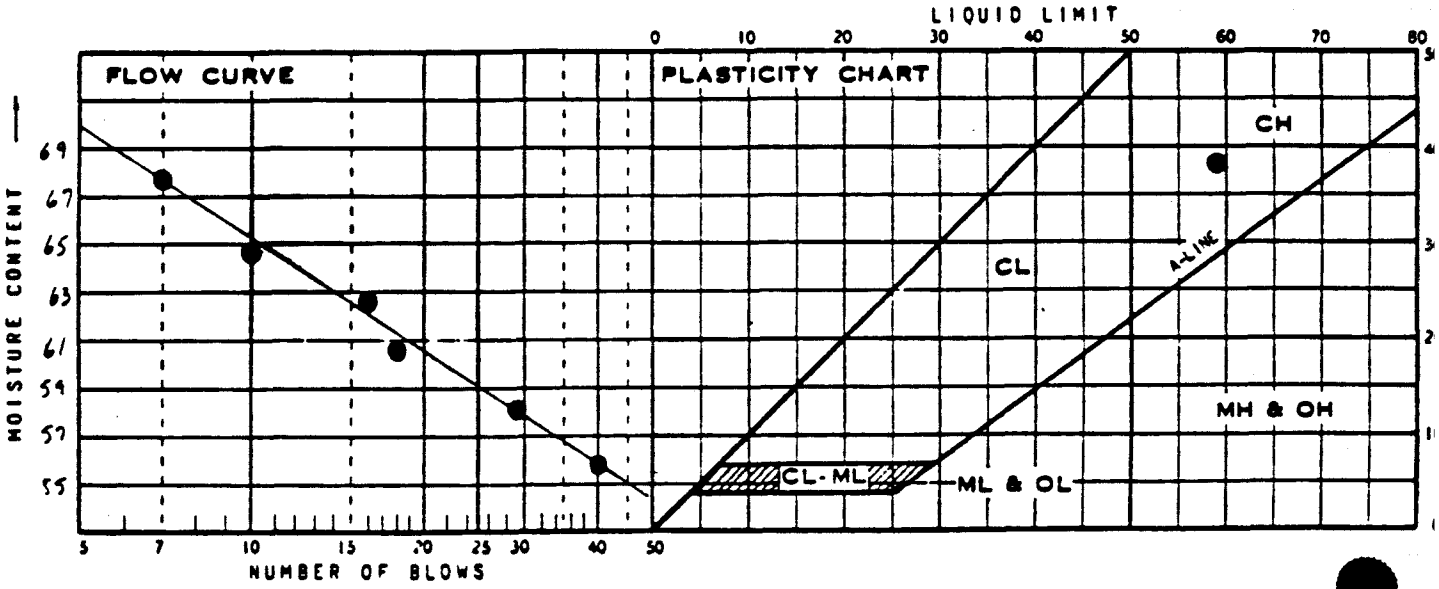
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DH 2/26/93

DETERMINATION	1	2	3	4	5	6
DISH	20C	2057	2037			
WT OF DISH + WET SOIL g	5.66g	6.71g	6.19g			
WT OF DISH + DRY SOIL g	4.85	5.74	5.33	—	—	—
WT OF MOISTURE g	.81	.97	.86			
WT OF DISH g	1.02	1.04	1.04	—	—	—
WT OF DRY SOIL g	3.83	4.70	4.29			
MOISTURE CONTENT %	21.1	20.6	20.0			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2044	2011	2012	2026	2043	2045
NUMBER OF BLOWS	40	29	19	16	10	7
WT OF DISH + WET SOIL g	12.77	10.74	11.79	12.41	12.23	11.2
WT OF DISH + DRY SOIL g	8.57	7.17	7.73	8.03	7.84	7.12
WT OF MOISTURE g	4.20	3.57	4.06	4.38	4.39	4.10
WT OF DISH g	1.05	1.05	1.04	1.04	1.06	1.06
WT OF DRY SOIL g	7.52	6.12	6.69	6.99	6.78	6.06
MOISTURE CONTENT %	55.9	58.3	60.7	62.7	64.7	67.7



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		[illegible]	20.6	38.5	CH	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+10	SAMPLED	Rocky Flats
DEPTH	49'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#4	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar) BR	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	60.36
Wt. Dry Soil & Pan	(g)	56.92
Wt. Lost Moisture	(g)	3.44
Wt. of Pan Only	(g)	3.69
Wt. of Dry Soil	(g)	53.23
Moisture Content	%	6.5

Wt. Hydrom. Sample Wet (g)	60.00
Wt. Hydrom. Sample Dry (g)	56.36

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	56.36
Wt. Total Sample Dry (g)	56.36
Calc. Wt. "W" (g)	56.36
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.58	0.01	0.01	0.0	100.0
#40	1.56	1.57	0.01	0.02	0.0	100.0
#60	1.57	1.58	0.01	0.03	0.1	99.9
#100	1.30	1.31	0.01	0.04	0.1	99.9
#230	1.57	1.60	0.03	0.07	0.1	99.9

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	11+10	SAMPLED	Rocky Flats
DEPTH	49'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#4	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

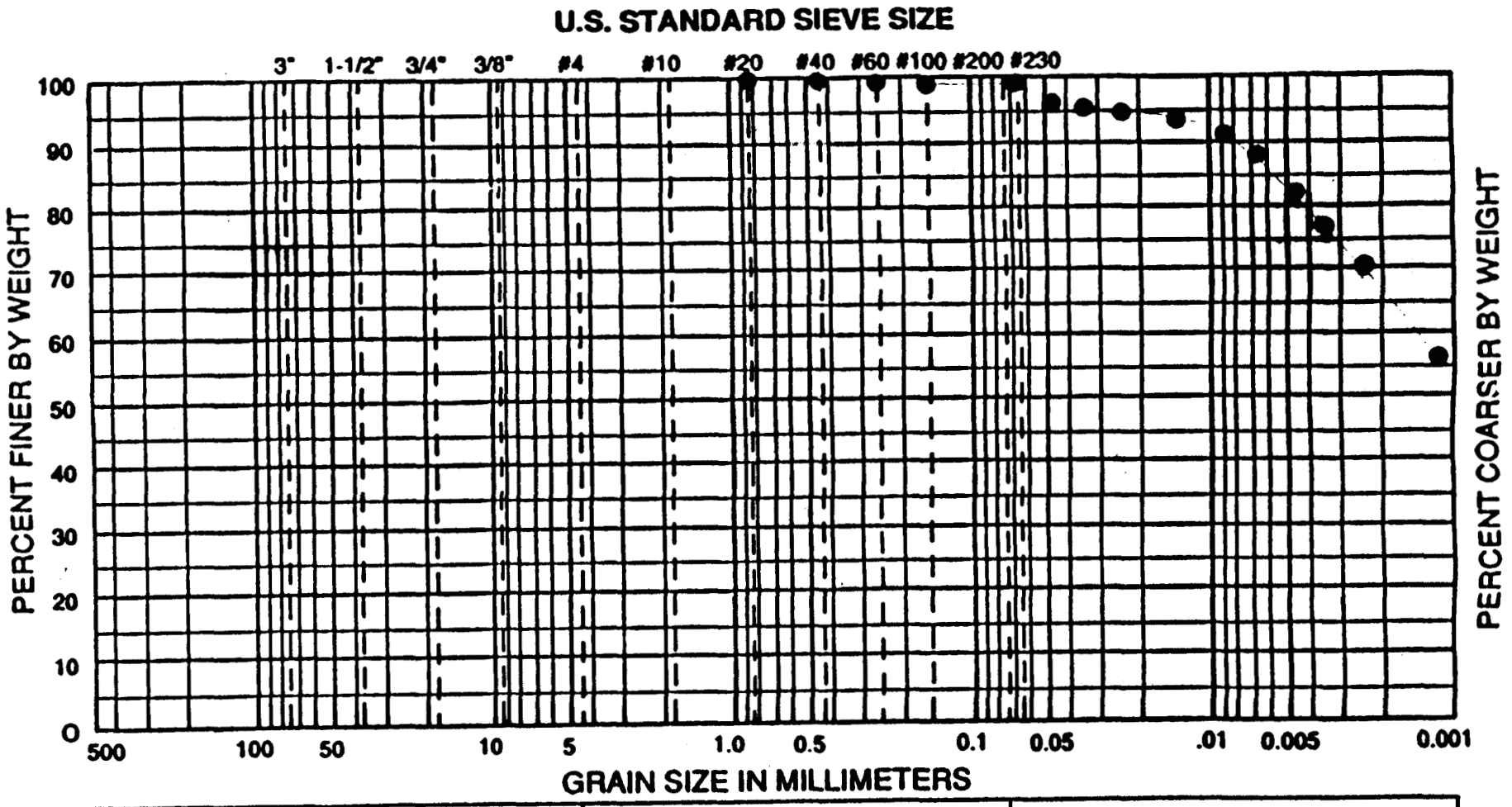
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.75	Temp. Coef. K	0.01294
Value of "a"	0.98	Wt. Dry Sample "W"	56.358
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	3.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	60.00	55.50	96.5	96.5	6.45	0.0465
1.0	59.75	55.25	96.1	96.1	6.49	0.0330
2.0	59.50	55.00	95.6	95.6	6.53	0.0234
5.0	59.00	54.50	94.8	94.8	6.61	0.0149
15.0	57.00	52.50	91.3	91.3	6.94	0.0088
30.0	55.50	51.00	88.7	88.7	7.19	0.0063
60.0	52.50	48.00	83.5	83.5	7.68	0.0046
120.0	49.00	44.50	77.4	77.4	8.25	0.0034
250.0	45.50	41.00	71.3	71.3	8.83	0.0024
1440.0	37.00	32.50	56.5	56.5	10.22	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+00 SAMPLE NO.: #4 DATE: 3-2-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION Silty Claystone
Rocky Flats	49.0'	

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

LOCATION _____

BORING J1+10 SAMPLE ____ DEPTH 49'

FIELD DENSITY BY ...../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

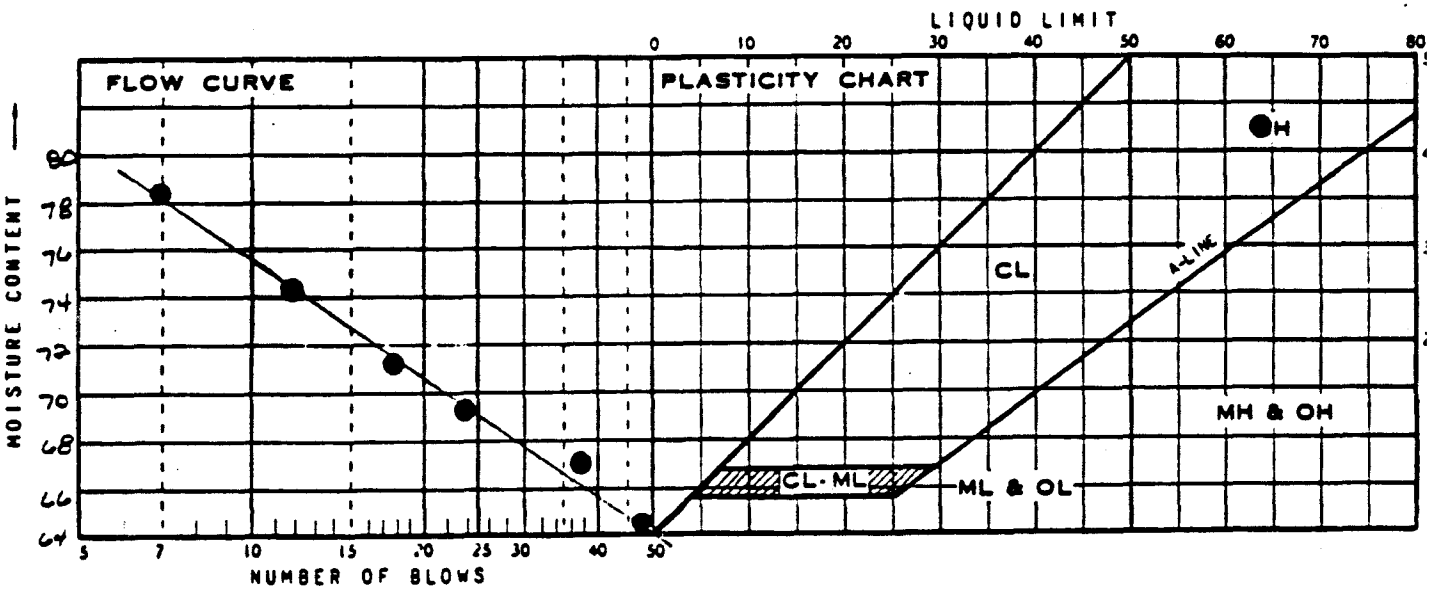
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR. 2/25/99.

DETERMINATION	1	2	3	4	5	6
DISH	2070	2069	2018			
WT OF DISH + WET SOIL g	5.60	5.91	6.59			
WT OF DISH + DRY SOIL g	4.66	4.91	5.46	—	—	—
WT OF MOISTURE g	.94	1.00	1.13			
WT OF DISH g	1.05	1.03	1.05	—	—	—
WT OF DRY SOIL g	3.61	3.88	4.41			
MOISTURE CONTENT %	26.0	25.8	25.6			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2001	2004	2039	2014	31 C	2003
NUMBER OF BLOWS	49	38	24	18	12	8±
WT OF DISH + WET SOIL g	16.69	16.46	16.61	20.58	16.39	15.88
WT OF DISH + DRY SOIL g	10.56	10.27	10.23	12.45	9.85	9.3[illegible]
WT OF MOISTURE g	6.13	6.19	6.38	8.13	6.54	6.[illegible]
WT OF DISH g	1.06	1.04	1.05	1.07	1.04	1.03
WT OF DRY SOIL g	9.50	9.23	9.18	11.38	8.81	8.32
MOISTURE CONTENT %	64.5	67.1	69.5	71.4	74.2	78.5



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		[illegible]	25.[illegible]	[illegible]	CH	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+25	SAMPLED	Rocky Flats
DEPTH	50'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	54.34
Wt. Dry Soil & Pan	(g)	53.51
Wt. Lost Moisture	(g)	0.83
Wt. of Pan Only	(g)	3.70
Wt. of Dry Soil	(g)	49.81
Moisture Content	%	1.7
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	59.02

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	59.02
Wt. Total Sample Dry (g)	59.02
Calc. Wt. "W" (g)	59.02
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.58	0.01	0.01	0.0	100.0
#40	1.55	1.56	0.01	0.02	0.0	100.0
#60	1.56	1.62	0.06	0.08	0.1	99.9
#100	1.56	1.80	0.24	0.32	0.5	99.5
#230	1.56	35.98	34.42	34.74	58.9	41.1

SILTY SANDSTONE w/ [illegible]

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	11+25	SAMPLED	Rocky Flats
DEPTH	50'	DATE TESTED	02-24-92 TN
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

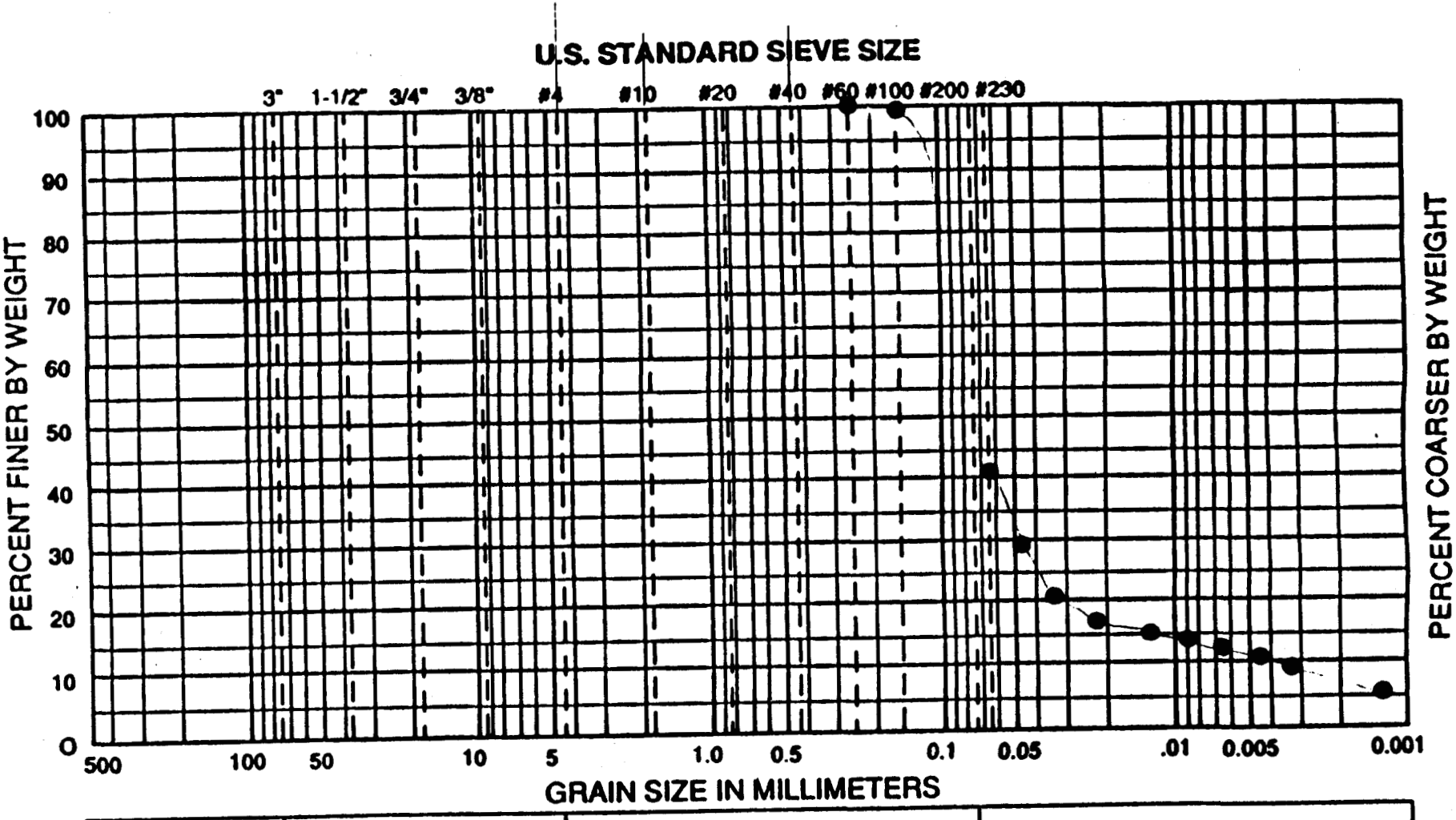
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.69	Temp. Coef. K	0.01332
Value of "a"	0.99	Wt. Dry Sample "W"	59.017
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	34.50	27.50	46.2	46.2	10.63	0.0614
1.0	24.00	17.00	28.6	28.6	12.35	0.0468
2.0	19.50	12.50	21.0	21.0	13.09	0.0341
5.0	17.00	10.00	16.8	16.8	13.50	0.0219
15.0	16.00	9.00	15.1	15.1	13.67	0.0127
30.0	15.50	8.50	14.3	14.3	13.75	0.0090
60.0	14.50	7.50	12.6	12.6	13.91	0.0064
120.0	13.50	6.50	10.9	10.9	14.08	0.0046
250.0	12.50	5.50	9.2	9.2	14.24	0.0032
1440.0	10.50	3.50	5.9	5.9	14.57	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+25 SAMPLE NO.: 5 DATE: 3/3/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	50'	1% M SD, 59% F sand, 30.1% SILT, 11% CLAY

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

CLIENT/OWNER WESTON

LOCATION Rocky Flats EG&G

BORING U#25 SAMPLE 5 DEPTH @ 50'

FIELD DENSITY BY _____

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

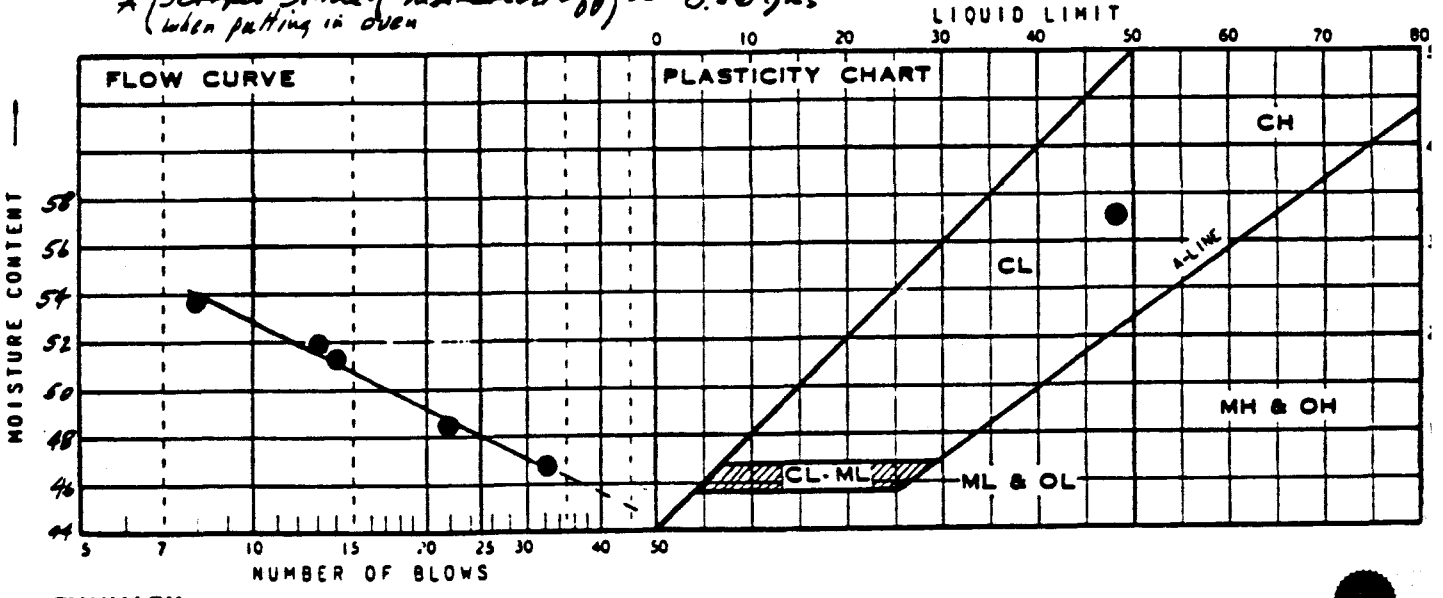
PLASTIC LIMIT BY RD 2/28/92

DETERMINATION	1	2	3	4	5	6
DISH	2011	2010	2095			
WT OF DISH + WET SOIL g	6.04	7.00	6.16			
WT OF DISH + DRY SOIL g	5.41	6.19	5.48	—	—	—
WT OF MOISTURE g	0.63	.81	.68			
WT OF DISH g	1.05	1.05	1.05	—	—	—
WT OF DRY SOIL g	4.36	5.14	4.43	~~[illegible]~~ = 15.55		
MOISTURE CONTENT %	14.45	15.76	15.35	= 45.56/15.19		

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6 ?
DISH	1C	2057	2043	2053	40C	2061
NUMBER OF BLOWS	32	31	22	14	13	9
WT OF DISH + WET SOIL g	10.40	11.31	10.68	10.77	10.17	11.[illegible]
WT OF DISH + DRY SOIL g	7.42	8.03	7.54	7.47	7.05	7.[illegible]
WT OF MOISTURE g	2.98	3.28	3.14	3.30	3.12	3.79
WT OF DISH g	1.05	1.04	1.05	1.04	1.04	1.01
WT OF DRY SOIL g	6.37	6.99	6.49	6.43	6.01	6.69
MOISTURE CONTENT %	46.8	46.9	48.4	51.3	51.9	56.4

* (Scraped some of material off) when putting in oven ~ 0.30 gms



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		48.1	15.2	32.9	CL	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+12	SAMPLED	Rocky Flats
DEPTH	52'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	51.62
Wt. Dry Soil & Pan	(g)	50.05
Wt. Lost Moisture	(g)	1.57
Wt. of Pan Only	(g)	3.73
Wt. of Dry Soil	(g)	46.32
Moisture Content	%	3.4
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	58.03

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	58.03
Wt. Total Sample Dry (g)	58.03
Calc. Wt. "W" (g)	58.03
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.56	1.58	0.02	0.02	0.0	100.0
#40	1.57	1.58	0.01	0.03	0.1	99.9
#60	1.57	1.58	0.00	0.03	0.1	99.9
#100	1.57	1.64	0.07	0.10	0.2	99.8
#230	1.59	10.77	9.18	9.29	16.0	84.0

Silt, Clay (ML)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+12	SAMPLED	Rocky Flats
DEPTH	52'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

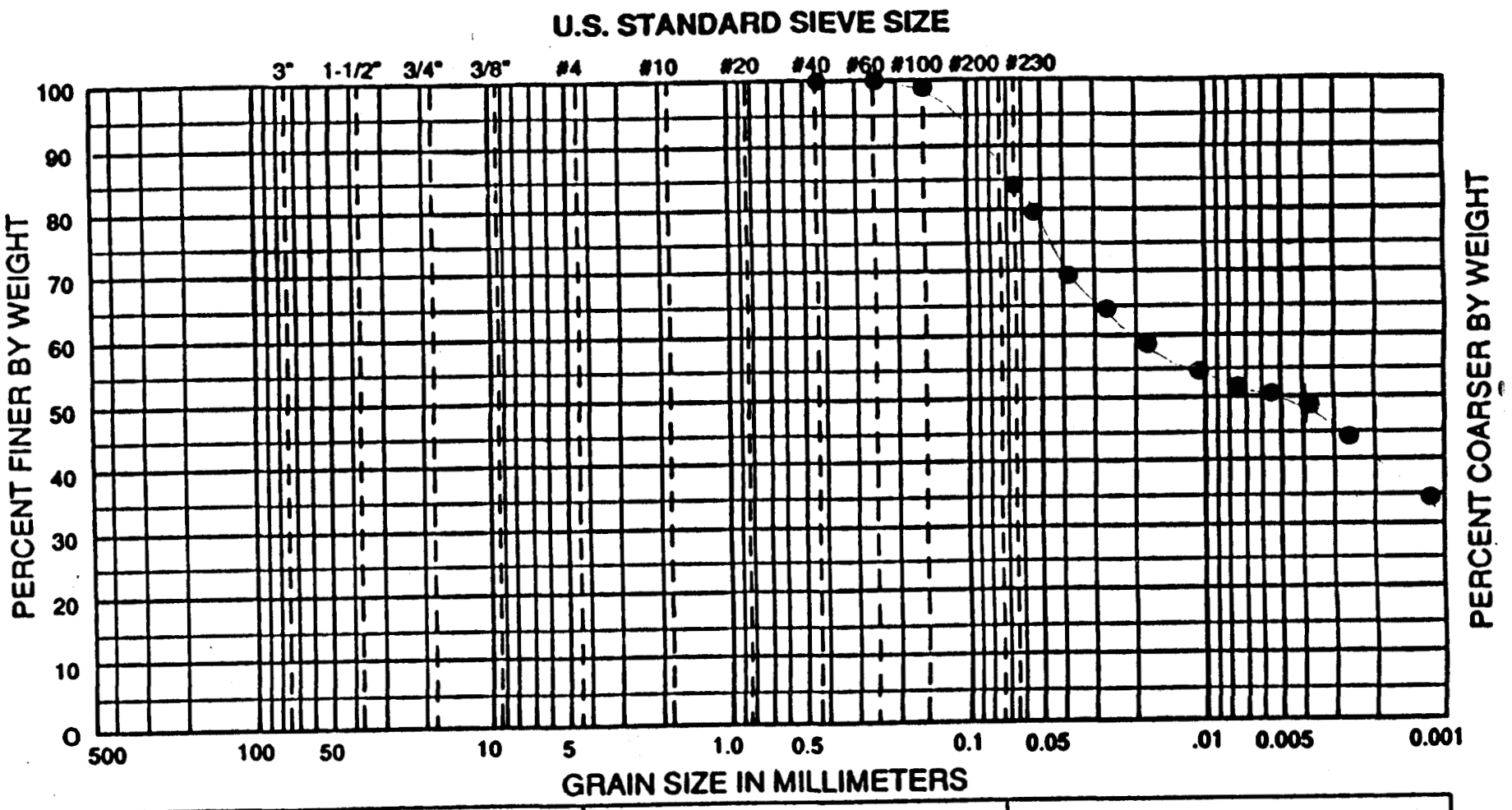
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.70	Temp. Coef. K	0.01328
Value of "a"	0.99	Wt. Dry Sample "W"	58.033
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	53.00	46.00	78.5	78.5	7.60	0.0518
1.0	47.50	40.50	69.1	69.1	8.50	0.0387
2.0	44.50	37.50	64.0	64.0	8.99	0.0282
5.0	41.00	34.00	58.0	58.0	9.57	0.0184
15.0	38.50	31.50	53.7	53.7	9.98	0.0108
30.0	37.50	30.50	52.0	52.0	10.14	0.0077
60.0	37.00	30.00	51.2	51.2	10.22	0.0055
120.0	35.00	28.00	47.8	47.8	10.55	0.0039
250.0	32.50	25.50	43.5	43.5	10.96	0.0028
1440.0	27.00	20.00	34.1	34.1	11.86	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING,

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+12 SAMPLE NO.: 5 DATE: 3/3/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	52'	

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

CLIENT/OWNER [illegible]

LOCATION _____

BORING U-12 SAMPLE CH #5 DEPTH 52'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

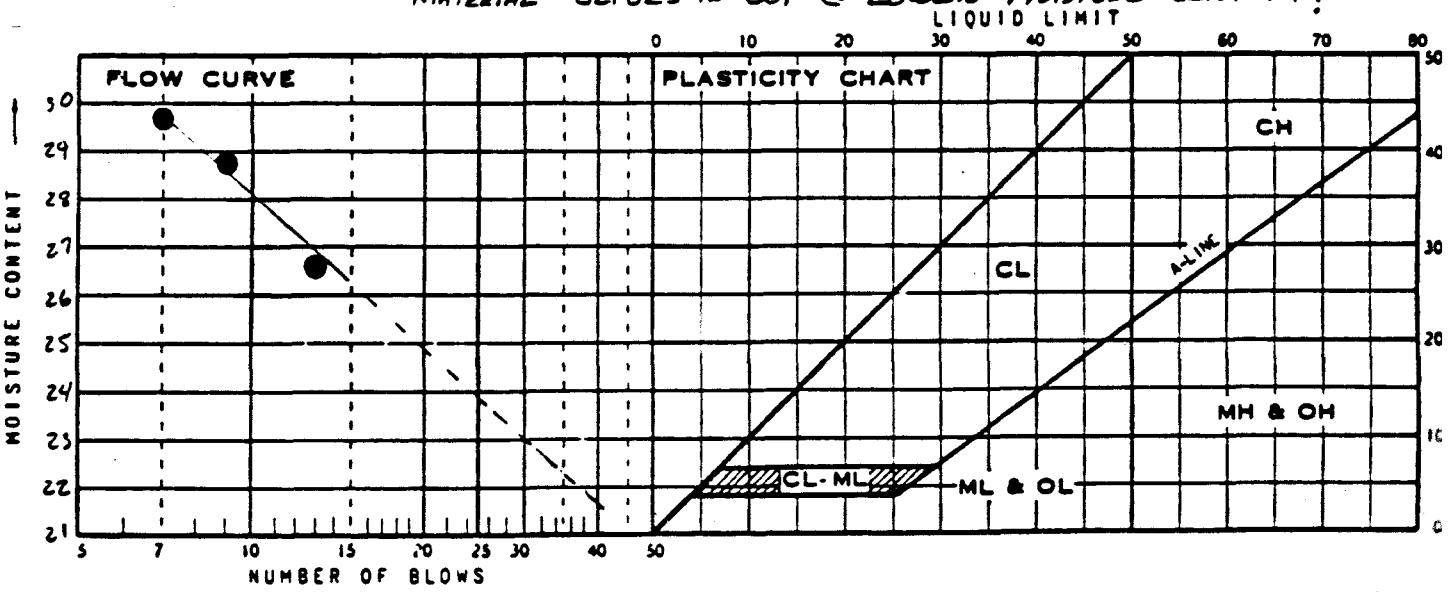
PLASTIC LIMIT BY GW 2/27/92

DETERMINATION	1	2	3	4	5	6
DISH	NON-PLASTIC					
WT OF DISH + WET SOIL						
WT OF DISH + DRY SOIL	—	—	—	—	—	—
WT OF MOISTURE						
WT OF DISH	—	—	—	—	—	—
WT OF DRY SOIL						
MOISTURE CONTENT						

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2016	32C	25C			
NUMBER OF BLOWS	13	9	7			
WT OF DISH + WET SOIL	23.84g	27.43g	26.20g			
WT OF DISH + DRY SOIL	19.03g	21.52g	20.44g	—	—	—
WT OF MOISTURE	4.81	5.91	5.76			
WT OF DISH	1.04g	1.02g	1.05g	—	—	—
WT OF DRY SOIL	17.99g	20.58g	19.39g			
MOISTURE CONTENT	26.7	28.8	29.7			

MATERIAL SLIDES IN CUP @ LOWER MOISTURE CONTENT!



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION
		23.8 (EST.)			NP

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+25	SAMPLED	Rocky Flats
DEPTH	34'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	61.53
Wt. Dry Soil & Pan	(g)	57.96
Wt. Lost Moisture	(g)	3.57
Wt. of Pan Only	(g)	3.86
Wt. of Dry Soil	(g)	54.10
Moisture Content	%	6.6
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	56.29

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	528.94
Weight of + #10 Before Washing (g)	48.43
Weight of + #10 After Washing (g)	6.00
Weight of - #10 Wet (g)	480.51
Weight of - #10 Dry (g)	490.57
Wt. Total Sample Dry (g)	496.57
Calc. Wt. "W" (g)	56.97
Calc. Mass + #10	0.69

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	3.11	3.11	3.11	0.6	99.4
#4	0.00	1.51	1.51	4.62	0.9	99.1
#10	0.00	1.38	1.38	6.00	1.2	98.8
#20	1.56	1.77	0.21	0.21	1.6	98.4
#40	1.56	1.90	0.34	0.55	2.2	97.8
#60	1.56	2.08	0.52	1.07	3.1	96.9
#100	1.56	2.37	0.81	1.88	4.5	95.5
#230	1.57	2.69	1.12	3.00	6.5	93.5

Silty Clay (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+25	SAMPLED	Rocky Flats
DEPTH	34'	DATE TESTED	02-24-92 TN
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

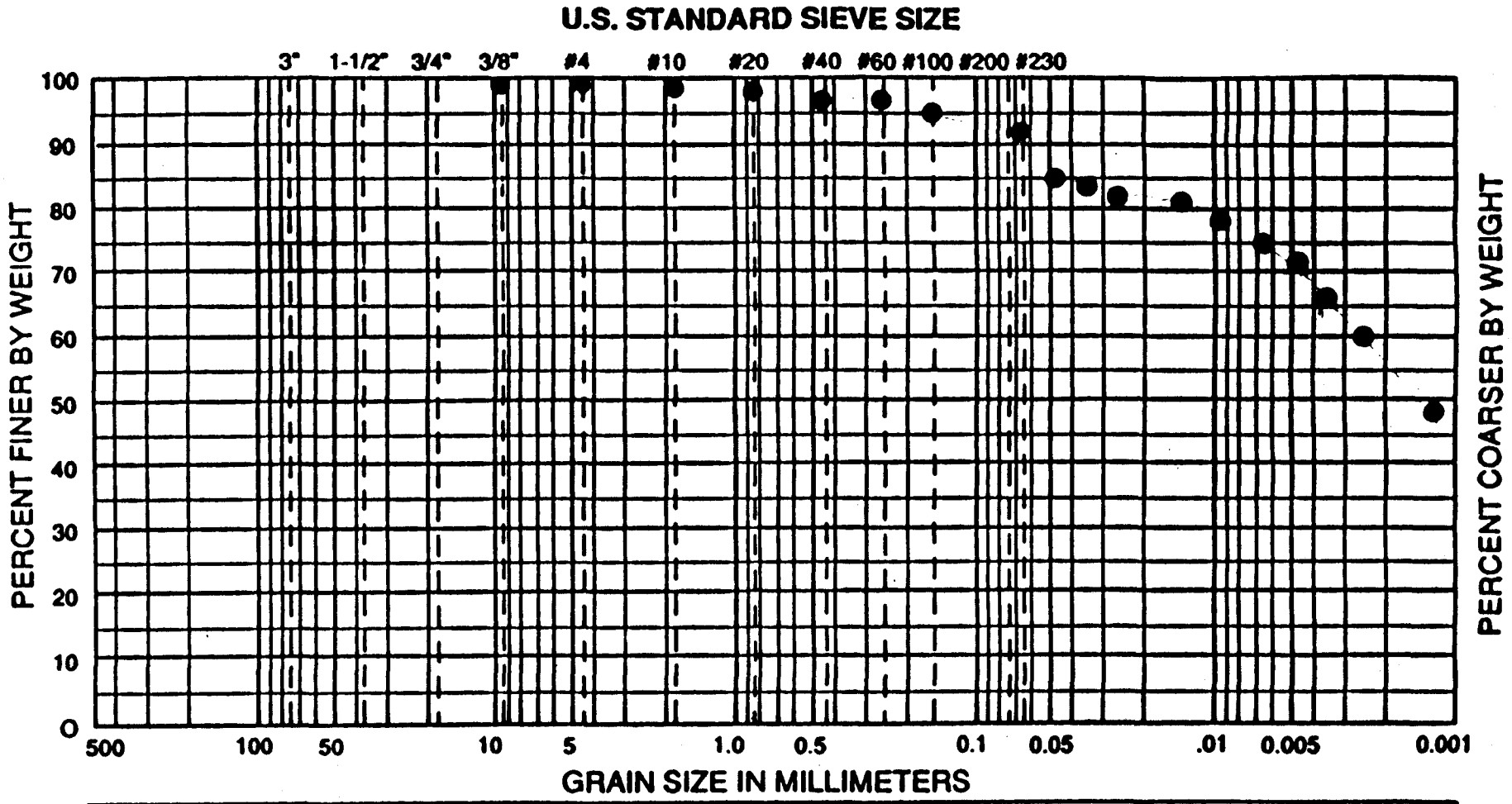
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.79	Temp. Coef. K	0.01295
Value of "a"	0.97	Wt. Dry Sample "W"	56.974
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	57.00	50.00	85.3	85.3	6.94	0.0483
1.0	56.50	49.50	84.4	84.4	7.02	0.0343
2.0	55.50	48.50	82.7	82.7	7.19	0.0246
5.0	55.00	48.00	81.9	81.9	7.27	0.0156
15.0	53.00	46.00	78.5	78.5	7.60	0.0092
30.0	51.00	44.00	75.1	75.1	7.93	0.0067
60.0	49.00	42.00	71.7	71.7	8.25	0.0048
120.0	46.00	39.00	66.5	66.5	8.75	0.0035
250.0	42.50	35.50	60.6	60.6	9.32	0.0025
1440.0	35.50	28.50	48.6	48.6	10.47	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+25 SAMPLE NO.: #5 DATE: 3-4-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	34.0'	Rocky FLATS

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. _____

CLIENT/OWNER Weston

LOCATION Rocky Flats EG&G

BORING 1125 SAMPLE CH #5 DEPTH 34'

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

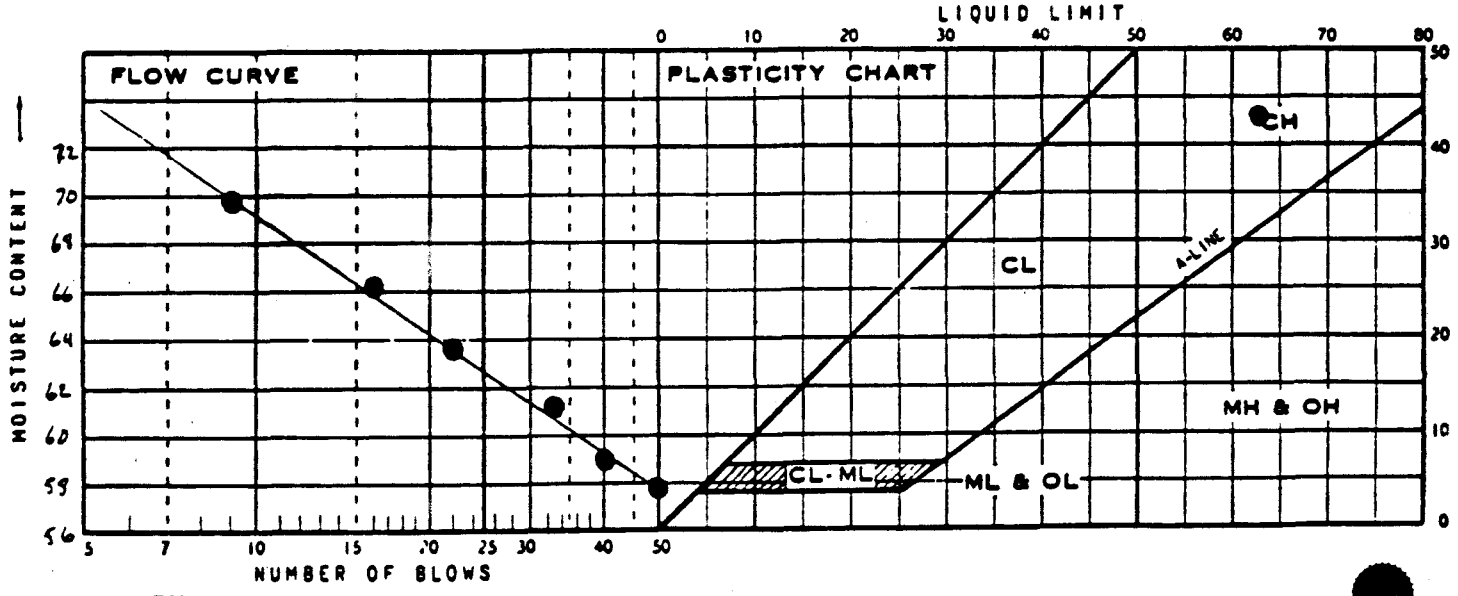
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DM 2/28/92

DETERMINATION	1	2	3	4	5	6
DISH	20C	2026	2012			
WT OF DISH + WET SOIL g	4.98	6.35	6.18			
WT OF DISH + DRY SOIL g	4.31	5.45	5.35	—	—	—
WT OF MOISTURE g	.67	.90	.83			
WT OF DISH g	1.03	1.04	1.05	—	—	—
WT OF DRY SOIL g	3.28	4.41	4.30			
MOISTURE CONTENT %	20.4	20.4	19.3			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2004	2025	2015	35C	37C	2055
NUMBER OF BLOWS	50	40	33	22	16	9
WT OF DISH + WET SOIL g	11.98	12.56	11.63	12.06	11.62	12.1
WT OF DISH + DRY SOIL g	7.97	8.29	7.61	7.77	7.40	7.59
WT OF MOISTURE g	4.01	4.27	4.02	4.29	4.22	4.57
WT OF DISH g	1.05	1.05	1.05	1.05	1.03	1.05
WT OF DRY SOIL g	6.92	7.24	6.56	6.72	6.37	6.54
MOISTURE CONTENT %	57.9	59.0	61.3	63.8	66.2	69.9



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		62.7	20.0	42.7	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+25	SAMPLED	Rocky Flats
DEPTH	43'	DATE TESTED	02-24-92 TN
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	51.12
Wt. Dry Soil & Pan	(g)	50.12
Wt. Lost Moisture	(g)	1.00
Wt. of Pan Only	(g)	3.70
Wt. of Dry Soil	(g)	46.42
Moisture Content	%	2.2
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	58.73

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	58.73
Wt. Total Sample Dry (g)	58.73
Calc. Wt. "W" (g)	58.73
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.32	1.33	0.01	0.01	0.0	100.0
#40	1.31	1.32	0.01	0.02	0.0	100.0
#60	1.32	1.33	0.01	0.03	0.1	99.9
#100	1.30	2.10	0.80	0.83	1.4	98.6
#230	1.56	20.28	18.72	19.55	33.3	66.7

Sandy Silt (CL)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	11+25	SAMPLED	Rocky Flats
DEPTH	43'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

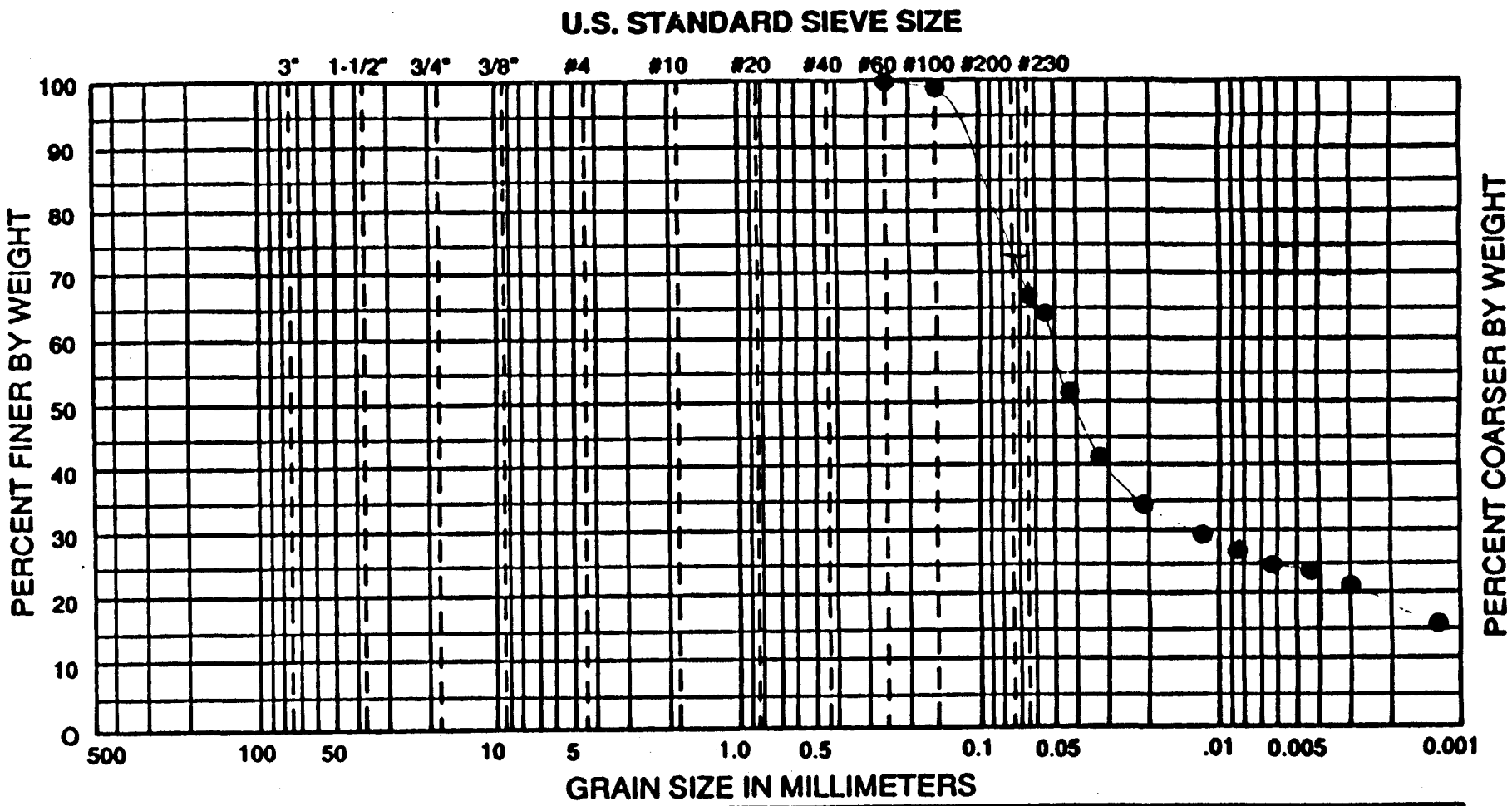
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.69	Temp. Coef. K	0.01332
Value of "a"	0.99	Wt. Dry Sample "W"	58.735
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	45.00	38.00	64.2	64.2	8.91	0.0562
1.0	37.50	30.50	51.5	51.5	10.14	0.0424
2.0	31.00	24.00	40.5	40.5	11.21	0.0315
5.0	27.00	20.00	33.8	33.8	11.86	0.0205
15.0	24.00	17.00	28.7	28.7	12.35	0.0121
30.0	23.00	16.00	27.0	27.0	12.52	0.0086
60.0	22.00	15.00	25.3	25.3	12.68	0.0061
120.0	21.00	14.00	23.6	23.6	12.85	0.0044
250.0	19.50	12.50	21.1	21.1	13.09	0.0030
1440.0	16.50	9.50	16.0	16.0	13.58	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+25 SAMPLE NO.: 5 DATE: 3/3/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION SANDY CLAYEY SILTSTONE
Rocky Flats	43'	27% F Sand, 50% Silt 23

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. [illegible]

CLIENT/OWNER Weston

LOCATION Rocky Flats EG+G

BORING 1/+25 SAMPLE CH #5 DEPTH 43'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

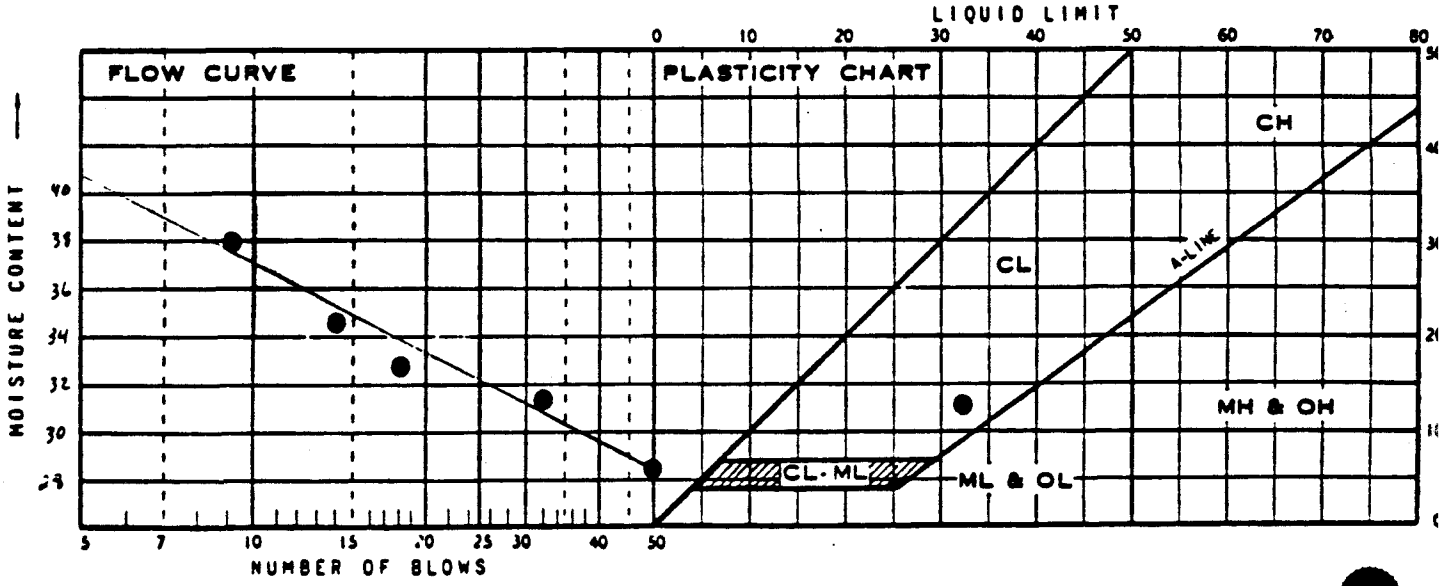
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DW 2/26/92

DETERMINATION	1	2	3	4	5	6
DISH	27C	4C	3C			
WT OF DISH + WET SOIL g	8.33	8.54	8.37			
WT OF DISH + DRY SOIL g	7.12	7.33	7.23	—	—	—
WT OF MOISTURE g	1.21	1.21	1.14			
WT OF DISH g	1.03	1.04	1.04	—	—	—
WT OF DRY SOIL g	6.09	6.29	6.19			
MOISTURE CONTENT %	19.9	19.2	18.4			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2035	2072	42C	2031	2064	2058
NUMBER OF BLOWS	50*	27	18	14	9	
WT OF DISH + WET SOIL g	11.67	15.89	14.62	14.97	13.78	
WT OF DISH + DRY SOIL g	9.31	12.34	11.26	11.39	10.27	—
WT OF MOISTURE g	2.36	3.55	3.36	3.58	3.51	
WT OF DISH g	1.04	1.03	1.03	1.04	1.03	1.02
WT OF DRY SOIL g	8.27	11.31	10.23	10.35	9.24	
MOISTURE CONTENT %	28.5	31.4	32.8	34.6	38.0	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		32.2	19.2	13.0	CL	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	11+50	SAMPLED	Rocky Flats
DEPTH	42'	DATE TESTED	02-24-92 TN
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	57.73
Wt. Dry Soil & Pan	(g)	55.74
Wt. Lost Moisture	(g)	1.99
Wt. of Pan Only	(g)	3.55
Wt. of Dry Soil	(g)	52.19
Moisture Content	%	3.8
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	57.80

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	572.84
Weight of + #10 Before Washing (g)	201.39
Weight of + #10 After Washing (g)	184.61
Weight of - #10 Wet (g)	371.45
Weight of - #10 Dry (g)	373.97
Wt. Total Sample Dry (g)	558.58
Calc. Wt. "W" (g)	86.33
Calc. Mass + #10	28.53

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	84.26	84.26	84.26	15.1	84.9
3/8"	0.00	41.56	41.56	125.82	22.5	77.5
#4	0.00	32.55	32.55	158.37	28.4	71.6
#10	0.00	26.24	26.24	184.61	33.0	67.0
#20	1.56	5.47	3.91	3.91	37.6	62.4
#40	1.57	5.54	3.97	7.88	42.2	57.8
#60	1.57	4.96	3.39	11.27	46.1	53.9
#100	1.56	5.63	4.07	15.34	50.8	49.2
#230	1.32	7.11	5.79	21.13	57.5	42.5

clay (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+50	SAMPLED	Rocky Flats
DEPTH	42'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

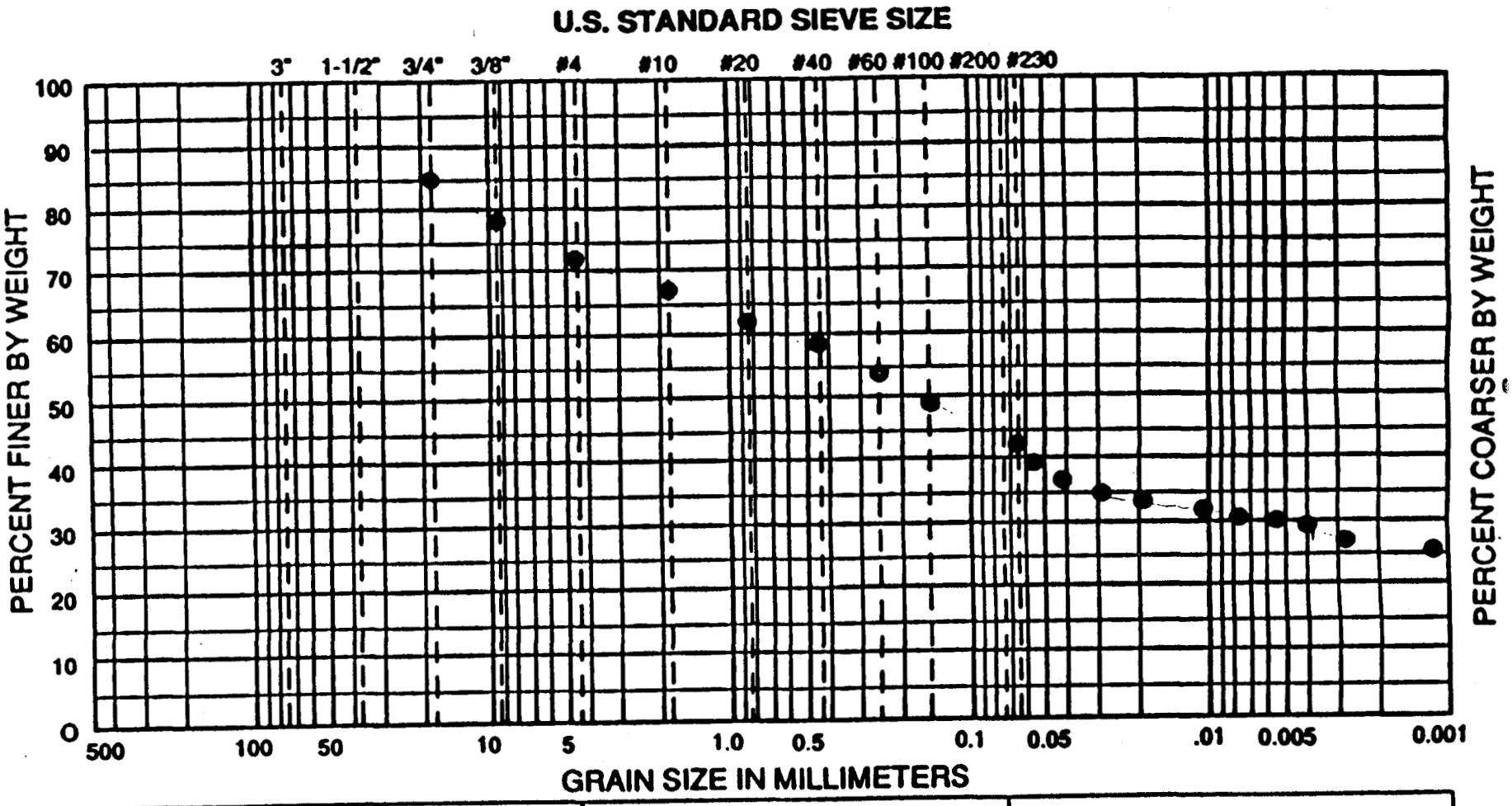
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01317
Value of "a"	0.98	Wt. Dry Sample "W"	86.327
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	41.50	34.50	39.3	39.3	9.48	0.0574
1.0	39.50	32.50	37.0	37.0	9.81	0.0413
2.0	38.75	31.75	36.2	36.2	9.94	0.0294
5.0	37.00	30.00	34.2	34.2	10.22	0.0188
15.0	36.00	29.00	33.1	33.1	10.39	0.0110
30.0	34.50	27.50	31.3	31.3	10.63	0.0078
60.0	34.00	27.00	30.8	30.8	10.71	0.0056
120.0	33.00	26.00	29.6	29.6	10.88	0.0040
250.0	31.00	24.00	27.4	27.4	11.21	0.0028
1440.0	30.00	23.00	26.2	26.2	11.37	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+50 SAMPLE NO.: 5 DATE: 3/4/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	42'	

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats EG+G
BORING 11-50 SAMPLE C11-5 DEPTH 42'

FIELD DENSITY BY _____

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

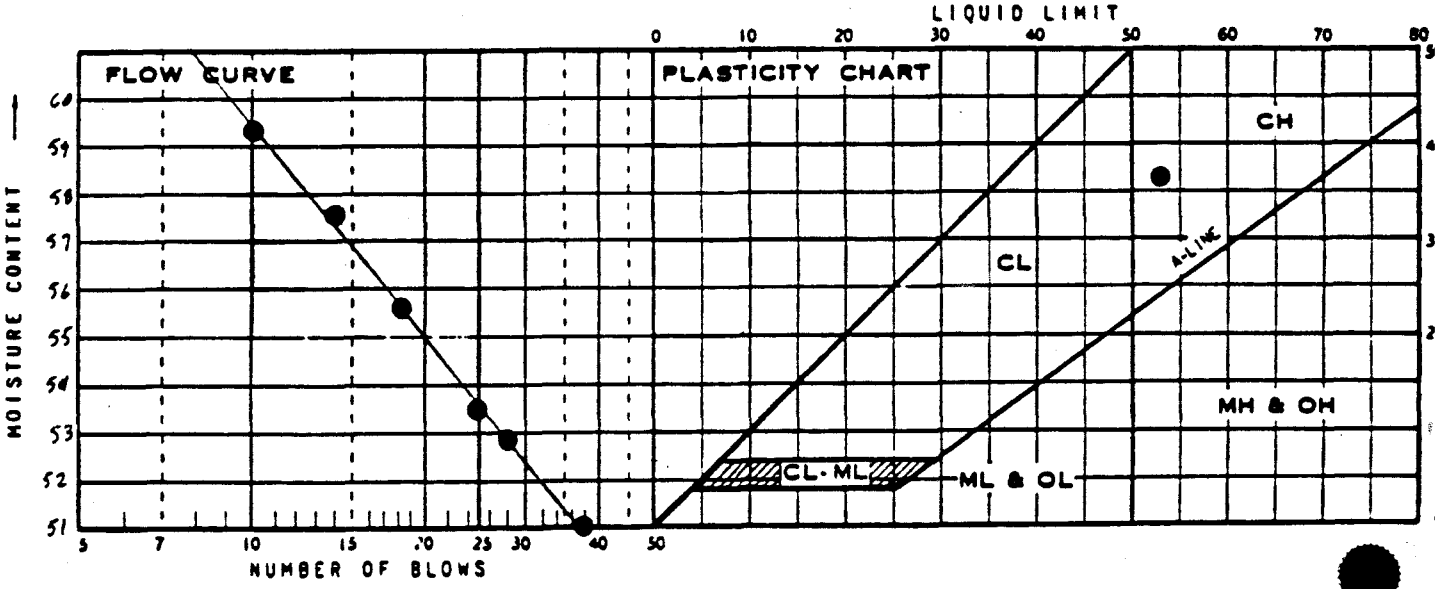
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY AW 10/28/92

DETERMINATION	1	2	3	4	5	6
DISH	2071	43C	36C			
WT OF DISH + WET SOIL g	5.17	4.65	5.56			
WT OF DISH + DRY SOIL g	4.58	4.15	4.91	—	—	—
WT OF MOISTURE g	.59	.50	.65			
WT OF DISH g	1.06	1.05	1.04	—	—	—
WT OF DRY SOIL g	3.52	3.10	3.87			
MOISTURE CONTENT %	16.9	16.1	16.8			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2054	2006	2013	2068	2060	2059
NUMBER OF BLOWS	38	28	25	18	14	10
WT OF DISH + WET SOIL g	11.29	12.41	11.88	13.82	12.09	13.3
WT OF DISH + DRY SOIL g	7.83	8.48	8.11	9.26	8.05	8.79
WT OF MOISTURE g	3.46	3.93	3.77	4.56	4.04	4.60
WT OF DISH g	1.05	1.05	1.06	1.07	1.04	1.05
WT OF DRY SOIL g	6.78	7.43	7.05	8.19	7.01	7.74
MOISTURE CONTENT %	51.0	52.9	53.5	55.7	57.6	59.4



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		53.5	16.6	36.9	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+50	SAMPLED	Rocky Flats
DEPTH	47'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	54.78
Wt. Dry Soil & Pan	(g)	52.98
Wt. Lost Moisture	(g)	1.80
Wt. of Pan Only	(g)	3.83
Wt. of Dry Soil	(g)	49.15
Moisture Content	%	3.7
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	57.88

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	590.18
Weight of + #10 Before Washing (g)	161.12
Weight of + #10 After Washing (g)	146.21
Weight of - #10 Wet (g)	429.06
Weight of - #10 Dry (g)	428.29
Wt. Total Sample Dry (g)	574.50
Calc. Wt. "W" (g)	77.64
Calc. Mass + #10	19.76

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	53.48	53.48	53.48	9.3	90.7
3/8"	0.00	45.35	45.35	98.83	17.2	82.8
#4	0.00	27.49	27.49	126.32	22.0	78.0
#10	0.00	19.89	19.89	146.21	25.5	74.5
#20	1.55	4.42	2.87	2.87	29.1	70.9
#40	1.57	4.67	3.10	5.97	33.1	66.9
#60	1.55	5.02	3.47	9.44	37.6	62.4
#100	1.56	6.38	4.82	14.26	43.8	56.2
#230	1.57	8.56	6.99	21.25	52.8	47.2

Clay (CL)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+50	SAMPLED	Rocky Flats
DEPTH	47'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

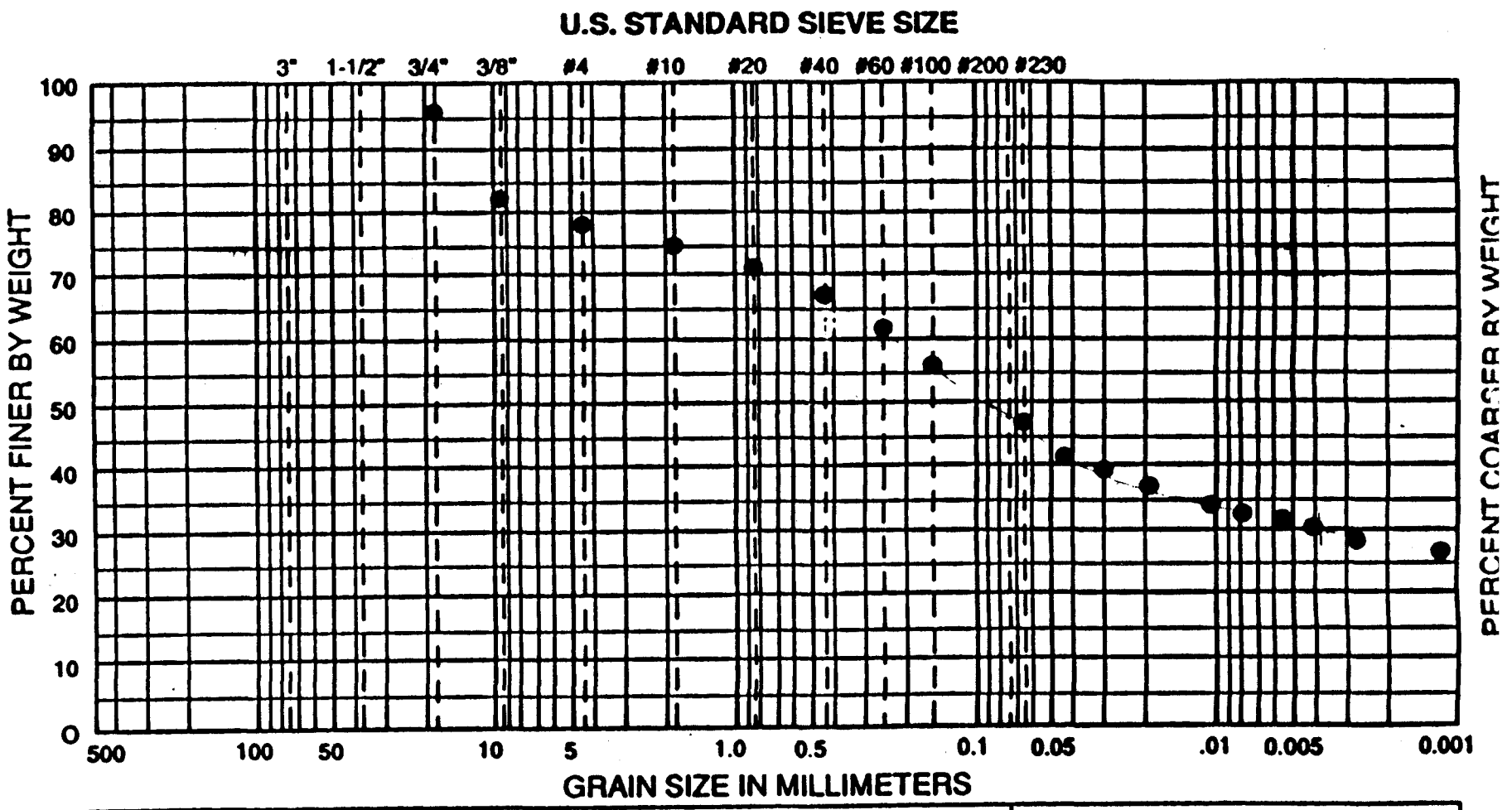
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.72	Temp. Coef. K	0.01320
Value of "a"	0.99	Wt. Dry Sample "W"	77.640
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	45.00	38.00	48.3	48.3	8.91	0.0557
1.0	39.00	32.00	40.6	40.6	9.89	0.0415
2.0	38.00	31.00	39.4	39.4	10.06	0.0296
5.0	36.00	29.00	36.8	36.8	10.39	0.0190
15.0	34.00	27.00	34.3	34.3	10.71	0.0112
30.0	33.00	26.00	33.0	33.0	10.88	0.0079
60.0	32.00	25.00	31.7	31.7	11.04	0.0057
120.0	31.00	24.00	30.5	30.5	11.21	0.0040
250.0	29.00	22.00	27.9	27.9	11.53	0.0028
1440.0	28.00	21.00	26.7	26.7	11.70	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+50 SAMPLE NO.: 5 DATE: 9/4/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION SANDY (Lean CLAY) w/some gravel
Rocky Flats	47'	

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION

LABORATORY CLASSIFICATION

JOB NO. 2066-02
CLIENT/OWNER WESTON
LOCATION Rocky Flats / 664G
BORING 1450 SAMPLE C#5 DEPTH 47'

FIELD DENSITY BY ...../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

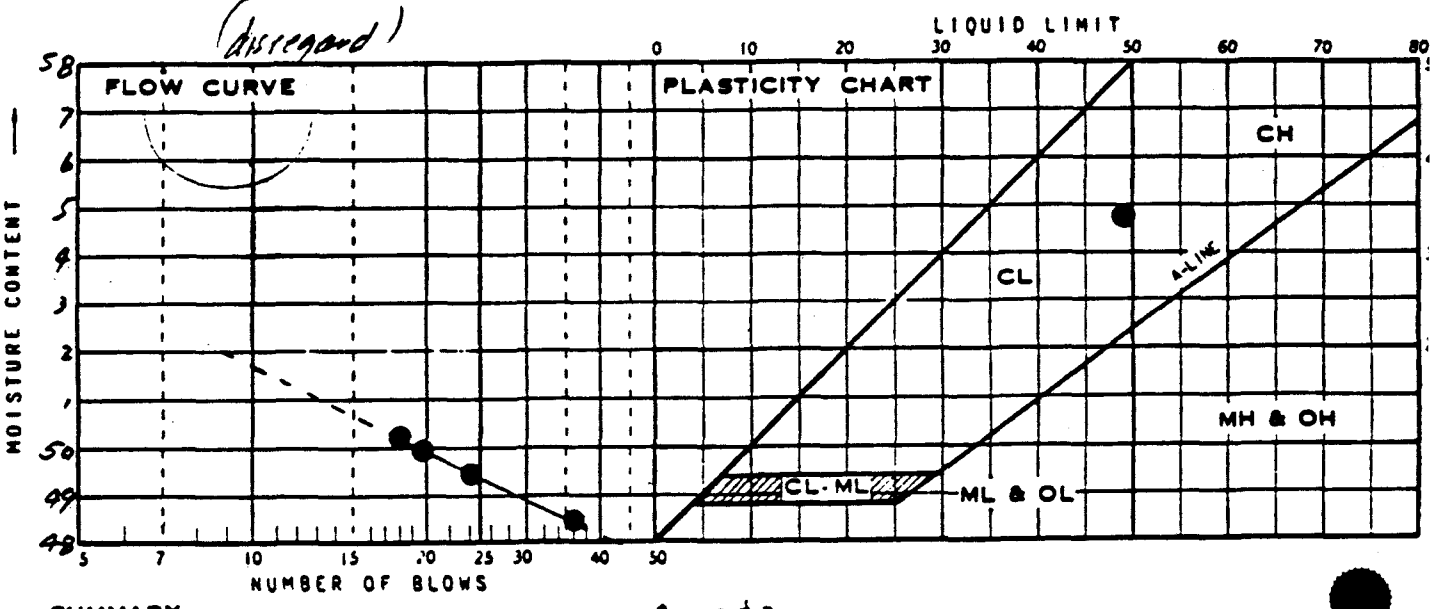
PLASTIC LIMIT BY 2044 2.27.92. (AEX)

DETERMINATION	1	2	3	4	5	6
DISH	2056	2006	2054			
WT OF DISH + WET SOIL g	7.82g	7.25g	8.21			
WT OF DISH + DRY SOIL g	6.80	6.41	7.25	—	—	—
WT OF MOISTURE g	1.02	.84	.96			
WT OF DISH g	1.03g	1.04g	1.04g	—	—	—
WT OF DRY SOIL g	5.77	5.37	6.21			
MOISTURE CONTENT %	17.7	15.64	15.46			

LIQUID LIMIT

DETERMINATION	1	2	3	4	~~5~~	~~6~~
DISH	33C	2073	10C	2067	~~2069~~	~~13C~~
NUMBER OF BLOWS	36	24	20	18	~~10~~	~~7~~
WT OF DISH + WET SOIL g	17.02g	12.98g	10.24g	12.68g	~~15.0g~~	~~15.~~
WT OF DISH + DRY SOIL g	11.81	9.03	7.17	8.75	~~9.99~~	~~9.~~
WT OF MOISTURE g	5.21	3.95	3.07	3.93	~~5.01~~	~~5.16~~
WT OF DISH g	1.05g	1.05g	1.03g	1.03g	~~1.04g~~	~~1.04~~
WT OF DRY SOIL g	10.76	7.98	6.14	7.72	~~8.95~~	~~8.9~~
MOISTURE CONTENT %	48.42	49.50	50.00	50.91	~~55.98~~	~~57.9~~

(disregard)



SUMMARY

* = Avg 2 & 3

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		49.4	15.5*	33.85	CL.	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+50	SAMPLED	Rocky Flats
DEPTH	54'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan	(g)	58.95
Wt. Dry Soil & Pan	(g)	56.33
Wt. Lost Moisture	(g)	2.62
Wt. of Pan Only	(g)	3.63
Wt. of Dry Soil	(g)	52.70
Moisture Content	%	5.0

Wt. Hydrom. Sample Wet (g)	60.00
Wt. Hydrom. Sample Dry (g)	57.16

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	57.16
Wt. Total Sample Dry (g)	57.16
Calc. Wt. "W" (g)	57.16
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.59	0.02	0.02	0.0	100.0
#40	1.57	1.59	0.02	0.04	0.1	99.9
#60	1.57	1.59	0.02	0.06	0.1	99.9
#100	1.56	1.59	0.03	0.09	0.2	99.8
#230	1.57	1.84	0.27	0.36	0.6	99.4

SILTY CLAYSTONE

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+50	SAMPLED	Rocky Flats
DEPTH	54'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

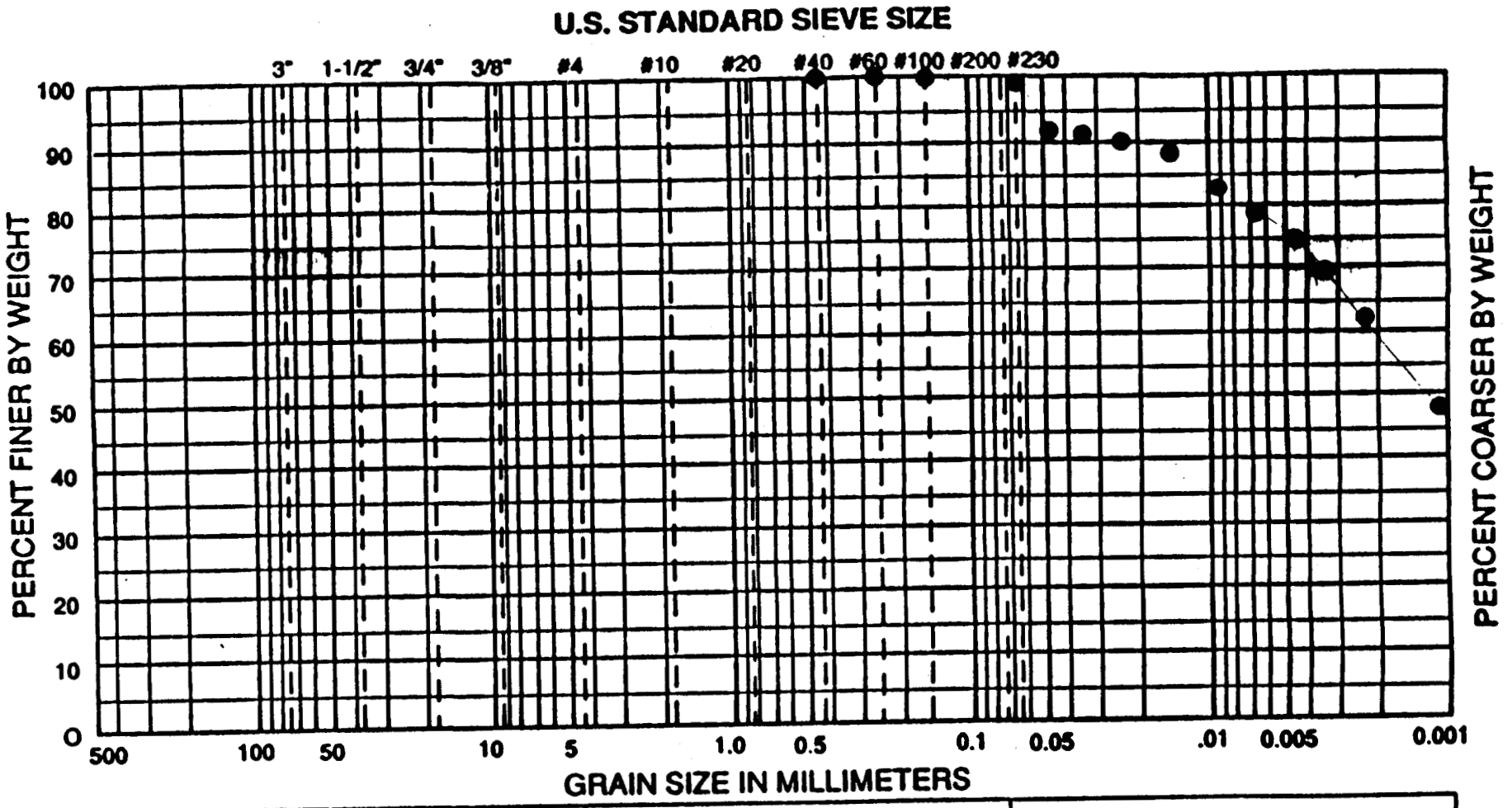
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01317
Value of "a"	0.98	Wt. Dry Sample "W"	57.158
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	60.50	53.50	92.1	92.1	6.37	0.0470
1.0	60.00	53.00	91.2	91.2	6.45	0.0334
2.0	59.50	52.50	90.4	90.4	6.53	0.0238
5.0	58.50	51.50	88.7	88.7	6.70	0.0152
15.0	55.00	48.00	82.6	82.6	7.27	0.0092
30.0	53.00	46.00	79.2	79.2	7.60	0.0066
60.0	50.50	43.50	74.9	74.9	8.01	0.0048
120.0	47.00	40.00	68.9	68.9	8.58	0.0035
250.0	43.00	36.00	62.0	62.0	9.24	0.0025
1440.0	35.00	28.00	48.2	48.2	10.55	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+50 SAMPLE NO.: 5 DATE: 8/21/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION Silty clay (CH)
Rocky Flats	54'	1 NW .49, 1 sd, 29.5% silt, 70% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats EG-G

BORING U-50 SAMPLE CH #5 DEPTH 54'

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY RW 2/26/90

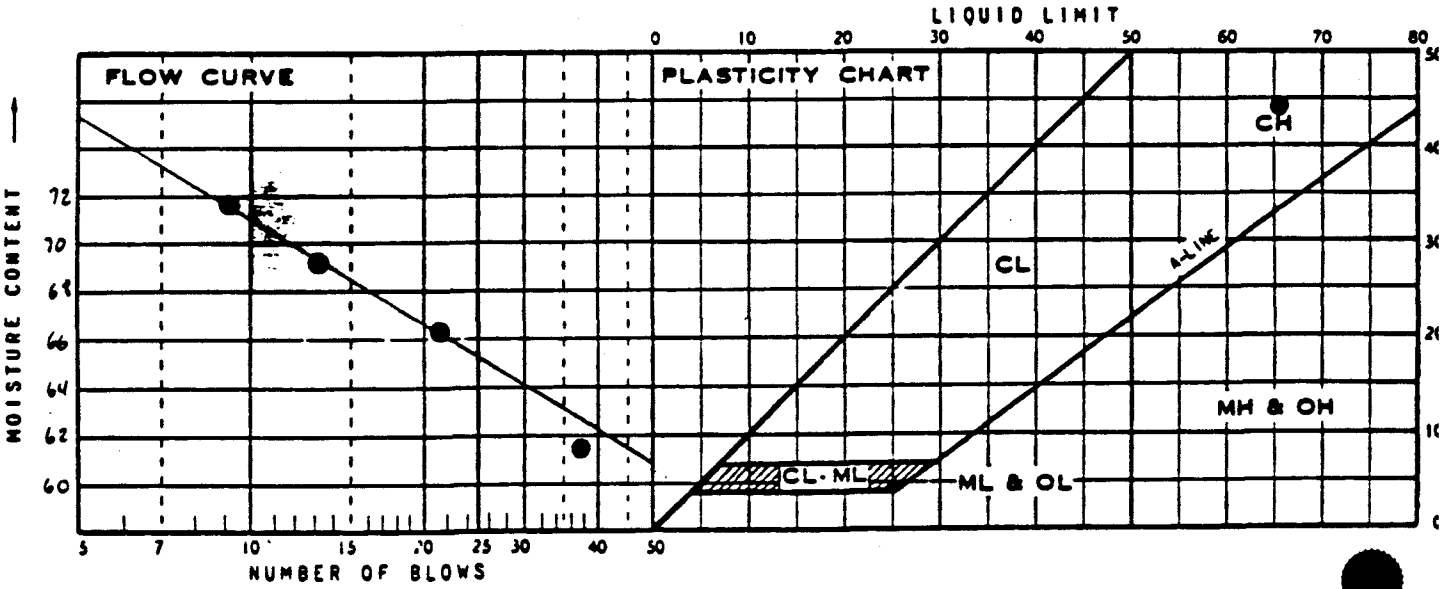
??

DETERMINATION	1	2	3	4	5	6
DISH	2029	2036	2032			
WT OF DISH + WET SOIL g	5.69g	6.12g	5.41g			
WT OF DISH + DRY SOIL g	4.89	5.19	4.65	—	—	—
WT OF MOISTURE g	.80	.93	.76			
WT OF DISH g	1.06	1.05	1.05	—	—	—
WT OF DRY SOIL g	3.83	4.14	3.60			
MOISTURE CONTENT %	20.9	22.5	21.1			

LIQUID LIMIT

?

DETERMINATION	1	2	3	4	5	6
DISH	126	326	2033	2050	2070	2058
NUMBER OF BLOWS	37	19	9	21	13	9
WT OF DISH + WET SOIL g	11.96	14.13	13.85	11.27	12.08	11.6
WT OF DISH + DRY SOIL g	7.80	9.06	8.83	7.19	7.57	7.21
WT OF MOISTURE g	4.16	5.07	5.02	4.08	4.51	4.44
WT OF DISH g	1.04	1.06	1.06	1.04	1.05	1.03
WT OF DRY SOIL g	6.76	8.00	7.77	6.15	6.52	6.18
MOISTURE CONTENT %	61.5	63.4	64.6	66.3	69.2	71.8



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		65.3	21.0	44.3	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+50	SAMPLED	Rocky Flats
DEPTH	57'	DATE TESTED	02-24-92 TN
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan	(g)	51.62
Wt. Dry Soil & Pan	(g)	50.54
Wt. Lost Moisture	(g)	1.08
Wt. of Pan Only	(g)	3.73
Wt. of Dry Soil	(g)	46.81
Moisture Content	%	2.3

Wt. Hydrom. Sample Wet (g)	60.00
Wt. Hydrom. Sample Dry (g)	58.65

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	655.94
Weight of + #10 Before Washing (g)	30.06
Weight of + #10 After Washing (g)	26.59
Weight of - #10 Wet (g)	625.88
Weight of - #10 Dry (g)	615.16
Wt. Total Sample Dry (g)	641.75
Calc. Wt. "W" (g)	61.18
Calc. Mass + #10	2.53

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	26.20	26.20	26.20	4.1	95.9
#10	0.00	0.39	0.39	26.59	4.1	95.9
#20	1.55	1.64	0.09	0.09	4.3	95.7
#40	1.56	1.72	0.16	0.25	4.6	95.4
#60	1.58	1.79	0.21	0.46	4.9	95.1
#100	1.56	1.91	0.35	0.81	5.5	94.5 >85
#230	1.57	8.62	7.05	7.86	17.0	83.0

Silt (Clay)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	11+50	SAMPLED	Rocky Flats
DEPTH	57'	DATE TESTED	02-24-92 TN
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

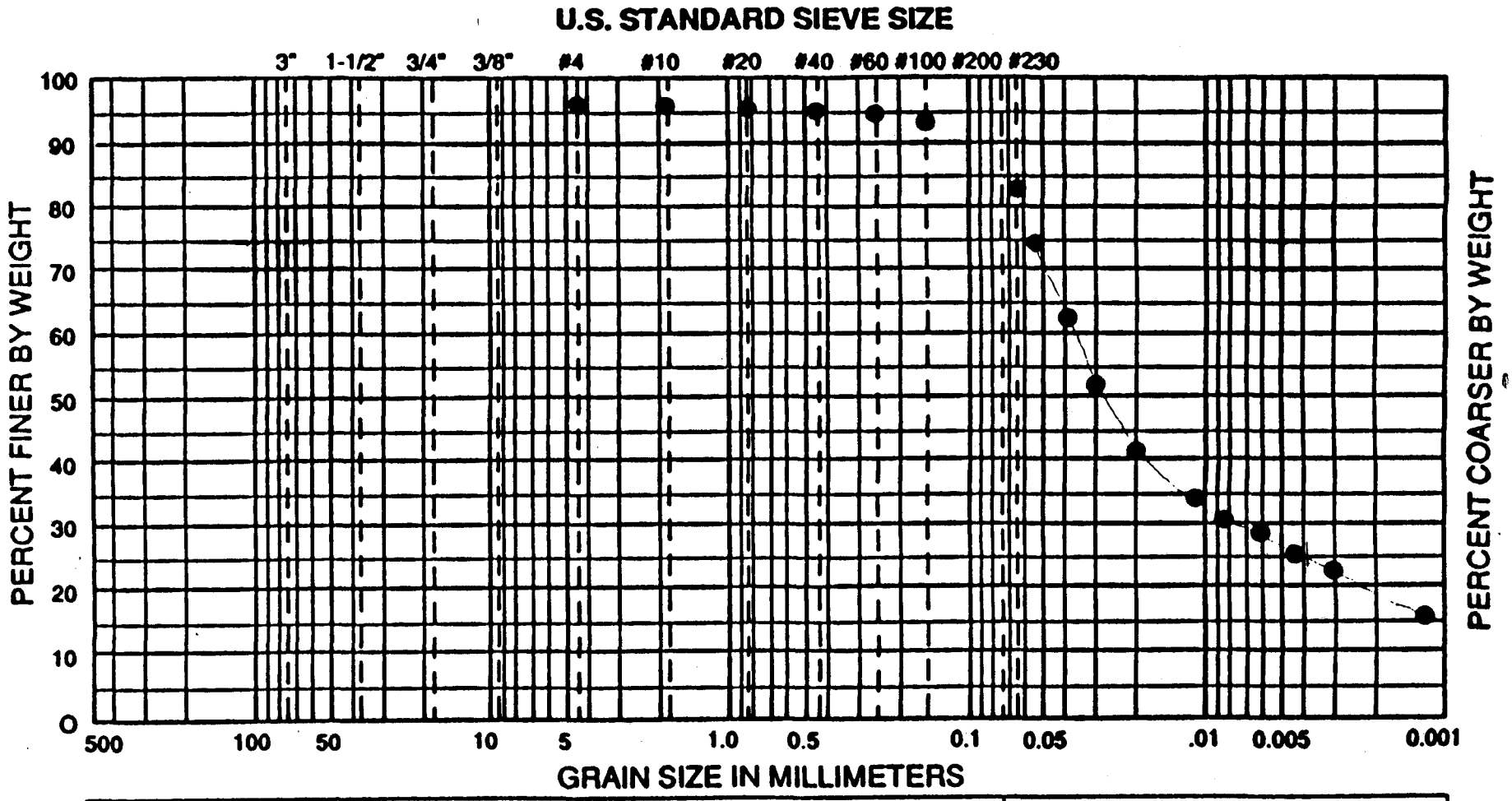
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.70	Temp. Coef. K	0.01328
Value of "a"	0.99	Wt. Dry Sample "W"	61.182
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	52.50	45.50	73.6	73.6	7.68	0.0520
1.0	46.00	39.00	63.1	63.1	8.75	0.0393
2.0	39.00	32.00	51.8	51.8	9.89	0.0295
5.0	32.50	25.50	41.3	41.3	10.96	0.0197
15.0	28.00	21.00	34.0	34.0	11.70	0.0117
30.0	26.00	19.00	30.7	30.7	12.03	0.0084
60.0	25.00	18.00	29.1	29.1	12.19	0.0060
120.0	23.00	16.00	25.9	25.9	12.52	0.0043
250.0	21.00	14.00	22.7	22.7	12.85	0.0030
1440.0	17.00	10.00	16.2	16.2	13.50	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+50 SAMPLE NO.: 5 DATE: 3/3/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	57'	

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - -

JOB NO. [illegible]

CLIENT/OWNER Weston

LOCATION

BORING 11 + 50 SAMPLE CH #5 DEPTH 5.7'

#5

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

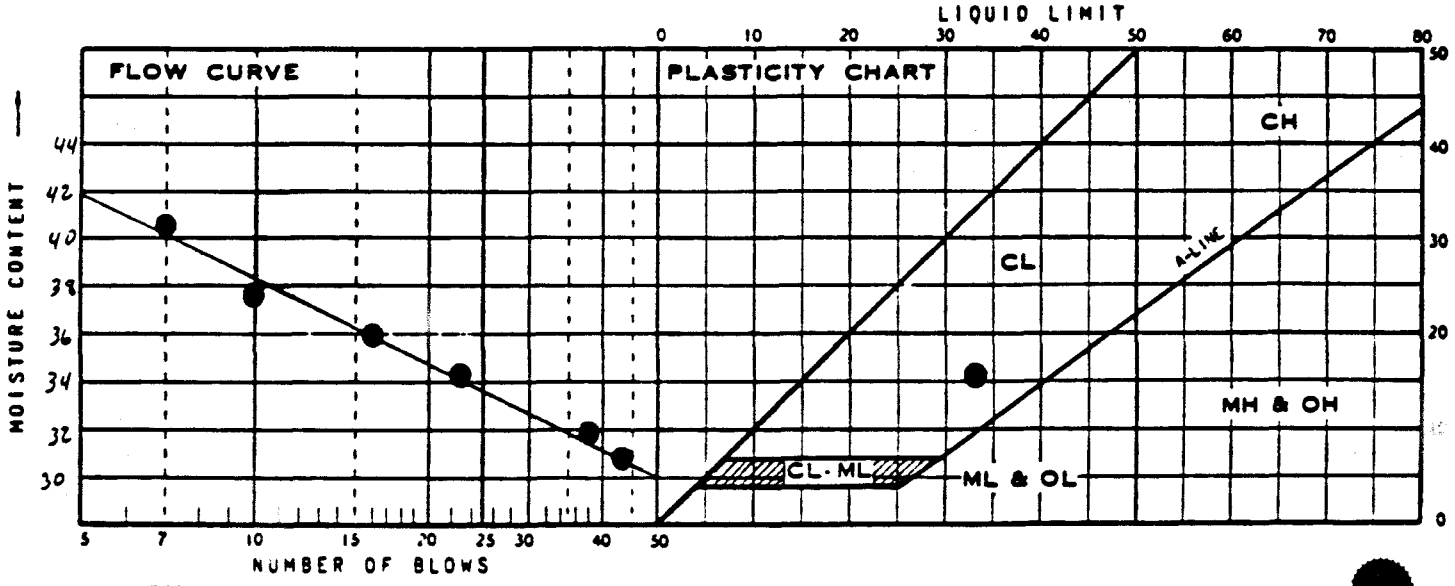
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY GW. 2/27/92

DETERMINATION	1	2	3	4	5	6
DISH	41C	34C	2019			
WT OF DISH + WET SOIL	6.97g	8.13g	9.46g			
WT OF DISH + DRY SOIL	6.02g	7.05	8.18g	—	—	—
WT OF MOISTURE	.95	1.08	1.28			
WT OF DISH	1.02g	1.02g	1.06g	—	—	—
WT OF DRY SOIL	5.00g	6.03	7.12g			
MOISTURE CONTENT	19.0	17.9	18.0			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	36C	2013	2068	2059	2060	2062
NUMBER OF BLOWS	44	38	23	16	10	7
WT OF DISH + WET SOIL	21.50g	23.27g	24.90g	23.27g	22.31g	21.1[illegible]
WT OF DISH + DRY SOIL	16.66g	17.89g	18.81g	17.38g	16.47g	15.36
WT OF MOISTURE	4.84	5.38	6.09	5.89	5.34	5.80
WT OF DISH	1.02g	1.05g	1.03g	1.04g	1.02g	1.03g
WT OF DRY SOIL	15.64	16.84	17.78	16.34	15.45	14.33
MOISTURE CONTENT	30.9	31.9	34.3	36.0	37.8	40.5



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		33.6	18.3	15.3	CL	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	11+75	SAMPLED	Rocky Flats
DEPTH	59'	DATE TESTED	03-05-92 SR
SAMPLE NO.	#3	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	61.14
Wt. Dry Soil & Pan	(g)	60.08
Wt. Lost Moisture	(g)	1.06
Wt. of Pan Only	(g)	3.68
Wt. of Dry Soil	(g)	56.40
Moisture Content	%	1.9

Wt. Hydrom. Sample Wet (g)	60.01
Wt. Hydrom. Sample Dry (g)	58.90

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	1000.71
Weight of + #10 Before Washing (g)	273.13
Weight of + #10 After Washing (g)	270.09
Weight of - #10 Wet (g)	727.58
Weight of - #10 Dry (g)	717.14
Wt. Total Sample Dry (g)	987.23
Calc. Wt. "W" (g)	81.09
Calc. Mass + #10	22.18

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	240.82	240.82	240.82	24.4	75.6
3/4"	0.00	14.69	14.69	255.51	25.9	74.1
3/8"	0.00	13.78	13.78	269.29	27.3	72.7
#4	0.00	0.51	0.51	269.80	27.3	72.7
#10	0.00	0.29	0.29	270.09	27.4	72.6
#20	1.57	1.60	0.03	0.03	27.4	72.6
#40	1.57	1.65	0.08	0.11	27.5	72.5
#60	1.55	1.63	0.08	0.19	27.6	72.4
#100	1.55	1.61	0.06	0.25	27.7	72.3
#230	1.56	1.79	0.23	0.48	28.0	72.0

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+75	SAMPLED	Rocky Flats
DEPTH	59'	DATE TESTED	03-05-92 SR
SAMPLE NO.	#3	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.79	Temp. Coef. K	0.01280
Value of "a"	0.97	Wt. Dry Sample "W"	81.088
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	63.00	57.00	68.3	68.3	5.96	0.0442
1.0	61.25	55.25	66.2	66.2	6.25	0.0320
2.0	60.00	54.00	64.7	64.7	6.45	0.0230
5.0	58.75	52.75	63.2	63.2	6.66	0.0148
15.0	56.00	50.00	59.9	59.9	7.11	0.0088
30.0	53.25	47.25	56.6	56.6	7.56	0.0064
60.0	50.25	44.25	53.0	53.0	8.05	0.0047
120.0	47.00	41.00	49.1	49.1	8.58	0.0034
250.0	43.25	37.25	44.7	44.7	9.20	0.0025
1440.0	35.25	29.25	35.1	35.1	10.51	0.0011

Grain Diameter = K*(SQRT(L/T))

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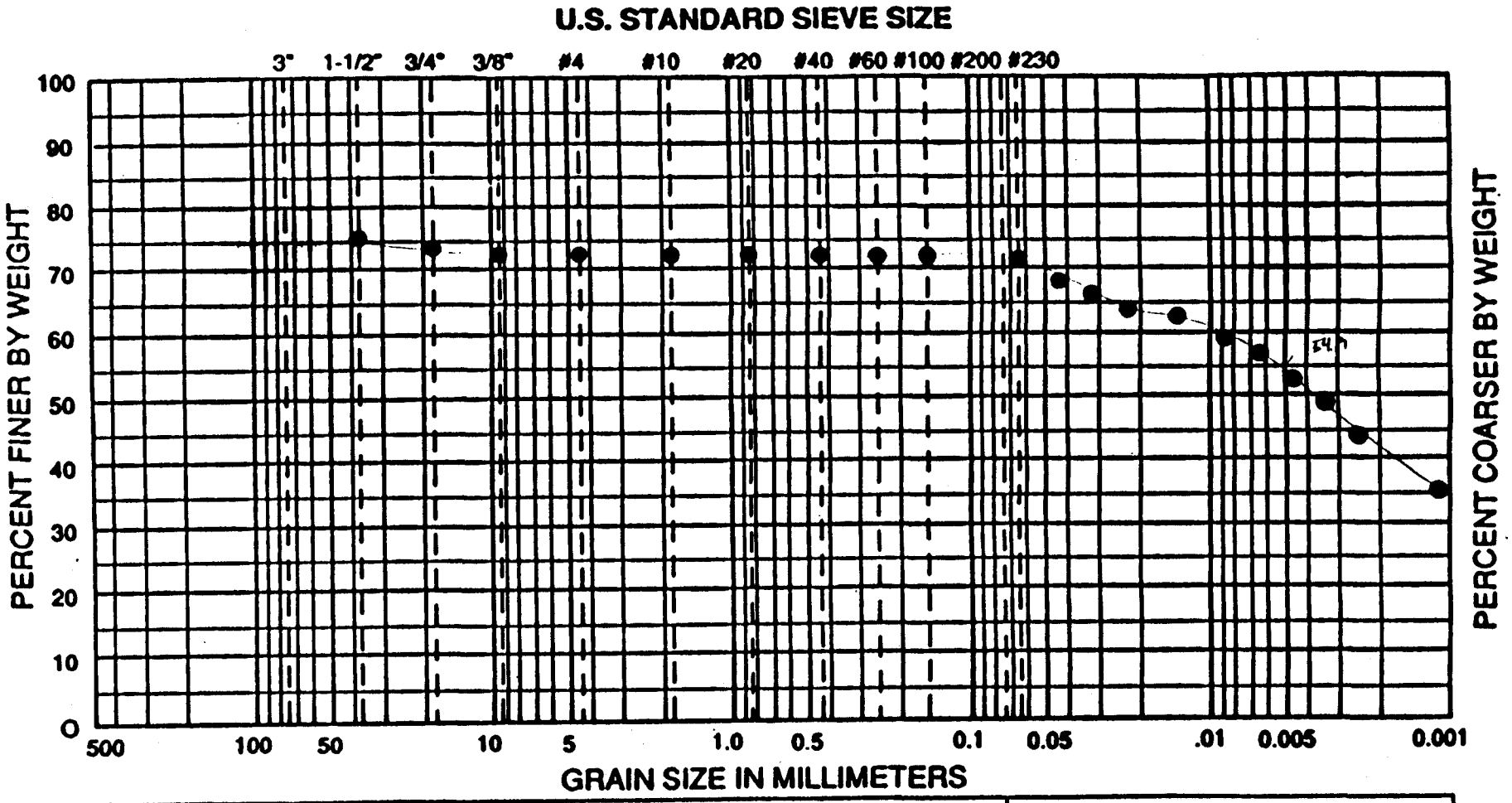


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11 + 75 SAMPLE NO.: CH #3 DATE: 3/9/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
		Gravely CLAY w/some silt + sand
Rocky Flats	59'	25.9% C gravel, 1.4% f gvl, .1% c sd, .1% m sd, .5% f sd 17.1% silt, 34.9% CLAY

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

CLIENT/OWNER Weston

LOCATION Rocky Flats EG&G

BORING 1L-75 SAMPLE GM#3 DEPTH 59'

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

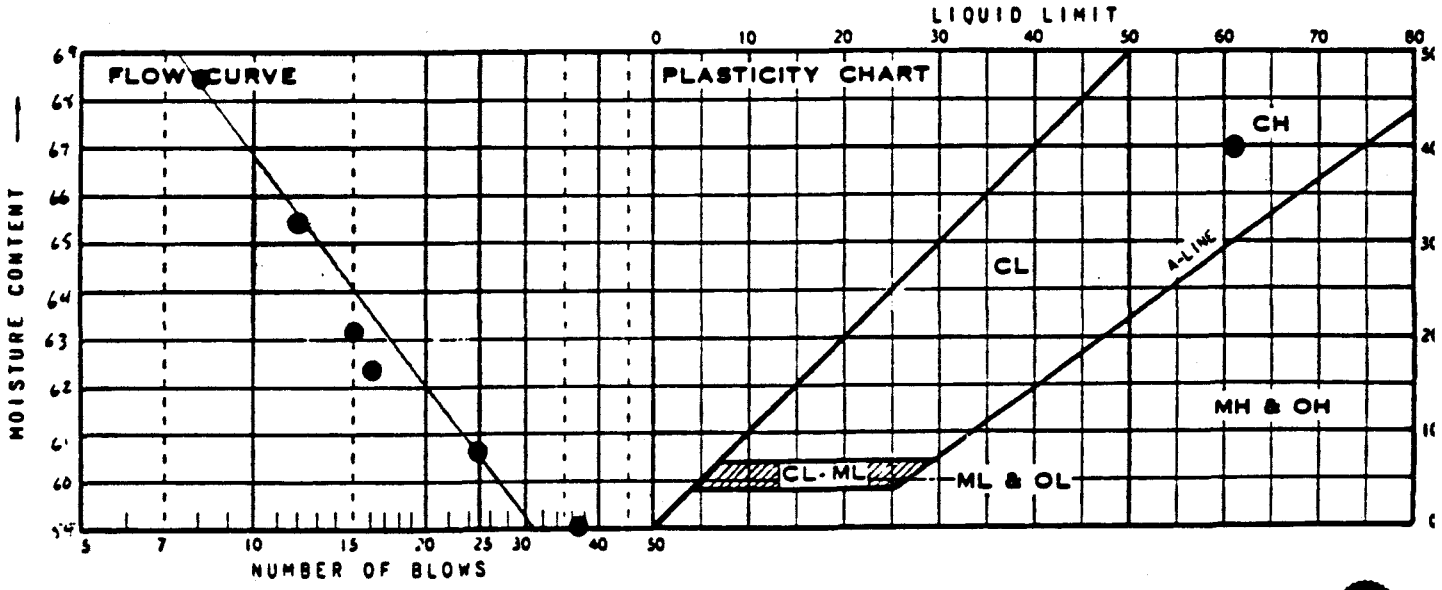
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DH 3/3/92

DETERMINATION	1	2	3	4	5	6
DISH	2035	19C	3C			
WT OF DISH + WET SOIL g	5.17	5.64	5.89			
WT OF DISH + DRY SOIL g	4.50	4.85	5.06	—	—	—
WT OF MOISTURE g	.67	.79	.83			
WT OF DISH g	1.04	1.03	1.05	—	—	—
WT OF DRY SOIL g	3.46	3.82	4.01			
MOISTURE CONTENT %	19.4	20.7	20.7			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	35C	27C	2064	40C	4C	2031
NUMBER OF BLOWS	37	25	16	15	12	8
WT OF DISH + WET SOIL g	10.08	10.38	11.66	10.67	10.98	10.6[illegible]
WT OF DISH + DRY SOIL g	6.73	6.85	7.58	6.94	7.05	6.7[illegible]
WT OF MOISTURE g	3.35	3.53	4.08	3.73	3.93	3.92
WT OF DISH g	1.06	1.03	1.04	1.05	1.04	1.04
WT OF DRY SOIL g	5.67	5.82	6.54	5.90	6.01	5.72
MOISTURE CONTENT %	59.1	60.7	62.4	63.2	65.4	68.5



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		60.7	20.7	40.0	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+80	SAMPLED	Rocky Flats
DEPTH	50'	DATE TESTED	03-05-92 SR
SAMPLE NO.	#3	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	64.32
Wt. Dry Soil & Pan	(g)	63.54
Wt. Lost Moisture	(g)	0.78
Wt. of Pan Only	(g)	3.74
Wt. of Dry Soil	(g)	59.80
Moisture Content	%	1.3
Wt. Hydrom. Sample Wet	(g)	60.01
Wt. Hydrom. Sample Dry	(g)	59.24

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	475.89
Weight of + #10 Before Washing (g)	48.15
Weight of + #10 After Washing (g)	33.69
Weight of - #10 Wet (g)	427.74
Weight of - #10 Dry (g)	436.51
Wt. Total Sample Dry (g)	470.20
Calc. Wt. "W" (g)	63.81
Calc. Mass + #10	4.57

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	26.67	26.67	26.67	5.7	94.3
#4	0.00	3.60	3.60	30.27	6.4	93.6
#10	0.00	3.42	3.42	33.69	7.2	92.8
#20	1.53	1.85	0.32	0.32	7.7	92.3
#40	1.53	2.28	0.75	1.07	8.8	91.2
#60	1.55	2.57	1.02	2.09	10.4	89.6
#100	1.55	4.06	2.51	4.60	14.4	85.6
#230	1.54	8.10	6.56	11.16	24.7	75.3

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	11+80	SAMPLED	Rocky Flats
DEPTH	50'	DATE TESTED	03-05-92 SR
SAMPLE NO.	#3	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.77	Temp. Coef. K	0.01287
Value of "a"	0.98	Wt. Dry Sample "W"	63.809
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	51.50	45.50	69.6	69.6	7.84	0.0510
1.0	47.75	41.75	63.9	63.9	8.46	0.0374
2.0	44.75	38.75	59.3	59.3	8.95	0.0272
5.0	42.75	36.75	56.2	56.2	9.28	0.0175
15.0	40.00	34.00	52.0	52.0	9.73	0.0104
30.0	38.00	32.00	48.9	48.9	10.06	0.0075
60.0	35.75	29.75	45.5	45.5	10.43	0.0054
120.0	34.00	28.00	42.8	42.8	10.71	0.0038
250.0	32.25	26.25	40.2	40.2	11.00	0.0027
1440.0	30.00	24.00	36.7	36.7	11.37	0.0011

Grain Diameter = K*(SQRT(L/T))

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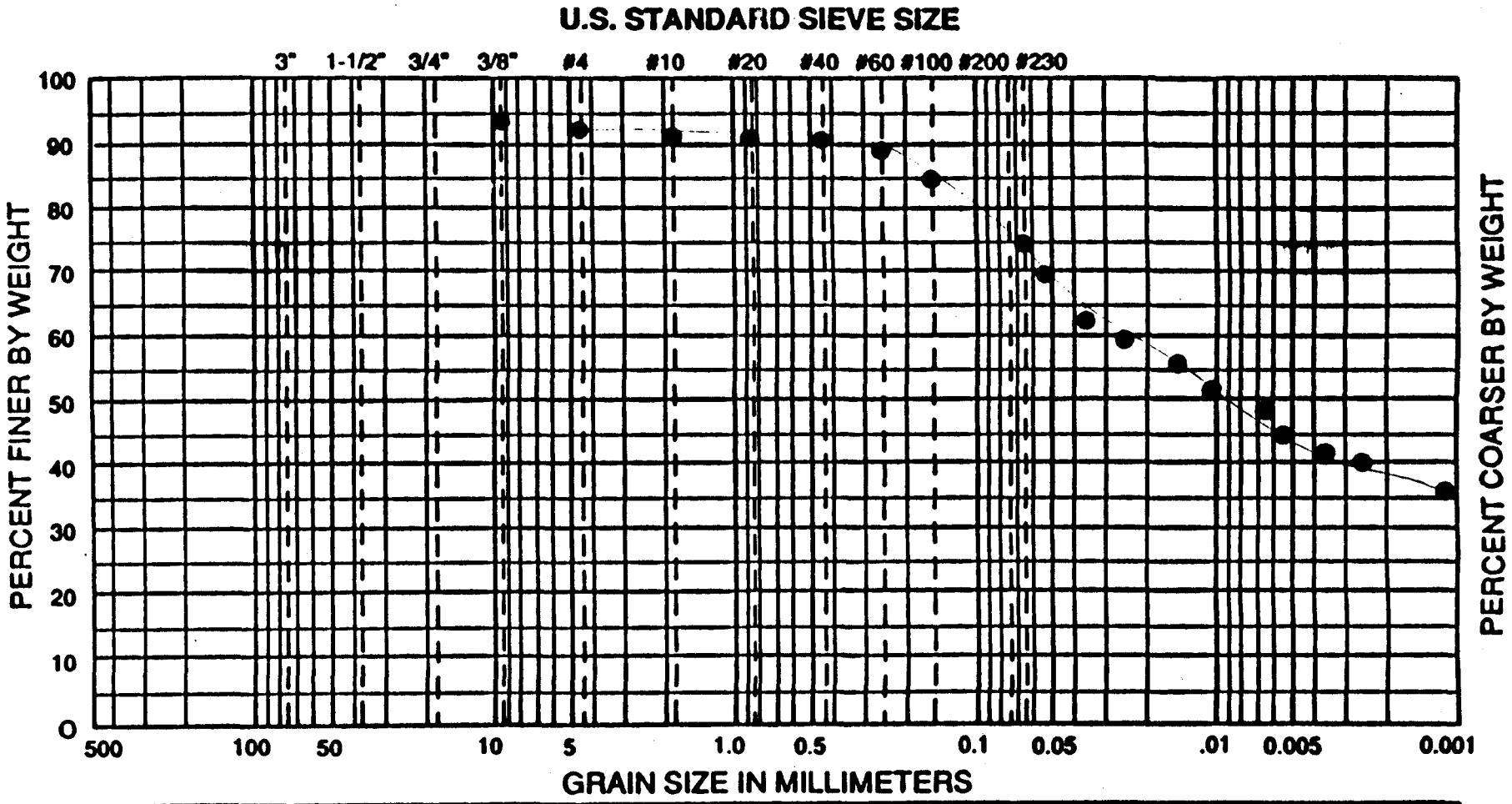

USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11+80 SAMPLE NO.: CH #3 DATE: 3-7-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
[illegible]	[illegible]	SILTY Clay w/ some SAND & trace gravel.

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

CLIENT/OWNER Weston

LOCATION Rocky Flats EG&G

BORING 11-80 SAMPLE CM-3 DEPTH 50'

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

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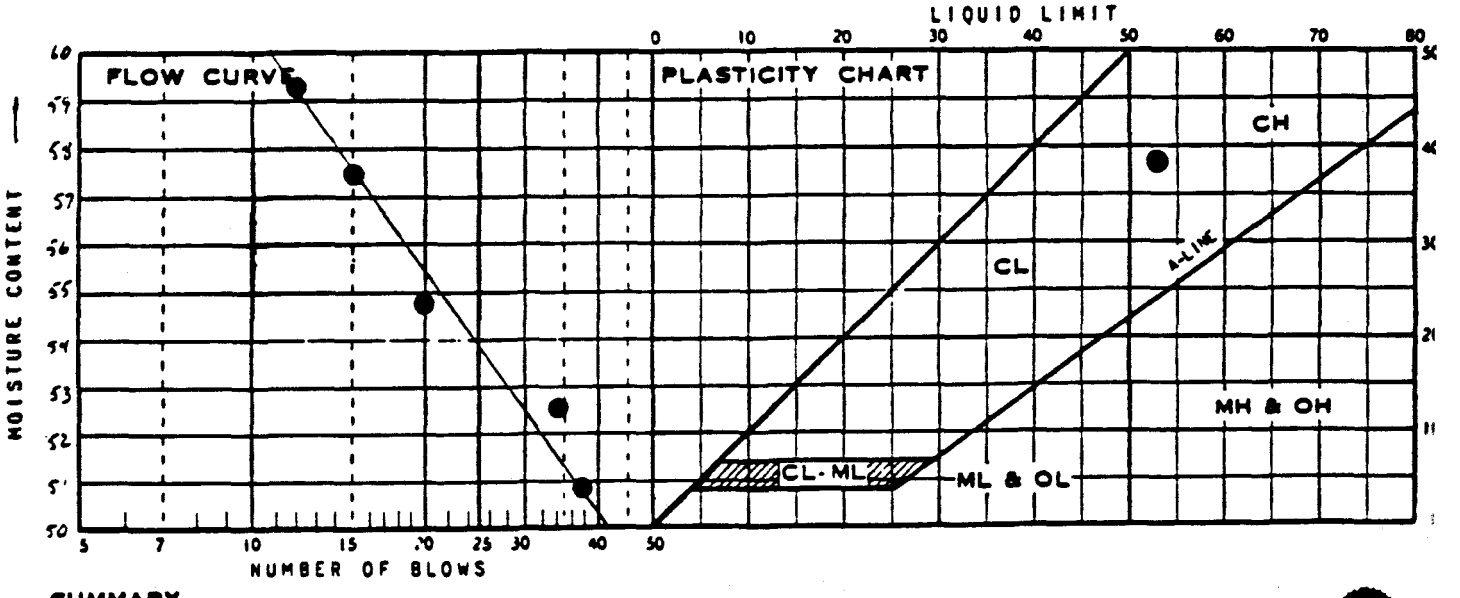
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DM 3/4/92

DETERMINATION	1	2	3	4	5	6
DISH	2020	10C	43C			
WT OF DISH + WET SOIL g	6.28	6.20	7.36			
WT OF DISH + DRY SOIL g	5.59	5.51	6.52	—	—	—
WT OF MOISTURE g	.69	.69	.84			
WT OF DISH g	1.05	1.05	1.04	—	—	—
WT OF DRY SOIL g	4.54	4.46	5.48			
MOISTURE CONTENT %	15.2	15.5	15.3			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2069	2036	2067	26C	28C	5C
NUMBER OF BLOWS	38	34	20	45	15	12
WT OF DISH + WET SOIL g	10.63	9.43	10.33	10.79	9.61	10.17
WT OF DISH + DRY SOIL g	7.40	6.54	7.04	7.31	6.48	6.7[illegible]
WT OF MOISTURE g	3.23	2.89	3.29	3.48	3.13	3.39
WT OF DISH g	1.05	1.05	1.04	1.06	1.05	1.06
WT OF DRY SOIL g	6.35	5.49	6.00	6.25	5.43	5.72
MOISTURE CONTENT %	50.9	52.6	54.8	55.7	57.6	59.3



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION
		53.9	15.3	38.5	CH

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	11+80	SAMPLED	Rocky Flats
DEPTH	56'	DATE TESTED	03-05-92 SR
SAMPLE NO.	#3	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	67.24
Wt. Dry Soil & Pan	(g)	66.49
Wt. Lost Moisture	(g)	0.75
Wt. of Pan Only	(g)	3.82
Wt. of Dry Soil	(g)	62.67
Moisture Content	%	1.2
Wt. Hydrom. Sample Wet (g)		60.00
Wt. Hydrom. Sample Dry (g)		59.29

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	859.53
Weight of + #10 Before Washing (g)	511.60
Weight of + #10 After Washing (g)	459.38
Weight of - #10 Wet (g)	347.93
Weight of - #10 Dry (g)	395.42
Wt. Total Sample Dry (g)	854.80
Calc. Wt. "W" (g)	128.17
Calc. Mass + #10	68.88

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	112.38	112.38	112.38	13.1	86.9
3/4"	0.00	212.78	212.78	325.16	38.0	62.0
3/8"	0.00	41.56	41.56	366.72	42.9	57.1
#4	0.00	55.95	55.95	422.67	49.4	50.6
#10	0.00	36.71	36.71	459.38	53.7	46.3
#20	1.56	4.90	3.34	3.34	56.3	43.7
#40	1.57	4.88	3.31	6.65	58.9	41.1
#60	1.56	3.66	2.10	8.75	60.6	39.4
#100	1.57	7.04	5.47	14.22	64.8	35.2
#230	1.30	4.04	2.74	16.96	67.0	33.0

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	11+80	SAMPLED	Rocky Flats
DEPTH	56'	DATE TESTED	03-05-92 SR
SAMPLE NO.	#3	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.79	Temp. Coef. K	0.01280
Value of "a"	0.97	Wt. Dry Sample "W"	128.172
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	49.50	43.50	33.0	33.0	8.17	0.0517
1.0	48.25	42.25	32.0	32.0	8.38	0.0370
2.0	47.75	41.75	31.7	31.7	8.46	0.0263
5.0	45.25	39.25	29.8	29.8	8.87	0.0170
15.0	43.75	37.75	28.6	28.6	9.12	0.0100
30.0	42.00	36.00	27.3	27.3	9.40	0.0072
60.0	39.75	33.75	25.6	25.6	9.77	0.0052
120.0	37.00	31.00	23.5	23.5	10.22	0.0037
250.0	35.00	29.00	22.0	22.0	10.55	0.0026
1440.0	30.25	24.25	18.4	18.4	11.33	0.0011

Grain Diameter = K*(SQRT(L/T))

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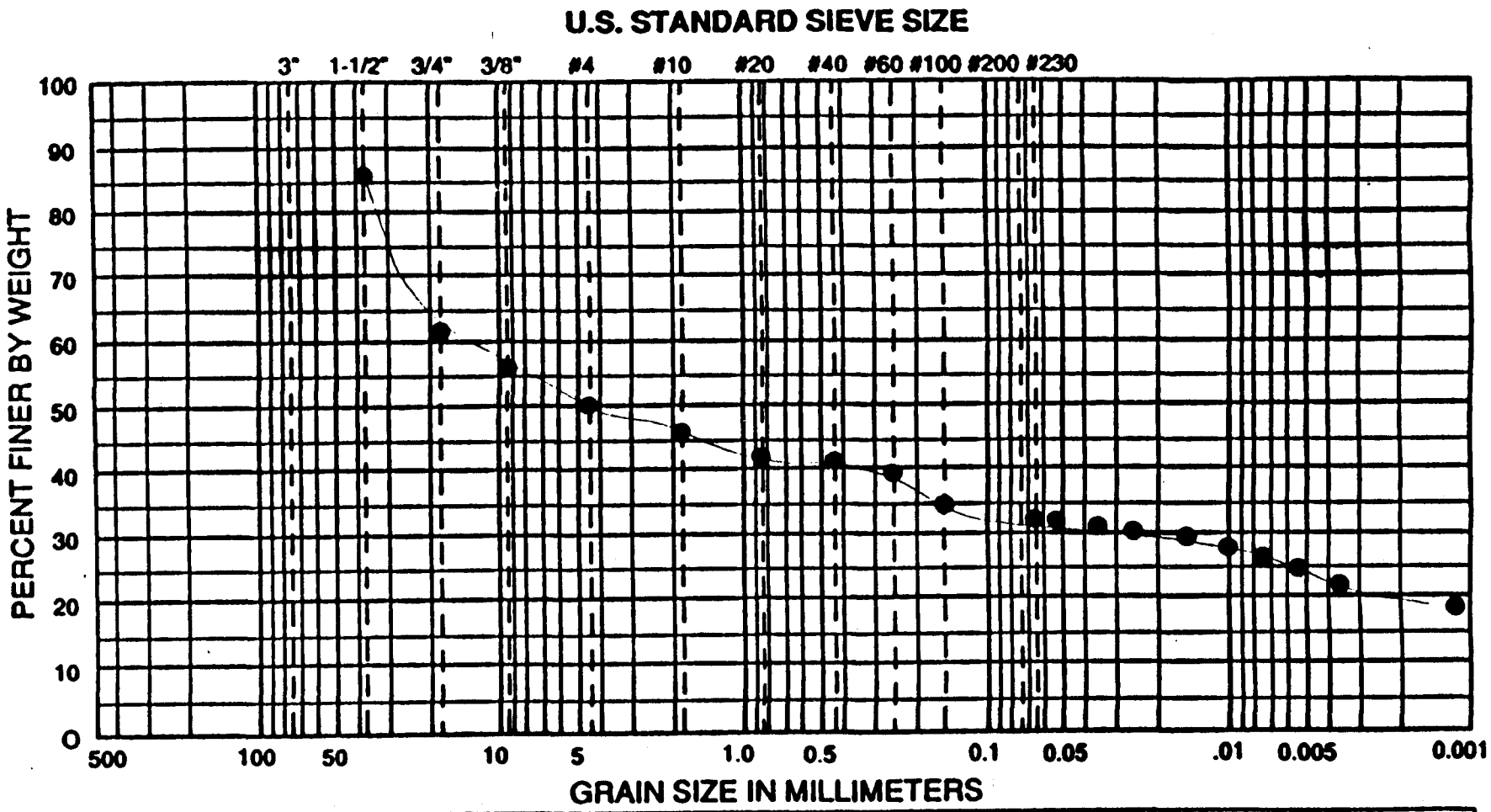


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 11 + 80 SAMPLE NO.: CH #3 DATE: 3-7-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	56.0'	Gravel w/ some SAND, SILT & CLAY. 38% C. Gravel, 11.4% f. gvl, 4.3% c. sd, 5.2% m. sd, 8.12% f. sd, 10% silt, 23% Clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION

LABORATORY CLASSIFICATION

JOB NO.

CLIENT/OWNER Weston

LOCATION Rocky Flats EU-6

BORING 1/80 SAMPLE CH #3 DEPTH 56'

FIELD DENSITY BY

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS		
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

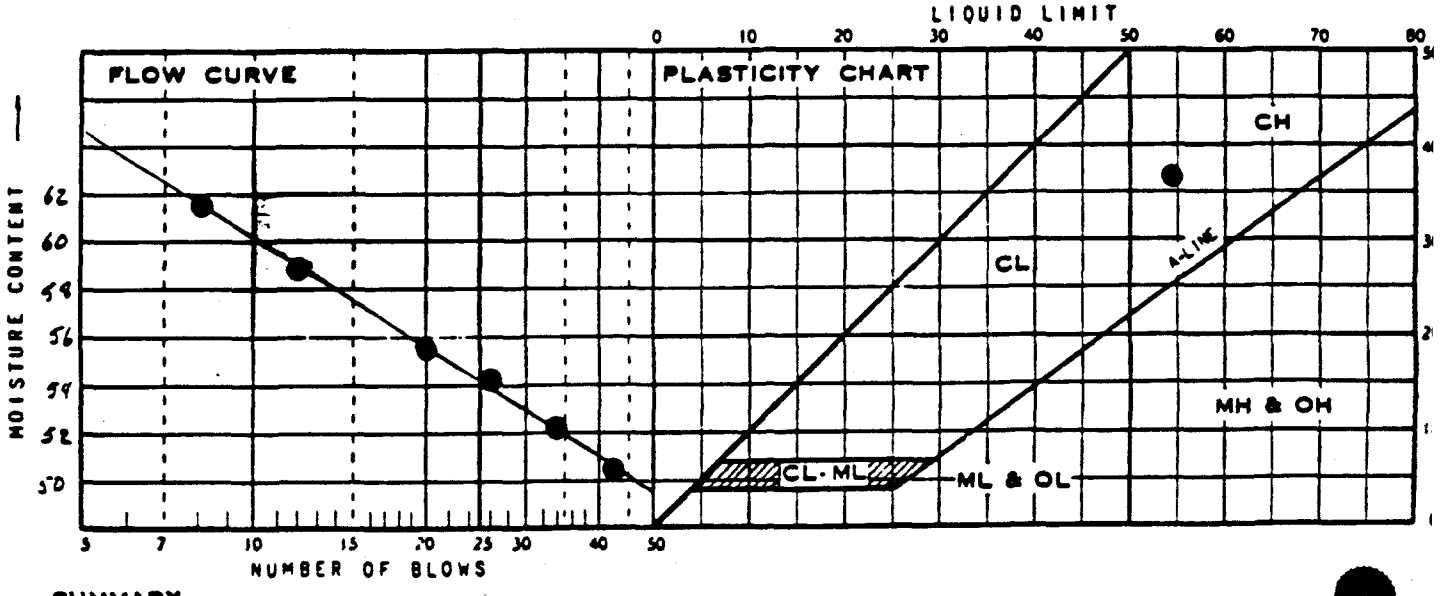
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL		
WT OF MOISTURE		
WT OF DISH		
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY

DETERMINATION	1	2	3	4	5	6
DISH	4C	27C	2031			
WT OF DISH + WET SOIL g	6.83	5.82	6.11			
WT OF DISH + DRY SOIL g	5.98	5.10	5.37			
WT OF MOISTURE g	.85	.72	.74			
WT OF DISH g	1.06	1.03	1.06			
WT OF DRY SOIL g	4.92	4.07	4.31			
MOISTURE CONTENT %	17.3	17.7	17.2			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	206	40C	35C	2035	3C	19C
NUMBER OF BLOWS	43	34	26	20	12	8
WT OF DISH + WET SOIL g	11.00	10.65	11.31	11.67	11.28	10.9
WT OF DISH + DRY SOIL g	7.66	7.36	7.71	7.87	7.49	7.15
WT OF MOISTURE g	3.34	3.29	3.60	3.80	3.79	3.77
WT OF DISH g	1.04	1.06	1.07	1.04	1.05	1.03
WT OF DRY SOIL g	6.62	6.30	6.64	6.83	6.44	6.12
MOISTURE CONTENT %	50.5	52.2	54.2	55.6	58.9	61.6



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION
		54.3	17.4	36.9	CH

ADVANCED TERRA TESTING inc

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	12+00	SAMPLED	Rocky Flats
DEPTH	41'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan	(g)	58.63
Wt. Dry Soil & Pan	(g)	56.25
Wt. Lost Moisture	(g)	2.38
Wt. of Pan Only	(g)	3.69
Wt. of Dry Soil	(g)	52.56
Moisture Content	%	4.5

Wt. Hydrom. Sample Wet (g)	60.00
Wt. Hydrom. Sample Dry (g)	57.40

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	609.04
Weight of + #10 Before Washing (g)	54.34
Weight of + #10 After Washing (g)	47.04
Weight of - #10 Wet (g)	554.70
Weight of - #10 Dry (g)	537.65
Wt. Total Sample Dry (g)	584.69
Calc. Wt. "W" (g)	62.42
Calc. Mass + #10	5.02

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	36.58	36.58	36.58	6.3	93.7
3/8"	0.00	7.19	7.19	43.77	7.5	92.5
#4	0.00	0.85	0.85	44.62	7.6	92.4
#10	0.00	2.42	2.42	47.04	8.0	92.0
#20	1.54	1.79	0.25	0.25	8.4	91.6
#40	1.55	2.21	0.66	0.91	9.5	90.5
#60	1.57	3.06	1.49	2.40	11.9	88.1
#100	1.55	6.05	4.50	6.90	19.1	80.9
#230	1.55	15.13	13.58	20.48	40.9	59.1

Sandy Clayey Silt

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	12+00	SAMPLED	Rocky Flats
DEPTH	41'	DATE TESTED	02-24-92 TN
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

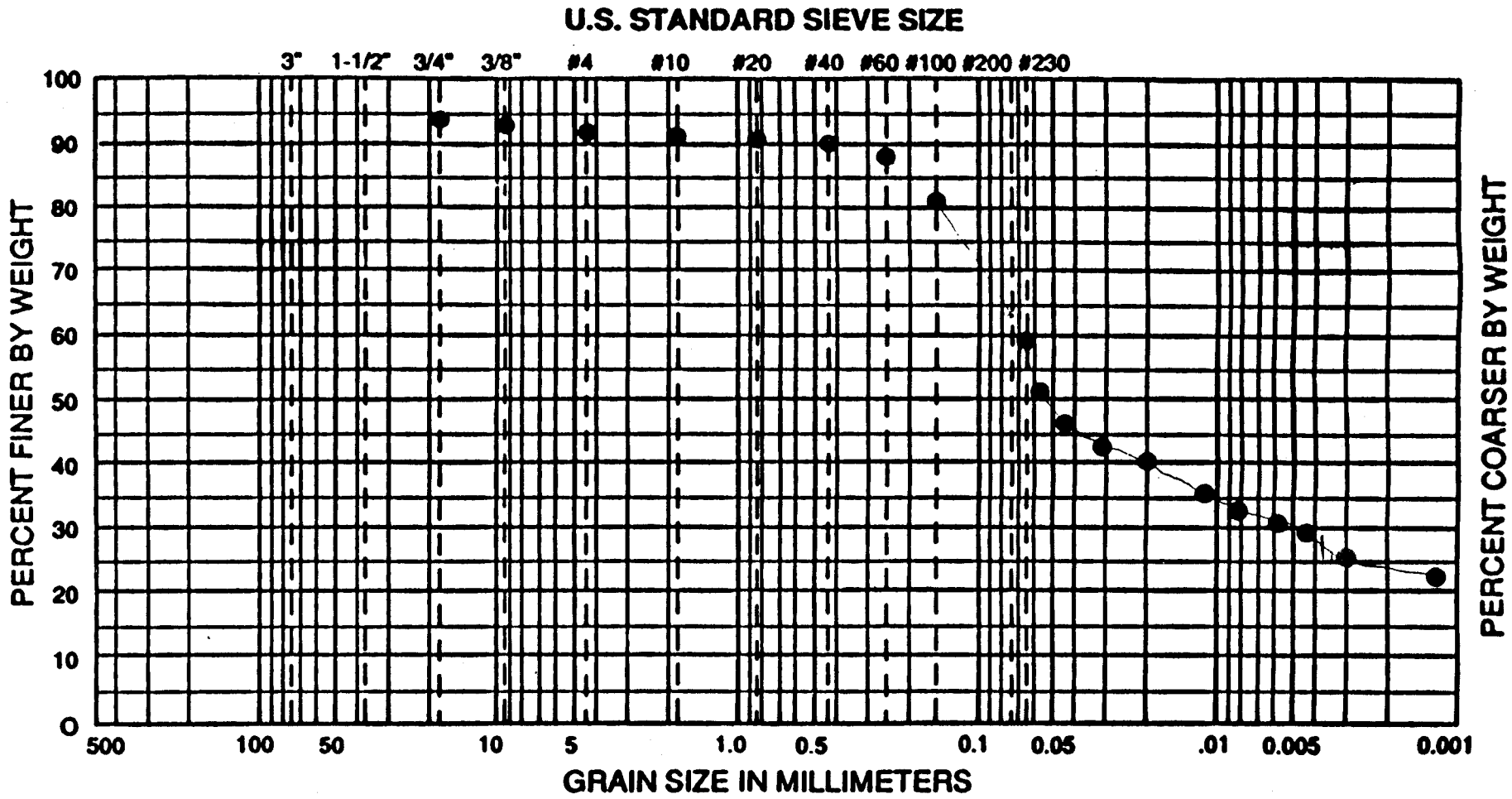
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01324
Value of "a"	0.99	Wt. Dry Sample "W"	62.423
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	40.00	33.00	52.2	52.2	9.73	0.0584
1.0	36.50	29.50	46.7	46.7	10.30	0.0425
2.0	34.00	27.00	42.7	42.7	10.71	0.0306
5.0	32.00	25.00	39.6	39.6	11.04	0.0197
15.0	29.50	22.50	35.6	35.6	11.45	0.0116
30.0	28.00	21.00	33.2	33.2	11.70	0.0083
60.0	26.50	19.50	30.9	30.9	11.94	0.0059
120.0	25.00	18.00	28.5	28.5	12.19	0.0042
250.0	23.00	16.00	25.3	25.3	12.52	0.0030
1440.0	21.00	14.00	22.2	22.2	12.85	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 12+00 SAMPLE NO.: 5 DATE: 3/11/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	41'	

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2060 03

CLIENT/OWNER Weston

LOCATION Rocky Flats EG+G

BORING 12-88 SAMPLE GN #5 DEPTH 41'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

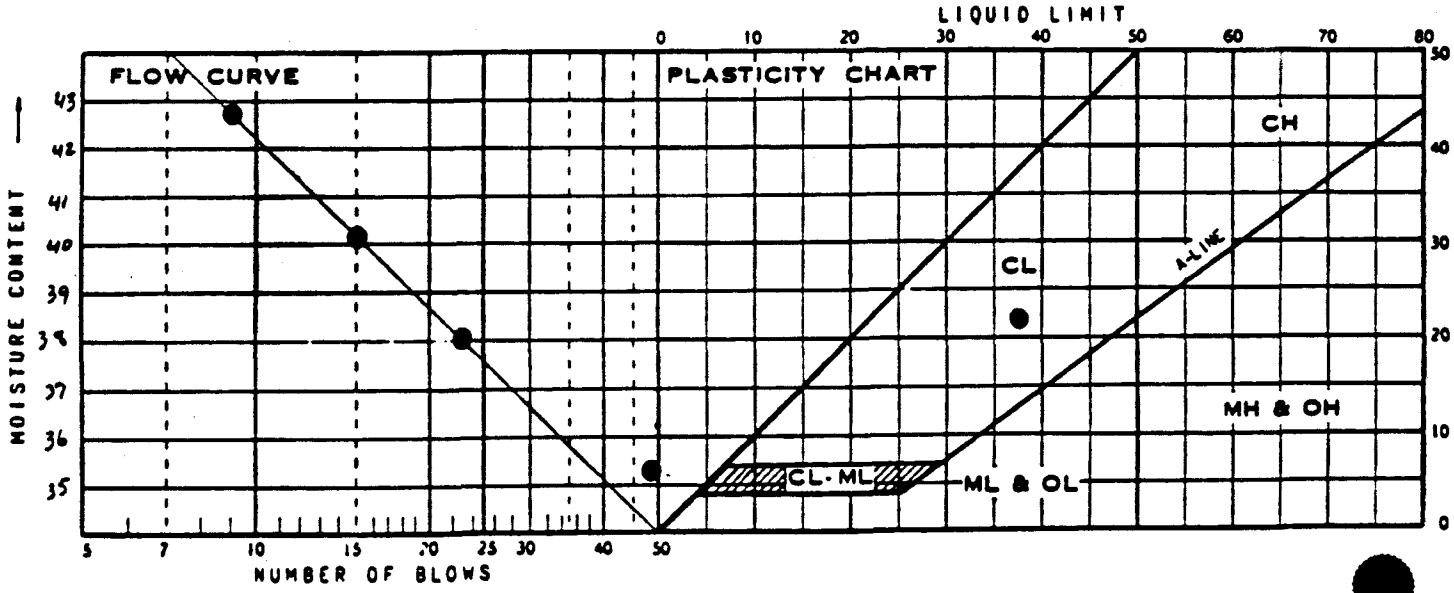
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DM 2/28/92

DETERMINATION	1	2	3	4	5	6
DISH	2036	2070	17C			
WT OF DISH + WET SOIL g	7.01	6.29	8.24			
WT OF DISH + DRY SOIL g	6.21	5.60	7.29	—	—	—
WT OF MOISTURE g	.80	.69	.95			
WT OF DISH g	1.06	1.07	1.05	—	—	—
WT OF DRY SOIL g	5.15	4.53	6.24			
MOISTURE CONTENT %	15.5	15.2	15.2			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2050	2029	2038	2058	2042	2030
NUMBER OF BLOWS	25	49	50	23	15	9
WT OF DISH + WET SOIL g	12.54	12.34	12.24	13.04	12.93	11.75
WT OF DISH + DRY SOIL g	9.49	9.40	9.27	9.73	9.53	8.55
WT OF MOISTURE g	3.05	2.94	2.97	3.31	3.40	3.20
WT OF DISH g	1.06	1.06	1.06	1.05	1.07	1.06
WT OF DRY SOIL g	8.43	8.34	8.21	8.68	8.46	7.49
MOISTURE CONTENT %	36.2	35.3	36.2	38.1	40.2	42.8



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		37.6	15.3	22.3	CL	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	12+00	SAMPLED	Rocky Flats
DEPTH	46'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	38.32
Wt. Dry Soil & Pan	(g)	37.10
Wt. Lost Moisture	(g)	1.22
Wt. of Pan Only	(g)	3.73
Wt. of Dry Soil	(g)	33.37
Moisture Content	%	3.7
Wt. Hydrom. Sample Wet	(g)	60.02
Wt. Hydrom. Sample Dry	(g)	57.90

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	2821.44
Weight of + #10 Before Washing (g)	2170.30
Weight of + #10 After Washing (g)	2147.77
Weight of - #10 Wet (g)	651.14
Weight of - #10 Dry (g)	649.91
Wt. Total Sample Dry (g)	2797.68
Calc. Wt. "W" (g)	249.24
Calc. Mass + #10	191.34

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	885.75	885.75	885.75	31.7	68.3
1 1/2"	0.00	823.07	823.07	1708.82	61.1	38.9
3/4"	0.00	166.09	166.09	1874.91	67.0	33.0
3/8"	0.00	122.73	122.73	1997.64	71.4	28.6
#4	0.00	79.64	79.64	2077.28	74.3	25.7
#10	0.00	70.49	70.49	2147.77	76.8	23.2
#20	1.55	7.96	6.41	6.41	79.3	20.7
#40	1.55	6.18	4.63	11.04	81.2	18.8
#60	1.56	4.98	3.42	14.46	82.6	17.4
#100	1.56	5.66	4.10	18.56	84.2	15.8
#230	1.56	8.67	7.11	25.67	87.1	12.9

Gravel (6%)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	12+00	SAMPLED	Rocky Flats
DEPTH	46'	DATE TESTED	02-24-92 TN
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

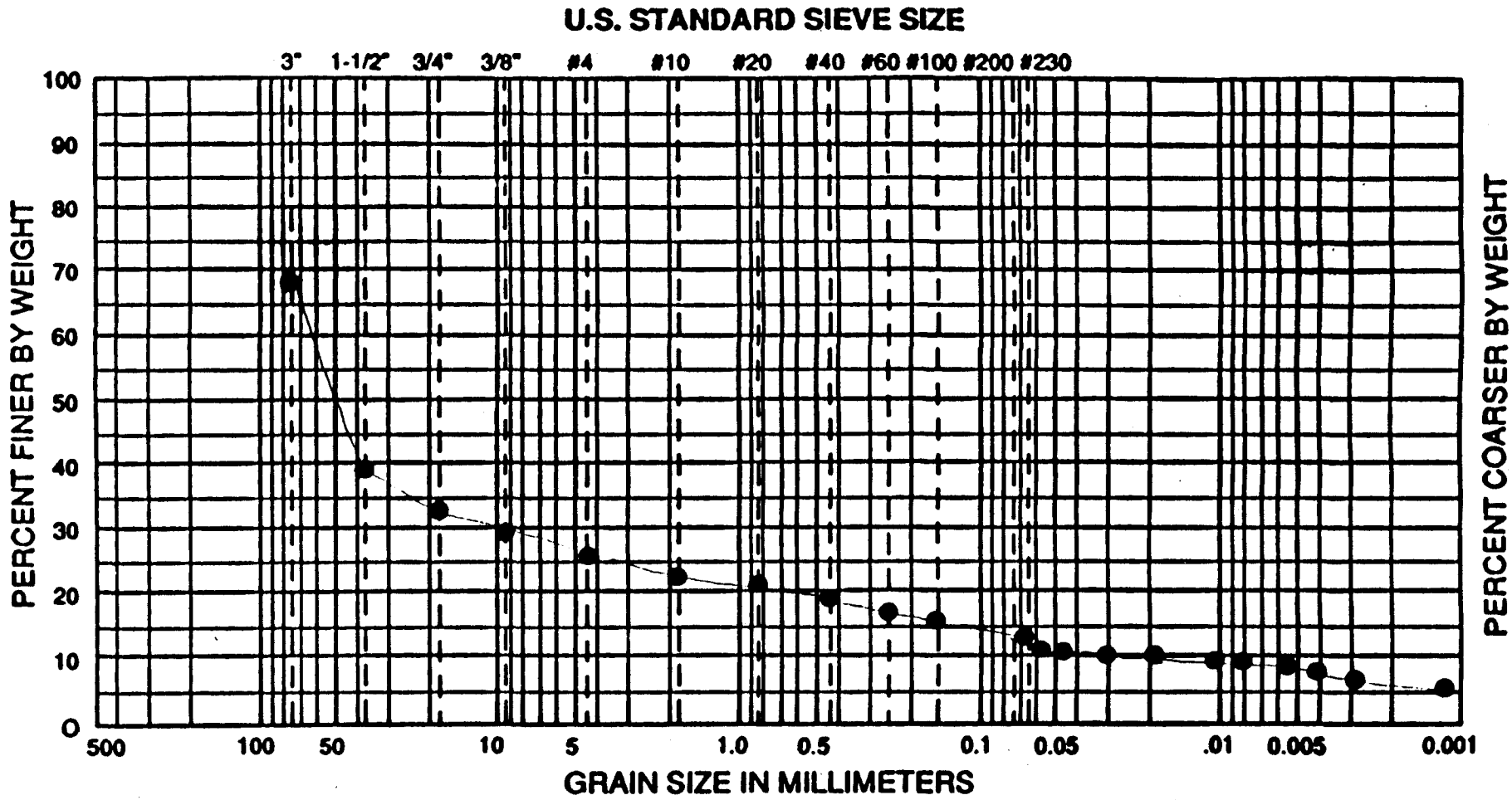
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.74	Temp. Coef. K	0.01298
Value of "a"	0.98	Wt. Dry Sample "W"	249.236
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	36.00	29.00	11.4	11.4	10.39	0.0592
1.0	34.00	27.00	10.6	10.6	10.71	0.0425
2.0	33.00	26.00	10.2	10.2	10.88	0.0303
5.0	32.00	25.00	9.9	9.9	11.04	0.0193
15.0	30.00	23.00	9.1	9.1	11.37	0.0113
30.0	29.00	22.00	8.7	8.7	11.53	0.0080
60.0	28.00	21.00	8.3	8.3	11.70	0.0057
120.0	27.00	20.00	7.9	7.9	11.86	0.0041
250.0	25.50	18.50	7.3	7.3	12.11	0.0029
1440.0	23.00	16.00	6.3	6.3	12.52	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 12+00 SAMPLE NO.: 5 DATE: 3/4/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION Gravel
Rocky Flats	416'	.7 10.9 1.4 6.4 3.4 | 8.8 12.3%

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats EG&G

BORING 12-00 SAMPLE CH #5 DEPTH 46'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

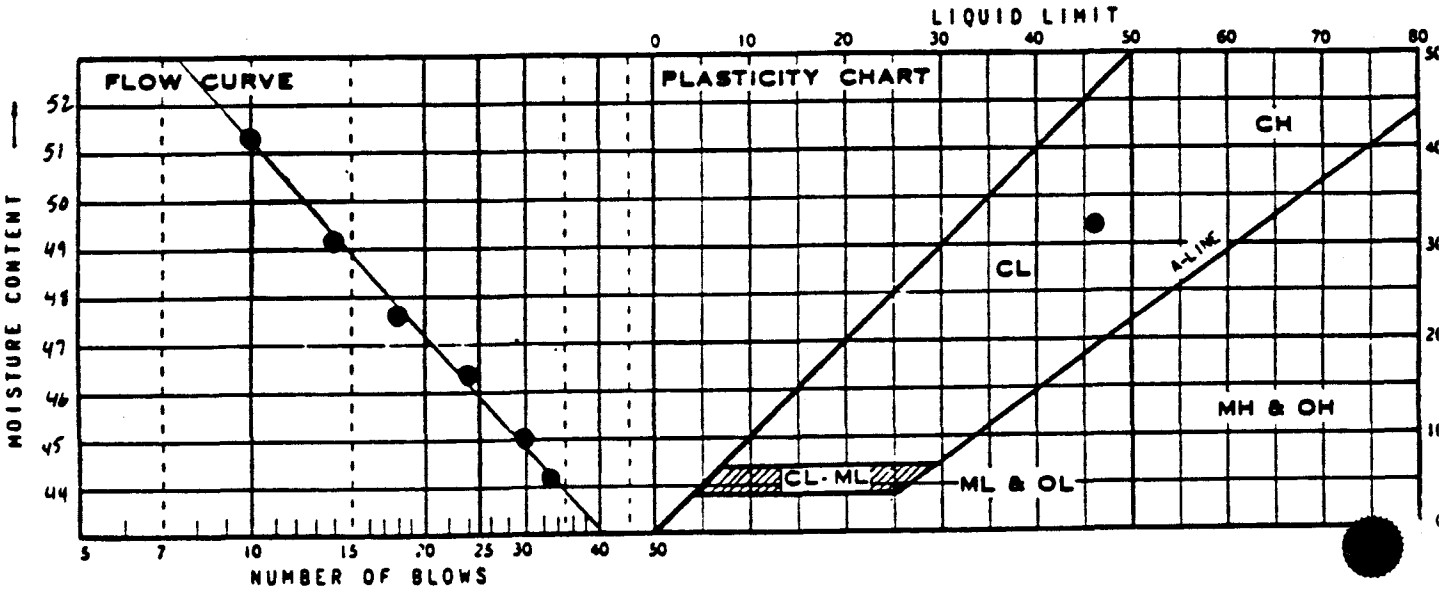
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY Dr. 2/28/92

DETERMINATION	1	2	3	4	5	6
DISH	54C	15C	2007			
WT OF DISH + WET SOIL g	7.97	6.38	8.01			
WT OF DISH + DRY SOIL g	7.11	5.76	7.16	—	—	—
WT OF MOISTURE g	.86	.62	.85			
WT OF DISH g	1.07	1.05	1.05	—	—	—
WT OF DRY SOIL g	6.04	4.71	6.11			
MOISTURE CONTENT %	14.2	13.2	13.9			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	58C	46C	3	2005	2028	2008
NUMBER OF BLOWS	33	30	24	18	14	10
WT OF DISH + WET SOIL g	12.99	11.97	11.92	12.92	12.58	12.74
WT OF DISH + DRY SOIL g	9.34	8.58	8.48	9.09	8.78	8.77
WT OF MOISTURE g	3.65	3.39	3.44	3.83	3.80	3.97
WT OF DISH g	1.09	1.060	1.09	1.05	1.05	1.04
WT OF DRY SOIL g	8.26	7.52	7.41	8.04	7.73	7.73
MOISTURE CONTENT %	44.2	45.1	46.4	47.7	49.2	51.4



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		45.9	13.8	32.1	CL	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	12+00	SAMPLED	Rocky Flats
DEPTH	49'	DATE TESTED	02-24-92 TN
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	60.31
Wt. Dry Soil & Pan	(g)	58.62
Wt. Lost Moisture	(g)	1.69
Wt. of Pan Only	(g)	3.76
Wt. of Dry Soil	(g)	54.86
Moisture Content	%	3.1
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	58.21

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	427.81
Weight of + #10 Before Washing (g)	12.36
Weight of + #10 After Washing (g)	0.67
Weight of - #10 Wet (g)	415.45
Weight of - #10 Dry (g)	414.37
Wt. Total Sample Dry (g)	415.04
Calc. Wt. "W" (g)	58.30
Calc. Mass + #10	0.09

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.54	0.54	0.54	0.1	99.9
#10	0.00	0.13	0.13	0.67	0.2	99.8
#20	1.56	1.63	0.07	0.07	0.3	99.7
#40	1.55	1.60	0.05	0.12	0.4	99.6
#60	1.55	1.62	0.07	0.19	0.5	99.5
#100	1.55	1.80	0.25	0.44	0.9	99.1
#230	1.56	16.07	14.51	14.95	25.8	74.2

SANDY CLAYEY SILT

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	12+00	SAMPLED	Rocky Flats
DEPTH	49'	DATE TESTED	02-24-92 TNT
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

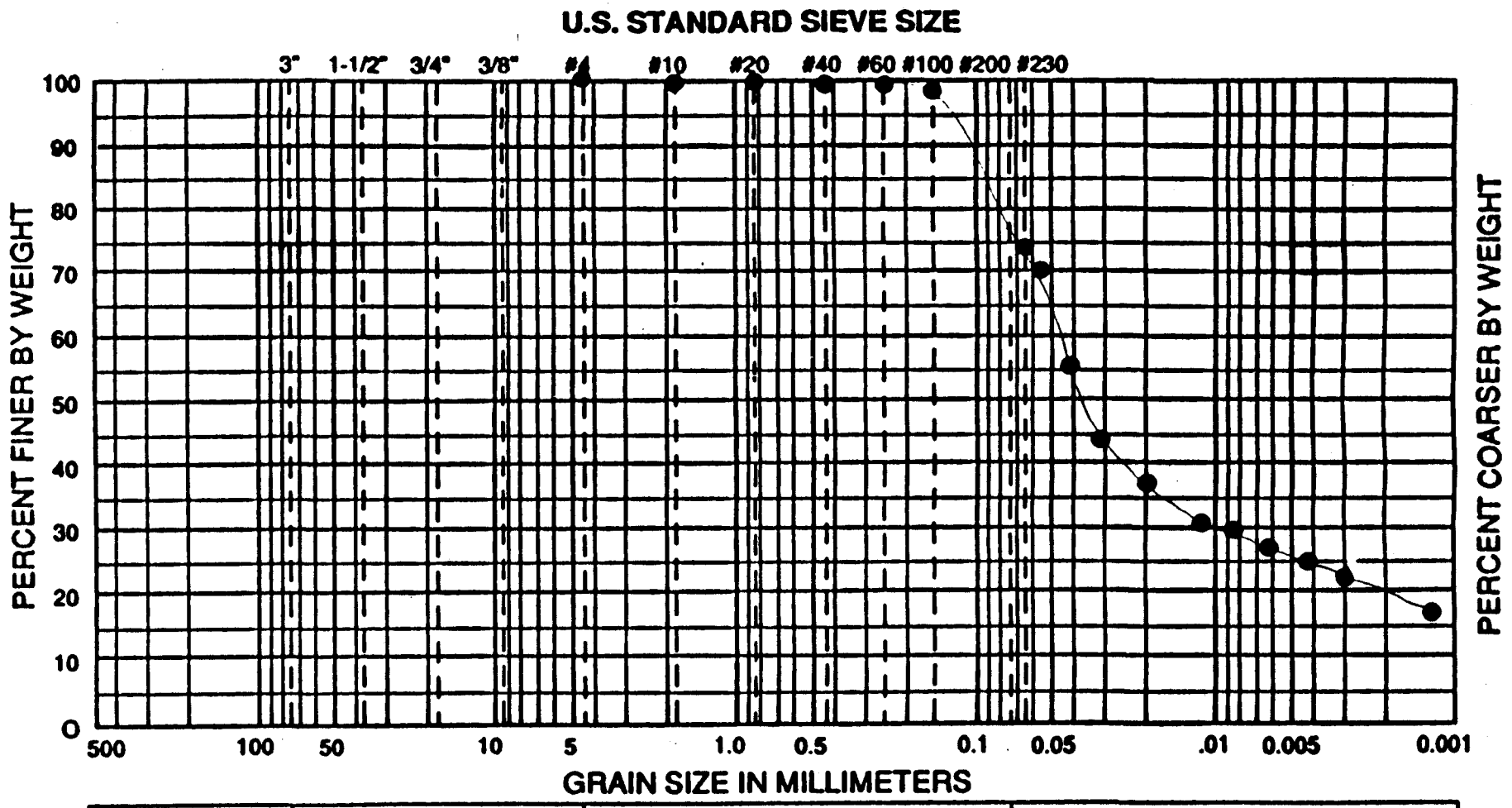
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.70	Temp. Coef. K	0.01328
Value of "a"	0.99	Wt. Dry Sample "W"	58.301
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	48.00	41.00	69.6	69.6	8.42	0.0545
1.0	40.00	33.00	56.0	56.0	9.73	0.0414
2.0	33.00	26.00	44.2	44.2	10.88	0.0310
5.0	29.00	22.00	37.4	37.4	11.53	0.0202
15.0	25.50	18.50	31.4	31.4	12.11	0.0119
30.0	24.50	17.50	29.7	29.7	12.27	0.0085
60.0	23.00	16.00	27.2	27.2	12.52	0.0061
120.0	21.50	14.50	24.6	24.6	12.76	0.0043
250.0	20.00	13.00	22.1	22.1	13.01	0.0030
1440.0	17.00	10.00	17.0	17.0	13.50	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 12+00 SAMPLE NO.: 5 DATE: 3/3/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	491'	

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Lexington

LOCATION Rocky Flats E&&G

BORING 12+90 SAMPLE 5 DEPTH @ 9.9'

FIELD DENSITY BY ...../...../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

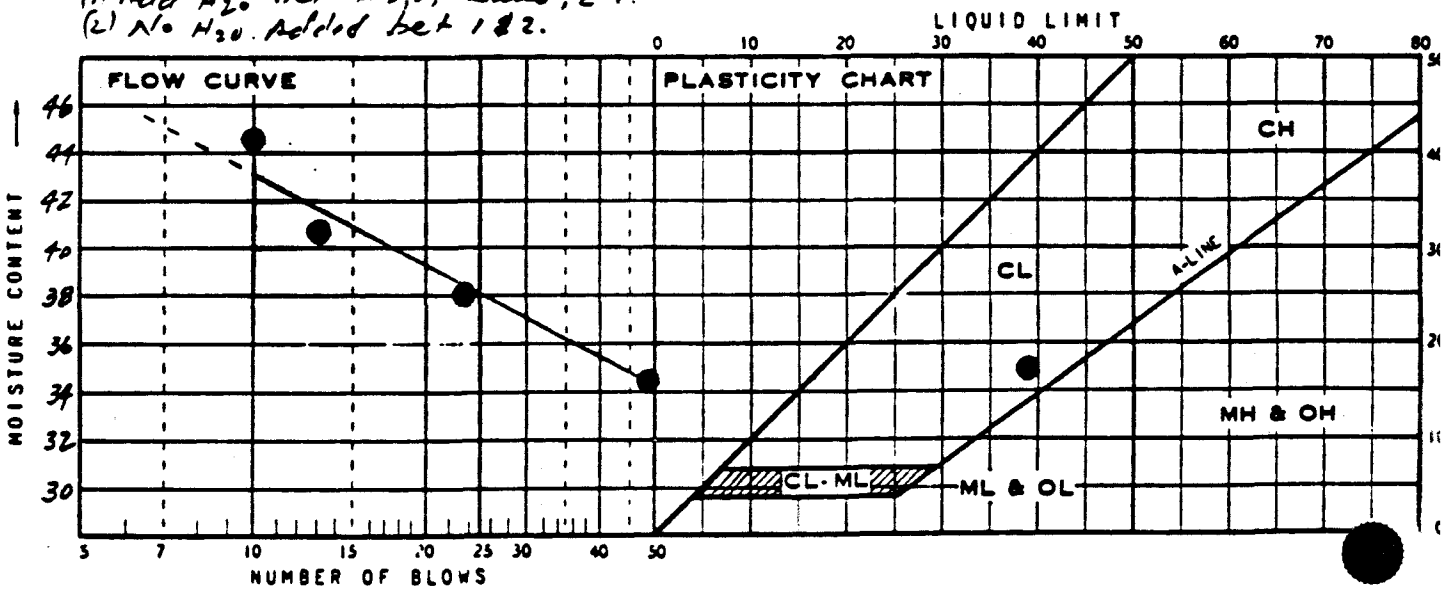
PLASTIC LIMIT BY EA 12/28/92

DETERMINATION	1	2	3	4	5	6
DISH	47C	7C	2003			
WT OF DISH + WET SOIL g	7.56	8.21	9.02			
WT OF DISH + DRY SOIL g	6.42	7.01	7.65	—	—	—
WT OF MOISTURE g	1.14	1.20	1.37			
WT OF DISH g	1.04	1.04	1.03	—	—	—
WT OF DRY SOIL g	5.38	5.97	6.62			
MOISTURE CONTENT %	21.19	20.10	20.69			

LIQUID LIMIT

DETERMINATION	1 (2)	2 (1)	3	4	5	6
DISH	27C	2064	2031	4C	2072	3C
NUMBER OF BLOWS	26	40	48	23	13	10
WT OF DISH + WET SOIL g	8.69	9.77	9.64	8.96	9.59	11.20
WT OF DISH + DRY SOIL g	6.54	7.59	7.44	6.78	7.07	8.13
WT OF MOISTURE g	1.85	2.18	2.20	2.18	2.52	3.15
WT OF DISH g	1.03	1.04	1.04	1.04	1.03	1.04
WT OF DRY SOIL g	5.51	6.55	6.40	5.74	6.04	7.09
MOISTURE CONTENT %	33.58	33.28	34.38	37.98	41.72	44.43

(1) Add H_2O bet #2,3, Runs, etc.
(2) No H_2O added bet 1 & 2.



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		38.1	20.7	17.4	CL	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston (BR)

JOB NO. 2066-03

BORING NO.	12+00	SAMPLED	Rocky Flats
DEPTH	53'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	61.35
Wt. Dry Soil & Pan	(g)	60.80
Wt. Lost Moisture	(g)	0.55
Wt. of Pan Only	(g)	3.82
Wt. of Dry Soil	(g)	56.98
Moisture Content	%	1.0
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	59.43

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	59.43
Wt. Total Sample Dry (g)	59.43
Calc. Wt. "W" (g)	59.43
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.56	1.57	0.01	0.01	0.0	100.0
#40	1.55	1.58	0.03	0.04	0.1	99.9
#60	1.55	2.10	0.55	0.59	1.0	99.0
#100	1.55	10.24	8.69	9.28	15.6	84.4
#230	1.55	32.06	30.51	39.79	67.0	33.0

SILTY SANDSTONE w/ [illegible] CLAY

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	12+00	SAMPLED	Rocky Flats
DEPTH	53'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

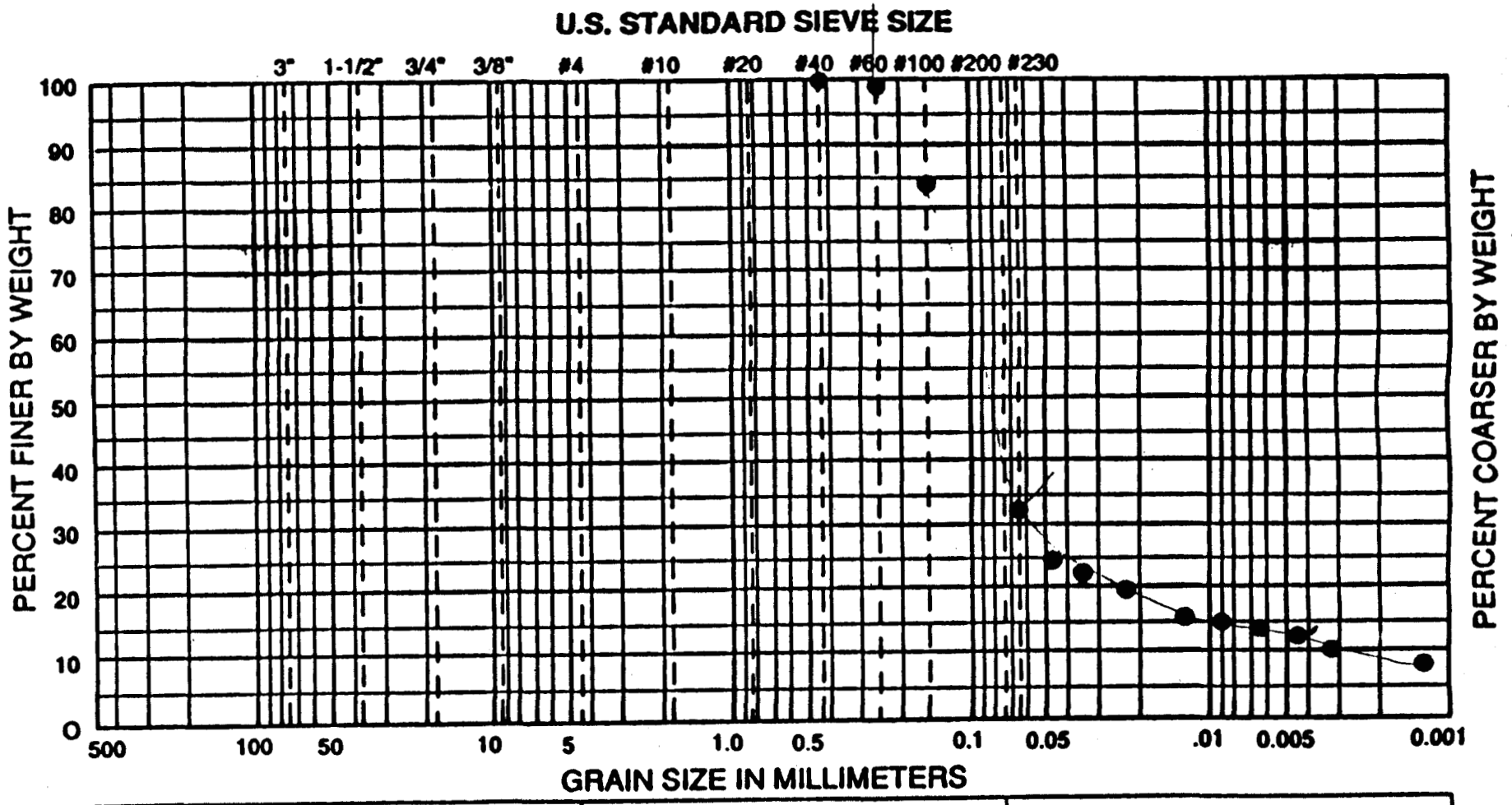
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.68	Temp. Coef. K	0.01336
Value of "a"	0.99	Wt. Dry Sample "W"	59.426
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	27.00	20.00	33.5	33.5	11.86	0.0651
1.0	21.50	14.50	24.3	24.3	12.76	0.0477
2.0	20.00	13.00	21.7	21.7	13.01	0.0341
5.0	18.50	11.50	19.2	19.2	13.26	0.0218
15.0	16.25	9.25	15.5	15.5	13.63	0.0127
30.0	16.00	9.00	15.1	15.1	13.67	0.0090
60.0	15.50	8.50	14.2	14.2	13.75	0.0064
120.0	14.50	7.50	12.5	12.5	13.91	0.0045
250.0	13.00	6.00	10.0	10.0	14.16	0.0032
1440.0	12.00	5.00	8.4	8.4	14.32	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 12+00 SAMPLE NO.: 5 DATE: 3/2/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION SILTY SANDstone w/some CLAY
Rocky Flats	53'	.1% C sd .9% m sd 66% f sd 20.5% SILT, 12.5% CLAY

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats EG&G

BORING 1200 SAMPLE #5 DEPTH 53'

FIELD DENSITY BY ..../..../....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

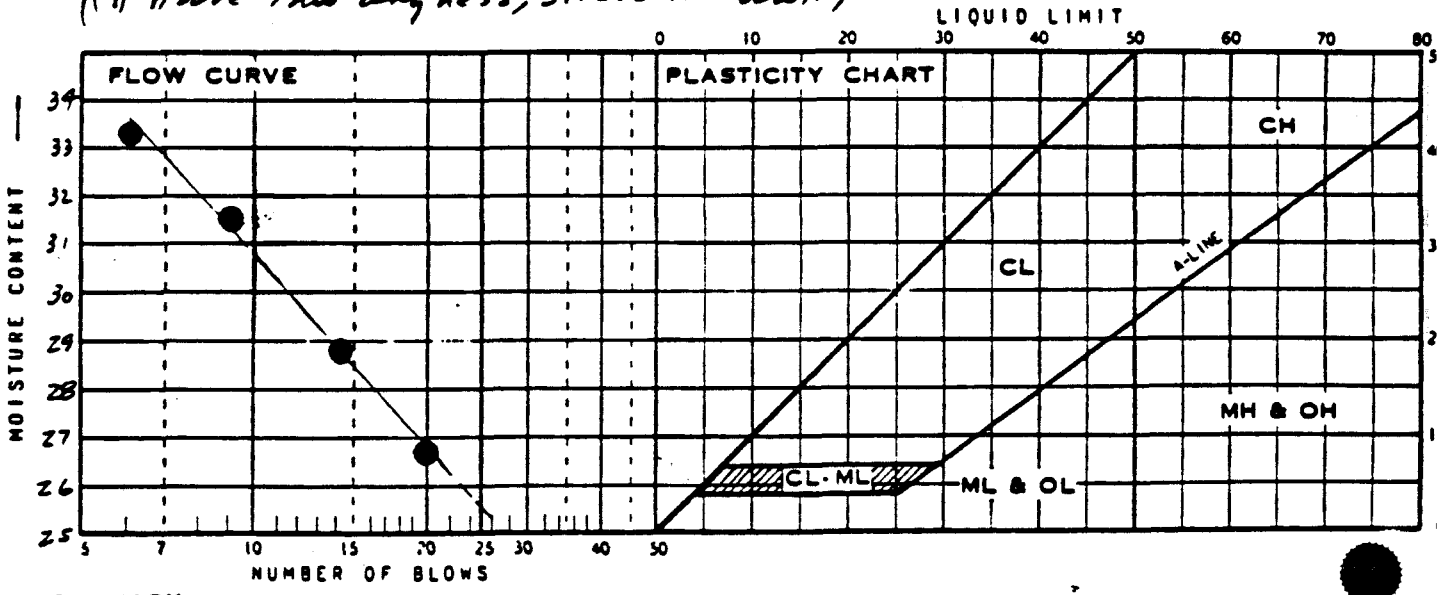
PLASTIC LIMIT BY [illegible] 2/20/92

DETERMINATION	1	2	3	4	5	6
DISH	42C	27C	206A			
WT OF DISH + WET SOIL	NP – (Rolls to ~ 1/8" wet / dry-ish & falls apart)					
WT OF DISH + DRY SOIL	—	(@ wetness @ 6 blows, will not roll)		—	—	—
WT OF MOISTURE						
WT OF DISH g	1.04	1.03	1.03	—	—	—
WT OF DRY SOIL						
MOISTURE CONTENT						

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	203S	19C	24C	35C	200S	7C
NUMBER OF BLOWS	20 ±(1)	19	9	6		
WT OF DISH + WET SOIL g	8.64	10.08	11.29	10.93		
WT OF DISH + DRY SOIL g	7.03	8.06	8.83	8.47	—	—
WT OF MOISTURE g	1.61	2.02	2.46	2.46		
WT OF DISH g	1.04	1.03	1.03	1.06	1.03	1.05
WT OF DRY SOIL g	5.99	7.03	7.80	7.41		
MOISTURE CONTENT %	26.9	28.7	31.5	33.2		

((1) Above thru dryness, slides in bowl.)



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		25.6 EST	—		NP	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	12+50	SAMPLED	Rocky Flats
DEPTH	40.5'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	65.13
Wt. Dry Soil & Pan	(g)	64.10
Wt. Lost Moisture	(g)	1.03
Wt. of Pan Only	(g)	3.70
Wt. of Dry Soil	(g)	60.40
Moisture Content	%	1.7

Wt. Hydrom. Sample Wet (g)	60.01
Wt. Hydrom. Sample Dry (g)	59.01

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	2474.35
Weight of + #10 Before Washing (g)	1751.19
Weight of + #10 After Washing (g)	1726.32
Weight of - #10 Wet (g)	723.16
Weight of - #10 Dry (g)	735.49
Wt. Total Sample Dry (g)	2461.81
Calc. Wt. "W" (g)	199.41
Calc. Mass + #10	140.40

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	1069.85	1069.85	1069.85	43.5	56.5
1 1/2"	0.00	270.76	270.76	1340.61	54.5	45.5
3/4"	0.00	257.32	257.32	1597.93	64.9	35.1
3/8"	0.00	68.10	68.10	1666.03	67.7	32.3
#4	0.00	35.64	35.64	1701.67	69.1	30.9
#10	0.00	31.65	31.65	1733.32	70.4	29.6
#20	1.55	5.85	4.30	4.30	72.6	27.4
#40	1.56	10.45	8.89	13.19	77.0	23.0
#60	1.58	11.60	10.02	23.21	82.0	18.0
#100	1.55	11.31	9.76	32.97	86.9	13.1
#230	1.55	8.22	6.67	39.64	90.3	9.7

Grow 1 (GM)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	12+50	SAMPLED	Rocky Flats
DEPTH	40.5'	DATE TESTED	02-24-92 TN
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

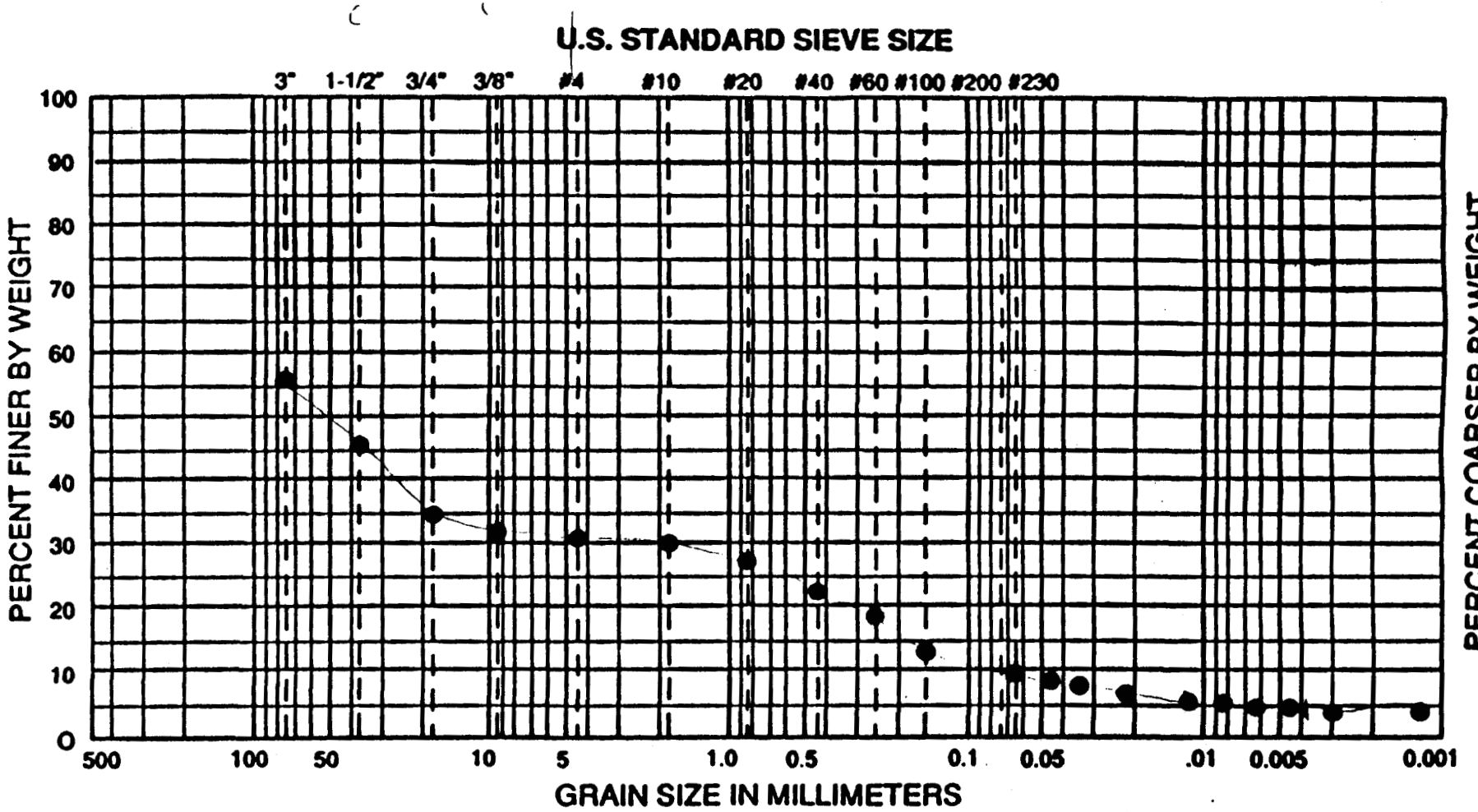
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01301
Value of "a"	0.98	Wt. Dry Sample "W"	199.407
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	24.00	17.00	8.4	8.4	12.35	0.0647
1.0	22.25	15.25	7.5	7.5	12.64	0.0463
2.0	22.00	15.00	7.4	7.4	12.68	0.0328
5.0	21.50	14.50	7.2	7.2	12.76	0.0208
15.0	19.50	12.50	6.2	6.2	13.09	0.0122
30.0	19.00	12.00	5.9	5.9	13.17	0.0086
60.0	18.50	11.50	5.7	5.7	13.26	0.0061
120.0	18.00	11.00	5.4	5.4	13.34	0.0043
250.0	16.25	9.25	4.6	4.6	13.63	0.0030
1440.0	15.00	8.00	3.9	3.9	13.83	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY	
		COARSE	FINE	COARSE	MEDIUM	FINE		
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 12+50 SAMPLE NO.: 5 DATE: 3/4/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION Gravel GM
Rocky Flats	40.5'	37.4 7.4 2.3 11.7 23.0 10.6 7.1
		43.5% Cobbles/ [illegible] 6.6 [illegible] 6 [illegible]

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats EG-G
BORING 12-50 SAMPLE CH #5 DEPTH 40.5'

FIELD DENSITY BY _____

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

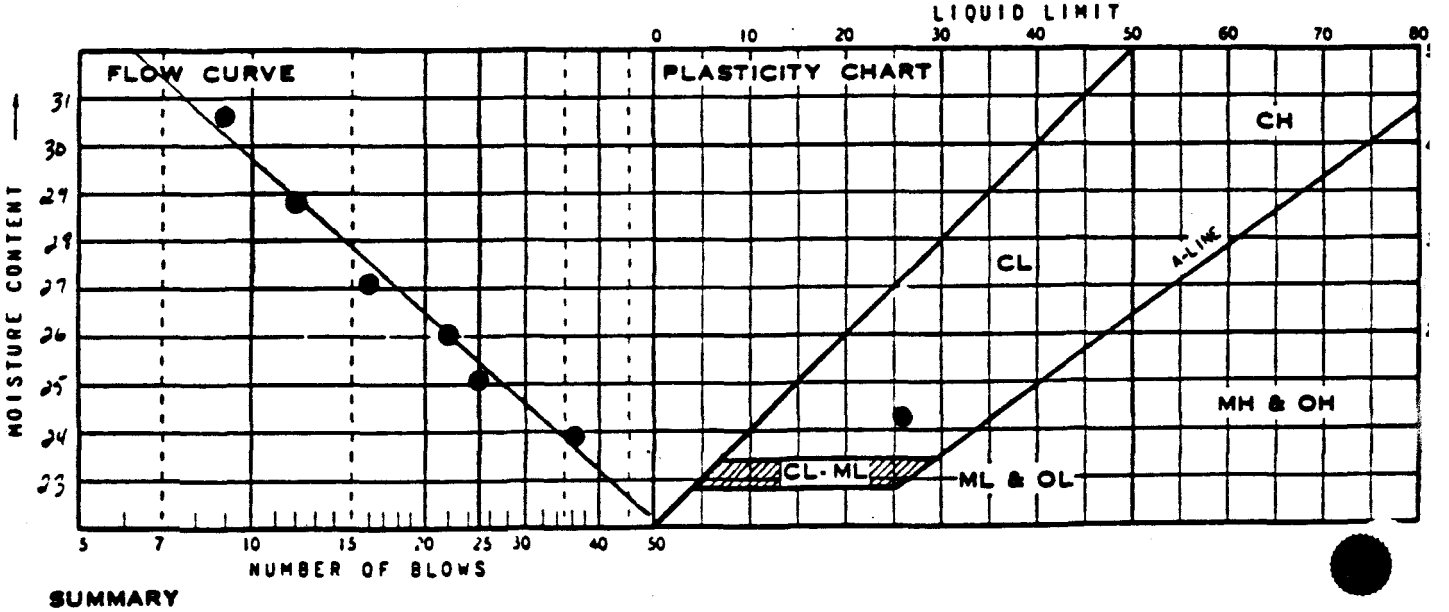
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY AA 2/28/94

DETERMINATION	1	2	3	4	5	6
DISH	34C	2068	2062			
WT OF DISH + WET SOIL g	6.75	8.70	9.18			
WT OF DISH + DRY SOIL g	6.06	7.74	8.15	—	—	—
WT OF MOISTURE g	.69	.96	1.03			
WT OF DISH g	1.04	1.05	1.04	—	—	—
WT OF DRY SOIL g	5.02	6.69	7.11			
MOISTURE CONTENT %	13.7	14.4	14.5			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	41C	2056	2073	2067	33C	10C
NUMBER OF BLOWS	24	36	25	22	16	12
WT OF DISH + WET SOIL g	13.72	14.30	12.57	14.63	15.68	17.3
WT OF DISH + DRY SOIL g	12.86	11.74	10.26	11.82	12.56	13.70
WT OF MOISTURE g	3.86	2.56	2.31	2.81	3.12	3.66
WT OF DISH g	1.04	1.05	1.05	1.04	1.06	1.05
WT OF DRY SOIL g	11.82	10.69	9.21	10.78	11.50	12.65
MOISTURE CONTENT %	24.2	23.9	25.1	26.1	27.1	28.9



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		25.5	14.2	11.3	CL	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

BR

CLIENT Weston

JOB NO. 2066-03

BORING NO.	12+50	SAMPLED	Rocky Flats
DEPTH	43.5'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	59.39
Wt. Dry Soil & Pan	(g)	58.50
Wt. Lost Moisture	(g)	0.89
Wt. of Pan Only	(g)	3.74
Wt. of Dry Soil	(g)	54.76
Moisture Content	%	1.6

Wt. Hydrom. Sample Wet (g)	60.00
Wt. Hydrom. Sample Dry (g)	59.04

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	59.04
Wt. Total Sample Dry (g)	59.04
Calc. Wt. "W" (g)	59.04
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.60	0.03	0.03	0.1	99.9
#40	1.57	1.63	0.06	0.09	0.2	99.8
#60	1.57	1.65	0.08	0.17	0.3	99.7
#100	1.57	2.04	0.47	0.64	1.1	98.9
#230	1.58	32.61	31.03	31.67	53.6	46.4

Clay - Silty Sandstone

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	12+50	SAMPLED	Rocky Flats
DEPTH	43.5'	DATE TESTED	02-24-92 TNU
SAMPLE NO.	#5	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

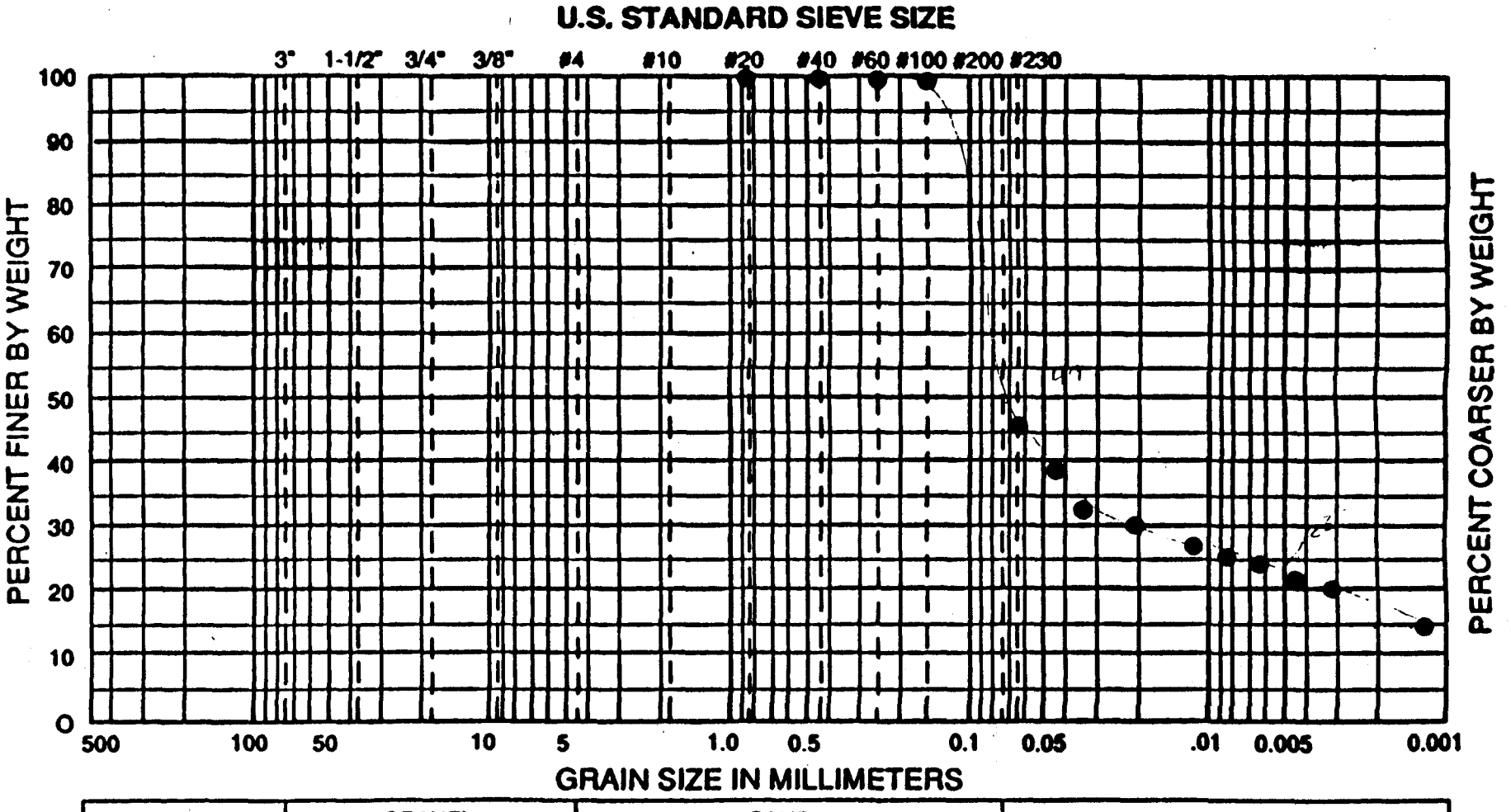
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.65	Temp. Coef. K	0.01348
Value of "a"	1.00	Wt. Dry Sample "W"	59.040
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	36.50	29.50	50.0	50.0	10.30	0.0612
1.0	29.50	22.50	38.1	38.1	11.45	0.0456
2.0	26.50	19.50	33.0	33.0	11.94	0.0329
5.0	24.50	17.50	29.6	29.6	12.27	0.0211
15.0	23.00	16.00	27.1	27.1	12.52	0.0123
30.0	22.50	15.50	26.3	26.3	12.60	0.0087
60.0	21.00	14.00	23.7	23.7	12.85	0.0062
120.0	20.00	13.00	22.0	22.0	13.01	0.0044
250.0	18.50	11.50	19.5	19.5	13.26	0.0031
1440.0	15.50	8.50	14.4	14.4	13.75	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 12+50 SAMPLE NO.: 5 DATE: 9/3/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION Sand
Rocky Flats	113.5'	25% SILT, 23% CLAY

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-C3
CLIENT/OWNER Weston
LOCATION Rocky Flats EG-G
BORING 12-SQ SAMPLE CH #5 DEPTH 43.5

FIELD DENSITY BY ...../../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

DETERMINATION	1	
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY Dun 2/28/92

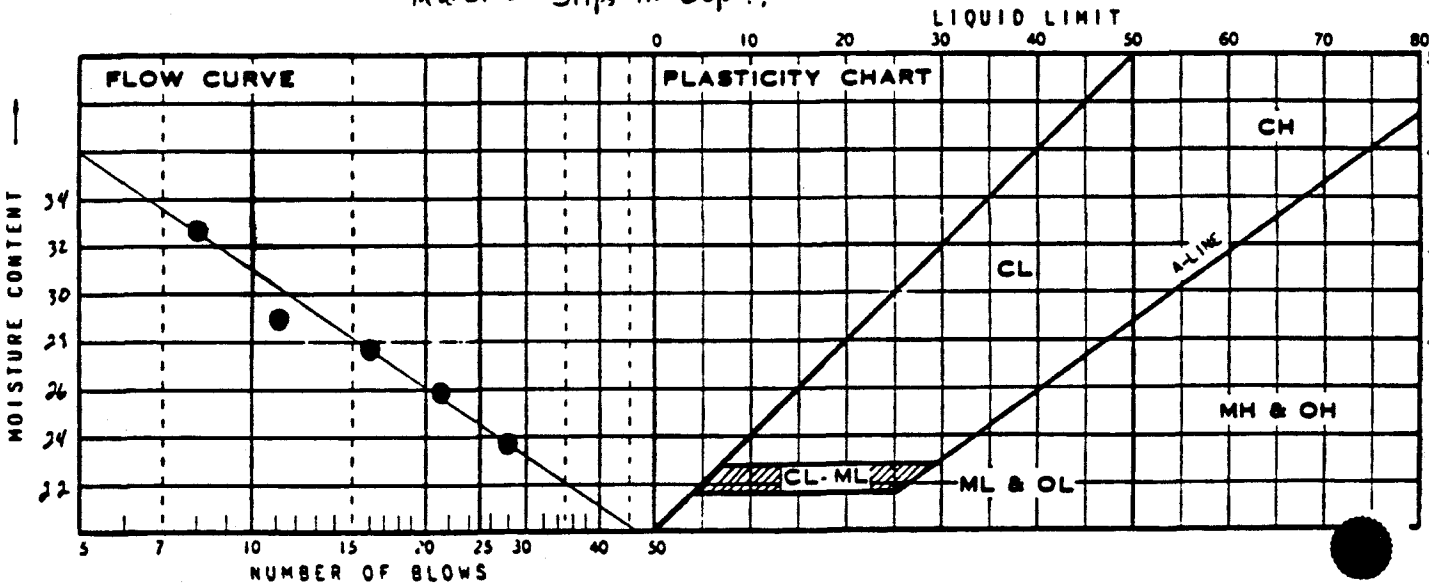
DETERMINATION	1	2	3	4	5	6
DISH						
WT OF DISH + WET SOIL						
WT OF DISH + DRY SOIL	—	—	—	—	—	—
WT OF MOISTURE						
WT OF DISH	—	—	—	—	—	—
WT OF DRY SOIL						
MOISTURE CONTENT						

Material Non-Plastic!! UNTESTABLE for Plastic Limits!!

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	31C	2065	2063	2027	2040	2009
NUMBER OF BLOWS	28	21	16	11	8	
WT OF DISH + WET SOIL	15.94	14.59	12.65	14.96	16.49	
WT OF DISH + DRY SOIL	13.09	11.79	10.13	11.83	12.68	—
WT OF MOISTURE	2.85	2.80	2.52	3.13	3.81	
WT OF DISH	1.05	1.04	1.06	1.05	1.04	1.04
WT OF DRY SOIL	12.04	10.75	9.01	10.78	11.64	
MOISTURE CONTENT	23.7	26.0	27.8	29.0	32.7	

Material Slips in cup!!



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		24.3			NP	

ADVANCED TERRA TESTING

RA

MECHANICAL ANALYSIS - SIEVE TEST DATA

BR

CLIENT Weston

JOB NO. 2066-03

BORING NO.	12+70	SAMPLED	Rocky Flats
DEPTH	55'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	51.41
Wt. Dry Soil & Pan	(g)	51.17
Wt. Lost Moisture	(g)	0.24
Wt. of Pan Only	(g)	3.76
Wt. of Dry Soil	(g)	47.41
Moisture Content	%	0.5
Wt. Hydrom. Sample Wet	(g)	58.93
Wt. Hydrom. Sample Dry	(g)	58.64

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	56.19
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	56.19
Weight of - #10 Dry (g)	55.91
Wt. Total Sample Dry (g)	55.91
Calc. Wt. "W" (g)	58.64
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.30	1.33	0.03	0.03	0.1	99.9
#40	1.57	1.65	0.08	0.11	0.2	99.8
#60	1.57	2.11	0.54	0.65	1.1	98.9
#100	1.57	6.12	4.55	5.20	8.9	91.1
#230	1.32	34.60	33.28	38.48	65.6	34.4

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Western

JOB NO. 2066-03

BORING NO.	12+70	SAMPLED	Rocky Flats/
DEPTH	55'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

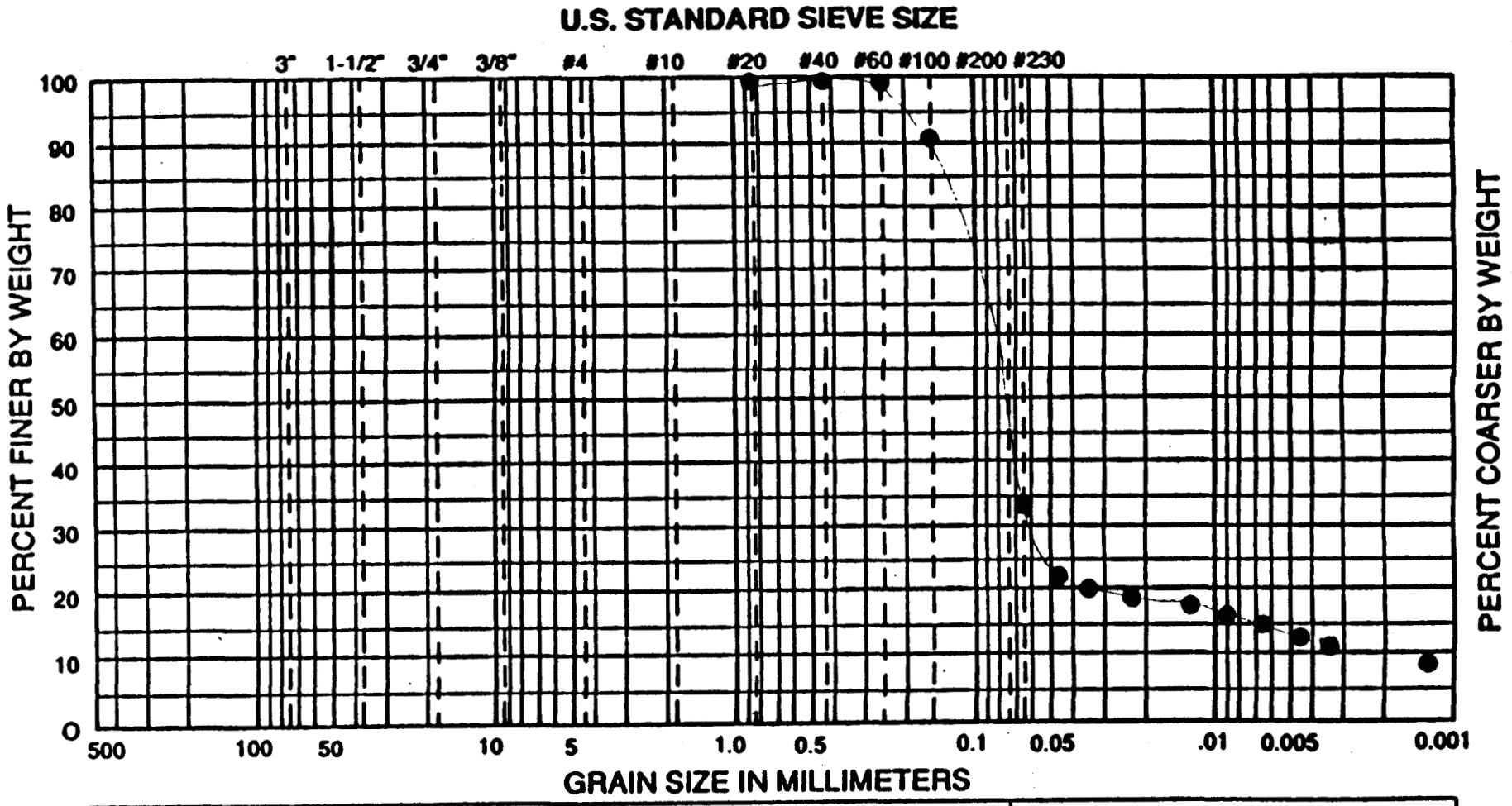
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.68	Temp. Coef. K	0.01336
Value of "a"	0.99	Wt. Dry Sample "W"	58.636
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	26.50	20.50	34.8	34.8	11.94	0.0653
1.0	20.00	14.00	23.7	23.7	13.01	0.0482
2.0	18.00	12.00	20.3	20.3	13.34	0.0345
5.0	16.75	10.75	18.2	18.2	13.54	0.0220
15.0	16.00	10.00	17.0	17.0	13.67	0.0128
30.0	15.50	9.50	16.1	16.1	13.75	0.0090
60.0	15.00	9.00	15.3	15.3	13.83	0.0064
120.0	14.00	8.00	13.6	13.6	13.99	0.0046
250.0	13.00	7.00	11.9	11.9	14.16	0.0032
1440.0	11.00	5.00	8.5	8.5	14.49	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 12+70 SAMPLE NO.: # 2 DATE: 2-21-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	55'	SILTY SAND STONE w/ some Clay
		Rocky Flat [illegible]

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats E.G.G
BORING 12-70 SAMPLE CH #2 DEPTH 55'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

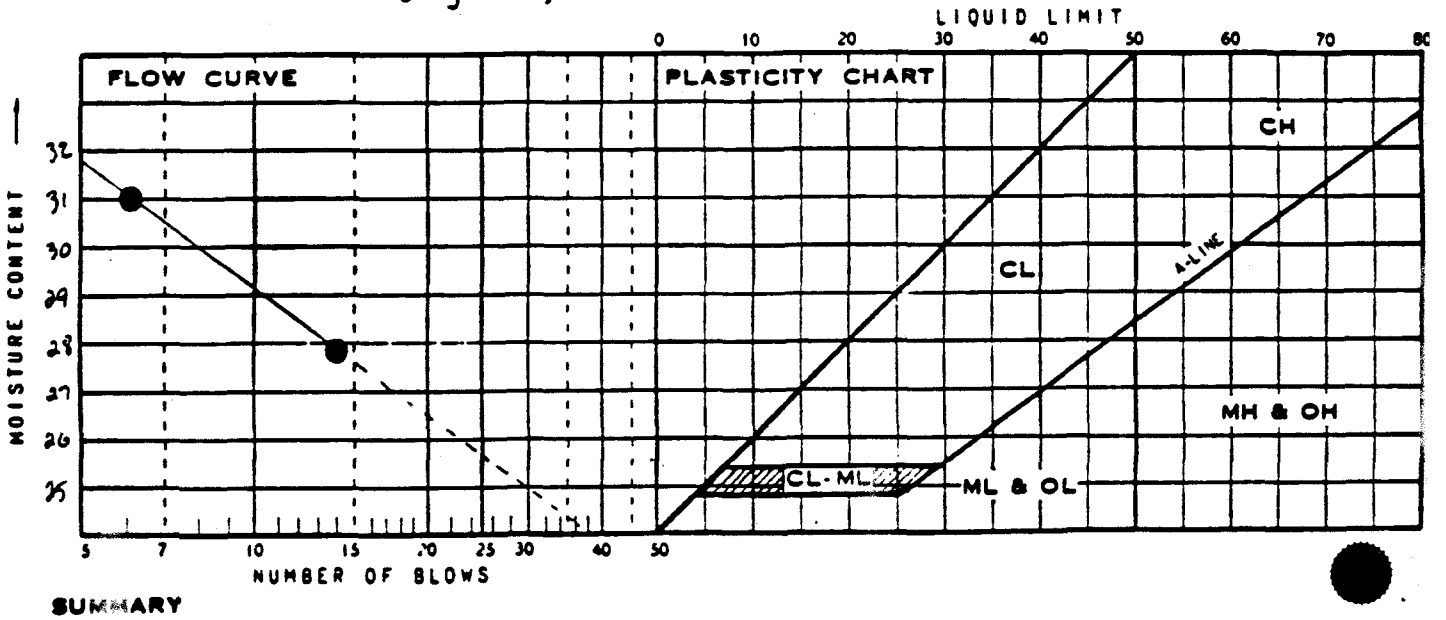
PLASTIC LIMIT BY DL 2/20/92

DETERMINATION	1	2	3	4	5	6
DISH						
WT OF DISH + WET SOIL g						
WT OF DISH + DRY SOIL g	—	—	—	—	—	—
WT OF MOISTURE g		non-PLASTIC!!				
WT OF DISH g	—	—	—	—	—	—
WT OF DRY SOIL g						
MOISTURE CONTENT %						

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2065	2022	2036			
NUMBER OF BLOWS	6	14	6			
WT OF DISH + WET SOIL g	17.17	18.22	15.96			
WT OF DISH + DRY SOIL g	14.16	14.49	13.43	—	—	—
WT OF MOISTURE g	3.01	3.75	3.53			
WT OF DISH g	1.04	1.05	1.04	—	—	—
WT OF DRY SOIL g	13.12	13.42	11.39			
MOISTURE CONTENT %	22.9	27.9	31.0			

Very sandy SLIPS in CUP



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		25.0	0.00			

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	13+00	SAMPLED	Rocky Flats
DEPTH	7'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	31.60
Wt. Dry Soil & Pan	(g)	30.70
Wt. Lost Moisture	(g)	0.90
Wt. of Pan Only	(g)	3.81
Wt. of Dry Soil	(g)	26.89
Moisture Content	%	3.3
Wt. Hydrom. Sample Wet	(g)	60.02
Wt. Hydrom. Sample Dry	(g)	58.08

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	342.73
Weight of + #10 Before Washing (g)	20.33
Weight of + #10 After Washing (g)	18.29
Weight of - #10 Wet (g)	322.40
Weight of - #10 Dry (g)	313.93
Wt. Total Sample Dry (g)	332.22
Calc. Wt. "W" (g)	61.46
Calc. Mass + #10	3.38

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	4.88	4.88	4.88	1.5	98.5
#4	0.00	7.09	7.09	11.97	3.6	96.4
#10	0.00	6.32	6.32	18.29	5.5	94.5
#20	1.56	2.88	1.32	1.32	7.7	92.3
#40	1.56	4.07	2.51	3.83	11.7	88.3
#60	1.56	6.35	4.79	8.62	19.5	80.5
#100	1.55	10.87	9.32	17.94	34.7	65.3
#230	1.56	12.41	10.85	28.79	52.3	47.7

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	13+00	SAMPLED	Rocky Flats/
DEPTH	7'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

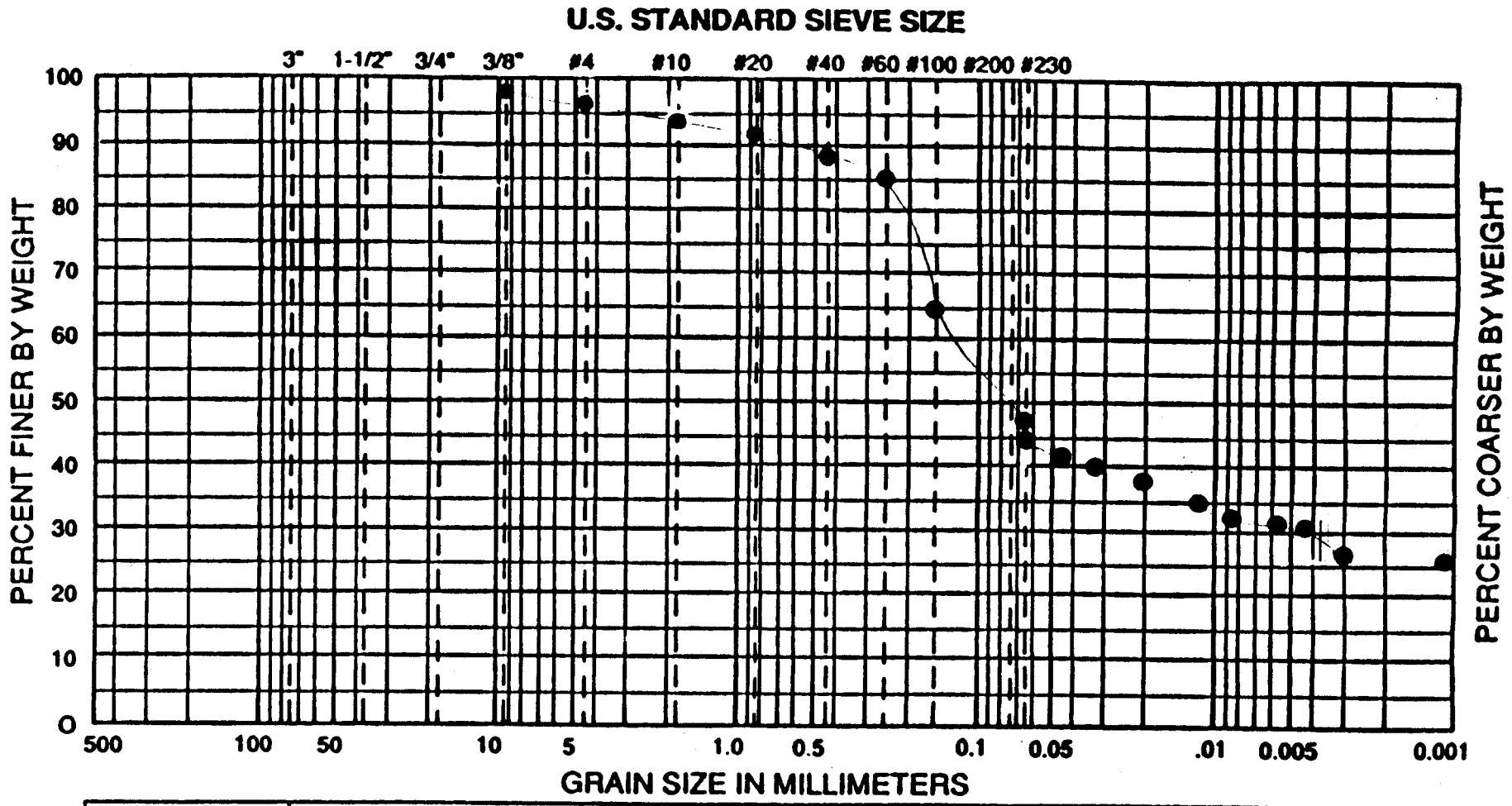
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.72	Temp. Coef. K	0.01324
Value of "a"	0.99	Wt. Dry Sample "W"	61.459
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	34.00	28.00	44.9	44.9	10.71	0.0613
1.0	32.00	26.00	41.7	41.7	11.04	0.0440
2.0	31.00	25.00	40.1	40.1	11.21	0.0313
5.0	29.00	23.00	36.9	36.9	11.53	0.0201
15.0	28.00	22.00	35.3	35.3	11.70	0.0117
30.0	26.50	20.50	32.9	32.9	11.94	0.0084
60.0	25.75	19.75	31.7	31.7	12.07	0.0059
120.0	25.00	19.00	30.5	30.5	12.19	0.0042
250.0	23.00	17.00	27.3	27.3	12.52	0.0030
1440.0	22.50	16.50	26.5	26.5	12.60	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 13+00 SAMPLE NO.: #2 DATE: 2-[illegible]-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	70'	CLAYEY SAND w/ some SILT TR GRAVEL [illegible]

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION _____

BORING 13+00 SAMPLE ____ DEPTH 7'

(2)

FIELD DENSITY BY ____

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

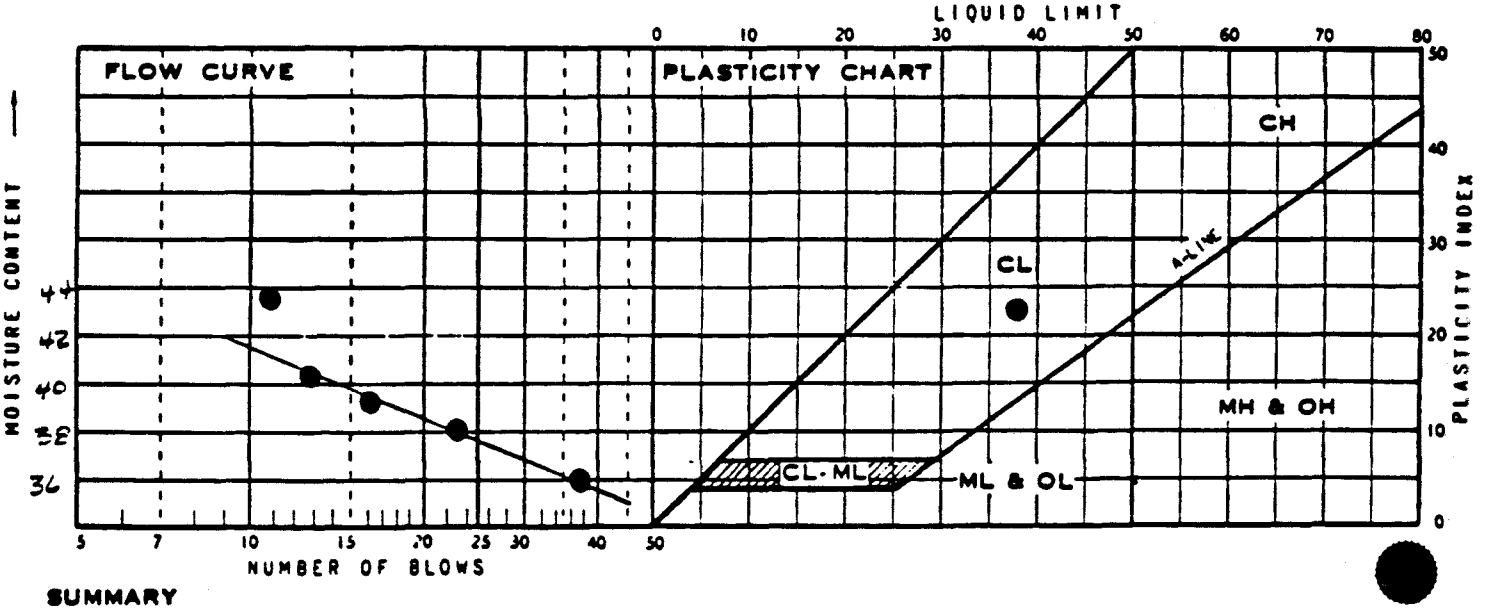
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 2/19/98

DETERMINATION	1	2	3	4	5	6
DISH	2022	2011	35C			
WT OF DISH + WET SOIL g	9.98	11.13	10.62			
WT OF DISH + DRY SOIL g	8.81	9.60	9.37	—	—	—
WT OF MOISTURE g	1.17	1.33	1.25			
WT OF DISH g	1.05	1.04	1.07	—	—	—
WT OF DRY SOIL g	7.76	8.76	8.30			
MOISTURE CONTENT %	15.0	15.2	15.0			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	20C	22	10C	4	2077	
NUMBER OF BLOWS	38	23±	16±	13±	11	
WT OF DISH + WET SOIL g	16.76	16.54	18.15	18.86	19.03	
WT OF DISH + DRY SOIL g	12.61	12.27	13.33	13.74	13.56	—
WT OF MOISTURE g	4.15	4.27	4.82	5.12	5.47	
WT OF DISH g	1.08	1.06	1.07	1.06	1.05	—
WT OF DRY SOIL g	11.53	11.21	12.26	12.68	12.51	
MOISTURE CONTENT %	36.0	38.1	39.3	40.4	43.7	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION
		37.8	15.0	22.8	CL

ADVANCED TERRA TESTING

Attachment A4-3
Geotechnical Analyses
Laboratory Reports

Phase III
RFI/RI Report

E

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	13+50	SAMPLED	Rocky Flats
DEPTH	1'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	56.62
Wt. Dry Soil & Pan	(g)	52.29
Wt. Lost Moisture	(g)	4.33
Wt. of Pan Only	(g)	3.65
Wt. of Dry Soil	(g)	48.64
Moisture Content	%	8.9
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	55.10

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	348.02
Weight of + #10 Before Washing (g)	20.00
Weight of + #10 After Washing (g)	2.66
Weight of - #10 Wet (g)	328.02
Weight of - #10 Dry (g)	317.13
Wt. Total Sample Dry (g)	319.79
Calc. Wt. "W" (g)	55.56
Calc. Mass + #10	0.46

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	1.02	1.02	1.02	0.3	99.7
#10	0.00	1.64	1.64	2.66	0.8	99.2
#20	1.57	1.83	0.26	0.26	1.3	98.7
#40	1.56	1.86	0.30	0.56	1.8	98.2
#60	1.58	1.87	0.29	0.85	2.4	97.6
#100	1.57	1.93	0.36	1.21	3.0	97.0
#230	1.56	2.34	0.78	1.99	4.4	95.6

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	13+50	SAMPLED	Rocky Flats/I
DEPTH	1'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

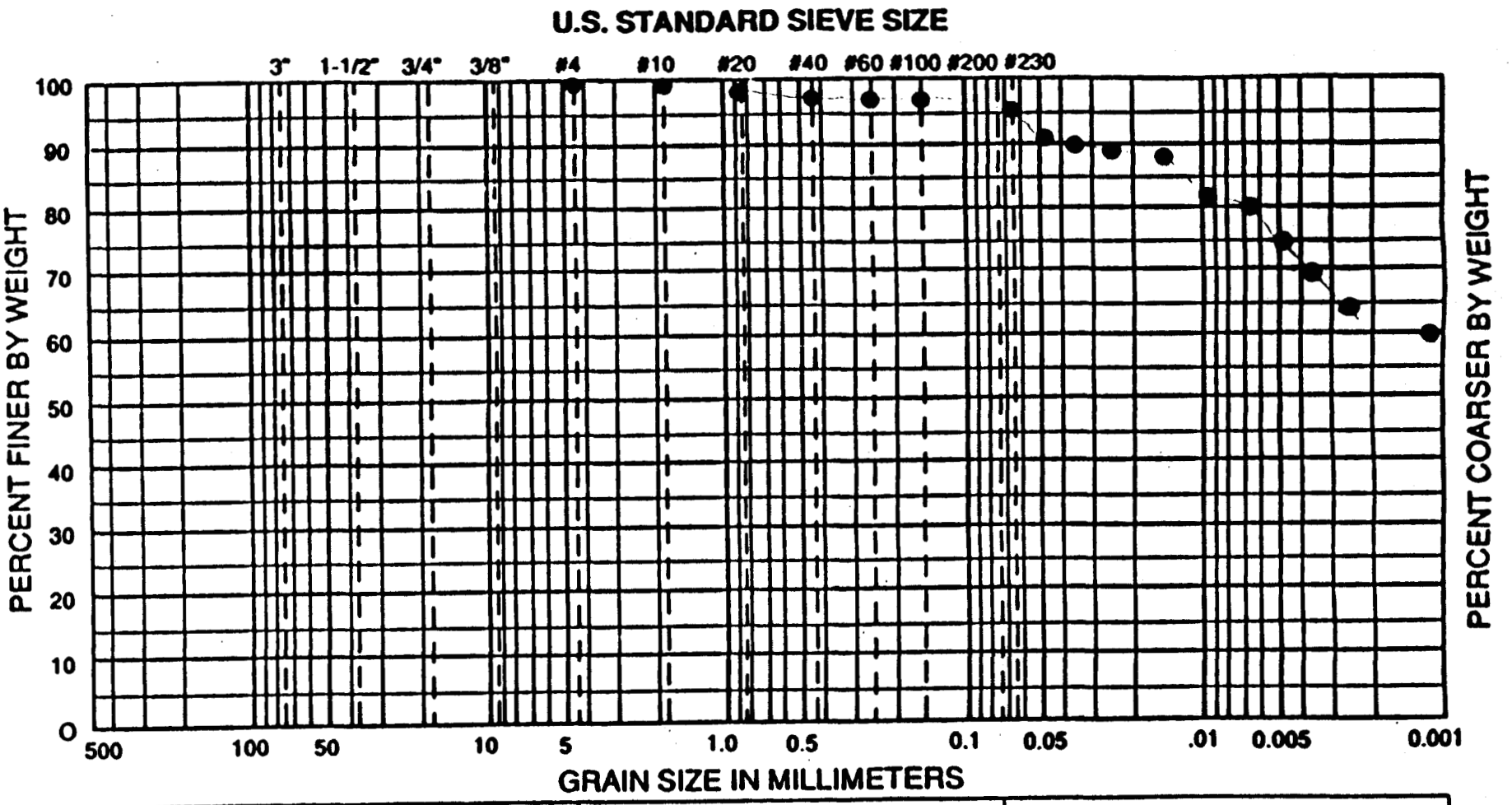
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01308
Value of "a"	0.99	Wt. Dry Sample "W"	55.557
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	57.50	51.50	91.6	91.6	6.86	0.0485
1.0	56.75	50.75	90.3	90.3	6.98	0.0346
2.0	56.50	50.50	89.8	89.8	7.02	0.0245
5.0	55.50	49.50	88.0	88.0	7.19	0.0157
15.0	53.00	47.00	83.6	83.6	7.60	0.0093
30.0	51.00	45.00	80.0	80.0	7.93	0.0067
60.0	48.50	42.50	75.6	75.6	8.34	0.0049
120.0	45.00	39.00	69.4	69.4	8.91	0.0036
250.0	42.00	36.00	64.0	64.0	9.40	0.0025
1440.0	40.00	34.00	60.5	60.5	9.73	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 13+50 SAMPLE NO.: #2 DATE: 2-22-92 PROJECT NO.:

AREA	DEPTH	SILTY CLAY w/ Trace SAND and gravels CLASSIFICATION (CH)
	10'	Rocky [illegible]

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats EG+G

BORING 13-50 SAMPLE CH-2 DEPTH 1'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

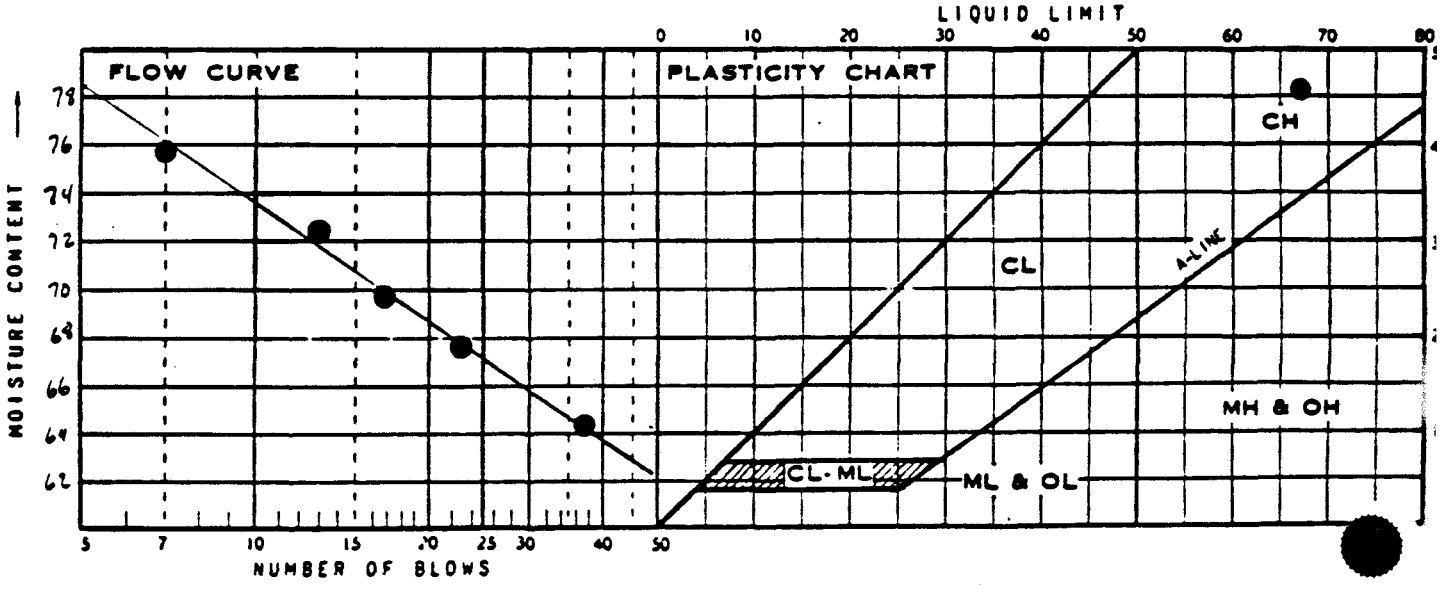
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY QA 2/20/92

DETERMINATION	1	2	3	4	5	6
DISH	2066	2067	2063			
WT OF DISH + WET SOIL g	6.92	7.41	5.91			
WT OF DISH + DRY SOIL g	5.87	6.27	5.10	—	—	—
WT OF MOISTURE g	1.05	1.14	.81			
WT OF DISH g	1.03	1.02	1.03	—	—	—
WT OF DRY SOIL g	4.84	5.25	4.07			
MOISTURE CONTENT %	21.7	21.7	19.9			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2069	2070	2071	2072	2073	2074
NUMBER OF BLOWS	37	23	17	13	7	
WT OF DISH + WET SOIL g	9.99	10.56	12.29	9.46	10.95	
WT OF DISH + DRY SOIL g	6.48	6.72	7.67	5.92	6.67	—
WT OF MOISTURE g	3.51	3.84	4.62	3.54	4.28	
WT OF DISH g	1.03	1.04	1.04	1.03	1.03	1.03
WT OF DRY SOIL g	5.45	5.68	6.63	4.89	5.64	
MOISTURE CONTENT %	64.4	67.6	69.7	72.4	75.8	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		67.2	21.7	45	CH	

ADVANCED TERRA TESTING

RR

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	13+50	SAMPLED	Rocky Flats
DEPTH	4.5'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	58.51
Wt. Dry Soil & Pan	(g)	56.06
Wt. Lost Moisture	(g)	2.45
Wt. of Pan Only	(g)	3.93
Wt. of Dry Soil	(g)	52.13
Moisture Content	%	4.7
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	57.31

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	384.03
Weight of + #10 Before Washing (g)	127.55
Weight of + #10 After Washing (g)	94.46
Weight of - #10 Wet (g)	256.48
Weight of - #10 Dry (g)	276.57
Wt. Total Sample Dry (g)	371.03
Calc. Wt. "W" (g)	76.88
Calc. Mass + #10	19.57

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	40.78	40.78	40.78	11.0	89.0
#4	0.00	28.54	28.54	69.32	18.7	81.3
#10	0.00	25.14	25.14	94.46	25.5	74.5
#20	1.56	5.38	3.82	3.82	30.4	69.6
#40	1.57	5.05	3.48	7.30	35.0	65.0
#60	1.56	5.75	4.19	11.49	40.4	59.6
#100	1.57	6.59	5.02	16.51	46.9	53.1
#230	1.30	6.88	5.58	22.09	54.2	45.8

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	13+50	SAMPLED	Rocky Flats/
DEPTH	4.5'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

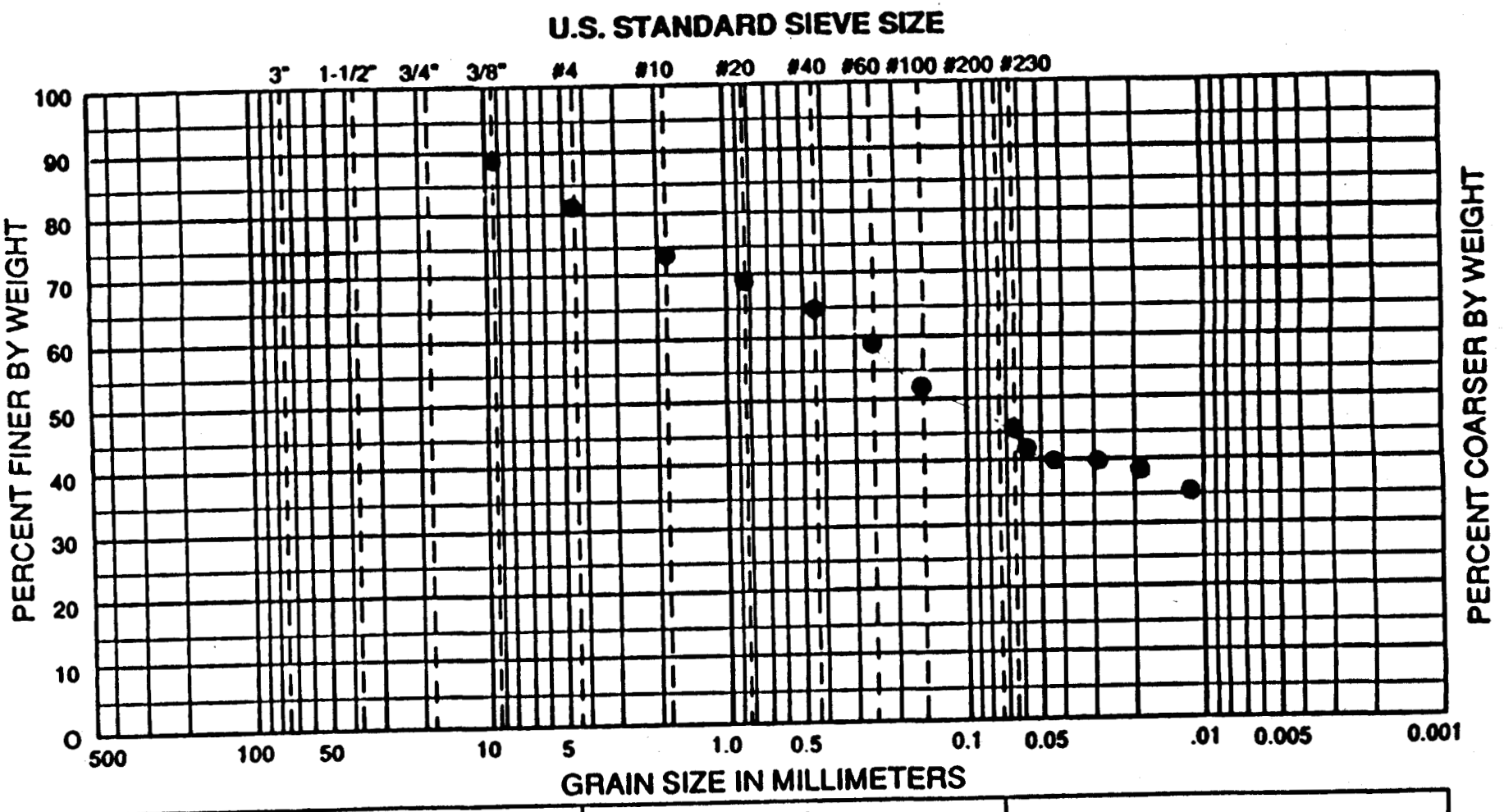
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.74	Temp. Coef. K	0.01313
Value of "a"	0.98	Wt. Dry Sample "W"	76.879
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	39.50	33.50	42.8	42.8	9.81	0.0582
1.0	38.00	32.00	40.9	40.9	10.06	0.0416
2.0	37.50	31.50	40.2	40.2	10.14	0.0296
5.0	36.00	30.00	38.3	38.3	10.39	0.0189
15.0	34.00	28.00	35.8	35.8	10.71	0.0111
30.0	33.00	27.00	34.5	34.5	10.88	0.0079
60.0	32.00	26.00	33.2	33.2	11.04	0.0056
120.0	30.50	24.50	31.3	31.3	11.29	0.0040
250.0	29.00	23.00	29.4	29.4	11.53	0.0028
1440.0	27.00	21.00	26.8	26.8	11.86	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 13+50 SAMPLE NO.: #2 DATE: 2-21-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	4.5'	CLAYEY SAND w/some SILT & GVL ROCKY FLATS

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION _____

BORING B-50 SAMPLE ____ DEPTH 4.5'

(2)

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

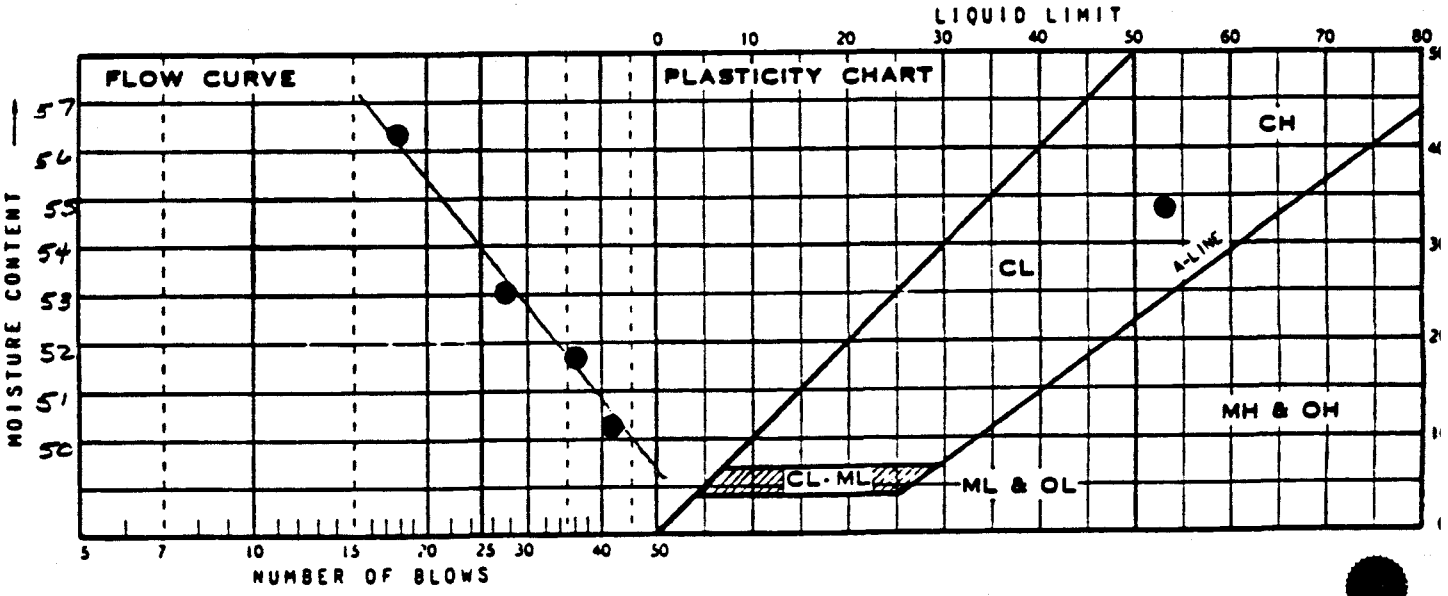
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR. 2/19/92.

DETERMINATION	1	2	3	4	5	6
DISH	2018	2003	2006			
WT OF DISH + WET SOIL g	9.72	8.42	8.09			
WT OF DISH + DRY SOIL g	8.28	7.17	7.68	—	—	—
WT OF MOISTURE g	1.44	1.25	1.31			
WT OF DISH g	1.04	1.03	1.04	—	—	—
WT OF DRY SOIL g	7.24	6.14	6.64			
MOISTURE CONTENT %	19.9	20.4	19.7			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2020	2026	2001	2025	2028	
NUMBER OF BLOWS	42	37	28	18	9	
WT OF DISH + WET SOIL g	16.42	10.54	11.86	14.80	14.65	
WT OF DISH + DRY SOIL g	11.41	7.30	8.11	9.85	8.77	—
WT OF MOISTURE g	5.21	3.24	3.75	4.95	5.88	
WT OF DISH g	1.04	1.03	1.05	1.05	1.04	—
WT OF DRY SOIL g	10.37	6.27	7.06	8.80	7.73	
MOISTURE CONTENT %	50.2	51.7	53.1	56.3	76.0	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		53.9	20.0	33.9	CH	

ADVANCED TERRA TESTING

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	13+50	SAMPLED	Rocky Flats
DEPTH	9.3'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	53.73
Wt. Dry Soil & Pan	(g)	51.64
Wt. Lost Moisture	(g)	2.09
Wt. of Pan Only	(g)	3.68
Wt. of Dry Soil	(g)	47.96
Moisture Content	%	4.4

Wt. Hydrom. Sample Wet (g)	60.00
Wt. Hydrom. Sample Dry (g)	57.50

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	365.34
Weight of + #10 Before Washing (g)	5.11
Weight of + #10 After Washing (g)	3.86
Weight of - #10 Wet (g)	360.23
Weight of - #10 Dry (g)	346.39
Wt. Total Sample Dry (g)	350.25
Calc. Wt. "W" (g)	58.14
Calc. Mass + #10	0.64

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	1.66	1.66	1.66	0.5	99.5
#10	0.00	2.20	2.20	3.86	1.1	98.9
#20	1.56	1.94	0.38	0.38	1.8	98.2
#40	1.56	2.56	1.00	1.38	3.5	96.5
#60	1.56	3.66	2.10	3.48	7.1	92.9
#100	1.57	5.43	3.86	7.34	13.7	86.3
#230	1.57	8.62	7.05	14.39	25.9	74.1

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	13+50	SAMPLED	Rocky Flats
DEPTH	9.3'	DATE TESTED	02-12-92 TNT
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

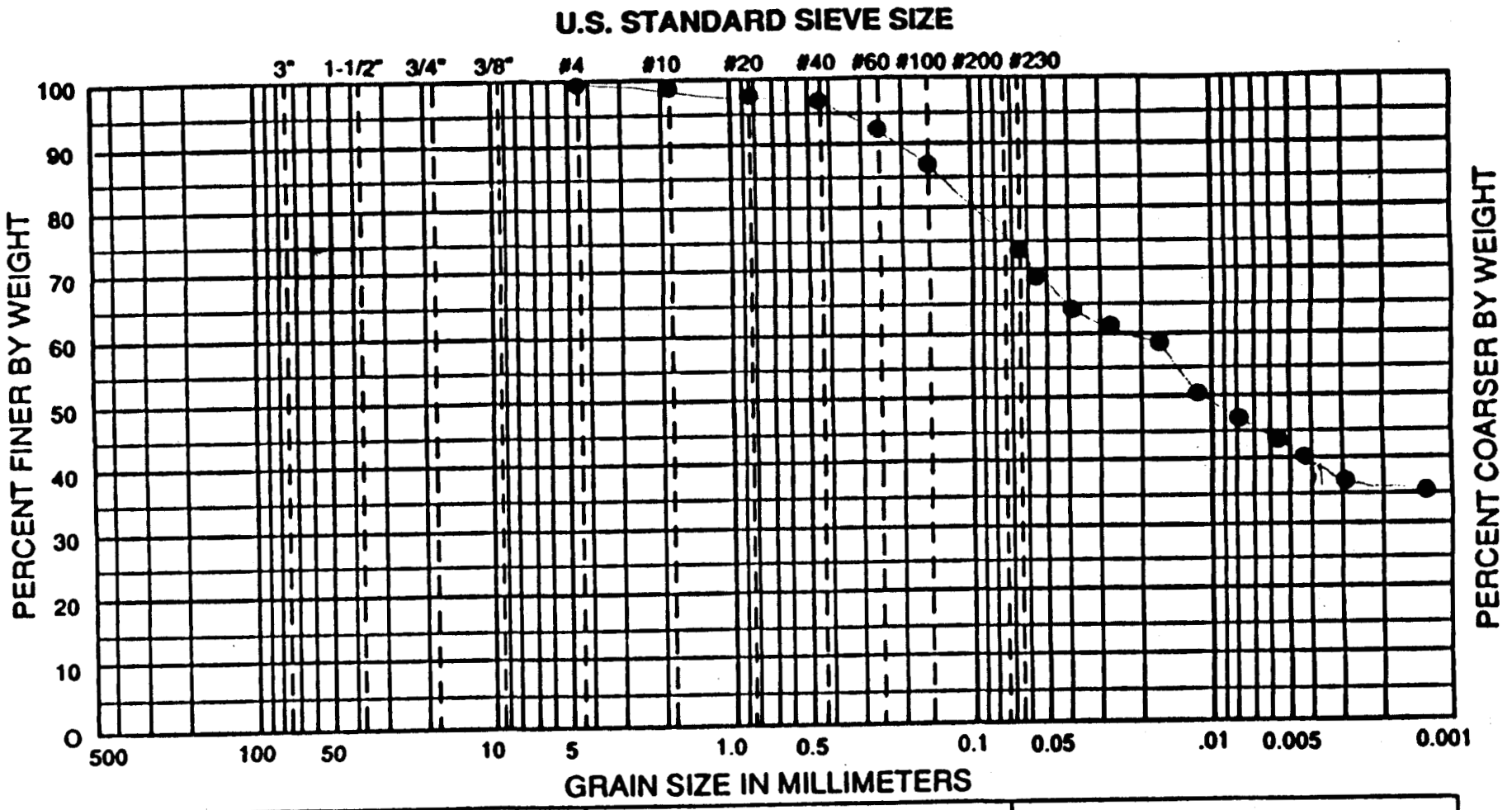
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.70	Temp. Coef. K	0.01328
Value of "a"	0.99	Wt. Dry Sample "W"	58.138
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	47.00	41.00	69.8	69.8	8.58	0.0550
1.0	44.50	38.50	65.6	65.6	8.99	0.0398
2.0	42.50	36.50	62.2	62.2	9.32	0.0287
5.0	41.00	35.00	59.6	59.6	9.57	0.0184
15.0	36.00	30.00	51.1	51.1	10.39	0.0111
30.0	34.00	28.00	47.7	47.7	10.71	0.0079
60.0	32.00	26.00	44.3	44.3	11.04	0.0057
120.0	30.00	24.00	40.9	40.9	11.37	0.0041
250.0	28.00	22.00	37.5	37.5	11.70	0.0029
1440.0	27.00	21.00	35.8	35.8	11.86	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 13+50 SAMPLE NO.: #2 DATE: 2-22-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION SILTY CLAY w/ little SAND, trace GVL
	0.3'	Rocky Flats

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2046-03

CLIENT/OWNER LEWISTON

LOCATION

BORING 13+50 SAMPLE ____ DEPTH 9.3'

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

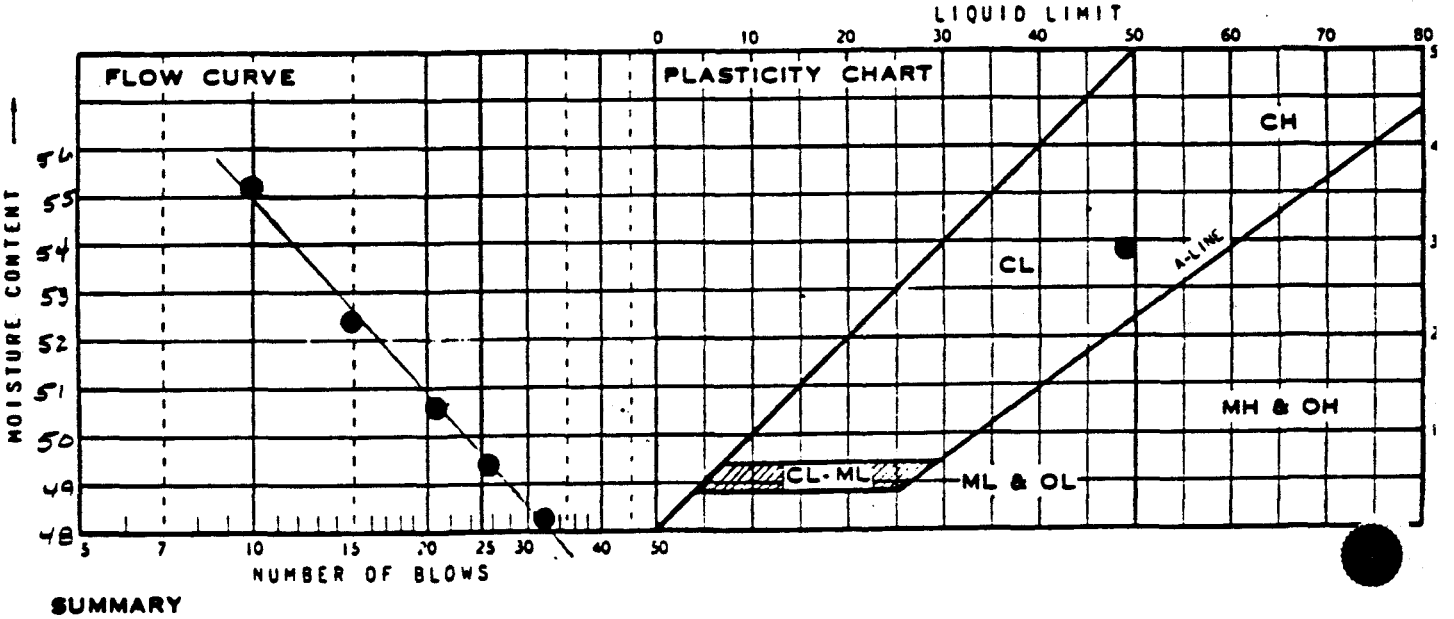
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 2/19/98

DETERMINATION	1	2	3	4	5	6
DISH	2014	2033	2045			
WT OF DISH + WET SOIL g	9.52	11.91	10.09			
WT OF DISH + DRY SOIL g	8.06	10.17	8.53	—	—	—
WT OF MOISTURE g	1.46	1.74	1.56			
WT OF DISH g	1.07	1.03	1.05	—	—	—
WT OF DRY SOIL g	6.99	9.14	7.48			
MOISTURE CONTENT %	20.9	19.0	20.9			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2007	2013	2009	2024	2036	
NUMBER OF BLOWS	32	26	22	15	10	
WT OF DISH + WET SOIL g	20.36	17.37	16.16	18.58	16.33	
WT OF DISH + DRY SOIL g	14.08	11.99	11.08	12.55	10.89	—
WT OF MOISTURE g	6.28	5.40	5.08	6.03	5.44	
WT OF DISH g	1.05	1.05	1.06	1.04	1.04	—
WT OF DRY SOIL g	13.03	10.94	10.02	11.51	9.85	
MOISTURE CONTENT %	48.2	49.4	50.7	52.4	55.2	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		49%	20	29	CL	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	13+50	SAMPLED	Rocky Flats
DEPTH	12.5'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	54.18
Wt. Dry Soil & Pan	(g)	53.28
Wt. Lost Moisture	(g)	0.90
Wt. of Pan Only	(g)	3.78
Wt. of Dry Soil	(g)	49.50
Moisture Content	%	1.8
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	58.93

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	298.82
Weight of + #10 Before Washing (g)	52.46
Weight of + #10 After Washing (g)	47.40
Weight of - #10 Wet (g)	246.36
Weight of - #10 Dry (g)	246.93
Wt. Total Sample Dry (g)	294.33
Calc. Wt. "W" (g)	70.24
Calc. Mass + #10	11.31

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	14.49	14.49	14.49	4.9	95.1
3/8"	0.00	5.05	5.05	19.54	6.6	93.4
#4	0.00	14.93	14.93	34.47	11.7	88.3
#10	0.00	12.93	12.93	47.40	16.1	83.9
#20	1.57	4.79	3.22	3.22	20.7	79.3
#40	1.55	3.56	2.01	5.23	23.6	76.4
#60	1.55	4.31	2.76	7.99	27.5	72.5
#100	1.54	5.46	3.92	11.91	33.1	66.9
#230	1.56	6.70	5.14	17.05	40.4	59.6

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	13+50	SAMPLED	Rocky Flats/
DEPTH	12.5'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

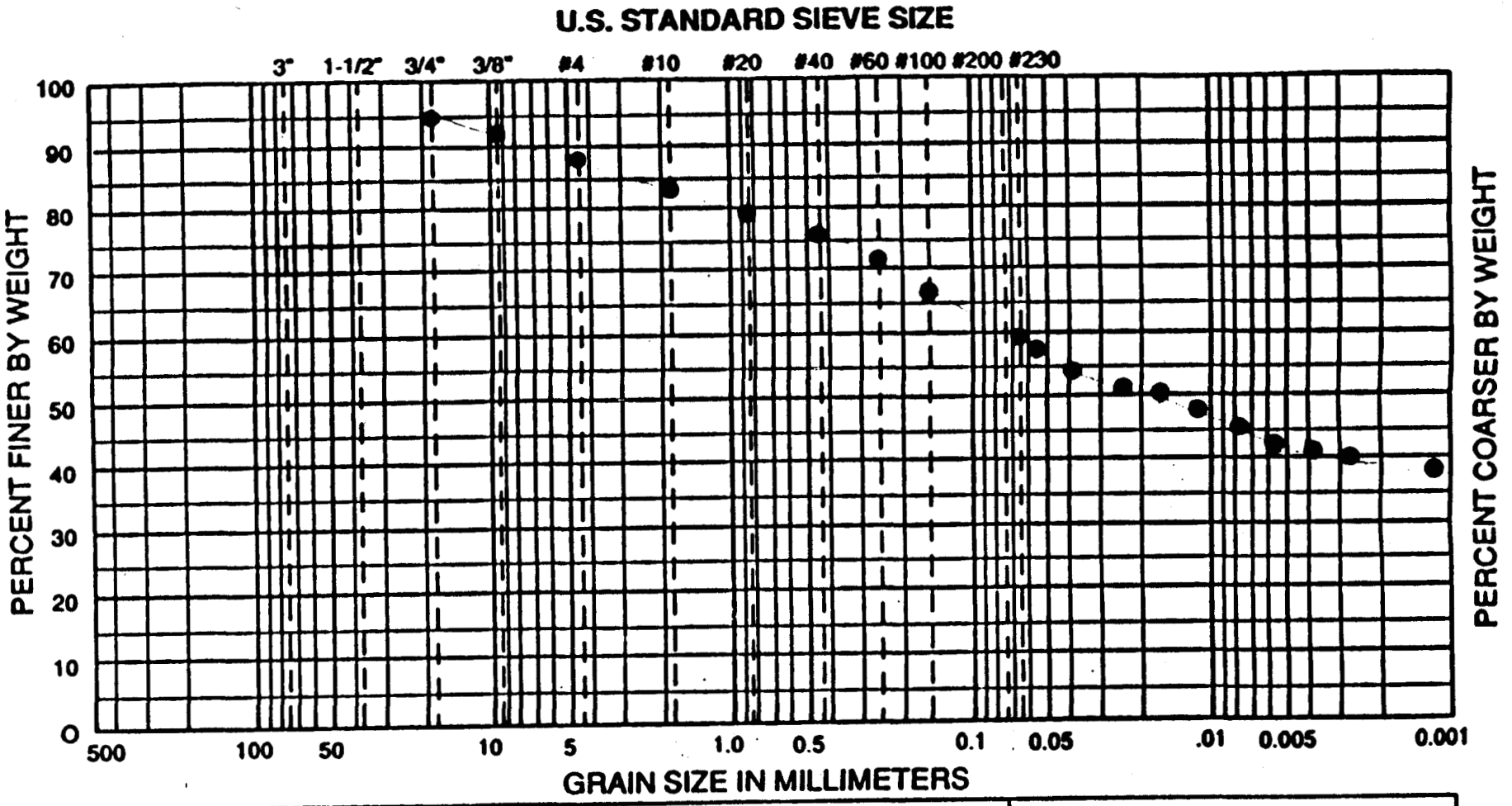
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.70	Temp. Coef. K	0.01328
Value of "a"	0.99	Wt. Dry Sample "W"	70.240
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	46.50	40.50	57.1	57.1	8.66	0.0553
1.0	44.50	38.50	54.3	54.3	8.99	0.0398
2.0	43.50	37.50	52.9	52.9	9.16	0.0284
5.0	42.00	36.00	50.7	50.7	9.40	0.0182
15.0	40.00	34.00	47.9	47.9	9.73	0.0107
30.0	38.50	32.50	45.8	45.8	9.98	0.0077
60.0	37.00	31.00	43.7	43.7	10.22	0.0055
120.0	36.00	30.00	42.3	42.3	10.39	0.0039
250.0	35.00	29.00	40.9	40.9	10.55	0.0027
1440.0	33.00	27.00	38.1	38.1	10.88	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 13+50 SAMPLE NO.: #2 DATE: 2-21-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	12.5'	SANDY CLAY w/ some silt & Gravel Rocky Flats 20" 40%

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER [illegible]

LOCATION _____

BORING 13+50 SAMPLE ____ DEPTH 12.5'

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

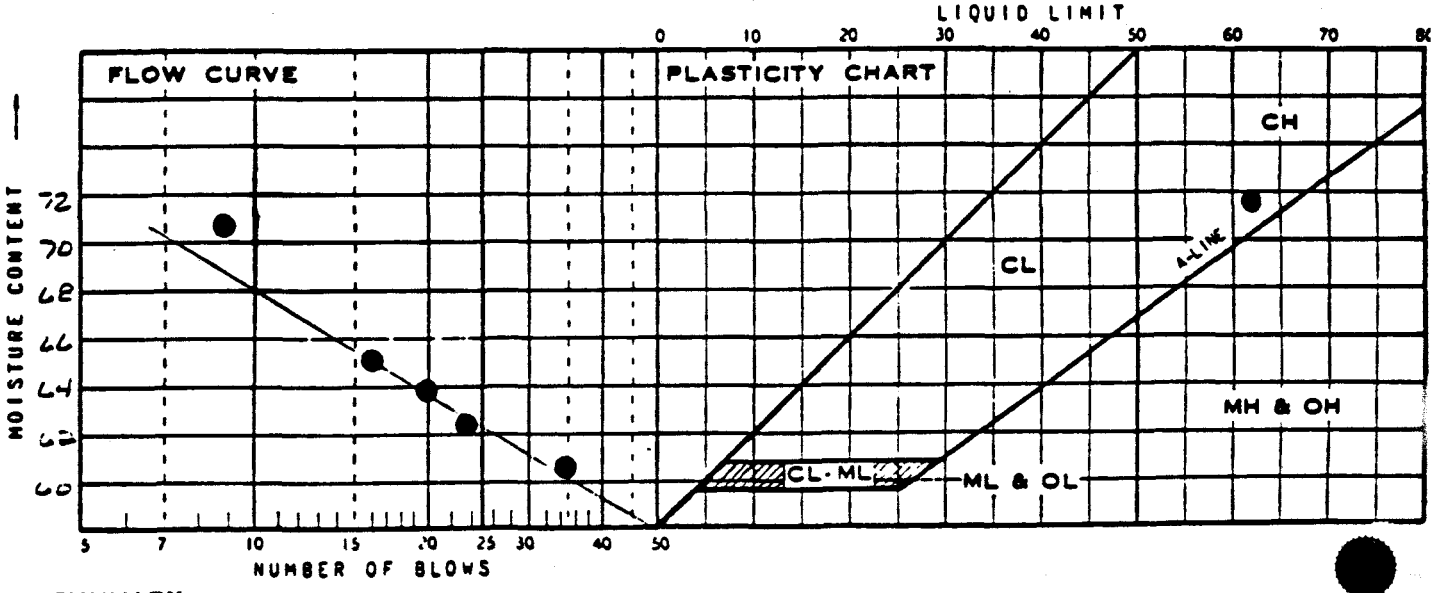
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR. 2/12/92

DETERMINATION	1	2	3	4	5	6
DISH	9 C	10 C	11 C			
WT OF DISH + WET SOIL g	8.02	6.82	7.37			
WT OF DISH + DRY SOIL g	6.48	5.58	5.98	—	—	—
WT OF MOISTURE g	1.54	1.24	1.39			
WT OF DISH g	1.05	1.03	1.03	—	—	—
WT OF DRY SOIL g	5.43	4.55	4.95			
MOISTURE CONTENT %	28.4	27.3	28.1			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	12 C	13 C	14 C	15 C	16 C	
NUMBER OF BLOWS	35	24	20	16	9	
WT OF DISH + WET SOIL g	11.33	11.71	11.67	12.79	18.12	
WT OF DISH + DRY SOIL g	7.46	7.62	7.52	8.14	11.04	—
WT OF MOISTURE g	3.87	4.09	4.15	4.65	7.08	
WT OF DISH g	1.04	1.04	1.03	1.04	1.05	—
WT OF DRY SOIL g	6.42	6.58	6.49	7.10	9.99	
MOISTURE CONTENT %	60.3	62.2	63.9	65.5	70.9	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		62.2	27.9	34.3	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	13+50	SAMPLED	Rocky Flats
DEPTH	13.6'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	50.64
Wt. Dry Soil & Pan	(g)	48.30
Wt. Lost Moisture	(g)	2.34
Wt. of Pan Only	(g)	3.76
Wt. of Dry Soil	(g)	44.54
Moisture Content	%	5.3
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	57.01

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	420.42
Weight of + #10 Before Washing (g)	128.99
Weight of + #10 After Washing (g)	125.11
Weight of - #10 Wet (g)	291.43
Weight of - #10 Dry (g)	280.57
Wt. Total Sample Dry (g)	405.68
Calc. Wt. "W" (g)	82.42
Calc. Mass + #10	25.42

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	48.57	48.57	48.57	12.0	88.0
3/8"	0.00	39.24	39.24	87.81	21.6	78.4
#4	0.00	19.69	19.69	107.50	26.5	73.5
#10	0.00	17.61	17.61	125.11	30.8	69.2
#20	1.57	3.77	2.20	2.20	33.5	66.5
#40	1.56	4.18	2.62	4.82	36.7	63.3
#60	1.59	5.34	3.75	8.57	41.2	58.8
#100	1.56	7.10	5.54	14.11	48.0	52.0
#230	1.56	9.18	7.62	21.73	57.2	42.8

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	13+50	SAMPLED	Rocky Flats
DEPTH	13.6'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

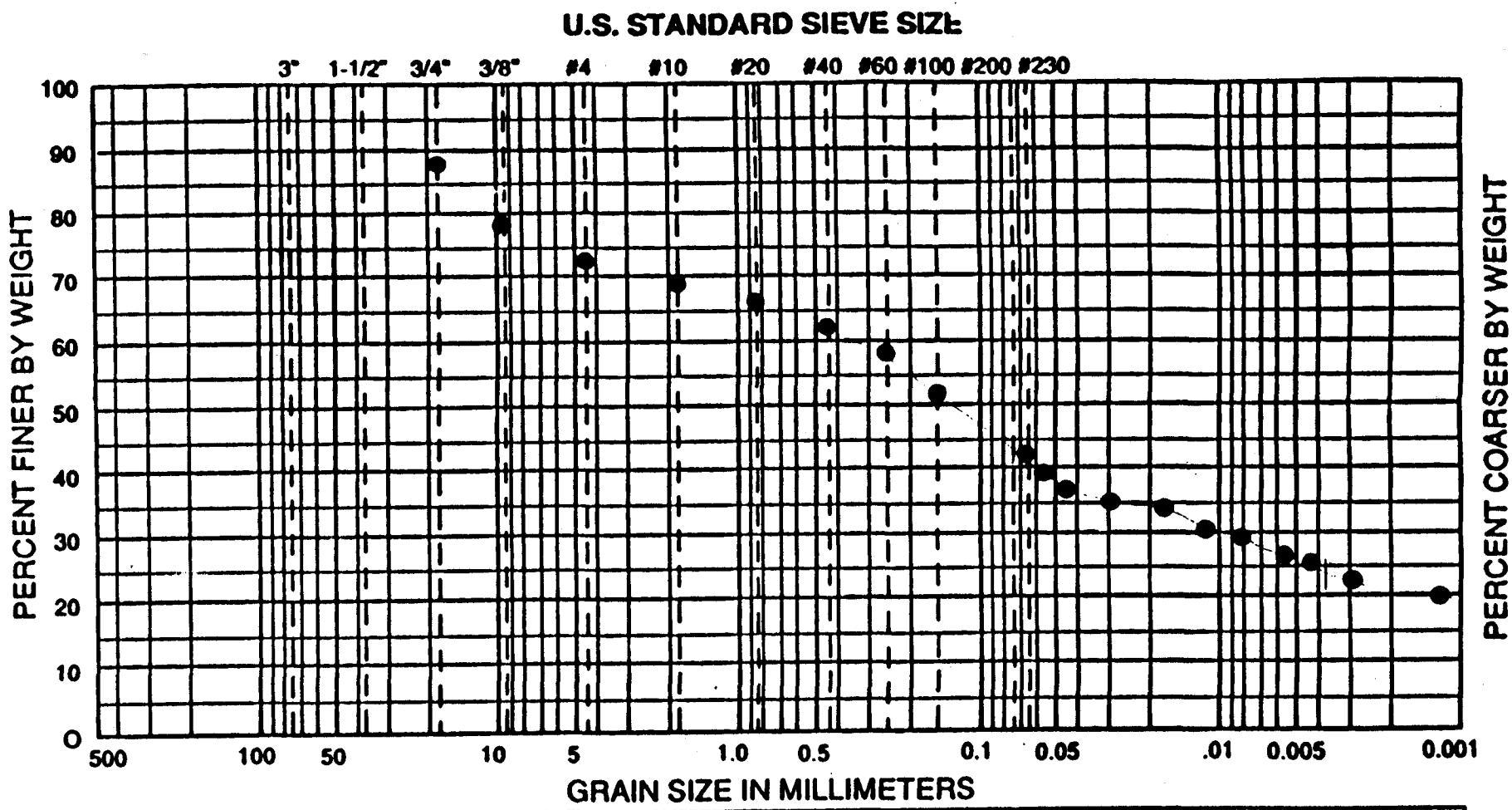
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.58	Temp. Coef. K	0.01300
Value of "a"	1.02	Wt. Dry Sample "W"	82.425
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	38.00	32.00	39.4	39.4	10.06	0.0583
1.0	36.00	30.00	36.9	36.9	10.39	0.0419
2.0	35.00	29.00	35.7	35.7	10.55	0.0299
5.0	34.00	28.00	34.5	34.5	10.71	0.0190
15.0	31.50	25.50	31.4	31.4	11.12	0.0112
30.0	30.00	24.00	29.6	29.6	11.37	0.0080
60.0	28.50	22.50	27.7	27.7	11.62	0.0057
120.0	27.00	21.00	25.9	25.9	11.86	0.0041
250.0	25.00	19.00	23.4	23.4	12.19	0.0029
1440.0	22.50	16.50	20.3	20.3	12.60	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY	
		COARSE	FINE	COARSE	MEDIUM	FINE		
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND		SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE

WELLNAME: 13 + 50 SAMPLE NO.: #2 DATE: 2-23-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	13 6'	Gravel, SAND w/some SILT & CLAY ROCKY FLATS

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-33

CLIENT/OWNER WESTON

LOCATION

BORING 13+50 SAMPLE C#2 DEPTH 13.6'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

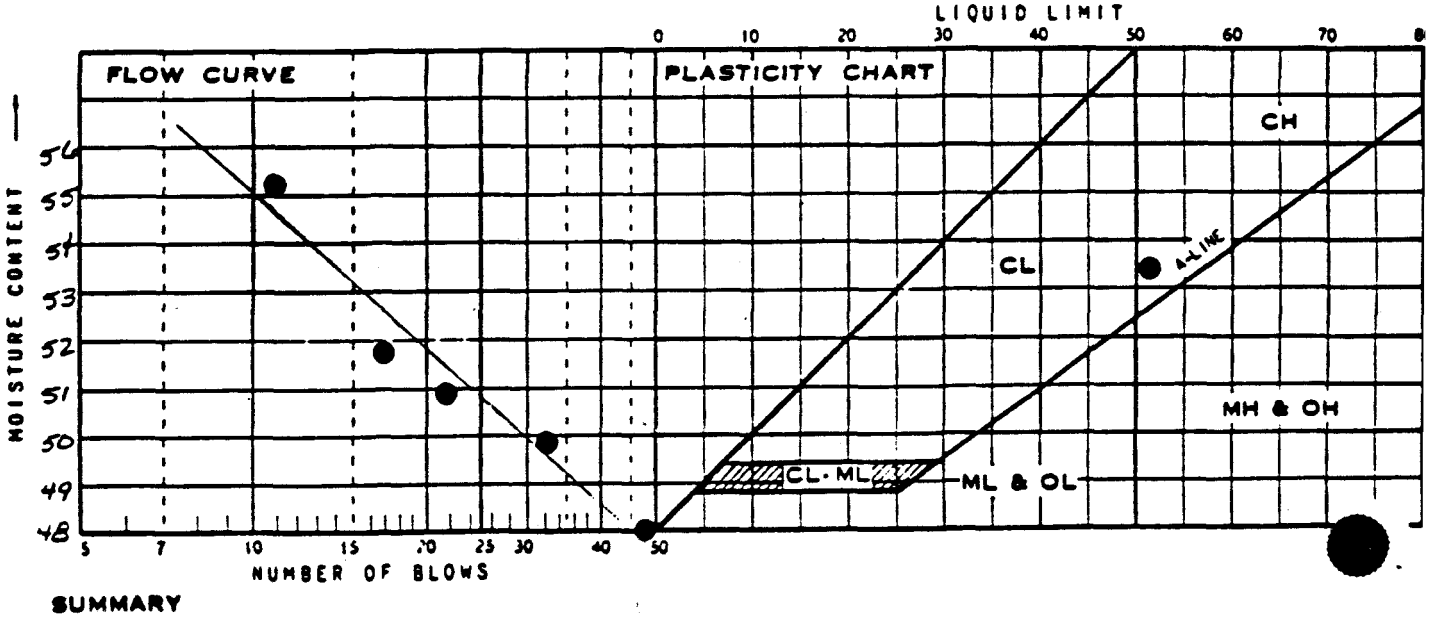
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SB. 2/12/92

DETERMINATION	1	2	3	4	5	6
DISH	47	60	07			
WT OF DISH + WET SOIL g	8.85	8.20	9.40			
WT OF DISH + DRY SOIL g	7.43	6.96	7.91	—	—	—
WT OF MOISTURE g	1.42	1.24	1.49			
WT OF DISH g	1.57	1.57	1.57	—	—	—
WT OF DRY SOIL g	5.86	5.39	6.34			
MOISTURE CONTENT %	24.2	23.0	23.5			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	39	50	50	00	17	
NUMBER OF BLOWS	49	33	22	17±	11	
WT OF DISH + WET SOIL g	17.36	15.03	17.31	16.96	19.26	
WT OF DISH + DRY SOIL g	12.23	10.55	12.00	11.71	12.97	—
WT OF MOISTURE g	5.13	4.48	5.31	5.25	6.29	
WT OF DISH g	1.56	1.57	1.57	1.56	1.58	—
WT OF DRY SOIL g	10.67	8.98	10.43	10.15	11.39	
MOISTURE CONTENT %	48.0	49.9	50.9	51.7	55.2	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		50.8	23%	27.2	CH	

ADVANCED TERRA TESTING

RC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	13+50	SAMPLED	Rocky Flats
DEPTH	28'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	45.05
Wt. Dry Soil & Pan	(g)	42.14
Wt. Lost Moisture	(g)	2.91
Wt. of Pan Only	(g)	3.77
Wt. of Dry Soil	(g)	38.37
Moisture Content	%	7.6
Wt. Hydrom. Sample Wet	(g)	60.02
Wt. Hydrom. Sample Dry	(g)	55.79

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	476.76
Weight of + #10 Before Washing (g)	33.66
Weight of + #10 After Washing (g)	30.78
Weight of - #10 Wet (g)	443.10
Weight of - #10 Dry (g)	414.54
Wt. Total Sample Dry (g)	445.32
Calc. Wt. "W" (g)	59.93
Calc. Mass + #10	4.14

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	15.89	15.89	15.89	3.6	96.4
#4	0.00	7.06	7.06	22.95	5.2	94.8
#10	0.00	7.83	7.83	30.78	6.9	93.1
#20	1.56	3.12	1.56	1.56	9.5	90.5
#40	1.56	3.33	1.77	3.33	12.5	87.5
#60	1.56	3.14	1.58	4.91	15.1	84.9
#100	1.56	3.21	1.65	6.56	17.9	82.1
#230	1.56	3.65	2.09	8.65	21.3	78.7

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	13+50	SAMPLED	Rocky Flats/
DEPTH	28'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

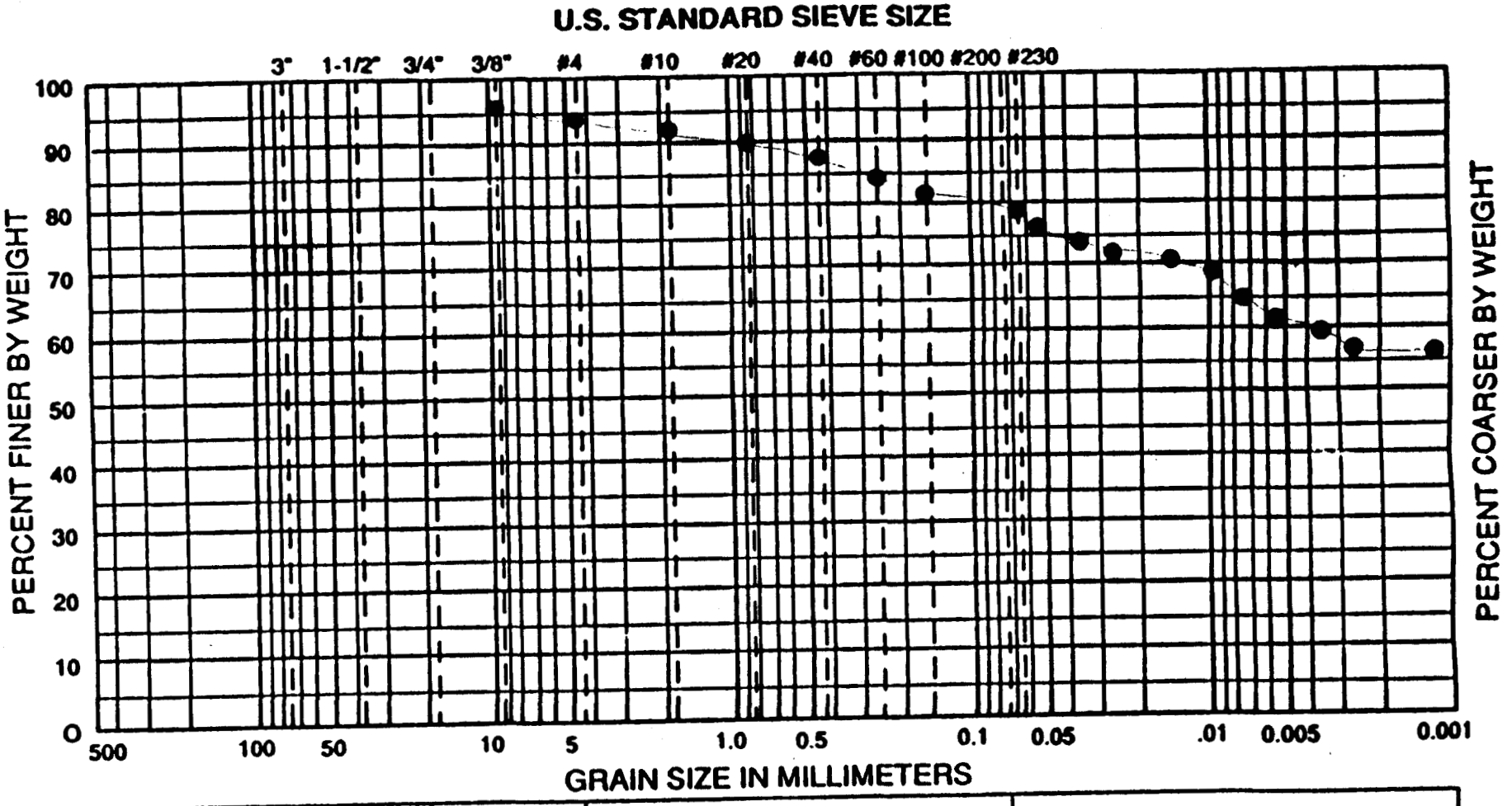
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.75	Temp. Coef. K	0.01309
Value of "a"	0.98	Wt. Dry Sample "W"	59.933
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	53.00	47.00	76.9	76.9	7.60	0.0510
1.0	51.50	45.50	74.4	74.4	7.84	0.0367
2.0	51.00	45.00	73.6	73.6	7.93	0.0261
5.0	50.00	44.00	71.9	71.9	8.09	0.0167
15.0	48.00	42.00	68.7	68.7	8.42	0.0098
30.0	46.00	40.00	65.4	65.4	8.75	0.0071
60.0	44.00	38.00	62.1	62.1	9.07	0.0051
120.0	42.50	36.50	59.7	59.7	9.32	0.0036
250.0	41.00	35.00	57.2	57.2	9.57	0.0026
1440.0	41.00	35.00	57.2	57.2	9.57	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 13+50 SAMPLE NO.: #1 DATE: 2-21-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	56	CLAY w/ some SAND & SILT, trace gravel

ATTERBERG LIMITS TEST DATA

JOB NO. 2066-03
CLIENT/OWNER WESTON
LOCATION
BORING B-50 SAMPLE CH2 DEPTH 28.0

FIELD CLASSIFICATION
LABORATORY CLASSIFICATION

FIELD DENSITY BY

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

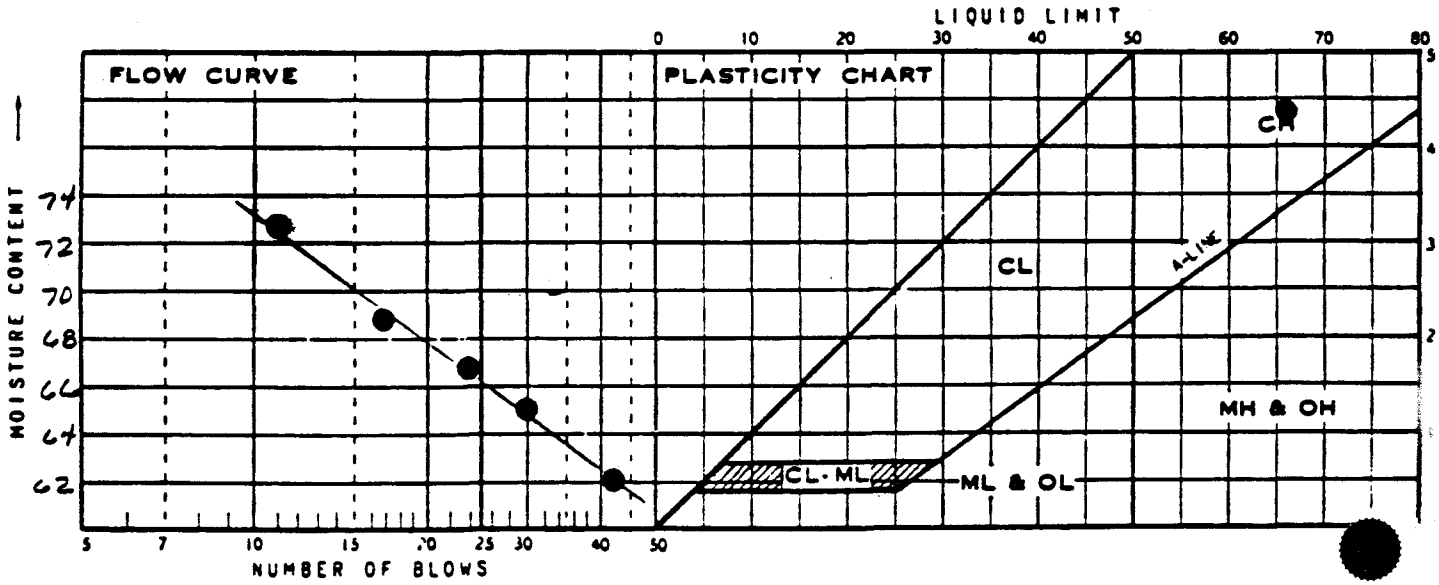
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SG 3/13/82

DETERMINATION	1	2	3	4	5	6
DISH	21A	134	108			
WT OF DISH + WET SOIL g	7.88	9.13	8.85			
WT OF DISH + DRY SOIL g	6.70	7.71	7.40	—	—	—
WT OF MOISTURE g	1.18	1.42	1.36			
WT OF DISH g	1.31	1.30	1.31	—	—	—
WT OF DRY SOIL g	5.39	6.41	6.18			
MOISTURE CONTENT %	21.9	22.2	22.0			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	75B	112	19A	115	51	
NUMBER OF BLOWS	43	30	24	17	11	
WT OF DISH + WET SOIL g	12.54	16.56	15.16	18.16	17.78	
WT OF DISH + DRY SOIL g	8.23	10.54	9.61	11.35	10.85	—
WT OF MOISTURE g	4.31	6.02	5.50	6.81	6.93	
WT OF DISH g	1.31	1.31	1.31	1.46	1.31	—
WT OF DRY SOIL g	6.92	9.23	8.30	9.89	9.54	
MOISTURE CONTENT %	62.3	65.2	66.9	68.9	72.6	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		66.2	22.0	44.2	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

BR

CLIENT Western

JOB NO. 2066-03

BORING NO.	13+50	SAMPLED	Rocky Flats
DEPTH	44.7'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	50.66
Wt. Dry Soil & Pan	(g)	50.50
Wt. Lost Moisture	(g)	0.16
Wt. of Pan Only	(g)	3.83
Wt. of Dry Soil	(g)	46.67
Moisture Content	%	0.3

Wt. Hydrom. Sample Wet (g)	60.33
Wt. Hydrom. Sample Dry (g)	60.13

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	517.51
Weight of + #10 Before Washing (g)	1.41
Weight of + #10 After Washing (g)	0.94
Weight of - #10 Wet (g)	516.10
Weight of - #10 Dry (g)	514.81
Wt. Total Sample Dry (g)	515.75
Calc. Wt. "W" (g)	60.24
Calc. Mass + #10	0.11

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.35	0.35	0.35	0.1	99.9
#10	0.00	0.59	0.59	0.94	0.2	99.8
#20	1.55	1.94	0.39	0.39	0.8	99.2
#40	1.55	1.71	0.16	0.55	1.1	98.9
#60	1.54	1.74	0.20	0.75	1.4	98.6
#100	1.55	3.70	2.15	2.90	5.0	95.0
#230	1.54	43.21	41.67	44.57	74.2	25.8

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	13+50	SAMPLED	Rocky Flats/
DEPTH	44.7'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

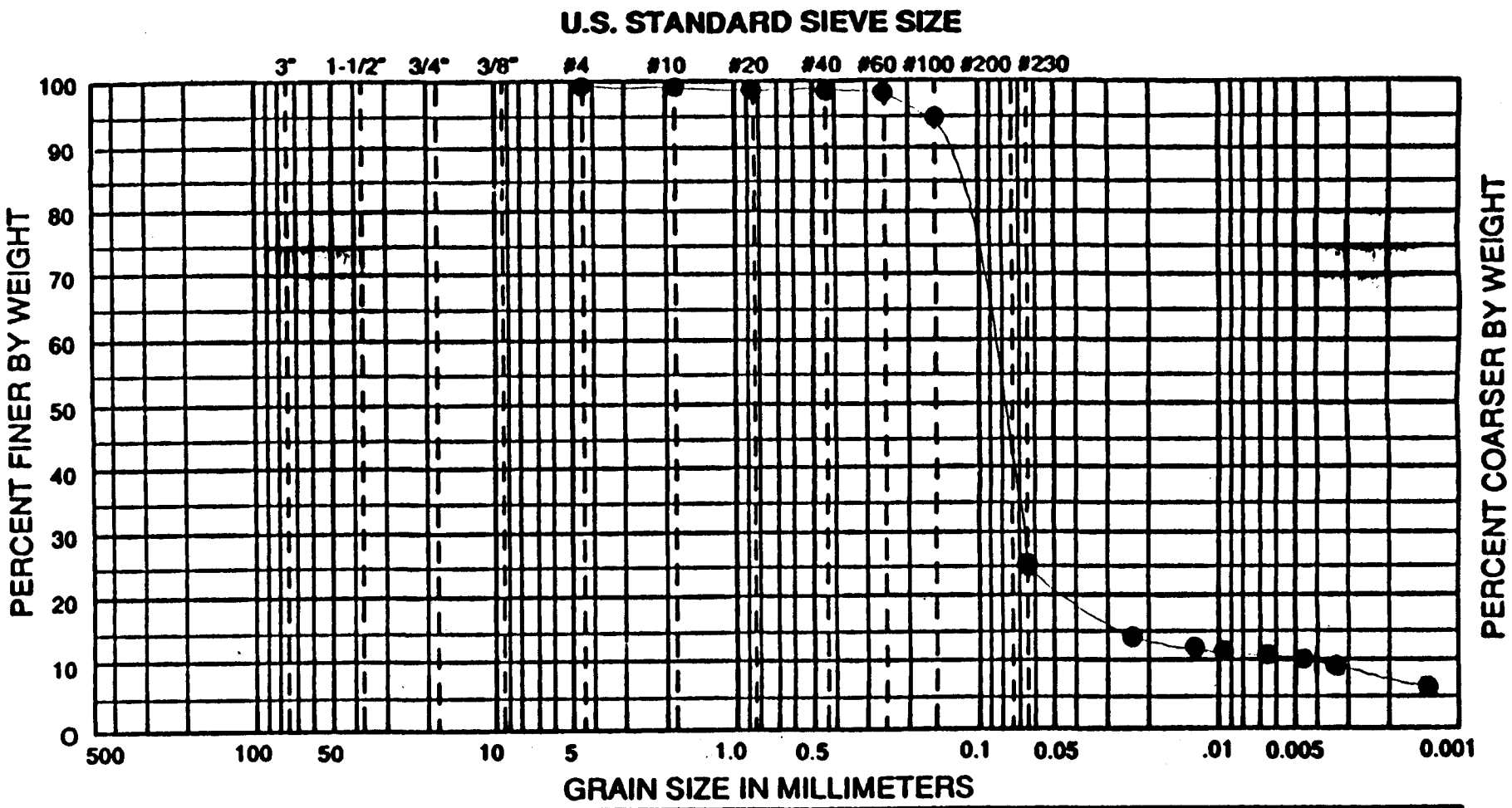
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.69	Temp. Coef. K	0.01332
Value of "a"	0.99	Wt. Dry Sample "W"	60.237
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	25.00	19.00	31.3	31.3	12.19	0.0658
1.0	18.00	12.00	19.8	19.8	13.34	0.0486
2.0	16.50	10.50	17.3	17.3	13.58	0.0347
5.0	15.00	9.00	14.8	14.8	13.83	0.0222
15.0	14.00	8.00	13.2	13.2	13.99	0.0129
30.0	14.00	8.00	13.2	13.2	13.99	0.0091
60.0	13.00	7.00	11.5	11.5	14.16	0.0065
120.0	12.50	6.50	10.7	10.7	14.24	0.0046
250.0	11.50	5.50	9.1	9.1	14.40	0.0032
1440.0	10.00	4.00	6.6	6.6	14.65	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 13+50 SAMPLE NO.: #1 DATE: 2-21-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION SANDSTONE w/ some SILT, Trace clay and gravel
	447	.2% cobbles / 0.9% boulders, Rocky Flats, 0.3 mm 72.8% sand 15.8% silt, 10% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-09

CLIENT/OWNER WESTON

LOCATION

BORING 13+50 SAMPLE ____ DEPTH 44.7'

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

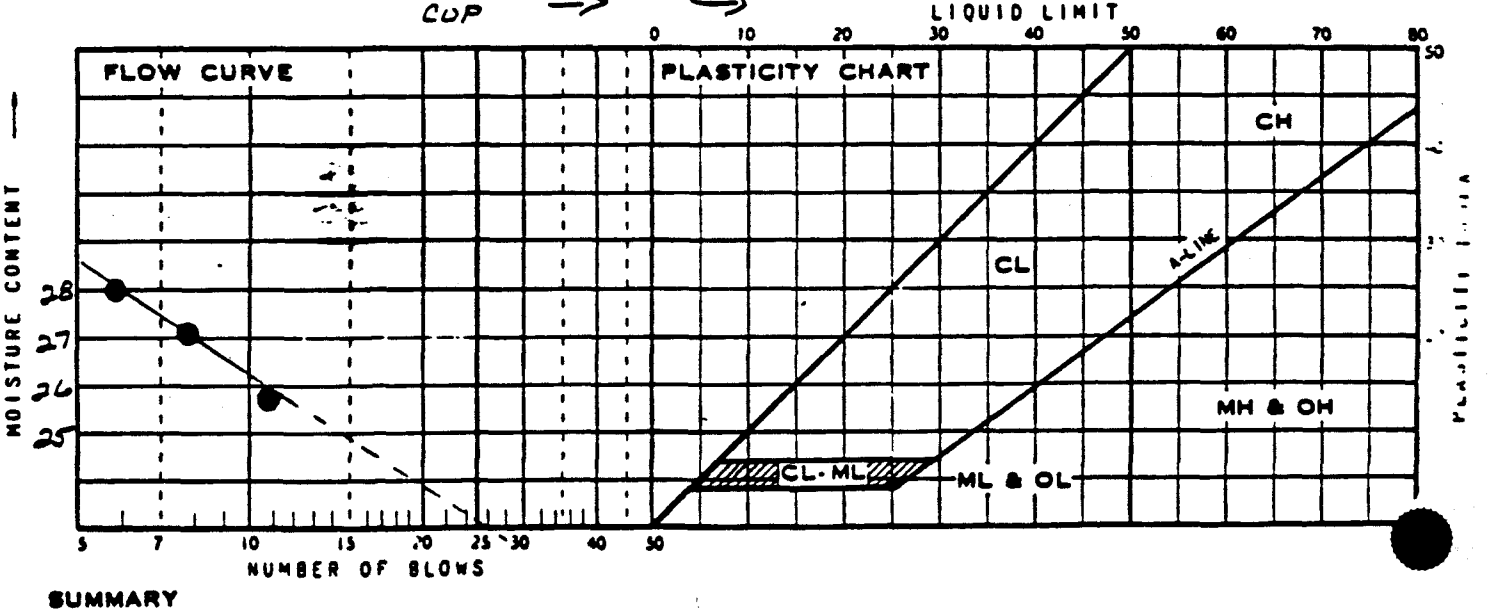
PLASTIC LIMIT BY SR 2/20/92

DETERMINATION	1	2	3	4	5	6
DISH						
WT OF DISH + WET SOIL	NON-PLASTIC!					
WT OF DISH + DRY SOIL	—	—	—	—	—	—
WT OF MOISTURE						
WT OF DISH	—	—	—	—	—	—
WT OF DRY SOIL						
MOISTURE CONTENT						

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	0 C	2017	2011			
NUMBER OF BLOWS	11	8	6			
WT OF DISH + WET SOIL g	20.09	21.71	21.82			
WT OF DISH + DRY SOIL g	16.20	16.91	17.28	—	—	—
WT OF MOISTURE g	3.89	4.80	4.54			
WT OF DISH g	1.04	1.05	1.04	—	—	—
WT OF DRY SOIL g	15.16	15.86	16.24			
MOISTURE CONTENT %	25.7	27.1	28.0			

SLIDES IN CUP → →



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	

ADVANCED TERRA TESTING

RDM

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	13+85	SAMPLED	Rocky Flats
DEPTH	4'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	56.81
Wt. Dry Soil & Pan	(g)	55.78
Wt. Lost Moisture	(g)	1.03
Wt. of Pan Only	(g)	3.69
Wt. of Dry Soil	(g)	52.09
Moisture Content	%	2.0
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	58.84

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	58.84
Wt. Total Sample Dry (g)	58.84
Calc. Wt. "W" (g)	58.84
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.55	1.56	0.01	0.01	0.0	100.0
#40	1.57	1.59	0.02	0.03	0.1	99.9
#60	1.58	1.60	0.02	0.05	0.1	99.9
#100	1.55	1.57	0.02	0.07	0.1	99.9
#230	1.57	1.77	0.20	0.27	0.5	99.5

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	13+85	SAMPLED	Rocky Flats/I
DEPTH	4'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

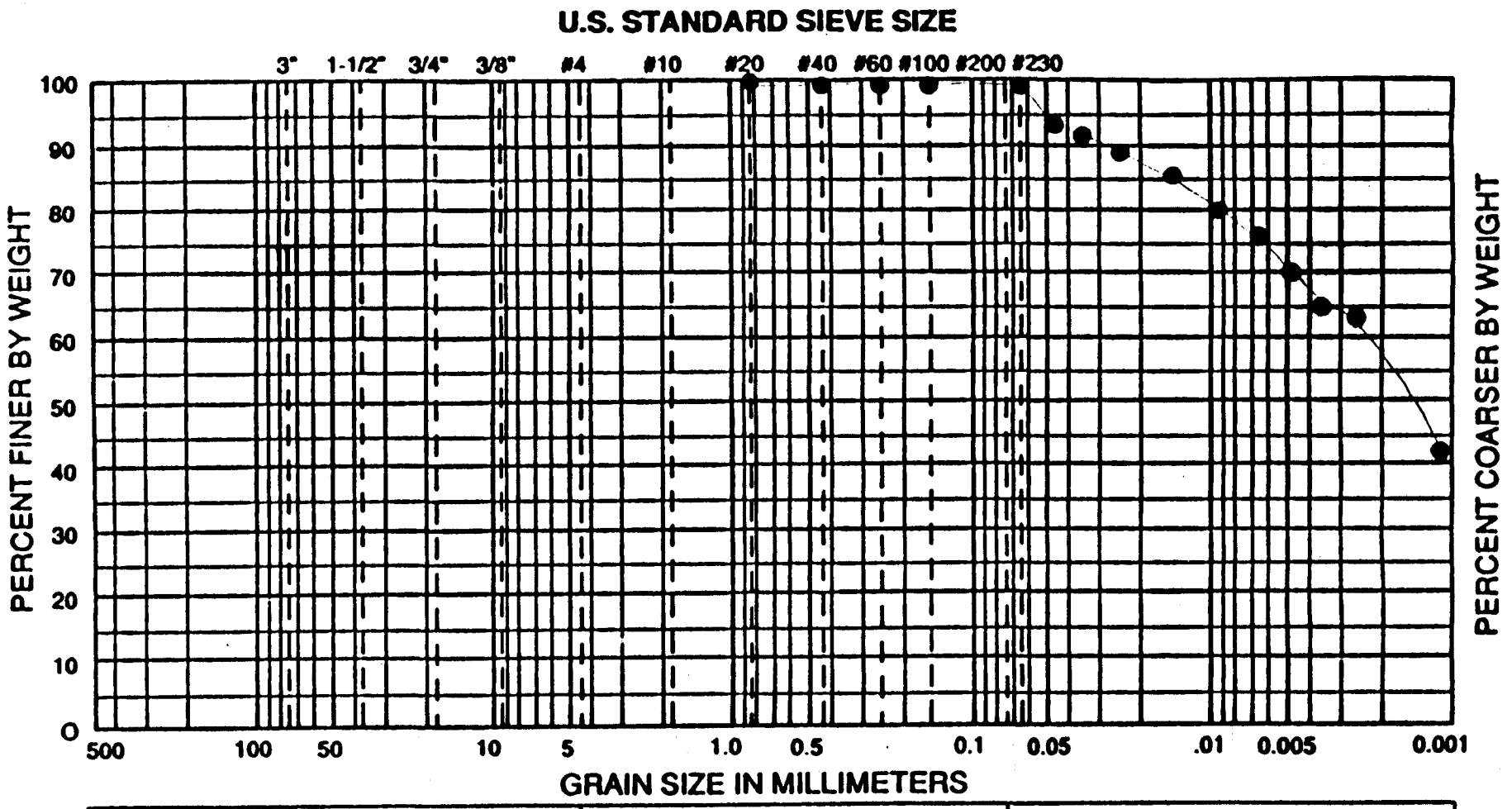
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.76	Temp. Coef. K	0.01305
Value of "a"	0.98	Wt. Dry Sample "W"	58.837
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	63.00	57.00	94.7	94.7	5.96	0.0451
1.0	62.00	56.00	93.1	93.1	6.12	0.0323
2.0	60.00	54.00	89.8	89.8	6.45	0.0234
5.0	58.00	52.00	86.4	86.4	6.78	0.0152
15.0	54.50	48.50	80.6	80.6	7.35	0.0091
30.0	52.00	46.00	76.5	76.5	7.76	0.0066
60.0	48.50	42.50	70.6	70.6	8.34	0.0049
120.0	45.00	39.00	64.8	64.8	8.91	0.0036
250.0	41.00	35.00	58.2	58.2	9.57	0.0026
1440.0	32.00	26.00	43.2	43.2	11.04	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 13+85 SAMPLE NO.: #1 DATE: 2-21-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	4	SILTY CLAY w/ Trace Sand (CH)

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. [illegible]

CLIENT/OWNER Weston

LOCATION Rocky Flats EG&G

BORING 13-85 SAMPLE CL #1 DEPTH 4'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

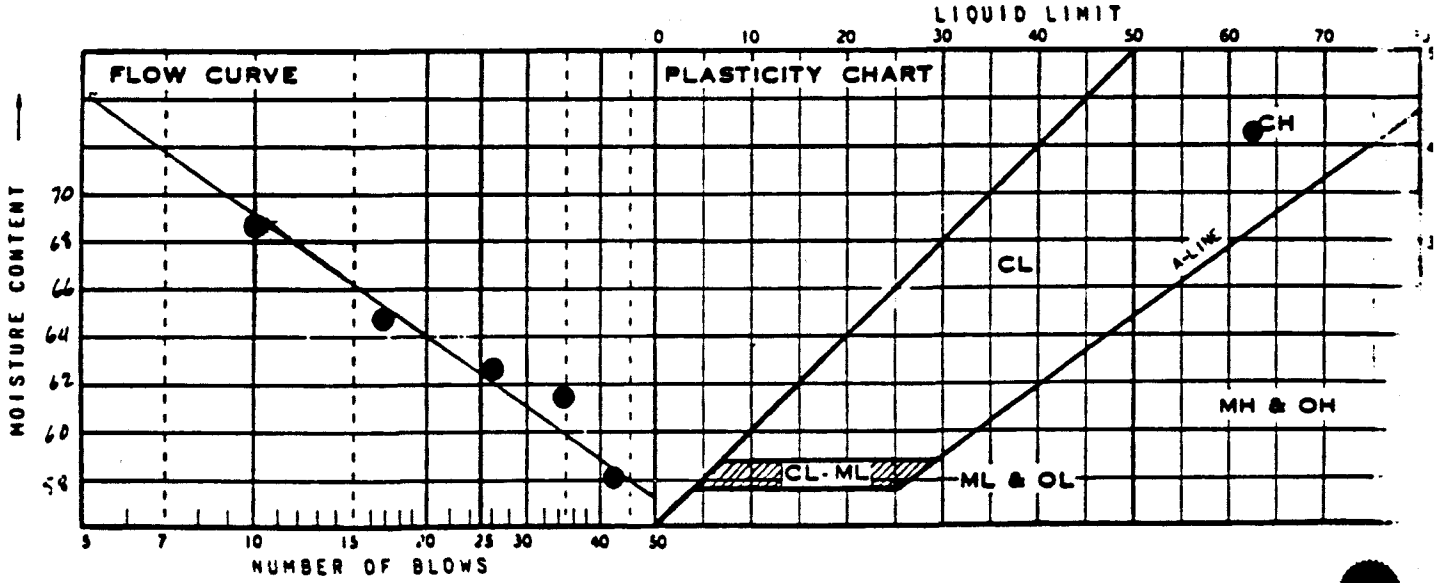
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DW 2/20/92

DETERMINATION	1	2	3	4	5	6
DISH	2058	2057	2056			
WT OF DISH + WET SOIL g	6.19	7.09	7.06			
WT OF DISH + DRY SOIL g	5.29	5.99	6.03	—	—	—
WT OF MOISTURE g	.90	1.10	1.03			
WT OF DISH g	1.02	1.04	1.03	—	—	—
WT OF DRY SOIL g	4.27	4.95	5.00			
MOISTURE CONTENT %	21.1	22.2	20.6			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2055	2054	2053	2052	2051	2050
NUMBER OF BLOWS	43	35	26	17	14	10
WT OF DISH + WET SOIL g	9.40	12.30	9.95	10.87	13.12	10.[illegible]
WT OF DISH + DRY SOIL g	6.32	8.01	6.52	7.00	8.79	6.94
WT OF MOISTURE g	3.08	4.29	3.43	3.87	4.33	3.99
WT OF DISH g	1.03	1.03	1.04	1.02	1.02	1.03
WT OF DRY SOIL g	5.29	6.98	5.48	5.98	7.77	5.8[illegible]
MOISTURE CONTENT %	58.2	61.5	62.6	64.7	64.2	68.7



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION
		62.5	21.3	41.2	CH

ADVANCED TERRA TESTING

RDM

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	13+85	SAMPLED	Rocky Flats
DEPTH	9.5'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	50.37
Wt. Dry Soil & Pan	(g)	50.20
Wt. Lost Moisture	(g)	0.17
Wt. of Pan Only	(g)	3.63
Wt. of Dry Soil	(g)	46.57
Moisture Content	%	0.4

Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	59.78

WASH SIEVE ANALYSIS

Wt. Total Sample Wet	(g)	444.67
Weight of + #10 Before Washing	(g)	108.19
Weight of + #10 After Washing	(g)	44.51
Weight of - #10 Wet	(g)	336.48
Weight of - #10 Dry	(g)	398.68
Wt. Total Sample Dry	(g)	443.19
Calc. Wt. "W"	(g)	66.45
Calc. Mass + #10		6.67

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	12.41	12.41	12.41	2.8	97.2
#4	0.00	18.71	18.71	31.12	7.0	93.0
#10	0.00	13.39	13.39	44.51	10.0	90.0
#20	1.57	1.79	0.22	0.22	10.4	89.6
#40	1.56	1.68	0.12	0.34	10.6	89.4
#60	1.56	1.76	0.20	0.54	10.9	89.1
#100	1.57	2.14	0.57	1.11	11.7	88.3
#230	1.56	8.32	6.76	7.87	21.9	78.1

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	13+85	SAMPLED	Rocky Flats/E
DEPTH	9.5'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

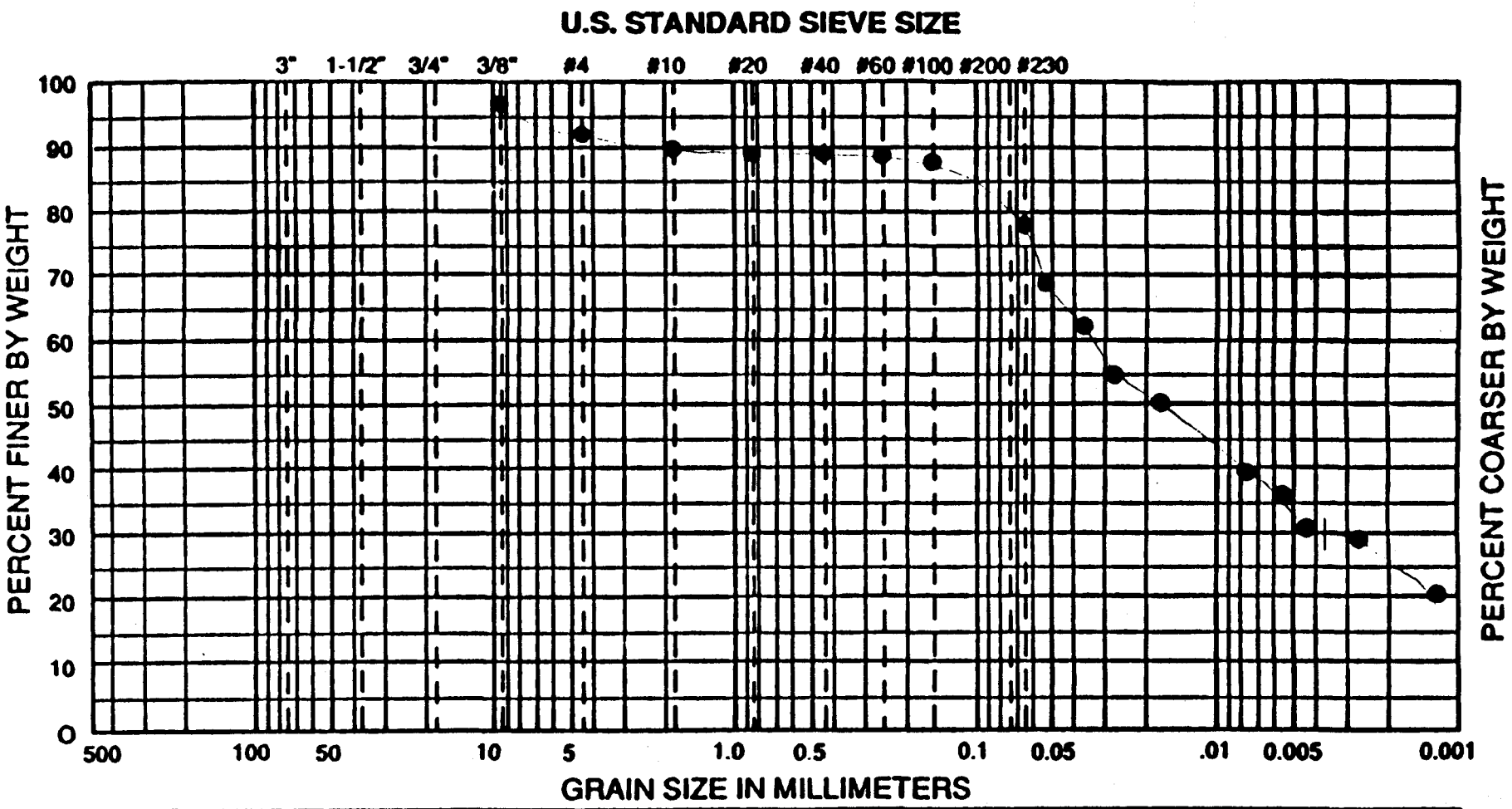
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.78	Temp. Coef. K	0.01298
Value of "a"	0.97	Wt. Dry Sample "W"	66.452
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	52.50	46.50	68.2	68.2	7.68	0.0509
1.0	49.00	43.00	63.0	63.0	8.25	0.0373
2.0	43.50	37.50	55.0	55.0	9.16	0.0278
5.0	40.50	34.50	50.6	50.6	9.65	0.0180
15.0	35.50	29.50	43.2	43.2	10.47	0.0108
30.0	33.00	27.00	39.6	39.6	10.88	0.0078
60.0	31.00	25.00	36.6	36.6	11.21	0.0056
120.0	28.00	22.00	32.2	32.2	11.70	0.0041
250.0	26.00	20.00	29.3	29.3	12.03	0.0028
1440.0	20.00	14.00	20.5	20.5	13.01	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 13+85 SAMPLE NO.: #1 DATE: 2-2-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	25'	CLAYEY SILT w/some SAND + Trace Gravel / 3% Gravel, Rocky Fine Sandy 9.4% F / 50% Silt, 3% Clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER WESTON
LOCATION _____
BORING B-45 SAMPLE U-2 DEPTH 9.5'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

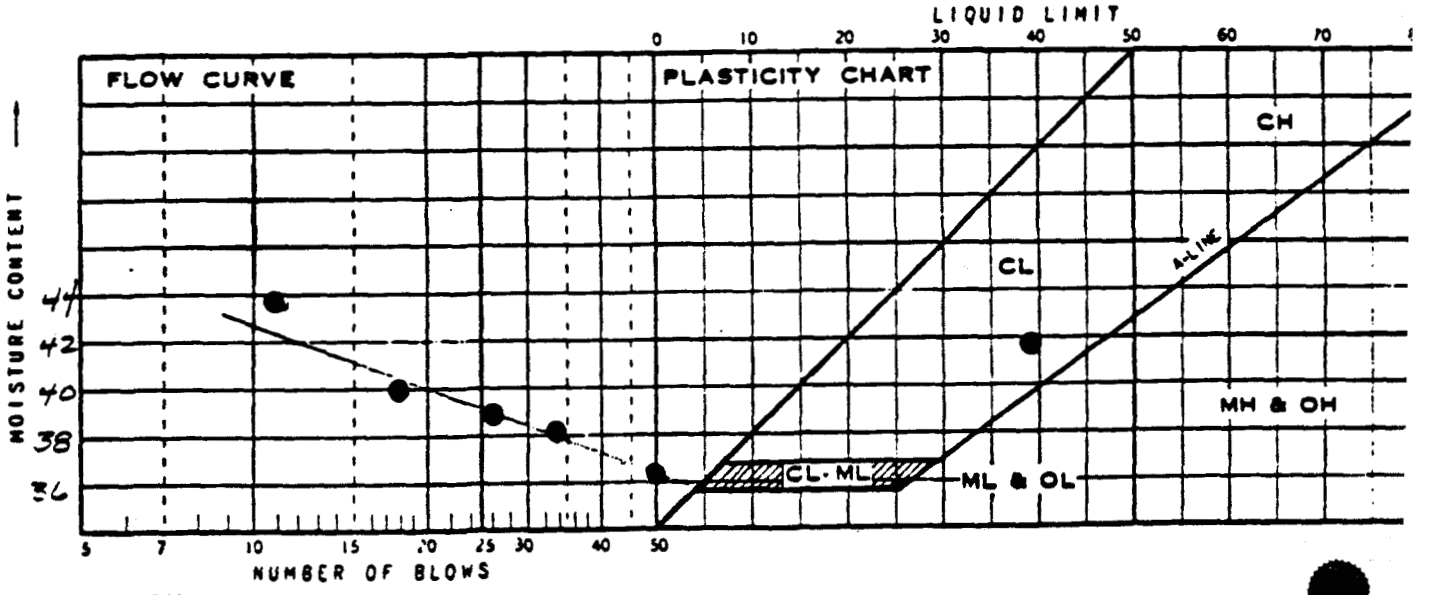
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 2/18/92

DETERMINATION	1	2	3	4	5	6
DISH	2040	2042	2035			
WT OF DISH + WET SOIL g	10.87	13.91	11.68			
WT OF DISH + DRY SOIL g	9.30	11.41	9.29	—	—	—
WT OF MOISTURE g	1.57	1.90	1.69			
WT OF DISH g	1.03	1.05	1.03	—	—	—
WT OF DRY SOIL g	8.27	9.51	8.26			
MOISTURE CONTENT %	19.0	20.0	18.9			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2032	2043	2035	2029	2036	
NUMBER OF BLOWS	50	34	26	17	11	
WT OF DISH + WET SOIL g	12.71	13.33	14.84	18.01	17.51	
WT OF DISH + DRY SOIL g	9.60	9.94	10.97	13.17	12.49	—
WT OF MOISTURE g	3.11	3.39	3.87	4.84	5.02	
WT OF DISH g	1.04	1.05	1.03	1.04	1.04	—
WT OF DRY SOIL g	8.56	8.89	9.94	12.15	11.45	
MOISTURE CONTENT %	36.3	38.1	38.9	40.0	43.8	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION
		37.1	19.3	17.8	CL

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	13+85	SAMPLED	Rocky Flats
DEPTH	11'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	63.66
Wt. Dry Soil & Pan	(g)	62.05
Wt. Lost Moisture	(g)	1.61
Wt. of Pan Only	(g)	3.84
Wt. of Dry Soil	(g)	58.21
Moisture Content	%	2.8
Wt. Hydrom. Sample Wet	(g)	60.01
Wt. Hydrom. Sample Dry	(g)	58.39

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.01
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.01
Weight of - #10 Dry (g)	58.39
Wt. Total Sample Dry (g)	58.39
Calc. Wt. "W" (g)	58.39
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.32	1.33	0.01	0.01	0.0	100.0
#40	1.56	1.60	0.04	0.05	0.1	99.9
#60	1.56	1.76	0.20	0.25	0.4	99.6
#100	1.56	2.34	0.78	1.03	1.8	98.2
#230	1.36	23.49	22.13	23.16	39.7	60.3

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	13+85	SAMPLED	Rocky Flats/
DEPTH	11'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

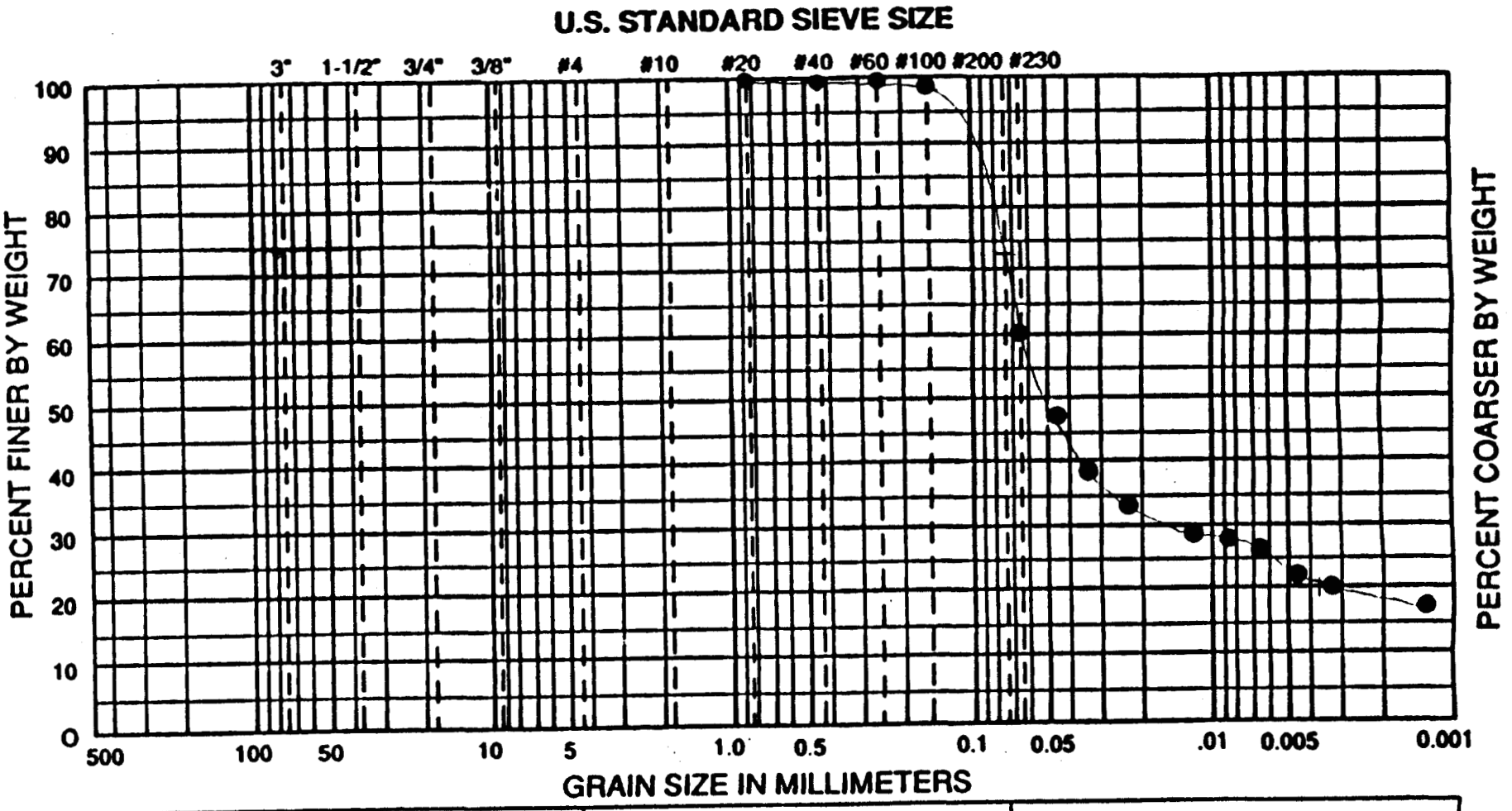
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.72	Temp. Coef. K	0.01324
Value of "a"	0.99	Wt. Dry Sample "W"	58.394
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	43.00	37.00	62.5	62.5	9.24	0.0569
1.0	34.00	28.00	47.3	47.3	10.71	0.0433
2.0	29.00	23.00	38.8	38.8	11.53	0.0318
5.0	26.00	20.00	33.8	33.8	12.03	0.0205
15.0	23.50	17.50	29.5	29.5	12.44	0.0121
30.0	22.50	16.50	27.9	27.9	12.60	0.0086
60.0	21.50	15.50	26.2	26.2	12.76	0.0061
120.0	20.00	14.00	23.6	23.6	13.01	0.0044
250.0	18.00	12.00	20.3	20.3	13.34	0.0031
1440.0	16.00	10.00	16.9	16.9	13.67	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 12+B5 SAMPLE NO.: #1 DATE: 2-22-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
		SANDY SILT w/some Clay
		Poor Test [illegible]

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066.33

CLIENT/OWNER LIVERTON

LOCATION

BORING 13+85 SAMPLE C#2 DEPTH 11'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

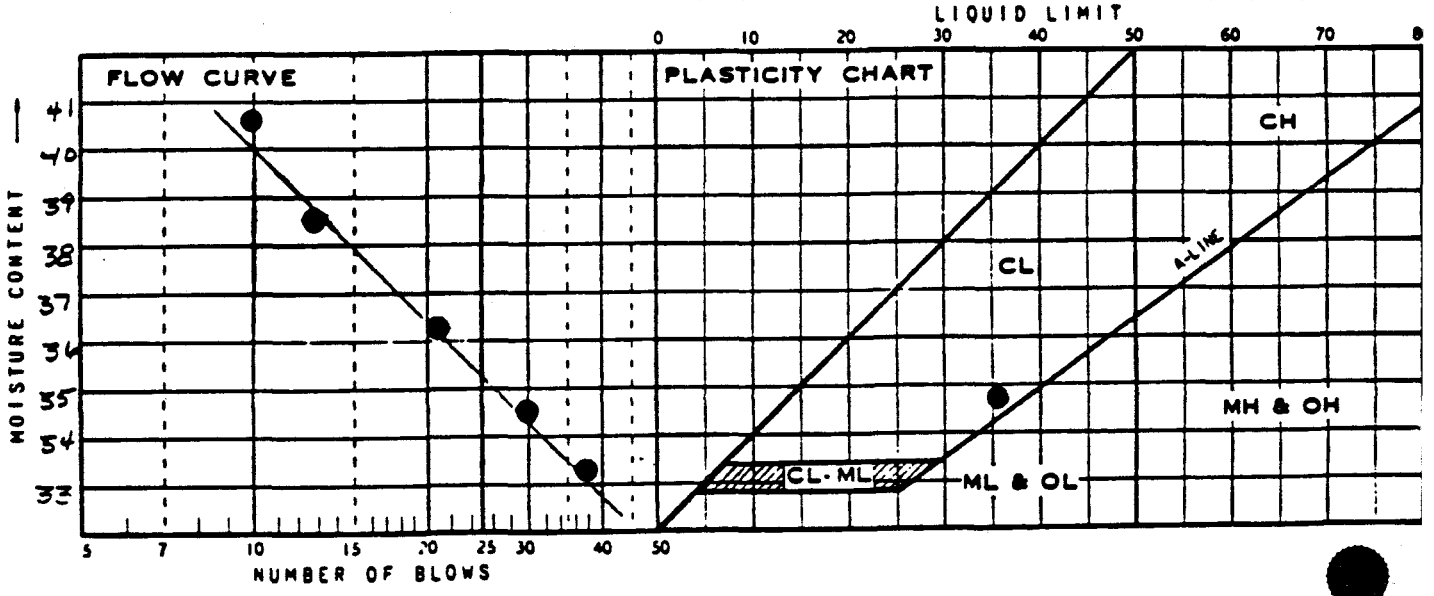
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR. 2/13/92.

DETERMINATION	1	2	3	4	5	6
DISH	54 C	22	15 C			
WT OF DISH + WET SOIL g	10.65	11.93	10.55			
WT OF DISH + DRY SOIL g	9.00	10.11	9.92	—	—	—
WT OF MOISTURE g	1.65	1.82	1.63			
WT OF DISH g	1.09	1.06	1.06	—	—	—
WT OF DRY SOIL g	7.92	9.05	7.86			
MOISTURE CONTENT %	20.8	20.1	20.7			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	48C	3	58C	32C	10 C	
NUMBER OF BLOWS	38	50	22±	14±	10	
WT OF DISH + WET SOIL g	17.44	16.31	16.62	16.38	20.32	
WT OF DISH + DRY SOIL g	13.35	12.38	12.08	12.11	14.75	—
WT OF MOISTURE g	4.09	3.93	4.00	4.27	5.57	
WT OF DISH g	1.06	1.06	1.07	1.05	1.06	—
WT OF DRY SOIL g	12.29	11.32	11.01	11.06	13.69	
MOISTURE CONTENT %	33.3	34.7	36.3	38.6	40.7	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION
		35.2	20.5	14.7	CL

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

5395.64

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	14+15	SAMPLED	Rocky Flats
DEPTH	13.0'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	58.80
Wt. Dry Soil & Pan	(g)	57.26
Wt. Lost Moisture	(g)	1.54
Wt. of Pan Only	(g)	3.84
Wt. of Dry Soil	(g)	53.42
Moisture Content	%	2.9
Wt. Hydrom. Sample Wet	(g)	60.01
Wt. Hydrom. Sample Dry	(g)	58.32

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.01
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.01
Weight of - #10 Dry (g)	58.32
Wt. Total Sample Dry (g)	58.32
Calc. Wt. "W" (g)	58.32
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.62	0.05	0.05	0.1	99.9
#40	1.57	1.66	0.09	0.14	0.2	99.8
#60	1.55	1.71	0.16	0.30	0.5	99.5
#100	1.55	1.94	0.39	0.69	1.2	98.8
#230	1.55	20.34	18.79	19.48	33.4	66.6

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	14+15	SAMPLED	Rocky Flats
DEPTH	13.0'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

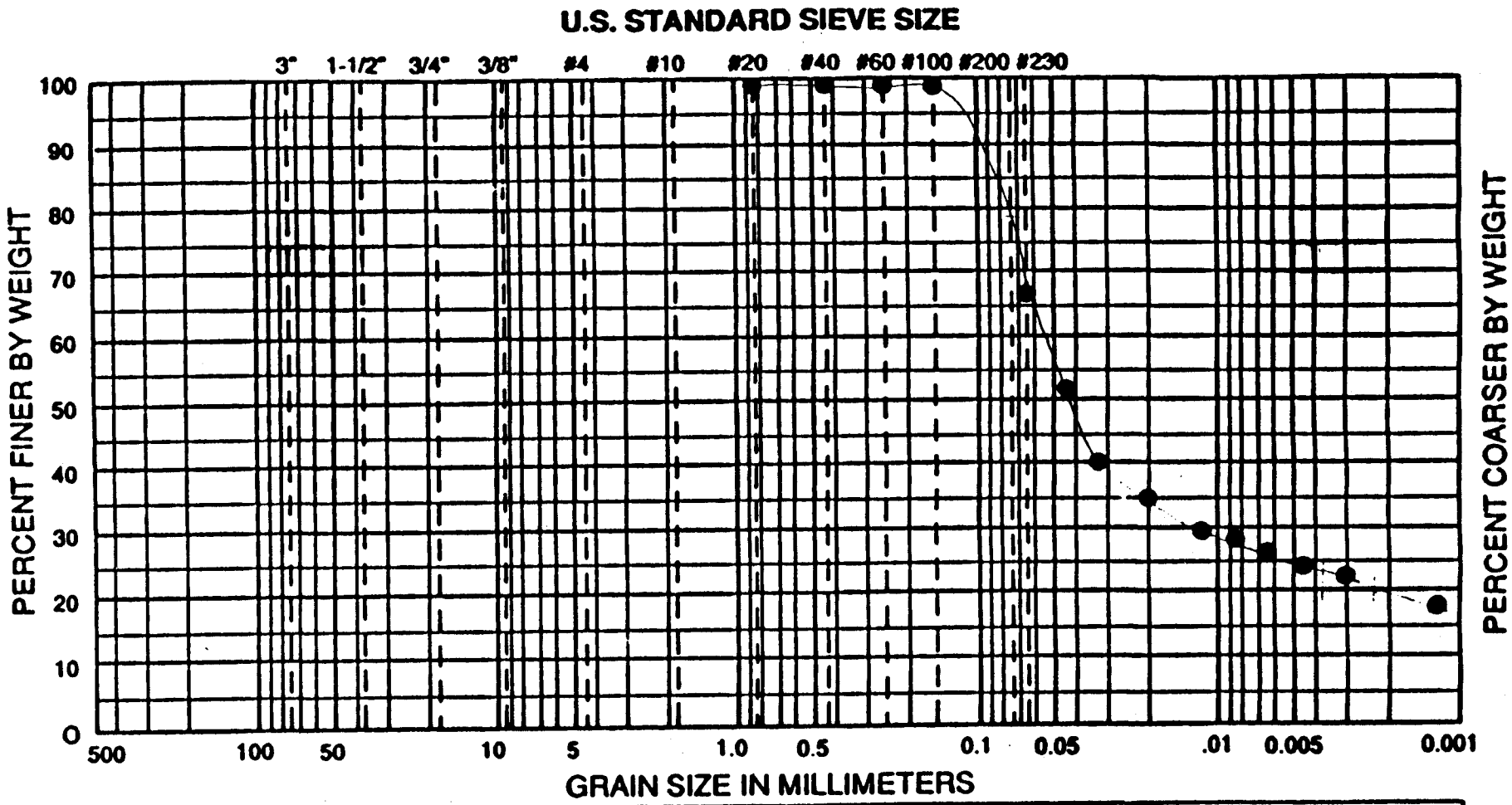
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.69	Temp. Coef. K	0.01332
Value of "a"	0.99	Wt. Dry Sample "W"	58.325
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	45.50	39.50	67.2	67.2	8.83	0.0560
1.0	37.00	31.00	52.7	52.7	10.22	0.0426
2.0	30.00	24.00	40.8	40.8	11.37	0.0318
5.0	26.50	20.50	34.9	34.9	11.94	0.0206
15.0	24.00	18.00	30.6	30.6	12.35	0.0121
30.0	23.00	17.00	28.9	28.9	12.52	0.0086
60.0	22.00	16.00	27.2	27.2	12.68	0.0061
120.0	20.50	14.50	24.7	24.7	12.93	0.0044
250.0	20.00	14.00	23.8	23.8	13.01	0.0030
1440.0	16.00	10.00	17.0	17.0	13.67	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 14+15 SAMPLE NO.: #1 DATE: 2-29-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
		SILT w/ some clay and SAND
		Pocket Penetr. [illegible]

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. [illegible]

CLIENT/OWNER WESTON

LOCATION _____

BORING 14+15 SAMPLE CH #7 DEPTH [illegible]

FIELD DENSITY BY _____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

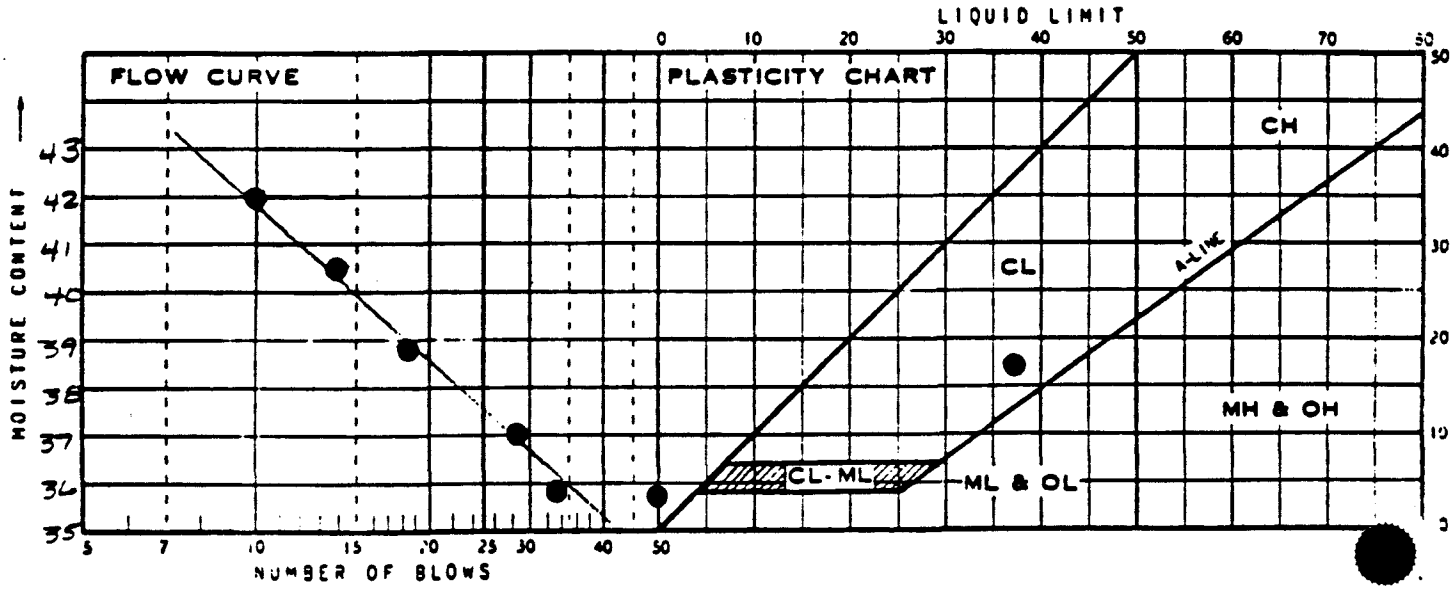
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR. 2/12/92

DETERMINATION	1	2	3	4	5	6
DISH	24	66 C	53 C			
WT OF DISH + WET SOIL g	11.32	10.03	9.69			
WT OF DISH + DRY SOIL g	9.53	8.50	8.23	—	—	—
WT OF MOISTURE g	1.79	1.53	1.46			
WT OF DISH g	1.05	1.06	1.07	—	—	—
WT OF DRY SOIL g	8.48	7.44	7.16			
MOISTURE CONTENT %	21.1	20.6	20.4			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	4	20	37 C	6 C	46 C	44 C
NUMBER OF BLOWS	50	33	29	19	15	11
WT OF DISH + WET SOIL g	17.33	13.97	18.16	17.61	16.73	17.02
WT OF DISH + DRY SOIL g	13.19	10.56	13.55	12.98	12.21	12.50
WT OF MOISTURE g	4.34	3.41	4.61	4.63	4.52	4.72
WT OF DISH g	1.06	1.07	1.08	1.08	1.06	1.08
WT OF DRY SOIL g	12.13	9.49	12.47	11.90	11.15	11.22
MOISTURE CONTENT %	35.8	35.9	37.0	38.9	40.5	42.0



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		37.6	20.7	[illegible]	CL	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

BR

CLIENT Weston

JOB NO. 2066-03

BORING NO.	14+15	SAMPLED	--
DEPTH	27.5'	DATE TESTED	02-15-92 TNU
SAMPLE NO.	1	WASH SIEVE	Yes
SOIL DESCR.	Bulk/Jar	DRY SIEVE	No

MOISTURE/DENSITY DATA

Wt. Soil & Ring(s) (g)	
Wt. Ring(s) (g)	
Wt. Soil (g)	
Wet Density PCF	
Wt. Wet Soil & Pan (g)	
Wt. Dry Soil & Pan (g)	
Wt. Lost Moisture (g)	
Wt. of Pan Only (g)	
Wt. of Dry Soil (g)	
Moisture Content %	
Dry Density PCF	

WASH SIEVE ANALYSIS

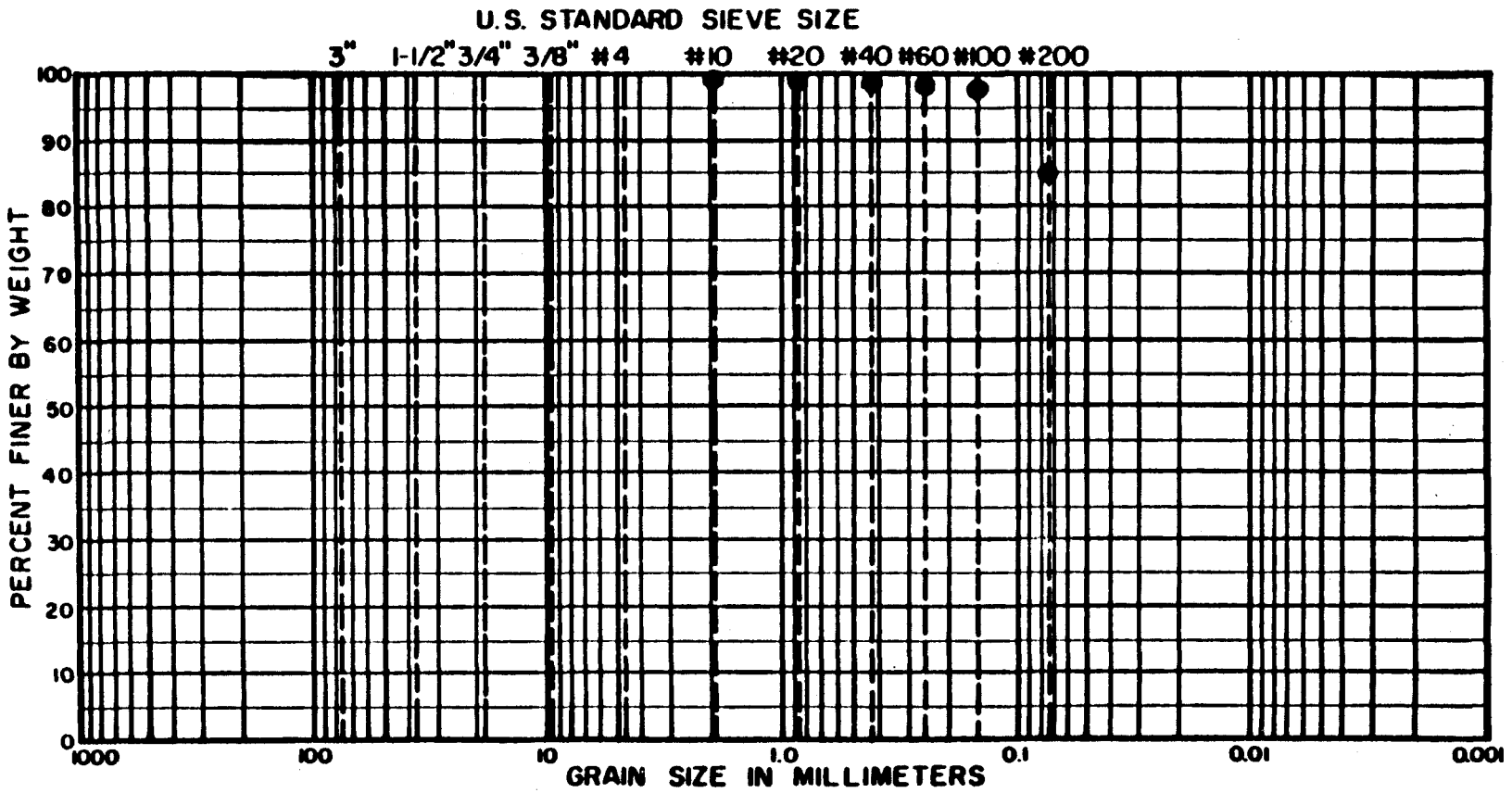
Wt. Wet Soil & Pan Before Washing (g)	
Wt. Dry Soil & Pan Before Washing (g)	177.1
Weight of Pan (g)	8.7
Wt. of Dry Soil Before Washing	168.4
Wt. Dry Soil & Pan After Washing (g)	33.8
Wt. of Dry Soil After Washing (g)	25.1
-#200 Wash. Out %	85.1

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	3.75	4.22	0.47	0.47	0.3	99.7
#20	3.73	4.06	0.33	0.80	0.5	99.5
#40	3.80	4.40	0.60	1.40	0.8	99.2
#60	3.73	4.44	0.71	2.11	1.3	98.7
#100	3.67	4.92	1.25	3.36	2.0	98.0
#200	3.79	25.52	21.73	25.09	14.9	85.1

Silt or Clay

Silty Clay (CL)

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

LOCATION	DEPTH	CLASSIFICATION
14+15	27.5'	Rocky Flats / EG+G Dr. Gravel, 1% Sand, 14.1% F Gravel, 85.1% Silt + Clay, trace fn sand

ADVANCED TERRA TESTING

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats EG-G

BORING 4-15 SAMPLE CH #2 DEPTH 27.5'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

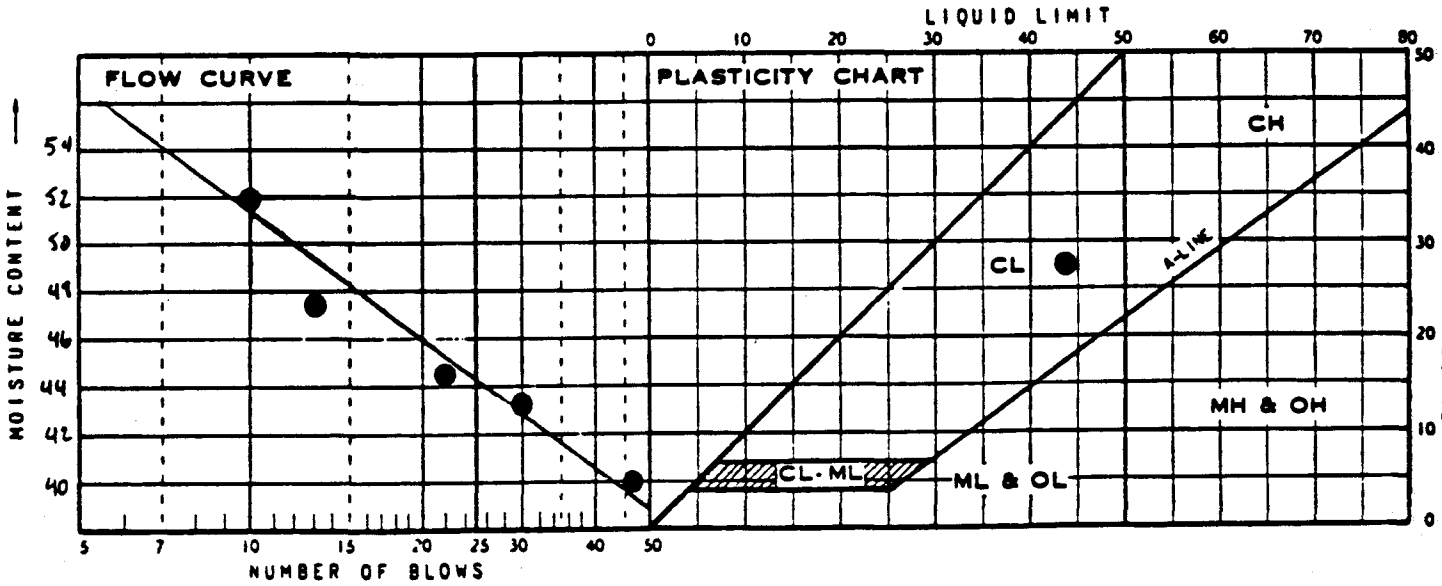
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY OW 2/15/92

DETERMINATION	1	2	3	4	5	6
DISH	2001	2002	2003			
WT OF DISH + WET SOIL g	7.77	9.66	7.79			
WT OF DISH + DRY SOIL g	6.83	8.45	6.85	—	—	—
WT OF MOISTURE g	.94	1.21	.94			
WT OF DISH g	1.04	1.04	1.04	—	—	—
WT OF DRY SOIL g	5.79	7.41	5.81			
MOISTURE CONTENT %	16.2	16.3	16.2			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2004	2005	2006	2007	2008	2009
NUMBER OF BLOWS	47	28	30	22	13	10
WT OF DISH + WET SOIL g	13.96	12.43	13.28	13.85	11.97	11.19
WT OF DISH + DRY SOIL g	10.27	9.05	9.59	9.91	8.44	7.72
WT OF MOISTURE g	3.69	3.38	3.69	3.94	3.53	3.47
WT OF DISH g	1.04	1.04	1.04	1.04	1.04	1.04
WT OF DRY SOIL g	9.23	8.01	8.55	8.87	7.40	6.68
MOISTURE CONTENT %	40.0	42.2	43.2	44.4	47.7	52.0



SUMMARY

DRY DENSITY	MOISTURE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		44.4	16.2	28.2	CL	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	14+50	SAMPLED	Rocky Flats
DEPTH	24'	DATE TESTED	02-21-92 TN
SAMPLE NO.	#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	42.34
Wt. Dry Soil & Pan	(g)	41.95
Wt. Lost Moisture	(g)	0.39
Wt. of Pan Only	(g)	3.76
Wt. of Dry Soil	(g)	38.19
Moisture Content	%	1.0
Wt. Hydrom. Sample Wet	(g)	59.67
Wt. Hydrom. Sample Dry	(g)	59.07

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	172.13
Weight of + #10 Before Washing (g)	0.43
Weight of + #10 After Washing (g)	0.40
Weight of - #10 Wet (g)	171.70
Weight of - #10 Dry (g)	169.99
Wt. Total Sample Dry (g)	170.3
Calc. Wt. "W" (g)	59.21
Calc. Mass + #10	0.14

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.36	0.36	0.36	0.2	99.8
#10	0.00	0.04	0.04	0.40	0.2	99.8
#20	1.56	1.75	0.19	0.19	0.6	99.4
#40	1.57	1.85	0.28	0.47	1.0	99.0
#60	1.57	2.01	0.44	0.91	1.8	98.2
#100	1.55	2.66	1.11	2.02	3.6	96.4
#230	1.57	12.14	10.57	12.59	21.5	78.5

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	14+50	SAMPLED	Rocky Flats
DEPTH	24'	DATE TESTED	02-21-92 TNU
SAMPLE NO.	#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

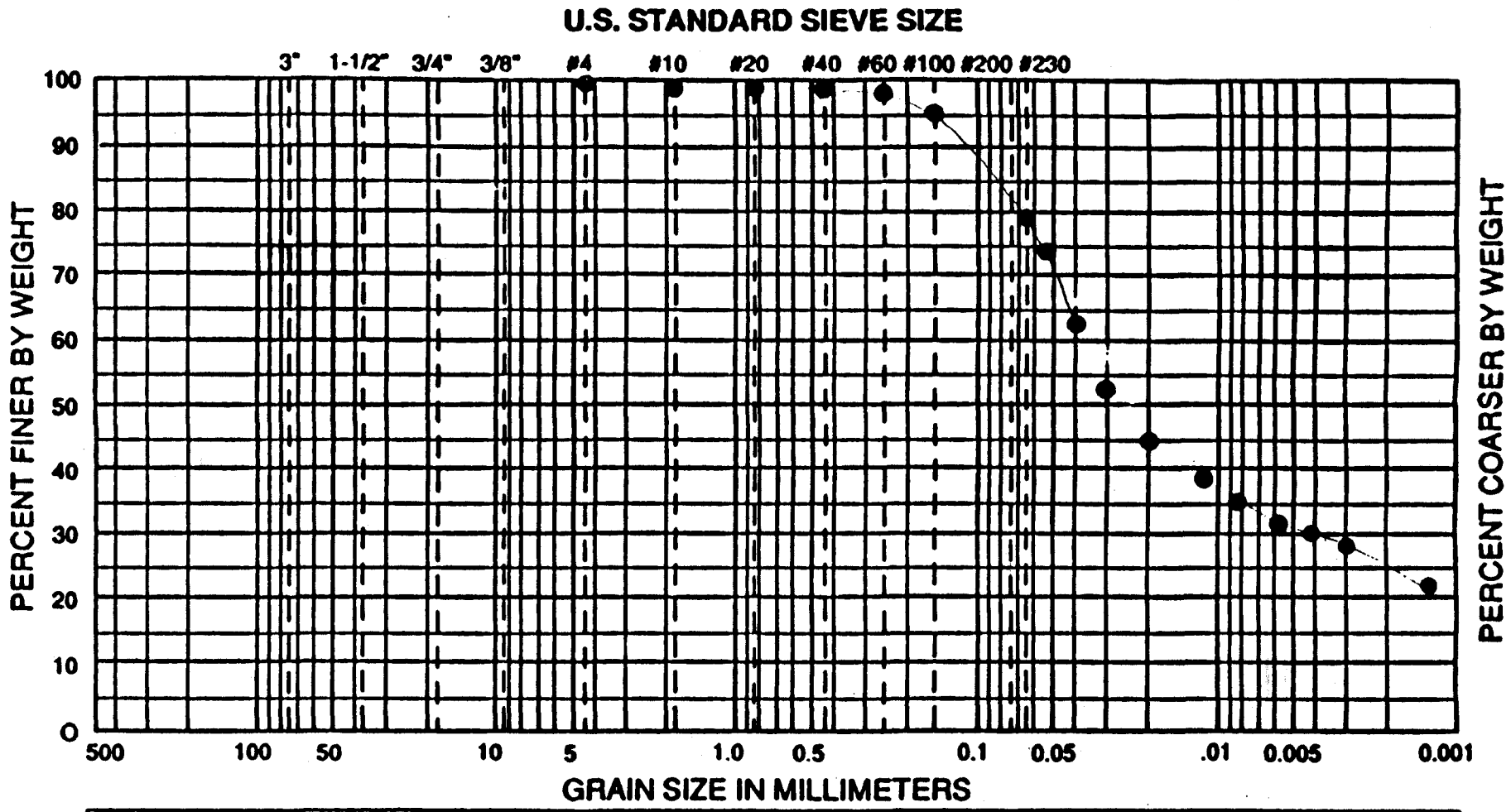
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01317
Value of "a"	0.98	Wt. Dry Sample "W"	59.209
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	50.00	44.50	74.0	74.0	8.09	0.0530
1.0	43.50	38.00	63.2	63.2	9.16	0.0399
2.0	37.50	32.00	53.2	53.2	10.14	0.0297
5.0	32.50	27.00	44.9	44.9	10.96	0.0195
15.0	28.50	23.00	38.2	38.2	11.62	0.0116
30.0	27.00	21.50	35.7	35.7	11.86	0.0083
60.0	25.00	19.50	32.4	32.4	12.19	0.0059
120.0	24.00	18.50	30.7	30.7	12.35	0.0042
250.0	22.50	17.00	28.3	28.3	12.60	0.0030
1440.0	19.00	13.50	22.4	22.4	13.17	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 14+50 SAMPLE NO.: #1 DATE: 2/20/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	2'/'	Rocky [illegible] Clay silt (ML) w/ some sand gr[illegible]

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats EG&G

BORING 14-50 SAMPLE CH #1 DEPTH 2.1

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

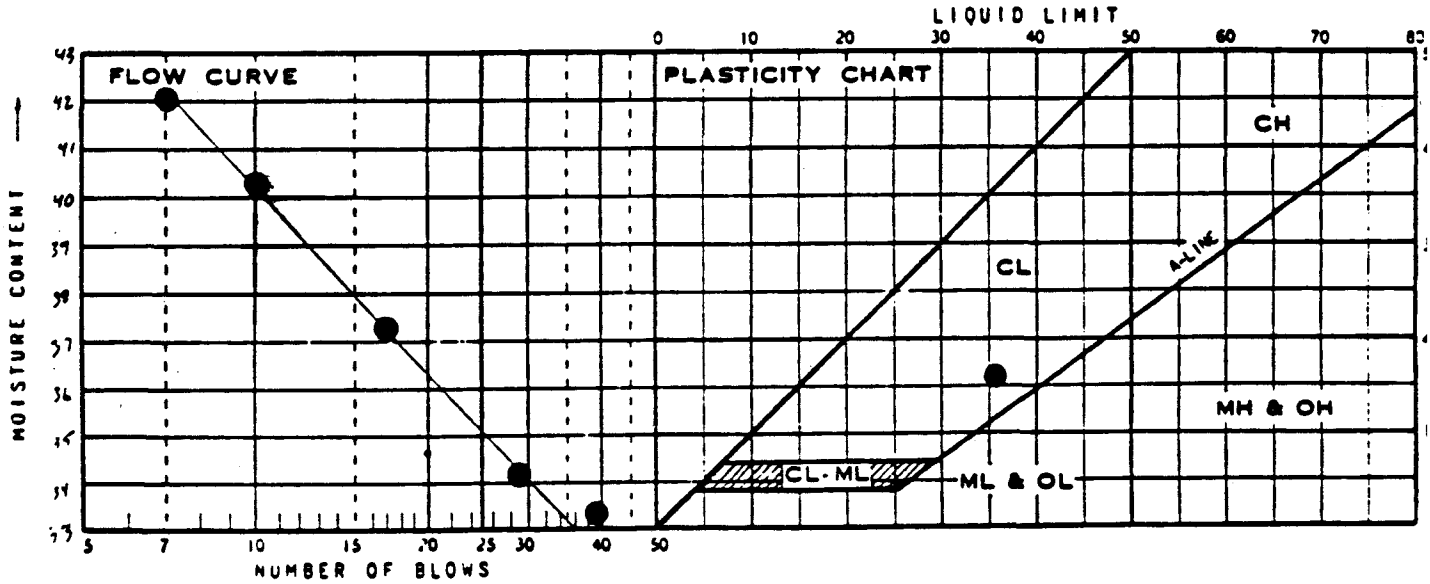
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DW 2/19/91

DETERMINATION	1	2	3	4	5	6
DISH	24	66C	37C			
WT OF DISH + WET SOIL g	8.64	10.64	11.36			
WT OF DISH + DRY SOIL g	7.48	9.12	9.72	—	—	—
WT OF MOISTURE g	1.16	1.52	1.64			
WT OF DISH g	1.05	1.06	1.07	—	—	—
WT OF DRY SOIL g	6.43	8.06	8.65			
MOISTURE CONTENT %	18.0	18.7	19.0			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2004	2041	48C	2016	2034	2071
NUMBER OF BLOWS	34	24	20	17	10	7
WT OF DISH + WET SOIL g	16.09	14.16	15.23	13.44	12.96	13.33
WT OF DISH + DRY SOIL g	12.33	10.82	11.58	10.07	9.53	9.27
WT OF MOISTURE g	3.76	3.34	3.65	3.37	3.43	3.73
WT OF DISH g	1.03	1.04	1.05	1.03	1.03	1.03
WT OF DRY SOIL g	11.30	9.78	10.53	9.04	8.50	8.24
MOISTURE CONTENT %	33.3	34.1	34.7	37.3	40.3	42.0



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		35.1	28.6	6.5	CL	

ADVANCED TERRA TESTING

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MECHANICAL ANALYSIS - SIEVE TEST DATA

BR

CLIENT Weston

JOB NO. 2066-03

BORING NO.	14+50	SAMPLED	Rocky Flats
DEPTH	33'	DATE TESTED	02-15-92 TNU
SAMPLE NO.	#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	65.74
Wt. Dry Soil & Pan	(g)	63.46
Wt. Lost Moisture	(g)	2.28
Wt. of Pan Only	(g)	3.80
Wt. of Dry Soil	(g)	59.66
Moisture Content	%	3.8
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	57.79

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	57.79
Wt. Total Sample Dry (g)	57.79
Calc. Wt. "W" (g)	57.79
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.56	1.67	0.11	0.11	0.2	99.8
#40	1.56	1.63	0.07	0.18	0.3	99.7
#60	1.57	1.65	0.08	0.26	0.4	99.6
#100	1.57	1.86	0.29	0.55	1.0	99.0
#230	1.56	7.82	6.26	6.81	11.8	88.2

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	14+50	SAMPLED	Rocky Flats
DEPTH	33'	DATE TESTED	02-15-92 TNU
SAMPLE NO.	#1	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

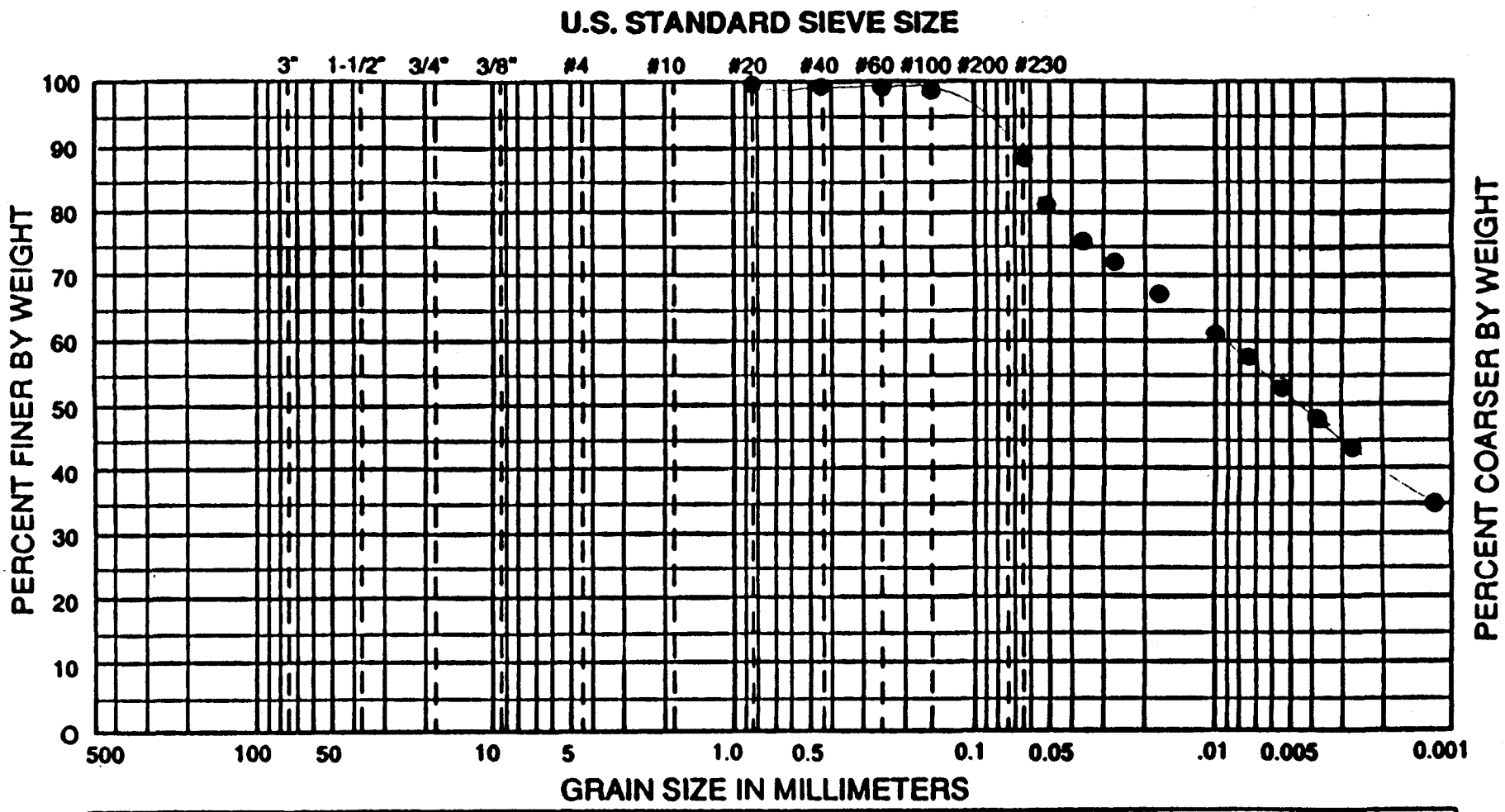
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01317
Value of "a"	0.98	Wt. Dry Sample "W"	57.791
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	54.00	48.00	81.7	81.7	7.43	0.0508
1.0	50.50	44.50	75.8	75.8	8.01	0.0373
2.0	49.00	43.00	73.2	73.2	8.25	0.0268
5.0	45.50	39.50	67.3	67.3	8.83	0.0175
15.0	42.00	36.00	61.3	61.3	9.40	0.0104
30.0	40.00	34.00	57.9	57.9	9.73	0.0075
60.0	37.00	31.00	52.8	52.8	10.22	0.0054
120.0	34.00	28.00	47.7	47.7	10.71	0.0039
250.0	32.00	26.00	44.3	44.3	11.04	0.0028
1440.0	26.50	20.50	34.9	34.9	11.94	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY	
		COARSE	FINE	COARSE	MEDIUM	FINE		
VENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND		SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE

VELLNAME: 14+50 SAMPLE NO.: #1 DATE: 2/20/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	33'	Area Flats — Silty Clay w/ some SAND — 13% gravel, 11.7% sand, 41.3% silt, 47% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-05

CLIENT/OWNER WESTON

LOCATION _____

BORING 4-5Q SAMPLE [illegible] DEPTH [illegible]

FIELD DENSITY BY _____

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

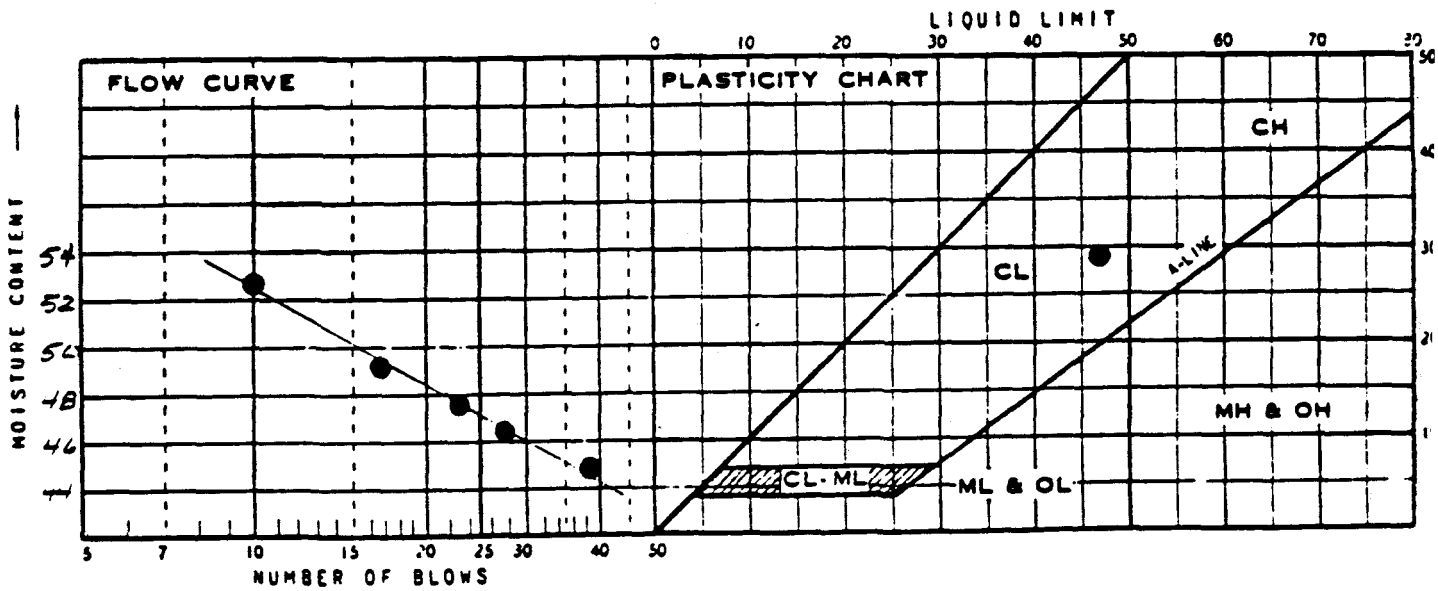
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible]

DETERMINATION	1	2	3	4	5	6
DISH	2024	2045	2028			
WT OF DISH + WET SOIL	11.25	9.92	10.21			
WT OF DISH + DRY SOIL	10.26	8.56	8.84	—	—	—
WT OF MOISTURE	.97	1.36	1.37			
WT OF DISH	1.04	1.05	1.04	—	—	—
WT OF DRY SOIL	9.22	7.51	7.80			
MOISTURE CONTENT %	10.5	18.1	17.6			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2007	2014	2015	2009	2017	
NUMBER OF BLOWS	37	28	24	17	10	
WT OF DISH + WET SOIL	17.95	13.10	15.45	16.68	16.46	
WT OF DISH + DRY SOIL	9.95	9.28	10.81	11.52	11.17	—
WT OF MOISTURE	4.00	3.82	4.64	5.16	5.37	
WT OF DISH	1.05	1.05	1.04	1.04	1.04	—
WT OF DRY SOIL	8.90	8.23	9.77	10.48	10.09	
MOISTURE CONTENT %	44.9	46.4	47.5	49.2	[illegible]	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		47.2	17.9	29.3	CL	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	14+75	SAMPLED	12-28-91
DEPTH	4'	DATE TESTED	02-04-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Rocky Flats/EG&G	DRY SIEVE	No

MOISTURE/DENSITY DATA

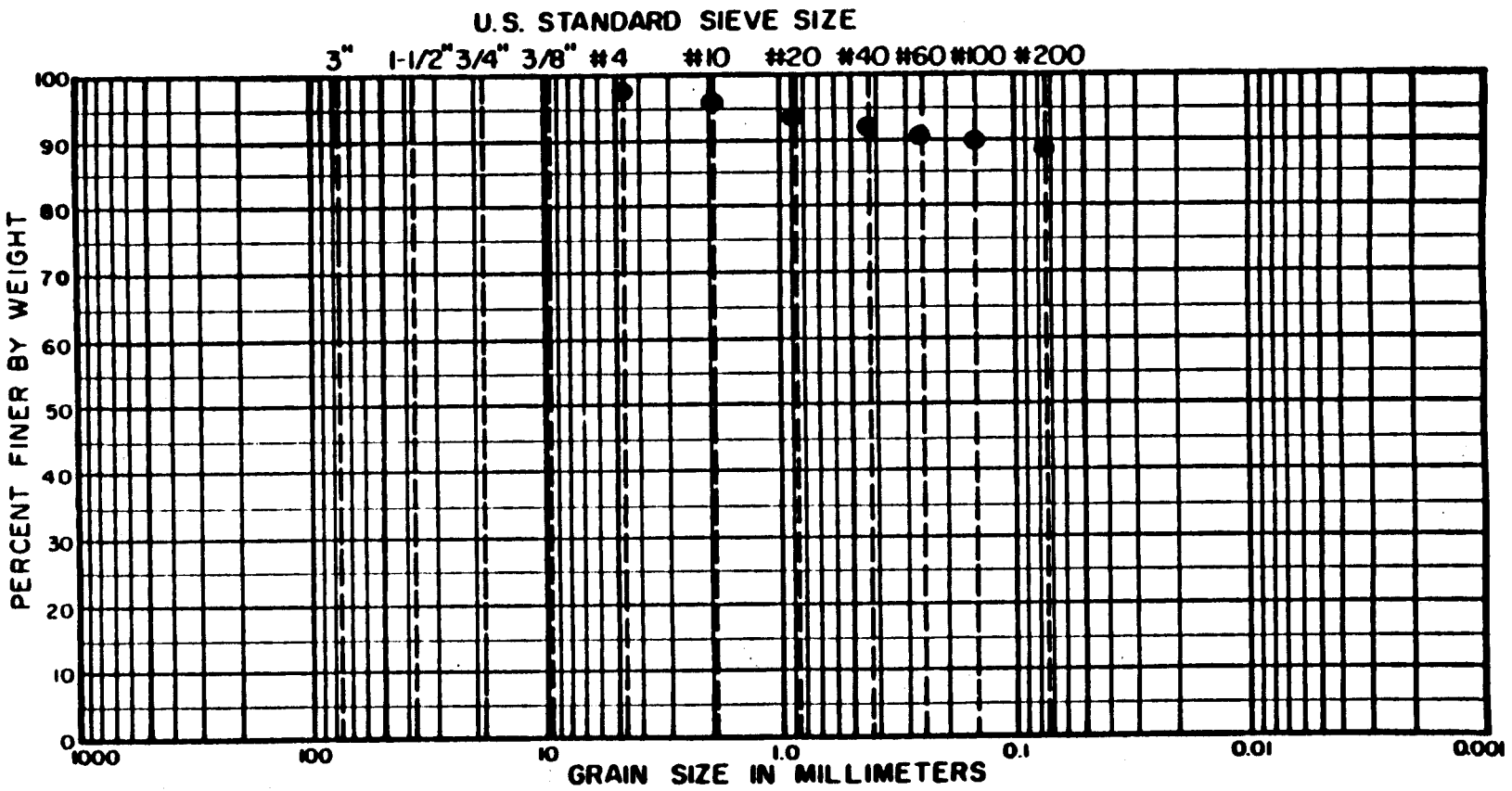
Wt. Soil & Ring(s) (g)	
Wt. Ring(s) (g)	
Wt. Soil (g)	
Wet Density PCF	
Wt. Wet Soil & Pan (g)	
Wt. Dry Soil & Pan (g)	
Wt. Lost Moisture (g)	
Wt. of Pan Only (g)	
Wt. of Dry Soil (g)	
Moisture Content %	
Dry Density PCF	

WASH SIEVE ANALYSIS

Wt. Wet Soil & Pan Before Washing (g)	
Wt. Dry Soil & Pan Before Washing (g)	130.5
Weight of Pan (g)	9.4
Wt. of Dry Soil Before Washing	121.1
Wt. Dry Soil & Pan After Washing (g)	23.9
Wt. of Dry Soil After Washing (g)	14.5
-#200 Wash. Out %	88.0

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	3.68	5.23	1.55	1.55	1.3	98.7
#10	3.77	6.61	2.84	4.39	3.6	96.4
#20	3.77	6.23	2.46	6.85	5.7	94.3
#40	3.75	5.62	1.87	8.72	7.2	92.8
#60	3.74	5.04	1.30	10.02	8.3	91.7
#100	3.72	5.19	1.47	11.49	9.5	90.5
#200	3.71	6.71	3.00	14.49	12.0	88.0

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

LOCATION	DEPTH	CLASSIFICATION CLAY w/ Some Silt
14+75	40	1.5% Gravels, 2.3% Coarse, Rocky Fine/Coarse 36% Med, 9.8% Fine, 88% silt or clay

ADVANCED TERRA TESTING

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats EG+E

BORING 4 ± 75 SAMPLE Ch #1 DEPTH 4'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

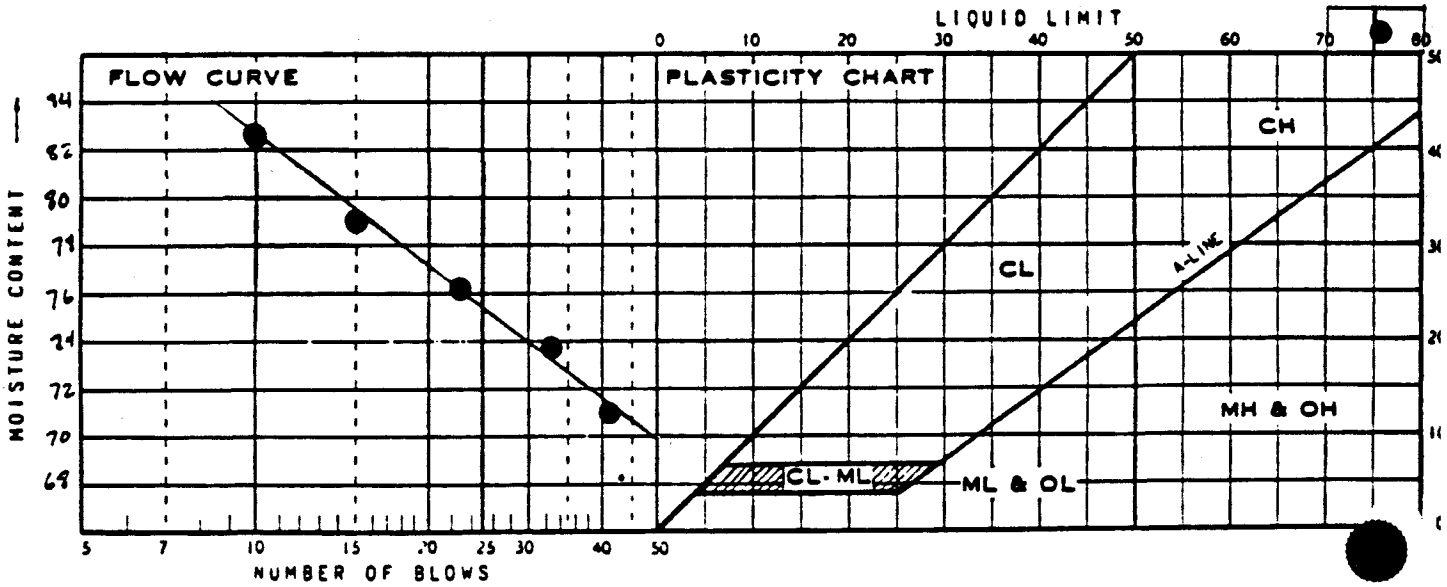
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY BH 2/15/98

DETERMINATION	1	2	3	4	5	6
DISH	2020	2021	2022			
WT OF DISH + WET SOIL g	7.89	6.25	6.55			
WT OF DISH + DRY SOIL g	6.59	5.25	5.55	—	—	—
WT OF MOISTURE g	1.30	1.00	1.00			
WT OF DISH g	1.03	1.04	1.05	—	—	—
WT OF DRY SOIL g	5.56	4.21	4.50			
MOISTURE CONTENT %	23.4	23.8	22.2			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2023	2024	2025	2026	2027	2028
NUMBER OF BLOWS	44	41	33	23	15	10
WT OF DISH + WET SOIL g	13.58	11.85	13.10	12.21	11.71	13.05
WT OF DISH + DRY SOIL g	8.49	7.36	7.98	7.37	7.00	7.61
WT OF MOISTURE g	5.09	4.49	5.12	4.84	4.71	5.44
WT OF DISH g	1.04	1.04	1.04	1.02	1.04	1.04
WT OF DRY SOIL g	7.45	6.32	6.94	6.35	5.96	6.57
MOISTURE CONTENT %	68.3	71.0	73.8	76.2	79.0	82.8



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		75.5	23.1	52.4	CH	

ADVANCED TERRA TESTING

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Roy F. Weston	JOB NO.	2066-03
BORING NO.	15+00	SAMPLED	12-17-91 SRC
DEPTH	20.5'	DATE TESTED	01-22-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Bulk	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01324
Value of "a"	0.99	Wt. Dry Sample "W"	59.225
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	—	—	—	—	—	—
0.5	58.50	53.00	88.4	88.4	6.70	0.0485
1.0	54.00	48.50	80.9	80.9	7.43	0.0361
2.0	51.50	46.00	76.7	76.7	7.84	0.0262
5.0	47.00	41.50	69.2	69.2	8.58	0.0173
15.0	42.50	37.00	61.7	61.7	9.32	0.0104
30.0	40.00	34.50	57.6	57.6	9.73	0.0075
60.0	37.50	32.00	53.4	53.4	10.14	0.0054
120.0	35.00	29.50	49.2	49.2	10.55	0.0039
250.0	32.00	26.50	44.2	44.2	11.04	0.0028
1440.0	26.50	21.00	35.0	35.0	11.94	0.0012

Grain Diameter = K*(SQRT(L/T))

Clayey Silt

(ML)

ADVANCED TERRA TESTING, INC.

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Roy F. Weston

JOB NO. 2066-03

BORING NO.	15+00
DEPTH	20.5'
SAMPLE NO.	—
SOIL DESCR.	Bulk

SAMPLED	12-17-91 SRC
DATE TESTED	01-22-92 TNU
WASH SIEVE	Yes
DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	59.36
Wt. Dry Soil & Pan	(g)	58.64
Wt. Lost Moisture	(g)	0.72
Wt. of Pan Only	(g)	3.64
Wt. of Dry Soil	(g)	55.00
Moisture Content	%	1.3

Wt. Hydrom. Sample	Wet (g)	60.00
Wt. Hydrom. Sample	Dry (g)	59.22

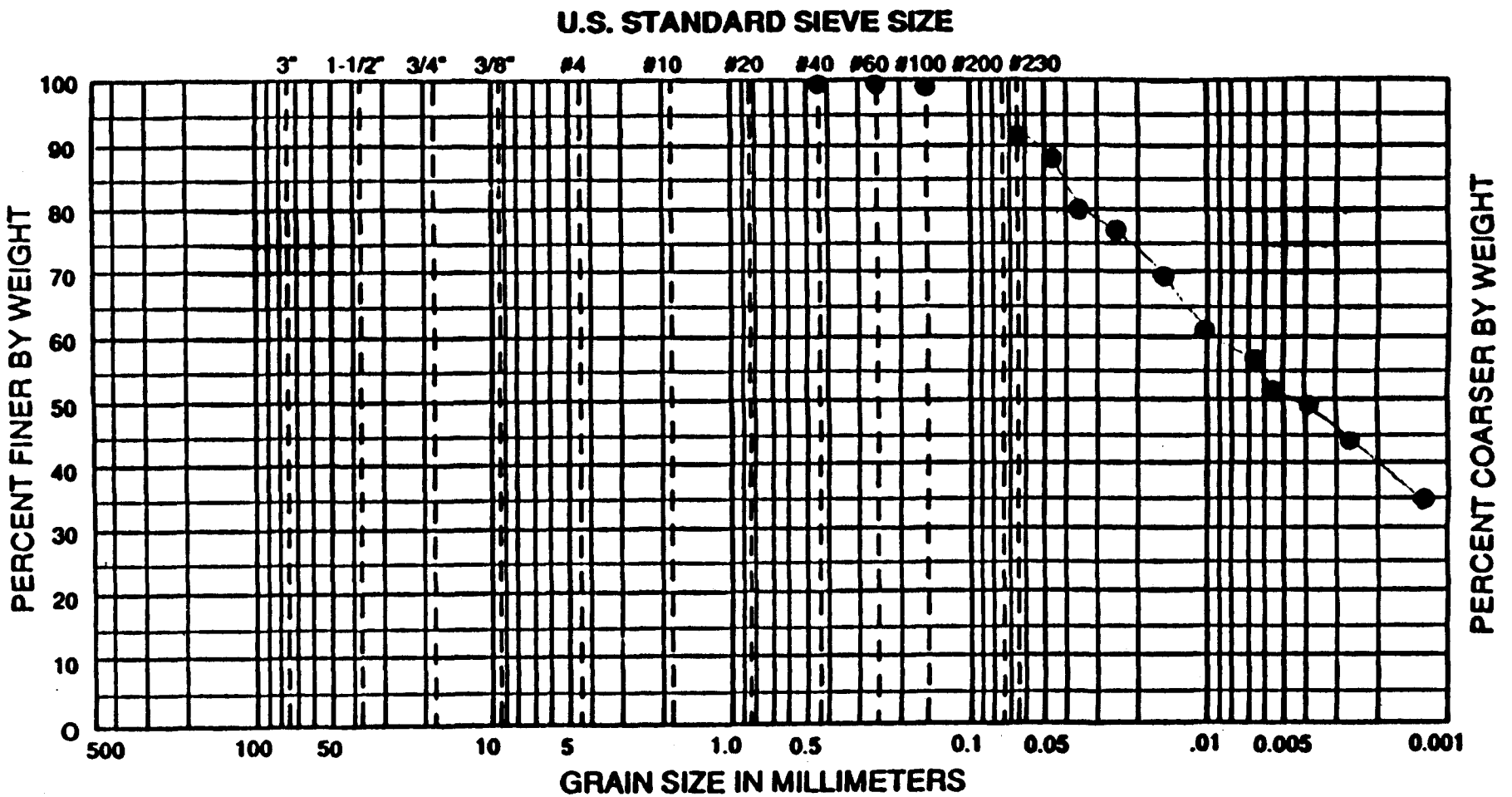
WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	59.22
Wt. Total Sample Dry (g)	59.22
Calc. Wt. "W" (g)	59.22
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	0.00	0.00	0.00	0.00	0.0	100.0
#40	1.56	1.60	0.04	0.04	0.1	99.9
#60	1.56	1.79	0.23	0.27	0.5	99.5
#100	1.56	1.71	0.15	0.42	0.7	99.3
#230	1.55	5.65	4.10	4.52	7.6	92.4

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING

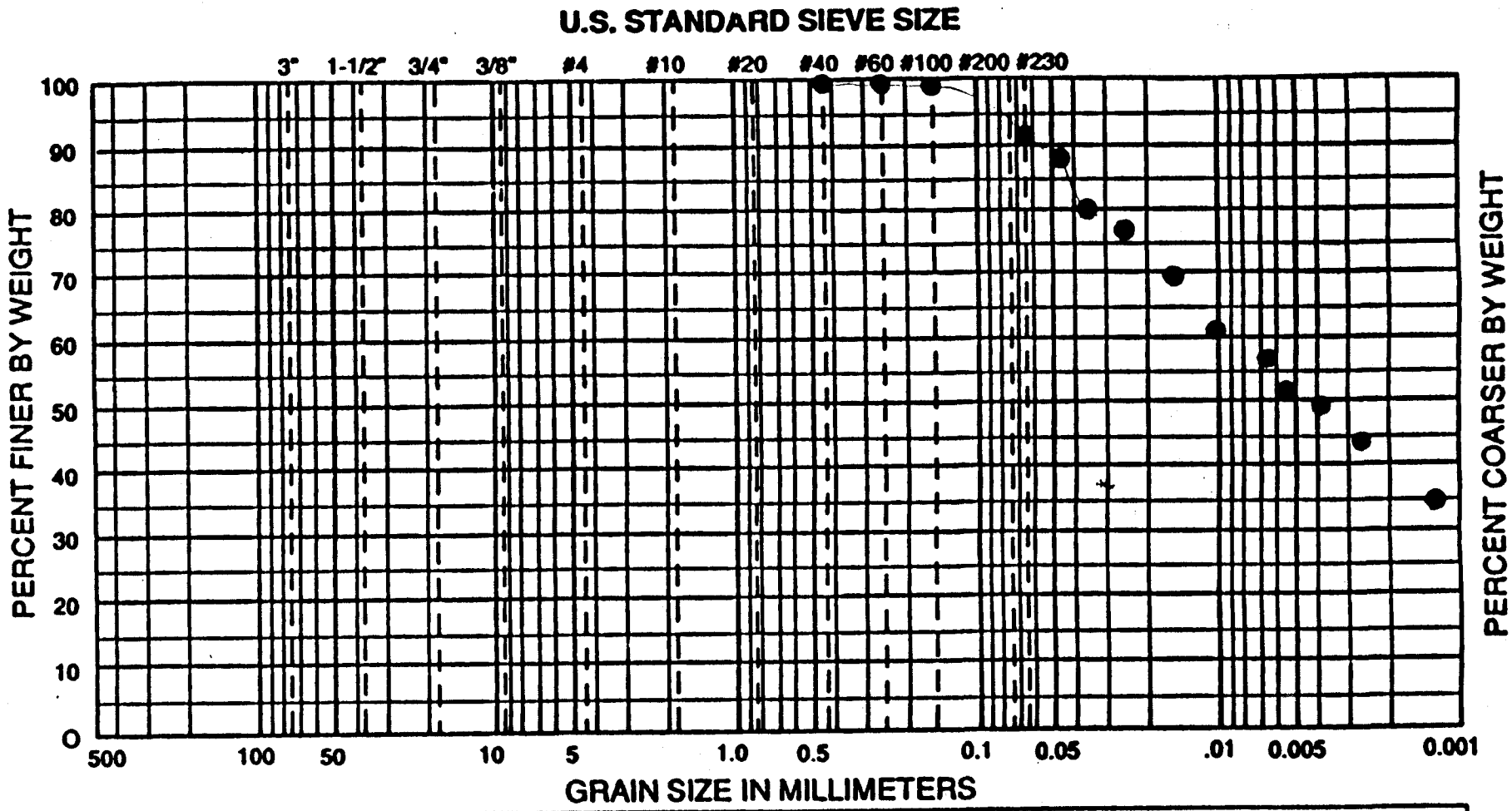


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 15+00 SAMPLE NO.: DATE: 1-29-92 PROJECT NO.: 2029-39-09-2096

AREA	DEPTH	CLASSIFICATION
	20.5'	(ML) 2% sand 50% silt, 48% clay

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 15+00 SAMPLE NO.: DATE: 1-29-92 PROJECT NO.: 2029-33-09-0096

AREA	DEPTH	CLASSIFICATION
	20.5'	98%

MECHANICAL ANALYSIS - SIEVE TEST DATA

BR

CLIENT Roy F. Weston

JOB NO. 2066-03

BORING NO.	15+10	SAMPLED	12-17-91 SRC
DEPTH	27.0'	DATE TESTED	01-22-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Bulk	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	45.44
Wt. Dry Soil & Pan	(g)	45.10
Wt. Lost Moisture	(g)	0.34
Wt. of Pan Only	(g)	3.68
Wt. of Dry Soil	(g)	41.42
Moisture Content	%	0.8

Wt. Hydrom. Sample	Wet (g)	60.00
Wt. Hydrom. Sample	Dry (g)	59.51

WASH SIEVE ANALYSIS

Wt. Total Sample	Wet (g)	60.00
Weight of + #10 Before Washing	(g)	0.00
Weight of + #10 After Washing	(g)	0.00
Weight of - #10	Wet (g)	60.00
Weight of - #10	Dry (g)	59.51
Wt. Total Sample	Dry (g)	59.51
Calc. Wt. "W"	(g)	59.51
Calc. Mass + #10		0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	0.00	0.00	0.00	0.00	0.0	100.0
#40	1.57	1.63	0.06	0.06	0.1	99.9
#60	1.55	2.39	0.84	0.90	1.5	98.5
#100	1.56	2.75	1.19	2.09	3.5	96.5
#230	1.56	11.74	10.18	12.27	20.6	79.4

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Roy F. Weston	JOB NO.	2066-03
BORING NO.	15+10	SAMPLED	12-17-91 SRC
DEPTH	27.0'	DATE TESTED	01-22-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Bulk	DRY SIEVE	No

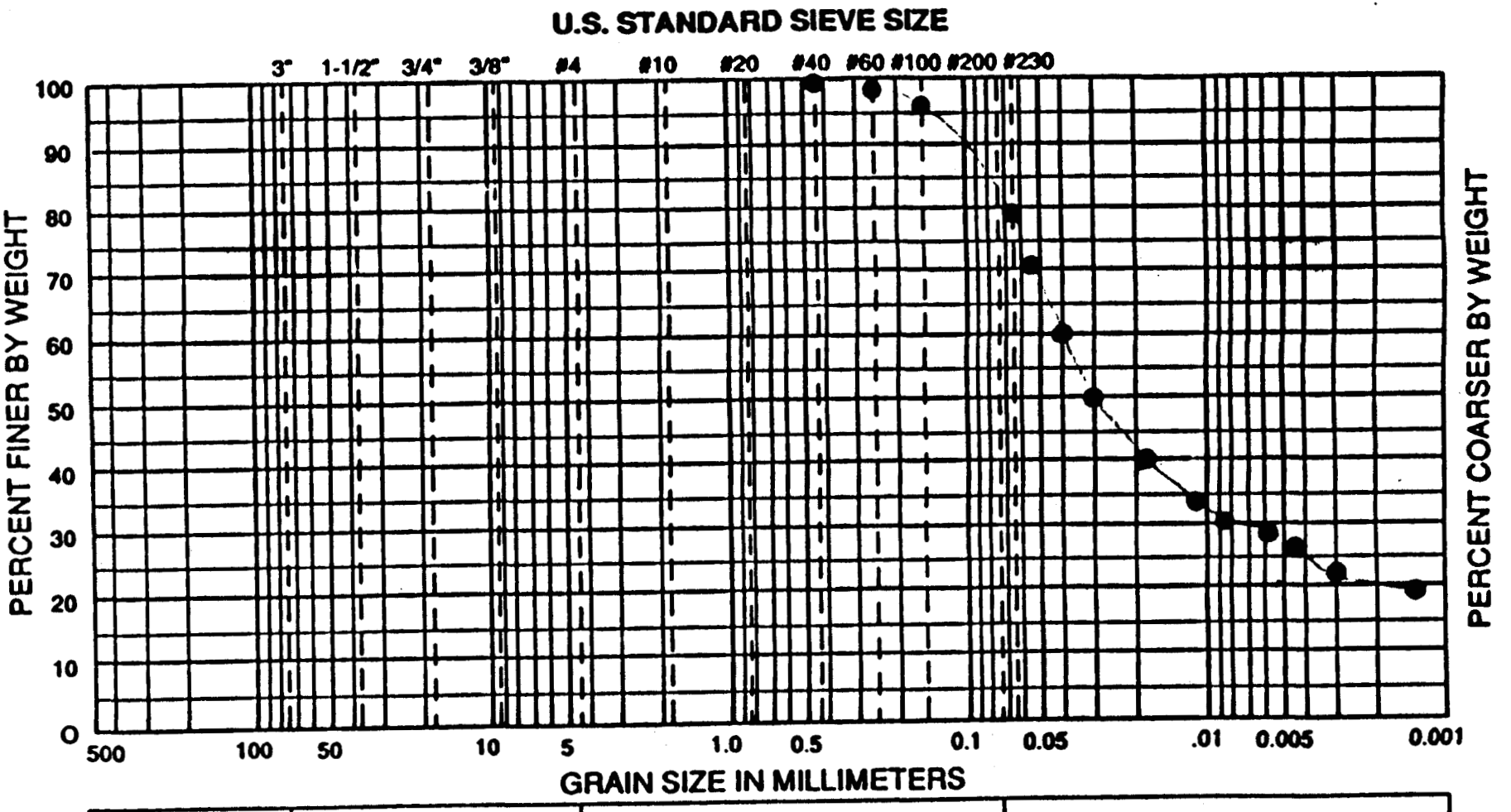
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.79	Temp. Coef. K	0.01295
Value of "a"	0.97	Wt. Dry Sample "W"	59.511
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	—	—	—	—	—	—
0.5	49.00	43.50	71.0	71.0	8.25	0.0526
1.0	42.50	37.00	60.4	60.4	9.32	0.0395
2.0	36.00	30.50	49.8	49.8	10.39	0.0295
5.0	30.00	24.50	40.0	40.0	11.37	0.0195
15.0	26.50	21.00	34.3	34.3	11.94	0.0116
30.0	24.50	19.00	31.0	31.0	12.27	0.0083
60.0	23.00	17.50	28.6	28.6	12.52	0.0059
120.0	22.00	16.50	26.9	26.9	12.68	0.0042
250.0	19.50	14.00	22.9	22.9	13.09	0.0030
1440.0	17.50	12.00	19.6	19.6	13.42	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 15+10 SAMPLE NO.: DATE: 1-29-92 PROJECT NO.: 2029-33-09-0030

AREA	DEPTH	SANDY SILTSTONE w/some clay CLASSIFICATION
	27.0'	.1% [illegible], 1.4% [illegible], 14.1% F sand, 58% silt, 22% clay

MECHANICAL ANALYSIS - SIEVE TEST DATA

BR

CLIENT Roy F. Weston

JOB NO. 2066-03

BORING NO.	15+15	SAMPLED	12-17-91 SRC
DEPTH	19.0'	DATE TESTED	01-22-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Bulk	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	53.13
Wt. Dry Soil & Pan	(g)	52.87
Wt. Lost Moisture	(g)	0.26
Wt. of Pan Only	(g)	3.65
Wt. of Dry Soil	(g)	49.22
Moisture Content	%	0.5
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	59.68

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	59.68
Wt. Total Sample Dry (g)	59.68
Calc. Wt. "W" (g)	59.68
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	0.00	0.00	0.00	0.00	0.0	100.0
#40	1.57	1.58	0.01	0.01	0.0	100.0
#60	1.56	1.57	0.01	0.02	0.0	100.0
#100	1.55	1.64	0.09	0.11	0.2	99.8
#230	1.56	30.98	29.42	29.53	49.5	50.5

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Roy F. Weston	JOB NO.	2066-03
BORING NO.	15+15	SAMPLED	12-17-91 SRC
DEPTH	19.0'	DATE TESTED	01-22-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Bulk	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.70	Temp. Coef. K	0.01328
Value of "a"	0.99	Wt. Dry Sample "W"	59.685
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.5		
Meniscus Corr'n	-1.0		

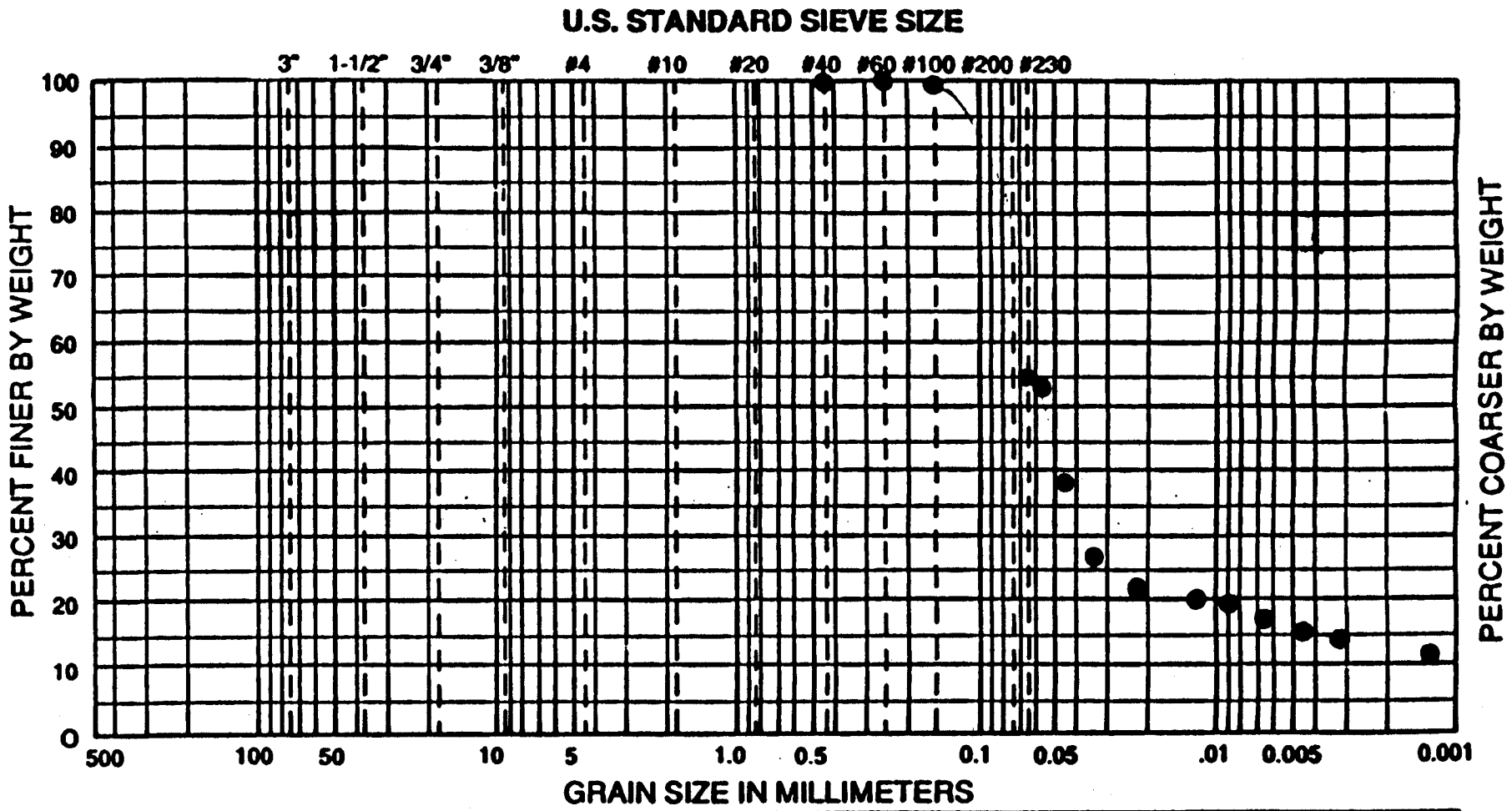
T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	—	—	—	—	—	—
0.5	38.00	32.50	53.9	53.9	10.06	0.0596
1.0	28.50	23.00	38.2	38.2	11.62	0.0453
2.0	22.00	16.50	27.4	27.4	12.68	0.0334
5.0	19.50	14.00	23.2	23.2	13.09	0.0215
15.0	18.00	12.50	20.7	20.7	13.34	0.0125
30.0	17.50	12.00	19.9	19.9	13.42	0.0089
60.0	16.00	10.50	17.4	17.4	13.67	0.0063
120.0	15.50	10.00	16.6	16.6	13.75	0.0045
250.0	14.00	8.50	14.1	14.1	13.99	0.0031
1440.0	13.00	7.50	12.4	12.4	14.16	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

Bed Rock (1) [illegible]

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY	
		COARSE	FINE	COARSE	MEDIUM	FINE		
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND		SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE

WELLNAME: 15+15 SAMPLE NO.: DATE: 1-29-92 PROJECT NO.: 3029-33-09-0030

AREA	DEPTH	CLASSIFICATION SILTY SANDSTONE w/ some clay
	130'	

MECHANICAL ANALYSIS - SIEVE TEST DATA

BR

CLIENT Roy F. Weston

JOB NO. 2066-03

BORING NO.	15+25	SAMPLED	12-17-91 SRC
DEPTH	26.5'	DATE TESTED	01-22-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Bulk	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan	(g)	46.19
Wt. Dry Soil & Pan	(g)	45.84
Wt. Lost Moisture	(g)	0.35
Wt. of Pan Only	(g)	3.78
Wt. of Dry Soil	(g)	42.06
Moisture Content	%	0.8

Wt. Hydrom. Sample	Wet (g)	60.00
Wt. Hydrom. Sample	Dry (g)	59.50

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	59.50
Wt. Total Sample Dry (g)	59.50
Calc. Wt. "W" (g)	59.50
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	0.00	0.00	0.00	0.00	0.0	100.0
#40	1.56	1.58	0.02	0.02	0.0	100.0
#60	1.57	1.65	0.08	0.10	0.2	99.8
#100	1.56	1.94	0.38	0.48	0.8	99.2
#230	1.57	17.54	15.97	16.45	27.6	72.4

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Roy F. Weston	JOB NO.	2066-03
BORING NO.	15+25	SAMPLED	12-17-91 SRC
DEPTH	26.5'	DATE TESTED	01-22-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Bulk	DRY SIEVE	No

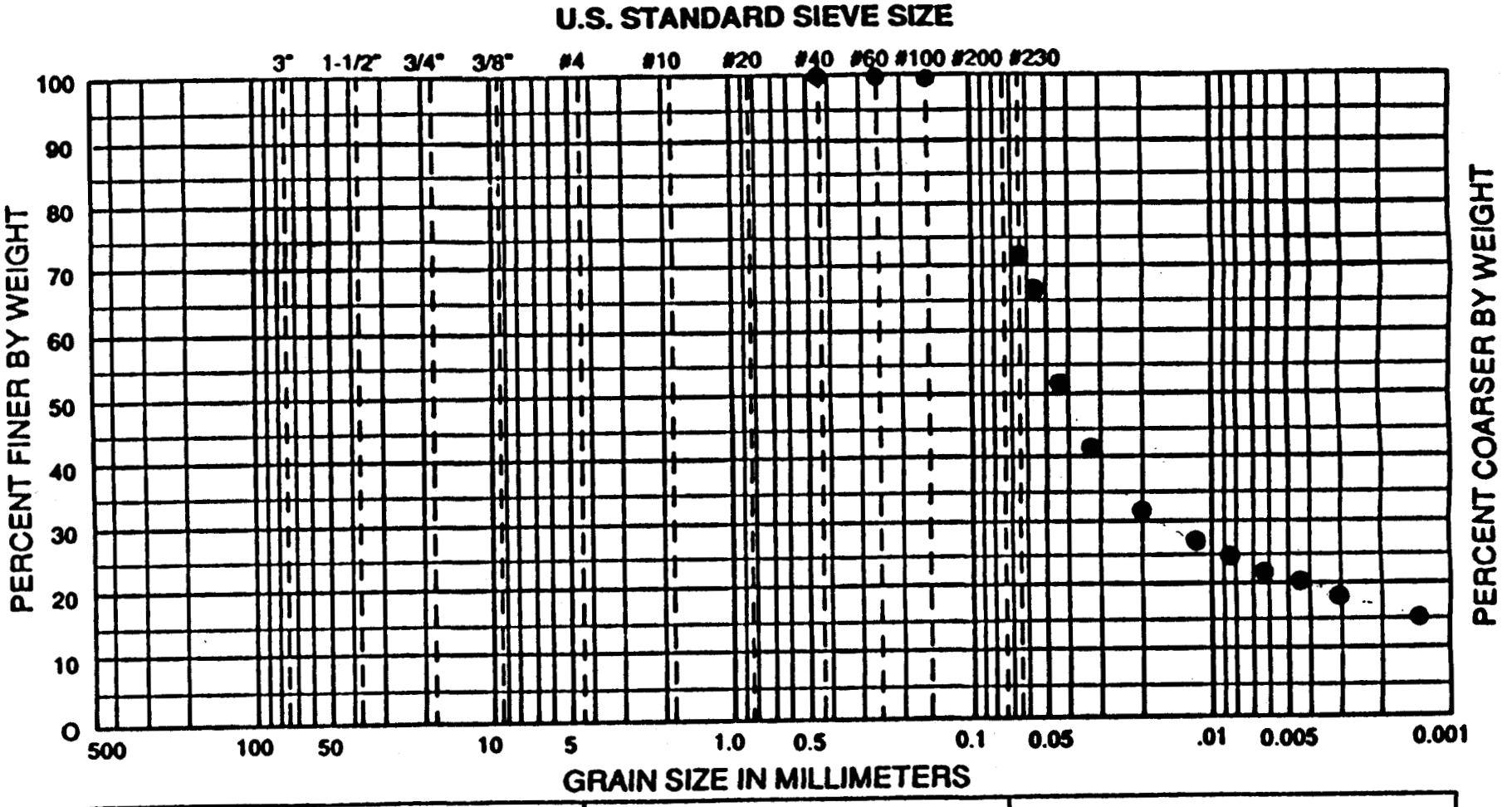
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.75	Temp. Coef. K	0.01309
Value of "a"	0.98	Wt. Dry Sample "W"	59.505
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	—	—	—	—	—	—
0.5	46.00	40.50	66.7	66.7	8.75	0.0547
1.0	38.00	32.50	53.5	53.5	10.06	0.0415
2.0	31.00	25.50	42.0	42.0	11.21	0.0310
5.0	25.00	19.50	32.1	32.1	12.19	0.0204
15.0	22.00	16.50	27.2	27.2	12.68	0.0120
30.0	21.00	15.50	25.5	25.5	12.85	0.0086
60.0	20.00	14.50	23.9	23.9	13.01	0.0061
120.0	18.50	13.00	21.4	21.4	13.26	0.0044
250.0	17.00	11.50	18.9	18.9	13.50	0.0030
1440.0	15.00	9.50	15.6	15.6	13.83	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 15+25 SAMPLE NO.: DATE: 1-24-92 PROJECT NO.: 2029-33-09-0030

AREA	DEPTH	CLASSIFICATION		
	26.5'	Sandy Siltstone w/Some Clay	.2% Gravel, 27.4% F Sand	53.4% Silt / 19% Clay

MECHANICAL ANALYSIS - SIEVE TEST DATA
-#230 SIEVE ONLY

BR

CLIENT Roy F. Weston

JOB NO. 2066-03

BORING NO.	15+25	SAMPLED	12-17-91 SRC
DEPTH	31'	DATE TESTED	01-22-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Bulk/Jar	DRY SIEVE	No

MOISTURE/DENSITY DATA

Wt. Soil & Ring(s)	(g)	
Wt. Ring(s)	(g)	
Wt. Soil	(g)	
Wet Density	PCF	
Wt. Wet Soil & Pan	(g)	338.2
Wt. Dry Soil & Pan	(g)	289.7
Wt. Lost Moisture	(g)	48.4
Wt. of Pan Only	(g)	14.3
Wt. of Dry Soil	(g)	275.4
Moisture Content	%	17.6
Dry Density	PCF	

WASH SIEVE ANALYSIS

Wt. Wet Soil & Pan Before Washing (g)	338.2
Wt. Dry Soil & Pan Before Washing (g)	289.7
Weight of Pan (g)	14.3
Wt. of Dry Soil Before Washing	275.4
Wt. Dry Soil & Pan After Washing (g)	16.1
Wt. of Dry Soil After Washing (g)	1.8
-#230 Wash. Out %	99.4

Silty Clay Loam **

ADVANCED TERRA TESTING, INC.

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	15+40	SAMPLED	Rocky Flats
DEPTH	27.5'	DATE TESTED	02-28-92 TNU
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	61.69
Wt. Dry Soil & Pan	(g)	60.34
Wt. Lost Moisture	(g)	1.35
Wt. of Pan Only	(g)	3.76
Wt. of Dry Soil	(g)	56.58
Moisture Content	%	2.4
Wt. Hydrom. Sample Wet	(g)	60.02
Wt. Hydrom. Sample Dry	(g)	58.62

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.02
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.02
Weight of - #10 Dry (g)	58.62
Wt. Total Sample Dry (g)	58.62
Calc. Wt. "W" (g)	58.62
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.59	1.60	0.01	0.01	0.0	100.0
#40	1.56	1.58	0.02	0.03	0.1	99.9
#60	1.58	1.70	0.12	0.15	0.3	99.7
#100	1.47	2.47	1.00	1.15	2.0	98.0
#230	1.57	20.48	18.91	20.06	34.2	65.8

Clayey Silt

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** JOB NO. 2066-03

BORING NO.	15+40	SAMPLED	Rocky Flats
DEPTH	27.5'	DATE TESTED	02-28-92 TNU
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

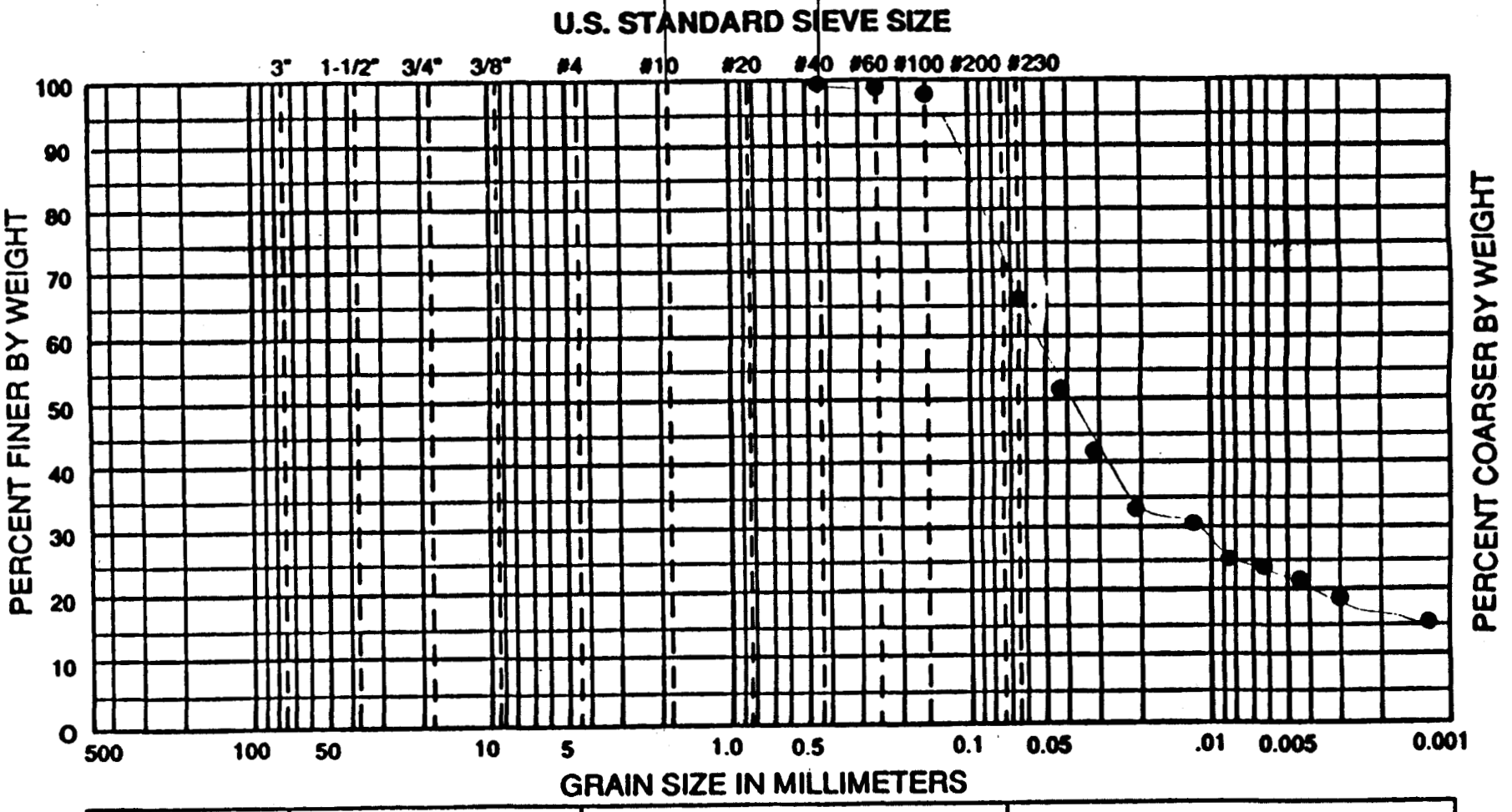
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01308
Value of "a"	0.99	Wt. Dry Sample "W"	58.619
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	44.00	39.00	65.7	65.7	9.07	0.0557
1.0	36.00	31.00	52.2	52.2	10.39	0.0422
2.0	30.00	25.00	42.1	42.1	11.37	0.0312
5.0	25.00	20.00	33.7	33.7	12.19	0.0204
15.0	23.00	18.00	30.3	30.3	12.52	0.0119
30.0	20.00	15.00	25.3	25.3	13.01	0.0086
60.0	19.50	14.50	24.4	24.4	13.09	0.0061
120.0	18.00	13.00	21.9	21.9	13.34	0.0044
250.0	16.50	11.50	19.4	19.4	13.58	0.0030
1440.0	14.00	9.00	15.2	15.2	13.99	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 15+40 SAMPLE NO.: CH # 7 DATE: 3/9/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Raku Flats	27.5'	CLAYEY SANDY SILTSTONE .1% medium sand, 27.9% f sd, 48% silt, 22% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION Rocky Flats E&DC

BORING 15+40 SAMPLE #7 DEPTH @ 27.5

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

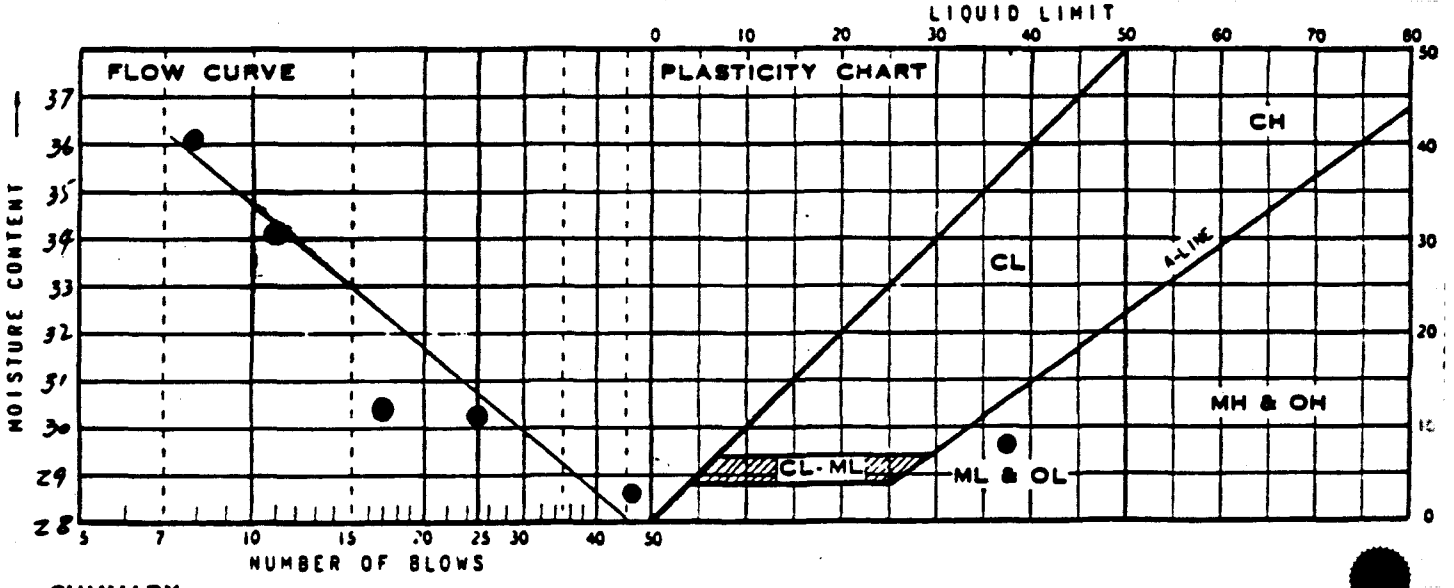
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY ~~AJ~~ 3/12/92

DETERMINATION	1	2	3	4	5	6
DISH	201C	25C	32C	15C		
WT OF DISH + WET SOIL	6.08	4.55	10.40	6.66		
WT OF DISH + DRY SOIL	5.18	3.89	5.42	5.65	—	—
WT OF MOISTURE	0.90	0.66	1.04	1.01		
WT OF DISH	1.04	1.04	1.02	1.04	—	—
WT OF DRY SOIL	4.14	2.85	4.40	4.61		
MOISTURE CONTENT	21.7	23.2	23.6	21.9	90.4/4 =	22.6

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	201B	202B	13C	16C	9C	
NUMBER OF BLOWS	17	46	25	11	8	
WT OF DISH + WET SOIL	12.95	10.46	9.27	13.43	13.84	
WT OF DISH + DRY SOIL	10.17	8.36	7.36	10.28	10.45	—
WT OF MOISTURE	2.78	2.10	1.91	3.15	3.39	
WT OF DISH	1.04	1.04	1.04	1.05	1.05	—
WT OF DRY SOIL	9.13	7.32	6.32	9.23	9.40	
MOISTURE CONTENT	30.4	28.7	30.3	34.1	36.1	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		30.8	22.6	8.2	ML	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Westom

JOB NO. 2066-03

BORING NO.	15+55	SAMPLED	Rocky Flats
DEPTH	2.3'	DATE TESTED	03-05-92 SR
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	62.87
Wt. Dry Soil & Pan	(g)	60.64
Wt. Lost Moisture	(g)	2.23
Wt. of Pan Only	(g)	3.74
Wt. of Dry Soil	(g)	56.90
Moisture Content	%	3.9

Wt. Hydrom. Sample Wet (g)	60.01
Wt. Hydrom. Sample Dry (g)	57.74

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	1301.67
Weight of + #10 Before Washing (g)	770.73
Weight of + #10 After Washing (g)	713.23
Weight of - #10 Wet (g)	530.94
Weight of - #10 Dry (g)	566.25
Wt. Total Sample Dry (g)	1279.48
Calc. Wt. "W" (g)	130.48
Calc. Mass + #10	72.73

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	306.03	306.03	306.03	23.9	76.1
3/8"	0.00	223.55	223.55	529.58	41.4	58.6
#4	0.00	110.18	110.18	639.76	50.0	50.0
#10	0.00	73.47	73.47	713.23	55.7	44.3
#20	1.31	5.54	4.23	4.23	59.0	41.0
#40	1.56	7.11	5.55	9.78	63.2	36.8
#60	1.57	5.45	3.88	13.66	66.2	33.8
#100	1.56	5.79	4.23	17.89	69.5	30.5
#230	1.57	7.49	5.92	23.81	74.0	26.0

Clayey Sand (SC)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Westen

JOB NO. 2066-03

BORING NO.	15+55	SAMPLED	Rocky Flats
DEPTH	2.3'	DATE TESTED	03-05-92 SR
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

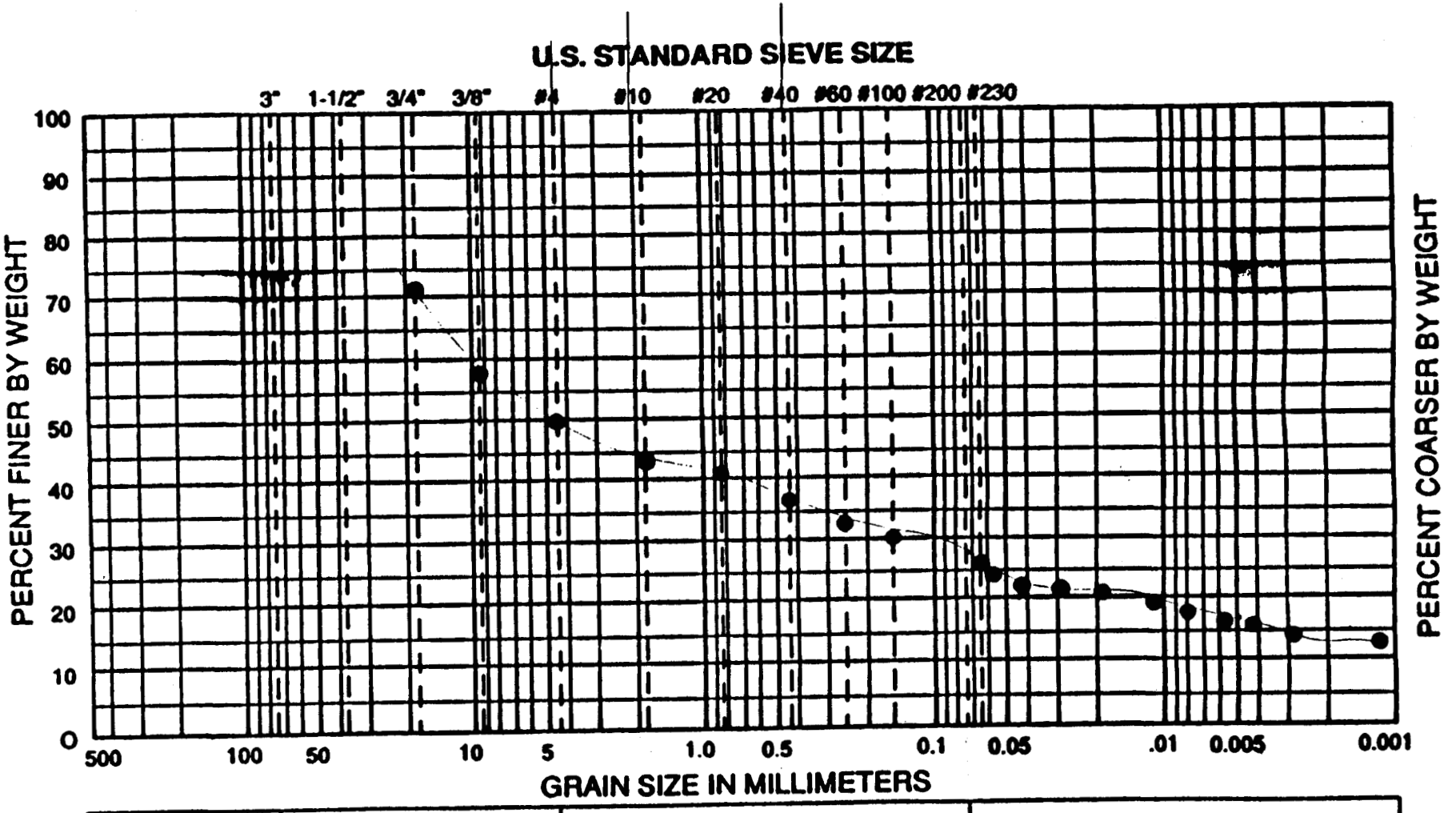
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01301
Value of "a"	0.98	Wt. Dry Sample "W"	130.477
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	38.50	32.50	24.5	24.5	9.98	0.0581
1.0	35.50	29.50	22.2	22.2	10.47	0.0421
2.0	34.75	28.75	21.7	21.7	10.59	0.0299
5.0	33.00	27.00	20.4	20.4	10.88	0.0192
15.0	31.75	25.75	19.4	19.4	11.08	0.0112
30.0	29.75	23.75	17.9	17.9	11.41	0.0080
60.0	28.00	22.00	16.6	16.6	11.70	0.0057
120.0	27.00	21.00	15.8	15.8	11.86	0.0041
250.0	25.50	19.50	14.7	14.7	12.11	0.0029
1440.0	23.50	17.50	13.2	13.2	12.44	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY	
		COARSE	FINE	COARSE	MEDIUM	FINE		

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 15-55 SAMPLE NO.: CH # 7 DATE: 3/9/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	2.3'	Gravel w/some SAND, silt & CLAY (CLAYEY SAND w/ some [illegible] GVL) 23% 23.9% C GVL, 26.1% F GVL | 5.7% C sd, 7.5% med, 9.8% f sd | 11.2% SILT, 16.8% CLAY

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-0[illegible]

CLIENT/OWNER WESTON

LOCATION

BORING 15+55 SAMPLE #7 DEPTH 2.3'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

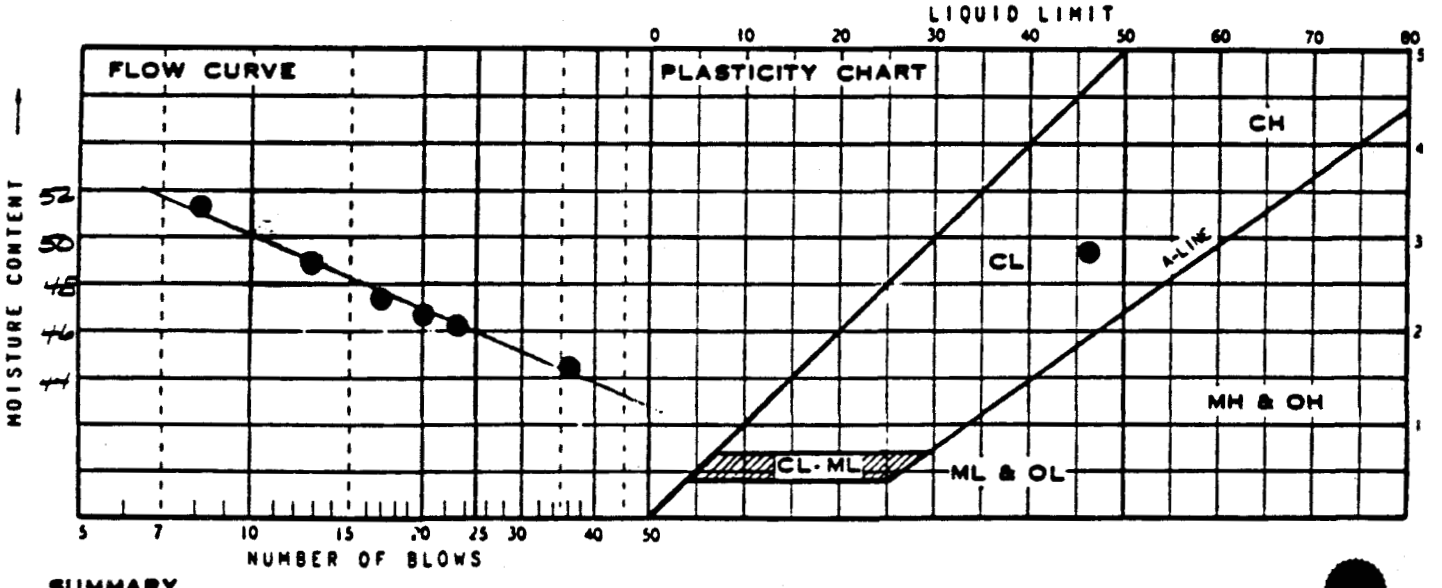
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY 3/14/92

DETERMINATION	1	2	3	4	5	6
DISH	0C	31C	12C			
WT OF DISH + WET SOIL g	7.14	6.89	5.73			
WT OF DISH + DRY SOIL g	6.25	5.99	5.02	—	—	—
WT OF MOISTURE g	.89	.90	.71			
WT OF DISH g	1.06	1.06	1.06	—	—	—
WT OF DRY SOIL g	5.19	4.93	3.96			
MOISTURE CONTENT %	17.2	18.3	17.9			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2071	2027	2040	203B	2063	34C
NUMBER OF BLOWS	36	23	20	17	13	9
WT OF DISH + WET SOIL g	17.55	20.70	19.77	22.53	24.52	20.5[illegible]
WT OF DISH + DRY SOIL g	12.47	14.49	13.81	15.62	16.81	13.86
WT OF MOISTURE g	5.08	6.21	5.96	6.90	7.71	6.65
WT OF DISH g	1.05	1.05	1.05	1.06	1.06	1.03
WT OF DRY SOIL g	11.42	13.44	12.76	14.57	15.75	12.83
MOISTURE CONTENT %	44.5	46.2	46.7	47.4	48.9	51.8



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		46.0	17.8	28.2	CL	

ADVANCED TERRA TESTING

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MECHANICAL ANALYSIS - SIEVE TEST DATA

BR

CLIENT	Roy F. Weston	JOB NO.	2066-03
BORING NO.	15+58	SAMPLED	12-04-91 SRC
DEPTH	25.0'	DATE TESTED	01-22-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Bulk	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan	(g)	53.08
Wt. Dry Soil & Pan	(g)	52.66
Wt. Lost Moisture	(g)	0.42
Wt. of Pan Only	(g)	3.68
Wt. of Dry Soil	(g)	48.98
Moisture Content	%	0.9

Wt. Hydrom. Sample Wet (g)	60.00
Wt. Hydrom. Sample Dry (g)	59.49

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.00
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.00
Weight of - #10 Dry (g)	59.49
Wt. Total Sample Dry (g)	59.49
Calc. Wt. "W" (g)	59.49
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	0.00	0.00	0.00	0.00	0.0	100.0
#40	1.56	1.58	0.02	0.02	0.0	100.0
#60	1.57	1.68	0.11	0.13	0.2	99.8
#100	1.57	2.24	0.67	0.80	1.3	98.7
#230	1.56	22.20	20.64	21.44	36.0	64.0

Sandy Silt

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Roy F. Weston	JOB NO.	2066-03
BORING NO.	15+58	SAMPLED	12-04-91 SRC
DEPTH	25.0'	DATE TESTED	01-22-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Bulk	DRY SIEVE	No

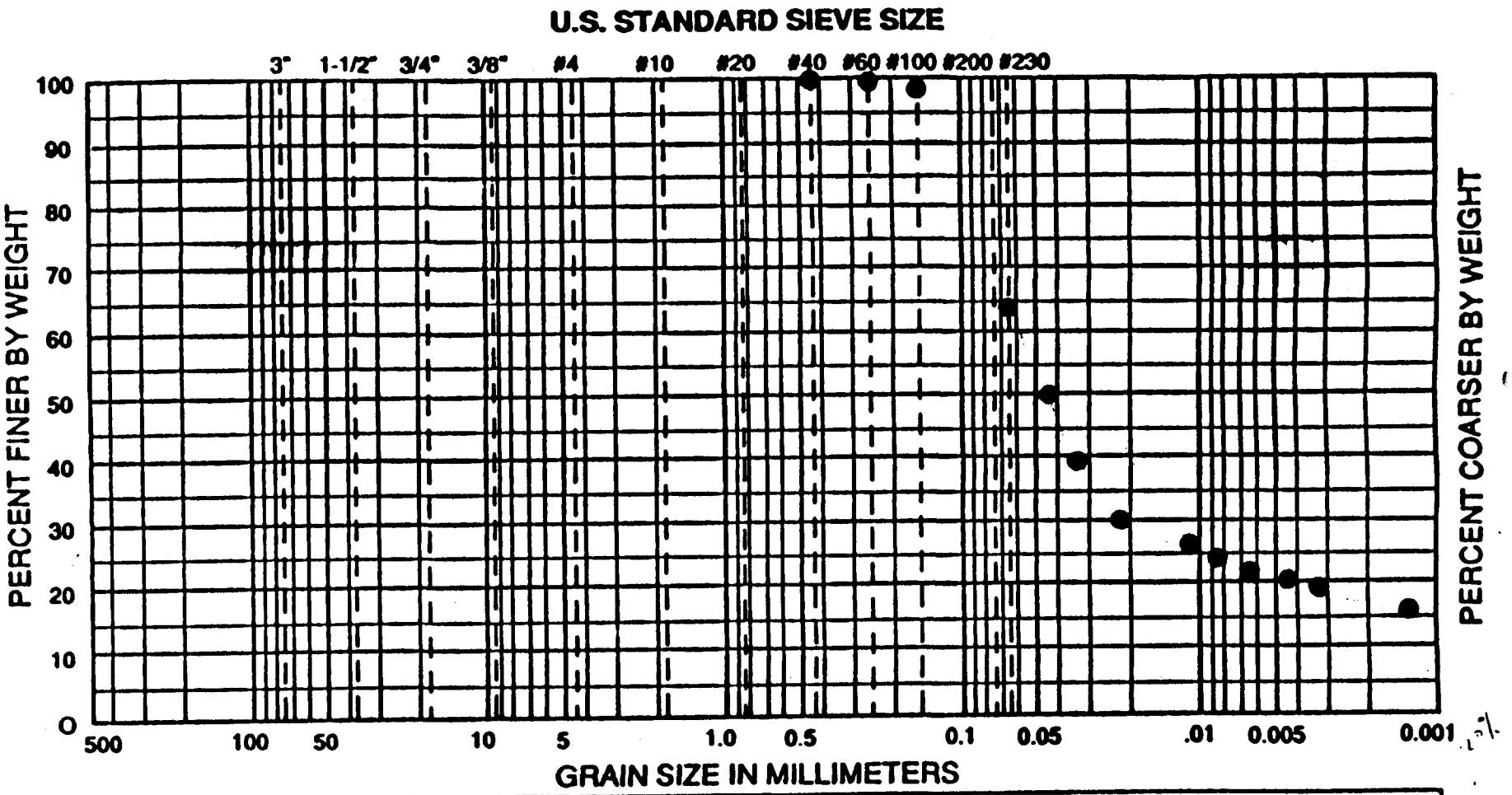
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01317
Value of "a"	0.98	Wt. Dry Sample "W"	59.490
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	—	—	—	—	—	—
0.5	46.50	41.00	67.8	67.8	8.66	0.0548
1.0	36.00	30.50	50.4	50.4	10.39	0.0424
2.0	29.00	23.50	38.9	38.9	11.53	0.0316
5.0	24.00	18.50	30.6	30.6	12.35	0.0207
15.0	21.50	16.00	26.5	26.5	12.76	0.0121
30.0	20.50	15.00	24.8	24.8	12.93	0.0086
60.0	19.50	14.00	23.2	23.2	13.09	0.0062
120.0	18.50	13.00	21.5	21.5	13.26	0.0044
250.0	17.00	11.50	19.0	19.0	13.50	0.0031
1440.0	15.00	9.50	15.7	15.7	13.83	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 15+58 SAMPLE NO.: DATE: 1-27-92 PROJECT NO.: 2029-33-09-0030

AREA	DEPTH	CLASSIFICATION
	25.0'	[illegible] % med, 35.8% F Sand, 46% Silt, 18 [illegible] clay [illegible] silt, [illegible]

MECHANICAL ANALYSIS - SIEVE TEST DATA

BR

CLIENT Weston

JOB NO. 2066-03

BORING NO.	15+58	SAMPLED	Rocky Flats
DEPTH	26.5'	DATE TESTED	03-27-92 TNC
SAMPLE NO.	#16	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	43.78
Wt. Dry Soil & Pan	(g)	42.53
Wt. Lost Moisture	(g)	1.25
Wt. of Pan Only	(g)	3.75
Wt. of Dry Soil	(g)	38.78
Moisture Content	%	3.2
Wt. Hydrom. Sample Wet	(g)	55.01
Wt. Hydrom. Sample Dry	(g)	53.29

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.01
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.01
Weight of - #10 Dry (g)	53.29
Wt. Total Sample Dry (g)	53.29
Calc. Wt. "W" (g)	53.2
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.31	1.32	0.01	0.01	0.0	100.0
#40	1.57	1.58	0.01	0.02	0.0	100.0
#60	1.55	1.56	0.01	0.03	0.1	99.9
#100	1.56	1.59	0.03	0.06	0.1	99.9
#230	1.57	2.09	0.52	0.58	1.1	98.9

Silty Clay

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	15+58	SAMPLED	Rocky Flats
DEPTH	26.5'	DATE TESTED	03-27-92 TNU
SAMPLE NO.	#16	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

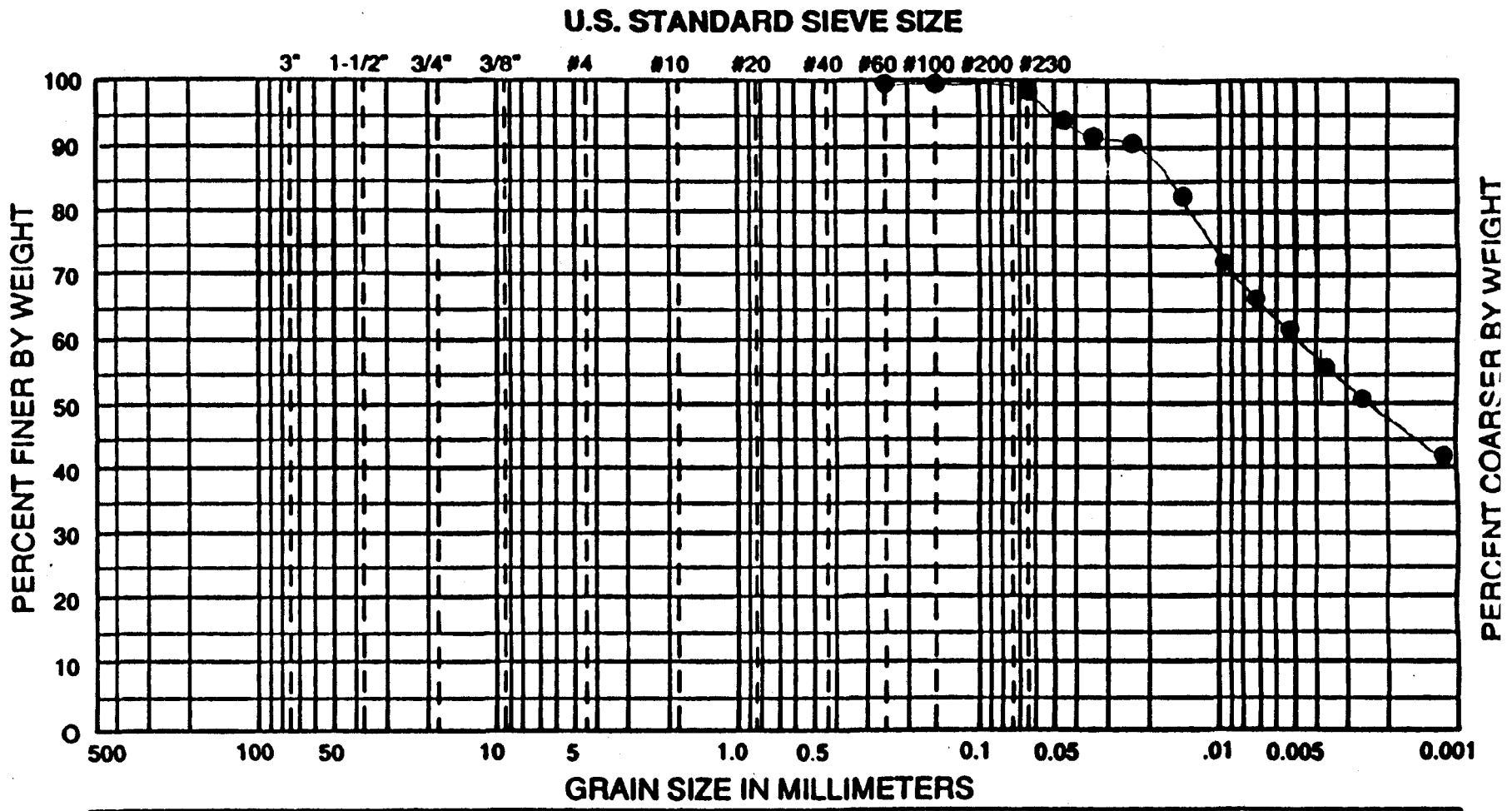
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.84	Temp. Coef. K	0.01262
Value of "a"	0.96	Wt. Dry Sample "W"	53.294
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	57.50	52.50	94.8	94.8	6.86	0.0467
1.0	56.00	51.00	92.1	92.1	7.11	0.0336
2.0	55.00	50.00	90.3	90.3	7.27	0.0241
5.0	51.00	46.00	83.0	83.0	7.93	0.0159
15.0	45.00	40.00	72.2	72.2	8.91	0.0097
30.0	42.00	37.00	66.8	66.8	9.40	0.0071
60.0	39.00	34.00	61.4	61.4	9.89	0.0051
120.0	36.00	31.00	56.0	56.0	10.39	0.0037
250.0	33.00	28.00	50.5	50.5	10.88	0.0026
1440.0	28.00	23.00	41.5	41.5	11.70	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 15+58 SAMPLE NO.: CH #16 DATE: 4-2-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION Silty Claystone
Rocky Flats	26.5'	17% Mud, 1.0% Sand, 42.9% Silt, 56% Clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. _____

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS / RFETS

BORING 15-58 SAMPLE CH #16 DEPTH 26.5'

SAME ALL!

FIELD DENSITY BY _____

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

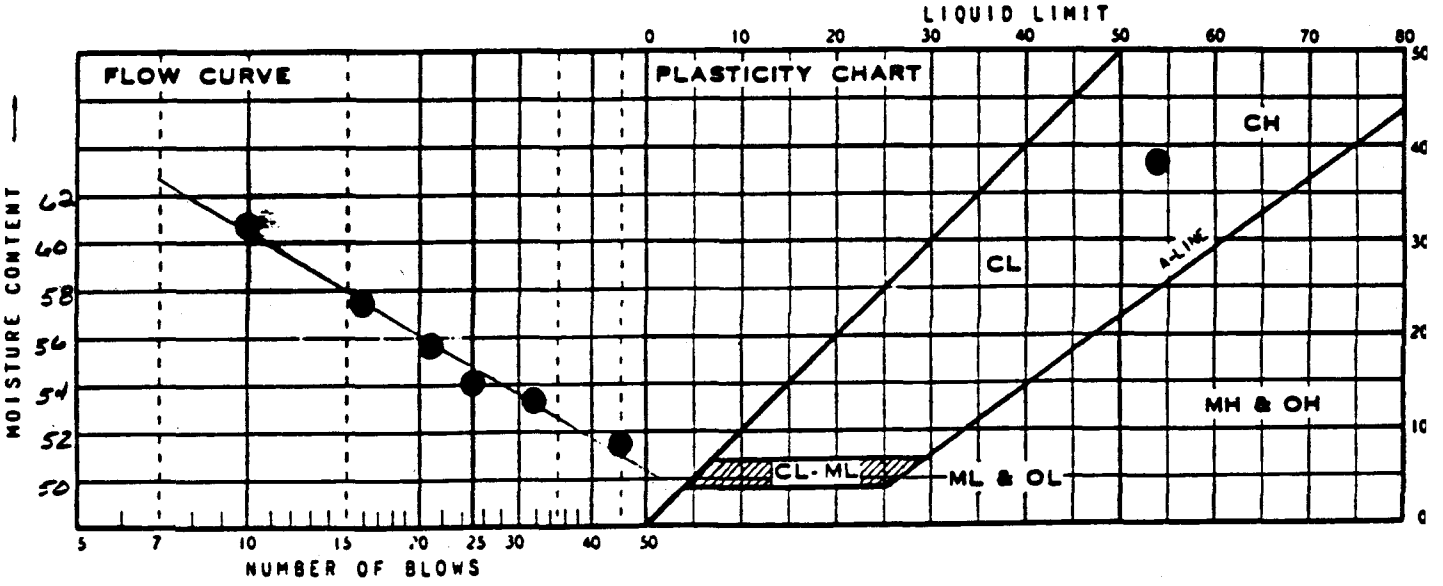
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY 3.3.25/92

DETERMINATION	1	2	3	4	5	6
DISH	B15	B6				
WT OF DISH + WET SOIL g	4.48	6.34				
WT OF DISH + DRY SOIL g	3.98	5.59	—	—	—	—
WT OF MOISTURE g	.50	.75				
WT OF DISH g	1.03	1.03	—	—	—	—
WT OF DRY SOIL g	2.95	4.56				
MOISTURE CONTENT %	17.0	16.5				

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	B16	B14	B5	B1	B3	7C
NUMBER OF BLOWS	45	32	25	21	16	10
WT OF DISH + WET SOIL g	12.73	13.47	14.26	10.78	13.16	13.90
WT OF DISH + DRY SOIL g	8.75	9.14	9.60	7.29	8.73	9.04
WT OF MOISTURE g	3.98	4.33	4.64	3.49	4.43	4.86
WT OF DISH g	1.02	1.03	1.04	1.03	1.02	1.06
WT OF DRY SOIL g	7.73	8.11	8.58	6.26	7.71	7.98
MOISTURE CONTENT %	51.5	53.4	54.1	55.8	57.5	60.9



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		54.8	16.8	32.0	CH	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA
-#230 SIEVE ONLY

CLIENT	Roy F. Weston	JOB NO.	2066-03
BORING NO.	~~15+17~~ 70	SAMPLED	12-17-91 SRC
DEPTH	6.5'	DATE TESTED	01-22-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Bulk/Jar	DRY SIEVE	No

MOISTURE/DENSITY DATA

Wt. Soil & Ring(s)	(g)	
Wt. Ring(s)	(g)	
Wt. Soil	(g)	
Wet Density	PCF	
Wt. Wet Soil & Pan	(g)	174.0
Wt. Dry Soil & Pan	(g)	140.6
Wt. Lost Moisture	(g)	33.3
Wt. of Pan Only	(g)	9.5
Wt. of Dry Soil	(g)	131.2
Moisture Content	%	25.4
Dry Density	PCF	

WASH SIEVE ANALYSIS

Wt. Wet Soil & Pan Before Washing (g)	174.0
Wt. Dry Soil & Pan Before Washing (g)	140.6
Weight of Pan (g)	9.5
Wt. of Dry Soil Before Washing	131.2
Wt. Dry Soil & Pan After Washing (g)	14.8
Wt. of Dry Soil After Washing (g)	5.3
-#230 Wash. Out %	96.0

Silt, clay (CL) **

ADVANCED TERRA TESTING, INC.

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION

LABORATORY CLASSIFICATION

JOB NO.

CLIENT/OWNER WESTON

LOCATION

BORING 1540 SAMPLE DEPTH 4.5'

FIELD DENSITY BY

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

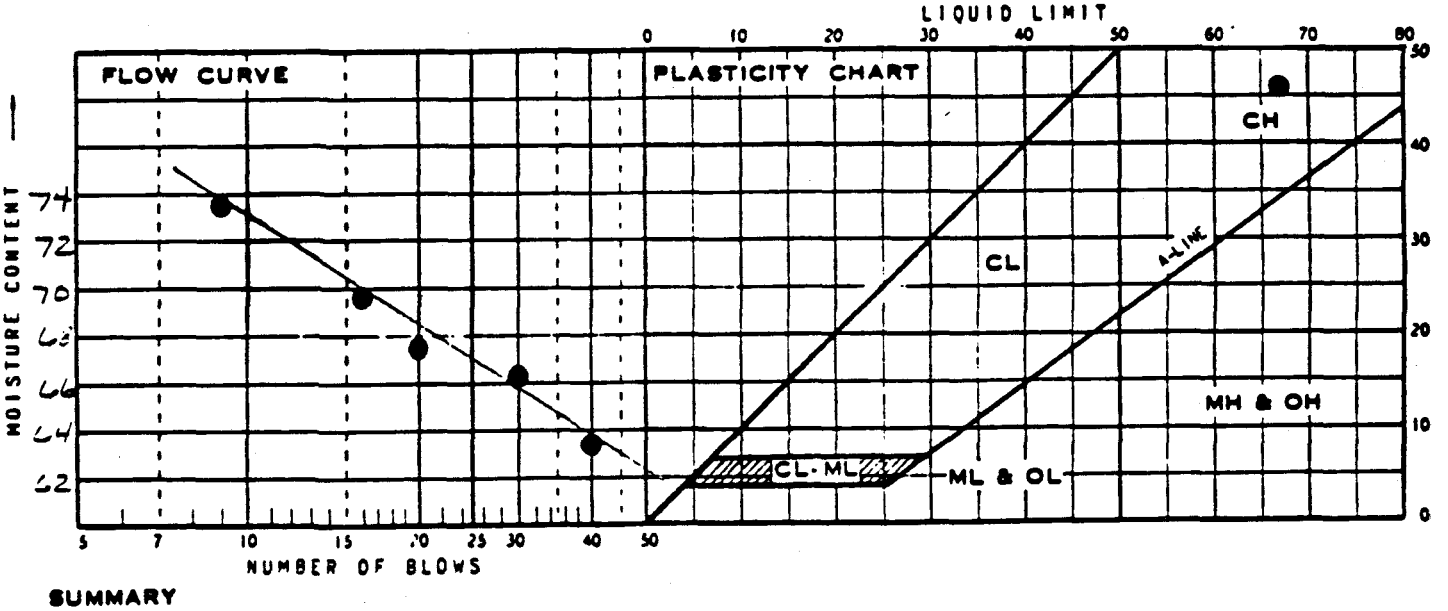
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 1/24/92

DETERMINATION	1	2	3	4	5	6
DISH	22	21	36			
WT OF DISH + WET SOIL g	8.15	7.37	7.94			
WT OF DISH + DRY SOIL g	6.91	6.24	6.79	—	—	—
WT OF MOISTURE g	1.24	1.09	1.15			
WT OF DISH g	1.02	1.03	1.04	—	—	—
WT OF DRY SOIL g	5.88	5.21	5.75			
MOISTURE CONTENT %	21.1	20.9	20.0			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	38	37	20	19	18	
NUMBER OF BLOWS	40	30	20	16	7	
WT OF DISH + WET SOIL g	13.30	14.58	14.60	12.70	15.52	
WT OF DISH + DRY SOIL g	8.53	9.37	9.13	7.92	9.38	—
WT OF MOISTURE g	4.77	5.51	5.47	4.78	6.14	
WT OF DISH g	1.04	1.04	1.05	1.04	1.05	—
WT OF DRY SOIL g	7.49	8.33	8.08	6.88	8.33	
MOISTURE CONTENT %	63.7	66.2	67.7	69.5	73.7	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		67.1	20.9	46.4	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA
-#230 SIEVE ONLY

CLIENT Roy F. Weston

JOB NO. 2066-03

BORING NO.	16+25	SAMPLED	12-05-91 SRC
DEPTH	13'	DATE TESTED	01-22-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Bulk/Jar	DRY SIEVE	No

MOISTURE/DENSITY DATA

Wt. Soil & Ring(s)	(g)	
Wt. Ring(s)	(g)	
Wt. Soil	(g)	
Wet Density	PCF	
Wt. Wet Soil & Pan	(g)	134.7
Wt. Dry Soil & Pan	(g)	124.8
Wt. Lost Moisture	(g)	10.0
Wt. of Pan Only	(g)	9.5
Wt. of Dry Soil	(g)	115.3
Moisture Content	%	8.7
Dry Density	PCF	

WASH SIEVE ANALYSIS

Wt. Wet Soil & Pan Before Washing (g)	134.7
Wt. Dry Soil & Pan Before Washing (g)	124.8
Weight of Pan (g)	9.5
Wt. of Dry Soil Before Washing	115.3
Wt. Dry Soil & Pan After Washing (g)	15.9
Wt. of Dry Soil After Washing (g)	6.4
-#230 Wash. Out %	94.4

Silty Clay (CL) **

ADVANCED TERRA TESTING, INC.

ATTERBERG LIMITS TEST DATA

JOB NO. 2066-03
CLIENT/OWNER WESTON
LOCATION
BORING 16-25 SAMPLE ____ DEPTH 13'

FIELD CLASSIFICATION ____
LABORATORY CLASSIFICATION ____

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

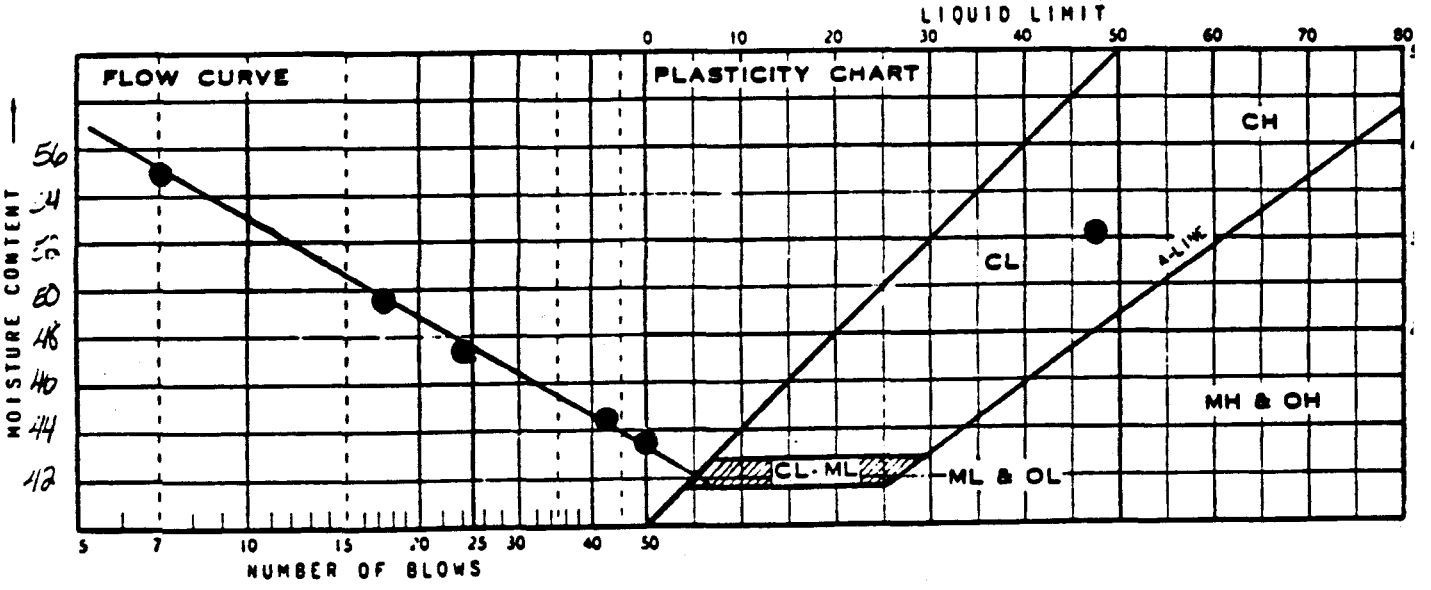
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY MW.1.12492

DETERMINATION	1	2	3	4	5	6
DISH	11	38C	23			
WT OF DISH + WET SOIL	10.60g	12.42g	12.66g			
WT OF DISH + DRY SOIL	9.21g	10.80g	10.97g	—	—	—
WT OF MOISTURE	1.39g	1.62g	1.69g			
WT OF DISH	1.05g	1.05g	1.05g	—	—	—
WT OF DRY SOIL	8.16g	9.75g	9.92g			
MOISTURE CONTENT	17.0%	16.6%	17.0%			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	16	15	14	13	12	
NUMBER OF BLOWS	50	43	24	18	7	
WT OF DISH + WET SOIL	20.82g	15.67g	19.19g	15.27g	17.43g	
WT OF DISH + DRY SOIL	14.85g	11.16g	13.37g	10.56g	11.60g	—
WT OF MOISTURE	6.02g	4.51g	5.82g	4.73g	5.83g	
WT OF DISH	1.03g	1.04g	1.04g	1.04g	1.03g	—
WT OF DRY SOIL	13.82g	10.12g	12.33g	9.52g	10.57g	
MOISTURE CONTENT	43.6%	44.6%	47.2%	49.7%	55.0%	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		47.5	16.9%	30.6	CL	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	16+50	SAMPLED	Rocky Flats
DEPTH	5.5'	DATE TESTED	3-5-92 SR
SAMPLE NO.	#8	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	60.90
Wt. Dry Soil & Pan	(g)	60.03
Wt. Lost Moisture	(g)	0.87
Wt. of Pan Only	(g)	3.68
Wt. of Dry Soil	(g)	56.35
Moisture Content	%	1.5

Wt. Hydrom. Sample Wet (g)	60.01
Wt. Hydrom. Sample Dry (g)	59.10

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	438.88
Weight of + #10 Before Washing (g)	0.48
Weight of + #10 After Washing (g)	0.43
Weight of - #10 Wet (g)	438.40
Weight of - #10 Dry (g)	431.78
Wt. Total Sample Dry (g)	432.21
Calc. Wt. "W" (g)	59.16
Calc. Mass + #10	0.06

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.43	0.43	0.43	0.1	99.9
#20	1.55	1.64	0.09	0.09	0.3	99.7
#40	1.55	1.90	0.35	0.44	0.8	99.2
#60	1.55	1.88	0.33	0.77	1.4	98.6
#100	1.31	1.69	0.38	1.15	2.0	98.0
#230	1.56	2.42	0.86	2.01	3.5	96.5

Clay (C-)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	16+50	SAMPLED	Rocky Flats
DEPTH	5.5'	DATE TESTED	3-5-92 SR
SAMPLE NO.	#8	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

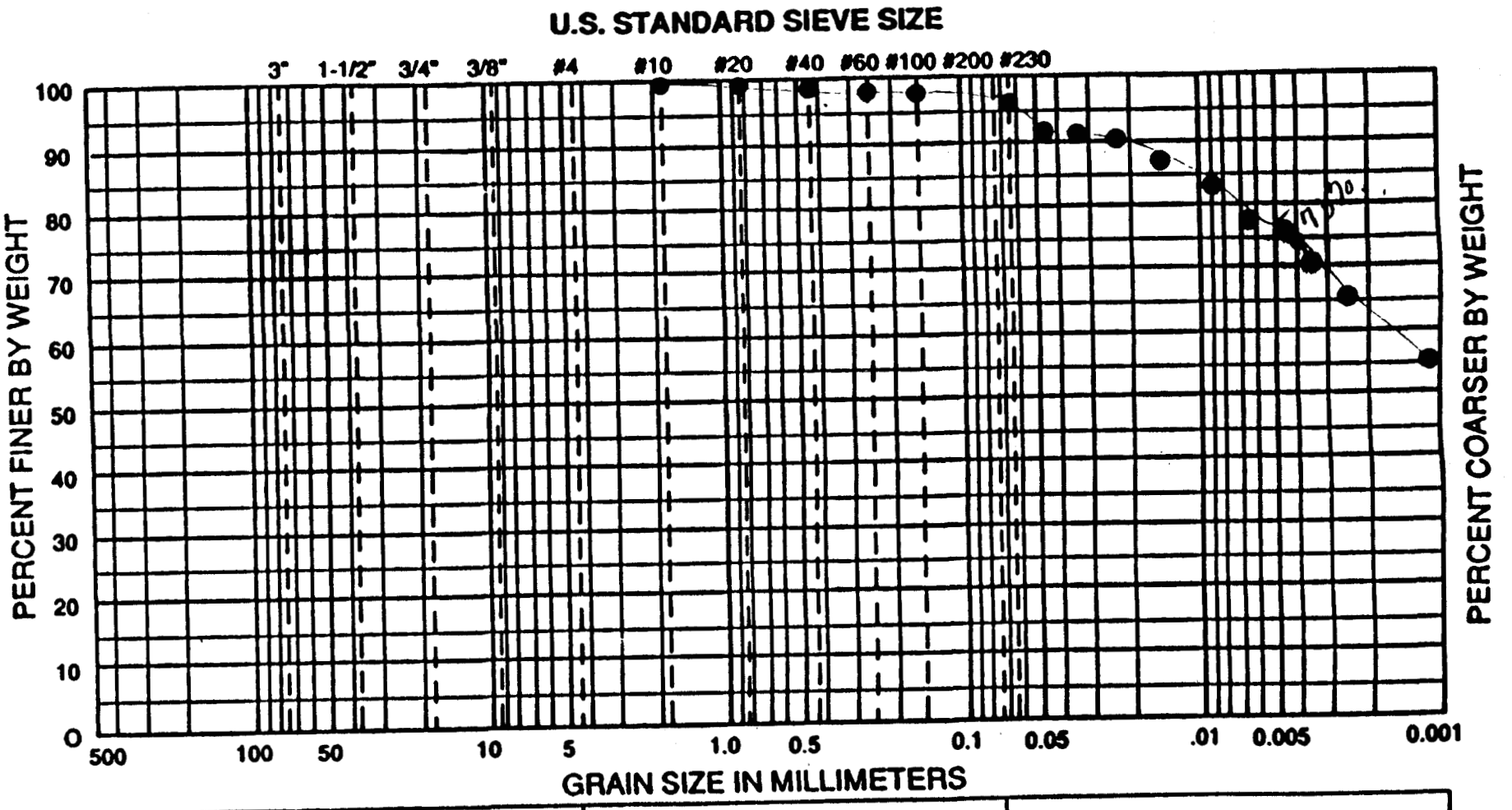
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01308
Value of "a"	0.99	Wt. Dry Sample "W"	59.160
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	61.00	55.00	91.9	91.9	6.29	0.0464
1.0	60.50	54.50	91.0	91.0	6.37	0.0330
2.0	60.00	54.00	90.2	90.2	6.45	0.0235
5.0	58.25	52.25	87.3	87.3	6.74	0.0152
15.0	55.75	49.75	83.1	83.1	7.15	0.0090
30.0	53.00	47.00	78.5	78.5	7.60	0.0066
60.0	51.50	45.50	76.0	76.0	7.84	0.0047
120.0	48.25	42.25	70.6	70.6	8.38	0.0035
250.0	45.25	39.25	65.5	65.5	8.87	0.0025
1440.0	39.00	33.00	55.1	55.1	9.89	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 16+50 SAMPLE NO.: CH #8 DATE: 3/11/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION (CH) CLAY w/ some silt, tr SAND
		.6 0.7 2.1 23.6 73
Rocky Flats	5.5'	1.1% C sand .7% med sd 2.1% f. sd 19.5% silt 77% CLAY

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats EG-6
BORING 16-50 SAMPLE CH #8 DEPTH 5.5

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

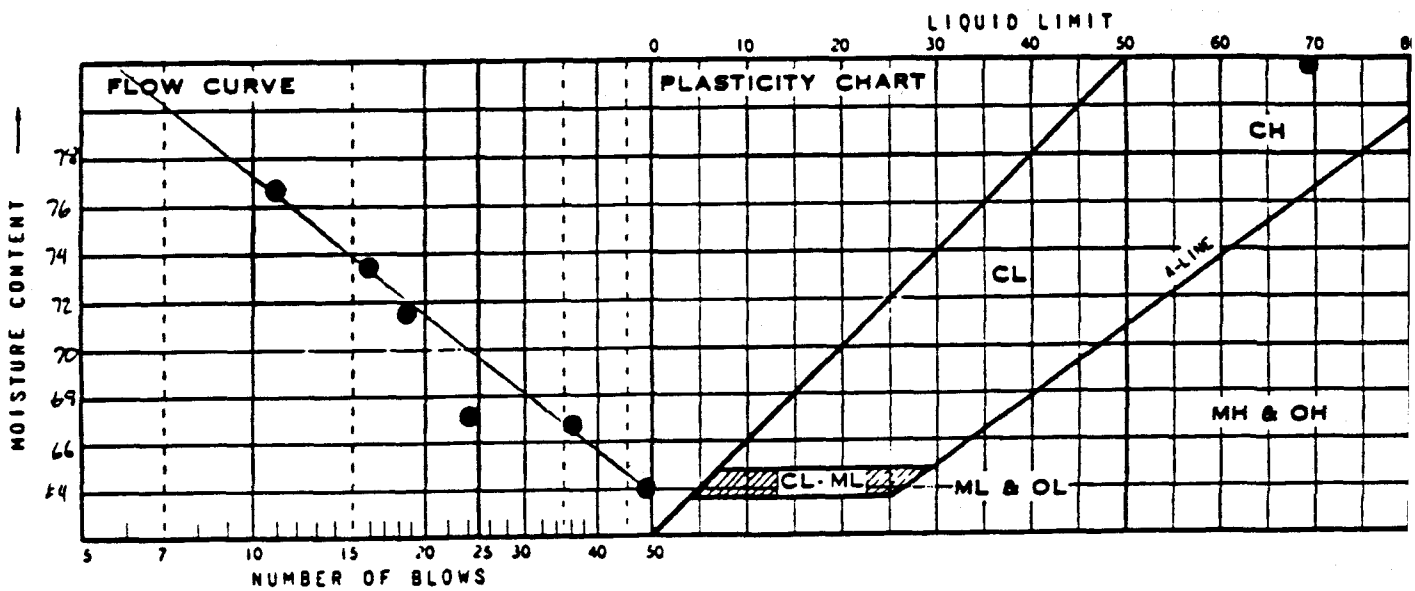
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DW 3/3/97

DETERMINATION	1	2	3	4	5	6
DISH	2073	13C	25C			
WT OF DISH + WET SOIL g	5.87	5.63	6.70			
WT OF DISH + DRY SOIL g	5.07	4.83	5.77	—	—	—
WT OF MOISTURE g	.80	.75	.93			
WT OF DISH g	1.04	1.04	1.04	—	—	—
WT OF DRY SOIL g	4.03	3.84	4.73			
MOISTURE CONTENT %	19.9	19.5	19.7			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	16C	2016	2018	32C	2023	9C
NUMBER OF BLOWS	49	36	24	19	16	11
WT OF DISH + WET SOIL g	11.63	11.73	10.25	11.255	11.31	10.79
WT OF DISH + DRY SOIL g	7.50	7.45	6.49	6.95	6.96	6.57
WT OF MOISTURE g	4.13	4.28	3.76	4.275	4.35	4.22
WT OF DISH g	1.06	1.04	1.05	1.02	1.04	1.06
WT OF DRY SOIL g	6.44	6.41	5.44	5.96	5.92	5.51
MOISTURE CONTENT %	64.1	66.8	69.1	71.7	73.5	76.6



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION
		69.6	19.7	49.9	CH

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	16+50	SAMPLED	Rocky Flats
DEPTH	26.1'	DATE TESTED	3-9-92 DU
SAMPLE NO.	#8	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	70.50
Wt. Dry Soil & Pan	(g)	67.55
Wt. Lost Moisture	(g)	2.95
Wt. of Pan Only	(g)	3.78
Wt. of Dry Soil	(g)	63.77
Moisture Content	%	4.6

Wt. Hydrom. Sample Wet (g)	55.01
Wt. Hydrom. Sample Dry (g)	52.58

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.01
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.01
Weight of - #10 Dry (g)	52.58
Wt. Total Sample Dry (g)	52.58
Calc. Wt. "W" (g)	52.58
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.60	0.03	0.03	0.1	99.9
#40	1.32	1.34	0.02	0.05	0.1	99.9
#60	1.57	1.72	0.15	0.20	0.4	99.6
#100	1.56	1.82	0.26	0.46	0.9	99.1
#230	1.56	2.55	0.99	1.45	2.8	97.2

Clauitone

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	16+50	SAMPLED	Rocky Flats
DEPTH	26.1'	DATE TESTED	3-9-92 DU
SAMPLE NO.	#8	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

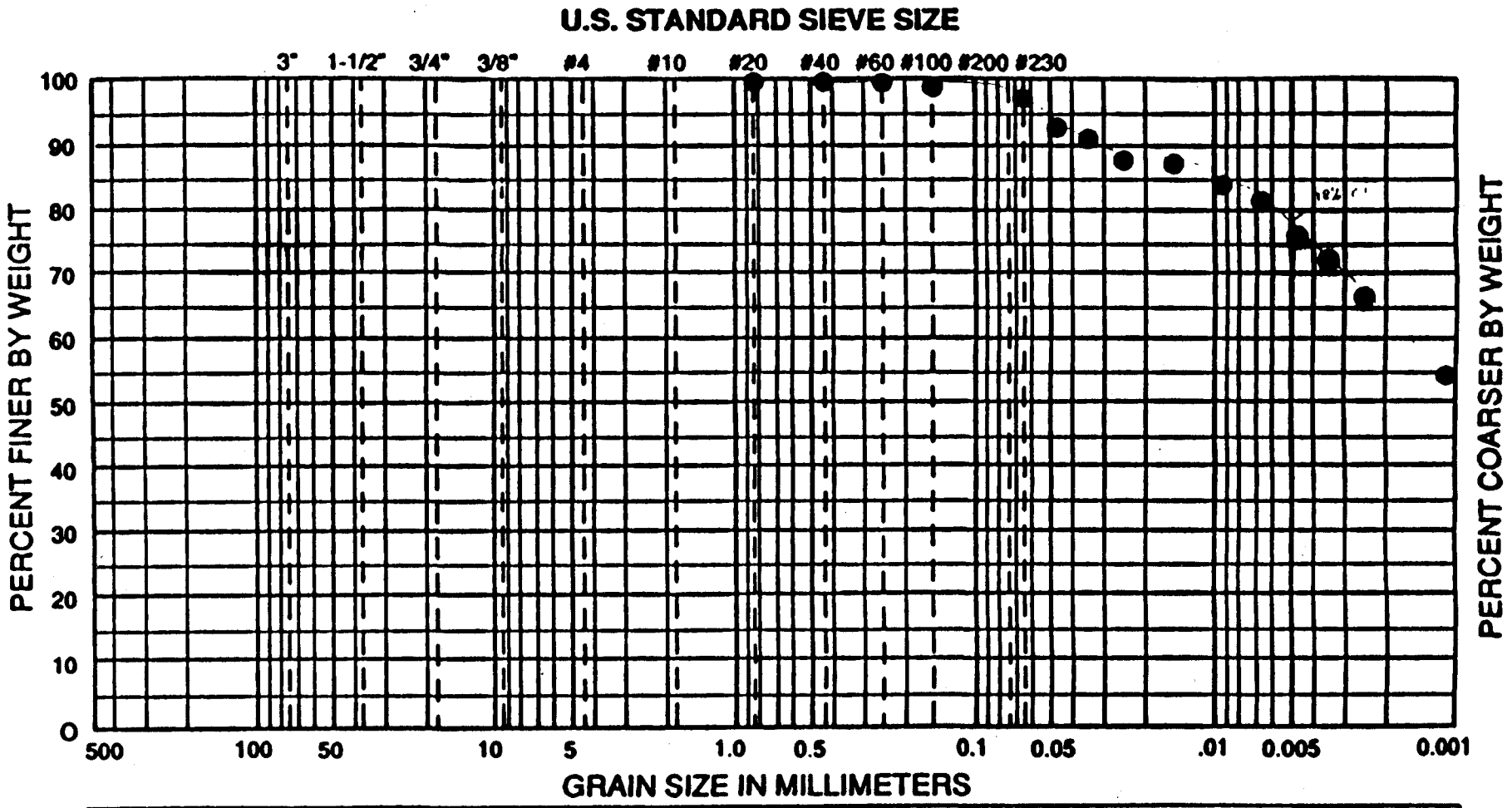
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.76	Temp. Coef. K	0.01290
Value of "a"	0.98	Wt. Dry Sample "W"	52.580
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	56.00	50.50	93.9	93.9	7.11	0.0486
1.0	54.50	49.00	91.1	91.1	7.35	0.0350
2.0	53.00	47.50	88.4	88.4	7.60	0.0251
5.0	52.75	47.25	87.9	87.9	7.64	0.0159
15.0	51.00	45.50	84.6	84.6	7.93	0.0094
30.0	49.00	43.50	80.9	80.9	8.25	0.0068
60.0	46.50	41.00	76.3	76.3	8.66	0.0049
120.0	44.50	39.00	72.5	72.5	8.99	0.0035
250.0	41.25	35.75	66.5	66.5	9.53	0.0025
1440.0	35.00	29.50	54.9	54.9	10.55	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 16-50 SAMPLE NO.: CH #8 DATE: 3/11/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Vanta Flats	26.1'	CLAYST w/ some SILT & TR sd Claystone
		.1% med sd .7% f sd 19.2% SILT 78% CLAY

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

CLIENT/OWNER WESTON

LOCATION _____

BORING 16+50 SAMPLE #8 DEPTH 26.1

SAVE ALL!

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

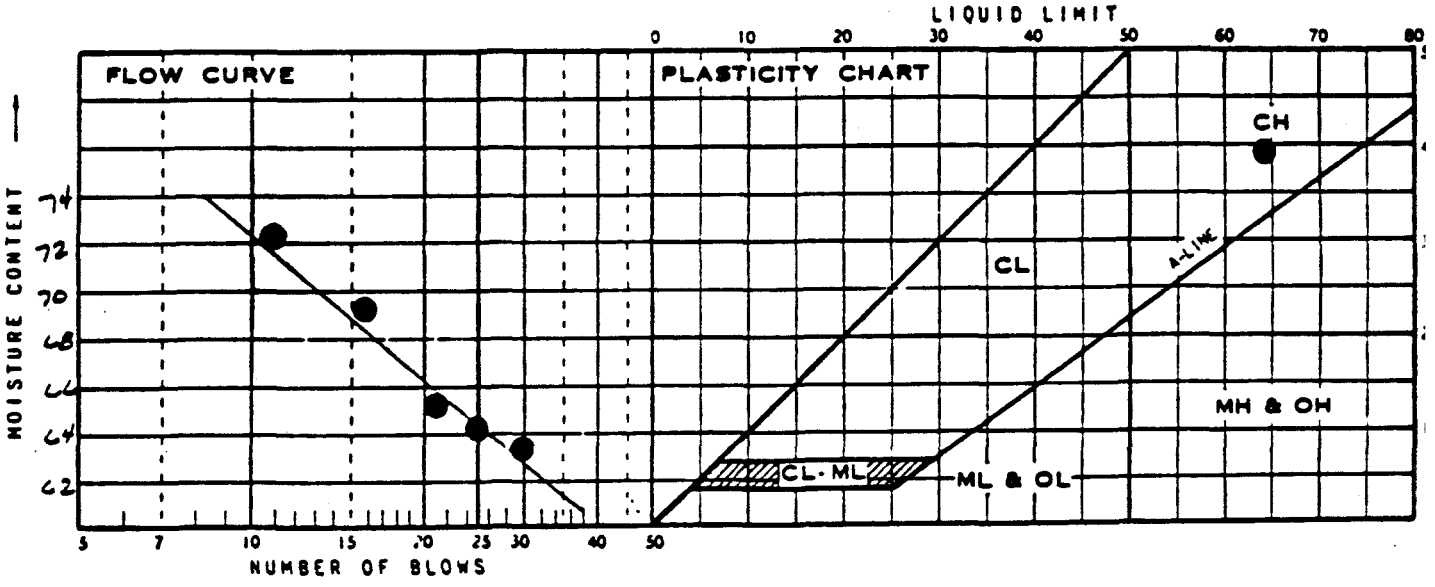
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SB 5/2/92

DETERMINATION	1	2	3	4	5	6
DISH	54 C	58 C	2008			
WT OF DISH + WET SOIL g	6.66	6.50	6.92			
WT OF DISH + DRY SOIL g	5.52	5.41	5.72	—	—	—
WT OF MOISTURE g	1.14	1.09	1.20			
WT OF DISH g	1.07	1.07	1.05	—	—	—
WT OF DRY SOIL g	4.45	4.34	4.67			
MOISTURE CONTENT %	25.6	25.1	25.7			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2028	2007	2005	15 C	46 C	
NUMBER OF BLOWS	30	25	21	17	11	
WT OF DISH + WET SOIL g	18.57	17.62	10.51	16.23	17.76	
WT OF DISH + DRY SOIL g	11.77	11.14	6.78	10.02	10.75	—
WT OF MOISTURE g	6.80	6.48	3.73	6.21	7.01	
WT OF DISH g	1.06	1.05	1.06	1.05	1.06	—
WT OF DRY SOIL g	10.71	10.09	5.72	8.97	9.69	
MOISTURE CONTENT %	63.5	64.2	65.2	69.2	72.3	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		64.5	25.5	39.0	CH	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	16+50	SAMPLED	Rocky Flats
DEPTH	27.5'	DATE TESTED	3-9-92 DU
SAMPLE NO.	#8	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	83.69
Wt. Dry Soil & Pan	(g)	81.42
Wt. Lost Moisture	(g)	2.27
Wt. of Pan Only	(g)	3.79
Wt. of Dry Soil	(g)	77.63
Moisture Content	%	2.9
Wt. Hydrom. Sample Wet	(g)	55.06
Wt. Hydrom. Sample Dry	(g)	53.49

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.06
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.06
Weight of - #10 Dry (g)	53.49
Wt. Total Sample Dry (g)	53.49
Calc. Wt. "W" (g)	53.49
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.58	0.01	0.01	0.0	100.0
#40	1.57	1.58	0.01	0.02	0.0	100.0
#60	1.57	1.62	0.05	0.07	0.1	99.9
#100	1.56	1.64	0.08	0.15	0.3	99.7
#230	1.56	4.28	2.72	2.87	5.4	94.6

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	16+50	SAMPLED	Rocky Flats
DEPTH	27.5'	DATE TESTED	3-9-92 DU
SAMPLE NO.	#8	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

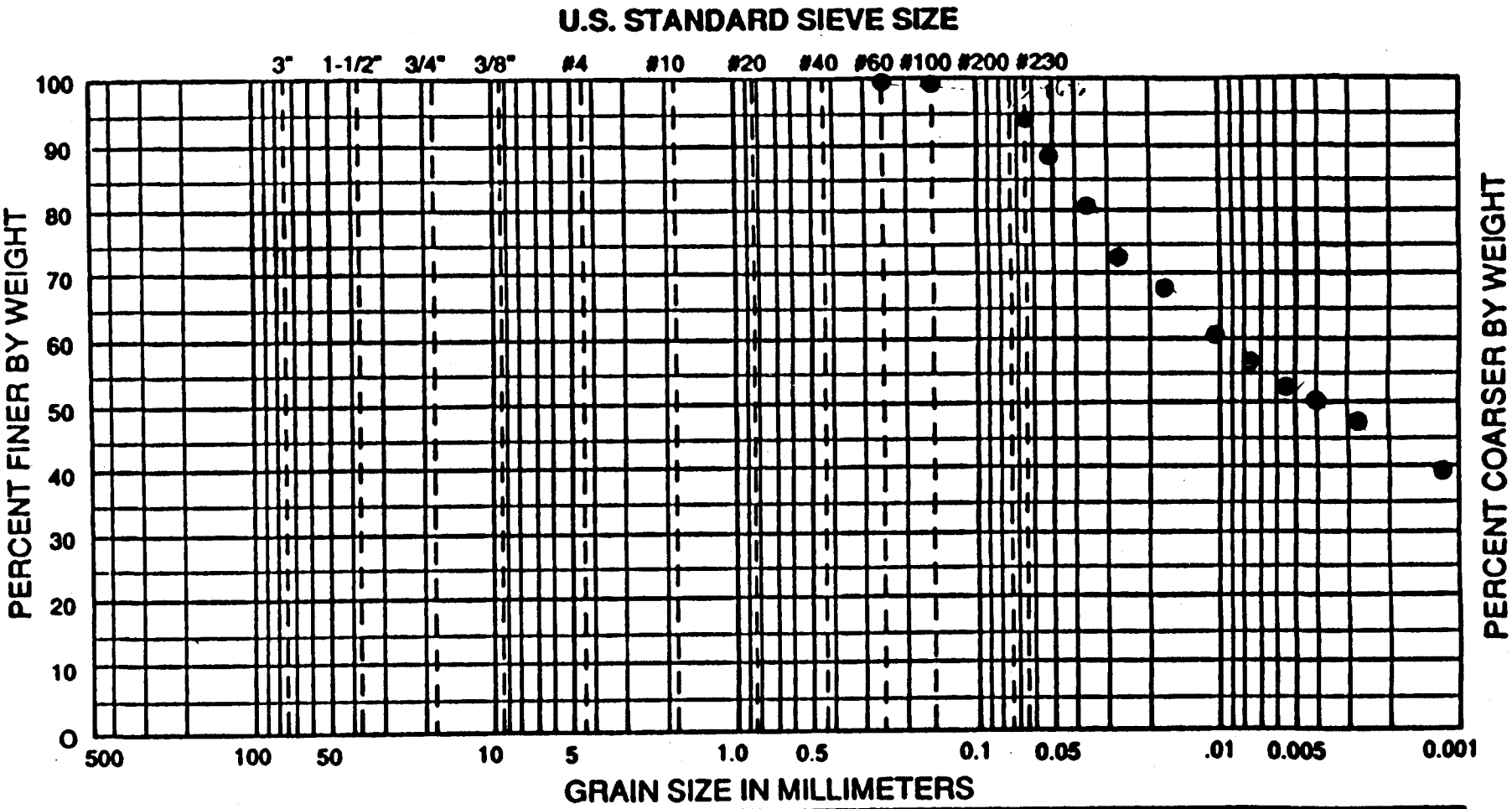
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.70	Temp. Coef. K	0.01312
Value of "a"	0.99	Wt. Dry Sample "W"	53.493
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	53.50	48.00	88.8	88.8	7.52	0.0509
1.0	49.00	43.50	80.5	80.5	8.25	0.0377
2.0	45.00	39.50	73.1	73.1	8.91	0.0277
5.0	42.25	36.75	68.0	68.0	9.36	0.0180
15.0	38.00	32.50	60.1	60.1	10.06	0.0107
30.0	36.00	30.50	56.4	56.4	10.39	0.0077
60.0	34.00	28.50	52.7	52.7	10.71	0.0055
120.0	32.75	27.25	50.4	50.4	10.92	0.0040
250.0	31.00	25.50	47.2	47.2	11.21	0.0028
1440.0	27.00	21.50	39.8	39.8	11.86	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 16+50 SAMPLE NO.: CH # 8 DATE: 3/11/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	27.5'	SILTY CLAY. TONE w/ trace SAND .1% m sd, 3.9% f sd, 44% silt, 52% CLAY

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats EG+G
BORING 16-SQ SAMPLE CH #8 DEPTH 27.5'

SAVE ALL MATERIAL!!

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

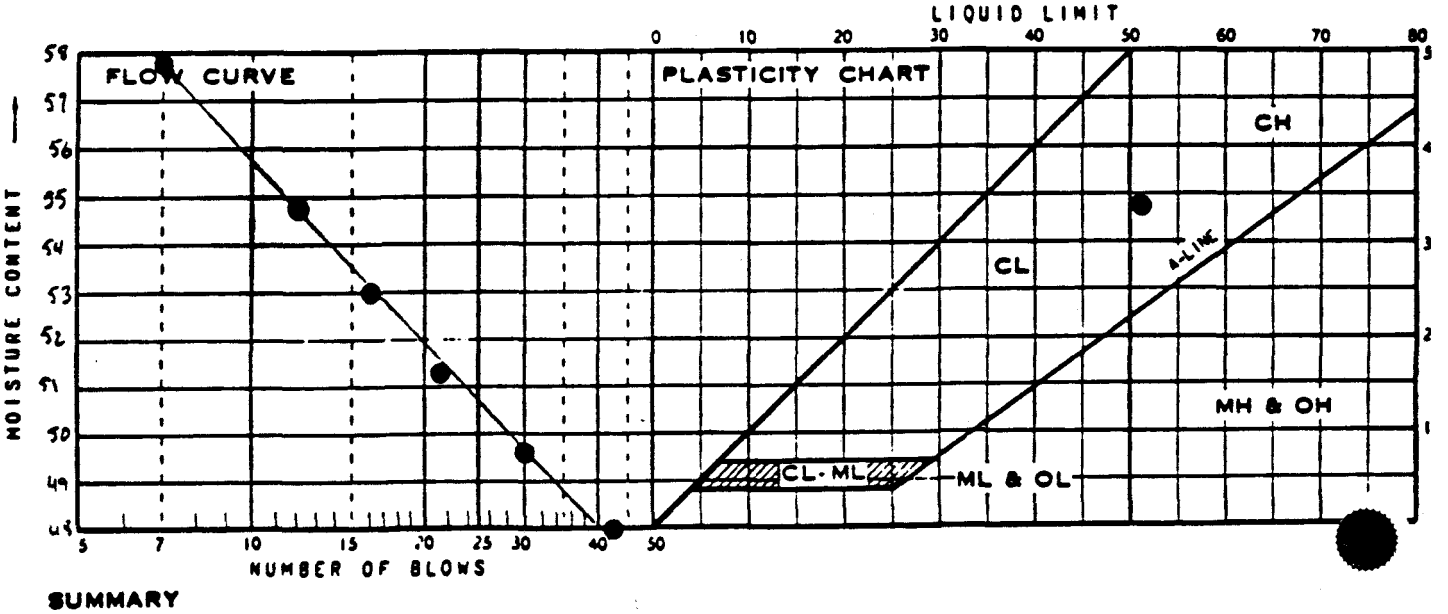
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DM 2/29/92

DETERMINATION	1	2	3	4	5	6
DISH	3	2032	2058			
WT OF DISH + WET SOIL g	5.81g	6.10g	5.82			
WT OF DISH + DRY SOIL g	5.10	5.38	5.13	—	—	—
WT OF MOISTURE g	.71	.72	.69			
WT OF DISH g	1.07	1.05	1.04	—	—	—
WT OF DRY SOIL g	4.03	4.33	4.09			
MOISTURE CONTENT %	17.6	16.6	16.9			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2050	2030	2036	2024	2029	17C
NUMBER OF BLOWS	44	30	21	16	12	7
WT OF DISH + WET SOIL g	10.17	11.78	11.66	11.80	11.81	12.73
WT OF DISH + DRY SOIL g	7.21	8.22	8.06	8.08	8.00	8.46
WT OF MOISTURE g	2.96	3.56	3.60	3.72	3.81	4.29
WT OF DISH g	1.04	1.05	1.04	1.06	1.05	1.04
WT OF DRY SOIL g	6.17	7.17	7.02	7.02	6.95	7.42
MOISTURE CONTENT %	48.0	49.7	51.3	53.0	54.8	57.8



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		50.7	17.0	33.7	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

BR

CLIENT Weston

JOB NO. 2066-03

BORING NO.	16+50	SAMPLED	Rocky Flats
DEPTH	31.4'	DATE TESTED	03-27-92 TNU
SAMPLE NO.	#16	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	16.43
Wt. Dry Soil & Pan	(g)	16.05
Wt. Lost Moisture	(g)	0.38
Wt. of Pan Only	(g)	3.69
Wt. of Dry Soil	(g)	12.36
Moisture Content	%	3.1
Wt. Hydrom. Sample Wet	(g)	55.05
Wt. Hydrom. Sample Dry	(g)	53.41

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.05
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.05
Weight of - #10 Dry (g)	53.41
Wt. Total Sample Dry (g)	53.41
Calc. Wt. "W" (g)	53.41
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
- #10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.58	0.01	0.01	0.0	100.0
- #40	1.57	1.58	0.01	0.02	0.0	100.0
- #60	1.57	1.58	0.01	0.03	0.1	99.9
#100	1.56	1.57	0.01	0.04	0.1	99.9
#230	1.56	2.69	1.13	1.17	2.2	97.8

ADVANCED TERRA TESTING, INC.

Silty, Clayey

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	16+50	SAMPLED	Rocky Flats
DEPTH	31.4'	DATE TESTED	03-27-92 TNU
SAMPLE NO.	#16	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

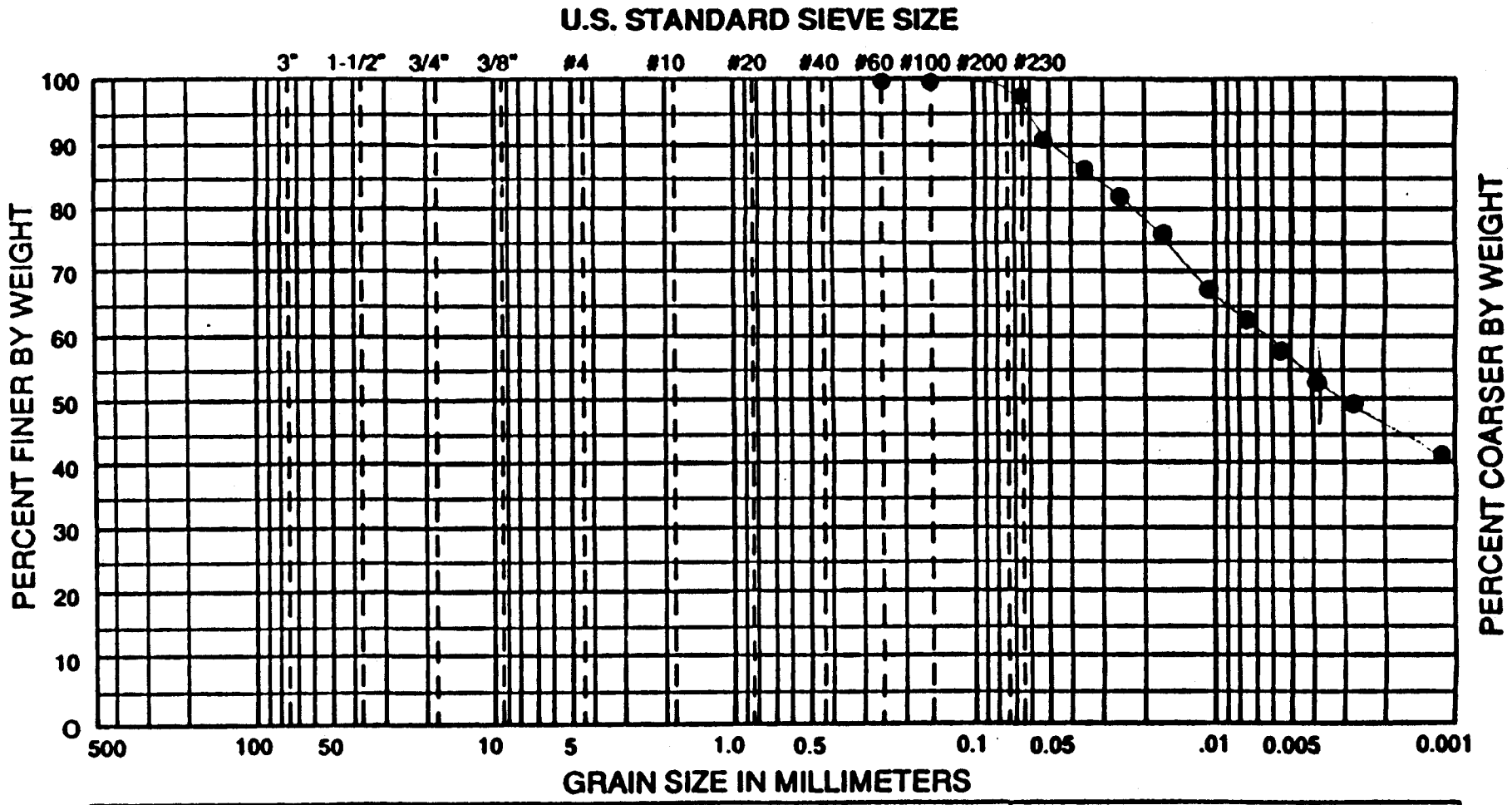
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01308
Value of "a"	0.99	Wt. Dry Sample "W"	53.408
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	54.00	49.00	90.6	90.6	7.43	0.0504
1.0	52.00	47.00	86.9	86.9	7.76	0.0364
2.0	50.00	45.00	83.2	83.2	8.09	0.0263
5.0	46.00	41.00	75.8	75.8	8.75	0.0173
15.0	41.50	36.50	67.5	67.5	9.48	0.0104
30.0	39.00	34.00	62.9	62.9	9.89	0.0075
60.0	36.50	31.50	58.3	58.3	10.30	0.0054
120.0	34.00	29.00	53.6	53.6	10.71	0.0039
250.0	32.00	27.00	49.9	49.9	11.04	0.0027
1440.0	27.00	22.00	40.7	40.7	11.86	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 16+50 SAMPLE NO.: CH# 16 DATE: 4-2-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION Silty Clay loam
Rocky Flats	31.4'	12.6% gravel, 2.1% sand, 44.8% silt, 40.5% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER WESTON
LOCATION ROCKY FLATS / EG&G
BORING 16+50 SAMPLE CH#4/6 DEPTH 31.4'
SAVE ALL

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

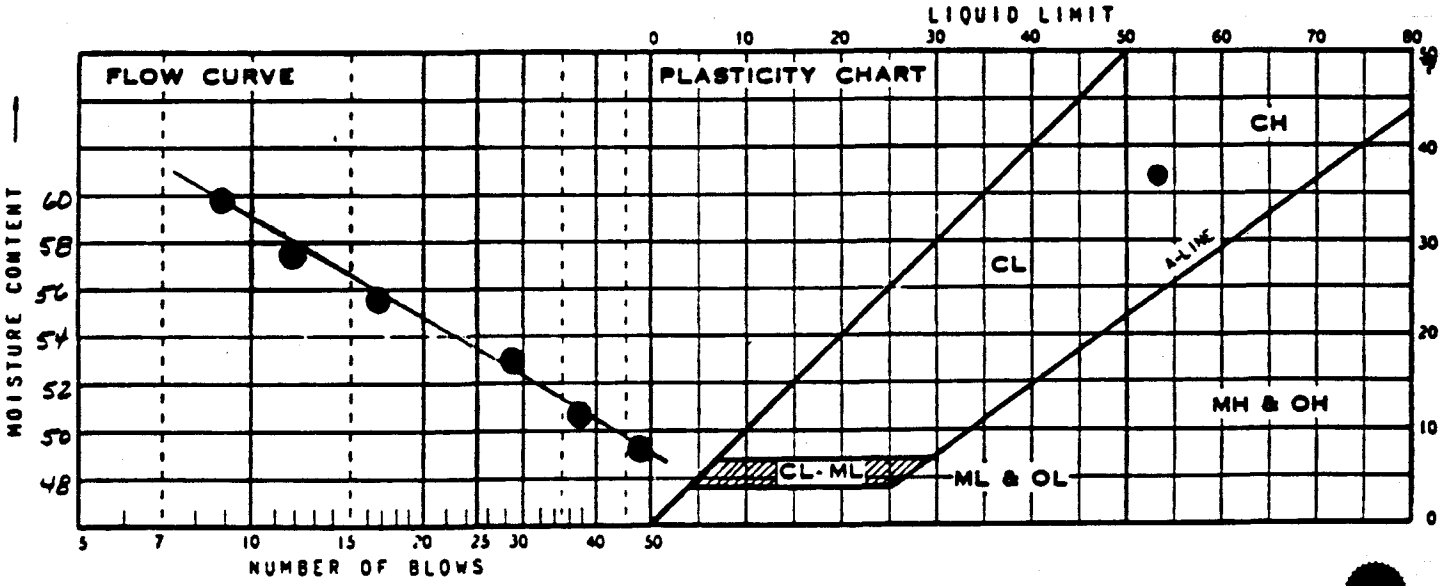
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SE 3/25/92

DETERMINATION	1	2	3	4	5	6
DISH	2069	2053	20C			
WT OF DISH + WET SOIL g	5.21	5.24	5.27			
WT OF DISH + DRY SOIL g	4.66	4.66	4.61	—	—	—
WT OF MOISTURE g	.55	.58	.66			
WT OF DISH g	1.04	1.06	1.02	—	—	—
WT OF DRY SOIL g	3.62	3.60	3.59			
MOISTURE CONTENT %	15.2	16.1	18.4			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	24C	2039	32C	31C	37C	2027
NUMBER OF BLOWS	49	38	29	17	12	10±
WT OF DISH + WET SOIL g	8.99	10.84	8.99	12.59	13.61	11.76
WT OF DISH + DRY SOIL g	6.36	7.54	6.24	8.46	9.08	7.75
WT OF MOISTURE g	2.63	3.30	2.75	4.13	4.59	4.01
WT OF DISH g	1.04	1.06	1.05	1.05	1.09	1.06
WT OF DRY SOIL g	5.32	6.48	5.19	7.41	7.99	6.69
MOISTURE CONTENT %	49.4	50.9	53.0	55.7	57.5	59.9



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		53.5	16.6	36.9	CH	

ADVANCED TERRA TESTING

RB

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	16+70	SAMPLED	Rocky Flats
DEPTH	24.5'	DATE TESTED	02-28-92 TNU
SAMPLE NO.	#8	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	72.41
Wt. Dry Soil & Pan	(g)	69.35
Wt. Lost Moisture	(g)	3.06
Wt. of Pan Only	(g)	3.61
Wt. of Dry Soil	(g)	65.74
Moisture Content	%	4.7

Wt. Hydrom. Sample Wet (g)	60.02
Wt. Hydrom. Sample Dry (g)	57.35

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.02
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.02
Weight of - #10 Dry (g)	57.35
Wt. Total Sample Dry (g)	57.35
Calc. Wt. "W" (g)	57.35
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.58	0.01	0.01	0.0	100.0
#40	1.55	1.56	0.01	0.02	0.0	100.0
#60	1.55	1.62	0.07	0.09	0.2	99.8
#100	1.57	1.98	0.41	0.50	0.9	99.1
#230	1.56	16.56	15.00	15.50	27.0	73.0

Silt (ML)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	16+70	SAMPLED	Rocky Flats
DEPTH	24.5'	DATE TESTED	02-28-92 TNU
SAMPLE NO.	#8	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

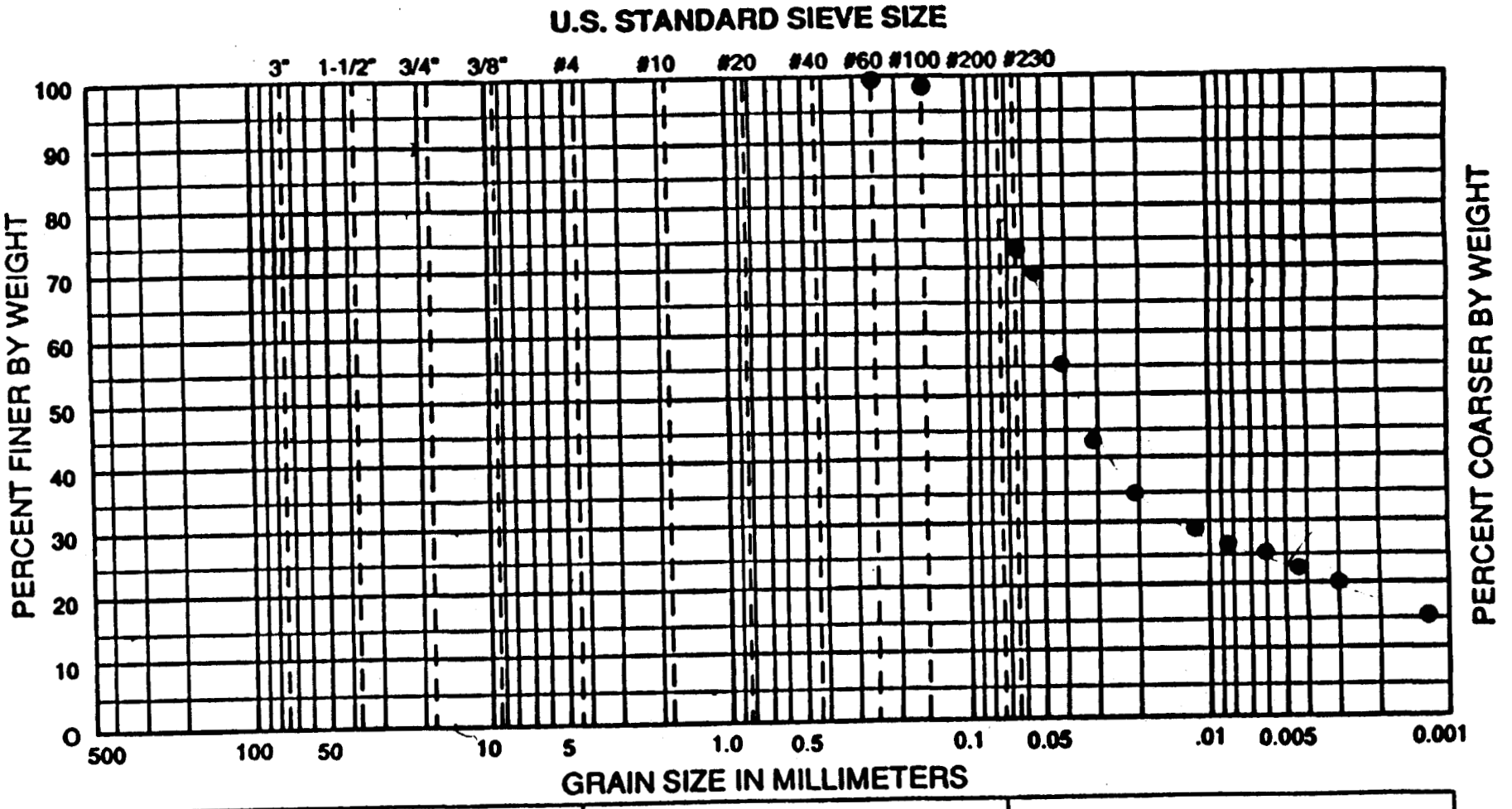
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.75	Temp. Coef. K	0.01294
Value of "a"	0.98	Wt. Dry Sample "W"	57.353
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	45.50	40.50	69.2	69.2	8.83	0.0544
1.0	37.50	32.50	55.5	55.5	10.14	0.0412
2.0	30.50	25.50	43.6	43.6	11.29	0.0307
5.0	25.50	20.50	35.0	35.0	12.11	0.0201
15.0	22.00	17.00	29.0	29.0	12.68	0.0119
30.0	20.50	15.50	26.5	26.5	12.93	0.0085
60.0	19.75	14.75	25.2	25.2	13.05	0.0060
120.0	18.50	13.50	23.1	23.1	13.26	0.0043
250.0	17.00	12.00	20.5	20.5	13.50	0.0030
1440.0	14.00	9.00	15.4	15.4	13.99	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 16-70 SAMPLE NO.: CH #8 DATE: 3/4/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rock Flat	24.5	SILT w/ some CLAY & fine SAND (ML)

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION _____

BORING 1470 SAMPLE #8 DEPTH 24.5

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

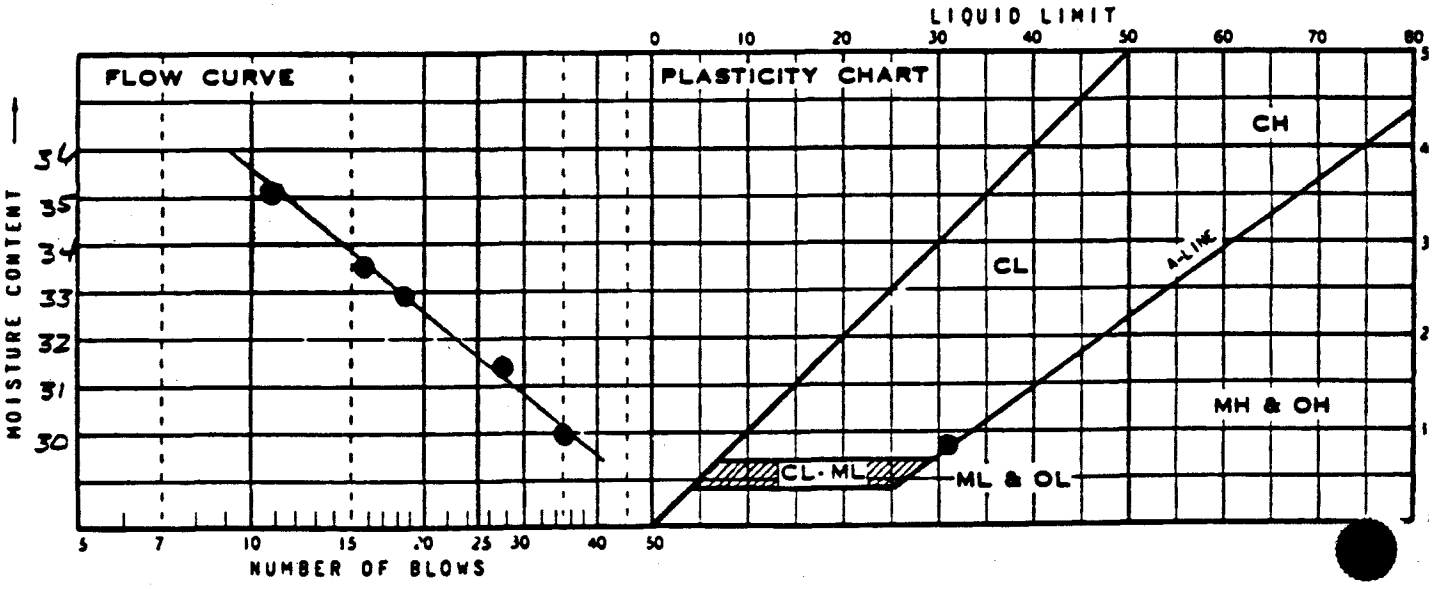
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR.J.A.R.R.

DETERMINATION	1	2	3	4	5	6
DISH	20C	22	24			
WT OF DISH + WET SOIL g	8.09	7.50	7.71			
WT OF DISH + DRY SOIL g	6.74	6.28	6.47	—	—	—
WT OF MOISTURE g	1.39	1.22	1.24			
WT OF DISH g	1.09	1.06	1.05	—	—	—
WT OF DRY SOIL g	5.65	5.22	5.42			
MOISTURE CONTENT %	22.8	23.4	22.9			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	44C	6C	10C	4	14C	
NUMBER OF BLOWS	35	28±	19	16	11±	
WT OF DISH + WET SOIL g	24.31	17.80	21.03	20.19	22.74	
WT OF DISH + DRY SOIL g	18.95	17.81	16.09	15.39	17.10	—
WT OF MOISTURE g	5.36	3.99	4.94	4.80	5.64	
WT OF DISH g	1.08	1.10	1.07	1.06	1.03	—
WT OF DRY SOIL g	17.87	12.71	15.02	14.33	16.07	
MOISTURE CONTENT %	30.0	31.4	32.9	33.5	35.1	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		31.6	23.0	8.6	CL	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	16+83	SAMPLED	Rocky Flats
DEPTH	3.0'	DATE TESTED	02-28-92 TNU
SAMPLE NO.	#8	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	53.94
Wt. Dry Soil & Pan	(g)	51.70
Wt. Lost Moisture	(g)	2.24
Wt. of Pan Only	(g)	3.80
Wt. of Dry Soil	(g)	47.90
Moisture Content	%	4.7

Wt. Hydrom. Sample Wet (g)	60.00
Wt. Hydrom. Sample Dry (g)	57.32

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	1199.66
Weight of + #10 Before Washing (g)	695.43
Weight of + #10 After Washing (g)	644.10
Weight of - #10 Wet (g)	504.23
Weight of - #10 Dry (g)	530.74
Wt. Total Sample Dry (g)	1174.84
Calc. Wt. "W" (g)	126.89
Calc. Mass + #10	69.57

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	269.74	269.74	269.74	23.0	77.0
3/8"	0.00	242.17	242.17	511.91	43.6	56.4
#4	0.00	83.91	83.91	595.82	50.7	49.3
#10	0.00	48.28	48.28	644.10	54.8	45.2
#20	1.57	2.89	1.32	1.32	55.9	44.1
#40	1.31	3.58	2.27	3.59	57.7	42.3
#60	1.57	3.78	2.21	5.80	59.4	40.6
#100	1.58	4.34	2.76	8.56	61.6	38.4
#230	1.57	6.21	4.64	13.20	65.2	34.8

Clayey Sand (SC)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	16+83	SAMPLED	Rocky Flats
DEPTH	3.0'	DATE TESTED	02-28-92 TNU
SAMPLE NO.	#8	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

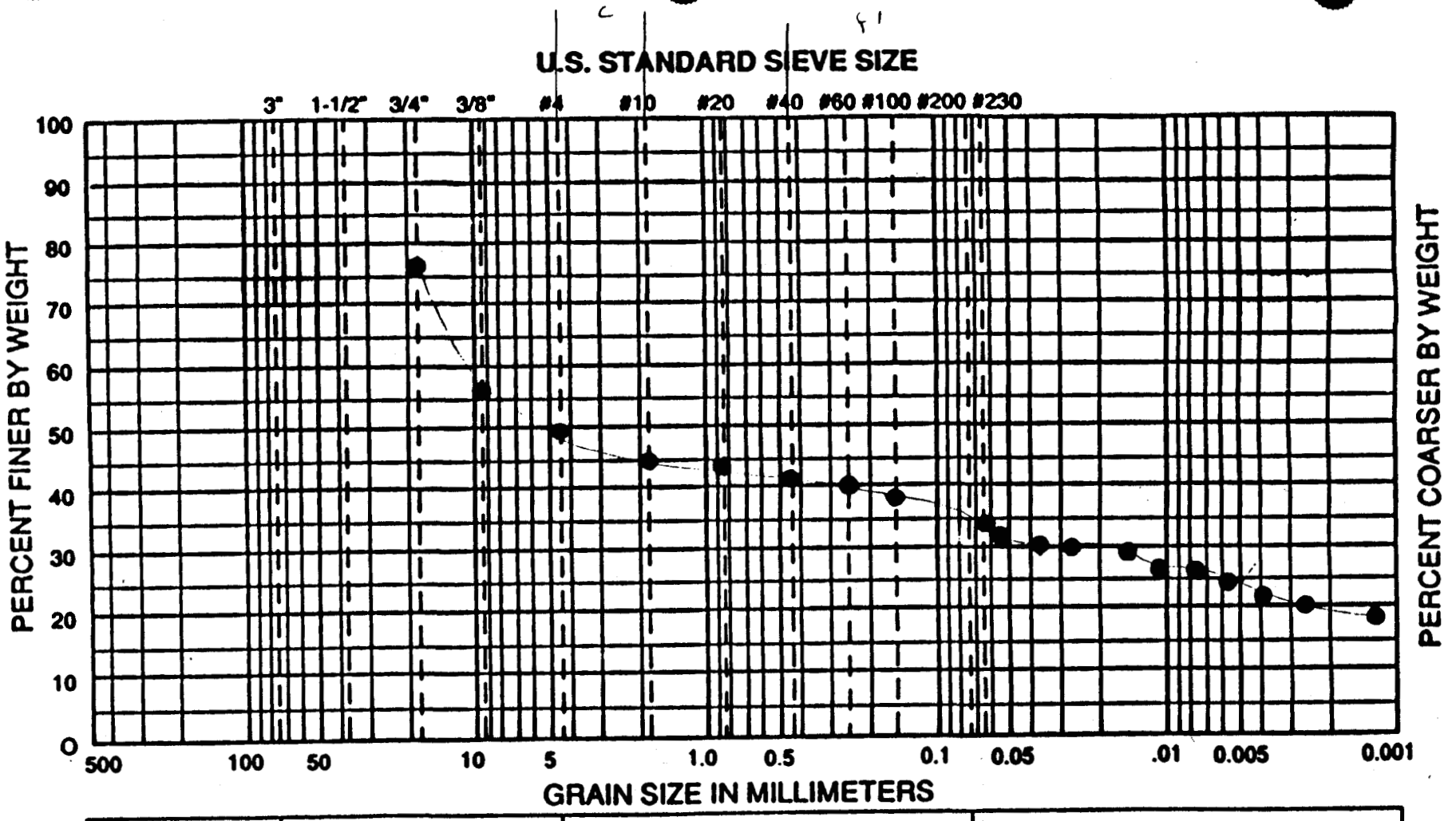
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.76	Temp. Coef. K	0.01290
Value of "a"	0.98	Wt. Dry Sample "W"	126.888
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	48.00	43.00	33.1	33.1	8.42	0.0529
1.0	46.00	41.00	31.6	31.6	8.75	0.0382
2.0	45.00	40.00	30.8	30.8	8.91	0.0272
5.0	43.00	38.00	29.3	29.3	9.24	0.0175
15.0	40.00	35.00	27.0	27.0	9.73	0.0104
30.0	39.00	34.00	26.2	26.2	9.89	0.0074
60.0	36.00	31.00	23.9	23.9	10.39	0.0054
120.0	34.00	29.00	22.4	22.4	10.71	0.0039
250.0	32.00	27.00	20.8	20.8	11.04	0.0027
1440.0	28.50	23.50	18.1	18.1	11.62	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 16+83 SAMPLE NO.: CH#8 DATE: 3-7-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION (CLAYEY SAND w/Some Silt & Gvl.) (SC)
		Gravel w/ some sd, silt, clay
	3.0'	Rocky Flats: 23% c gvl, 20.6% f. gvl, 4.1% c sd, 2.7% m sd, 14.6% f. sd, 5.3% silt, 11.5% cl.

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats EG-G
BORING 16-83 SAMPLE CH #3 DEPTH 3'

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

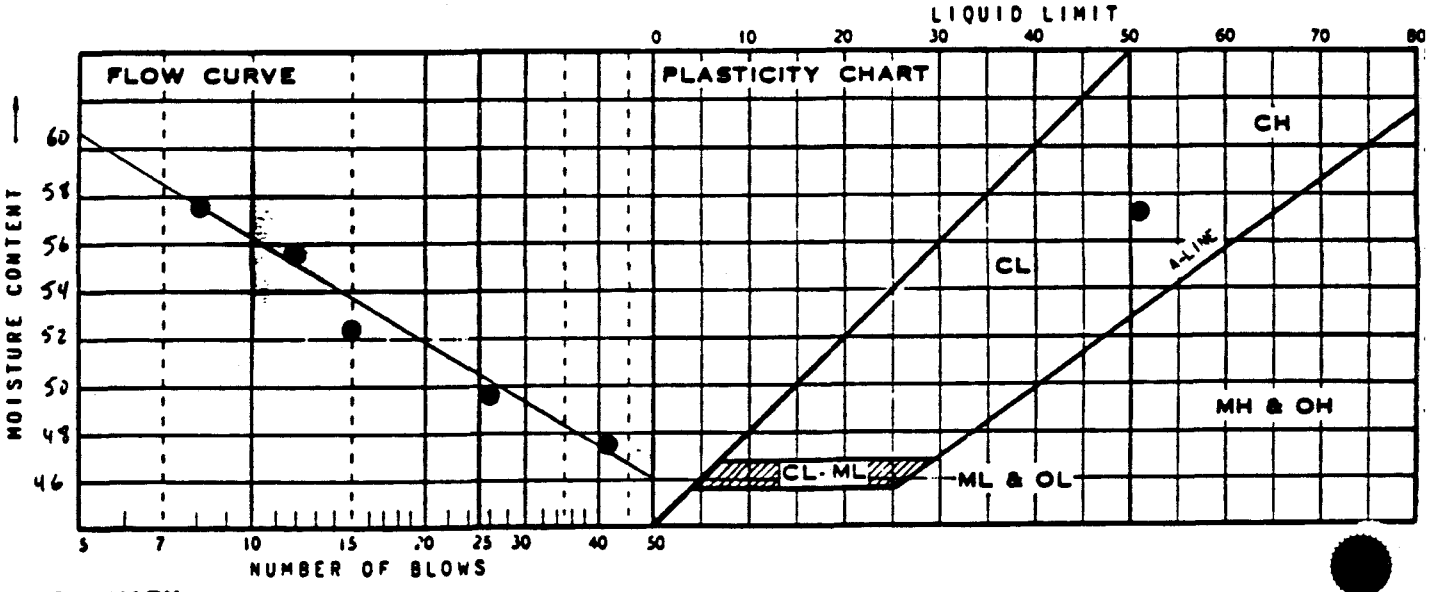
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DW 3/3/92

DETERMINATION	1	2	3	4	5	6
DISH	2062	34C	2056			
WT OF DISH + WET SOIL g	6.14	5.80	5.15			
WT OF DISH + DRY SOIL g	5.38	5.11	4.54	—	—	—
WT OF MOISTURE g	.76	.69	.61			
WT OF DISH g	1.03	1.03	1.04	—	—	—
WT OF DRY SOIL g	4.35	4.08	3.50			
MOISTURE CONTENT %	17.5	16.9	17.4			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	33C	41C	2070	2022	2068	37C
NUMBER OF BLOWS	41	26	15	15	12	8
WT OF DISH + WET SOIL g	12.75	12.25	11.25	11.54	10.96	11.8
WT OF DISH + DRY SOIL g	9.00	8.52	7.78	7.93	7.41	7.91
WT OF MOISTURE g	3.75	3.73	3.47	3.61	3.55	3.44
WT OF DISH g	1.06	1.03	1.06	1.05	1.04	1.08
WT OF DRY SOIL g	7.94	7.49	6.72	6.88	6.37	6.83
MOISTURE CONTENT %	47.2	49.8	51.6	52.5	55.7	57.7



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		50.5	17.3	33.2	CH	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Western

JOB NO. 2066-03

BORING NO.	17+10	SAMPLED	Rocky Flats
DEPTH	4.8'	DATE TESTED	03-05-92 SR
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	69.89
Wt. Dry Soil & Pan	(g)	68.56
Wt. Lost Moisture	(g)	1.33
Wt. of Pan Only	(g)	3.76
Wt. of Dry Soil	(g)	64.80
Moisture Content	%	2.1
Wt. Hydrom. Sample Wet	(g)	60.01
Wt. Hydrom. Sample Dry	(g)	58.81

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	804.96
Weight of + #10 Before Washing (g)	0.49
Weight of + #10 After Washing (g)	0.38
Weight of - #10 Wet (g)	804.47
Weight of - #10 Dry (g)	788.40
Wt. Total Sample Dry (g)	788.78
Calc. Wt. "W" (g)	58.83
Calc. Mass + #10	0.03

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.38	0.38	0.38	0.0	100.0
#20	1.31	1.36	0.05	0.05	0.1	99.9
#40	1.57	1.72	0.15	0.20	0.4	99.6
#60	1.57	1.66	0.09	0.29	0.5	99.5
#100	1.56	1.63	0.07	0.36	0.7	99.3
#230	1.57	1.77	0.20	0.56	1.0	99.0

Silty Clay (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Western

JOB NO. 2066-03

BORING NO.	17+10	SAMPLED	Rocky Flats
DEPTH	4.8'	DATE TESTED	03-05-92 SR
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

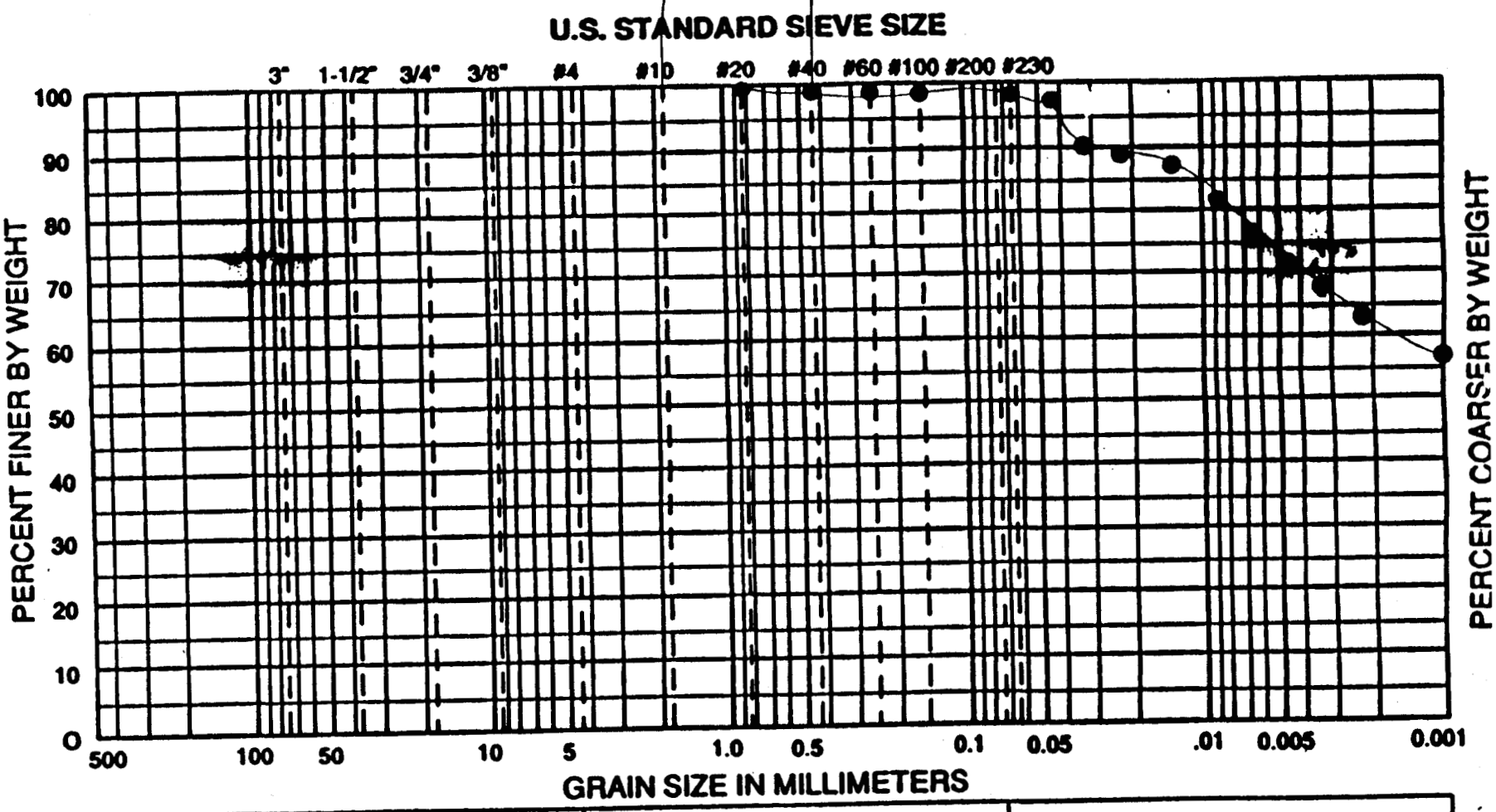
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.79	Temp. Coef. K	0.01280
Value of "a"	0.97	Wt. Dry Sample "W"	58.834
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	65.00	59.00	97.5	97.5	5.63	0.0430
1.0	60.50	54.50	90.0	90.0	6.37	0.0323
2.0	60.00	54.00	89.2	89.2	6.45	0.0230
5.0	58.75	52.75	87.1	87.1	6.66	0.0148
15.0	55.25	49.25	81.4	81.4	7.23	0.0089
30.0	52.25	46.25	76.4	76.4	7.72	0.0065
60.0	49.00	43.00	71.0	71.0	8.25	0.0047
120.0	47.00	41.00	67.7	67.7	8.58	0.0034
250.0	44.00	38.00	62.8	62.8	9.07	0.0024
1440.0	40.25	34.25	56.6	56.6	9.69	0.0010

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 17 + 10 SAMPLE NO.: CH # 7 DATE: 3/9/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION SILTY CLAY w/ tr SAND
Rock Flats	4.8'	4% med sd, 6% f. sd 24% SILT, 70% CLAY

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

CLIENT/OWNER Weston

LOCATION Rocky Flats EG-G

BORING 17-10 SAMPLE CN #7 DEPTH 4.3'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

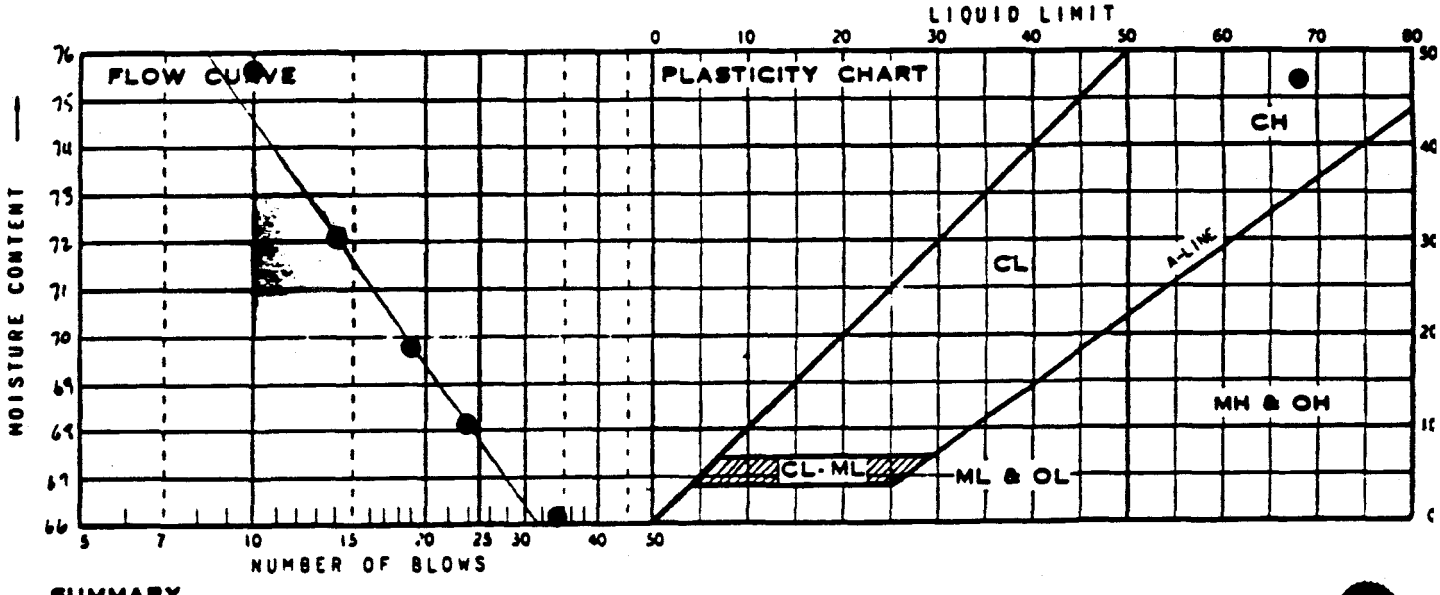
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DM 3/4/92

DETERMINATION	1	2	3	4	5	6
DISH	34C	2062	2068			
WT OF DISH + WET SOIL g	4.81	5.52	4.84			
WT OF DISH + DRY SOIL g	4.17	4.75	4.19	—	—	—
WT OF MOISTURE g	.64	.77	.65			
WT OF DISH g	1.03	1.04	1.05	—	—	—
WT OF DRY SOIL g	3.14	3.71	3.14			
MOISTURE CONTENT %	20.4	20.8	20.7			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2070	37C	2056	41C	33C	2022
NUMBER OF BLOWS	34	25	19	14	10	
WT OF DISH + WET SOIL g	10.85	9.39	10.76	10.10	10.32	
WT OF DISH + DRY SOIL g	6.95	6.02	6.76	6.30	6.33	—
WT OF MOISTURE g	3.90	3.37	4.00	3.80	3.99	
WT OF DISH g	1.06	1.08	1.03	1.03	1.06	1.06
WT OF DRY SOIL g	5.89	4.94	5.73	5.27	5.27	
MOISTURE CONTENT %	66.2	69.2	69.8	72.1	75.7	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		67.9	20.6	47.3	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	17+32	SAMPLED	Rocky Flats
DEPTH	18'	DATE TESTED	3-9-92 DU
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	64.84
Wt. Dry Soil & Pan	(g)	62.15
Wt. Lost Moisture	(g)	2.69
Wt. of Pan Only	(g)	3.74
Wt. of Dry Soil	(g)	58.41
Moisture Content	%	4.6

Wt. Hydrom. Sample Wet (g)	60.01
Wt. Hydrom. Sample Dry (g)	57.37

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.01
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.01
Weight of - #10 Dry (g)	57.37
Wt. Total Sample Dry (g)	57.37
Calc. Wt. "W" (g)	57.37
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.59	0.02	0.02	0.0	100.0
#40	1.57	1.62	0.05	0.07	0.1	99.9
#60	1.56	1.60	0.04	0.11	0.2	99.8
#100	1.55	1.61	0.06	0.17	0.3	99.7
#230	1.57	1.74	0.17	0.34	0.6	99.4

CLAY (LIT)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	17+32	SAMPLED	Rocky Flats
DEPTH	18'	DATE TESTED	3-9-92 DU
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

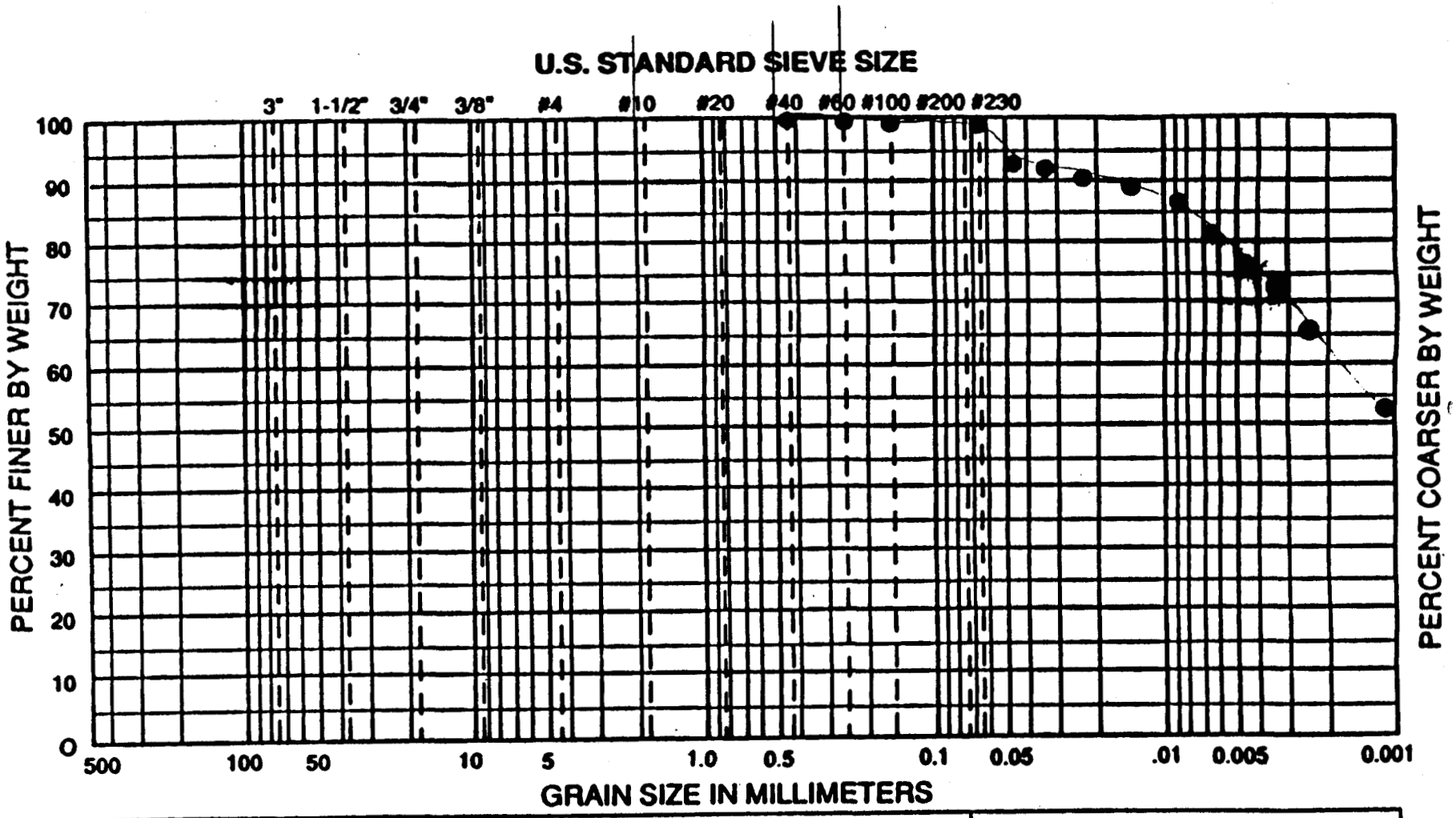
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.76	Temp. Coef. K	0.01290
Value of "a"	0.98	Wt. Dry Sample "W"	57.368
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	60.50	55.00	93.8	93.8	6.37	0.0460
1.0	59.50	54.00	92.1	92.1	6.53	0.0330
2.0	58.50	53.00	90.4	90.4	6.70	0.0236
5.0	58.00	52.50	89.5	89.5	6.78	0.0150
15.0	56.00	50.50	86.1	86.1	7.11	0.0089
30.0	53.50	48.00	81.8	81.8	7.52	0.0065
60.0	50.50	45.00	76.7	76.7	8.01	0.0047
120.0	48.00	42.50	72.5	72.5	8.42	0.0034
250.0	44.00	38.50	65.6	65.6	9.07	0.0025
1440.0	37.00	31.50	53.7	53.7	10.22	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, I

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 17·32 SAMPLE NO.: CH # 7 DATE: 3/11/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION CLAY (CH) w/some silt
Rocky Flats	18'	c sil, .17 m sd, .3 f sd — 24% silt, 75% CLAY

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 20[illegible]-03

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS EG&G

BORING 17-32 SAMPLE CH-7 DEPTH 18'

FIELD DENSITY BY _____

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

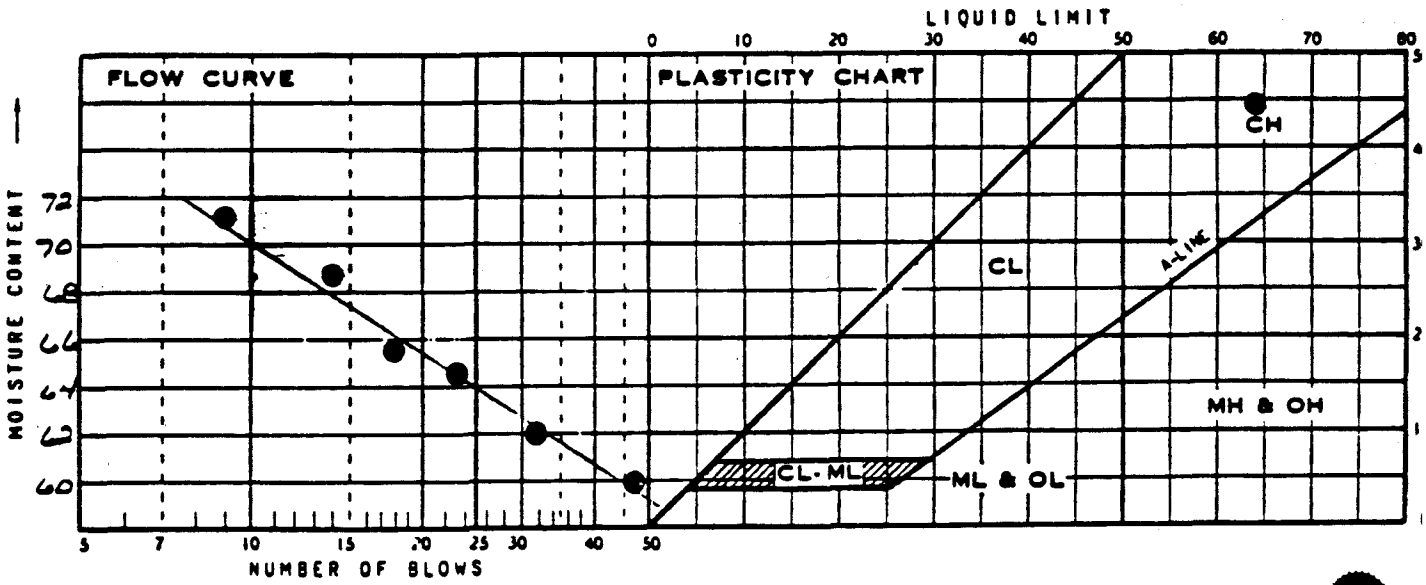
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY JR 3/16/92

DETERMINATION	1	2	3	4	5	6
DISH	38 C	2029	2015			
WT OF DISH + WET SOIL g	4.84	5.55	5.10			
WT OF DISH + DRY SOIL g	4.23	4.81	4.44	—	—	—
WT OF MOISTURE g	.61	.74	.66			
WT OF DISH g	1.04	1.05	1.06	—	—	—
WT OF DRY SOIL g	3.19	3.76	3.38			
MOISTURE CONTENT %	19.1	19.7	19.5			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2032	3	10 C	20 C	4	2010
NUMBER OF BLOWS	48	32	23	18	15	9
WT OF DISH + WET SOIL g	18.77	17.32	20.15	19.98	19.12	18.26
WT OF DISH + DRY SOIL g	11.82	11.10	12.66	12.50	11.76	11.10
WT OF MOISTURE g	6.45	6.22	7.49	7.48	7.36	7.16
WT OF DISH g	1.05	1.07	1.07	1.08	1.07	1.05
WT OF DRY SOIL g	10.77	10.03	11.59	11.42	10.69	10.05
MOISTURE CONTENT %	60.0	62.1	64.6	65.5	68.9	71.2



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		64.0	19.4	44.6	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA
-#230 SIEVE ONLY

CLIENT Roy F. Weston

JOB NO. 2066-03

BORING NO.	17+32	SAMPLED	12-12-91 SRC
DEPTH	18'	DATE TESTED	01-23-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Bulk/Jar	DRY SIEVE	No

MOISTURE/DENSITY DATA

Wt. Soil & Ring(s)	(g)	
Wt. Ring(s)	(g)	
Wt. Soil	(g)	
Wet Density	PCF	
Wt. Wet Soil & Pan	(g)	171.1
Wt. Dry Soil & Pan	(g)	148.1
Wt. Lost Moisture	(g)	22.9
Wt. of Pan Only	(g)	9.3
Wt. of Dry Soil	(g)	138.8
Moisture Content	%	16.5
Dry Density	PCF	

WASH SIEVE ANALYSIS

Wt. Wet Soil & Pan Before Washing (g)	171.1
Wt. Dry Soil & Pan Before Washing (g)	148.1
Weight of Pan (g)	9.3
Wt. of Dry Soil Before Washing	138.8
Wt. Dry Soil & Pan After Washing (g)	10.1
Wt. of Dry Soil After Washing (g)	0.7
-#230 Wash. Out %	99.5

ADVANCED TERRA TESTING, INC.

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION

BORING 17+32 SAMPLE - - - - DEPTH 18' - -

FIELD DENSITY BY - - - - - - - - / - - / - - -

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + ~~WET~~ SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

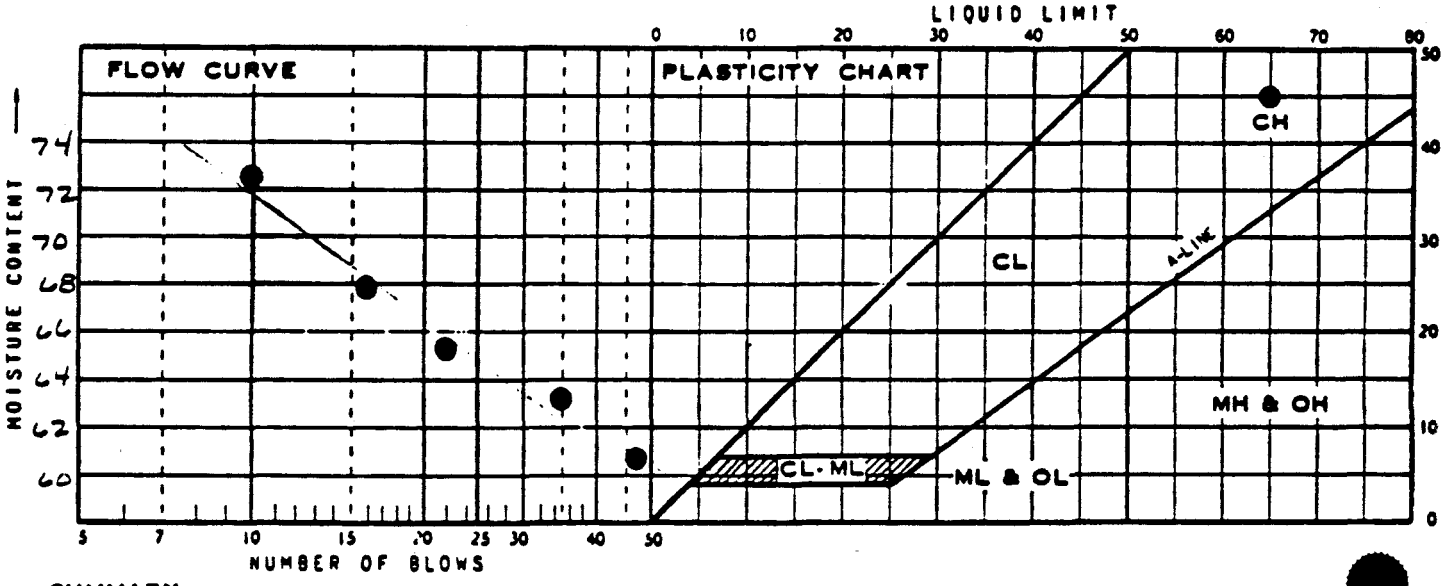
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SB 1/20/92

DETERMINATION	1	2	3	4	5	6
DISH	35	34	33			
WT OF DISH + WET SOIL g	8.67	9.26	7.75			
WT OF DISH + DRY SOIL g	7.43	7.86	6.64	—	—	—
WT OF MOISTURE g	1.26	1.40	1.11			
WT OF DISH g	1.02	1.04	1.04	—	—	—
WT OF DRY SOIL g	6.41	6.82	5.60			
MOISTURE CONTENT %	19.7	20.5	19.8			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	32	31	30	29	28	
NUMBER OF BLOWS	47	35	22	16	11	
WT OF DISH + WET SOIL g	13.84	13.16	14.84	16.12	15.96	
WT OF DISH + DRY SOIL g	10.01	8.46	9.38	10.02	9.69	—
WT OF MOISTURE g	4.83	4.70	5.46	6.10	6.27	
WT OF DISH g	1.05	1.04	1.02	1.04	1.04	—
WT OF DRY SOIL g	7.96	7.42	8.36	8.98	8.65	
MOISTURE CONTENT %	60.7	63.3	65.3	67.9	72.5	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION
		150	20.0	130	CH

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA
-#230 SIEVE ONLY

CLIENT Roy F. Weston

JOB NO. 2066-03

BORING NO.	17+50	SAMPLED	12-12-91 SRC
DEPTH	.3'	DATE TESTED	01-23-92 TNU
SAMPLE NO.	—	WASH SIEVE	Yes
SOIL DESCR.	Bulk/Jar	DRY SIEVE	No

MOISTURE/DENSITY DATA

Wt. Soil & Ring(s) (g)	
Wt. Ring(s) (g)	
Wt. Soil (g)	
Wet Density PCF	
Wt. Wet Soil & Pan (g)	
Wt. Dry Soil & Pan (g)	
Wt. Lost Moisture (g)	
Wt. of Pan Only (g)	
Wt. of Dry Soil (g)	
Moisture Content %	
Dry Density PCF	

WASH SIEVE ANALYSIS

Wt. Wet Soil & Pan Before Washing (g)	0.0
Wt. Dry Soil & Pan Before Washing (g)	319.3
Weight of Pan (g)	9.6
Wt. of Dry Soil Before Washing	309.8
Wt. Dry Soil & Pan After Washing (g)	171.4
Wt. of Dry Soil After Washing (g)	161.9
-#230 Wash. Out %	47.7

? Silty Sand (CL)
Sandy Clay

ADVANCED TERRA TESTING, INC.

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - -

JOB NO. 20660-03

CLIENT/OWNER WESTON

LOCATION

BORING 17150 SAMPLE - - - - DEPTH 3'

FIELD DENSITY BY - - - - - - / / / - -

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

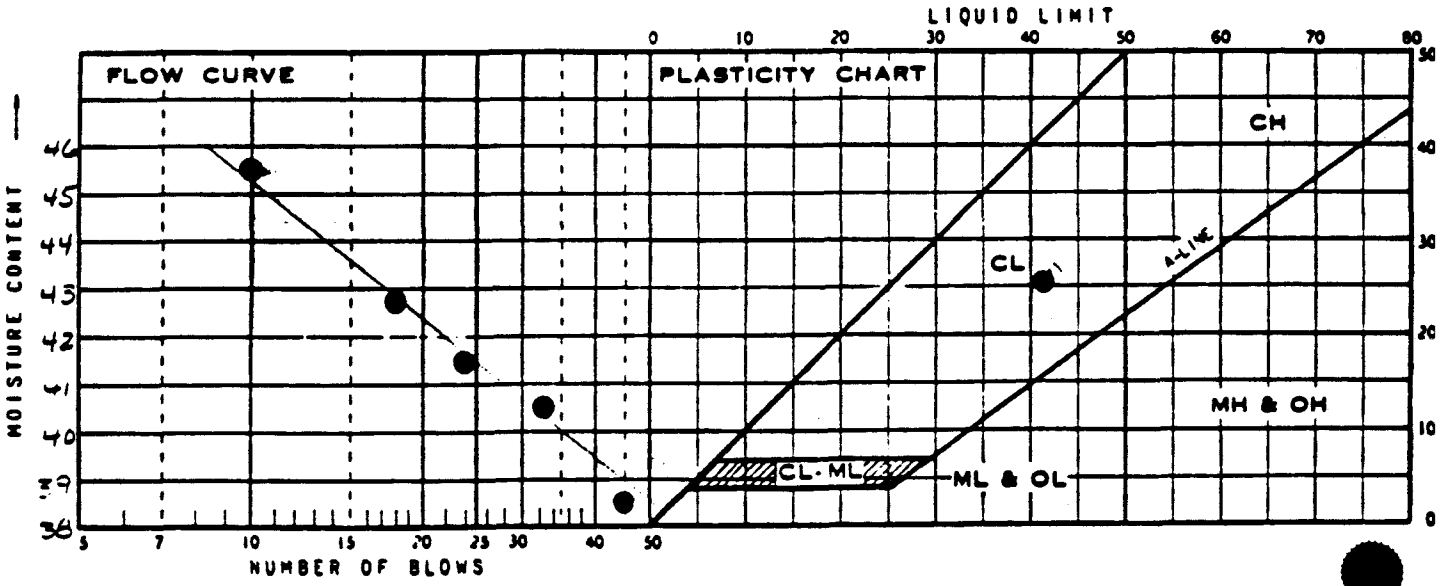
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SS / / 12/4/

DETERMINATION	1	2	3	4	5	6
DISH	56	55	54			
WT OF DISH + WET SOIL g	8.59	9.70	9.63			
WT OF DISH + DRY SOIL g	7.55	8.50	8.45	—	—	—
WT OF MOISTURE g	1.04	1.20	1.18			
WT OF DISH g	1.03	1.04	1.03	—	—	—
WT OF DRY SOIL g	6.52	7.46	7.42			
MOISTURE CONTENT %	16.0	16.1	15.9			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	53	52	51	50	39	
NUMBER OF BLOWS	45	33	24	18	11	
WT OF DISH + WET SOIL g	16.86	17.19	15.42	14.63	16.68	
WT OF DISH + DRY SOIL g	12.46	12.54	11.20	10.56	11.79	—
WT OF MOISTURE g	4.40	4.65	4.22	4.07	4.89	
WT OF DISH g	1.04	1.05	1.04	1.05	1.04	—
WT OF DRY SOIL g	11.42	11.49	10.16	9.51	10.75	
MOISTURE CONTENT %	38.5	40.5	41.5	42.8	45.5	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		41.4	16.0	25.4	CL	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	17+50
DEPTH	.8'
SAMPLE NO.	#7
SOIL DESCR.	Bulk (Jar)

SAMPLED	Rocky Flats
DATE TESTED	02-28-92 TNU
WASH SIEVE	Yes
DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	75.30
Wt. Dry Soil & Pan	(g)	71.09
Wt. Lost Moisture	(g)	4.21
Wt. of Pan Only	(g)	3.74
Wt. of Dry Soil	(g)	67.35
Moisture Content	%	6.3

Wt. Hydrom. Sample Wet (g)	60.01
Wt. Hydrom. Sample Dry (g)	56.47

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	384.41
Weight of + #10 Before Washing (g)	7.85
Weight of + #10 After Washing (g)	5.66
Weight of - #10 Wet (g)	376.56
Weight of - #10 Dry (g)	356.47
Wt. Total Sample Dry (g)	362.13
Calc. Wt. "W" (g)	57.37
Calc. Mass + #10	0.90

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	4.45	4.45	4.45	1.2	98.8
#10	0.00	1.21	1.21	5.66	1.6	98.4
#20	1.56	1.85	0.29	0.29	2.1	97.9
#40	1.56	1.84	0.28	0.57	2.6	97.4
#60	1.56	1.83	0.27	0.84	3.0	97.0
#100	1.55	1.90	0.35	1.19	3.6	96.4
#230	1.57	2.38	0.81	2.00	5.0	95.0

CLAY (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	17+50	SAMPLED	Rocky Flats
DEPTH	.8'	DATE TESTED	02-28-92 TN
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

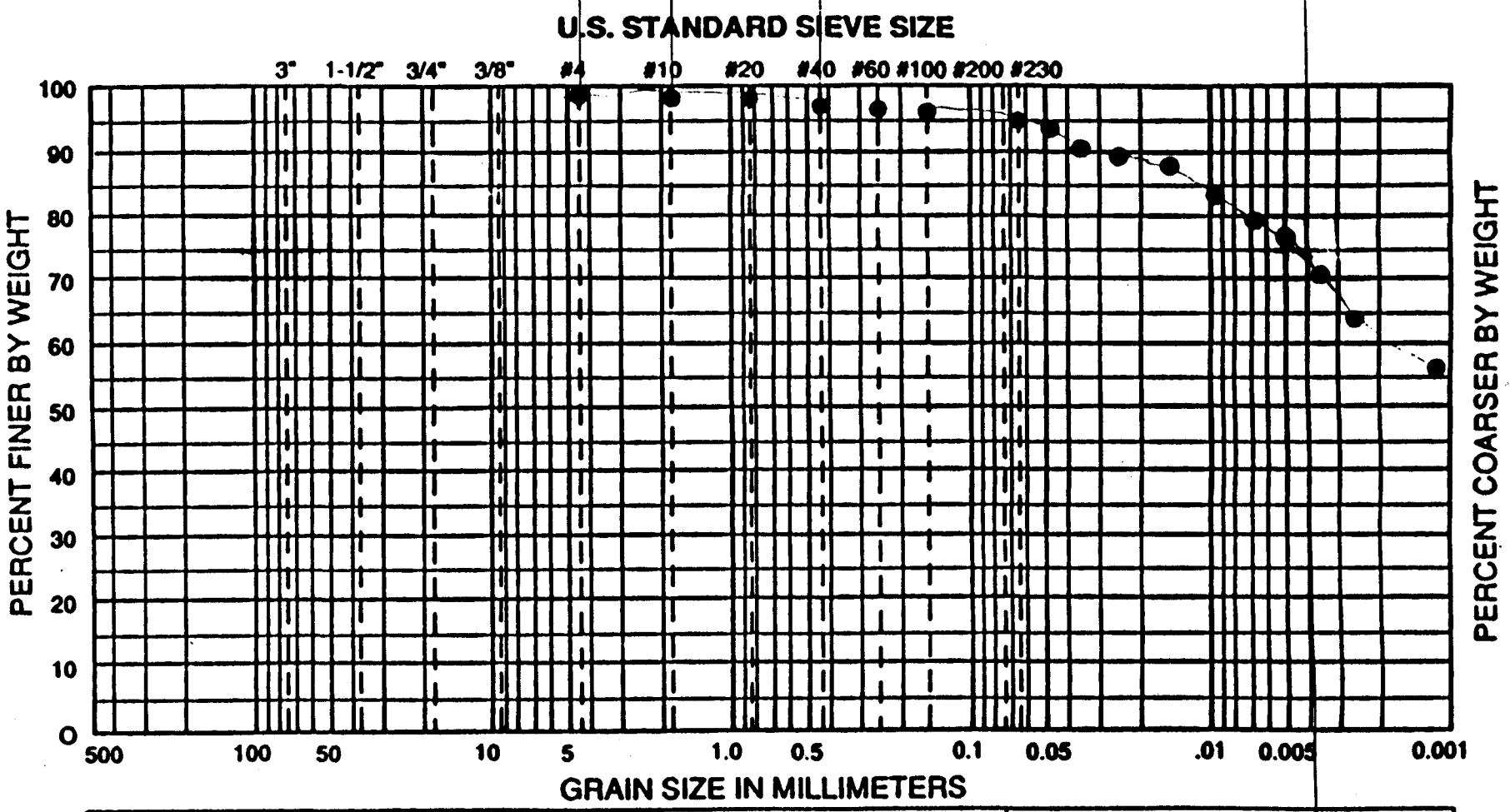
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.62	Temp. Coef. K	0.01345
Value of "a"	1.01	Wt. Dry Sample "W"	57.372
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	58.50	53.50	93.8	93.8	6.70	0.0492
1.0	56.50	51.50	90.3	90.3	7.02	0.0356
2.0	56.25	51.25	89.9	89.9	7.07	0.0253
5.0	55.00	50.00	87.7	87.7	7.27	0.0162
15.0	52.50	47.50	83.3	83.3	7.68	0.0096
30.0	50.50	45.50	79.8	79.8	8.01	0.0069
60.0	48.50	43.50	76.3	76.3	8.34	0.0050
120.0	45.50	40.50	71.0	71.0	8.83	0.0036
250.0	42.00	37.00	64.9	64.9	9.40	0.0026
1440.0	37.00	32.00	56.1	56.1	10.22	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY	
		COARSE	FINE	COARSE	MEDIUM	FINE		

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 17+50 SAMPLE NO.: CH# 7 DATE: 3/9/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	.8'	.2% Gravel CLAY .4% C. sd, 1% med sd, 2.4% f. sd, 22% SILT, 73% CLAY

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-02

CLIENT/OWNER Weston

LOCATION Rocky Flats EG+G

BORING 17-50 SAMPLE CH #7 DEPTH 8'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

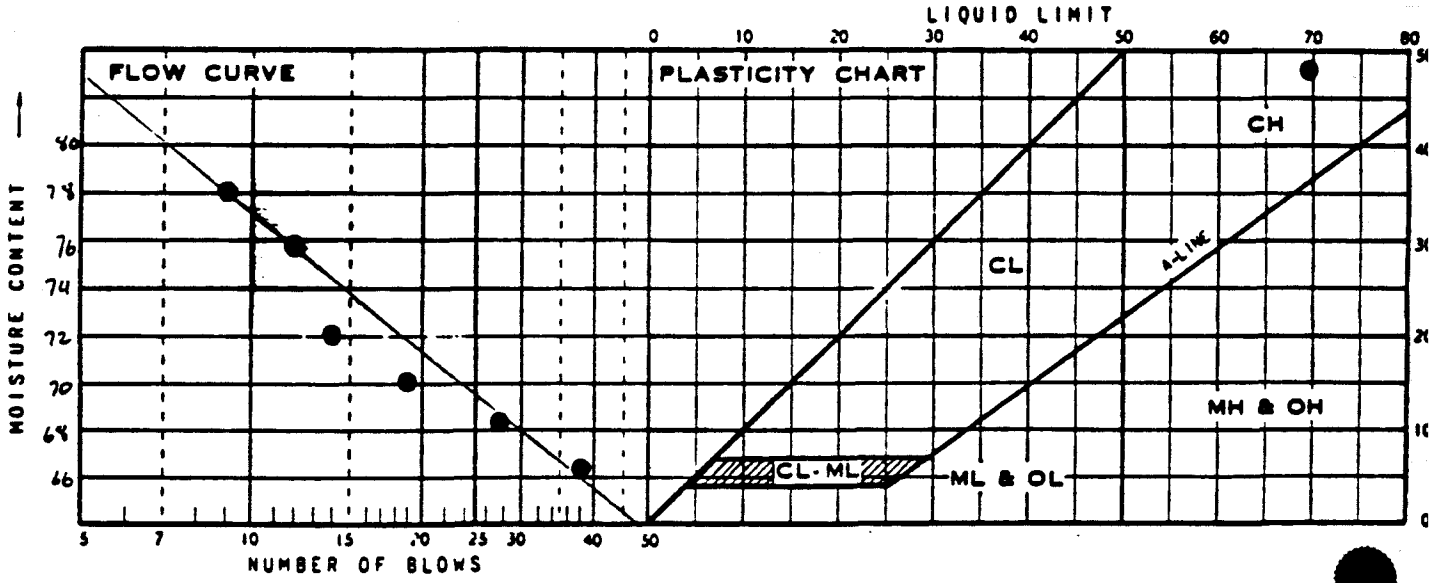
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DM 3/4/93

DETERMINATION	1	2	3	4	5	6
DISH	32c	2018	16c			
WT OF DISH + WET SOIL g	7.22	6.00	6.84			
WT OF DISH + DRY SOIL g	6.11	5.11	5.81	—	—	—
WT OF MOISTURE g	1.11	.89	1.03			
WT OF DISH g	1.03	1.05	1.06	—	—	—
WT OF DRY SOIL g	5.08	4.06	4.75			
MOISTURE CONTENT %	21.9	21.9	21.7			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	9c	2023	2073	13c	2016	25c
NUMBER OF BLOWS	38	27	19	14	12	9
WT OF DISH + WET SOIL g	10.36	9.65	10.40	10.61	9.43	10.7[illegible]
WT OF DISH + DRY SOIL g	6.65	6.16	6.54	6.60	5.81	6.50
WT OF MOISTURE g	3.71	3.49	3.86	4.01	3.62	4.27
WT OF DISH g	1.07	1.06	1.04	1.04	1.04	1.04
WT OF DRY SOIL g	5.58	5.10	5.50	5.56	4.77	5.46
MOISTURE CONTENT %	66.5	68.4	70.2	72.1	75.9	74.2



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		69.6	21.8	47.8	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Roy F. Weston

JOB NO. 2066-03

BORING NO.	17+50	SAMPLED	12-12-91 SRC
DEPTH	15'	DATE TESTED	01-27-91 TNU
SAMPLE NO.		WASH SIEVE	Yes
SOIL DESCR.	Bulk/Jar	DRY SIEVE	No

MOISTURE/DENSITY DATA

Wt. Soil & Ring(s) (g)	
Wt. Ring(s) (g)	
Wt. Soil (g)	
Wet Density PCF	
Wt. Wet Soil & Pan (g)	
Wt. Dry Soil & Pan (g)	
Wt. Lost Moisture (g)	
Wt. of Pan Only (g)	
Wt. of Dry Soil (g)	
Moisture Content %	
Dry Density PCF	

WASH SIEVE ANALYSIS

Wt. Wet Soil & Pan Before Washing (g)	
Wt. Dry Soil & Pan Before Washing (g)	302.6
Weight of Pan (g)	8.9
Wt. of Dry Soil Before Washing	293.7
Wt. Dry Soil & Pan After Washing (g)	108.8
Wt. of Dry Soil After Washing (g)	99.9
-#200 Wash. Out %	66.0

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	3.69	6.62	2.93	2.93	1.0	99.0
#10	0.00	0.00	0.00	2.93	1.0	99.0
#20	0.00	0.00	0.00	2.93	1.0	99.0
#40	0.00	0.00	0.00	2.93	1.0	99.0
#60	0.00	0.00	0.00	2.93	1.0	99.0
#100	0.00	0.00	0.00	2.93	1.0	99.0
#200	8.89	105.82	96.93	99.86	34.0	66.0

Sandy Clay (CH) *

ADVANCED TERRA TESTING, INC.

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2666-02

CLIENT/OWNER WESTON

LOCATION _____

BORING 17+50 SAMPLE ____ DEPTH 15'

FIELD DENSITY BY _____

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

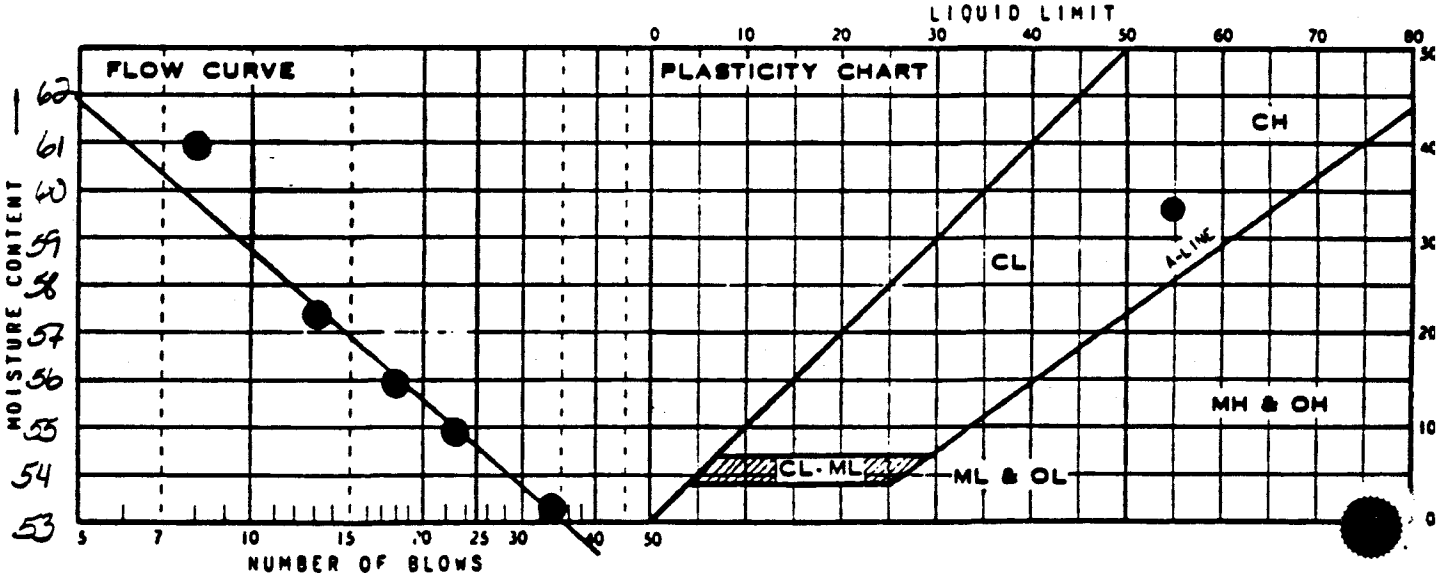
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY Drill

DETERMINATION	1	2	3	4	5	6
DISH	11	17	10			
WT OF DISH + WET SOIL	10.55g	10.24g	12.15g			
WT OF DISH + DRY SOIL	8.87g	9.08g	10.18g	—	—	—
WT OF MOISTURE	1.68g	1.76g	1.97g			
WT OF DISH	1.03g	1.05g	1.04g	—	—	—
WT OF DRY SOIL	7.84g	8.03g	9.14g			
MOISTURE CONTENT	21.4%	21.9%	21.6%			

LIQUID LIMIT

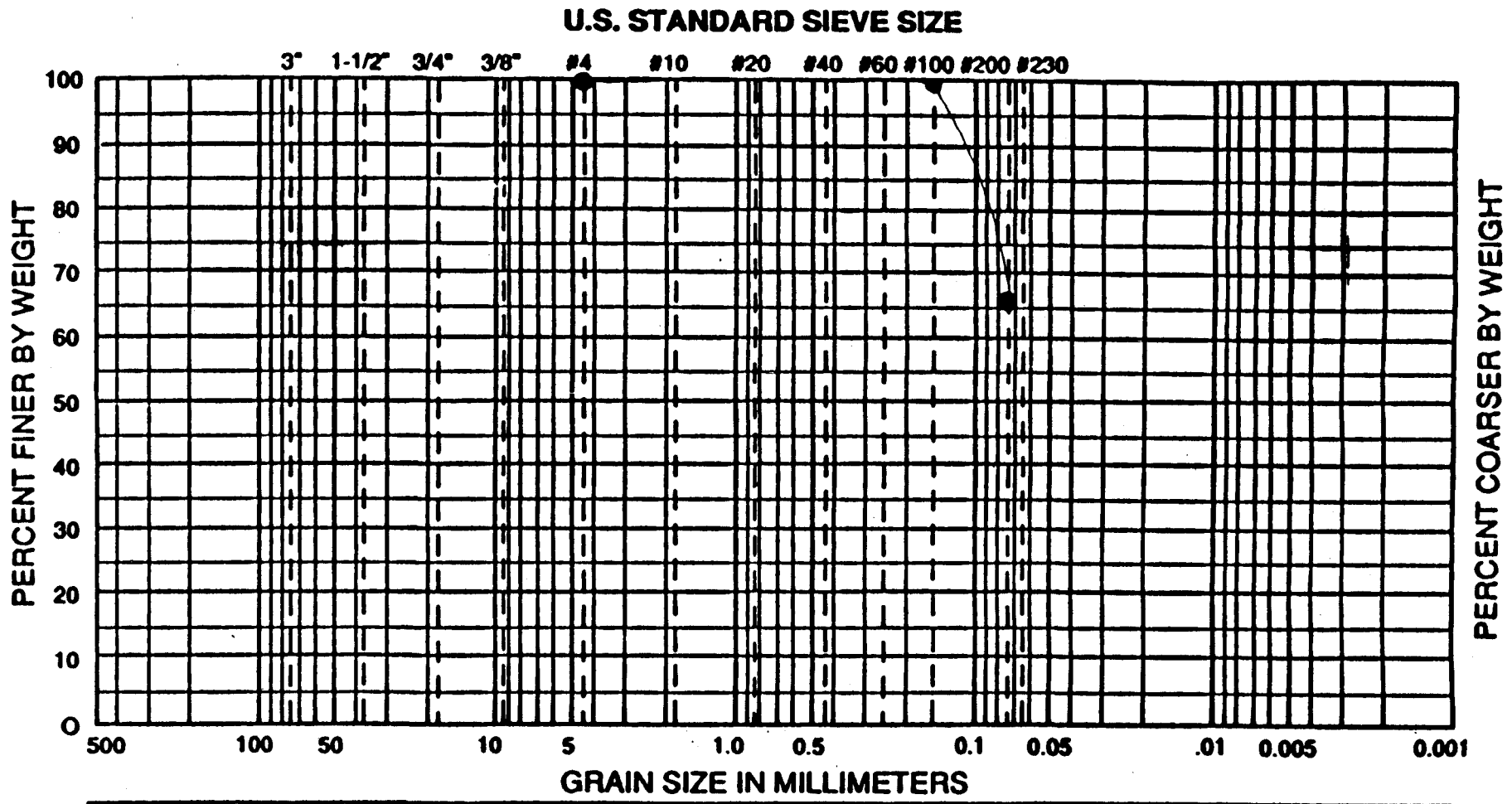
DETERMINATION	1	2	3	4	5	6
DISH	30C	17C	14C	27C	33C	
NUMBER OF BLOWS	34	23	18	13	8	
WT OF DISH + WET SOIL	16.65	15.83	14.59	15.16	14.26g	
WT OF DISH + DRY SOIL	11.24g	10.60g	9.74g	10.03g	9.25g	—
WT OF MOISTURE	5.41g	5.23g	4.85g	5.13g	5.01g	
WT OF DISH	1.06g	1.07g	1.07g	1.07g	1.2[illegible]g	—
WT OF DRY SOIL	10.18g	9.53g	8.67g	8.96g	8.20g	
MOISTURE CONTENT	53.2%	54.9%	55.9%	57.8%	61.1%	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		54.6	21.6	33.0	CH	

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 17+50 SAMPLE NO.: DATE: 1-29-92 PROJECT NO.: 2029-35-09-0030

AREA	DEPTH	CLASSIFICATION
	15'	Gravelly Sandy Clay (CL/CH) 1% Gravel 33% Sand 66% Fines

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Roy F. Weston

JOB NO. 2066-03

BORING NO.	17+50	SAMPLED	12-12-91 SRC
DEPTH	18'	DATE TESTED	01-27-91 TNU
SAMPLE NO.		WASH SIEVE	Yes
SOIL DESCR.	Bulk/Jar	DRY SIEVE	No

MOISTURE/DENSITY DATA

Wt. Soil & Ring(s) (g)	
Wt. Ring(s) (g)	
Wt. Soil (g)	
Wet Density PCF	
Wt. Wet Soil & Pan (g)	
Wt. Dry Soil & Pan (g)	
Wt. Lost Moisture (g)	
Wt. of Pan Only (g)	
Wt. of Dry Soil (g)	
Moisture Content %	
Dry Density PCF	

WASH SIEVE ANALYSIS

Wt. Wet Soil & Pan Before Washing (g)	
Wt. Dry Soil & Pan Before Washing (g)	280.7
Weight of Pan (g)	9.4
Wt. of Dry Soil Before Washing	271.3
Wt. Dry Soil & Pan After Washing (g)	79.5
Wt. of Dry Soil After Washing (g)	70.1
-#200 Wash. Out %	74.2

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	9.40	35.21	25.81	25.81	9.5	90.5
#10	0.00	0.00	0.00	25.81	9.5	90.5
#20	0.00	0.00	0.00	25.81	9.5	90.5
#40	0.00	0.00	0.00	25.81	9.5	90.5
#60	0.00	0.00	0.00	25.81	9.5	90.5
#100	0.00	0.00	0.00	25.81	9.5	90.5
#200	8.30	52.58	44.28	70.09	25.8	74.2

Silty Clay (CH) *

ADVANCED TERRA TESTING, INC.

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION

LABORATORY CLASSIFICATION

JOB NO.

CLIENT/OWNER

LOCATION

BORING 17+50 SAMPLE DEPTH 18'

FIELD DENSITY BY

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

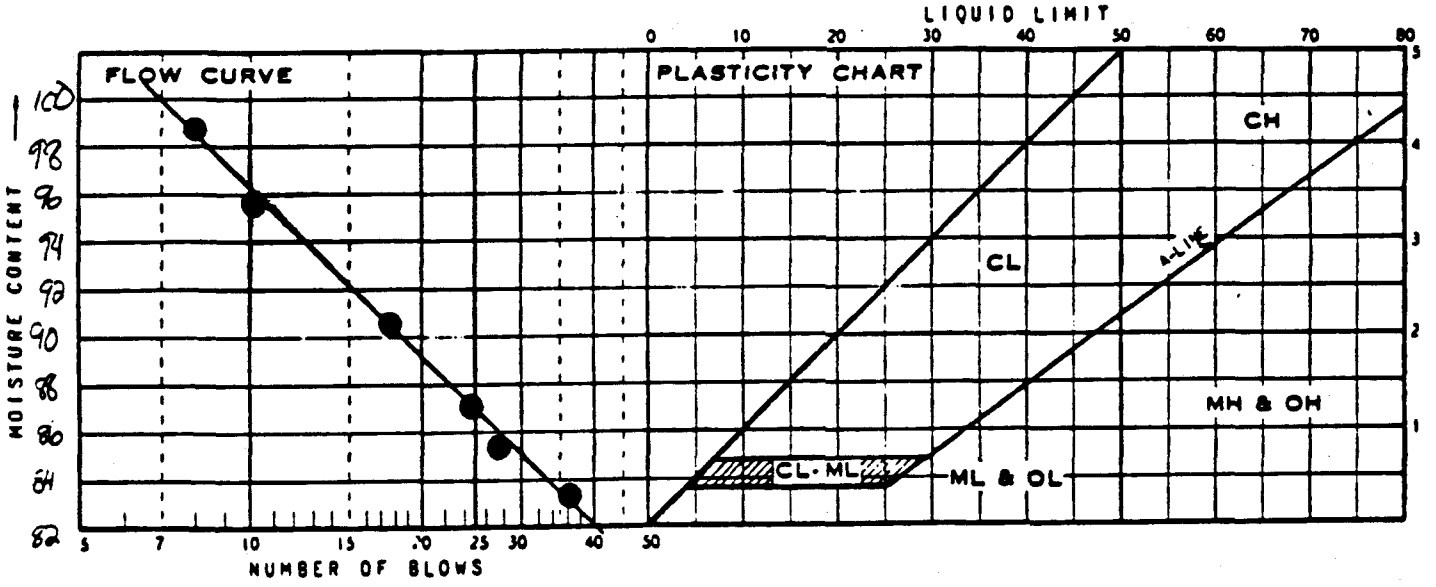
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY 1.24.92

DETERMINATION	1	2	3	4	5	6
DISH	8	56C	20			
WT OF DISH + WET SOIL	8.81g	10.33g	10.63g			
WT OF DISH + DRY SOIL	7.11g	8.32g	8.56g	—	—	—
WT OF MOISTURE	1.70g	2.01g	2.07g			
WT OF DISH	1.08g	1.07g	1.06g	—	—	—
WT OF DRY SOIL	6.03g	7.25g	7.50g			
MOISTURE CONTENT	28.2%	27.7%	27.6%			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	27	43C	26	25	24	23
NUMBER OF BLOWS	36+	27	25	18	10	8
WT OF DISH + WET SOIL	16.11g	16.54	15.[illegible]	14.87g	13.82	13.01g
WT OF DISH + DRY SOIL	9.26g	9.25g	8.80g	8.29g	7.57g	7.06g
WT OF MOISTURE	6.85g	6.99g	6.77g	6.58g	6.25g	5.95g
WT OF DISH	1.03g	1.06g	1.04	1.05g	1.04g	1.04g
WT OF DRY SOIL	8.23g	8.19g	7.76g	7.26g	6.53g	6.02g
MOISTURE CONTENT	83.2%	85.3%	87.2%	90.6%	95.7%	98.8%

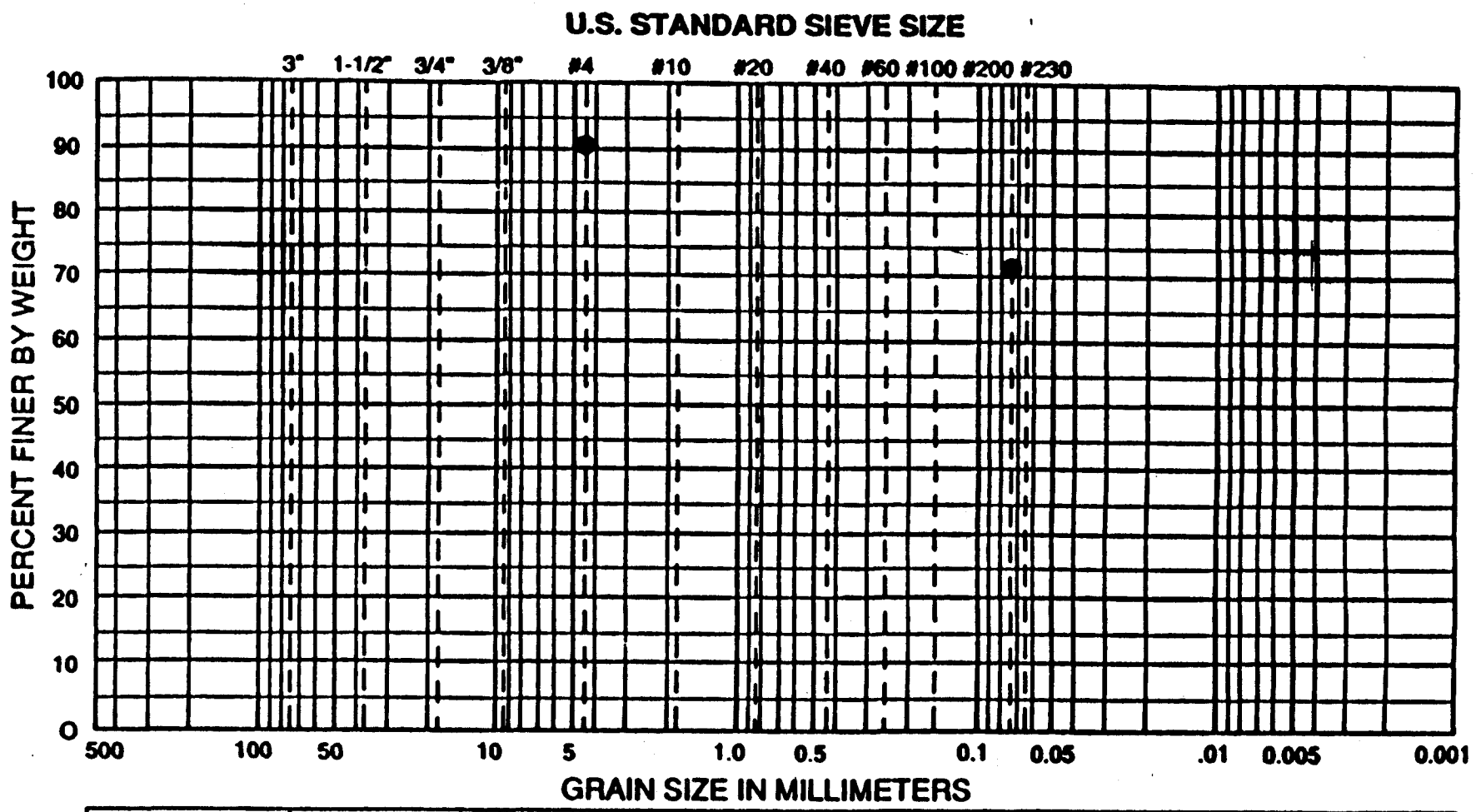


SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		86.8	27.7	59.1	CH	

ADVANCED TERRA TESTING

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 17+50 SAMPLE NO.: DATE: 1-29-92 PROJECT NO.: 2029-33-09-0030

AREA	DEPTH	CLASSIFICATION
		Gravelly Sandy Clay (CL/CH). 74.2% silt or 9.5% coarse, 16.3% F sand.

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Western

JOB NO. 2066-03

BORING NO.	17+75	SAMPLED	Rocky Flats
DEPTH	21'	DATE TESTED	03-05-92 SR
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	72.06
Wt. Dry Soil & Pan	(g)	68.90
Wt. Lost Moisture	(g)	3.16
Wt. of Pan Only	(g)	3.69
Wt. of Dry Soil	(g)	65.21
Moisture Content	%	4.8
Wt. Hydrom. Sample Wet	(g)	60.00
Wt. Hydrom. Sample Dry	(g)	57.23

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	596.97
Weight of + #10 Before Washing (g)	64.85
Weight of + #10 After Washing (g)	52.15
Weight of - #10 Wet (g)	532.12
Weight of - #10 Dry (g)	519.64
Wt. Total Sample Dry (g)	571.79
Calc. Wt. "W" (g)	62.97
Calc. Mass + #10	5.74

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	25.66	25.66	25.66	4.5	95.5
#4	0.00	11.08	11.08	36.74	6.4	93.6
#10	0.00	15.41	15.41	52.15	9.1	90.9
#20	1.31	2.83	1.52	1.52	11.5	88.5
#40	1.57	4.39	2.82	4.34	16.0	84.0
#60	1.46	3.90	2.44	6.78	19.9	80.1
#100	1.57	4.07	2.50	9.28	23.9	76.1
#230	1.55	4.77	3.22	12.50	29.0	71.0

CLAY (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	17+75	SAMPLED	Rocky Flats
DEPTH	21'	DATE TESTED	03-05-92 SR
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

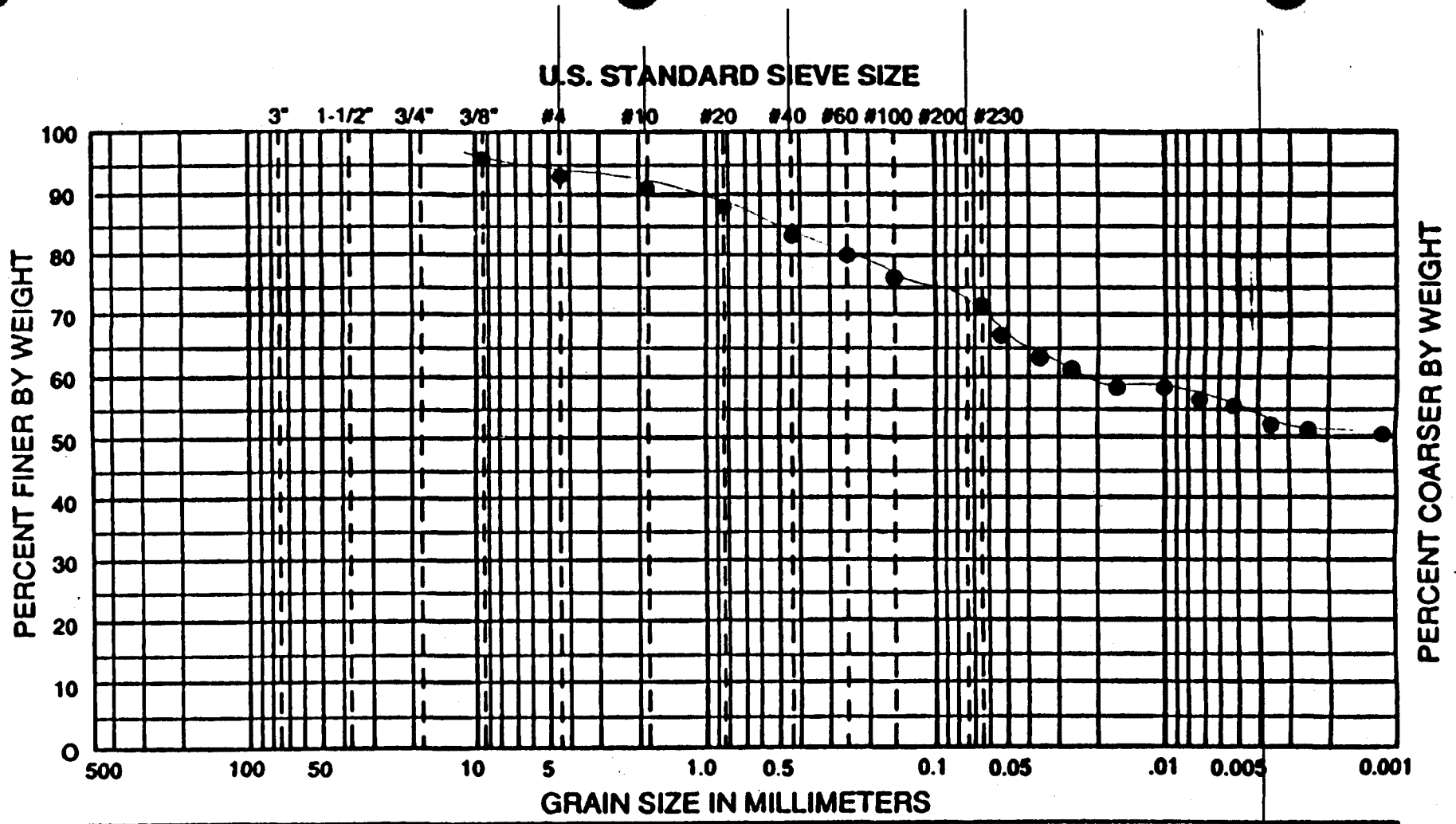
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.79	Temp. Coef. K	0.01280
Value of "a"	0.97	Wt. Dry Sample "W"	62.972
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	49.50	43.50	67.1	67.1	8.17	0.0517
1.0	47.50	41.50	64.1	64.1	8.50	0.0373
2.0	45.50	39.50	61.0	61.0	8.83	0.0269
5.0	44.00	38.00	58.7	58.7	9.07	0.0172
15.0	44.00	38.00	58.7	58.7	9.07	0.0100
30.0	42.75	36.75	56.7	56.7	9.28	0.0071
60.0	42.00	36.00	55.6	55.6	9.40	0.0051
120.0	40.00	34.00	52.5	52.5	9.73	0.0036
250.0	39.50	33.50	51.7	51.7	9.81	0.0025
1440.0	38.75	32.75	50.6	50.6	9.94	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, I

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 17+75 SAMPLE NO.: CH # 7 DATE: 3/9/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION		CLAY	
		TR	some 1.1% sd	some	
Rocky Flats	21'	4.5% c gvl, 1.9% f gvl	2.7% c sd, 6.9% m sd, 11.5% f sd	18.5% silt	54% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats EG+G
BORING 1275 SAMPLE CH #7 DEPTH 21'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

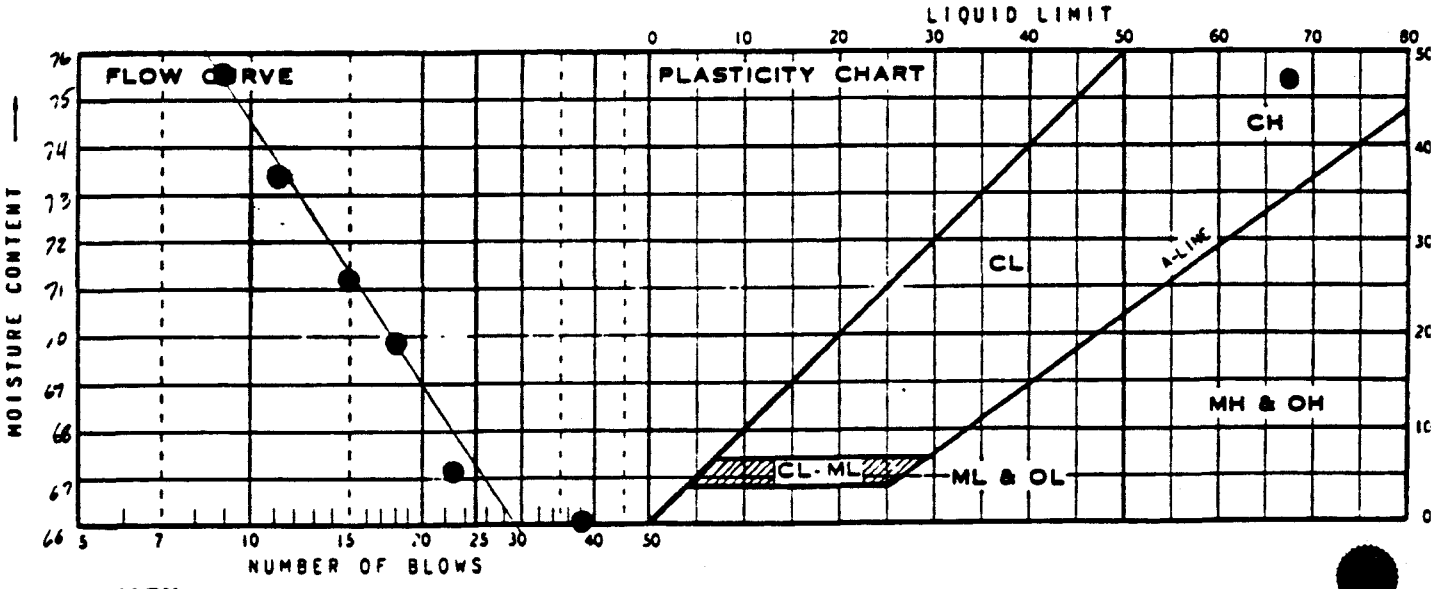
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DW 3/6/92

DETERMINATION	1	2	3	4	5	6
DISH	32C	28C	2020			
WT OF DISH + WET SOIL g	7.16	6.01	5.78			
WT OF DISH + DRY SOIL g	6.11	5.19	4.99	—	—	—
WT OF MOISTURE g	1.05	.82	.79			
WT OF DISH g	1.05	1.06	1.05	—	—	—
WT OF DRY SOIL g	5.06	4.13	3.94			
MOISTURE CONTENT %	20.9	19.9	20.1			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	26C	2008	2036	5C	2026	46C
NUMBER OF BLOWS	38 ±	23	16 ±	18	15	11 ±
WT OF DISH + WET SOIL g	11.24	11.16	11.62	11.05	10.92	10.8
WT OF DISH + DRY SOIL g	7.19	7.10	7.32	6.95	6.81	6.73
WT OF MOISTURE g	4.05	4.06	4.30	4.10	4.11	4.16
WT OF DISH g	1.06	1.06	1.05	1.06	1.04	1.06
WT OF DRY SOIL g	6.13	6.04	6.27	5.89	5.77	5.67
MOISTURE CONTENT %	66.1	67.2	68.6	69.6	71.2	73.4



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		67.3	20.3	47.0	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	17+90	SAMPLED	Rocky Flats
DEPTH	25'	DATE TESTED	02-28-92 TNU
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	44.17
Wt. Dry Soil & Pan	(g)	42.31
Wt. Lost Moisture	(g)	1.86
Wt. of Pan Only	(g)	3.81
Wt. of Dry Soil	(g)	38.50
Moisture Content	%	4.8
Wt. Hydrom. Sample Wet	(g)	60.01
Wt. Hydrom. Sample Dry	(g)	57.24

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	943.04
Weight of + #10 Before Washing (g)	55.87
Weight of + #10 After Washing (g)	50.83
Weight of - #10 Wet (g)	887.17
Weight of - #10 Dry (g)	851.09
Wt. Total Sample Dry (g)	901.92
Calc. Wt. "W" (g)	60.66
Calc. Mass + #10	3.42

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	12.49	12.49	12.49	1.4	98.6
3/8"	0.00	9.30	9.30	21.79	2.4	97.6
#4	0.00	13.19	13.19	34.98	3.9	96.1
#10	0.00	15.85	15.85	50.83	5.6	94.4
#20	1.56	1.57	0.01	0.01	5.7	94.3
#40	1.55	1.57	0.02	0.03	5.7	94.3
#60	1.31	1.33	0.02	0.05	5.7	94.3
#100	1.31	1.34	0.03	0.08	5.8	94.2
#230	1.56	2.30	0.74	0.82	7.0	93.0

CLAY (CL)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	17+90	SAMPLED	Rocky Flats
DEPTH	25'	DATE TESTED	02-28-92 TNU
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

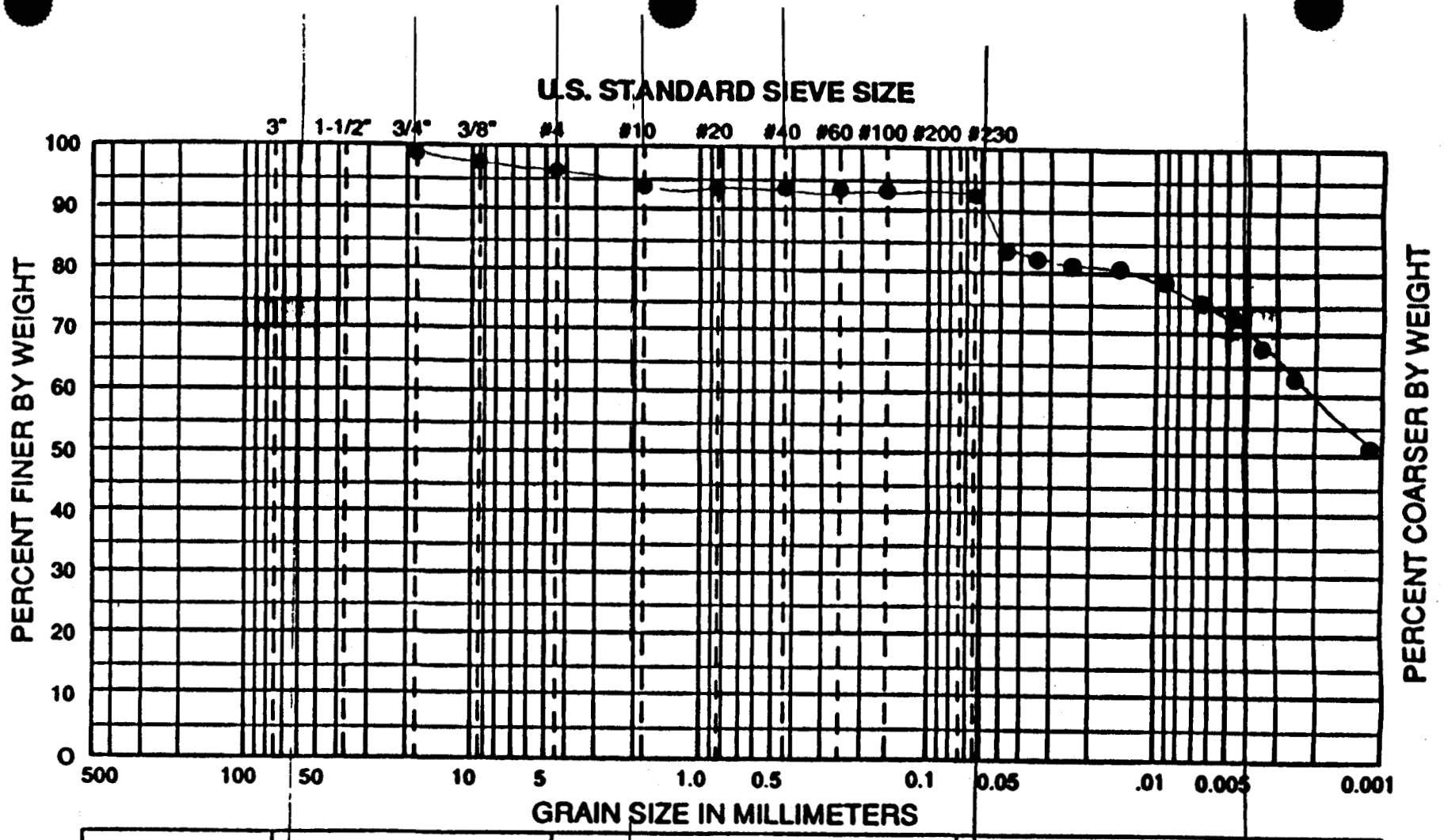
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.75	Temp. Coef. K	0.01294
Value of "a"	0.98	Wt. Dry Sample "W"	60.659
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	57.00	52.00	84.0	84.0	6.94	0.0482
1.0	56.00	51.00	82.4	82.4	7.11	0.0345
2.0	55.50	50.50	81.6	81.6	7.19	0.0245
5.0	55.00	50.00	80.8	80.8	7.27	0.0156
15.0	54.00	49.00	79.2	79.2	7.43	0.0091
30.0	52.00	47.00	75.9	75.9	7.76	0.0066
60.0	50.00	45.00	72.7	72.7	8.09	0.0048
120.0	47.00	42.00	67.9	67.9	8.58	0.0035
250.0	44.00	39.00	63.0	63.0	9.07	0.0025
1440.0	36.50	31.50	50.9	50.9	10.30	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 17+90 SAMPLE NO.: CH # 7 DATE: 3/9/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION CLAY		
Rocky Flats	25'	1.4%cG, 1.5%fG, 1.7%csd, .1%mdsd, 1.3%fsd	23% silt	70% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION ROCK FLATS

BORING 12+90 SAMPLE CH#2 DEPTH 25'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

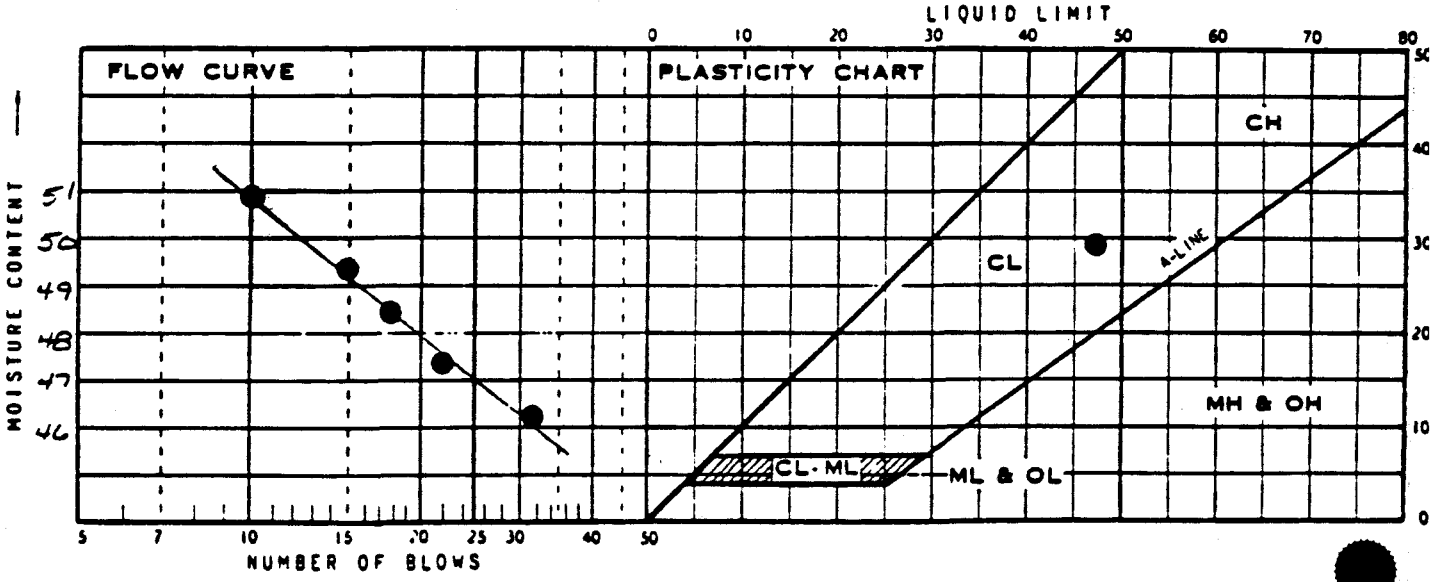
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SB 3/15/92

DETERMINATION	1	2	3	4	5	6
DISH	2032	2015	38C			
WT OF DISH + WET SOIL g	6.34	5.51	5.96			
WT OF DISH + DRY SOIL g	5.55	4.84	5.20	—	—	—
WT OF MOISTURE g	.79	.67	.76			
WT OF DISH g	1.06	1.07	1.04	—	—	—
WT OF DRY SOIL g	4.49	3.77	4.16			
MOISTURE CONTENT %	17.6	17.8	18.3			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	9C	2C	39C	44C	11C	
NUMBER OF BLOWS	32	22	19	15	10	
WT OF DISH + WET SOIL g	20.51	17.65	18.00	20.23	19.02	
WT OF DISH + DRY SOIL g	14.36	12.31	12.46	13.88	12.95	—
WT OF MOISTURE g	6.15	5.34	5.54	6.35	6.07	
WT OF DISH g	1.04	1.04	1.03	1.03	1.03	—
WT OF DRY SOIL g	13.32	11.27	11.43	12.85	11.92	
MOISTURE CONTENT %	46.2	47.4	48.5	49.4	50.9	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		47.1	17.9	29.1	CL	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	18+00	SAMPLED	Rocky Flats
DEPTH	17'	DATE TESTED	02-28-92 TNU
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	43.82
Wt. Dry Soil & Pan	(g)	41.37
Wt. Lost Moisture	(g)	2.45
Wt. of Pan Only	(g)	3.17
Wt. of Dry Soil	(g)	38.20
Moisture Content	%	6.4

Wt. Hydrom. Sample Wet (g)	60.01
Wt. Hydrom. Sample Dry (g)	56.40

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	866.61
Weight of + #10 Before Washing (g)	4.17
Weight of + #10 After Washing (g)	2.94
Weight of - #10 Wet (g)	862.44
Weight of - #10 Dry (g)	811.62
Wt. Total Sample Dry (g)	814.56
Calc. Wt. "W" (g)	56.60
Calc. Mass + #10	0.20

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	2.11	2.11	2.11	0.3	99.7
#10	0.00	0.83	0.83	2.94	0.4	99.6
#20	1.56	1.73	0.17	0.17	0.7	99.3
#40	1.56	1.83	0.27	0.44	1.1	98.9
#60	1.57	1.74	0.17	0.61	1.4	98.6
#100	1.56	1.70	0.14	0.75	1.7	98.3
#230	1.56	2.05	0.49	1.24	2.6	97.4

Silt, clay [illegible]

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	18+00	SAMPLED	Rocky Flats
DEPTH	17'	DATE TESTED	02-28-92 TNU
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

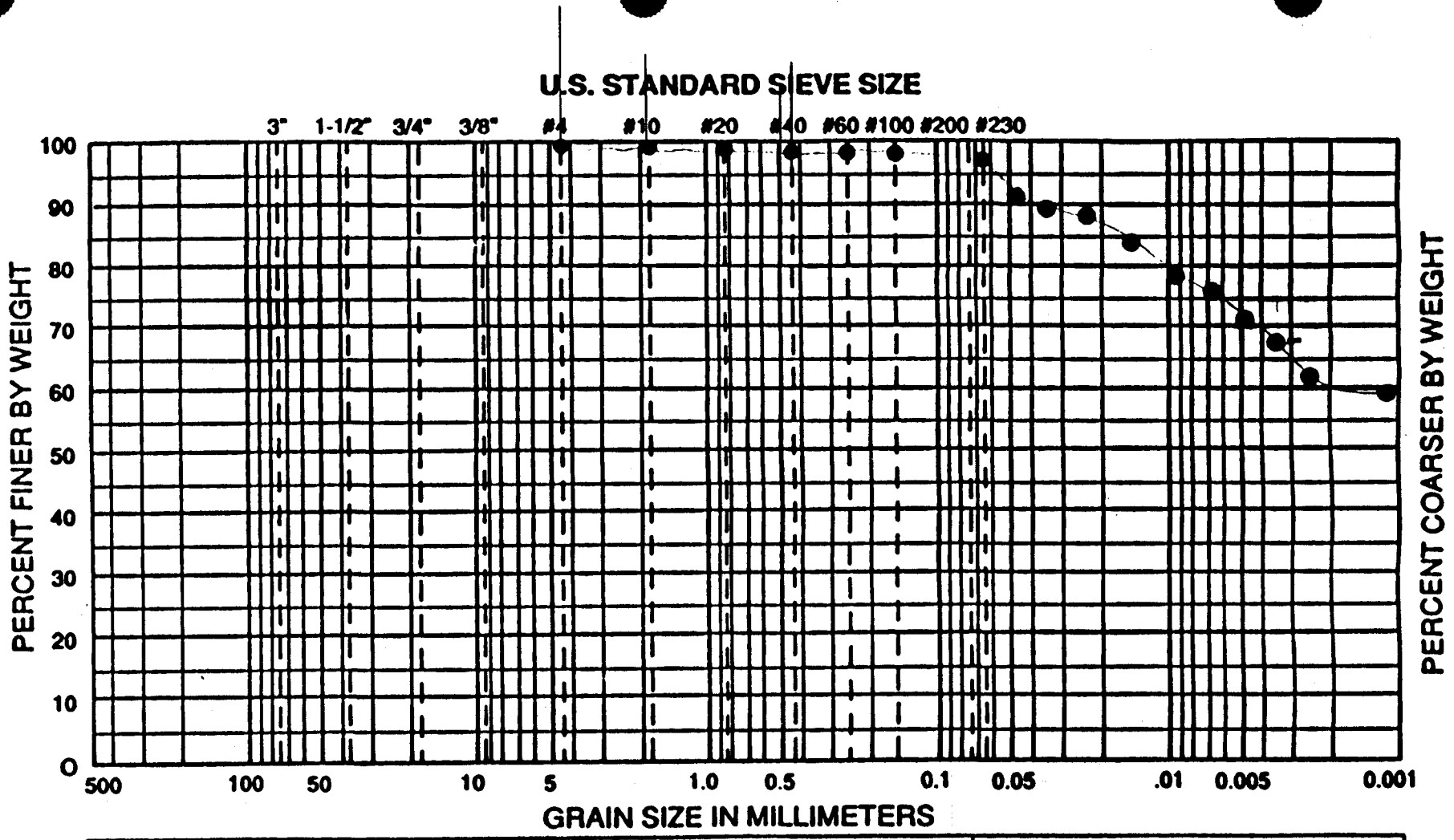
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.76	Temp. Coef. K	0.01290
Value of "a"	0.98	Wt. Dry Sample "W"	56.600
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	58.00	53.00	91.6	91.6	6.78	0.0475
1.0	57.00	52.00	89.9	89.9	6.94	0.0340
2.0	56.00	51.00	88.1	88.1	7.11	0.0243
5.0	54.00	49.00	84.7	84.7	7.43	0.0157
15.0	50.50	45.50	78.6	78.6	8.01	0.0094
30.0	49.00	44.00	76.0	76.0	8.25	0.0068
60.0	46.00	41.00	70.8	70.8	8.75	0.0049
120.0	44.00	39.00	67.4	67.4	9.07	0.0035
250.0	41.00	36.00	62.2	62.2	9.57	0.0025
1440.0	39.50	34.50	59.6	59.6	9.81	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 18+00 SAMPLE NO.: CH 7 DATE: 3/4/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	17.0'	SILTY CLAY .1% Csd, .7% MSd, 1.5% fsd, 30.4% Silt 67% CLAY

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 1066-02

CLIENT/OWNER Weston

LOCATION Rocky Flats EG&G

BORING 18-00 SAMPLE CM #7 DEPTH 12'

FIELD DENSITY BY ____/____/____

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

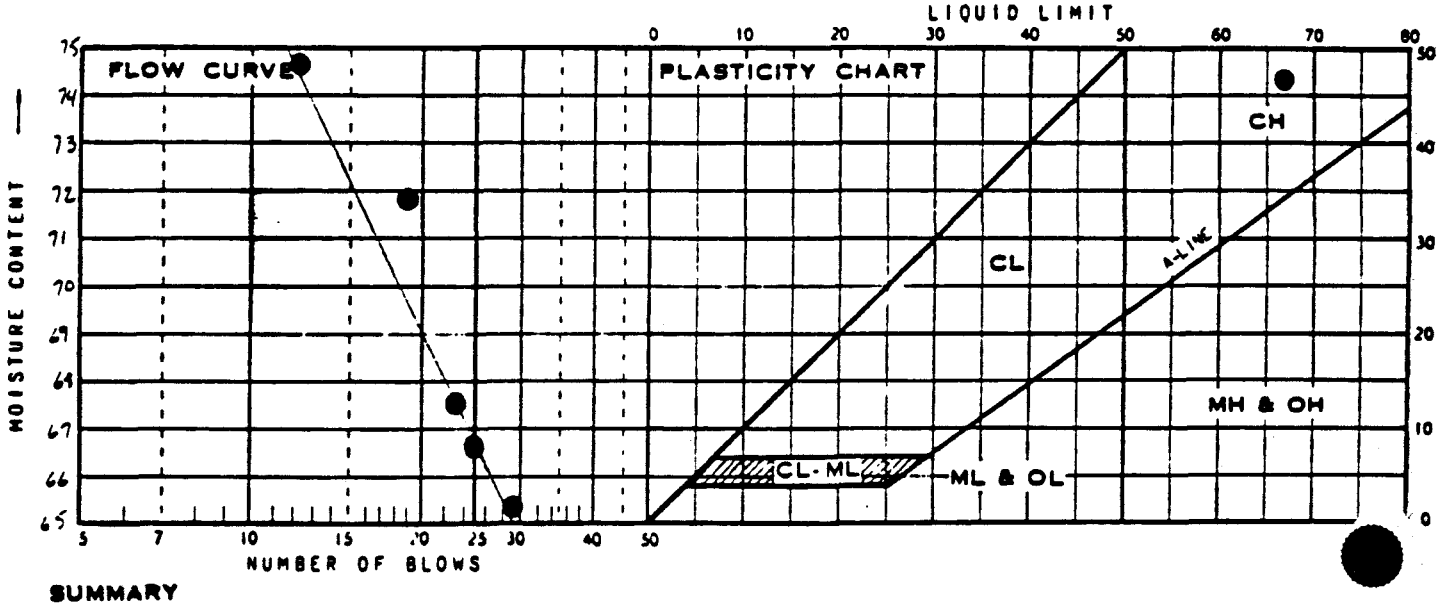
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DW 3/4/93

DETERMINATION	1	2	3	4	5	6
DISH	2044	20C	2007			
WT OF DISH + WET SOIL g	4.70	4.13	5.56			
WT OF DISH + DRY SOIL g	4.10	3.62	4.83	—	—	—
WT OF MOISTURE g	.60	.51	.73			
WT OF DISH g	1.05	1.02	1.06	—	—	—
WT OF DRY SOIL g	3.05	2.60	3.77			
MOISTURE CONTENT %	19.7	19.6	19.4			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2005	5PC	46C	2065	2038	32C
NUMBER OF BLOWS	29	25	23	23	19	12
WT OF DISH + WET SOIL g	11.68	10.49	9.95	10.36	9.78	9.70
WT OF DISH + DRY SOIL g	7.48	6.72	6.36	6.53	6.14	6.00
WT OF MOISTURE g	4.20	3.77	3.59	3.83	3.64	3.70
WT OF DISH g	1.06	1.07	1.06	1.04	1.08	1.05
WT OF DRY SOIL g	6.42	5.65	5.30	5.49	5.06	4.95
MOISTURE CONTENT %	65.4	66.7	67.7	69.8	71.9	74.7



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		66.1	19.6	47.1	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	18+00	SAMPLED	Rocky Flats
DEPTH	21.5'	DATE TESTED	02-21-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	53.14
Wt. Dry Soil & Pan	(g)	52.49
Wt. Lost Moisture	(g)	0.65
Wt. of Pan Only	(g)	3.84
Wt. of Dry Soil	(g)	48.65
Moisture Content	%	1.3
Wt. Hydrom. Sample Wet	(g)	60.11
Wt. Hydrom. Sample Dry	(g)	59.32

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	307.16
Weight of + #10 Before Washing (g)	49.86
Weight of + #10 After Washing (g)	37.59
Weight of - #10 Wet (g)	257.30
Weight of - #10 Dry (g)	266.02
Wt. Total Sample Dry (g)	303.61
Calc. Wt. "W" (g)	67.70
Calc. Mass + #10	8.38

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.	
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0	
3/4"	0.00	0.00	0.00	0.00	0.0	100.0	
3/8"	0.00	10.56	10.56	10.56	3.5	96.5	
#4	0.00	13.74	13.74	24.30	8.0	92.0	
#10	0.00	13.29	13.29	37.59	12.4	87.6	
#20	1.57	4.07	2.50	2.50	16.1	83.9	3-4"
#40	1.57	5.07	3.50	6.00	21.2	78.8	
#60	1.57	5.12	3.55	9.55	26.5	73.5	
#100	1.57	5.91	4.34	13.89	32.9	67.1	
#230	1.31	7.49	6.18	20.07	42.0	58.0	

Sandy Clay (CL-)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	18+00	SAMPLED	Rocky Flats
DEPTH	21.5'	DATE TESTED	02-21-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

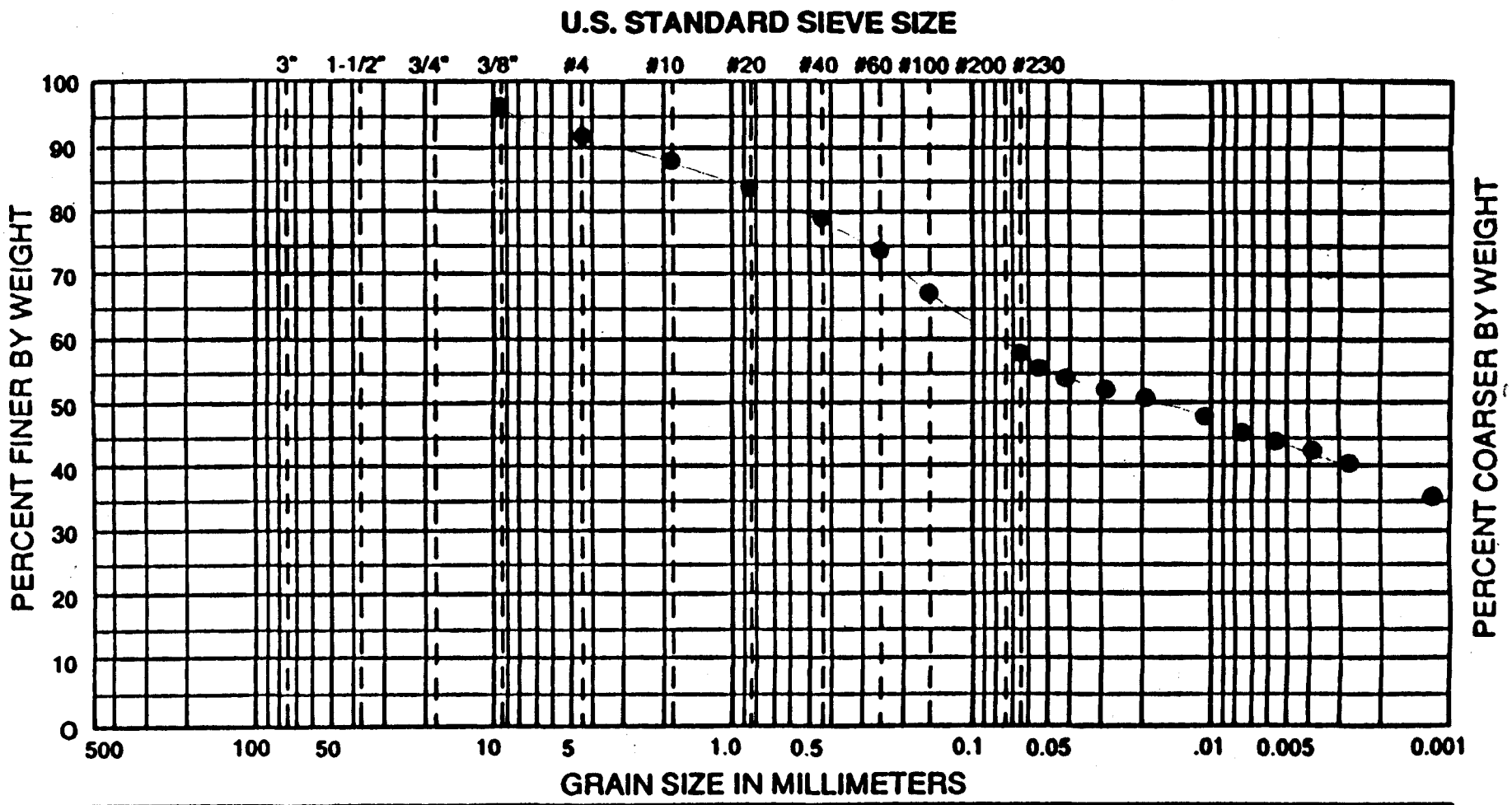
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.69	Temp. Coef. K	0.01332
Value of "a"	0.99	Wt. Dry Sample "W"	67.697
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	44.00	38.50	56.4	56.4	9.07	0.0567
1.0	42.00	36.50	53.5	53.5	9.40	0.0408
2.0	41.50	36.00	52.8	52.8	9.48	0.0290
5.0	40.00	34.50	50.6	50.6	9.73	0.0186
15.0	38.50	33.00	48.4	48.4	9.98	0.0109
30.0	37.00	31.50	46.2	46.2	10.22	0.0078
60.0	36.00	30.50	44.7	44.7	10.39	0.0055
120.0	35.00	29.50	43.2	43.2	10.55	0.0039
250.0	33.50	28.00	41.0	41.0	10.80	0.0028
1440.0	30.10	24.60	36.0	36.0	11.35	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND				SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 18+00 SAMPLE NO.: #2 DATE: 2/25/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	21.5'	SANDY CLAY Rocky Flats

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - -

JOB NO. 6006 02

CLIENT/OWNER Weston

LOCATION Rocky Flats EG-6

BORING 18-00 SAMPLE Ch# 2 DEPTH 21.5'

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

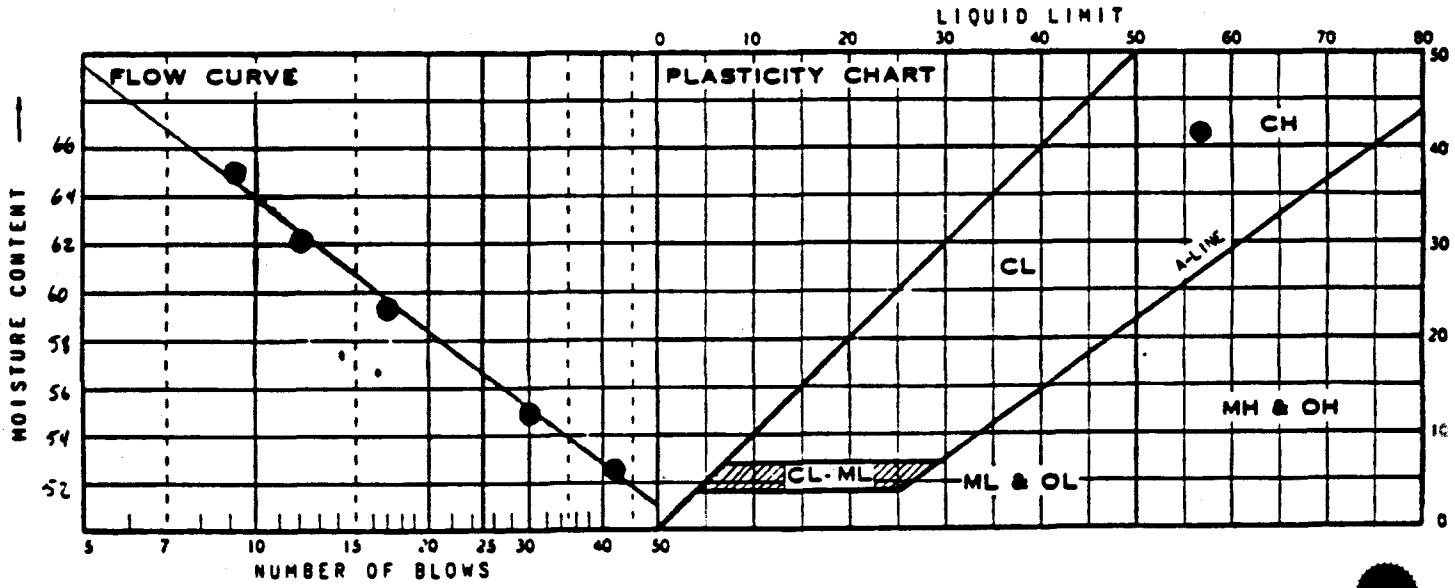
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY AJL 2/18/92

DETERMINATION	1	2	3	4	5	6
DISH	2025	2026	2021			
WT OF DISH + WET SOIL g	7.37	8.67	8.10			
WT OF DISH + DRY SOIL g	6.56	7.63	7.23	—	—	—
WT OF MOISTURE g	.81	1.04	.87			
WT OF DISH g	1.04	1.03	1.04	—	—	—
WT OF DRY SOIL g	5.52	6.60	6.19			
MOISTURE CONTENT %	14.7	15.8	14.1			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2022	2011	2003	2006	2001	2020
NUMBER OF BLOWS	43	30	16	14	17	12
WT OF DISH + WET SOIL g	12.85	12.76	13.35	13.04	12.44	10.7
WT OF DISH + DRY SOIL g	8.79	8.60	8.90	11.82	8.18	7.0
WT OF MOISTURE g	4.06	4.16	4.45	1.22	4.26	3.73
WT OF DISH g	1.05	1.04	1.03	1.04	1.05	1.03
WT OF DRY SOIL g	7.74	7.56	7.87	10.78	7.13	6.01
MOISTURE CONTENT %	52.5	55.0	56.6	57.7	59.7	62.1



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		56.7	14.9	41.8	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	18+10	SAMPLED	Rocky Flats
DEPTH	27'	DATE TESTED	3-9-92 DU
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	67.49
Wt. Dry Soil & Pan	(g)	64.58
Wt. Lost Moisture	(g)	2.91
Wt. of Pan Only	(g)	3.72
Wt. of Dry Soil	(g)	60.86
Moisture Content	%	4.8

Wt. Hydrom. Sample Wet (g)	60.01
Wt. Hydrom. Sample Dry (g)	57.27

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	60.01
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	60.01
Weight of - #10 Dry (g)	57.27
Wt. Total Sample Dry (g)	57.27
Calc. Wt. "W" (g)	57.27
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.56	1.57	0.01	0.01	0.0	100.0
#40	1.55	1.56	0.01	0.02	0.0	100.0
#60	1.56	1.59	0.03	0.05	0.1	99.9
#100	1.57	1.62	0.05	0.10	0.2	99.8
#230	1.56	2.45	0.89	0.99	1.7	98.3

rido

Silty claystone

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	18+10	SAMPLED	Rocky Flats
DEPTH	27'	DATE TESTED	3-9-92 DU
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.70	Temp. Coef. K	0.01312
Value of "a"	0.99	Wt. Dry Sample "W"	57.271
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	60.00	54.50	94.2	94.2	6.45	0.0471
1.0	59.00	53.50	92.5	92.5	6.61	0.0337
2.0	57.00	51.50	89.0	89.0	6.94	0.0244
5.0	55.00	49.50	85.6	85.6	7.27	0.0158
15.0	52.50	47.00	81.2	81.2	7.68	0.0094
30.0	49.50	44.00	76.1	76.1	8.17	0.0068
60.0	46.50	41.00	70.9	70.9	8.66	0.0050
120.0	43.00	37.50	64.8	64.8	9.24	0.0036
250.0	39.00	33.50	57.9	57.9	9.89	0.0026
1440.0	30.00	24.50	42.4	42.4	11.37	0.0012

Grain Diameter = K*(SQRT(L/T))

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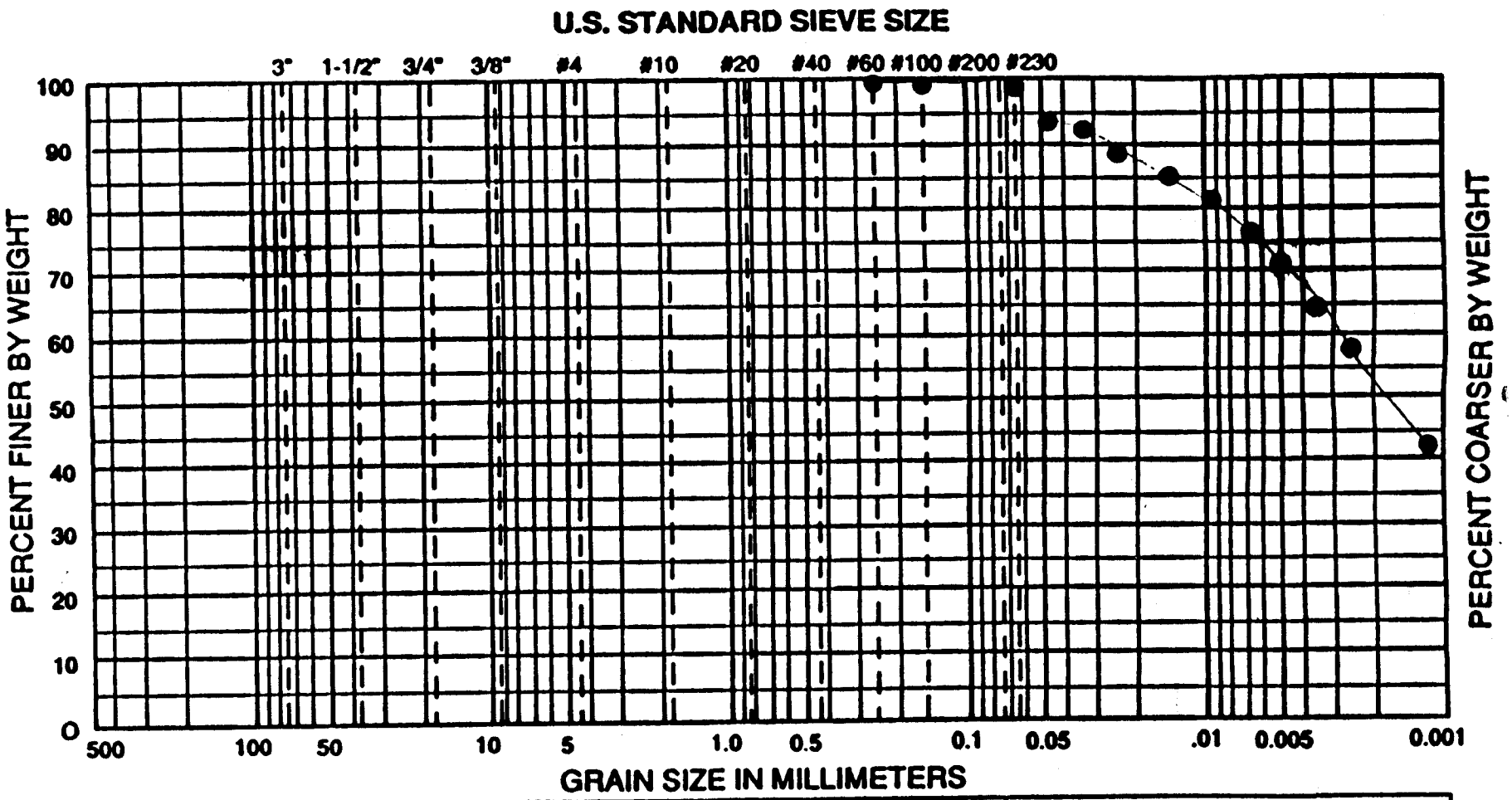


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 18+10 SAMPLE NO.: CH # 7 DATE: 3/11/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	27'	1.1% f.g. 30.3% silt, 68% CLAY

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

LOCATION Rocky Flats Site

BORING 18-10 SAMPLE CH-7 DEPTH 27'

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

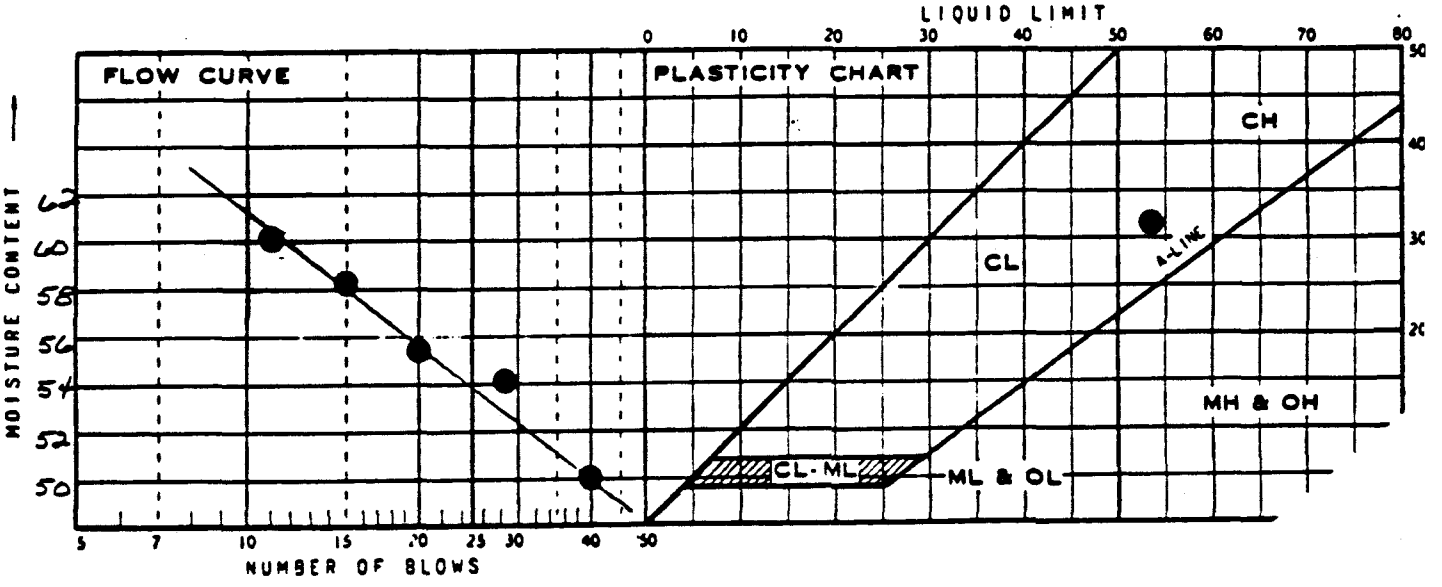
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY S/B.3.15.192

DETERMINATION	1	2	3	4	5	6
DISH	2029	2030	10C			
WT OF DISH + WET SOIL g	6.17	5.65	5.95			
WT OF DISH + DRY SOIL g	5.26	4.84	5.07	—	—	—
WT OF MOISTURE g	.91	.81	.88			
WT OF DISH g	1.05	1.05	1.07	—	—	—
WT OF DRY SOIL g	4.21	3.79	4.00			
MOISTURE CONTENT %	21.6	21.4	22.0			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	4	3	14C	20C	24	
NUMBER OF BLOWS	40	30 ±	20	15	11	
WT OF DISH + WET SOIL g	17.57	18.68	19.27	19.96	19.45	
WT OF DISH + DRY SOIL g	12.00	12.49	12.76	13.01	12.53	—
WT OF MOISTURE g	5.57	6.19	6.51	6.95	6.92	
WT OF DISH g	1.06	1.06	1.03	1.08	1.05	—
WT OF DRY SOIL g	10.94	11.43	11.73	11.93	11.48	
MOISTURE CONTENT %	50.9	54.2	55.5	58.3	60.3	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION
		53.9	21.7	32.2	CH

ADVANCED TER

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	18+60	SAMPLED	Rocky Flats
DEPTH	~~20.5'~~ 18.5'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	60.14
Wt. Dry Soil & Pan	(g)	58.23
Wt. Lost Moisture	(g)	1.91
Wt. of Pan Only	(g)	3.73
Wt. of Dry Soil	(g)	54.50
Moisture Content	%	3.5
Wt. Hydrom. Sample Wet	(g)	56.22
Wt. Hydrom. Sample Dry	(g)	54.32

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	56.22
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	56.22
Weight of - #10 Dry (g)	54.32
Wt. Total Sample Dry (g)	54.32
Calc. Wt. "W" (g)	54.32
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.56	1.62	0.06	0.06	0.1	99.9
#40	1.56	1.61	0.05	0.11	0.2	99.8
#60	1.31	1.35	0.04	0.15	0.3	99.7
#100	1.56	1.65	0.09	0.24	0.4	99.6
#230	1.30	2.21	0.91	1.15	2.1	97.9

Silty Clay (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	18+60	SAMPLED	Rocky Flats
DEPTH	20.5'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

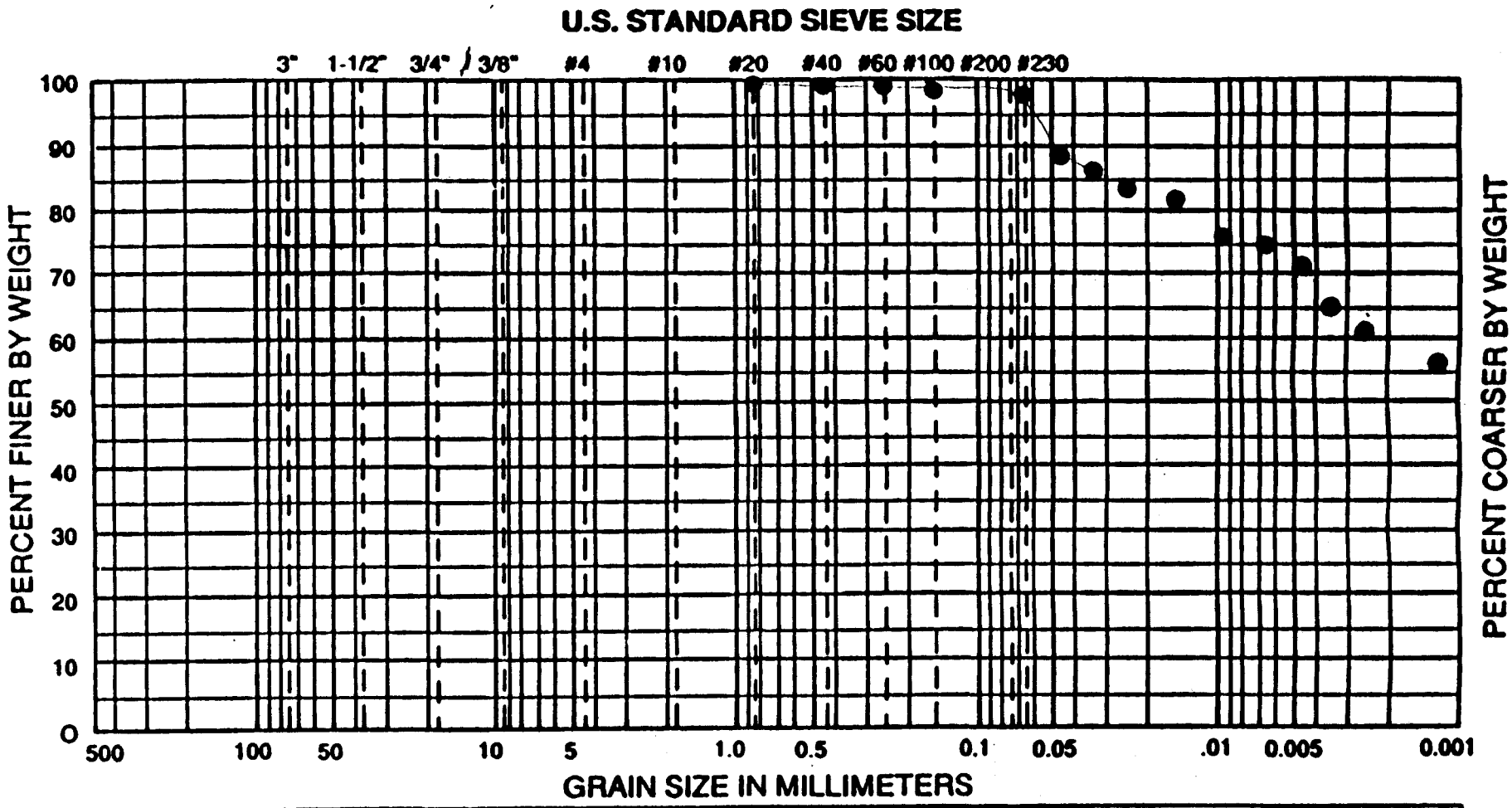
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.86	Temp. Coef. K	0.01271
Value of "a"	0.96	Wt. Dry Sample "W"	54.316
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	56.00	50.00	88.2	88.2	7.11	0.0479
1.0	55.00	49.00	86.4	86.4	7.27	0.0343
2.0	53.75	47.75	84.2	84.2	7.48	0.0246
5.0	53.00	47.00	82.9	82.9	7.60	0.0157
15.0	50.00	44.00	77.6	77.6	8.09	0.0093
30.0	49.00	43.00	75.8	75.8	8.25	0.0067
60.0	47.00	41.00	72.3	72.3	8.58	0.0048
120.0	43.00	37.00	65.3	65.3	9.24	0.0035
250.0	41.00	35.00	61.7	61.7	9.57	0.0025
1440.0	33.00	27.00	47.6	47.6	10.88	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 18+60 SAMPLE NO.: #2 DATE: 2-23-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	20-[illegible]	[illegible]

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats EG+G
BORING 18+60 SAMPLE CH #2 DEPTH 20.5

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

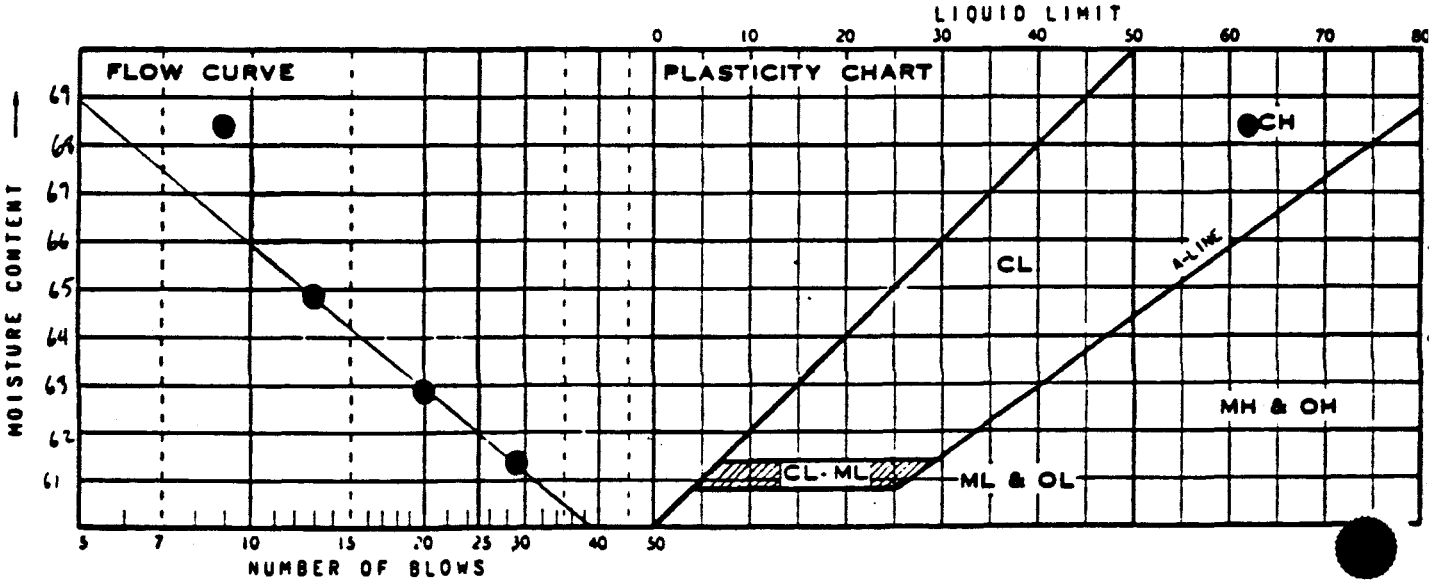
DETERMINATION	1	
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DH 2/20/98

DETERMINATION	1	2	3	4	5	6
DISH	356	2006	2059			
WT OF DISH + WET SOIL g	7.51	7.78	6.48			
WT OF DISH + DRY SOIL g	6.39	6.62	5.58	—	—	—
WT OF MOISTURE g	1.12	1.16	.90			
WT OF DISH g	1.06	1.04	1.03	—	—	—
WT OF DRY SOIL g	5.33	5.58	4.55			
MOISTURE CONTENT %	21.0	20.8	19.8			

LIQUID LIMIT

DETERMINATION	? 1	2	3	4	5	6
DISH	2060	2061	2062	2063	2064	
NUMBER OF BLOWS	41	29	20	13	9	
WT OF DISH + WET SOIL g	9.95	11.64	11.48	12.47	12.77	
WT OF DISH + DRY SOIL g	6.85	7.60	7.45	7.97	8.00	—
WT OF MOISTURE g	3.10	4.04	4.03	4.50	4.77	
WT OF DISH g	1.02	1.01	1.03	1.04	1.03	—
WT OF DRY SOIL g	5.83	6.59	6.42	6.93	6.97	
MOISTURE CONTENT %	53.2	61.3	62.8	64.9	68.4	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		62.0	20.5	41.5	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

BR

CLIENT Weston

JOB NO. 2066-03

BORING NO.	18+60	SAMPLED	Rocky Flats
DEPTH	24.5'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	44.00
Wt. Dry Soil & Pan	(g)	42.81
Wt. Lost Moisture	(g)	1.19
Wt. of Pan Only	(g)	3.79
Wt. of Dry Soil	(g)	39.02
Moisture Content	%	3.0

Wt. Hydrom. Sample Wet	(g)	60.02
Wt. Hydrom. Sample Dry	(g)	58.24

WASH SIEVE ANALYSIS

Wt. Total Sample Wet	(g)	60.02
Weight of + #10 Before Washing	(g)	0.00
Weight of + #10 After Washing	(g)	0.00
Weight of - #10 Wet	(g)	60.02
Weight of - #10 Dry	(g)	58.24
Wt. Total Sample Dry	(g)	58.24
Calc. Wt. "W"	(g)	58.24
Calc. Mass + #10		0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	2.07	0.50	0.50	0.9	99.1
#40	1.55	1.85	0.30	0.80	1.4	98.6
#60	1.57	1.82	0.25	1.05	1.8	98.2
#100	1.57	1.83	0.26	1.31	2.2	97.8
#230	1.55	2.06	0.51	1.82	3.1	96.9

S.H. Cizmarek

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	18+60	SAMPLED	Rocky Flats
DEPTH	24.5'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

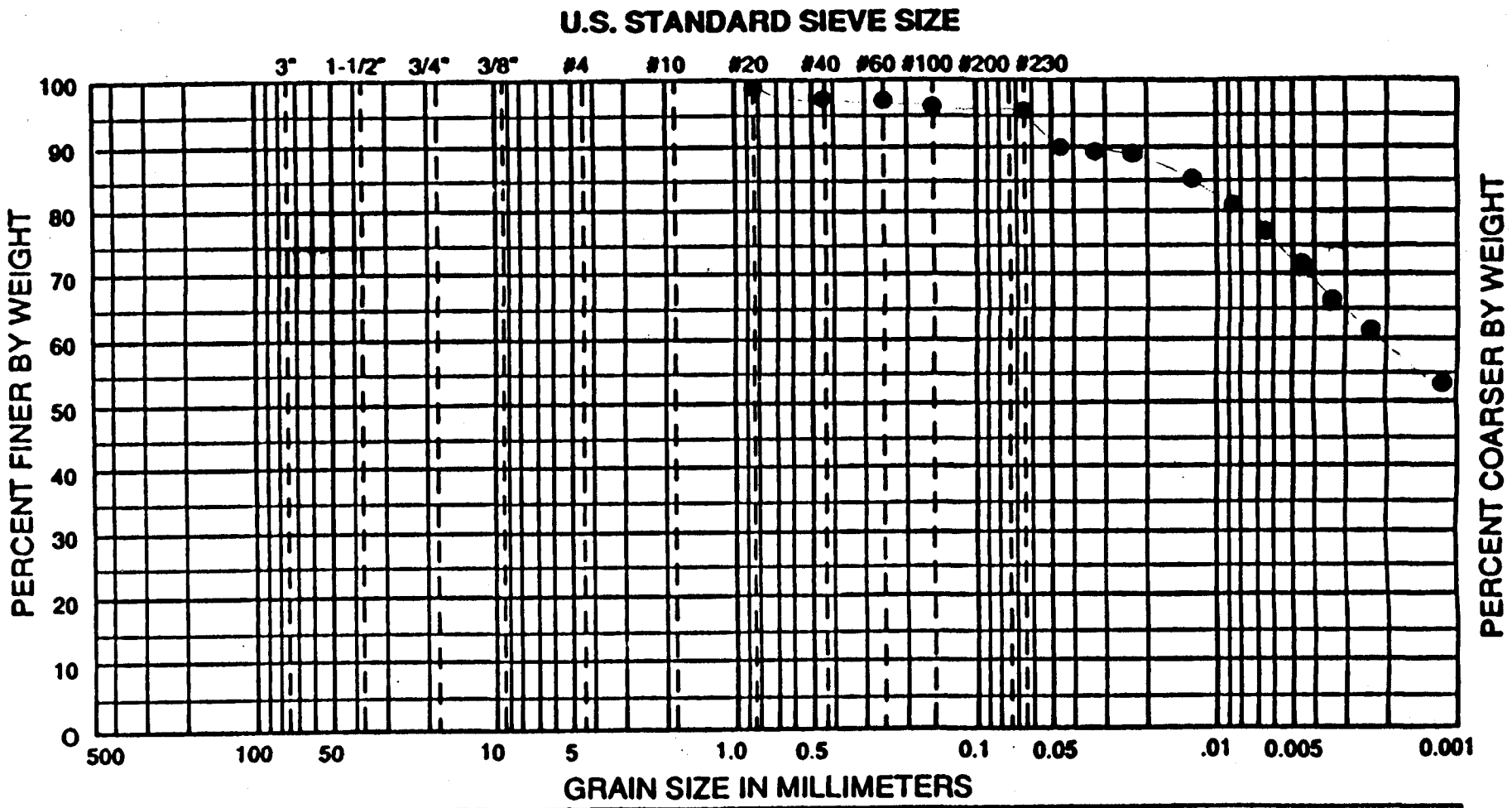
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.85	Temp. Coef. K	0.01273
Value of "a"	0.96	Wt. Dry Sample "W"	58.241
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	61.00	55.00	90.7	90.7	6.29	0.0451
1.0	60.50	54.50	89.8	89.8	6.37	0.0321
2.0	60.00	54.00	89.0	89.0	6.45	0.0229
5.0	58.50	52.50	86.5	86.5	6.70	0.0147
15.0	55.50	49.50	81.6	81.6	7.19	0.0088
30.0	53.00	47.00	77.5	77.5	7.60	0.0064
60.0	50.00	44.00	72.5	72.5	8.09	0.0047
120.0	46.50	40.50	66.8	66.8	8.66	0.0034
250.0	44.00	38.00	62.6	62.6	9.07	0.0024
1440.0	38.50	32.50	53.6	53.6	9.98	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND				SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 18 + 60 SAMPLE NO.: #2 DATE: 2-23-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	24.5'	Silty clay stone Based [illegible] 29% Silt 66% Cl

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. [illegible]

CLIENT/OWNER WESTON

LOCATION

BORING 18+60 SAMPLE ____ DEPTH 24.5'

(2)

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

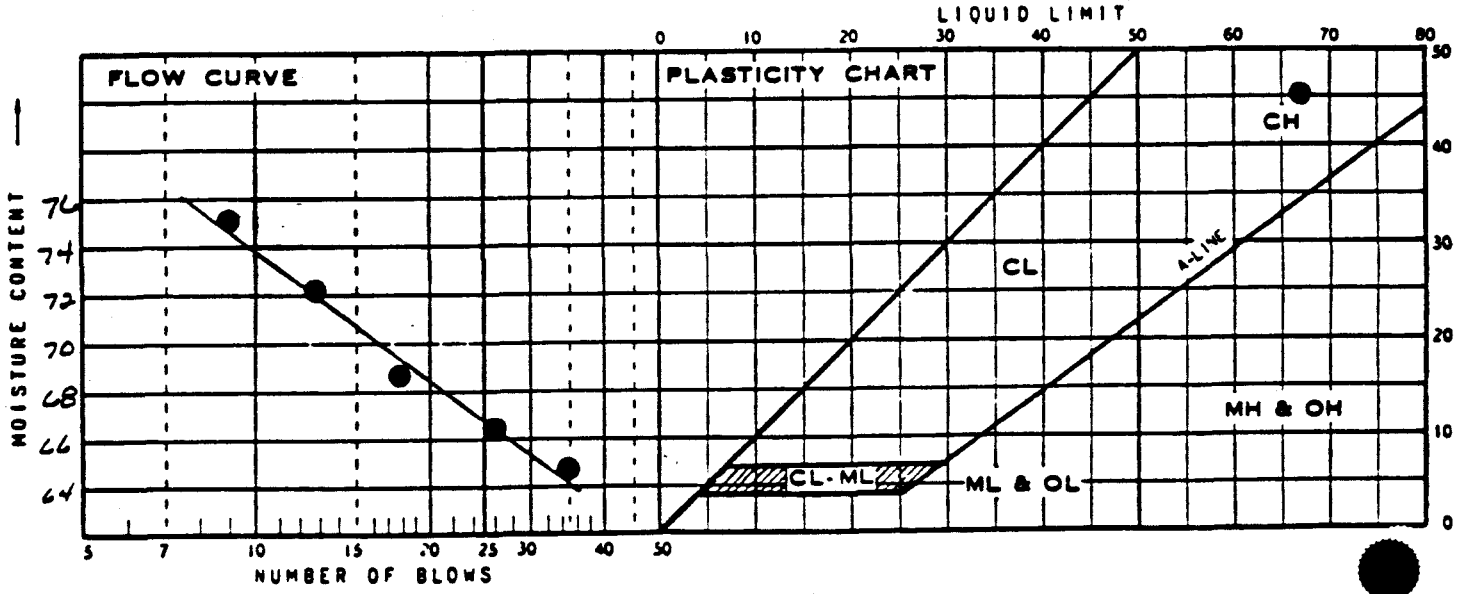
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 2/20/92

DETERMINATION	1	2	3	4	5	6
DISH	2003	2025	2045			
WT OF DISH + WET SOIL g	6.14	6.30	6.19			
WT OF DISH + DRY SOIL g	5.23	5.37	5.29	—	—	—
WT OF MOISTURE g	.91	.93	.90			
WT OF DISH g	1.03	1.05	1.05	—	—	—
WT OF DRY SOIL g	4.20	4.32	4.24			
MOISTURE CONTENT η_o	21.7	21.5	21.2			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	316	322	2001	2021	2014	
NUMBER OF BLOWS	35	26	18	13	10±	
WT OF DISH + WET SOIL g	15.19	13.87	17.04	13.34	17.03	
WT OF DISH + DRY SOIL g	9.63	8.74	10.52	8.18	10.18	—
WT OF MOISTURE g	5.56	5.13	6.52	5.16	6.85	
WT OF DISH g	1.04	1.02	1.05	1.04	1.06	—
WT OF DRY SOIL g	8.59	7.72	9.47	7.14	9.12	
MOISTURE CONTENT η_o	64.7	66.5	68.8	72.3	75.1	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		66.9	21.5	45.4	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Westom

JOB NO. 2066-03

BORING NO.	19+00	SAMPLED	Rocky Flats
DEPTH	6.0'	DATE TESTED	3-9-92 DU
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	46.07
Wt. Dry Soil & Pan	(g)	45.41
Wt. Lost Moisture	(g)	0.66
Wt. of Pan Only	(g)	3.78
Wt. of Dry Soil	(g)	41.63
Moisture Content	%	1.6
Wt. Hydrom. Sample Wet	(g)	60.02
Wt. Hydrom. Sample Dry	(g)	59.08

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	758.16
Weight of + #10 Before Washing (g)	366.89
Weight of + #10 After Washing (g)	294.97
Weight of - #10 Wet (g)	391.27
Weight of - #10 Dry (g)	455.96
Wt. Total Sample Dry (g)	750.93
Calc. Wt. "W" (g)	97.30
Calc. Mass + #10	38.22

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	105.47	105.47	105.47	14.0	86.0
3/8"	0.00	88.97	88.97	194.44	25.9	74.1
#4	0.00	59.89	59.89	254.33	33.9	66.1
#10	0.00	40.64	40.64	294.97	39.3	60.7
#20	1.56	5.10	3.54	3.54	42.9	57.1
#40	1.57	6.67	5.10	8.64	48.2	51.8
#60	1.57	5.25	3.68	12.32	51.9	48.1
#100	1.55	4.53	2.98	15.30	55.0	45.0
#230	1.57	5.43	3.86	19.16	59.0	41.0

Sandy Clay

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	19+00	SAMPLED	Rocky Flats
DEPTH	6.0'	DATE TESTED	3-9-92 DU
SAMPLE NO.	#7	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

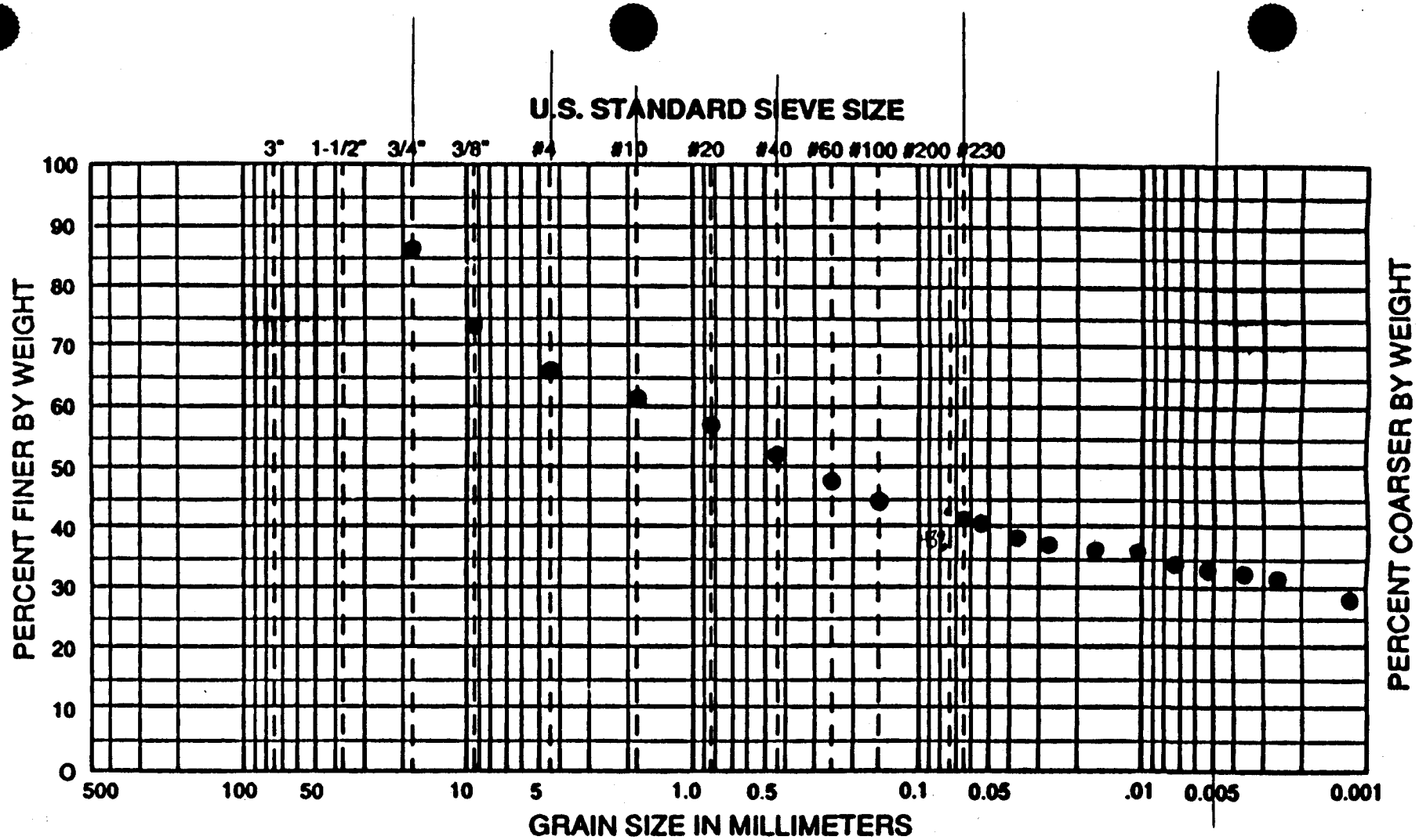
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.77	Temp. Coef. K	0.01287
Value of "a"	0.98	Wt. Dry Sample "W"	97.297
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	45.50	40.00	40.1	40.1	8.83	0.0541
1.0	44.00	38.50	38.6	38.6	9.07	0.0388
2.0	42.75	37.25	37.4	37.4	9.28	0.0277
5.0	42.50	37.00	37.1	37.1	9.32	0.0176
15.0	41.50	36.00	36.1	36.1	9.48	0.0102
30.0	40.25	34.75	34.9	34.9	9.69	0.0073
60.0	39.50	34.00	34.1	34.1	9.81	0.0052
120.0	38.50	33.00	33.1	33.1	9.98	0.0037
250.0	37.00	31.50	31.6	31.6	10.22	0.0026
1440.0	34.00	28.50	28.6	28.6	10.71	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 19+00 SAMPLE NO.: CH #7 DATE: 3/11/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	6.0'	14% Gravel 25.1% Sd SANDY CLAY 17.9% fine gravel 5.4% csd, 8.9% msd, 10.8% fsd, 8% Silt, 33% CLAY

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER WESTON
LOCATION ROCKY FLATS EGC
BORING 19+80 SAMPLE CH#7 DEPTH 6.0'

FIELD DENSITY BY ...../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

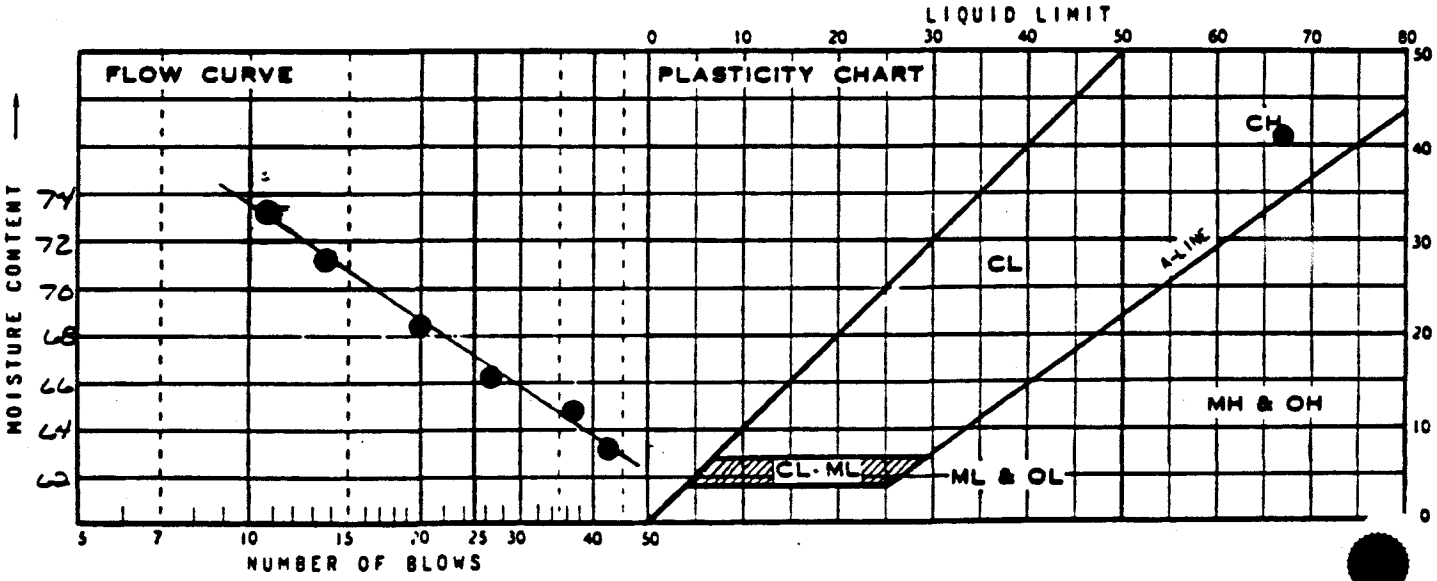
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 3/5/92

DETERMINATION	1	2	3	4	5	6
DISH	2028	24	2030			
WT OF DISH + WET SOIL g	4.27	6.23	6.64			
WT OF DISH + DRY SOIL g	3.62	5.14	5.47	—	—	—
WT OF MOISTURE g	.65	1.09	1.17			
WT OF DISH g	1.08	1.05	1.05	—	—	—
WT OF DRY SOIL g	2.54	4.09	4.42			
MOISTURE CONTENT %	25.6	26.7	26.5			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	14C	6C	48C	1202	2051	22C
NUMBER OF BLOWS	43	38	27	20	14	11
WT OF DISH + WET SOIL g	15.60	17.25	15.64	16.25	13.85	17.17
WT OF DISH + DRY SOIL g	9.96	10.87	9.81	10.07	8.52	10.35
WT OF MOISTURE g	5.64	6.38	5.83	6.18	5.33	6.82
WT OF DISH g	1.04	1.04	1.04	1.05	1.04	1.04
WT OF DRY SOIL g	8.92	9.83	8.77	9.02	7.48	9.31
MOISTURE CONTENT %	63.2	64.9	66.5	68.5	71.3	73.3



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		67.3	26.3	41.0	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

SURFACE ELEV. ELEV 5990'

CLIENT Weston

JOB NO. 2066-03

BORING NO.	19+20	SAMPLED	Rocky Flats
DEPTH	5'	DATE TESTED	02-21-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	42.79
Wt. Dry Soil & Pan	(g)	42.17
Wt. Lost Moisture	(g)	0.62
Wt. of Pan Only	(g)	3.63
Wt. of Dry Soil	(g)	38.54
Moisture Content	%	1.6
Wt. Hydrom. Sample Wet	(g)	65.82
Wt. Hydrom. Sample Dry	(g)	64.77

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	374.35
Weight of + #10 Before Washing (g)	159.55
Weight of + #10 After Washing (g)	141.87
Weight of - #10 Wet (g)	214.80
Weight of - #10 Dry (g)	228.80
Wt. Total Sample Dry (g)	370.67
Calc. Wt. "W" (g)	104.94
Calc. Mass + #10	40.16

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	18.35	18.35	18.35	5.0	95.0
3/8"	0.00	71.26	71.26	89.61	24.2	75.8
#4	0.00	28.86	28.86	118.47	32.0	68.0
#10	0.00	23.40	23.40	141.87	38.3	61.7
#20	1.55	7.97	6.42	6.42	44.4	55.6
#40	1.33	6.59	5.26	11.68	49.4	50.6
#60	1.56	4.59	3.03	14.71	52.3	47.7
#100	1.57	4.42	2.85	17.56	55.0	45.0
#230	1.57	5.92	4.35	21.91	59.2	40.8

Sandy Gravelly Clay

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Westoff

JOB NO. 2066-03

BORING NO.	19+20	SAMPLED	Rocky Flats
DEPTH	5'	DATE TESTED	02-21-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

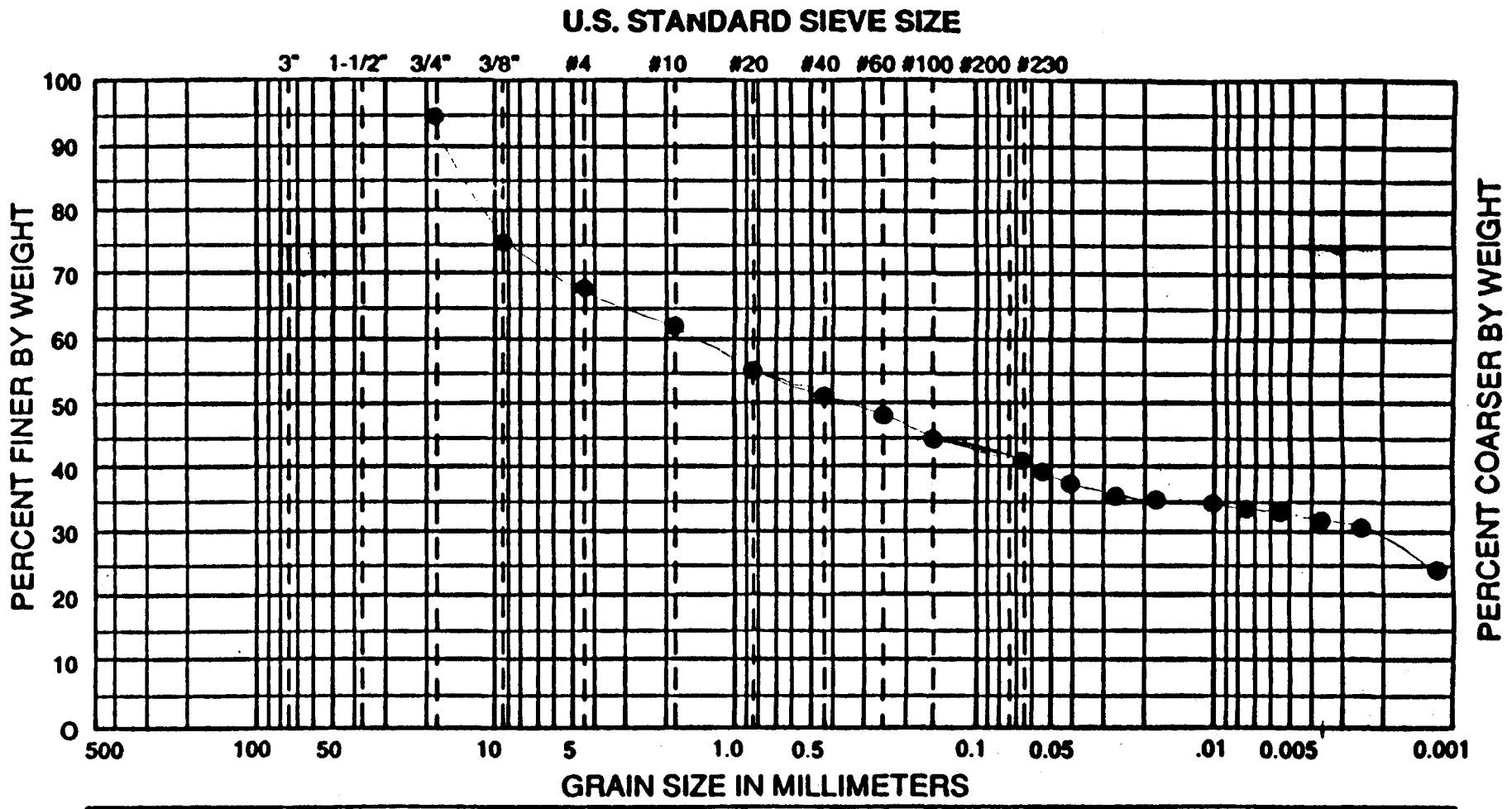
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01324
Value of "a"	0.99	Wt. Dry Sample "W"	104.938
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.5		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	46.50	41.00	38.6	38.6	8.66	0.0551
1.0	45.00	39.50	37.2	37.2	8.91	0.0395
2.0	44.00	38.50	36.2	36.2	9.07	0.0282
5.0	43.75	38.25	36.0	36.0	9.12	0.0179
15.0	42.50	37.00	34.8	34.8	9.32	0.0104
30.0	42.00	36.50	34.4	34.4	9.40	0.0074
60.0	40.50	35.00	33.0	33.0	9.65	0.0053
120.0	39.50	34.00	32.0	32.0	9.81	0.0038
250.0	38.50	33.00	31.1	31.1	9.98	0.0026
1440.0	30.60	25.10	23.6	23.6	11.27	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

ASTM D-

WELLNAME: 19+20 SAMPLE NO.: #2 DATE: 2/25/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	5'	Rocky Flats Sandy Gravelly Clay (CH) 3.0% Cobbles 6.3% Coarse, 11.1% Medium, 9.9% Fine, 7.8% Silt, 33% Clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION

LABORATORY CLASSIFICATION

JOB NO.

CLIENT/OWNER WESTON

LOCATION

BORING 19+20 SAMPLE DEPTH 5'

2

FIELD DENSITY BY

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

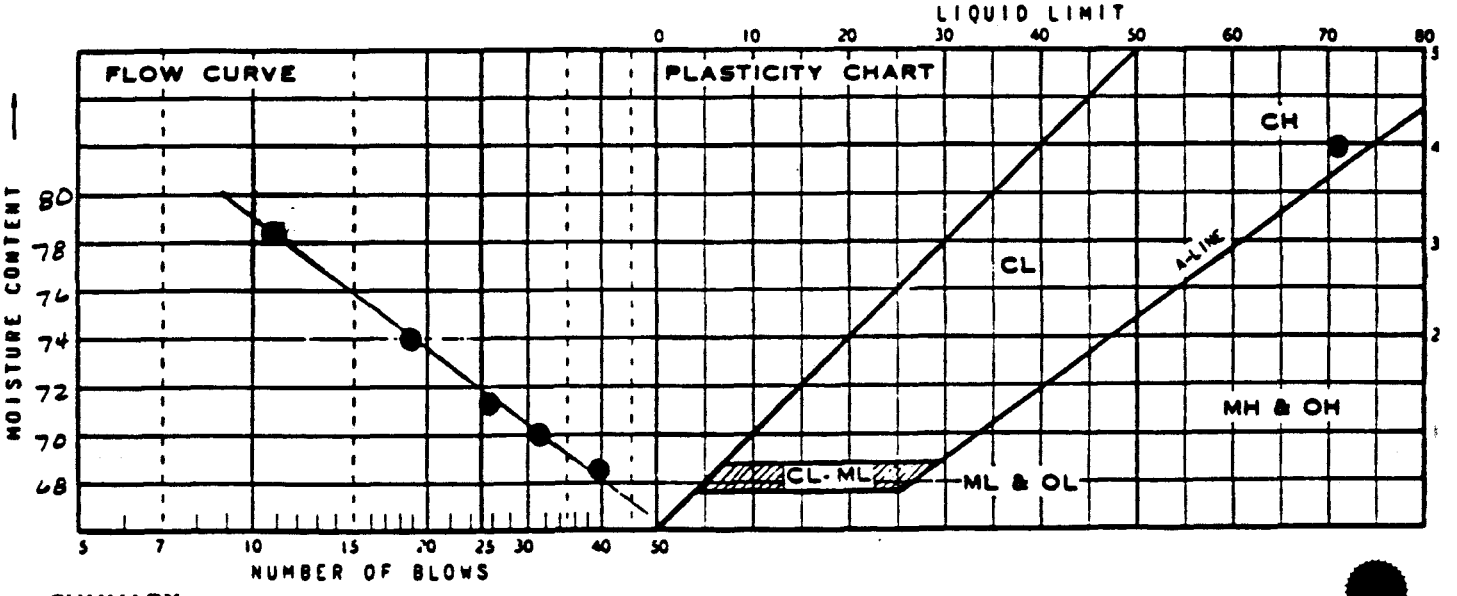
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 2/12/92

DETERMINATION	1	2	3	4	5	6
DISH	2042	2040	2038			
WT OF DISH + WET SOIL g	9.48	9.33	9.08			
WT OF DISH + DRY SOIL g	7.47	7.30	7.10	—	—	—
WT OF MOISTURE g	2.01	2.03	1.98			
WT OF DISH g	1.04	1.03	1.03	—	—	—
WT OF DRY SOIL g	6.43	6.27	6.07			
MOISTURE CONTENT %	31.3	32.4	32.6			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2039	2043	2015	2032	2035	
NUMBER OF BLOWS	40	31	26	19	11	
WT OF DISH + WET SOIL g	15.05	15.74	13.36	13.70	12.84	
WT OF DISH + DRY SOIL g	9.36	9.69	8.24	8.32	10.45	—
WT OF MOISTURE g	5.69	6.05	5.12	5.38	7.39	
WT OF DISH g	1.05	1.05	1.07	1.05	1.04	—
WT OF DRY SOIL g	8.31	8.64	7.17	7.27	9.41	
MOISTURE CONTENT %	68.5	70.0	71.4	74.0	78.5	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		71.9	32.1	39.8	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

BK

CLIENT Weston

JOB NO. 2066-03

BORING NO.	19+20	SAMPLED	Rocky Flats
DEPTH	15'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	44.90
Wt. Dry Soil & Pan	(g)	43.33
Wt. Lost Moisture	(g)	1.57
Wt. of Pan Only	(g)	3.65
Wt. of Dry Soil	(g)	39.68
Moisture Content	%	4.0
Wt. Hydrom. Sample Wet	(g)	56.69
Wt. Hydrom. Sample Dry	(g)	54.53

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	56.69
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	56.69
Weight of - #10 Dry (g)	54.53
Wt. Total Sample Dry (g)	54.53
Calc. Wt. "W" (g)	54.53
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.60	0.03	0.03	0.1	99.9
#40	1.56	1.60	0.04	0.07	0.1	99.9
#60	1.56	1.60	0.04	0.11	0.2	99.8
#100	1.57	1.65	0.08	0.19	0.3	99.7
#230	1.57	7.48	5.91	6.10	11.2	88.8

Silty Clay-tone

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	19+20	SAMPLED	Rocky Flats/I
DEPTH	15'	DATE TESTED	02-12-92 TNU
SAMPLE NO.	#2	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

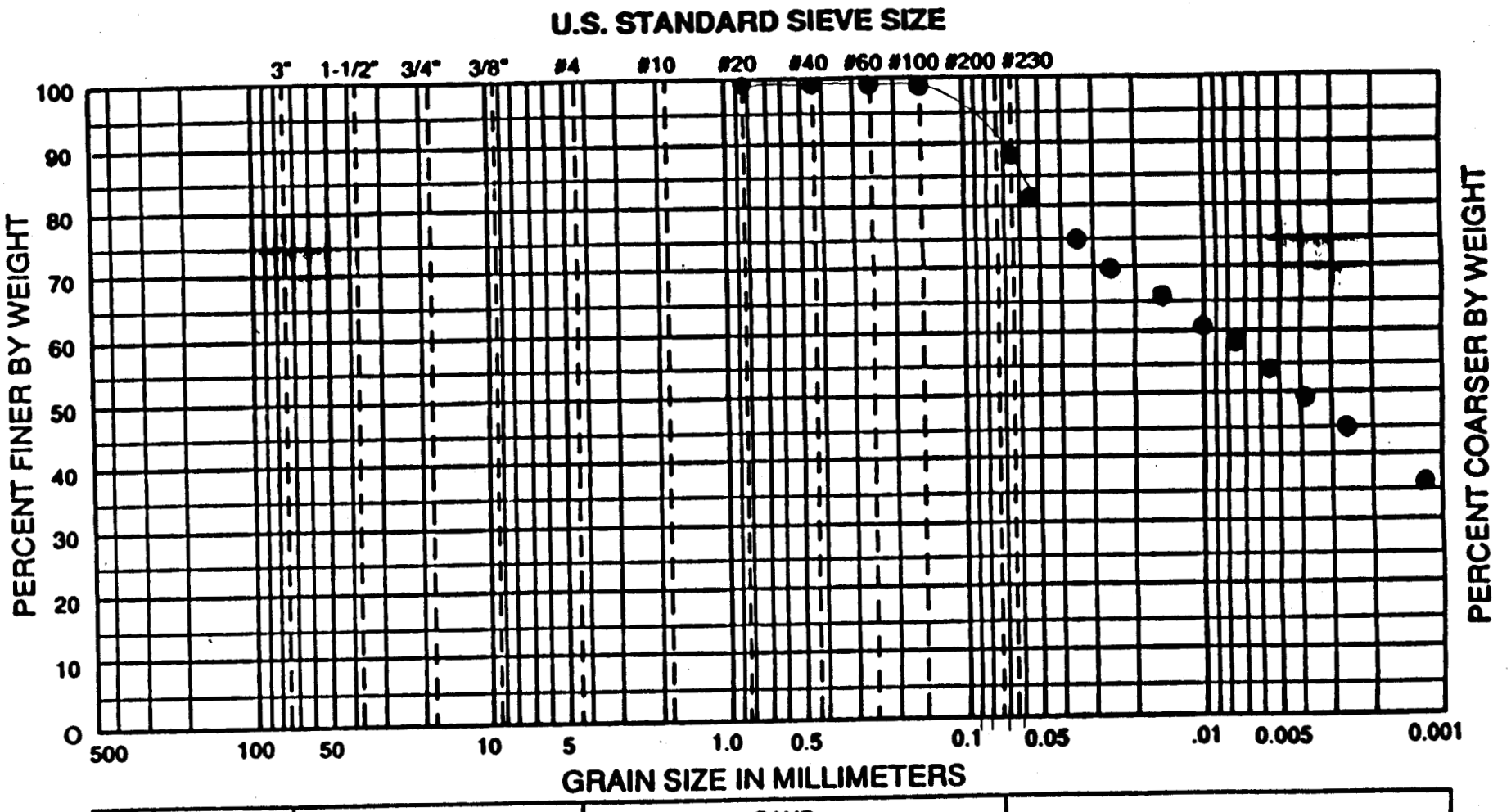
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.75	Temp. Coef. K	0.01294
Value of "a"	0.98	Wt. Dry Sample "W"	54.528
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	51.50	45.50	81.8	81.8	7.84	0.0513
1.0	48.00	42.00	75.5	75.5	8.42	0.0375
2.0	45.00	39.00	70.1	70.1	8.91	0.0273
5.0	43.00	37.00	66.5	66.5	9.24	0.0176
15.0	40.00	34.00	61.1	61.1	9.73	0.0104
30.0	38.50	32.50	58.4	58.4	9.98	0.0075
60.0	36.00	30.00	53.9	53.9	10.39	0.0054
120.0	33.50	27.50	49.4	49.4	10.80	0.0039
250.0	31.50	25.50	45.8	45.8	11.12	0.0027
1440.0	26.50	20.50	36.8	36.8	11.94	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 19+20 SAMPLE NO.: #2 DATE: 2-21-93 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	15'	Silty Clay(ey) Rocky Flats 11.2% Fine Sand 38.8% Silt 50% Clay(ey)

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-07

CLIENT/OWNER WESTON

LOCATION _____

BORING B320 SAMPLE ____ DEPTH 15'

(2)

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

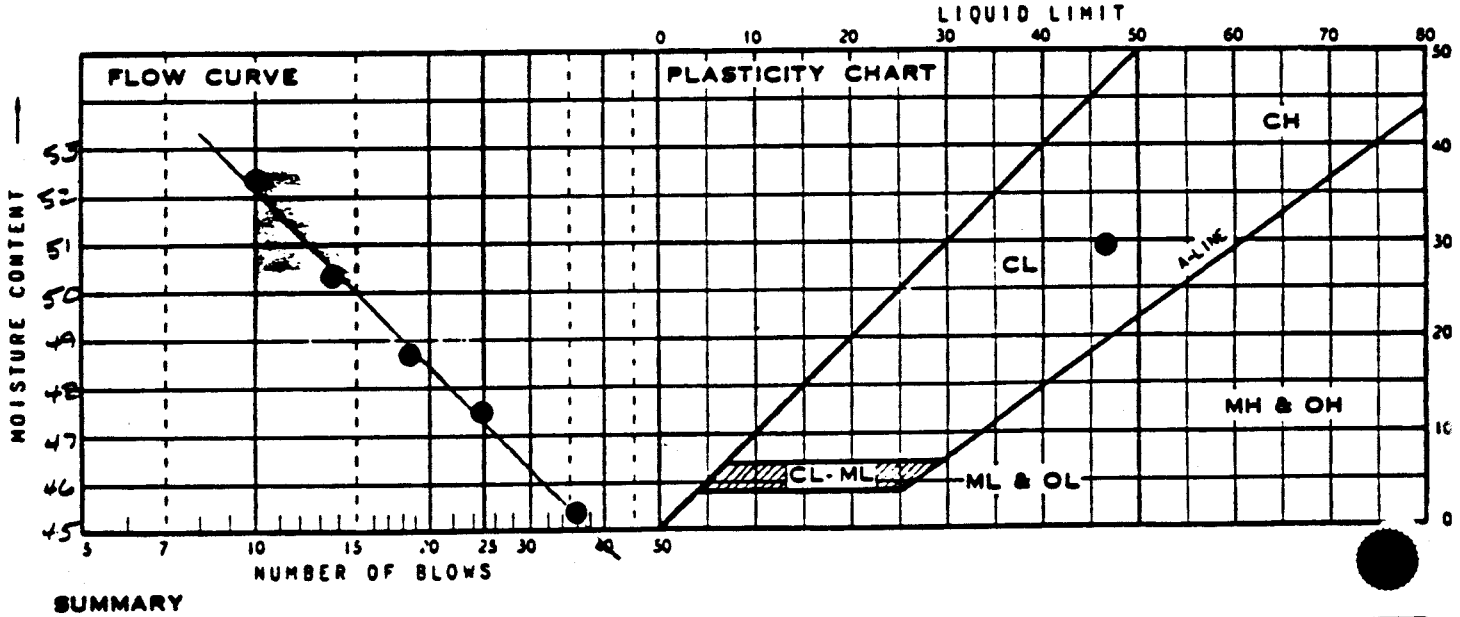
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 2/12/92

DETERMINATION	1	2	3	4	5	6
DISH	OC	2019	2011			
WT OF DISH + WET SOIL g	8.45	9.06	9.76			
WT OF DISH + DRY SOIL g	7.35	7.83	8.49	—	—	—
WT OF MOISTURE g	1.10	1.23	1.27			
WT OF DISH g	1.04	1.05	1.05	—	—	—
WT OF DRY SOIL g	6.31	6.78	7.44			
MOISTURE CONTENT %	17.4	18.1	17.1			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2029	2032	2043	2040	2038	
NUMBER OF BLOWS	36	25	19	15	11	
WT OF DISH + WET SOIL g	12.78	17.10	16.79	17.53	16.24	
WT OF DISH + DRY SOIL g	9.12	11.93	11.63	12.00	11.01	—
WT OF MOISTURE g	3.66	5.17	5.16	5.53	5.23	
WT OF DISH g	1.04	1.04	1.05	1.04	1.04	—
WT OF DRY SOIL g	8.08	10.89	10.58	10.96	4.77	
MOISTURE CONTENT %	45.3	47.5	48.8	50.5	52.5	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		47.2	17.5	29.7	CL	

ADVANCED TERRA TESTING

Attachment A4-4-1
Grain Size Distribution and Atterberg Limits for Alluvial Materials

Phase III
RFI/RI Report

Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5) COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY	U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7) LIQUID LIMIT	PLASTIC LIMIT	PLASTIC INDEX
05+00-43.0	0-43.0	28	20.19 / 5913.8	1.8	4.3	1.9	5.6	13.9	25.5	47.0	Clay (CH)	55.3	20.1	35.2
05+00-57.0	0-57.0	28	26.76 / 5907.2	0	0.1	0.4	1.4	9.1	26.5	62.5	Silty Clay (CH)	57.6	16.6	41.0
05+00-62.5	0-62.5	28	29.34 / 5904.7	0	0	0	0.1	0.7	23.2	76.0	Clay (CH)	56.1	19.1	37
05+25-32.0	0-26.0 26.0-32.0	18 24	10.47 / 5923.5	0	14.2	6.0	10.1	23.7	18.7	27.3	Clayey Sand (SC)	35.4	15.3	20.1
05+25-42.0	0-26.0 26.0-42.0	18 24	14.54 / 5919.5	3.8	3.4	1.9	3.4	13.5	29.5	44.5	Silty Clay (CL/CH)	53.1	16.5	36.6
05+25-50.4	0-26.0 26.0-45.0 45.0-50.4	18 24 40	19.23 / 5914.8	0	0	0	0.4	0.6	27.9	71.1	Silty Clay (CH)	55.1	20.3	34.8
05+50-24.0	0-24.0	28	11.27 / 5921.7	0	4.9	0.5	3.5	13.1	17.0	61.0	Clay (CH)	72.6	20.6	52.0
05+50-31.5	0-31.5	28	14.79 / 5918.2	0	0.1	0.2	1.7	17.0	32.5	48.5	Silty Clay (CL)	48.5	16.5	32.0

(1) Sample Number corresponds to the Station Number (Engineering Sciences, 1991) and the sample depth during excavation. (2) Slope equals angle from horizontal.
(3) Corrected depth corresponds to the sine of the slope angle. (4) Elevation refers to the corrected elevation of the sample location.
(5) Grain size distribution is analyzed according to American Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent clay indicates total silt and clay since sieve analysis #230 was not performed.
** Sieve analysis includes #230 only; hydrometer was not performed.

NP - Non-plastic
ND - No Data

Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5) COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY	U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7) LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
05+50-39.0	0-39.0	28	18.31 / 5914.7	0	0.4	0.3	1.4	5.9	27.1	64.9	Silty Clay (CH)	55.7	18.5	37.2
05+50-47.0	0-47.0	28	22.07 / 5910.9	0	0	0	0.9	4.1	44.0	51.0	Silty Clay (CL)	49.9	14.4	35.5
06+00-18.0	0-12.7 12.7-18.0	25 22	7.35 / 5924.6	0	0.2	0.4	4.1	13.8	23.0	58.5	Clay (CH)	63.7	23.5	40.2
06+00-24.0	0-12.7 12.7-22.0 22.0-24.0	25 22 32	9.91 / 5922.1	0	0.2	0.6	2.6	21.6	32.5	42.5	Silty Clay (CL)	42.9	16.8	26.1
06+00-26.0	0-12.7 12.7-22.0 22.0-26.0	25 22 32	10.97 / 5921.0	0	1.4	0.6	2.4	5.6	17.0	73.0	Clay (CH)	72.7	18.3	54.4
06+00-41.0	0-12.7 12.7-22.0 22.0-40.0	25 22 32	18.70 / 5913.3	0	2.0	1.4	3.8	12.8	17.5	62.5	Clay (CH)	59.4	17.2	42.2
06+25-24.0	0-19.0 19.0-24.0	20 30	9.00 / 5923.0	0	0	1.0	2.0	19.5	33.5	44.0	Silty Clay (CL)	44.0	17.3	26.7
06+25-27.0	0-19.0 19.0-27.0	20 30	10.50 / 5921.5	0	0.1	0	1.4	20.5	43.0	35.0	Clayey Silt (CL)	43.3	17.1	26.2

(1) Sample Number corresponds to the Station Number (Engineering Sciences, 1991) and the sample depth during excavation. (2) Slope equals angle from horizontal.
(3) Corrected depth corresponds to the sine of the slope angle. (4) Elevation refers to the corrected elevation of the sample location.
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(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent [illegible] indicates total silt and clay since sieve analysis #230 was not perf[illegible]d. NP - Non-plastic
** Sieve an[illegible] includes #230 only; hydrometer was not performed. ND - No Data

Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5) COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY	U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7) LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
06+25-42.0	0-19.0	20	16.96 / 5915.0	0	0.2	0.3	1.9	7.6	25.0	65.0	Clay (CH)	58.2	18.1	40.1
	19.0-28.6	30												
	28.6-42.0	25												
06+25-45.0	0-19.0	20	18.53 / 5913.5	0	0	0	0.4	1.9	28.7	69.0	Silty Clay (CH)	61.0	18.0	43.0
	19.0-28.6	30												
	28.6-43.0	25												
06+40-51.7	0-24.0	16	19.81 / 5912.2	0	0	0	0.4	9.6	32.5	57.5	Silty Clay (CH)	55.3	16.5	38.8
	24.0-45.0	32												
	45.0-51.7	18												
06+40-55.0	0-24.0	16	20.83 / 5911.2	0	0	0	0.7	1.0	19.3	79.0	Clay (CH)	66.4	21.5	44.9
	24.0-45.0	32												
	45.0-55.0	18												
06+50-30.0	0-24.0	16	9.79 / 5922.2	0	0	0	2.4	22.4	30.3	44.9	Silty Clay (CL)	44.5	16.1	28.4
	24.0-30.0	32												
06+75-26.0	0-26.0	18	8.03 / 5923.0	0	0.1	0	2.7	14.2	39.5	43.5	Silty Clay (CL)	47.6	16.7	30.9
06+75-38.3	0-34.0	18	12.79 / 5918.2	0	0	0	1.2	20.8	40.5	37.5	Clayey Silt (CL)	47.2	15.5	31.7
	34.0-38.3	32												
06+75-51.0	0-34.0	18	19.05 / 5912.0	8.6	15.1	9.2	25.3	9.8	5.5	26.5	Clayey Sand (SC)	59.9	19.6	40.3
	34.0-49.8	32												
	49.8-51.0	8												

(1) Sample Number corresponds to the Station Number (Engineering Sciences, 1991) and the sample depth during excavation. (2) Slope equals angle from horizontal.
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(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent clay indicates total silt and clay since sieve analysis #230 was not performed.
** Sieve analysis includes #230 only; hydrometer was not performed.

NP - Non-plastic
ND - No Data

Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5) COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY	U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7) LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
06+75-58.9	0-34.0	18	20.15 / 5910.9	0	0	0.1	1.7	2.9	16.3	79.0	Clay (CH)	72.0	22.1	49.9
	34.0-49.8	32												
	49.8-58.9	8												
07+00-34.0	0-16.0	25	17.09 / 5912.9	0	2.6	1.5	3.3	20.1	32.5	40.0	Silty Clay (CL)	44.1	16.9	27.2
	16.0-34.0	35												
07+00-43.0	0-16.0	25	22.25 / 5907.8	7.9	15.4	5.4	16.0	14.3	9.0	32.0	Clayey Sand (CH)	65.4	19.4	46.0
	16.0-43.0	35												
07+00-46.0	0-16.0	25	23.97 / 5906.0	0	0	0	0.8	1.7	25.5	72.0	Silty Clay (CH)	75.8	18.9	56.9
	16.0-46.0	35												
07+25-15.0	0-15.0	19	4.88 / 5924.1	0	0.3	0.2	1.5	22.0	32.0	44.0	Silty Clay (CL)	43.8	17.4	26.4
07+25-25.0	0-25.0	19	8.14 / 5920.9	34.0	7.9	1.6	3.5	10.0	15.5	27.5	Clayey Gravel (GM)	47.9	18.4	29.5
07+25-33.0	0-33.0	19	10.74 / 5918.3	10.7	11.5	5.1	2.3	6.4	24.0	40.0	Clay (CL)	48.7	15.5	33.2
07+25-44.3	0-40.0	19	14.97 / 5914.0	0	0.9	0.2	2.3	4.6	19.0	73.0	Clay (CH)	69.9	21.2	48.7
	40.0-44.3	27												

(1) Sample Number corresponds to the Station Number (Engineering Sciences, 1991) and the sample depth during excavation. (2) Slope equals angle from horizontal.
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(5) Grain size distribution is analyzed according to American Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent [illegible] indicates total silt and clay since sieve analysis #230 was not perf[illegible]d. NP - Non-plastic
** Sieve an[illegible] includes #230 only; hydrometer was not performed. ND - No Data

Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5) COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY	U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7) LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
07+25-63.5	0-40.0 40.0-63.5	19 27	23.69 / 5905.3	0	0	0	0.6	1.4	46.0	52.0	Silty Clay (CH)	53.0	18.3	34.7
07+75-23.0	0-23.0	22	8.62 / 5919.4	15.3	24.8	6.2	5.3	17.4	12.0	19.0	Gravelly Sand (SW)	43.9	16.4	27.4
07+75-29.5	0-29.5	22	11.05 / 5916.9	17.7	8.2	4.9	12.7	22.5	10.0	24.0	Gravelly Sand (SC)	46.8	17.8	29.0
07+75-36.0	0-36.0	22	13.49 / 5914.5	0	1.7	0.3	2.0	15.0	38.5	42.5	Silty Clay (CL)	48.3	16.8	31.5
07+75-45.0	0-45.0	22	16.86 / 5911.1	6.9	2.5	0.3	0.8	5.5	32.0	52.0	Silty Clay (CH)	62.7	18.0	44.7
07+75-46.5	0-46.5	22	17.42 / 5910.6	0	0	0	0.1	0.9	1.5	97.5	Clay (CH)	75.9	24.9	51.0
08+00-6.5	0- 6.5	26	2.85 / 5924.2	0	0.4	0	0.2	16.9	42.5	40.0	Clayey Silt (CL)	47.5	16.9	30.6
08+00-13.5	0-13.5	26	5.92 / 5921.1	6.9	6.1	2.7	8.4	30.9	19.0	26.0	Clayey Sand (SC)	41.6	17.0	24.6

(1) Sample Number corresponds to the Station Number (Engineering Sciences, 1991) and the sample depth during excavation. (2) Slope equals angle from horizontal.
(3) Corrected depth corresponds to the sine of the slope angle. (4) Elevation refers to the corrected elevation of the sample location.
(5) Grain size distribution is analyzed according to American Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent clay indicates total silt and clay since sieve analysis #230 was not performed.
** Sieve analysis includes #230 only; hydrometer was not performed.

NP - Non-plastic
ND - No Data

Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5) COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY	U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7) LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
08+00-29.0	0-29.0	26	12.71 / 5914.3	12.6	22.0	8.0	20.2	15.2	9.5	12.5	Gravely Sand (GM)	49.5	16.5	33.0
08+00-38.0	0-38.0	26	16.66 / 5910.3	0	0	0	0.1	8.9	43.0	48.0	Silty Clay (CL)	49.8	18.5	31.3
08+25-1.5	0- 1.5	19	0.49 / 5926.0	8.9	12.1	3.8	4.5	15.7	23.0	32.0	Clay (CL)	46.9	16.7	30.2
08+25-4.0	0- 4.0	19	1.30 / 5925.2	5.1	7.7	0.9	6.7	13.6	26.0	40.0	Silty Clay (CH)	54.1	19.0	35.1
08+25-8.0	0- 8.0	19	2.60 / 5923.9	0	0.7	0.2	1.3	17.8	30.0	50.0	Silty Clay (CH)	57.0	18.8	38.2
08+25-18.0	0-18.0	19	5.86 / 5920.1	0	1.5	1.8	13.6	24.1	23.0	36.0	Clayey Sand (SC)	46.0	17.3	28.7
08+25-21.5	0-21.5	19	7.00 / 5919.5	32.5	18.2	6.8	12.3	12.2	7.0	11.0	Sandy Gravel (GM)	44.7	17.3	27.4
08+25-25.5	0-25.5	19	8.30 / 5918.2	0	0	0	0.7	9.3	46.0	44.0	Clayey Silt (CH)	51.7	17.1	34.6

(1) Sample Number corresponds to the Station Number (Engineering Sciences, 1991) and the sample depth during excavation. (2) Slope equals angle from horizontal.
(3) Corrected depth corresponds to the sine of the slope angle. (4) Elevation refers to the corrected elevation of the sample location.
(5) Grain size distribution is analyzed according to American Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent[illegible] indicates total silt and clay since sieve analysis #230 was not per[illegible]ed. NP - Non-plastic
** Sieve a[illegible]s includes #230 only; hydrometer was not performed. ND - No Data

Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5) COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY	U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7) LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
08+25-35.0	0-30.5 30.5-35.0	19 31	12.25 / 5914.3	0	0	0	0.1	9.9	42.0	48.0	Silty Clay (CH)	52.8	18.6	34.2
08+25-45.0	0-30.5 30.5-45.0	19 31	17.40 / 5909.1	0	0	0	3.4	3.6	20.0	73.0	Clay (CH)	61.4	22.0	39.4
08+25-55.0	0-30.5 30.5-55.0	19 31	22.55 / 5904.0	0	3.6	0.8	2.3	8.3	30.0	55.0	Silty Clay (CH)	54.2	17.6	36.6
08+50-2.6	0- 2.6	20	0.89 / 5921.1	0	6.0	1.8	4.3	17.4	25.5	45.0	Clay (CH)	54.5	19.3	35.2
08+50-4.2	0- 4.2	20	1.44 / 5920.6	28.4	16.8	5.8	7.1	11.9	12.0	18.0	Gravel (GM)	48.6	17.9	30.7
08+50-12.7	0-12.7	20	4.34 / 5917.7	28.7	26.7	6.3	12.5	11.8	6.0	8.0	Sandy Gravel (GM)	42.6	16.5	26.1
08+50-36.0	0-36.0	20	12.31 / 5909.7	0	0.9	0.5	1.3	11.3	47.0	39.0	Clayey Silt (CL)	46.2	16.7	29.5
08+50-39.0	0-39.0	20	13.34 / 5908.7	5.4	5.1	2.4	5.2	4.4	30.5	47.0	Silty Clay (CH)	53.8	17.4	36.4

(1) Sample Number corresponds to the Station Number (Engineering Sciences, 1991) and the sample depth during excavation. (2) Slope equals angle from horizontal.
(3) Corrected depth corresponds to the sine of the slope angle. (4) Elevation refers to the corrected elevation of the sample location.
(5) Grain size distribution is analyzed according to American Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent clay indicates total silt and clay since sieve analysis #230 was not performed.
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Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5)							U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7)		
				COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY		LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
08+75-15.0	0-15.0	22	5.62 / 5916.4	10.1	7.7	1.7	5.0	10.5	26.0	39.0	Silty Clay (CH)	54.0	17.0	37.0
08+75-31.3	0-31.3	22	11.73 / 5910.3	0	5.3	0.3	2.4	5.0	25.0	62.0	Silty Clay (CH)	63.4	19.2	44.2
08+75-33.8	0-33.8	22	12.66 / 5909.3	21.8	14.0	3.4	12.4	20.9	10.5	17.0	Gravely Sand (SC)	41.9	15.6	26.3
08+75-51.0	0-51.0	22	19.10 / 5902.9	0	2.2	1.0	2.8	26.0	35.0	33.0	Sandy Clayey Silt (CL)	36.8	15.1	21.7
08+75-64.1	0-64.1	22	24.01 / 5898.0	0	0.8	0	0.7	1.5	18.0	79.0	Clay (CH)	67.2	23.8	43.4
08+75-72.0	0-72.0	22	26.97 / 5895.0	0	0	0	0	0.1	15.9	84.0	Clay (CH)	67.5	25.4	42.1
09+00-7.5	0- 7.5	20	2.57 / 5918.4	10.9	11.5	2.9	4.4	12.8	25.0	32.5	Clay (CH)	51.6	17.2	34.4
09+00-19.8	0-19.8	20	6.77 / 5914.2	11.6	6.8	2.7	5.3	5.6	16.5	51.5	Clay (CH)	67.7	18.7	49.0

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(5) Grain size distribution is analyzed according to American Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent[illegible] indicates total silt and clay since sieve analysis #230 was not per[illegible]med. NP - Non-plastic
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Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5)							U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7)		
				COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY		LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
09+00-26.0	0-26.0	20	8.89 / 5912.1	13.9	28.9	7.2	18.4	12.1	6.5	13.0	Sandy Gravel (SW)	48.6	15.8	32.8
09+00-31.8	0-31.8	20	10.88 / 5910.1	12.3	27.9	7.9	16.6	12.3	10.0	13.0	Sandy Gravel (SW)	48.5	17.3	31.2
09+00-40.0	0-40.0	20	13.68 / 5907.3	3.5	1.1	0.9	3.5	12.0	33.0	46.0	Silty Clay (CH)	51.6	17.0	34.6
09+00-52.0	0-52.0	20	17.79 / 5903.2	0	0	0.1	0.7	3.2	17.0	79.0	Clay (CH)	68.4	21.3	47.1
09+50-5.0	0- 5.0	28	2.35 / 5915.7	0.3	0	0.1	4.2	14.4	28.0	53.0	Silty Clay (CH)	52.1	16.8	35.3
09+50-11.5	0-11.5	28	5.40 / 5912.6	0	2.9	0.5	1.5	15.1	37.5	42.5	Silty Clay (CL)	49.4	16.0	33.4
09+50-30.0	0-30.0	28	14.08 / 5903.9	0	26.0	7.6	15.6	12.3	13.5	25.0	Gravely Sand (SC)	52.3	16.5	35.8
09+50-36.5	0-36.5	28	17.14 / 5900.9	17.3	35.5	9.4	10.4	12.4	5.0	10.0	Sandy Gravel (SW)	NP	NP	NP

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(5) Grain size distribution is analyzed according to American Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
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Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5)							U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7)		
				COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY		LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
09+50-46.0	0-46.0	28	21.60 / 5896.4	0	6.2	0.8	2.1	6.9	34.0	50.0	Silty Clay (CH)	57.8	23.3	34.5
09+50-54.0	0-54.0	28	25.35 / 5892.6	0	1.0	0.1	0.4	0.9	18.1	79.5	Clay (CH)	67.4	22.2	45.2
09+75-3.0	0- 3.0	28	1.41 / 5916.6	0	0	0	5.1	11.9	36.0	47.0	Silty Clay (CH)	55.4	17.2	38.2
09+75-12.5	0-12.5	28	5.87 / 5912.1	0	2.4	0.3	2.7	21.6	32.0	41.0	Silty Clay (CL)	44.9	16.6	28.3
09+75-20.0	0-20.0	28	9.39 / 5908.6	25.7	3.1	2.6	6.8	16.8	17.0	28.0	Sandy Clayey Gravel (GM)	45.0	17.0	28.0
09+75-26.0	0-26.0	28	12.21 / 5905.8	3.8	10.1	4.5	11.7	20.9	16.0	33.0	Clayey Sand (SC)	51.3	15.8	35.5
09+75-31.0	0-31.0	28	14.55 / 5903.4	0	2.9	0.8	1.9	16.9	25.5	52.0	Clay (CL)	46.3	15.6	30.7
09+75-34.5	0-34.5	28	16.20 / 5901.8	0	0	0	0.1	29.9	36.5	33.5	Sandy Clayey Silt (CL)	34.5	15.7	18.8

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(5) Grain size distribution is analyzed according to American Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
(7) Atterberg limits are analyzed according to ASTM, 1989.
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Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5) COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY	U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7) LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
09+75-39.0	0-39.0	28	18.31 / 5899.7	0	0	0.3	0.1	4.0	31.6	64.0	Silty Clay (CH)	55.4	19.0	36.4
10+00-1.0	0- 1.0	31	0.52 / 5917.0	0	0.7	1.9	3.5	14.9	27.0	52.0	Silty Clay (CH)	58.6	16.6	42.0
10+00-5.0	0- 5.0	31	2.58 / 5914.9	0	0.3	0.2	3.5	21.0	31.0	44.0	Silty Clay (CL)	46.5	17.0	29.5
10+00-13.0	0-13.0	31	6.70 / 5910.8	0	0	0.4	2.8	24.8	32.0	40.0	Sandy Silty Clay (CL)	41.9	15.1	26.8
10+00-31.0	0-31.0	31	15.97 / 5901.5	5.3	4.9	2.9	10.1	20.8	26.0	30.0	Silty Clayey Sand (SC/SM)	47.3	14.1	33.2
10+00-43.0	0-36.0 36.0-43.0	31 14	20.23 / 5897.3	0	0	0	0	0.8	8.2	91.0	Clay (CH)	65.7	23.2	42.5
10+25-15.0	0-15.0	31	7.73 / 5909.8	0	1.1	0.8	5.3	16.8	26.0	50.0	Silty Clay (CH)	58.7	20.6	38.1
10+25-22.0	0-22.0	31	11.33 / 5906.2	0	1.0	0.4	4.6	17.0	37.0	40.0	Silty Clay (CL)	49.4	17.4	32.0

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(5) Grain size distribution is analyzed according to Anerican Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
(7) Atterberg limits are analyzed according to ASTM, 1989.
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Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5)							U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7)		
				COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY		LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
10+25-30.0	0-30.0	31	15.45 / 5902.0	0	0.1	0.6	2.0	22.3	38.0	37.0	Clayey Silt (CL)	42.4	15.0	27.4
10+25-40.0	0-36.0 36.0-40.0	31 14	19.51 / 5898.0	0	1.9	0.5	2.1	6.5	32.0	57.0	Silty Clay (CH)	60.8	16.6	44.2
10+25-46.0	0-36.0 36.0-46.0	31 14	20.96 / 5896.5	0	0	0	0.5	1.5	35.0	63.0	Silty Clay (CH)	57.7	18.8	38.9
10+50-1.4	0- 1.4	40	0.90 / 5916.1	15.3	1.7	2.0	9.5	14.5	21.5	35.5	Sandy Clay (CH)	50.0	17.4	32.6
10+50-4.5	0- 4.5	40	2.89 / 5914.1	0	6.0	1.3	1.9	5.1	25.7	60.0	Silty Clay (CH)	59.0	18.3	40.7
10+50-20.5	0-11.2 11.2-20.5	40 29	11.71 / 5905.3	0	0	0	0.2	0.4	24.4	75.0	Clay (CH)	64.0	21.3	42.7
10+50-42.5	0-11.2 11.2-42.5	40 29	22.37 / 5894.6	0	0.2	0.1	0.1	0.5	29.1	70.0	Silty Clay (CH)	67.7	23.5	44.2
10+50-46.0	0-11.2 11.2-46.0	40 29	24.07 / 5892.9	0	0	0	0.1	0.2	22.7	77.0	Clay (CH)	72.8	21.8	51.0

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(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent[illegible] indicates total silt and clay since sieve analysis #230 was not pe[illegible]med. NP - Non-plastic
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Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5) COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY	U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7) LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
10+75-1.0	0- 1.0	36	0.59 / 5915.9	0	33.5	2.0	4.4	14.9	0	45.2	Gravelly Clayey Sand (SC)*	54.7	22.0	32.7
10+75-3.0	0- 3.0	36	1.76 / 5914.7	0	0	2.3	6.0	17.5	0	74.2	Sandy Clay (CH)*	62.9	25.9	37.0
10+75-4.5	0- 4.5	36	2.65 / 5913.9	0	6.7	2.3	5.6	10.5	0	74.9	Sandy Clay (CH)*	59.8	21.2	38.6
10+75-5.5	0- 5.5	36	3.23 / 5913.3	0	0	0.6	0.9	6.1	0	92.4	Sandy Clay (CH)*	51.6	17.3	34.3
10+75-8.0	0- 8.0	36	4.70 / 5911.8	0	0	0.2	1.1	0.7	0	98.0	Clay (CH)*	70.0	23.7	46.3
10+75-16.0	0- 8.0 8.0-16.0	36 27	8.33 / 5908.2	0	0	0.1	2.2	6.2	40.5	51.0	Silty Clay (CH)	65.8	19.0	46.8
10+75-20.4	0- 8.0 8.0-20.4	36 27	10.33 / 5906.2	0	21.1	1.6	6.5	14.8	22.0	34.0	Clay (CH)	52.5	18.1	34.4
10+75-32.0	0- 8.0 8.0-32.0	36 27	15.60 / 5900.9	0	0	0	2.0	4.0	28.0	66.0	Silty Clay (CH)	65.8	20.8	45.0

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(5) Grain size distribution is analyzed according to Anerican Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
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Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5) COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY	U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7) LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
10+75-47.5	0- 8.0 8.0-47.5	36 27	22.63 / 5893.9	0	11.3	0	1.1	0.1	21.5	66.0	Clay (CH)	67.2	20.4	46.8
10+75-53.0	0- 8.0 8.0-53.0	36 27	25.13 / 5891.4	0	0.2	0.6	2.3	7.9	30.0	59.0	Silty Clay (CH)	59.4	20.0	39.4
11+00-2.0	0- 2.0	31	1.03 / 5915.0	0	2.9	2.3	7.6	21.2	20.0	46.0	Sandy Clay (CH)	58.8	24.7	34.1
11+00-6.0	0- 6.0	31	3.09 / 5912.9	0	0.7	1.6	5.9	28.8	20.0	43.0	Sandy Clay (CH)	53.1	21.7	31.4
11+00-14.0	0-14.0	31	7.21 / 5908.8	0	0	0	1.4	1.1	30.5	67.0	Silty Clay (CH)	64.5	22.4	42.1
11+00-19.5	0-19.5	31	10.04 / 5906.0	0	0	0	0	0.5	29.5	70.0	Silty Clay (CH)	57.4	19.6	37.8
11+00-24.5	0-24.5	31	12.62 / 5903.4	0	0	0	0.1	2.9	35.0	62.0	Silty Clay (CH)	55.9	16.5	39.4
11+00-55.0	0-55.0	31	28.33 / 5887.7	0	0	0	0	45.0	43.0	12.0	Silty Sand (SM)		24.9	

(1) Sample Number corresponds to the Station Number (Engineering Sciences, 1991) and the sample depth during excavation. (2) Slope equals angle from horizontal.
(3) Corrected depth corresponds to the sine of the slope angle. (4) Elevation refers to the corrected elevation of the sample location.
(5) Grain size distribution is analyzed according to American Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent[illegible] indicates total silt and clay since sieve analysis #230 was not pe[illegible]d. NP - Non-plastic
** Sieve an[illegible]s includes #230 only; hydrometer was not performed. ND - No Data

Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5)							U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7)		
				COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY		LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
11+10-36.0	0-36.0	31	18.54 / 5897.1	0	0.7	0.2	0.4	0.2	38.5	60.0	Silty Clay (CH)	56.3	18.7	37.6
11+10-44.0	0-44.0	31	22.66 / 5892.9	0	0.3	0.3	1.9	5.5	19.0	73.0	Clay (CH)	59.1	20.6	38.5
11+12-52.0	0-52.0	31	26.78 / 5888.8	0	0	0	0.1	12.9	39.0	48.0	Silty Clay (ML)	23.8	NP	NP
11+25-34.0	0-34.0	31	17.51 / 5898.0	0	0.9	0.3	1.0	3.8	28.0	66.0	Silty Clay (CH)	62.7	20.0	42.7
11+25-43.0	0-43.0	31	22.15 / 5893.4	0	0	0	0	27.0	50.0	23.0	Sandy Silt (CL)	32.2	19.2	13.0
11+50-42.0	0-42.0	40	27.00 / 5888.0	15.1	13.3	4.6	9.2	10.8	8.0	39.0	Clay (CH)	53.5	16.6	36.9
11+50-47.0	0-47.0	40	30.21 / 5884.8	9.3	12.7	3.5	7.6	17.9	19.0	30.0	Clay (CL)	49.4	15.55	33.85
11+75-59.0	0-59.0	40	37.92 / 5876.6	25.9	1.4	0.1	0.1	0.5	17.1	54.9	Gravely Clay (CH)	60.7	20.7	40.0

(1) Sample Number corresponds to the Station Number (Engineering Sciences, 1991) and the sample depth during excavation. (2) Slope equals angle from horizontal.
(3) Corrected depth corresponds to the sine of the slope angle. (4) Elevation refers to the corrected elevation of the sample location.
(5) Grain size distribution is analyzed according to Anerican Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent clay indicates total silt and clay since sieve analysis #230 was not performed.
** Sieve analysis includes #230 only; hydrometer was not performed.

NP - Non-plastic
ND - No Data

Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5)							U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7)		
				COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY		LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
11+80-50.0	0-50.0	40	32.14 / 5882.3	0	6.4	0.8	1.6	15.9	31.3	44.0	Silty Clay (CH)	53.8	15.3	38.5
11+80-56.0	0-56.0	40	36.00 / 5878.4	38.0	11.4	4.3	5.2	8.1	10.0	23.0	Gravel (GC)	54.3	17.4	36.9
12+00-41.0	0-41.0	40	26.35 / 5887.6	6.3	1.3	0.4	1.5	26.5	37.0	27.0	Sandy Clayey Silt (CL)	37.6	15.3	22.3
12+00-46.0	0-46.0	40	29.57 / 5884.4	51.7	10.8	3.7	6.4	8.4	8.8	10.2	Gravel (GM)	45.9	13.8	32.1
12+50-40.5	0-40.5	40	26.03 / 5886.0	37.9	7.4	2.3	11.7	23.0	10.6	7.1	Gravel (GM)	25.5	14.2	11.3
13+00-7.0	0- 7.0	40	4.50 / 5905.5	0	3.6	1.9	6.2	38.3	21.0	29.0	Clayey Sand (SC)	37.8	15.0	22.8
13+50-1.0	0- 1.0	40	0.64 / 5907.4	0	0.3	0.5	1.0	2.2	26.0	70.0	Silty Clay (CH)	67.2	21.7	45.5
13+50-4.5	0- 4.5	40	2.89 / 5905.1	0	18.7	6.8	9.5	18.0	31.0	16.0	Clayey Sand (SC)	53.9	20.0	33.9

(1) Sample Number corresponds to the Station Number (Engineering Sciences, 1991) and the sample depth during excavation. (2) Slope equals angle from horizontal.
(3) Corrected depth corresponds to the sine of the slope angle. (4) Elevation refers to the corrected elevation of the sample location.
(5) Grain size distribution is analyzed according to American Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent[illegible] indicates total silt and clay since sieve analysis #230 was not per[illegible]ed. NP - Non-plastic
** Sieve a[illegible]s includes #230 only; hydrometer was not performed. ND - No Data

Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5)							U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7)		
				COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY		LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
13+50-9.3	0- 9.3	40	5.98 / 5902.0	0	0.5	0.6	2.4	21.5	36.0	39.0	Silty Clay (CL)	49.6	20.3	29.3
13+50-12.5	0-12.5	40	8.03 / 5900.0	0	11.7	4.4	7.5	16.4	20.0	40.0	Sandy Clay (CH)	62.2	27.9	34.3
13+50-13.6	0-13.6	40	8.74 / 5899.3	0	26.5	4.3	5.9	20.5	18.8	24.0	Gravely Sand (SM/SC)	50.8	23.6	27.2
13+50-28.0	0-28.0	40	18.00 / 5890.0	0	5.2	1.7	5.6	8.5	19.0	60.0	Clay (CH)	66.2	22.0	44.2
13+85-4.0	0- 4.0	40	2.57 / 5903.4	0	0	0	0.1	0.4	34.5	65.0	Silty Clay (CH)	62.5	21.3	41.2
13+85-9.5	0- 9.5	40	6.11 / 5899.9	0	7.0	3.0	0.6	9.4	50.0	30.0	Clayey Silt (CL)	39.1	19.3	19.8
13+85-11.0	0-11.0	40	7.07 / 5898.9	0	0	0	0.1	26.9	52.0	21.0	Sandy Silt (CL)	35.2	20.5	14.7
14+15-13.0	0-13.0	40	8.36 / 5895.6	0	0	0	0.2	21.8	54.0	24.0	Silt (CL)	37.6	20.7	16.9

(1) Sample Number corresponds to the Station Number (Engineering Sciences, 1991) and the sample depth during excavation. (2) Slope equals angle from horizontal.
(3) Corrected depth corresponds to the sine of the slope angle. (4) Elevation refers to the corrected elevation of the sample location.
(5) Grain size distribution is analyzed according to Anerican Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent clay indicates total silt and clay since sieve analysis #230 was not performed.
** Sieve analysis includes #230 only; hydrometer was not performed.

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ND - No Data

Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5)							U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7)		
				COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY		LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
14+50-24.0	0-24.0	40	15.43 / 5885.6	0	0.2	0	0.8	14.0	56.0	29.0	Clayey Silt (CL)	35.1	18.6	16.5
14+75-4.0	0- 4.0	40	2.57 / 5896.9	0	1.3	2.3	3.6	4.8	88.0	0	Clay (CH)	75.5	23.1	52.4
15+00-20.5	0-20.5	40	13.18 / 5973.8	0	0	0	1.0	1.0	50.0	48.0	Clayey Silt (ML)	ND	ND	ND
15+55-2.3	0- 2.3	40	1.48 / 5892.3	23.9	26.1	5.7	7.5	9.8	11.0	16.0	Clayey Sand (SC)	46.0	17.8	28.2
15+70-6.5	0- 6.5	40	4.18 / 5889.0	ND	ND	ND	ND	ND	ND	96.0	Silty Clay (CH)**	67.1	20.7	46.4
16+25-13.0	0-13.0	40	8.36 / 5879.6	ND	ND	ND	ND	ND	ND	94.4	Silty Clay (CL)**	47.5	16.9	30.6
16+50-5.5	0- 5.5	40	3.54 / 5893.5	0	0	0.6	0.7	2.1	23.6	73.0	Clay (CH)	69.6	19.7	49.9
16+70-24.5	0-24.5	40	15.75 / 5878.3	0	0	0	0	22.9	54.0	23.1	Silt (ML)	31.6	23.0	8.6

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(5) Grain size distribution is analyzed according to American Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percen[illegible] indicates total silt and clay since sieve analysis #230 was not pe[illegible]med. NP - Non-plastic
** Sieve [illegible] is includes #230 only; hydrometer was not performed. ND - No Data

Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5)							U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7)		
				COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY		LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
16+83-3.0	0- 3.0	40	1.93 / 5892.9	23.0	20.6	4.1	2.9	14.6	15.3	19.5	Clayey Sand (SC)	50.5	17.3	33.2
17+10-4.8	0- 4.8	40	3.09 / 5893.6	0	0	0	0.4	0.6	29.0	70.0	Silty Clay (CH)	67.8	20.6	47.2
17+32-18.0	0-18.0	40	11.57 / 5884.6	0	0	0	0.1	0.4	24.5	75.0	Clay (CH)	64.0	19.4	44.6
17+50-0.3	0- 0.3	40	0.19 / 5895.8	ND	ND	ND	ND	ND	ND	47.7	Silty Sand (CL)**	41.4	16.0	25.4
17+50-0.8	0- 0.8	40	0.51 / 5895.5	0	0.2	0.4	1.0	2.4	22.0	74.0	Clay (CH)	69.6	21.8	47.8
17+50-15.0	0-15.0	40	9.64 / 5886.4	0	1.0	0	0	33.0	0	66.0	Sandy Clay (CH)*	54.6	21.6	33.0
17+50-18.0	0-18.0	40	11.57 / 5884.4	0	9.5	0	0	16.3	0	74.2	Silty Clay (CH)*	86.8	27.8	59.0
17+75-21.0	0-21.0	40	13.50 / 5881.5	4.5	1.9	2.7	6.9	11.5	18.5	54.0	Clay (CH)	67.3	20.3	47.0

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(5) Grain size distribution is analyzed according to American Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent clay indicates total silt and clay since sieve analysis #230 was not performed.
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Grain Size Distribution and Atterberg Limits for Alluvium Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5) COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY	U.S.C.S. CLASSIFICATION (6)	ATTERBERG LIMITS (7) LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
17+90-25.0	0-25.0	40	16.07 / 5878.9	1.4	2.5	1.7	0.1	1.3	23.0	70.0	Clay (CL)	47.0	17.9	29.1
18+00-17.0	0-17.0	40	10.93 / 5884.1	0	0	0.3	0.8	1.5	30.4	67.0	Silty Clay (CH)	66.7	19.6	47.1
18+00-21.5	0-21.5	40	13.82 / 5881.2	0	8.0	4.4	8.8	19.8	16.0	43.0	Sandy Clay (CH)	56.7	14.9	41.8
18+60-20.5	0-20.5	40	13.18 / 5880.8	0	0	0	0.1	1.9	33.0	65.0	Silty Clay (CH)	62.0	20.5	41.5
19+00-6.0	0- 6.0	40	3.86 / 5888.1	14.0	19.9	5.4	8.9	10.8	8.0	33.0	Sandy Clay (CH)	67.3	26.3	41.0
19+20-5.0	0- 5.0	40	3.21 / 5886.4	0	32.0	6.3	11.1	9.8	7.8	33.0	Sandy Gravely Clay (CH)	71.9	32.1	39.8

(1) Sample Number corresponds to the Station Number (Engineering Sciences, 1991) and the sample depth during excavation. (2) Slope equals angle from horizontal.
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(5) Grain size distribution is analyzed according to Anerican Society for Testing and Materials (ASTM), 1989.
(6) U.S.C.S. (Unified Soil Classification System) 1960. The silt and clay category has been further subdivided to include clay size particles less than 0.0039 millimeters.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percentage indicates total silt and clay since sieve analysis #230 was not performed. NP - Non-plastic
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Attachment A4-4-2
Grain Size Distribution and Atterberg Limits for Bedrock Materials

Phase III
RFI/RI Report

Grain Size Distribution and Atterberg Limits for Bedrock Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5) COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY	WENTWORTH CLASSIFICATION (6)	ATTERBERG LIMITS (7) LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
05+25-63.2	0-26.0 26.0-45.0 45.0-63.2	18 24 40	27.46 / 5906.5	0	0	0	0	0.2	20.3	79.5	Silty Claystone	70.0	22.4	47.6
05+50-56.3	0-50.0 50.0-56.3	28 37	27.27 / 5905.7	0	0	0	0.3	0.8	12.9	86.0	Claystone	68.7	22.7	46.0
06+25-53.6	0-19.0 19.0-28.6 28.6-43.0	20 30 25	23.46 / 5908.5	0	0	0	0.1	0.3	15.6	84.0	Claystone	64.7	23.4	41.3
07+00-56.0	0-16.0 16.0-46.2 46.2-56.0	25 35 7	25.28 / 5904.7	0	0	0	2.1	1.0	20.4	76.5	Silty Claystone	63.8	21.5	42.3
07+25-66.5	0-40.0 40.0-66.5	19 27	25.05 / 5903.9	0	0	0	0.1	1.9	40.0	58.0	Silty Claystone	57.0	18.6	38.4
07+25-67.5	0-40.0 40.0-67.5	19 27	25.51 / 5903.5	0	0	0.2	0.4	0.9	17.5	80.0	Claystone	41.4	16.0	25.4
07+75-52.0	0-52.0	22	19.48 / 5908.5	0	0	0	0.2	0.5	14.3	85.0	Claystone	69.8	26.2	43.6
08+00-52.0	0-52.0	26	22.80 / 5904.2	0	0	0	0.5	1.5	18.0	80.0	Claystone	69.2	25.1	44.1

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(5) Grain size distribution is analyzed according to American Society for Testing and Materials (ASTM), 1989.
(6) Wentworth grain size scale from Compton, 1962.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent clay indicates total silt and clay since sieve analysis #230 was not performed.
** Sieve analysis includes #230 only; hydrometer was not performed.

NP - Non-plastic
ND - No Data

Grain Size Distribution and Atterberg Limits for Bedrock Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5)							WENTWORTH CLASSIFICATION (6)	ATTERBERG LIMITS (7)		
				COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY		LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
08+25-56.1	0-30.5 30.5-56.1	19 30	22.73 / 5903.8	0	0	0	0	3.3	19.7	77.0	Claystone	58.8	22.7	36.1
08+75-75.0	0-75.0	22	28.10 / 5893.9	0	0	0	0	10.8	31.2	58.0	Silty Claystone	49.5	18.7	30.8
09+00-60.0	0-60.0	20	20.52 / 5900.5	0	0	0.1	0.3	1.3	15.3	83.0	Claystone	71.2	24.0	47.2
09+50-55.0	0-55.0	28	25.82 / 5892.2	0	0	0	0.1	4.9	25.0	70.0	Silty Claystone	64.8	19.3	45.5
09+50-58.1	0-58.1	28	27.28 / 5890.7	0	0	0	0.1	18.9	51.0	30.0	Clayey Siltstone	39.4	18.1	21.3
09+75-55.0	0-55.0	28	25.82 / 5892.2	0	0	0	0.3	3.6	16.1	80.0	Claystone	69.2	22.3	46.9
10+00-53.4	0-36.0 36.0-49.0 49.0-53.4	31 14 40	24.51 / 5893.0	0	0	0	0	1.0	13.0	86.0	Claystone	67.6	27.1	40.5
10+00-55.5	0-36.0 36.0-49.0 49.0-55.5	31 14 40	25.86 / 5891.6	0	0	0.1	0.1	13.8	50.5	35.5	Clayey Siltstone	40.7	15.3	25.4

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(5) Grain size distribution is analyzed according to American Society for Testing and Materials (ASTM), 1989.
(6) Wentworth grain size scale from Compton, 1962.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent [illegible]ndicates total silt and clay since sieve analysis #230 was not perf[illegible]d.
** Sieve ana[illegible] includes #230 only; hydrometer was not performed.

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ND - No Data

Grain Size Distribution and Atterberg Limits for Bedrock Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5) COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY	WENTWORTH CLASSIFICATION (6)	ATTERBERG LIMITS (7) LIQUID LIMIT	PLASTIC LIMIT	PLASTIC INDEX
10+25-69.0	0-36.0 36.0-49.0 49.0-69.0	31 14 40	34.54 / 5883.0	0	0	0	8.1	26.9	25.0	40.0	Sandy Silty Claystone	68.7	22.5	46.2
10+25-74.0	0-36.0 36.0-49.0 49.0-74.0	31 14 40	37.76 / 5879.7	0	0	0.1	0	19.0	45.9	35.0	Clayey Siltstone	39.6	14.6	25.0
10+50-55.0	0-11.2 11.2-55.0	40 29	28.43 / 5888.6	0	0.1	0.1	0.1	0.2	26.5	73.0	Silty Claystone	62.3	23.6	38.7
10+50-72.0	0-11.2 11.2-72.0	40 29	36.68 / 5880.3	0	0	0	0.1	55.4	28.5	16.0	Silty Sandstone	31.0	23.0	8.0
10+75-64.0	0- 8.0 8.0-64.0	36 27	30.13 / 5886.4	0	0	0	0	0.3	21.7	78.0	Claystone	68.7	27.5	41.2
10+75-65.0	0- 8.0 8.0-65.0	36 27	30.58 / 5885.9	0	0	0	0.2	15.3	35.5	49.0	Silty Claystone	50.0	16.9	33.1
10+75-67.9	0- 8.0 8.0-67.9	36 27	31.90 / 5884.6	0	0	0.2	0.1	16.2	51.5	32.0	Clayey Siltstone	40.9	17.8	23.1
11+00-62.5	0-62.5	31	32.19 / 5883.8	0	0	0.4	0.1	0.7	33.8	65.0	Silty Claystone	58.7	24.4	34.3

(1) Sample Number corresponds to the Station Number (Engineering Sciences, 1991) and the sample depth during excavation. (2) Slope equals angle from horizontal.
(3) Corrected depth corresponds to the sine of the slope angle. (4) Elevation refers to the corrected elevation of the sample location.
(5) Grain size distribution is analyzed according to American Society for Testing and Materials (ASTM), 1989.
(6) Wentworth grain size scale from Compton, 1962.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent clay indicates total silt and clay since sieve analysis #230 was not performed.
** Sieve analysis includes #230 only; hydrometer was not performed.

NP - Non-plastic
ND - No Data

Grain Size Distribution and Atterberg Limits for Bedrock Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5) COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY	WENTWORTH CLASSIFICATION (6)	ATTERBERG LIMITS (7) LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
11+10-49.0	0-49.0	31	25.24 / 5890.4	0	0	0	0	0.1	21.9	78.0	Silty Claystone	69.0	25.8	43.2
11+25-50.0	0-50.0	31	25.75 / 5889.7	0	0	0	0.1	58.9	30.1	10.9	Silty Sandstone	48.1	15.2	32.9
11+50-54.0	0-54.0	40	34.71 / 5880.3	0	0	0	0.1	0.4	29.5	70.0	Silty Claystone	65.3	21.0	44.3
11+50-57.0	0-57.0	40	36.64 / 5878.4	0	4.1	0	0.5	12.4	59.0	24.0	Clayey Siltstone	33.6	18.3	15.3
12+00-49.0	0-49.0	40	31.50 / 5882.5	0	0.1	0.1	0.2	22.6	53.0	24.0	Sandy Clayey Siltstone	38.1	20.7	17.4
12+00-53.0	0-53.0	40	34.07 / 5879.9	0	0	0.1	0.9	66.0	20.5	12.5	Silty Sandstone	25.6 E		
12+50-43.5	0-43.5	40	27.96 / 5884.0	0	0	0	0.2	50.8	25.0	23.0	Clayey Silty Sandstone	24.3		
12+70-55.0	0-55.0	40	35.35 / 5876.2	0	0	0.2	0.9	64.5	22.4	12.0	Silty Sandstone	25.0	0.00	

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Grain Size Distribution and Atterberg Limits for Bedrock Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5)							WENTWORTH CLASSIFICATION (6)	ATTERBERG LIMITS (7)		
				COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY		LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
13+50-44.7	0-44.7	40	28.73 / 5879.3	0	0.2	0.9	0.3	72.8	15.8	10.0	Sandstone	ND	ND	ND
14+15-27.5	0-27.5	40	17.68 / 5886.3	0	0	0.3	0.5	14.1	0	85.1	Claystone *	44.4	16.2	28.2
14+50-33.0	0-33.0	40	21.21 / 5879.8	0	0	0.3	0.1	11.4	41.2	47.0	Silty Claystone	47.2	17.9	29.3
15+10-27.0	0-27.0	40	17.36 / 5969.5	0	0	0.1	1.4	19.1	57.4	22.0	Sandy Siltstone	ND	ND	ND
15+15-19.0	0-19.0	40	12.21 / 5974.6	0	0	0	0	49.5	32.5	18.0	Silty Sandstone	ND	ND	ND
15+25-26.5	0-26.5	40	17.03 / 5969.0	0	0	0	0.2	27.4	53.4	19.0	Sandy Siltstone	ND	ND	ND
15+25-31.0	0-31.0	40	19.93 / 5966.1	ND	ND	ND	ND	ND	ND	99.4	Silty Claystone **	ND	ND	ND
15+40-27.5	0-27.5	40	17.68 / 5876.5	0	0	0	0.1	29.9	48.0	22.0	Clayey Sandy Siltstone	30.8	22.6	8.2

(1) Sample Number corresponds to the Station Number (Engineering Sciences, 1991) and the sample depth during excavation. (2) Slope equals angle from horizontal.
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(6) Wentworth grain size scale from Compton, 1962.
(7) Atterberg limits are analyzed according to ASTM, 1989.
* Percent clay indicates total silt and clay since sieve analysis #230 was not performed.
** Sieve analysis includes #230 only; hydrometer was not performed.

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Grain Size Distribution and Atterberg Limits for Bedrock Materials

SAMPLE NUMBER (1)	DEPTH INTERVAL (feet)	SLOPE (2) (degrees)	CORRECTED DEPTH (3) /ELEVATION (4)	GRAIN SIZE (PERCENT) (5)							WENTWORTH CLASSIFICATION (6)	ATTERBERG LIMITS (7)		
				COARSE GRAVEL& COBBLES	FINE GRAVEL	COARSE SAND	MED SAND	FINE SAND	SILT	CLAY		LIQUID LIMIT	PLAS-TIC LIMIT	PLAS-TIC INDEX
15+58-25.0	0-25.0	40	16.07 / 5877.5	0	0	0	0.2	35.8	46.0	18.0	Sandy Siltstone	ND	ND	ND
15+58-26.5	0-26.5	40	17.03 / 5876.6	0	0	0	0.1	1.0	42.9	56.0	Silty Claystone	54.8	16.8	38.0
16+50-26.1	0-26.1	40	16.78 / 5880.2	0	0	0	0.1	2.7	19.2	78.0	Claystone	64.5	25.5	39.0
16+50-27.5	0-27.5	40	17.68 / 5879.3	0	0	0	0.1	3.9	44.0	52.0	Silty Claystone	50.7	17.0	33.7
16+50-31.4	0-31.4	40	20.18 / 5876.8	0	0	0.1	0	2.1	44.8	53.0	Silty Claystone	53.5	16.6	36.9
18+10-27.0	0-27.0	40	17.36 / 5877.5	0	0	0	0	1.7	30.3	68.0	Silty Claystone	53.9	21.7	32.2
18+60-24.5	0-24.5	40	15.75 / 5878.3	0	0	0.9	0.5	1.7	30.9	66.0	Silty Claystone	66.9	21.5	45.4
19+20-15.0	0-15.0	40	9.64 / 5880.0	0	0	0	0	11.2	38.8	50.0	Silty Claystone	47.2	17.5	29.7

(1) Sample Number corresponds to the Station Number (Engineering Sciences, 1991) and the sample depth during excavation. (2) Slope equals angle from horizontal.
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EG&G ROCKY FLATS PLANT

Revision 1, Draft

OPERABLE UNIT - 1, 881 HILLSIDE

SUPPLEMENTAL SURFICIAL RADIOLOGICAL CHARACTERIZATION

ACTION PLAN

Submitted by:

Keith D. Anderson
Environmental Restoration Health and Safety Officer

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VIII. TECHNICAL TASKS ACCOMPLISHED

- A. POSTING OF THE IDENTIFIED AREAS
- B. PART I, CHARACTERIZATION
- C. PART II, QUALITATIVE RADIOLOGICAL SURVEY

ATTACHMENT I

ATTACHMENT II

I. Introduction

The Environmental Management Division (EMD) is responsible for implementation of the Interagency Agreement (IAG) Remediation Investigation/ Feasibility Study (RI/FS) Phase I of Operable Unit 1. As part of the RI/FS, a Baseline Risk Assessment has been performed for OU-1. The specifics of the Assessment evaluated and characterized the potential chemical and radiological hazards of the Site. In order to expand on the statements provided in the Assessment, it has been identified that a supplemental radiological characterization of the OU would be beneficial to the Final Assessment. To provide this supplemental information, a Qualitative Radiological Survey (QRS) will be conducted of areas of concern for OU-1 to identify anomalous radiological activity present.

In addition, the supplemental QRS may be utilized to validate the random sampling locations that were selected for the Baseline Risk Assessment. This could be done by comparing the two sample populations produced by the separate investigations. This will provide Radiological Engineering (RE), an opportunity to establish walk over survey procedures and requirements, while enhancing the field data already collected for the Risk Assessment.

RE is responsible for the implementation of the Environmental Management Radiological Protection Program, including operational and remedial investigation requirements, documentation, review requirements, and plant interface details. RE is also responsible for providing technical assistance and guidance for the conduct of radiological characterization surveys, utilizing standard radiation detection instrumentation. To this end, EMD and RE will cooperatively pursue the completion of the QRS.

The driving force of the QRS is the documented identification of an anomaly activity, i.e. hot spot, that has been found on the 881 Hillside. This anomaly has not yet been characterized nor quantified.

II. Scope

This action plan includes the planning, development, field implementation, and final report preparation of the QRS. It does not include radiation detection instrumentation research or development. The scope will follow a phased scenario, to include radiological posting and a two part field characterization.

III. Qualifications

The work shall be performed under the direction of a qualified Project Manager (PM) with substantial experience in the area of radiological site characterization techniques. It is preferred that the individual be familiar with OU-1 Baseline Risk Assessment and previous investigations conducted at the site. In addition, a thorough knowledge of historical data is beneficial to the successful development of a survey.

EMD has expressed an interest in RE conducting the entirety of the QRS, which requires a RE Project Manager. This would allow for RE to research, develop, and objectively evaluate the QRS methodology.

Additional personnel performing work on the action plan will be technically managed by the qualified PM. Individuals shall provide verification of qualifications for performing the QRS.

IV. Applicable Documents

The following documents are considered to be reference documentation applicable to development of criteria and methods to be used for the QRS.

Department of Energy Order N 5480.6, Radiological Control Manual, June 1992.

Department of Energy Order 5480.11, Radiation Protection for Occupational Workers, 1989.

Department of Energy Order 5400.5, Radiation Protection of the Public and the Environment, 1990.

DOE/CH/8901 - A Manual for Implementing Residual Radioactive Material Guidelines, Argonne National Laboratory, Argonne, IL, 1989.

Radiological Operating Instructions, EG&G Rocky Flats.

Radiological Engineering Procedures, EG&G Rocky Flats.

Health and Safety Practices Manual, EG&G Rocky Flats.

Appropriate EMD Operating Procedures

Relevant and Applicable requirements under the IAG.

V. Technical Requirements and Tasks

The action plan will require technical services performed by individuals qualified in Section III. Technical qualifications must ensure satisfactory completion of the development, field implementation, completion, and final report generation of the QRS. These activities will be conducted under the direction of EMD and RE Representatives for OU-1. Since this work may potentially amend the OU-1 Baseline Risk Assessment, it is essential that the action plan be carried out with a level of assurance that a comprehensive effort has been made to comply with the specifics of the action plan.

A. Technical Requirements, Posting of the Identified Area

1. Radiological posting and control of the identified anomaly located on the 881 Hillside. An immediate response is

required as per Memorandum dated November 30, 1992, concerning Operable Unit 1 (881 Hillside) Plutonium Contamination. This must include appropriate control measures and radiological postings in accordance with the EG&G Health and Safety Practices Manual and the EG&G Radiological Operating Instructions Manual. All measures must comply ultimately with the referenced requirements.

B. Technical Tasks, Posting of the Identified Area

1. Radiological boundaries and controls will be implemented by qualified Radiological Protection Technicians (RPTs) and Environmental Operations Management (EOM)

2. Establish a 5 by 5 foot area around the hot spot by placing stakes/posts at each corner and running yellow and magenta rope around the perimeter.

3. Install signs along the boundary for clear visibility to personnel from all access routes to the area. Temporary posting signs will be used with inserts "Radiologically Controlled Area, RWP Required".

4. No material or equipment will be stored or maintained within 10 feet of the hot spot (5 feet from the boundary).

C. Resource Requirements, Posting of the Identified Area

1. Radiological Posting Material

   a. Posts/stakes

   b. Yellow and magenta rope.

   c. Four temporary radiological signs with appropriate inserts for each.

D. Technical Requirements, Part I, Characterization

1. Investigation into the identified anomaly on the 881 Hillside in order to support actions taken by the radiological posting of the area. All quantitative and qualitative information will be made available to the DOE, Colorado Department of Health (CDH) and the Environmental Protection Agency (EPA) in a formal report. This will involve (a) the identification of the radiological activity concentration and (b) the vertical and horizontal extent of the contamination.

E. Technical Tasks, Part I, Characterization

1. RE and RPM perform sampling and field measurement of the identified area using this plan and a characterized detector. The components of the plan will include the following:

   a. Field Gamma Spectroscopy of the identified anomaly. This will be provided by RE and performed according to RE Procedure 4-61199-REP-1401, Operation of the NOMAD Portable Gamma Spectroscopy System. A characterized High Purity Germanium (HPGe) Detector will be required for the task. Characterization is expected to be completed by December 9, 1992, pending access to Wind Site Facility (Completed 12/8/92).

   b. A series of field spectrum will be collected to delineate the horizontal, surficial boundaries of the anomaly. Previous data collected using the Field Instrument for the Detection of Low Energy Radiation (FIDLER) will be referenced for this task.

   c. The verticle extent of the anomaly will be characterized by obtaining a series of subsurface samples. The samples will be collected at predetermined intervals and screened using field spectroscopy. Samples will be collected using a hand shovel in accordance with EMD SOP GT.8, "Surface Soil Sampling". Samples will be packaged and labelled according to EMD SOP FO.16, "Containerization, Preserving, Handling and Shipping of Soil and Water Samples".

      1. Preliminary surface scrapes will be taken using the Colorado Department of Health Soil Sampling Technique. These will be packaged separately.

      2. Additional samples will be taken in 6 inch increments following the initial surface scrape. The maximum depth of the sampling will be 24 inches, or until activity concentrations decrease to background level as determined for OU-1. If elevated activity concentrations are identified at this time, further evaluation will be required, but no additional field actions will take place. All samples will be packaged in depth intervals.

3. Clean backfill material will be utilized to replace soil removed for sampling purposes. If sampling activities are not completed or significant activity is still detected using field screening techniques following sampling, proper controls shall be initiated to prevent the spread of contamination.

d. The horizontal extent of the surficial contamination will be determined by moving the detector to different counting locations away from the source material. A decrease in activity concentration will be used as an indicator of spot boundaries.

e. An approved Addendum to the Operable Unit 1 Health and Safety Plan will be prepared for the work conducted. A separate Radiation Work Permit will be issued for the activity.

f. ALARA practices will be followed throughout this phase of the field investigation.

F. Resource Requirements, Part I, Characterization

1. Characterized and Calibrated Portable Gamma Spectroscopy System.

2. Field sampling equipment.

3. Sample Handling and Disposal Plan.

4. Supplemental laboratory needs.

5. Approved Site Specific Health and Safety Plan Addendum.

G. Technical Requirements, Part II, Qualitative Radiological Survey

1. Definition and clarification of QRS. The QRS is focuses upon identifying the presence of anomalies exceeding background. The survey will provide a comprehensive indicator of radiological contamination based upon the results of mutilple field measurement techniques. These techniques will include in situ gamma spectroscopy, walk-over FIDLER surveys, and soil sampling. Soil sampling will provide Level 1 data.

2. Specification of Radiation Detection Instrumentation required for the QRS. RE shall require the use of the following for field work:

a. Field Gamma Germanium Spectroscopy (FGGS) survey instrument. The FGGS survey will be performed by the Environmental Science and Engineering (ESE) Group. The survey will provide real-time, in situ measurements of ^{241}Am activity in soil. The FGGS is a boom mounted, five germanium crystal detector array, multichannel analyzer (MCA) system. The system is utilized by ESE to perform in situ measurements for RI/FS and related activities.

b. Field Instrument for the Detection of Low Energy Radiation (FIDLER), or similar. This instrument will be utilized to isolate potential anomalies identified by the FGGS survey, i.e. locate hot spots. This is not intended to provide quantitative information.

c. PGSS for supplemental investigation of identified "hot spots" is recommended. This will allow for the identification of radioisotopes that comprise hot spots.

3. Development of QRS data reporting format. This shall include grid locations and reporting units as a minimum.

4. Determination of the applicability of OSHA 1910.120 and Site Specific Health and Safety Plan.

H. Technical Tasks, Part II, Qualitative Radiological Survey

Note: Information relating to the identification and determination of field anomalies is detailed in Attachment 1. This includes FIDLER survey requirements, FIDLER action level explanation, and field anomaly criteria, i.e. what activity concentration results in an anomaly. The attachment also includes an empirical determination of the application of the FGGS survey results that will prompt FIDLER surveys.

1. Performance of the field QRS within OU-1.

a. Initial screening using the FGGS system. Individual Hazardous Substance Site (IHSS) 119.1, 119.2, and 130 will be investigated. Each survey location has a 75 foot radius, with 90% of the detection coverage included in data analysis.

2. Delineation of identified hot spots within OU-1.

a. Specific locations for the FIDLER survey will be determined by in situ measurements of the FGGS. Each location is based upon a 75 foot radius around the center of the FGGS detector field of view. Each survey location with an integrated point source activity greater than 20 μCi ^{241}Am will be surveyed using the FIDLER. The specific action level for the FIDLER that will require further investigation will be 3700 cpm. This represents a 95% confidence level that the count rate of the FIDLER is above the background of the site (2492 cpm ± 1208 cpm) (Attachment 1).

In addition to the locations selected from the FGGS survey, all former drum storage areas will be investigated (Attachment 2). These additional surveys will be conducted due to the potential for leaking drums once stored at the site.

b. FIDLER surveys are to be performed by EG&G RPTs. Weather conditions and site conditions must not present significant risk to the physical safety of personnel. A representative from RE will be present at all times to assist in the field identification of any qualifying anomalies.

b. Identified anomalies will be investigated using the PGSS if they qualify as hot spots according to DOE Order 5400.5. Surfacial measurements only will be taken. Additional anomalies will be sampled.

3. Documentation of field QRS data within OU-1.

4. Documentation of delineation of identified hot spots within OU-1.

5. Compliance to Site Specific Health and Safety Plan.

I. **Resource Requirements, Part II, Qualitative Radiological Survey**

1. FGGS and related field equipment.

2. ESE support for the project.

3. FIDLER and related field equipment.

4. RPT support for the project.

5. Laboratory needs and arrangements, if necessary.

6. Approved Site Specific Health and Safety Plan Addendum.

The specific number of hours required to complete this action plan have not yet been determined. A reasonable estimate of the required number of hours is 140 total hours for Radiological Engineering and 80 hours for Radiological Operations, for development, implementation, completion, and generation of a final report. It is preferred that the identified number of hours be utilized since budget restrictions do not allow for additional funding.

VI. Deliverables

Final completion of the action plan will require a documented report of the results and potential consequences of QRS. This will include QRS grid locations, associated FIDLER readings, designated hot spots, and HPGe Spectral report and analysis. RE will provide technical assistance in the interpretation and evaluation of the field data. Recommended or required actions may not be within the scope of this work.

VII. Period of Performance

Since the plan has been incorporated into the IAG schedule for OU-1, successful completion is essential. Presently, the IAG requires the submittal of the completed OU-1 Phase III Baseline Risk Assessment. It is imperative that this Action Plan be completed within the scope for OU-1.

However, it is stressed that weather conditions and snow covering may seriously affect the completion of Parts I and II. Additionally, attaining Level II/V data may have schedule impacts.

VIII. Technical Tasks Accomplished

Preliminary findings of field activities are included in the Action Plan. Findings are in the form of a brief summary of accomplishments to date.

A. Posting of the Identified Area

Radiological posting of the identified anomaly was completed , 1992. All controls were implemented according to plant procedures. Radiological Operations performs weekly audits of the posting to insure controls are intact.

B. Part I, Characterization

Field Gamma Spectroscopy of the anomaly located within IHSS 119.1 was performed during December 1992 and January 1993. The gamma spectra collected with the PGSS prior to field sampling provided data for computer analysis of the radionuclide activity concentration in soil. The measurements using the PGSS are in situ indicators of soil radioactivity. Using the Nuclear Materials Analysis (NuMal)software,

total activity of 0.13 nCi or 110 pCi/gm for ^{241}Am and 1400 pCi/gm ^{239}Pu were identified. No significant activity was detected at locations surrounding the anomaly. An additional spectrum was collected following the removal of samples, 10 inches total depth. Analysis of the spectrum indicated an activity concentration of 120 pCi/gm ^{241}Am and 1200 pCi/gm ^{239}Pu remained in the soil (Table 1).

Table 1. Activity concentrations for identified radionuclides in soil. Analysis conducted using NuMAl software.

Spectrum Number	Depth (in.)	^{241}Am Act. (pCi/gm)	^{239}Pu Act. (pCi/g)
3829101	surface	110	1400
3829102	surface	5.5	NDA
3829103	surface	1.8	NDA
3829104	surface	NDA	NDA
3829105	10	120	1200

NDA: no detectable activity
3829101: directly over hotspot
3829102: 10′ south of hotspot
3829103: 10′ east of hotspot
3829104: 10′ northwest of hotspot
3829105: directly over hotspot

Sixteen soil samples were obtained from the anomaly on January 14 and 15, 1993. Samples were obtained using a hand trowel and shovel. Each container was screened and labeled in the field prior to transfer to a lab for screening. Each sample was counted using the PGSS, approximately 30 in. from the face of the detector. Samples were treated as point sources (Calculation 1). Gamma spectra were analyzed with the NuMal software, generating total activity detected for ^{241}Am per sample. The activity was divided by the mass, giving the activity concentration per sample (Table 2).

Calculation 1. Counting Distance.

$D_P = 10 \times D_D$

D_P = Distance of sample from detector face, in.

D_D = Diameter of detector face = 3 in.

Calc. 1. Continued.

D_p = 10 x 3 in.

D_p = 30 in.

Table 2. Field Gamma Spectroscopy analysis of soil samples obtained form IHSS 119.1 anomaly. Samples counted 76.2 cm from the detector face with the beryllium window cover removed, count time 600 sec.

Date	Depth in	Activity μCi	Mass gm	Act. Conc. pCi/gm
1/14/93	0	0.05	40	1250
1/14/93	0.75	0.74	670	1100
1/14/93	2.5	0.70	630	1111
1/15/93	4	0.53	370	1430
1/15/93	4	0.86	405	2120
1/15/93	5	0.78	450	1730
1/15/93	5	0.32	445	719
1/15/93	5	0.60	410	1460
1/15/93	6	0.54	445	1210
1/15/93	6	0.33	425	776
1/15/93	7	0.41	440	932
1/15/93	8	0.23	360	639
1/15/93	8	0.32	430	744
1/15/93	4	0.41	450	911
1/15/93	9	0.69	670	1030
1/15/93	10	0.32	590	542
1/15/93	10	0.20	670	299
1/15/93	na	nd	670	

C. Part II, Qualitative Radiological Survey

The FGGS survey has been completed for IHSSs #119.1, #119.2, and #130. The survey provided quantitative in situ measurements of ^{241}Am present in the soil of each location. The analysis of the spectra collected provided a dispersed activity concentration and point source activity derivation. This information is presented in Table 3. Specific location are plotted on Maps 1 and 3 (Attachment 2).

The field FIDLER survey is presently underway. Weather conditions and personnel availability have hampered the progress of the survey. To date, two additional anomalies have been identified out of 6 sectors investigated.

Table 3. Field Germanium Gamma Spectroscopy survey of IHSSs #119.1, #119.2, and 130.

North feet	East feet	Am-241 pCi/g	Am-142 uCi	Exposure uR/hr
748450	2085500	0	0	10.1
748450	2085650	0.65	320	10.7
748300	2085050	0.24	120	6.3
748300	2085350	0.48	240	6.74
748300	2085500	0.32	150	12.6
748300	2084450	0.19	91	6.31
748300	2084300	0	0	7.98
748300	2084600	0.19	94	5.68
748300	2084750	0	0	6.59
748300	2085200	0.48	240	7.78
748300	2084900	0.13	64	6.96
748150	2084750	0	0	7.45
748150	2084900	0.12	60	9.92
748150	2074600	0.32	160	8.17
748150	2085050	0	0	8.32
748150	2084450	0.4	190	8.17
748150	2084300	0	0	8.44
748150	2085200	0.25	120	7.96
748000	2084600	0	0	6.56
748000	2084750	0.24	120	7.84
748000	2084300	0	0	7.15
748000	2084450	0.13	65	6.99

ATTACHMENT 1
ANOMALY CRITERIA FOR FIELD APPLICATION

In order to provide guidance for performing the QRS, a background, i.e. action level, must be established for OU-1. The background established for this Action Plan is exclusive to OU-1. It is not relative to Rocky Flats Plant or global values. In addition, it is derived from FIDLER data and is to be used exclusively for this instrument. All data used to determine the background was collected during OU-1 Phase I field investigation activities.

When possible, a pre-job survey was conducted prior to drilling and/or soil sampling activities. Each location consisted of 14 discreet measurement locations. The gross cpm values is used, since it is most applicable to the QRS survey. By determining the mean of the sample population (FIDLER readings), a background level os 3700 cpm was identified. This represents a 95 % confidence level that the count rate is above the background of the site (Calculation 1).

Calculation 1. Determination of Site Background for FIDLER.

The calculated mean was obtained from a population of 749 FIDLER readings. The counts selected are gross cpm. The value of the background represents a 95% confidence level.

$\beta = \chi \pm 1.96\sigma$

β = FIDLER background

χ = mean

σ = standard deviation

β = 2492 cpm $\pm$ 1.96(616 cpm)

β = 2492 cpm $\pm$ 1207 cpm

β = 3700 cpm

Field anomalies are small areas that exhibit levels of residual contaminants that exceed or are above the average levels of the site. The presence of anomalies indicates that the assumption of homogeneous distribution is incorrect. Therefore, the impact of such areas must be evaluated as to the effect upon larger areas. DOE Order 5400.5 and DOE/CH-8901 provide specific guidance as to the identification and quantification of anomalies. These documents have been utilized to develop a methodology for the performance of field radiological surveys. The purpose of the methodology is to identify anomalies.

The following information concerning anomalies is taken from DOE/CH-8901, Section 3.3.2, Hot Spot Criteria for Field Application.

> Hot spots are small areas that have levels of residual radioactive material that are considerably above the levels in the surrounding area. The derivation of remedial action criteria generally assumes homogeneous contamination of large areas (several hundred square meters or more), and the derived concentration guide is stated in terms of concentrations averaged over an area of 100 m^2. Because of this averaging process, within these 100 m^2 areas hot spots can exist that contain concentrations of radionuclides that area significantly higher than the authorized limit. Therefore, the presence of hot spots could potentially pose a greater risk of exposure to individuals using the site than the risk associated with homogeneous contamination. In order to ensure that individuals are adequately protected and to ensure that the ALARA process is satisfied, the following hot spot criteria must be applied along with the general criterion for homogeneous contamination. The hot spot criterion for field application is
>
> $$M = \Sigma_i \; S_i/G_i(t_m) \leq 1$$
>
> where
>
> M = hot spot mixture sum for field use,
> S_i = measured concentration of the ith principle radionuclide in the hot spot (pCi/g), and
> $G_i(t_m)$ = single radionuclide soil guideline for the ith principal radionuclide in the hot spot (pCi/g).
>
> The measure hot spot concentrations S_i are the peak concentrations if the hot spot area is 1 m^2 or less or the average concentrations if the hot spot area is larger than 1 m^2.
>
> The formula for single radionuclide, hot spot soil guidelines is
>
> $$G_i = G_i(t_m) \times (100/A)_{1/2}$$
>
> where
>
> $G_i(t_m)$ = as defined for Equation 3.4 (Residual Soil Guideline)
> A = area of hot spot (m^2), and
> $(100/A)^{1/2}$ = hot spot multiplication factor.

The Manual goes on to provide an interpretation and application of the values obtained. The basic intent is to provide a usable methodology for determining anomalies with derived residual guidelines.

A RESRAD analysis has been conducted using site specific radiological constituents present in OU-1. Using this site specific information, a residual guideline has been derived for ^{239}Pu and ^{241}Am. They are 33 pCi/g and 230 pCi/g, respectively, for ^{239}Pu and ^{241}Am. These values are derived from a conservative,

farm habitat scenario, dose assessment with a limiting annual limiting dose of 100 mrem/yr. Applying these values to the equation for a single radionuclide,

$G_i(t_m)$ = 33 pCi/g for ^{241}Am
$G_i(t_m)$ = 230 pCi/g for ^{239}Pu

an action level may be determined for ^{239}Pu and ^{241}Am (Table 1). The same equation may be applied to the FIDLER readings. Substituting the action level count rate of 3700 cpm, initial criteria for hot spots may be established based upon the specific surface area (Table 1). It is important to note that the FIDLER survey provides a screening methodology for the initial screening of potential anomalies.

Table 1. Action Levels for ^{239}Pu, ^{241}Am, and FIDLER Readings based upon ranges for Hot Spot Multiplication Factors.

Range	Hot Spot Mult. Factor	FIDLER, G_i cpm	Am-241, G^i pCi/g	Pu-239, G_i pCi/g
<1 m^2	10[a]	37000	330	2300
1 - <3 m^2	6	22200	198	1380
3 - <10 m^2	3	11100	99	690
10 - <25 m^2	2	7400	66	460

[a]Areas less than 1 m^2 are to be averaged over a 1 m^2 area. and that average shall not exceed 10 times the authorized limit.

For the supplemental radiological survey conducted at the 881 Hillside, a presite screening was conducted using the Field Germanium Gamma Spectroscopy (FGGS). Analysis of the spectra provided two sets of data. The first set provided an indication of the homogenous distribution of ^{241}Am, pCi/g, over a 1.76×10^4 m^2 area, with a depth of 3 cm. The second set provided the total activity associated with a point source that was calculated to lie at the edge of the field of view of the detector. The point source represented the integration of the total activity of the entire field of view into one single location.

Using the Action Level for the <1 m^2 range, a screening value for the integrated point source activity can be determined. A value of 21 μCi for ^{241}Am and 145 μCi for ^{239}Pu was established (Calculation 1). An isotope specific, integrated point source value exceeding these values, requires a FIDLER survey.

Calculation 2. FGGS Integrated Point Source Action Level.

Assume a homogenous distribution in a cylinder of soil, with a surface area of 1 m^2 ($1x10^4$ cm^2).

$V = \pi r^2 h$

$r = 56$ cm

$h = 3$ cm

$V = 3x10^4$ cm^3

Determine the gram quantity of soil of V,

$M = V\rho$

$V = 3x10^4$ cm^3

$\rho = 2.1$ g/cm^3 (mean of average 1.6 - 2.6 g/cm^3)

$M = 6.3x10^4$ g

A_{Am-241} = Total Activity (μCi) for 1m^2 surface area, 3 cm depth

$= MG_i$

$M = 6.3x10^4$ g

$G_i = {}^{241}Am$

$= 330$ pCi/g

$A_{Am-241} = 2.1x10^7$ pCi

$= 21$ μCi

$A_{Pu-239} = 1.45x10^9$ pCi

$= 145$ μCi

It is stressed that this is a preliminary application of the FGGS field data. Further empirical investigation into it's use is warranted.

An additional criteria for FIDLER walk over surveys will be applied. All areas known to or suspected to have been drum storage areas within IHSS 119.1, 119.2, and 130 will be surveyed. This is related directly to the potential for leaking drums.

SPECIAL REPORT

OPERABLE UNIT - 1, 881 HILLSIDE

ROCKY FLATS PLANT

SUPPLEMENTAL SURFACIAL RADIOLOGICAL CHARACTERIZATION

Submitted by

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Environmental Restoration Management

EG&G Rocky Flats Plant, Inc.

EXECUTIVE SUMMARY

Elevated radiological contamination was detected during a routine radiological survey performed to support maintenance activities on a groundwater monitoring station, Well Number 3829, at the Rocky Flats Plant. The contamination consisted of a small, isolated location north east of the well head. The surface area of the radiological contamination was approximately 0.3 m^2. In order to determine the extent and nature of the radiological contamination at the well, i.e. hotspot, and determine if additional anomalies existed, a supplemental field investigation was initiated. The field investigation was conducted at Operable Unit-1, within Individual Hazardous Substance Sites (IHSSs) 119.1, 119.2, and 130. The investigation involved the use of a Portable Gamma Spectroscopy System, a Field Germanium Gamma Spectroscopy System, and a Field Instrument for the Detection of Low Energy Radiation (FIDLER). The instrumentation utilize in situ measurement techniques to provide contamination level indicators. Physical soil sampling of the identified hotspots was also conducted. The investigation identified a total of four radiological anomalies, two of which indicated elevated activity concentrations of Americium-241 and Plutonium-239. The remaining anomalies showed activity concentrations of Uranium isotopes above the background levels established for Operable Unit-1.

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INTRODUCTION

The purpose of this report is to discuss supplemental field investigation activities that were conducted as part of the Phase I RCRA Facility Investigation (RFI) Remedial Investigation (RI) activities conducted for Operable Unit (OU) 1, 881 Hillside. These activities were conducted to characterize an identified radiological anomaly; perform field surveys to locate and characterize any additional radiological anomalies that may be present within Individual Hazardous Substance Site (IHSSs) 119.1, 119.2, and 130.

Prior to maintenance activities on a groundwater monitoring station (Well Number 3829) within IHSS 119.1, at OU-1 in August, 1992, a prejob site survey for radiological contamination was performed using a Field Instrument for the Detection of Low Energy Radiation (FIDLER). During this survey, an isolated area of elevated radiological contamination in soil was detected. The area of contamination was roughly $0.3m^2$. The highest Initial readings obtained using the FIDLER were 8000 count per minute (cpm). The activity detected by the FIDLER was determined to be a "hotspot" (DOE Order 5400.5, 1990). Herein referred to as location SS100493. The term hotspot refers to an isolated area of residual contamination that meets the criteria as defined in DOE Order 5400.5. In contrast, an anomaly is an isolated area that significantly exceeds the average background of a site.

In order to further characterize the hotspot and determine if other anomalies were present within IHSS 119.1, 119.2, and 130, a supplemental radiological characterization effort was initiated. An Action Plan was developed to conduct a Qualitative and Quantitative Radiological Survey (QQRS) (Appendix A).

The Action Plan included program planning, development criteria, and field implementation directives. A phased approach was followed, which detailed a two part field characterization effort. Part 1 established radiological controls of the hotspot and provided for the identification of the extent and character (i.e. radiological activity concentration) of contamination of SS100493. Part 2 established field activities intended to identify any further radiological anomalies that may be present in IHSSs 119.1, 119.2, and 130. For Part 1 and 2, in situ measurements using a portable, high resolution, high purity germanium (HPGe) detection systems and the FIDLER were performed. The in situ measurements using

the HPGe detection systems and subsequent manipulation of the gamma spectrum provided an indication of the spatial distribution of the radioactive material in soil media.

Basic Theory

In situ measurements were performed using the Portable Gamma Spectroscopy System (PGSS) and a HPGe Field Germanium Gamma Spectroscopy (FGGS). Both systems are capable of generating realtime spectrum of photon energies of 10 to 3000 keV. Each consists of a liquid nitrogen cooled HPGe Detector coupled with a self contained portable multichannel analyzer (MCA). The MCA provides an integrated, realtime display of field generated spectrum. A characterized detector that was calibrated on a daily basis was utilized for the task. Vertical contamination was characterized by obtaining subsurface soil samples and screening them using the PGSS.

An initial screen of the hotspot using the PGSS, indicated that the primary contaminants were Americium-241 (^{241}Am) and Plutonium-239 (^{239}Pu). Based upon this, ^{241}Am was selected as the contaminant of concern, in that it is a gamma emitter that can provide an indirect measure of the presence of plutonium.

Measurement of low levels of plutonium, specifically ^{239}Pu, is extremely difficult, if not impossible in field situations. This is particularly true for in situ detection techniques. Americium-241, a decay progeny of ^{241}Pu, is in close association with ^{239}Pu if sufficient decay time has elapsed. This is due to the simultaneous existence of the plutonium isotopes, although ^{241}Pu accounts for a small percentage. This phenomenon allows for the ^{241}Am to be utilized as an indicator of the ^{239}Pu activity. If a known ratio between the two radionuclides exists, the activity of ^{239}Pu can be inferred from the direct measurement of the ^{241}Am. For the purpose of investigation at the 881 Hillside, the ratio of ^{239}Pu to ^{241}Am is expected to lie between 5 and 7 (Boyns, P. K., 1989).

Americium-241 emits a series of photons as it undergoes radioactive decay that are detectable by spectroscopy (Figure 1). 104 gammas are emitted, 101 of which are of weak energies, which are often undetected by a field gamma spectroscopy system without long count times. The gamma photon which occurs with the greatest frequency and energy is the 59.5370 keV photon (Brodsky, 1978). The

frequency and energy of this photon provides sufficient voltage potential for the detection of ^{241}Am by spectroscopy even when activity concentrations are low.

^{241}Am

Primary Gamma Decay

26.345 keV, 2.58%

33.200 keV, 0.1125%

59.537 keV, 36.3%

Figure 1 Decay scheme for Americium-241 with primary photons shown.

In situ measurements are effected by interferences of media with the gamma photons causing a loss of kinetic energy. The rate of the energy loss in the media is expressed by the fluence rate. The fluence rates for in situ measurements in soil are based upon attenuation coefficients for air and for "typical" soil with a moisture content of 10% (HPRRH, 1992). The mass attenuation coefficient, μ_p, is extremely sensitive for energies less than 100 keV. An increase in the μ_p will result in an equal decrease in the fluence rate. Therefore, when determining the accuracy of low energy gamma photon detection, comparative readings using soils of varying densities were conducted (Rieman, RT, 1990). This information was used in the development of data analysis software.

The collection of field measurements using the PGSS and the FGGS involve placing the detector at a specific height above the counting surface (ground) and collecting a spectrum. It is essential that the height be known, in that the detector intercepts uncollided photons originating from a large area. The spectrum collected by the system is effectively an average of the energies detected. The height above the ground will determine the horizontal field/area of view. The distribution of the source in the soil and its proximity to the surface will also effect the viewing area and the interaction of the uncollided photons with the detector. Nonhomogeneous radioactive contamination that lies directly on the surface can increase the viewing by as much as 50% (Miller, Shebell, and Klemic, 1993). Therefore, when

conducting in situ measurements of environmental soil media, the general assumption of homogeneous distribution of the radioactive contamination to a depth of 3 cm is made for spectral analysis purposes.

METHODS AND MATERIALS

In situ measurements were obtained of SS100493 using the PGSS. Subsequent measurements were obtained for the entire area of IHSSs 119.1, 119.2, and 130 using the FGGS System. Spectra were collected using the truck mounted six crystal array detector. The detector was secured at a 10 foot height above the counting surface, i.e. ground, establishing a 75 foot radius field of view, with 90% of the detection coverage included in data analysis. Selected locations for the FIDLER walkover survey were determined by reviewing the in situ measurements obtained from the FGGS. Each location was based upon a 75 foot radius around the center of the FGGS detector field of view. Each location with an integrated point source activity greater than 20 microCurie (μCi) ^{241}Am was evaluated for a survey by the FIDLER (Appendix B). The areas selected for the survey were actually those which exceeded 100 μCi calculated point source. The action level for the FIDLER was determined to be 3700 cpm (Ebasco, 1992). This level represented 95% confidence interval that the count rate of the FIDLER was above background for the site (2492 cpm +/- 1208 cpm) (Appendix C). Anomalies identified as a result of the FIDLER survey were investigated with the PGGS.

Field Activities

The order in which the activities were conducted in the field where driven by the Action Plan. The immediate objective of the field investigation was the characterization of hotspot located next to Well Number 3829, location SS100493. Following this activity, the focus became determining if additional anomalies existed within the selected IHSSs. This involved narrowing a broad scoped FGGS survey to isolated sectors for the FIDLER survey. The sequential order of tasks performed in the field is as follows:

1. Collect gamma spectrum of SS100493 using the PGSS. Perform subsequent analysis of spectrum collected to identify radioisotopes present in the soil.

2. Collect surfacial and subsurface soil samples at location SS100493 for field screening and laboratory analysis.

3. Collect gamma spectrum of IHSSs 119.1, 119.2, and 130 using the truck mounted FGGS System. Perform subsequent manipulation of spectrum collected to identify homogeneous distribution of identified radioisotopes and point source derivations for ^{241}Am.

4. Perform and document FIDLER walkover survey of selected locations.

5. Collect gamma spectrum of any additional anomalies identified by the FIDLER survey. Perform subsequent manipulation of spectrum collected to identify radioisotopes present in the soil.

6. Collect surfacial and subsurface soil samples at locations SS100193, SS100293, and SS100393 for field screening and laboratory analysis.

Radiological Controls

Radiological posting and control of the hotspot was done to minimize intrusive contact with the contaminated soil. All actions were in accordance with DOE Order 5480.11, Radiation Protection of the Occupational Worker. A 5' by 5' area was established by placing posts at each corner and running yellow and magenta rope around the perimeter. Temporary posting to communicated the radiological hazard were installed.

Portable Gamma Spectroscopy System

The PGSS utilized for the in situ measurements of the hot spot is a liquid nitrogen cooled HPGe detector coupled to the EG&G ORTEC NOMAD 92X-P, which provides for an integrated signal to the MCA emulation software. The NOMAD provides for an integrated spectrometer suitable for stand alone operation with the HPGe detector. A user controlled, live spectral analysis display and first line analysis emulation software system provides for real time indicators of specific photon energies detected from radioisotopes. The PGSS is a durable, easily transported system, that requires no external energy sources for field operations. (EG&G ORTEC, 1991).

The detector is an EG&G ORTEC, LO-AX Series, HPGe Coaxial Low-Energy Photon Spectrometer. It is an n-type crystal, that exhibits low background and noise, high efficiency and resolution, and maintains an optimum peak-to-peak ratio of 10 to 400 keV. This high peak-to-peak ration allows for the discrimination of low energy photons (EG&G ORTEC, 1991).

The detector was characterized using laboratory point source angular response measurements. This effort is not to be confused with the operational calibration. The characterization is intended to evaluate the detection capabilities and limits of the HPGe detector. The information obtained from the measurements underwent a sensitivity computation, determining the individual response for specific energies. Conversion factors were generated based upon the angular response of the detector, which provided the absolute and relative efficiencies of the PGSS.

An operational calibration was performed for the PGSS prior to each use in accordance with EG&G Rocky Flats, Radiological Engineering Procedure 4-16100-REP-1401, "Operation of the NOMAD Portable Gamma Spectroscopy System". The emulation software used on the PGSS is the EG&G ORTEC, ADCAM 100 Maestro™ Emulation Software, Model A64-B1, Version 01.20, Copyright 1991. Spectral analysis was conducted using the Nuclear Material Analysis program (NuMAI), a germanium, gamma ray spectrum, peak search computer program. NuMAI produces results in a concentration term of picoCuries per gram (pCi/gm) of soil.

The horizontal extent of the surfacial contamination was determined by moving the detector to different counting locations away from the source material. A decrease in activity concentration, i.e. concentrations reflective of the site/area background, delineated the hotspot boundaries. Considerations such as shine were taken into account when delineating the horizontal extent of the contamination. This was also conducted at locations SS100193, SS100293, and SS100393. These were identified by the FIDLER survey. However, the size was not delineated for these locations. The detector was placed 1 meter above the ground on a tripod unit (Figure 2).

Field Instrument for the Detection of Low Energy Radiation

The FIDLER is a thin window inorganic scintillation detector, Bicron G-5, coupled to a single channel analyzer (SCA), Bicron Analyst meter, equipped with a scaler option. The FIDLER is primarily used for field gamma-ray measurements, providing a qualitative measurement of low energy radiation sources. The discriminator is set to detect events in the 60 keV range, primarily x-rays from transuranics (Radiological Operating Instructions, Procedure 6.5, 1993).

The FIDLER detector is comprised of an inorganic scintillation crystal coupled to a photomultiplier tube (PMT). The crystal is maintains a valence and conduction bands that are separated by electron energy gaps generated by an electron activator. When a charged particle or incident photon interacts with the crystal, it promotes electrons from the valence band into the conduction band. This process generated "electron holes", which lead to a decayed ionization photon; this process generates photons in the visible range, i.e. photoionization. The PMT multiplies the photons so that an electronic pulse may be generated. This pulse is then processed by the SCA (Turner, 1986).

The FIDLER is calibrated to a range of 60 keV ± 10 keV. Daily performance checks are conducted to ensure appropriate energy response.

The walk over FIDLER survey was conducted around 150' foot diameters of the locations identified by the Germanium Gamma Survey. Readings identified as anomalies were marked using flagging tape. These were then investigated further for quantitative activity concentrations with the PGSS.

Field Germanium Gamma Spectroscopy

The FGGS System is a portable gamma spectroscopy system utilized by EG&G Rocky Flats, Inc. for field measurements. A description of a similar system is as follows and pictured in Figure 3 (Boyns, P. K., 1990)

> Gamma ray spectral data were collected with nitrogen-cooled high purity germanium (HPGe) detectors. The gamma signals were processed using 4,096-channel, multichannel analyzers. The measurements were conducted with two systems. **One** system was mounted to a 4-wheel drive vehicle with the detector heights between ground level and 7.4 meters. The vehicle was also equipped with a generator that supplied the power to data processing equipment which allows immediate analysis of the acquired data.

The six crystal array detector is mounted to a remotely adjustable boom. The height of the boom was set at 6.5 meters following a systematic adjustment. Characterization and calibration of the FGGS is conducted in the same manner as previously discussed for the PGSS. Spectrum locations were identified using the Global Positioning System (GPS). The GPS operates on a real time differential to delineate coordinatal identifiers with a 1-2 meter accuracy. The spectrum locations are verified against State of Colorado benchmarks. FGGS survey locations are plotted on Figures 4 and 5.

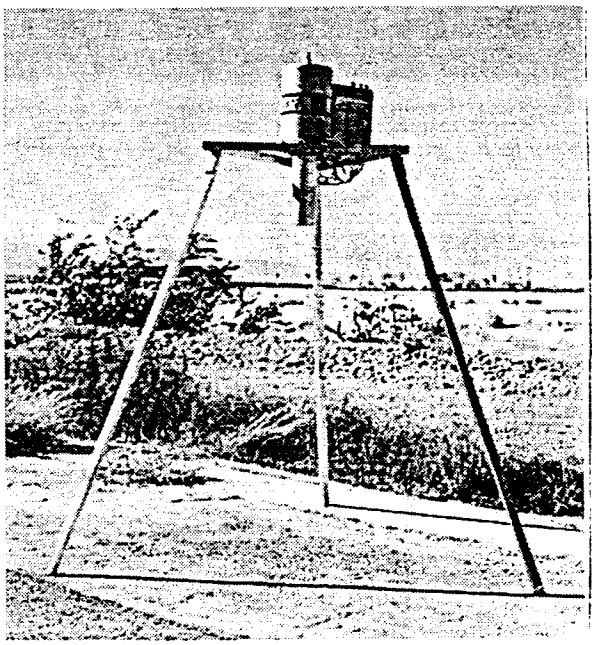

FIGURE 2. IN SITU GERMANIUM DETECTOR SYSTEM AND MULTICHANNEL ANALYZER MOUNTED ON A TRIPOD

FIGURE 3. IN SITU GERMANIUM DETECTOR SYSTEM AND SUBURBAN

Field Soil Sampling

Soil samples of the hotspot, SS100493, were collected at depths as excavation permitted and screened using the PGSS. Samples were collected using a hand shovel in accordance with EMD SOP GT.8, "Surface Soil Sampling". Samples were taken in one inch intervals as material was collected. All samples were packaged and labeled appropriately. Preliminary surface scrapes were taken using the Colorado Department of Health Soil Sampling Technique. This determines the potential for wind blown contamination by sampling only surfacial contamination. Additional samples were taken to a maximum depth of ten inches. Soil samples for semi and volatile organic analysis (VOA) and radioactive analysis were obtained from all identified anomalies, SS100193, SS100293, SS100393, and SS100493, by subcontractor support. A hand auger was used to obtain samples until refusal was met. Sampling intervals are detailed in Table 6.

Soil Sample Screening

Field samples were screened using the PGSS in a laboratory setting. Sample containers were weighed for mass using a tared scale. They were then placed 30 in from the face of the detector, counted, and analyzed as point sources (Appendix D).

RESULTS

Field activities provided a variety of radiological characterization data of the identified hotspot (SS100493) and IHSS 119.1, 119.2, and 130. The gamma spectra collected in January 1993 using the PGSS of SS100493 prior to field sampling provided data for analysis of radionuclide activity concentration in the soil. Analysis of the spectrum indicated a total activity of 13 μCi or 110 pCi/gm. ^{239}Pu activity concentration was at least 7.1 x 10^4 pCi/gm. No significant activity was detected at the sampling locations surrounding the hotspot. An additional spectrum was collected of the hotspot following removal of a 10 in. depth of soil. Analysis of the spectrum indicated an activity concentration of 120 pCi/g for ^{241}Am and 1200 pCi/gm for ^{239}Pu (Table 1).

Table 1. Activity concentrations for identified radionuclides in soil, SS100493. Analysis conducted using NuMAI software.

Spectrum Number	Depth (in.)	^{241}Am Act. (pCi/gm)	^{239}Pu Act. (pCi/g)
3829101	surface	110	1400
3829102	surface	5.5	NDA
3829103	surface	1.8	NDA
3829104	surface	NDA	NDA
3829105	10	120	1200

NDA: no detectable activity
3829101: directly over hotspot
3829102: 10' south of hotspot
3829103: 10' east of hotspot
3829104: 10' northwest of hotspot
3829105: directly over hotspot

Sixteen soil samples were obtained from SS100493 on January 14 and 15, 1993. Samples were obtained using a hand trowel and shovel. Each container was screened in the field using the PGSS and labeled in the field prior to transfer to a lab for screening. Each sample was then counted using the PGSS, approximately 30 in. from the face of the detector. Samples were treated as point sources (Appendix D). Gamma spectra were analyzed with the NuMAI software, generating total activity detected for ^{241}Am per sample (Table 2). This information is plotted activity per gram versus depth to illustrate the contamination ranges (Figure 6).

Table 2. Field Gamma Spectroscopy analysis of soil samples obtained from IHSS 119.1 hotspot, SS100493. Samples counted 76.2 cm from the detector face with the beryllium window cover removed, count item 600 seconds, January 14 and 15, 1993.

Depth inches	Activity μCi	Mass gm	Act. Conc pCi/gm
0.00	0.05	40	1250
0.75	0.74	670	1100
2.50	0.70	630	1111
4.00	0.53	370	1430
4.00	0.86	405	2120
5.00	0.78	450	1730
5.00	0.32	445	719
5.00	0.60	410	1460
6.00	0.54	445	1210
6.00	0.33	425	776
7.00	0.41	440	932
8.00	0.23	360	639
8.00	0.32	430	744
4.00	0.41	450	911
9.00	0.69	670	1030
10.00	0.32	590	542
10.00	0.20	670	299
na	nd	670	

The FGGS survey was conducted by the EG&G Environmental Sciences and Engineering Group in late January early February, 1993. Spectrum collected in the field were analyzed using the NuMAI software. Locations which exceed 100 μCi, ^{241}Am, calculated point source activity were selected for the FIDLER walkover survey. The analysis of the spectrum produced integrated activity concentrations for Potassium-40, Radium-226, Thorium-232, Uranium-235, Cesium-137, and ^{241}Am (Table 3).

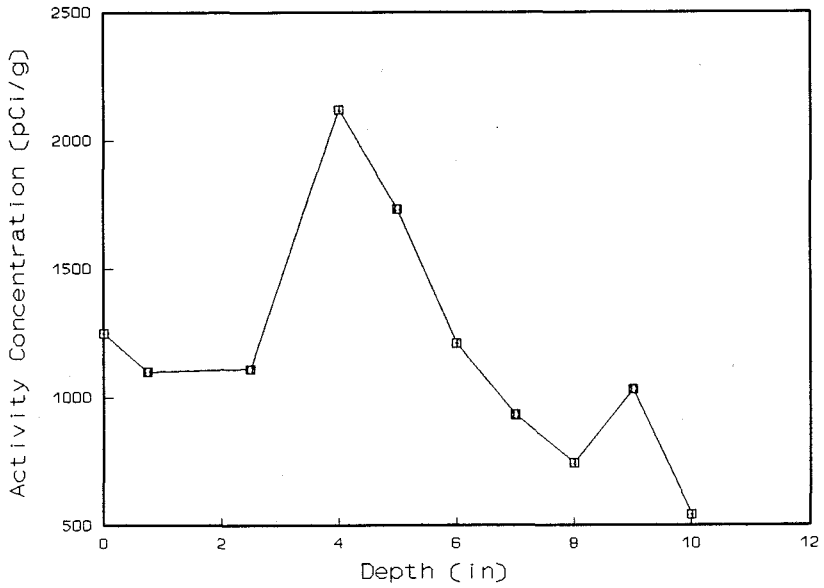

Figure 6. Soil sample screening results for ^{241}Am (pCi/g) activity concentration versus depth, February, 1993.

Table 3 Field Germanium Gamma Spectroscopy survey of Operable Unit-1 IHSS 119.1, 119.2, and 130, February 9, 1993.

North Feet	East Feet	K-40 pCi/g	Ra-226 pCi/g	Th-232 pCi/g	U-238 pCi/g	U-235 pCi/g	Cs-137 pCi/g	Am-241 pCi/g	Am-241 μCi	Exposure μR/h
748450	2085500	17.3	0.748	0.923	1.48	0.0455	0.0957	0	0	10.1
748450	2085650	14.6	0.791	1.09	1.3	0.0699	0.221	0.65	320	10.7
748300	2085050	10.8	0.78	0.957	1.22	0.0754	0.338	0.24	120	6.3
748300	2085350	11.1	0.779	1.16	1.4	0.0647	0.354	0.48	240	6.74
748300	2085500	16	0.956	1.28	1.49	0.0791	0.349	0.32	150	12.6
748300	2084450	9.2	1.01	0.664	1.59	0.0616	0.184	0.19	91	6.31
748300	2084300	12.4	1.37	1.19	1.85	0.0374	0.114	0	0	7.98
748300	2084600	7.96	0.869	0.887	1.79	0.0602	0.192	0.19	94	5.68
748300	2084750	10.3	0.933	1	1.53	0.0756	0.297	0	0	6.59
748300	2085200	12.5	0.975	1.28	1.57	0.0897	0.425	0.48	240	7.78
748300	2084900	11	1.07	1.08	1.76	0.0779	0.281	0.13	64	6.96
748150	2084750	11.2	0.924	1.29	3.45	0.11	0.169	0	0	7.45
748150	2084900	12.6	0.843	1.45	2.08	0.112	0.217	0.12	60	9.92
748150	2084600	10.9	0.688	1.03	1.67	0.0577	0.162	0.32	160	8.17
748150	2085050	13.4	0.943	1.51	1.99	0.095	0.262	0	0	8.32
748150	2084450	12.7	1.2	1.26	1.51	0.0497	0.0841	0.4	190	8.17
748150	2084300	14.5	1.09	1.36	1.38	0.0651	0.097	0	0	8.44
748150	2085200	12.8	1.1	1.28	1.79	0.0624	0.295	0.25	120	7.96
748000	2084600	11.1	0.699	1.1	1.69	0.0733	0.321	0	0	6.56
748000	2084750	13.4	0.843	1.31	1.95	0.104	0.178	0.24	120	7.84
748000	2084300	12	0.994	1.05	1.49	0.0494	0.222	0	0	7.15
748000	2084450	11.7	0.847	1.16	1.56	0.075	0.327	0.13	65	6.99

The FILDER walkover survey was conducted by EG&G Radiological Control Technicians (RCTs); one recorded data while two performed the FIDLER walkover survey; under the technical direction of Radiological Engineering (RE). The radiological survey was performed according to the Action Plan and RFP Procedure ROI-6.6, "Use of the Bicron FIDLER (Field Instrument for the Detection of Low Energy Radiation)". Survey areas encompassed a 75 foot radius around a focal point marked in the field by the FGGS Crew. The northern and eastern coordinates were logged on the survey forms. The average background countrate of each sector was recorded. Additionally, the countrates at discreet locations were annotated (Table 4). Samples forms used for the documentation of surveys are located in Appendix E.

Three locations (SS100193, SS100293, and SS100393) which exceeded 3700 cpm were identified from the FILDER walkover survey. The areas were carefully delineated by logging the decrease in the countrate as the FIDLER was moved away from the anomaly. The surface area of each anomaly did not exceed 1 ft^2. The countrates for each identified anomaly using the FIDLER were 1) 8193 cpm [SS100193], 2) 3667 cpm [SS100293], and 3) 3494 cpm [SS100393]. Gamma spectrum were collected of the anomalies with the PGSS and analyzed using the NuMAI software (Table 5). The spectrum did not indicate significant levels of radioisotopic contamination that would qualify these anomalies as hotspots using DOE Order 5400.5 criteria.

Soil sampling of SS100193, SS100293, and SS100393 was conducted by EG&G subcontractor support. Sampling was conducted in accordance with EMD SOP GT.8, "Surface Soil Sampling". Samples were analyzed for semi-VOAs, VOAs, metals, and selected radionuclides. Data for the selected radionuclides is presented in Table 6.

Table 4. FIDLER walkover survey of selected locations within Operable Unit-1, IHSS 119.1, 119.2, and 130, January/April, 1993.

North Feet	East Feet	FIDLER Location	Scaler cpm	Background cpm
748300	2085050	1	2150	2000
748300	2085050	2	1908	2100
748300	2085050	3	2064	2100
748300	2085050	4	2130	2100
748300	2085050	5	2237	2300
748300	2085050	6	2131	2100
748300	2085050	7	2178	2100
748300	2085050	8	2049	2000
748300	2085050	9	2126	2100
748300	2085200	1	2549	2300
748300	2085200	2	2178	2000
748300	2085200	3	2231	2100
748300	2085200	4	1937	2000
748300	2085200	5	2012	2000
748300	2085200	6	2177	2100
748300	2085200	7	2146	2000
748300	2085200	8	2250	2000
748300	2085200	9	2064	2100
748150	2084450	1	2962	3000
748150	2084450	2	3117	3000
748150	2084450	3	3002	3000
748150	2084450	4	2996	3000
748150	2084450	5	3018	3000
748150	2084450	6	3198	3000
748150	2084450	7	3077	3000

Table 4. Continued.

North Feet	East Feet	FIDLER Location	Scaler cpm	Background cpm
748150	2084450	8	3250	3000
748150	2084450	9	3207	3000
748150	2084600	1	3129	3000
748150	2084600	2	2715	3000
748150	2084600	3	2926	3000
748150	2084600	4	3157	3000
748150	2084600	5	3099	3000
748150	2084600	6	3031	3000
748150	2084600	7	2649	3000
748150	2084600	8	2957	3000
748150	2084600	9	3281	3000
748150	2085200	1	1874	2100
748150	2085200	2	2140	2000
748150	2085200	3	1779	2000
748150	2085200	4	1834	2100
748150	2085200	9	2217	2000
748000	2084750	1	1756	1700
748000	2084750	2	1763	1700
748000	2084750	3[1]	8193	1600
748000	2084750	31	1531	1600
748000	2084750	32[2]	3667	1600
748000	2084750	33	1667	1600
748000	2084750	4[3]	202920	1600

[1]SS100193

[2]SS100293

[3]SS100493

Table 4. Continued.

748000	2084750	41	1609	1600
748000	2084750	42	3980	1600
748000	2084750	43	25295	1600
748000	2084750	9	1789	1700
748300	2085500	1	1538	1700
748300	2085500	2	1650	1700
748300	2085500	3	2151	2000
748300	2085500	4	2008	2100
748300	2085500	9	2035	2100
748450	2085650	4	2273	2100
748450	2085650	5	1807	2200
748450	2085650	6	3494[4]	3000
748450	2085650	7	2082	2300
748450	2085650	8	1977	2400
748450	2085650	9	1925	2000

Table 5. Activity concentrations for identified radionuclides in soil (SS100193, SS100293, SS100393). Spectrum obtained using the PGSS at 1 meter, analysis conducted using NuMAI software, April, 1993.

Spectrum Location	Am-241 pCi/g	Pu-239 pCi/g	U-235 pCi/g	U-238 pCi/g
SS100193	N/D	N/D	8.10	0.671
SS100293	2.70	N/D	3.63	0.533
SS100393	0.85	N/D	2.62	0.143

[4]SS100393

Table 6. Analytical results of supplemental soil samples collected by subcontract support of radiological anomalies, SS100193, SS100293, SS100393, and SS100493, April, 1993.

Sample Location	Sample I.D.	Depth	Am-241 pCi/g	Pu-239 pCi/g	U-233 pCi/g	U-235 pCi/g	U-238 pCi/g
SS100193	SS10002ST	0.25 in	0.029	0.074	6.09	0.176	3.38
SS100193	SS10003ST	1.40 ft	0.049	0.133	429	14.6	122
SS100293	SS10004ST	0.25 in	0.153	0.429	25.4	0.843	1.39
SS100293	SS10005ST	2.00 ft	0.192	0.878	240	6.23	1.51
SS100293	SS10006ST	3.70 ft	0.037	0.054	8.27	0.301	0.779
SS100393	SS10007ST	0.25 in	4.15	22.7	1.49	0.107	0.892
SS100393	SS10008ST	1.00 ft	1.90	14.7	0.64	0.0557	0.75
SS100493	SS10001EG	0.75 in	2650	11100	9.68	0	4.69
SS100493	SS10002EG	5.00 in	4260	17400	7.46	0.92	8.22
SS100493	SS10003EG	9.00 in	2010	6670	0.91	2.07	1.22

CONCLUSION

The methodology followed for the supplemental survey dedicated a wide range of techniques intended to qualify and quantify the presence of radiological contamination. The end result of the survey provided indicators of overall radiological contamination within IHSS 119.1, 119.2, and 130, as well as anomalies identified. The use of the FGGS and the PGSS through in situ gamma-ray spectroscopy successfully provided a rapid and accurate assessment of radionuclides in the soil environment. This technique is theoretically and operationally sound and extremely effective as a practicable, portable field measurement tool. The spectra collected in the field and the subsequent manipulation using the NuMAI emulation software, provided an expedient indicator of contaminants present with minimal cost and effort.

Significant difficulties were encountered during the initial sampling conducted at SS100493 hotspot. A large rock was encountered at 10 inches. This prevented efforts to sample to the 24 inch maximum depth, which may have allowed for a complete horizontal characterization of the contamination. As it is, the vertical extent of the contamination was not determined. The horizontal extent of the contamination was determined in the field and is roughly 0.3 m^2. This was also verified by the PGSS and FIDLER surveys conducted of the SS100493 hotspot.

The locations selected for the FGGS survey differed from those indicated by the action plan. Only locations that exceeded 100 μCi derived point source activity were selected. Documentation of the survey for one of the locations was unable to be located. This decision was made due to the actual probability of a hotspot following the initial surveys, and personnel support available. Based upon the actual hotspots identified in the field, the likelihood of anomalies not being identified is extremely small.

The review of the supplemental soil sample data showed elevated levels of ^{233}U, ^{235}U, and ^{238}U at locations SS100193 and SS100293. These locations were identified during the walkover surveys conducted by the RCTs. Although the FIDLER was calibrated to detect the 59.5 keV gamma-ray emitted by ^{241}Am, the instrument identified the hotspot. As stated previously, the FIDLER is a MCA with a set energy band that provides a gross indicator (cpm) of radiological contamination. This band may be 10 to 20 keV in range. The instrument fails to discriminate gamma and x-rays energies which may be emitted by varying sources. The presence of ^{238}U in the soil sampled from SS100193 and SS100293 substantiates the abilities of the FIDLER. Thorium-234 (^{234}Th) is a decay progeny of ^{238}U and reaches secular equilibrium with the parent (^{238}U) in approximately 180 days. Since the source material has been at the site greater than 180 days, the activity concentration of ^{234}Th is equal to that of ^{238}U. The transuranic, long lived, nature of the ^{238}U isotope would thus indicate its presence if the progeny, ^{234}Th is detected. Therefore, the FIDLER identified SS100193 and SS100293 due to the detection of the 63.3 keV gamma emitted by ^{234}Th.

The supplemental soil sampling conducted adequately characterized the depth of the contamination present at SS100193, SS100293, and SS100393. However, additional depth was not obtained from SS100493 due to the large rock present at 10 inches depth.

The inability of the PGSS survey to identify the isotopic contaminants present in the soil of locations SS100193, SS100293, and SS100393 is directly related to the count times selected. The 3600 second counttimes conducted at each location followed a regular spectrum collection time for field activities. The low activity concentration of ^{241}Am and ^{239}Pu at SS100393 required a longer count time in order to detect a sufficient number of events for spectral analysis. Longer count times were not selected due to support availability.

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APPENDIX A

EG&G ROCKY FLATS PLANT

Revision 1, Draft

OPERABLE UNIT - 1, 881 HILLSIDE

SUPPLEMENTAL SURFACIAL RADIOLOGICAL CHARACTERIZATION

ACTION PLAN

OUTLINE

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- C. RESOURCE REQUIREMENTS, POSTING OF THE IDENTIFIED AREA
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VII. PERIOD OF PERFORMANCE

I. Introduction

The Environmental Management Division (EMD) is responsible for implementation of the Interagency Agreement (IAG) Remediation Investigation/ Feasibility Study (RI/FS) Phase I of Operable Unit 1. As part of the RI/FS, a Baseline Risk Assessment has been performed for OU-1. The specifics of the Assessment evaluated and characterized the potential chemical and radiological hazards of the Site. In order to expand on the statements provided in the Assessment, it has been identified that a supplemental radiological characterization of the OU would be beneficial to the Final Assessment. To provide this supplemental information, a Qualitative Radiological Survey (QRS) will be conducted of areas of concern for OU-1 to identify anomalous radiological activity present.

In addition, the supplemental QRS may be utilized to validate the random sampling locations that were selected for the Baseline Risk Assessment. This could be done by comparing the two sample populations produced by the separate investigations. This will provide Radiological Engineering (RE), an opportunity to establish walk over survey procedures and requirements, while enhancing the field data already collected for the Risk Assessment.

RE is responsible for the implementation of the Environmental Management Radiological Protection Program, including operational and remedial investigation requirements, documentation, review requirements, and plant interface details. RE is also responsible for providing technical assistance and guidance for the conduct of radiological characterization surveys, utilizing standard radiation detection instrumentation. To this end, EMD and RE will cooperatively pursue the completion of the QRS.

The driving force of the QRS is the documented identification of an anomaly activity, i.e. hot spot, that has been found on the 881 Hillside. This anomaly has not yet been characterized nor quantified.

II. Scope

This action plan includes the planning, development, field implementation, and final report preparation of the QRS. It does not include radiation detection instrumentation research or development. The scope will follow a phased scenario, to include radiological posting and a two part field characterization.

III. Qualifications

The work shall be performed under the direction of a qualified Project Manager (PM) with substantial experience in the area of radiological site characterization techniques. It is preferred that the individual be familiar with OU-1 Baseline Risk Assessment and previous investigations conducted at the site. In addition, a thorough knowledge of historical data is beneficial to the successful development of a survey.

EMD has expressed an interest in RE conducting the entirety of the QRS, which requires a RE Project Manager. This would allow for RE to research, develop, and objectively evaluate the QRS methodology.

Additional personnel performing work on the action plan will be technically managed by the qualified PM. Individuals shall provide verification of qualifications for performing the QRS.

IV. Applicable Documents

The following documents are considered to be reference documentation applicable to development of criteria and methods to be used for the QRS.

Department of Energy Order N 5480.6, Radiological Control Manual, June 1992.

Department of Energy Order 5480.11, Radiation Protection for Occupational Workers, 1989.

Department of Energy Order 5400.5, Radiation Protection of the Public and the Environment, 1990.

DOE/CH/8901 - A Manual for Implementing Residual Radioactive Material Guidelines, Argonne National Laboratory, Argonne, IL, 1989.

Radiological Operating Instructions, EG&G Rocky Flats.

Radiological Engineering Procedures, EG&G Rocky Flats.

Health and Safety Practices Manual, EG&G Rocky Flats.

Appropriate EMD Operating Procedures

Relevant and Applicable requirements under the IAG.

V. Technical Requirements and Tasks

The action plan will require technical services performed by individuals qualified in Section III. Technical qualifications must ensure satisfactory completion of the development, field implementation, completion, and final report generation of the QRS. These activities will be conducted under the direction of EMD and RE Representatives for OU-1. Since this work may potentially amend the OU-1 Baseline Risk Assessment, it is essential that the action plan be carried out with a level of assurance that a comprehensive effort has been made to comply with the specifics of the action plan.

A. Technical Requirements, Posting of the Identified Area

1. Radiological posting and control of the identified anomaly located on the 881 Hillside. An immediate response is required as per Memorandum dated November 30, 1992, concerning Operable Unit 1 (881 Hillside) Plutonium Contamination. This must include appropriate control measures and radiological postings in accordance with the EG&G Health and Safety Practices Manual and the EG&G Radiological Operating Instructions Manual. All measures must comply ultimately with the referenced requirements.

B. Technical Tasks, Posting of the Identified Area

1. Radiological boundaries and controls will be implemented by qualified Radiological Protection Technicians (RPTs) and Environmental Operations Management (EOM)

2. Establish a 5 by 5 foot area around the hot spot by placing stakes/posts at each corner and running yellow and magenta rope around the perimeter.

3. Install signs along the boundary for clear visibility to personnel from all access routes to the area. Temporary posting signs will be used with inserts "Radiologically Controlled Area, RWP Required".

4. No material or equipment will be stored or maintained within 10 feet of the hot spot (5 feet from the boundary).

C. Resource Requirements, Posting of the Identified Area

1. Radiological Posting Material

   a. Posts/stakes

   b. Yellow and magenta rope.

   c. Four temporary radiological signs with appropriate inserts for each.

D. Technical Requirements, Part I, Characterization

1. Investigation into the identified anomaly on the 881 Hillside in order to support actions taken by the radiological posting of the area. All quantitative and qualitative information will be made available to the DOE, Colorado Department of Health (CDH) and the Environmental Protection Agency (EPA) in a formal report. This will involve (a) the identification of the radiological activity concentration and (b) the vertical and horizontal extent of the contamination.

E. Technical Tasks, Part I, Characterization

1. RE and RPM perform sampling and field measurement of the identified area using this plan and a characterized detector. The components of the plan will include the following:

   a. Field Gamma Spectroscopy of the identified anomaly. This will be provided by RE and performed according to RE Procedure 4-61199-REP-1401, Operation of the NOMAD Portable Gamma Spectroscopy System. A characterized High Purity Germanium (HPGe) Detector will be required for the task. Characterization is expected to be completed by December 9, 1992, pending access to Wind Site Facility (Completed 12/8/92).

   b. A series of field spectrum will be collected to delineate the horizontal, surfacial boundaries of the anomaly. Previous data collected using the Field Instrument for the Detection of Low Energy Radiation (FIDLER) will be referenced for this task.

   c. The verticle extent of the anomaly will be characterized by obtaining a series of subsurface samples. The samples will be collected at predetermined intervals and screened using field spectroscopy. Samples will be collected using a hand shovel in accordance with EMD SOP GT.8, "Surface Soil Sampling". Samples will be packaged and labelled according to EMD SOP FO.16, "Containerization, Preserving, Handling and Shipping of Soil and Water Samples".

      1. Preliminary surface scrapes will be taken using the Colorado Department of Health Soil Sampling Technique. These will be packaged separately.

      2. Additional samples will be taken in 6 inch increments following the initial surface scrape. The maximum depth of the sampling

will be 24 inches, or until activity concentrations decrease to background level as determined for OU-1. If elevated activity concentrations are identified at this time, further evaluation will be required, but no additional field actions will take place. All samples will be packaged in depth intervals.

3. Clean backfill material will be utilized to replace soil removed for sampling purposes. If sampling activities are not completed or significant activity is still detected using field screening techniques following sampling, proper controls shall be initiated to prevent the spread of contamination.

d. The horizontal extent of the surfacial contamination will be determined by moving the detector to different counting locations away from the source material. A decrease in activity concentration will be used as an indicator of spot boundaries.

e. An approved Addendum to the Operable Unit 1 Health and Safety Plan will be prepared for the work conducted. A separate Radiation Work Permit will be issued for the activity.

f. ALARA practices will be followed throughout this phase of the field investigation.

F. Resource Requirements, Part I, Characterization

1. Characterized and Calibrated Portable Gamma Spectroscopy System.

2. Field sampling equipment.

3. Sample Handling and Disposal Plan.

4. Supplemental laboratory needs.

5. Approved Site Specific Health and Safety Plan Addendum.

G. Technical Requirements, Part II, Qualitative Radiological Survey

1. Definition and clarification of QRS. The QRS is focuses upon identifying the presence of anomalies exceeding background. The survey will provide a comprehensive indicator of radiological contamination based upon the results of mutilple field measurement techniques. These techniques will include in situ gamma spectroscopy, walk-over FIDLER surveys, and soil sampling. Soil sampling will provide Level 1 data.

2. Specification of Radiation Detection Instrumentation required for the QRS. RE shall require the use of the following for field work:

a. Field Gamma Germanium Spectroscopy (FGGS) survey instrument. The FGGS survey will be performed by the Environmental Science and Engineering (ESE) Group. The survey will provide real-time, in situ measurements of ^{241}Am activity in soil. The FGGS is a boom mounted, five germanium crystal detector array, multichannel analyzer (MCA)

system. The system is utilized by ESE to perform in situ measurements for RI/FS and related activities.

b. Field Instrument for the Detection of Low Energy Radiation (FIDLER), or similar. This instrument will be utilized to isolate potential anomalies identified by the FGGS survey, i.e. locate hot spots. This is not intended to provide quantitative information.

c. PGSS for supplemental investigation of identified "hot spots" is recommended. This will allow for the identification of radioisotopes that comprise hot spots.

3. Development of QRS data reporting format. This shall include grid locations and reporting units as a minimum.

4. Determination of the applicability of OSHA 1910.120 and Site Specific Health and Safety Plan.

H. Technical Tasks, Part II, Qualitative Radiological Survey

Note: Information relating to the identification and determination of field anomalies is detailed in Attachment 1. This includes FIDLER survey requirements, FIDLER action level explanation, and field anomaly criteria, i.e. what activity concentration results in an anomaly. The attachment also includes an empirical determination of the application of the FGGS survey results that will prompt FIDLER surveys.

1. Performance of the field QRS within OU-1.

   a. Initial screening using the FGGS system. Individual Hazardous Substance Site (IHSS) 119.1, 119.2, and 130 will be investigated. Each survey location has a 75 foot radius, with 90% of the detection coverage included in data analysis.

2. Delineation of identified hot spots within OU-1.

   a. Specific locations for the FIDLER survey will be determined by in situ measurements of the FGGS. Each location is based upon a 75 foot radius around the center of the FGGS detector field of view. Each survey location with an integrated point source activity greater than 20 μCi ^{241}Am will be surveyed using the FIDLER. The specific action level for the FIDLER that will require further investigation will be 3700 cpm. This represents a 95% confidence level that the count rate of the FIDLER is above the background of the site (2492 cpm $\pm$ 1208 cpm) (Attachment 1).

      In addition to the locations selected from the FGGS survey, all former drum storage areas will be investigated (Attachment 2). These additional surveys will be conducted due to the potential for leaking drums once stored at the site.

b. FIDLER surveys are to be performed by EG&G RPTs. Weather conditions and site conditions must not present significant risk to the physical safety of personnel. A representative from RE will be present at all times to assist in the field identification of any qualifying anomalies.

c. Identified anomalies will be investigated using the PGSS if they qualify as hot spots according to DOE Order 5400.5. Surfacial measurements only will be taken. Additional anomalies will be sampled.

3. Documentation of field QRS data within OU-1.

4. Documentation of delineation of identified hot spots within OU-1.

5. Compliance to Site Specific Health and Safety Plan.

I. Resource Requirements, Part II, Qualitative Radiological Survey

1. FGGS and related field equipment.

2. ESE support for the project.

3. FIDLER and related field equipment.

4. RPT support for the project.

5. Laboratory needs and arrangements, if necessary.

6. Approved Site Specific Health and Safety Plan Addendum.

The specific number of hours required to complete this action plan have not yet been determined. A reasonable estimate of the required number of hours is 140 total hours for Radiological Engineering and 80 hours for Radiological Operations, for development, implementation, completion, and generation of a final report. It is preferred that the identified number of hours be utilized since budget restrictions do not allow for additional funding.

VI. Deliverables

Final completion of the action plan will require a documented report of the results and potential consequences of QRS. This will include QRS grid locations, associated FIDLER readings, designated hot spots, and HPGe Spectral report and analysis. RE will provide technical assistance in the interpretation and evaluation of the field data. Recommended or required actions may not be within the scope of this work.

APPENDIX B

ANOMALY CRITERIA FOR FIELD APPLICATION

Anomaly Criteria for Field Application

Field anomalies are small areas that exhibit levels of residual contaminants that exceed or are above the average levels of the site. The presence of anomalies indicates that the assumption of homogeneous distribution is incorrect. Therefore, the impact of such areas must be evaluated as to the effect upon larger areas. DOE Order 5400.5 and DOE/CH-8901 provide specific guidance as to the identification and quantification of anomalies. These documents have been utilized to develop a methodology for the performance of field radiological surveys. The purpose of the methodology is to identify anomalies.

The following information concerning anomalies is taken from DOE/CH-8901, Section 3.3.2, Hot Spot Criteria for Field Application.

> Hot spots are small areas that have levels of residual radioactive material that are considerably above the levels in the surrounding area. The derivation of remedial action criteria generally assumes homogeneous contamination of large areas (several hundred square meters or more), and the derived concentration guide is stated in terms of concentrations averaged over an area of 100 m^2. Because of this averaging process, within these 100 m^2 areas hot spots can exist that contain concentrations of radionuclides that area significantly higher than the authorized limit. Therefore, the presence of hot spots could potentially pose a greater risk of exposure to individuals using the site than the risk associated with homogeneous contamination. In order to ensure that individuals are adequately protected and to ensure that the ALARA process is satisfied, the following hot spot criteria must be applied along with the general criterion for homogeneous contamination. The hot spot criterion for field application is
>
> $$M = \Sigma_i S_i/G_i(t_m) \leq 1$$
>
> where
>
> M = hot spot mixture sum for field use,
> S_i = measured concentration of the ith principle radionuclide in the hot spot (pCi/g), and
> $G_i(t_m)$ = single radionuclide soil guideline for the ith principal radionuclide in the hot spot (pCi/g).
>
> The measure hot spot concentrations S_i are the peak concentrations if the hot spot area is 1 m^2 or less or the average concentrations if the hot spot area is larger than 1 m^2.
>
> The formula for single radionuclide, hot spot soil guidelines is
>
> $$G_i = G_i(t_m) \times (100/A)_{1/2}$$
>
> where
>
> $G_i(t_m)$ = as defined for Equation 3.4 (Residual Soil Guideline)
> A = area of hot spot (m^2), and
> $(100/A)^{1/2}$ = hot spot multiplication factor.

The Manual goes on to provide an interpretation and application of the values obtained. The basic intent is to provide a usable methodology for determining anomalies with derived residual guidelines.

A RESRAD analysis has been conducted using site specific radiological constituents present in OU-1. Using this site specific information, a residual guideline has been derived for ^{239}Pu and ^{241}Am. They are 33 pCi/g and 230 pCi/g, respectively, for ^{239}Pu and ^{241}Am. These values are derived from a conservative, farm habitat scenario, dose assessment with a limiting annual limiting dose of 100 mrem/yr. Applying these values to the equation for a single radionuclide,

$G_i(t_m)$ = 33 pCi/g for ^{241}Am
$G_i(t_m)$ = 230 pCi/g for ^{239}Pu

an action level may be determined for ^{239}Pu and ^{241}Am. The same equation may be applied to the FIDLER readings. Substituting the action level count rate of 3700 cpm, initial criteria for hot spots may be established based upon the specific surface area. It is important to note that the FIDLER survey provides a screening methodology for the initial screening of potential anomalies.

Action Levels for ^{239}Pu, ^{241}Am, and FIDLER Readings based upon ranges for Hot Spot Multiplication Factors.

Range	Hot Spot Mult. Factor	FIDLER, G_i cpm	Am-241, G^i pCi/g	Pu-239, G_i pCi/g
<1 m^2	10[a]	37000	330	2300
1 - <3 m^2	6	22200	198	1380
3 - <10 m^2	3	11100	99	690
10 - <25 m^2	2	7400	66	460

[a]Areas less than 1 m^2 are to be averaged over a 1 m^2 area. and that average shall not exceed 10 times the authorized limit.

For the supplemental radiological survey conducted at the 881 Hillside, a presite screening was conducted using the Field Germanium Gamma Spectroscopy (FGGS). Analysis of the spectra provided two sets of data. The first set provided an indication of the homogenous distribution of ^{241}Am, pCi/g, over a 1.76×10^4 m^2 area, with a depth of 3 cm. The second set provided the total activity associated with a point source that was calculated to lie at the edge of the field of view of the detector. The point source represented the integration of the total activity of the entire field of view into one single location.

Using the Action Level for the <1 m^2 range, a screening value for the integrated point source activity can be determined. A value of 21 μCi for ^{241}Am and 145 μCi for ^{239}Pu was established. An isotope specific, integrated point source value exceeding these values, requires a FIDLER survey.

FGGS Integrated Point Source Action Level.

Assume a homogenous distribution in a cylinder of soil, with a surface area of 1 m^2 (1×10^4 cm^2).

$V = \pi r^2 h$

$r = 56$ cm

$h = 3$ cm

$V = 3x10^4$ cm^3

Determine the gram quantity of soil of V,

$M = V\rho$

$V = 3x10^4$ cm^3

$\rho = 2.1$ g/cm^3 (mean of average 1.6 - 2.6 g/cm^3)

$M = 6.3x10^4$ g

$A_{Am\text{-}241}$ = Total Activity (μCi) for $1m^2$ surface area, 3 cm depth

$= MG_i$

$M = 6.3x10^4$ g

$G_i = {}^{241}Am$

$= 330$ pCi/g

$A_{Am\text{-}241} = 2.1x10^7$ pCi

$= 21$ μCi

$A_{Pu\text{-}239} = 1.45x10_9$ pCi

$= 145$ μCi

APPENDIX C

DETERMINATION OF FIDLER ACTION LEVEL

Determination of FIDLER Action Level

In order to provide guidance for performing the QRS, a background, i.e. action level, must be established for OU-1. The background established for this Action Plan is exclusive to OU-1. It is not relative to Rocky Flats Plant or global values. In addition, it is derived from FIDLER data and is to be used exclusively for this instrument. All data used to determine the background was collected during OU-1 Phase I field investigation activities.

When possible, a pre-job survey was conducted prior to drilling and/or soil sampling activities. Each location consisted of 14 discreet measurement locations. The gross cpm values is used, since it is most applicable to the QRS survey. By determining the mean of the sample population (FIDLER readings), a background level os 3700 cpm was identified. This represents a 95 % confidence level that the count rate is above the background of the site.

Determination of Site Background for FIDLER.

The calculated mean was obtained from a population of 749 FIDLER readings. The counts selected are gross cpm. The value of the background represents a 95% confidence level.

$\beta = \chi \pm 1.96\sigma$

β = FIDLER background

χ = mean

σ = standard deviation

β = 2492 cpm $\pm$ 1.96(616 cpm)

β = 2492 cpm $\pm$ 1207 cpm

β = 3700 cpm

An additional criteria for FIDLER walk over surveys will be applied. All areas known to or suspected to have been drum storage areas within IHSS 119.1, 119.2, and 130 will be surveyed. This is related directly to the potential for leaking drums.

APPENDIX D

DETERMINATION OF COUNTING DISTANCE FOR SOIL SAMPLE SCREENING

Determination of Counting Distance for Soil Sample Screening

In order to comply with Department of Transportation (DOT) shipping requirements and initially evaluate the activity concentrations of the soil samples from the Well 3824 hot spot, a screening methodology was developed. This involved placing the samples at a predetermined distance from the face of the HPGe PGGS detector, and collecting a spectrum. This provided for a field identification of the soil samples ^{241}Am activity concentration. Counting distances were determined from the following calculation.

Sample Counting Distance.

$D_P = 10 \times D_D$

D_P = Distance of sample from detector face, in.

D_D = Diameter of detector face = 3 in.

$D_P = 10 \times 3$ in.

$D_P = 30$ in.

APPENDIX E

RADIOLOGICAL OPERATIONS FIDLER SURVEY FORMS (SAMPLE)

RADIOLOGICAL OPERATIONS
GAMMA SURVEY

CONTROL NO. SPECIAL

Taken by:_____ Emp. #_____ Reviewed by:

Taken by:_____ Emp. #_____ Rad Ops Foreman_____ Emp. #_____

Taken by:_____ Emp. #_____ Name/Organization_____ Emp. #_____

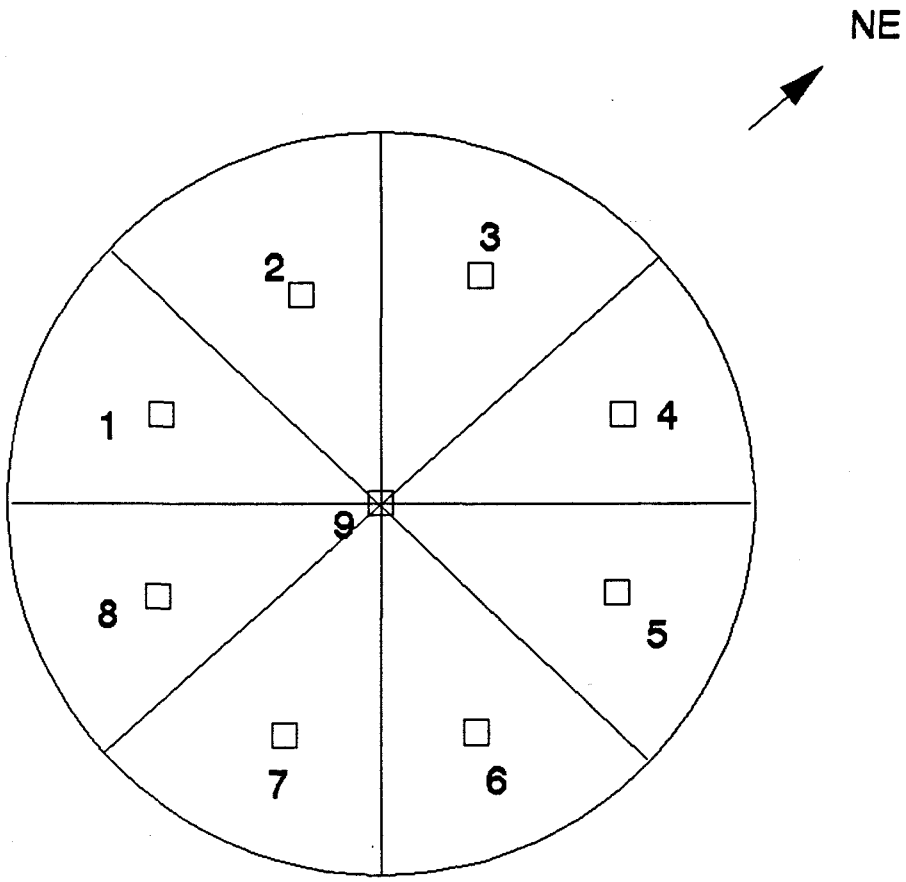
Date:_____ Building:_____	Survey Description:_____
Time:_____ Room #:_____	_____
Shift:_____	_____

BICRON FIDLER

	FIDLER	FIDLER	FIDLER	FIDLER	FIDLER
Mfg:					
Model:					
Serial #:					
Date Perf. Ck:					
Date Calib'd:					
Cal. Due Date:					

	BKG	c/m METER	SCALER	AREA POSTED (Y/N)		BKG	c/m METER	SCALER	AREA POSTED (Y/N)
1.					12.				
2.					13.				
3.					14.				
4.					15.				
5.					16.				
6.					17.				
7.					18.				
8.					19.				
9.					20.				
10.					21.				
11.					22.				

FIDLER Walkover Survey
FGGS Survey Location_____
N_____
E_____



FGGS survey location, diameter = 150'
Markers are 1 minite FIDLER counts

RPT_____
EMP#_____
Date_____

HOT SPOT ANALYSIS

DRAFT

Step 1: For all contaminants with detection frequency <5%, prepare a list of the sampling results ranked by increasing concentration.

Step 2: Calculate the mean contaminant concentration of the first two sampling results $\{(x_1 + x_2)/2\}$. Compare this to the third sampling result, x_3. If $x_3 >$ 10 times the mean of the first two results, go to step 4. If $x_3 <$ 10 times the mean, calculate a new mean using the first three sampling results and compare this to the fourth sampling result. Continue in this iterative manner until the criteria of > 10 times the mean is satisfied. If the criteria is never met, this indicates that the sampling results have little variability, but does not indicate whether the concentrations are above a health based criteria. Therefore, go to step 3.

Step 3: Compare the maximum concentration of the sampling results to 1000 PRG. The PRG is calculated using multiple exposure pathways and is set at a 10^{-6} risk level. If the maximum concentration is less than 1000 PRG, delete the contaminant from further consideration. If the maximum concentration is greater than 1000 PRG, go to step 4.

Step 4: Perform a spatial analysis of the sampling results by mapping surface distribution and vertical distribution. Use this map, the results of step 1, and professional judgement to determine the appropriate sampling results to use in calculating the exposure point concentration.

2	200
3	150
4	350
50	275
100	

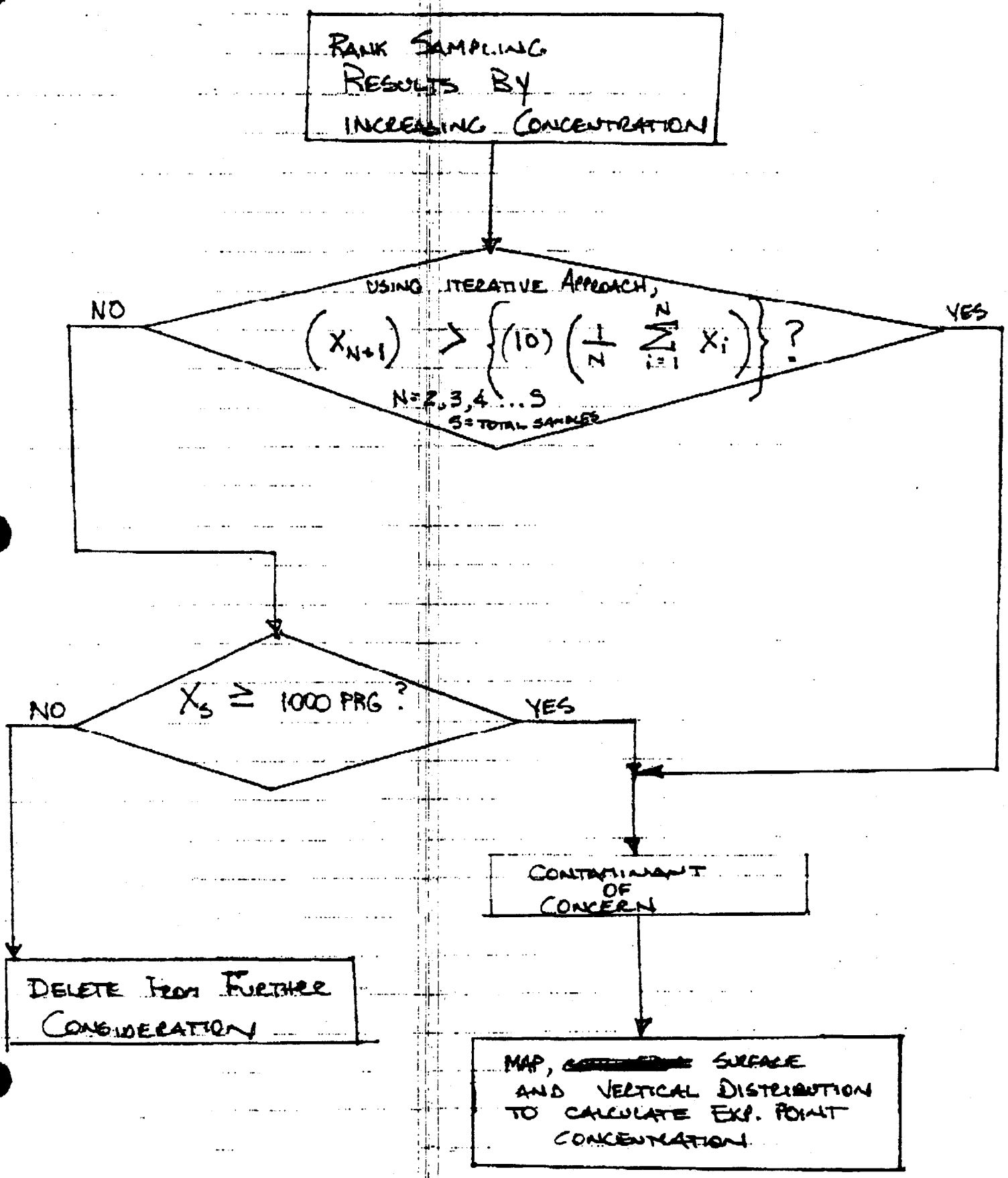
OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL # of pages ▶ 32

To JOE GORDON	From BONNIE LAVELLE
Dept./Agency DAMES & MOORE	Phone # 294-1067
Fax # 299-7977	Fax # 294-7559

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

HOT SPOT IDENTIFICATION



OU1 Surficial Pad Characterization

General -

1) Rewrite to summarize actions already accomplished vs. actions proposed

2) Include maps showing results already obtained, location of hot spot, areas to be further investigated, IBSS boundaries etc.

3) Attachment 1 -> not included

4) Include schedule for proposed actions (more detail needed)

Specific

1) When will we receive report described in the last paragraph of page 5?

2) Page 6; E. 2. Be clear about use of the term "background levels." As stated here, it is actually the mean OU1 level, which is > true background.

Further evaluation is mentioned here, but not described. This should be discussed in more detail.

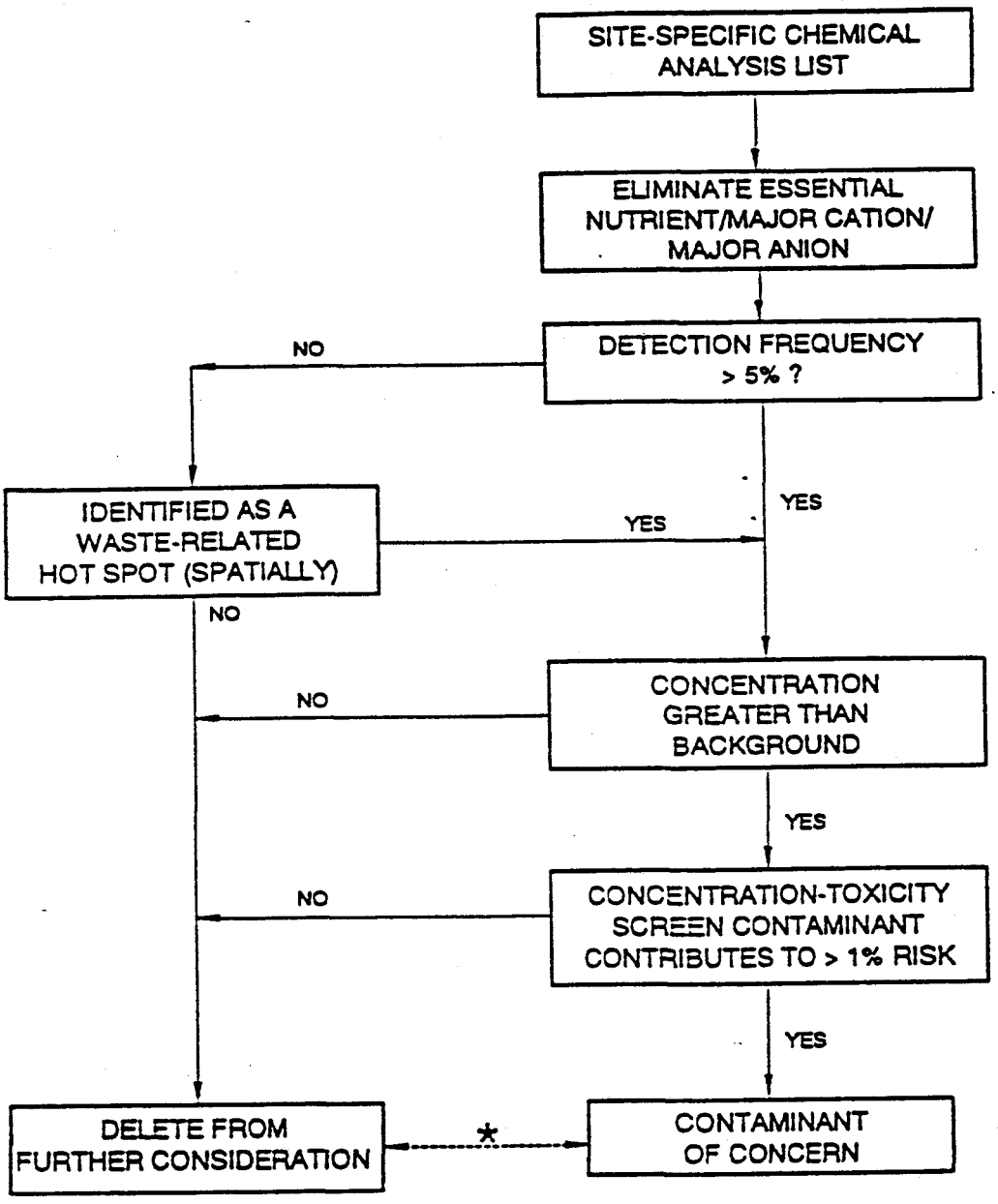
3) Page 7 E. d. Need better definition of method used to determine horizontal extent.

page 7. G.1. Yes! Extent of surficial investigation and density of survey locations must be defined in this action plan.

page 9 H.2.a. - Explain how 20 µci ^{241}Am was determined to be appropriate action level.

- Also need to be sure that this will include all historical drum storage areas.
- Again background cited here is actually mean count rate of OU (not true background.

Figure F2-1. Protocol For Identification of Contaminants of Concern



* Professional judgement may be used to retain or delete a chemical

EG&G ROCKY FLATS
EG&G ROCKY FLATS, INC.
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Date: 3.24.93

FACSIMILE TRANSMITTAL COVER SHEET

To: Keith Anderson
FAX No: 67666
Organization: Rad Engr.

From: Cindy Gee
(FAX No: (303) 966-8556)
(Verify: (303) 966-)
Organization:
Phone: 8550

Comments:

Keith -
here's EPA comments on the action plan - We (you) need to revise per these comments -
thanks!
Cindy

(p.s. lets talk on progress)

Total Pages (Including cover sheet): 2

CORRES. CONTROL
OUTGOING LTR NO.

93RF2262

DIST.	LTR	ENC
BENEDETTI, R.L.		
BENJAMIN, A.		
BERMAN, H.S.		
BRANCH, D.B.		
CARNIVAL, G.J.		
DAVIS, J.G.		
FERRERA, D.W.		
HANNI, B.J.		
HARMAN, L.K.		
HEALY, T.J.		
HEDAHL, T.		
HILBIG, J.G.		
IDEKER, F.H.		
KIRBY, W.A.		
KUESTER, A.W.		
LEE, E.M.		
MANN, H.P.		
MARX, G.E.		
McDONALD, M.M.		
McKENNA, F.G.		
MONTROSE, J.K.		
MORGAN, R.V.		
POTTER, G.L.		
PIZZUTO, V.M.		
RILEY, J.H.		
SANDLIN, N.B.		
SHEPLER, R.L.		
STEWART, D.L.		
SULLIVAN, M.T.		
SWANSON, E.R.		
WILKINSON, R.B.		
WILLIAMS, S. (ORC)		
WILSON, J. M.		
ZANE, J. O.		
Gee, C.B.	X	
Greengard, T.C.	X	
Smith, D.M.	X	
CORRES CONTROL	X	X
TRAFFIC		

CLASSIFICATION:

UCNI		
UNCLASSIFIED		
CONFIDENTIAL		
SECRET		

AUTHORIZED CLASSIFIER SIGNATURE
Not Req'd per Class. Office
DATE signature

IN REPLY TO RFP CC NO:
N/A

ON ITEM STATUS
OPEN ☐ CLOSED
☐ PARTIAL

LTR APPROVALS:

ORIG & TYPIST INITIALS
DMS:cet

RF-46469 (Rev. 9/92)

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February 22, 1993 93-RF-2262

Scott R. Grace
Environmental Restoration Division
DOE, RFO

OPERABLE UNIT NO. 1 MEETING SUMMARY, 881 HILLSIDE "HOT SPOTS" - TCG-101-93

Attached is the Meeting Summary for the January 27, 1993 discussion with the Environmental Protection Agency and Colorado Department of Health regarding the plutonium/americium hot spots detected at the 881 Hillside area. We recommend this Meeting Summary be forwarded to the agencies for their concurrence.

Please contact C. B. Gee of Remediation Project Management at extension 8055 if you have any questions.

T C Greengard

T. C. Greengard, Acting Director
Environmental Science & Engineering

DMS:cet

Attachment:
As Stated

Meeting Summary

881 HILLSIDE "HOT SPOT" MEETING AT EPA

January 28, 1993

Location: USEPA Region VIII

Attendees:

USDOE	USEPA	CDH
Scott Grace(SG)	Gary Kleeman(GK)	Joe Schiefflin(JS) (by phone)

EG&G
Cindy Gee(CG)
Keith Anderson(KA)
Dennis Smith(DS)

Purpose:

The purpose of this meeting was to update EPA and CDH on progress toward characterizing the recently discovered radionuclude contamination in the 881 Hillside Area. Additionally, DOE intended to seek EPA and CDH input on the remaining characterization work planned.

Issues and Resolutions:

The presentation of issues and their resolution followed the Agenda (attached) provided by DOE.

Item 1) A brief history of the how the "Hot Spot" was discovered was provided by SG. The main point was that the area was discovered unexpectedly during the Treatability Study sampling wrap-up performed in late August 1992, followup investigation was conducted and EPA/CDH were informally notified of this issue in November 1992.

The apparent dimensions of the hot spot (roughly 1 foot in diameter by 1 foot deep) and preliminary activity concentration depth profile (10 nCi/gr down to 50 pCi/gr [assuming a point source]) were presented and discussed. Also, KA discussed the apparent discoloration aspect of samples obtained from the survey.

This was an informative exchange; there were no resolutions.

Item 2) Results of the preliminary field survey to identify the presence of similar hot spots was presented by SG. The main

point recognized was that we have identified five (5) areas within IHSSs 119.1, 119.2 and 130 (partially completed) for followup with detailed surveys. The remaining HPGE work for IHSS 130 would be completed as soon as weather permitted.

No resolutions. EPA and CDH were satisfied with the approach employed.

Item 3) KA described the detailed survey method which included: i) areal confirmation of the 5 areas identified by HPGE survey, ii) follow up areal and depth profile evaluation using a field gamma spectroscopy instrument.

No resolutions. EPA and CDH were satisfied with the approach employed.

Item 4) DS and SG broached the issue that since the detailed survey (Item 3) resulted in removal of the hot spot from the soil, could the survey activity constitute a "removal" under the IAG provisions for an Emergency Response?

EPA and CDH both agreed that DOE could consider the hot spot removals as emergency response actions.

Item 5) CG and SG discussed the potential schedule impacts associated with the survey as proposed. It was pointed out that this work is very weather dependant because moisture and snow affects instrument capabilities and wind impacts use of the HPGE. To avoid adversely impacting the IAG milestones, SG proposed that this survey and removal action be presented to EPA and CDH as a stand alone document outside of the OU 1 RFI/RI. The report would detail the investigation, and findings. A ballpark date of mid-1993 was discussed and generally agreed on as realistic.

EPA and CDH both agreed that this was appropriate.

Additional Discussion

JS expressed a desire for DOE to perform a detailed investigation of the hot spots to evaluate the potential for radionuclde migration as if it resulted from a spill. Specifically, JS requested that chemical analysis be performed as well as GRAASP radionuclide assay (i.e., Level V data) of soils in addition to the gamma spectroscopy DOE had intended to employ (Level II or III data). SG indicated that this was more than anticipated and would require DOE's evaluation of: cost, schedule, and logistical considerations. CDH's request resulted in identification of two approaches and sets of requirements: A. gamma spectroscopy alone, or B. gamma spectroscopy/GRAASP radionuclide analysis/chemical analysis of soils. Both agencies requested to be involved in the scoping and implementation decision process.

DOE agreed to develop a proposed approach for the investigation and removal. The target date was 2-3 weeks owing to completion of the HPGE survey and weather conditions.

881 Hillside "Hot Spot" Meeting at EPA
January 28, 1993

Agenda

- History

- Results of Preliminary Field Survey

  - High Purity Germanium Survey
  - Surveyed 119.1, 119.2 and part of 130
  - Five areas for follow up Fiddler Hand Survey

- Describe Fiddler Hand Survey Method

- Pursue as Emergency Response

  - As per IAG, SOW Section I.B. 10)?
  - Pursue "full sampling"?

- Schedule impacts will not be known until the surveys are completed

RADIOLOGICAL OPERATIONS
GAMMA SURVEY

CONTROL NO. _____

Taken by: M Brown Emp. # [redacted] Reviewed by:

Taken by: [illegible] Emp. # [redacted] Rad Ops Forman [illegible] Emp. # [redacted]

Taken by: R Curry Emp. # [redacted] Name/Organization _____ Emp. # _____

Date: 3-25-93 Building: 881 Hillside

Time: 1700 Room #: AREA F6

Shift: DAY'S

Survey Description: Survey of Location F6 on 881 Hillside.

BICRON FILDER

Mfg:	FIDLER	FIDLER	FIDLER	FIDLER	FIDLER
Model:	Bicron	Bicron			
Serial #:	A5137	A5316			
Date Perf. Ck:	3-25-93	3-25-93			
Date Calib'd:	10-8-92	10-27-92			
Cal. Due Date:	12-93	10-93			

	BKG	d/m METER	SCALER	AREA POSTED (Y/N)		BKG	d/m METER	SCALER	AREA POSTED (Y/N)
1.	1789	1789	1700	N	12.	1600	3980	4000	N
2.	1784	1628	1650	N	13.	1600	202920	200000	Y
3.	1789	1756	1700	N	14.	1600	25292	25000	Y
4.	1700	1629	1600	N	15.	1600	1609	1600	N
5.	1700	1763	1700	N	16.				
6.	1600	1667	1700	N	17.				
7.	1600	8193	8200	N	18.				
8.	1600	1531	1500	N	19.				
9.	1600	3667	4000	N	20.				
10.	1600	1534	1500	N	21.				
11.	1600	1634	1600	N	22.				

RF-47414 (11/90)

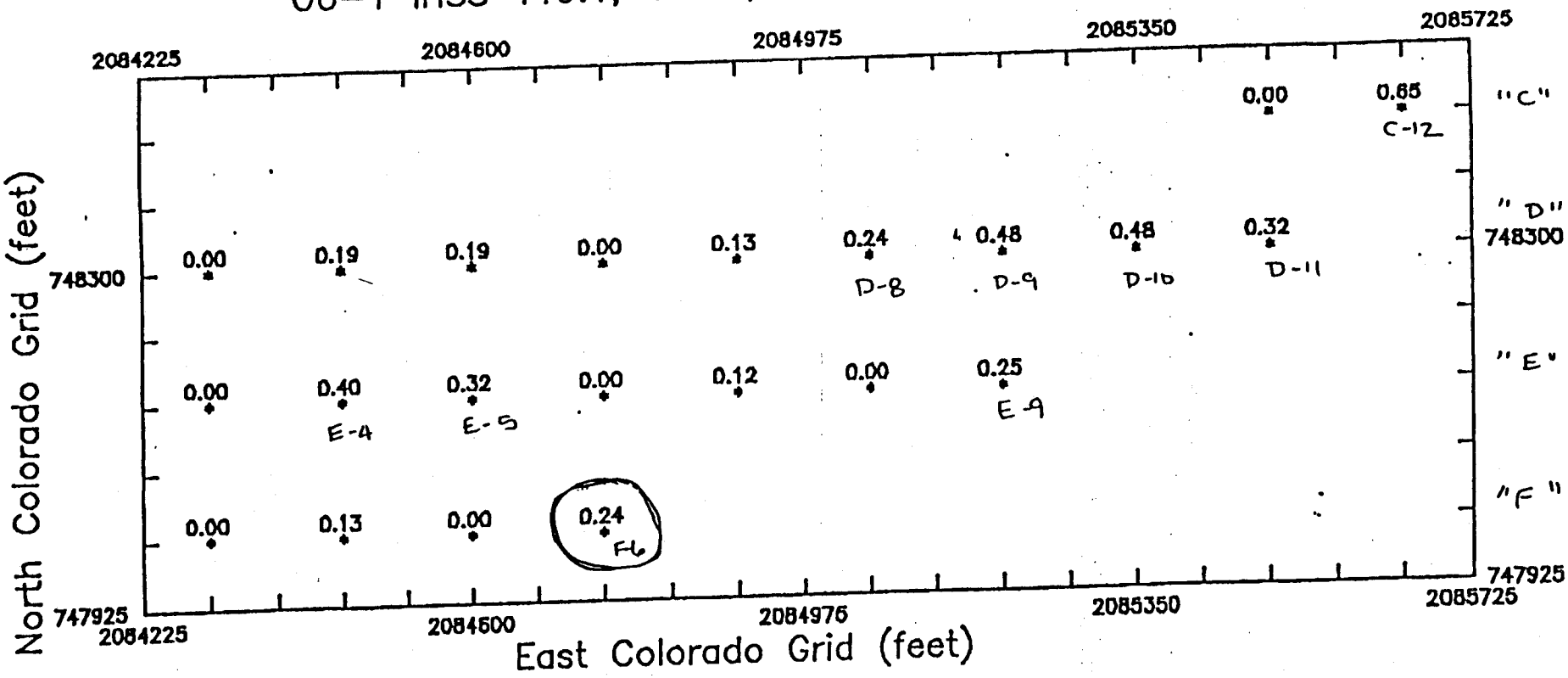
Draft
by
G.S.G.

	North	East	K-40	Ra-226	Th-232	U-238	U-235	Cs-137	Am-241	Am-241	Exposure
	feet	feet	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	uCi	uR/h
	748450	2085500	17.3	0.748	0.923	1.48	0.0455	0.0957	0	0	10.1
E-12	748450	2085650	14.6	0.791	1.09	1.3	0.0699	0.221	0.65	320	10.7
D-8	748300	2085050	10.8	0.78	0.957	1.22	0.0754	0.338	0.24	120	6.3
D-10	748300	2085350	11.1	0.779	1.16	1.4	0.0647	0.354	0.48	240	6.74
D-11	748300	2085500	16	0.956	1.28	1.49	0.0791	0.349	0.32	150	12.6
	748300	2084450	9.2	1.01	0.964	1.59	0.0616	0.184	0.19	91	6.31
	748300	2084300	12.4	1.37	1.19	1.85	0.0374	0.114	0	0	7.98
	748300	2084600	7.96	0.869	0.887	1.79	0.0602	0.192	0.19	94	5.68
	748300	2084750	10.3	0.933	1	1.53	0.0756	0.297	0	0	6.59
D-9	748300	2085200	12.5	0.975	1.28	1.57	0.0897	0.425	0.48	240	7.78
	748300	2084900	11	1.07	1.08	1.76	0.0779	0.281	0.13	64	6.96
	748150	2084750	11.2	0.924	1.29	3.45	0.11	0.169	0	0	7.45
	748150	2084900	12.6	0.843	1.45	2.08	0.112	0.217	0.12	60	9.92
E-5	748150	2084600	10.9	0.688	1.03	1.67	0.0577	0.162	0.32	160	8.17
	748150	2085050	13.4	0.943	1.51	1.99	0.095	0.262	0	0	8.32
E-4	748150	2084450	12.7	1.2	1.26	1.51	0.0497	0.0841	0.4	190	8.17
	748150	2084300	14.5	1.09	1.36	1.38	0.0651	0.097	0	0	8.44
E-9	748150	2085200	12.8	1.1	1.28	1.79	0.0624	0.295	0.25	120	7.96
	748000	2084600	11.1	0.699	1.1	1.69	0.0733	0.321	0	0	6.56
F-6	748000	2084750	13.4	0.843	1.31	1.95	0.104	0.178	0.24	120	7.84
	748000	2084300	12	0.994	1.05	1.49	0.0494	0.222	0	0	7.15
	748000	2084450	11.7	0.847	1.16	1.56	0.075	0.327	0.13	65	6.99

Draft
6y
G.S.G.

AREA F-6

OU-1 IHSS 119.1, 119.2, & 130 Am-241 (pCi/g)



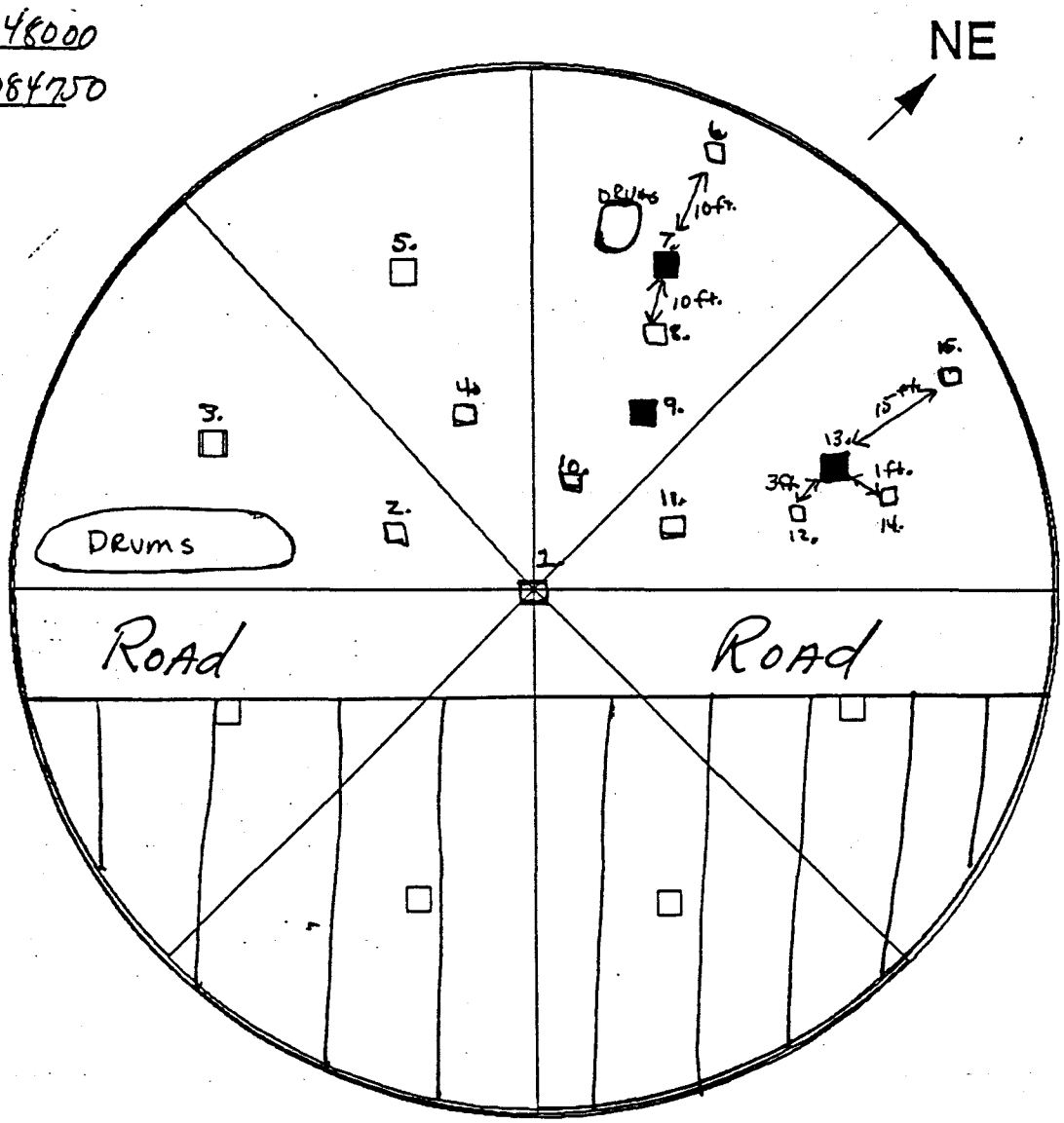
■ — High Areas.
□ — Meter Readings

FIDLER Walkover Survey

FGGS Survey Location F6

N 748000

E 2084750



FGGS survey location, diamter = 150'
Markers are 1 minute FIDLER counts

M. Brown
D. Simoik
RPT R. Curry
EMP# 516766 516777 516788
Date 3·25·93

RADIOLOGICAL OPERATIONS
GAMMA SURVEY

CONTROL NO. _____

Taken by: M. Brown Emp. # [redacted] Reviewed by:

Taken by: [illegible] Emp. # [redacted] Rad Ops Forman [illegible] Emp. # [redacted]

Taken by: R Cruz Emp. # [redacted] Name/Organization _____ Emp. # _____

Date: 3-29-93 Building: 881 Hillside

Time: 1300 Room #: NA

Shift: DAYS

Survey Description: Survey of Area E-5 on 881 Hillside

BICRON FILDER

Mfg:	FIDLER	FIDLER	FIDLER	FIDLER	FIDLER
Model:	Bicron	Bicron			
Serial #:	A513P	A531G			
Date Perf. Ck:	3-17-93	3-10-93			
Date Calib'd:	10-27-92	12-9-92			
Cal. Due Date:	10-93	12-93			

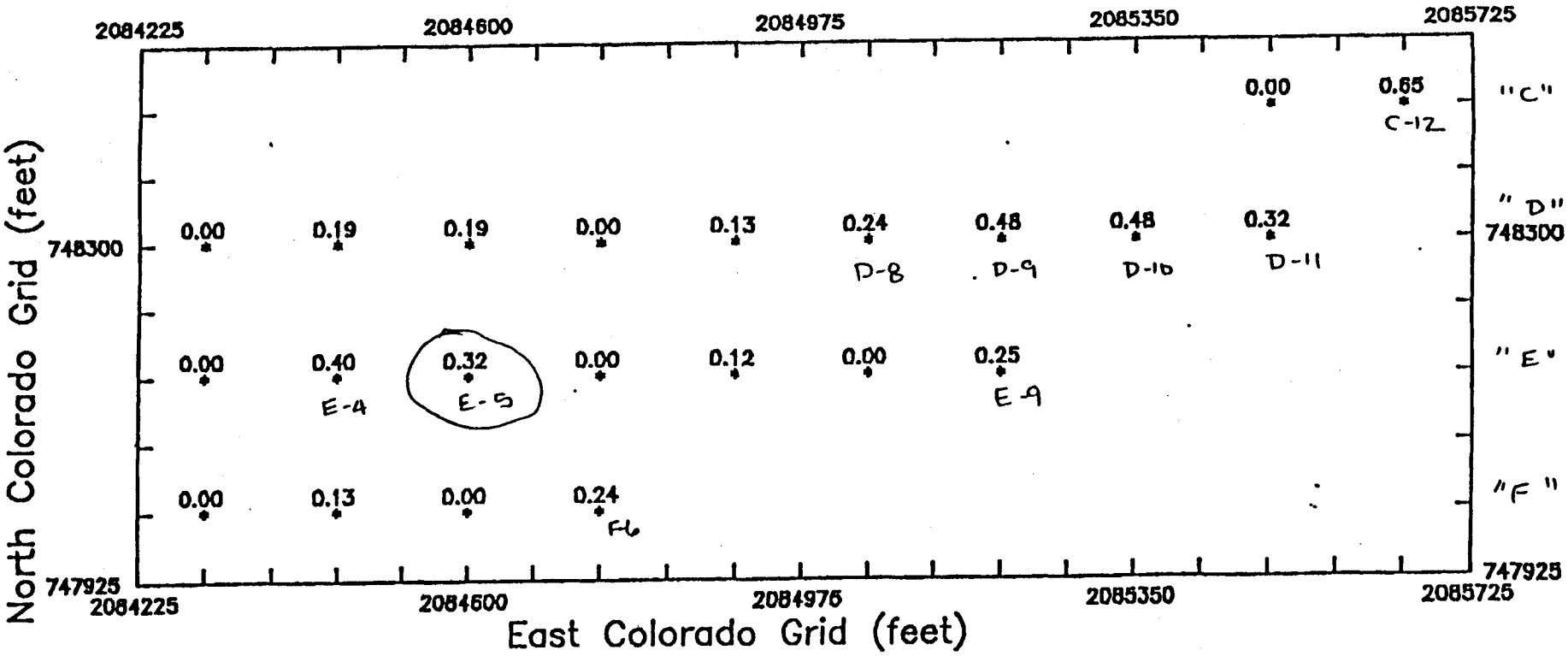
	BKG	c/m METER	SCALER	AREA POSTED (Y/N)		BKG	c/m METER	SCALER	AREA POSTED (Y/N)
1.	3200	3000	2715	N	12.	3200	3000	3099	N
2.	3200	3000	2635	N	13.	3200	3000	3157	N
3.	3200	3000	3124	N	14.	3200	3000	3203	N
4.	3200	3000	3216	N	15.	3200	3000	2926	N
5.	3200	3000	2957	N	16.	3200	3000	3031	N
6.	3200	3000	3009	N	17.	3200	3000	3281	N
7.	3200	3000	2517	N	18.				
8.	3200	3000	2649	N	19.				
9.	3200	3000	3198	N	20.				
10.	3200	3000	3206	N	21.				
11.	3200	3000	3176	N	22.				

Draft
by
G.S.G.

	North	East	K-40	Ra-226	Th-232	U-238	U-235	Cs-137	Am-241	Am-241	Exposure
	feet	feet	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	uCi	uR/h
	748450	2085500	17.3	0.748	0.923	1.48	0.0455	0.0957	0	0	10.1
C-12	748450	2085650	14.6	0.791	1.09	1.3	0.0699	0.221	0.65	320	10.7
D-8	748300	2085050	10.8	0.78	0.957	1.22	0.0754	0.338	0.24	120	6.3
D-10	748300	2085350	11.1	0.779	1.16	1.4	0.0647	0.354	0.48	240	6.74
D-11	748300	2085500	16	0.956	1.28	1.49	0.0791	0.349	0.32	150	12.6
	748300	2084450	9.2	1.01	0.964	1.59	0.0616	0.184	0.19	91	6.31
	748300	2084300	12.4	1.37	1.19	1.85	0.0374	0.114	0	0	7.98
	748300	2084600	7.96	0.869	0.887	1.79	0.0602	0.192	0.19	94	5.68
	748300	2084750	10.3	0.933	1	1.53	0.0756	0.297	0	0	6.59
D-9	748300	2085200	12.5	0.975	1.28	1.57	0.0897	0.425	0.48	240	7.78
	748300	2084900	11	1.07	1.08	1.76	0.0779	0.281	0.13	64	6.96
	748150	2084750	11.2	0.924	1.29	3.45	0.11	0.169	0	0	7.45
	748150	2084900	12.6	0.843	1.45	2.08	0.112	0.217	0.12	60	9.92
E-5	748150	2084600	10.9	0.688	1.03	1.67	0.0577	0.162	0.32	160	8.17
	748150	2085050	13.4	0.943	1.51	1.99	0.095	0.262	0	0	8.32
E-4	748150	2084450	12.7	1.2	1.26	1.51	0.0497	0.0841	0.4	190	8.17
	748150	2084300	14.5	1.09	1.36	1.38	0.0651	0.097	0	0	8.44
E-9	748150	2085200	12.8	1.1	1.28	1.79	0.0624	0.295	0.25	120	7.96
	748000	2084600	11.1	0.699	1.1	1.69	0.0733	0.321	0	0	6.56
F-6	748000	2084750	13.4	0.843	1.31	1.95	0.104	0.178	0.24	120	7.84
	748000	2084300	12	0.994	1.05	1.49	0.0494	0.222	0	0	7.15
	748000	2084450	11.7	0.847	1.16	1.56	0.075	0.327	0.13	65	6.99

Draft
by
G.S.G.

OU-1 IHSS 119.1, 119.2, & 130 Am-241 (pCi/g)

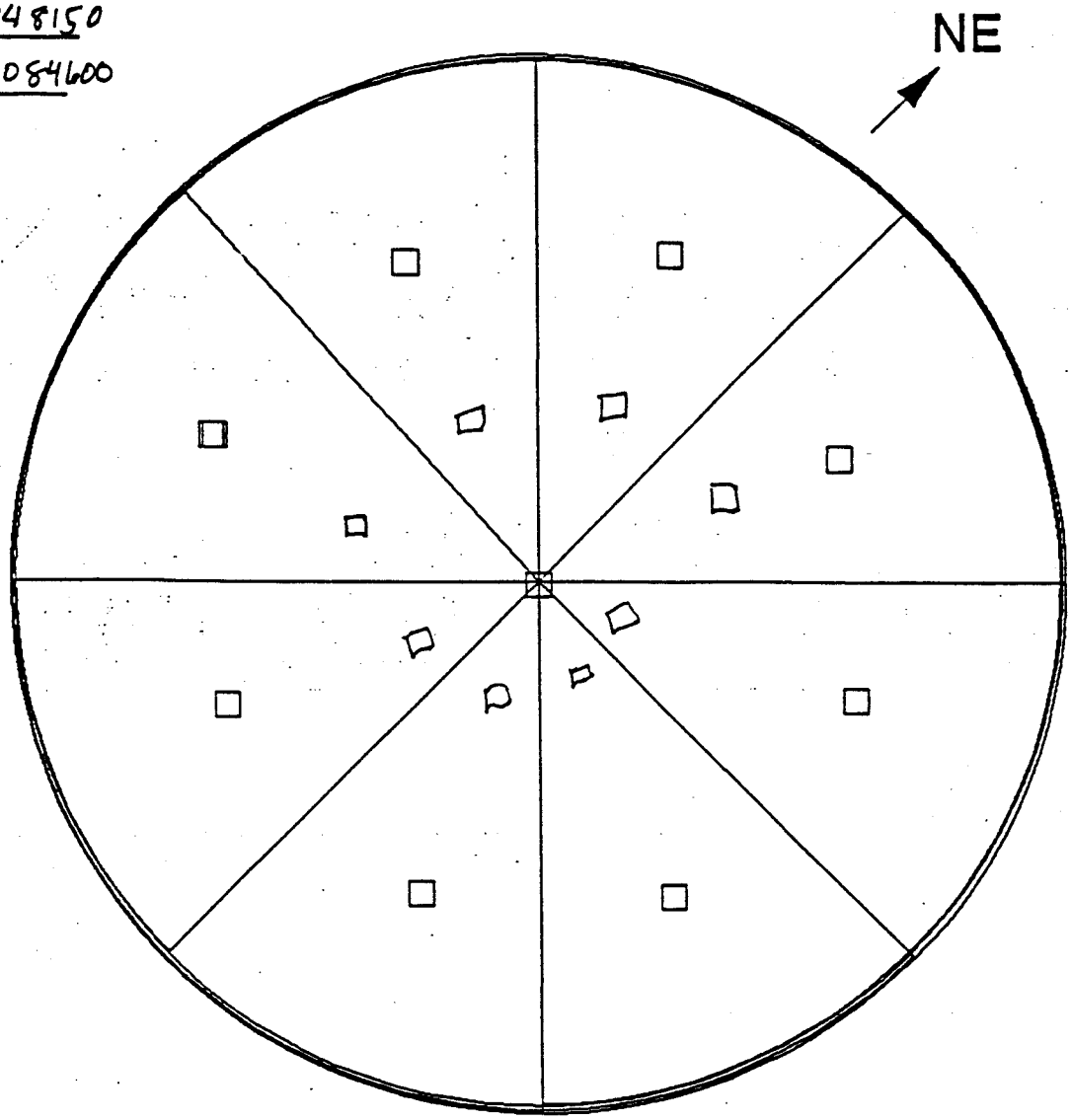


FIDLER Walkover Survey

FGGS Survey Location E-5

N 748150

E 2084600



FGGS survey location, diamter = 150'

Markers are 1 minute FIDLER counts

M. Brown
D. Simcik

RPT R. Curry

EMP# 516766 516777 516788

Date 3-29-93

RADIOLOGICAL OPERATIONS
GAMMA SURVEY

CONTROL NO. _____

Taken by: M. Brown Emp. # [redacted] Reviewed by:

Taken by: T. Smead Emp. # [redacted] Rad Ops Foreman [signature] Emp. # [redacted]

Taken by: Ron Cuny Emp. # [redacted] Name/Organization _____ Emp. # _____

Date: 3-24-93 Building: 881 Hillside

Time: 1300 Room #: NA

Shift: Days

Survey Description: Survey of Area E-4 on 881 Hillside

BICRON FILDER

Mfg:	FIDLER	FIDLER	FIDLER	FIDLER	FIDLER
Model:	Bicron	Bicron			
Serial #:	A5137	A5316			
Date Perf. Ck:	3-24-93	3-24-93			
Date Calib'd:	10-27-92	12-8-92			
Cal. Due Date:	10-93	12-93			

	BKG	c/m METER	SCALER	AREA POSTED (Y/N)		BKG	c/m METER	SCALER	AREA POSTED (Y/N)
1.	3200	3000	3112	N	12.	3200	3000	3018	N
2.	3200	3000	3128	N	13.	3200	3000	2996	N
3.	3200	3000	2962	N	14.	3200	3000	3158	N
4.	3200	3000	3007	N	15.	3200	3000	3002	N
5.	3200	3000	3250	N	16.	3200	3000	3198	N
6.	3200	3000	2875	N	17.	3200	3000	3207	N
7.	3200	3000	2947	N	18.				N
8.	3200	3000	3177	N	19.				N
9.	3200	3000	3056	N	20.				
10.	3200	3000	2901	N	21.				
11.	3200	3000	3208	N	22.				

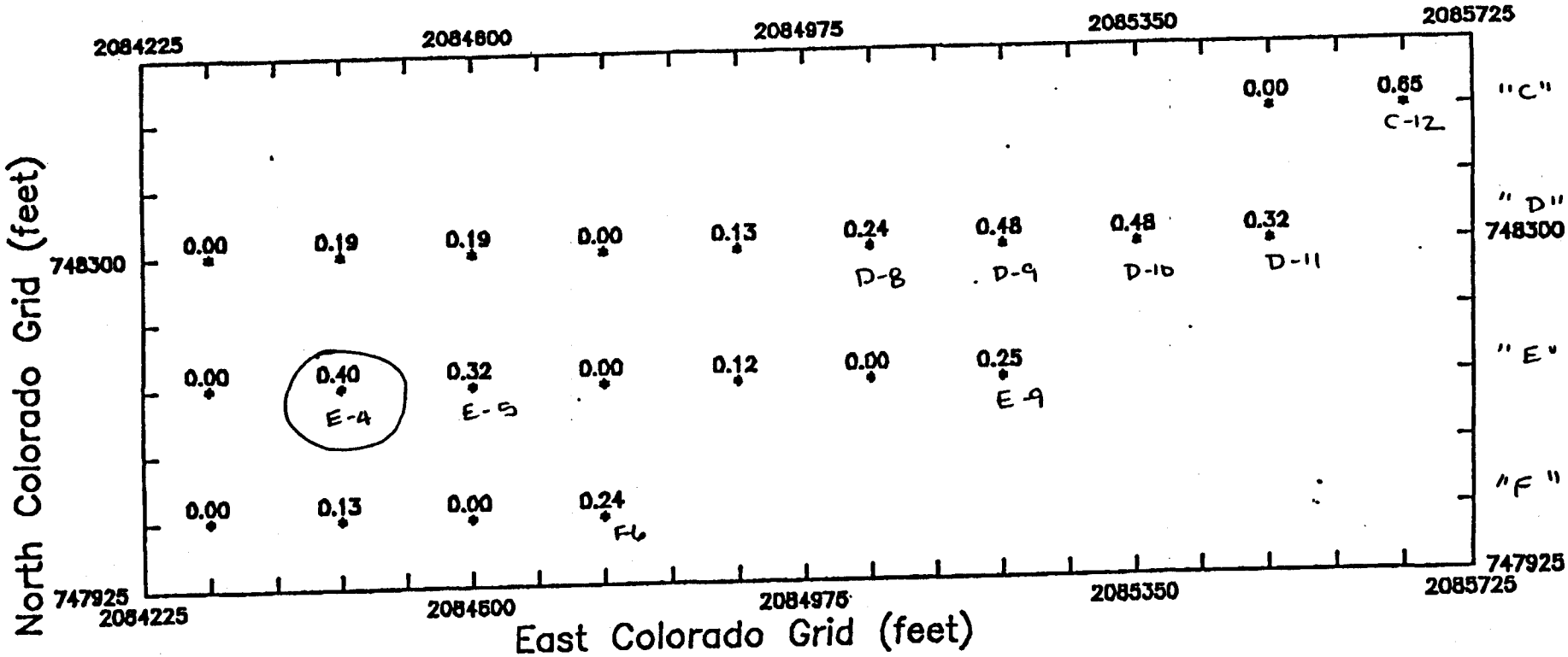
RF-47414 (11/90)

Draft
by
G.S.G.

	North	East	K-40	Ra-226	Th-232	U-238	U-235	Cs-137	Am-241	Am-241	Exposure
	feet	feet	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	uCi	uR/h
	748450	2085500	17.3	0.748	0.923	1.48	0.0455	0.0957	0	0	10.1
C-12	748450	2085650	14.6	0.791	1.09	1.3	0.0699	0.221	0.65	320	10.7
D-8	748300	2085050	10.8	0.78	0.957	1.22	0.0754	0.338	0.24	120	6.3
D-10	748300	2085350	11.1	0.779	1.16	1.4	0.0647	0.354	0.48	240	6.74
D-11	748300	2085500	16	0.956	1.28	1.49	0.0791	0.349	0.32	150	12.6
	748300	2084450	9.2	1.01	0.964	1.59	0.0616	0.184	0.19	91	6.31
	748300	2084300	12.4	1.37	1.19	1.85	0.0374	0.114	0	0	7.98
	748300	2084600	7.96	0.869	0.887	1.79	0.0602	0.192	0.19	94	5.68
	748300	2084750	10.3	0.933	1	1.53	0.0756	0.297	0	0	6.59
D-9	748300	2085200	12.5	0.975	1.28	1.57	0.0897	0.425	0.48	240	7.78
	748300	2084900	11	1.07	1.08	1.76	0.0779	0.281	0.13	64	6.96
	748150	2084750	11.2	0.924	1.29	3.45	0.11	0.169	0	0	7.45
	748150	2084900	12.6	0.843	1.45	2.08	0.112	0.217	0.12	60	9.92
E-5	748150	2084600	10.9	0.688	1.03	1.67	0.0577	0.162	0.32	160	8.17
	748150	2085050	13.4	0.943	1.51	1.99	0.095	0.262	0	0	8.32
E-4	748150	2084450	12.7	1.2	1.26	1.51	0.0497	0.0841	0.4	190	8.17
	748150	2084300	14.5	1.09	1.36	1.38	0.0651	0.097	0	0	8.44
E-9	748150	2085200	12.8	1.1	1.28	1.79	0.0624	0.295	0.25	120	7.96
	748000	2084600	11.1	0.699	1.1	1.69	0.0733	0.321	0	0	6.56
F-6	748000	2084750	13.4	0.843	1.31	1.95	0.104	0.178	0.24	120	7.84
	748000	2084300	12	0.994	1.05	1.49	0.0494	0.222	0	0	7.15
	748000	2084450	11.7	0.847	1.16	1.56	0.075	0.327	0.13	65	6.99

Draft
by
G.S.G.

OU-1 IHSS 119.1, 119.2, & 130 Am-241 (pCi/g)



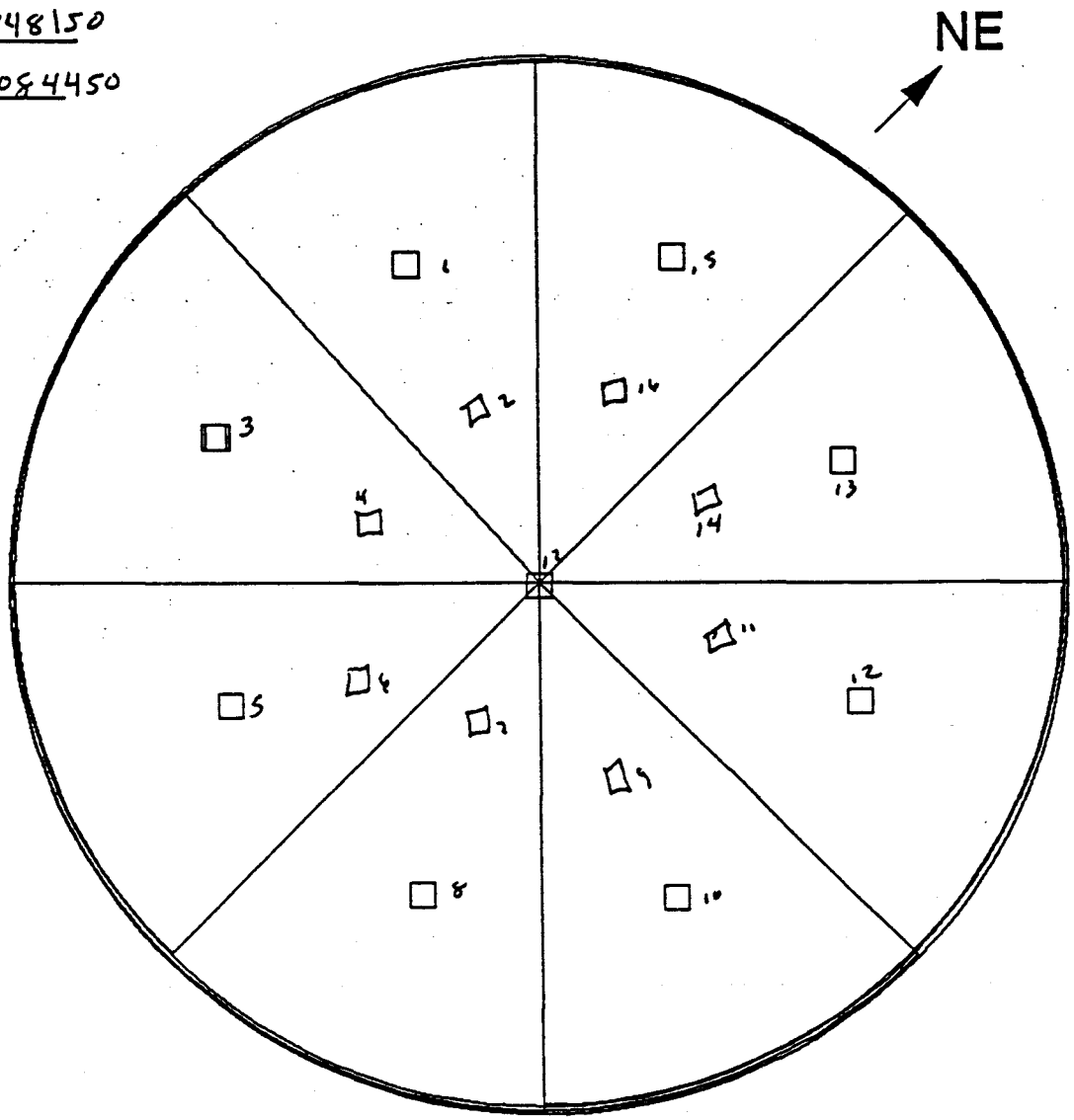
1 minute count

FIDLER Walkover Survey

FGGS Survey Location E-4

N 748150

E 2084450



FGGS survey location, diamter = 150'

Markers are 1 minute FIDLER counts

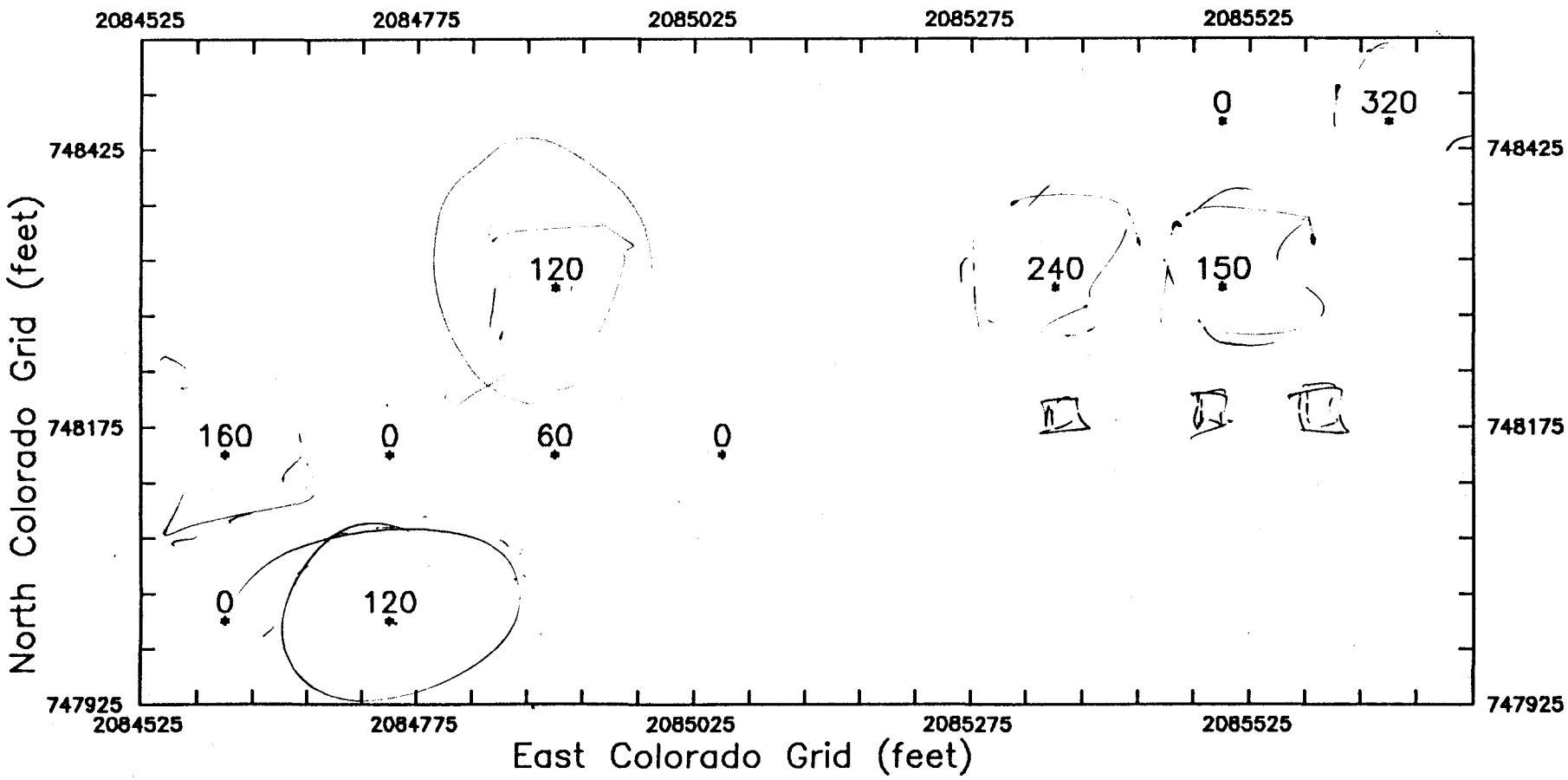
M. Brown
D. Simcick
RPT R. Curry

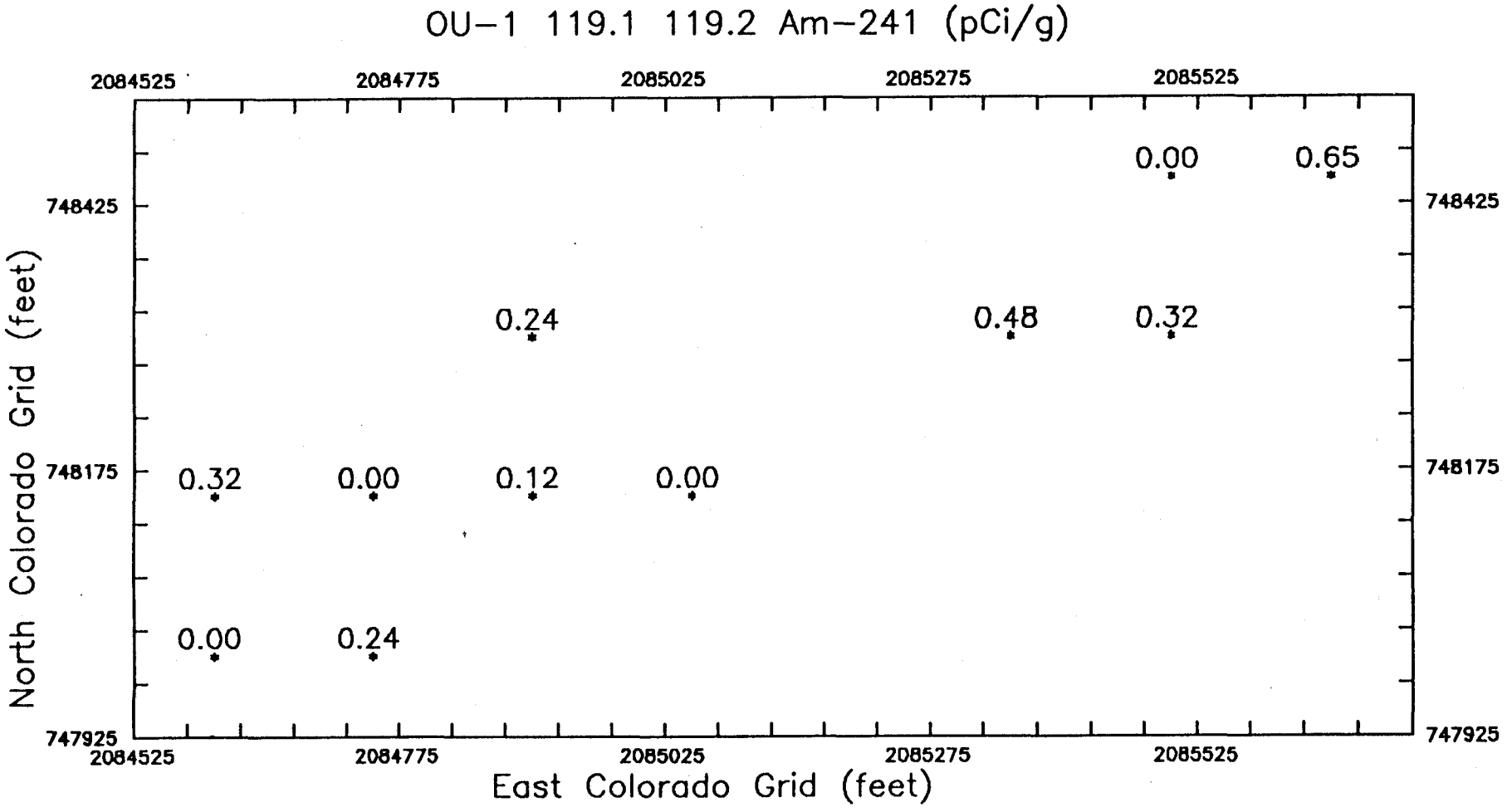
EMP# 516766
516737
516784

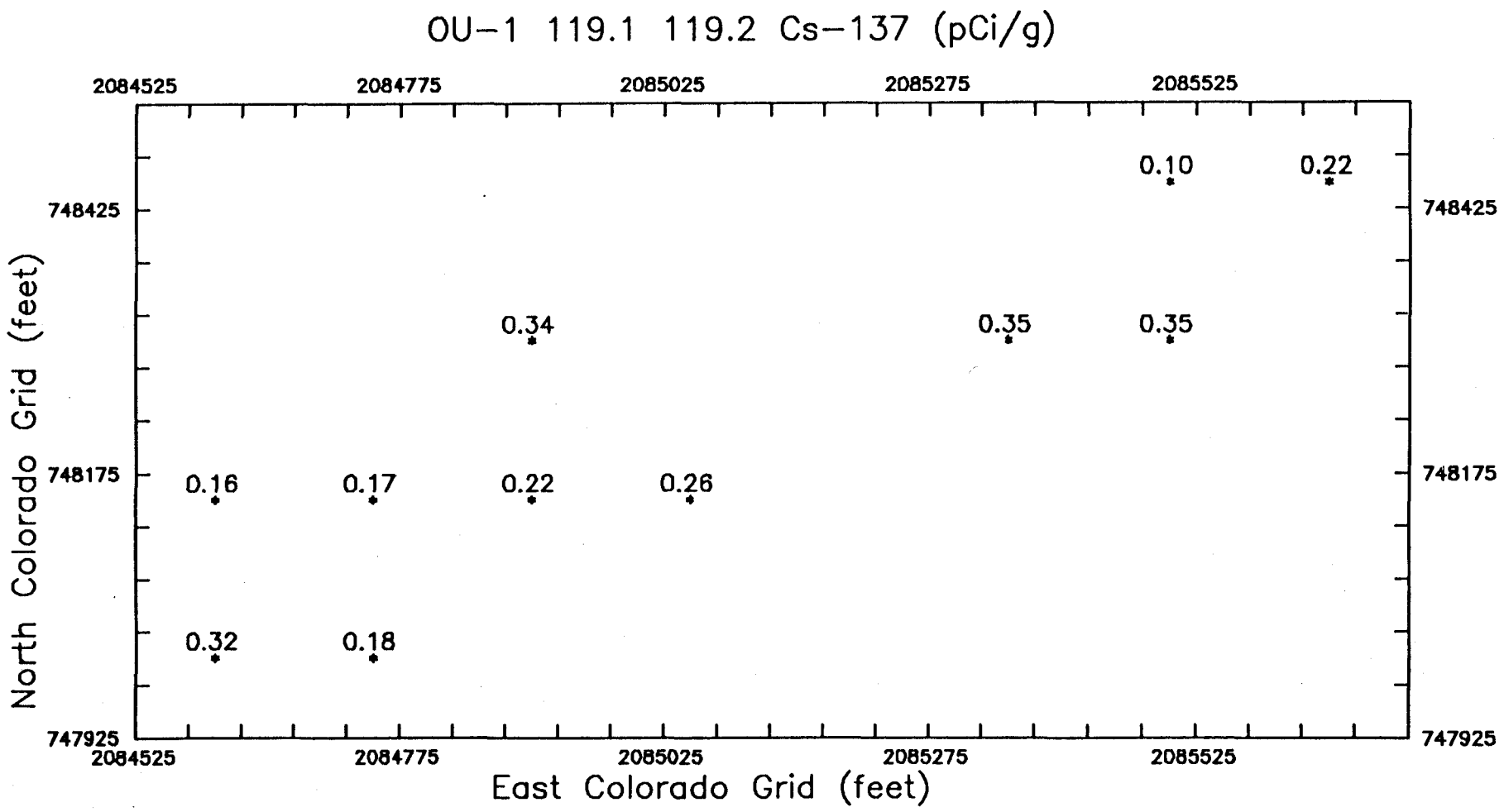
Date 3-29-93

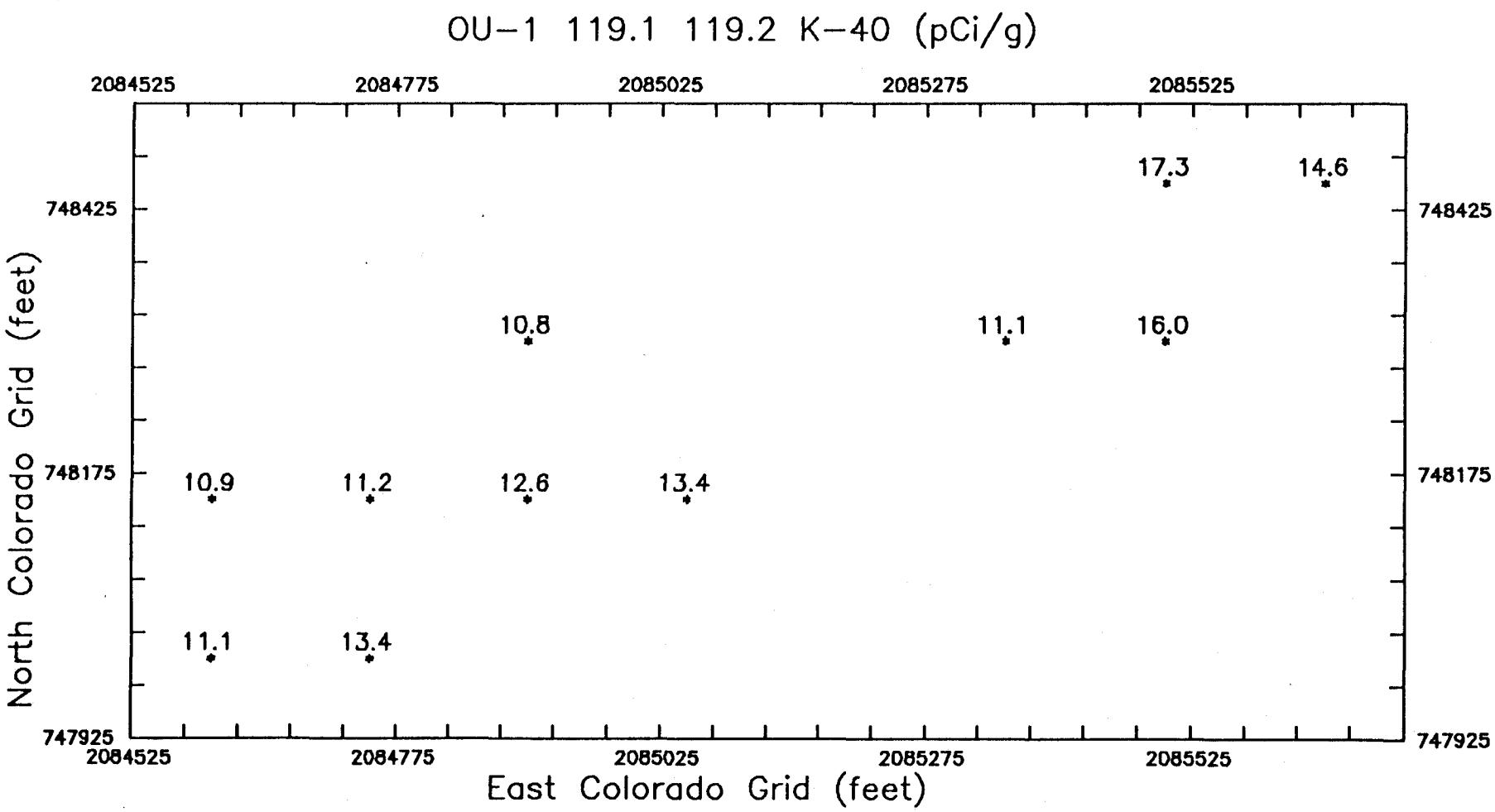
North	East	K-40	Ra-226	Th-232	U-238	U-235	Cs-137	Am-241	Am-241	Exposure
feet	feet	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	pCi/g	uCi	uR/h
748000	2084600	11.1	0.699	1.1	1.69	0.0733	0.321	0	0	6.56
748000	2084750	13.4	0.843	1.31	1.95	0.104	0.178	0.24	120	7.84
748150	2084750	11.2	0.924	1.29	3.45	0.11	0.169	0	0	7.45
748150	2084900	12.6	0.843	1.45	2.08	0.112	0.217	0.12	60	9.92
748150	2084600	10.9	0.688	1.03	1.67	0.0577	0.162	0.32	160	8.17
748150	2085050	13.4	0.943	1.51	1.99	0.095	0.262	0	0	8.32
748300	2084900	10.8	0.78	0.957	1.22	0.0754	0.338	0.24	120	6.3
748300	2085350	11.1	0.779	1.16	1.4	0.0647	0.354	0.48	240	6.74
748450	2085500	17.3	0.748	0.923	1.48	0.0455	0.0957	0	0	10.1
748450	2085650	14.6	0.791	1.09	1.3	0.0699	0.221	0.65	320	10.7
748300	2085500	16	0.956	1.28	1.49	0.0791	0.349	0.32	150	12.6

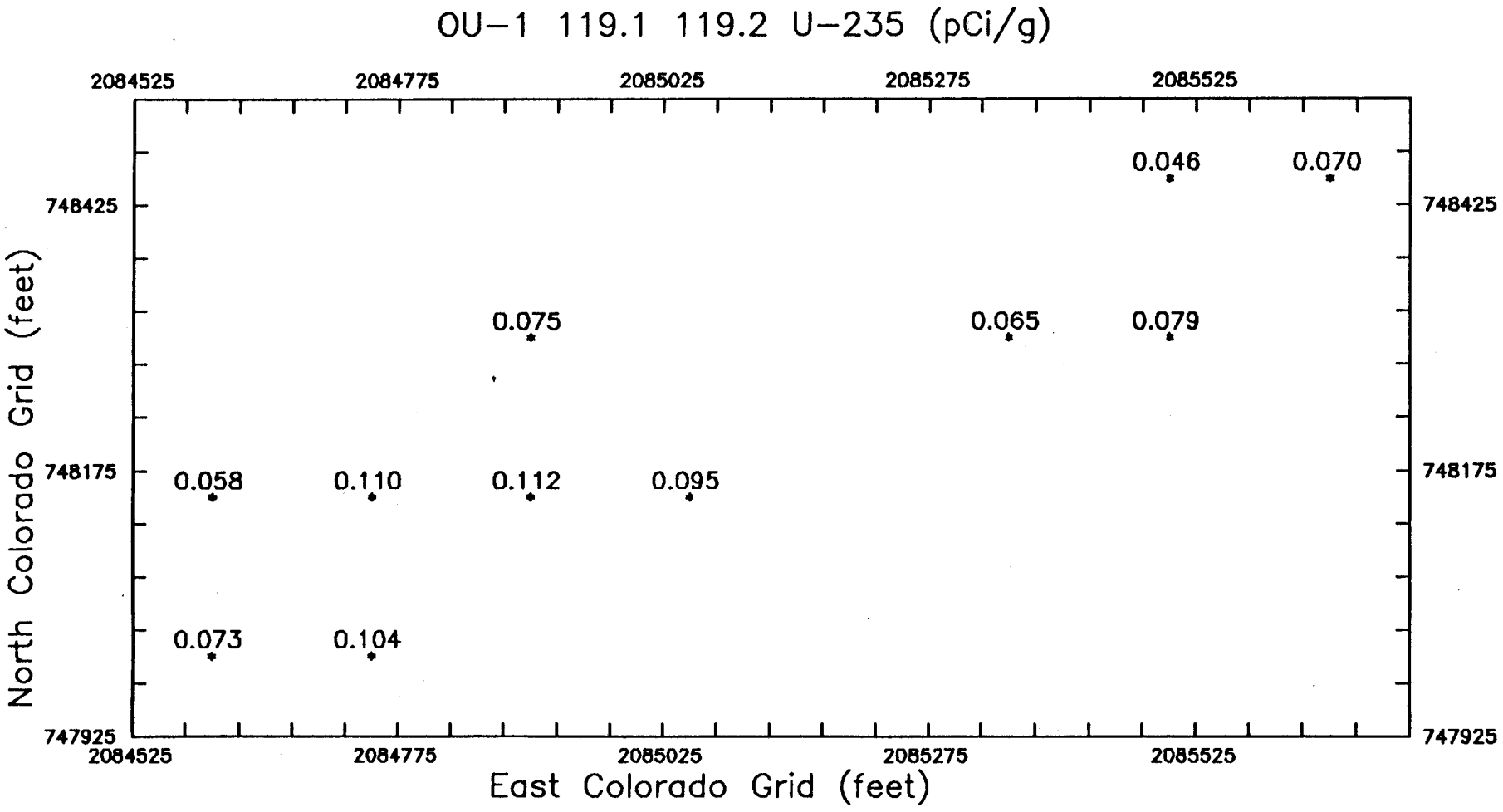
OU-1 119.1 119.2 Am-241 (uCi)

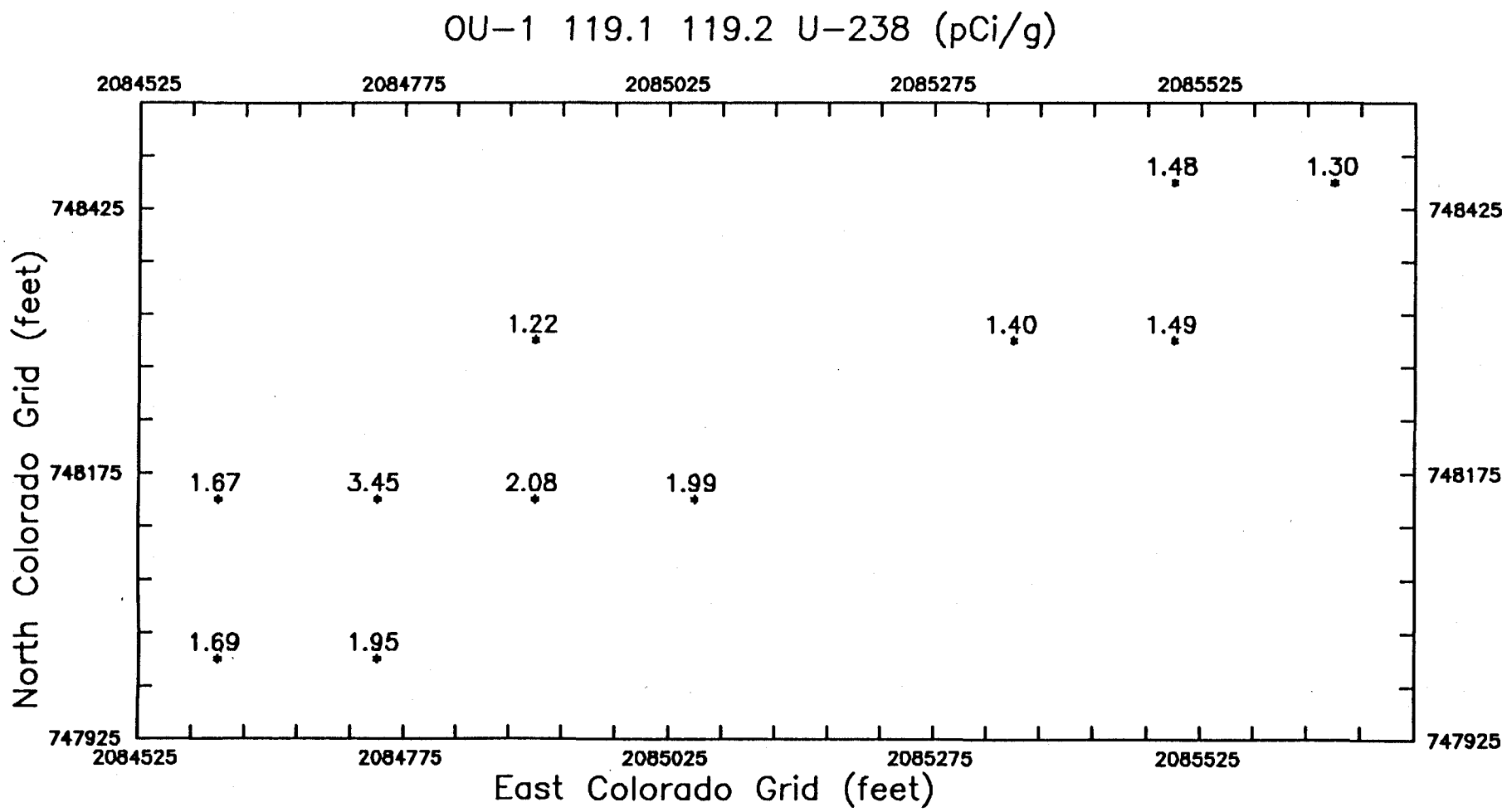


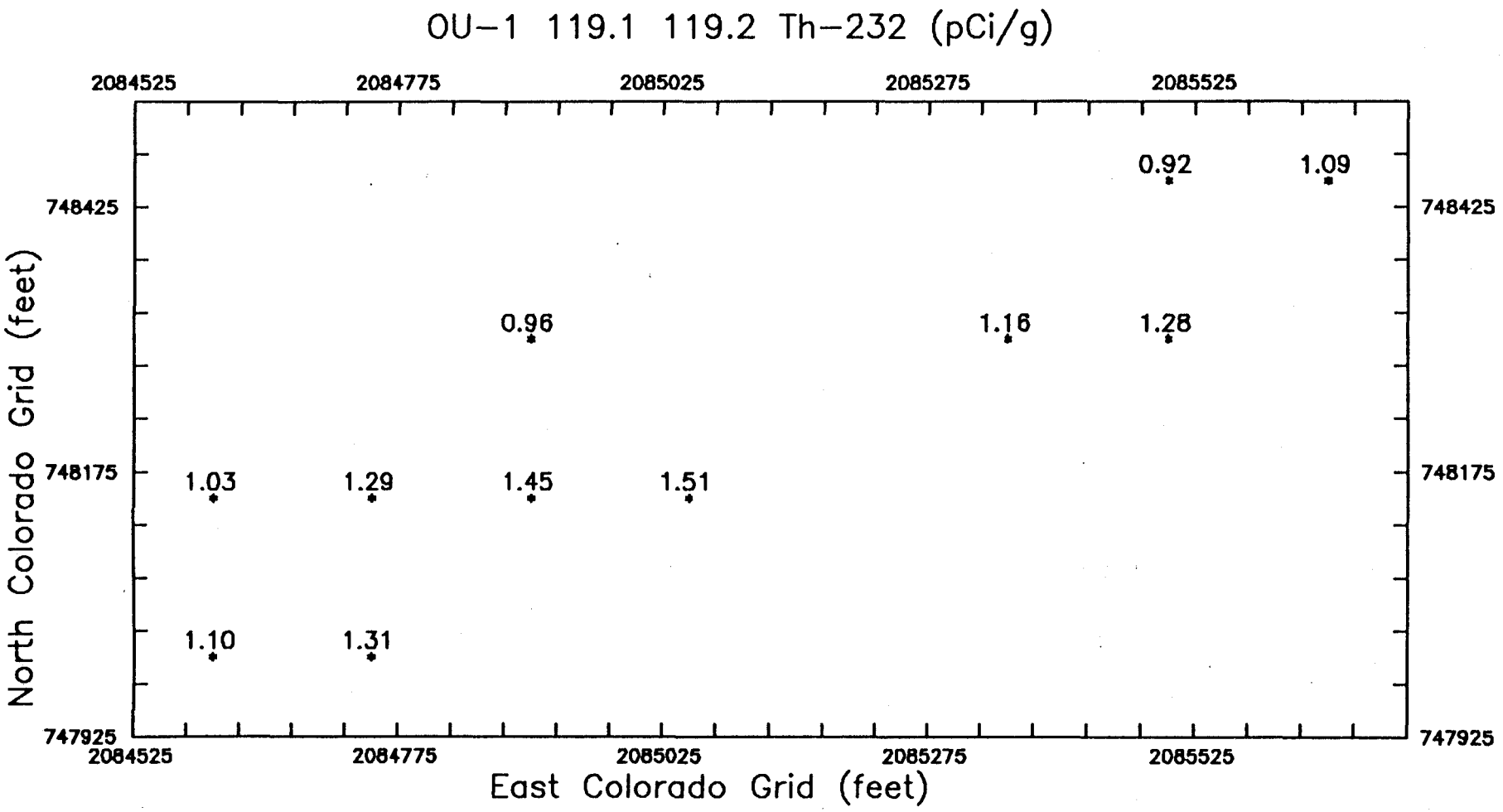

OU-1 119.1 119.2 Am-241 (pCi/g)
2084525
2084775
2085025
2085275
2085525
748425
748175
747925
0.00
0.65
0.24
0.48
0.32
0.32
0.00
0.12
0.00
0.00
0.24
North Colorado Grid (feet)
East Colorado Grid (feet)

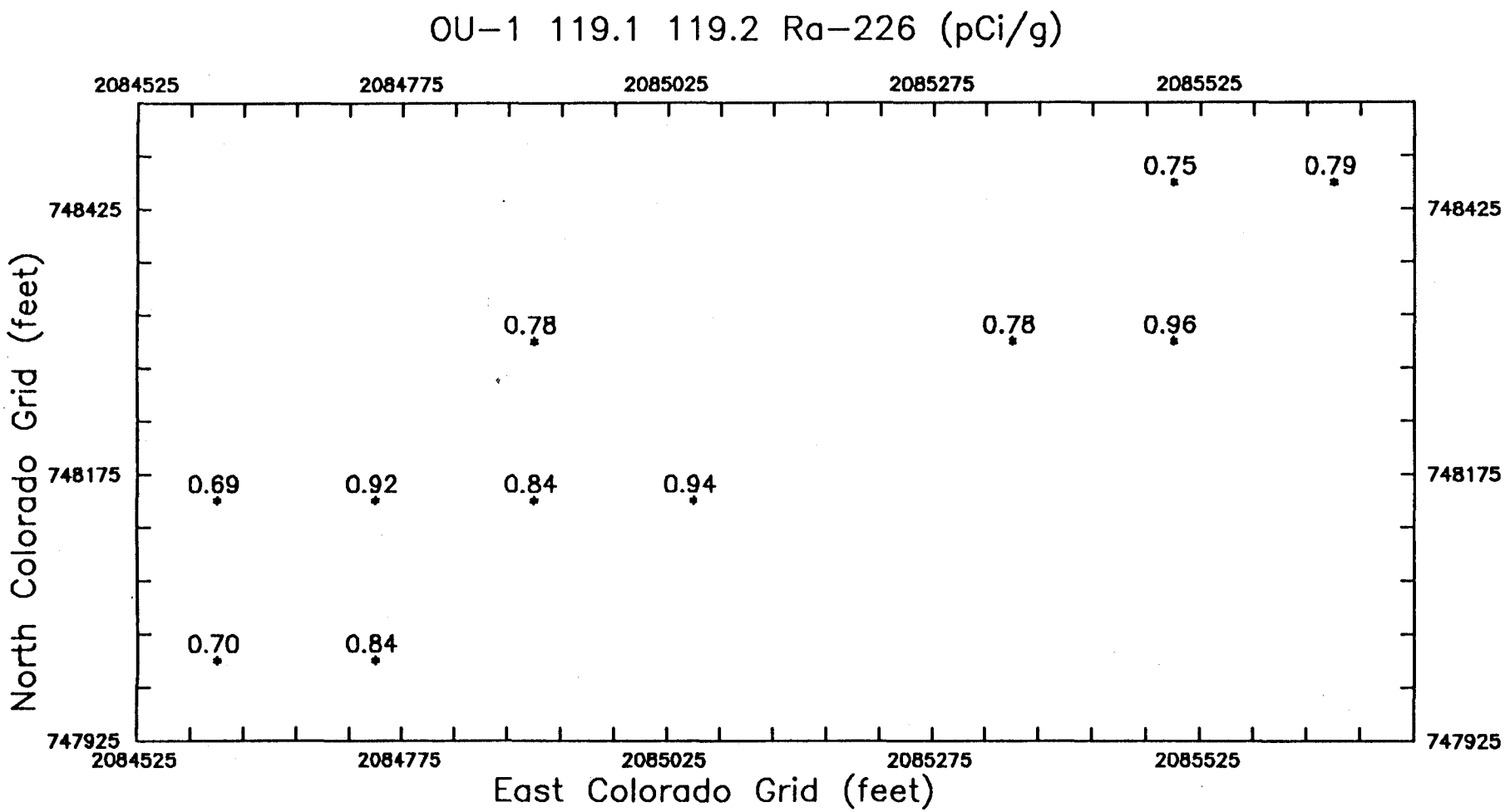

OU-1 119.1 119.2 Cs-137 (pCi/g)
2084525
2084775
2085025
2085275
2085525
748425
748175
747925
North Colorado Grid (feet)
East Colorado Grid (feet)
0.10
0.22
0.34
0.35
0.35
0.16
0.17
0.22
0.26
0.32
0.18


OU-1 119.1 119.2 K-40 (pCi/g)
2084525
2084775
2085025
2085275
2085525
748425
748175
747925
17.3
14.6
10.8
11.1
16.0
10.9
11.2
12.6
13.4
11.1
13.4
North Colorado Grid (feet)
East Colorado Grid (feet)


OU-1 119.1 119.2 U-235 (pCi/g)
2084525
2084775
2085025
2085275
2085525
748425
748175
747925
0.046
0.070
0.075
0.065
0.079
0.058
0.110
0.112
0.095
0.073
0.104
North Colorado Grid (feet)
East Colorado Grid (feet)


OU-1 119.1 119.2 U-238 (pCi/g)
2084525
2084775
2085025
2085275
2085525
748425
748175
747925
North Colorado Grid (feet)
East Colorado Grid (feet)
1.48
1.30
1.22
1.40
1.49
1.67
3.45
2.08
1.99
1.69
1.95


OU-1 119.1 119.2 Th-232 (pCi/g)
2084525
2084775
2085025
2085275
2085525
748425
748175
747925
North Colorado Grid (feet)
East Colorado Grid (feet)
0.92
1.09
0.96
1.16
1.28
1.03
1.29
1.45
1.51
1.10
1.31


OU-1 119.1 119.2 Ra-226 (pCi/g)
2084525
2084775
2085025
2085275
2085525
748425
748175
747925
0.75
0.79
0.78
0.78
0.96
0.69
0.92
0.84
0.94
0.70
0.84
North Colorado Grid (feet)
East Colorado Grid (feet)

INTERNATIONAL TECHNOLOGY CORPORATION

DATE 5/20/93

PLEASE DELIVER THE FOLLOWING PAGES TO:

NAME: Matt Garton

FIRM/LOCATION: EG&G Rocky Flats

TELECOPIER NUMBER: 303-966-8575

VERIFICATION NUMBER:

FROM:

NAME Susan Aderholdt

IT OAK RIDGE LABORATORY
1550 BEAR CREEK ROAD
KINGSTON, TENNESSEE 37763

PHONE: 615-482-9707
FAX: 615-481-3606

NOTES: Results from Rush Samples

IF YOU DO NOT RECEIVE ALL THE PAGES NOTED, PLEASE CALL AND THE TELECOPY WILL THEN BE COMPLETED.

CONFIRMATION OF RECEIPT REQUESTED

_____ YES _____ NO

PAGE 1 OF 26

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT DENVER - ROCKY FLATS
EG&G Rocky Flats, Inc.
Rocky Flats Plant
Hwy. 93, Interloken Bldg. 080
Golden, Colorado 80402-0464
ATTN: Karen Schoendaller

Date: May 19, 1993

Work Order: S3-05-008

This is the Certificate of Analysis for the following samples:

Client Project ID:	STOLLER 989087
Date Received By Lab:	05/05/93
Number of Samples:	Seven (7)
Sample Type:	Solid

I. INTRODUCTION

On May 5, 1993, seven (7) solid samples were received in good condition at ITAS-Oak Ridge, Tennessee laboratory from EG&G Rocky Flats Plant, Golden, Colorado. The list of analytical tests performed as well as date of receipt and analysis, can be found in the attached report.

Fractions (01A) SS10002ST - (09A) DUP SS10008ST are part of Sample Delivery Group S3-05-008.

Reviewed and Approved:

for Laurie Bates
James M. Littlefield
Radiologic Analysis Group Leader

Reviewed and Approved:

Susan Aderholdt
Susan Aderholdt
Project Manager

JML/bav

Any reproductions must be made of the complete data report.

I. INTRODUCTION (Continued)

The samples were labeled as follows:

DENVER SAMPLE ID	ITAS SAMPLE NUMBER	RECEIPT DATE	PARAMETERS REQUIRED
SS10002ST	S3-05-008-01A	05/05/93	List One
SS10003ST	S3-05-008-02A	05/05/93	List One
SS10004ST	S3-05-008-03A	05/05/93	List One
SS10005ST	S3-05-008-04A	05/05/93	List One
SS10006ST	S3-05-008-05A	05/05/93	List One
SS10007ST	S3-05-008-06A	05/05/93	List One
MS 10007ST	S3-05-008-07A	05/05/93	List Two
SS10008ST	S3-05-008-08A	05/05/93	List One
DUP SS10008ST	S3-05-008-09A	05/05/93	List One
BLANK RESULTS	S3-05-008-10A	05/05/93	List Three
SPIKE RESULTS	S3-05-008-11A	05/05/93	List Three

List One consists of: Americium 241, Gross Alpha, Gross Beta, Plutonium 239/240, Uranium 233/234, Uranium 235/236, and Uranium 238.

List Two consists of: Americium 241, Plutonium 239, and Uranium 238.

List Three consists of: Americium 241, Gross Alpha, Gross Beta, Plutonium 239, and Uranium 238.

II. ANALYTICAL RESULTS/METHODOLOGY

The analytical results for this report are presented by analytical tests. Each set of data will include sample identification, analytical results, data package including the raw data, and/or the appropriate detection limits.

The samples were prepared using Procedure OR7006. Alpha Isotopic analysis was performed for Americium 241, Plutonium 239/240 and Isotopic Uranium using Procedure OR7103. Gross Alpha and Gross Beta determinations were performed using Procedure OR7105.

III. QUALITY CONTROL

QA/QC information was performed on the enclosed analytical data. The purpose of this information is to ensure the user that the data enclosed is scientifically valid and is used to assess the laboratory's performance.

The samples were analyzed within the required holding time.

IV. NONCONFORMANCE

There were no nonconformances associated with this work order.

V. COMMENTS

Americium and Plutonium analyses for samples 1-3, 5, and 8-9:

To further decontaminate for Thorium interferences, samples (01) SS10002ST through (03) SS10004ST, (05) SS10006ST, (08) SS10008ST and (09) DUP SS10008ST were taken through a nitric acid column three (3) times rather than one (1) time as dictated by the Alpha Isotopic Procedure OR7103 for Americium and Plutonium analyses.

Page 2
Received: 05/05/93

ITOXL OAK RIDGE REPORT

Results by Sample

Work Order # 93-05-008

SAMPLE ID [illegible] FRACTION 01A TEST CODE [illegible] NAME Special form for reporting
Date & Time Collected 04/29/93 10:45:00 Category SOLID

PARAMETER	RESULT	2-SIGMA ERROR	UNITS
AM-241	2.94E-2	2.08E-2	pCi/g
PU-239/240	7.35E-2	5.27E-2	pCi/g
U-233/234	6.09E+0	1.30E+0	pCi/g
U-235/236	1.76E-1	0.66E-1	pCi/g
U-238	3.38E+0	0.74E+0	pCi/g
GROSS ALPHA	3.44E+1	0.85E+1	pCi/g
GROSS BETA	3.57E+1	0.76E+0	pCi/g

Received: 05/05/93

IEGEL OAK RIDGE REPORT

Results by Sample

Work Order # 93-05-008

SAMPLE ID 9M10003HX FRACTION 02A TEST CODE HXRC NAME Special form for reporting

Date & Time Collected 04/29/93 11:00:00 Category SOLID

PARAMETER	RESULT	2-SIGMA ERROR	UNITS
AM-241	4.93E-2	5.05E-2	pCi/g
PU-239/240	1.32E-1	1.06E-1	pCi/g
U-233/234	4.29E+2	1.01E+2	pCi/g
U-235/236	1.46E+1	0.41E+1	pCi/g
U-238	1.22E+2	0.29E+2	pCi/g
GROSS ALPHA	4.25E+2	0.86E+2	pCi/g
GROSS BETA	1.97E+3	0.40E+2	pCi/g

Received: 05/06/93

ITORL OAK RIDGE REPORT

Results by Sample

Work Order # 93-05-008

SAMPLE ID SS100949F FRACTION 03A TEST CODE [illegible] NAME Special form for reporting

Date & Time Collected 04/29/93 12:00:00 Category SOLID

PARAMETER	RESULT	2-SIGMA ERROR	UNITS
AM-241	1.83E-1	0.99E-1	pCi/g
PU-239/240	4.29E-1	2.02E-2	pCi/g
U-233/234	2.84E+1	0.56E+1	pCi/g
U-235/236	8.43E-1	3.58E-1	pCi/g
U-238	1.39E+0	0.46E+0	pCi/g
GROSS ALPHA	3.17E+1	0.80E+1	pCi/g
GROSS BETA	3.38E+1	0.72E+1	pCi/g

Received: 05/06/93 Results by Sample

SAMPLE ID [illegible] FRACTION 04A TEST CODE SPEC NAME Special form for reporting

Date & Time Collected 04/29/93 12:20:00 Category SOLID

PARAMETER	RESULT	2-SIGMA ERROR	UNITS
AM-241	1.92E-1	2.98E-1	pCi/g
PU-239/240	8.70E-1	5.98E-1	pCi/g
U-233/234	2.40E+2	0.51E+2	pCi/g
U-235/236	6.21E+0	2.00E+0	pCi/g
U-238	1.51E+0	0.75E+0	pCi/g
GROSS ALPHA	4.01E+2	0.82E+2	pCi/g
GROSS BETA	5.51E+1	1.14E+1	pCi/g

 ITOHL OAK RIDGE REPORT Work Order # 93-05-008

Received: 05/05/93

Results by Sample

SAMPLE ID [illegible] FRACTION 05A TEST CODE RPEL NAME Special form for reporting

Date & Time Collected 04/29/93 12:29:00 Category POLYD

PARAMETER	RESULT	2-SIGMA ERROR	UNITS
AM-241	3.72E-2	4.37E-2	pCi/g
PU-239/240	5.39E-2	6.34E-2	pCi/g
U-233/234	8.27E+0	1.93E+0	pCi/g
U-235/236	3.01E-1	1.79E-1	pCi/g
U-238	7.79E-1	2.95E-1	pCi/g
GROSS ALPHA	2.93E+1	0.74E+1	pCi/g
GROSS BETA	3.00E+1	0.64E+1	pCi/g

Received: 05/05/93

Results by Sample

SAMPLE ID [illegible] FRACTION 96A TEST CODE [illegible] NAME Special form for reporting

Date & Time Collected 04/29/93 14:20:00 Category SOLID

PARAMETER	RESULT	2-SIGMA ERROR	UNITS
AM-241	4.15E+0	1.27E+0	pCi/g
PU-239/240	2.27E+1	0.86E+1	pCi/g
U-233/234	1.49E+0	0.66E+0	pCi/g
U-235/236	1.07E-1	2.14E-1	pCi/g
U-238	8.92E-1	5.00E-1	pCi/g
GROSS ALPHA	5.85E+1	1.32E+1	pCi/g
GROSS BETA	3.33E+1	0.71E+1	pCi/g

Received: 05/05/93 Results by Sample

SAMPLE ID [illegible] FRACTION 97A TEST CODE ASTRPT NAME Form to report data

Date & Time Collected 04/29/93 14:20:00 Category SOLID

PARAMETER		RESULT	2-SIGMA ERROR	UNITS
AM-241				
	KNOWN	5.3		DPM
	FOUND	5.0		DPM
DEVIATION (IN SIGMA)		-0.41		
PU-239				
	KNOWN	6.2		DPM
	FOUND	6.3		DPM
DEVIATION (IN SIGMA)		0.04		
U-238				
	KNOWN	24.2		DPM
	FOUND	25.6		DPM
DEVIATION (IN SIGMA)		0.62		

Received: 05/05/93

ITCORL OAK RIDGE REPORT

Results by Sample

Work Order # 93-05-008

SAMPLE ID BS1000BST

FRACTION 00A TEST CODE STBC MATX Special form for repository

Date & Time Collected 04/29/93 14:30:00 Category SOLID

PARAMETER	RESULT	2-SIGMA ERROR	UNITS
AM-241	1.90E+0	0.51E+0	pCi/g
PU-239/240	1.47E+1	0.34E+1	pCi/g
U-233/234	6.40E-1	2.59E-1	pCi/g
U-235/236	5.57E-2	8.12E-2	pCi/g
U-238	7.50E-1	2.83E-1	pCi/g
GROSS ALPHA	2.73E+1	0.71E+1	pCi/g
GROSS BETA	3.17E+1	0.68E+1	pCi/g

Received: 05/05/93

ITORL OAK RIDGE REPORT

Results by Sample

Work Order # 93-05-005

SAMPLE ID DEP 051000BEK

FRACTION 09A TEST CODE SPEC NAME Special form for reporting

Date & Time Collected 04/22/93 14:30:00 Category SOLID

PARAMETER	RESULT	2-SIGMA ERROR	UNITS
AM-241	3.15E+0	0.59E+0	pCi/g
PU-238/240	1.27E+1	0.30E+1	pCi/g
U-233/234	8.05E-1	2.90E-1	pCi/g
U-235/236	8.30E-2	9.48E-2	pCi/g
U-238	8.74E-1	3.07E-1	pCi/g
GROSS ALPHA	2.64E+1	0.70E+1	pCi/g
GROSS BETA	2.55E+1	0.56E+1	pCi/g

Received: 05/03/93

IPORL OAK RIDGE REPORT

Results by Sample

Work Order # 93-05-008

SAMPLE ID BLANK RESULTS FRACTION 18A TEST CODE AEIEFF NAME Form to report data

Date & Time Collected not specified Category LIQUID

PARAMETER	RESULT	2-SIGMA ERROR	UNITS
B-93-1216 (AM-241) FRAC.1-3,5,8-9	0.02		DPM
B-93-1217 (AM-241) FRAC.4,6,7	0.00		DPM
B-93-1216 (PU-239) FRAC.1-3,5,8-9	0.04		DPM
B-93-1217 (PU-239) FRAC.4,6,7	0.04		DPM
B-93-1213 (U-238) FRAC.1-3,5,8-9	0.00		DPM
B-93-1218 (U-238) FRAC.4,6,7	0.10		DPM
B-93-9062 (G.ALPHA) FRAC.1-6,8-9	-0.61		DPM
B-93-9062 (G.BETA) FRAC.1-6,8-9	-0.38		DPM

Results by Sample

SAMPLE ID [illegible] FRACTION 11A TEST CODE [illegible] NAME [illegible]
Date & Time Collected not specified Category LIQUID

PARAMETER		RESULT	2-SIGMA ERROR	UNITS
S-93-1214 (AM-241)				
FRAC 1-3,5&	KNOWN	5.3		DPM
S-9	FOUND	5.2		DPM
DEVIATION (IN SIGMA)		-0.13		
S-93-1217 (AM-241)				
FRAC 4,6,7	KNOWN	5.3		DPM
	FOUND	5.0		DPM
DEVIATION (IN SIGMA)		-0.31		
S-93-1214 (PU-239)				
FRAC 1-3,5&	KNOWN	6.2		DPM
S-9	FOUND	6.2		DPM
DEVIATION (IN SIGMA)		-0.13		
S-93-1217 (PU-239)				
FRAC 4,6,7	KNOWN	6.2		DPM
	FOUND	5.4		DPM
DEVIATION (IN SIGMA)		-1.25		
S-93-1213 (U-238)				
FRAC 1-3,5&	KNOWN	24.2		DPM
S-9	FOUND	28.0		DPM
DEVIATION (IN SIGMA)		1.61		
S-93-1216 (U-238)				
FRAC 4,6,7	KNOWN	24.2		DPM
	FOUND	27.4		DPM
DEVIATION (IN SIGMA)		1.34		

Received: 05/05/93 Results by Sample

SAMPLE ID STORM RESIDUES FRACTION 11B TEST CODE ASTRPT NAME Form to report data

Date & Time Collected not specified Category LIQUID

PARAMETER		RESULT	2-SIGMA ERROR	UNITS
S-93-9062 (G.ALPHA)				
FRAC.1-6,8-9	KNOWN	20.8		DPM
	FOUND	23.5		DPM
DEVIATION (IN SIGMA)		0.26		
S-93-9062 (G.BETA)				
FRAC.1-6,8-9	KNOWN	131.3		DPM
	FOUND	141.5		DPM
DEVIATION (IN SIGMA)		0.91		

Received: 05/05/93 05/19/93 08:37:11

IT DENVER- ROCKY FLATS

AMERICIUM 241
FRAC. 1-3, 5, 8-9
PREPARED: 05/10/93
ANALYZED: 05/11/93

AMERICIUM ISOTOPIC
FRAC. 4, 6-7
PREPARED: 05/11/93
ANALYZED: 05/11/93

PLUTONIUM ISOTOPIC
FRAC. 1-3, 5, 8-9
PREPARED: 05/10/93
ANALYZED: 05/11/93

PLUTONIUM ISOTOPIC
FRAC. 4, 6-7
PREPARED: 05/07/93
ANALYZED: 05/11/93

URANIUM ISOTOPIC
FRAC. 1-3, 5, 8-9
PREPARED: 05/07/93
ANALYZED: 05/11/93

URANIUM ISOTOPIC
FRAC. 4, 6-7
PREPARED: 05/11/93
ANALYZED: 05/11/93

GROSS ALPHA/GROSS BETA
FRAC. 1-6, 8-9
PREPARED: 05/06/93
COUNTED: 05/12/93

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

~~IT DENVER - ROCKY FLATS~~
EG&G Rocky Flats, Inc.
Rocky Flats Plant
Hwy. 93, Interloken Bldg. 080
Golden, Colorado 80402-0464
ATTN: Karen Schoendaller

Date: May 18, 1993

Work Order: S3-05-009

This is the Certificate of Analysis for the following sample:

Client Project ID:	STOLLER 989087
Date Received By Lab:	05/05/93
Number of Samples:	One (1)
Sample Type:	Liquid

I. INTRODUCTION

On May 5, 1993, one (1) liquid sample was received in good condition at ITAS-Oak Ridge, Tennessee laboratory from EG&G Rocky Flats Plant, Golden, Colorado. The list of analytical tests performed as well as date of receipt and analysis, can be found in the attached report.

Fractions (01A) SS10012ST - (02A) DUP SS10012ST are part of Sample Delivery Group S3-05-009.

Reviewed and Approved:

James M. Littlefield
Radiologic Analysis Group Leader

Reviewed and Approved:

Susan Aderholdt
Project Manager

JML/bav

Any reproductions must be made of the complete data report.

I. INTRODUCTION (Continued)

The samples were labeled as follows:

DENVER SAMPLE ID	ITAS SAMPLE NUMBER	RECEIPT DATE	PARAMETERS REQUIRED
SS10012ST	S3-05-009-01A	05/05/93	List One
DUP SS10012ST	S3-05-009-02A	05/05/93	List One
BLANK RESULTS	S3-05-009-03A	05/05/93	List Two
SPIKE RESULTS	S3-05-009-04A	05/05/93	List Two

List One consists of: Americium 241, Gross Alpha, Gross Beta, Plutonium 239/240, Uranium 233/234, Uranium 235/236, and Uranium 238.

List Two consists of: Americium 241, Gross Alpha, Gross Beta, Plutonium 239, and Uranium 238.

II. ANALYTICAL RESULTS/METHODOLOGY

The analytical results for this report are presented by analytical tests. Each set of data will include sample identification, analytical results, data package including the raw data, and/or the appropriate detection limits.

The samples were prepared using Procedure OR7006. Alpha Isotopic analysis was performed for Americium 241, Plutonium 239/240 and Isotopic Uranium using Procedure OR7103. Gross Alpha and Gross Beta determinations were performed using Procedure OR7105.

III. QUALITY CONTROL

QA/QC information was performed on the enclosed analytical data. The purpose of this information is to ensure the user that the data enclosed is scientifically valid and is used to assess the laboratory's performance.

The samples were analyzed within the required holding time.

IV. NONCONFORMANCE

There were no nonconformances associated with this work order.

IT ANALYTICAL SERVICES
OAK RIDGE, TN

IT DENVER - ROCKY FLATS
Date: May 18, 1993
Client Project ID: STOLLER 989087

Work Order: S3-05-009

V. COMMENTS

Uranium yield on sample 1:

Sample (01) SS10012ST had a uranium yield of 19.5%. The client LLD of 0.6 pCi/l was met and the sample did not have activity. The data is being reported.

Uranium analysis for samples 1 and 2:

Due to an expected high level of Thorium activity, samples (01) SS10012ST and (02) DUP SS10012ST were taken through column I (8N HNO_3 column) and column III (9N HCl column) of Procedure OR7103 for Uranium analysis.

Received: 05/05/93

Results by Sample

SAMPLE ID [illegible] FRACTION 010 TEST CODE ASTRPT NAME Form to submit data

Date & Time Collected 04/29/93 16:48:00 Category LIQUID

PARAMETER	RESULT	2-SIGMA ERROR	UNITS
AM-241	1.60E-2	2.29E-2	pCi/l
PU-239/240	5.47E-2	5.13E-2	pCi/l
U-233/234	0.62E-1	1.16E-1	pCi/l
U-235/236	1.91E-2	8.53E-2	pCi/l
U-238	6.18E-2	8.85E-2	pCi/l
GROSS ALPHA	4.53E+0	0.61E+0	pCi/l
GROSS BETA	5.61E-1	3.19E-1	pCi/l

Received: 05/05/93

ITORL OAK RIDGE REPORT

Results by Sample

Work Order # 93-05-009

SAMPLE ID DUP 05100129K FRACTION 02H TEST CODE AGIRPT NAME Form to report data

Date & Time Collected 04/29/93 16:45:00 Category LIQUID

PARAMETER	RESULT	2-SIGMA ERROR	UNITS
AM-241	2.09E-2	2.46E-2	pCi/l
PU-239/240	5.55E-2	4.72E-2	pCi/l
U-233/234	8.05E-1	2.72E-1	pCi/l
U-235/236	0.00E-2	5.89E-2	pCi/l
U-238	3.45E-2	5.01E-2	pCi/l
GROSS ALPHA	5.84E+0	0.73E+0	pCi/l
GROSS BETA	4.44E-1	3.35E-1	pCi/l

Received: 05/05/93

ITOHL OAK RIDGE REPORT

Results by Sample

Work Order # 93-05-009

SAMPLE ID BLANK RESULTS

FRACTION 93A TEST CODE ASTRPT NAME Form to report data

Date & Time Collected not specified

Category LIQUID

PARAMETER	RESULT	2-SIGMA ERROR	UNITS
B-93-1208 (AM-241)	0.20		DPM
B-93-1208 (PU-239)	0.00		DPM
B-93-1209 (U-238)	0.10		DPM
B-93-9061 (G.ALPHA)	-1.07		DPM
B-93-9061 (G.BETA)	-0.05		DPM

Received: 05/05/93

Results by Sample

SAMPLE ID SPIKE RESULTS FRACTION 04A TEST CODE ASTERT NAME Form to report data

Date & Time Collected not specified Category LIQUID

PARAMETER	RESULT	2-SIGMA ERROR	UNITS
S-93-1208 (AM-241)			
KNOWN	2.6		DPM
FOUND	2.5		DPM
DEVIATION (IN SIGMA)	-0.42		
S-93-1208 (PU-239)			
KNOWN	4.3		DPM
FOUND	3.9		DPM
DEVIATION (IN SIGMA)	-0.15		
S-93-1209 (U-238)			
KNOWN	24.2		DPM
FOUND	26.6		DPM
DEVIATION (IN SIGMA)	0.27		
S-93-9061 (G.ALPHA)			
KNOWN	20.8		DPM
FOUND	27.1		DPM
DEVIATION (IN SIGMA)	0.57		
S-93-9061 (G.BETA)			
KNOWN	121.3		DPM
FOUND	149.5		DPM

Received: 05/05/93 05/18/93 17:27:53

IT DENVER- ROCKY FLATS

AMERICIUM 241

PREPARED: 05/06/93
ANALYZED: 05/07/93

PLUTONIUM 239/240

PREPARED: 05/06/93
ANALYZED: 05/07/93

URANIUM ISOTOPIC

PREPARED: 05/06/93
ANALYZED: 05/10/93

GROSS ALPHA/GROSS BETA

PREPARED: 05/12/93
COUNTED: 05/12/93

CONTRACTOR Stoller SAMPLERS D. Keeder, S. Lynn 5305009 PROJECT # 989087 986144

SITE CONTACT/PHONE C. Gee (303) 966-8550 LAB/LOCATION IT, Oak Ridge

C-O-C NUMBER ST-ITL0024

EG&G ROCKY FLATS, CHAIN OF CUSTODY

RadioChemistry

DATE/TIME		SAMPLE NUMBER	LOCATION	CONTAINER TYPE	NUMBER OF CONTAINERS	MEDIA: S=SOIL, W=WATER	F=FILTERED, U=UNFILTERED	R=TURN AROUND RUSH	OUT OF SPEC REPORTS	HCl	HNO_3				GROSS ALPHA / BETA	Pu 239/240 Am241	U 233/234,235,238	Sr 89/90 Cs137 (1)	Ra 226, Ra 228	DISS GROSS ALPHA/BETA	DISS Pu 239/240 Am 241	DISS U233/234,235,238	DISS Sr 89/90 Cs 137 (1)	DISS Ra 226, Ra 228	TRITIUM (H3)	RAD SCREEN
															R A	R B	R C	R D	R E	R A	R B	R C	R D	R E	R G	R H
															A	B	C	D	E	A	B	C	D	E	G	H
																				•	•	•	•	•		
4/29/93	1045	SS100025T	SS100193	250ml Glass	1	S		R							✓	✓	✓	✓	✓							
	1100	SS100035T	SS100193		1	S		R							✓	✓	✓	✓	✓							
	1200	SS100045T	SS100293		1	S		R							✓	✓	✓	✓	✓							
	1220	SS100055T	SS100293		1	S		R							✓	✓	✓	✓	✓							
	1230	SS100065T	SS100293		1	S		R							✓	✓	✓	✓	✓							
	1420	SS100075T	SS100393		1	S		R							✓	✓	✓	✓	✓							
	1430	SS100085T	SS100393		1	S		R							✓	✓	✓	✓	✓							
	1615	SS100125T	SS100493	Gal. Plast.	3	W		R			✓				✓	✓	✓	✓	✓							
																		N/A	SCAN 5/6/93							

RELINQUISHED BY	DATE/TIME		RECEIVED BY	DATE/TIME	
[signature]	5/4/93	1140	[signature]	5/4/93	11:40
[signature]	5/4/92	1400	David D. Flora 5/5/93	5-5-93	1000

LABORATORY USE ONLY	Y	N
PCKG REC'D/CUSTODY SEALS INTACT	X	
SAMPLE LABELS/COCs AGREE	X	
TEMPERATURE WITHIN SPECIFICATION Ambient		
CORRECTED COPY ATTACHED		
PROBLEMS OR DISCREPANCIES None 5/5/93		

REMARKS (1) INCLUDES Cs 134 WHEN BY GAMMA
Fax Prelim. Results To Cindy Gee (303) 966-8556

SHIPMENT METHOD: UPS
AIR BILL No.: 0185 0809 692

NOTE: Ra 226/228, IF GROSS A/B > 5 pCi/(l) or (g)

SHIP WHITE AND YELLOW COPIES WITH SAMPLES – RETAIN PINK FIELD COPY

Form: EGGRFP-081092-COCRC-v1.0

S.O.C. Sample of Ra226 228 per SCN 5/5/93

INTERNATIONAL TECHNOLOGY CORPORATION

DATE 5-26-93

PLEASE DELIVER THE FOLLOWING PAGES TO:

NAME: Matt GARTON

FIRM/LOCATION: IT Denver

TELECOPIER NUMBER: (303) 966-8575

VERIFICATION NUMBER:

FROM:

NAME Susan Aderholdt

IT OAK RIDGE LABORATORY
1550 BEAR CREEK ROAD
KINGSTON, TENNESSEE 37763

PHONE: 615-482-9707
FAX: 615-481-3606

NOTES: For Cindy Gee as requested on COC.
Report for S3-05-016.

IF YOU DO NOT RECEIVE ALL THE PAGES NOTED,
PLEASE CALL AND THE TELECOPY WILL THEN BE COMPLETED.

CONFIRMATION OF RECEIPT REQUESTED

_____ YES _____ NO

PAGE 1 OF 13

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT DENVER - ROCKY FLATS
EG&G Rocky Flats, Inc.
Rocky Flats Plant
Hwy. 93, Interloken Bldg. 080
Golden, Colorado 80402-0464
ATTN: Karen Schoendaller

Date: May 26, 1993

Work Order: S3-05-016 P.O. #: Accounts Payable

This is the Certificate of Analysis for the following samples:

Client Project ID:	DAMES & MOORE 989087
Date Received By Lab:	05/10/93
Number of Samples:	Three (03)
Sample Type:	Solid

I. INTRODUCTION

On May 10, 1993, three (03) solid samples were received in good condition at ITAS-Oak Ridge, Tennessee laboratory from EG&G Rocky Flats Plant, Golden, Colorado. The list of analytical tests performed as well as date of receipt and analysis, can be found in the attached report.

Fractions (01A) SS10001EG - (03A) SS10003EG are part of Sample Delivery Group S3-05-016.

Reviewed and Approved:

James M. Littlefield
Radiologic Analysis Group Leader

Reviewed and Approved:

Susan Aderholdt
Project Manager

JML/kds

Any reproductions must be made of the complete data report

I. INTRODUCTION (Continued)

The samples were labeled as follows:

DENVER SAMPLE ID	ITAS SAMPLE #	RECEIPT DATE	PARAMETERS REQUIRED
SS10001EG	S3-05-016-01A	05/10/93	List One
SS10002EG	S3-05-016-02A	05/10/93	List One
SS10003EG	S3-05-016-03A	05/10/93	List One
BLANK RESULTS	S3-05-016-04A	05/10/93	List Two
SPIKE RESULTS	S3-05-016-05A	05/10/93	List Two

List One consists of: Gross Alpha, Gross Beta, Americium 241, Plutonium 239/240 and Uranium 233/234, 235/236 & 238.

List Two consists of: Gross Alpha, Gross Beta, Americium 241, Plutonium 239 and Uranium 238.

II. ANALYTICAL RESULTS/METHODOLOGY

The analytical results for this report are presented by analytical tests. Each set of data will include sample identification, analytical results, data package including the raw data, and/or the appropriate detection limits.

The samples were prepared using Procedure OR7006. Gross Alpha and Gross Beta were performed using Procedure OR7105. Alpha Isotopic analysis was performed for Americium 241, Plutonium 239/240, and Uranium 233/234, 235/236, 238 using procedure OR7103.

III. QUALITY CONTROL

QA/QC information was performed on the enclosed analytical data. The purpose of this information is to ensure the user that the data enclosed is scientifically valid and is used to assess the laboratory's performance.

The samples were analyzed within the required holding time.

IV. NONCONFORMANCE

There were no nonconformances associated with this work order.

V. COMMENTS

Plutonium Analysis:

Samples SS10001EG (01) and SS10002EG (02) were counted for 200 minutes due to high Plutonium activity.

Uranium Analysis:

Due to the high Plutonium activity samples SS10001EG (01) through SS10003EG (03) were analyzed using small aliquots, therefore the MDA of 0.3 pCi/g was not met for all samples.

Samples SS10001EG (01) thru SS10003EG (03) were contaminated with Plutonium. Plutonium peaks were separated from Uranium peaks by means of manual region adjustment. Data reflects Uranium activity only.

Page 1
Received: 05/10/93

XROOL OAK RIDGE REPORT
05/26/93 08:21:33

Work Order # 93-05-016
Work Not Complete

REPORT TO
IT DENVER - ROCKY FLATS
5600 SOUTH QUEBEC ST.
SUITE 280
ENGLEWOOD, CO 80111
ATTEN PETE WELLS

PREPARED BY
IT/RADIOLOGICAL SCIENCES LAB.
1550 BEAR CREEK ROAD
OAK RIDGE, TN 37831
ATTEN BRB
PHONE 615-482-9707

CERTIFIED BY

CONTACT S ADERHOLDT

CLIENT IT DENVER RF SAMPLES 5
COMPANY IT DENVER- ROCKY FLATS
FACILITY 5600 SOUTH QUEBEC ST. STE 280
ENGLEWOOD, CO 80111

WORK ID DAMES & MOORE 989087
TAKEN NOT APPLICABLE
TRANS OAS 097
TYPE SOLID
P.O. #
INVOICE under separate cover

SAMPLE IDENTIFICATION

01 S810001BG
02 S810002BG
03 S810003BG
04 BLANK
05 SPIKE

TEST CODES and NAMES used on this report

AM S Americium Isotopic - solid
ASINPT Form to report data
DSPSL Sample disposal/return
GA S Gross Alpha - solid
GB S Gross Beta - solid
PU S Plutonium Isotopic - solid
U S Uranium Isotopic - solid

ITCHL OAK RIDGE REPORT

Work Order # 93-06-016

Page 1

Results by Sample

Received: 05/10/93

SAMPLE ID [illegible] FRACTION 01A TEST CODE [illegible] NAME Form to report data

Date & Time Collected 01/14/93 12:99:00 Category SOLID

PARAMETER	RESULT	2-SIGMA ERROR	UNITS
GROSS ALPHA	2.94E+4	0.59E+4	pCi/g
GROSS BETA	5.15E+2	1.05E+2	pCi/g
AM-241	2.68E+3	0.57E+3	pCi/g
PU-239/240	1.11E+4	0.27E+4	pCi/g
U-233/234	9.68E+0	6.32E+0	pCi/g
U-235/236	0.00E+0	0.00E+0	pCi/g
U-238	4.69E+0	3.96E+0	pCi/g

Received: 05/18/93

Results by Sample

SAMPLE ID [illegible] FRACTION 02A TEST CODE [illegible] NAME Form to report data

Date & Time Collected 01/15/93 12:00:00 Category SOLID

PARAMETER	RESULT	2-SIGMA ERROR	UNITS
GROSS ALPHA	3.99E+4	0.80E+4	pCi/g
GROSS BETA	7.74E+2	1.57E+2	pCi/g
AM-241	4.26E+3	0.93E+3	pCi/g
PU-239/240	1.74E+4	0.44E+4	pCi/g
U-233/234	7.46E+0	5.56E+0	pCi/g
U-235/236	0.92E+0	1.85E+0	pCi/g
U-238	8.22E+0	5.01E+0	pCi/g

Received: 05/10/93

INDEL OAK RIDGE REPORT

Work Order # 93-05-016

Results by Sample

SAMPLE ID [illegible] FRACTION [illegible] TEST CODE [illegible] NAME Form to report data

Date & Time Collected 01/18/93 12:00:00 Category [illegible]

PARAMETER	RESULT	2-SIGMA ERROR	UNITS
GROSS ALPHA	1.73E+4	0.35E+4	pCi/g
GROSS BETA	3.13E+2	0.65E+2	pCi/g
AM-241	2.01E+3	0.45E+3	pCi/g
PU-239/240	6.67E+3	1.54E+3	pCi/g
U-233/234	0.91E+0	2.33E+0	pCi/g
U-235/236	2.07E+0	3.45E+0	pCi/g
U-238	1.22E+0	2.25E+0	pCi/g

Page 1 INDEX OAK RIDGE REPORT Work Order # 93-05-016

Received: 05/18/93 Results by Sample

SAMPLE ID BLANK FRACTION 04A . TEST CODE ASHRT NAME Fuck to report data

Date & Time Collected not specified Category LIQUID

PARAMETER		RESULT	2-SIGMA ERROR	UNITS
GROSS ALPHA	B93-9063	-2.22E+0	5.45E+0	pCi/g
GROSS BETA	B93-9063	5.51E+0	5.13E+0	pCi/g
AM-241	B93-1240	1.17E-3	1.67E-3	pCi/g
PU-239	B93-1240	0.99E-3	2.58E-3	pCi/g
U-238	B93-1239	1.33E-3	2.66E-3	pCi/g

Page 1 TEORL OAK RIDGE REPORT Work Order # R3-R5-616

Received: 05/18/93 Results by Sample

SAMPLE ID SPIKE FRACTION SOR TEST CODE ALLFRT NAME Form 3g report data

Date & Time Collected not specified Category LIQUID

PARAMETER		RESULT	2-SIGMA ERROR	UNITS
GROSS ALPHA	S93-9063	1.21E+2	0.33E+2	pCi/g
GROSS BETA	S93-9063	6.49E+2	1.32E+2	pCi/g
AM-241	S93-1240	1.87E-1	0.46E-1	pCi/g
PU-239	S93-1240	3.00E-1	0.71E-1	pCi/g
U-238	S93-1239	1.20E+0	0.26E+0	pCi/g

Received: 05/10/93

XRONL OAK RIDGE REPORT
05/26/93 12:02:02

Work Order # R3-05-016

IT DENVER- ROCKY FLATS

AMERICIUM 241

PREPARED: 05/20/93
COUNTED: 05/24/93

PLUTONIUM 239/240

PREPARED: 05/20/93
COUNTED: 05/24/93

URANIUM ISOTOPIC

PREPARED: 05/20/93
COUNTED: 05/21/93

GROSS ALPHA/GROSS BETA

PREPARED: 04/11/93
COUNTED: 05/13/93

CONTRACTOR Dames & Moore SAMPLERS R Gentry PROJECT # 989087

SITE CONTACT/PHONE K Anderson (303) 966-6979 LAB/LOCATION Ft St. Louis & Oakridge

C-O-C NUMBER ST-ITL0026

EG&G ROCKY FLATS, CHAIN OF CUSTODY

RadioChemistry 5305016

DATE/TIME		SAMPLE NUMBER	LOCATION	CONTAINER TYPE	NUMBER OF CONTAINERS	MEDIA: S=SOIL, W=WATER	F=FILTERED, U=UNFILTERED	R=TURN AROUND RUSH	OUT OF SPEC REPORTS	HCl	HNO_3				GROSS ALPHA / BETA	Pu 239/240 AM241	U 233/234,235,238	Sr89/90 Cs137 (1)	Ra 226, Ra228	DISS GROSS ALPHA/BETA	DISS Pu 239/240 Am 241	DISS U233/234,235,238	DISS Sr 89/90 Cs 137 (1)	DISS Ra 226, Ra 228	TRITIUM (H3)	RAD SCREEN
BOTTLE CODES										R A	R B	R C	R D	R E	R A	R B	R C	R D	R E					R G	R H
PRESERVATIVE															*	*	*	*	*						
1/4/93	1200	SS1000 1 EG	SS100493	8 oz glass	1	S		R							X	X	X								
1/5/93	1200	SS1000 2 EG	SS100493	8 oz glass	1	S		R							X	X	X								
1/5/93	1200	SS1000 3 EG	SS100493	8 oz glass	1	S		R							X	X	X								

RELINQUISHED BY	DATE/TIME		RECEIVED BY	DATE/TIME	
[illegible]	5/6/93	1530	K. Ford TOKL Received OK	5-10-93	1000

LABORATORY USE ONLY	Y	N
PCKG REC'D/CUSTODY SEALS INTACT		
SAMPLE LABELS/COCs AGREE		
TEMPERATURE WITHIN SPECIFICATION ____C		
CORRECTED COPY ATTACHED		
PROBLEMS OR DISCREPANCIES		

REMARKS (1) INCLUDES Cs 134 WHEN BY GAMMA

SHIPMENT METHOD: Fed Ex

AIR BILL No.: 6613039090

SHIP WHITE AND YELLOW COPIES WITH SAMPLES – RETAIN PINK FIELD COPY

NOTE: Ra 226/228, IF GROSS A/B > 5 pCi/(l) or (g)

Form: EGGRFP-081092-COCRC-v1.0

Fax results to C. Gee
(303) 966 8556

6613039101
6613039112

CONTRACTOR Dames & Moore SAMPLERS R Gentry PROJECT # 989087

SITE CONTACT/PHONE K Anderson (303) 966-6979 LAB/LOCATION It St. Louis Oakridge

C-O-C NUMBER ST-IT10006 26

EG&G ROCKY FLATS, CHAIN OF CUSTODY

5305016

RadioChemistry

DATE/TIME		SAMPLE NUMBER	LOCATION	CONTAINER TYPE	NUMBER OF CONTAINERS	MEDIA: S=SOIL, W=WATER	F=FILTERED, U=UNFILTERED	R=TURN AROUND RUSH	OUT OF SPEC REPORTS	HCl	HNO_3				GROSS ALPHA / BETA	Pu 239/240 Am241	U 233/234,235,238	Sr89/90 Cs137 (1)	Ra 226, Ra228	DISS GROSS ALPHA/BETA	DISS Pu 239/240 Am 241	DISS U233/234,235,238	DISS Sr 89/90 Cs 137 (1)	DISS Ra 226, Ra 228	TRITIUM (H3)	RAD SCREEN							
BOTTLE CODES															R A	R B	R C	R D	R E	R A	R B	R C	R D	R E	R G	R H						
PRESERVATIVE																				•	•	•	•	•								
1/14/93	1200	SS100001EG	SS100493	Rat glass	1	S		R							X	X	X															
1/15/93	1200	SS10002EG	SS100493	Rat glass	1	S		R							X	X	X															
1/15/93	1200	SS10003EG	SS100493	Rat glass	1	S		R							X	X	X															

RELINQUISHED BY	DATE/TIME		RECEIVED BY	DATE/TIME	
[signature]	1/16/93	1530			

LABORATORY USE ONLY	Y	N
PCKG REC'D/CUSTODY SEALS INTACT		
SAMPLE LABELS/COCs AGREE		
TEMPERATURE WITHIN SPECIFICATION ____C		
CORRECTED COPY ATTACHED		
PROBLEMS OR DISCREPANCIES		

REMARKS (1) INCLUDES Cs 134 WHEN BY GAMMA

SHIPMENT METHOD: Fed Ex

AIR BILL No.: 6613039090

NOTE: Ra 226/228, IF GROSS A/B > 5 pCi/(l) or (g)

Form: EGGRFP-081092-COCRC-v1.0

SHIP WHITE AND YELLOW COPIES WITH SAMPLES – RETAIN PINK FIELD COPY

Fax results to C. Gee (303) 966-8336

6613039101

6613039112

To: C Gee
EG+G Rocky Flats

From: Cathy Schroer
ITAS - St. Louis
13715 Rider Trail North
Earth City, MO 63045

Date: 10-8-93

Number of Pages: 6

Office (314) 298-8566
Fax (314) 298-8757

International Technology Corporation

"Creating a Safer Tomorrow"

303-966-8556

Rush Sample Results.

Metals results from hot spots

981-1622

MEMORANDUM

TO: C. Gee, EG&G Rocky Flats, Inc.

FROM: David Kornegay, EG&G Project Manager, ITAS-St. Louis

DATE: June 10, 1993

SUBJECT: Rush Analyses for SS1XXXXEG Samples, Rec'd May 12, 1993

Lab ID	Client Name	Matrix	Received	Parameters
2957-001	SS10001EG	S	12-MAY-93	Metals
2957-002	SS10002EG	S	12-MAY-93	Metals
2957-003	SS10003EG	S	12-MAY-93	Metals

Attached are the pertinent forms for metals for these samples.

The supporting analytical data for these samples are contained in the appropriate ITAS-St. Louis comple packages.

Please call me at (800) 333-3305 if you have questions.

cc: Ms. Beth Montano
Program Chemist, EG&G Rocky Flats, Inc.

Peter Wells, PH.D.
Program Manager, ITAS

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SS10002EG

Lab Name: ITAS_ST._LOUIS Contract: 262.01

Lab Code: ITSL Case No.: SAS No.: SDG No.: S430

Matrix (soil/water): SOIL Lab Sample ID: 2957-002

Level (low/med): LOW Date Received: 05/12/93

% Solids: 84.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7750			P
7440-36-0	Antimony	13.8	U	N	P
7440-38-2	Arsenic	2.5			F
7440-39-3	Barium	167			P
7440-41-7	Beryllium	2.9			P
7440-43-9	Cadmium	2.9			P
7440-70-2	Calcium	9590			P
7440-47-3	Chromium	13.5			P
7440-48-4	Cobalt	9.0	B		P
7440-50-8	Copper	334			P
7439-89-6	Iron	14400			P
7439-92-1	Lead	125		SN	F
7439-95-4	Magnesium	2470			P
7439-96-5	Manganese	253		*	P
7439-97-6	Mercury	0.16			CV
7440-02-0	Nickel	12.2			P
7440-09-7	Potassium	1660			P
7782-49-2	Selenium	0.24	U	N	F
7440-22-4	Silver	4.0			P
7440-23-5	Sodium	162	B		P
7440-28-0	Thallium	0.24	U		F
7440-62-2	Vanadium	27.7			P
7440-66-6	Zinc	126		E	P
	Cyanide				NR
7439-98-7	Molybdenu	1.6	U		P
7440-31-5	Tin	7.9	U		P
7440-24-6	Strontium	61.7			P
7440-21-3	Silicon				NR
7440-46-2	Cesium	13.9	B		A
7439-93-2	Lithium	9.0	B		P

Color Before: BROWN Clarity Before: OPAQUE Texture: N/A

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

ILM02.1

U.S. EPA - CLP

1

INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

SS10003EG

Lab Name: ITAS_ST._LOUIS Contract: 262.01

Lab Code: ITSL Case No.: SAS No.: SDG No.: S430

Matrix (soil/water): SOIL Lab Sample ID: 2957-003

Level (low/med): LOW Date Received: 05/12/93

% Solids: 84.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7980			P
7440-36-0	Antimony	13.8	U	N	P
7440-38-2	Arsenic	3.1			F
7440-39-3	Barium	129			P
7440-41-7	Beryllium	1.0	B		P
7440-43-9	Cadmium	0.90	B		P
7440-70-2	Calcium	6990			P
7440-47-3	Chromium	10.6			P
7440-48-4	Cobalt	8.4	B		P
7440-50-8	Copper	26.5			P
7439-89-6	Iron	11400			P
7439-92-1	Lead	66.9		SN	F
7439-95-4	Magnesium	2280			P
7439-96-5	Manganese	242		*	P
7439-97-6	Mercury	0.06	B		CV
7440-02-0	Nickel	14.6			P
7440-09-7	Potassium	1420			P
7782-49-2	Selenium	0.24	U	N	F
7440-22-4	Silver	0.82	U		P
7440-23-5	Sodium	147	B		P
7440-28-0	Thallium	0.24	U		F
7440-62-2	Vanadium	30.4			P
7440-66-6	Zinc	74.1		E	P
	Cyanide				NR
7439-98-7	Molybdenu	1.6	U		P
7440-31-5	Tin	7.9	U		P
7440-24-6	Strontium	46.0	B		P
7440-21-3	Silicon				NR
7440-46-2	Cesium	13.2	B		A
7439-93-2	Lithium	8.5	B		P

Color Before: BROWN Clarity Before: OPAQUE Texture: N/A

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

FORM I - IN

ILM02.1

CONTRACTOR [illegible] & Moore SAMPLERS R Gentry PROJECT # 989082

SITE CONTACT/PHONE K Anderson (303) 966 6979 LAB/LOCATION IT St. Louis

C-O-C NUMBER ST-ITSL 00051

EG&G ROCKY FLATS, CHAIN OF CUSTODY

General Chemistry

DATE/TIME		SAMPLE NUMBER	LOCATION	CONTAINER TYPE	NUMBER OF CONTAINERS	MEDIA: S=SOIL, W=WATER	F=FILTERED, U=UNFILTERED	R=TURN AROUND RUSH	OUT OF SPEC REPORTS	COOLED TO 4°C	NAOH	HNO_3	H_2SO_4	VOA - CLP	VOA - 502.2	BNA - CLP	PCB's/PEST. - CLP	CLP TOTAL METALS(1)	CLP DISS. METALS(1)	WATER QUALITY (2)	NO_3/NO_2 as N	Tot. Phosphorus, NH_4	OIL & GREASE	Ortho-Phosphate	NO_2	CYANIDE	TOC	DOC	H_2S	Cr VI
BOTTLE CODES														V	V	B	P	M	M	W	W	W	W	W	W	W	W	W	W	W
															D				*	A	B	B	C	D	D	E	H	I	J	K
PRESERVATIVE															C						C			A						
11/4/93	1200	SS100001EG	SS100493	8oz glass	1	S		R										X												
11/5/93	1200	SS100002EG	SS100493	8oz glass	1	S		R										X												
11/5/93	1200	SS100003EG	SS100493	8oz glass	1	S		R										X												

RELINQUISHED BY	DATE/TIME		RECEIVED BY	DATE/TIME	
[signature]	5/6/93	1530	[signature] IT/KCL	5-10-93	1800
David D Flora IT/KCL	5-11-93	1630	[signature]	5/12/93	9:10

LABORATORY USE ONLY	Y	N
PCKG REC'D/CUSTODY SEALS INTACT seals intact	✓	
SAMPLE LABELS/COCs AGREE	✓	
TEMPERATURE WITHIN SPECIFICATION 20° C		✓
CORRECTED COPY ATTACHED		
PROBLEMS OR DISCREPANCIES		

REMARKS (1) INCLUDES Co, Li, Sr, Mo, Si, Sn
(2) TSS, TDS, Cl, SO_4, CO_3, HCO_3

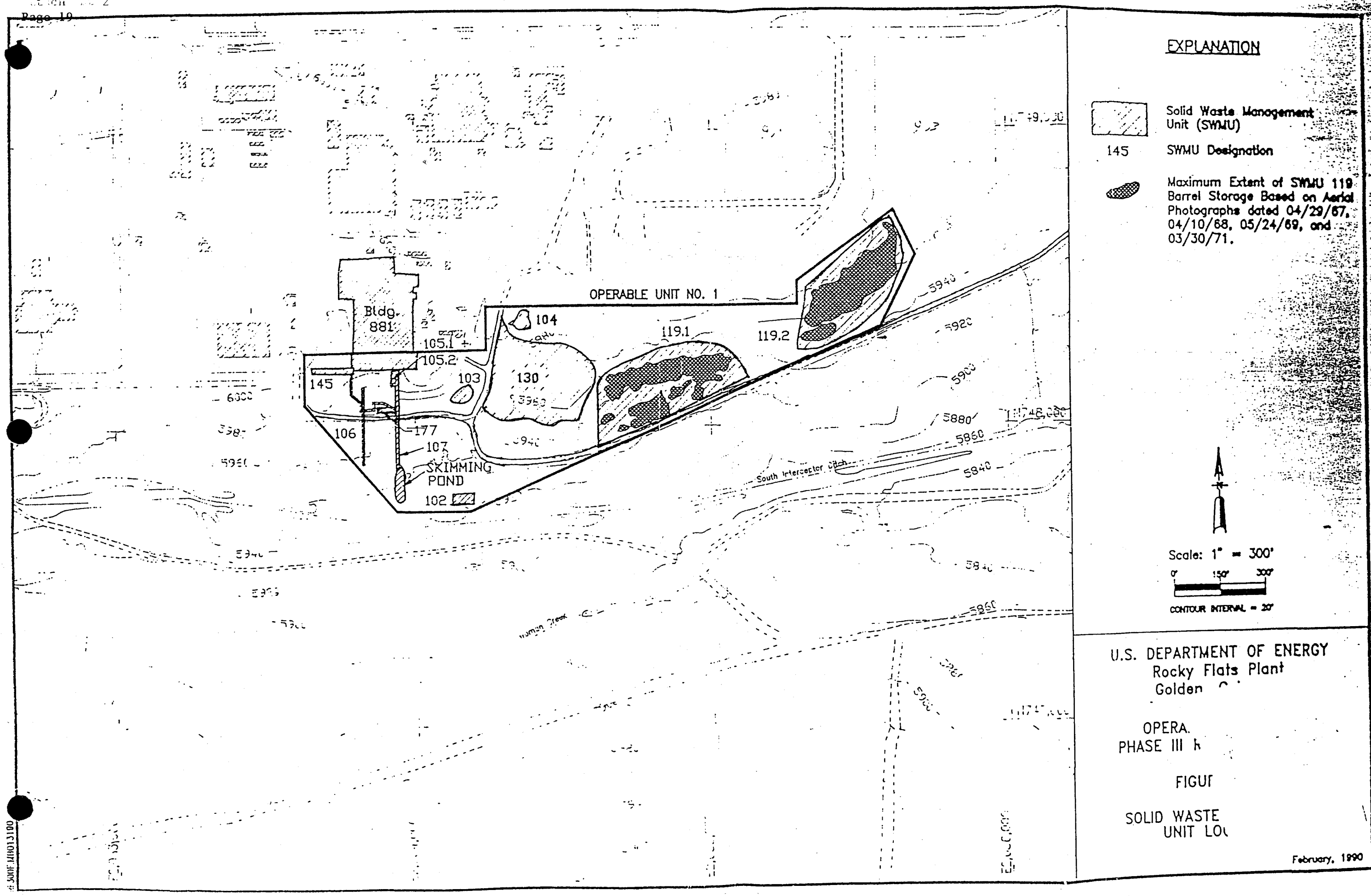
SHIPMENT METHOD: FED EX

AIR BILL NO.: 6613039123
6613039086
6613039075

SHIP WHITE AND YELLOW COPIES WITH SAMPLES – RETAIN PINK FIELD COPY

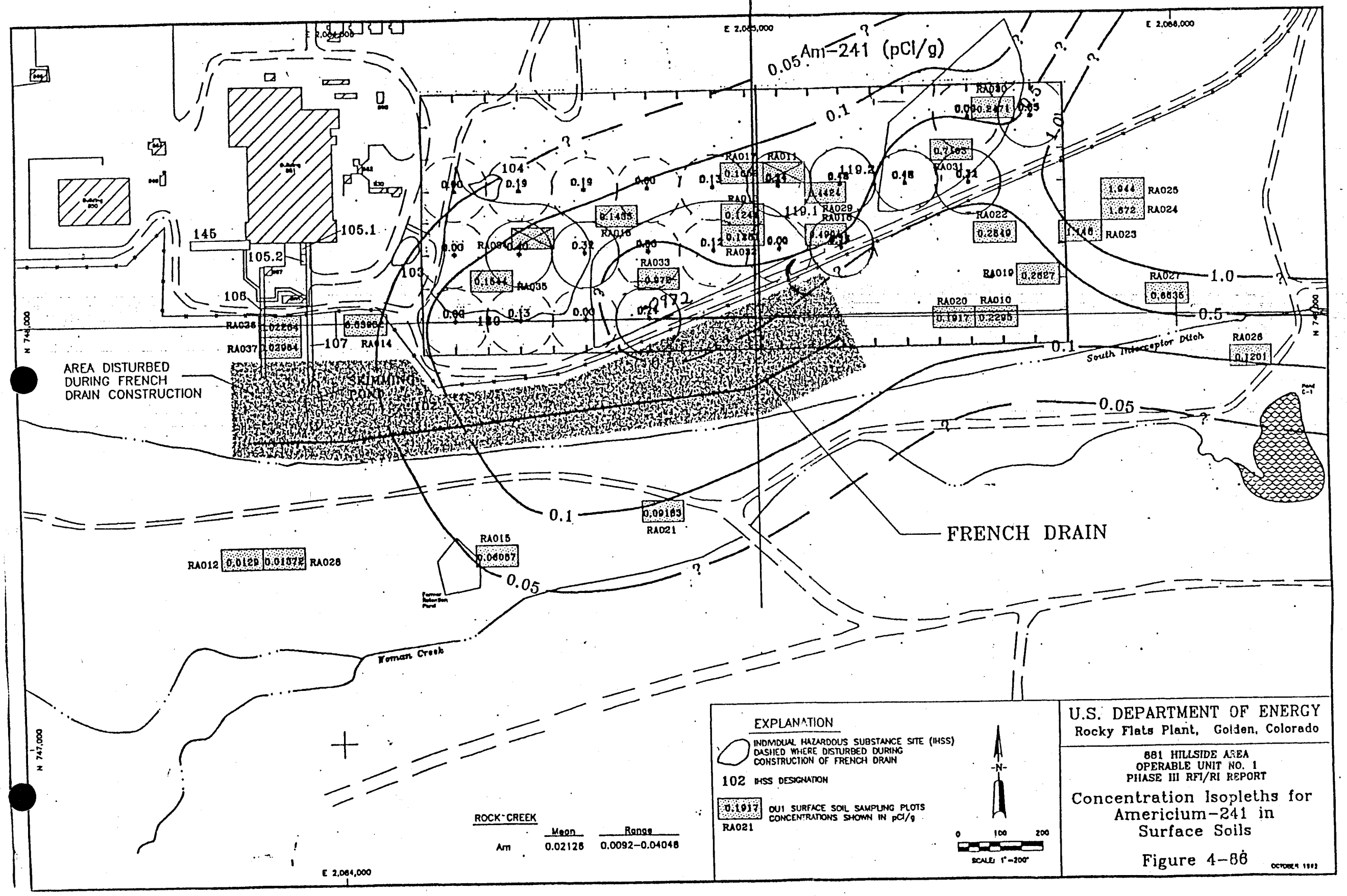
Form: EGGRFP-081292-COCGC-v1.0

FAX Results to C. Gee
(303) 966 8556


EXPLANATION
Solid Waste Management Unit (SWMU)
145
SWMU Designation
Maximum Extent of SWMU 119 Barrel Storage Based on Aerial Photographs dated 04/29/67, 04/10/68, 05/24/69, and 03/30/71.
Scale: 1" = 300'
0' 150' 300'
CONTOUR INTERVAL = 20'
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden
OPERA.
PHASE III
FIGUI
SOLID WASTE
UNIT LO
February, 1990
OPERABLE UNIT NO. 1
Bldg. 881
105.1
105.2
145
103
104
130
119.1
119.2
106
177
107
SKIMMING POND
102
South Interceptor Ditch
Woman Creek
5940
5920
5900
5880
5860
5840

Attachment

Map 3
Page 20



Map of Survey points plotted on IHSS's

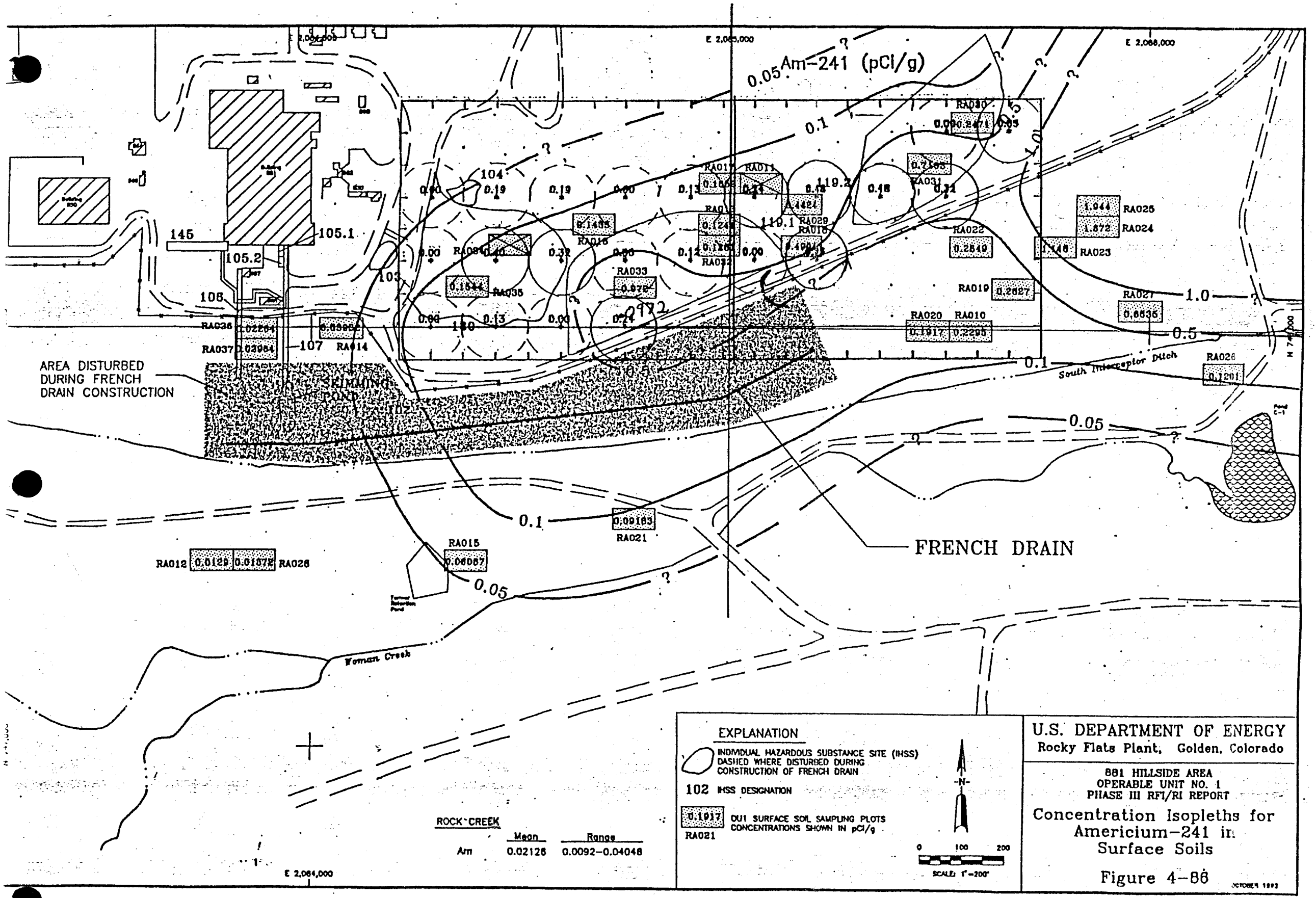


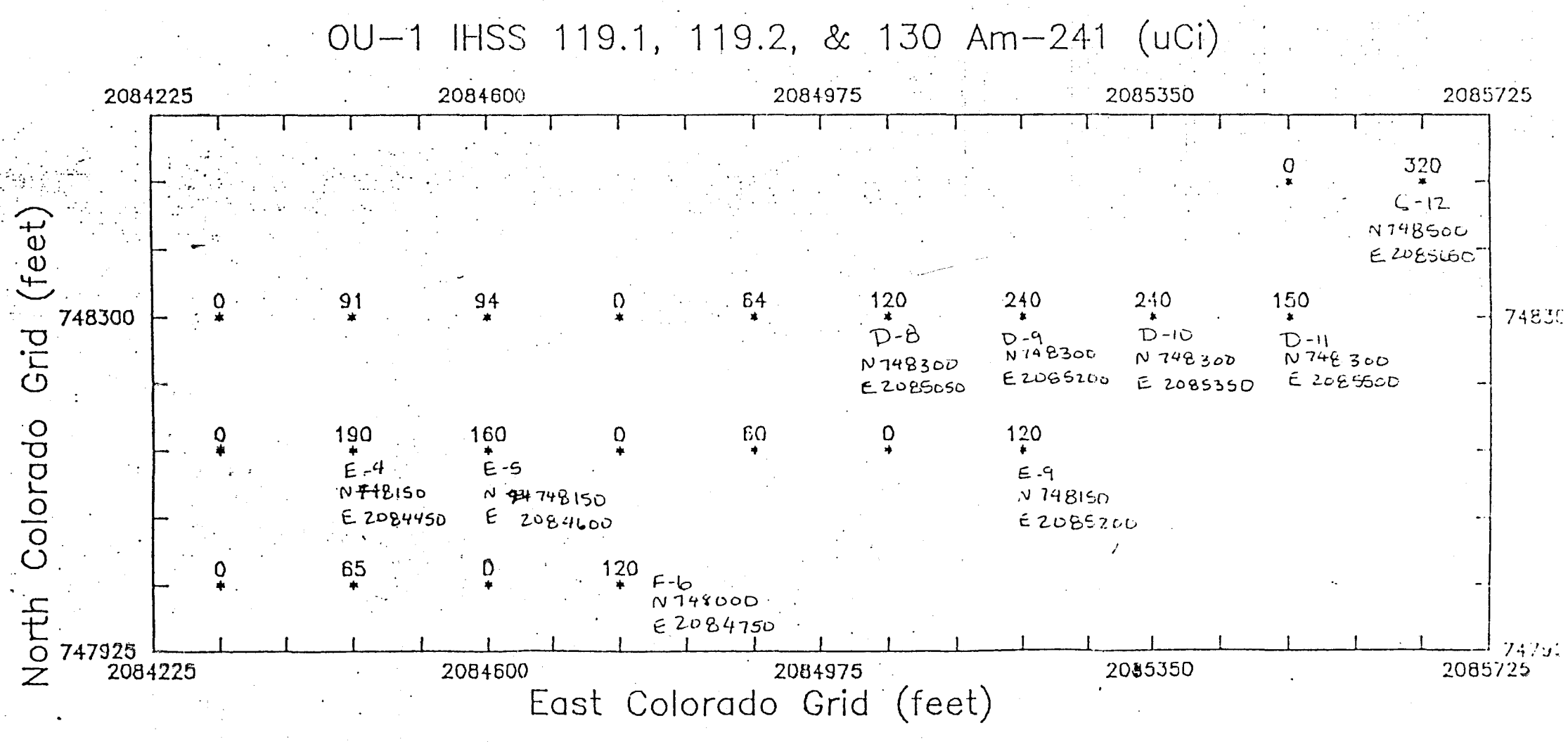
Figure 4

Integrated activity concentration for AM-241 pCi/g from in situ measurement for IHSS119.1, 119.2, and 130 using the Germanium Gamma Spectroscopy System.

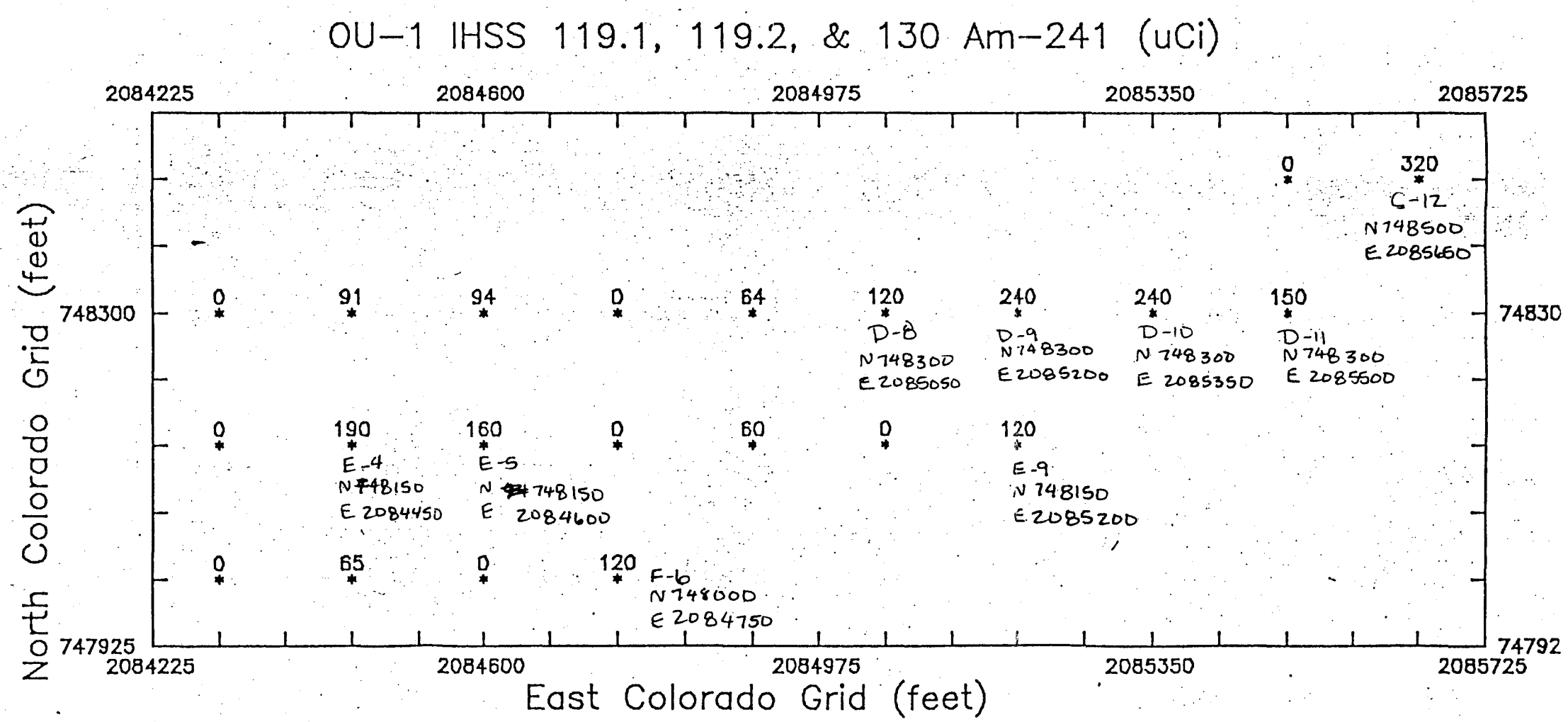
Figure 5

Derived total activity for AM-241 (µCi) from in situ measurements for IHSS119.1, 119.2, and 130 using the Field Germanium Gamma Spectroscopy System.

Draft by G.S.G.



Draft
by
G.S.G.


OU-1 IHSS 119.1, 119.2, & 130 Am-241 (uCi)
2084225
2084600
2084975
2085350
2085725
North Colorado Grid (feet)
748300
74830
747925
74792
East Colorado Grid (feet)
0
91
94
0
64
120
240
240
150
0
320
C-12
N 748500
E 2085660
D-8
N 748300
E 2085050
D-9
N 748300
E 2085200
D-10
N 748300
E 2085350
D-11
N 748300
E 2085500
0
190
160
0
60
0
120
E-4
N 748150
E 2084450
E-5
N 748150
E 2084600
E-9
N 748150
E 2085200
0
65
0
120
F-6
N 748000
E 2084750