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Station #12

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 604296

2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) Geosciences - R.B. Mercer	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: Environmental	6. Cog. Engr.: K. D. Reynolds	7. Purchase Order No.: N/A
8. Originator Remarks: Release		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: N/A
11. Receiver Remarks:		12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: 20 Mar 93

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1	WHC-SD-EN-DP-086		0	1993 Borehole Completion Data Package for the Low-Level Burial Grounds	Q	1/2	1	

16. KEY

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1/2	1	Cog. Mgr. R.L. Jackson	RL Jackson	3/24/94	H6-06	Central Files (2)			L8-04	3	
1/2	1	QA W.R. Thackaberry	W.R. Thackaberry	3.30.94	H4-16						
1/2	1	B.A. Williams	B.A. Williams	3-30-94	H6-06						
1/2	1	L.C. Swanson	LC Swanson	3/24/94	H6-06						

18.	19.	20.	21. DOE APPROVAL (if required)
R.B. Mercer 24 Mar 94 Signature of EDT Originator / Date	N/A Authorized Representative for Receiving Organization / Date	R.L. Jackson 3/24/94 Cognizant/Project Engineer's Manager / Date	Ltr. No. [] Approved [] Approved w/comments [] Disapproved w/comments

BD-7400-172-2 (07/91) GEF097

BD-7400-172-1 (07/91)

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R B Mercer

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7. Abstract

Two additional groundwater monitoring wells were installed around the Low-Level Burial Grounds in 1993. This data package contains information on the drilling, construction, development, and aquifer testing of these wells.

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Page 1 of 1

1. EDT 604296

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1/2	1	B.A. Williams	BA Williams	3-30-94	H6-06						
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CONTENTS

1.0 INTRODUCTION 1-1

2.0 WELL 299-W10-20 2-1
2.1 DRILLING 2-1
2.2 WELL COMPLETION 2-2
2.3 WELL DEVELOPMENT AND PUMP INSTALLATION 2-2
2.4 AQUIFER TESTING 2-2

3.0 WELL 299-W10-21 3-1
3.1 DRILLING 3-1
3.2 WELL COMPLETION 3-2
3.3 WELL DEVELOPMENT AND PUMP INSTALLATION 3-2
3.4 AQUIFER TESTING 3-2

4.0 REFERENCES 4-1

FIGURES:

1-1 Location of the Hanford Site, 200 Areas, and the Low-Level Burial Grounds. 1-2
1-2 Low-Level Waste Management Area 3. 1-3
1-3 Bouwer-Rice Analysis Test Terms. 1-5
2-1 299-W10-20 Slug Withdrawal Plot 2-3

TABLES:

1-1 Coordinates and Elevations for 1993 LLBG Monitoring Wells 1-4
1-2 Summary of Hydrologic Testing at the 1993 LLBG Wells 1-5
2-1 299-W10-20 Construction Particulars 2-1
2-2 Hydrologic Testing Results from 299-W10-20 2-3
3-1 299-W10-21 Construction Particulars 3-1

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1.0 INTRODUCTION

Two additional groundwater monitoring wells were installed in 1993 at the Low-Level Burial Grounds (LLBG) of the Hanford Site. These wells were constructed in support of the Tri-Party Agreement milestone M-24-17. The LLBG consists of five Low-Level Waste Management Areas (LLWMA) located in the 200 East and 200 West Areas (Figure 1-1).

Both of the new monitoring wells were installed at LLWMA-3 (Figure 1-2). Coordinates for the 1993 wells are presented in Table 1-1.

The hydrogeology of the LLBG is described in Last, et al. 1989. The groundwater monitoring plan (Last and Bjornstad, 1989) and associated Engineering Change Notices (ECN) provide justification for the well locations. The wells were constructed to the specifications in WHC (1990).

This data package is a compilation of information on drilling, construction, and development. Field notes, forms, and diagrams make up the bulk of this document. The section for each well contains the following information, where available.

- Activity summary
- Well summary sheet
- Well construction report
- Borehole log
- Well development record
- Aquifer test data and results
  - Drawdown and recovery data
  - Slug test data
- Pump installation record
- Physical sample data
  - Grain size data for screened interval
  - $CaCO_3$ and moisture content data
- Well Construction Verification Report
- Radiation sample results
- Geophysical logs

Chain of custody forms, decontamination records, daily field reports, and training records are on file with Westinghouse Hanford Company.

Data interpretation has been limited to the differentiation of major stratigraphic units and aquifer testing data. Information from each well is located in separate chapters.

The boreholes and soils were routinely monitored for organic vapors and radioactive contaminants. There was no detectible contamination at any of the locations.

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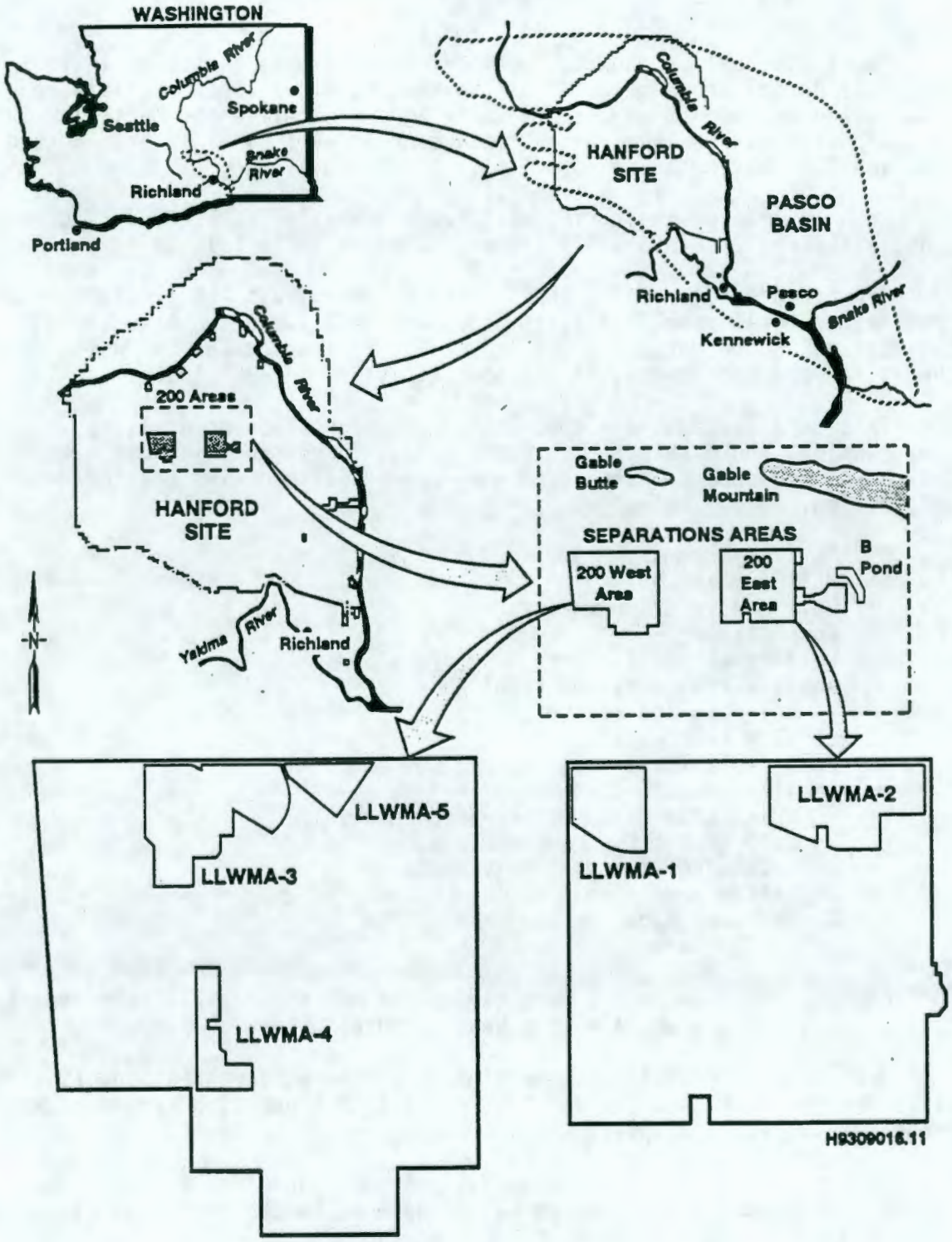

Figure 1-1. Location of the Hanford Site, 200 Areas, and the Low-Level Burial Grounds.

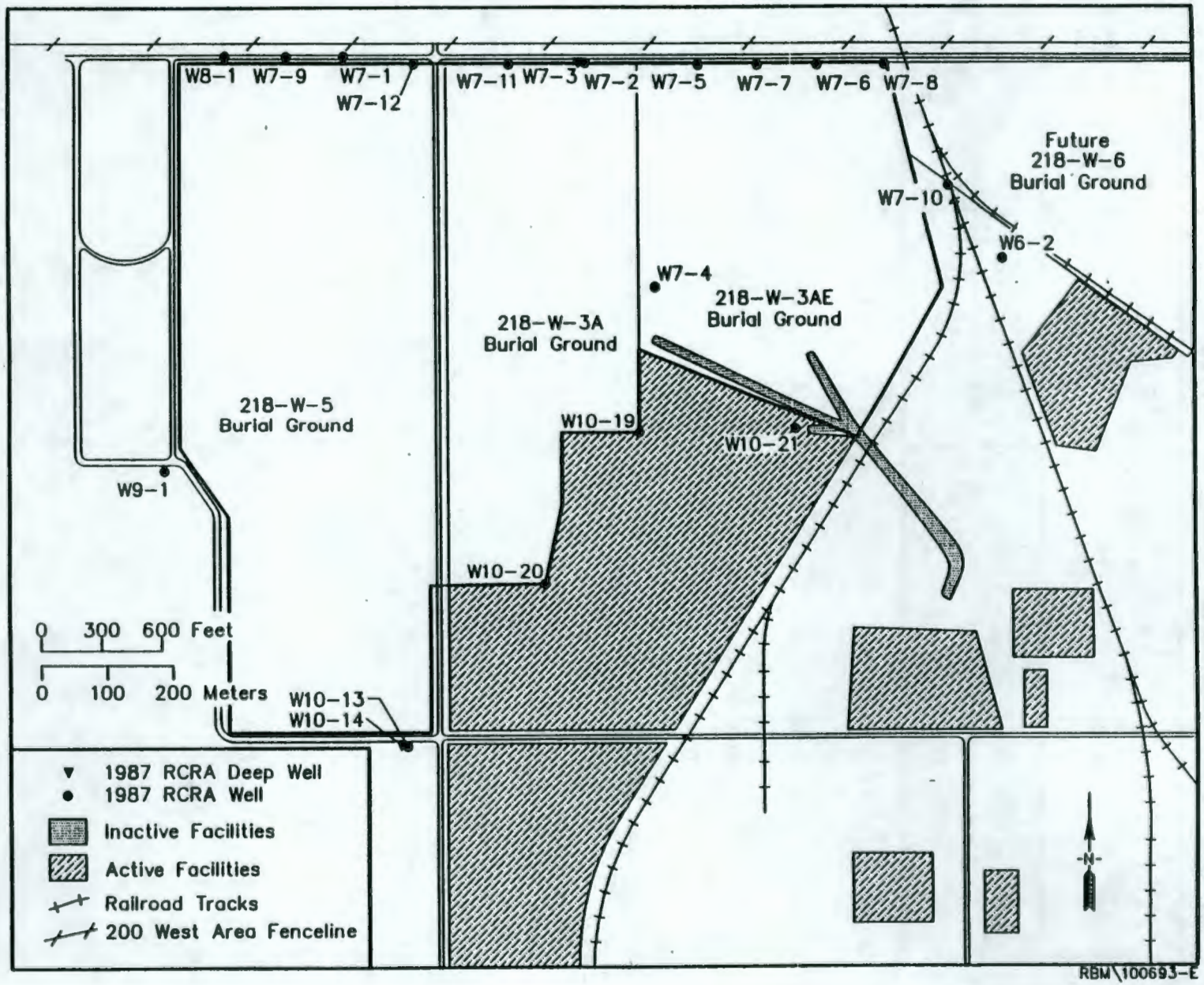

Figure 1-2. Low-Level Waste Management Area 3.

Table 1-1. Coordinates and Elevations for 1993 LLBG Monitoring Wells.

LLWMA	Well number	Coordinates		Elevation	
		Plant (ft)	Lambert (NAD '83 meters)[a]	Brass cap	Top of casing
3	299-W10-20	N 43,987.26 W 77,565.47	N 136,866.645 E 566,249.759	684.75	687.54
	299-W10-21	N 44,929.86 W 76,466.42	N 137,154.746 E 566,583.998	672.07	674.06

[a]North American Datum 1983

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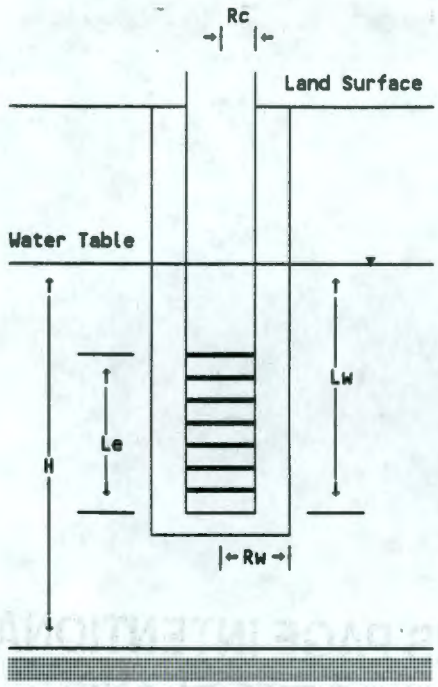
Hydrologic testing was accomplished by monitoring the aquifer development pumping for withdrawal and recovery data and conducting slug injection and withdrawal tests. Withdrawal and recovery data were analyzed using the Cooper-Jacob (1946) straight line method. Estimates of the time criterion for borehole storage were based on the equation $t>25\ r_c^2/T$ (Weeks 1977). Slug testing was accomplished using a 6-ft long, 0.20-ft-diameter rod. The test data were analyzed using the Bouwer-Rice (1989) method. In general the results from the slug withdrawal are considered to be better than the slug injection results. See Figure 1-3 for a definition of terms used in the Bouwer-Rice method.

The aquifer development testing was generally not interpretable because of the short test durations, variable flow rates, lack of a check valve, and partial well penetration. A summary of the hydrologic testing results is presented in Table 1-2.



H = Saturated thickness of aquifer
Le = Length of screen beneath static water level (SWL)
Lw = Length from SWL to bottom of hole
Rc = Radius of casing
Rw = Radius of the hole

Figure 1-3. Bouwer-Rice Analysis Test Terms.

Table 1-2. Summary of Hydrologic Testing at the 1993 LLBG Wells.

LLWMA	Well number	Development T (ft^2/day)		Slug test K (ft/day)	
		Drawdown	Recovery	Injection	Withdrawal
3	299-W10-20	DNI	DNI	DNI	26
	299-W10-21	DNI	DNI	DNI	DNI

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2.0 WELL 299-W10-20

2.1 DRILLING

Construction of this well began on 23 June 1993 and total depth of 251.0 ft was reached on 16 November 1993. The well was drilled using an ODEX (a trademark of Atlas Copco & Sandvik Rock Tools) air-rotary rig. Approximately 260 gal of water were added during drilling and well completion activities. Specific well construction information is located in Table 2.1. A more detailed description of the drilling is shown in the well summary report at the end of this section.

Table 2.1. 299-W10-20 Construction Particulars.

	Size/type/date	Interval (ft BLS[a])	
Temporary Casing	12-in.	15.0	ALS[b]
	10-in.	53.2	ALS
	8-in.	250.5	ALS
Gross Gamma Logging	20 Oct	52	0
	17 Dec	236	0
Permanent Casing	4-in.	221.7	ALS
Screen	4-in. 20-Slot	241.6	221.7
Filter Pack	8-12 and 10-20 Silica Sand	247.5	218.6
Annular Seal	Bentonite Pellets	218.6	212.7
	Bentonite Crumbles	212.7	10.0
	Cement Grout	10	2.0
Concrete Pad	4ft x 4ft x 6in.	2.0	ALS

[a]Below Land Surface
[b]Above Land Surface

The first 20 ft of the borehole were dug with a backhoe. The remainder of the borehole was advanced by air-rotary drilling. Sediments from the Hanford formation, early "Palouse" soil, Plio-Pleistocene unit, and the Ringold Formation were encountered in this borehole. Hanford deposits extended to 97 ft below land surface (bls) and were primarily gravelly sand and sandy gravel with some silt. Approximately 14 ft (97-111 ft bls) of silt and silty sand with carbonate concretions represent the early "Palouse" soil and the Plio-Pleistocene unit. Ringold Formation deposits comprise the remainder of the sediments encountered in this borehole (111-243.0 ft bls). Samples were collected at approximately 5-ft intervals for moisture content (above the water table only), radiological screening, carbonate analysis, and

9413224.0431

lithologic archiving. Grain size analysis was done on samples from the interval to be screened. The borehole log and physical data for this well are located at the end of this section.

Gross gamma logging was conducted as indicated in Table 2.1. Reproductions of these logs are also located at the end of this section.

2.2 WELL COMPLETION

Well completion began on 17 December 1993 and was completed on 20 December 1993. Static water level at the time of completion was 222.90 ft bls. Completion details are presented in Table 2.1. Approximately 40 gal of water were removed from the well to settle the filter pack. A 6-in. protective casing with a locking cap, four guard posts, and a brass marker with the well number were also set in the concrete pad. Elevations were determined for the brass marker, the top of the protective casing, and the top of the Hydrostar (a trademark of Instrumentation Northwest, Inc.) plate. Lambert and plant (200 West datum) coordinates were established for the centerline of the well. Documentation of well completion activities can be found in the well construction report.

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2.3 WELL DEVELOPMENT AND PUMP INSTALLATION

Well development took place on 22 December 1993 using a 1.5 horsepower submersible pump. Approximately 1,150 gal of water were removed to develop the well. A dedicated Hydrostar pump was installed on 27 December 1993 with the intake located 238.45 ft below the top of the protective casing.

2.4 AQUIFER TESTING

Instantaneous slug injection and withdrawal tests were conducted on 22 December 1993. The data from the well development pumping was collected for analysis as drawdown and recovery tests. Results from these tests are presented in Table 2.2. Data from the aquifer testing at 299-W10-20 are located at the end of this section.

Table 2.2. Hydrologic Testing Results from 299-W10-20.

Formation: Ringold		Lithology: sandy gravel	Interval tested*: 227.1-247.1	
Test type	Date	Analysis method	K (ft/day)	T (ft^2/day)
Constant Discharge	22 Dec 93	Not Interpretable	----	----
Recovery	22 Dec 93	Not Interpretable	----	----
Slug Injection	22 Dec 93	Not Interpretable	----	----
Slug Withdrawal	22 Dec 93	Bouwer-Rice (1989)	26	----

* Depth below top of 6-in. protective casing

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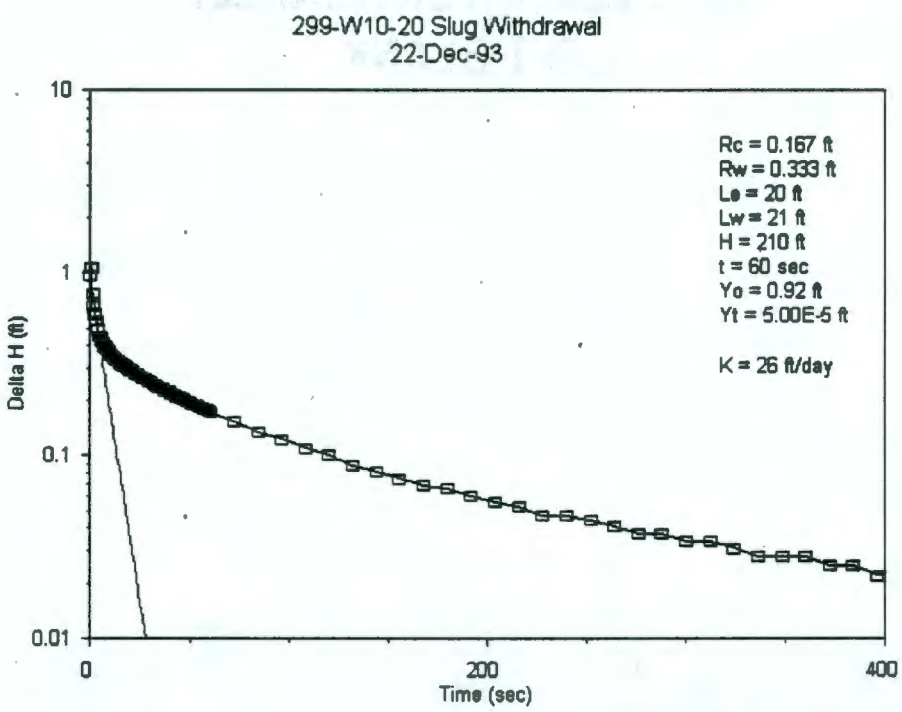

Figure 2-1 299-W10-20 Slug Withdrawal Plot.

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WELL SUMMARY SHEET

Boring or Well No. 299-W10-20

Sheet 1 of 2

Location 200 WEST LLBG

Project W-ϕ152

Prepared By ANDREW M. TEMPLETON (Sign/Print Name) Date 6-23-93

Reviewed By EDWARD C. RAFUSE (Sign/Print Name) Date 02/8/94

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA	
Description	Diagram		Graphic Log	Lithologic Description
TYPE I & II PORTLAND CEMENT 2.0'-10.0'		0		
		5		0-2 FT. Sandy GRAVEL
12" CS CASING SET AT		10		2-7 FT. Silty SAND
15.0' BGS TEMPORARY.		15		
NO SHOE		20		7-25 FT. Sandy GRAVEL 40% Gravel
		25		
		30		25-33 FT. Sandy GRAVEL 35% Gravel
		35		
		40		
		45		33-60 FT. Sandy GRAVEL 79% Gravel
TEMPORARY 10" CS CASING		50		
SET AT 53.22' BGS		55		
NO SHOE		60		
		65		
		70		60-78.5 FT. Sandy GRAVEL 73% Gravel
BENTONITE CHIPS 21.6'-10.0'		75		Fining Downwards
		80		78.5-91.0 FT. Gravelly SAND
		85		
		90		
		95		91.0-97.0 FT. Silty SAND
		100		97.0-101.0 FT. SILT
		105		101.0-104.5 FT. Silty SAND CALECHE
		110		104.5-108.5 FT. SAND
		115		108.5-110.3 FT.
		120		110.3-117.5 FT. SAND
		125		117.5-130.0 FT. Sandy GRAVEL
		130		
		135		130.0-132.0 Silty Sandy GRAVEL
		140		
		145		132.0-176.0' Sandy GRAVEL
		150		60% Gravel
		2-6		

VALIDATED
KDR 2/18/94
SIGNATURE/DATE

Pg 1 of 3

WELL CONSTRUCTION SUMMARY REPORT

Specification No. WHC-S-014 Rev. No. 7

ECNs 166764

Project W-152

Drilling Company PC EXPLORATION

Driller CLAYTON SHELLOS

Other (Companies)

Geologist(s) ANDREW TEMPLETON - GOLDER
JAMES N. BARRON
EDWARD C. RAFUSE (WHC)
KEVIN REYNOLDS (WHC)
JON FLYNN (MEA) L. DiLockard WHC Review

Date Drilling Started 6-23-93

Well No. 299-W10-20 Temp. Well No.

Approximate Location 200 WEST LLBG

Drill Method

Type AIR ROTARY 15.0 - 250.50'

Drilling Fluid N/A

Total Amount of Water Added During Drilling ~260 gals Raw Columbia River Water

Comments

Temporary Casings and Drilled Depth

Casing Type and Size	Interval	Shoe OD
12" CS TEMP	0 - 15.0'	NONE
10" CS TEMP	~~0~~ 15.0 - 53.22' (ECL 02/08/94)	N/A
8" CS TEMP	~~0~~ 53.22 - ~~242.44~~ 250.50' (ECL 02/08/94)	7 3/4"

Drilled Depth 243.0' Hole Diameter at TD 8"

Static Water Level/Date 11/16/93 - 222.90' 11/18/93 - 223.12'

Comments

Geophysical Logging

Sondes (type)	Interval	Date
KUT	0 - 52	10-20-93
Spectral Gamma (KUT)	0 - 236.0	12/07/93

Completion Activity Date Started 12/17/93

Casing and Screen (Permanent)

Type	Depths	Length	Slot Size
8" Stainless T304 STEEL SCREEN	221.7 - 241.6	20.2' w/cap	20
8" Stainless T304 RISER	8.1 (ft above ref pt) - 221.7	229.8'	BLANK

Annular Seal/Filter Pack

Type	Interval	Volume	Mesh Size
8-12 SAND (ft below ref pt)	247.5 - 244.5	1 sk (1.01 ft³)	8-12
10-20 SAND	244.5 - 218.6	7 sks (8.03 ft³)	10-20
3/8" PELLETS	218.6 - 212.7	3 buckets (1.86 ft³)	
BENTONITE CHIPS	212.7 - 10.0	188 sks (133.48 ft³)	8-20
I & II Type PORTLAND CEMENT	10.0 - 2.0	15 sks (19.28 ft³)	

Other Activity

Aquifer Test Performed? Yes

Type Instantaneous Slug test Date 12/22/93

Well Abandoned?

Date

Well Survey Data

Date 1/11/94

Washington State Prime Coordinates N:136866.645 E:566249.759

Protective Casing Elevation 687.54'

Brass Cap Elevation 684.75'

Comments/Remarks 11-18 Added ~260 gals Raw Columbia River Water

A-6000-436 (01/93)

Pg 3 of 3

WELL SUMMARY SHEET

Boring or Well No. 299-W10-20

Sheet 2 of 2

Location 200 WEST LLBG

Project W-Ø152

Prepared By [signature] / ANDREW M. TEMPLETON (Sign/Print Name) Date 11-2-93

Reviewed By [signature] / EDWARD C. LOPEZ (Sign/Print Name) Date 02/18/94

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA	
Description	Diagram		Graphic Log	Lithologic Description
BENTONITE CHUNKLES 218.6' - 10.0'		155		
		160		
		165		176.0 - 183.0 FT. Sandy GRAVEL 50% Gravel
		170		
		175		
		180		
		185		183.0 - 213.0 FT. Sandy GRAVEL 70% Gravel
		190		
		195		
BENTONITE PELLETS 212.7' - 218.6'		200		
STATIC WATER LEVEL 222.90' - 11/x/93		205		
8-12 mesh SAND INTERVAL 244.5 - 247.5		210		213 - 214.0 FT. Sandy GRAVEL 65% Gravel
10-20 SAND INTERVAL 247.5' - 218.6'		215		
20 SLOT SCREEN INTERVAL 221.7 - 241.9 FEET		220		214 - 215.0 FT. Slightly Silty Gravelly SAND
BOTTOM OF 4" SCREEN @ 241.9'		225		
TEMPORARY 8" CS CASING SET AT ~~242.49~~ 250.50 FT BGS		230		215 - 232.0 FT. Sandy GRAVEL 52% Gravel
SHOE SIZE		235		232 - 238.0 FT. Sandy GRAVEL 50% Gravel
BOTTOM OF SAND @ 247.5'		240		238 - 243.0 FT. SAND
SLOUGH FROM 247.5' - 251.0 FT.		245		243 - 251.0 FT. Sandy GRAVEL 75% Gravel
		250		
		255		

A-6000-384 (01/93)

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BOREHOLE LOG

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SIGNATURE/DATE

Boring or Well No. 299-W10-20

Sheet 1 of 13

Location LOW LEVEL BURIAL GROUND 200 WEST

Project W-152

Prepared By [signature] / A.M. TEMPLETON (Sign/Print Name) Date 6-23-93

Reviewed By [signature] / EDWARD C. PAPEZ (Sign/Print Name) Date 12/01/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
				0.0-2.0' Gravelly SAND interbedded w/ Sandy GRAVEL	
1					
2					
3					2-7' Silty Sand
				2'-7'	
4				5' SAMPLE Silty SAND mS	
				57% Sand 40% Silt 3% Gravel	
5				60% fs 2% fgp	
	2 LITH. 1 RAD. 1 $CaCO_3$/H_2O	BACKHOE		20% mS 1% mp	
6				20% CS	
				color moist: 2.5y 5/2 Grayish Brown	
7				color dry: 2.5y 7/2 lt. grey to 7/3 pale yellow, moist, well sorted, sub-angular to sub-rounded (sand) rounded to sub angular (pebble), 40% mafic,	
8					
9				40% lithic, 20% Quartzite, m-pebble, weak to strong reaction to HCL.	
10				7'-25' Sandy GRAVEL SG	
	2 LITH. 1 RAD. 1 $CaCO_3$/H_2O	BACKHOE		10' SAMPLE ~~Gravelly SAND~~ gS	EXCAVATED HOLE W/ BACKHOE.
11				40% Gravel 58% Sand 2% silt	
				fp - 30% fs - 10%	
12				mp - 60% mS - 30%	SET 12-INCH STEEL
				cp - 7% CS - 60%	CASING AT 14-FT BGS
13				SC - 3%	AND PUSHED TO TOTAL DEPTH
				Color moist: 2.5y N3 Very DK grey	OF ~15.0 FT.
14				color dry:	
				moist, poorly to moderately sorted,	
15				angular to subrounded, 70% mafic	
	2 LITH. 1 RAD 1 $CaCO_3$/H_2O	BACKHOE		20% lithic, 10% quartzite, s-cobble,	
16				none to weak reaction to HCL	
17				15' SAMPLE ~~Gravelly SAND gS~~ Sandy GRAVEL SG	
18				SAME AS ABOVE	
19					

A-6000-382 (01/93)

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BOREHOLE LOG

Boring or Well No. 299-W10-20

Sheet 2 of 13

Location LOW LEVEL BURIAL GROUND 200 WEST Project W-152

Prepared By [signature] / A.M. TEMPLETON (Sign/Print Name) Date 10/20/93 Reviewed By [signature] / EDWARD C. LOFERE (Sign/Print Name) Date 12/01/93

Depth (feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
20	2 LITH. 1 RAD. 1 $CaCO_3$ H_2O	AIR ROTARY		20' SAMPLE Gravelly Sand gS Same as above	
25	2 LITH 1 RAD. 1 $CaCO_3$ H_2O	AIR ROTARY		25' SAMPLE 25-33 FT. ~~Gravelly Sand gS~~ Sandy GRAVEL SG 63% Sand 35% Gravel 2% Silt color moist: 2.5y N3 Very Dk. grey color dry: dry, poorly sorted, angular to subrounded, 60% mafic, 20% lithic, 10% Quartzite, m-pebble, weak reaction to HCL.	25' SAMPLE
30	2 LITH 1 RAD 1 $CaCO_3$ H_2O	AIR ROTARY		30' SAMPLE Gravelly Sand gS 58% Sand 40% Gravel 2% silt	30' SAMPLE
31					
32					change to S-Gravel at ~33'
33					
35	2 LITH. 1 RAD. 1 $CaCO_3$ H_2O	AIR ROTARY		33-55 FT Sandy GRAVEL SG 79% Gravel 20% Sand 1% Silt Color moist: color dry: dark grey N4 dry, moderately sorted, gravel: subrounded to rounded, sands: subrounded to ~~sub~~angular. Gravels: 75% basalt, 15% Felsics (Granitic) 10% Qt. Sand:	35' SAMPLE

A-6000-382 (01/93)

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BOREHOLE LOG

Boring or Well No. 299-W10-20

Sheet 3 of 13

Location LOW LEVEL BURIAL GROUNDS 200 WEST Project W-Ø152

Prepared by [signature] / ANDREW M. TEMPLETON (Sign/Print Name) Date 10-20-93

Reviewed By Edward C. Rafuse / EDWARD C. RAFUSE (Sign/Print Name) Date 10/20/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
40	2 LITH			Sandy GRAVEL as above	40' SAMPLE
	1 $CaCO_3$ / H_2O			SG	Sandy GRAVEL
	1 RAD				
45					45' SAMPLE
	2 LITH.			Sandy GRAVEL as above	Sandy GRAVEL
	1 $CaCO_3$ / H_2O			SG	
	1 RAD	AIR ROTARY			
50					50' SAMPLE
	2 LITH			Sandy GRAVEL as above	Sandy GRAVEL
	1 $CaCO_3$ / H_2O			SG	
	1 RAD.				
55				55-60' Sandy GRAVEL SG	55' SAMPLE
	2 LITH			~~80~~ 78% Gravel 20% Sand 2% Silt	
	1 $CaCO_3$ / H_2O			color ~~wet~~ dry : 5Y 2.5/1 Black	55-56 coating on pebbles
	1 RAD			color ~~wet~~ dry: 5Y 4/1 dark grey	slight iron stain
				dry, poorly sorted, sand: subangular to	intact m-c pebbles in sample
				subrounded, gravel: subrounded to	
				subangular, sand: 70% mafic 20% qtz	
				10% felsics, Gravel: 85% mafic 10% qtz	5% felsics
				5-cobble, sand: weak reaction to	
				HCL, Gravel: <5% of gravel has a	59' 3-4" moist to wet
				strong reaction to HCL	zone finer grained.

A-6000-382 (01/93)

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BOREHOLE LOG

Boring or Well No. 299-W10-20

Sheet 4 of 13

Location 200 WEST LLBG

Project W0152

Prepared By [signature] / ANDREW M. TEMPLETON (Sign/Print Name) Date 10-27-93

Reviewed By [signature] / EDWARD C. RAFFUSE (Sign/Print Name) Date 2/01/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
60	2 LITH 1 RAD 1 $CaCO_3$ / H_2O	AIR ROTARY		60.0 - 78.5'	60' SAMPLE
				Sandy GRAVEL SG	Fining downwards
				73% Gravel 22% Sand 5% Silt	
				color dry: 2.5Y N5 Gray	intact vf-m pebbles
				color wet: 2.5Y N2 Black	
				dry, poorly sorted, gravel: subrounded	
				to rounded, sand: subangular, Gravel:	
				90% Basalt (mafic) 5% Qtz, 5% Felsic	
				sand: 75% mafics 15% Qtz 10% Felsics	
				c-pebble, sand: weak reaction to HCL	
65	2 LITH 1 RAD 1 $CaCO_3$ / H_2O			gravel: occasional $CaCO_3$ clast strong reaction	65' SAMPLE
				Same as above	
70	2 LITH 1 RAD 1 $CaCO_3$ / H_2O			Same as above	70' SAMPLE
75	2 LITH 1 RAD 1 $CaCO_3$ / H_2O			Same as above	75' SAMPLE
76					
77					78.5' change
78					
79				78.5 - 91.0' Gravelly SAND	

A-6000-382 (01/93)

BOREHOLE LOG

Boring or Well No. 299-W10-20

Sheet 5 of 13

Location 200 WEST LLBG

Project W-0152

Prepared By [signature] / ANDREW M. TEMPLETON (Sign/Print Name) Date 10-27-93

Reviewed By Edward C. Lofe / EDWARD C. LOFE (Sign/Print Name) Date 12/6/93

Depth ( )	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
80	2 LITH 1 $CaCO_3$ 1 RAD NO H_2O sample. Rain!	AIR ROTARY		78.5' - 91.0' Gravelly SAND gS 23% ~~Sand~~ 75% ~~Gravel~~ Gravel 2% silt 30% m-p 35% vc-s sand 30% f-p 35% c-s 40% vf-p 15% m-s 30% 15% f-vf-s color dry: light grey 2.5Y 7/2 color wet: dk grey 2.5Y 4/4 dry, well sorted, subrounded (sand & gravel) 30% mafics, 35% 25% felsics 45% Qtz med. pebble, strong reaction ~ 10% of sand grains (carbonate grains)	80' SAMPLE
85	2 LITH 1 $CaCO_3$ 1 RAD NO H_2O sample Rain!				85' SAMPLE
90	2 LITH 1 $CaCO_3$ / H_2O 1 RAD			Same as above	90' SAMPLE
91					91' change from sand to silty sand.
92		100% 91.90-93.90 #1			92' vf sand.
93					
94		SHOE PULL			
95	2 LITH 1 $CaCO_3$ / H_2O 1 RAD	AIR ROTARY		91.0' - 97.0' Silty SAND mS 75% Sand 22% silt 3% Gravel c-s 5% f-p carbonate clasts m-s 20% f-s 60% vf-s 15% color dry: light grey 2.5Y 7/2 color wet: dk grey 2.5Y 4/4 dry, well sorted, subrounded, 75% Qtz 15% felsics, 10% mafics, f-pebble, strong reaction to HCL	95' SAMPLE 97' change to silt 98' SAMPLE
96					
97					
98	2 LITH 1 $CaCO_3$ / H_2O 1 RAD				
99					

A-6000-382 (01/93)

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WHC-SD-EN-DP-086, Rev. 0

BOREHOLE LOG

Boring or Well No. 299-W10-20

Sheet 6 of 13

Location 200 WEST LLBG

Project W-Ø152

Prepared By [signature] / ANDREW M. TEMPLETON (Sign/Print Name) Date 10-28-93

Reviewed By [signature] / EDWARD C. LEFEVER (Sign/Print Name) Date 10/28/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
100		AIR ROTARY		97.0-101.0'	
101				SILT M	101' chang to caleche.
				96% Silt 4% Sand (f-vf)	Silt above caleche was moist
102				color dry: very pale brown 10YR 7/4	looked like moisture builds up on
				color wet: dk brown 10YR 4/6	top of caleche zone.
103				moist, to wet very well sorted, sand is qtz,	104' SAMPLE CALECHE
				occasional $CaCO_3$ clast <1mm. vc-sand	
104				sized Carbonate clast, strong reaction to HCL	104.5 change to f-sand.
	2 LITH. 1 $CaCO_3$ H_2O 1 RAD				
105				101.0-104.5' Caleche	
				Silty SAND m S	
106				25% Sand 25% Silt 5% Gravel (CaCO3 clasts)	
				72% 23% 5% m-p	
				10% c-sand	
107				40% m-sand 50% vf-f-p	107' SAMPLE
	2 LITH. 1 $CaCO_3$ H_2O 1 RAD			30% f-sand	
				20% vf-sand.	
108		108.44'		color dry: 2.5Y 8/4 Pale yellow	108.5-110.3' Caleche
109		#2 100% SPLIT-SPOON 110.44'		color wet: 2.5Y 5/2 grayish brown	
				dry to damp, well sorted, subrounded to	
110				sub-angular, 75% Qtz, 10% Basalt (mafics)	
				10% Felsics, 5% $CaCO_3$ clasts, m-pebble,	110.3-117.5'
		SHOE 110.94'		strong reaction to HCL	
		AIR ROTARY		104.5-108.5'	
				SAND S	
				95% Sand 5% Silt	
				30% m-s color dry: lt. brownish gray 2.5Y 6/2	
				45% f-s color wet: 2.5Y 3/2 dk brown	
				25% vf-s	
115				dry, well sorted, sub rounded to	115' SAMPLE
	2 LITH. 1 $CaCO_3$ H_2O 1 RAD.			subangular, 78% Qtz 10% mafics	
116				10% Felsics 2% micaceous m-s, med. to strong reaction to HCL	
				108.5-110.3 Caleche zone (split-spoon)	
117		117.41		110.3-117.5 SAND S	
				96% Sand 4% Silt	
118	SLUFF →	118.11'		40% c-sand, 40% m-sand 20% f-sand	
		118.32'		color dry: lt. yellowish brown 2.5Y 6/3	
119		16"/24" #3		color wet: 2.5Y 4/4	
				dry, well sorted, subangular to subrounded,	
		119.61'		80% Qtz, 10% mafics, 10% felsics, c-sand,	
				no reaction to HCL	

A-6000-382 (01/93)

9413224.0442

BOREHOLE LOG

Boring or Well No. 299-W10-20

Sheet 7 of 13

Location 200 WEST LLBG

Project W-0152

Prepared By (Sign/Print Name) ANDREW M. TEMPLETON Date 11-1-93

Reviewed By (Sign/Print Name) EDWARD C. LAFFERTY Date 12/03/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
120		AIR ROTARY		117.5 - 120	Description of Split-Spoon
				Sandy GRAVEL SG	material/sample
					Sandy GRAVEL
125				120 - 130 FT.	125' SAMPLE
	2 LITH.			Sandy GRAVEL SG	Sandy Gravel
	1 $CaCO_3$ / H_2O			60% Gravel 40% Sand	
	1 RAD			45% c-sand	
				40% m-sand	
				10% f-sand	
				5% vf-sand.	
				color dry: 2.5Y N3 Very DK. gray	
				color wet: 2.5Y N2 Black	
				dry, poorly sorted, gravel: rounded to	
130				subrounded, sand: subrounded to subangular	130' SAMPLE sandy gravel
	2 LITH.			gravel: 80% Mafic 10% Qtz 10% Felsics	130-132' silty GRAVEL
131	1 $CaCO_3$ / H_2O			sand: 45% Mafic 45% Qtz 10% Felsics	
	1 RAD			c-pebble, no reaction to HCL	
132					132' SAMPLE
	2 LITH.			130 - 132' Silty Sandy GRAVEL	~~Sandy~~ silty GRAVEL
	1 $CaCO_3$ / H_2O			mSG	
	1 RAD.			40% 40%	
				50% Gravel 30% Sand 20% silt	
				color wet 2.5y 7/6 dk grayish brown	
				color dry: 2.5y 7/4 Pale yellow	
135				dry, poorly sorted, Gravel; subrounded	135' SAMPLE
	2 LITH.			to rounded, sand; angular to subrounded	Same as 120-130 ft.
	1 $CaCO_3$ / H_2O			Gravel; 90% Basalt 5% Felsic 5% Qtz	
				Sand; 50% Basalt 35% Qtz 15% Felsics	weak reaction to HCL
	1 RAD			c-pebble weak reaction to HCL	on pebble coatings
				135' 140'	
				132 - 135 Sandy GRAVEL SG	same as 125' sample

A-6000-382 (01/93)

9413224.0443

BOREHOLE LOG

Boring or Well No. 299-W10-20

Sheet #8 of 13

Location 200 WEST LLBG

Project W-0152

Prepared By [signature] / ANDREW M. TEMPLETON (Sign/Print Name) Date 11-2-93

Reviewed By Edward C. Lafuse / EDWARD C. LAFUSE (Sign/Print Name) Date 12/03/93

Depth (feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
140	2 LITH. 1 $CaCO_3$ / H_2O 1 RAD.	AIR ROTARY		140-176'	140' SAMPLE
				Sandy GRAVEL SG	Sandy GRAVEL
				63% Gravel 35% Sand 2% Silt	
				color wet: 2.5Y N3/2 dk gray	
				color dry: 2.5Y N6 Grey	
				dry, poorly sorted, gravel;	
				subrounded to rounded, sand;	
				subangular to subrounded, gravel;	
				40% Qtz 30% Felsics 30% mafics	
				Sand: 70% Qtz 15% Felsics 15% mafics	145' SAMPLE
145	2 LITH. 1 $CaCO_3$ / H_2O 1 RAD.			m-pebble, no reaction to HCL	Sandy GRAVEL
				Same as above	
					150' SAMPLE
150	2 LITH. 1 $CaCO_3$ / H_2O 1 RAD.			Same as above	Sandy GRAVEL
					155' SAMPLE
155	2 LITH. 1 $CaCO_3$ / H_2O 1 RAD.			Same as above	Sandy GRAVEL

A-6000-382 (01/93)

BOREHOLE LOG

Boring or Well No. 299-W10-20

Sheet 89 of 13

Location 200 WEST LLBG

Project W-0152

Prepared By ANDREW M. TEMPLETON (Sign/Print Name) Date 11-2-93

Reviewed By Edward C. LaFace (Sign/Print Name) Date 12/03/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
160	2 LITH. 1 $CaCO_3$ H_2O 1 RAD.	AIR ROTARY		Same as above	160' sample Gravel
165	2 LITH. 1 $CaCO_3$ H_2O 1 RAD.	AIR ROTARY		Same as above	165' SAMPLE Gravel
170	2 LITH. 1 $CaCO_3$ H_2O 1 RAD.	AIR ROTARY		Same as above	170' SAMPLE
175	2 LITH 1 $CaCO_3$ H_2O	AIR ROTARY		Same as above	175' SAMPLE
176				176-183' Sandy GRAVEL SG.	176' Becomes Sandy see 180' description

A-6000-382 (01/93)

9413224.0445

BOREHOLE LOG

Boring or Well No. 299-W10-20

Sheet 10 of 13

Location 200 WEST LLBG

Project W-Ø152

Prepared By ANDREW M. TEMPLETON (Sign/Print Name) Date 11-2-93

Reviewed By EDWARD C. RAFUSE (Sign/Print Name) Date 12/03/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
180	2 LITH.			176 - 183' Sandy GRAVEL SG	180' SAMPLE
181	1 $CaCO_3$ / H_2O			50% Gravel 48% Sand 2% Silt	
				color dry: 2.5Y 8/2 white	
182	1 RAD.			color wet: 2.5Y 7/2 lt gray	183' change less sand.
				dry, poorly sorted, gravel: subrounded	
183				to rounded, sand; subrounded to rounded.	
				gravel: 35% Qtz 50% Felsics 15% mafics	
				sand: 80% Qtz 15% Felsics 5% mafics	
				vc-pebble, no reaction to HCL	
185		AIR ROTARY			185' SAMPLE
	2 LITH.			183 - 213' Sandy GRAVEL SG	
	1 $CaCO_3$ / H_2O			70% Gravel 28% Sand 2% Silt	
				color dry: 2.5Y N6 grey	
	1 RAD.			color wet: 2.5Y N3 Very dk. grey	
				dry, poorly sorted, gravel: subrounded	
				to rounded, sand: subrounded to subangular	
				gravel: 50% mafic 25% Qtz 25% Felsics	
				sand: 75% Qtz 15% Felsics 10% mafics	
				c-pebble, no reaction to HCL	
190					
	2 LITH				190' SAMPLE
	1 $CaCO_3$ / H_2O			Same as above	Sandy GRAVEL
	1 RAD.				
195					
	2 LITH			Same as above	190' SAMPLE
	1 $CaCO_3$ / H_2O				Sandy GRAVEL
	1 RAD				

A-6000-382 (01/93)

9413224.0446

BOREHOLE LOG

Boring or Well No. 299-W10-20

Sheet 11 of 13

Location 200 WEST LLBG

Project W-Ø152

Prepared By (Sign/Print Name) ANDREW M. TEMPLETON Date 11-5-93

Reviewed By (Sign/Print Name) EDWARD C. LEFORE Date 12/03/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
200	2 LITH 1 $CaCO_3$ H_2O 1 RAD	AIR ROTARY		Same as above	200' SAMPLE Sandy Gravel
205	2 LITH 1 $CaCO_3$ H_2O 1 RAD			Same as above	205' SAMPLE Sandy Gravel
210	2 LITH 1 $CaCO_3$ H_2O 1 RAD			Same as above	210' SAMPLE Sandy Gravel
211					
212				213-214' Sandy GRAVEL SG	
213				65% Gravel 30% Sand 5% Silt	213-214 coating on pebbles
				color dry: 2.5Y 6/2 lt. brownish grey	cemented?
214				color wet: 2.5Y 5/2 grayish brown	213-214 change to
				dry to moist, poorly sorted, gravel;	Sand & Gravel
215				subrounded to rounded, sand; rounded	
	2 LITH 1 $CaCO_3$ H_2O			to subangular, gravel; 45% Felsics,	215' SAMPLE
216				40% Qtz 15% mafic, sand;	
				75% Qtz 15% Felsics 10% mafics. m-pebble	1 LITH. AT 213 moist beginning dry
217	1 RAD			no reaction to HCL	1 LITH AT 214
				214-215' Slightly Silty Gravelly SAND	
218				70% Sand 8% 10% Silt 15% Gravel	217' becomes calcareous
				color dry:	
219				color wet: 10YR 3/3 Dark brown, moist to wet,	
				moderately sorted, gravel; subrounded to rounded, sand; same	
				gravel; 70% Qtz, 25% Felsics 5% mafic	
				sand; 80% Qtz 10% Felsics 10% mafic	
				f-pebble, no reaction to HCL	

2-18

A-6000-382 (01/93)

9413224.0947

BOREHOLE LOG

Boring or Well No. 299-W10-20

Sheet 12 of 13

Location 200 WEST LLBG

Project W-Ø152

Prepared By ANDREW TEMPLETON (Sign/Print Name) Date 11-8-93

Reviewed By Edward C. Rafuse (Sign/Print Name) Date 12/03/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
220	2 LITH 1 $CaCO_3$ 1 RAD	AIR ROTARY		215-238'	220' SAMPLE
				Sandy GRAVEL SG	becomes less calc.
				60% Sand 32% Gravel 8% Silt	at ~220'
				color dry: 2.5Y 6/2 lt. brownish grey	
				color wet: 2.5Y 4/2 dk grayish brown	11-9-93 Water Level = 222.78' BGS
				moist, moderately to poorly sorted	11-12-93 Water Level = 223.16' BGS
				Gravel; subangular to subrounded	11-16-93 Water Level = 222.90' BGS
				sand; subrounded to rounded, gravel;	11-18-93 Water Level = 223.12' BGS
				50% felsics, 40% Qtz 10% mafics	
225				sand; 90% Qtz 5% felsics 5% mafics	225' SAMPLE
	2 LITH. 1 $CaCO_3$ 1 RAD.			c-pebble, weak reaction to HCl on sand	
226				and coating on pebbles.	
227				Same as above	
228					
229		229.17' #4 100%			
230	2 LITH 1 $CaCO_3$ 1 RAD				230' SAMPLE
231		231.17' SHOE 231.42'			231-~232' color change iron stain
		AIR ROTARY		232-238'	
				Sandy GRAVEL SG	
				50% Gravel 46% Sand 4% Silt	
				color dry; 10YR 7/4 Very Pale Brown	
				color wet: 10YR 5/4 yellowish brown	
				wet, moderately sorted gravel;	
235				rounded to subrounded, sand;	236-
	2 LITH. 1 $CaCO_3$ 1 RAD.			subangular to subrounded, gravel;	237' less Fe stain
236				50% Qtz 40% Felsics, 10% mafics,	
237				sand; 90% Qtz, 5% felsics, 4% mafics	238' change to sand
				1% mica	no Fe stain
238					
239					

A-6000-382 (01/93)

BOREHOLE LOG

Boring or Well No. 299-W10-20

Sheet 13 of 13

Location 200 WEST LLBG

Project W-0152

Prepared By ANDREW TEMPLETON (Sign/Print Name) Date 11-16-93

Reviewed By Edward C. Lefler / Edward C. Lefler (Sign/Print Name) Date 12/28/93

Depth ( )	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
240	2 LITH. 1 $CaCO_3$ 1 RAD	AIR ROTARY		238-243'	240' SAMPLE
241				SAND S	sand
				94% Sand 5% Silt 1% Gravel	
242				color dry: 2.5Y 6/2 lt. brownish gray	
				color wet: 2.5Y 7/1 olive brown	
243				wet, very well sorted, subrounded	heaving sands
				to rounded,	
244				70% Qtz 20% mafics 10% Felsics	Boring terminated at
				f-pebble, no reaction to HCL	243' BGS
245					
					Gravelly at 243'
				243-251 FT.	
					Hard drilling
				Sandy GRAVEL SG	
				75% Gravel 20% Sand 5% Silt	
				20% vcs, 20% cs 45% ms, 10% fs, 5% vfs	
				color wet; lt. yellowish brown 6/3	
250				wet to moist, moderately sorted,	250' SAMPLE
	2 LITH 1 $CaCO_3$ 1 RAD			sand; subrounded to rounded, gravel;	Grab sample from
251				subrounded to rounded, sand;	dumpster
				90% Qtz, 5% mafics, 5% Felsics	
				gravel; 40% Felsics, 40% mafics, 20% Qtz.	
				max particle size c-pebble, no reaction	
				to HCL.	
				BORING TERMINATED AT	
				251.2' FT BGS	
255					

A-6000-382 (01/93)

9413224.0449

Pg 3 of 3

WELL CONSTRUCTION VERIFICATION REPORT

Criteria from WHC-S-014, and other change documents

Well No. 299-W10-20

Well Specification/Revision WHC-S014 Rev. 7

Subject	Verification Method	Criteria Spec	Criteria Chg. Doc.	Initials/Date
Cleaning				
Drilling Rig/Tools Req #355 (PT D4014)	Visual	7.6.7.7		ECL / 6-29-93
Temporary Mater.	Visual	7.7		KDR / 8/20/93 ECL / 6-29-93
Drill Method Air Rotary	Visual	5.2		ECL / 6-29-93
Lubricants/Additives				
Lubricants	Visual	7.2		ECL / 6-29-93
Additives	Visual	7.2		GWH 12-17-93
Straightness Test	Visual	8.2		GWH 12-17-93
Material Storage/Packing of Completion Material				
Mtl. Hand./Stor.	Visual	7.3		X 12/18/94
Material Packing	Visual	7.3		X 12/18/94
Casing and Screen (Permanent)	Visual	4.2 - 4.2.5, 12.2.1		X 12/18/94
Annular/Seal/ Filter Pack	Visual	4.2.6 - 4.2.9, 5.3.1		X 12/18/94
Well Development	Visual	5.3.1.K		RJE 12/22/94
Well Protection				
Surface Pad	Visual	4.2.9, 4.2.10		BES 12/27/93
Prot. Casing	Visual	4.2.10		BES 12/27/93
Prot. Posts	Visual	4.2.10		BES 12/27/93
Cap, Hasp, Lock	Visual	4.2.10		BES 12/27/93
Site Restored	Visual	11.0		2/14/94
Pump Installation				
Pump Decon/Prep.	Visual	4.2.10, 12.2.1		BES 12/27/93
Installed	Visual	5.3.1.L		BES 12/27/93
Pump Tested	Visual	5.3.1.L		BES 12/28/93
Well Surveying/Labeling				
Ms. Pt. Surveyed	Visual	3.4		DJC 2/15/94
P. Casing/BC Surv.	Visual	3.4		DJC 2/15/94
Well No. Stamped	Visual	4.2.9		2/14/94
BC Labeled	Visual	4.2.9		BES 12/27/93

Comments

A-6000-868 (01/93)

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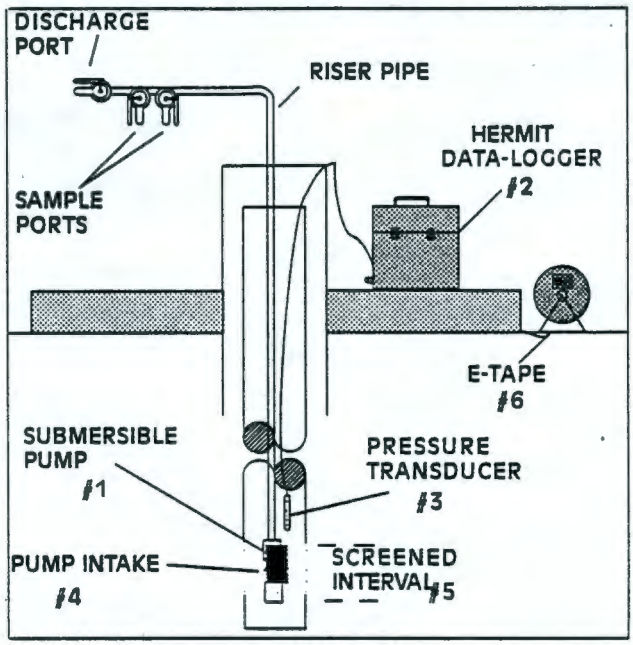
EQUIPMENT CONFIGURATION AND WELL HEAD DIAGRAM

Page 1 of 1

Well Designation 299-W10-20 Well Depth 247.7' TOC 6"

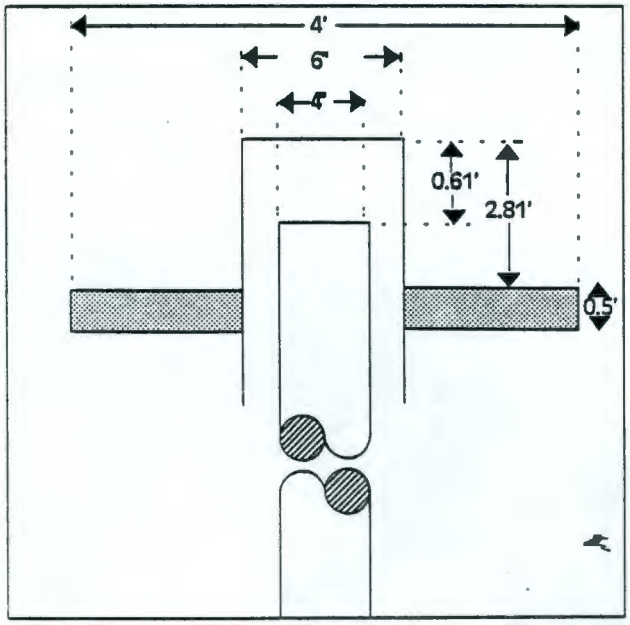
Equipment Configuration Diagram

Item	Description
#1	1.5 hp. Grundfos submersible
#2	Data Logger 2K-459
#3	In-Situ Inc s/n 4044FE (cal. 11-11-94)
#4	247.10' TOC 6"
#5	227.70'-247.70' TOC 6"
#6	Solinst s/n: ET-4 (cal. 1-30-94)



Comments: The 6 inch outer casing was not in place until after development.

Well Head Diagram



Signature Robert S. Edrington R.S.Edrington Date 01-11-94

A-6000-417 (08/89)

9413274.0451

WELL DEVELOPMENT FORM

page 1 of 1

Well Designation: 299-W10-20 Well Depth: 247.70' TOC 6"

Screened Interval: 227.70'-247.70' TOC 6" Date Well Devel. Performed: 12-21&22-93

BAILING

Water Level Prior to Bailing: _____ Time of Measurement: _____

Volume of Bailer: _____ Number of Bails Removed: _____ Gallons: _____

Summary Description of Water Removed: _____

Water Level After Bailing: _____ Time of Measurement: _____

SURGE BLOCK:

N.A.

Type of Surge Block: _____ Dimensions of Surge Block: _____

TD Before	Stroke Length	Stroke Frequency	Surge Interval	Surge Time	TD After	TD Difference

AIRLIFT:

N.A.

Depth to Eductor Pipe: _____ Airlift Start Time: _____

Flow Rate: _____ Accumulated Flow: _____ Airlift Stop Time: _____

Turbidity (NTU): _____

MECHANICAL PUMPING:

Pumping Technique: Constant Discharge Pump Depth: 235.0'TOC4" Pump Start Time: 1300/731

Flow Rate: 3.6-2.4gpm Accumulated Flow: 1,150 gallons Pump Stop Time: 1528/1430

Turbidity (NTU): 209 >1000 >1000 82.8 25.6 33.3 28.2 25.6

45.3 6.5 4.7 5.6 4.9

COMMENTS: Development was performed before 6" outer casing was in place.

Recorded by: Robert S. Edrington R. S. Edrington Date: 01-11-94

Sign and Print Name

A-6000-393 (03/90)

9413224.0452

VALIDATED
KDR 2/18/94
SIGNATURE/DATE

INSTANTANEOUS SLUG TEST DATA SHEET: INJECTION

Well no.: 299-W10-20

Screened interval: 227.10'-247.10' *TOC 4"*

Depth To Water: 226.0' *TOC 4"*

Depth to Transducer: 15.104' BWL

Measured by: B.F. Strode

Slug Volume: .194 cu.ft

Barometric Reading (PSIA):
Beginning: N/A End: N/A

Time:	Start	End
Baseline	1544	1604
Injection	1605	1640

Date: 12-22-93

Initial Pressure (Pi): 0.00

Slug Level/Pressure (Pmax) 2.128

Borehole Diameter: 4"

Time		Pressure	Time		Pressure	Time		Pressure
Observed	Elapsed	Trans.Measurement	Observed	Elapsed	Trans.Measurement	Observed	Elapsed	Trans.Measurement

SEE ATTACHED DATA

Recorded by: [signature] R.S. Edrington Date: 01-11-94
Sign and Print Name

BD-6000-293(07/90)

9413224.0453

INSTANTANEOUS SLUG TEST DATA SHEET: WITHDRAWAL

Page 1 of 1

Well no.: 299-W10-20

Screened interval: 227.10'-247.10' *TOC 4"*

Depth To Water: 226.0' *TOC 4"*

Depth to Transducer: 15.104' BWL

Measured by: B.F. Strode

Slug Volume: .194 cu.ft

Barometric Reading (PSIA):

Beginning: N/A End: N/A

Time:	Start	End
Baseline	1544	1604
Injection	1643	1705

Date: 12-22-93

Initial Pressure (Pi): 0.00

Slug Level/Pressure (Pmax) -1.075

Borehole Diameter: 4"

Time		Pressure	Time		Pressure	Time		Pressure
Observed	Elapsed	Trans.Measurement	Observed	Elapsed	Trans.Measurement	Observed	Elapsed	Trans.Measurement

SEE ATTACHED DATA

Recorded by: Robert S. Edrington R.S. Edrington Date: 01-11-94

Sign and Print Name

BD-6000-293(07/90)

9413224.0454

Well 299-W10-20

Hermit Unit # 2K-459
Test# 4,5,6: Slug Test

Test# 4: Baseline
Start Time: 15:44 12/22/93

Time (min)	dWL(ft)
0	0.000
1	0.018
2	0.031
3	0.037
4	0.040
5	0.040
6	0.044
7	0.047
8	0.044
9	0.047
10	0.047
11	0.047
12	0.047
13	0.047
14	0.050
15	0.047
16	0.050
17	0.050
18	0.050
19	0.050
20	0.053

Test# 5: Slug Injection
Start Time: 16:05 12/22/93

Time (min)	Time(hrs)	dWL(ft)
0.0000	0.0000	0.479
0.0083	0.0001	2.128
0.0166	0.0003	0.772
0.0250	0.0004	1.315
0.0333	0.0006	0.690
0.0416	0.0007	0.211
0.0500	0.0008	0.463
0.0583	0.0010	0.236
0.0666	0.0011	0.299
0.0750	0.0013	0.277
0.0833	0.0014	0.274
0.0916	0.0015	0.284
0.1000	0.0017	0.277
0.1083	0.0018	0.277
0.1166	0.0019	0.262
0.1250	0.0021	0.262
0.1333	0.0022	0.258
0.1416	0.0024	0.258
0.1500	0.0025	0.252
0.1583	0.0026	0.252
0.1666	0.0028	0.252
0.1750	0.0029	0.249
0.1833	0.0031	0.246
0.1916	0.0032	0.246
0.2000	0.0033	0.243
0.2083	0.0035	0.243
0.2166	0.0036	0.239
0.2250	0.0038	0.239
0.2333	0.0039	0.239
0.2416	0.0040	0.236
0.2500	0.0042	0.236
0.2583	0.0043	0.233
0.2666	0.0044	0.233
0.2750	0.0046	0.230
0.2833	0.0047	0.230
0.2916	0.0049	0.227
0.3000	0.0050	0.227
0.3083	0.0051	0.224
0.3166	0.0053	0.221
0.3250	0.0054	0.221
0.3333	0.0056	0.221
0.3500	0.0058	0.217
0.3666	0.0061	0.214
0.3833	0.0064	0.214
0.4000	0.0067	0.211
0.4166	0.0069	0.211
0.4333	0.0072	0.211
0.4500	0.0075	0.205

Test# 6: Slug Withdrawal
Start Time: 16:43 12/22/93

Time (min)	Time(hrs)	dWL(ft)
0.0000	0.0000	-0.971
0.0083	0.0001	-1.075
0.0166	0.0003	-0.656
0.0250	0.0004	-0.763
0.0333	0.0006	-0.596
0.0416	0.0007	-0.583
0.0500	0.0008	-0.542
0.0583	0.0010	-0.495
0.0666	0.0011	-0.488
0.0750	0.0013	-0.447
0.0833	0.0014	-0.444
0.0916	0.0015	-0.422
0.1000	0.0017	-0.413
0.1083	0.0018	-0.403
0.1166	0.0019	-0.397
0.1250	0.0021	-0.391
0.1333	0.0022	-0.384
0.1416	0.0024	-0.378
0.1500	0.0025	-0.372
0.1583	0.0026	-0.365
0.1666	0.0028	-0.359
0.1750	0.0029	-0.353
0.1833	0.0031	-0.350
0.1916	0.0032	-0.347
0.2000	0.0033	-0.340
0.2083	0.0035	-0.337
0.2166	0.0036	-0.334
0.2250	0.0038	-0.331
0.2333	0.0039	-0.328
0.2416	0.0040	-0.321
0.2500	0.0042	-0.321
0.2583	0.0043	-0.315
0.2666	0.0044	-0.315
0.2750	0.0046	-0.312
0.2833	0.0047	-0.309
0.2916	0.0049	-0.306
0.3000	0.0050	-0.302
0.3083	0.0051	-0.299
0.3166	0.0053	-0.296
0.3250	0.0054	-0.293
0.3333	0.0056	-0.290
0.3500	0.0058	-0.287
0.3666	0.0061	-0.280
0.3833	0.0064	-0.277
0.4000	0.0067	-0.274
0.4166	0.0069	-0.268
0.4333	0.0072	-0.265
0.4500	0.0075	-0.261

9413274.0455

0.4666	0.0078	0.205	0.4666	0.0078	-0.258
0.4833	0.0081	0.202	0.4833	0.0081	-0.255
0.5000	0.0083	0.202	0.5000	0.0083	-0.252
0.5166	0.0086	0.198	0.5166	0.0086	-0.246
0.5333	0.0089	0.195	0.5333	0.0089	-0.242
0.5500	0.0092	0.195	0.5500	0.0092	-0.239
0.5666	0.0094	0.192	0.5666	0.0094	-0.236
0.5833	0.0097	0.192	0.5833	0.0097	-0.233
0.6000	0.0100	0.189	0.6000	0.0100	-0.233
0.6166	0.0103	0.189	0.6166	0.0103	-0.227
0.6333	0.0106	0.186	0.6333	0.0106	-0.224
0.6500	0.0108	0.186	0.6500	0.0108	-0.224
0.6666	0.0111	0.183	0.6666	0.0111	-0.217
0.6833	0.0114	0.183	0.6833	0.0114	-0.217
0.7000	0.0117	0.180	0.7000	0.0117	-0.214
0.7166	0.0119	0.180	0.7166	0.0119	-0.211
0.7333	0.0122	0.176	0.7333	0.0122	-0.208
0.7500	0.0125	0.176	0.7500	0.0125	-0.205
0.7666	0.0128	0.176	0.7666	0.0128	-0.205
0.7833	0.0131	0.173	0.7833	0.0131	-0.201
0.8000	0.0133	0.173	0.8000	0.0133	-0.198
0.8166	0.0136	0.170	0.8166	0.0136	-0.198
0.8333	0.0139	0.170	0.8333	0.0139	-0.195
0.8500	0.0142	0.170	0.8500	0.0142	-0.192
0.8666	0.0144	0.167	0.8666	0.0144	-0.189
0.8833	0.0147	0.164	0.8833	0.0147	-0.189
0.9000	0.0150	0.164	0.9000	0.0150	-0.186
0.9166	0.0153	0.164	0.9166	0.0153	-0.183
0.9333	0.0156	0.161	0.9333	0.0156	-0.183
0.9500	0.0158	0.161	0.9500	0.0158	-0.179
0.9666	0.0161	0.161	0.9666	0.0161	-0.179
0.9833	0.0164	0.157	0.9833	0.0164	-0.176
1.0	0.0167	0.157	1.0	0.0167	-0.173
1.2	0.0200	0.145	1.2	0.0200	-0.154
1.4	0.0233	0.132	1.4	0.0233	-0.135
1.6	0.0267	0.126	1.6	0.0267	-0.123
1.8	0.0300	0.116	1.8	0.0300	-0.110
2.0	0.0333	0.107	2.0	0.0333	-0.101
2.2	0.0367	0.101	2.2	0.0367	-0.088
2.4	0.0400	0.094	2.4	0.0400	-0.082
2.6	0.0433	0.088	2.6	0.0433	-0.075
2.8	0.0467	0.082	2.8	0.0467	-0.069
3.0	0.0500	0.075	3.0	0.0500	-0.066
3.2	0.0533	0.069	3.2	0.0533	-0.060
3.4	0.0567	0.066	3.4	0.0567	-0.056
3.6	0.0600	0.060	3.6	0.0600	-0.053
3.8	0.0633	0.060	3.8	0.0633	-0.047
4.0	0.0667	0.053	4.0	0.0667	-0.047
4.2	0.0700	0.050	4.2	0.0700	-0.044
4.4	0.0733	0.047	4.4	0.0733	-0.041
4.6	0.0767	0.047	4.6	0.0767	-0.037
4.8	0.0800	0.044	4.8	0.0800	-0.037
5.0	0.0833	0.041	5.0	0.0833	-0.034
5.2	0.0867	0.038	5.2	0.0867	-0.034
5.4	0.0900	0.038	5.4	0.0900	-0.031
5.6	0.0933	0.034	5.6	0.0933	-0.028
5.8	0.0967	0.034	5.8	0.0967	-0.028
6.0	0.1000	0.031	6.0	0.1000	-0.028
6.2	0.1033	0.031	6.2	0.1033	-0.025

9413224.0456

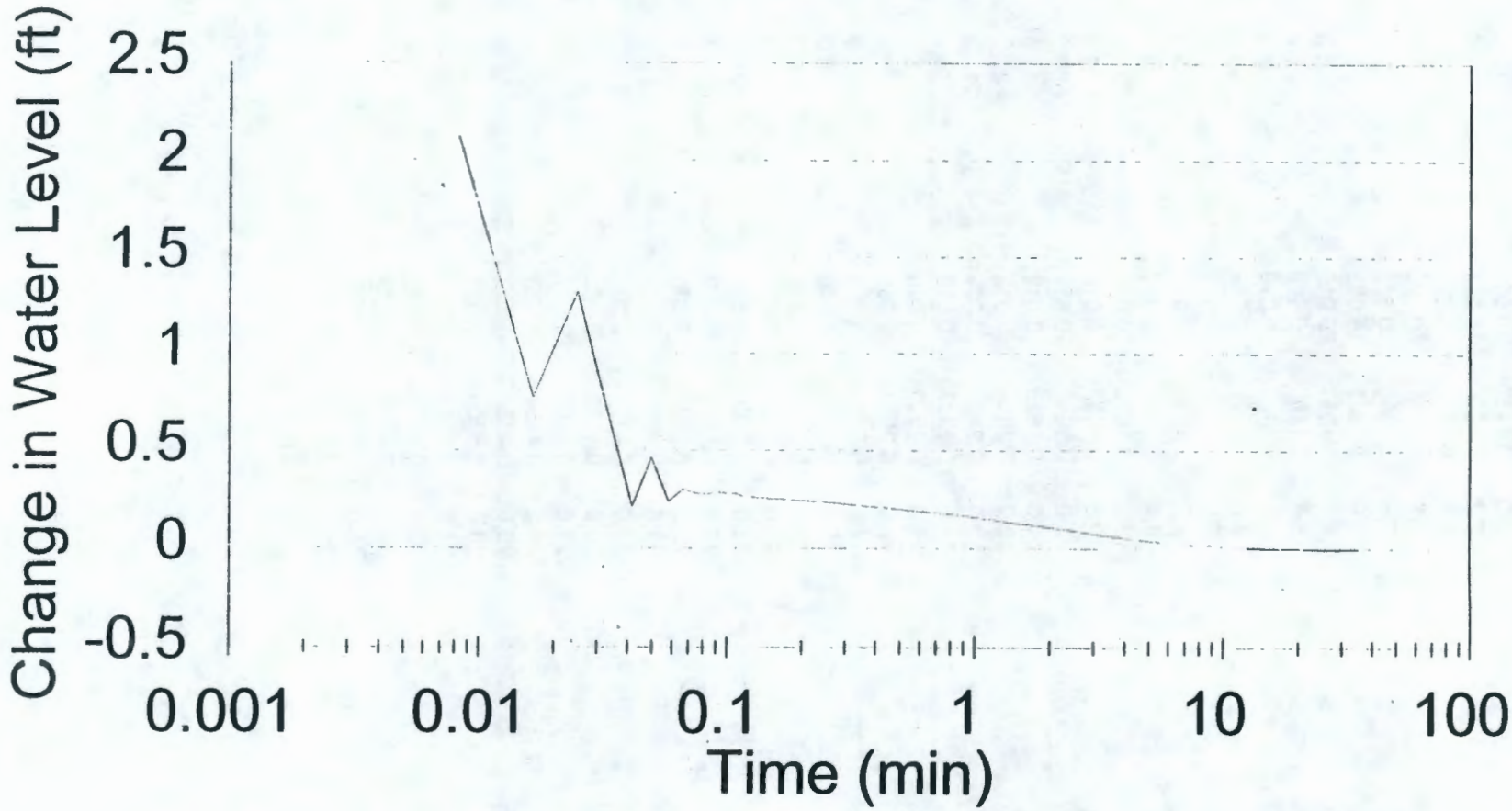
6.4	0.1067	0.031
6.6	0.1100	0.028
6.8	0.1133	0.028
7.0	0.1167	0.025
7.2	0.1200	0.025
7.4	0.1233	0.025
7.6	0.1267	0.022
7.8	0.1300	0.022
8.0	0.1333	0.022
8.2	0.1367	0.019
8.4	0.1400	0.019
8.6	0.1433	0.019
8.8	0.1467	0.019
9.0	0.1500	0.019
9.2	0.1533	0.016
9.4	0.1567	0.016
9.6	0.1600	0.016
9.8	0.1633	0.016
10.0	0.1667	0.012
11.0	0.1833	0.012
12.0	0.2000	0.012
13.0	0.2167	0.009
14.0	0.2333	0.009
15.0	0.2500	0.006
16.0	0.2667	0.006
17.0	0.2833	0.003
18.0	0.3000	0.006
19.0	0.3167	0.006
20.0	0.3333	0.006
21.0	0.3500	0.003
22.0	0.3667	0.000
23.0	0.3833	0.000
24.0	0.4000	0.000
25.0	0.4167	-0.003
26.0	0.4333	-0.003
27.0	0.4500	-0.003
28.0	0.4667	-0.003
29.0	0.4833	-0.003
30.0	0.5000	0.000
31.0	0.5167	0.000
32.0	0.5333	0.000
33.0	0.5500	0.000
34.0	0.5667	0.000
35.0	0.5833	0.000

6.4	0.1067	-0.025
6.6	0.1100	-0.022
6.8	0.1133	-0.022
7.0	0.1167	-0.022
7.2	0.1200	-0.019
7.4	0.1233	-0.019
7.6	0.1267	-0.019
7.8	0.1300	-0.015
8.0	0.1333	-0.015
8.2	0.1367	-0.015
8.4	0.1400	-0.015
8.6	0.1433	-0.012
8.8	0.1467	-0.012
9.0	0.1500	-0.012
9.2	0.1533	-0.009
9.4	0.1567	-0.009
9.6	0.1600	-0.009
9.8	0.1633	-0.009
10.0	0.1667	-0.009
11.0	0.1833	-0.006
12.0	0.2000	-0.003
13.0	0.2167	-0.003
14.0	0.2333	-0.003
15.0	0.2500	0.000
16.0	0.2667	0.000
17.0	0.2833	0.000
18.0	0.3000	0.000
19.0	0.3167	0.000
20.0	0.3333	0.000
21.0	0.3500	0.000
22.0	0.3667	0.003
23.0	0.3833	0.000

9413271.0457

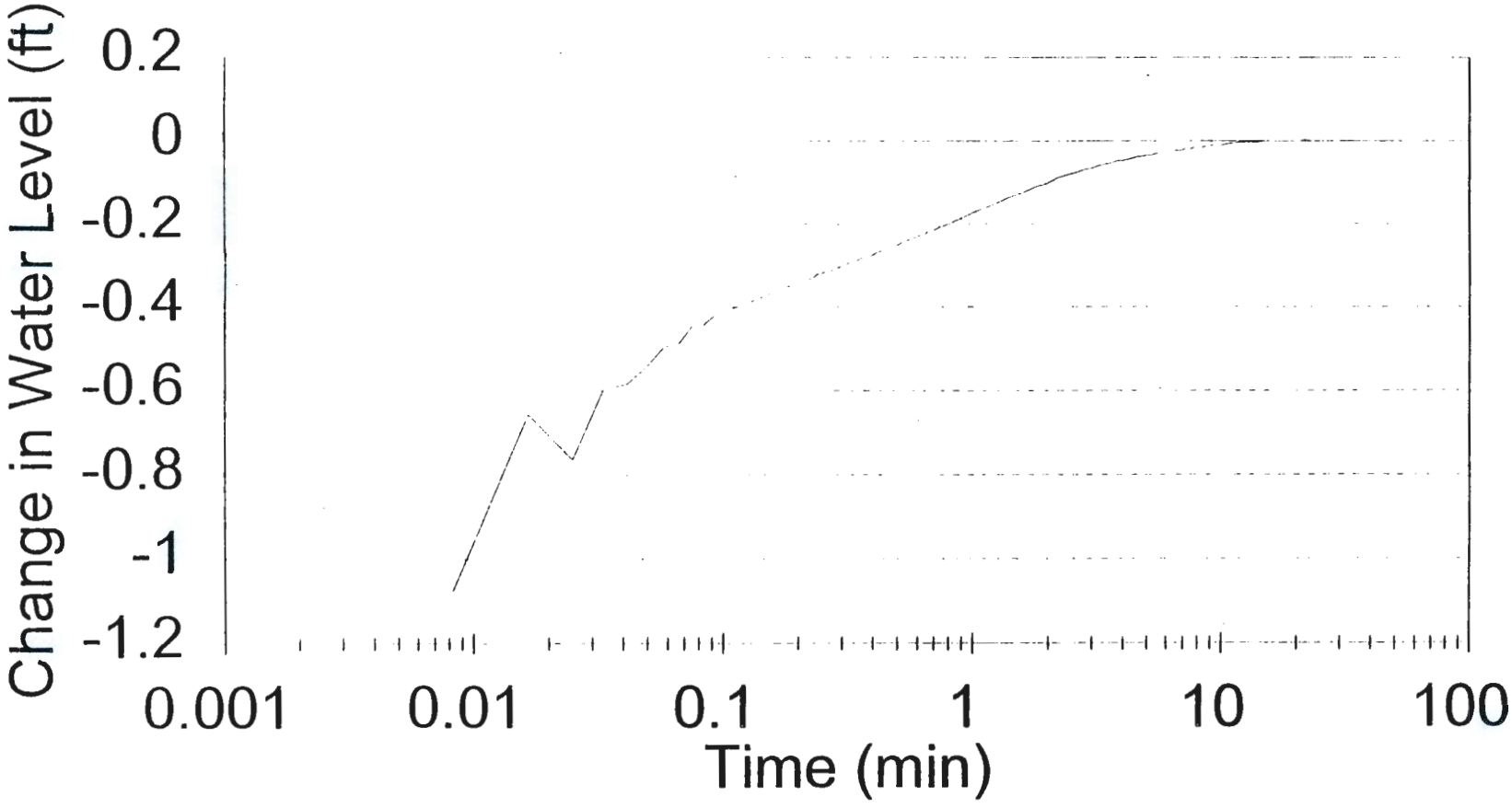
299-W10-20 Slug Injection

22-Dec-93



299-W10-20 Slug Withdrawal

22-Dec-93



BOREHOLE TEST INFORMATION

page 1 of 1

Borehole 299-W10-20 Borehole Diameter 4 in. Hanford Coordinates N/A

Screened interval 227.7'-247.7'TOC 6" SWL 226.6'TOC6" Test Type: Instantaneous Slug

Borehole Depth: 247.70' Instruction Used: WHC-CM-7-7 (EII 10.1)

EQUIPMENT

NAME	DESCRIPTION
Electric Sounder	Solinst s/n: ET-4 Calibration due: 1-30-94
Data Logger	In-Situ Inc. s/n: 2K-459
Pressure Transducer	In-Situ Inc. s/n: 4044FE Calibration due: 11-11-94
Slugging Rod	BR-2 .194 cu.ft.
Steel Measuring Tape	300' Graduated Steel Tape

MEASUREMENT DATUM

Control Datum: Top of Casing (TOC) 6"

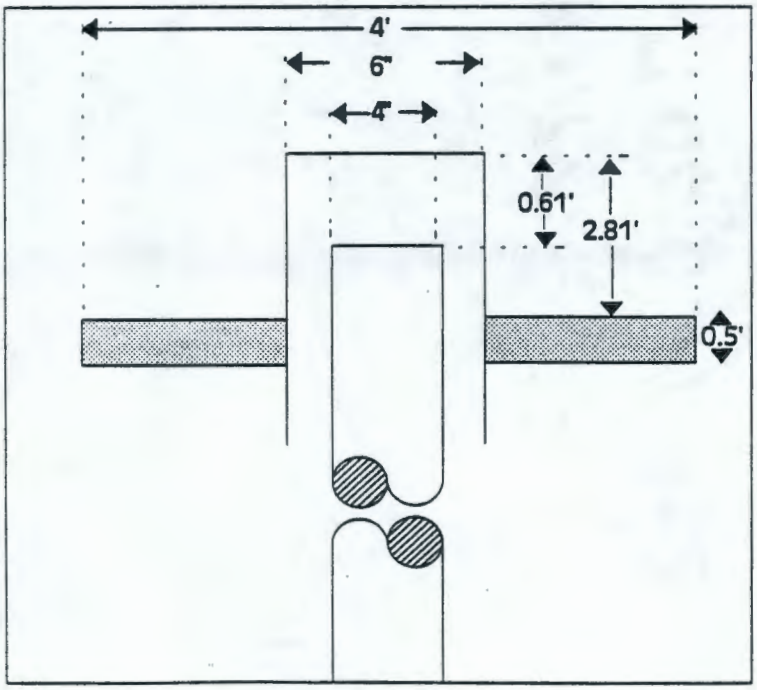
Elevation: N/A

Electric Sounder: TOC 6"

Steel Tape: TOC 6"

Pressure Transducer: TOC 6"

WELL HEAD DIAGRAM



COMMENTS

Recorded by: Robert S. Edrington R. S. Edrington Date: 01-11-94

Sign and Print Name

9413240.0940

SAMPLE PUMP INSTALLATION FORM

Well no: 299-W10-20

Project no: W-152

Installation date: 12-27-93

Installed by: T Macheski

Pump type: Positive displacement

Pump model: Hydrostar HS-8001

PUMP AND RISER PIPE INFORMATION

Pipe: 23@10'x3/4" 1@5'x3/4" SS

Pump length: 2.42'

Material cleaning: Manufacture

Pump screen length: 1.90'

PUMP TESTING INFORMATION

Test date: 12-29-93 Strokes: 65

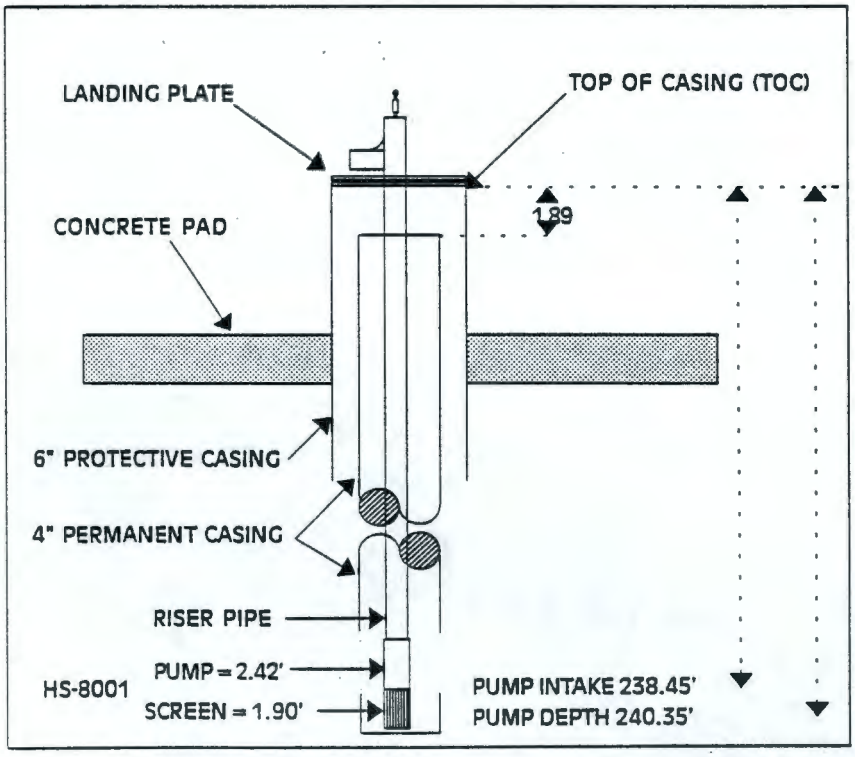
$$\text{Pump efficiency} = \frac{\text{calculated strokes/volume @ 100\%}}{\text{observed strokes/volume}} \times 100$$

$$\frac{\text{Pump eff. 10 strokes/1 gal.}}{\text{x strokes / gal.}} \times 100 = 76.92\%$$

PUMP INSTALLATION DRAWING

Total material length: 236.05'

Comments:
This well will produce water at a maximum of 3 gallons per minute.



Report by: Robert S. Edrington

Title: Advanced Scientist

Signature: Robert S. Edrington

Reviewed by: B. F. Strode

Title: Environmental Equipment Tech.

Signature: Bat Fitts

A-6001-035(01/93)

9413224.0461

VALIDATED
KDR 2/18/94
SIGNATURE/DATE

299-W10-20

P9 of 7

SAMPLE STATUS REPORT FOR E 3397. E-BLANK 5 - 70 TIME: 11/21/93 11:46
DISPATCHED: 11/18/93 13:34 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/19/93 13:10

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

END OF REPORT

9413224.0462

SAMPLE STATUS REPORT FOR E 3398. E-BLANK 75 - 240 TIME: 11/21/93 11:36
DISPATCHED: 11/18/93 13:34 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/19/93 13:12

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

END OF REPORT

9413224.0463

SAMPLE STATUS REPORT FOR E 3256. E-BLANK 299-90 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:34 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:42

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

SAMPLE STATUS REPORT FOR E 3257. E-BLANK 299-95 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:35 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:43

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

SAMPLE STATUS REPORT FOR E 3258. E-BLANK 299-98 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:36 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:43

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

SAMPLE STATUS REPORT FOR E 3259. E-BLANK 299-104 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:36 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:43

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

SAMPLE STATUS REPORT FOR E 3260. E-BLANK 299-107 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:36 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:43

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

END OF REPORT

SAMPLE STATUS REPORT FOR E 3261. E-BLANK 299-115 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:37 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:43

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

SAMPLE STATUS REPORT FOR E 3262. E-BLANK 299-120 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:38 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:51

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

SAMPLE STATUS REPORT FOR E 3263. E-BLANK 299-125 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:39 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:51

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

SAMPLE STATUS REPORT FOR E 3264. E-BLANK 299-130 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:39 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:52

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

SAMPLE STATUS REPORT FOR E 3265. E-BLANK 299-132 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:40 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:52

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

END OF REPORT

SAMPLE STATUS REPORT FOR E 3266. E-BLANK 299-135 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:40 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:52

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

SAMPLE STATUS REPORT FOR E 3267. E-BLANK 299-140 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:41 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:52

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

SAMPLE STATUS REPORT FOR E 3268. E-BLANK 299-145 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:42 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:52

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

SAMPLE STATUS REPORT FOR E 3269. E-BLANK 299-150 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:42 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:52

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

SAMPLE STATUS REPORT FOR E 3248. E-BLANK 299-155 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:21 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:42

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

END OF REPORT

9413224.0466

19647

SAMPLE STATUS REPORT FOR E 3249. E-BLANK 299-160 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:25 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:42

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

SAMPLE STATUS REPORT FOR E 3250. E-BLANK 299-165 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:25 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:42

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

SAMPLE STATUS REPORT FOR E 3251. E-BLANK 299-170 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:25 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:42

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

SAMPLE STATUS REPORT FOR E 3252. E-BLANK 299-175 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:26 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:42

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

SAMPLE STATUS REPORT FOR E 3253. E-BLANK 299-180 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:27 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:42

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

END OF REPORT

177

SAMPLE STATUS REPORT FOR E 3254. E-BLANK 299-185 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:27 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:42

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******

SAMPLE STATUS REPORT FOR E 3255. E-BLANK 299-190 TIME: 11/15/93 8: 1
DISPATCHED: 11/11/93 13:28 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/15/93 7:42

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

11/15/93 15:51 ☎373 3176 222S 3B → GEOSCIENCES 002

329.2' 234.2'

SAMPLE STATUS REPORT FOR E 3173. E-BLANK 22922312 TIME: 11/15/93 15:40
DISPATCHED: 11/10/93 8:21 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 11/10/93 15:16

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

299-W10-20

250.0

SAMPLE STATUS REPORT FOR E 4783. E-BLANK 20050 TIME: 1/31/94 8:47
DISPATCHED: 1/28/94 8: 2 SAMPLE HAS NOT BEEN SLURPED
RECEIVED: 1/28/94 14:49

EXT.	DETER.	RESULTS OR STATUS	OUT OF RANGE?	GOOD ANS?	CHARGE CODE
****	********	**********	***	***	******
4271	TOT-ACT	< 5.00000E 01 pCi/G	N	Y	VOGEL

END OF REPORT

VALIDATED
KDR 2/18/94
SIGNATURE/DATE

Pg 1 of 5

BILLING # _____

TEST REQUEST

OPERABLE UNIT	W-152	WELL NO	299-W10-20	DEPTH	5-240'
SAMPLE/SPECIMEN NO	4-0517>0564	COST CODE/WORK ORDER NUMBER			R4G81
REQUESTED BY: ORG	81235	PERSON	E.C. RAFUSE	PHONE	544-8137
********HEIS********	N/A	MSIN	H6-06	DATE	12/3/93

TEST REQUESTED	# OF SAMPLES	TEST LAB INFORMATION
MOISTURE CONTENT	1 EA	GEL 14
CALCIUM CARBONATE		GEL 19

REMARKS: _____

ARCHIVE YES ☐ **NO** ☐

TAPE RELEASE STICKER HERE

RECEIVED BY JY FANNIN

DATE 12/3/93

Pg 2-45

GEOTECHNICAL ENGINEERING LABORATORY

GEL-14, GEL-19

DATE	1/17/94	GEL-14 SOIL MOISTURE						GEL-19 CALCIUM CARBONATE			
Tested b	JRP/LDB	Balance	3304	Calibration due dat		1/17/94		Vessel no.	5697	Sample wt.8.0(g)	
	WELLNO	299-W10-20		OP.UNIT	W-152	CONTAC	Rafuse	PHONE	544-8137		
Sample no.	Wet wt. & tare	Dry wt. & tare	Tare wt.	Moisture wt.	Dry wt. soil	Wet wt. soil	% Moisture	Pressure SOIL	% CACO3 per gram	Calculate by	COMMENTS
5 4-0517	391.37	373.12	63.17	18.25	309.95	328.2	5.89	0.4	< 1%	HH	
10 518	416.44	403.36	63.13	13.08	340.23	353.3	3.84	0.3	< 1%	HH	
15 519	570.2	551.11	63.06	19.09	488.05	507.1	3.91	0.2	< 1%	HH	
20 520	565.47	553.21	63.03	12.26	490.18	502.4	2.50	0.3	< 1%	HH	
25 521	517.85	508.82	61.88	9.03	446.94	456.0	2.02	0.3	< 1%	HH	
30 522	559.38	552.86	62.64	6.52	490.22	496.7	1.33	0.3	< 1%	HH	
35 523	549.48	542.67	62	6.81	480.67	487.5	1.42	0.3	< 1%	HH	
40 524	523.06	518.78	62.93	4.28	455.85	460.1	0.94	0.2	< 1%	HH	
45 525	595.63	589.33	63.97	6.3	525.36	531.7	1.20	0.3	< 1%	HH	
50 526	543.56	538.33	61.75	5.23	476.58	481.8	1.10	0.3	< 1%	HH	
55 527	590.63	584.4	61.5	6.23	522.9	529.1	1.19	0.5	< 1%	HH	
60 528	560.83	552.54	63.76	8.29	488.78	497.1	1.70	0.3	< 1%	HH	
65 529	606.1	596.46	61.55	9.64	534.91	544.6	1.80	0.3	< 1%	HH	
70 530	574.15	566.25	60.2	7.9	506.05	514.0	1.56	0.4	< 1%	HH	
75 531	582.1	573.98	62.76	8.12	511.22	519.3	1.59	0.3	< 1%	HH	
80 532	540.04	523.09	61.86	16.95	461.23	478.2	3.67	0.6	< 1%	HH	
85 533	506.66	492.17	64.14	14.49	428.03	442.5	3.39	0.5	< 1%	HH	
90 534	514.27	501.25	63.46	13.02	437.79	450.8	2.97	0.7	1.0	HH	
95 535	525.91	521.19	62.76	4.72	458.43	463.2	1.03	1.4	2.6	HH	
100 536	400.64	374.44	61.87	26.2	312.57	338.8	8.38	1.2	2.2	HH	
104 537	462.95	439.99	62.28	22.96	377.71	400.7	6.08	4.1	8.7	HH	
107 538	492.87	483.87	60.68	9	423.19	432.2	2.13	1.4	2.6	HH	
115 539	464.58	456.17	62.23	8.41	393.94	402.4	2.13	0.4	< 1%	HH	
125 540	585.76	580.82	62.38	4.94	518.44	523.4	0.95	0.3	< 1%	HH	
130 541	617.56	612.28	62.58	5.28	549.7	555.0	0.96	0.3	< 1%	HH	
132 542	601.08	590.88	62.67	10.2	528.21	538.4	1.93	0.4	< 1%	HH	
135 543	649.2	643.92	61.44	5.28	582.48	587.8	0.91	0.2	< 1%	HH	
140 544	574.79	571.55	61.94	3.24	509.61	512.9	0.64	0.2	< 1%	HH	
145 545	656.54	651.43	63.63	5.11	587.8	592.9	0.87	0.5	< 1%	HH	
Tests Checked By	RICHARD T. MCINTOSH			Richard T. McIntosh					Date:	######	1/20/94

COPY

Pg 3 of 5

GEOTECHNICAL ENGINEERING LABORATORY

GEL-14, GEL-19

DATE	1/17/94	GEL-14 SOIL MOISTURE						GEL-19 CALCIUM CARBONATE			
Tested b	JRP/LDB	Balance	3304	Calibration due date		2/7/94		Vessel no.	5697	Sample wt.8.0(g)	
	Well no.	299-W10-20		Op. Unit	W-152	Contact	Rafuse	Phone	544-8137		
Sample	Wet wt.	Dry wt.	Tare	Moisture	Dry wt.	Wet wt.	%	Pressure	% CACO3	Calculated	COMMENTS
no.	& tare	& tare	wt.	wt.	soil	soil	Moisture	SOIL	per gram	by	
150 4-0546	604.59	600.23	62.68	4.36	537.55	541.9	0.81	0.3	< 1%	HH	
155 547	636.77	632.41	61.21	4.36	571.2	575.6	0.76	0.3	< 1%	HH	
160 548	585.42	581	64.05	4.42	516.95	521.4	0.86	0.2	< 1%	HH	
165 549	649.34	644.98	59.72	4.36	585.26	589.6	0.74	0.2	< 1%	HH	
170 550	647.74	642.52	63.15	5.22	579.37	584.6	0.90	0.2	< 1%	HH	
175 551	632.57	627.63	62.73	4.94	564.9	569.8	0.87	0.2	< 1%	HH	
180 552	574.92	571.93	61.52	2.99	510.41	513.4	0.59	0.2	< 1%	HH	
185 553	629.68	624.9	62.56	4.78	562.34	567.1	0.85	0.2	< 1%	HH	
190 554	655.6	648.29	61.12	7.31	587.17	594.5	1.24	0.3	< 1%	HH	
195 555	609.48	600.72	63.24	8.76	537.48	546.2	1.63	0.2	< 1%	HH	
200 556	616.49	607.46	62.83	9.03	544.63	553.7	1.66	0.2	< 1%	HH	
205 557	651.02	641.08	62.72	9.94	578.36	588.3	1.72	0.2	< 1%	HH	
210 558	539.59	530.6	62.28	8.99	468.32	477.3	1.92	0.1	< 1%	HH	
215 559	615.49	600.86	62	14.63	538.86	553.5	2.71	0.1	< 1%	HH	
220 560	604.27	593.44	60.3	10.83	533.14	544.0	2.03	1.4	2.6	HH	
225 561	589.78	575.48	62.09	14.3	513.39	527.7	2.79	0.2	< 1%	HH	
230 562	586.3	571.23	63.78	15.07	507.45	522.5	2.97	0.2	< 1%	HH	
235 563	546.48	521.69	62.65	24.79	459.04	483.8	5.40	0.2	< 1%	HH	
240 564	586.97	510.55	64.42	76.42	446.13	522.6	17.13	0.4	< 1%	HH	

Tests Checked By RICHARD T. MCINTOSH Richard T. McIntosh Date: ###### 1/20/94

COPY

GEL 09 ☐ GEL 17 ☐
GEL 10 ☐ GEL 19 ☑
GEL 14 ☑ GEL ☐

GEOTECHNICAL ENGINEERING LABORATORY

GEL-14, GEL-19

WHC-SD-EN-DP-086, Rev. 0

P4P5

GEL-14 SOIL MOISTURE	GEL-19 CALCIUM CARBONATE
Tested By JP/LDB Balance: 3304 Calibration Due Date 2-7-95	Vessel No. 5697
Date 1/12/94 Thermometer: oven Calibration Due Date	Sample Wt. 8.0 (g)

Sample No.	Wet Wt. + Tare	Dry Wt. + Tare	Tare Wt.	Moisture Wt.	Dry Wt. Soil	% Moisture	Sample Pressure (psi)	% $CaCO_3$ (per gram)	Calculated By
4-0517	391.37	373.12	63.17				0.4		
4-0518	416.44	403.36	63.13				0.3		
4-0519	570.20	551.11	63.06				0.2		
4-0520	565.47	553.21	63.03				0.3		
4-0521	517.85	508.82	61.88				0.3		
4-0522	559.38	552.86	62.64				0.3		
4-0523	549.48	542.67	62.00				0.3		
4-0524	523.06	518.78	62.93				0.2		
4-0525	595.63	589.33	63.97				0.3		
4-0526	543.56	538.33	61.75				0.3		
4-0527	590.63	584.40	61.50				0.5		
4-0528	560.83	552.54	63.76				0.3		
4-0529	606.10	596.46	61.55				0.3		
4-0530	574.15	566.25	60.20				0.4		
4-0531	582.10	573.98	62.76				0.3		
4-0532	540.04	523.04	61.86				0.6		
4-0533	506.66	492.17	64.14				0.5		
4-0534	514.27	501.25	63.46				0.7		
4-0535	525.91	521.19	62.76				1.4		
4-0536	400.64	374.44	61.87				1.2		
4-0537	462.95	439.99	62.28				4.1		
4-0538	492.87	483.87	60.68				1.4		
4-0539	464.58	456.17	62.23				0.4		
4-0540	585.76	580.82	62.38				0.3		
4-0541	617.56	612.28	62.58				0.3		
4-0542	601.08	590.88	62.67				0.4		
4-0543	649.20	643.92	61.44				0.2		
4-0544	574.79	571.55	61.94				0.2		
4-0545	656.54	651.43	63.63				0.5		

Remarks:

Tests Checked By: Date

BD-6000-806 (04/92)

9413224.0472

GEL 09 ☐ GEL 17 ☐
GEL 10 ☐ GEL 19 ☑
GEL 14 ☑ GEL ☐

GEOTECHNICAL ENGINEERING LABORATORY

GEL-14, GEL-19

WHC-SD-EN-DP-086, Rev. 0

P595

4-0546 To 4-0564

GEL-14 SOIL MOISTURE	GEL-19 CALCIUM CARBONATE
Tested By JP/WDB Balance: 3304 Calibration Due Date 2-7-94	Vessel No. 5697
Date 4/7/94 Thermometer: Oven Calibration Due Date	Sample Wt. 8.0 (g)

Sample No.	Wet Wt. + Tare	Dry Wt. + Tare	Tare Wt.	Moisture Wt.	Dry Wt. Soil	% Moisture	Sample Pressure (psi)	% $CaCO_3$ (per gram)	Calculated By
4-0546	604.59	600.23	62.68				0.3		
4-0547	636.72	632.41	61.21				0.3		
4-0548	585.42	581.00	64.05				0.2		
4-0549	649.34	644.98	59.72				0.2		
4-0550	647.74	642.52	63.15				0.2		
4-0551	632.57	627.63	62.73				0.2		
4-0552	574.92	571.93	61.52				0.2		
4-0553	629.68	624.90	62.56				0.2		
4-0554	655.60	648.29	61.12				0.3		
4-0555	609.48	600.72	63.24				0.2		
4-0556	616.49	607.46	62.83				0.2		
4-0557	651.02	641.08	62.72				0.2		
4-0558	539.59	530.60	62.28				0.1		
4-0559	615.49	600.86	62.00				0.1		
4-0560	604.27	593.44	60.30				1.4		
4-0561	589.78	575.48	62.09				0.2		
4-0562	586.30	571.23	63.78				0.2		
4-0563	546.48	521.69	62.65				0.2		
4-0564	586.97	510.55	64.42				0.4		

COPY

Remarks:

Tests Checked By: Date

BD-6000-806 (04/92)

GEOTECHNICAL SAMPLE TRANSFER RECORD

Type of Geotechnical Sample	Geotechnical Sample Transfer Record No.	Page 1 of 3
299-W10-20	HGTL-93-031	

Initiated By: ANDREW M. TEMPLETON / Andrew M. Templeton — Print and Sign Name — 11-19-93 — Date

Transported By: EDWARD C. RAFISE / Edward C. Rafise — Print and Sign Name — 12/13/93 — Date

Received By HGSL: LISA GRAY / Lisa Gray — Print and Sign Name — 12-13-93 — Date

Enter survey number and attach a copy of survey report or obtain HPT release signature and enter survey number — 156009 — Survey Number

Health Physics Release: _____ Print and Sign Name _____ Date

Borehole Designation/ Sample No.	Box No.	Depth (ft)	Comments
299-W10-20	1	5'	2 BALL PINT JARS
	1	10'	
	1	15'	
	1	20'	
	1	25'	
	1	30'	
	2	35'	
	2	40'	
	2	45'	
	2	50'	
	2	55'	
	2	60'	
	3	65'	
	3	70'	
	3	75'	
	3	80'	
	3	85'	
	3	90'	
	4	95'	
	4	98'	
	4	104'	
	4	107'	
	4	115' 2-46	

DISTRIBUTION: White - Originator Yellow - HGSL

BC-6000-291 (06/93)

9413224.0474

Pg 2 of 5

GEOTECHNICAL SAMPLE TRANSFER RECORD

Type of Geotechnical Sample	Geotechnical Sample Transfer Record No. HGTL-93-031	Page 2 of 3

Initiated By: Andrew M. Templeton / Andrew M. Templeton — Print and Sign Name — 11-19-93 — Date

Transported By: Edward C. Rafuse / Edward C. Rafuse — Print and Sign Name — 12/13/93 — Date

Received By HGSL: Lisa Gray / Lisa Gray — Print and Sign Name — 12-13-93 — Date

Enter survey number and attach a copy of survey report or obtain HPT release signature and enter survey number — 156009 — Survey Number

Health Physics Release: _____ Print and Sign Name _____ Date

Borehole Designation/ Sample No.	Box No.	Depth (ft)	Comments
299-W10-20	4	120'	2 BALL PINT JARS
	5	125'	
	5	130'	
	5	132'	
	5	135'	
	5	140'	
	5	145'	
	6	150'	
	6	155'	
	6	160'	
	6	165'	
	6	170'	
	6	175'	
	7	180'	
	7	185'	
	7	190'	
	7	195'	
	7	200'	
	7	205'	
	8	210'	
	8	215'	
	8	220'	
	8	225' 2-47	

DISTRIBUTION: White - Originator Yellow - HGSL

BC-6000-291 (06/93)

Pg 3 of 15

GEOTECHNICAL SAMPLE TRANSFER RECORD

ype of Geotechnical Sample	Geotechnical Sample Transfer Record No. HGTL-93-031	Page 3 of 3

nitiated By: ANDREW M. TEMPLETON / Andrew M. Templeton — Print and Sign Name — 11-19-93 — Date

Transported By: EDWARD C. RAFUSE / Edward C. Rafuse — Print and Sign Name — 12/13/93 — Date

Received By HGSL: LISA GRAY / Lisa Gray — Print and Sign Name — 12-13-93 — Date

Enter survey number and attach a copy of survey report or obtain HPT release signature and enter survey number: 15609 — Survey Number

Health Physics Release: _____ Print and Sign Name _____ Date

Borehole Designation/ Sample No.	Box No.	Depth (ft)	Comments
299-W10-20	8	230'	2 BALL PINT JARS
↓	8	235'	↓
	9	240'	

BC-6000-291 (06/93)

9413224.0476

299-W10-20

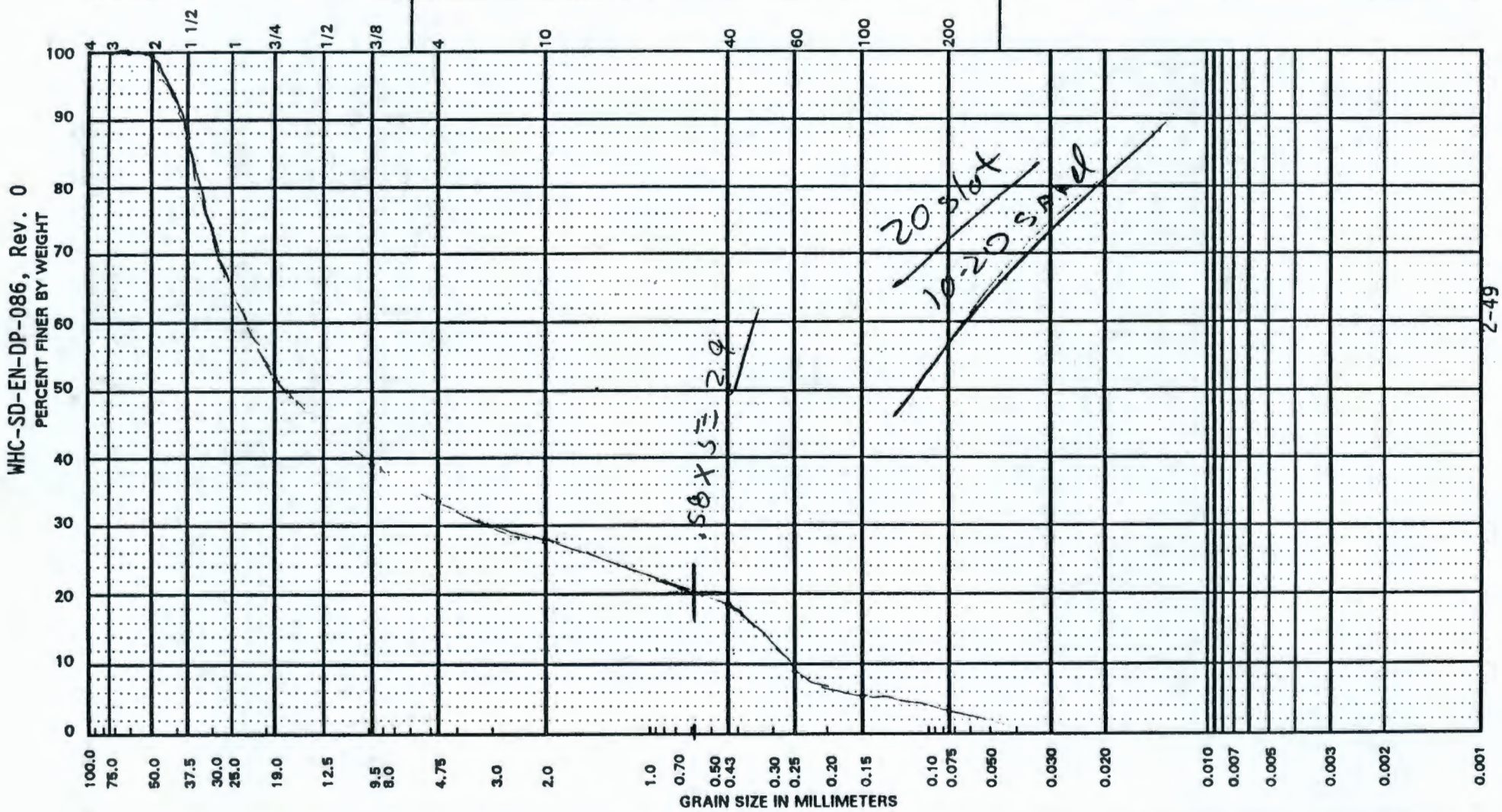
94915

GEL-07 GRAIN SIZE ANALYSIS PLOT

Sample No. 230-231'

Page ____ of ____

Remarks Sieve for screen selection LLBG-(299-W10-20)



Plotted By KDR Date 11/17/93

Plot Checked By ____ Date ____

WHC-SD-EN-DP-086, Rev. 0

2-49

PD 6000-799 (04/92)

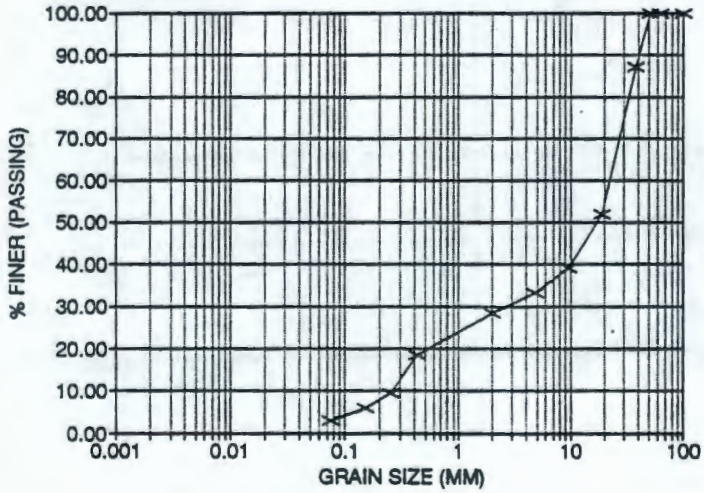
Pg 5 of 15

SIEVE ANALYSIS REPORT SHEE

WELL # 299-W10-20	CONTACT ED RAFUSE	ORIG CODE	PHONE
LAB #	DEPTH 230.0 -231.0	TESTED BY RMS	DATE

SAMPLE WT (g)	SIEVE SIZE IN.	CUMULATIVE WEIGHT	% WEIGHT RETAINED	% PASSING	GRAIN SIZ MM	COMMENTS
2372.3	4.000	0.0	0.0	100.0	101.600	
	2.500	0.0	0.0	100.0	63.500	
	2.000	0.0	0.0	100.0	50.800	
	1.500	305.0	12.9	87.1	38.100	
	0.750	1140.2	48.1	51.9	19.050	
	0.375	1443.2	60.8	39.2	9.525	
WT.-#10	SIEVE# 4	1585.0	66.8	33.2	4.750	
SAMP.(g)	S# 10	1700.3	71.7	28.3	2.000	
673.9	S# 40	234.2	34.8	18.5	0.425	
	S# 60	449.1	66.6	9.4	0.250	
	S# 100	532.5	79.0	5.9	0.150	
	S# 200	604.1	89.6	2.9	0.075	

SIEVE ANALYSIS DATA

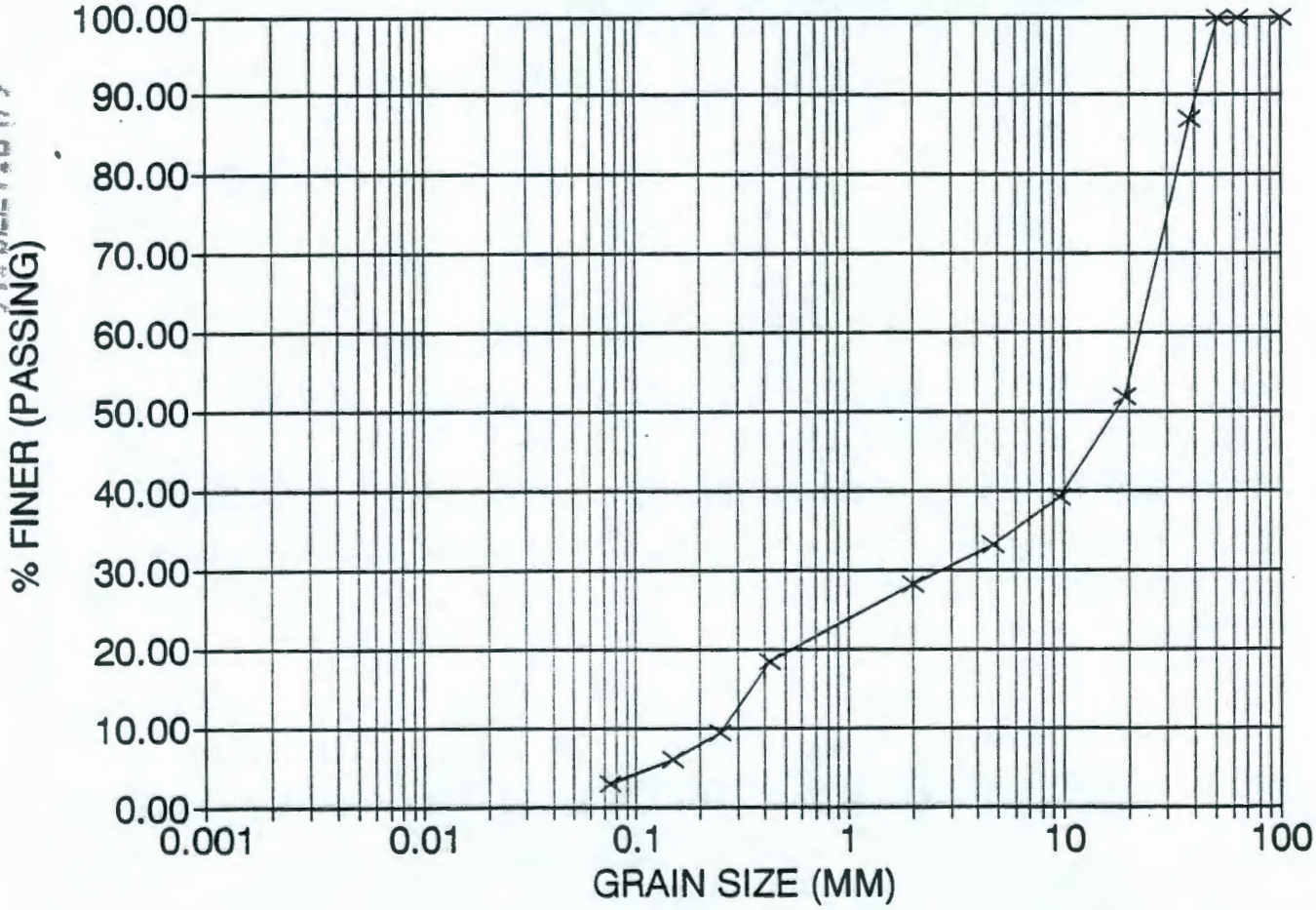


TEST CHECKED BY:_____ DATE: __/__/__

9413224.0478

Pg 6 of 15

SIEVE ANALYSIS DATA



9413224.0479

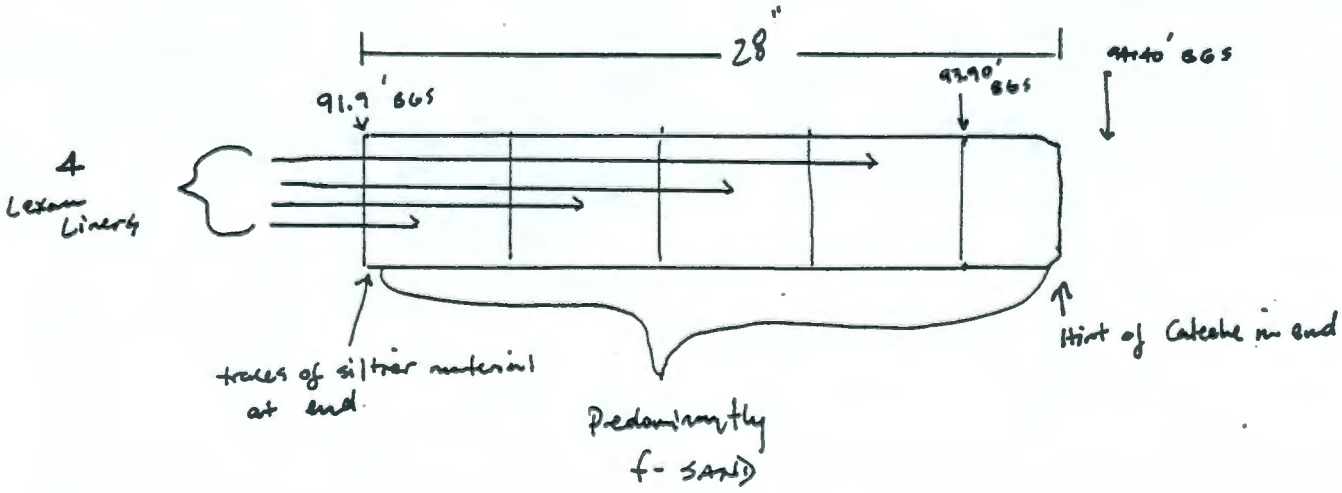
PC EXPLORATION/RCRA WELLS HANFORD
GOLDER ASSOCIATES
SPLIT SPOON SAMPLING LOG

DATE:	10-27-93 / 10-28-93	PROJ. NO:	933-1285 / W-0152
FIELD ACTIVITY REPORT NO.:	#29 / #30	BORING/WELL:	299-W10-20
SAMPLE INTERVAL:	91.90 - 93.90	DRILLED DEPTH:	91.27' BGS
OPEN HOLE DEPTH:	91.89' BGS	SPOON DEPTH BEFORE DRIVING:	92.40' BGS
RECOVERY:	SPOON FULL 100% 28"/30"	SPOON LENGTH:	28"
SPOON ~~WIDTH~~ Ø:	4"	STICKUP	16.4'

DATE/TIME OF SAMPLE COLLECTION: 10-28-93 / 0945-0947'

ADDITIONAL COMMENTS: SPOON + HAMMER + SUB = 8.79' METRIC RODS = 20.01' + 20.00' + 20.00' + 20.00' + 20.00' = 100.01' + 8.79' = TOTAL LENGTH = 108.80' - (STICK-UP) 16.4' = 92.40' BGS
DROVE SPOON 24". I THINK WE PUSHED THE SPOON THE LAST 2" WHEN IT WAS ALREADY FULL!
SEE CHAIN OF CUSTODY FOR SAMPLE COLLECTION DETAILS

SKETCH:



9413224.0480

REQUEST FOR SPECIAL ANALYSIS (RSA)

1. Sample Origin	2. Date Submitted	4. Requester Name	6. Charge Code/Work Package
299-W10-20		EC. RaFuse	
	3. Submitted By	5. Requester Phone/MSIN	7. Date Required
		372-1051	

8. Customer ID	9. Laboratory ID
5	
10	
15	
20	
25	
30	
35	
40	
45	
50	
55	
60	
65	
70	

10. Determination	11. Expected Range

12. Number of Samples: 14

13. Volume of Samples: 100 grams

14. Protocols
- ___ None
- ___ NQA-1
- ___ CERCLA
- ___ RCRA
- ___ Other ___

15. Sample Type
- ___ Solid
- X Soil
- ___ Slurry
- ___ Gas
- ___ Water
- ___ Waste
- ___ Solution
- ___ Sludge
- ___ Other (specify) ___

16. Storage Requirements
- X None
- ___ Specify ___

17. Process Knowledge/Known Listed Wastes
- X Unknown
- ___ Known (Please attach list)
- ___ Previously submitted for this Project

18. Survey

	Reading (Contact/Uncorrected)
HPT	mRem/hr

19. Disposition of Waste
- ___ Return to Client
- ___ Dispose per 222-S Procedures
- ___ Other ___

Date Disposed:

20. Additional Information

FAX NO# 376-7893 ATTN: EC. RaFuse

21. Chain of Custody
- X No
- ___ Yes Number: ___

22. Assigned Custodial Group (circle one)

PCL POSU ENV Process

23. Sample Received By: ___

Date: ___ Time: ___

24. Laboratory Manager (if required)

2-53

Date: ___

BC-6700-181 (08/92)

REQUEST FOR SPECIAL ANALYSIS (RSA)

RSA No.

1. Sample Origin	2. Date Submitted	4. Requester Name	6. Charge Code/Work Package
299-W10-20		Ed. RaFuse	
	3. Submitted By	5. Requester Phone/MSIN	7. Date Required
		372-1051; 544-8137	

8. Customer ID	Collected Date	Collected Time	9. Laboratory ID
90			E 3256
95			E 3257
98			E 3258
104			E 3259
107			E 3260
115			E3261
120			E 3262
125			E 3263
~~132~~ 130			E 3264
132			E 3265
135			E 3266
140			E 3267
145			E 3268
150			E 3269

12. Number of Samples: 14

13. Volume of Samples:

14. Protocols: ☐ None ☐ RCRA ☐ NQA-1 ☐ Other ☐ CERCLA

15. Sample Type: ☐ Solid ☒ Soil ☐ Slurry ☐ Gas ☐ Water ☐ Waste ☐ Solution ☐ Sludge ☐ Oil ☐ Other (specify)

16. Storage Requirements: ☒ None ☐ Specify

17. Process Knowledge/Known Listed Wastes: ☒ Unknown ☐ Known (Please attach list) ☐ Previously submitted for this Project

10. Determination	11. Expected Range
Total Activity	

18. Survey — HPT Signature — Dose Rate

19. Disposition of Waste: ☐ Return to Client/Location ☐ Dispose per 222-S Procedures ☐ Other

20. Additional Information

ATTN: Ed. RaFuse

Fax 376-7893

21. Chain of Custody: ☒ No ☐ Yes Number:

22. Assigned Custodial Group (select one): ☐ PCL ☐ PDSU ☐ ENV ☐ Process

23. Sample Received By: Date: Time:

24. Laboratory Manager (if required) Date:

2-54

BC-6700-181 (11/92)

9413274.0482

vegal -209

REQUEST FOR SPECIAL ANALYSIS (RSA)

RSA No.

1. Sample Origin	2. Date Submitted	4. Requester Name	6. Charge Code/Work Package
299-W10-20		ED. RAFUSA	
	3. Submitted By	5. Requester Phone/MSIN	7. Date Required
		372-1051	

8. Customer ID	Collected Date	Collected Time	9. Laboratory ID
155			E3248
160			E3249
165			E3250
170			E3251
175			E3252
180			E3253
185			E3254
190			E3255

9410224.0493

12. Number of Samples: 8

13. Volume of Samples:

14. Protocols: ☐ None ☐ RCRA ☐ NQA-1 ☐ Other ☐ CERCLA

15. Sample Type: ☐ Solid ☒ Soil ☐ Slurry ☐ Gas ☐ Water ☐ Waste ☐ Solution ☐ Sludge ☐ Oil ☐ Other (specify)

16. Storage Requirements: ☒ None ☐ Specify

17. Process Knowledge/Known Listed Wastes: ☒ Unknown ☐ Known (Please attach list) ☐ Previously submitted for this Project

10. Determination	11. Expected Range
Total Activity	

18. Survey — HPT Signature — Dose Rate

19. Disposition of Waste: ☐ Return to Client/Location ☐ Dispose per 222-S Procedures ☐ Other

20. Additional Information

ATTN: ED. RAFUSA

FAX 376-7893

21. Chain of Custody: ☒ No ☐ Yes Number:

22. Assigned Custodial Group (select one): ☐ PCL ☐ POSU ☐ ENV ☐ Process

23. Sample Received By: Date: Time:

24. Laboratory Manager (if required): 2-55 Date:

REQUEST FOR SPECIAL ANALYSIS (RSA)

RSA No.

1. Sample Origin: 299-W10-20	2. Date Submitted	4. Requester Name: E.C. RaFuse	6. Charge Code/Work Package
	3. Submitted By	5. Requester Phone/MSIN: 372-1051	7. Date Required

8. Customer ID	Collected Date	Collected Time	9. Laboratory ID
75			
80			
85			
90			
195			
200			
205			
210			
215			
220			
225			
230			
235			
240			

12. Number of Samples: 14

13. Volume of Samples: 100 grams

14. Protocols: ☐ None ☐ RCRA ☐ NQA-1 ☐ Other ☐ CERCLA

15. Sample Type: ☐ Solid ☒ Soil ☐ Slurry ☐ Gas ☐ Water ☐ Waste ☐ Solution ☐ Sludge ☐ Oil ☐ Other (specify)

16. Storage Requirements: ☒ None ☐ Specify

17. Process Knowledge/Known Listed Wastes: ☒ Unknown ☐ Known (Please attach list) ☐ Previously submitted for this Project

10. Determination	11. Expected Range

18. Survey — Dose Rate

HPT Signature

19. Disposition of Waste: ☐ Return to Client/Location ☐ Dispose per 222-S Procedures ☐ Other

20. Additional Information

Fax No.# 376-7893 ATTN E.C. RaFuse

21. Chain of Custody: ☒ No ☐ Yes Number:

22. Assigned Custodial Group (select one): ☐ PCL ☐ PDSU ☐ ENV ☐ Process

23. Sample Received By: Date: Time:

24. Laboratory Manager (if required): 2-56 Date:

9413224.0484

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

Collector ANDREW TEMPLETON Date 10-28-93

Company Contact ED RAFUSE Telephone (509) 372-1051

Sample Number	*	Date Collected	Time Collected	Number and Type of Sample Containers/Analysis Requested
299-W10-20 92.40-92.90	S	10-28-93	0947	(1) 6" LEXAN LINER / PACKAGE A
299-W10-20 92.90-93.40	S	10-28-93	0947	(1) 6" LEXAN LINER / PACKAGE A
299-W10-20 93.4-93.9'	S	10-28-93	0947	(1) ALUMINUM TIN / GEL-14 + GEL-19

*Type of Sample
A = Air
DL = Drum Liquids
DS = Drum Solids
L = Liquid
O = Oil
S = Soil
SE = Sediment
SL = Sludge
SO = Solid
T = Tissue
W = Water
WI = Wipe
X = Other

Field Information

Special Handling and/or Storage

Possible Sample Hazards

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

Collector ANDREW TEMPLETON Date 10-29-93

Company Contact ED RAFUSE Telephone (509) 372-1051

Sample Number	*	Date Collected	Time Collected	Number and Type of Sample Containers/Analysis Requested
299-W10-20, 108.94'-109.44'	S	10-29-93	1440	(1) 6" LEXAN LINER / PACKAGE B
299-W10-20 109.94-109.94	S	10-29-93	1440	(1) 6" LEXAN LINER / PACKAGE B
299-W10-20, 109.94-110.44'	S	10-29-93	1440	(1) ALUMINUM TIN / GEL-14 + GEL-19

*Type of Sample A = Air; DL = Drum Liquids; DS = Drum Solids; L = Liquid; O = Oil; S = Soil; SE = Sediment; SL = Sludge; SO = Solid; T = Tissue; W = Water; WI = Wipe; X = Other

Field Information NOTE: $CaCO_3$ content (calcite pieces) are not present in tins, but

Special Handling and/or Storage

Possible Sample Hazards 2-58

9413224.0486

Pg 14 of 15

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

Collector ANDREW TEMPLETON Date 11-1-93

Company Contact ED RAFUSE Telephone (509) 372-1051

Sample Number	*	Date Collected	Time Collected	Number and Type of Sample Containers/Analysis Requested
299-W10-20 117.5-118.0'	S	11-1-93	1451	(1) 6" LEXAN LINER / PACKAGE A
299-W10-20 118.5-118.74	S	11-1-93	1451	(1) ALUMINUM TIN / GEL-14, GEL-19

*Type of Sample

A = Air	L = Liquid	SE = Sediment	T = Tissue	X = Other
DL = Drum Liquids	O = Oil	SL = Sludge	W = Water	
DS = Drum Solids	S = Soil	SO = Solid	WI = Wipe	

Field Information

Special Handling and/or Storage

Possible Sample Hazards

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

Collector ANDREW M. TEMPLETON Date 11-9-93

Company Contact ED RAFUSE Telephone (509) 372-1051

Sample Number	*	Date Collected	Time Collected	Number and Type of Sample Containers/Analysis Requested
299-W10-20 229.67-230.17	S	11-9-93	1318	(1) 6" LEXAN LINER / PACKAGE A + GEL-09
299-W10-20 230.17-230.67	S	11-9-93	1318	(1) 6" LEXAN LINER / PACKAGE A + GEL-09
299-W10-20, 231.17-231.42	S	11-9-93	1318	(1) $CaCO_3$ TIN GEL-19

*Type of Sample

A = Air	L = Liquid	SE = Sediment	T = Tissue	X = Other
DL = Drum Liquids	O = Oil	SL = Sludge	W = Water	
DS = Drum Solids	S = Soil	SO = Solid	WI = Wipe	

Field Information

Special Handling and/or Storage

Possible Sample Hazards

9413224.0488

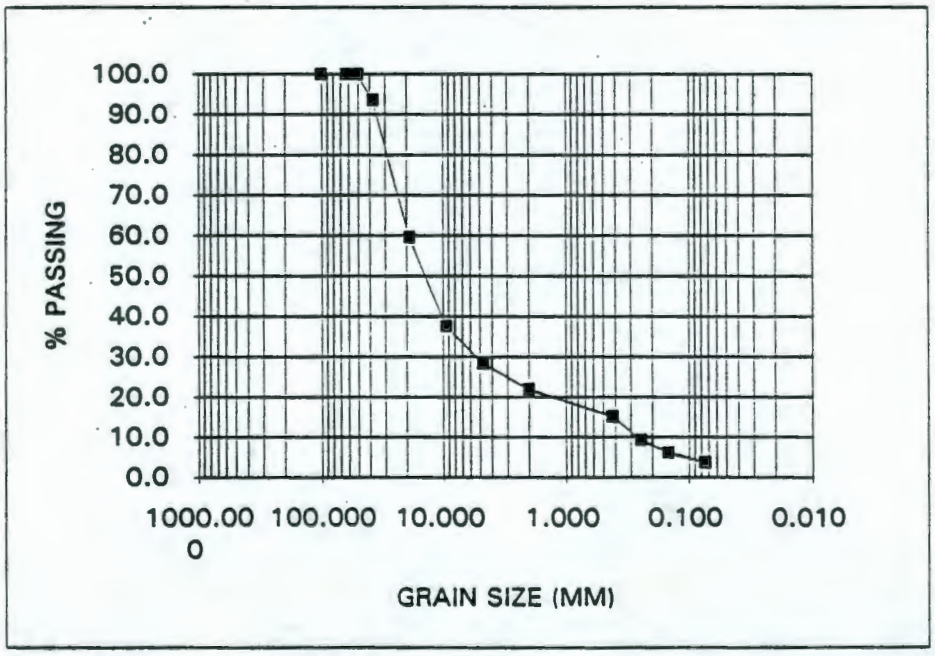
Pg 1 of 10

SIEVE ANALYSIS REPORT SHEET

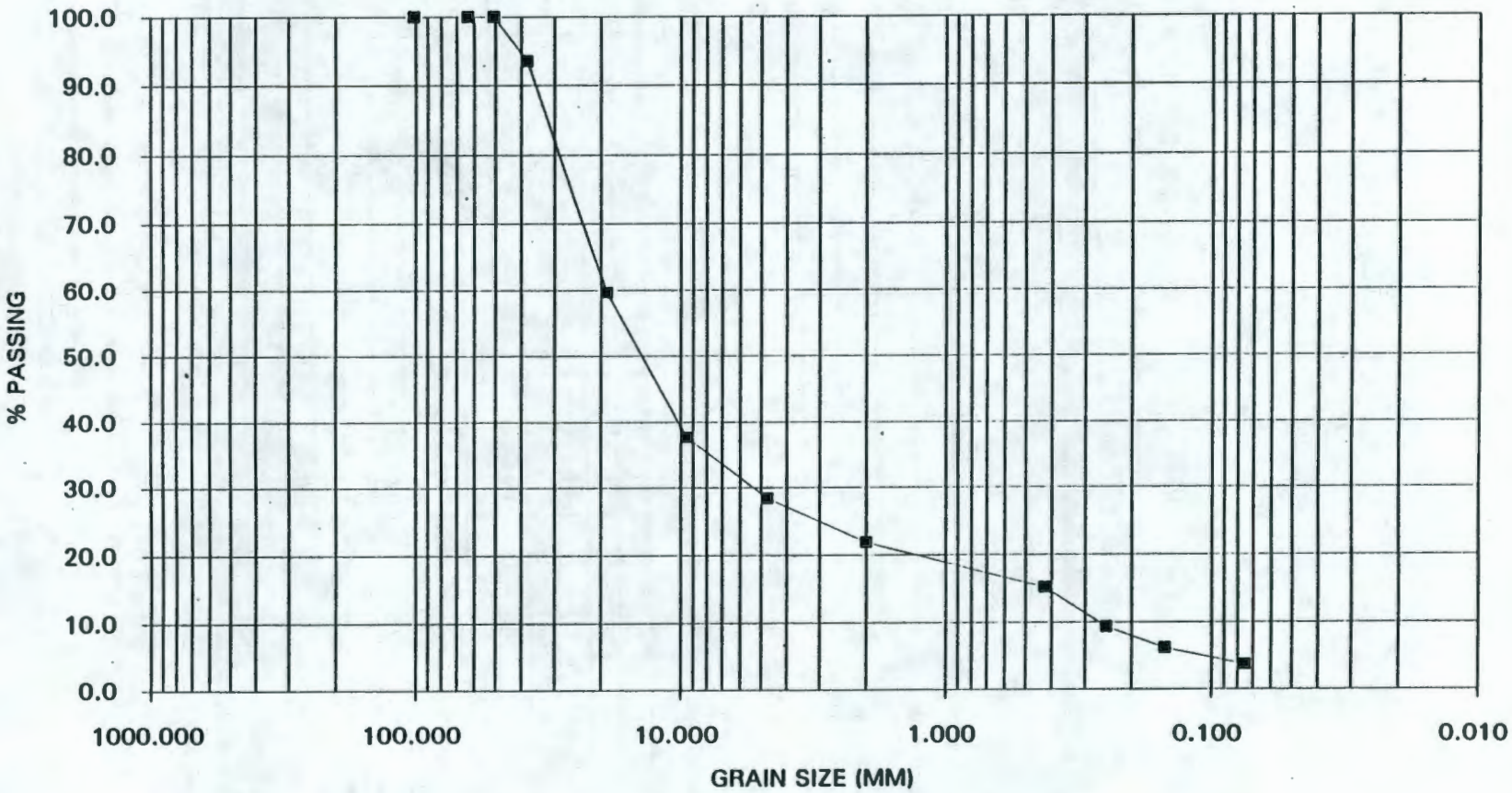
WELL #	299-W10-20	CONTACT	RAFUSE	ORIG COD	81235	PHONE	544-8137
LAB #	4-0290-1	DEPTH	~~60.6-70.6~~ HH 229.67-230.17	TESTED BY	HH	DATE	2/1/94

SAMPLE WT (g)	SIEVE SIZE IN.	CUMULATIVE WEIGHT	% WEIGHT RETAINED	% PASSING	GRAIN SIZ MM	COMMENTS	
2550.5	4.000	0.0	0.0	100.0	101.600		
	2.500	0.0	0.0	100.0	63.500		
	2.000	0.0	0.0	100.0	50.800		
	1.500	163.8	6.4	93.6	38.100		
	0.750	1029.2	40.4	59.6	19.050		
	0.375	1590.4	62.4	37.6	9.525		
WT.-#10	SIEVE# 4	1827.1	71.6	28.4	4.750		
SAMP.(g)	S# 10	1992.4	78.1	21.9	2.000		
157.8	S# 40	48.1	30.5	15.2	0.425	SAMPLE SPLIT	
	S# 60	90.4	57.3	9.3	0.250	WASH SIEVE	
	S# 100	113.5	71.9	6.1	0.150		
	S# 200	131.3	83.2	3.7	0.075		

9413224.0489



TEST CHECKED BY: R.T. McCutcheon DATE: 2/8/94



9413224.0490

Pg 3 of 10

GEL 07 ☒	GEL 16 ☒	WHC-SD-EN-DP-086, Rev. 0	Sample No. 4-0290-1
GEL 09 ☒	GEL 17 ☐	GEOTECHNICAL ENGINEERING LABORATORY	
GEL 10 ☒	GEL 19 ☒	GEL-07 SIEVE AND HYDROMETER ANALYSIS	Page ____ of ____
GEL 14 ☒	GEL ☐		

GEL-07 SIEVE ANALYSIS

Date 2/1/94 Calibration Due Date _____ Balance: _____

Sample Description _____ Sieve Time 10 (min)

Reduced By: ☐ Splitting ☐ Quartering ☐ Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed	Tested By
2	2550.5	0 ~~163.8~~ HH			HH
1½		163.8 ~~1029.2~~ HH			
1 3/4		1029.2 ~~1590.4~~ HH			
~~HH 3/4~~ 3/8		1590.4 ~~1827.1~~ HH			
~~HH 3/8~~ 4		1827.1			
~~HH~~ #10	157.8	1992.9			sample split
40		48.1			wash sieve
~~40~~ 60		90.4			
~~HH 100~~ 100		113.5			
200		131.3			

Remarks: _____

GEL-07 HYDROMETER ANALYSIS

Date _____ Balance: _____ Calibration Due Date _____

Thermometer: _____ Calibration Due Date _____

Hydrometer: _____ Calibration Due Date _____

WEIGHT OF SAMPLE

Wt. Container + Soil _____ (g)

Wt. Container _____ (g)

Wt. Soil _____ (g)

Specific Gravity of Sample _____

% Passing No. 10 Sieve _____ %

A = _____ W = _____ K = _____

COMPOSITE CORRECTION

1st Reading _____ at _____ °C

2nd Reading _____ at _____ °C

Date	Clock Time	Elapsed Time (min)	Hydrometer Reading	Hydrometer with Composite Correction	Temperature (°C)	Soil in Suspension (%)	Particle Diameter (mm)	Tested By
		2.0						
		5.0						
		15.0						
		30.0						
		60.0						
		250.0						
		1440.0						

Remarks: _____

Tests Checked By _____ Date _____

9D-6000-728 (04/93)

1 of 10

GEL 07 ☒ GEL 09 ☒ GEL 10 ☒ GEL 14 ☒	GEL 16 ☒ GEL 17 ☐ GEL 19 ☒ GEL ☐	**GEOTECHNICAL ENGINEERING LABORATORY** **GEL-14, GEL-16, GEL-19**

Sample No. 4-0290-1

Page _____ of _____

GEL-14 SOIL MOISTURE

Balance: 3311 Calibration Due Date 2/7/94 Tested By HH

Thermometer: _____ Calibration Due Date _____

Date	Wet Wt. + Can	Dry Wt. + Can	Tare Wt.	Moisture	Dry Wt. Soil	% Moisture	Calculated By
1/26/94		2806.5*	251.6		2311.5*		

Remarks: pan wt.: 251.6 pan # 101 * subtract 243.4 from dry wt. for determ. of D_B → leave in for sieve wt. total

GEL-16 BULK DENSITY-POROSITY

DETERMINATION NO.			1	
Pan No.:	Mold: ☒ Plastic ☐ Metal	Length:		
Sample Volume, V, cc				
Wt. of Sample & Mold, g			3014.2	247.3g * 2766.9
Wt. of Mold, g			324.0	
Wet Wt. of Sample, g				
Wet Density of Sample, γ m, g/cc				
Water Content % Dry Weight				
Dry Density, g/cc γ d				
Dry weight of Sample, g, Ws				
*Void Ratio, e				
**Porosity, n, %				

Tested By HH

$$Ws = \frac{\text{Wet Wt.}}{1 + \%\ \text{Dry Wt.}}$$

$$*\text{Void Ratio, } e = \frac{\text{Avg. Sp. Gr.} \times \text{Vol.}}{Ws} - 1$$

$$**\text{Porosity, } n, \% = \left(\frac{e}{1+e}\right) 100$$

Remarks: liner overfilled, some material removed: 247.3g (subtract from wet wt. of sample)

GEL-19 CALCIUM CARBONATE

Vessel No. _____ Tested By _____

Balance No. 3304 Date Due _____

Sample Weight 8.0 (g)

Sample Pressure _____ (psi) $\%CaCO_3$ _____ Per Gram

Remarks: _____

Tests Checked By: _____ Date _____

9413224.0492

Pg 5 of 10

GEL-16 BULK DENSITY-POROSITY	
DATE:	1/26/94
Sample No.	4-0290-1
Heis No.	
Well No.	299-W10-20
Depth	~~69.6-70.6~~ HH 229.67-230.17
Tested by	HH
length	15.2
diameter	9.5
volume	1087.0
wt of sample + mold	2766.9
wt of mold	324.0
wet wt of sample	2442.9
dry wt of sample	2311.5
wet density of sample	2.2
water content % dry wt	5.7%
dry density	2.1
specific gravity	2.63
void ratio	0.2
porosity	19.15%
TEST CHECKED BY:	R.T. McCutcheon 2/8/94

9413224.0493

GEL 07 ☐ GEL 09 ☐ GEL 10 ☐ GEL 14 ☑	GEL 16 ☐ GEL 17 ☐ GEL 19 ☑ GEL ☐	WHC-SD-EN-DP-086, Rev. 0 **GEOTECHNICAL ENGINEERING LABORATORY** **GEL-14, GEL-16, GEL-19**

Sample No. 4-0290-3

Page ____ of ____

GEL-14 SOIL MOISTURE

Balance: 3304 Calibration Due Date 2-7-94 Tested By LD Bruggeman

Thermometer: Oven Calibration Due Date ____

Date	Wet Wt. + Can	Dry Wt. + Can	Tare Wt.	Moisture	Dry Wt. Soil	% Moisture	Calculated By
1-20-94	608.67	575.43	62.22	33.24	513.21	6.5%	HH

Remarks: TIN 4-0290-3

GEL-16 BULK DENSITY-POROSITY

DETERMINATION NO.			1	
Pan No.:	Mold: ☐ Plastic ☐ Metal	Length:		
Sample Volume, V, cc				
Wt. of Sample & Mold, g				
Wt. of Mold, g				
Wet Wt. of Sample, g				
Wet Density of Sample, γ m, g/cc				
Water Content % Dry Weight				
Dry Density, g/cc γ d				
Dry weight of Sample, g, Ws				
*Void Ratio, e				
**Porosity, n, %				

Tested By ____

$$Ws = \frac{\text{Wet Wt.}}{1 + \%\ \text{Dry Wt.}}$$

$$*\text{Void Ratio, } e = \frac{\text{Avg. Sp. Gr.} \times \text{Vol.}}{Ws} - 1$$

$$**\text{Porosity, } n, \% = \left(\frac{e}{1+e}\right) 100$$

Remarks: ____

GEL-19 CALCIUM CARBONATE

Vessel No. 5697 Tested By LD Bruggeman

Balance No. 3304 Date Due 2-7-94

Sample Weight 8.0 (g)

Sample Pressure 0.4 (psi) %$CaCO_3$ ~~0.44% HH~~ Per Gram <1%

Remarks: TIN 4-0290-3

Tests Checked By: R. L. McCutchen Date 1/27/94

2-66

BD-6000-797 (04

9413224.0494

94/3224.0495

HYDRAULIC CONDUCTIVITY REPORT
GEL-09

SAMPLE NO.	4-0290-1	299-W10-20	Page	VISCOSITY	1

Tested By: H. HAMPT Date 1/26/94

SpecimenDiameter (D, cm) 9.53 Specimen Length (L, cm) 15.24

Start Date	27-Jan-94	27-Jan-94	28-Jan-94	28-Jan-94		
Start Time	07:04:00	14:40:00	06:59:00	13:35:00		
End Date	27-Jan-94	28-Jan-94	28-Jan-94	29-Jan-94		
End Time	14:37:00	06:58:00	13:34:00	09:26:00		
Time Sec.	27180	58680	23700	71460		
Volume, cm^3	26.5	74.4	31.9	95.6		
Head, cm	78.7	78.1	78.7	78.1		
"Q"	9.75E-04	1.27E-03	1.35E-03	1.34E-03		
L/(A*H)	2.71E-03	2.74E-03	2.71E-03	2.74E-03		
K, cm/sec	2.65E-06	3.47E-06	3.65E-06	3.66E-06		
Kc,(K*Visc)	2.65E-06	3.47E-06	3.65E-06	3.66E-06		

Darcy's Law	K = (Q*L)/(A*H)

K = Hydraulic Conductivity (cm/sec)
Q = Flow Rate (cm^3/sec) = Volume (cm^3)/Time (sec)
A = Area (cm^2)
H = Hydraulic Head (cm - water)
L = Length of soil in column (cm)
Kc= HYDRAULIC CONDUCTIVITY corrected to VISCOSITY

Kc AVERAGE 3.36E-06
STANDARD DEVIATION 4.17E-07

Remarks:

All data is acurately and completely recorded. The test operator was trained and used calibrated instruments

Checked By: R.T. McIntosh Date: 2/08/94

9413224.0496

GEL 07 ☒	GEL 16 ☒
GEL 09 ☒	GEL 17 ☐
GEL 10 ☒	GEL 19 ☒
GEL 14 ☒	GEL ☐

GEOTECHNICAL ENGINEERING LABORATORY
GEL-09 HYDRAULIC CONDUCTIVITY DATA SHEET

299-W10-20 (W-0152)

Sample No. 4-0290-1

Page ____ of ____

Balance No. 3311

Permeameter No. 229.67-230.7

Test Initiated By HH

Date ~~11/26/94~~ HH 1/26/94

Procedure

Sleeve Type: ☐ Metal ☒ Plastic

Specimen Diameter (D) 9.53 cm

Specimen Length (L) 15.24 cm

$$A = \left(\frac{D}{2}\right)^2 \times 3.1415$$

Specimen Area (A) 71.3 cm^2

Darcy's Law

$$K = \frac{QL}{AH}$$

K = Hydraulic Conductivity (cm/sec)

Q = Flow (cm^3/sec) = Vol. g/Time (sec)

A = Area (cm^2)

H = Hydraulic Head

L = Length (cm)

01/28/94

Date Year 94 (Mo/Day)	Run Time System (Hr:Min)	Run Time System (Hr:Min)	Run Time Time Change	Container Weight (± 0.1 g)	Container Tare (± 0.1 g)	Container Tare & Effluent (± 0.1 g)	Room Temp (°C)	Pressure Pore H_2O (cm)	Effluent Description	Operator Initials	Hydraulic Conductivity (cm/sec)	Calculated By
~~1.26~~ 1.27	~~07:00~~				~~154.6~~					HH		HH
1.27	07:04:00	14:37:00	19980	26.5	154.8	181.3	24.9	78.7	clear	HH	3.6×10^{-6}	HH
1.27	14:37:00 HH	1.28 06:58:00	51480	74.4	181.2 ~~181.3~~ HH	256.6	23.8	78.1	clear	HH	4.0×10^{-6}	HH
1.28	06:58:00	13:34:00 ~~14:13~~	23700	31.9	256.6	288.5	23.6	78.7	clear	HH	3.7×10^{-6}	HH
1.28	1.28 13:35:00	09:26:00	71460	95.6	288.5	384.1	22.8	78.1	clear	HH	3.7×10^{-6}	HH

2-68

HNC-SD-EN-DP-086, Rev. 0

Remarks

Test Checked By ____ Date ____

GEL 07 ☒	GEL 16 ☒
GEL 09 ☒	GEL 17 ☐
GEL 10 ☒	GEL 19 ☒
GEL 14 ☒	GEL ☐

WHC-SD-EN-DP-086, Rev. 0

GEOTECHNICAL ENGINEERING LABORATORY
GEL-10 SPECIFIC GRAVITY SOILS FINE/COARSE

Sample No. 4-0290-1

Page ____ of ____

GEL-10 SPECIFIC GRAVITY OF SOILS

Date ~~2/4/94~~ 2/3/94 Tested By HH

Balance: 3304 Calibration Due Date ____

	DETERMINATION NO.	1	2	3
W_o	Wt. Oven Dry, Soil, g	55.00	.	.
	Pycnometer No.			
	Wt. Pycnometer, g	129.19	.	.
W_a	Wt. Pycnometer + Wetting Agent, g	381.25	.	.
W_b	Wt. Pycnometer + Wetting Agent + Soil, g	415.69	.	.
	Temperature, T_x at W_b, °C	22.4		
G_w	Specific Gravity of Wetting Agent at T_x	.	.	.
G_t	Specific Gravity of Soil at T_x	.	.	.
G_s	Specific Gravity of Soil at 20 °C	.	.	.

Wetting Agent Tapwater

$$C_t = \frac{W_o}{W_o + W_a - W_b}$$

Remarks: ____

GEL-10 SPECIFIC GRAVITY COARSE AGGREGATES

Date 2/4/94 Tested By: HH

Balance: 3312 Calibration Due Date 4/22/94

	DETERMINATION NO.	1	
	Size fraction	#4	
P_1	Size fraction, wt. % total, g		
	Tare weight		
B	Weight sample (SSD), g	.	.
C	Weight sample in H_2O, g	1131.0	.
A	Weight of oven dry sample, g	1832.0	.

Bulk Specific Gravity, 23/23 °C = A/(B-C) = ____

A = wt. oven dry sample in air, g
B = wt. SSD sample in air, g
C = wt. saturated sample in H_2O, g

Bulk Specific Gravity SSD, 23/23 °C = B/(B-C) = ____

Apparent Specific Gravity, 23/23 °C = A/(A-C) = ____

*Average Specific Gravity Values, 23/23 °C $\overline{G}$ = ____

Remarks: ____

$$\overline{G} = \frac{1}{\dfrac{P_1 = \%\ \text{coarse}}{G_1 = \text{coarse sp.gr.} \times 100} + \dfrac{P_2 = \%\ \text{fines}}{G_2 = \text{fines sp. gr.} \times 100}}$$

$\overline{G}$ = Ave. Specific Gravity for all forms of Specific Gravity i.e., formula applicable to Bulk, Bulk SSD and Apparent Specific Gravity.

G_1, G_2 = appropriate Specific Gravity values for each size fraction depending on the type of Specific Gravity being averaged.

P_1, P_2 = wt. percentages of each size fraction present in the original sample.

*State type of Specific Gravity Reported i.e., either Bulk, Bulk SSD or Apparent.

Tests Checked By: ____ Date ____

BD-6000-798 (08/92)

SPECIFIC GRAVITY
GEL-10

SAMPLE NO.: 4-0290-1 Tested by HH DATE: 2/3/94

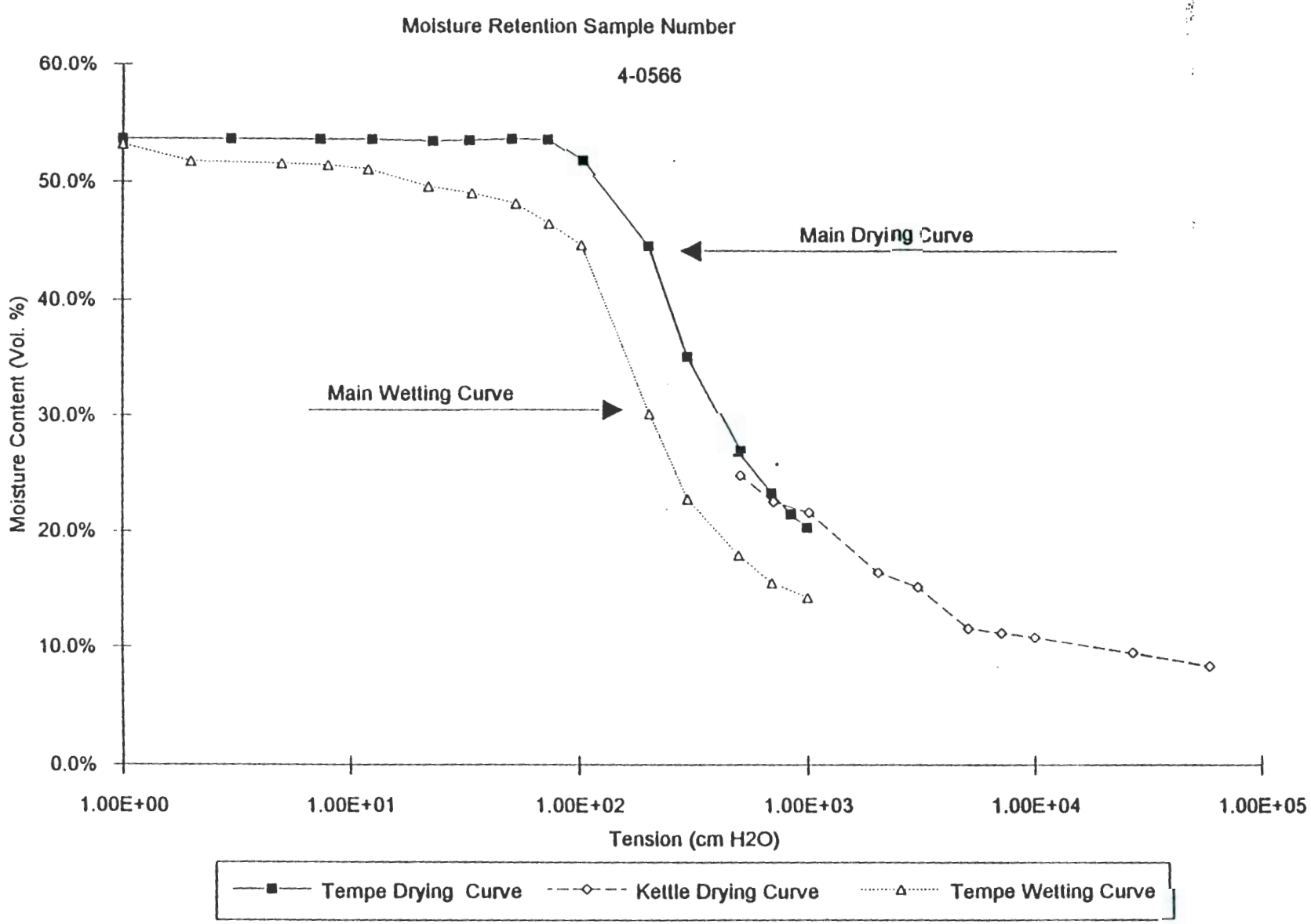
WT. OVEN DRY SOIL, g	55.00
WT. PYCN. + WET AGEN	381.25
WT. PYCN+WET+SOIL	415.69
TEMP Deg. C	22.4
Sp.G WET. AGENT @ Te	1
Sp.G of soil at Temp	2.68
Sp.G of soil at 20 Deg.C	2.67
WT. SAMPLE IN H2O, g (	1131
WT. OVEN DRY SAMPLE	1832
APPARENT SpG, 23/23C	2.61
SIZE FRACION, COARS	71.6
SIZE FRACION, FINE	28.4
AVG. SpG. Values, 23/23	2.63

temp	K
18	1.0004
19	1.0002
20	1.0000
21	0.9998
22	0.9996
23	0.9993
24	0.9991
25	0.9989
26	0.9986
27	0.9983
28	0.998
29	0.9977
30	0.9974

COMMENTS:

TEST CHECKED BY: R.T. McIntosh DATE: 2/8/94.

9413224.0498


Moisture Retention Sample Number
4-0566
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Moisture Content (Vol. %)
Main Drying Curve
Main Wetting Curve
1.00E+00
1.00E+01
1.00E+02
1.00E+03
1.00E+04
1.00E+05
Tension (cm H2O)
Tempe Drying Curve
Kettle Drying Curve
Tempe Wetting Curve

9413224.0500

SAMPLE NO.	4-0566	Operable Unit	W-152/RCRA
Contact	E.C. RAFUSE	HEIS No.	N/A
Well No.	299-W10-20	Depth	108.9-110.4

TEMPE CELLS	Sample #	4-0566 1 Bar Drying Curve									
tension in cm	N/A	N/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	7.4
error in tension value +/-			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
container number	MC-4	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29
weight of container/ring,+wet sample	175.40	518.01	547.73	548.45	548.54	548.66	548.69	548.68	548.67	548.69	548.67
weight of container/ring,+ dry sample	173.66	516.54	515.60	515.60	515.60	515.60	515.60	515.60	515.60	515.60	515.60
weight of moisture	1.74	1.47	32.13	32.85	32.94	33.06	33.09	33.08	33.07	33.09	33.07
weight of container and ring	61.03	420.06	419.30	419.30	419.30	419.30	419.30	419.30	419.30	419.30	419.30
weight of dry sample	114.37	96.48	96.30	96.30	96.30	96.30	96.30	96.30	96.30	96.30	96.30
moisture content % by wt.	1.52%		33.36%	34.11%	34.21%	34.33%	34.36%	34.35%	34.34%	34.36%	34.34%
moisture content % by vol.			52.16%	53.32%	53.47%	53.66%	53.71%	53.70%	53.68%	53.71%	53.68%
date measured			12/22/93	12/27/93	12/28/93	12/29/93	1/3/94	1/4/94	1/5/94	1/6/94	1/7/94
temperature deg. C			23	22	22	22	23	23	23	23	22

TEMPE CELLS	Sample #	4-0566 1 Bar Drying Curve										
tension in cm	12.5	23	33.3	51	73.5	103.4	203	300	500	700	850
error in tension value +/-	0.5	2	2	1	3	3	3	20	20	20	20
container number	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29
weight of container/ring,+wet sample	548.67	548.61	548.66	548.72	548.71	547.56	543.15	537.20	532.17	530.00	528.86
weight of container/ring,+ dry sample	515.60	515.60	515.60	515.60	515.60	515.60	515.60	515.60	515.60	515.60	515.60
weight of moisture	33.07	33.01	33.06	33.12	33.11	31.96	27.55	21.60	16.57	14.40	13.26
weight of container and ring	419.30	419.30	419.30	419.30	419.30	419.30	419.30	419.30	419.30	419.30	419.30
weight of dry sample	96.30	96.30	96.30	96.30	96.30	96.30	96.30	96.30	96.30	96.30	96.30
moisture content % by wt.	34.34%	34.28%	34.33%	34.39%	34.38%	33.19%	28.61%	22.43%	17.21%	14.95%	13.77%
moisture content % by vol.	53.68%	53.58%	53.66%	53.76%	53.75%	51.88%	44.72%	35.06%	26.90%	23.37%	21.52%
date measured	1/10/94	1/11/94	1/12/94	1/13/94	1/14/94	1/17/94	1/19/94	1/20/94	1/24/94	1/25/94	1/26/94
temperature deg. C	23	25	23	23	22	22	22	22	22	22	22

TEMPE CELLS	Sample #	4-0566 1 Bar Drying Curve	
tension in cm	1000	N/A	N/A
error in tension value +/-	20		
container number	TC-29	TC-29	MC-4
weight of container/ring,+wet sample	528.16	528.12	169.65
weight of container/ring,+ dry sample	515.60	515.60	157.20
weight of moisture	12.56	12.52	12.45
weight of container and ring	419.30	419.30	61.05
weight of dry sample	96.30	96.30	96.15
moisture content % by wt.	13.04%	13.00%	12.95%
moisture content % by vol.	20.39%	20.32%	
date measured	1/27/94		1/31/94
temperature deg. C	22		22

volume of brass ring, cm^3	68.26	
SAMPLE BULK DENSITY =	1.41	g/cm³
FIELD BULK DENSITY =	1.60	g/cm³
FRACTION LESS THAN 2 mm =	0.98	
Cell wt. before cleanup =	419.29	grams
Cell wt. after cleanup =	419.63	grams
	419.66 Average of all 3	

TEMPE CELLS — Sample # 4-0566 1 Bar Wetting Curve 9413224.0501

tension in cm	N/A	N/A	1000	1000	1000	1000	1000	1000	1000
error in tension value +/-			20	20	20	20	20	20	20
container number	MC-4	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19
weight of container/ring,+wet sample	175.40	518.09	521.95	523.30	526.07	526.18	526.37	526.38	526.44
weight of container/ring,+ dry sample	173.66	516.61	517.50	517.50	517.50	517.50	517.50	517.50	517.50
weight of moisture	1.74	1.48	4.45	5.80	8.57	8.68	8.87	8.88	8.94
weight of container and ring	61.03	419.39	420.20	420.20	420.20	420.20	420.20	420.20	420.20
weight of dry sample	114.37	97.22	97.30	97.30	97.30	97.30	97.30	97.30	97.30
moisture content %	1.52%		4.57%	5.96%	8.81%	8.92%	9.12%	9.13%	9.19%
moisture content % by vol.			7.15%	9.32%	13.77%	13.95%	14.25%	14.27%	14.36%
date measured			12/21/93	12/22/93	12/27/93	12/28/93	12/29/93	1/3/94	1/4/94
temperature deg. C			22	23	22	22	22	23	23

TEMPE CELLS — Sample # 4-0566 1 Bar Wetting Curve

tension in cm	1000	1000	700	500	300	204.5	103	74	53
error in tension value +/-	20	20	20	20	20	20	5	2	2
container number	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19
weight of container/ring,+wet sample	526.44	526.40	527.16	528.68	531.72	536.28	545.39	546.5	547.57
weight of container/ring,+ dry sample	517.50	517.50	517.50	517.50	517.50	517.50	517.50	517.50	517.50
weight of moisture	8.94	8.90	9.66	11.18	14.22	18.78	27.89	29.00	30.07
weight of container and ring	420.20	420.20	420.20	420.20	420.20	420.20	420.20	420.20	420.20
weight of dry sample	97.30	97.30	97.30	97.30	97.30	97.30	97.30	97.30	97.30
moisture content %	9.19%	9.15%	9.93%	11.49%	14.61%	19.30%	28.66%	29.80%	30.90%
moisture content % by vol.	14.36%	14.30%	15.52%	17.96%	22.85%	30.17%	44.81%	46.59%	48.31%
date measured	1/5/94	1/6/94	1/7/94	1/10/94	1/11/94	1/12/94	1/13/94	1/14/94	1/17/94
temperature deg. C	25	25	25	24	24	23	24	24	25

Cell wt. before cleanup = 420.50 grams

Cell wt. after cleanup = 419.54 grams

TEMPE CELLS — Sample # 4-0566 1 Bar Wetting Curve — 419.81 Average of all 3

tension in cm	34.0	22.0	12.0	8.0	5.0	2.0	0.0	N/A	N/A
error in tension value +/-	3	3	3	3	3	3	1		
container number	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	MC-14
weight of container/ring,+wet sample	548.09	548.45	549.34	549.57	549.64	549.76	550.62	550.60	190.09
weight of container/ring,+ dry sample	517.50	517.50	517.50	517.50	517.50	517.50	517.50	517.50	157.14
weight of moisture	30.59	30.95	31.84	32.07	32.14	32.26	33.12	33.10	32.95
weight of container and ring	420.20	420.20	420.20	420.20	420.20	420.20	420.20	420.20	60.23
weight of dry sample	97.30	97.30	97.30	97.30	97.30	97.30	97.30	97.30	96.91
moisture content %	31.44%	31.81%	32.72%	32.96%	33.03%	33.16%	34.04%	34.02%	34.00%
moisture content % by vol.	49.15%	49.72%	51.15%	51.52%	51.64%	51.83%	53.21%	53.18%	
date measured	1/19/94	1/20/94	1/24/94	1/25/94	1/26/94	1/27/94	1/28/94		1/31/94
temperature deg. C	22	22	22	22	22	22	22		22
volume of brass ring, cm^3	68.26								

BULK DENSITY = 1.43

KETTLES	Sample #	4-0566	15 Bar Drying Curve							
tension in Bars	0.5	0.5	0.7	0.7	1.0	1.0	2.0	2.0	3.0	3.0
error in tension value +/-	20	20	20	20	20	20	20	20	20	20
container number	BA7	BA8	BA7	BA8	BA7	BA8	BB7	BB8	BB7	BB8
weight of container/ring,+wet sample	43.39	46.14	43.13	45.81	43.03	45.69	44.68	46.52	44.52	46.35
weight of container/ring,+ dry sample	41.23	43.67	41.16	43.60	41.14	43.57	43.07	44.75	43.04	44.71
weight of moisture	2.16	2.47	1.97	2.21	1.89	2.12	1.61	1.77	1.48	1.64
weight of container and ring	27.72	28.09	27.72	28.09	27.72	28.09	27.77	27.87	27.77	27.87
weight of dry sample	13.51	15.58	13.44	15.51	13.42	15.48	15.30	16.88	15.27	16.84
moisture content %	15.99%	15.85%	14.66%	14.25%	14.08%	13.70%	10.52%	10.49%	9.69%	9.74%
date measured	1/11/94	1/11/94	1/19/94	1/19/94	1/25/94	1/25/94	1/11/94	1/11/94	1/19/94	1/19/94
temperature deg. C	25	25	22	22	22	22	25	25	22	22

KETTLES						
tension in Bars	5.0	5.0	7.0	7.0	9.8	9.8
error in tension value +/-	20	20	100	100	100	100
container number	BB7	BB8	BC7	BC8	BC7	BC8
weight of container/ring,+wet sample	44.16	45.95	49.12	47.90	49.00	47.76
weight of container/ring,+ dry sample	43.02	44.70	47.86	46.72	47.79	46.63
weight of moisture	1.14	1.25	1.26	1.18	1.21	1.13
weight of container and ring	27.77	27.87	30.35	30.32	30.35	30.32
weight of dry sample	15.25	16.83	17.51	16.40	17.44	16.31
moisture content %	7.48%	7.43%	7.20%	7.20%	6.94%	6.93%
date measured	1/25/94	1/25/94	1/11/94	1/11/94	1/19/94	1/19/94
temperature deg. C	22	22	25	25	22	22

Water Potential Data for CX-2 Samples

Sample No.	4-0566	4-0566
Container Number	BC7	BC8
Aw Reading	0.981	0.959
Temperature °C	25.2	25.3
Water Potential, Bars	26.4	57.6

Can ID No	BC7	BC8
Can + Soil Wet wt., g	48.87	47.51
Can + Soil Dry wt., g	47.80	46.63
Can Tare wt., g	30.35	30.32
Weight of Water, g	1.07	0.88
Dry Weight of Sample, g	17.45	16.31
Moisture Content, wt. %	6.13%	5.40%
date measured	1/24/94	1/24/94

POINTS SELECTED FOR PLOTTING Sample # 4-0566

container number	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29
Tension in cm	1.00E+00	3.00E+00	7.40E+00	1.25E+01	2.30E+01	3.33E+01	5.10E+01	7.35E+01	1.03E+02	2.03E+02	3.00E+02
Tempe Drying Curve	53.7%	53.7%	53.7%	53.7%	53.6%	53.7%	53.8%	53.7%	51.9%	44.7%	35.1%
Kettle/CX-2 Drying Curve											
Tempe Wetting Curve											
date measured	1/5/94	1/6/94	1/7/94	1/10/94	1/11/94	1/12/94	1/13/94	1/14/94	1/17/94	1/19/94	1/20/94

container number	TC-29	TC-29	TC-29	TC-29	BA7	BA7	BA7	BB7	BB7	BB7	BC7
tension in cm	5.00E+02	7.00E+02	8.50E+02	1.00E+03	5.10E+02	7.14E+02	1.02E+03	2.04E+03	3.06E+03	5.10E+03	7.14E+03
Tempe Drying Curve	26.90%	23.37%	21.52%	20.39%							
Kettle/CX-2 Drying Curve					24.89%	22.59%	21.71%	16.42%	15.19%	11.65%	11.25%
Tempe Wetting Curve											
date measured	1/24/94	1/25/94	1/26/94	1/27/94	1/11/94	1/19/94	1/25/94	1/11/94	1/19/94	1/25/94	1/11/94

container number	BC7	BC8	BC7	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19
tension in cm	1.00E+04	5.88E+04	2.69E+04	1.00E+03	7.00E+02	5.00E+02	3.00E+02	2.05E+02	1.03E+02	7.40E+01	5.30E+01
Tempe Drying Curve											
Kettle/CX-2 Drying Curve	10.84%	8.43%	9.59%								
Tempe Wetting Curve				14.30%	15.52%	17.96%	22.85%	30.17%	44.81%	46.59%	48.31%
date measured	1/19/94	1/24/94	1/24/94	1/6/94	1/7/94	1/10/94	1/11/94	1/12/94	1/13/94	1/14/94	1/17/94

container number	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19
tension in cm	3.40E+01	2.20E+01	1.20E+01	8.00E+00	5.00E+00	2.00E+00	1.00E+00
Tempe Drying Curve							
Kettle/CX-2 Drying Curve							
Tempe Wetting Curve	49.15%	49.72%	51.15%	51.52%	51.64%	51.83%	53.21%
date measured	1/19/94	1/20/94	1/24/94	1/25/94	1/26/94	1/27/94	1/28/94

Kettle data points were converted from gravimetric to volumetric by multiplying by the field Bulk Density
And the fraction of fines (less than 2mm).

Bulk Density = 1.60 g/cm³

Fraction of fines = 0.98

Points from kettle are enclosed by the double outline

Points from CX-2 are enclosed by the single outline

MOISTURE RETENTION DATA SHEET

WM3224.0504

SAMPLE NO. 4-0566

Page ____ of ____

Tested By:	R.M. Shaller	Date	12/21/93
Procedure No:	17	Rev.	1 — Date Issued 3/2/93
Test Plan No:	N/A	Rev.	N/A — Date Issued N/A
Pressure Cell No.	TC-29	Calibration Due Date	N/A
Gauge:	GEL - 2097	Calibration Due Date	10-4-94
Thermometer:	GEL -	Calibration Due Date	
Balance:	GEL - 3308	Calibration Due Date	2/12/94
Gauge:	GEL -	Calibration Due Date	
:	GEL -	Calibration Due Date	

(1) Tension units = cm	NA	NA	0	0	0	0	0	0	0	3	7.4	12.5	23
(2) Container/Ring Number	MC-4	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29
(3) Wt. of Container and Wet Sample, g	175.40	518.01	547.73	548.45	548.54	548.66	548.69	548.68	548.67	548.69	548.67	548.67	548.61
(4) Wt. of Container and Dry Sample, g	173.66												
(5) Container Tare Wt., g	61.03	420.06											
(6) Temperature			23	22	22	22	23	23	23	23	22	23	25
(7) Date			12/22/93	12/27/93	12/28/93	12/29/93	1/3/94	1/4/94	1/5/94	1/6/94	1/7/94	1/10/94	1/11/94

(1) Tension units = cm	33.3	51	73.5	103.4	203	300	500	700	850	1000	NA	NA	
(2) Container/Ring Number	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	TC-29	MC-4	
(3) Wt. of Container and Wet Sample, g	548.66	548.72	548.71	547.56	543.15	537.20	532.17	530.00	528.86	528.16	528.12	169.65	
(4) Wt. of Container and Dry Sample, g												157.20	
(5) Container Tare Wt., g											* 419.29	61.05	
(6) Temperature	23	23	22	22	22	22	22	22	22	22		22	
(7) Date	1/12/94	1/13/94	1/14/94	1/17/94	1/19/94	1/20/94	1/24/94	1/25/94	1/26/94	1/27/94		1/31/94	

REMARKS

Tempe Drying Curve (0 to 1 Bar)

* Cleaned Tare Wt. 419.63

All data are acurately and completely recorded. The test operator was trained and used calibrated instruments

Checked By: J F Relyea Date: 2-11-94

WHC-SD-EN-DP-086, Rev. 0

MOISTURE RETENTION DATA SHEET

OW3224.0505

SAMPLE NO. 4-0566

Page ____ of ____

Tested By:	R.M. Shailer	Date	12/20/93
Procedure No:	17	Rev.	1
Test Plan No:	N/A	Rev.	N/A
Pressure Cell No.	TC-19		
Gauge:	GEL - 2052		
Thermometer:	GEL -		
Balance:	GEL - 3308		
Gauge:	GEL -		
:	GEL -		

Date Issued	3/2/93	
Date Issued	N/A	
Calibration Due Date	N/A	
Calibration Due Date	7/21/94	
Calibration Due Date	N/A	
Calibration Due Date	2/12/94	
Calibration Due Date		
Calibration Due Date		

(1) Tension units = cm	NA	NA	1000	1000	1000	1000	1000	1000	1000	1000	1000	700	500
(2) Container/Ring Number	MC-4	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19
(3) Wt. of Container and Wet Sample, g	175.40	518.07	521.95	523.30	526.07	526.18	526.37	526.38	526.44	526.44	526.40	527.16	528.68
(4) Wt. of Container and Dry Sample, g	173.66												
(5) Container Tare Wt., g	61.03	419.39											
(6) Temperature			22	23	22	22	22	23	23	23	22	22	23
(7) Date			12/21/93	12/22/93	12/27/93	12/28/93	12/29/93	1/3/94	1/4/94	1/5/94	1/6/94	1/7/94	1/10/94

(1) Tension units = cm	300	204.5	103	74	53	34	22	12	8	5	2	0	NA	NA
(2) Container/Ring Number	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	TC-19	MC-14
(3) Wt. of Container and Wet Sample, g	531.72	536.28	545.39	546.50	547.57	548.09	548.45	549.34	549.57	549.64	549.76	550.62	550.60	190.09
(4) Wt. of Container and Dry Sample, g														157.14
(5) Container Tare Wt., g													* 420.50	60.23
(6) Temperature	25	23	23	22	22	22	22	22	22	22	22	22		22
(7) Date	1/11/94	1/12/94	1/13/94	1/14/94	1/17/94	1/19/94	1/20/94	1/24/94	1/25/94	1/26/94	1/27/94	1/28/94		1/31/94

REMARKS

Tempe Wetting Curve (0 to 1 Bar)

* Cleaned Tare WT. 419.54

All data are acurately and completely recorded. The test operator was trained and used calibrated instruments

Checked By: [signature] Date: 2-11-94

WHC-SD-EN-DP-086, Rev. 0

MOISTURE RETENTION DATA SHEET 9413224.0506

SAMPLE NO. 4-0566

Tested By:	R.M. Shailer	Date	1/5/94
Procedure No:	17	Rev.	1
Test Plan No:	N/A	Rev.	N/A
Pressure Cell No.	KETTLE PK05-01		
Gauge:	GEL - 2032		
Thermometer:	GEL - 12		
Balance:	GEL - 3308		
Gauge:	GEL -		
:	GEL -		

	.5	.5	.7	.7	1	1							
(1) Tension units = Bar ~~cm~~	.5	.5	.7	.7	1	1							
(2) Container/Ring Number	1-7 BA7	1-8 BA8	1-7 BA7	1-8 BA8	1-7 BA7	1-8 BA8							
(3) Wt. of Container and Wet Sample, g	43.39	46.14	43.13	45.81	43.03	45.69							
(4) Wt. of Container and Dry Sample, g	41.23	43.67	41.16	43.60	41.14	43.57							
(5) Container Tare Wt., g	27.72 ~~28.0~~ 1/25/94	28.09	27.72	28.09	27.72	28.09							
(6) Temperature	25	25	22	22	22	22							
(7) Date	1/11/94	1/11/94	1/19/94	1/19/94	1/25/94	1/25/94							

(1) Tension units = cm													
(2) Container/Ring Number													
(3) Wt. of Container and Wet Sample, g													
(4) Wt. of Container and Dry Sample, g													
(5) Container Tare Wt., g													
(6) Temperature													
(7) Date													

REMARKS KETTLE DRYING CURVE (0.5 to 1.0 BARs)

All data are acurately and completely recorded. The test operator was trained and used calibrated instruments

Checked By: J.T. Relyea Date: 2-1-94

MOISTURE RETENTION DATA SHEET

9413224.0507

SAMPLE NO. 4-0566

Page 2 of 3

Tested By:	R.M. Shailer	Date	1/5/94
Procedure No:	17	Rev.	1
Test Plan No:	N/A	Rev.	N/A
Pressure Cell No.	KETTLE PK05-02	Calibration Due Date	N/A
Gauge:	GEL - 2028	Calibration Due Date	4/5/94
Thermometer:	GEL - 12	Calibration Due Date	N/A
Balance:	GEL - 3308	Calibration Due Date	2/12/94
Gauge:	GEL - 2034	Calibration Due Date	6/7/94
:	GEL -	Calibration Due Date	

Date issued: 3/2/93

	2	2	3	3	5	5							
(1) Tension units = ~~cm~~ Bars	2	2	3	3	5	5							
(2) Container/Ring Number	3-7 BB7	3-8 BB8	3-7 BB7	3-8 BB8	3-7 BB7	3-8 BB8							
(3) Wt. of Container and Wet Sample, g	44.68	46.52	44.52	46.35	44.16	45.95							
(4) Wt. of Container and Dry Sample, g	43.07	44.75	43.04	44.71	43.02	44.70							
(5) Container Tare Wt., g	27.77	27.87	27.77	27.87	27.77	27.87							
(6) Temperature	25	25	22	22	22	22							
(7) Date	1/11/94	1/11/94	1/19/94	1/19/94	1/25/94	1/25/94							

(1) Tension units = cm													
(2) Container/Ring Number													
(3) Wt. of Container and Wet Sample, g													
(4) Wt. of Container and Dry Sample, g													
(5) Container Tare Wt., g													
(6) Temperature													
(7) Date													

REMARKS KETTLE DRYING CURVE (2.0 to 5.0 BARs)

All data are acurately and completely recorded. The test operator was trained and used calibrated instruments

Checked By: J F Relyea Date: 2-11-94

WHC-SD-EN-DP-086, Rev. 0

MOISTURE RETENTION DATA SHEET

9413224.0508

SAMPLE NO. 4-0566

Tested By: R.M. Shailer
Procedure No: 17
Test Plan No: N/A
Pressure Cell No. KETTLE PK15-02
Gauge: GEL - 2035
Thermometer: GEL - 12
Balance: GEL - 3308
Gauge: GEL -
: GEL -

Date 1/5/94
Rev. 1 Date Issued 3/2/93
Rev. N/A Date Issued
Calibration Due Date N/A
Calibration Due Date 6/7/94
Calibration Due Date N/A
Calibration Due Date 2/12/94
Calibration Due Date
Calibration Due Date

	7	7	10	10									
(1) Tension units = Bars cm	7	7	9.8	9.8									
(2) Container/Ring Number	5-7 BC7	5-8 BC8	5-7 BC7	5-8 BC8									
(3) Wt. of Container and Wet Sample, g	49.12	47.90	49.00	47.76									
(4) Wt. of Container and Dry Sample, g	47.86	46.72	47.79	46.63									
(5) Container Tare Wt., g	30.35	30.32	30.35	30.32									
(6) Temperature	25	25	22	22									
(7) Date	1/11/94	1/11/94	1/19/94	1/19/94									

(1) Tension units = cm													
(2) Container/Ring Number													
(3) Wt. of Container and Wet Sample, g													
(4) Wt. of Container and Dry Sample, g													
(5) Container Tare Wt., g													
(6) Temperature													
(7) Date													

REMARKS KETTLE DRYING CURVE (7.0 to 15.0 BARs)

All data are acurately and completely recorded. The test operator was trained and used calibrated instruments

Checked By: D F Relyea Date: 2-11-94

WHC-SD-EN-DP-086, Rev. 0

Pg 1 of 4

CX-2 WATER ACTIVITY DATA SHEET

Tested By: R.M. Shailer Date 1/24/94 Page 1 of 2

Procedure No: GEL-33 Rev. 0 Date Issued 3/23/93
Test Plan No: ____ Rev. ____ Date Issued ____

Equipment	GEL No.	Calibration Due Date
Balance	3308	2/12/94
CX-2	user calibrated	

Equipment	GEL No.	Calibration Due Date

Linear Offset Data	Pretest Verification					Post Test / Periodic Verification				
Type of Salt	DI H_2O	$CuSO_4$	KCL	K_2SO_4		K_2SO_4	$CuSO_4$			
Salt Conc. (Molal) (Sat.)	sat	sat	sat	sat						
Aw Reading	1.000	.978	.852	.975		.977	.977			
Temperature °C	23.3	23.7	24.1	24.2		25.1	25.1			
Aw Standard (20°C) (25°C)	1.000	.980 at 20°	.851 at 20°	.975 at 25°						

Water Potential Data for Samples

Sample No.	4-0291	4-0291	4-0292	4-0292	4-0158	4-0158	4-0566	4-0566	3-1707	3-1707
Container Number	BC1	BC2	BC3	BC4	BC5	BC6	BC7	BC8	BC9	BC10
Aw Reading	.968	.917	.975	.886	.965	.866	.981	.959	.979	.957
Temperature °C	24.7	24.9	25.1	25.1	25.1	25.2	25.2	25.3	25.2	25.2

Moisture Content for Water Potential Samples

Can ID No	BC1	BC2	BC3	BC4	BC5	BC6	BC7	BC8	BC9	BC10
Can + Soil Wet wt., g	49.89	48.18	52.91	50.26	50.31	49.38	48.87	47.51	48.50	47.43
Can + Soil Dry wt., g	49.58	47.96	52.61	50.08	50.14	49.27	47.80	46.63	47.73	46.79
Can Tare wt., g	30.30	29.12	29.28	30.50	29.23	30.17	30.35	30.32	29.11	29.13

REMARKS

All data are acurately and completely recorded. The test operator was trained and used calibrated instruments.

Checked By: J.F. Ryan Date: 2-11-94

GEL 09 ☐ GEL 17 ☐
GEL 10 ☐ GEL 19 ☐
GEL 14 ☐ GEL ☐

GEOTECHNICAL ENGINEERING LABORATORY
GEL-07 SIEVE AND HYDROMETER ANALYSIS
WHC-SD-EN-DP-086, Rev. 0

Sample No. 4-0566-2

GEL-07 SIEVE ANALYSIS

Date 12/14/93 Calibration Due Date 2/7/94 Balance: 3311

Sample Description _____ Sieve Time 10 (min)

Reduced By: ☐ Splitting ☐ Quartering ☐ Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed	Tested By
+10	1739.0	~~0~~			R.M.S.
-10		1739.0			

Remarks: Par 301

GEL-07 HYDROMETER ANALYSIS

Date _____ Balance: _____ Calibration Due Date _____

Thermometer: _____ Calibration Due Date _____

Hydrometer: _____ Calibration Due Date _____

WEIGHT OF SAMPLE

Wt. Container + Soil _____ (g)

Wt. Container _____ (g)

Wt. Soil _____ (g)

Specific Gravity of Sample _____

% Passing No. 10 Sieve _____ %

A = _____ W = _____ K = _____

COMPOSITE CORRECTION

1st Reading _____ at _____ °C

2nd Reading _____ at _____ °C

Date	Clock Time	Elapsed Time (min)	Hydrometer Reading	Hydrometer with Composite Correction	Temperature (°C)	Soil in Suspension (%)	Particle Diameter (mm)	Tested By
		2.0						
		5.0						
		15.0						
		30.0						
		60.0						
		250.0						
		1440.0						

Remarks: _____

Tests Checked By _____ Date _____

BD-6000-796 (04/92)

Pg 13 of 64

GEL-16 BULK DENSITY-POROSITY	
DATE:	1/26/94
Sample No.	4-0566-1
Heis No.	
Well No.	299-W10-20
Depth	108.94-109.44
Tested by	HH
length	15.2
diameter	9.5
volume	1087.0
wt of sample + mold	2187.7
wt of mold	340.9
wet wt of sample	1846.8
dry wt of sample	1736.8
wet density of sample	1.7
water content % dry wt	6.3%
dry density	1.6
specific gravity	2.71
void ratio	0.7
porosity	41.04%
TEST CHECKED BY:	2/08/94

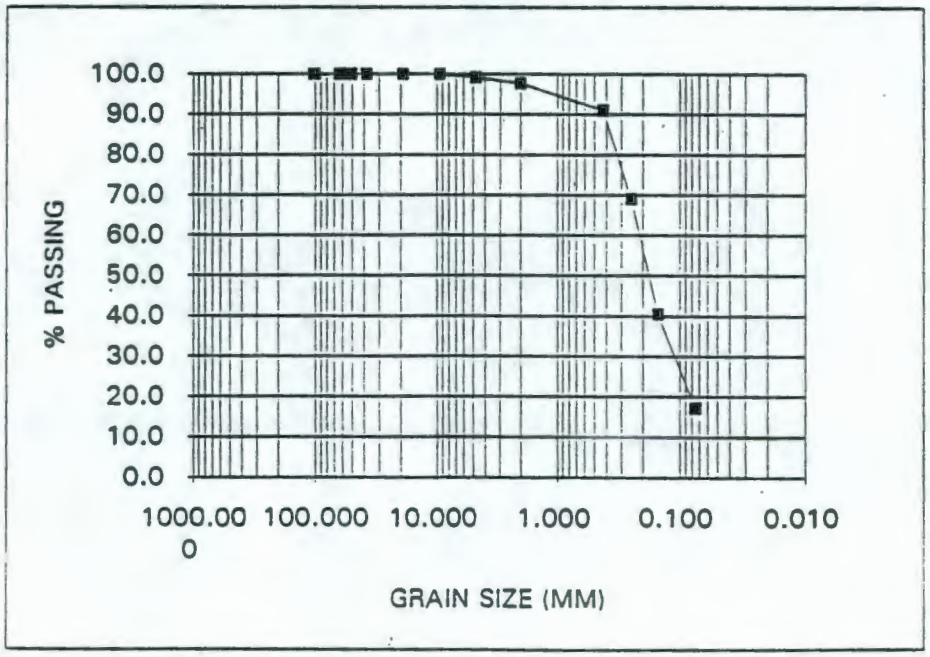
9413224.0511

Pg 14 of 64

SIEVE ANALYSIS REPORT SHEET

WELL #	299-W10-20	CONTACT	RAFUSE	ORIG COD	81235	PHONE	544-8137
LAB #	4-0566-1	DEPTH	108.94-109.44	TESTED BY	HH	DATE	2/1/94

SAMPLE WT (g)	SIEVE SIZE IN.	CUMULATIVE WEIGHT	% WEIGHT RETAINED	% PASSING	GRAIN SIZ MM	COMMENTS	
1736.3	4.000	0.0	0.0	100.0	101.600		
	2.500	0.0	0.0	100.0	63.500		
	2.000	0.0	0.0	100.0	50.800		
	1.500	0.0	0.0	100.0	38.100		
	0.750	0.0	0.0	100.0	19.050		
	0.375	0.0	0.0	100.0	9.525		
WT.-#10	SIEVE# 4	14.5	0.8	99.2	4.750		
SAMP.(g)	S# 10	39.7	2.3	97.7	2.000		
239.8	S# 40	16.5	6.9	91.0	0.425	SAMPLE SPLIT	
	S# 60	70.5	29.4	69.0	0.250	WASH SIEVE	
	S# 100	140.5	58.6	40.5	0.150		
	S# 200	197.6	82.4	17.2	0.075		



TEST CHECKED BY: R.T. McCutcheon DATE: 2/8/94

9413224.0512

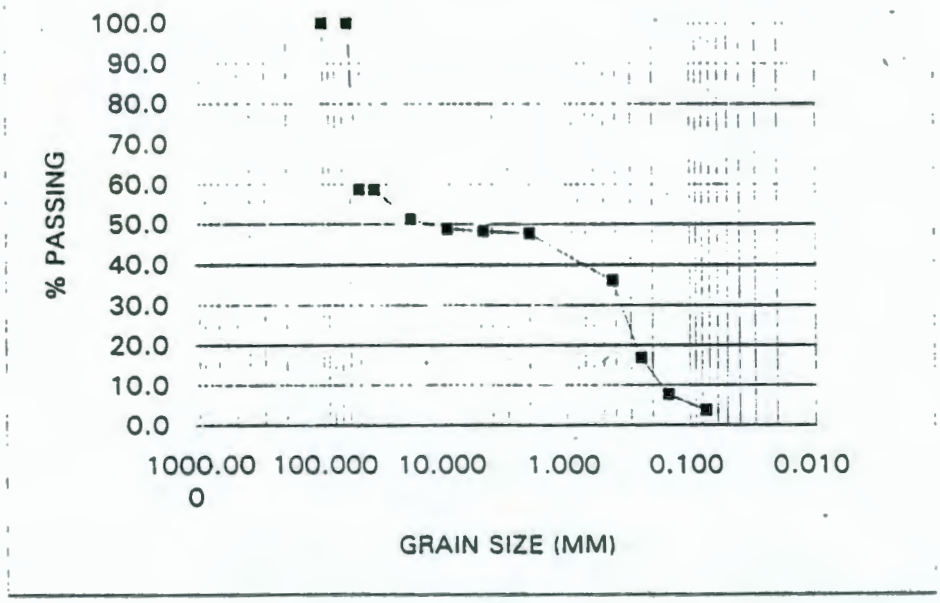
Pg 15 of 64

SIEVE ANALYSIS REPORT SHEET

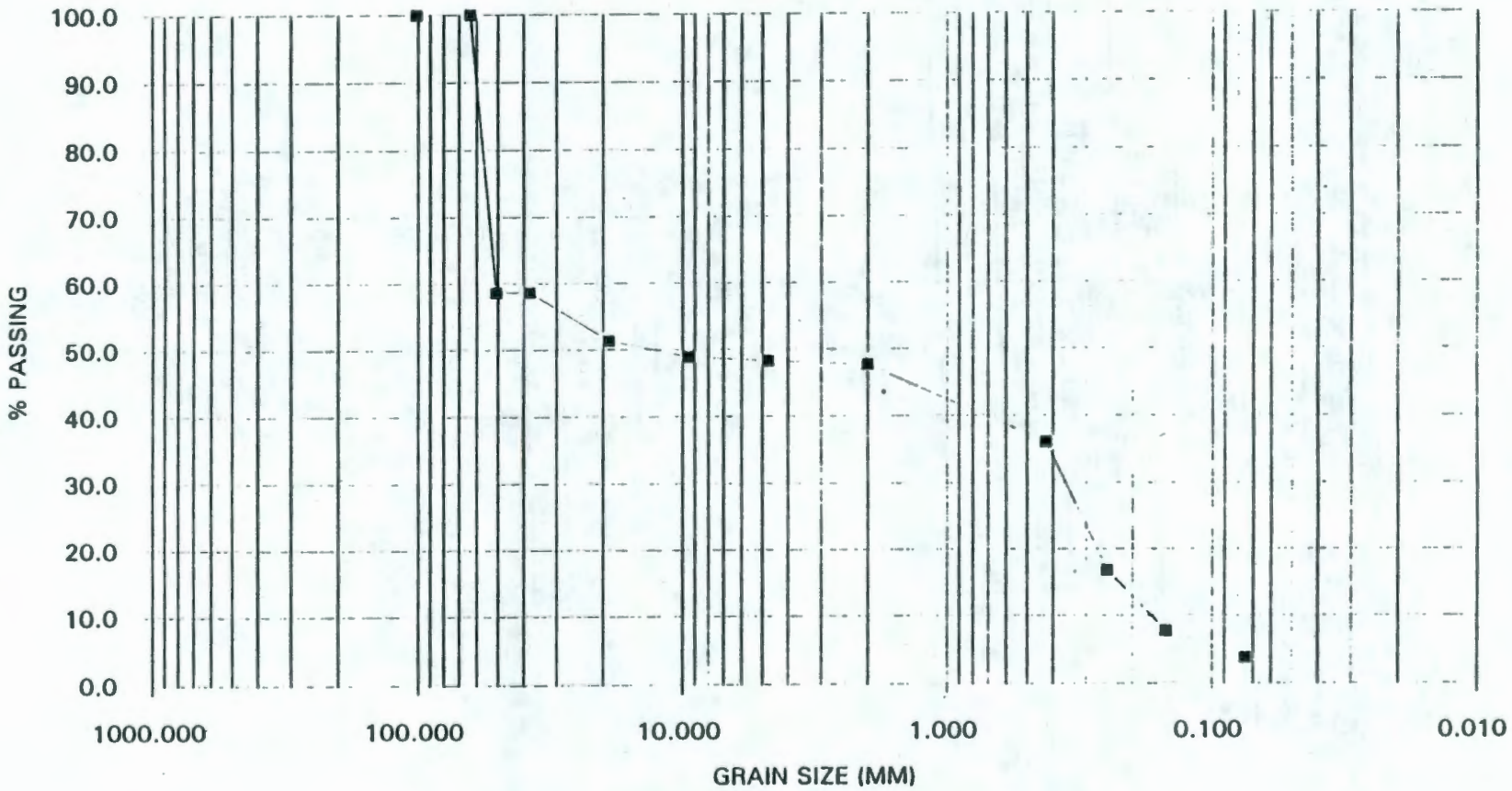
WELL #	299-W10-20	CONTACT	RAFUSE	ORIG COD	81235	PHONE	544-8137
LAB #	4-0567-1	DEPTH	117.5-118.0	TESTED BY	HH	DATE	2/2/94

SAMPLE WT (g)	SIEVE SIZE IN.	CUMULATIVE WEIGHT	% WEIGHT RETAINED	% PASSING	GRAIN SIZ MM	COMMENTS	
1903.7	4.000	0.0	0.0	100.0	101.600		
	2.500	0.0	0.0	100.0	63.500		
	2.000	786.6	41.3	58.7	50.800		
	1.500	786.6	41.3	58.7	38.100		
	0.750	926.2	48.7	51.3	19.050		
	0.375	972.6	51.1	48.9	9.525		
WT.-#10	SIEVE# 4	983.6	51.7	48.3	4.750		
SAMP.(g)	S# 10	995.4	52.3	47.7	2.000		
213.9	S# 40	52.1	24.4	36.1	0.425	SAMPLE SPLIT	
	S# 60	138.2	64.6	16.9	0.250	WASH SIEVE	
	S# 100	179.3	83.8	7.7	0.150		
	S# 200	197.2	92.2	3.7	0.075		

9413224.0513



TEST CHECKED BY: R.J. McArthur DATE: 2/8/94


100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
% PASSING
1000.000
100.000
10.000
1.000
0.100
0.010
GRAIN SIZE (MM)

Page 64

GEL 07 ☒ GEL 09 ☐ GEL 10 ☒ GEL 14 ☒	GEL 16 ☒ GEL 17 ☐ GEL 19 ☒ GEL ☐	**GEOTECHNICAL ENGINEERING LABORATORY** **GEL-07 SIEVE AND HYDROMETER ANALYSIS**	Sample No. 4-0567-1 Page 17 of 64

GEL-07 SIEVE ANALYSIS

Date 2.2.94 Calibration Due Date 2.7.94 Balance: 3311

Sample Description _____ Sieve Time 10 (min)

Reduced By: ☐ Splitting ☐ Quartering ☐ Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed	Tested By
2	1903.7	786.6			HH
1½		786.6			
¾		926.2			
⅜		972.6			
4		983.6			
10	213.9	995.4			sample split
40		52.1			wash sieve
60		138.2			
100		179.3			
200		197.2			

Remarks: _____

GEL-07 HYDROMETER ANALYSIS

Date _____ Balance: _____ Calibration Due Date _____

Thermometer: _____ Calibration Due Date _____

Hydrometer: _____ Calibration Due Date _____

WEIGHT OF SAMPLE

Wt. Container + Soil _____ (g) Specific Gravity of Sample _____

Wt. Container _____ (g) % Passing No. 10 Sieve _____ %

Wt. Soil _____ (g) A = _____ W = _____ K = _____

COMPOSITE CORRECTION

1st Reading _____ at _____ °C

2nd Reading _____ at _____ °C

Date	Clock Time	Elapsed Time (min)	Hydrometer Reading	Hydrometer with Composite Correction	Temperature (°C)	Soil in Suspension (%)	Particle Diameter (mm)	Tested By
		2.0						
		5.0						
		15.0						
		30.0						
		60.0						
		250.0						
		1440.0						

Remarks: _____

Tests Checked By _____ Date _____

Pg 18 of 64

GEOTECHNICAL ENGINEERING LABORATORY

GEL-16 BULK DENSITY-POROSITY	
DATE:	2/1/94
Sample No.	4-0567-1
Heis No.	
Well No.	299-W10-20
Depth	69.6-70.6
Tested by	HH
length	12.7
diameter	9.5
volume	908.7
wt of sample + mold	2268.3
wt of mold	347.7
wet wt of sample	1920.6
dry wt of sample	1903.3
wet density of sample	2.1
water content % dry wt	0.9%
dry density	2.1
specific gravity	2.75
void ratio	0.3
porosity	23.84%
TEST CHECKED BY:	[illegible] 2/2/94

9413274.0516

GEL 07 ☒	GEL 16 ☒	GEOTECHNICAL ENGINEERING LABORATORY GEL-14, GEL-16, GEL-19	Sample No. 4-0567-132
GEL 09 ☐	GEL 17 ☐		Page 19 of 64
GEL 10 ☒	GEL 19 ☒		
GEL 14 ☒	GEL ☐		

GEL-14 SOIL MOISTURE

Balance: 3311 Calibration Due Date 5/7/94 Tested By JRP / LDB

Thermometer: _____ Calibration Due Date _____

Date	Wet Wt. + Can	Dry Wt. + Can	Tare Wt.	Moisture	Dry Wt. Soil	% Moisture	Calculated By
2/9/94	508.33	501.06	61.30	7.27	439.76	1.65	HH

Remarks: _____

GEL-16 BULK DENSITY-POROSITY

DETERMINATION NO.			1	
Pan No.:	Mold: ☒ Plastic ☐ Metal	Length:	12.74	9.53
Sample Volume, V, cc				
Wt. of Sample & Mold, g			2268.3	
Wt. of Mold, g			347.7	
Wet Wt. of Sample, g				
Wet Density of Sample, γ m, g/cc				
Water Content % Dry Weight				
Dry Density, g/cc γ d				
Dry weight of Sample, g, Ws			1903.3	
*Void Ratio, e				
**Porosity, n, %				

Tested By HH 2/1/94

4-0567-1

$$Ws = \frac{\text{Wet Wt.}}{1 + \%\ \text{Dry Wt.}}$$

$$*\text{Void Ratio, } e = \frac{\text{Avg. Sp. Gr. x Vol.}}{Ws} - 1$$

$$**\text{Porosity, } n, \% = \left(\frac{e}{1+e}\right) 100$$

Remarks: pan no. 127 wt. = 249.6 wet wt. + pan = 2171.4 sleeve not full voidspace = 2.5
117.5 - 118.0' 299-W10-20 W-152 sandy gravel
d = L = 15.24 - 2.5 = 12.74 dry wt. + pan = 2152.9

GEL-19 CALCIUM CARBONATE

Vessel No. 5697 Tested By JRP

Balance No. 3304 Date Due 5/7/94

Sample Weight 8.0 (g)

Sample Pressure .5 (psi) %$CaCO_3$ <1 Per Gram

Remarks: _____

2-89

Tests Checked By: R. T. McCulloch Date 1/28/94

Pg 20 of 64

SPECIFIC GRAVITY
GEL-10

SAMPLE NO.: 4-0567-1 Tested by HH DATE: 2/3/94

WT. OVEN DRY SOIL, g	55.00
WT. PYCN. + WET AGEN	381.25
WT. PYCN+WET+SOIL	415.94
TEMP Deg. C	22.7
Sp.G WET. AGENT @ Te	1
Sp.G of soil at Temp	2.71
Sp.G of soil at 20 Deg.C	2.71
WT. SAMPLE IN H2O, g (	638
WT. OVEN DRY SAMPLE	995
APPARENT SpG, 23/23C	2.79
SIZE FRACION, COARS	51.7
SIZE FRACION, FINE	48.3
AVG. SpG. Values, 23/23	2.75

temp	K
18	1.0004
19	1.0002
20	1.0000
21	0.9998
22	0.9996
23	0.9993
24	0.9991
25	0.9989
26	0.9986
27	0.9983
28	0.998
29	0.9977
30	0.9974

COMMENTS:

TEST CHECKED BY: R. T. McIntosh DATE: 2/8/94

9413224.0518

GEL 07 ☒ GEL 09 ☐ GEL 10 ☒ GEL 14 ☒ GEL 16 ☒ GEL 17 ☐ GEL 19 ☒ GEL ☐	**GEOTECHNICAL ENGINEERING LABORATORY** **GEL-10 SPECIFIC GRAVITY SOILS FINE/COARSE**	Sample No. 4-0567-1 Page 21 of 64

GEL-10 SPECIFIC GRAVITY OF SOILS

Date 2/3/94 Tested By HH

Balance: 3304 Calibration Due Date 2/7/94

	DETERMINATION NO.	1	2	3
W_o	Wt. Oven Dry, Soil, g	55.00	.	.
	Pycnometer No.			
	Wt. Pycnometer, g	129.19	.	.
W_a	Wt. Pycnometer + Wetting Agent, g	381.25	.	.
W_b	Wt. Pycnometer + Wetting Agent + Soil, g	415.94	.	.
	Temperature, T_x at W_b, °C	22.7		
G_w	Specific Gravity of Wetting Agent at T_x	- .	.	.
G_t	Specific Gravity of Soil at T_x	.	.	.
G_s	Specific Gravity of Soil at 20 °C	.	.	.

Wetting Agent tapwater

$$C_t = \frac{W_o}{W_o + W_a - W_b}$$

Remarks:

GEL-10 SPECIFIC GRAVITY COARSE AGGREGATES

Date 2/3/94 Tested By: HH

	DETERMINATION NO.	1	
	Size fraction	+4	
P_1	Size fraction, wt. % total, g		
B	Weight sample (SSD), g	.	.
C	Weight sample in H_2O, g HH	638.00	.
A	Weight of oven dry sample, g	995.00	.

Bulk Specific Gravity, 23/23 °C = A/(B-C) = .

A = wt. oven dry sample in air, g
B = wt. SSD sample in air, g
C = wt. saturated sample in H_2O, g

Bulk Specific Gravity SSD, 23/23 °C = B/(B-C) = .

Apparent Specific Gravity, 23/23 °C = A/(A-C) = .

*Average Specific Gravity Values, 23/23 °C $\overline{G}$ = .

Remarks:

$$\overline{G} = \frac{1}{\frac{P_1 = \%\ \text{coarse}}{G_1 = \text{coarse sp.gr.} \times 100} + \frac{P_2 = \%\ \text{fines}}{G_2 = \text{fines sp. gr.} \times 100}}$$

$\overline{G}$ = Ave. Specific Gravity for all forms of Specific Gravity i.e., formula applicable to Bulk, Bulk SSD and Apparent Specific Gravity.

G_1, G_2 = appropriate Specific Gravity values for each size fraction depending on the type of Specific Gravity being averaged.

P_1, P_2 = wt. percentages of each size fraction present in the original sample.

*State type of Specific Gravity Reported i.e., either Bulk, Bulk SSD or Apparent.

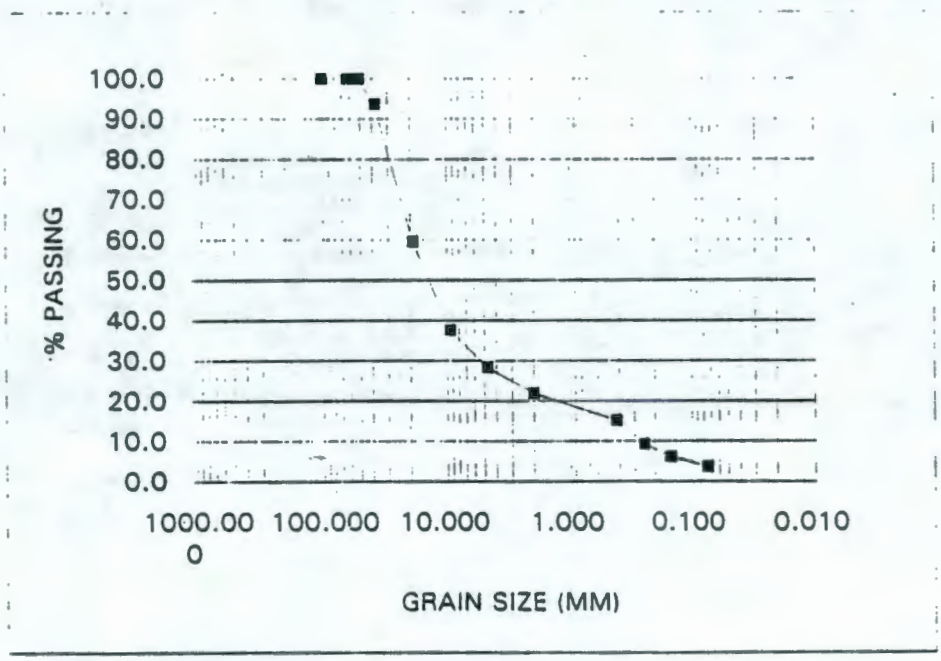
Tests Checked By: Date

Pg 22 of 64

SIEVE ANALYSIS REPORT SHEET

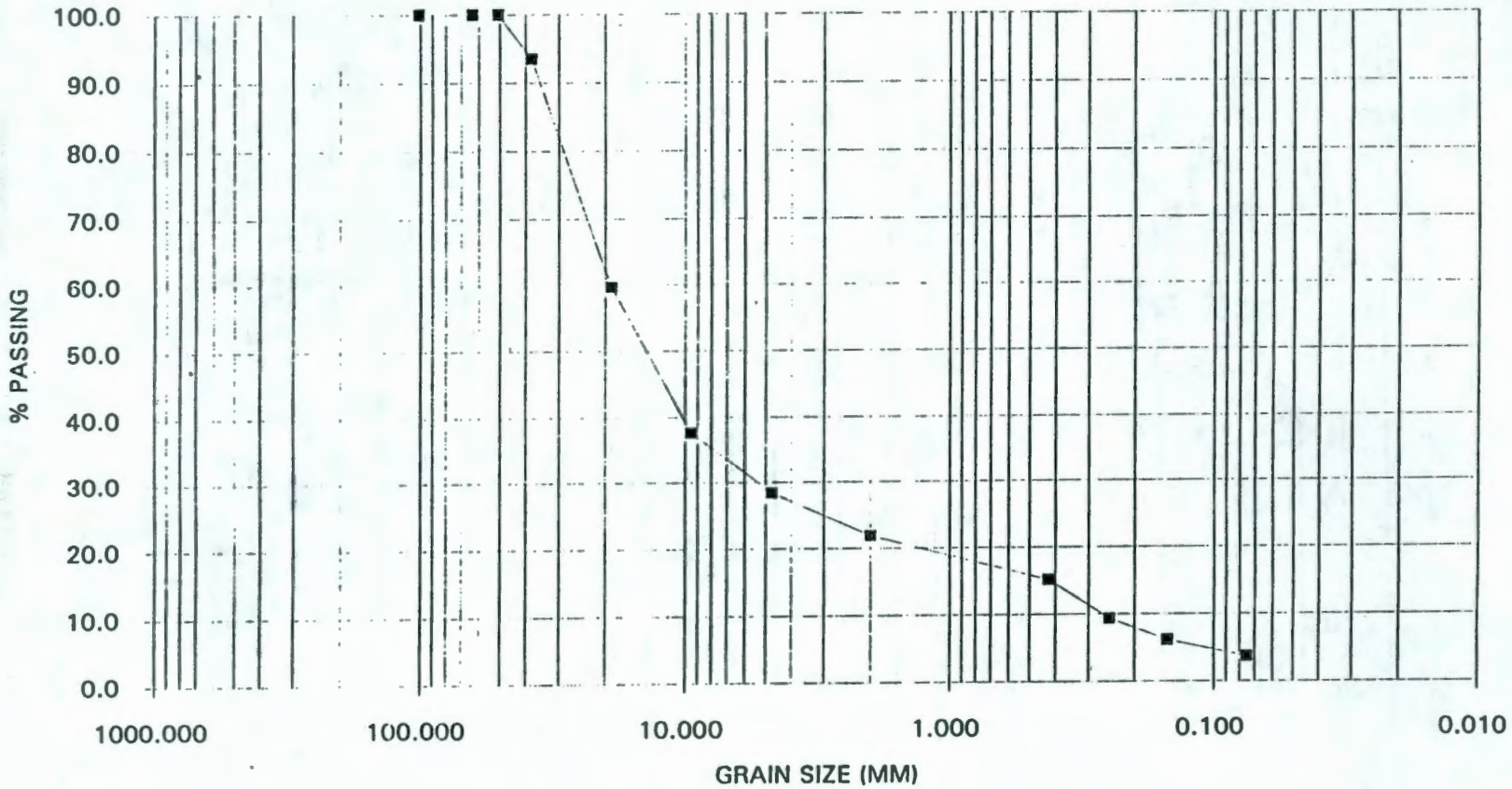
WELL #	299-W10-20	CONTACT	RAFUSE	ORIG COD	81235	PHONE	544-8137
LAB #	4-0290-1	DEPTH	~~69.6-70.6~~ HH 229.67-230.17	TESTED BY	HH	DATE	2/1/94

SAMPLE WT (g)	SIEVE SIZE IN.	CUMULATIVE WEIGHT	% WEIGHT RETAINED	% PASSING	GRAIN SIZ MM	COMMENTS	
2550.5	4.000	0.0	0.0	100.0	101.600		
	2.500	0.0	0.0	100.0	63.500		
	2.000	0.0	0.0	100.0	50.800		
	1.500	163.8	6.4	93.6	38.100		
	0.750	1029.2	40.4	59.6	19.050		
	0.375	1590.4	62.4	37.6	9.525		
WT.-#10	SIEVE# 4	1827.1	71.6	28.4	4.750		
SAMP.(g)	S# 10	1992.4	78.1	21.9	2.000		
157.8	S# 40	48.1	30.5	15.2	0.425	SAMPLE SPLIT	
	S# 60	90.4	57.3	9.3	0.250	WASH SIEVE	
	S# 100	113.5	71.9	6.1	0.150		
	S# 200	131.3	83.2	3.7	0.075		



TEST CHECKED BY: R.T. McCutcheon DATE: 2/8/94

9413224.0520



9413224.0521

GEL 07 ☒ GEL 09 ☒ GEL 10 ☒ GEL 14 ☒	GEL 15 ☒ GEL 17 ☐ GEL 19 ☒ GEL ☐	**GEOTECHNICAL ENGINEERING LABORATORY** **GEL-07 SIEVE AND HYDROMETER ANALYSIS**	Sample No. 4-0290-1 Page 24 of 64

GEL-07 SIEVE ANALYSIS

Date 2/1/94 Calibration Due Date 2/7/94 Balance: 3311

Sample Description _____ Sieve Time 10 (min)

Reduced By: ☐ Splitting ☐ Quartering ☐ Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed	Tested By
2	2550.5	~~0~~ ~~163.8~~ HH			HH
1½	163.8	~~1029.2~~ HH			
1 3/4	1029.2	~~1590.4~~ HH			
~~HH 3/4~~ 3/8	1590.4	~~1827.1~~ HH			
~~HH 3/8~~ 4		1827.1			
~~HH~~ #10	157.8	1992.4			sample split
40		48.1			wash sieve
40/60		90.4			
~~HH 100~~ 100		113.5			
200		131.3			

Remarks: _____

GEL-07 HYDROMETER ANALYSIS

Date _____ Balance: _____ Calibration Due Date _____

Thermometer: _____ Calibration Due Date _____

Hydrometer: _____ Calibration Due Date _____

WEIGHT OF SAMPLE

Wt. Container + Soil _____ (g) Specific Gravity of Sample _____

Wt. Container _____ (g) % Passing No. 10 Sieve _____ %

Wt. Soil _____ (g) A = _____ W = _____ K = _____

COMPOSITE CORRECTION

1st Reading _____ at _____ °C

2nd Reading _____ at _____ °C

Date	Clock Time	Elapsed Time (min)	Hydrometer Reading	Hydrometer with Composite Correction	Temperature (°C)	Soil in Suspension (%)	Particle Diameter (mm)	Tested By
		2.0						
		5.0						
		15.0						
		30.0						
		60.0						
		250.0						
		1440.0						

Remarks: _____

2-94

Tests Checked By K. T. [illegible] Date 3/29/94

BD-6000-796 (04/92)

9413221.0532

GEL 07 [X] GEL 08 [X] GEL 10 [X] GEL 14 [X]	GEL 16 [X] GEL 17 [ ] GEL 19 [X] GEL [ ]	GEOTECHNICAL ENGINEERING LABORATORY GEL-14, GEL-16, GEL-19	Sample No. 4-0290-1 Page 25 of 64

GEL-14 SOIL MOISTURE

Balance: 3311 Calibration Due Date 2/7/94 Tested By HH

Thermometer: _____ Calibration Due Date _____

Date	Wet Wt. + Can	Dry Wt. + Can	Tare Wt.	Moisture	Dry Wt. Soil	% Moisture	Calculated By
1/26/94		2806.5*	251.6		2311.5*		

Remarks: pan wt.: 251.6 pan # 101 * subtract 243.4 from dry wt. for determ. of D_B ⇒ leave in for sieve wt. total

GEL-16 BULK DENSITY-POROSITY

DETERMINATION NO.	1	
Pan No.: Mold: [X] Plastic [ ] Metal Length:		
Sample Volume, V, cc		
Wt. of Sample & Mold, g	3014.2	247.3g * 2766.9
Wt. of Mold, g	324.0	
Wet Wt. of Sample, g		
Wet Density of Sample, γ m, g/cc		
Water Content % Dry Weight		
Dry Density, g/cc γ d		
Dry weight of Sample, g, Ws		
*Void Ratio, e		
**Porosity, n, %		

Tested By HH

$$Ws = \frac{\text{Wet Wt.}}{1 + \%\ \text{Dry Wt.}}$$

$$*\text{Void Ratio, } e = \frac{\text{Avg. Sp. Gr.} \times \text{Vol.}}{Ws} - 1$$

$$**\text{Porosity, } n, \% = \left(\frac{e}{1+e}\right) 100$$

Remarks: Liner overfilled, some material removed: 247.3g (subtract from wet wt. of sample)

GEL-19 CALCIUM CARBONATE

Vessel No. _____ Tested By _____

Balance No. 3304 Date Due _____

Sample Weight 8.0 (g)

Sample Pressure _____ (psi) $\%CaCO_3$ _____ Per Gram

Remarks: _____

Tests Checked By: _____ Date _____

Pg 26 of 64

GEOTECHNICAL ENGINEERING LABORATORY

GEL-16 BULK DENSITY-POROSITY	
DATE:	1/26/94
Sample No.	4-0290-1
Heis No.	
Well No.	299-W10-20
Depth	~~69.6-70.6~~ HH 229.67 - 230.17
Tested by	HH
length	15.2
diameter	9.5
volume	1087.0
wt of sample + mold	2766.9
wt of mold	324.0
wet wt of sample	2442.9
dry wt of sample	2311.5
wet density of sample	2.2
water content % dry wt	5.7%
dry density	2.1
specific gravity	2.63
void ratio	0.2
porosity	19.15%
TEST CHECKED BY:	[illegible] 2/5/94

9413224.0524

GEL 07 ☐ GEL 09 ☐ GEL 10 ☐ GEL 14 ☑	GEL 16 ☐ GEL 17 ☐ GEL 19 ☑ GEL ☐	**GEOTECHNICAL ENGINEERING LABORATORY** **GEL-14, GEL-16, GEL-19**	Sample No. 4-0290-3 4A Page 27 of 64

GEL-14 SOIL MOISTURE

Balance: 3304 Calibration Due Date 2-7-94 Tested By LD Bruggeman

Thermometer: Oven Calibration Due Date _____

Date	Wet Wt. + Can	Dry Wt. + Can	Tare Wt.	Moisture	Dry Wt. Soil	% Moisture	Calculated By
1-20-94	608.67	575.43	62.22	33.24	513.21	6.5%	HH

Remarks: Tin 4-0290-3

GEL-16 BULK DENSITY-POROSITY

DETERMINATION NO.			1	
Pan No.:	Mold: ☐ Plastic ☐ Metal	Length:		
Sample Volume, V, cc				
Wt. of Sample & Mold, g				
Wt. of Mold, g				
Wet Wt. of Sample, g				
Wet Density of Sample, γ m, g/cc				
Water Content % Dry Weight				
Dry Density, g/cc γ d				
Dry weight of Sample, g, Ws				
*Void Ratio, e				
**Porosity, n, %				

Tested By _____

$$Ws = \frac{\text{Wet Wt.}}{1 + \%\ \text{Dry Wt.}}$$

$$*\text{Void Ratio, } e = \frac{\text{Avg. Sp. Gr.} \times \text{Vol.}}{Ws} - 1$$

$$**\text{Porosity, } n, \% = \left(\frac{e}{1+e}\right) 100$$

Remarks: _____

GEL-19 CALCIUM CARBONATE

Vessel No. 5697 Tested By LD Bruggeman

Balance No. 3304 Date Due 2-7-94

Sample Weight 8.0 (g)

Sample Pressure 0.4 (psi) %$CaCO_3$ ~~0.4% HH~~ Per Gram <1%

Remarks: Tin 4-0290-3

Tests Checked By: R.T. McGlothlin 2-97 Date 1/27/94

9413224.0525

HYDRAULIC CONDUCTIVITY REPORT
GEL-09

SAMPLE NO. 4-0290-1 299-W10-20 Page VISCOSITY 1

Tested By: H. HAMPT Date 1/26/94

SpecimenDiameter (D, cm) 9.53 Specimen Length (L, cm) 15.24

Start Date	27-Jan-94	27-Jan-94	28-Jan-94	28-Jan-94		
Start Time	07:04:00	14:40:00	06:59:00	13:35:00		
End Date	27-Jan-94	28-Jan-94	28-Jan-94	29-Jan-94		
End Time	14:37:00	06:58:00	13:34:00	09:26:00		
Time Sec.	27180	58680	23700	71460		
Volume, cm^3	26.5	74.4	31.9	95.6		
Head, cm	78.7	78.1	78.7	78.1		
"Q"	9.75E-04	1.27E-03	1.35E-03	1.34E-03		
L/(A*H)	2.71E-03	2.74E-03	2.71E-03	2.74E-03		
K, cm/sec	2.65E-06	3.47E-06	3.65E-06	3.66E-06		
Kc,(K*Visc)	2.65E-06	3.47E-06	3.65E-06	3.66E-06		

Darcy's Law	K = (Q*L)/(A*H)

K = Hydraulic Conductivity (cm/sec)
Q = Flow Rate (cm^3/sec) = Volume (cm^3)/Time (sec)
A = Area (cm^2)
H = Hydraulic Head (cm - water)
L = Length of soil in column (cm)
Kc= HYDRAULIC CONDUCTIVITY corrected to VISCOSITY

Kc AVERAGE 3.36E-06
STANDARD DEVIATION 4.17E-07

Remarks:

All data is acurately and completely recorded. The test operator was trained and used calibrated instruments

Checked By: R.T. Mc[illegible]

Date: 2/08/94

Pg 29 of 64

GEL 07 ☒ GEL 16 ☒
GEL 09 ☒ GEL 17 ☐
GEL 10 ☒ GEL 19 ☒
GEL 14 ☒ GEL ☐

GEOTECHNICAL ENGINEERING LABORATORY
GEL-09 HYDRAULIC CONDUCTIVITY DATA SHEET

299-W10-20 (W-0152)

Sample No. 4-0290-1

Page ____ of ____

Balance No. 3311

Permeameter No. 229.67-230.7

Test Initiated By HH

Date ~~1/26/94~~ HH 1/26/94

Procedure

Sleeve Type: ☐ Metal ☒ Plastic

Specimen Diameter (D) 9.53 cm

Specimen Length (L) 15.24 cm

$$A = \left(\frac{D}{2}\right)^2 \times 3.1415$$

Specimen Area (A) 71.3 cm^2

Darcy's Law

$$K = \frac{QL}{AH}$$

K = Hydraulic Conductivity (cm/sec)

Q = Flow (cm^3/sec) = Vol. g/Time (sec)

A = Area (cm^2)

H = Hydraulic Head

L = Length (cm)

Date Year 94 (Mo/Day)	Run Time System (Hr:Min)	Run Time System (Hr:Min)	Run Time Time Change	Container Weight (± 0.1 g)	Container Tare (± 0.1 g)	Container Tare & Effluent (± 0.1 g)	Room Temp (°C)	Pressure Pore H_2O (cm)	Effluent Description	Operator Initials	Hydraulic Conductivity (cm/sec)	Calculated By
~~1.26~~ 1.27 HH	~~0:7:00~~				~~154.6~~					HH		
1.27	0:7:04:00	14:37:00	19980	26.5	154.8	181.3	24.9	78.7	clear	HH	3.6×10^{-6}	HH
1.27	14:37:00	1.28 ~~09~~ 10 HH 09:58:00	51480	74.4	~~181.3~~ 182.2 HH	256.6	23.8	78.1	clear	HH	4.0×10^{-6}	HH
1.28	~~09~~ 10:59:00	~~14:3~~ 13:34:00	23700	31.9	256.6	288.5	23.6	78.7	clear	HH	3.7×10^{-6}	HH
1.28	1.28 13:35:00	09:26:00	71460	95.6	288.5	384.1	22.8	78.1	clear	HH	3.7×10^{-6}	HH

Remarks

Test Checked By ____ Date ____

WHC-SD-EN-DP-086, Rev. 0

SPECIFIC GRAVITY
GEL-10

SAMPLE NO.: 4-0290-1 Tested by HH DATE: 2/3/94

WT. OVEN DRY SOIL, g	55.00
WT. PYCN. + WET AGEN	381.25
WT. PYCN+WET+SOIL	415.69
TEMP Deg. C	22.4
Sp.G WET. AGENT @ Te	1
Sp.G of soil at Temp	2.68
Sp.G of soil at 20 Deg.C	2.67
WT. SAMPLE IN H2O, g (	1131
WT. OVEN DRY SAMPLE	1832
APPARENT SpG, 23/23C	2.61
SIZE FRACION, COARS	71.6
SIZE FRACION, FINE	28.4
AVG. SpG. Values, 23/23	2.63

temp	K
18	1.0004
19	1.0002
20	1.0000
21	0.9998
22	0.9996
23	0.9993
24	0.9991
25	0.9989
26	0.9986
27	0.9983
28	0.998
29	0.9977
30	0.9974

COMMENTS:

TEST CHECKED BY: R.T. McCutcheon DATE: 2/8/94

9413224.0528

GEL 07 ☒	GEL 16 ☒	GEL TECHNICAL ENGINEERING LABORATORY GEL-10 SPECIFIC GRAVITY SOILS FINE/COARSE	Sample No. 4-0290-1
GEL 09 ☒	GEL 17 ☐		Page 31 of 64
GEL 10 ☒	GEL 19 ☒		
GEL 14 ☒	GEL ☐		

GEL-10 SPECIFIC GRAVITY OF SOILS

Date ~~2/4/94~~ 2/3/94 Tested By HH

Balance: 3304 Calibration Due Date 2/7/94

	DETERMINATION NO.	1	2	3
W_o	Wt. Oven Dry, Soil, g	55.00	.	.
	Pycnometer No.			
	Wt. Pycnometer, g	129.19	.	.
W_a	Wt. Pycnometer + Wetting Agent, g	381.25	.	.
W_b	Wt. Pycnometer + Wetting Agent + Soil, g	415.69	.	.
	Temperature, T_x at W_b, °C	22.4		
G_w	Specific Gravity of Wetting Agent at T_x	.	.	.
G_t	Specific Gravity of Soil at T_x	.	.	.
G_s	Specific Gravity of Soil at 20 °C	.	.	.

Wetting Agent: tapwater

$$C_t = \frac{W_o}{W_o + W_a - W_b}$$

Remarks:

GEL-10 SPECIFIC GRAVITY COARSE AGGREGATES

Date 2/4/94 Tested By: HH

Balance: 3312 Calibration Due Date 4/22/94

	DETERMINATION NO.	1	
	Size fraction	+4	
P_1	Size fraction, wt. % total, g		
	Tare weight		
B	Weight sample (SSD), g	.	.
C	Weight sample in H_2O, g	1131.0	.
A	Weight of oven dry sample, g	1832.0	.

Bulk Specific Gravity, 23/23 °C = A/(B-C) = .

A = wt. oven dry sample in air, g
B = wt. SSD sample in air, g
C = wt. saturated sample in H_2O, g

Bulk Specific Gravity SSD, 23/23 °C = B/(B-C) = .

Apparent Specific Gravity, 23/23 °C = A/(A-C) = .

*Average Specific Gravity Values, 23/23 °C $\overline{G}$ = .

Remarks:

$$\overline{G} = \frac{1}{\dfrac{P_1 = \%\ \text{coarse}}{G_1 = \text{coarse sp.gr.} \times 100} + \dfrac{P_2 = \%\ \text{fines}}{G_2 = \text{fines sp. gr.} \times 100}}$$

$\overline{G}$ = Ave. Specific Gravity for all forms of Specific Gravity i.e., formula applicable to Bulk, Bulk SSD and Apparent Specific Gravity.

G_1, G_2 = appropriate Specific Gravity values for each size fraction depending on the type of Specific Gravity being averaged.

P_1, P_2 = wt. percentages of each size fraction present in the original sample.

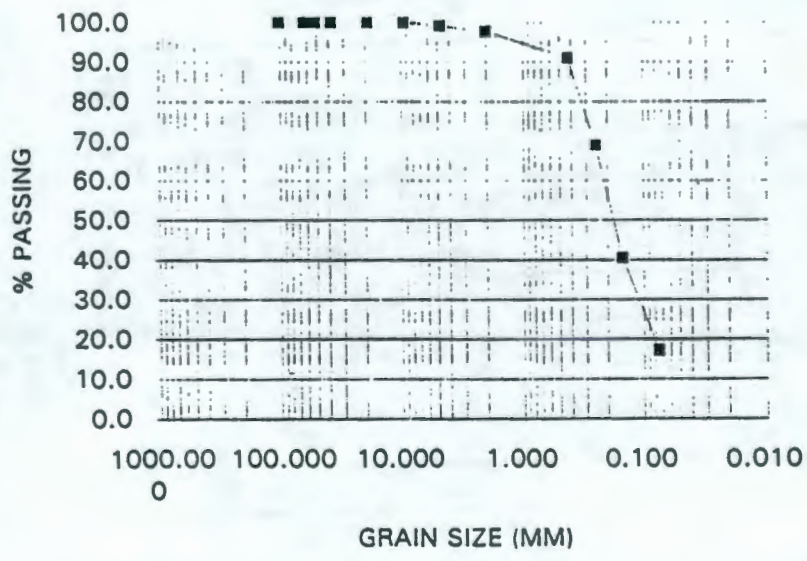
*State type of Specific Gravity Reported i.e., either Bulk, Bulk SSD or Apparent.

Tests Checked By: Date

SIEVE ANALYSIS REPORT SHEET

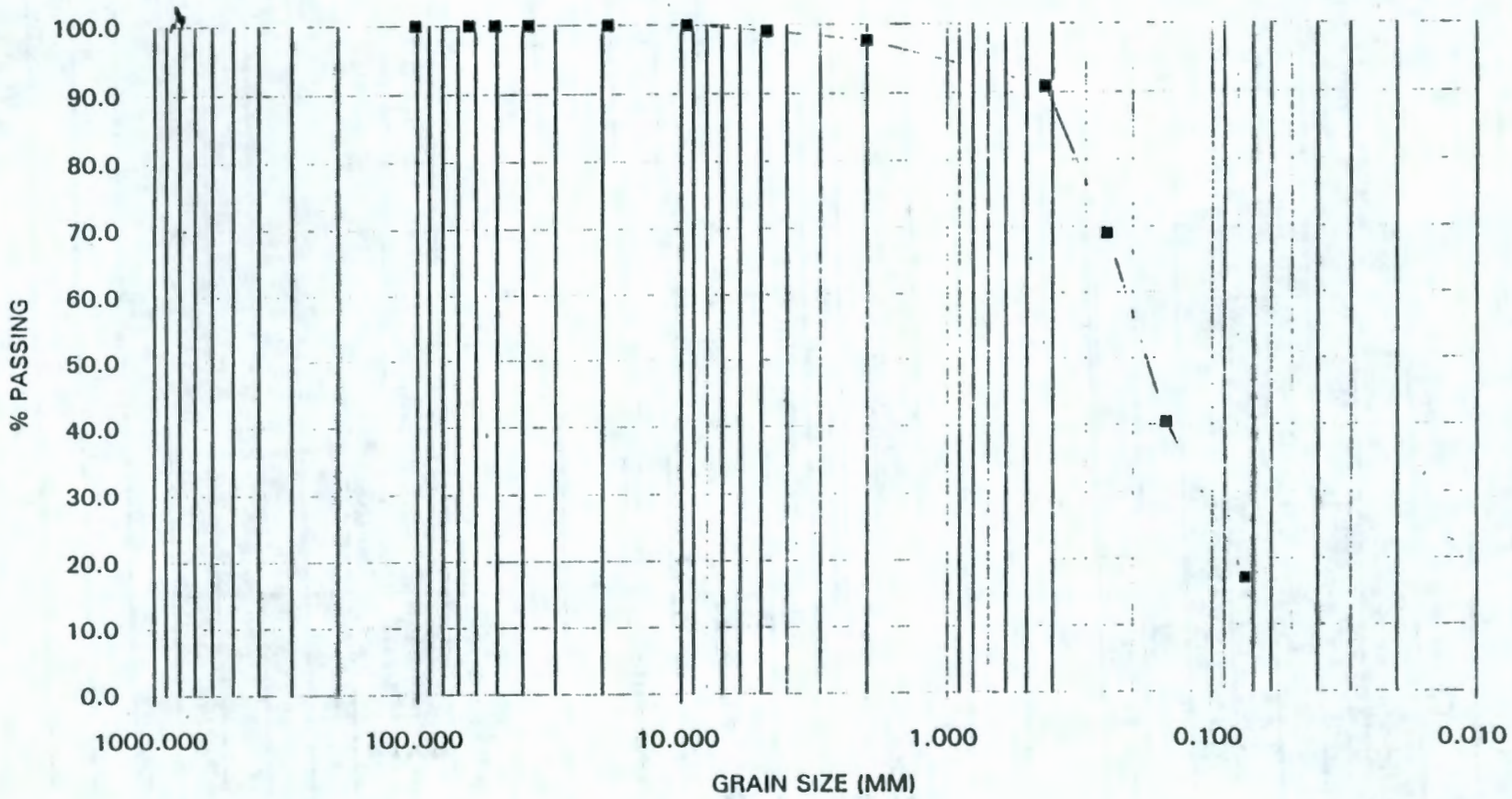
WELL #	299-W10-20	CONTACT	RAFUSE	ORIG COD	81235	PHONE	544-8137
LAB #	4-0566-1	DEPTH	108.94-109.44	TESTED BY	HH	DATE	2/1/94

SAMPLE WT (g)	SIEVE SIZE IN.	CUMULATIVE WEIGHT	% WEIGHT RETAINED	% PASSING	GRAIN SIZ MM	COMMENTS	
1736.3	4.000	0.0	0.0	100.0	101.600		
	2.500	0.0	0.0	100.0	63.500		
	2.000	0.0	0.0	100.0	50.800		
	1.500	0.0	0.0	100.0	38.100		
	0.750	0.0	0.0	100.0	19.050		
	0.375	0.0	0.0	100.0	9.525		
WT.-#10	SIEVE# 4	14.5	0.8	99.2	4.750		
SAMP.(g)	S# 10	39.7	2.3	97.7	2.000		
239.8	S# 40	16.5	6.9	91.0	0.425	SAMPLE SPLIT	
	S# 60	70.5	29.4	69.0	0.250	WASH SIEVE	
	S# 100	140.5	58.6	40.5	0.150		
	S# 200	197.6	82.4	17.2	0.075		



TEST CHECKED BY: R.T. McCutcheon DATE: 2/8/94

9413224.0530


100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
% PASSING
1000.000
100.000
10.000
1.000
0.100
0.010
GRAIN SIZE (MM)

Pg 33 of 64

GEL 07 ☒ GEL 08 ☒ GEL 09 ☒ GEL 10 ☒ GEL 14 ☒ GEL 16 ☒ GEL 17 ☒ GEL 19 ☒ GEL ☐

GEOTECHNICAL ENGINEERING LABORATORY
GEL-07 SIEVE AND HYDROMETER ANALYSIS

Sample No. 4-0566-1

GEL-07 SIEVE ANALYSIS

Date 2/1/94 Calibration Due Date 2/7/94 Balance: 3311

Sample Description _____ Sieve Time 10 (min)

Reduced By: ☐ Splitting ☐ Quartering ☐ Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed	Tested By
2.0	1736.3	0.0			HH
1.5		0.0			↓
0.75		0.0			
#4 ~~0.~~ 3/8		0.0			
4		14.5			
10	239.8	39.7			
~~#40~~ 40		16.5			sample split each sieve
60		70.5			
100		140.5			
200		197.6			

Remarks: coarse pieces are cemented materials

GEL-07 HYDROMETER ANALYSIS

Date _____ Balance: _____ Calibration Due Date _____

Thermometer: _____ Calibration Due Date _____

Hydrometer: _____ Calibration Due Date _____

WEIGHT OF SAMPLE

Wt. Container + Soil _____ (g)

Wt. Container _____ (g)

Wt. Soil _____ (g)

Specific Gravity of Sample _____

% Passing No. 10 Sieve _____ %

A = _____ W = _____ K = _____

COMPOSITE CORRECTION

1st Reading _____ at _____ °C

2nd Reading _____ at _____ °C

Date	Clock Time	Elapsed Time (min)	Hydrometer Reading	Hydrometer with Composite Correction	Temperature (°C)	Soil in Suspension (%)	Particle Diameter (mm)	Tested By
		2.0						
		5.0						
		15.0						
		30.0						
		60.0						
		250.0						
		1440.0						

Remarks: _____

Tests Checked By 2-104 Date _____

Pg 35464

GEOTECHNICAL ENGINEERING LABORATORY

GEL-16 BULK DENSITY-POROSITY	
DATE:	1/26/94
Sample No.	4-0566-1
Heis No.	
Well No.	299-W10-20
Depth	108.94-109.44
Tested by	HH
length	15.2
diameter	9.5
volume	1087.0
wt of sample + mold	2187.7
wt of mold	340.9
wet wt of sample	1846.8
dry wt of sample	1736.8
wet density of sample	1.7
water content % dry wt	6.3%
dry density	1.6
specific gravity	2.71
void ratio	0.7
porosity	41.04%
TEST CHECKED BY:	2/05/94

9413274.0533

GEL 07 ☒	GEL 16 ☒	GEOTECHNICAL ENGINEERING LABORATORY GEL-14, GEL-16, GEL-19	Sample No. [illegible]-1
GEL 09 ☒	GEL 17 ☒		Page 36 of 64
GEL 10 ☒	GEL 19 ☒		
GEL 14 ☒	GEL ☐		

GEL-14 SOIL MOISTURE

Balance: 3311 Calibration Due Date 2/7/94 Tested By HH/LDB/JRP

Thermometer: _____ Calibration Due Date _____

Date	Wet Wt. + Can	Dry Wt. + Can	Tare Wt.	Moisture	Dry Wt. Soil	% Moisture	Calculated By
1/26/94		1990.6	253.8				
2/9/94	455.11	407.10	64.14	48.01	342.96	14.0%	HH

Remarks: Pan 105

GEL-16 BULK DENSITY-POROSITY

DETERMINATION NO.			1	
Pan No.:	Mold: ☒ Plastic ☐ Metal	Length:	15 24	9.53
Sample Volume, V, cc				
Wt. of Sample & Mold, g			2187.7	
Wt. of Mold, g			340.9	
Wet Wt. of Sample, g				
Wet Density of Sample, γ m, g/cc				
Water Content % Dry Weight				
Dry Density, g/cc γ d				
Dry weight of Sample, g, Ws			1736.8	
*Void Ratio, e				
**Porosity, n, %				

Tested By HH

$$Ws = \frac{\text{Wet Wt.}}{1 + \%\ \text{Dry Wt.}}$$

$$\text{*Void Ratio, } e = \frac{\text{Avg. Sp. Gr.} \times \text{Vol.}}{Ws} - 1$$

$$\text{**Porosity, } n, \% = \left(\frac{e}{1+e}\right) 100$$

Remarks: _____

GEL-19 CALCIUM CARBONATE

Vessel No. _____ Tested By JRP

Balance No. 3304 Date Due _____

Sample Weight 8.0 (g)

Sample Pressure 0.4 (psi) $\%CaCO_3$ <1 Per Gram

Remarks: _____

Tests Checked By: _____ Date _____

9413224.0534

HYDRAULIC CONDUCTIVITY REPORT
GEL-09

SAMPLE NO. 4-0566-1 299-W10-20 Page VISCOSITY 1

Tested By: H. HAMPT Date 1/26/94

SpecimenDiameter (D, cm) 9.53 Specimen Length (L, cm) 15.24

Start Date	26-Jan-94	26-Jan-94	26-Jan-94	28-Jan-94		
Start Time	00:00:00	00:00:00	00:00:00	00:00:00		
End Date	26-Jan-94	26-Jan-94	26-Jan-94	28-Jan-94		
End Time	00:04:00	00:05:00	00:04:00	00:04:00		
Time Sec.	240	300	240	240		
Volume, cm^3	44.9	55	43.7	43.8		
Head, cm	76.8	76.8	76.8	78.7		
"Q"	1.87E-01	1.83E-01	1.82E-01	1.82E-01		
L/(A*H)	2.78E-03	2.78E-03	2.78E-03	2.71E-03		
K, cm/sec	5.20E-04	5.10E-04	5.07E-04	4.95E-04		
Kc,(K*Visc)	5.20E-04	5.10E-04	5.07E-04	4.95E-04		

Darcy's Law	K = (Q*L)/(A*H)

K = Hydraulic Conductivity (cm/sec)
Q = Flow Rate (cm^3/sec) = Volume (cm^3)/Time (sec)
A = Area (cm^2)
H = Hydraulic Head (cm - water)
L = Length of soil in column (cm)
Kc= HYDRAULIC CONDUCTIVITY corrected to VISCOSITY

Kc AVERAGE 5.08E-04
STANDARD DEVIATION 8.93E-06

Remarks:

All data is acurately and completely recorded. The test operator was trained and used calibrated instruments

Checked By: R. T. McCulloch Date: 2/05/94

Pg 37 of 64

EL 09 ☒ GEL 17 ☒
EL 10 ☒ GEL 19 ☒
EL 14 ☒ GEL ☐

GEOTECHNICAL ENGINEERING LABORATORY
GEL-09 HYDRAULIC CONDUCTIVITY DATA SHEET

299-W10-20
W-15z/RCRA
108.94 - 109.44

Sample No. [illegible]
Page ____ of ____

alance No. 3311 Permeameter No. ____

est Initiated By HH Date 1/26/94 Procedure ____ Sleeve Type: ☐ Metal ☒ Plastic

Specimen Diameter (D) 9.53 cm

Specimen Length (L) 15.24 cm

$$A = \left(\frac{D}{2}\right)^2 \times 3.14156$$

Specimen Area (A) 71.3 cm^2

Darcy's Law

$$K = \frac{QL}{AH}$$

K = Hydraulic Conductivity (cm/sec)
Q = Flow (cm^3/sec) = Vol. g/Time (sec)
A = Area (cm^2)
H = Hydraulic Head
L = Length (cm)

Date (Year 94 Mo/Day)	Run Time System (Hr:Min)	Run Time System (Hr:Min)	Run Time Time Change	Container Weight (± 0.1 g)	Container Tare (± 0.1 g)	Container Tare & Effluent (± 0.1 g)	Room Temp (°C)	Pressure Pore H_2O (cm)	Effluent Description	Operator Initials	Hydraulic Conductivity (cm/sec)	Calculated By
1.26	0:0	~~AM 4:0~~ 0:4	240s	44.9	155.4	200.3	22.4	76.8	clear	HH	5.2×10^{-4}	HH
1.26	0:0	0:5	300s	55.0	200.3	255.3	22.6	76.8	clear	HH	5.1×10^{-4}	HH
1.26	0:0	0:4	240s	43.7	255.3	299.0	22.9	76.8	clear	HH	5.1×10^{-4}	HH
1.28	0:0	0:4	240s	43.8	154.9	198.7	23.7	78.7	clear	HH	5.0×10^{-4}	HH

2-108

WHC-SD-EN-DP-086, Rev. 0

Page 38 of 64

marks ____

Test Checked By ____ Date ____

BD 6000 795 (04/92)

SPECIFIC GRAVITY
GEL-10

SAMPLE NO.: 4-0566-1 Tested by HH DATE: 2/3/94

WT. OVEN DRY SOIL, g	55.00
WT. PYCN. + WET AGEN	381.25
WT. PYCN+WET+SOIL	415.97
TEMP Deg. C	22.4
Sp.G WET. AGENT @ Te	1
Sp.G of soil at Temp	2.71
Sp.G of soil at 20 Deg.C	2.71

WT. SAMPLE IN H2O, g (C)
WT. OVEN DRY SAMPLE, g (A)
APPARENT SpG, 23/23C

SIZE FRACION, COARSE
SIZE FRACION, FINE

AVG. SpG. Values, 23/23C

temp	K
18	1.0004
19	1.0002
20	1.0000
21	0.9998
22	0.9996
23	0.9993
24	0.9991
25	0.9989
26	0.9986
27	0.9983
28	0.998
29	0.9977
30	0.9974

COMMENTS:

TEST CHECKED BY: R. T. McCutcheon DATE: 2/08/94

9413224.0567

GEL 07 ☒ GEL 09 ☒ GEL 10 ☒ GEL 14 ☒	GEL 16 ☒ GEL 17 ☒ GEL 19 ☒ GEL ☐	**GEOTECHNICAL ENGINEERING LABORATORY** **GEL-10 SPECIFIC GRAVITY SOILS FINE/COARSE**	Sample No. 4-0566-1 Page 40 of 64

GEL-10 SPECIFIC GRAVITY OF SOILS

Date ~~2/4/94 HH~~ 2/3/94 Tested By HH

Balance: 3304 Calibration Due Date ~~2/7/94~~ 2/7/94

	DETERMINATION NO.	1	2	3
W_o	Wt. Oven Dry, Soil, g	55.00	. — —	. — —
	Pycnometer No.			
	Wt. Pycnometer, g	129.19	. — —	. — —
W_a	Wt. Pycnometer + Wetting Agent, g	351.75	. — —	. — —
W_b	Wt. Pycnometer + Wetting Agent + Soil, g	415.97	. — —	. — —
	Temperature, T_x at W_b, °C	22.4		
G_w	Specific Gravity of Wetting Agent at T_x	. — —	. — —	. — —
G_t	Specific Gravity of Soil at T_x	. — —	. — —	. — —
G_s	Specific Gravity of Soil at 20 °C	. — —	. — —	. — —

Wetting Agent ~~tap~~ H_2O

$$C_t = \frac{W_o}{W_o + W_a - W_b}$$

Remarks:

GEL-10 SPECIFIC GRAVITY COARSE AGGREGATES

Date Tested By:

Balance: 3312 Calibration Due Date

	DETERMINATION NO.	1	
	Size fraction		
P_1	Size fraction, wt. % total, g		
	Tare weight		
B	Weight sample (SSD), g	. —	. —
C	Weight sample in H_2O, g	. —	. —
A	Weight of oven dry sample, g	. —	. —

Bulk Specific Gravity, 23/23 °C = A/(B-C) = . — —

A = wt. oven dry sample in air, g
B = wt. SSD sample in air, g
C = wt. saturated sample in H_2O, g

Bulk Specific Gravity SSD, 23/23 °C = B/(B-C) = . — —

Apparent Specific Gravity, 23/23 °C = A/(A-C) = . — —

*Average Specific Gravity Values, 23/23 °C $\overline{G}$ = . — —

Remarks:

$$\overline{G} = \frac{1}{\dfrac{P_1 = \%\ \text{coarse}}{G_1 = \text{coarse sp.gr.} \times 100} + \dfrac{P_2 = \%\ \text{fines}}{G_2 = \text{fines sp. gr.} \times 100}}$$

$\overline{G}$ = Ave. Specific Gravity for all forms of Specific Gravity i.e., formula applicable to Bulk, Bulk SSD and Apparent Specific Gravity.

G_1, G_2 = appropriate Specific Gravity values for each size fraction depending on the type of Specific Gravity being averaged.

P_1, P_2 = wt. percentages of each size fraction present in the original sample.

*State type of Specific Gravity Reported i.e., either Bulk, Bulk SSD or Apparent.

Tests Checked By: Date

GEL-07 SIEVE ANALYSIS REPORT SHEET

WELL #	299-W10-20	CONTACT	Rafuse	ORIG CODE	81235	PHONE	544-8137
LAB #	4-0565-2	DEPTH	92.9-93.4	TESTED BY	HH	DATE	2/10/94

SAMPLE WT (g)	SIEVE SIZE IN.	CUMMULATI WEIGHT	%WEIGHT RETAINED	% PASSING	COMMENTS	GRAIN SIZE MM
1783.4	4.000	0.0	0.0	100.0		101.600
	2.000	0.0	0.0	100.0		50.800
	1.500	0.0	0.0	100.0		38.100
	0.750	0.0	0.0	100.0		19.050
	0.375	0.0	0.0	100.0		9.525
WT.-#10	SIEVE# 4	0.0	0.0	100.0		4.750
SAMP.(g)	S# 10	0.0	0.0	100.0	WET SIEVE	2.000
200.9	S# 40	2.9	1.4	98.6		0.425
	S# 60	29.2	14.5	85.5		0.250
	S# 100	85.8	42.7	57.3		0.150
	S# 200	149.7	74.5	25.5		0.075

HYDROMETER ANALYSIS

DATE:	2/8/94	BALANCE:	3304	CALIBRATION DUE DAT	5/7/94
	THERMOMETER NO.		15	CALIBRATION DUE DAT	LIMITED
	HYDROMETER		1000	CALIBRATION DUE DAT	6/7/94

2.73

WEIGHT OF SAMPLE	104.7		SPECIFIC GRAVITY of SAMPLE	2.74
COMP. CORRECTION	4.5		% TOTAL SAMPLE PASSING #10 SIEV	99.6

DATE / TIME	ELAPSED TIME	HYDRO. READING	HYDRO. CORRECTED	TEMP. CENT.	%SOIL in SUSPENSION	"K"	"L"	PARTICLE SIZE (mm)
2/8/94	0							
10:36	2	17	12.5	22.7	11.89	0.01279	13.5	0.0332
	5	14	9.5	22.6	9.04	0.01279	14.0	0.0214
	15	12	7.5	22.7	7.13	0.01279	14.3	0.0125
	30	11	6.5	23.1	6.18	0.01279	14.5	0.0089
	60	10	5.5	23.3	5.23	0.01279	14.7	0.0063
	250	9	4.5	22.9	4.28	0.01279	14.8	0.0031
2/9/94	1440	8	3.5	21.9	3.33	0.01279	15.0	0.0013
		TEST CHECKED BY: [illegible]				DATE: 2/15/94		

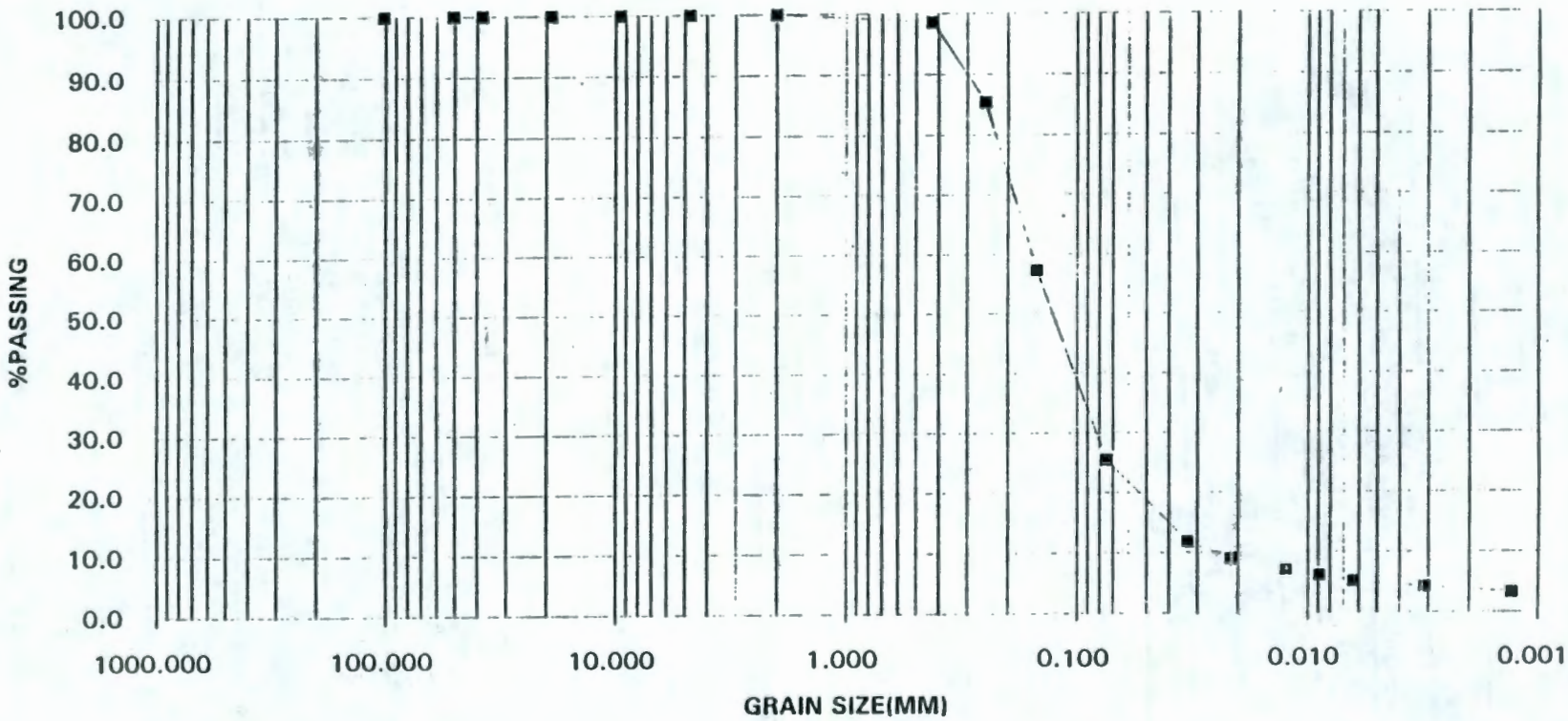
9413224.0539

Pg 42 of 64

9413224.0540

PASSING	MM
100.0	101.600
100.0	50.800
100.0	38.100
100.0	19.050
100.0	9.525
100.0	4.750
100.0	2.000
98.6	0.425
85.5	0.250
57.3	0.150
25.5	0.075
11.89	0.0332
9.04	0.0214
7.13	0.0125
6.18	0.0089
5.23	0.0063
4.28	0.0031
3.33	0.0013

GRAIN SIZE ANALYSIS PLOT



Pg 43 of 64

Gel 7,10,16

W-152

GEL 07 ☒ GEL 16 ☒
GEL 09 ☒ GEL 17 ☒
GEL 10 ☒ GEL 19 ☒
GEL 14 ☒ GEL ☐

GEOTECHNICAL ENGINEERING LABORATORY
GEL-07 SIEVE AND HYDROMETER ANALYSIS

Sample No. 4-0565-2

GEL-07 SIEVE ANALYSIS

Date 2.2.94 Calibration Due Date 2.7.94 Balance: 3311

Sample Description _____ Sieve Time 10 (min)

Reduced By: ☐ Splitting ☐ Quartering ☐ Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed	Tested By
2	1783.4	0			HH
1½		0			
3/4		0			
3/8		0			
4		0			
10	200.9	0			sample split
40		2.9			washsieve
60		29.2			
100		85.8			
200		149.7			

Remarks: * Run hydrometer A3

GEL-07 HYDROMETER ANALYSIS

Date 2/8/94

Balance: 3304 Calibration Due Date 5-7-94

Thermometer: 0015 Calibration Due Date limited

Hydrometer: 1000 Calibration Due Date 6-7-94

WEIGHT OF SAMPLE

Wt. Container + Soil 144.0 (g)

Wt. Container 39.3 (g)

Wt. Soil 104.7 (g)

Specific Gravity of Sample _____

% Passing No. 10 Sieve _____ %

A = _____ W = _____ K = _____

COMPOSITE CORRECTION

1st Reading 4.5 at 24.7 °C

2nd Reading 4.5 at 22.1 °C

Date	Clock Time	Elapsed Time (min)	Hydrometer Reading	Hydrometer with Composite Correction	Temperature (°C)	Soil in Suspension (%)	Particle Diameter (mm)	Tested By
2/8/94	10:36	2.0	17		22.7			LDB
	10:39	5.0	14		22.7			
	10:49	15.0	12		22.8			
	11:04	30.0	11		23.1			
	11:34	60.0	10		23.1			
	14:44	250.0	9		22.9			
2/9/94	10:34	1440.0	8		21.9			HH

Remarks: CYL 2, #3 washsieve pan A2

Tests Checked By _____ Date _____

9413224.0542

GEL-07 SIEVE ANALYSIS REPORT SHEET

WELL #	299-W10-20	CONTACT	Rafuse	ORIG CODE	81235	PHONE	544-8137
LAB #	4-0565-2	DEPTH	92.9-93.4	TESTED BY	HH	DATE	2/10/94

SAMPLE WT (g)	SIEVE SIZE IN.	CUMMULATI WEIGHT	%WEIGHT RETAINED	% PASSING	COMMENTS	GRAIN SIZE MM
1783.4	4.000	0.0	0.0	100.0		101.600
	2.000	0.0	0.0	100.0		50.800
	1.500	0.0	0.0	100.0		38.100
	0.750	0.0	0.0	100.0		19.050
	0.375	0.0	0.0	100.0		9.525
WT.-#10	SIEVE# 4	0.0	0.0	100.0		4.750
SAMP.(g)	S# 10	0.0	0.0	100.0	WET SIEVE	2.000
104.7	S# 40	1.1	1.1	98.9		0.425
	S# 60	13.1	12.5	87.5		0.250
	S# 100	40.2	38.4	61.6		0.150
	S# 200	73.4	70.1	29.9		0.075

HYDROMETER ANALYSIS

DATE:	2/8/94	BALANCE:	3304	CALIBRATION DUE DAT	5/7/94
	THERMOMETER NO.		15	CALIBRATION DUE DAT	LIMITED
	HYDROMETER		1000	CALIBRATION DUE DAT	6/7/94

2.73

WEIGHT OF SAMPLE	104.7		SPECIFIC GRAVITY of SAMPLE	2.74
COMP. CORRECTION	4.5		% TOTAL SAMPLE PASSING #10 SIEV	99.6

DATE / TIME	ELAPSED TIME	HYDRO. READING	HYDRO. CORRECTED	TEMP. CENT.	%SOIL in SUSPENSION	"K"	"L"	PARTICLE SIZE (mm)
2/8/94	0							
10:36	2	17	12.5	22.7	11.89	0.01279	13.5	0.0332
	5	14	9.5	22.6	9.04	0.01279	14.0	0.0214
	15	12	7.5	22.7	7.13	0.01279	14.3	0.0125
	30	11	6.5	23.1	6.18	0.01279	14.5	0.0089
	60	10	5.5	23.3	5.23	0.01279	14.7	0.0063
	250	9	4.5	22.9	4.28	0.01279	14.8	0.0031
2/9/94	1440	8	3.5	21.9	3.33	0.01279	15.0	0.0013
		TEST CHECKED BY: [illegible]				DATE:	2/15/94	

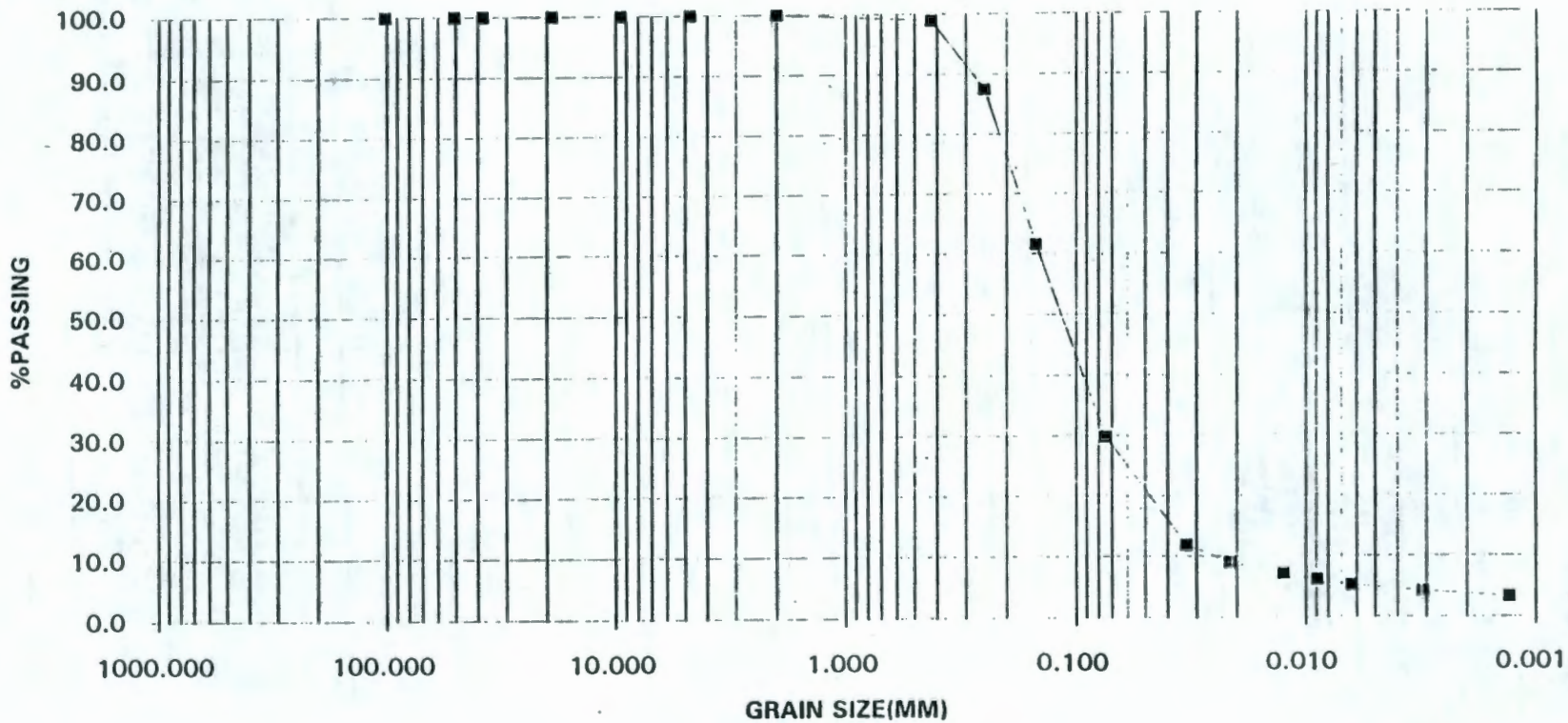
9413224.0543

Pg 46 of 64

PASSING	MM
100.0	101.600
100.0	50.800
100.0	38.100
100.0	19.050
100.0	9.525
100.0	4.750
100.0	2.000
98.9	0.425
87.5	0.250
61.6	0.150
29.9	0.075
11.89	0.0332
9.04	0.0214
7.13	0.0125
6.18	0.0089
5.23	0.0063
4.28	0.0031
3.33	0.0013

9413224.0544

GRAIN SIZE ANALYSIS PLOT



GEL 07 ☒	GEL 16 ☒	**GEOTECHNICAL ENGINEERING LABORATORY**	Sample No. 4-08605-2
GEL 09 ☐	GEL 17 ☒	**GEL-07 SIEVE AND HYDROMETER ANALYSIS**	Page 48 of 64
GEL 10 ☒	GEL 19 ☒		
GEL 14 ☒	GEL ☐		

GEL-07 SIEVE ANALYSIS

Date 6/10/94 Calibration Due Date 5/7/94 Balance: 3311

Sample Description _____ Sieve Time 10 (min)

Reduced By: ☐ Splitting ☐ Quartering ☐ Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed	Tested By
10	104.7	0 ~~0.1~~			[illegible]
40		1.1			↓
60		13.1			↓
100		40.2			↓
200		73.4			↓

Remarks: hydrometer wash material

GEL-07 HYDROMETER ANALYSIS

Date _____ Balance: _____ Calibration Due Date _____

Thermometer: _____ Calibration Due Date _____

Hydrometer: _____ Calibration Due Date _____

WEIGHT OF SAMPLE

Wt. Container + Soil _____ (g) Specific Gravity of Sample _____

Wt. Container _____ (g) % Passing No. 10 Sieve _____ %

Wt. Soil _____ (g) A = _____ W = _____ K = _____

COMPOSITE CORRECTION

1st Reading _____ at _____ °C

2nd Reading _____ at _____ °C

Date	Clock Time	Elapsed Time (min)	Hydrometer Reading	Hydrometer with Composite Correction	Temperature (°C)	Soil in Suspension (%)	Particle Diameter (mm)	Tested By
		2.0						
		5.0						
		15.0						
		30.0						
		60.0						
		250.0						
		1440.0						

Remarks: _____

Tests Checked By _____ Date _____

9413224.0596

Pg 49 of 64

GEOTECHNICAL ENGINEERING LABORATORY

GEL-16 BULK DENSITY-POROSITY	
DATE:	2/1/94
Sample No.	4-0565-2
Heis No.	
Well No.	299-W10-20
Depth	92.9-93.4
Tested by	HH
length	15.1
diameter	9.5
volume	1071.1
wt of sample + mold	2163.7
wt of mold	334.5
wet wt of sample	1829.2
dry wt of sample	1780.4
wet density of sample	1.7
water content % dry wt	2.7%
dry density	1.7
specific gravity	2.73
void ratio	0.6
porosity	39.11%
TEST CHECKED BY:	[illegible] 2/15/94

9413224.0547

GEL 07 ☒	GEL 16 ☒	GEOTECHNICAL ENGINEERING LABORATORY GEL-14, GEL-16, GEL-19	Sample No. 4-0565-2
GEL 09 ☐	GEL 17 ☐		Page 56 of 64
GEL 10 ☒	GEL 19 ☐		
GEL 14 ☐	GEL ☐		

GEL-14 SOIL MOISTURE

Balance: _____ Calibration Due Date _____ Tested By _____

Thermometer: _____ Calibration Due Date _____

Date	Wet Wt. Can	Dry Wt. Can	Tare Wt.	Moisture	Dry Wt. Soil	% Moisture	Calculated By

Remarks: _____

GEL-16 BULK DENSITY-POROSITY

DETERMINATION NO.			1	
Pan No.:	Mold: ☒ Plastic ☐ Metal	Length:	15.08	9.51
Sample Volume, V, cc			1071.16	
Wt. of Sample & Mold, g			2163.7	
Wt. of Mold, g			334.5	
Wet Wt. of Sample, g			1829.20	
Wet Density of Sample, γ m, g/cc			1.71	
Water Content % Dry Weight			2.68	
Dry Density, g/cc γ d			1.66	
Dry weight of Sample, g, Ws			1780.4	
*Void Ratio, e			0.64	
**Porosity, n, %			39.12%	

Tested By HH 2/1/94

4-0565-2

$$Ws = \frac{\text{Wet Wt.}}{1 + \%\ \text{Dry Wt.}}$$

$$*\text{Void Ratio, } e = \frac{\text{Avg. Sp. Gr.} \times \text{Vol.}}{Ws} - 1$$

$$**\text{Porosity, } n, \% = \left(\frac{e}{1+e}\right) 100$$

Remarks: pan no. 121 wt. = 257.3 wet wt. + pan = 2085.4 full sleeve, Sand
92.9-93.40' 299-W10-20 W-152
d = 9.54, 9.53, 9.46 L = 15.08, 15.10, 15.07 dry wt. + pan = 2037.7

GEL-19 CALCIUM CARBONATE

Vessel No. _____ Tested By _____

Balance No. 3304 Date Due _____

Sample Weight 9.0 (g)

Sample Pressure _____ (psi) %$CaCO_3$ _____ Per Gram

Remarks: _____

Tests Checked By: _____ Date _____

SPECIFIC GRAVITY
GEL-10

SAMPLE NO 4-0565-2 Tested by HH DATE: 2/4/94

WT. OVEN DRY SOIL. g	55.00
WT. PYCN. + WET AGEN	381.25
WT. PYCN+WET+SOIL	416.12
TEMP Deg. C	21.9
Sp.G WET. AGENT @ Te	1
Sp.G of soil at Temp	2.73
Sp.G of soil at 20 Deg.C	2.73

WT. SAMPLE IN H2O, g (C)
WT. OVEN DRY SAMPLE, g (A)
APPARENT SpG, 23/23C

SIZE FRACION, COARSE
SIZE FRACION, FINE

AVG. SpG. Values, 23/23C

temp	K
18	1.0004
19	1.0002
20	1.0000
21	0.9998
22	0.9996
23	0.9993
24	0.9991
25	0.9989
26	0.9986
27	0.9983
28	0.998
29	0.9977
30	0.9974

COMMENTS:

TEST CHECKED BY: R M Schofield DATE: 2/15/94

GEL 07 ☒ GEL 16 ☒ GEL 09 ☐ GEL 17 ☐ GEL 10 ☒ GEL 19 ☐ GEL 14 ☐ GEL ☐	**GEOTECHNICAL ENGINEERING LABORATORY** **GEL-10 SPECIFIC GRAVITY SOILS FINE/COARSE**	Sample No. ~~4-865~~ 4-0565- Page 52 of 64

GEL-10 SPECIFIC GRAVITY OF SOILS

Date 2/4/94 Tested By HH

Balance: 3304 Calibration Due Date 2/7/94

	DETERMINATION NO.	1	2	3
W_o	Wt. Oven Dry, Soil, g	55.00	.	.
	Pycnometer No.			
	Wt. Pycnometer, g	129.19	.	.
W_a	Wt. Pycnometer + Wetting Agent, g	381.25	.	.
W_b	Wt. Pycnometer + Wetting Agent + Soil, g	416.12	.	.
	Temperature, T_x at W_b, °C	21.9		
G_w	Specific Gravity of Wetting Agent at T_x	1.00	.	.
G_t	Specific Gravity of Soil at T_x	2.73	.	.
G_s	Specific Gravity of Soil at 20 °C	2.73	.	.

Wetting Agent ~~tap~~ H_2O

$$C_t = \frac{W_o}{W_o + W_a - W_b}$$

Remarks:

GEL-10 SPECIFIC GRAVITY COARSE AGGREGATES

Date Tested By:

	DETERMINATION NO.	1	
	Size fraction		
P_1	Size fraction, wt. % total, g		
B	Weight sample (SSD), g	.	.
C	Weight sample in H_2O, g	.	.
A	Weight of oven dry sample, g	.	.

Bulk Specific Gravity, 23/23 °C = A/(B-C) = .

A = wt. oven dry sample in air, g
B = wt. SSD sample in air, g
C = wt. saturated sample in H_2O, g

Bulk Specific Gravity SSD, 23/23 °C = B/(B-C) = .

Apparent Specific Gravity, 23/23 °C = A/(A-C) = .

*Average Specific Gravity Values, 23/23 °C $\overline{G}$ = .

Remarks:

$$\overline{G} = \frac{1}{\frac{P_1 = \%\ \text{coarse}}{G_1 = \text{coarse sp.gr.} \times 100} + \frac{P_2 = \%\ \text{fines}}{G_2 = \text{fines sp. gr.} \times 100}}$$

$\overline{G}$ = Ave. Specific Gravity for all forms of Specific Gravity i.e., formula applicable to Bulk, Bulk SSD and Apparent Specific Gravity.

G_1, G_2 = appropriate Specific Gravity values for each size fraction depending on the type of Specific Gravity being averaged.

P_1, P_2 = wt. percentages of each size fraction present in the original sample.

*State type of Specific Gravity Reported i.e., either Bulk, Bulk SSD or Apparent.

Tests Checked By: Date

Pg 53 of 64

GEL-07 SIEVE ANALYSIS REPORT SHEET

WELL #	299-W10-20	CONTACT	Rafuse	ORIG CODE	81235	PHONE	544-8137
LAB #	4-0565-1	DEPTH	92.4-92.9	TESTED BY	HH	DATE	2/2/94

SAMPLE WT (g)	SIEVE SIZE IN	CUMMULATI WEIGHT	%WEIGHT RETAINED	% PASSING	COMMENTS	GRAIN SIZE MM
1720.2	4.000	0.0	0.0	100.0		101.600
	2.000	0.0	0.0	100.0		50.800
	1.500	0.0	0.0	100.0		38.100
	0.750	0.0	0.0	100.0		19.050
	0.375	1.7	0.1	99.9		9.525
WT.-#10	SIEVE# 4	2.8	0.2	99.8		4.750
SAMP.(g)	S# 10	7.5	0.4	99.6	WET SIEVE	2.000
189.0	S# 40	4.5	2.4	97.2		0.425
	S# 60	23.3	12.3	87.3		0.250
	S# 100	65.4	34.6	65.1		0.150
	S# 200	122.9	65.0	34.8		0.075

HYDROMETER ANALYSIS

DATE:	2/8/94	BALANCE.	3304	CALIBRATION DUE DAT	5/7/94
	THERMOMETER NO.		15	CALIBRATION DUE DAT	LIMITED
	HYDROMETER		1007	CALIBRATION DUE DAT	1/20/95

WEIGHT OF SAMPLE	87.9		SPECIFIC GRAVITY of SAMPLE	2.74
COMP. CORRECTION	4		% TOTAL SAMPLE PASSING #10 SIEV	99.6

DATE / TIME	ELAPSED TIME	HYDRO. READING	HYDRO. CORRECTED	TEMP. CENT.	%SOIL in SUSPENSION	"K"	"L"	PARTICLE SIZE (mm)
2/8/94	0							
10:29	2	18	14	22.7	15.86	0.01279	13.3	0.0330
	5	14	10	22.6	11.33	0.01279	14.0	0.0214
	15	12	8	22.7	9.06	0.01279	14.3	0.0125
	30	11	7	23.1	7.93	0.01279	14.5	0.0089
	60	10	6	23.3	6.80	0.01279	14.7	0.0063
	250	9	5	22.9	5.67	0.01279	14.8	0.0031
2/9/94	1440	7	3	21.9	3.40	0.01279	15.2	0.0013
		TEST CHECKED BY: [illegible]				DATE:	2/15/94	

9413224.0551

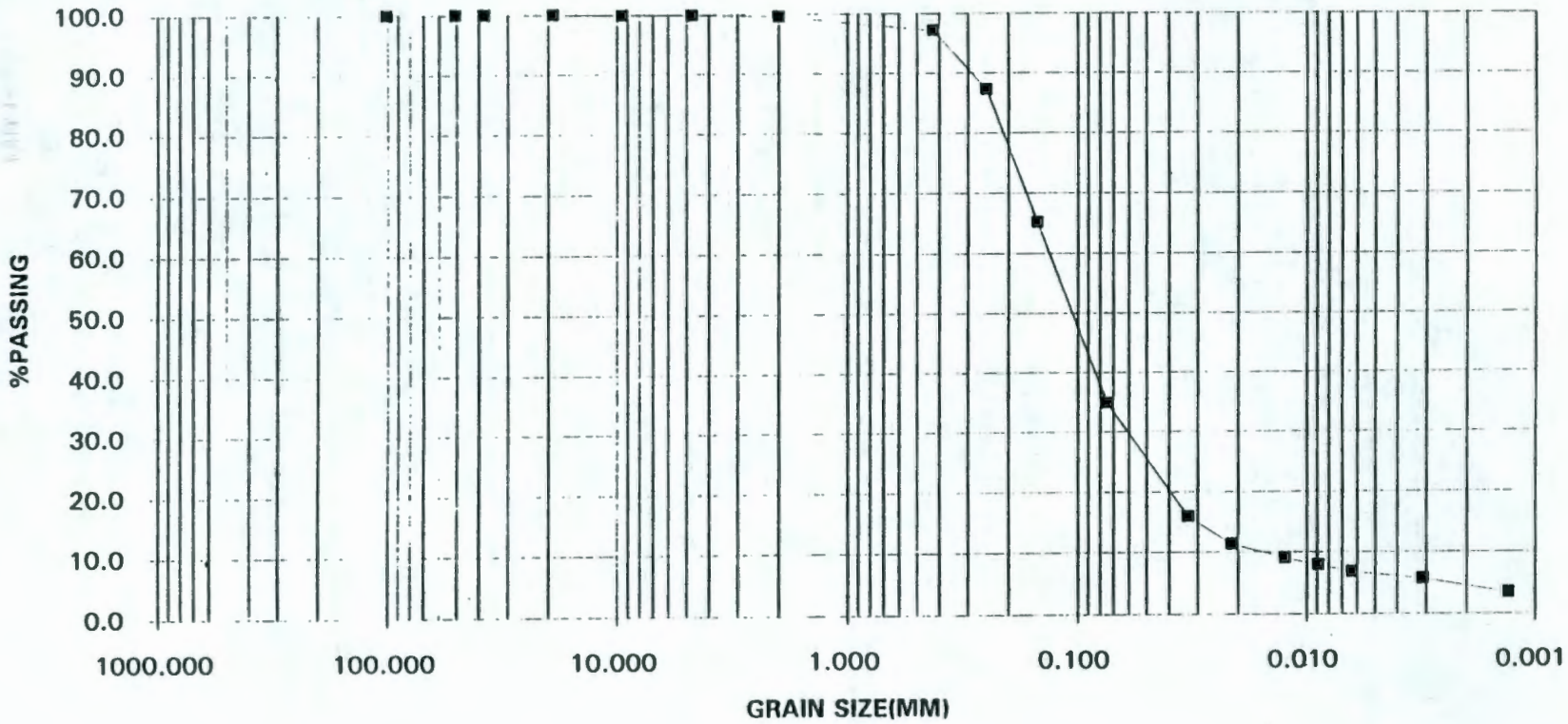
Pg 54 of 64

9413274.0552

PASSING	MM
100.0	101.600
100.0	50.800
100.0	38.100
100.0	19.050
99.9	9.525
99.8	4.750
99.6	2.000
97.2	0.425
87.3	0.250
65.1	0.150
34.8	0.075
15.86	0.0330
11.33	0.0214
9.06	0.0125
7.93	0.0089
6.80	0.0063
5.67	0.0031
3.40	0.0013

Pg 65 of 64

GRAIN SIZE ANALYSIS PLOT



9413224.0553

GEL 07 ☒ GEL 16 ☒
GEL 09 ☐ GEL 17 ☐
GEL 10 ☒ GEL 19 ☒
GEL 14 ☒ GEL ☐

GEOTECHNICAL ENGINEERING LABORATORY
GEL-07 SIEVE AND HYDROMETER ANALYSIS

Sample No. 4-0565-1

GEL-07 SIEVE ANALYSIS

Date 2.2.94 Calibration Due Date 2.7.94 Balance: 3311

Sample Description _____ Sieve Time 10 (min)

Reduced By: ☐ Splitting ☐ Quartering ☐ Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed	Tested By
2	1720.2	0			HH
1½		0			
~~#4~~ 3/4		0			
3/8		1.7			
4		2.8			
10	189.0	7.5			sample split wash sieve
40		4.5			
60		23.3			
100		65.4			
200		122.9			

Remarks: * hydrometer necessary 12

GEL-07 HYDROMETER ANALYSIS

Date 2/8/94 Balance: 3304 Calibration Due Date 5-7-94

Thermometer: 15 Calibration Due Date 12-8-94

Hydrometer: 1007 Calibration Due Date 1-20-95

WEIGHT OF SAMPLE

Wt. Container + Soil 128.1 (g)

Wt. Container 40.2 (g)

Wt. Soil 87.9 (g)

Specific Gravity of Sample 2.74

% Passing No. 10 Sieve _____ %

A = _____ W = _____ K = _____

COMPOSITE CORRECTION

1st Reading 4.0 at 24.7 °C

2nd Reading 4.0 at 22.1 °C

Date	Clock Time	Elapsed Time (min)	Hydrometer Reading	Hydrometer with Composite Correction	Temperature (°C)	Soil in Suspension (%)	Particle Diameter (mm)	Tested By
2/8/94	10:29	2.0	18		22.7			LDB
	10:32	5.0	14		22.6			
	10:42	15.0	12		22.7			
	10:57	30.0	11		23.1			
	11:27	60.0	10		23.3			
	14:37	250.0	~~8~~ 9		22.9			
2/9/94	10:27	1440.0	7		21.9			HH

Remarks: ~~BCA~~ CYL-1, A2 washsieve pan no. #4

Tests Checked By _____ Date _____

Pg 57 of 64

GEL-07 SIEVE ANALYSIS REPORT SHEET

WELL #	299-W10-20	CONTACT	Rafuse	ORIG CODE	81235	PHONE	544-8137
LAB #	4-0565-1	DEPTH	92.9-93.4	TESTED BY	HH	DATE	2/2/94

SAMPLE WT (g)	SIEVE SIZE IN.	CUMMULATI WEIGHT	%WEIGHT RETAINED	% PASSING	COMMENTS	GRAIN SIZE MM
1720.2	4.000	0.0	0.0	100.0		101.600
	2.000	0.0	0.0	100.0		50.800
	1.500	0.0	0.0	100.0		38.100
	0.750	0.0	0.0	100.0		19.050
	0.375	1.7	0.1	99.9		9.525
WT.-#10	SIEVE# 4	2.8	0.2	99.8		4.750
SAMP.(g)	S# 10	7.5	0.4	99.6	WET SIEVE	2.000
87.9	S# 40	2.9	3.3	96.3		0.425
	S# 60	13.1	14.9	84.7		0.250
	S# 100	31.9	36.3	63.4		0.150
	S# 200	55.7	63.4	36.5		0.075

HYDROMETER ANALYSIS

DATE:	2/8/94	BALANCE:	3304	CALIBRATION DUE DAT	5/7/94
	THERMOMETER NO.		15	CALIBRATION DUE DAT	LIMITED
	HYDROMETER		1000	CALIBRATION DUE DAT	6/7/94

2.73

WEIGHT OF SAMPLE	104.7		SPECIFIC GRAVITY of SAMPLE	2.74
COMP. CORRECTION	4.5		% TOTAL SAMPLE PASSING #10 SIEV	99.6

DATE / TIME	ELAPSED TIME	HYDRO. READING	HYDRO. CORRECTED	TEMP. CENT.	%SOIL in SUSPENSION	"K"	"L"	PARTICLE SIZE (mm)
2/8/94	0							
10:36	2	17	12.5	22.7	11.89	0.01279	13.5	0.0332
	5	14	9.5	22.6	9.04	0.01279	14.0	0.0214
	15	12	7.5	22.7	7.13	0.01279	14.3	0.0125
	30	11	6.5	23.1	6.18	0.01279	14.5	0.0089
	60	10	5.5	23.3	5.23	0.01279	14.7	0.0063
	250	9	4.5	22.9	4.28	0.01279	14.8	0.0031
2/9/94	1440	8	3.5	21.9	3.33	0.01279	15.0	0.0013
		TEST CHECKED BY: [illegible]				DATE: 2/15/94		

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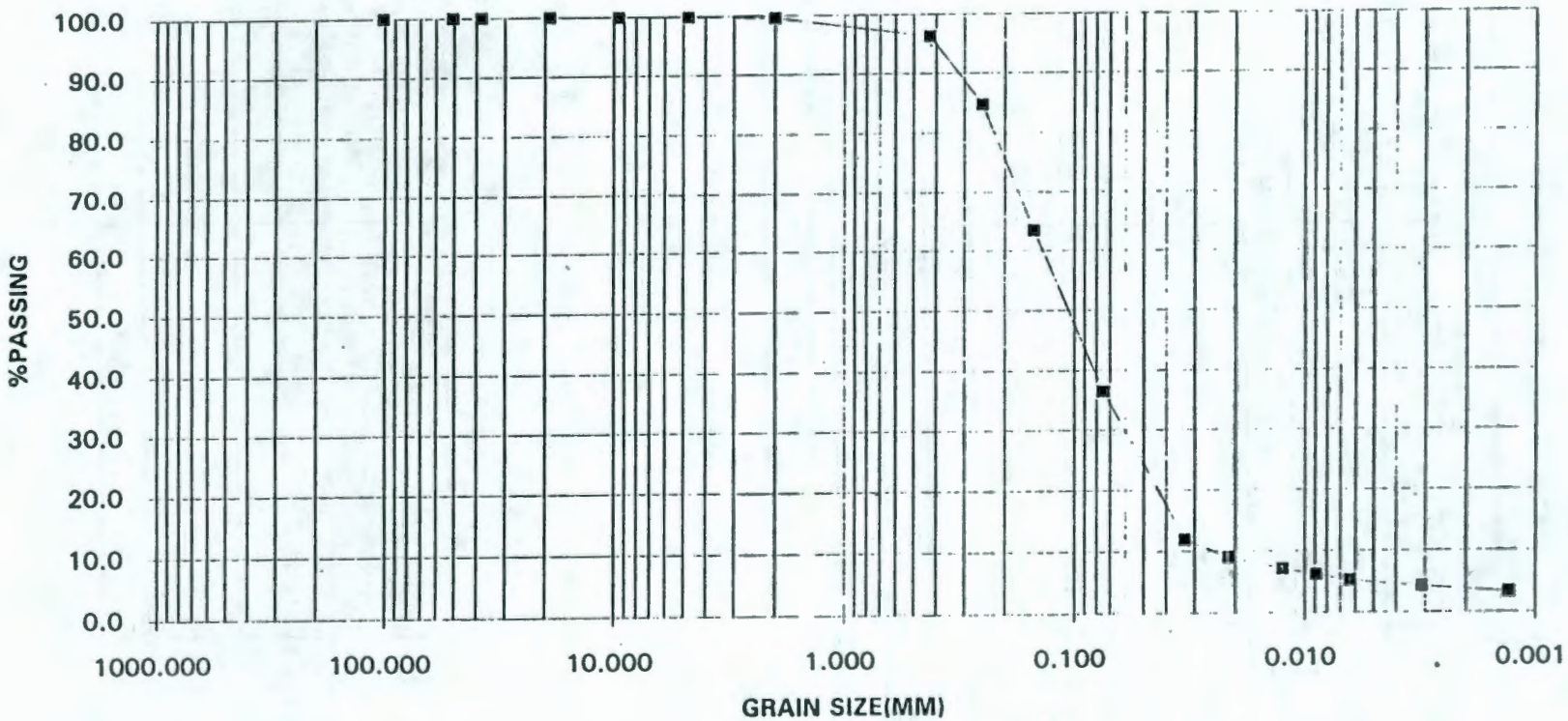
Pg 58 of 64

PASSING	MM
100.0	101.600
100.0	50.800
100.0	38.100
100.0	19.050
99.9	9.525
99.8	4.750
99.6	2.000
96.3	0.425
84.7	0.250
63.4	0.150
36.5	0.075
11.89	0.0332
9.04	0.0214
7.13	0.0125
6.18	0.0089
5.23	0.0063
4.28	0.0031
3.33	0.0013

9413224.0556

GRAIN SIZE ANALYSIS PLOT



Pg 59 of 64

GEL 07 ☒	GEL 16 ☒
GEL 09 ☐	GEL 17 ☐
GEL 10 ☒	GEL 19 ☒
GEL 14 ☒	GEL ☐

WHC-SD-EN-DP-086, Rev. 0

GEOTECHNICAL ENGINEERING LABORATORY
GEL-07 SIEVE AND HYDROMETER ANALYSIS

Sample No. 4-0565-1

GEL-07 SIEVE ANALYSIS

Date 2/10/94 Calibration Due Date 5/7/94 Balance: 3311

Sample Description _____ Sieve Time 10 (min)

Reduced By: ☐ Splitting ☐ Quartering ☐ Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed	Tested By
10	87.9	0			
40		2.9			
60		13.1			
100		31.9			
200		55.7			

Remarks: Hydrometer wash material?

GEL-07 HYDROMETER ANALYSIS

Date _____ Balance: _____ Calibration Due Date _____

Thermometer: _____ Calibration Due Date _____

Hydrometer: _____ Calibration Due Date _____

WEIGHT OF SAMPLE

Wt. Container + Soil _____ (g)

Wt. Container _____ (g)

Wt. Soil _____ (g)

Specific Gravity of Sample _____

% Passing No. 10 Sieve _____ %

A = _____ W = _____ K = _____

COMPOSITE CORRECTION

1st Reading _____ at _____ °C

2nd Reading _____ at _____ °C

Date	Clock Time	Elapsed Time (min)	Hydrometer Reading	Hydrometer with Composite Correction	Temperature (°C)	Soil in Suspension (%)	Particle Diameter (mm)	Tested By
		2.0						
		5.0						
		15.0						
		30.0						
		60.0						
		250.0						
		1440.0						

Remarks: _____

2-130

Tests Checked By R.T. McCartney Date 3/29/94

BD-6000-796 (04/92)

GEL 07 [X] GEL 09 [ ] GEL 10 [X] GEL 14 [X]	GEL 16 [X] GEL 17 [ ] GEL 19 [X] GEL [ ]	GEOTECHNICAL ENGINEERING LABORATORY GEL-14, GEL-16, GEL-19

Sample No. 4-0565-1&3

Page 61 of 64

GEL-14 SOIL MOISTURE

Balance: 3304 Calibration Due Date 5/7/94 Tested By JRP | LDB

Thermometer: _____ Calibration Due Date _____

Date	Wet Wt. + Can	Dry Wt. + Can	Tare Wt.	Moisture	Dry Wt. Soil	% Moisture	Calculated By
2/9/94	489.32	478.33	62.58	10.99	415.75	2.6	HH

Remarks: 4-0565-3

GEL-16 BULK DENSITY-POROSITY

DETERMINATION NO.	1	diam.
Pan No.: Mold: [X] Plastic [ ] Metal Length:	15.11	9.56
Sample Volume, V, cc		
Wt. of Sample & Mold, g	2124.8	
Wt. of Mold, g	336.4	
Wet Wt. of Sample, g		
Wet Density of Sample, γ m, g/cc		
Water Content % Dry Weight		
Dry Density, g/cc γ d		
Dry weight of Sample, g, Ws	1720.0	
*Void Ratio, e		
**Porosity, n, %		

Tested By HH 2/1/94

4-0565-1

$$Ws = \frac{\text{Wet Wt.}}{1 + \%\ \text{Dry Wt.}}$$

$$*\text{Void Ratio, } e = \frac{\text{Avg. Sp. Gr.} \times \text{Vol.}}{Ws} - 1$$

$$**\text{Porosity, } n, \% = \left(\frac{e}{1+e}\right) 100$$

Remarks: pan no. 122 wt. = 252.1 fullsleeve, sand
92.4'-92.9' 299-W10-20 W-152 d=9.58, 9.57, 9.53
wet wt. w/pan = 2038.5 dry wt. + pan = 1972.1 L=15.12, 15.10, 15.11

GEL-19 CALCIUM CARBONATE

Vessel No. 5687 Tested By JRP

Balance No. 3304 Date Due 5/7/94

Sample Weight 8.0 (g)

Sample Pressure 1.0 (psi) %$CaCO_3$ 1.7 Per Gram

Remarks: _____

Tests Checked By: [signature] Date 2/15/94

Pg 62 of 64

GEOTECHNICAL ENGINEERING LABORATORY

GEL-16 BULK DENSITY-POROSITY	
DATE:	2/1/94
Sample No.	4-0565-1
Heis No.	
Well No.	299-W10-20
Depth	92.4-92.9
Tested by	HH
length	15.1
diameter	9.6
volume	1084.6
wt of sample + mold	2124.8
wt of mold	336.4
wet wt of sample	1788.4
dry wt of sample	1720.0
wet density of sample	1.6
water content % dry wt	4.0%
dry density	1.6
specific gravity	2.74
void ratio	0.7
porosity	42.12%
TEST CHECKED BY:	[illegible]

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Pg 63 of 64

SPECIFIC GRAVITY
GEL-10

SAMPLE NO.: 4-0565-1 Tested by HH DATE: 2/4/94

WT. OVEN DRY SOIL, g	55.00
WT. PYCN. + WET AGEN	381.25
WT. PYCN+WET+SOIL	416.16
TEMP Deg. C	22
Sp.G WET. AGENT @ Te	1
Sp.G of soil at Temp	2.74
Sp.G of soil at 20 Deg.C	2.74
WT. SAMPLE IN H2O, g (C)	
WT. OVEN DRY SAMPLE, g (A)	
APPARENT SpG, 23/23C	
SIZE FRACION, COARSE	
SIZE FRACION, FINE	
AVG. SpG. Values, 23/23C	

temp	K
18	1.0004
19	1.0002
20	1.0000
21	0.9998
22	0.9996
23	0.9993
24	0.9991
25	0.9989
26	0.9986
27	0.9983
28	0.998
29	0.9977
30	0.9974

COMMENTS:

TEST CHECKED BY: R. T. M. Shutosti DATE: 2/15/94

GEL 07 ☒ GEL 09 ☐ GEL 10 ☒ GEL 14 ☒	GEL 16 ☒ GEL 17 ☐ GEL 19 ☒ GEL ☐	**GEOTECHNICAL ENGINEERING LABORATORY** **GEL-10 SPECIFIC GRAVITY SOILS FINE/COARSE**

Sample No. 4-0565-1

GEL-10 SPECIFIC GRAVITY OF SOILS

Date 2/4/94 Tested By HH

Balance: 3304 Calibration Due Date 2/7/94

	DETERMINATION NO.	1	2	3
W_o	Wt. Oven Dry, Soil, g	55.00	.	.
	Pycnometer No.			
	Wt. Pycnometer, g	129.19	.	.
W_a	Wt. Pycnometer + Wetting Agent, g	381.25	.	.
W_b	Wt. Pycnometer + Wetting Agent + Soil, g	416.16	.	.
	Temperature, T_x at W_b, °C	22.0		
G_w	Specific Gravity of Wetting Agent at T_x	~~1.02.74~~	.	.
G_t	Specific Gravity of Soil at T_x	2.74	.	.
G_s	Specific Gravity of Soil at 20 °C	2.74	.	.

Wetting Agent ~~Tapwater~~

$$C_t = \frac{W_o}{W_o + W_a - W_b}$$

Remarks:

GEL-10 SPECIFIC GRAVITY COARSE AGGREGATES

Date Tested By:

	DETERMINATION NO.	1	
	Size fraction		
P_1	Size fraction, wt. % total, g		
B	Weight sample (SSD), g	.	.
C	Weight sample in H_2O, g	.	.
A	Weight of oven dry sample, g	.	.

Bulk Specific Gravity, 23/23 °C = A/(B-C) = .

A = wt. oven dry sample in air, g
B = wt. SSD sample in air, g
C = wt. saturated sample in H_2O, g

Bulk Specific Gravity SSD, 23/23 °C = B/(B-C) = .

Apparent Specific Gravity, 23/23 °C = A/(A-C) = .

*Average Specific Gravity Values, 23/23 °C $\overline{G}$ = .

Remarks:

$$\overline{G} = \frac{1}{\frac{P_1 = \%\ \text{coarse}}{G_1 = \text{coarse sp.gr.} \times 100} + \frac{P_2 = \%\ \text{fines}}{G_2 = \text{fines sp. gr.} \times 100}}$$

$\overline{G}$ = Ave. Specific Gravity for all forms of Specific Gravity i.e., formula applicable to Bulk, Bulk SSD and Apparent Specific Gravity.

G_1, G_2 = appropriate Specific Gravity values for each size fraction depending on the type of Specific Gravity being averaged.

P_1, P_2 = wt. percentages of each size fraction present in the original sample.

*State type of Specific Gravity Reported i.e., either Bulk, Bulk SSD or Apparent.

Tests Checked By: Date

VALIDATED
KDR 3/24/94
SIGNATURE/DATE

Pg 1 of 3

Westinghouse Hanford Company
NaI Spectral Gamma-Ray Borehole Survey Log Header

Project Information

Borehole 299-W10-20

Project LLBG - 3

Borehole Environment Information

Borehole liquid depth none (ft) from zero (0.0) depth reference of log

Casing size (inch)	Casing thickness (inch)	Top depth (feet)	Base depth (feet)
12	0.40	0	15
10	0.38	0	53
8	0.38	0	242

NaI Passive Spectral Gamma Survey Information

Logging Engineer(s) R. K. Price R K Price
Log depth reference at zero (0.0) depth is ground level
Depth return error recorded at zero depth reference.
☑ Pre log energy calibration spectra recorded with field verifier.
☑ Logging Equipment was cleaned as described in WHC-CM-7-7 EII 11.1 Section 5.4 Signed Randall Price Date 24 MAR 94
Detector Type: NaI Spectra Detector ID: RLSN3
Calibration Date: Jul 26, 93
Notes: Total Gamma-ray activity is computed from each recorded spectra. Casing thickness and borehole fluid corrections are not applied. Heaving sand at 242 feet prevented log survey to drill depth.

Log Date	Archive File Names	Log Mode	Speed ft/m	Depth interval (ft) Top	Base	Incr	Return Error (inch)
Oct 20, 93	N032	Fixed	2.5	0	51	0.5	0.5 Low
Nov 17, 93	N040 N041	Fixed "	2.5 "	0 0	236 236	0.5 0.5	- 0.3 Low

Fixed: Constant Winch Speed

9413224.0563

NaI Gamma-Ray Borehole Survey

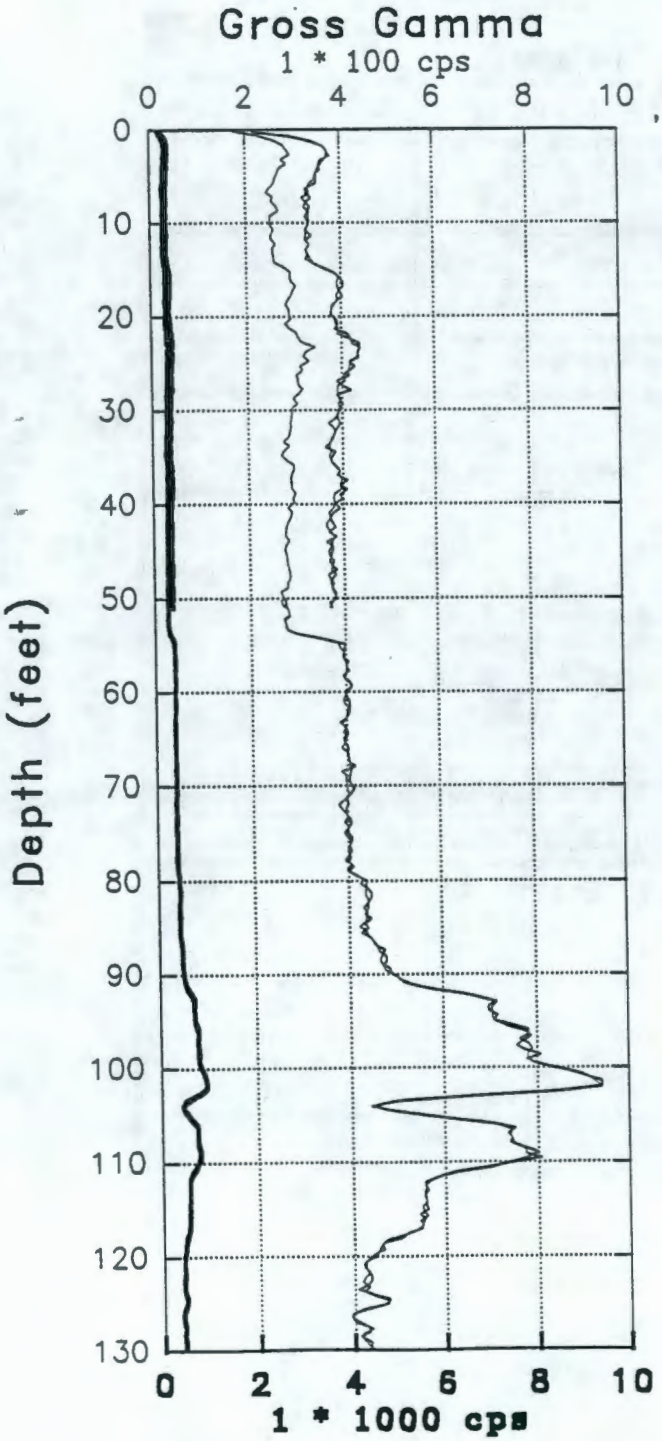
Pg 2 of 3

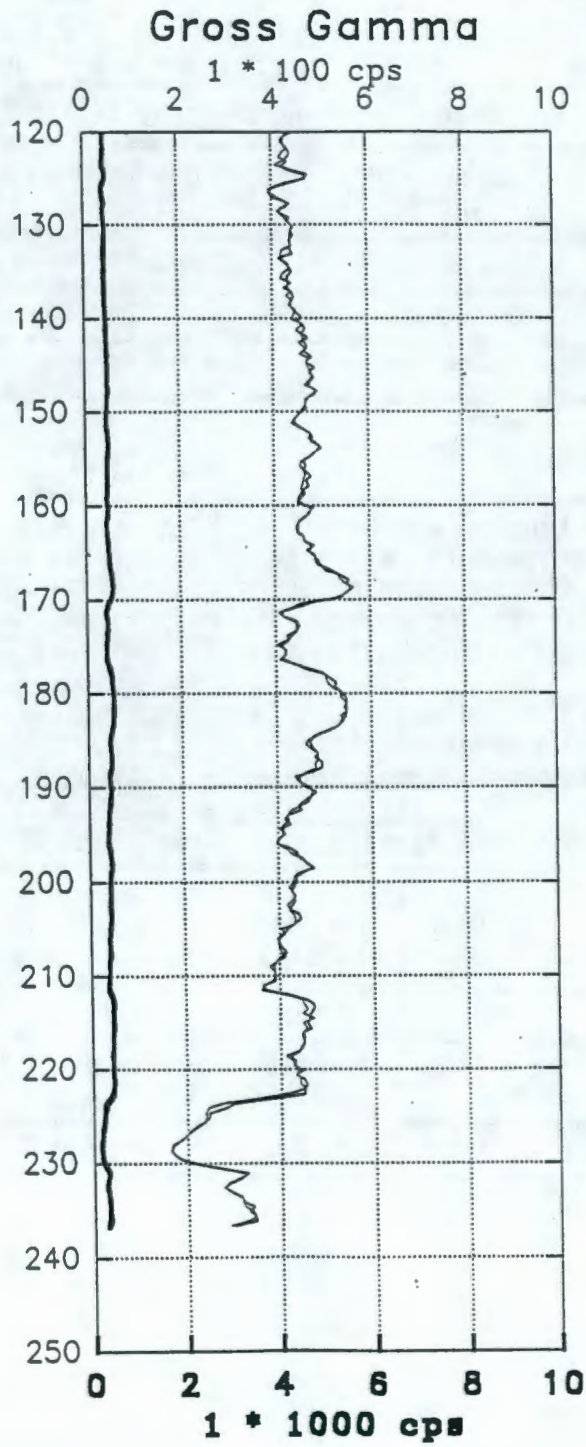
Project: LLBG

Borehole: 299-W10-20

No Corrections Applied

Log Date	Depth Range
Oct 20, 1993	0 - 50'
Nov 17, 1993	0 - 236'





9413224.0564

NaI Gamma-Ray Borehole Survey

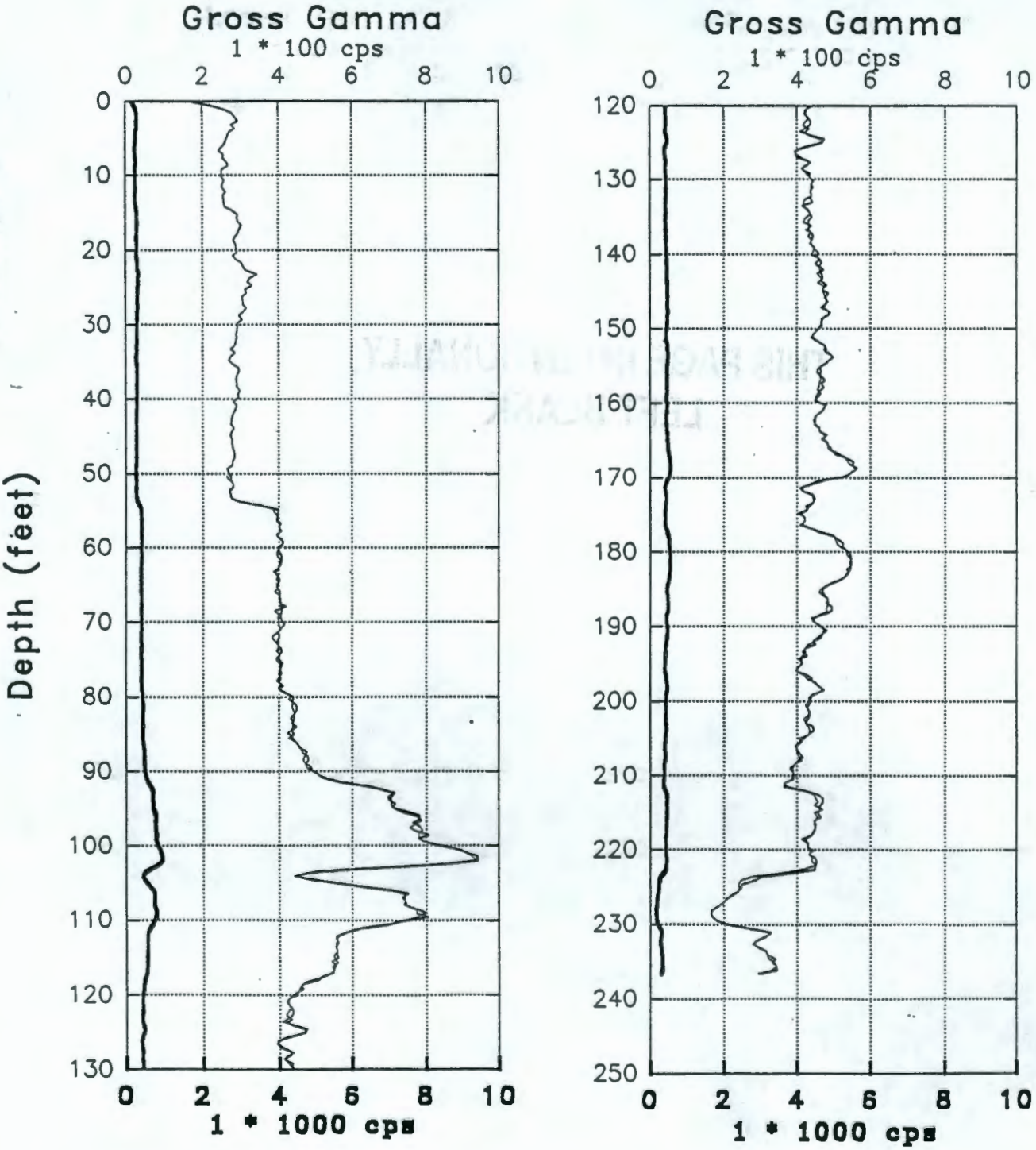
Pg 3 of 3

Project: RCRA LLBG

Borehole: 299-W10-20

No Corrections Applied

Log Date	Depth Range
Nov 17, 1993	0 - 236'



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3.0 WELL 299-W10-21

3.1 DRILLING

Construction of this well began on 24 June 1993 and total depth of 237.4 ft was reached on 5 August 1993. The well was drilled using an ODEX air rotary rig. Approximately 150 gal of water were added during drilling an well completion activities. Specific well construction information is located in Table 3.1. A more detailed description of the drilling is shown in the well summary report at the end of this section.

Table 3.1. 299-W10-21 Construction Particulars.

	Size/type/date	Interval (ft BLS[a])	
Temporary Casing	12-in.	14	ALS[b]
	10-in.	143.8	ALS
	8-in.	237.0	ALS
Gross Gamma Logging	30 July	139.0	1.80
	9 August	236.9	100
Permanent Casing	4-in.	209.25	ALS
Screen	4-in. 10-Slot	229.25	209.25
Back-fill	Bentointe Chunks	237.1	233.1
Filter Pack	20-40 Silica Sand	233.1	204.9
Annular Seal	Bentonite Pellets	204.9	201.2
	Bentonite Crumbles	201.2	11.4
	Cement Grout	11.4	2.3
Concrete Pad	4ft x 4ft x 6in.	2.3	ALS

[a]Below Land Surface
[b]Above Land Surface

The first 20 ft of the borehole were dug with a backhoe. The remainder of the borehole was advanced by air-rotary drilling. Sediments from the Hanford formation, early "Palouse" soil, Plio-Pleistocene unit, and the Ringold Formation were encountered in this borehole. Hanford deposits extended to 72 ft (bls) and were primarily gravelly sand and sandy gravel with some silt. Approximately 13 ft (72-85 ft bls) of silt and silty sand with carbonate concretions represent the early "Palouse" soil and the Plio-Pleistocene unit. Ringold Formation deposits comprise the remainder of the sediments encountered in this borehole (85-237.8 ft bls). Samples were collected at approximately 5-ft intervals for moisture content (above the water table only), radiological screening, carbonate analysis, and lithologic archiving. Grain size analysis was done on samples from the interval to be

9413224.0566

screened. The borehole log and physical data for this well are located at the end of this section.

Gross gamma logging was conducted as indicated in Table 3.1. Reproductions of these logs are also located at the end of this section.

3.2 WELL COMPLETION

Well completion began on 12 August 1993 and was completed on 19 August 1993. Static water level at the time of completion was 211.97 ft bls. Completion details are presented in Table 3.1. Approximately 40 gal of water were removed from the well to settle the filter pack. A 6-in. protective casing with a locking cap, four guard posts, and a brass marker with the well number were also set in the concrete pad. Elevations were determined for the brass marker, the top of the protective casing, and the top of the Hydrostar plate. Lambert and plant (200 West datum) coordinates were established for the centerline of the well. Documentation of well completion activities can be found in the well construction report.

3.3 WELL DEVELOPMENT AND PUMP INSTALLATION

Well development took place on 4 October 1993 using a 1.5 horsepower submersible pump. Approximately 1,910 gal of water were removed to develop the well. A dedicated Hydrostar pump was installed on 4 October 1993 with the intake located 228.50 ft below the top of the protective casing.

3.4 AQUIFER TESTING

Instantaneous slug injection and withdrawal tests were conducted on 4 October 1993. The data from the well development pumping was collected for analysis as drawdown and recovery tests. Results from all tests were inconclusive. Data from the aquifer testing at 299-W10-21 are located at the end of this section.

9413224.0567

Page 2 of 4

WELL CONSTRUCTION SUMMARY REPORT

Specification No. WHC-S-014 Rev. No. 7

ECNs 166764

Project W-152

Drilling Company PC EXPLORATION

Driller CLAYTON SHIELDS

Other (Companies) GOLDER ASSOCIATES

Geologist(s) ANDREW TEMPLETON - GOLDER
JAMES N. BARRON - PC EXPLORATION
Bret F Strode - WHC/MCF

Date Drilling Started 6-~~28~~ 4 -93 and 7-22

Well No. 299-W10-21 Temp. Well No.

Approximate Location 200 WEST

Drill Method

Type AIR ROTARY

Drilling Fluid N/A

Total Amount of Water Added During Drilling N/A

Comments ① SEE NOTE 1 BELOW

Temporary Casings and Drilled Depth

Casing Type and Size	Interval	Shoe OD
12" CS TEMP.	0 - 14'	N/A
10" CS TEMP.	0 - ~~142.85~~ 143'	N/A
8" CS TEMP.	0 - ~~236.95~~ 237'	N/A
	-	

Drilled Depth 237.38 Hole Diameter at TD 8"

Static Water Level/Date 211.97 FT BGS

Comments ② AFTER COMPLETION SEE NOTE 2 BELOW

Geophysical Logging

Sondes (type)	Interval	Date
KUT	1.75 - 139.0'	7/30/93
GROSS GAMMA	1.80 - 139.0'	7/30/93
MAGNETIC	1.70 - 139.8'	8/2/93
GROSS GAMMA	100 - 236.9'	8/9/93
KUT	110 - 236.0	8/9/93

Completion Activity Date Started 8/12/93

Casing and Screen (Permanent)

Type	Depths	Length	Slot Size
034-Bottom CAP(SS) w/CENTRALIZER	229.58 - 229.25 ~~229.18 - 228.86~~	0.32'	N/A
304-SS	229.25 - 209.25 ~~228.86 - 208.85~~	20.01'	10-SLOT
304-SS-SCH5	209.25 ~~208.85~~ 0.9(AGS)	210.15'	N/A
	-		
	-		

Annular Seal/Filter Pack

Type	Interval ③	Volume	Mesh Size
BENTONITE CHUNK SEAL	237.1 - 233.1	1.04 ft³	COARSE
SILICA SAND	233.1 - 204.9	27.44 ft³	20-40
BENTONITE PELLETS	204.9 - 201.2	1.86 ft³	1/4"
GRANULAR BENTONITE	201.2 - 11.4	202.35 ft³	8-20
PORTLAND TYPE I/II	11.4 - 2.3	37.26 ft³	N/A

Other Activity

Aquifer Test Performed? YES

Type Instantaneous Slug Date 10-4-94

Well Abandoned?

Date

Well Survey Data

Date 11/16/93

Washington State Prime Coordinates N 137154.746, E 566583.998

Protective Casing Elevation 674.06'

Brass Cap Elevation 672.07'

Comments/Remarks ① APPROXIMATELY 150 GALLONS OF RAW COLUMBIA RIVER WATER ADDED TO WELL TO STABALIZE HOLE DURING ADDITION OF 20-40 SAND PACK, ② STATIC WATER LEVELS 8/12 = 211.87'; 8/13 = 211.20'; 8/14 = 211.82' AND UPON FINAL READING THE NEXT DAY AFTER GROUT WAS POURED (8/20/93) = 211.77' BELOW GROUND SURFACE. (J.B.) ③ TAGGED HOLE DEPTH AT START OF COMPLETION WAS 0.28' SHALLOWER THAN AT END OF ~~S~~ B DRILLING.

A-6000-436 (01/93)

WELL SUMMARY SHEET

Boring or Well No. 299-W10-21

Sheet 1 of 2

Location 200 WEST

Project W-152

Prepared By [signature] / ANDREW TEMPLETON (Sign/Print Name) Date 6-24-93

Reviewed By [signature] / EDWARD C. LAFUSE (Sign/Print Name) Date 08/23/93

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA	
Description	Diagram		Graphic Log	Lithologic Description
12" TEMPORARY CARBON STEEL CASING SET @ 14.0' BGS NO SHOE		0		0.0 - 4.0' Silty SAND mS
CEMENT GROUT - 2.3'-11.4' BGS		10		4.0 - 15.0' Sandy GRAVEL sG ~~65% Gravel 32% Sand~~ ECL 08/23/93
		20		15.0 - 34.0' Sandy GRAVEL sG ~~75% Gravel 23% Sand~~ ECL 08/23/93
		30		34.0 - 36.0' Gravelly SAND gS
		40		36.0 - 41.0' Sandy GRAVEL sG ~~75% Gravel 22% Sand~~ ECL 08/23/93
GRANULAR BENTONITE (8-20 MESH) 11.4' - 201.2'		50		41.0 - 55.0' Sandy GRAVEL sG ~~65% Gravel 31% Sand~~ ECL 08/23/93
		60		55.0 - 61.5' Sandy GRAVEL sG ~~53% Gravel 45% Sand~~ ECL 08/23/
				61.5 - 62.0' Silty SAND mS
				62.0 - 66.5' Sandy GRAVEL sG
		70		66.5 - 67.0' Gravelly Sandy SILT gsM
				67.0 - 69.8' Sandy GRAVEL sG
		80		69.8 - 77.0' Slightly Silty SAND (m)S
				77.0 - 83.0' Slightly Silty SAND (m)S Caliche
				83.0 - 85.0' Gravelly SAND gS
		90		85.0 - 92.5' SAND S
				92.5 - 93.5' Silty SAND mS
		100		93.5 - 106.0' SAND S
				106 - 115.0' Sandy GRAVEL sG
		110		
		120		115.0 - 144.0' Sandy GRAVEL sG
		130		
10" TEMPORARY CARBON STEEL CASING SET @ ~~236.95'~~ amh 8-11-93 ~~143.35'~~ BGS NO SHOE 143.85'		140		144.0 - 175' Sandy GRAVEL sG
		150		

8-10-93

A-6000-384 (01/93)

9413224.0569

WELL SUMMARY SHEET

Boring or Well No. 299-W10-21

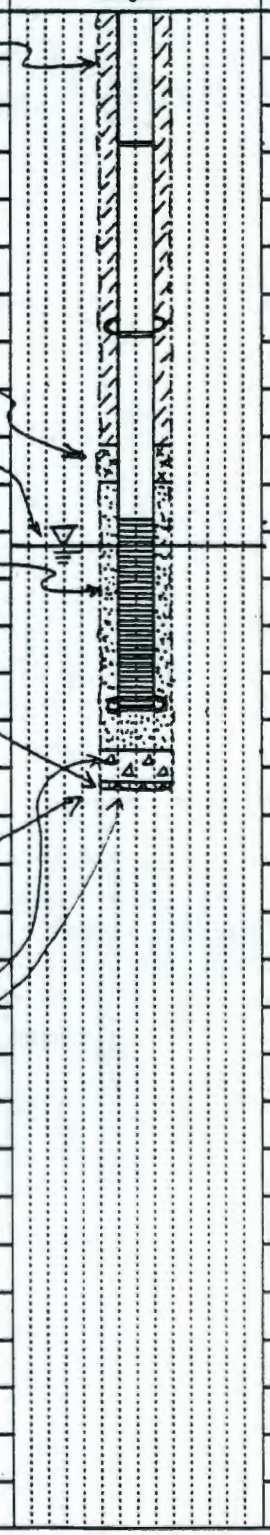
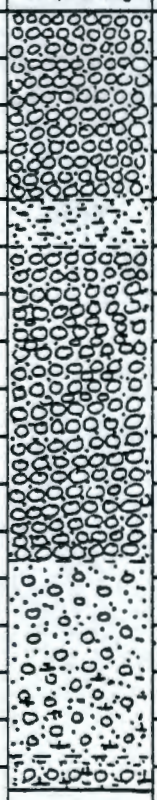
Sheet 2 of 2

Location 200 WEST LLBG

Project W-152

Prepared By [signature] / ANDREW TEMPLETON (Sign/Print Name) Date 8-2-93

Reviewed By [signature] / EDWARD C. RAFUSE (Sign/Print Name) Date 08/27/93

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA	
Description	Diagram		Graphic Log	Lithologic Description
GRANULAR BENTONITE (8-20 MESH) 11.4'-201.2'		155		144.0-175.0' Sandy GRAVEL sG
		160		
		165		
		170		
		175		175.0'-180.0' Silty SAND mS
		180		
		185		
		190		
1/4" BENTONITE PELLETS - 201.2'-204.9'		195		180.0 - 213.0' Sandy GRAVEL sG
		200		
STATIC WATER LEVEL - 211.77'		205		
		210		
20-40 SILICA SAND - 204.9'-233.1'		215		
TEMPORARY 8" CS		220		213.0 - 234.0' Gravelly SAND gS
CASING SET @		225		
236.95 FT BGS		230		
		235		234.0 - 237.0' Gravelly Silty SAND gmS
		240		
TOTAL DEPTH DRILLED 237.38 FT BGS				
BENTONITE CHUNK SEAL 233.1-237.1				
SLUFF 237.1-237.38				

A-6000-384 (01/93)

KAISER ENGINEERS HANFORD

SURVEY DATA REPORT

Request No.

File No.

Project/W.O. No.	Title		
KEH Job No. KEH 5342	Prepared By PERMIT SURVEYING	Date 11/16/93	Reviewer

DESCRIPTION OF WORK

Horizontal location and elevations for well 299-W10-21

ACCEPTABILITY (Within Plan Tolerance)

Yes [x]
No [ ]
NA [ ]
IND by Requestor [ ]

DISTRIBUTION

Survey File	OR
Field Project File	--
TD Clawson	
D. Weeks	
JT Rieger	
M. Chamness	
L. Dietz	

SURVEY RESULTS AND COMMENTS

WELL NO.	COORDINATED C/L CASING		VERTICAL DATUM	ELEVATION	
	200W AREA (FEET)	WCS83S (METERS)		TOP OF BRASS CAP	TOP OF OUTER CASING
299-W10-21	N 44929.86 W 76466.42	N 137154.746 E 566583.998	NGVD29 (FEET)	672.07	674.06

Vertical control benchmark held for this survey was KEH Hanford B.C. @ well #299-W7-4. Misclosure of all run lines were less than 12mm ✓K.

Horizontal survey of wells was performed by conventional method with a closure of better than third order accuracy. Survey Control monuments used were KEH Brass Caps 2W-8 & 2W-16.

GERALD C. WEBBER
STATE OF WASHINGTON
13173
11-16-93
REGISTERED
PROFESSIONAL LAND SURVEYOR
EXPIRES 4-5-94

BOREHOLE LOG

VALIDATED
KDR 2/18/94
SIGNATURE/DATE

Boring or Well No. 299-W10-21

Sheet 1 of 12

Location LOW LEVEL BURIAL GROUNDS 200 WEST

Project W-152

Prepared By [signature] / A.M. TEMPLETON (Sign/Print Name) Date 6-24-93

Reviewed By Edward C. Lalane / EDWARD C. LALANE (Sign/Print Name) Date 09/13/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
				0.0 - 4.0 FEET Silty SAND (mS)	
				60% Sand 40% silt	0.0 - 4.0 FT.
				fS - 90% color moist: 2.5y 5/2 Grayish Br.	Silty SAND mS
				mS - 10% color dry: 2.5y 7/2 Lt. grey	
				dry to moist, well sorted, m-sand	
				angular to subangular, 60% mafic,	
				20% ~~felsic~~ Felsic and 8-1-93, 20% Quartzite, m-sand,	
				weak reaction to HCL.	4.0 - 15.0 FT.
					Sandy GRAVEL sG
5				5' SAMPLE Sandy GRAVEL (sG)	
	2 LITH 1 RAD 1 $CaCO_3$/H_2O	GRAB SAMPLE BACKHOE		65% Gravel 33% Sand 2% silt	
				fp - 25% fS - 15%	
				mp - 30% mS - 55%	
				cp - 25% cS - 30%	
				SC - 20%	
				color wet: 2.5y 3/1 Very dk grey, color dry:	
				2.5y N7 light grey, dry, poorly sorted,	
				sand is subangular to subrounded, gravel	
				is subrounded to rounded, gravel is 80% mafic	
10				10% felsic, 10% Qtz, SC, strong reaction to HCL	
	2 LITH. 1 RAD 1 $CaCO_3$/H_2O	GRAB SAMPLE BACKHOE		on coatings (silt) on gravel.	
					EXCAVATED WITH BACK-HOE TO APPROX. 14' THEN SET CASING (12" STEEL).
				10' SAMPLE Sandy GRAVEL (SG)	
				SAME AS ABOVE	
15				15' SAMPLE Sandy GRAVEL (SG)	15.0 - 34.0 FT.
	2 LITH. 1 RAD 1 $CaCO_3$/H_2O	GRAB SAMPLE BACKHOE		75% Gravel 23% Sand 2% Silt	Sandy GRAVEL sG
				fp - 35% fS - 10%	
				mp - 40% mS - 50%	
				cp - 15% cS - 40%	
				SC - 10% color dry: 2.5y N6 Grey,	
				Color wet: 2.5y N3 Very DK. Grey, dry,	
				poorly sorted, angular to sub-rounded,	
				75% mafic (basalt), 15% Felsic, 10% qtzite	
				max PARTICLE = SG, NONE to weak reaction	
				to HCL. 3-7	

9413224.0572

BOREHOLE LOG

Boring or Well No. 299-W10-201

Sheet 2 of 12

Location 200 WEST LLBG

Project W-152

Prepared By [signature] / AMT COMPLETION (Sign/Print Name) Date 7-21-93

Reviewed By Edward C. Lepine / EDWARD C. LEPINE (Sign/Print Name) Date 09/2/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
20	2 LITH 1 RAD 1 CaCO3/H2O	Air Rotary GRAB SAMPLE		20 FT. SAMPLE Sandy GRAVEL (SG) SAA	OPEN FRAMEWORK GRAVELS TO 34'
25	2 Lith 1 RAD 1 CaCO3/H2O	Air Rotary GRAB SAMPLE		25 FT. SAMPLE Sandy GRAVEL (SG) SAA	15-34 FT. Sandy GRAVEL
30	2 Lith 1 RAD 1 CaCO3/H2O	Air Rotary GRAB SAMPLE		30 FT. SAMPLE Sandy GRAVEL (SG) SAA	34-36' finer grained gS layer.
35	2 Lith 1 RAD 1 CaCO3/H2O	Air Rotary GRAB SAMPLE		35 FT SAMPLE 34-36 FT. Gravelly SAND (gS) 60% Sand 39% Gravel 1% Silt color dry: HUE 2.5Y Gray N6 color wet: 2.5Y very dk gray (N3) to black (N2). Dry, moderately sorted, sub-angular to sub rounded, 70% mafic, 20% felsic, 10% Quartzite very fine pebble, NONE TO WEAK reaction (occasional clast) to HCL	increasing HCL reaction 36-41 FT Sandy GRAVEL

A-6000-382 (01/93)

9413224.0573

BOREHOLE LOG

Boring or Well No. 299-W10-21

Sheet 3 of 12

Location 200 WEST

Project W-152

Prepared By [signature] / ANDREW TEMPLETON (Sign/Print Name) Date 7-21-93

Reviewed By Edward C. Rafuse / EDWARD C. RAFUSE (Sign/Print Name) Date 09/13/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
40	2 LITH	GRAB SAMPLE FROM CYCLONE		36.0 - 41.0 FT	40 FT. SAMPLE
41	1 $CaCO_3$ / H_2O			Sandy GRAVEL (SG)	
	1 RAD.			SAME AS 15-34.0 FT.	CHANGE AT 41' INCREASE IN SILT MOIST AT 41 - 42.0 FT.
45	2 LITH			41.0 - 55.0 FT	45 FT. SAMPLE
	1 $CaCO_3$ / H_2O			Sandy GRAVEL (SG)	
	1 RAD.			65% Gravel 31% Sand 4% Silt	
				color dry: 2.5Y Grey N5/	
				color wet: 2.5Y Very Dark Grey N3/	
				dry, poorly to moderately sorted,	
				sand: angular to subrounded	
				gravel: subangular to subrounded,	
				80% mafic (basalt) 10% Qtz 10% Felsics,	
				m-pebble, reaction to HCL: weak.	
50	2 LITH				50 FT. SAMPLE
	1 $CaCO_3$ / H_2O			Same as above except:	
51				52.0 FT strong reaction to HCL,	
52	1 RAD.			moist, 0.2' thick. silty layer.	
53				54.0 FT coarser grained layer,	
				moist	
54				becoming finer grained	
55	2 LITH.			55.0 - 61.5 FT.	55 FT. SAMPLE
	1 $CaCO_3$ / H_2O			Sandy Gravel (SG)	
	1 Rad.			53% Gravel 45% Sand 2% Silt	Gravel is approaching vf-pebbles
				color dry: 2.5y Grey N5/	
				color wet: 2.5y Very Dk. Grey N3/	
				dry, moderately sorted, gravel:	
				subangular to rounded, sand:	At 59.0 FT 2mm
				subangular to rounded, 75% mafics	$CaCO_3$ ~~nodules~~ nodules
				(basalt) 15% Felsics, 10% Qtz, f-	
				pebble reaction to HCL: weak.	

9413224.0574

BOREHOLE LOG

Boring or Well No. 299-W10-21

Sheet 4 of 12

Location 200 WEST

Project W-152

Prepared By [signature] / ANDREW M. TEMPLETON (Sign/Print Name) Date 7-26-93

Reviewed By Edward C. Rafuse / EDWARD C. RAFUSE (Sign/Print Name) Date 9/3/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
60	1 LITH. 1 RAD.	GRAB SAMPLE FROM CYCLONE AIR PORTEY		60.0' 0.2' silty sand layer	60.0 FT. SAMPLE
61					Same as above
				61.5 - 62.0 FT. Silty SAND (mS)	62.0 FT SAMPLE
62	2 LITH 1 CaCO3 H2O 1 RAD.			65% Sand 35% Silt	
				color dry: 10yr Lt. grey to grey 6/1	
63				color wet: 10yr Dk. greyish brown 4/2	63', .03' Ø CaCO3 nodules
				dry, moderately sorted, sand: subangular	clastic dike?
64				to subrounded, 40% Mafic (basalt), 30%	
				felsics, 30% Qtz, very c-sand, reaction	
65	2 LITH 1 CaCO3 H2O 1 RAD.			to HCL: strong	
66				62.0-66.5 FT. Sandy GRAVEL (SG)	65.0 FT. SAMPLE
					Same as 55-61.5 Ft
67				66.5 - 67.0 FT.	66.5 FT. SAMPLE
				Gravelly Sandy SILT (gSM)	66' .15' Ø CaCO3 clasts
68				55% Silt, 20% Sand, 25% Gravel	
				color dry: 10yr Very Pale Brown 7/3	
69				color wet: 10yr brown 5/3, moist	
				moderately sorted, sand and gravel:	
70				subangular to rounded, 75% mafic	
	SPLIT SPOON #1	70.10 - 71.80' 100%		(basalt), 15% Felsics, 10% Qtz, vf-	
71				cobble, reaction to HCL: strong.	
72	2 LITH. 1 CaCO3 H2O 1 RAD.	GRAB SAMPLE FROM CYCLONE		67.0 - 69.8 FT. Sandy Gravel (SG)	Change at 69.8 FT.
73				69.8 - 77.0 FT. Slightly Silty Sand (m)S	70 FT. SAMPLE
74				78% Sand, 2% Gravel, 20% Silt	76 FT. CaCO3 content
				vf-sand } 60% vf-cobbles - 100%	increasing
75				f-sand }	
	2 LITH. 1 CaCO3 H2O 1 RAD.			m-sand 10%	75 FT SAMPLE Same as Above
76				color dry: 10 YR Very Pale brown 7/4	At 77 FT. CaCO3 clasts
77				color wet: 10YR Brown to dk. brown 4/3,	throughout
				moist, well sorted, subangular to sub-	
78				rounded, 60% Qtz, 25% Felsics 15% mafic	
				(basalt), vf-cobble, reaction to HCL:	
79				strong	77.0 - 80.0 Dominant
					CaCO3 clast zone.

W10-21

BOREHOLE LOG

Boring or Well No. 299-~~E25-49~~ 10/4/93

Sheet 5 of 12

Location 200 WEST

Project W-152

Prepared By [signature] / ANDREW TEMPLETON (Sign/Print Name) Date 7-27-93

Reviewed By [signature] / EDWARD C. ROSS (Sign/Print Name) Date 09/9/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
80	2 LITH 1 $CaCO_3$ H_2O 1 RAD.	GRAB SAMPLE →		77.0-83.0 FT. Caliche	80.0 FT SAMPLE
81				Slightly Silty SAND (M) S	77-80 FT. dominant
				70% Sand 21% Silt 9% Gravel	caliche zone
82				color dry: 7.5yr Pinkish White 8/2	carbonate clasts throughout
				color wet: 7.5yr Pinkish Grey 6/2	irregular shapes, sand to
83				dry, moderately sorted, sub angular	pebble size.
				to rounded (sand), 30% Qtz	
84	SPLIT SPOON #2	83.4-85.2 FT. 100%		30% mafics, 30% Carbonate clasts	83.0 FT CHANGE TO gS
				10% felsics, f-pebble, reaction to	
85				HCL: strong (violent).	
	2 LITH. 1 $CaCO_3$ H_2O 1 RAD.	GRAB SAMPLE FROM CYCLONE AFTER ROTARY		*	Upper Ringold Sand
				83.0-85.0' Gravelly SAND gS	
				85.0-93.0' SAND S	85.0 FT SAMPLE
				90% Sand 7% Silt 3% Gravel	
				color dry: 10yr Very Pale brown 7/3	
				color wet: 10yr Very dk. grayish brown	Occasional Carbonate clast
				3/2, dry, well to very well sorted,	~10%
				sub angular to rounded, 60% Qtz,	
90				30% mafics, 10% felsics, f-pebble,	
	2 LITH. 1 $CaCO_3$ H_2O 1 RAD			reaction to HCL: strong	
91				90.0 FT SAMPLE	
92				SAME AS ABOVE EXCEPT:	Silty layer 92.5-93.5'
				• damp to moist	
93				• weak reaction to HCL	
	2 LITH. 1 $CaCO_3$ H_2O 1 RAD.			• carbonate nodules < 5%	
94					93.0 FT. SAMPLE
				92.5-93.5 FT. SAMPLE	
95				Silty SAND mS	95.0 FT. SAMPLE
	2 LITH. 1 $CaCO_3$ H_2O 1 RAD.			60% Sand 35% Silt 5% Gravel	
				color dry: 10yr pale brown 6/3	
				color wet: 10yr Dark brown 4/3	
				moist, well sorted, subangular to	
				subrounded, sand: 45% Qtz	
				30% mafics 10% felsics 15%	moist at 97'
				Carbonate clasts. weak reaction	
				to HCL, clasts strong reaction.	
				max. particle size = c-sand	
				93.5-106.0 FT. SAND S	Same as 85-93.0 FT

9250.1276 FAX

BOREHOLE LOG

Boring or Well No. 299-W10-21

Sheet 6 of 12

Location 200 WEST LLBG

Project W-152

Prepared By [signature] / Andrew Templeton (Sign/Print Name) Date 7-28-93

Reviewed By Edward C. Rafuse / Edward C. Rafuse (Sign/Print Name) Date 09/13/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
100	2 LITH 1 CaCO3 H2O 1 RATD	Air Rotary GRAB SAMPLE		100' SAMPLE SAND S	99-100' sample interval
101				Same as 95' SAMPLE	
102				93.5 - 106.0 FT SAND S	102.5 becomes slightly more gravelly <5%
103					
104					3 ~~104~~-105 sample interval
105	2 LITH 1 CaCO3 H2O 1 RATD	GRAB SAMPLE		105' SAMPLE SAND S SAA	106' change from sand to gravelly sand
				106.0 - 115.0 FT Sandy Gravel SG Middle Ringold Gravels	106 - 108 gS
108					108 SG
109					
110	2 LITH 1 CaCO3 H2O 1 RATD	GRAB SAMPLE		110' SAMPLE. 106 → 2, Sandy Gravel SG 45% Sand 3% Silt 55% Gravel	110' moist
111				color dry: 10YR Very Pale Brown 8/3	calcium carbonate coating to 121' on pebbles
112				color wet: 10YR DK yellowish brown 4/6	
113				moist, moderate to poorly sorted, angular to subrounded (sand: gravel) Pebbles = 50% Basalt 30% Felsic 20% Qtz Sand = 60% Qtz 20% Basalt 20% Felsic	max. particle v. coarse pebble weak to strong reaction to HCl CaCO3 coatings on pebbles.
115	2 LITH 1 CaCO3 H2O 1 RATD	GRAB SAMPLE		115' SAMPLE Sandy Gravel SG 75% Gravel 23% Sand 2% Silt	115-120 coating on pebbles
				115.0 - 144.0 FT Sandy GRAVEL SG	calcareous
				color dry: 2.5Y gray N/6	
				color wet: 2.5Y Very dk gray N3/	120'
				dry, moderate to poorly sorted, pebble: subangular to rounded. sand: subrounded to rounded, 50% Qtz 30% Basalt 20% Felsic, medium pebble, weak reaction to HCl. 3-12	no coating on pebbles
120					

BOREHOLE LOG

Boring or Well No. 299-W10-21

Sheet 7 of 12

Location 200 WEST LLBG

Project W-152

Prepared By [signature] / Andrew M. Templeton (Sign/Print Name) Date 7-29-93

Reviewed By Edward C. Rafes / E. Edward C. Rafes (Sign/Print Name) Date 09/13/93

Depth (_____)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
120	2 LITH 1 CaCO3 / H2O 1 RAD	Air Rotary GRAB SAMPLE		120' SAMPLE Sandy GRAVEL SAA 115.0-144.0 FT Sandy GRAVEL	120-123 no cuttings on screen
125	2 LITH 1 CaCO3 / H2O 1 Rad	GRAB SAMPLE		125' SAMPLE Sandy GRAVEL SG SAA	
130	2 LITH 1 CaCO3 / H2O 1 RAD	GRAB SAMPLE		130' SAMPLE Sandy GRAVEL SAA	
131 132 133 134					
135	2 LITH 1 CaCO3 / H2O 1 Rad	GRAB SAMPLE		135' SAMPLE Sandy GRAVEL SAA	

A-6000-382 (01/93)

BOREHOLE LOG

Boring or Well No. 299-W10-21

Sheet 8 of 12

Location 200 WEST LLBG

Project W-152

Prepared By [signature] / Andrew Templeton (Sign/Print Name) Date 7-29-93

Reviewed By Edward C. Rafuse / E. Rafuse (Sign/Print Name) Date 09/3/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
140	2 LITH	Air		140' SAMPLE Dry	
	1 $CaCO_3$ / H_2O	Rotary		SAA	
	1 Rad.				
				144 - 175.0' FT Sandy GRAVEL	color change.
144				Ringold Gravel	
				Sandy Gravell	144' → 175'
145				145' SAMPLE ~~Gravelly SAND~~ Dry	143 - 144
	2 LITH	GRAB		~~53%~~ Sand ~~42%~~ Gravell 3% Silt	Fe stain
	1 $CaCO_3$ / H_2O	SAMPLE		~~40%~~ 37% 60%	
	1 RAD			color dry: 2.5Y lt. yellowish brown 6/3	max particle size = mp
				color wet: 2.5Y lt. olive brown 5/4	no reaction to HCL
				dry, moderate to poorly sorted,	
				gravell: sub rounded to rounded	
				sand: sub-angular to subrounded.	
				gravel: 20% Basalt 50% Undiff. Plutonics 30% Qtz	
				Sand: 50% Qts 20% Basalt 30% Felsics	
150				150' SAMPLE	Dry
	2 LITH	GRAB			
151	1 $CaCO_3$ / H_2O	SAMPLE		SAA	151-152 Gravelly Sand layer.
152	1 Rad.			except: Gravelly sand layer at 151-152	
				Sand 35% 60% Gravel 5% silt	
				none to weak reaction to HCL	
155				155' SAMPLE	Dry
	2 Lith	GRAB			
	1 $CaCO_3$ / H_2O	SAMPLE		SAA	
	1 Rad.				

A-6000-382 (01/93)

9413224.0579

BOREHOLE LOG

Boring or Well No. 299-W10-21

Sheet 9 of 12

Location 200 WEST LLBG

Project W-152

Prepared By [signature] (Sign/Print Name) Date 8-3-93

Reviewed By Edward C. Rafuse / C. Rafuse (Sign/Print Name) Date 09/13/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
160	2 LITH 1 $CaCO_3$ / H_2O 1 Rad.	Air Rotary GRAB SAMPLE		160' SAMPLE (Gravelly SAND)	Ringold
				SAA	
165	2 Lith 1 $CaCO_3$ / H_2O 1 Rad.	GRAB SAMPLE		165' SAMPLE	
				SAA	
					Approx. 172-176 moist silty sand.
170	2 Lith 1 $CaCO_3$ / H_2O 1 Rad.	GRAB SAMPLE		170' SAMPLE	
172				SAA	
				175-180.0 Ft. Silty SAND mS	
175	2 Lith 1 $CaCO_3$ / H_2O 1 Rad	GRAB SAMPLE		175' SAMPLE Silty Sand mS 30% Silt 67% Sand 3% Gravel	moist 172-176
176				color wet: 2.5Y lt. olive brown 5/4 color dry: 10YR Very Pale Brown 7/4 moist, well sorted, Gravel: subrounded to rounded, Sand: angular to subrounded Gravel: 40% Basalt 40% Undiff. Plutonic 20% Qtz Sand: 20% Basalt 40% Qtz 40% K-Feldspars m-c pebble, none to weak reaction to HCL 3-15	

A-6000-382 (01/93)

BOREHOLE LOG

Boring or Well No. 299-W10-21

Sheet 10 of 12

Location 200 WEST LLBG

Project W-152

Prepared By [signature] (Sign/Print Name) Date 8-3-93

Reviewed By Edward C. Rafuse / EDWARD C. RAFUSE (Sign/Print Name) Date 09/3/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
180	2 LITH 1 $CaCO_3$ / H_2O 1 RAD	Air Rotary Grab Sample		180' SAMPLE SG Sandy GRAVEL 65% Gravel 32% Sand 3% Silt color dry: 10YR Very Pale Brown 7/4 color wet: 10YR Yellowish Brown 5/6 dry, moderately sorted, Gravel: subrounded to rounded Sand: subangular to rounded, Gravel 35% Basalt 35% Undiff Pl. 30% Qtz Sand: 15% ~~Basalt~~ Basalt 20% Felsics 65% Qtz	Ringold Pbl Gravel
185	2 LITH 1 $CaCO_3$ / H_2O 1 Rad.	GRAB SAMPLE		185' SAMPLE SG SAA	
189					189' damp layer
190	2 Lith 1 $CaCO_3$ / H_2O 1 Rad.	GRAB SAMPLE		190' SAMPLE SG SAA except: 65% Gravel 28% Sand 7% Silt	190-191 sandy 192' damp layer
195	2 Lith 1 $CaCO_3$ / H_2O 1 Rad.	GRAB SAMPLE		195' SAMPLE SG SAA	
					200' damp

9413224.0581

BOREHOLE LOG

Boring or Well No. 299-W10-21

Sheet 11 of 12

Location 200 WEST LLBG

Project W-152

Prepared By [signature] (Sign/Print Name) Date 8-4-93

Reviewed By Edward C. Rafuse / Edward C. Rafuse (Sign/Print Name) Date 09/3/93

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
200	2 Lith	Air Rotary		200' SAMPLE ≈G ~~GS~~ amt 8-11-93	less silt
20'	1 CaCO3 / H2O				
				SAA	
203	1 Rad	GRAB SAMPLE			
205				205' SAMPLE Sandy Gravel	dry, ft 205 change ~~over~~ ~~of~~ to ~~56 gravel~~
	2 Lith	GRAB SAMPLE		SAA	205-212 10% silt
	1 CaCO3 / H2O				(205-212)
	1 Rad			Except: 70% Gravel 28% Sand 2% Silt	202-211 cemented
210				210' SAMPLE Sandy Gravel	dry
	2 Lith	GRAB SAMPLE			
211	1 CaCO3 / H2O			SAA	211-213 uncemented sand & pebbles
212	1 Rad.				At 212' Begin drilling 8-5, Cuttings moist
213					213' change from c-sand pebbles to gS
215				215' SAMPLE Gravelly SAND gS	moist
	2 Lith	GRAB SAMPLE		30% Gravel 62% Sand 8% Silt	
	1 CaCO3 / H2O				216 fines falling out
	1 Rad.			color dry: 2.5Y lt. yellowish brown 6/4	
				color wet: 2.5Y lt. olive brown 5/4	Water Level 8-10-93
				moist, moderately sorted, gravel:	@
				subrounded to rounded, sand:	
				subangular to rounded, 10% Basalt	micaceous 1%
				60% Qtz 30% Felsics, fine pebble,	
				Reaction to HCl: None 3-17	

9413224.0592

BOREHOLE LOG

Boring or Well No. 299-W10-21

Sheet 12 of 12

Location 200 WEST

Project W-152

Prepared By [signature] / Andrew Templeton (Sign/Print Name) Date 8-5-93

Reviewed By Edward C. Rafuse / Edward C. Rafuse (Sign/Print Name) Date 09/2/93

Depth (_____)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description (Group Name, Group Symbol, Grain Size Distribution, Soil Classification, Color, Moisture Content, Sorting, Angularity, Mineralogy, Max Particle Size, Reaction to HCl)	Comments (Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level)
220	2 Lith 1 $CaCO_3$ H_2O 1 Rad.	Air Rotary GRAB SAMPLE		220' SAMPLE	220 moist
221				SAA	moist to wet
~~or 221~~					222-224'
222					(coarser grained)
~~or 222~~					interbedded
223					micaceous
~~or 223~~					
224					
225	2 Lith 1 $CaCO_3$ H_2O 1 Rad.	GRAB SAMPLE		225' SAMPLE	moist to wet
224				SAA	
				except: weak to strong reaction	
225				to HCL	
226		228.12			SPLIT-SPOON SAMPLE
	SPLIT SPOON	10" / 10" #3			TAKEN 228.12-228.97
229		228.97			4" Ø
230	2 Lith 1 $CaCO_3$ H_2O 1 Rad.	GRAB SAMPLE		230' SAMPLE	wet
				SAA	
				except:	
				weak reaction to HCL	
				to strong	
234					234' change to more silt
235	2 Lith. 1 $CaCO_3$ H_2O 1 Rad.	GRAB SAMPLE		235' SAMPLE Gravelly Silty Sand gms	dry to damp
236				~~SAA~~	
				Except 20% Gravel 70% Sand 10% Silt	
237				ECL 9/13/93	
				color dry: 2.5Y lt. yellowish brown 6/3	
				color wet: 2.5y dk. grayish brown 4/2	
				dry to damp, moderately sorted	
				Pebbles: subrounded to rounded	
				Sand: subangular to rounded,	
				20% mafic 25% Felsic 2% mica	53% Qtzite

9413224.0583

VALIDATED
KDR 2/19/94
SIGNATURE/DATE

Page 10/4

WELL CONSTRUCTION VERIFICATION REPORT

Criteria from WHC-S-014, and other change documents

Well No. 299-W10-21

Well Specification/Revision WHC-S-014 Rev 7

Subject	Verification Method	Criteria Spec	Criteria Chg. Doc.	Initials/Date
Cleaning				
Drilling Rig/Tools	Visual	7.6.7.7		ECL/07-21-93
Temporary Mater.	Visual	7.7		ECL/07-21-93
Drill Method	Visual	5.2		ECL/07-21-93
Lubricants/Additives				
Lubricants	Visual	7.2		ECL/07-21-93
Additives	Visual	7.2		2/14/94 N/A
Straightness Test	Visual	8.2		ECL/8-11-93
Material Storage/Packing of Completion Material				
Mtl. Hand./Stor.	Visual	7.3		JWB/8-11-93
Material Packing	Visual	7.3		JWB/8-11-93
Casing and Screen (Permanent)	Visual	4.2 - 4.2.5, 12.2.1		JWB/8-13-93
Annular/Seal/ Filter Pack	Visual	4.2.6 - 4.2.9, 5.3.1		JWB/8-19-93
Well Development	Visual	5.3.1.K		BJS 10-4-93
Well Protection				
Surface Pad	Visual	4.2.9, 4.2.10		BJS 10-4-93
Prot. Casing	Visual	4.2.10		BJS 10-4-93
Prot. Posts	Visual	4.2.10		BJS 10-4-93
Cap, Hasp, Lock	Visual	4.2.10		BJS 10-4-93
Site Restored	Visual	11.0		2/14/94
Pump Installation				
Pump Decon/Prep.	Visual	4.2.10, 12.2.1		BJS 10-4-93
Installed	Visual	5.3.1.L		BJS 10-4-93
Pump Tested	Visual	5.3.1.L		BJS 10-4-93
Well Surveying/Labeling				
Ms. Pt. Surveyed	Visual	3.4		2/15/94
P. Casing/BC Surv.	Visual	3.4		2/15/94
Well No. Stamped	Visual	4.2.9		2/14/94
BC Labeled	Visual	4.2.9		BJS 10-4-93

Comments

A-6000-868 (01/93)

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NaI Gamma-Ray Borehole Survey

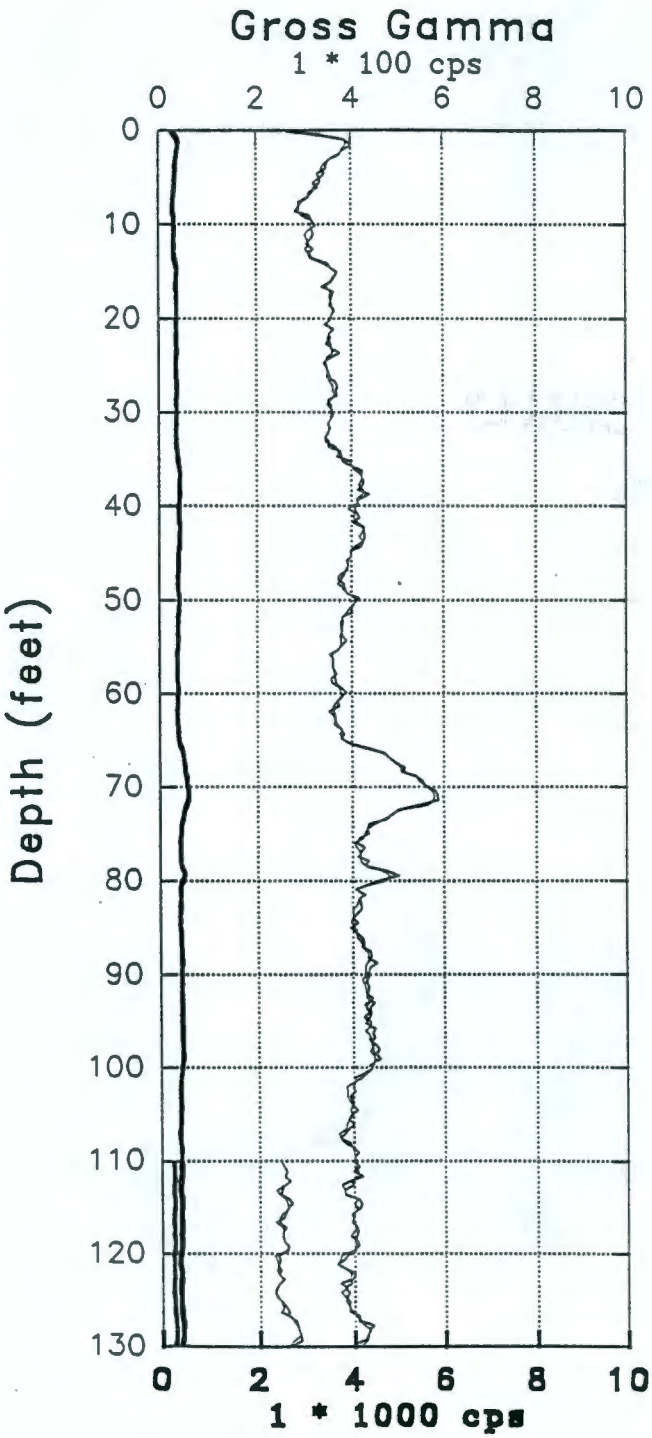
VALIDATED
9/13/94
SIGNATURE/DATE

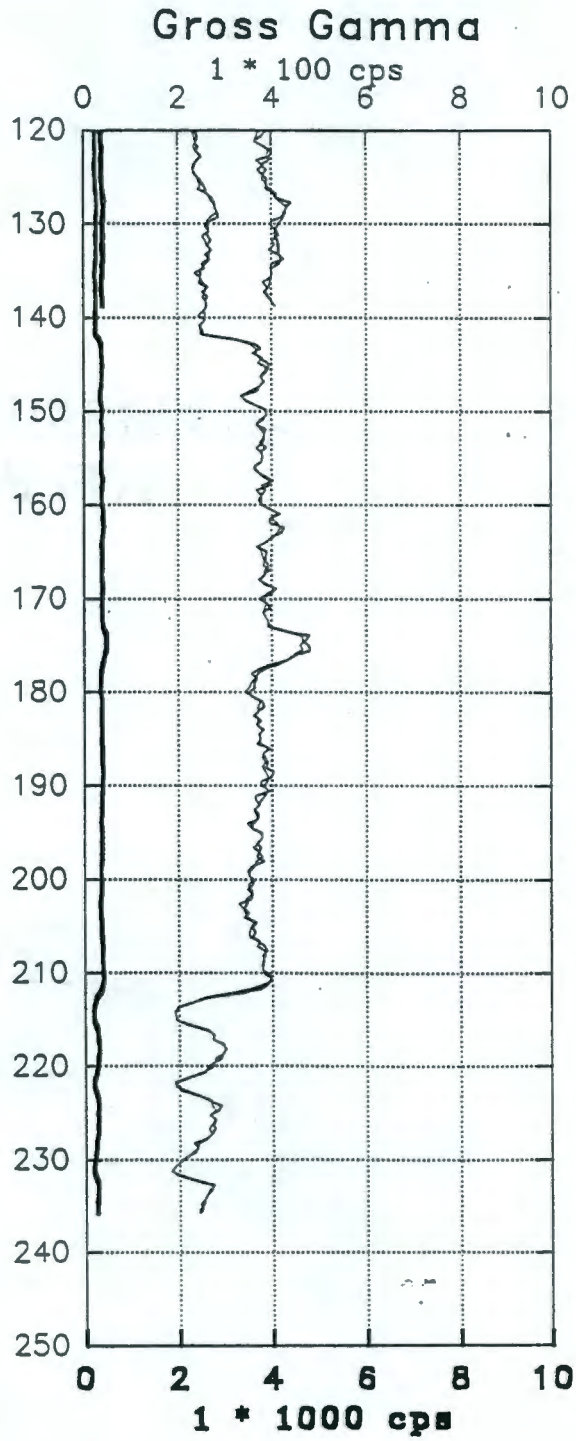
Project: 218-W-3A-E Burial

Log Date: Aug 9, 1993

Borehole: 299-W10-21

No Corrections Applied





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Pg 2 of 3

WELL DEVELOPMENT FORM

Well Designation: 299W-10-21 Well Depth: 232.40'TOC 6"

Screened Interval: 229.25'/209.25' TOC 6" Date Well Devel. Performed: 10-4-93

BAILING

Water Level Prior to Bailing: _____ Time of Measurement: _____

Volume of Bailer: _____ Number of Bails Removed: _____ Gallons: _____

Summary Description of Water Removed: _____

Water Level After Bailing: _____ Time of Measurement: _____

SURGE BLOCK:

N.A.

Type of Surge Block: _____ Dimensions of Surge Block: _____

TD Before	Stroke Length	Stroke Frequency	Surge Interval	Surge Time	TD After	TD Difference

AIRLIFT:

N.A.

Depth to Eductor Pipe: _____ Airlift Start Time: _____

Flow Rate: _____ Accumulated Flow: _____ Airlift Stop Time: _____

Turbidity (NTU): _____

MECHANICAL PUMPING:

Pumping Technique: Constant Discharge Pump Depth: 230.40' TOC Pump Start Time: 09:30

Flow Rate: 10.345 gpm Accumulated Flow: 1,910 gallons Pump Stop Time: 10:15

Turbidity (NTU): 85 28.1 21.9 9.3 4.76 4.1

COMMENTS: _____

Recorded by: [signature] Bret F. Strode Date: 10-4-93

Sign and Print Name

A-6000-393 (03/90)

9413224.0588

Pg 3 of 3

DRAWDOWN/RECOVERY

Well Designation: 299W-10-21 Date: 10-1-93/10-4-93

Well Depth: 232.40'BTOC Screened Interval: 229.25'/209.25' TOC

Pumping Method: Constant Discharge

Equipment Used to Measure Water Level: E.Tape/Transducer S.N. ET-4/2246 Calibration Due: 7-27-93/3-11-94

Equipment Used to Measure Flow: N.A. S.N.: N.A. Calibration Due: N.A.

Measuring Point: Top of Casing (6") Pump Start Time: 12:55/09:30 Pump Stop Time: 14:54/10:15

Time		Water Level		Discharge
Date	Time	Reading Units:	Water Level Units:	Reading Units:
				Bucket Method: 5gal./29.0sec.
				= 10.345 gal/min.
	See Attached Data			
			See Attached Data	

Recorded by: Bret F. Strode Date: 10-1-93/10-4-93

Sign and Print Name

BD-6000-402(03/90)

9413224.0589

VALIDATED
KDR 2/18/94
SIGNATURE/DATE

INSTANTANEOUS SLUG TEST DATA SHEET: INJECTION

Well no.: 299W-10-21

Screened interval: 229.25'/209.25' TOC 6"

Depth To Water: 214.91' TOC 6"

Depth to Transducer: 12.084' BWL

Measured by: Bret F. Strode

Slug Volume: BR-2 .194 (cu.ft.)

Barometric Reading:
Beginning: 29.302(In. Hg.) End: 29.296

Time:	Start	End
Baseline	11:55	12:15
Injection	12:19	12:39

Date: 10-4-93

Initial Pressure (Pi): 0.00

Slug Level/Pressure (Pmax) -0.629

Borehole Diameter: 4"

Time		Pressure	Time		Pressure	Time		Pressure
Observed	Elapsed	Trans.Measurement	Observed	Elapsed	Trans.Measurement	Observed	Elapsed	Trans.Measurement
		See attached data						
					See attached data			

Recorded by: Bret F. Strode Date: 10-4-93
Sign and Print Name

BD-6000-293(07/90)

9413224.0590

INSTANTANEOUS SLUG TEST DATA SHEET: WITHDRAWAL

Well no.: 299W-10-21

Screened interval: 229.25'/209.25' TOC 6"

Depth To Water: 214.91' TOC 6"

Depth to Transducer: 12.084' BWL

Measured by: Bret F. Strode

Slug Volume: BR-2 .194'

Barometric Reading:

Beginning: N/A End: N/A

Time:	Start	End
Baseline	12:40	12:53
Withdrawal	12:55	13:15

Date: 10-4-94

Initial Pressure (Pi): 0.00

Slug Level/Pressure (Pmax) -1.763

Borehole Diameter: 4"

Time		Pressure	Time		Pressure	Time		Pressure
Observed	Elapsed	Trans.Measurement	Observed	Elapsed	Trans.Measurement	Observed	Elapsed	Trans.Measurement

Recorded by: Bret F. Strode Date: 10-4-93

Sign and Print Name

9413224.0591

BOREHOLE TEST INFORMATION

page 1 of 1

Borehole 299W-10-21 Borehole Diameter 4 in Hanford Coordinates N/A

Screened interval 229.25'/209.25' SWL 214.91' Test Type: Instantaneous Slug

Borehole Depth: 232.40' Instruction Used: WHC-CM-7-7 (EII 10.1)

EQUIPMENT

NAME	DESCRIPTION
Electric Sounder	Solinst s/n: ET-4 Calibration due: 1-30-94
Data Logger	In-Situ Inc. s/n: 2K-192
Pressure Transducer	In-Situ Inc. s/n: 2246 Calibration due: 3-11-94
Slugging Rod	BR-2: 0.194 Cu. Ft.
Steel Measuring Tape	300' Graduated Steel Tape

MEASUREMENT DATUM

Control Datum: Top of Casing (TOC) 6"

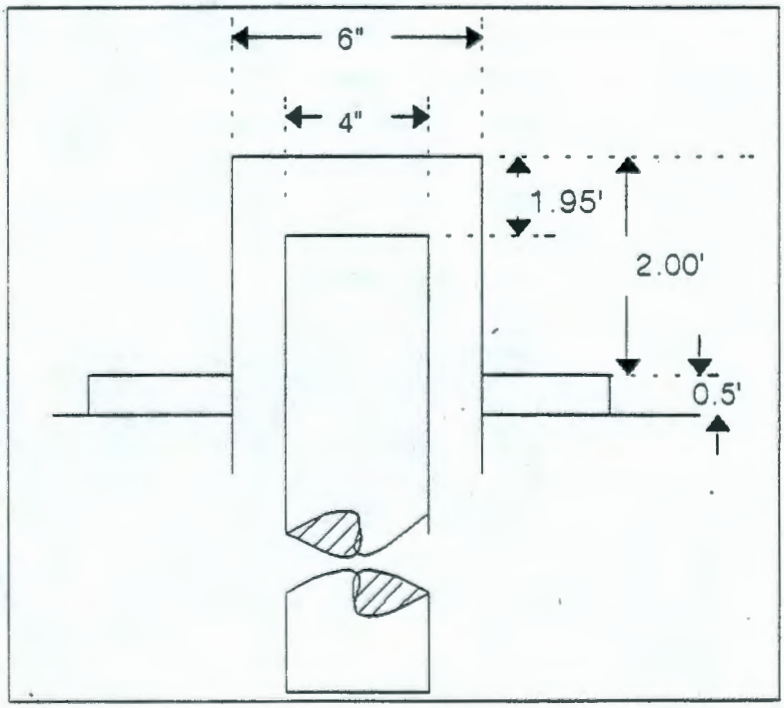
Elevation: N/A

Electric Sounder: TOC 6"

Steel Tape: TOC 6"

Pressure Transducer: TOC 6"

WELL HEAD DIAGRAM



COMMENTS

Recorded by: Bret F. Strode Date: 10-4-93

Sign and Print Name

9413224.0592

Well 299-W10-21

Hermit Unit# 758
Test# 1: Drawdown
SWL: 214.91' TOC
Start Time: 12:55 10/01/93

Hermit Unit# 2K-192
Test 1 Type: 2nd Drawdown
SWL: 214.82'
Start Time: 09:30 10/04/93

Time:min	d(WL):Ft	Time:min	d(WL):Ft	Temp C	pH	In. Hg
0.0000	0.000	0.0000	0.000	25.37	7.246	29.302
0.0033	-0.070	0.0083	0.076	25.37	7.246	29.302
0.0066	-0.060	0.0166	0.000	25.37	7.246	29.302
0.0099	-0.090	0.0250	-0.137	25.37	7.246	29.302
0.0133	-0.230	0.0333	-0.222	25.37	7.246	29.302
0.0166	-0.280	0.0416	-0.318	25.37	7.246	29.304
0.0200	-0.300	0.0500	-0.410	25.37	7.246	29.302
0.0233	-0.320	0.0583	-0.499	25.37	7.246	29.302
0.0266	-0.390	0.0666	-0.575	25.37	7.246	29.302
0.0300	-0.430	0.0750	-0.642	25.37	7.246	29.302
0.0333	-0.450	0.0833	-0.712	25.37	7.246	29.302
0.0500	-0.670	0.0916	-0.762	25.37	7.246	29.302
0.0666	-0.780	0.1000	-0.845	25.37	7.246	29.302
0.0833	-0.920	0.1166	-0.950	25.37	7.246	29.302
0.1000	-1.050	0.1333	-1.077	25.37	7.246	29.302
0.1166	-1.110	0.1500	-1.166	25.37	7.246	29.302
0.1333	-1.230	0.1666	-1.236	25.37	7.246	29.302
0.1500	-1.270	0.1833	-1.315	25.37	7.246	29.302
0.1666	-1.370	0.2000	-1.404	25.37	7.246	29.302
0.1833	-1.420	0.2166	-1.471	25.37	7.246	29.302
0.2000	-1.500	0.2333	-1.538	25.37	7.246	29.302
0.2166	-1.520	0.2500	-1.611	25.37	7.246	29.302
0.2333	-1.610	0.2666	-1.665	25.37	7.246	29.302
0.2500	-1.610	0.2833	-1.712	25.37	7.246	29.302
0.2666	-1.670	0.3000	-1.760	25.37	7.246	29.302
0.2833	-1.710	0.3083	-1.785	25.37	7.246	29.302
0.3000	-1.740	0.3166	-1.795	25.37	7.246	29.302
0.3166	-1.790	0.3250	-1.820	25.37	7.246	29.302
0.3333	-1.790	0.3333	-1.833	25.37	7.246	29.302
0.4167	-1.910	0.4000	-1.998	25.37	7.246	29.302
0.5000	-2.000	0.5000	-2.179	25.37	7.246	29.302
0.5833	-2.030	0.5833	-2.297	25.37	7.246	29.302
0.6667	-1.960	0.6666	-2.376	25.37	7.246	29.302

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Pg 5 of 45

299-W10-21 Drawdown Tests

0.7500	-2.010	0.7500	-2.456	25.37	7.246	29.302
0.8333	-2.050	0.8333	-2.538	25.37	7.246	29.302
0.9167	-2.090	0.9166	-2.605	25.37	7.246	29.302
1.00	-2.160	1.0	-2.637	25.37	7.246	29.302
1.08	-2.180	1.2	-2.751	25.37	7.246	29.302
1.17	-2.230	1.4	-2.846	25.37	7.246	29.302
1.25	-2.280	1.6	-2.891	25.37	7.246	29.302
1.33	-2.290	1.8	-2.923	25.37	7.246	29.302
1.42	-2.320	2.0	-3.043	25.37	7.246	29.304
1.50	-2.340	2.2	-3.148	25.37	7.246	29.302
1.58	-2.360	2.4	-3.205	25.37	7.246	29.302
1.67	-2.400	2.6	-3.294	25.37	7.246	29.302
1.75	-2.430	2.8	-3.387	25.37	7.246	29.302
1.83	-2.460	3.0	-3.456	25.37	7.246	29.302
1.92	-2.500	3.2	-3.539	25.37	7.246	29.302
2.00	-2.540	3.4	-3.615	25.37	7.246	29.302
2.50	-2.780	3.6	-3.707	25.37	7.246	29.298
3.00	-2.950	3.8	-3.780	25.37	7.246	29.302
3.50	-3.120	4.0	-3.841	25.37	7.246	29.302
4.00	-3.280	4.2	-3.930	25.37	7.246	29.302
4.50	-3.440	4.4	-3.993	25.37	7.246	29.302
5.00	-3.570	4.6	-4.050	25.37	7.246	29.302
5.50	-3.650	4.8	-4.104	25.37	7.246	29.302
6.00	-3.740	5.0	-4.197	25.37	7.246	29.298
6.50	-3.790	6.0	-4.486	25.37	7.246	29.302
7.00	-3.880	7.0	-4.695	25.37	7.246	29.302
7.50	-3.980	7.6	-4.838	25.37	7.246	29.302
8.00	-4.030	8.0	-4.883	25.37	7.246	29.302
8.50	-4.100	8.6	-5.007	25.37	7.246	29.302
9.00	-4.170	9.0	-5.054	25.37	7.246	29.302
9.50	-4.220	9.6	-5.140	25.37	7.246	29.302
10.00	-4.280	10.0	-5.175	25.37	7.246	29.298
12.00	-4.450	12.0	-5.388	25.37	7.246	29.302
14.00	-4.530	14.0	-5.534	25.37	7.246	29.298
16.00	-4.650	16.0	-5.642	25.37	7.246	29.298
18.00	-4.720	18.0	-5.706	25.37	7.246	29.298
20.00	-4.830	20.0	-5.810	25.37	7.246	29.298
22.00	-4.950	22.0	-5.849	25.37	7.246	29.298
24.00	-5.030	24.0	-5.887	25.37	7.246	29.298
26.00	-5.070	26.0	-5.957	25.37	7.246	29.296
28.00	-5.120	28.0	-5.982	25.37	7.246	29.296
30.00	-5.160	30.0	-6.011	25.37	7.246	29.296

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32.00	-5.210	32.0	-6.026	25.37	7.246	29.296
34.00	-5.220	34.0	-6.068	25.37	7.246	29.296
36.00	-5.250	36.0	-6.045	25.37	7.246	29.296
38.00	-5.290	38.0	-6.058	25.37	7.246	29.296
40.00	-5.300	40.0	-6.068	25.37	7.246	29.294
42.00	-5.310	42.0	-6.093	25.37	7.246	29.296
44.00	-5.330					
46.00	-5.330					
48.00	-5.350					
50.00	-5.360					
52.00	-5.370					
54.00	-5.380					
56.00	-5.380					
58.00	-5.400					
60.00	-5.400					
62.00	-5.410					
64.00	-5.410					
66.00	-5.430					
68.00	-5.430					
70.00	-5.440					
72.00	-5.420					
74.00	-5.440					
76.00	-5.450					
78.00	-5.440					
80.00	-5.450					
82.00	-5.430					
84.00	-5.460					
86.00	-5.470					
88.00	-5.470					
90.00	-5.470					
92.00	-5.480					
94.00	-5.460					
96.00	-5.490					
98.00	-5.500					
100.00	-5.520					
110.00	-5.540					

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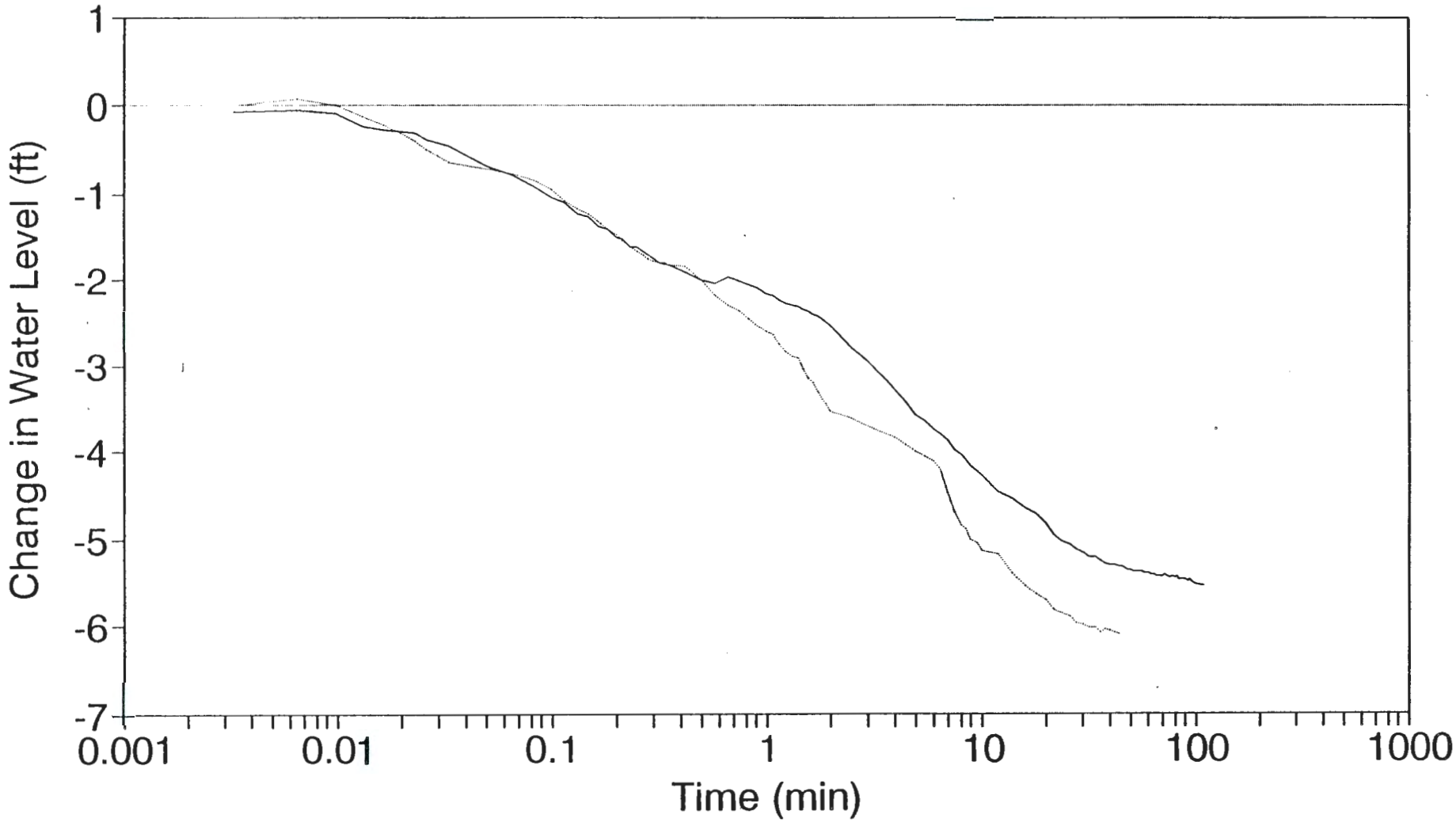
9413224.0596

Well 299-W10-23 Drawdown

01-Oct & 04-Oct-93



10.3 gpm — 10.2 gpm

Pg 8 of 45

299-W10-21 Recovery

Datalogger: Hermit Unit# 758
SWL: 214.91'
Test 2 Type: Recovery 1
Start Time: 14:54 10/01/93

Hermit Unit# 192
SWL: 214.82'
Test 2 Type: 2nd Recovery
Start Time: 10:15 10/04/93

Time:min	d(WL):Ft	Time:min	d(WL):Ft
0.0000	-5.79	0.0000	-6.128
0.0033	-5.70	0.0083	-6.213
0.0066	-5.66	0.0166	-6.074
0.0099	-5.57	0.0250	-5.877
0.0133	-5.48	0.0333	-5.721
0.0166	-5.40	0.0416	-5.575
0.0200	-5.33	0.0500	-5.425
0.0233	-5.27	0.0583	-5.298
0.0266	-5.20	0.0666	-5.159
0.0300	-5.13	0.0750	-5.044
0.0333	-5.07	0.0833	-4.936
0.0500	-4.77	0.0916	-4.819
0.0666	-4.55	0.1000	-4.73
0.0833	-4.39	0.1083	-4.638
0.1000	-4.24	0.1166	-4.561
0.1166	-4.12	0.1250	-4.488
0.1333	-4.02	0.1333	-4.406
0.1500	-3.94	0.1416	-4.352
0.1666	-3.88	0.1500	-4.298
0.1833	-3.82	0.1666	-4.193
0.2000	-3.75	0.1833	-4.104
0.2166	-3.70	0.1750	-4.148
0.2333	-3.64	0.2000	-4.028
0.2500	-3.58	0.2500	-3.866
0.2666	-3.52	0.2666	-3.818
0.2833	-3.46	0.2833	-3.767
0.3000	-3.41	0.3000	-3.723
0.3166	-3.35	0.3166	-3.672
0.3333	-3.30	0.3333	-3.624
0.4167	-3.08	0.4166	-3.395
0.5000	-2.89	0.5000	-3.202
0.5833	-2.71	0.5833	-3.033
0.6667	-2.55	0.6666	-2.887

9413274.1597

P, 9 of 45

299-W10-21 Recovery

0.7500	-2.40	0.7500	-2.744
0.8333	-2.27	0.8333	-2.608
0.9167	-2.14	0.9166	-2.484
1.0	-2.02	1.0	-2.376
1.1	-1.91	1.1	-2.376
1.2	-1.82	1.2	-2.096
1.3	-1.73	1.2	-2.096
1.3	-1.65	1.2	-2.096
1.4	-1.58	1.4	-1.861
1.5	-1.50	1.4	-1.861
1.6	-1.43	1.6	-1.664
1.7	-1.36	1.6	-1.664
1.8	-1.30	1.8	-1.486
1.8	-1.24	1.8	-1.486
1.9	-1.18	1.8	-1.486
2.0	-1.13	2.0	-1.334
2.5	-0.87	2.6	-0.962
3.0	-0.72	3.0	-0.81
3.5	-0.68	3.6	-0.724
4.0	-0.69	4.0	-0.727
4.5	-0.71	4.6	-0.759
5.0	-0.69	5.0	-0.746
5.5	-0.66	5.6	-0.714
6.0	-0.63	6.0	-0.692
6.5	-0.60	6.6	-0.654
7.0	-0.57	7.0	-0.629
7.5	-0.54	7.6	-0.594
8.0	-0.51	8.0	-0.568
8.5	-0.48	8.6	-0.533
9.0	-0.45	9.0	-0.511
9.5	-0.43	9.6	-0.479
10.0	-0.40	10.0	-0.46
11.0	-0.36	11.0	-0.419
12.0	-0.33	12.0	-0.378
13.0	-0.29	13.0	-0.339
14.0	-0.26	14.0	-0.308
15.0	-0.23	15.0	-0.282
16.0	-0.21	16.0	-0.257
17.0	-0.19	17.0	-0.235
18.0	-0.17	18.0	-0.216
19.0	-0.15	19.0	-0.196
20.0	-0.14	20.0	-0.184

9413274.0598

21.0	-0.13	21.0	-0.171
22.0	-0.11	22.0	-0.158
23.0	-0.10	23.0	-0.146
24.0	-0.09	24.0	-0.136
25.0	-0.08	25.0	-0.13
26.0	-0.08	26.0	-0.12
27.0	-0.07	27.0	-0.111
28.0	-0.06	28.0	-0.104
29.0	-0.05	29.0	-0.098
30.0	-0.05	30.0	-0.092
31.0	-0.04	31.0	-0.088
32.0	-0.04		
33.0	-0.03		
34.0	-0.03		
35.0	-0.03		
36.0	-0.02		
37.0	-0.02		
38.0	-0.01		
39.0	-0.01		
40.0	-0.01		
41.0	-0.01		
42.0	-0.01		
43.0	-0.00		
44.0	-0.00		
45.0	-0.00		
46.0	-0.00		
47.0	0.01		
48.0	0.01		
49.0	0.01		
50.0	0.01		
51.0	0.01		
52.0	0.01		
53.0	0.02		
54.0	0.02		
55.0	0.02		
56.0	0.02		
57.0	0.02		
58.0	0.02		
59.0	0.02		
60.0	0.02		
61.0	0.03		
62.0	0.03		

9413274.0599

63.0	0.03
64.0	0.03
65.0	0.03
66.0	0.03
67.0	0.03
68.0	0.04
69.0	0.04
70.0	0.04
71.0	0.04
72.0	0.04
73.0	0.04
74.0	0.04
75.0	0.04
76.0	0.04
77.0	0.05
78.0	0.05
79.0	0.05
80.0	0.05
81.0	0.05
82.0	0.05
83.0	0.05
84.0	0.05
85.0	0.05
86.0	0.05
87.0	0.05
88.0	0.06
89.0	0.06
90.0	0.06
91.0	0.06
92.0	0.06
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95.0	0.06
96.0	0.06
97.0	0.06
98.0	0.06
99.0	0.06
100.0	0.06
101.0	0.07
102.0	0.07
103.0	0.07
104.0	0.07

9413224.0600

105.0	0.07
106.0	0.07
107.0	0.07
108.0	0.07
109.0	0.07
110.0	0.07
111.0	0.07
112.0	0.07
113.0	0.07
114.0	0.07
115.0	0.07
116.0	0.07
117.0	0.07
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120.0	0.07
121.0	0.07
122.0	0.07
123.0	0.08
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137.0	0.09
138.0	0.09
139.0	0.09
140.0	0.09
141.0	0.09
142.0	0.09
143.0	0.09
144.0	0.09
145.0	0.09
146.0	0.09

9413224.0601

299-W10-21 Recovery

147.0	0.09
148.0	0.09
149.0	0.09
150.0	0.09
151.0	0.09
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155.0	0.09
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158.0	0.09
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164.0	0.09
165.0	0.09
166.0	0.09
167.0	0.09
168.0	0.09
169.0	0.10
170.0	0.10
171.0	0.10
172.0	0.10
173.0	0.10
174.0	0.10
175.0	0.10
176.0	0.10
177.0	0.10
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179.0	0.10
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182.0	0.10
183.0	0.10
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186.0	0.10
187.0	0.10
188.0	0.10

9413224.0402

189.0	0.10
190.0	0.10
191.0	0.10
192.0	0.10
193.0	0.10
194.0	0.10
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196.0	0.10
197.0	0.10
198.0	0.10
199.0	0.10
200.0	0.10
201.0	0.10
202.0	0.11
203.0	0.10
204.0	0.11
205.0	0.11
206.0	0.11
207.0	0.11
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210.0	0.10
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215.0	0.11
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230.0	0.11

9413224.0603

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232.0	0.11
233.0	0.11
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236.0	0.11
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241.0	0.11
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254.0	0.11
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272.0	0.10

9413224.0604

273.0	0.10
274.0	0.10
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276.0	0.10
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313.0	0.09
314.0	0.09

9413224.0605

315.0	0.09
316.0	0.09
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9413224.0606

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9413224.0607

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440.0	0.06

9413224.0600

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482.0	0.06

9413224.0609

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524.0	0.05

9413224.0610

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557.0	0.04
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561.0	0.05
562.0	0.05
563.0	0.05
564.0	0.05
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566.0	0.05

9413224.0611

567.0	0.05
568.0	0.05
569.0	0.04
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571.0	0.04
572.0	0.04
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575.0	0.04
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586.0	0.05
587.0	0.05
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589.0	0.04
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599.0	0.05
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608.0	0.04

9413224.0612

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618.0	0.04
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650.0	0.03

9413224.0613

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686.0	0.03
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692.0	0.03

9413224.0614

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695.0	0.03
696.0	0.03
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717.0	0.03
718.0	0.03
719.0	0.03
720.0	0.04
721.0	0.04
722.0	0.04
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726.0	0.04
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728.0	0.03
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730.0	0.03
731.0	0.03
732.0	0.03
733.0	0.03
734.0	0.03

9413224.0615

735.0	0.03
736.0	0.04
737.0	0.03
738.0	0.03
739.0	0.03
740.0	0.04
741.0	0.04
742.0	0.03
743.0	0.04
744.0	0.04
745.0	0.03
746.0	0.03
747.0	0.03
748.0	0.03
749.0	0.03
750.0	0.03
751.0	0.03
752.0	0.03
753.0	0.03
754.0	0.03
755.0	0.03
756.0	0.03
757.0	0.03
758.0	0.03
759.0	0.03
760.0	0.03
761.0	0.03
762.0	0.03
763.0	0.03
764.0	0.03
765.0	0.03
766.0	0.03
767.0	0.03
768.0	0.03
769.0	0.03
770.0	0.03
771.0	0.03
772.0	0.03
773.0	0.03
774.0	0.03
775.0	0.03
776.0	0.03

9102 1422 1146

Pg 28 of 45

299-W10-21 Recovery

777.0	0.03
778.0	0.03
779.0	0.03
780.0	0.03
781.0	0.03
782.0	0.03
783.0	0.03
784.0	0.03
785.0	0.03
786.0	0.03
787.0	0.03
788.0	0.03
789.0	0.03
790.0	0.03
791.0	0.03
792.0	0.03
793.0	0.03
794.0	0.03
795.0	0.03
796.0	0.03
797.0	0.03
798.0	0.03
799.0	0.03
800.0	0.03
801.0	0.03
802.0	0.03
803.0	0.03
804.0	0.03
805.0	0.03
806.0	0.03
807.0	0.03
808.0	0.03
809.0	0.03
810.0	0.03
811.0	0.03
812.0	0.03
813.0	0.03
814.0	0.03
815.0	0.03
816.0	0.03
817.0	0.03
818.0	0.03

9413224.0617

819.0	0.03
820.0	0.03
821.0	0.03
822.0	0.03
823.0	0.03
824.0	0.03
825.0	0.03
826.0	0.03
827.0	0.03
828.0	0.03
829.0	0.03
830.0	0.03
831.0	0.03
832.0	0.03
833.0	0.03
834.0	0.03
835.0	0.03
836.0	0.03
837.0	0.03
838.0	0.03
839.0	0.02
840.0	0.02
841.0	0.02
842.0	0.02
843.0	0.02
844.0	0.02
845.0	0.02
846.0	0.03
847.0	0.03
848.0	0.03
849.0	0.03
850.0	0.03
851.0	0.03
852.0	0.03
853.0	0.03
854.0	0.03
855.0	0.03
856.0	0.03
857.0	0.03
858.0	0.03
859.0	0.03
860.0	0.03

9413224.0618

p 30 p 45

299-W10-21 Recovery

861.0	0.03
862.0	0.03
863.0	0.03
864.0	0.03
865.0	0.03
866.0	0.03
867.0	0.03
868.0	0.03
869.0	0.03
870.0	0.03
871.0	0.03
872.0	0.03
873.0	0.03
874.0	0.03
875.0	0.03
876.0	0.03
877.0	0.03
878.0	0.03
879.0	0.03
880.0	0.03
881.0	0.03
882.0	0.03
883.0	0.03
884.0	0.03
885.0	0.03
886.0	0.03
887.0	0.03
888.0	0.03
889.0	0.03
890.0	0.03
891.0	0.03
892.0	0.03
893.0	0.03
894.0	0.03
895.0	0.03
896.0	0.03
897.0	0.03
898.0	0.03
899.0	0.03
900.0	0.03
901.0	0.03
902.0	0.03

9413224.0619

§ 31 of 45

903.0	0.03
904.0	0.03
905.0	0.03
906.0	0.03
907.0	0.03
908.0	0.03
909.0	0.03
910.0	0.03
911.0	0.03
912.0	0.03
913.0	0.03
914.0	0.03
915.0	0.03
916.0	0.02
917.0	0.03
918.0	0.02
919.0	0.02
920.0	0.02
921.0	0.02
922.0	0.02
923.0	0.02
924.0	0.02
925.0	0.02
926.0	0.02
927.0	0.02
928.0	0.02
929.0	0.02
930.0	0.02
931.0	0.02
932.0	0.03
933.0	0.03
934.0	0.02
935.0	0.02
936.0	0.02
937.0	0.02
938.0	0.02
939.0	0.02
940.0	0.02
941.0	0.02
942.0	0.02
943.0	0.02
944.0	0.02

9413224.0620

p 32 of 45

945.0	0.02
946.0	0.02
947.0	0.02
948.0	0.02
949.0	0.02
950.0	0.02
951.0	0.02
952.0	0.02
953.0	0.02
954.0	0.01
955.0	0.01
956.0	0.02
957.0	0.01
958.0	0.01
959.0	0.01
960.0	0.01
961.0	0.02
962.0	0.02
963.0	0.02
964.0	0.01
965.0	0.01
966.0	0.01
967.0	0.01
968.0	0.01
969.0	0.01
970.0	0.01
971.0	0.01
972.0	0.01
973.0	0.01
974.0	0.01
975.0	0.01
976.0	0.01
977.0	0.01
978.0	0.01
979.0	0.00
980.0	0.01
981.0	0.00
982.0	0.01
983.0	0.01
984.0	0.01
985.0	0.01
986.0	0.01

9413224.0621

987.0	0.00
988.0	0.00
989.0	0.00
990.0	0.00
991.0	0.00
992.0	0.00
993.0	0.00
994.0	0.00
995.0	0.00
996.0	0.00
997.0	0.00
998.0	0.00
999.0	0.00
1000.0	0.00
1001.0	0.00
1002.0	0.00
1003.0	0.00
1004.0	0.00
1005.0	0.00
1006.0	0.00
1007.0	0.00
1008.0	0.00
1009.0	0.00
1010.0	0.00
1011.0	0.00
1012.0	0.00
1013.0	0.00
1014.0	0.00
1015.0	0.00
1016.0	0.00
1017.0	0.00
1018.0	0.00
1019.0	0.00
1020.0	0.00
1021.0	0.00
1022.0	0.00
1023.0	0.00
1024.0	0.00
1025.0	0.00
1026.0	0.00
1027.0	0.00
1028.0	0.00

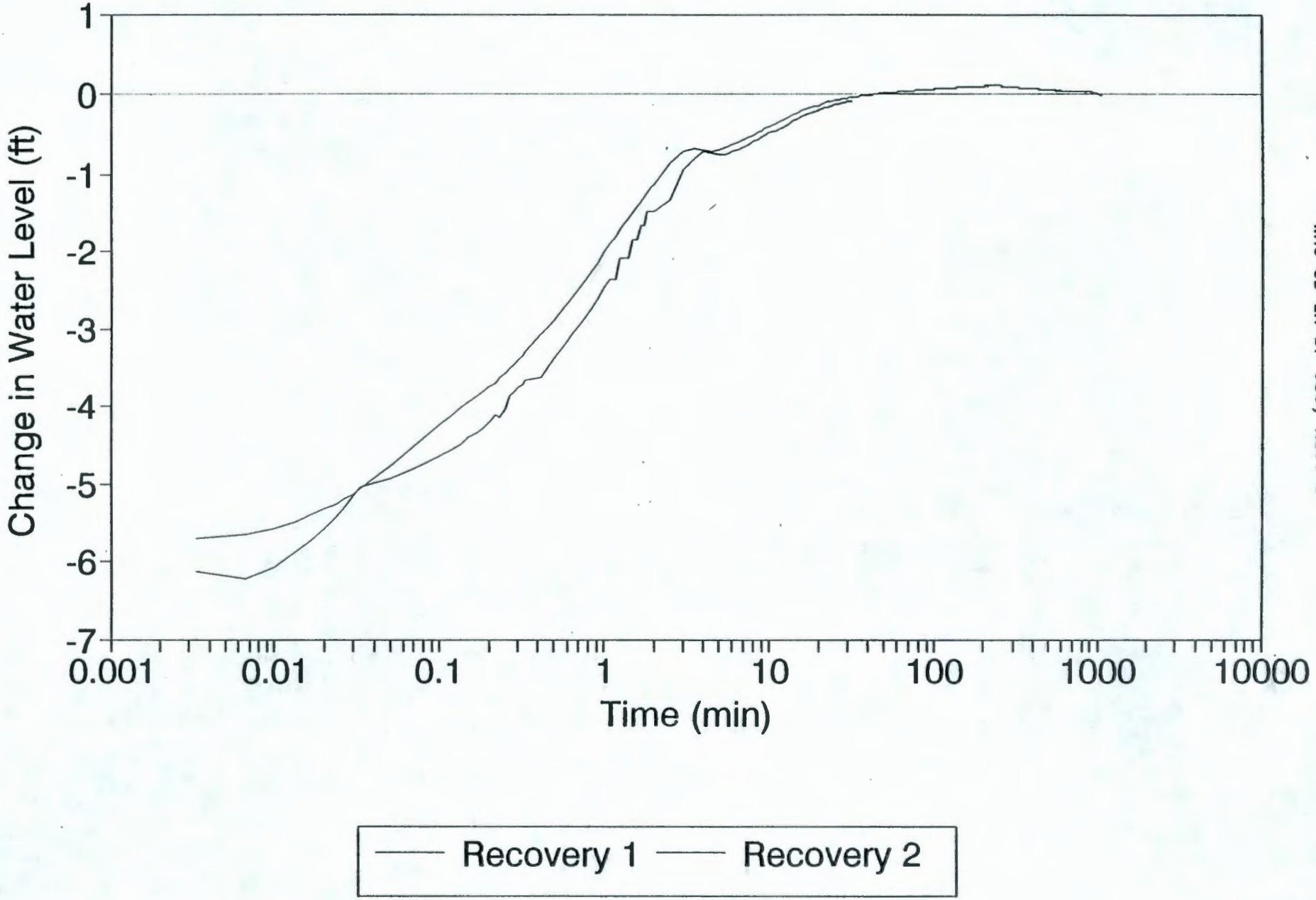
9413224.0622

P, 34 P 45

1029.0	0.00
1030.0	0.00
1031.0	0.00
1032.0	0.00
1033.0	0.00
1034.0	0.00
1035.0	-0.01
1036.0	-0.01
1037.0	-0.01
1038.0	-0.01
1039.0	-0.01
1040.0	-0.01
1041.0	-0.01
1042.0	-0.01
1043.0	-0.01
1044.0	0.00
1045.0	0.00

9413224.0623

Well 299-W10-21 Recovery
01-Oct& 04-Oct-93



299-W10-21 Slug Injection

Datalogger: Hermit Unit# 192
SWL: 214.82'
Test 4 Type: Slug Injection
Start Time: 12:19 10/04/93

Time:min	Time:hrs	d(WL):Ft
0.0000	0.00000	5.648
0.0083	0.00014	2.694
0.0166	0.00028	0.620
0.0250	0.00042	1.309
0.0333	0.00056	0.454
0.0416	0.00069	0.648
0.0500	0.00083	0.454
0.0583	0.00097	0.473
0.0666	0.00111	0.448
0.0750	0.00125	0.473
0.0833	0.00139	0.410
0.0916	0.00153	0.372
0.1000	0.00167	0.375
0.1083	0.00181	0.353
0.1166	0.00194	0.372
0.1250	0.00208	0.346
0.1333	0.00222	0.349
0.1416	0.00236	0.324
0.1500	0.00250	0.318
0.1583	0.00264	0.308
0.1666	0.00278	0.305
0.1750	0.00292	0.295
0.1833	0.00306	0.292
0.1916	0.00319	0.286
0.2000	0.00333	0.283
0.2083	0.00347	0.276
0.2166	0.00361	0.273
0.2250	0.00375	0.270
0.2333	0.00389	0.264
0.2416	0.00403	0.261
0.2500	0.00417	0.257
0.2583	0.00431	0.254
0.2666	0.00444	0.251

9413224.0625

Pg 37 of 45

299-W10-21 Slug Injection

0.2750	0.00458	0.248
0.2833	0.00472	0.245
0.2916	0.00486	0.241
0.3000	0.00500	0.238
0.3083	0.00514	0.235
0.3166	0.00528	0.232
0.3250	0.00542	0.229
0.3333	0.00556	0.226
0.3500	0.00583	0.222
0.3666	0.00611	0.216
0.3833	0.00639	0.213
0.4000	0.00667	0.210
0.4166	0.00694	0.207
0.4333	0.00722	0.203
0.4500	0.00750	0.197
0.4666	0.00778	0.197
0.4833	0.00806	0.194
0.5000	0.00833	0.187
0.5166	0.00861	0.187
0.5333	0.00889	0.181
0.5500	0.00917	0.181
0.5666	0.00944	0.178
0.5833	0.00972	0.175
0.6000	0.01000	0.172
0.6166	0.01028	0.168
0.6333	0.01056	0.165
0.6500	0.01083	0.165
0.6666	0.01111	0.162
0.6833	0.01139	0.159
0.7000	0.01167	0.159
0.7166	0.01194	0.156
0.7333	0.01222	0.156
0.7500	0.01250	0.153
0.7666	0.01278	0.153
0.7833	0.01306	0.146
0.8000	0.01333	0.146
0.8166	0.01361	0.143
0.8333	0.01389	0.143
0.8500	0.01417	0.140
0.8666	0.01444	0.140
0.8833	0.01472	0.137
0.9000	0.01500	0.137

9413224.0626

Pg 38 of 45

299-W10-21 Slug Injection

0.9166	0.01528	0.133
0.9333	0.01556	0.133
0.9500	0.01583	0.130
0.9666	0.01611	0.130
0.9833	0.01639	0.127
1.0	0.01667	0.127
1.2	0.02000	0.108
1.4	0.02333	0.092
1.6	0.02667	0.079
1.8	0.03000	0.070
2.0	0.03333	0.064
2.2	0.03667	0.057
2.4	0.04000	0.051
2.6	0.04333	0.048
2.8	0.04667	0.041
3.0	0.05000	0.038
3.2	0.05333	0.035
3.4	0.05667	0.032
3.6	0.06000	0.032
3.8	0.06333	0.029
4.0	0.06667	0.025
4.2	0.07000	0.025
4.4	0.07333	0.022
4.6	0.07667	0.022
4.8	0.08000	0.019
5.0	0.08333	0.019
5.2	0.08667	0.019
5.4	0.09000	0.016
5.6	0.09333	0.016
5.8	0.09667	0.013
6.0	0.10000	0.013
6.2	0.10333	0.013
6.4	0.10667	0.013
6.6	0.11000	0.010
6.8	0.11333	0.010
7.0	0.11667	0.010
7.2	0.12000	0.010
7.4	0.12333	0.010
7.6	0.12667	0.006
7.8	0.13000	0.010
8.0	0.13333	0.006
8.2	0.13667	0.006

9413224.0627

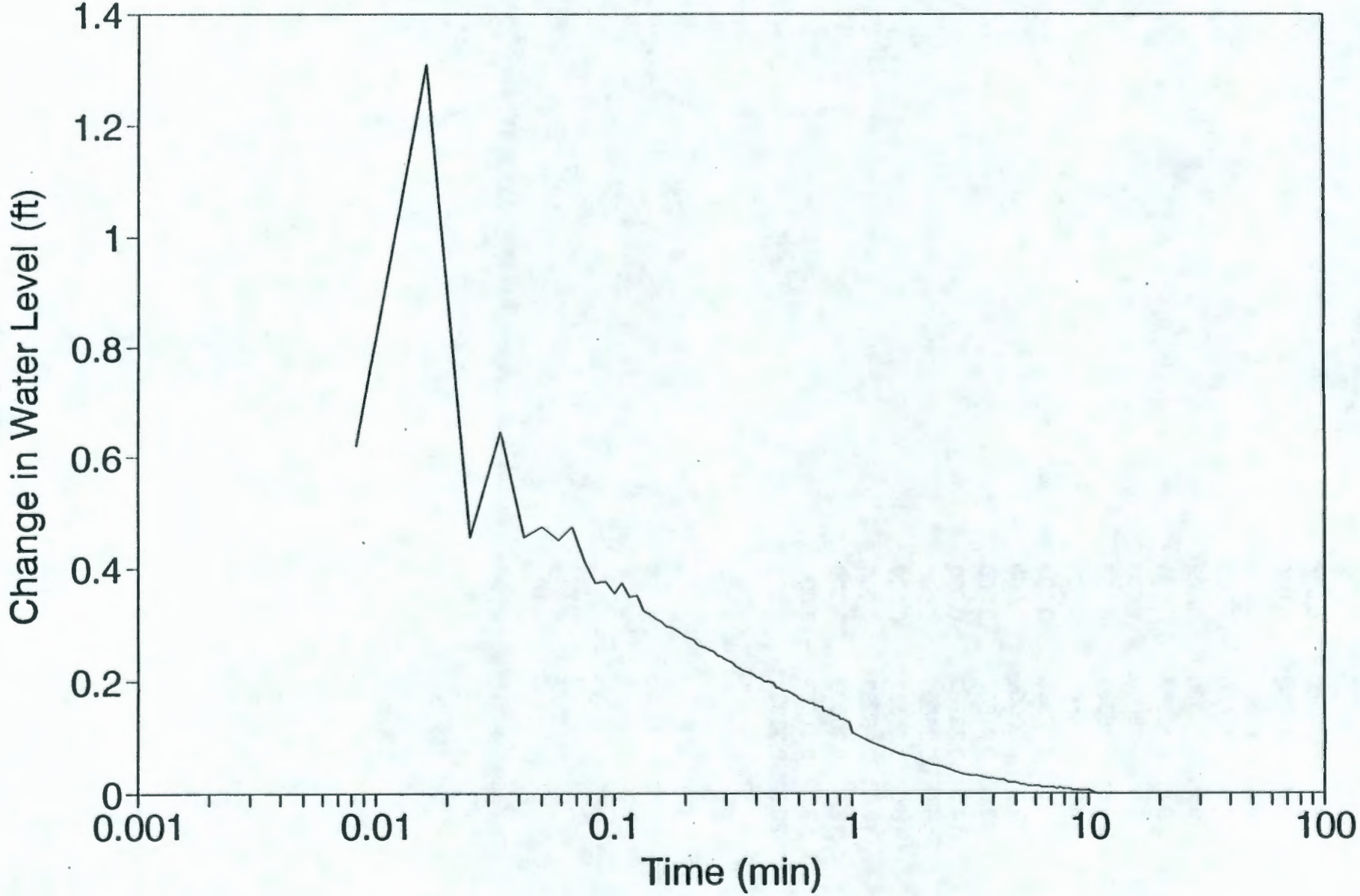
8.4	0.14000	0.006
8.6	0.14333	0.006
8.8	0.14667	0.003
9.0	0.15000	0.003
9.2	0.15333	0.003
9.4	0.15667	0.003
9.6	0.16000	0.003
9.8	0.16333	0.003
10.0	0.16667	0.003
11.0	0.18333	0.003
12.0	0.20000	0.000
13.0	0.21667	0.000
14.0	0.23333	0.000
15.0	0.25000	0.000
16.0	0.26667	0.000
17.0	0.28333	0.000
18.0	0.30000	0.000
19.0	0.31667	0.000
20.0	0.33333	0.000

9413224.0628

9413224.0629

1940 P45

299-W10-21 Slug Injection
04-Oct-93



Pg 41 of 45

299-W10-21 Slug Withdrawal

Datalogger: Hermit Unit# 192
SWL: 214.91'
Test 6 Type: Slug Withdrawal
Start Time: 12:55 10/04/93

Time:min	Time:hrs	d(WL):Ft
0.0000	0.00000	-1.614
0.0083	0.00014	-0.039
0.0166	0.00028	-0.588
0.0250	0.00042	-1.729
0.0333	0.00056	-1.265
0.0416	0.00069	-1.125
0.0500	0.00083	-1.122
0.0583	0.00097	-0.969
0.0666	0.00111	-0.973
0.0750	0.00125	-0.871
0.0833	0.00139	-0.861
0.0916	0.00153	-0.779
0.1000	0.00167	-0.757
0.1083	0.00181	-0.703
0.1166	0.00194	-0.674
0.1250	0.00208	-0.639
0.1333	0.00222	-0.607
0.1416	0.00236	-0.579
0.1500	0.00250	-0.550
0.1583	0.00264	-0.528
0.1666	0.00278	-0.502
0.1750	0.00292	-0.480
0.1833	0.00306	-0.461
0.1916	0.00319	-0.439
0.2000	0.00333	-0.423
0.2083	0.00347	-0.404
0.2166	0.00361	-0.391
0.2250	0.00375	-0.375
0.2333	0.00389	-0.359
0.2416	0.00403	-0.347
0.2500	0.00417	-0.334
0.2583	0.00431	-0.324
0.2666	0.00444	-0.312

9413224.0630

0.2750	0.00458	-0.302
0.2833	0.00472	-0.293
0.2916	0.00486	-0.283
0.3000	0.00500	-0.274
0.3083	0.00514	-0.267
0.3166	0.00528	-0.258
0.3250	0.00542	-0.251
0.3333	0.00556	-0.245
0.3500	0.00583	-0.232
0.3666	0.00611	-0.220
0.3833	0.00639	-0.210
0.4000	0.00667	-0.201
0.4166	0.00694	-0.191
0.4333	0.00722	-0.182
0.4500	0.00750	-0.175
0.4666	0.00778	-0.166
0.4833	0.00806	-0.162
0.5000	0.00833	-0.153
0.5166	0.00861	-0.150
0.5333	0.00889	-0.143
0.5500	0.00917	-0.140
0.5666	0.00944	-0.134
0.5833	0.00972	-0.131
0.6000	0.01000	-0.124
0.6166	0.01028	-0.121
0.6333	0.01056	-0.118
0.6500	0.01083	-0.115
0.6666	0.01111	-0.112
0.6833	0.01139	-0.108
0.7000	0.01167	-0.105
0.7166	0.01194	-0.102
0.7333	0.01222	-0.099
0.7500	0.01250	-0.096
0.7666	0.01278	-0.093
0.7833	0.01306	-0.093
0.8000	0.01333	-0.089
0.8166	0.01361	-0.086
0.8333	0.01389	-0.083
0.8500	0.01417	-0.083
0.8666	0.01444	-0.080
0.8833	0.01472	-0.077
0.9000	0.01500	-0.077

9413224.063

Pg 43 of 45

299-W10-21 Slug Withdrawal

0.9166	0.01528	-0.074
0.9333	0.01556	-0.074
0.9500	0.01583	-0.070
0.9666	0.01611	-0.067
0.9833	0.01639	-0.067
1.0	0.01667	-0.067
1.2	0.02000	-0.048
1.4	0.02333	-0.032
1.6	0.02667	-0.023
1.8	0.03000	-0.016
2.0	0.03333	-0.007
2.2	0.03667	0.000
2.4	0.04000	0.003
2.6	0.04333	0.009
2.8	0.04667	0.012
3.0	0.05000	0.015
3.2	0.05333	0.019
3.4	0.05667	0.022
3.6	0.06000	0.025
3.8	0.06333	0.028
4.0	0.06667	0.028
4.2	0.07000	0.031
4.4	0.07333	0.034
4.6	0.07667	0.034
4.8	0.08000	0.034
5.0	0.08333	0.031
5.2	0.08667	0.031
5.4	0.09000	0.028
5.6	0.09333	0.028
5.8	0.09667	0.025
6.0	0.10000	0.025
6.2	0.10333	0.025
6.4	0.10667	0.025
6.6	0.11000	0.022
6.8	0.11333	0.022
7.0	0.11667	0.019
7.2	0.12000	0.022
7.4	0.12333	0.022
7.6	0.12667	0.019
7.8	0.13000	0.019
8.0	0.13333	0.019
8.2	0.13667	0.019

9413224.0682

Pg 44 of 95

299-W10-21 Slug Withdrawal

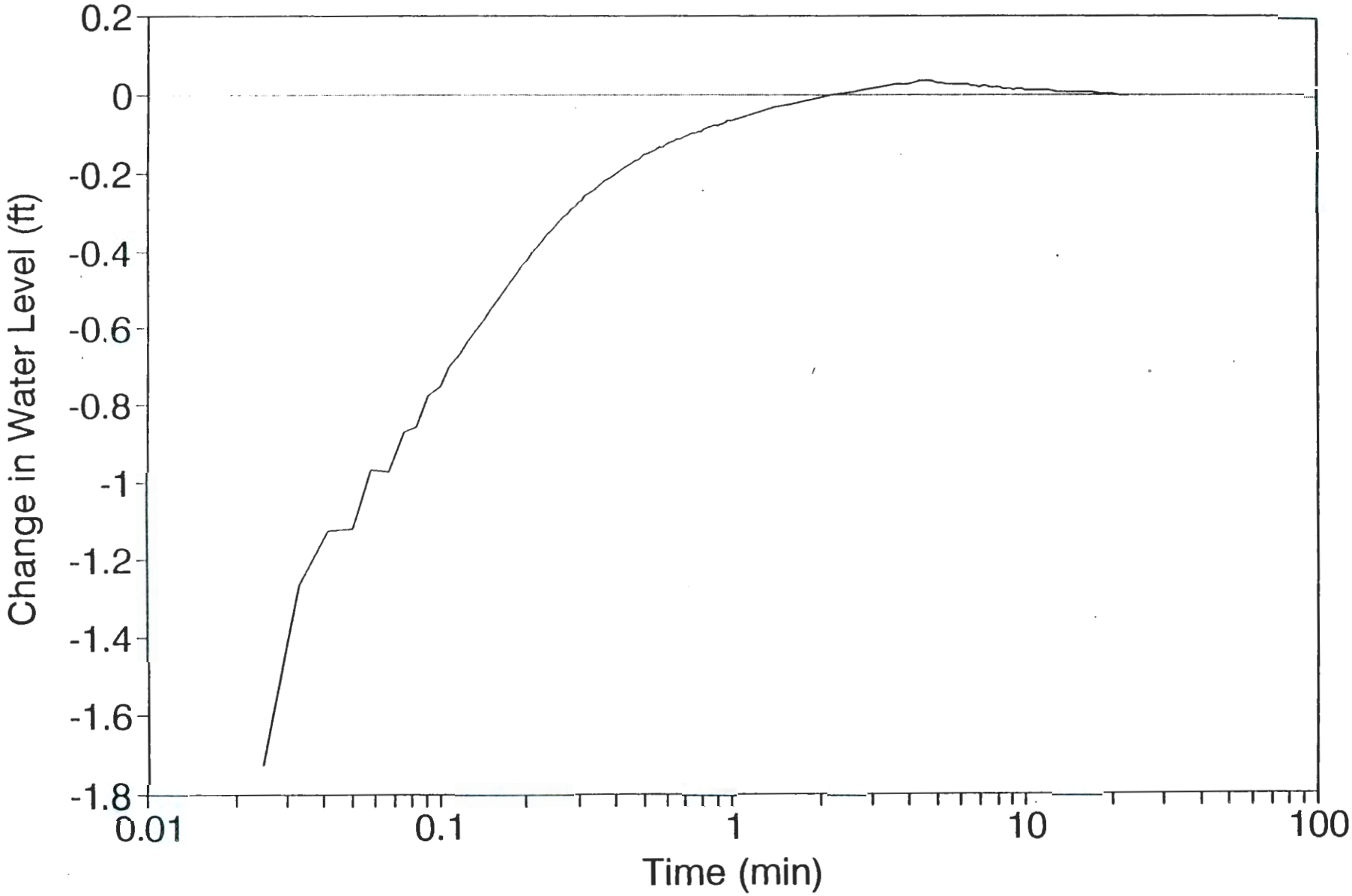
8.4	0.14000	0.015
8.6	0.14333	0.015
8.8	0.14667	0.015
9.0	0.15000	0.015
9.2	0.15333	0.012
9.4	0.15667	0.015
9.6	0.16000	0.015
9.8	0.16333	0.015
10.0	0.16667	0.012
11.0	0.18333	0.012
12.0	0.20000	0.012
13.0	0.21667	0.009
14.0	0.23333	0.009
15.0	0.25000	0.006
16.0	0.26667	0.006
17.0	0.28333	0.006
18.0	0.30000	0.003
19.0	0.31667	0.003
20.0	0.33333	0.003
21.0	0.35000	0.000
22.0	0.36667	0.000
23.0	0.38333	0.000

9413224.1653

9413224.0634

pg 45 of 46

299-W10-21 Slug Withdrawal
04-Oct-93



SAMPLE PUMP INSTALLATION FORM

Well no: 299W-10-21

Project no: W-152

Instalation date: 10-4-93

Installed by: T. Macseski

Pump type: Positive displacement

Pump model: Hydrostar HS-8001

PUMP AND RISER PIPE INFORMATION

Pipe: 22@ 10'x3/4",1@ 5'x3/4"SS

Pump length: 2.42'

Material cleaning: Manufacture

Pump screen length: 1.90'

PUMP TESTING INFORMATION

Test date: 10-4-93 Strokes: 61

Pump efficiency= $\frac{\text{calculated strokes / volume @ 100\%}}{\text{observed strokes / volume}}$ x100

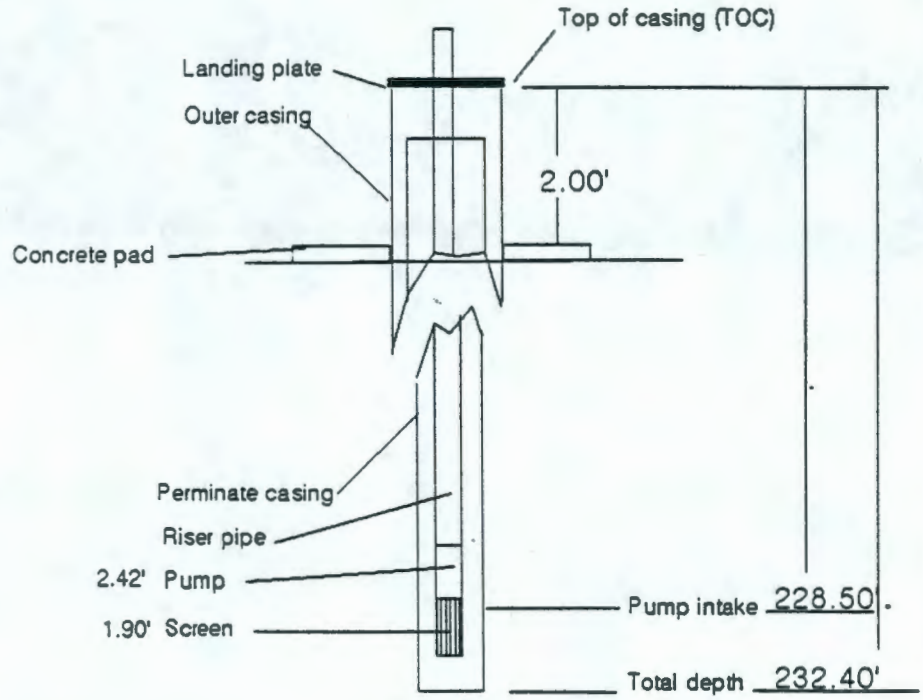
$\frac{\text{Pump eff. 10 strokes/1gal.}}{\text{x strokes / gal.}}$ x 100=83.3%

PUMP INSTALATION DRAWING

Total material length: 230.40'

Comments:

Bottom of pump/pipe assembly is 2.00' off bottom of well. Total pump length is 4.32'.



Report by: Bret F. Strode

Title Equipment Technician

Signature

Reviewed by: Robert S. Edrington

Title: Advanced Scientist

Signature:

A-6001-035(01/93)

9413224.0635

SOIL SAMPLE RESULTS
ENVIRONMENTAL RESTORATION HEALTH PHYSICS

Requested by:	Phone No.	Well No.	Date:
		299-W10-21	

Sample No. (Depth)	Sample Date	Sample Description	Analysis Date	Lab No.	Results Beta/Gamma (pci/g)	Results Alpha (pci/g)
80'	8-9-93	Soil	8-16-93	0849-93	15.9	1.1
180'	8-6-93		8-12-93	0842-93	7.6	<D
185'				0843-93	<D	<D
190'	8-6-93		8-12-93	0844-93	<D	0.7
195'	8-9-93		8-16-93	0851-93	5.0	1.3
198'				0850-93	8.6	<D
200'				0852-93	15.3	0.4
205'				0853-93	24.2	3.4
210'				0854-93	11.5	0.9
215'				0855-93	6.4	0.6
220'				0856-93	12.6	2.6
225'				0857-93	12.3	<D
230'				0858-93	12.8	0.4
235' (T.D.)	8-9-93	Soil	8-16-93	0859-93	14.7	1.9

Performed By: [signature] Date: 8-17-93.

Supervisor Review: Gary LaFrenier per telecon [signature] Date: 8-17-93

Page: 3 of 3

A-6000-829 (10/91)

9413224.0636

SOIL SAMPLE RESULTS
ENVIRONMENTAL RESTORATION HEALTH PHYSICS

Requested by:	Phone No.	Well No. 299-W10-21	Date:

Sample No. (Depth)	Sample Date	Sample Description	Analysis Date	Lab No.	Results Beta/Gamma (pci/g)	Result Alpha (pci/g)
85'	7-29-93	Soil	8-5-93	0821-93	20.2	0.7
90'				0822-93	17.4	0.7
93'				0823-93	26.8	5.9
95'			8-5-93	0824-93	18.5	1.5
100'			8-6-93	0825-93	1.4	<D
105'				0826-93	3.6	<D
110'				0827-93	5.9	<D
115'				0828-93	5.8	<D
120'				0829-93	6.4	0.2
125'	7-29-93			0830-93	<D	<D
130'	8-3-93			0831-93	2.2	<D
135'				0832-93	2.1	0.8
140'				0833-93	<D	<D
145'	8-3-93			0836-93	9.6	<D
150'	8-4-93			0835-93	<D	<D
155'				0836-93	<D	0.7
160'				0837-93	5.9	<D
165'				0838-93	7.4	<D
170'				0839-93	<D	0.7
175'	8-4-93			0840-93	<D	<D
228.17' - 228.97'	8-6-93	Soil	8-6-93	~~0842-93~~ 0841-93 on 8-6-93	<D	2.2

Performed By: [signature] Date: 8-6-93

Supervisor Review: [signature] Date: 8-6-93

Page: 2 of 3

A-6000-829 (10/91)

9413224.0637

SOIL SAMPLE RESULTS
ENVIRONMENTAL RESTORATION HEALTH PHYSICS

VALIDATED
KD 2/18/94
SIGNATURE/DATE

Requested by:	Phone No.	Well No.	Date:
		299-W10-21	

Sample No. (Depth)	Sample Date	Sample Description	Analysis Date	Lab No.	Results Beta/Gamma (pci/g)	Results Alpha (pci/g)
5'	7-22-93	Soil	7-28-93	0798-93	19.8	1.2
10'				0799-93	6.7	1.0
15'				0800-93	2.8	0.7
20'				0801-93	5.2	0.3
25'				0802-93	10.3	0.6
30'	7-22-93		7-28-93	0803-93	13.6	0.7
35'	7-23-93			0812-93	4.8	2.0
40'				0813-93	9.8	0.2
45'				0814-93	6.2	0.7
50'	7-23-93			0815-93	10.2	0.7
55'	7-27-93			0808-93	15.6	0.4
60'				0809-93	5.5	0.1
62'	7-27-93		7-28-93	0810-93	9.2	1.7
65'	7-29-93		7-30-93	0816-93	54.8	<D
66.5'				0817-93	48.9	<D
70'	7-29-93		7-30-93	0818-93	38.3	<D
70.10'-71.80'	7-27-93		7-28-93	0811-93	35.7	7.0
75'	7-29-93		7-30-93	0819-93	71.4	5.2
83.4'-85.2'	7-29-93	Soil	7-30-93	0820-93	21.0	0.2

Performed By: [signature] Date: 7-30-93

Supervisor Review: [signature] Date: 7-30-93

Page: 1 of 3

A-6000-829 (10/91)

9413224.0638

Pg 17 of 17

BILLING # _____

TEST REQUEST

OPERABLE UNIT	W-152	WELL NO	299-W10-21	DEPTH	228.12-228.62
SAMPLE/SPECIMEN NO	3-1182	COST CODE/WORK ORDER NUMBER			R4G1H
REQUESTED BY: ORG	81235	PERSON	ED RAFUSE	PHONE	2-1051
********HEIS********	N/A	MSIN	H6-03	DATE	8/9/93

TEST REQUESTED	# OF SAMPLES	TEST LAB INFORMATION
SEIVE	1	GEL 07

REMARKS:

ARCHIVE YES ☐ NO ☑

TAPE RELEASE STICKER HERE

RECEIVED BY JY FANNIN

DATE 8/9/93

9413274.0639

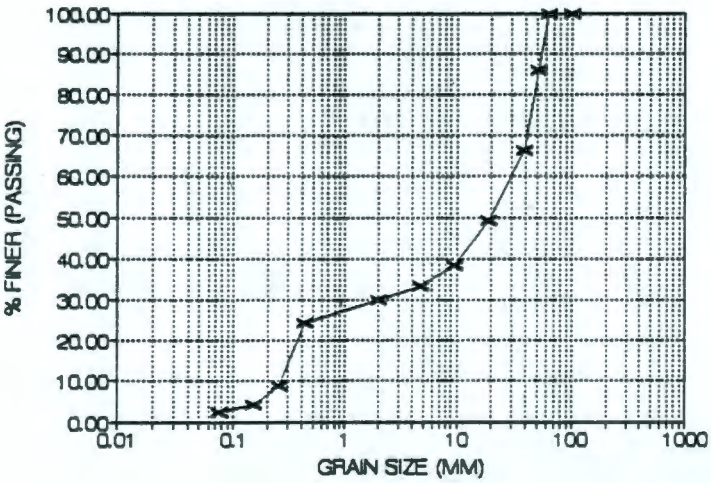
Pg 2 of 17

SIEVE ANALYSIS REPORT SHEET

WELL #	299-W10-21	CONTACT	ED RAFUSE	ORIG COD	81235	PHONE	
LAB #	3-1182	DEPTH	228.1-228.6	TESTED BY RTM		DATE	8/10/93

SAMPLE WT (g)	SIEVE SIZE IN.	CUMULATIVE WEIGHT	% WEIGHT RETAINED	% PASSING	GRAIN SIZ MM	COMMENTS
2174.0	4.000	0.0	0.0	100.0	101.600	
	2.500	0.0	0.0	100.0	63.500	
	2.000	306.0	14.1	85.9	50.800	
	1.500	733.0	33.7	66.3	38.100	
	0.750	1105.6	50.9	49.1	19.050	
	0.375	1344.7	61.9	38.1	9.525	
WT.-#10	SIEVE# 4	1452.1	66.8	33.2	4.750	
SAMP.(g)	S# 10	1521.8	70.0	30.0	2.000	
653.2	S# 40	120.9	18.5	24.4	0.425	
	S# 60	460.5	70.5	8.9	0.250	
	S# 100	560.2	85.8	4.3	0.150	
	S# 200	599.8	91.8	2.5	0.075	

SIEVE ANALYSIS DATA



TEST CHECKED BY: R. T. McIntosh DATE: 8/10/93

9413274.0640

GEL 07 ☐	GEL 16 ☐
GEL 09 ☐	GEL 17 ☐
GEL 10 ☐	GEL 19 ☐
GEL 14 ☐	GEL ☐

WHC-SD-EN-DP-086, Rev. 0

GEOTECHNICAL ENGINEERING LABORATORY
GEL-07 SIEVE AND HYDROMETER ANALYSIS

Sample No. 3-1182 Pg 3 of

Page _____ of _____

GEL-07 SIEVE ANALYSIS

Date _____ Calibration Due Date 10/29/97 Balance: 3310

Sample Description _____ Sieve Time 10 (min)

Reduced By: ☐ Splitting ☐ Quartering ☐ Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed	Tested By
2"	2174.0	306.0			
1½	~~733.0~~	733.0			
3/4	~~1105.6~~	1105.6			
3/8	~~1344.7~~	1344.7			
4		1452.1			
10		1521.8			
40	#10 (653.2)	120.9			
60		460.5			
100		560.2			
200		599.8			

Remarks: Pan #201 T 193.9 T+Wet Soil: 2552.1 T+Dry Soil 2367.9
Dry Soil = 2174.0 M. Loss = 184.2 %M =

GEL-07 HYDROMETER ANALYSIS

Date _____ Balance: _____ Calibration Due Date _____

Thermometer: _____ Calibration Due Date _____

Hydrometer: _____ Calibration Due Date _____

WEIGHT OF SAMPLE

Wt. Container + Soil _____ (g)

Wt. Container _____ (g)

Wt. Soil _____ (g)

Specific Gravity of Sample _____

% Passing No. 10 Sieve _____ %

A = _____ W = _____ K = _____

COMPOSITE CORRECTION

1st Reading _____ at _____ °C

2nd Reading _____ at _____ °C

Date	Clock Time	Elapsed Time (min)	Hydrometer Reading	Hydrometer with Composite Correction	Temperature (°C)	Soil in Suspension (%)	Particle Diameter (mm)	Tested By
		2.0						
		5.0						
		15.0						
		30.0						
		60.0						
		250.0						
		1440.0						

Remarks: _____

Tests Checked By 3-76 Date _____

BD-6000-796 (04/92)

9413224.0641

Pg 4 of 1

BILLING # 930275

TEST REQUEST

OPERABLE UNIT	RCRA	WELL NO	299-W10-21	DEPTH	70.1-71.8
SAMPLE/SPECIMEN NO	3-1179>1180	COST CODE/WORK ORDER NUMBER			R4G1H
REQUESTED BY: ORG	81235	PERSON	E. RAFUSE	PHONE	2-1051
********HEIS********	N/A	MSIN	H6-03	DATE	7-30-93

TEST REQUESTED	# OF SAMPLES	TEST LAB INFORMATION
SEIVE/HYDROMETER	1 EA	GEL 07
MOISTURE CONTENT	1 EA	GEL 14
CALCIUM CARBONATE	1 EA	GEL 19

REMARKS: Pint Fruit Jar.

ARCHIVE YES ☐ NO ☐

TAPE RELEASE STICKER HERE

RECEIVED BY JY FANNIN

DATE 7/30/93

9413224.0642

GEL 07 ☐	GEL 16 ☐
GEL 09 ☐	GEL 17 ☐
GEL 10 ☐	GEL 19 ☐
GEL 14 ☐	GEL ☐

WHC-SD-EN-DP-086, Rev. 0

GEOTECHNICAL ENGINEERING LABORATORY
GEL-07 SIEVE AND HYDROMETER ANALYSIS

Sample No. 3-1179 Pg 5of

Page ____ of ____

GEL-07 SIEVE ANALYSIS

Date 8-24-93 Calibration Due Date 10-25-93 Balance: 3304

Sample Description dirt Sieve Time 10 (min)

Reduced By: ☐ Splitting ☐ Quartering ☐ Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed	Tested By
10	353.56				
40		27.81		92.1	
60		35.45		90.0	
100		45.80		87.0	
200		82.47		76.7	

Remarks:

Work check and OK

GEL-07 HYDROMETER ANALYSIS

Date 8-26-93

Balance: 3304 Calibration Due Date 10-25-93

Thermometer: ~~0009~~ 0015 Calibration Due Date 11-19-93

Hydrometer: 1007 Calibration Due Date 1-21-94

WEIGHT OF SAMPLE

Wt. Container + Soil 161.35 (g)

Wt. Container 57.37 (g)

Wt. Soil 103.98 (g)

Specific Gravity of Sample ____

% Passing No. 10 Sieve ____ %

A = ____ W = ____ K = ____

COMPOSITE CORRECTION

1st Reading 7 at 18.9 °C

2nd Reading 7 at 19.6 °C

Date	Clock Time	Elapsed Time (min)	Hydrometer Reading	Hydrometer with Composite Correction	Temperature (°C)	Soil in Suspension (%)	Particle Diameter (mm)	Tested By
8-26-93	0803	2.0	60		18.6			
	0805	5.0	53		18.9			
	0815	15.0	30		18.9			
	0830	30.0	23		18.9			
	0900	60.0	19		19.1			
	1213	250.0	13		23.6			
8-27-93	0801	1440.0	11		19.7			

Remarks:

Tests Checked By 3-78 Date ____

BD-6000-796 (04/92)

9413224.0943

Pg 6 of 17

SIEVE ANALYSIS REPORT SHEET

WELL #	299-W10-21	CONTACT	RAFUSE	ORIG CODE	81235	PHONE	2-1051
LAB #	(3)1179	DEPTH	70.1-70.5	TESTED BY	JRP	DATE	8/26/93

SAMPLE WT (g)	SIEVE SIZE IN.	CUMULATIVE WEIGHT	% WEIGHT RETAINED	% PASSING	COMMENTS	GRAIN SIZ MM
353.6	4.000	0.0	0.0	100.0		101.600
	2.500	0.0	0.0	100.0		63.500
	2.000	0.0	0.0	100.0		50.800
	1.500	0.0	0.0	100.0		38.100
	0.750	0.0	0.0	100.0		19.050
	0.375	0.0	0.0	100.0		9.525
WT.-#10	SIEVE# 4	0.0	0.0	100.0		4.750
SAMP.(g)	S# 10	0.0	0.0	100.0		2.000
353.6	S# 40	27.8	7.9	92.1		0.425
	S# 60	35.5	10.0	90.0		0.250
	S# 100	45.8	13.0	87.0		0.150
	S# 200	82.5	23.3	76.7		0.075

GEL-07 HYDROMETER ANALYSIS

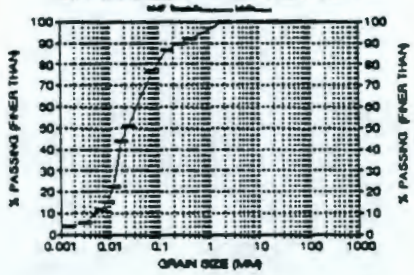
DATE:	8/26/93	BALANCE:	3304	CALIBRATION DUE DATE	10/25/93
	THERMOMETER NO.		15	CALIBRATION DUE DATE	11/19/93
	HYDROMETER		1007	CALIBRATION DUE DATE	1/21/94

WEIGHT OF SAMPLE	103.98	SPECIFIC GRAVITY of SAMPLE	2.7
COMP. CORRECTION	7	% TOTAL SAMPLE PASSING #10 SIEVE	100

DATE / TIME	ELAPSED TIME	HYDRO. READING	HYDRO. CORRECTED	TEMP. CENT.	%SOIL in SUSPENSION	"K"	"L"	PARTICLE SIZE (mm)
	0							
	2	60	53	18.8	50.97	0.01344	6.5	0.0242
	5	53	53	18.9	44.24	0.01344	7.6	0.0166
	15	30	30	18.9	22.12	0.01344	11.4	0.0117
	30	23	23	18.9	15.39	0.01344	12.5	0.0087
	60	19	19	19.1	11.54	0.01344	13.2	0.0063
	250	13	13	23.6	5.77	0.01344	14.2	0.0032
	1440	11	11	19.7	3.85	0.01344	14.5	0.0013
		TEST CHECKED BY:		R.T. MCINTOSH		DATE:	8/27/93	

R.T. McIntosh

GRAIN SIZE ANALYSIS PLOT

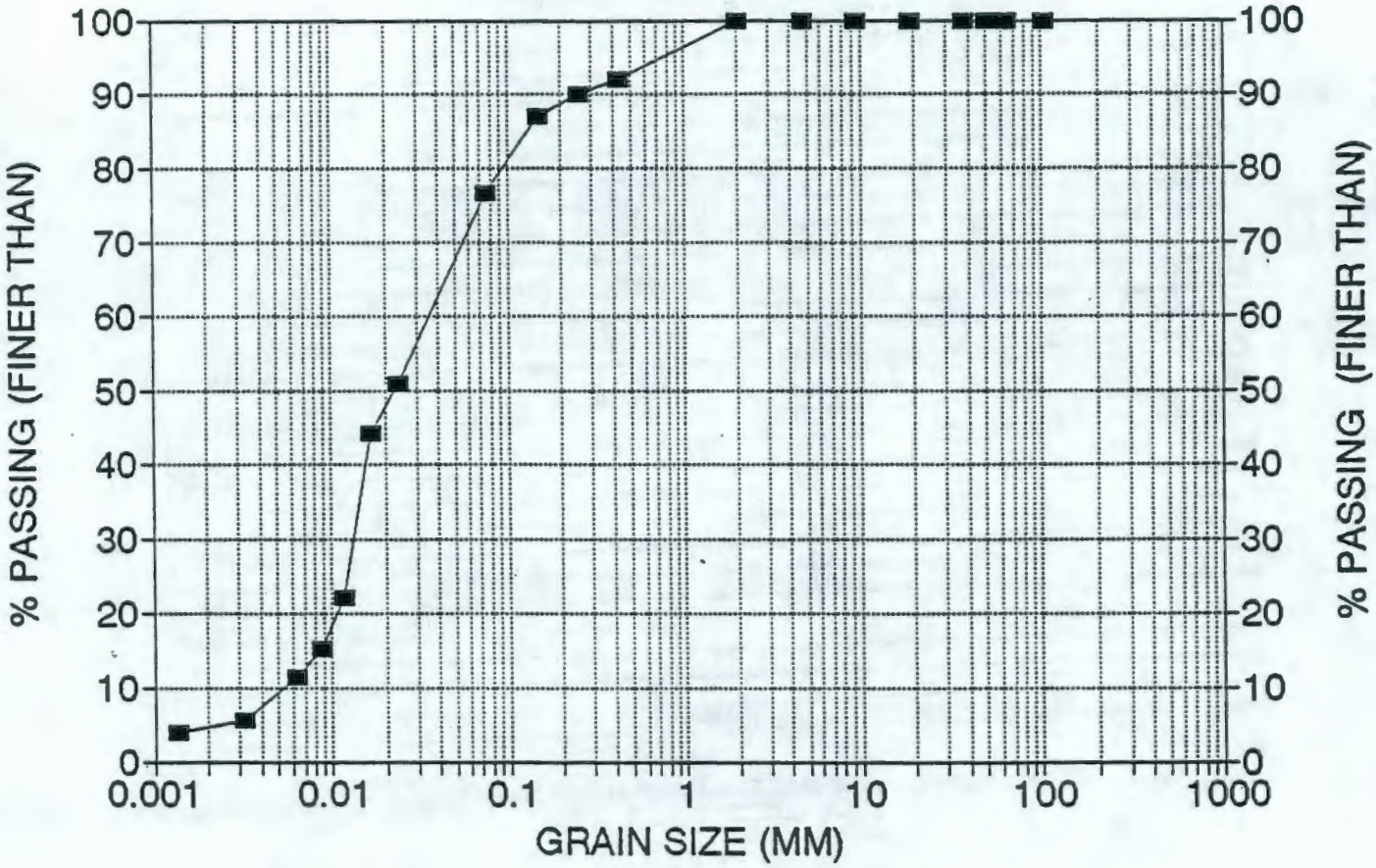


R.T. McIntosh 8/27/93

9413224.0644

GRAIN SIZE ANALYSIS PLOT

Gel-07 Sample No._____ Lab.No. 3-1179



9413224.0645

3-80 R. T. McCollum 8/27/93

GEL 07 ☐ GEL 16 ☐
GEL 09 ☐ GEL 17 ☐
GEL 10 ☐ GEL 19 ☐
GEL 14 ☐ GEL ☐

GEOTECHNICAL ENGINEERING LABORATORY
GEL-14, GEL-16, GEL-19
WHC-SD-EN-DP-086, Rev. 0

Sample No. 3-1179

GEL-14 SOIL MOISTURE

Balance: 3304 Calibration Due Date 10-25-93 Tested By JR Payne

Thermometer: 0009 Calibration Due Date limited cal.

Date	Wet Wt. + Can	Dry Wt. + Can	Tare Wt.	Moisture	Dry Wt. Soil	% Moisture	Calculated By
8-23-93	573.29	543.06	189.50	30.23	353.56	8.55	RW

Remarks:

GEL-16 BULK DENSITY-POROSITY

DETERMINATION NO.			1	
Pan No.:	Mold: ☐ Plastic ☐ Metal	Length:		
Sample Volume, V, cc				
Wt. of Sample & Mold, g				
Wt. of Mold, g				
Wet Wt. of Sample, g				
Wet Density of Sample, γ m, g/cc				
Water Content % Dry Weight				
Dry Density, g/cc γ d				
Dry weight of Sample, g, Ws				
*Void Ratio, e				
**Porosity, n, %				

NOT APPLICABLE

Tested By

$$Ws = \frac{\text{Wet Wt.}}{1 + \%\ \text{Dry Wt.}}$$

$$*\text{Void Ratio, } e = \frac{\text{Avg. Sp. Gr.} \times \text{Vol.}}{Ws} - 1$$

$$**\text{Porosity, } n, \% = \left(\frac{e}{1+e}\right) 100$$

Remarks:

GEL-19 CALCIUM CARBONATE

Vessel No. 5650 Tested By JR Payne

Balance No. 3304 Date Due 10-25-93

Sample Weight 8.0 (g)

Sample Pressure 1.1 (psi) $\%CaCO_3$ 1.9 Per Gram

Remarks:

Tests Checked By: R.T. McCulloch Date 8/27/93

BD-6000-797 (04/92)

NO

GEL 07 ☐	GEL 16 ☐	WHC-SD-EN-DP-086, Rev. 0	Sample No. 3-1180
GEL 09 ☐	GEL 17 ☐	GEOTECHNICAL ENGINEERING LABORATORY	
GEL 10 ☐	GEL 19 ☐	GEL-07 SIEVE AND HYDROMETER ANALYSIS	Page 9 of 17
GEL 14 ☐	GEL ☐		

GEL-07 SIEVE ANALYSIS

Date 8.24.93 Calibration Due Date 10.25.93 Balance: 3304

Sample Description _____ Sieve Time 10 (min)

Reduced By: ☐ Splitting ☐ Quartering ☐ Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed	Tested By
1 1/2	515.45				
3/4		52.51			
3/8		81.27			
4		128.53			
10		229.73			
40		354.57			
60		377.36			
100		391.03			
200		413.92			

Remarks: _____

GEL-07 HYDROMETER ANALYSIS

Date _____ Balance: _____ Calibration Due Date _____

Thermometer: _____ Calibration Due Date _____

Hydrometer: _____ Calibration Due Date _____

WEIGHT OF SAMPLE

Wt. Container + Soil _____ (g)

Wt. Container _____ (g)

Wt. Soil _____ (g)

Specific Gravity of Sample _____

% Passing No. 10 Sieve _____ %

A = _____ W = _____ K = _____

COMPOSITE CORRECTION

1st Reading _____ at _____ °C

2nd Reading _____ at _____ °C

Date	Clock Time	Elapsed Time (min)	Hydrometer Reading	Hydrometer with Composite Correction	Temperature (°C)	Soil in Suspension (%)	Particle Diameter (mm)	Tested By
		2.0						
		5.0						
		15.0						
		30.0						
		60.0						
		250.0						
		1440.0						

Remarks: _____

Tests Checked By _____ Date _____

BD-6000-796 (04/92)

9413224.0647

Pg 10 of 17

SIEVE ANALYSIS REPORT SHEET

SAMPLE NO. (3)1180 PAGE: 1 of 1

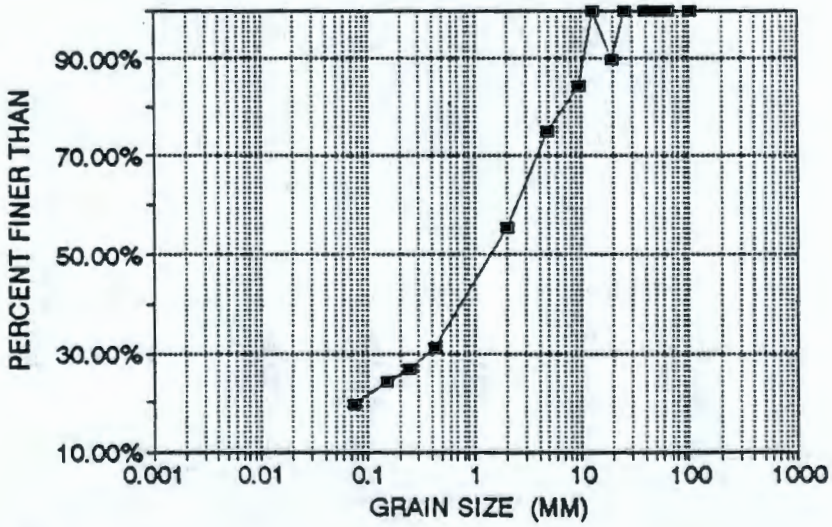
DATE: 10/27/93

Total Sample Weight (g)	Sieve Size (inches)	Cumulative Soil Weight (g)	Cumulative Retained (% wt.)	% Finer Weight (g)	Grain Size (mm)
515.5	4.000	0.0	0.0%	100.0%	101.600
	2.500	0.0	0.0%	100.0%	63.500
	2.000	0.0	0.0%	100.0%	50.800
	1.500	0.0	0.0%	100.0%	38.100
	1.000	0.0	0.0%	100.0%	25.400
	0.750	52.5	10.2%	89.8%	19.050
	0.500	0.0	0.0%	100.0%	12.700
	0.375	81.3	15.8%	84.2%	9.525
	#4	128.5	24.9%	75.1%	4.750
	#10	229.7	44.6%	55.4%	2.000
	#40	354.57	68.8%	31.2%	0.425
	#60	377.36	73.2%	26.8%	0.250
	#100	391.03	75.9%	24.1%	0.150
	#200	413.92	80.3%	19.7%	0.075

TEST CHECKED BY: R. T. McIntosh DATE: 8/23/93

GRAIN SIZE ANALYSIS LOG

SAMPLE NO. DATE: / /

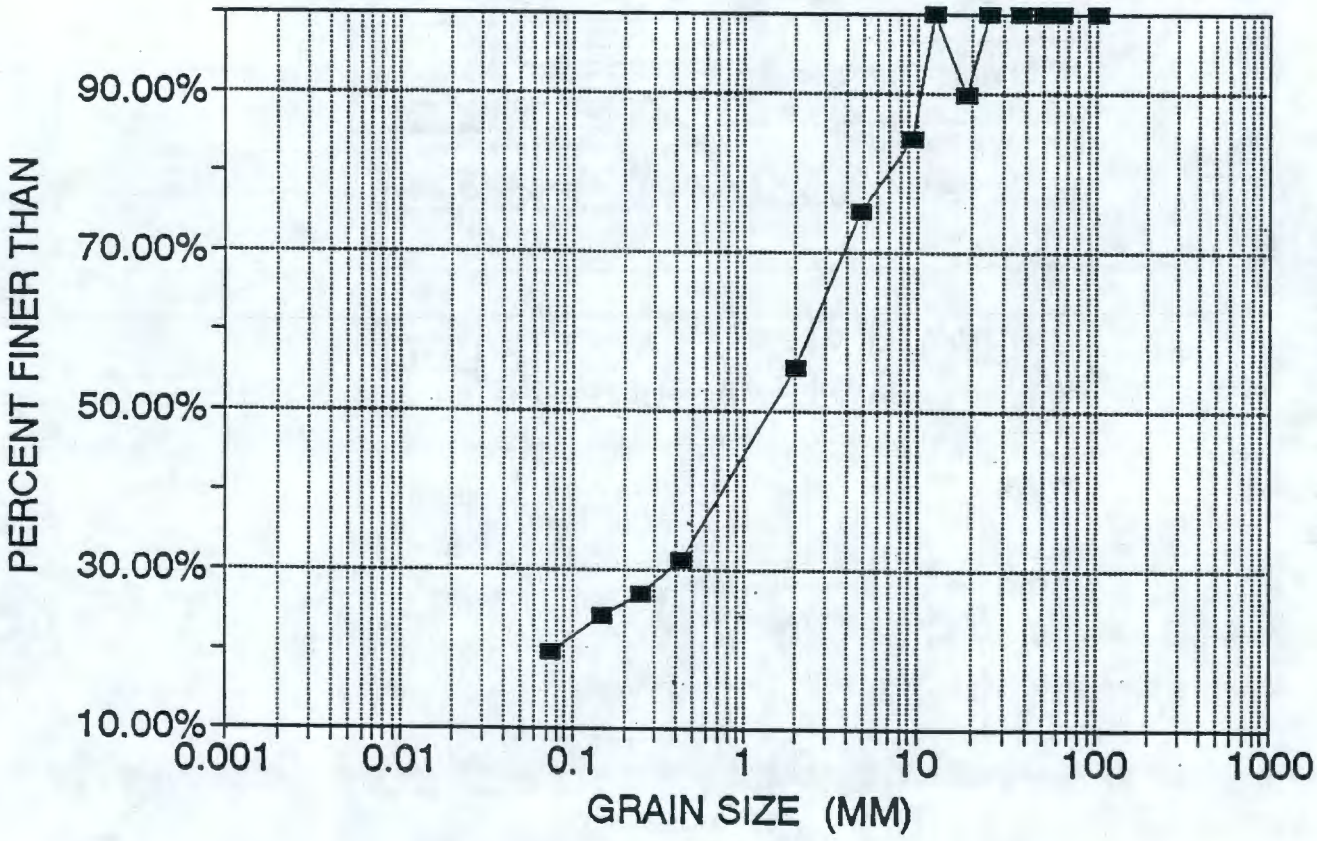


9413274.0648

Pg 11 of 17

GRAIN SIZE ANALYSIS LOG

SAMPLE NO. DATE: / /



R. T. McCutcheon 8/27/93

9413224.0649

GEL 07 ☐	GEL 16 ☐	WHC-SD-EN-DP-086 Rev. 0 GEOTECHNICAL ENGINEERING LABORATORY GEL-14, GEL-16, GEL-19	Sample No. 3-1180
GEL 09 ☐	* GEL 17 ☐		Page 12 of 17
GEL 10 ☐	GEL 19 ☐		
GEL 14 ☐	GEL ☐		

GEL-14 SOIL MOISTURE

Balance: 3304 Calibration Due Date 10-25-93 Tested By J.R. Payne

Thermometer: 0009 Calibration Due Date limited cal.

Date	Wet Wt. + Can	Dry Wt. + Can	Tare Wt.	Moisture	Dry Wt. Soil	% Moisture	Calculated By
9-23-83	736.34	708.17	192.72	28.17	515.45	5.47	RHW

Remarks:

GEL-16 BULK DENSITY-POROSITY

DETERMINATION NO.			1	
Pan No.:	Mold: ☐ Plastic ☐ Metal	Length:		
Sample Volume, V.cc				
Wt. of Sample & Mold, g				
Wt. of Mold, g				
Wet Wt. of Sample, g				
Wet Density of Sample, γ m, g/cc				
Water Content % Dry Weight				
Dry Density, g/cc γ d				
Dry weight of Sample, g, Ws				
*Void Ratio, e				
**Porosity, n, %				

NOT VALID

Tested By

$$Ws = \frac{\text{Wet Wt.}}{1 + \%\ \text{Dry Wt.}}$$

$$*\text{Void Ratio, } e = \frac{\text{Avg. Sp. Gr.} \times \text{Vol.}}{Ws} - 1$$

$$**\text{Porosity, } n, \% = \left(\frac{e}{1+e}\right) 100$$

Remarks:

GEL-19 CALCIUM CARBONATE

Vessel No. 5650 Tested By J.R. Payne

Balance No. 3304 Date Due 10-25-93

Sample Weight 8.0 (g)

Sample Pressure 1.2 (psi) $\%CaCO_3$ 2.2 Per Gram

Remarks:

Tests Checked By: R.T. McCulloch Date 8/27/93

BD-6000-797 (04/92)

BILLING # 930249

Pg 13 of 17

TEST REQUEST

OPERABLE UNIT	W-152	WELL NO	299-W10-21	DEPTH	228.12-228.62
SAMPLE/SPECIMEN NO	3-1182	COST CODE/WORK ORDER NUMBER			R4G1H
REQUESTED BY: ORG	81235	PERSON	ED RAFUSE	PHONE	2-1051
********HEIS********	N/A	MSIN	H6-03	DATE	8/9/93

TEST REQUESTED	# OF SAMPLES	TEST LAB INFORMATION
SEIVE	1	GEL 07

REMARKS:

ARCHIVE YES ☐ NO ☑

TAPE RELEASE STICKER HERE

RECEIVED BY JY FANNIN

DATE 8/9/93

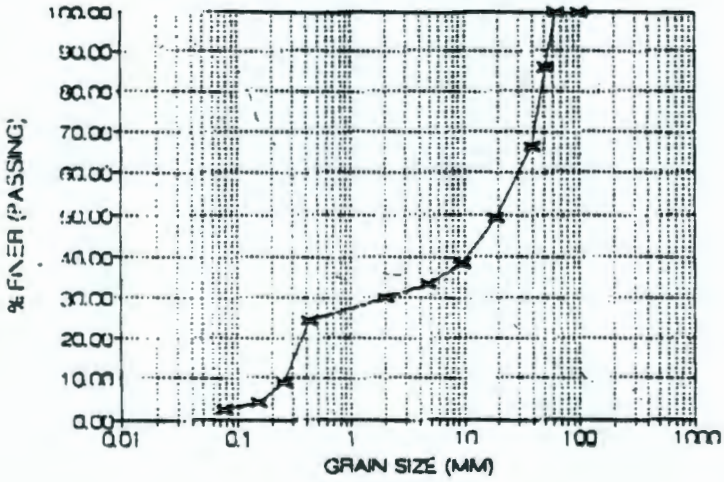
9413224.0651

SIEVE ANALYSIS REPORT SHEET

WELL #	299-W10-21	CONTACT	ED RAFUSE	ORIG COD	81235	PHONE	
LAB #	3-1182	DEPTH	228.1-228.6	TESTED BY RTM		DATE	8/10/93

SAMPLE WT (g)	SIEVE SIZE IN.	CUMULATIVE WEIGHT	% WEIGHT RETAINED	% PASSING	GRAIN SIZ MM	COMMENTS
2174.0	4.000	0.0	0.0	100.0	101.600	
	2.500	0.0	0.0	100.0	63.500	
	2.000	306.0	14.1	85.9	50.800	
	1.500	733.0	33.7	66.3	38.100	
	0.750	1105.6	50.9	49.1	19.050	
	0.375	1344.7	61.9	38.1	9.525	
WT.-#10	SIEVE# 4	1452.1	66.8	33.2	4.750	
SAMP.(g)	S# 10	1521.8	70.0	30.0	2.000	
653.2	S# 40	120.9	18.5	24.4	0.425	
	S# 60	460.5	70.5	8.9	0.250	
	S# 100	560.2	85.8	4.3	0.150	
	S# 200	599.8	91.8	2.5	0.075	

SIEVE ANALYSIS DATA



TEST CHECKED BY: R. T. Mattson DATE: 8/10/93

Selected 10 slot with 20-40 sand pack because of the presence of a fine flowing sand in the screen interval KDR 8/11/93

9413224.0652

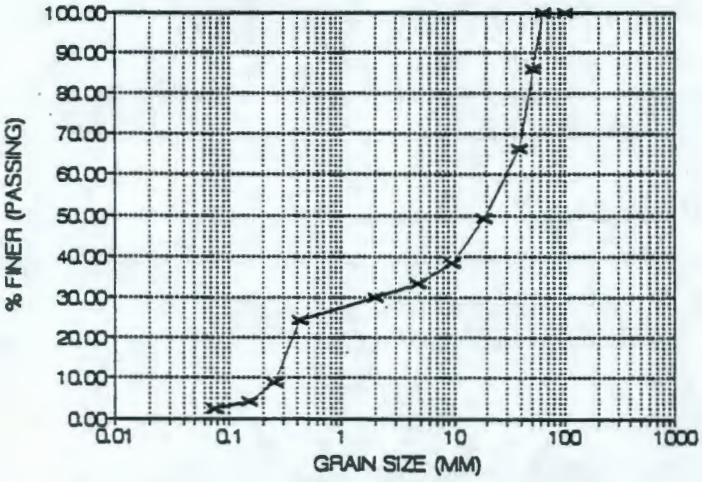
Pg 15 of 17

SIEVE ANALYSIS REPORT SHEET

WELL #	299-W10-21	CONTACT	ED RAFUSE	ORIG COD	81235	PHONE	
LAB #	3-1182	DEPTH	228.1-228.6	TESTED BY RTM		DATE	8/10/93

SAMPLE WT (g)	SIEVE SIZE IN.	CUMULATIVE WEIGHT	% WEIGHT RETAINED	% PASSING	GRAIN SIZ MM	COMMENTS
2174.0	4.000	0.0	0.0	100.0	101.600	
	2.500	0.0	0.0	100.0	63.500	
	2.000	306.0	14.1	85.9	50.800	
	1.500	733.0	33.7	66.3	38.100	
	0.750	1105.6	50.9	49.1	19.050	
	0.375	1344.7	61.9	38.1	9.525	
WT.-#10	SIEVE# 4	1452.1	66.8	33.2	4.750	
SAMP.(g)	S# 10	1521.8	70.0	30.0	2.000	
653.2	S# 40.	120.9	18.5	24.4	0.425	
	S# 60	460.5	70.5	8.9	0.250	
	S# 100	560.2	85.8	4.3	0.150	
	S# 200	599.8	91.8	2.5	0.075	

SIEVE ANALYSIS DATA



TEST CHECKED BY: R. T. McIntosh DATE: 8/10/93

COPY

9413274.0653

07 ☐ GEL 16 ☐
09 ☐ GEL 17 ☐
10 ☐ GEL 19 ☐
14 ☐ GEL ☐

GEOTECHNICAL ENGINEERING LABORATORY
GEL-07 SIEVE AND HYDROMETER ANALYSIS

Sample No. 3-1182

Page 16 of 17

GEL-07 SIEVE ANALYSIS

Calibration Due Date 10/29/97 Balance: 3310

le Description _____ Sieve Time 10 (min)

ced By: ☐ Splitting ☐ Quartering ☐ Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed	Tested By
2"	2174.0	306.0			
1½	~~733.0~~	733.0			
3/4	~~1105.6~~	1105.6			
3/8	~~1344.7~~	1344.7			
4		1452.1			
10		1521.8			
40	#10 (653.2)	120.9			
60		460.5			
100		560.2			
200		599.8			

rks: Pan #201 T 193.9 T+Wet Soil: 2552.1 T+Dry Soil 2367.9

y Soil = 2174.0 M. Loss = 184.2 %M =

GEL-07 HYDROMETER ANALYSIS

Balance: _____ Calibration Due Date _____

Thermometer: _____ Calibration Due Date _____

Hydrometer: _____ Calibration Due Date _____

GHT OF SAMPLE

Container + Soil _____ (g)

Container _____ (g)

Soil _____ (g)

Specific Gravity of Sample _____

% Passing No. 10 Sieve _____ %

A = _____ W = _____ K = _____

COMPOSITE CORRECTION

1st Reading _____ at _____ °C

2nd Reading _____ at _____ °C

ste	Clock Time	Elapsed Time (min)	Hydrometer Reading	Hydrometer with Composite Correction	Temperature (°C)	Soil in Suspension (%)	Particle Diameter (mm)	Tested By
		2.0						
		5.0						
		15.0						
		30.0						
		60.0						
		250.0						
		1440.0						

s: _____

Tests Checked By _____ Date _____

COPY

Westinghouse Hanford Company

SAMPLE ANALYSIS REQUEST

Collector ANDREW TEMPLETON Date 7-27-93

Company Contact ED LAFFOE (WHC) Telephone ( ) 376-3416 / 372-1051

Sample Number	*	Date Collected	Time Collected	Number and Type of Sample Containers/Analysis Requested
299-W10-21		07/26/93	1405	2 SOIL JARS FOR GEL 14 MOISTURE CONTENT
				GEL-19 CALCIUM CARBONATE
				GEL-07 SIEVE HYDROMETER
299-W10-21		07/27/93	1345	4 LINERS (83.4-85.2) FULL CHARACTERIZATION
				CERCLA-TEST PACKAGE B

*Type of Sample

A = Air	L = Liquid	SE = Sediment	T = Tissue	X = Other
DL = Drum Liquids	O = Oil	SL = Sludge	W = Water	
DS = Drum Solids	S = Soil	SO = Solid	WI = Wipe	

Field Information

Special Handling and/or Storage

Possible Sample Hazards

3-90

A-6000-406 (06/91)

9413224.0655

Pg. 1 of 46

WHC-SD-EN-DP-086, Rev. 0

VALIDATED
SIGNATURE/DATE

BILLING # 930275

TEST REQUEST

VALIDATED
KDR 2/18/94
SIGNATURE/DATE

OPERABLE UNIT	W-152	WELL NO	299-W10-21	DEPTH	5'> 235'
SAMPLE/SPECIMEN NO	3-1574>1622	COST CODE/WORK ORDER NUMBER			R4G1H
REQUESTED BY: ORG	81235	PERSON	E.C. RAFUSE	PHONE	2-1051
********HEIS********	N/A	MSIN	H6-06	DATE	8/19/93

TEST REQUESTED	# OF SAMPLES	TEST LAB INFORMATION
MOISTURE CONTENT	1 EA	GEL 14
CALCIUM CARBONATE	1 EA	GEL 19

REMARKS:

ARCHIVE YES ☐ NO ☒

TAPE RELEASE STICKER HERE

RECEIVED BY JY FANNIN

DATE 8/19/93

9413274.0656

Pg 2 of 4

GEOTECHNICAL ENGINEERING LABOATORY

GEL-14, GEL-19

GEL-14 SOIL MOISTURE							GEL-19 CALCIUM CARBONATE			
Tested by:	RP	Balance	3304	Calibration due date	10/23/93		Vessel no.	5650	Sample wt.8.0(g)	

Sample no.	Wet wt. & tare	Dry wt. & tare	Tare wt.	Moisture wt.	Dry wt. soil	% Moisture	Pressure (psi)	% CACO3 per gram	Calculate by	COMMENTS
(3)1574	563.13	547.83	61.55	15.3	486.28	3.15	0.7	< 1%	RTM	PAGE 1 OF 2
1575	638.76	623.07	63.63	15.69	559.44	2.80	0.3	< 1%	RTM	
1576	625.03	611.3	61.18	13.73	550.12	2.50	0.5	< 1%	RTM	
1577	580.55	572.14	62.17	8.41	509.97	1.65	0.4	< 1%	RTM	
1578	586.53	578.02	63.53	8.51	514.49	1.65	0.4	< 1%	RTM	
1579	598.18	586.99	63.15	11.19	523.84	2.14	0.5	< 1%	RTM	
1580	570.3	561.27	61.87	9.03	499.4	1.81	0.6	< 1%	RTM	
1581	610.66	598.49	62.28	12.17	536.21	2.27	0.5	< 1%	RTM	
1582	584.18	573.51	63.12	10.67	510.39	2.09	0.5	< 1%	RTM	
1583	572.14	557.09	62.35	15.05	494.74	3.04	0.4	< 1%	RTM	
1584	570.8	562.61	61.51	8.19	501.1	1.63	0.4	< 1%	RTM	
1585	561.19	548.36	61.62	12.83	486.74	2.64	1.2	2.2	RTM	
1586	565.25	551.08	62.69	14.17	488.39	2.90	1.3	2.5	RTM	
1587	500.05	477.15	62.12	22.9	415.03	5.52	1.6	3.2	RTM	
1588	465.43	451.98	63.08	13.45	388.9	3.46	1.5	3.0	RTM	
1589	472.93	467.91	62.35	5.02	405.56	1.24	1.8	3.7	RTM	
1590	542.32	503.77	62.34	38.55	441.43	8.73	3.9	8.9	RTM	
1591	546.45	534.87	63.25	11.58	471.62	2.46	1.7	3.5	RTM	
1592	502.34	494.72	62.12	7.62	432.6	1.76	0.4	< 1%	RTM	
1593	483.19	464.09	61.91	19.1	402.18	4.75	3.2	7.2	RTM	
1594	510.88	503.36	63.69	7.52	439.67	1.71	0.5	< 1%	RTM	
1595	502.54	492.11	62.8	10.43	429.31	2.43	0.6	< 1%	RTM	
1596	525.42	519.56	62.15	5.86	457.41	1.28	0.4	< 1%	RTM	
1597	563.33	556.1	62.54	7.23	493.56	1.46	0.4	< 1%	RTM	
1598	587.6	585.25	62.84	2.35	522.41	0.45	0.3	< 1%	RTM	
1599	636.17	631.69	63.01	4.48	568.68	0.79	0.3	< 1%	RTM	
1600	636.32	632.87	62.81	3.45	570.06	0.61	0.3	< 1%	RTM	
1601	606.24	602.74	62.68	3.5	540.06	0.65	0.4	< 1%	RTM	
1602	577.79	573.96	62.55	3.83	511.41	0.75	0.3	< 1%	RTM	
1603	628.91	625.22	62.21	3.69	563.01	0.66	0.3	< 1%	RTM	
1604	570.63	557.94	63	12.69	494.94	2.56	0.4	< 1%	RTM	
1605	630.63	626.67	62.63	4.16	564.04	0.74	0.4	< 1%	RTM	
1606	617.65	613.09	62.81	4.56	550.28	0.83	0.3	< 1%	RTM	
1607	557.75	552.88	62.24	4.87	490.64	0.99	0.3	< 1%	RTM	
1608	632.24	628.42	63.51	3.82	564.91	0.68	0.3	< 1%	RTM	
1609	606.27	601.95	62.47	4.32	539.48	0.80	0.4	< 1%	RTM	
1610	498.22	468.66	63.19	29.56	405.47	7.29	0.3	< 1%	RTM	
1611	586.36	576.24	63.82	10.12	512.42	1.97	0.3	< 1%	RTM	
1612	619.73	613.57	62.68	6.16	550.89	1.12	0.3	< 1%	RTM	
1613	620.12	614.1	62.11	6.02	551.99	1.09	0.3	< 1%	RTM	
1614	602.91	592.75	63.31	10.16	529.44	1.92	0.3	< 1%	RTM	
1615	535.56	521.96	62.98	13.6	458.98	2.96	0.4	< 1%	RTM	
1616	593.17	583.96	63.17	9.21	520.79	1.77	0.4	< 1%	RTM	
1617	594.77	585.81	62.19	8.96	523.62	1.71	0.3	< 1%	RTM	
1618	572.9	556.65	64.67	16.25	491.98	3.30	0.3	< 1%	RTM	
1619	510.49	494.48	60.85	16.01	433.63	3.69	0.3	< 1%	RTM	
1620	570.93	550.57	61.86	20.36	488.71	4.17	0.5	< 1%	RTM	
1621	566.03	517.44	62.47	48.59	454.97	10.68	0.3	< 1%	RTM	
1622	519.99	505.06	62.55	14.93	442.51	3.37	0.3	< 1%	RTM	
				0	0	ERR		< 1%	RTM	

TESTS CHECKED BY: RICHARD T. MCINTOSH DATE: 8/27/93

Richard T. McIntosh

9413224.0657

GEL 07 ☐ GEL 16 ☐
GEL 09 ☐ GEL 17 ☐
GEL 10 ☐ GEL 19 ☐
GEL 14 ☐ GEL ☐

WHC-SD-EN-DP-086, Rev. 0

GEOTECHNICAL ENGINEERING LABORATORY
GEL-14, GEL-19

Sample No(s). Pg 3-14

Page 1 of 2

GEL-14 SOIL MOISTURE

Tested By JR Payne Balance: 3304 Calibration Due Date 10-25-93

Date 9. Thermometer: 0015 Calibration Due Date 11-19-93

GEL-19 CALCIUM CARBONATE

Vessel No. 5650

Sample Wt. 8.0 (g)

Sample No.	Wet Wt. + Tare	Dry Wt. + Tare	Tare Wt.	Moisture Wt.	Dry Wt. Soil	% Moisture	Sample Pressure (psi)	% $CaCO_3$ (per gram)	Calculated By
3-1574	563.13	547.83	61.55				.7		
1575	638.76	623.07	63.63				.3		
1576	625.03	611.30	61.18				.5		
1577	580.58	572.14	62.17				.4		
1578	586.53	578.02	63.53				.4		
1579	598.18	586.99	63.15				.5		
1580	570.30	561.27	61.87				.6		
1581	610.66	598.49	62.28				.5		
1582	584.18	573.51	63.12				.5		
1583	572.14	557.09	62.35				.4		
1584	570.80	562.61	61.51				.4		
1585	561.19	548.36	61.62				1.2		
1586	565.25	551.08	62.69				1.3		
1587	500.05	477.15	62.12				1.6		
1588	465.43	451.98	63.08				1.5		
1589	472.93	467.91	62.35				1.8		
1590	542.32	503.77	62.34				3.9		
1591	546.45	534.87	63.25				1.7		
1592	502.34	494.72	62.12				.4		
1593	483.19	464.09	61.91				3.2		
1594	510.88	503.36	63.69				.5		
1595	502.54	492.11	62.80				.6		
— 1596	525.42	519.56	62.15	—			.4	—	—
1597	563.33	556.10	62.54				.4		
1598	587.60	585.25	62.84				.3		
1599	636.17	631.69	63.01				.3		
1600	636.32	632.87	62.81				.3		
1601	606.24	602.74	62.68				.4		
1602	577.79	573.96	62.53				.3		

Work checked

Remarks:

Tests Checked By: R. T. McIntosh Date 8/27/93

3-93

BD-6000-806 (04/92)

9413224.0659

GEL 07 ☐ GEL 16 ☐
GEL 09 ☐ GEL 17 ☐
GEL 10 ☐ GEL 19 ☐
GEL 14 ☐ GEL ☐

WHC-SD-EN-DP-086, Rev. 0

GEOTECHNICAL ENGINEERING LABORATORY

GEL-14, GEL-19

Sample No(s). Pg 4 of

Page 2 of 2

GEL-14 SOIL MOISTURE		GEL-19 CALCIUM CARBONATE	
Tested By D.R. Payne	Balance: 3304	Calibration Due Date 10-25-93	Vessel No. 5650
Date 8-26-93	Thermometer: 0015	Calibration Due Date 11-19-93	Sample Wt. 8.0 (g)

Sample No.	Wet Wt. + Tare	Dry Wt. + Tare	Tare Wt.	Moisture Wt.	Dry Wt. Soil	% Moisture	Sample Pressure (psi)	% $CaCO_3$ (per gram)	Calculated By
3-1603	628.91	625.22	62.21				.3		
1604	570.63	557.94	63.00				.4		
1605	630.83	626.67	62.63				.4		
1606	617.65	613.09	62.81				.3		
1607	557.75	552.88	62.24				.3		
1608	632.24	628.42	63.51				.3		
1609	606.27	601.95	62.47				.4		
1610	498.22	468.66	63.19				.3		
1611	586.36	576.24	63.82				.3		
1612	619.73	613.57	62.68				.3		
1613	620.12	614.10	62.11				.3		
1614	602.91	592.75	63.31				.3		
1615	535.56	521.96	62.98				.4		
1616	593.17	583.96	63.17				.4		
1617	594.77	585.87	62.19				.3		
1618	572.90	556.65	64.67				.3		
1619	510.49	494.48	60.85				.3		
1620	570.93	550.57	61.86				.5		
1621	566.03	517.44	62.47				.3		
1622	519.99	505.06	62.53				.3		

Remarks:

Tests Checked By: R.T. McCutchen Date 8/27/93

3-94

BD-6000-806 (04/92)

9413274.0659

VALIDATED
KDR 3/24/94
SIGNATURE/DATE

Pg 1 of 4

Westinghouse Hanford Company
NaI Spectral Gamma-Ray Borehole Survey Log Header

Project Information

Borehole 299-W10-21

Project LLBG

Borehole Environment Information

Borehole liquid depth 212.7 (ft) from zero (0.0) depth reference of log

Casing size (inch)	Casing thickness (inch)	Top depth (feet)	Base depth (feet)
12	0.25	0	14
10	0.5	0	143
8	na	0	236

NaI Passive Spectral Gamma Survey Information

Logging Engineer(s) R. K. Price RK Price
Log depth reference at zero (0.0) depth is ground level
Depth return error recorded at zero depth reference.
☑ Pre log energy calibration spectra recorded with field verifier.
☑ Logging Equipment was cleaned as described in WHC-CM-7-7 EII 11.1 Section 5.4 Signed Randall Price Date 24MAR94
Detector Type: NaI Spectra Detector ID: RLSN3
Calibration Date: Jul 26, 93
Notes: Total Gamma-ray activity is computed from each recorded spectra. Casing thickness and borehole fluid corrections are not applied.

Log Date	Archive File Names	Log Mode	Speed ft/m	Depth interval (ft) Top	Base	Incr	Return Error (inch)
Jul 30, 93	N013	Fixed	2.5	0	139	0.5	-
Jul 30, 93	N014	Fixed	2.5	84	100	0.5	2 Low
Aug 9, 93	N015	Fixed	2.5	110	236	0.5	0.5 Low

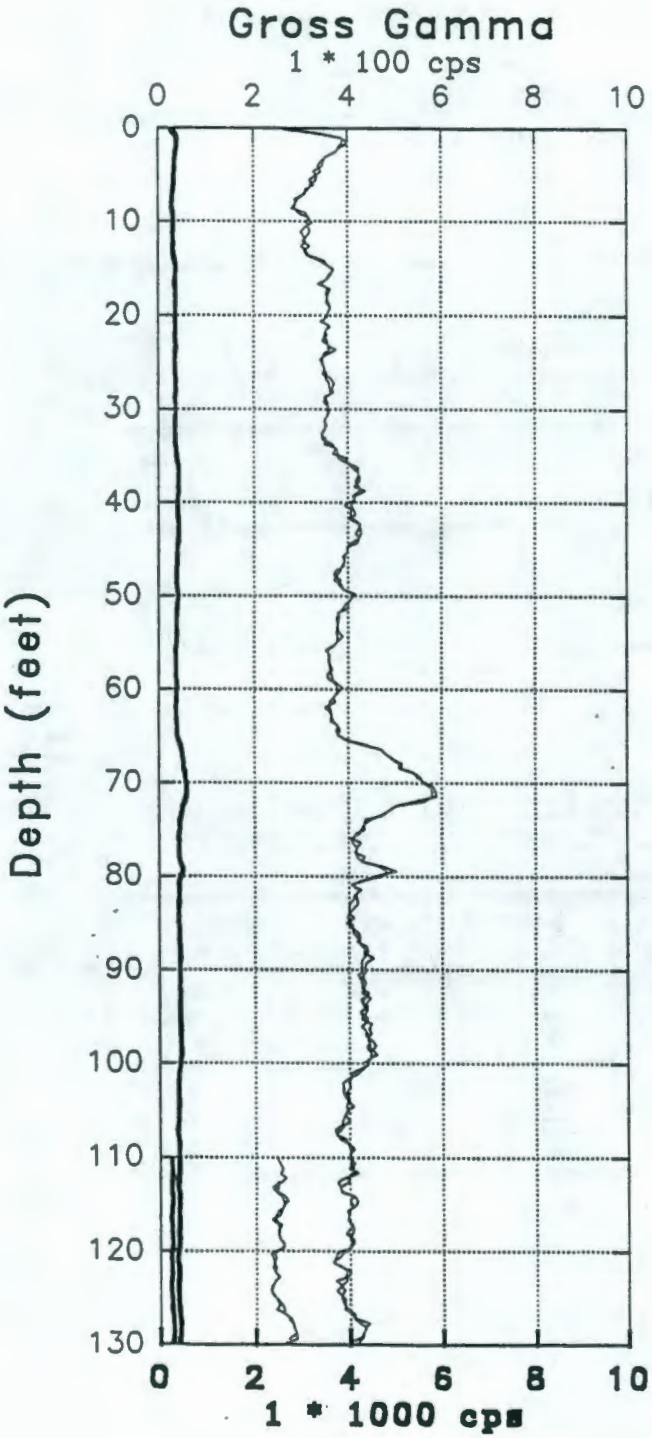
Fixed: Constant Winch Speed

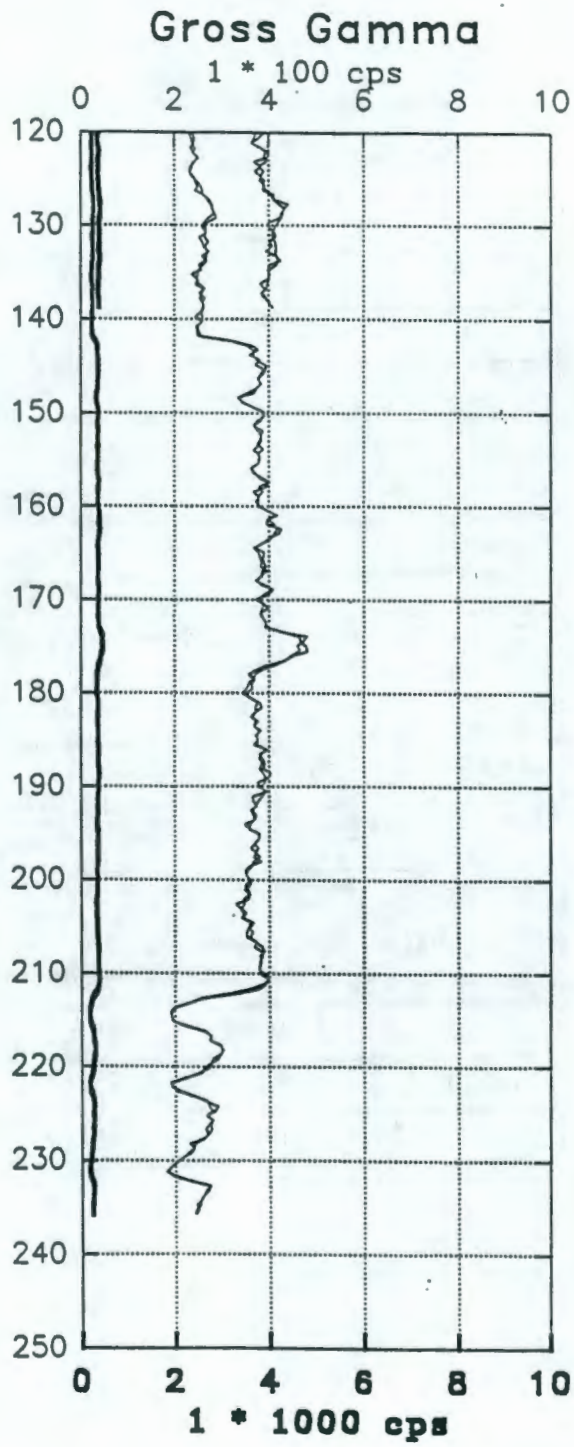
9413224.0660

NaI Gamma-Ray Borehole Survey Pg 2of4

Project: 218-W-3A-E LLBG
Borehole: 299-10-21
No Corrections Applied

Log Date	Depth Range
Jun 30, 1993	0 - 139'
Aug 9, 1993	110-236'





9413224.0661

NaI Gamma-Ray Borehole Survey

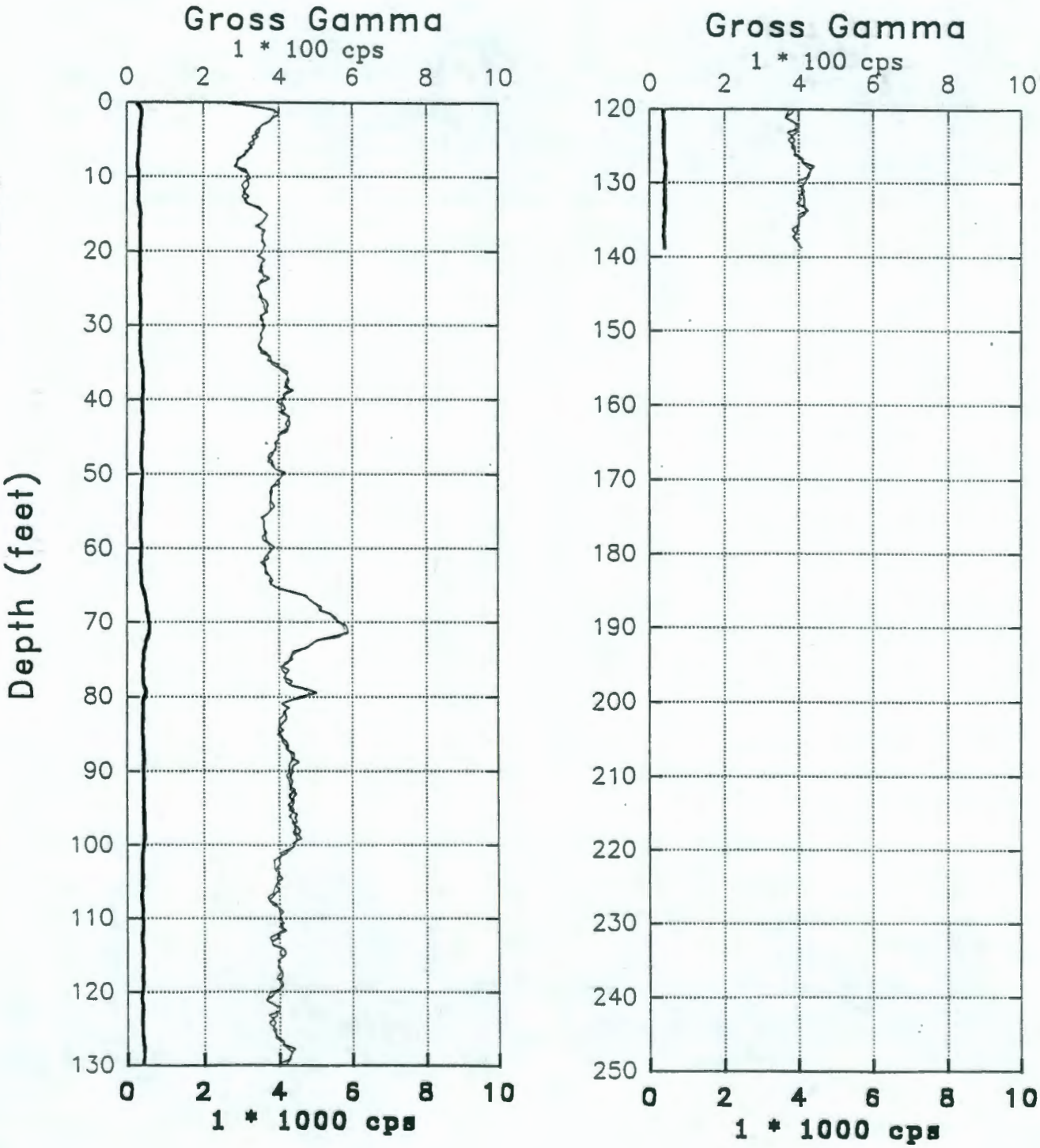
Pg 3 of 4

Project: 218-W-3A-E Burial

Log Date: Jun 30, 1993

Borehole: 299-W10-21

No Corrections Applied



9413224.0662

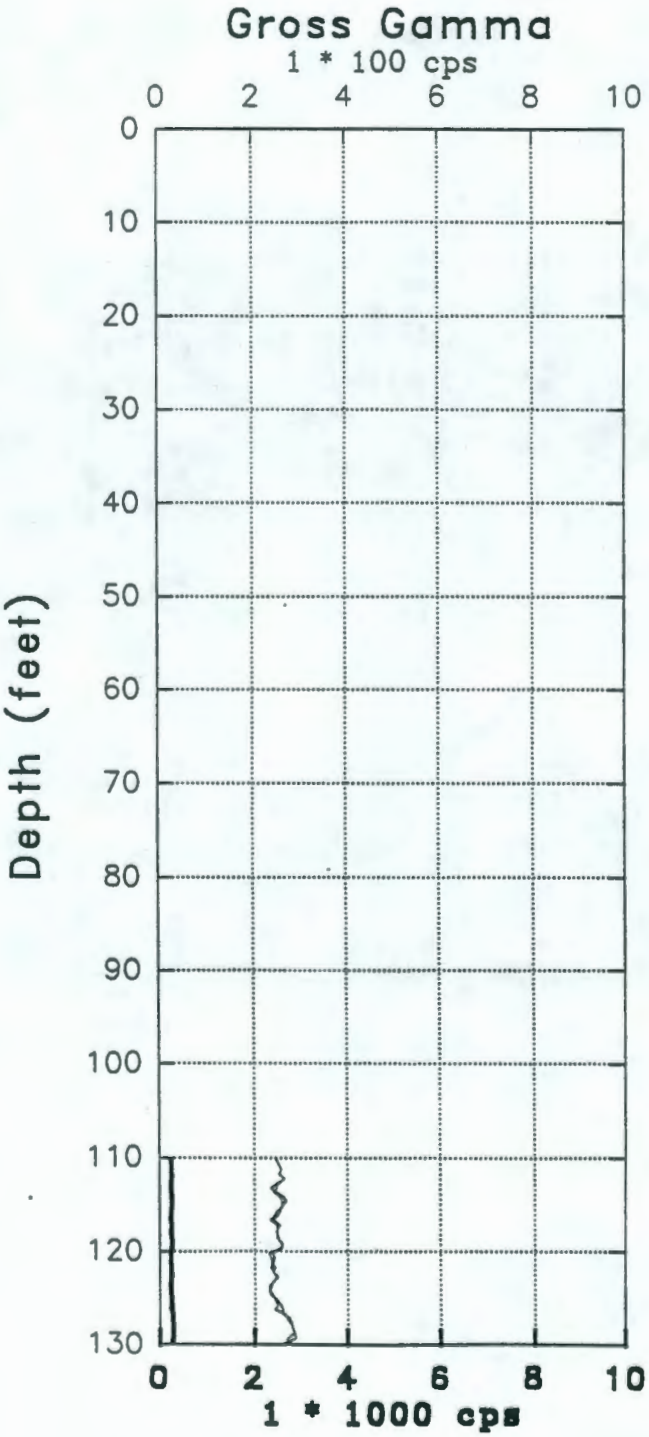
NaI Gamma-Ray Borehole Survey

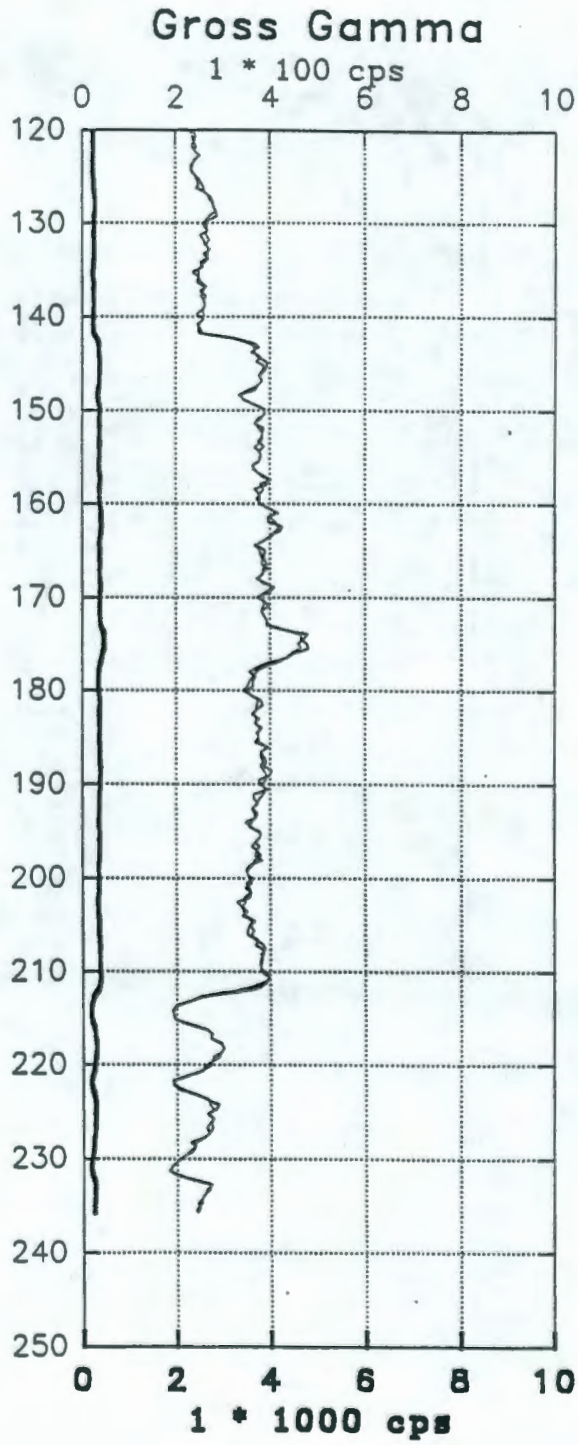
Project: 218-W-3A-E Burial

Log Date: Aug 9, 1993

Borehole: 299-W10-21

No Corrections Applied





9413224.0663

4.0 REFERENCES

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