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Steve Trent
Fluor Hanford, Inc.
2430 Stevens Drive
PO Box 1000
Richland, WA 99352
(509) 373-5869

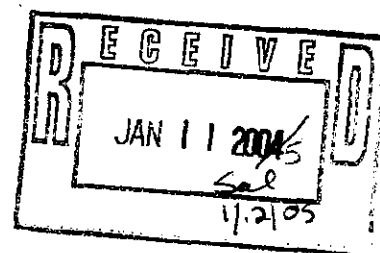
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Daniel B. Stephens & Associates, Inc.
Supplemental Report
LB04.0220.00
1/7/05

Fluor Hanford
Area C

FO4-208





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Summary of Tests Performed

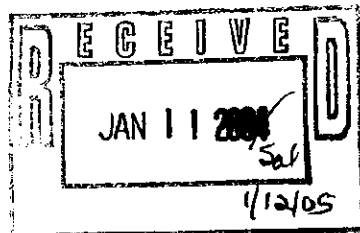
Laboratory Sample Number	Initial Soil Properties ¹ (θ , ρ_d , ϕ)	Saturated Hydraulic Conductivity ²		Moisture Characteristics ³				Unsaturated Hydraulic Conductivity	Particle Size ⁴			Effective Porosity	Particle Density	Air Permeability	1/3, 15 Bar Points and Water Holding Capacity	Atterberg Limits	Proctor Compaction
		CH	FH	HC	PP	TH	WP		RH	DS	WS						
B18DD3/B18DD2 Composite	X	X		X	X		X	X	X	X	X		X			X	X
B18DD4/B18DF7 Composite	X	X		X	X		X	X	X	X	X		X			X	X
B18DF8	X	X		X	X		X	X	X	X	X		X				
B18DF6	X	X		X	X		X	X	X	X	X		X				
B18DF9	X		X	X	X		X	X	X	X	X		X				
B18DD5	X		X	X	X		X	X	X	X	X		X			X	
B18DD6	X	X		X	X		X	X	X	X	X		X				
B18DF2	X	X		X	X		X	X	X	X	X		X				
B18DF4	X	X		X	X		X	X	X	X	X		X				
B18DF5	X	X		X	X		X	X	X	X	X		X			X	

¹ θ = Initial moisture content, ρ_d = Dry bulk density, ϕ = Calculated porosity

² CH = Constant head, FH = falling head

³ HC = Hanging column, PP = Pressure plate, TH = Thermocouple psychrometer, WP = Water activity meter, RH = Relative humidity box

⁴ DS = Dry sieve, WS = Wet sieve, H = Hydrometer





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Summary of Atterberg Tests

Sample Number	Liquid Limit	Plastic Limit	Plasticity Index	Classification
B18DD3/B18DD2 Composite	--	--	--	ML
B18DD4/B18DF7 Composite	---	---	---	ML
B18DD5	30	26	4	ML
B18DF5	--	---	---	ML

-- = Soil requires visual-manual classification due to non-plasticity

Raw Laboratory Data and Graphical Plots



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Summary of Atterberg Tests

Sample Number	Liquid Limit	Plastic Limit	Plasticity Index	Classification
B18DD3/B18DD2	*	*	*	*
B18DD4/B18DF7	*	*	*	*
B18DD5	30	26	4	ML
B18DF5	*	*	*	*

* = Soil requires visual-manual classification due to non-plasticity



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Atterberg Limits

Job Name: Flour Hanford
Job Number: LB04.0220.00
Sample Number: B18DD5
Ring Number: NA
Depth: NA

Test Date: 6-Jan-05

Liquid Limit

	<u>Trial 1</u>	<u>Trial 2</u>	<u>Trial 3</u>
Number of drops:	34	25	18
Pan number:	LL1	LL2	LL3
Weight of pan plus moist soil (g):	217.25	210.05	210.48
Weight of pan plus dry soil (g):	213.10	207.09	207.39
Weight of pan (g):	198.70	197.24	197.78
Gravimetric moisture content (% g/g):	28.83	30.06	32.16

Liquid Limit: 30

Plastic Limit

	<u>Trial 1</u>	<u>Trial 2</u>
Pan number:	PL1	PL2
Weight of pan plus moist soil (g):	204.53	204.68
Weight of pan plus dry soil (g):	203.12	203.16
Weight of pan (g):	197.85	197.05
Gravimetric moisture content (% g/g):	26.73	24.89

Plastic Limit: 26

Results

Percent of Sample Retained on #40 Sieve: 0.02

Liquid Limit: 30

Plastic Limit: 26

Plasticity Index: 4

Classification: ML

Comments:

-- = Soil requires visual-manual classification due to non-plasticity

Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

**Data for Description and Identification of Fines,
(Visual-Manual Procedure)**

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD3/B18DD2
Ring Number: NA
Depth: NA
Test Date: 6-Jan-04

Descriptive Information:

Angulosity of Course Sand, Gravel, Cobbles, Boulders: NA
Shape of Gravel, Cobbles, and Boulders: N/A
Color of Moist Sample: 10YR (3/2)
Odor: NA
Moisture Condition: Moist
HCl Reaction: Strong
Particle Sizes: See Sieve Data

Preliminary Identification:

Fine Grained: Contains 50% or more fines

Preliminary Identification of the Fines:

Dry Strength: Medium
Dilatency: Rapid
Toughness: low
Plasticity: non-plastic

Identification of the Fines:

Silt (ML): low dry strength, rapid dilatency, low toughness & NP

Identification of the Fines:

Group Symbol: ML
Group Name: Sandy Silt

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

**Data for Description and Identification of Fines,
(Visual-Manual Procedure)**

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DD4/B18DF7
Ring Number: NA
Depth: NA
Test Date: 6-Jan-04

Descriptive Information:

Angulosity of Course Sand, Gravel, Cobbles, Boulders: NA
Shape of Gravel, Cobbles, and Boulders: N/A
Color of Moist Sample: 10YR (3/2)
Odor: NA
Moisture Condition: Moist
HCl Reaction: Strong
Particle Sizes: See Sieve Data

Preliminary Identification:

Fine Grained: Contains 50% or more fines

Preliminary Identification of the Fines:

Dry Strength: Medium
Dilatency: Rapid
Toughness: low
Plasticity: non-plastic

Identification of the Fines:

Silt (ML): low dry strength, rapid dilatency, low toughness & NP

Identification of the Fines:

Group Symbol: ML
Group Name: Sandy Silt

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

**Data for Description and Identification of Fines,
(Visual-Manual Procedure)**

Job Name: Fluor Hanford
Job Number: LB04.0220.00
Sample Number: B18DF5
Ring Number: NA
Depth: NA
Test Date: 6-Jan-04

Descriptive Information:

Angulosity of Course Sand, Gravel, Cobbles, Boulders: NA
Shape of Gravel, Cobbles, and Boulders: N/A
Color of Moist Sample: 10YR (3/2)
Odor: NA
Moisture Condition: Moist
HCl Reaction: Weak
Particle Sizes: See Sieve Data

Preliminary Identification:

Fine Grained: Contains 50% or more fines

Preliminary Identification of the Fines:

Dry Strength: Medium
Dilatency: Rapid
Toughness: low
Plasticity: non-plastic

Identification of the Fines:

Silt (ML): low dry strength, rapid dilatency, low toughness & NP

Identification of the Fines:

Group Symbol: ML
Group Name: Silt with Sand

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



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Summary of Particle Size Characteristics

Sample Number	d ₁₀ (mm)	d ₅₀ (mm)	d ₆₀ (mm)	C _u	C _c	Method	ASTM Classification	USDA Classification
B18DD3/B18DD2 Composite	0.0057	0.072	0.092	16	3.2	WS/H	Sandy silt	Sandy Loam
B18DD4/B18DF7 Composite	0.0035	0.051	0.064	18	2.6	WS/H	Sandy silt	Loam
B18DF8	0.0047	0.072	0.088	19	3.7	WS/H	Classification by ASTM 2487 requires Atterberg test	Sandy Loam
B18DF6	0.019	0.18	0.23	12	2.3	WS/H	Classification by ASTM 2487 requires Atterberg test	Loamy Sand
B18DF9	0.0024	0.022	0.033	14	1.3	WS/H	Classification by ASTM 2487 requires Atterberg test	Silt Loam
B18DD5	0.00071	0.015	0.021	30	3.4	WS/H	Silt	Silt Loam
B18DD6	0.0053	0.042	0.051	9.6	2.1	WS/H	Classification by ASTM 2487 requires Atterberg test	Silt Loam
B18DF2	0.00019	0.019	0.027	142	13	WS/H	Classification by ASTM 2487 requires Atterberg test	Silt Loam
B18DF4	0.0024	0.041	0.056	23	1.7	WS/H	Classification by ASTM 2487 requires Atterberg test	Loam
B18DF5	0.0051	0.031	0.048	9.4	1.5	WS/H	Silt with sand	Silt Loam

d₅₀ = Median particle diameter

Est = Reported values for d₁₀, C_u, C_c, and soil classification are estimates, since extrapolation was required to obtain the d₁₀ diameter

$$C_u = \frac{d_{60}}{d_{10}}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

DS = Dry sieve

H = Hydrometer

WS = Wet sieve

† Greater than 10% of sample is coarse material



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**Particle Size Analysis
Wet Sieve Data (#10 Split)**

Job Name: Flour Hanford Initial Dry Weight of Sample (g): 828.60
 Job Number: LB04.0220.00 Weight Passing #10 (g): 827.77
 Sample Number: B18DD3/B18DD2 Composite Weight Retained #10 (g): 0.83
 Ring Number: NA Weight of Hydrometer Sample (g): 50.04
 Depth: NA Calculated Weight of Sieve Sample (g): 50.09

Test Date: 1-Dec-04

Shape: NA
Hardness: NA

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	828.60	100.00
	2"	50	0.00	0.00	828.60	100.00
	1.5"	38.1	0.00	0.00	828.60	100.00
	1"	25	0.00	0.00	828.60	100.00
	3/4"	19.0	0.00	0.00	828.60	100.00
	3/8"	9.5	0.00	0.00	828.60	100.00
	4	4.75	0.00	0.00	828.60	100.00
	10	2.00	0.83	0.83	827.77	99.90
-10	(Based on calculated sieve wt.)					
	20	0.85	0.31	0.36	49.73	99.28
	40	0.425	1.75	2.11	47.98	95.79
	60	0.250	3.15	5.26	44.83	89.50
	140	0.106	12.05	17.31	32.78	65.44
	200	0.075	6.75	24.06	26.03	51.97
	dry pan			0.77	24.83	25.26
wet pan				25.26	0.00	

d_{10} (mm): 0.0057 d_{50} (mm): 0.072
 d_{16} (mm): 0.012 d_{60} (mm): 0.092
 d_{30} (mm): 0.041 d_{84} (mm): 0.21

Median Particle Diameter— d_{50} (mm): 0.072
 Uniformity Coefficient, C_u — $[d_{60}/d_{10}]$ (mm): 16
 Coefficient of Curvature, C_c — $[(d_{30})^2/(d_{10} \cdot d_{60})]$ (mm): 3.2
 Mean Particle Diameter— $[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.098

Classification of fines (visual method): ML

ASTM Soil Classification: Sandy silt
 USDA Soil Classification: Sandy Loam

Laboratory analysis by: D. O'Dowd
 Data entered by: D. O'Dowd
 Checked by: J. Hines



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**Particle Size Analysis
Hydrometer Data**

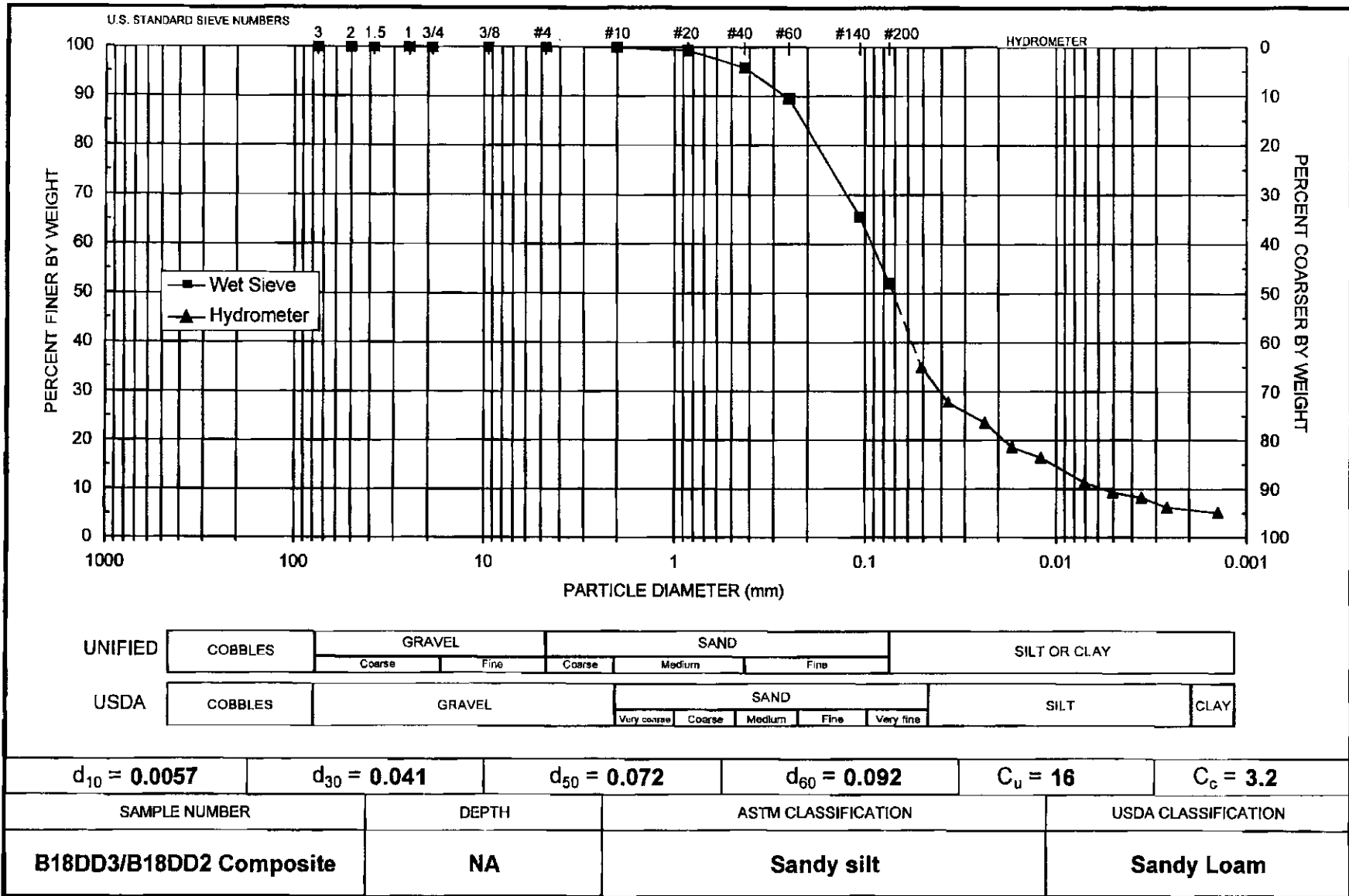
Job Name: Flour Hanford	Type of Water Used: DISTILLED
Job Number: LB04.0220.00	Reaction with H ₂ O ₂ : N/A
Sample Number: B18DD3/B18DD2 Composite	Dispersant*: (NaPO ₃) ₆
Ring Number: NA	Measured particle density: 2.51
Depth: NA	Initial Wt. (g): 50.04
Test Date: 1-Dec-04	Total Sample Wt. (g): 828.60
Start Time: 8:30	Wt. Passing #10 (g): 827.77

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
10-Dec-04	1	19.6	21.5	4.5	17.0	12.8	0.05115	35.0	35.0
	2	19.6	18.0	4.5	13.5	13.3	0.03697	27.8	27.8
	5	19.6	16.0	4.5	11.5	13.7	0.02367	23.7	23.6
	10	19.6	13.5	4.5	9.0	14.1	0.01698	18.5	18.5
	20	19.6	12.5	4.5	8.0	14.3	0.01208	16.5	16.5
	60	19.5	10.0	4.5	5.5	14.7	0.00708	11.3	11.3
	120	19.3	9.0	4.5	4.5	14.8	0.00505	9.3	9.3
	240	19.1	8.5	4.5	4.0	14.9	0.00359	8.2	8.2
11-Dec-04	454	18.8	8.0	5.0	3.0	15.0	0.00263	6.2	6.2
	1562	19.8	7.0	4.5	2.5	15.2	0.00141	5.1	5.1

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: D. O'Dowd
 Data entered by: D. O'Dowd
 Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.



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**Particle Size Analysis
Wet Sieve Data (#10 Split)**

Job Name: Flour Hanford Initial Dry Weight of Sample (g): 634.77
 Job Number: LB04.0220.00 Weight Passing #10 (g): 633.98
 Sample Number: B18DD4/B18DF7 Composite Weight Retained #10 (g): 0.79
 Ring Number: NA Weight of Hydrometer Sample (g): 50.28
 Depth: NA Calculated Weight of Sieve Sample (g): 50.34

Test Date: 1-Dec-04

Shape: NA
Hardness: NA

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10						
	3"	75	0.00	0.00	634.77	100.00
	2"	50	0.00	0.00	634.77	100.00
	1.5"	38.1	0.00	0.00	634.77	100.00
	1"	25	0.00	0.00	634.77	100.00
	3/4"	19.0	0.00	0.00	634.77	100.00
	3/8"	9.5	0.00	0.00	634.77	100.00
	4	4.75	0.00	0.00	634.77	100.00
	10	2.00	0.79	0.79	633.98	99.88
-10			(Based on calculated sieve wt.)			
	20	0.85	0.13	0.19	50.15	99.62
	40	0.425	0.58	0.77	49.57	98.47
	60	0.250	1.70	2.47	47.87	95.09
	140	0.106	8.34	10.81	39.53	78.52
	200	0.075	5.44	16.25	34.09	67.72
	dry pan		1.67	17.92	32.42	
	wet pan			32.42	0.00	

d_{10} (mm): 0.0035 d_{50} (mm): 0.051
 d_{16} (mm): 0.0076 d_{60} (mm): 0.064
 d_{30} (mm): 0.024 d_{84} (mm): 0.14

Median Particle Diameter— d_{50} (mm): 0.051
 Uniformity Coefficient, C_u — $[d_{60}/d_{10}]$ (mm): 18
 Coefficient of Curvature, C_c — $[(d_{30})^2/(d_{10} \cdot d_{60})]$ (mm): 2.6
 Mean Particle Diameter— $[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.066

Classification of fines (visual method): ML

ASTM Soil Classification: Sandy silt
 USDA Soil Classification: Loam

Laboratory analysis by: D. O'Dowd
 Data entered by: D. O'Dowd
 Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Hydrometer Data

Job Name: Flour Hanford
Job Number: LB04.0220.00
Sample Number: B18DD4/B18DF7 Composite
Ring Number: NA
Depth: NA
Test Date: 1-Dec-04
Start Time: 8:24

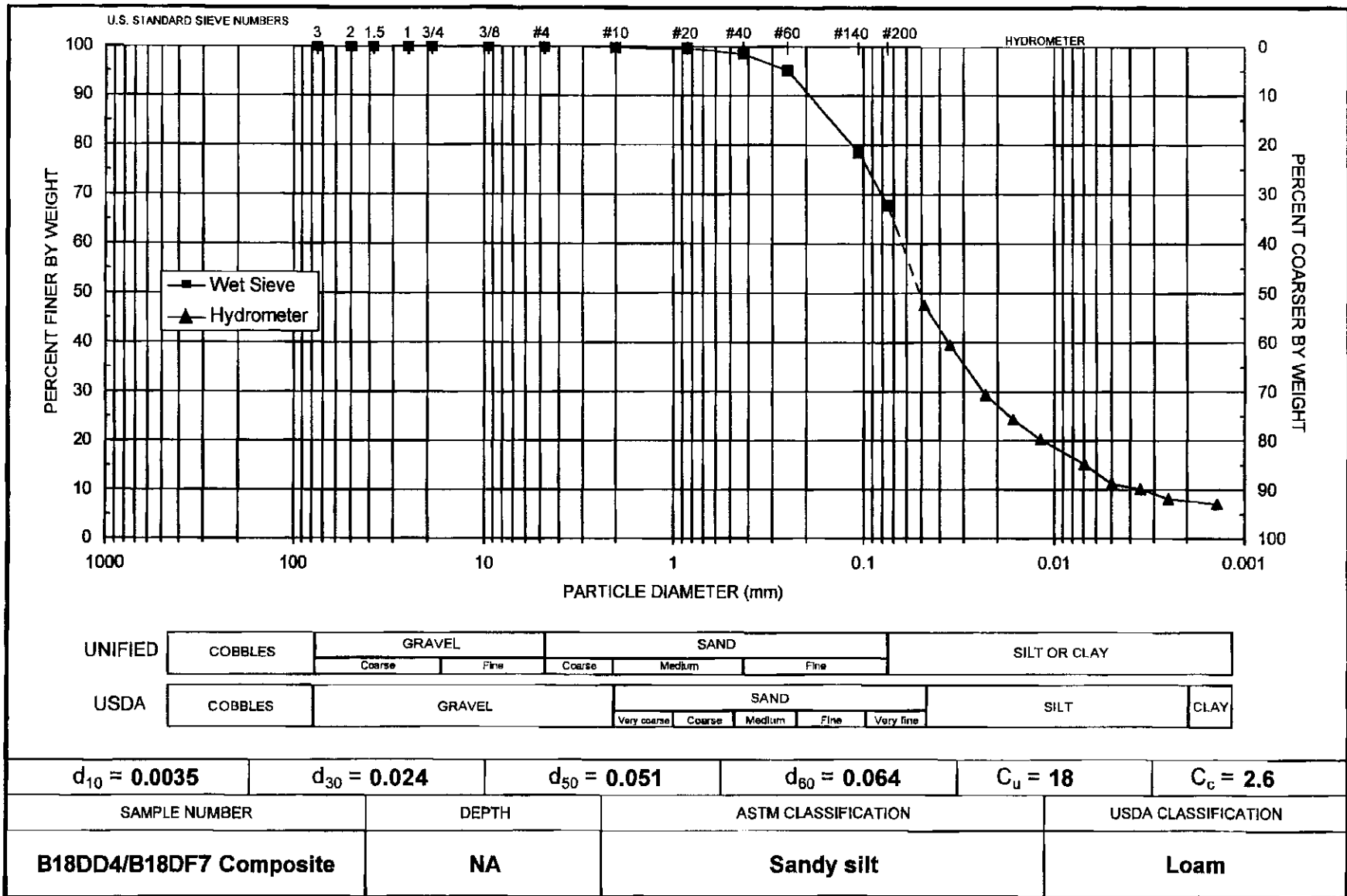
Type of Water Used: DISTILLED
Reaction with H₂O₂: N/A
Dispersant*: (NaPO₃)₆
Measured particle density: 2.53
Initial Wt. (g): 50.28
Total Sample Wt. (g): 634.77
Wt. Passing #10 (g): 633.98

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
10-Dec-04	1	19.6	28.0	4.5	23.5	11.7	0.04862	47.7	47.6
	2	19.6	24.0	4.5	19.5	12.4	0.03533	39.6	39.5
	5	19.6	19.0	4.5	14.5	13.2	0.02307	29.4	29.4
	10	19.6	16.5	4.5	12.0	13.6	0.01657	24.3	24.3
	20	19.6	14.5	4.5	10.0	13.9	0.01185	20.3	20.3
	60	19.5	12.0	4.5	7.5	14.3	0.00695	15.2	15.2
	120	19.3	10.0	4.5	5.5	14.7	0.00498	11.2	11.1
	240	19.1	9.5	4.5	5.0	14.7	0.00354	10.1	10.1
480	18.8	9.0	5.0	4.0	14.8	0.00252	8.1	8.1	
11-Dec-04	1567	19.8	8.0	4.5	3.5	15.0	0.00139	7.1	7.1

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



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**Particle Size Analysis
Wet Sieve Data (#10 Split)**

Job Name: Flour Hanford
 Job Number: LB04.0220.00
 Sample Number: B18DD5
 Ring Number: NA
 Depth: NA

Initial Dry Weight of Sample (g): 627.04
 Weight Passing #10 (g): 627.04
 Weight Retained #10 (g): 0.00
 Weight of Hydrometer Sample (g): 50.11
 Calculated Weight of Sieve Sample (g): 50.11

Test Date: 1-Dec-04

Shape: NA
 Hardness: NA

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	627.04	100.00
	2"	50	0.00	0.00	627.04	100.00
	1.5"	38.1	0.00	0.00	627.04	100.00
	1"	25	0.00	0.00	627.04	100.00
	3/4"	19.0	0.00	0.00	627.04	100.00
	3/8"	9.5	0.00	0.00	627.04	100.00
	4	4.75	0.00	0.00	627.04	100.00
	10	2.00	0.00	0.00	627.04	100.00
-10	(Based on calculated sieve wt.)					
	20	0.85	0.00	0.00	50.11	100.00
	40	0.425	0.01	0.01	50.10	99.98
	60	0.250	0.04	0.05	50.06	99.90
	140	0.106	0.36	0.41	49.70	99.18
	200	0.075	1.32	1.73	48.38	96.55
	dry pan			0.10	1.83	48.28
wet pan				48.28	0.00	

d_{10} (mm): 0.00071

d_{50} (mm): 0.015

d_{16} (mm): 0.0023

d_{60} (mm): 0.021

d_{30} (mm): 0.0071

d_{84} (mm): 0.048

Median Particle Diameter $-d_{50}$ (mm): 0.015

Uniformity Coefficient, $C_u - [d_{60}/d_{10}]$ (mm): 30

Coefficient of Curvature, $C_c - [(d_{30})^2 / (d_{10} * d_{60})]$ (mm): 3.4

Mean Particle Diameter $-[(d_{16} + d_{50} + d_{84}) / 3]$ (mm): 0.022

Note: Reported values for d_{10} , C_u , C_c , and soil classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Classification of fines: ML

ASTM Soil Classification: Silt

USDA Soil Classification: Silt Loam

Laboratory analysis by: D. O'Dowd

Data entered by: D. O'Dowd

Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

**Particle Size Analysis
Hydrometer Data**

Job Name: Flour Hanford
 Job Number: LB04.0220.00
 Sample Number: B18DD5
 Ring Number: NA
 Depth: NA

Type of Water Used: DISTILLED
 Reaction with H₂O₂: NA
 Dispersant*: (NaPO₃)₆
 Measured particle density: 2.48

Test Date: 1-Dec-04
 Start Time: 8:12

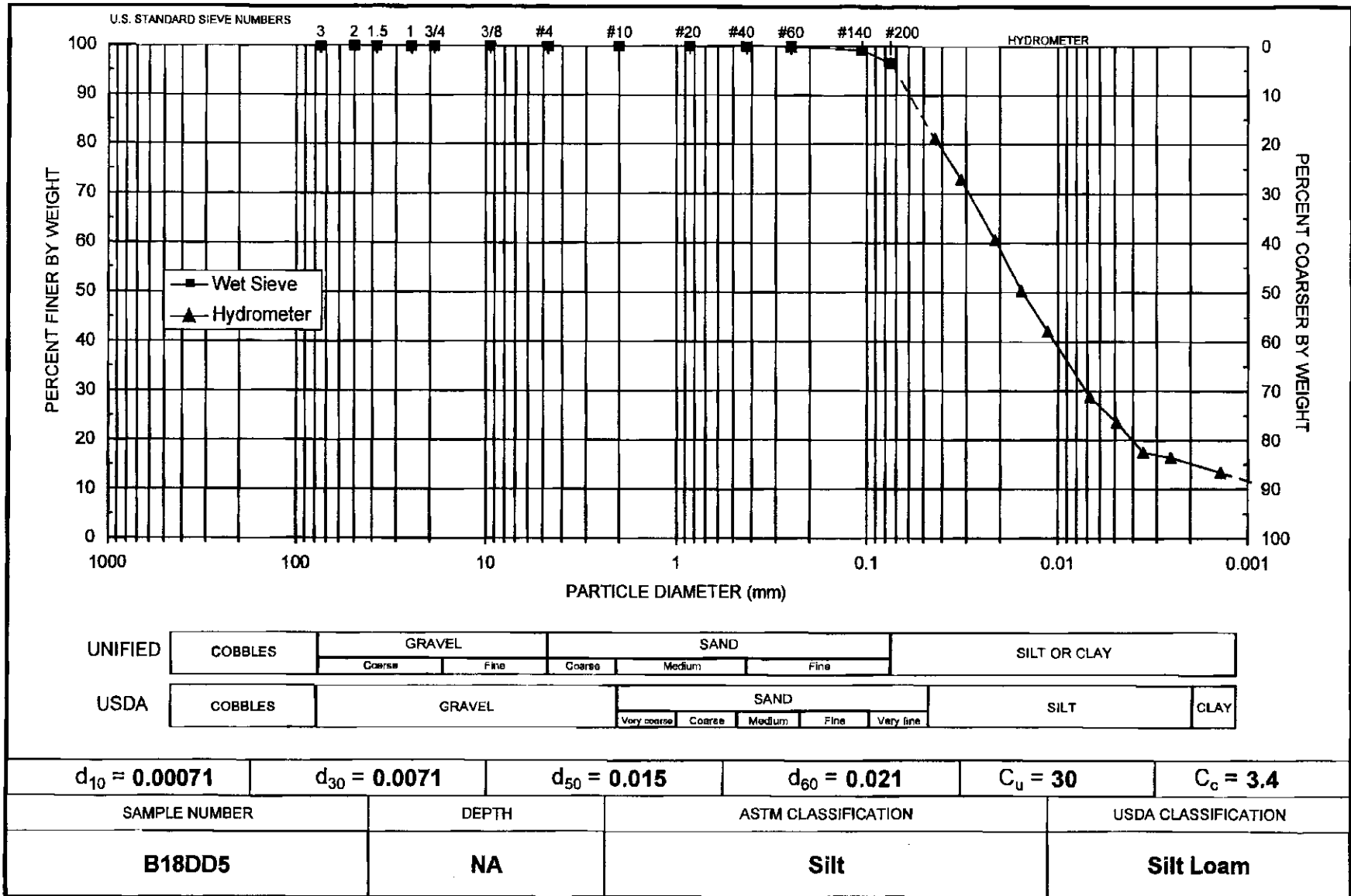
Initial Wt. (g): 50.11
 Total Sample Wt. (g): 627.04
 Wt. Passing #10 (g): 627.04

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
10-Dec-04	1	19.6	44.0	4.5	39.5	9.1	0.04364	81.2	81.2
	2	19.6	40.0	4.5	35.5	9.7	0.03196	73.0	73.0
	5	19.6	34.0	4.5	29.5	10.7	0.02121	60.6	60.6
	10	19.6	29.0	4.5	24.5	11.5	0.01556	50.4	50.4
	20	19.6	25.0	4.5	20.5	12.2	0.01131	42.1	42.1
	60	19.5	18.5	4.5	14.0	13.3	0.00682	28.8	28.8
	120	19.3	16.0	4.5	11.5	13.7	0.00491	23.6	23.6
	240	19.1	13.0	4.5	8.5	14.2	0.00354	17.5	17.5
469	18.8	13.0	5.0	8.0	14.2	0.00254	16.4	16.4	
11-Dec-04	1579	19.8	11.0	4.5	6.5	14.5	0.00138	13.4	13.4

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: D. O'Dowd
 Data entered by: D. O'Dowd
 Checked by: J. Hines



Note: Reported values for d_{10} , C_u , C_c , and ASTM classification are estimates, since extrapolation was required to obtain the d_{10} diameter

Daniel B. Stephens & Associates, Inc.



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**Particle Size Analysis
Wet Sieve Data (#10 Split)**

Job Name: Flour Hanford	Initial Dry Weight of Sample (g): 343.28
Job Number: LB04.0220.00	Weight Passing #10 (g): 343.28
Sample Number: B18DF5	Weight Retained #10 (g): 0.00
Ring Number: NA	Weight of Hydrometer Sample (g): 50.14
Depth: NA	Calculated Weight of Sieve Sample (g): 50.14
Test Date: 1-Dec-04	Shape: NA
	Hardness: NA

Test Fraction	Sieve Number	Diameter (mm)	Wt. Retained	Cum Wt. Retained	Wt. Passing	% Passing
+10	3"	75	0.00	0.00	343.28	100.00
	2"	50	0.00	0.00	343.28	100.00
	1.5"	38.1	0.00	0.00	343.28	100.00
	1"	25	0.00	0.00	343.28	100.00
	3/4"	19.0	0.00	0.00	343.28	100.00
	3/8"	9.5	0.00	0.00	343.28	100.00
	4	4.75	0.00	0.00	343.28	100.00
	10	2.00	0.00	0.00	343.28	100.00
-10	(Based on calculated sieve wt.)					
	20	0.85	0.02	0.02	50.12	99.96
	40	0.425	0.20	0.22	49.92	99.56
	60	0.250	0.49	0.71	49.43	98.58
	140	0.106	4.24	4.95	45.19	90.13
	200	0.075	6.17	11.12	39.02	77.82
	wet pan			1.15	12.27	37.87
				37.87	0.00	

d_{10} (mm): 0.0051 d_{50} (mm): 0.031
 d_{16} (mm): 0.0074 d_{60} (mm): 0.048
 d_{30} (mm): 0.019 d_{84} (mm): 0.089

Median Particle Diameter-- d_{50} (mm): 0.031
Uniformity Coefficient, C_u -- $[d_{60}/d_{10}]$ (mm): 9.4
Coefficient of Curvature, C_c -- $[(d_{30})^2/(d_{10} \cdot d_{60})]$ (mm): 1.5
Mean Particle Diameter-- $[(d_{16}+d_{50}+d_{84})/3]$ (mm): 0.042

Classification of fines (visual method): ML

ASTM Soil Classification: Silt with sand
USDA Soil Classification: Silt Loam

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Particle Size Analysis Hydrometer Data

Job Name: Flour Hanford
Job Number: LB04.0220.00
Sample Number: B18DF5
Ring Number: NA
Depth: NA

Type of Water Used: DISTILLED
Reaction with H₂O₂: NA
Dispersant*: (NaPO₃)₆
Measured particle density: 2.63

Test Date: 1-Dec-04
Start Time: 8:00

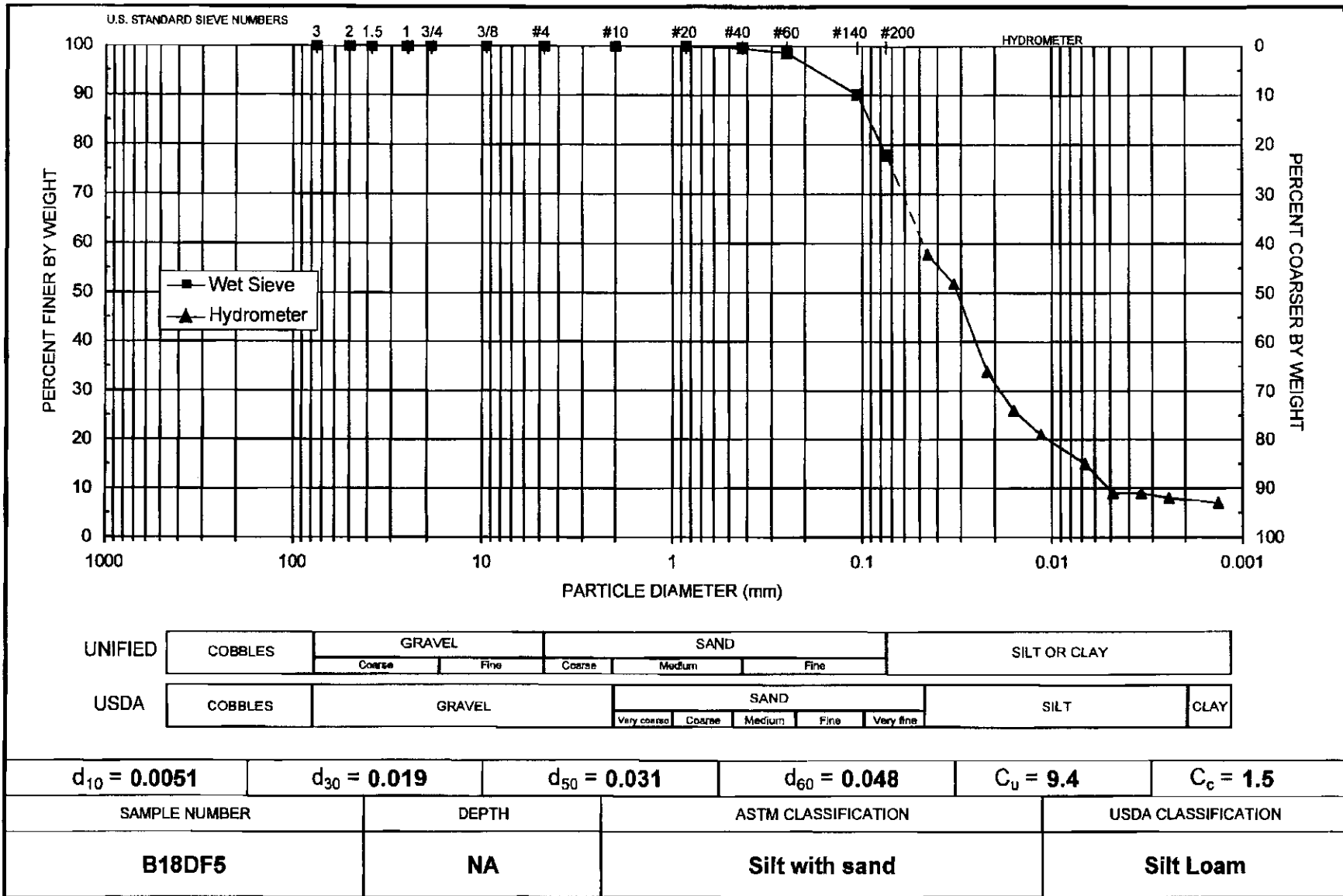
Initial Wt. (g): 50.14
Total Sample Wt. (g): 343.28
Wt. Passing #10 (g): 343.28

Date	Time (min)	Temp (°C)	R (g/L)	R _L (g/L)	R _{corr} (g/L)	L (cm)	D (mm)	P (%)	% Finer
10-Dec-04	1	19.6	33.5	4.5	29.0	10.8	0.04529	57.8	57.8
	2	19.6	30.5	4.5	26.0	11.3	0.03275	51.9	51.9
	5	19.6	21.5	4.5	17.0	12.8	0.02202	33.9	33.9
	10	19.6	17.5	4.5	13.0	13.4	0.01597	25.9	25.9
	20	19.6	15.0	4.5	10.5	13.8	0.01146	20.9	20.9
	60	19.5	12.0	4.5	7.5	14.3	0.00674	15.0	15.0
	120	19.3	9.0	4.5	4.5	14.8	0.00486	9.0	9.0
	240	19.1	9.0	4.5	4.5	14.8	0.00345	9.0	9.0
11-Dec-04	480	18.8	9.0	5.0	4.0	14.8	0.00245	8.0	8.0
	1590	19.8	8.0	4.5	3.5	15.0	0.00133	7.0	7.0

Comments:

* Dispersion device: mechanically operated stirring device

Laboratory analysis by: D. O'Dowd
Data entered by: D. O'Dowd
Checked by: J. Hines



Daniel B. Stephens & Associates, Inc.

Laboratory Tests and Methods



Daniel B. Stephens & Associates, Inc.

Tests and Methods

Particle Size Analysis	ASTM D 422
Atterberg Limits	ASTM D 4318
Estimation of Fines	ASTM D 2487



Daniel B. Stephens & Associates, Inc.
 5840 Osuna Rd., NE
 Albuquerque, NM 87109
 (505) 889-7752
 FAX: (505) 889-0258

Date	<u>10/18/04</u>	Total Pages Including Cover Sheet	<u>7</u>
To	<u>Steve Trent</u>	From	<u>Joleen Hines, DBS&A</u>
Fax No.	<u>866-252-5816</u>	Project No.	<u></u>

Remarks:

Steve,

Please see the attached COC's for your samples, as well as our sample receipt forms. I have also attached a blank copy of our COC for your review.

Please let me know if you have any questions.

Thank you,

Joleen

The information contained in this facsimile contains confidential, privileged, or proprietary information that is the property of Daniel B. Stephens & Associates, Inc., (DBS&A), or is the property of another entity, but within the custody and control of DBS&A. The information is intended for the use of the individual or the entity named on the transmission sheet. If you are not the intended recipient, be aware that any disclosure, copying, or use of this telecopied information is prohibited. If you receive this telecopy in error, please notify us by telephone immediately so that we can arrange for the retrieval of the original documents at no cost to you. Thank you for your assistance.

Fluor Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F04-008-028	PAGE 1 OF 3	
COLLECTOR <i>S.W. Petersen</i>		COMPANY CONTACT TRENT, SI		TELEPHONE NO. 509-373-5869	PROJECT COORDINATOR TRENT, SI	PRICE CODE	SN	DATA TURNAROUND
SAMPLING LOCATION AREA C BARROW STUDY		PROJECT DESIGNATION Hanford Site - Area C Fine-Grained Soils Characterization			SAP NO. F04-008	ATR QUALITY <input type="checkbox"/>		45 Days / 45 Days
ICE CHEST NO. <i>GIRP-04-016</i>		FIELD LOGBOOK NO.		DOA 119138ES10	METHOD OF SHIPMENT Federal Express			
SHIPPED TO D. B. Stephens		OFFSITE PROPERTY NO. <i>2u PTR 14289</i>			BILL OF LADING/AIR BILL NO. <i>2u PTR 14289</i>			
MATRIX* A-Air DL-Drum Liquids DS-Drum Solids L-Liquid O-Oil S-Soil SF-Sediment T-Tissue V-Vegetation W-Water Wt-Wipe X-Other	POSSIBLE SAMPLE HAZARDS/ REMARKS <i>Samples were collected from a nonradiological area</i>	PRESERVATION	None	None				
		TYPE OF CONTAINER	Moisture Resistant Cont.	Bucket				
		NO. OF CONTAINER(S)	1	1				
		VOLUME	20g	1 liter				
	SPECIAL HANDLING AND/OR STORAGE	SAMPLE ANALYSIS	Moisture Content - D2296	SECTION (1) IN SPECIAL INSTRUCTIONS				
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME					
B18DD5	SOIL	<i>12/20/03</i>	<i>1145</i>			<i>[B18405]</i>		
B18DD6	SOIL	<i>12/17/03</i>	-			<i>[B18407]</i>		
B18DF2	SOIL	<i>12/9/03</i>	<i>1310</i>			<i>[B18318]</i>		
B18DF4	SOIL	<i>12/9/03</i>	-			<i>[B18402]</i>		
B18DF5	SOIL	<i>12/15/03</i>	-			<i>[B18410]</i>		
CHAIN OF POSSESSION		SIGN/ PRINT NAMES			SPECIAL INSTRUCTIONS			
RELINQUISHED BY/REMOVED FROM <i>S.W. Petersen</i>	DATE/TIME <i>10/13/04 10:35</i>	RECEIVED BY/STORED IN <i>M. B. Bunker</i>	DATE/TIME <i>10/13/04 10:35</i>		** Geotechnical lab to determine most appropriate method (ASTM 6836 or ASTM 2325) based on sample material and configuration. ** Samples to be wet-sieved, no hydrometer required. (1) Capillary-Moisture Relationship - D6836; Capillary-Moisture Relationship - D2325; Permeability - D2434; Specific Gravity; Particle Size (Wet Sieve) - D422;			
RELINQUISHED BY/REMOVED FROM <i>M. B. Bunker</i>	DATE/TIME <i>10/13/04 2:05</i>	RECEIVED BY/STORED IN <i>F. A. FA</i>	DATE/TIME <i>10/13/04</i>					
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN <i>Steven Hines</i>	DATE/TIME <i>10/14/04</i>					
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME					
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME					
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME					
LABORATORY SECTION	RECEIVED BY	TITLE			DATE/TIME			
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY			DATE/TIME			

Fluor Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				F04-008-028	PAGE 2 OF 3	
COLLECTOR <i>S.W. Peterson</i>		COMPANY CONTACT TRENT, SI		TELEPHONE NO. 509-373-5869	PROJECT COORDINATOR TRENT, SI	PRICE CODE SN	DATA TURNOVER 45 Days / 45 Days	
SAMPLING LOCATION AREA C BARROW STUDY		PROJECT DESIGNATION Hanford Site - Area C Fine-Grained Soils Characterization			SAF NO. F04-008	AIR QUALITY <input type="checkbox"/>		
ICE CHEST NO. <i>GAPP-04-016</i>		FIELD LOGBOOK NO. COA 119138ES10		METHOD OF SHIPMENT Federal Express				
SHIPPED TO D. B. Stephens		OFFSITE PROPERTY NO. <i>20 PTR 14289</i>		BILL OF LADING/AIR BILL NO. <i>20 PTR 14289</i>				
MATRIX* A=Air DL=Drum L=Liquid DS=Drum S=Solids L=Liquid D=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WD=Wipe X=Other	POSSIBLE SAMPLE HAZARDS/ REMARKS <i>Samples were collected from a non radiological area</i>	PRESERVATION None None						
	SPECIAL HANDLING AND/OR STORAGE	TYPE OF CONTAINER Moisture Resistant Cont. Bucket <i>liner/jar/bottle</i>						
		NO. OF CONTAINER(S)						
		VOLUME 250g 50g						
		SAMPLE ANALYSIS Moisture Content - D226; SEE ITEM (1) IN SPECIAL INSTRUCTIONS						
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME					
B18DF6	SOIL	12/17/03	-					
B18DF7	SOIL	12/16/03	-			247		
B18DF8	SOIL	12/16/03	-					
B18DF9	SOIL	12/17/03	-					
B18DF0	SOIL							
CHAIN OF POSSESSION		SIGN/ PRINT NAMES			SPECIAL INSTRUCTIONS			
RELINQUISHED BY/REMOVED FROM <i>S.W. Peterson</i>	DATE/TIME 10/17/04 10:35	RECEIVED BY/STORED IN <i>M. Bunker</i>	DATE/TIME 10/21/04	** Geotechnical lab to determine most appropriate method (ASTM 6836 or ASTM 2325) based on sample material and configuration. ** Samples to be wet-sieved, no hydrometer required. (1) Capillary-Moisture Relationship - D6836; Capillary-Moisture Relationship - D2325; Permeability - D2434; Specific Gravity; Particle Size (Wet Sieve) - D422;				
RELINQUISHED BY/REMOVED FROM <i>M.H. Bunker</i>	DATE/TIME 10/21/04	RECEIVED BY/STORED IN <i>Feb 8</i>	DATE/TIME 10/21/04					
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN <i>John Hurd</i>	DATE/TIME 10/19/04					
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME					
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME					
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME					
LABORATORY SECTION	RECEIVED BY	TITLE	DATE/TIME					
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY	DATE/TIME					

OCT-18-2004 MON 02:50 PM

FAX NO.

P. 03

Fluor Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			F04-008-027	PAGE 1 OF 1
COLLECTOR <i>S.W. Peterson</i>	COMPANY CONTACT TRENT, SJ	TELEPHONE NO. 509-373-5869	PROJECT COORDINATOR TRENT, SJ		PRICE CODE BN	DATA TURNAROUND
SAMPLING LOCATION AREA C BARROW STUDY	PROJECT DESIGNATION Hanford Site - Area C Fine-Grained Soils Characterization		SAF NO. F04-008		AIR QUALITY <input type="checkbox"/>	45 Days / 45 Days
ICE CHEST NO. <i>N/A</i>	FIELD LOGBOOK NO.	COA 119138ES10	METHOD OF SHIPMENT Federal Express			
SHIPPED TO D. B. Stephens	OFFSITE PROPERTY NO. <i>See PTC 14289</i>		BILL OF LADING/BILL NO. <i>See PTC 14289</i>			
MATRIX* A=Air DL=Drum Liquids DS=Drum Solids L=Liquid O=Oil S=Soil SE=Sediment T=Tissue V=Vegetation W=Water WJ=Wipe X=Other	POSSIBLE SAMPLE HAZARDS/ REMARKS <i>Samples were collected from a non radiological area.</i>	PRESERVATION None None None	TYPE OF CONTAINER Moisture Resistant Cont. Bucket Bucket	NO. OF CONTAINER(S) 1 0 11	VOLUME 250g 5gal 5gal	SPECIAL HANDLING AND/OR STORAGE
		SAMPLE ANALYSIS Moisture Content - D2236; Capillary - D6836; SHEET (S) IN SPECIAL INSTRUCTIONS				
SAMPLE NO.	MATRIX*	SAMPLE DATE	SAMPLE TIME			
B18DD2	SOIL	9/21/04	1100	1	1	29#
B18DD3	SOIL	9/21/04	1145	1	1	37#
B18DD4	SOIL	9/21/04	1230	1	1	36#
B18DH3	SOIL					
CHAIN OF POSSESSION			SIGN/ PRINT NAMES		SPECIAL INSTRUCTIONS	
RELINQUISHED BY/ REMOVED FROM <i>S.W. Peterson</i>	DATE/TIME 10/13/04 10:30	RECEIVED BY/ STORED IN <i>M.A. Baubler</i>	DATE/TIME 10/13/04 10:30	** Geotechnical lab to determine most appropriate method (ASTM 6836 or ASTM 2325) based on sample material and configuration. ** Samples to be wet-sieved, no hydrometer required. ** All sample material provided in 1 5-gallon bucket. (1) Capillary-Moisture Relationship - D6836; Capillary-Moisture Relationship - D2325; Permeability - D2434; Specific Gravity; Particle Size (Wet Sieve) - D422;		
RELINQUISHED BY/ REMOVED FROM <i>M.A. Baubler</i>	DATE/TIME 10/13/04 10:30	RECEIVED BY/ STORED IN <i>M.A. Baubler</i>	DATE/TIME 10/13/04 10:30			
RELINQUISHED BY/ REMOVED FROM	DATE/TIME	RECEIVED BY/ STORED IN	DATE/TIME			
RELINQUISHED BY/ REMOVED FROM	DATE/TIME	RECEIVED BY/ STORED IN	DATE/TIME			
RELINQUISHED BY/ REMOVED FROM	DATE/TIME	RECEIVED BY/ STORED IN	DATE/TIME			
RELINQUISHED BY/ REMOVED FROM	DATE/TIME	RECEIVED BY/ STORED IN	DATE/TIME			
LABORATORY SECTION	RECEIVED BY	TITLE		DATE/TIME		
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY		DATE/TIME		

OCT-18-2004 MON 02:50 PM

FAX NO.

P. 04



Daniel B. Stephens & Associates, Inc.

SAMPLE RECEIPT FORM

CLIENT: Flour Hanford
PROJECT #: Area C

DATE RECEIVED: 10/14/04

DBS&A
PROJECT #: _____

1) Are the custody seals on the cooler intact?	NA
2) Are the custody seals on the sample containers intact?	NA
3) Are there Chain of Custody(COC), or other directive shipping papers?	Yes
4) Is the COC complete?	Yes
5) Is the COC in agreement with the samples received?	No
6) Did all the samples arrive intact?	No
7) Comments	

12 samples were received. Please see the attached sheet for sample details.

If you have any questions or concerns, please contact Joleen Hines at 505-889-7752.

NOTE: Samples will be held for a period of 30 days after the completion of testing. After 30 days samples will be disposed of locally unless DBS&A receives other instructions.

Signature: Joleen Hines

Flour Hanford Samples Received 10/14/04

Samples Listed on COC	Sample Received (Y/N)	Sample Container	Approximate Amount of Headpace	Moisture Content - D2216	Capillary-Moisture Relationship* - D6836; Capillary-Moisture Relationship-D2325; Permeability D2434; Specific Gravity; Particle Size (Wet Sieve)-D422	Compaction-D698
B18DD2	Y	5-Gal. Bucket	50%		X	X
B18DD3	Y	5-Gal. Bucket	50%		X	X
B18DD4	Y	5-Gal. Bucket	50%		X	X
B18DF7	Y	5-Gal. Bucket	50%		X	
B18DF8	Y	1 L Plastic Bottle	10%		X	
B18DF6	Y	250 ml. Glass Jar	50%		X	
B18DF9	Y	250 ml. Glass Jar	20%	X	X	
B18DD5	Y	16" Plastic Sleeve	50%		X	
B18DD6	Y	16" Plastic Sleeve	60%		X	
B18DF2	Y	16" Plastic Sleeve	60%		X	
B18DF4	Y	16" Plastic Sleeve	75%		X	
B18DF6	Y	10" Plastic Sleeve	60%		X	
B18DH0	N					
B18DH3	N					

*Geotechnical lab to determine most appropriate method (ASTM D6836 or ASTM D 2325) based on sample material and configuration.



Daniel B. Stephens & Associates, Inc.
Laboratory Shipping and Receiving
 5840 Osuna Road, NE
 Albuquerque, NM 87109
 Phone: (505) 889-7752 • Fax: (505) 889-0258

Name to Appear on Report and Invoice:

cc: Report - Invoice to: (circle one or both)

Attn: _____ Ph: _____

Attn: _____ Ph: _____

FAX: _____ E-mail: _____

FAX: _____ E-mail: _____

Project Name or PO.#		Number of Containers	Type of Container	Initial Soil Properties (Pd, θ, φ)	Saturated Hydraulic Conductivity (Ksat)	Moisture Retention Characteristics	Unsaturated Hydraulic Conductivity	Particle Size Analysis	Effective Porosity	Hydraulic Properties Package				Remarks:	
Date	Sample Identification														
Relinquished by: (Signature)		Date	Received by: (Signature)					Date	Comments:						

Samples containing contamination must be accompanied by chemical analysis results.