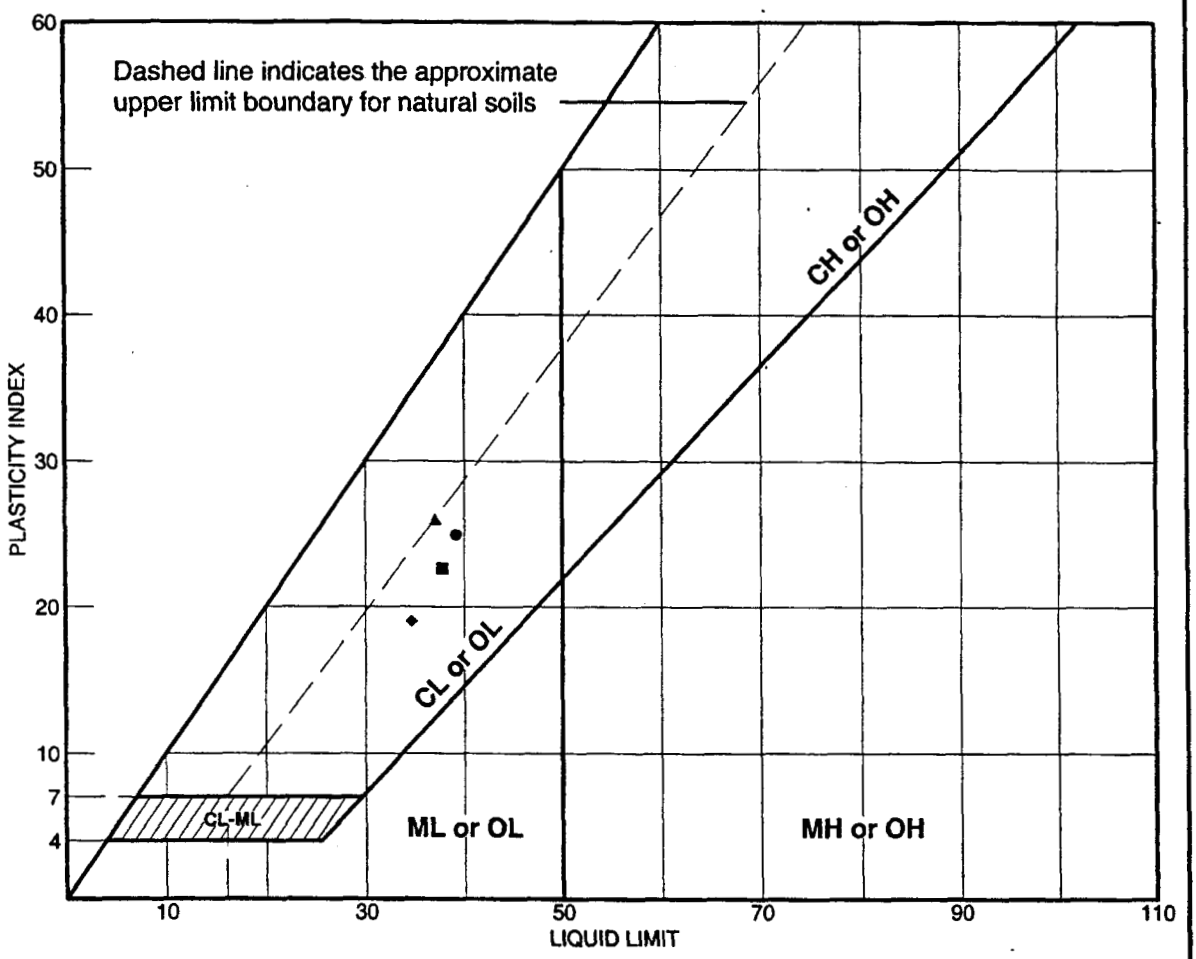
Appendix A

Material Testing Data

Appendix A-1

Atterberg Limits

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

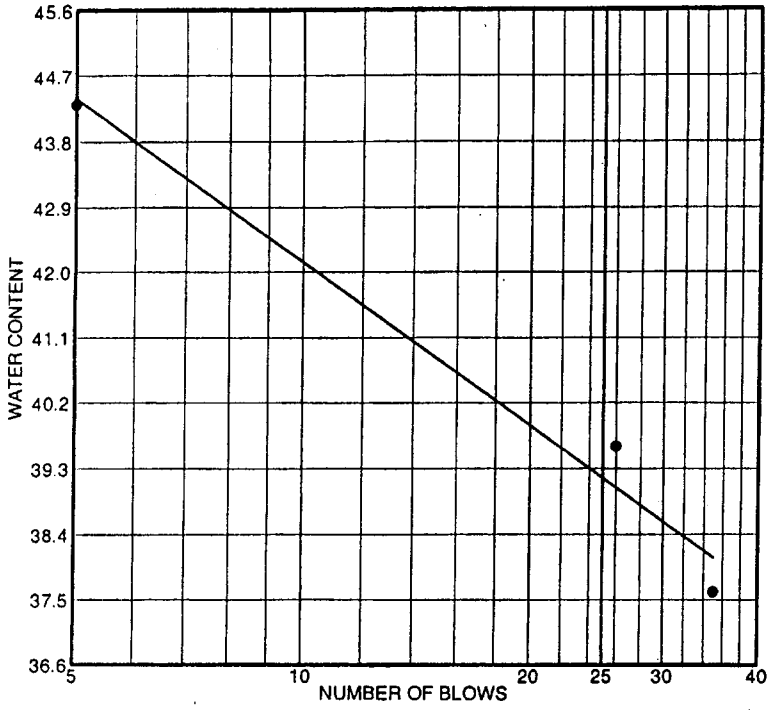
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Ryegrass Clay	BCL #1	Stockpile	15.7%	14.3	39.2	24.9	CL
■	Ryegrass Clay	BCL #2	Stockpile	13.8%	15.2	37.8	22.6	CL
▲	Ryegrass Clay	BCL #3	Stockpile	13.8%	11.1	37.1	26.0	CL
●	Ryegrass Clay	BCL #4	Stockpile	15.2%	15.7	34.7	19.0	CL

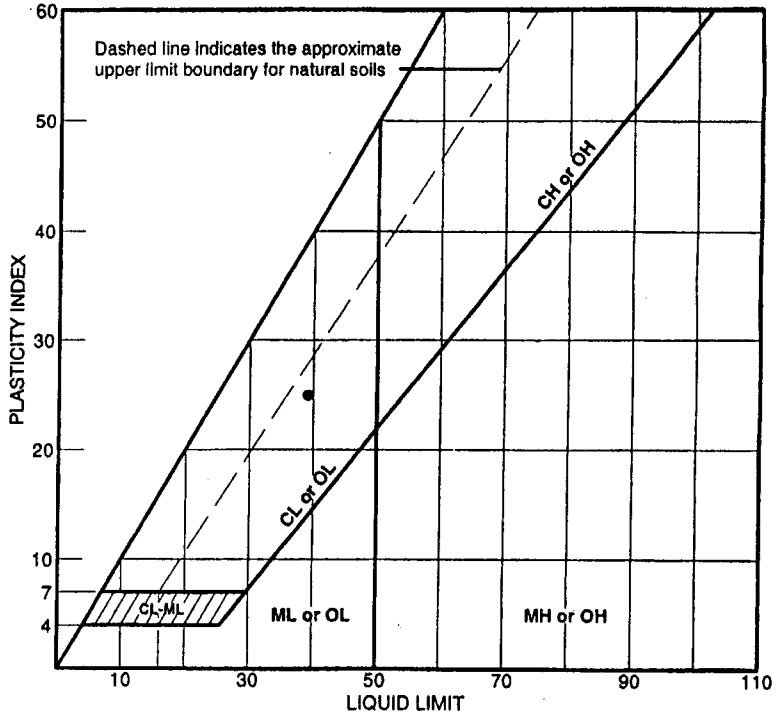
LIQUID AND PLASTIC LIMITS TEST REPORT

INEL MATERIALS LAB

Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project No.: S01-588058 **Plate**

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Ryegrass Clay with 5% Bentonite	BCL #1	Stockpile	8/21/01	CL	Lean clay	15.7%	39.2	24.9

Client Tom Borschel/ICDF Project

Project INTEC CERCLA Disposal Facility

CH2M Hill

Project No. S01-588058 | Plate

INEL MATERIALS LAB

● Sample BCL #1 from mix pad at ICDF

LIQUID AND PLASTIC LIMIT TEST DATA

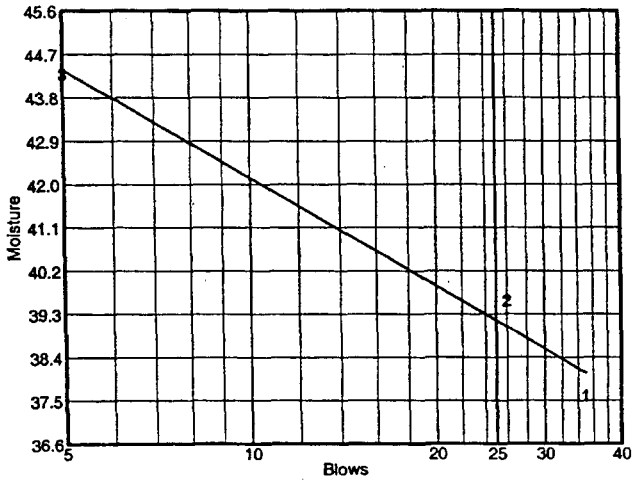
Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Clay with 5% Bentonite
Sample No.: BCL #1
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: BCL#1 Sampled from Mixing Pad
Description: Lean clay
Date: 8/21/01 **Natural Moisture:** 15.7%
USCS Class.: CL **AASHTO Class.:** A-6(22)
Testing Remarks: Sample BCL #1 from mix pad at ICDF

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	24.77	26.22	26.56			
Dry+Tare	21.06	21.95	21.82			
Tare	11.18	11.16	11.12			
# Blows	35	26	5			
Moisture	37.6	39.6	44.3			



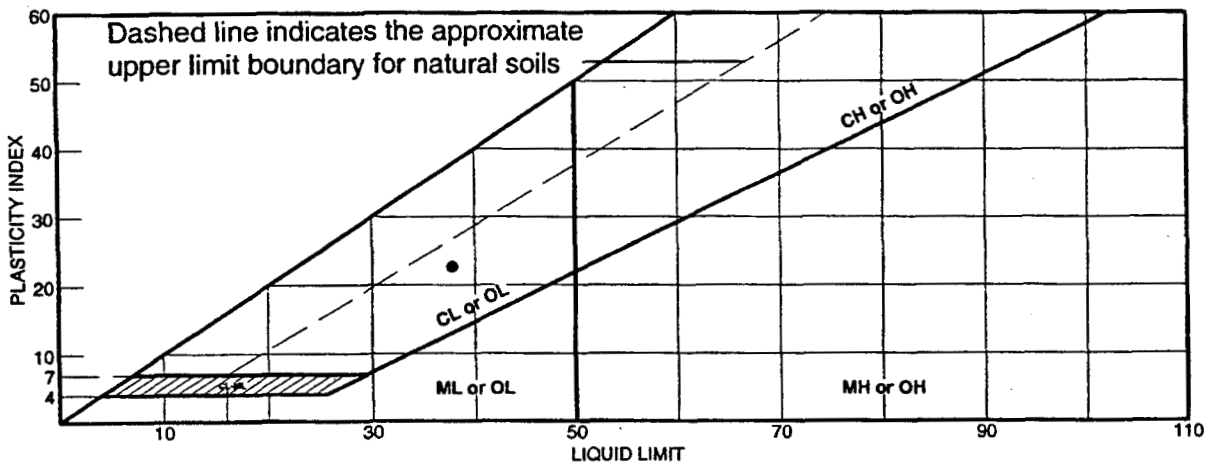
Liquid Limit= 39.2
Plastic Limit= 14.3
Plasticity Index= 24.9

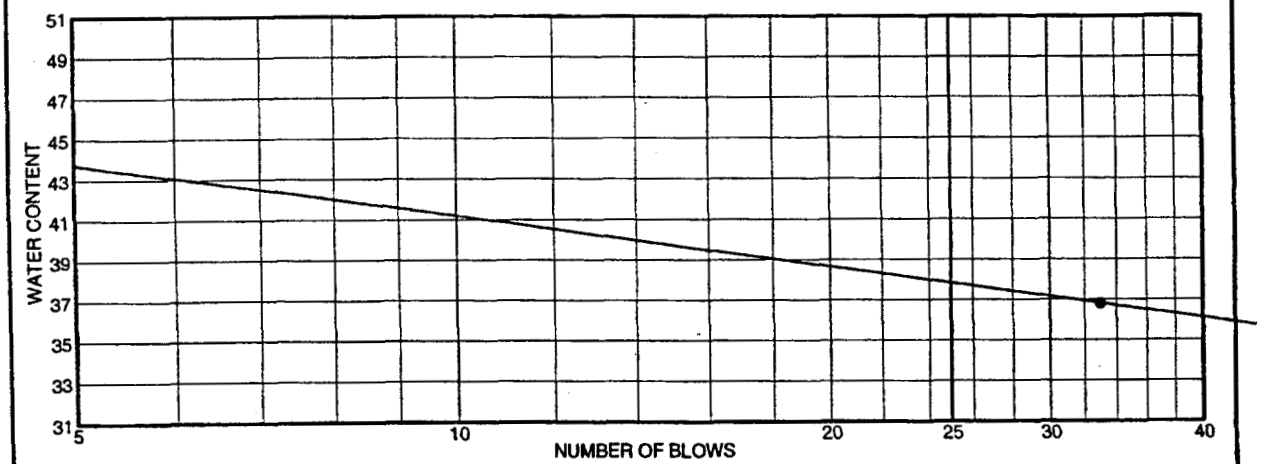
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	8.56	10.05			
Dry+Tare	8.03	9.35			
Tare	4.41	4.31			
Moisture	14.6	13.9			

INEL MATERIALS LAB

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	37.8	15.2	22.6	97.3	89.3	CL

Project No. S01-588058 **Client:** Tom Borschel/ICDF Project

Project: INTEC CERCLA Disposal Facility

CH2M Hill

● **Location:** BCL #2 sampled from Mixing Pad

Remarks:

● Sample BCL #2, Mixing Pad

LIQUID AND PLASTIC LIMITS TEST REPORT

INEL MATERIALS LAB

Plate

LIQUID AND PLASTIC LIMIT TEST DATA

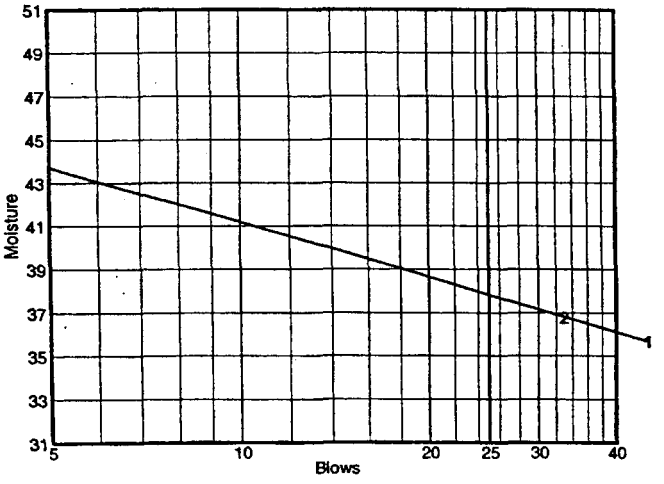
Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Clay with 5% Bentonite
Sample No.: BCL #2
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: BCL #2 sampled from Mixing Pad
Description: Lean clay
%<#40: 97.3 **%<#200:** 89.3 **USCS:** CL **AASHTO:** A-6(20)
Testing Remarks: Sample BCL #2, Mixing Pad

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	27.46	27.04	36.76			
Dry+Tare	23.17	22.76	28.55			
Tare	11.15	11.13	11.13			
# Blows	45	33	2			
Moisture	35.7	36.8	47.1			



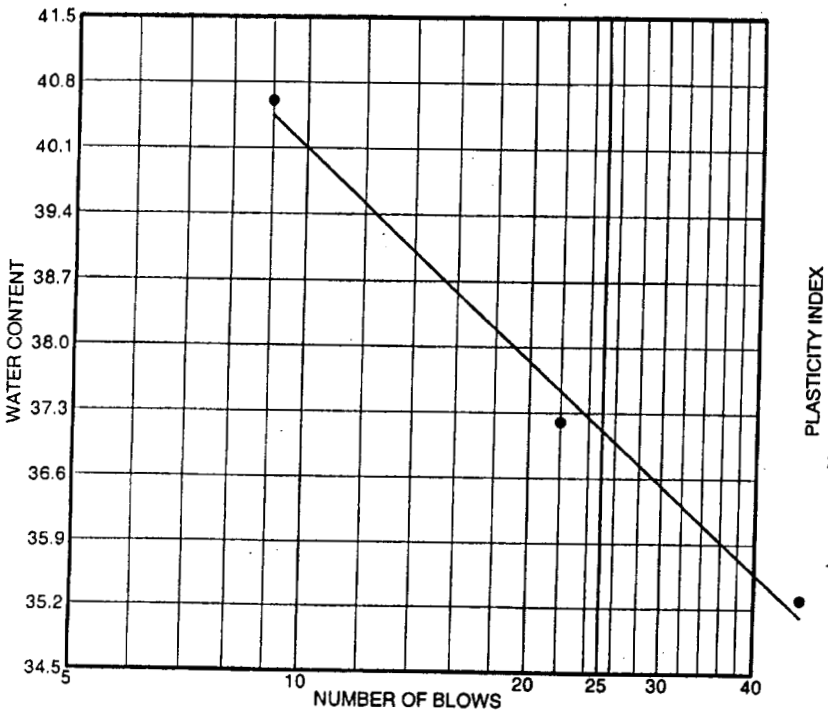
Liquid Limit= 37.8
Plastic Limit= 15.2
Plasticity Index= 22.6

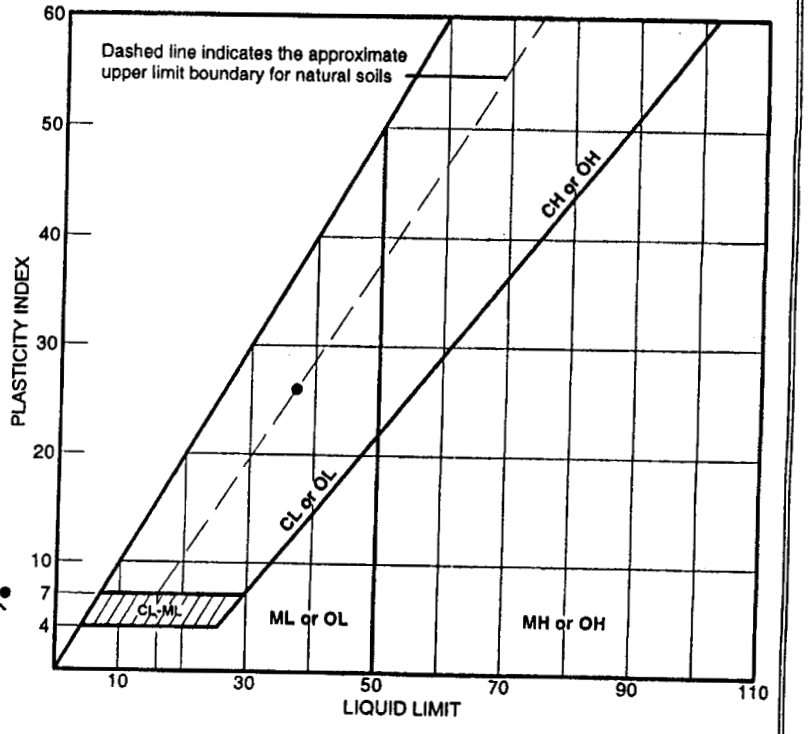
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	8.62	8.55			
Dry+Tare	8.06	8.00			
Tare	4.39	4.33			
Moisture	15.3	15.0			

INEL MATERIALS LAB

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Ryegrass Clay with 5% Bentonite	BCL #3	Stockpile	9/5/01	CL	Lean clay	13.8%	37.1	26.0

Client Tom Borschel/ICDF Project
Project INTEC CERCLA Disposal Facility
CH2M Hill
Project No. S01-588058 | Plate

INEL MATERIALS LAB

● BCL #3 Sampled from Mixing Pad

LIQUID AND PLASTIC LIMIT TEST DATA

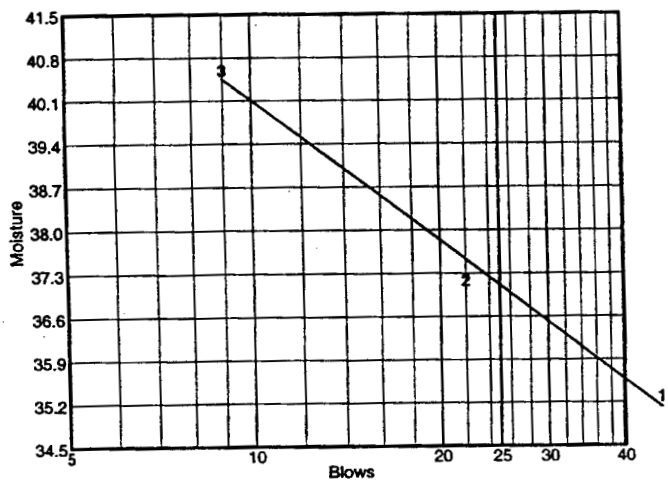
Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Clay with 5% Bentonite
Sample No.: BCL #3
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: BCL #3 sampled from Mixing Pad
Description: Lean clay
Date: 9/5/01 **Natural Moisture:** 13.8%
USCS Class.: CL **AASHTO Class.:** A-6(22)
Testing Remarks: BCL #3 Sampled from Mixing Pad

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	26.03	27.26	26.95			
Dry+Tare	22.13	22.87	22.39			
Tare	11.07	11.07	11.15			
# Blows	46	22	9			
Moisture	35.3	37.2	40.6			



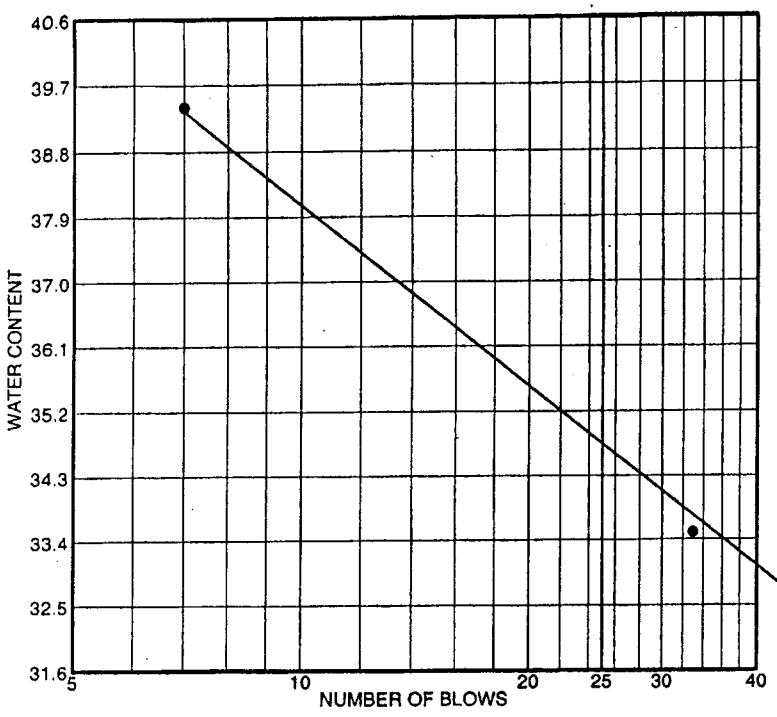
Liquid Limit= 37.1
Plastic Limit= 11.1
Plasticity Index= 26.0

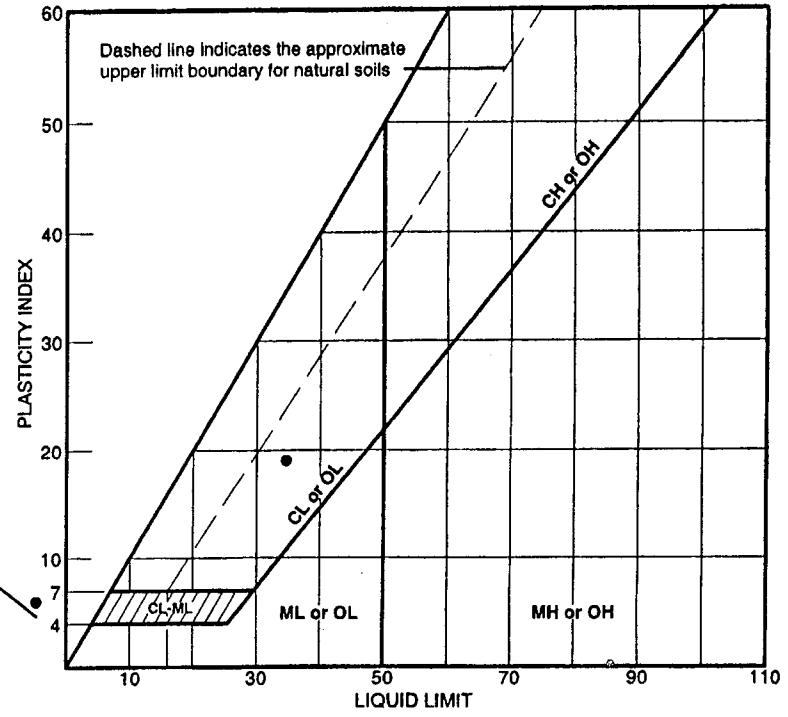
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	6.84	7.01			
Dry+Tare	6.59	6.74			
Tare	4.32	4.33			
Moisture	11.0	11.2			

INEL MATERIALS LAB

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Ryegrass Clay with 5% Bentonite	BCL #4	Stockpile	9-05-01	CL	Lean clay	15.2%	34.7	19.0

Client Tom Borschel/ICDF Project

Project INTEC CERCLA Disposal Facility

CH2M Hill

Project No. S01-588058 | Plate

INEL MATERIALS LAB

● BCL #4 Sampled from Mixing Pad

LIQUID AND PLASTIC LIMIT TEST DATA

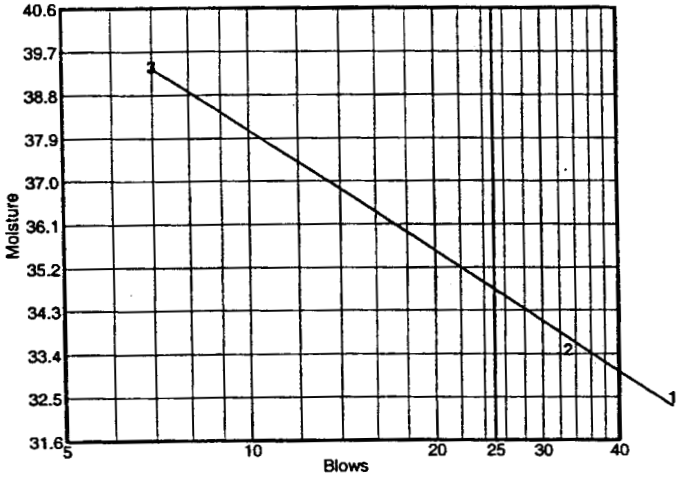
Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Clay with 5% Bentonite
Sample No.: BCL #4
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: BCL #4 Sampled from Mixing Pad
Description: Lean clay
Date: 9-05-01 **Natural Moisture:** 15.2%
USCS Class.: CL **AASHTO Class.:** A-6(16)
Testing Remarks: BCL #4 Sampled from Mixing Pad

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	29.02	25.94	26.23			
Dry+Tare	24.64	22.22	21.96			
Tare	11.15	11.13	11.13			
# Blows	49	33	7			
Moisture	32.5	33.5	39.4			



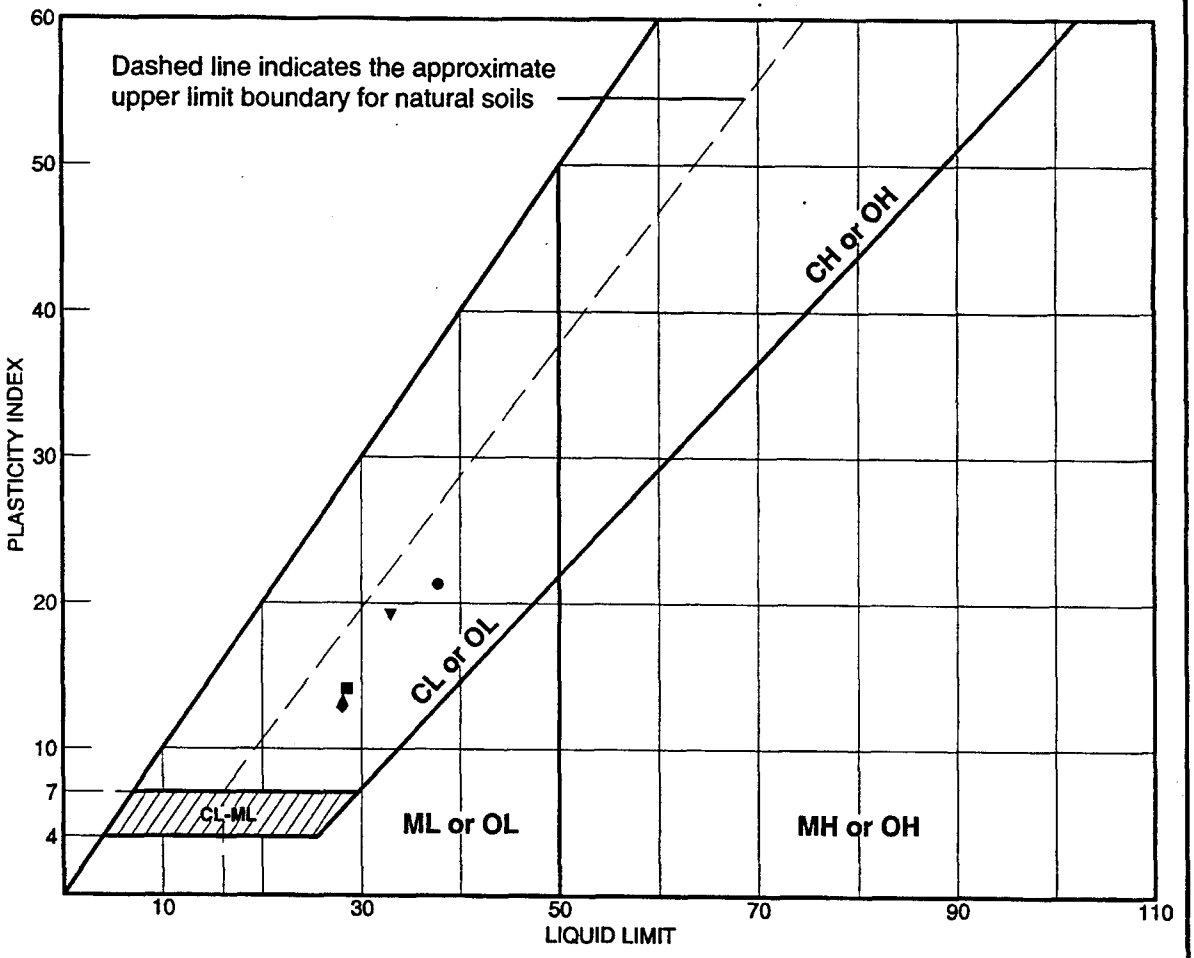
Liquid Limit= 34.7
Plastic Limit= 15.7
Plasticity Index= 19.0

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	7.44	8.37			
Dry+Tare	7.03	7.82			
Tare	4.39	4.33			
Moisture	15.5	15.8			

INEL MATERIALS LAB

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

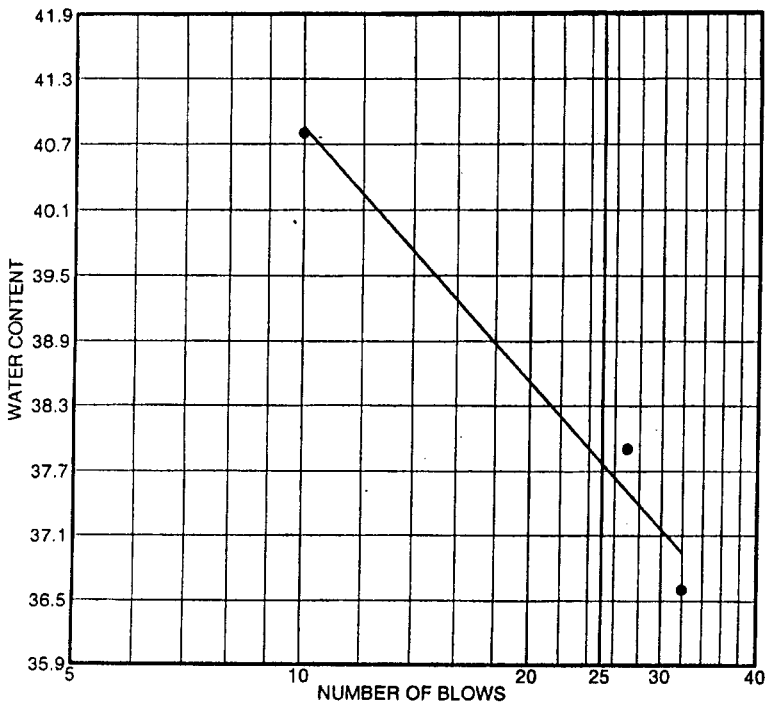
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Ryegrass Flats	NCL #1	Stockpile	8.9%	16.5	37.8	21.3	CL
■	Ryegrass Flats	NCL #2	Stockpile	8.8%	14.4	28.5	14.1	CL
▲	Ryegrass Flats	NCL #3	stockpile	8.6%	14.8	28.1	13.3	CL
●	Ryegrass Flats	NCL #4	Stockpile	8.3%	15.2	28.0	12.8	CL
▼	Ryegrass Flats	NCL #5	Stockpile	15.8%	13.7	32.9	19.2	CL

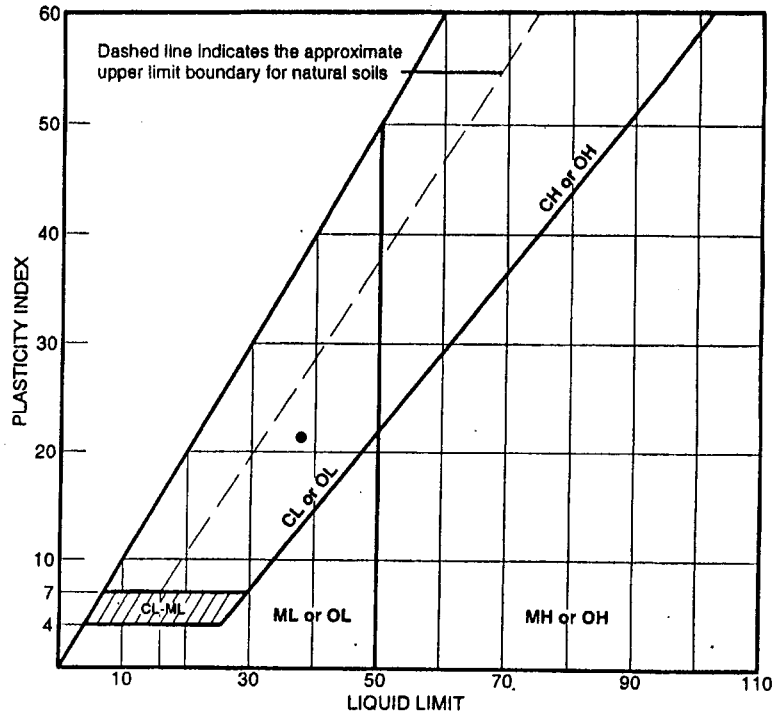
LIQUID AND PLASTIC LIMITS TEST REPORT

INEL MATERIALS LAB

Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project No.: S01-588058 **Plate**

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Ryegrass Flats Soil	NCL #1	Stockpile	8/13/01	CL	Lean clay	8.9%	37.8	21.3

Client Tom Borschel/ICDF Project
Project INTEC CERCLA Disposal Facility
CH2M Hill
Project No. S01-588058 Plate

INEL MATERIALS LAB

● NCL #1 Sampled from Ryegrass Borrow Area

LIQUID AND PLASTIC LIMIT TEST DATA

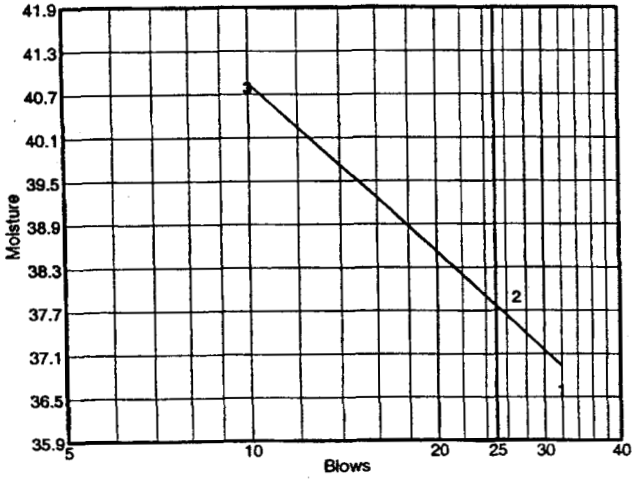
Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Flats Soil
Sample No.: NCL #1
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: RyeGrass Borrow Area
Description: Lean clay
Date: 8/13/01 **Natural Moisture:** 8.9%
USCS Class.: CL **AASHTO Class.:** A-6(19)
Testing Remarks: NCL #1 Sampled from Ryegrass Borrow Area

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	26.22	26.84	30.72			
Dry+Tare	22.18	22.53	25.05			
Tare	11.15	11.17	11.16			
# Blows	32	27	10			
Moisture	36.6	37.9	40.8			



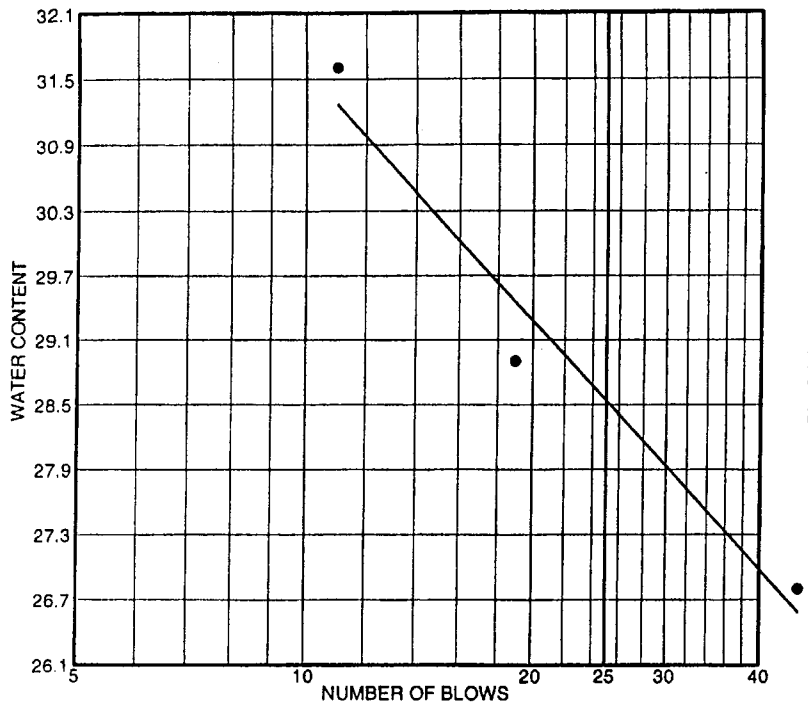
Liquid Limit= 37.8
Plastic Limit= 16.5
Plasticity Index= 21.3

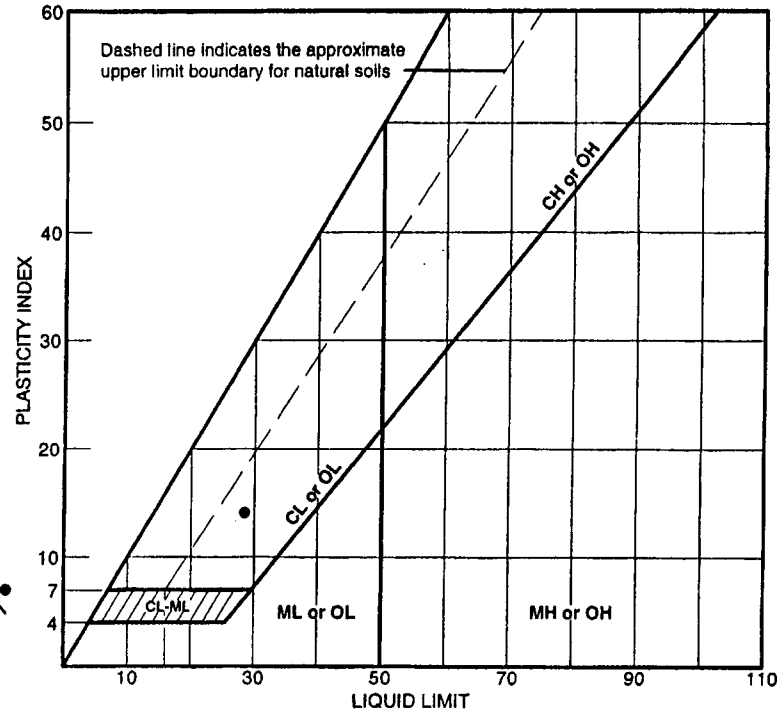
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	7.52	6.65			
Dry+Tare	7.08	6.32			
Tare	4.37	4.36			
Moisture	16.2	16.8			

INEL MATERIALS LAB

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Ryegrass Flats Soil	NCL #2	Stockpile	8/21/01	CL	Lean clay	8.8%	28.5	14.1

Client Tom Borschel/ICDF Project

Project INTEC CERCLA Disposal Facility

CH2M Hill

Project No. S01-588058 | Plate

INEL MATERIALS LAB

● Sampled from Ryegrass stockpiled materials located on test site.

LIQUID AND PLASTIC LIMIT TEST DATA

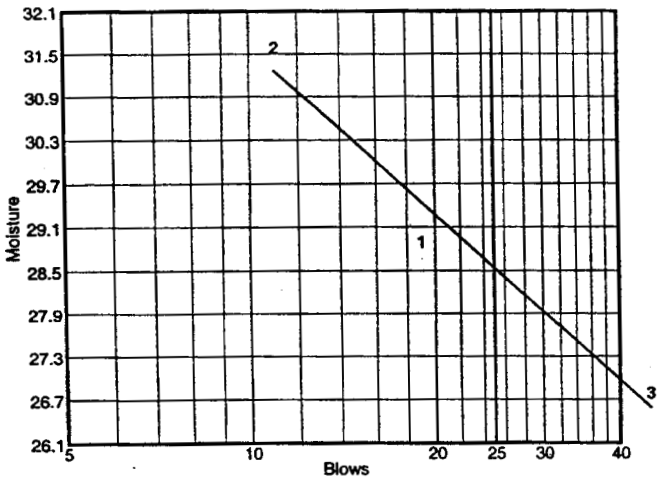
Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Flats Soil
Sample No.: NCL #2
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: NCL #2 Ryegrass Borrow Area
Description: Lean clay
Date: 8/21/01 **Natural Moisture:** 8.8%
USCS Class.: CL **AASHTO Class.:** A-6(12)
Testing Remarks: Sampled from Ryegrass stockpiled materials located on test site.

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	27.55	25.30	27.28			
Dry+Tare	23.86	21.90	23.88			
Tare	11.10	11.15	11.19			
# Blows	19	11	45			
Moisture	28.9	31.6	26.8			



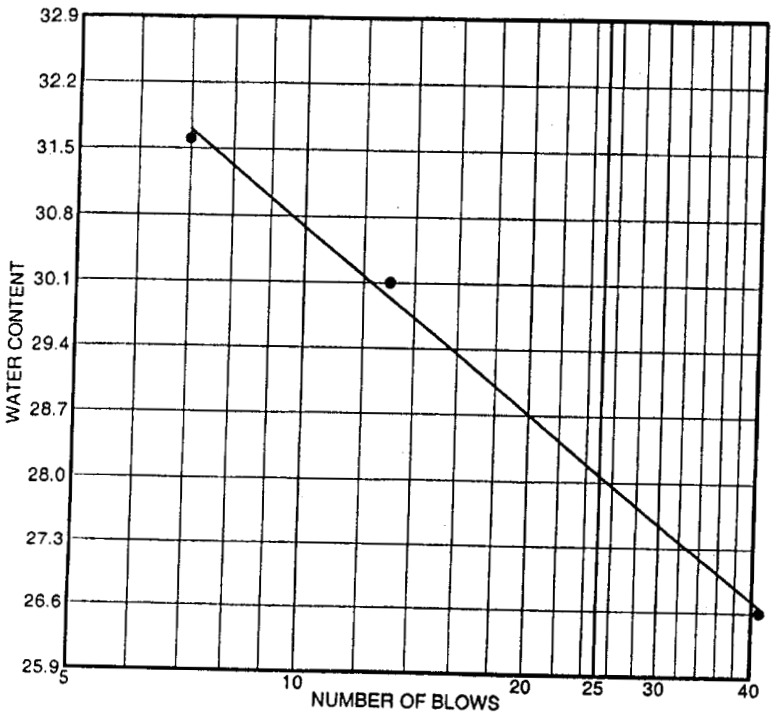
Liquid Limit= 28.5
Plastic Limit= 14.4
Plasticity Index= 14.1

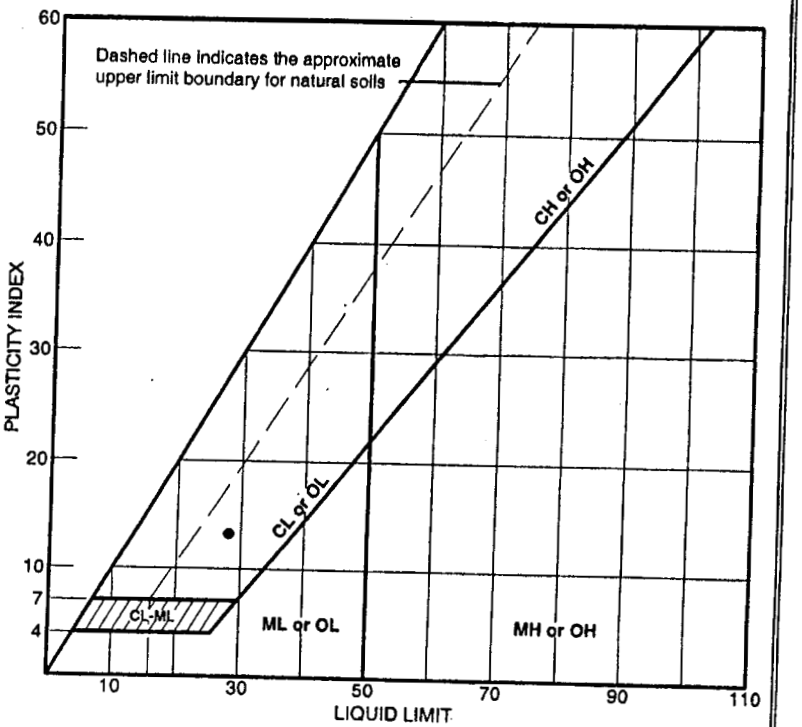
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	8.61	7.99			
Dry+Tare	8.09	7.52			
Tare	4.36	4.34			
Moisture	13.9	14.8			

INEL MATERIALS LAB

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
•	Ryegrass Flats Soil	NCL #3	stockpile	8/21/01	CL	Lean clay	8.6%	28.1	13.3

Client Tom Borschel/ICDF Project
Project INTEC CERCLA Disposal Facility
CH2M Hill
Project No. S01-588058 | Plate

INEL MATERIALS LAB

• Sampled from Ryegrass clay stockpile

LIQUID AND PLASTIC LIMIT TEST DATA

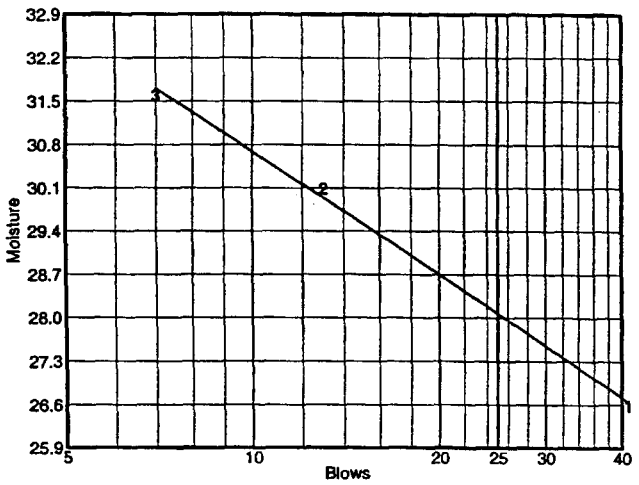
Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Flats Soil
Sample No.: NCL #3
Elev. or Depth: stockpile **Sample Length (in./cm.):**
Location: NCL #3 Sampled from Ryegrass Stockpile
Description: Lean clay
Date: 8/21/01 **Natural Moisture:** 8.6%
USCS Class.: CL **AASHTO Class.:** A-6(10)
Testing Remarks: Sampled from Ryegrass clay stockpile

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	28.02	25.93	28.24			
Dry+Tare	24.46	22.51	24.15			
Tare	11.06	11.13	11.19			
# Blows	41	13	7			
Moisture	26.6	30.1	31.6			



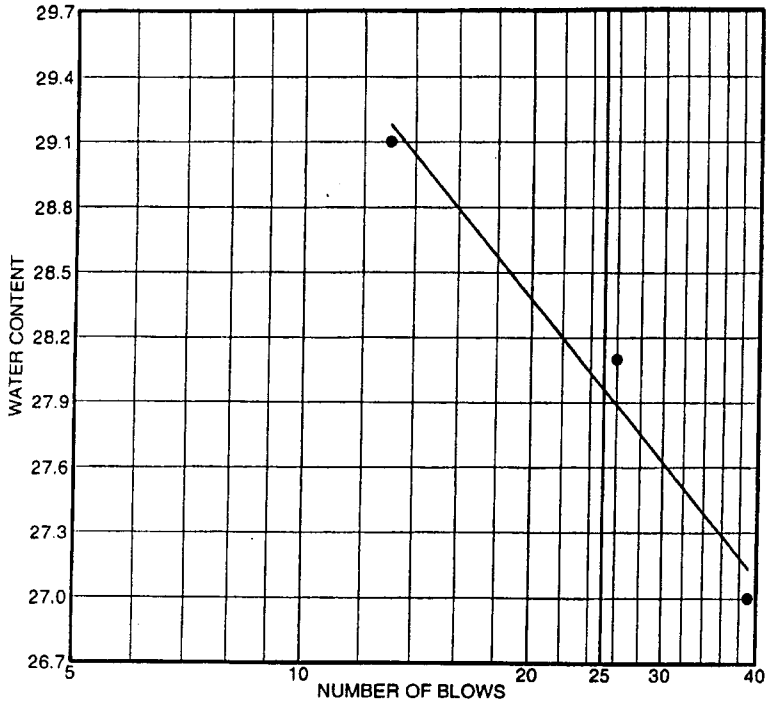
Liquid Limit= 28.1
Plastic Limit= 14.8
Plasticity Index= 13.3

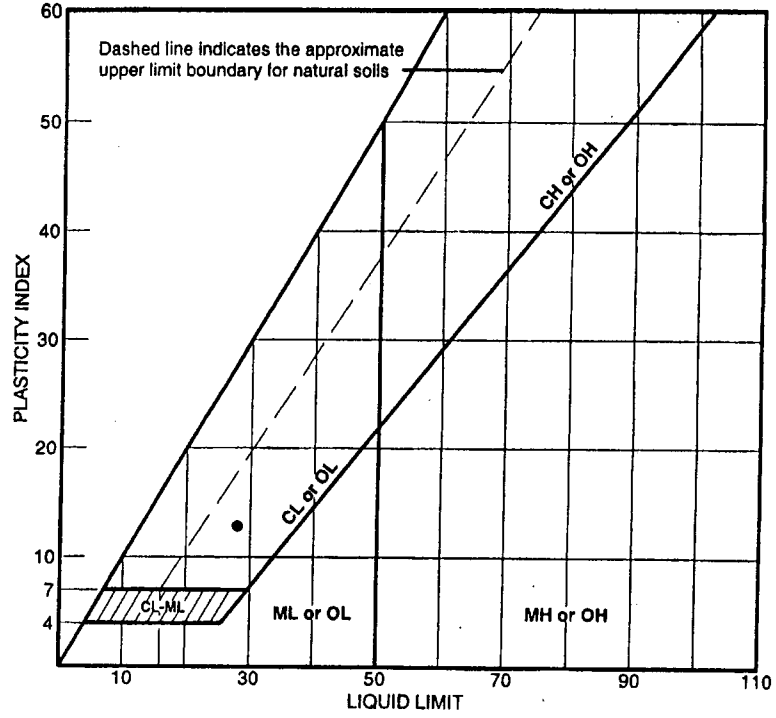
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	8.14	7.55			
Dry+Tare	7.65	7.13			
Tare	4.30	4.33			
Moisture	14.6	15.0			

INEL MATERIALS LAB

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Ryegrass Flats Soil	NCL #4	Stockpile	8/21/01	CL	Lean clay with sand	8.3%	28.0	12.8

Client Tom Borschel/ICDF Project
Project INTEC CERCLA Disposal Facility
CH2M Hill
Project No. S01-588058 | Plate

INEL MATERIALS LAB

● Sampled from Ryegrass stockpile

LIQUID AND PLASTIC LIMIT TEST DATA

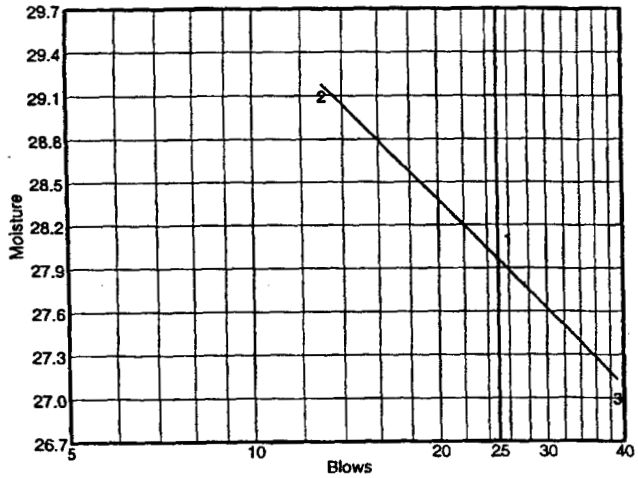
Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Flats Soil
Sample No.: NCL #4
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: NCL #4 Ryegrass Borrow Stockpile
Description: Lean clay with sand
Date: 8/21/01 **Natural Moisture:** 8.3%
USCS Class.: CL **AASHTO Class.:** A-6(9)
Testing Remarks: Sampled from Ryegrass stockpile

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	25.96	27.79	29.18			
Dry+Tare	22.70	24.03	25.34			
Tare	11.11	11.10	11.10			
# Blows	26	13	39			
Moisture	28.1	29.1	27.0			



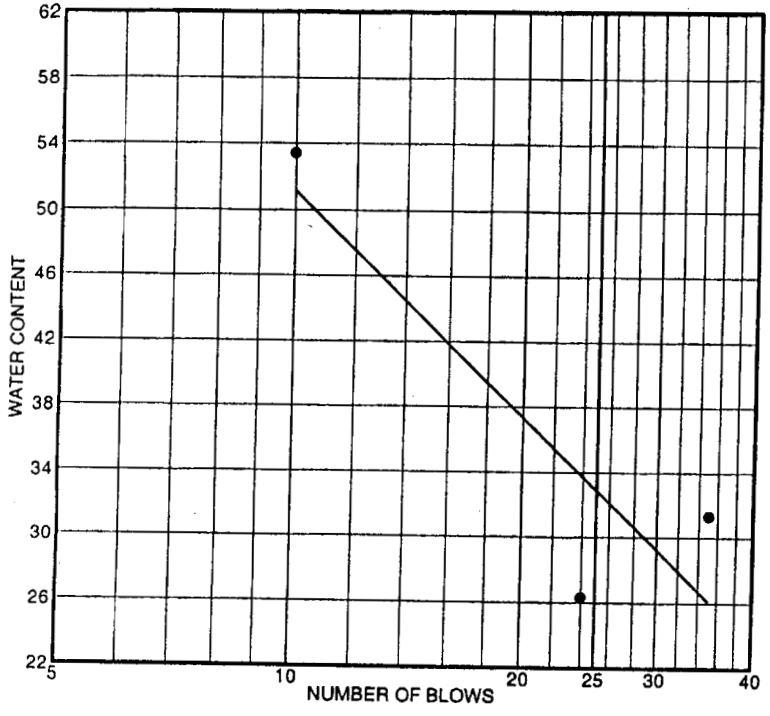
Liquid Limit= 28.0
Plastic Limit= 15.2
Plasticity Index= 12.8

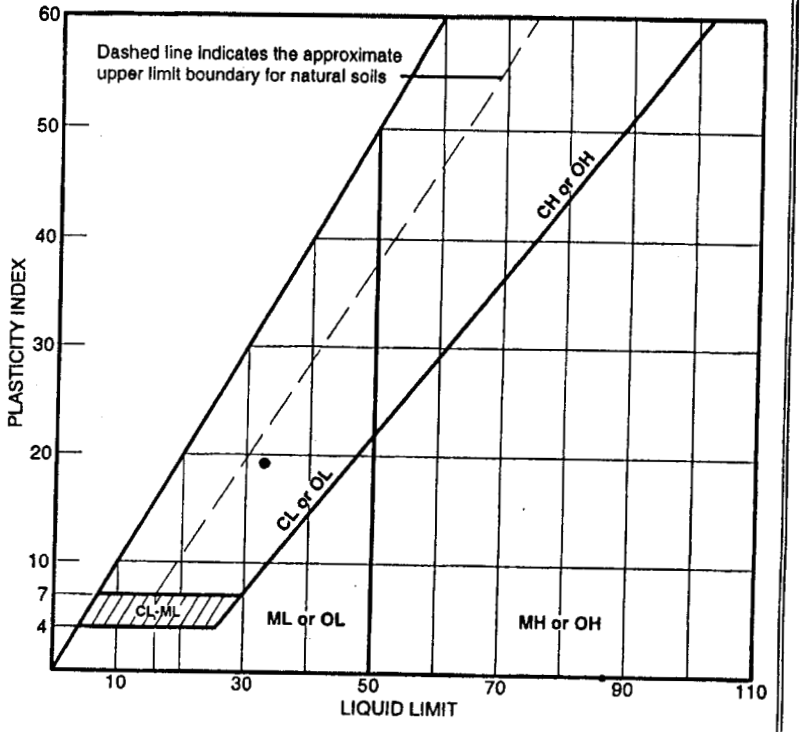
Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	9.60	8.34			
Dry+Tare	8.94	7.80			
Tare	4.42	4.35			
Moisture	14.6	15.7			

INEL MATERIALS LAB

LIQUID AND PLASTIC LIMITS TEST REPORT





	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PI
●	Ryegrass Flats Soil	NCL #5	Stockpile	9-5-01	CL	Lean clay	15.8%	32.9	19.2

Client Tom Borschel/ICDF Project
Project INTEC CERCLA Disposal Facility
CH2M Hill
Project No. S01-588058 Plate

INEL MATERIALS LAB

● NCL #5 Sampled from Ryegrass Borrow Stockpile

LIQUID AND PLASTIC LIMIT TEST DATA

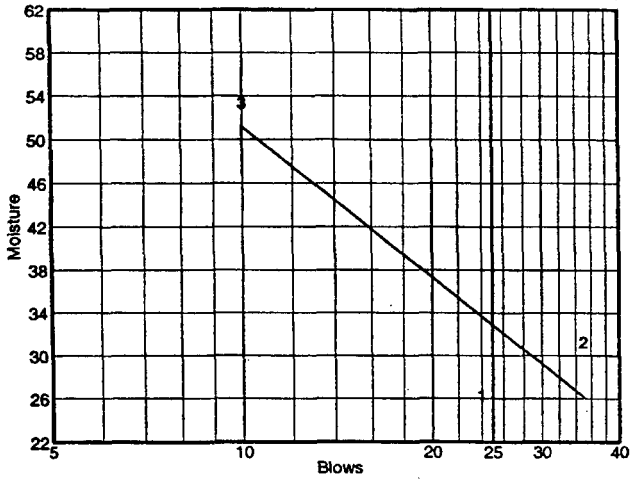
Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Flats Soil
Sample No.: NCL #5
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: NCL #5 Ryegrass Borrow Stockpile
Description: Lean clay
Date: 9-5-01 **Natural Moisture:** 15.8%
USCS Class.: CL **AASHTO Class.:** A-6(15)
Testing Remarks: NCL #5 Sampled from Ryegrass Borrow Stockpile

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	29.33	28.31	27.86			
Dry+Tare	25.50	24.22	22.00			
Tare	10.94	11.14	11.03			
# Blows	24	35	10			
Moisture	26.3	31.3	53.4			



Liquid Limit= 32.9
Plastic Limit= 13.7
Plasticity Index= 19.2

Plastic Limit Data

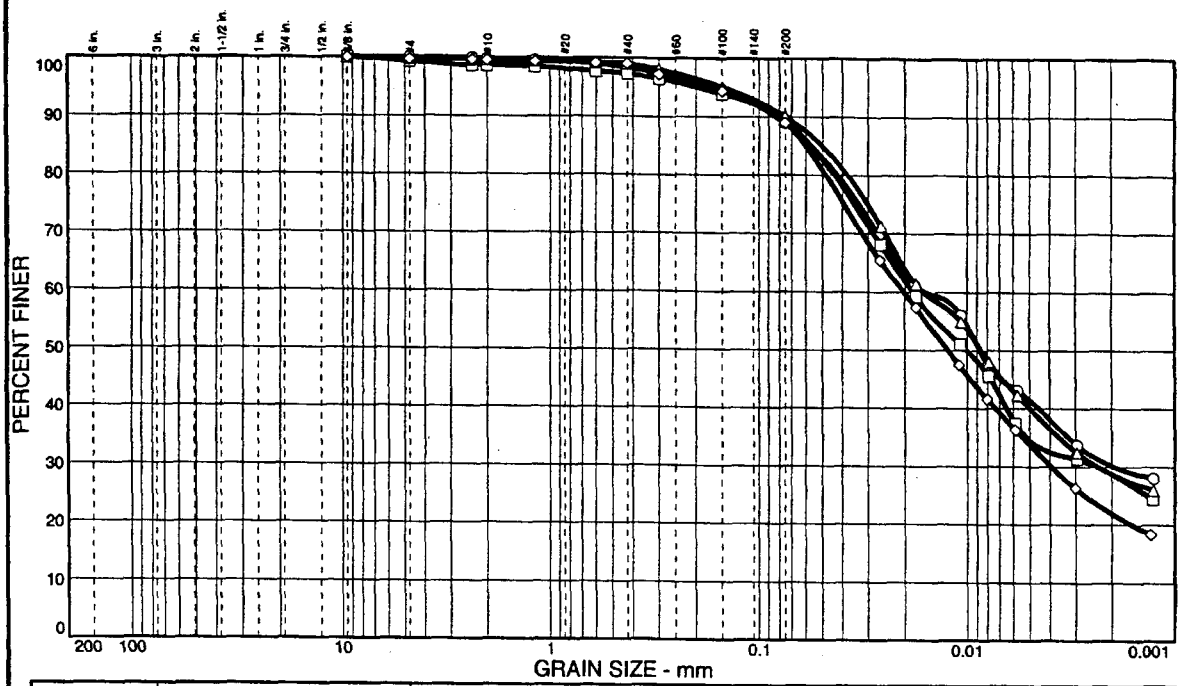
Run No.	1	2	3	4	
Wet+Tare	7.74	8.79			
Dry+Tare	7.35	8.23			
Tare	4.32	4.37			
Moisture	12.9	14.5			

INEL MATERIALS LAB

Appendix A-2

Particle Size Distribution

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.0	0.3	1.4	9.4	47.4	41.5
□	0.0	0.0	0.7	0.7	1.3	8.0	54.8	34.5
△	0.0	0.0	0.2	0.3	0.5	8.9	50.0	40.1
◇	0.0	0.0	0.3	0.2	0.5	10.0	55.2	33.8

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	39.2	14.3	0.0564	0.0158	0.0087	0.0020				
□	37.8	15.2	0.0564	0.0183	0.0100	0.0023				
△	37.1	11.1	0.0501	0.0162	0.0086	0.0023				
◇	34.7	15.7	0.0600	0.0202	0.0124	0.0039				

MATERIAL DESCRIPTION	USCS	AASHTO
○ Lean clay	CL	A-6(22)
□ Lean clay	CL	A-6(20)
△ Lean clay	CL	A-6(22)
◇ Lean clay	CL	A-6(16)

Project No. S01-588058 **Client:** Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
○ **Location:** BCL#1 Sampled from Mixing Pad
□ **Location:** BCL #2 sampled from Mixing Pad
△ **Location:** BCL #3 sampled from Mixing Pad
◇ **Location:** BCL #4 Sampled from Mixing Pad

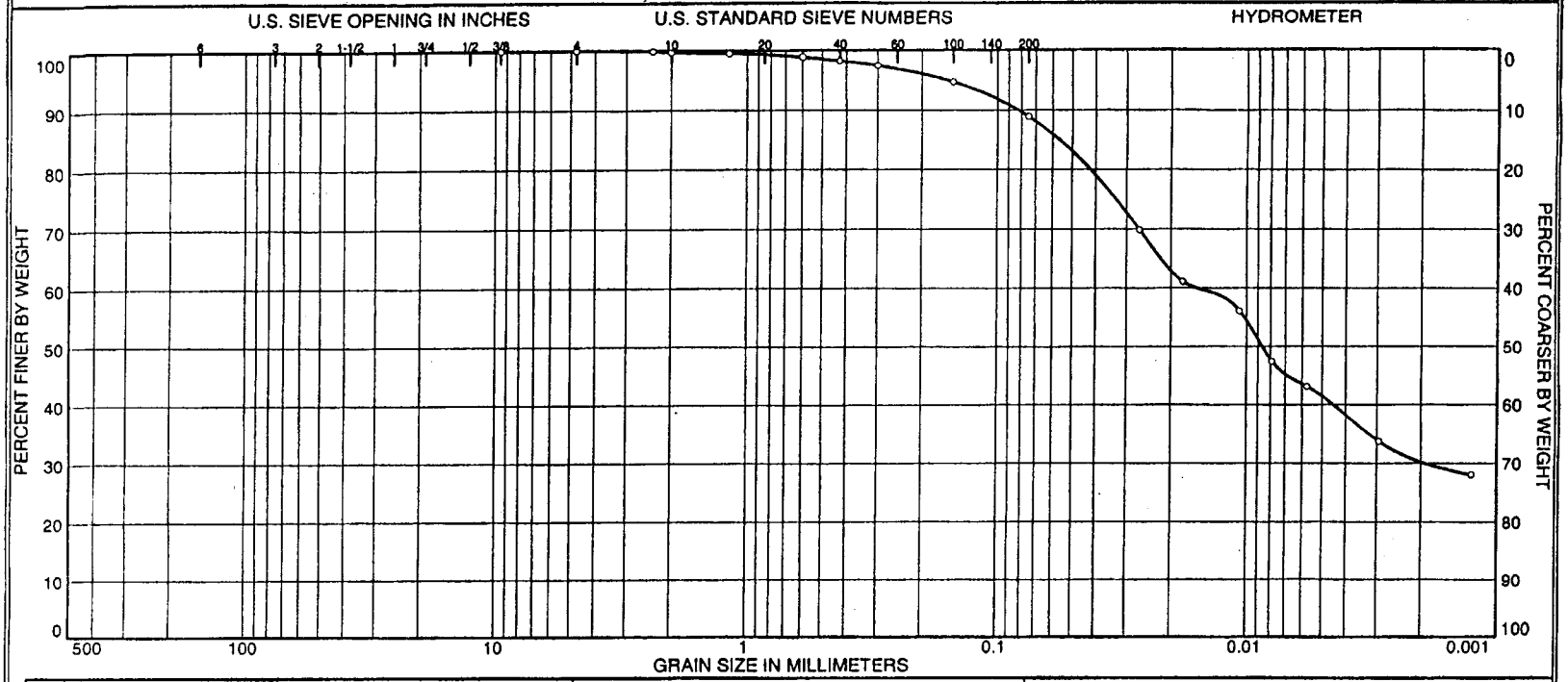
Remarks:
○ Sample BCL #1
□ Sample BCL #2, Mixing Pad
△ BCL #3, Sampled from Mixing Pad
◇ BCL #4, Sampled from Mixing Pad

PARTICLE SIZE DISTRIBUTION TEST REPORT

INEL MATERIALS LAB

Plate

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.0	0.3	1.4	9.4	47.4	41.5

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	Ryegrass Clay with 5% Bentonite	BCL #1	Stockpile	8/21/01	CL	Lean clay	15.7%	39.2	14.3

Client Tom Borschel/ICDF Project
Project INTEC CERCLA Disposal Facility
CH2M Hill
Project No. S01-588058 Plate

INEL MATERIALS LAB

○ Sample BCL #1

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Clay with 5% Bentonite
Sample No.: BCL #1
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: BCL#1 Sampled from Mixing Pad
Description: Lean clay
Date: 8/21/01 **Natural Moisture:** 15.7%
Liquid Limit: 39.2 **Plastic Limit:** 14.3 **USCS Class.:** CL
Testing Remarks: Sample BCL #1

Mechanical Analysis Data

		Initial
Dry sample and tare	=	505.60
Tare	=	0.00
Dry sample weight	=	505.60

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
3/8 inch	0.00	0.00	100.0
# 4	0.00	0.00	100.0
# 8	0.70	0.00	99.9
# 10	0.70	0.00	99.7
# 16	1.30	0.00	99.5
# 30	3.00	0.00	98.9
# 40	2.90	0.00	98.3
# 50	4.30	0.00	97.5
# 100	14.10	0.00	94.7
# 200	29.20	0.00	88.9

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 99.7
Weight of hydrometer sample: 70
Calculated biased weight= 70.21
Automatic temperature correction
Composite correction at 20 deg C = -3.0

Meniscus correction only= 1.0
Specific gravity of solids= 2.60
Specific gravity correction factor= 1.012
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	22.0	51.0	52.0	0.0135	52.0	7.8	0.0266	69.8
5.00	22.0	45.0	46.0	0.0135	46.0	8.8	0.0179	61.1
15.00	22.0	41.5	42.5	0.0135	42.5	9.3	0.0107	56.1

INEL MATERIALS LAB

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
30.00	22.0	35.5	36.5	0.0135	36.5	10.3	0.0079	47.4
60.00	22.0	32.5	33.5	0.0135	33.5	10.8	0.0057	43.1
250.00	22.0	26.0	27.0	0.0135	27.0	11.9	0.0029	33.7
1440.00	22.0	22.0	23.0	0.0135	23.0	12.5	0.0013	28.0

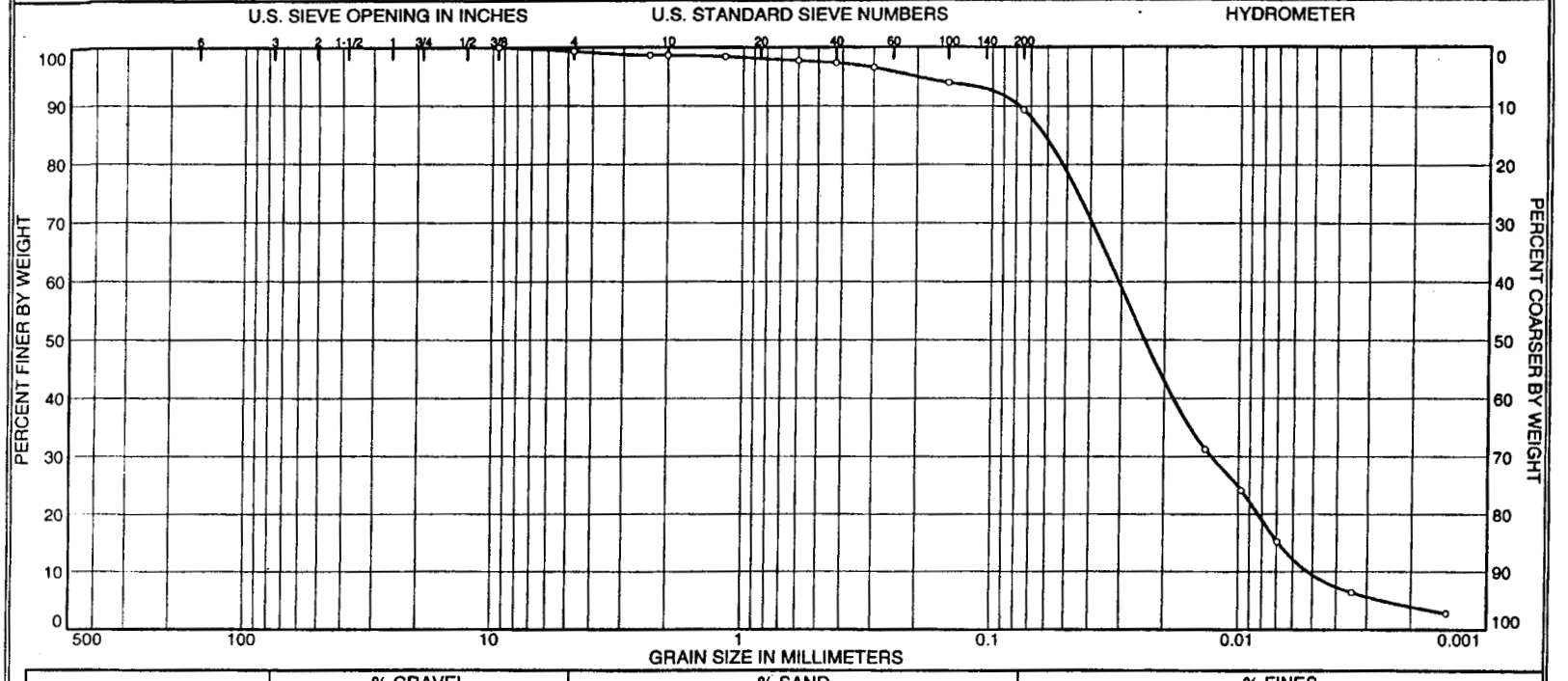
Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 % GRAVEL = 0.0
% SAND = 11.1 (% coarse = 0.3 % medium = 1.4 % fine = 9.4)
% SILT = 47.4 % CLAY = 41.5

D_{85}= 0.06 D_{60}= 0.02 D_{50}= 0.01
D_{30}= 0.00

INEL MATERIALS LAB

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.7	0.7	1.3	8.0	79.9	9.4

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	Ryegrass Clay with 5%	BCL #2	Test Pad	11/27/01	CL	Lean clay	13.8%	37.8	22.6
	Bentonite	Dispersion							

Client Tom Borschel/ICDF Project
Project INTEC CERCLA Disposal Facility
CH2M Hill
Project No. S01-588058 | Plate

INEL MATERIALS LAB

○ Sample is the same as BCL #2, for Dispersion Test. Same Gradation used as BCL #2.

% Dispersion = 27.6 %

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Clay with 5% Bentonite
Sample No.: BCL #2 Dispersion
Elev. or Depth: Test Pad **Sample Length (in./cm.):**
Location: Sampled from Test Pad
Description: Lean clay
Date: 11/27/01 **Natural Moisture:** 13.8%
Liquid Limit: 37.8 **Plastic Limit:** 22.6 **USCS Class.:** CL
Testing Remarks: Sample is the same as BCL #2, for Dispersion Test.

Mechanical Analysis Data

	Initial
Dry sample and tare=	455.70
Tare =	0.00
Dry sample weight =	455.70

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
3/8 inch	0.00	0.00	100.0
# 4	3.00	0.00	99.3
# 8	3.30	0.00	98.6
# 10	0.20	0.00	98.6
# 16	0.70	0.00	98.4
# 30	3.10	0.00	97.7
# 40	2.20	0.00	97.3
# 50	3.60	0.00	96.5
# 100	11.80	0.00	93.9
# 200	20.70	0.00	89.3

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 98.6
Weight of hydrometer sample: 28.08
Calculated biased weight= 28.48
Automatic temperature correction
Composite correction at 20 deg C = 1.5

Meniscus correction only= 1.0
Specific gravity of solids= 2.60
Specific gravity correction factor= 1.012
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
15.00	21.5	7.0	8.0	0.0136	8.0	15.0	0.0136	31.2
30.00	21.5	5.0	6.0	0.0136	6.0	15.3	0.0097	24.1
60.00	21.5	2.5	3.5	0.0136	3.5	15.7	0.0070	15.2

INEL MATERIALS LAB

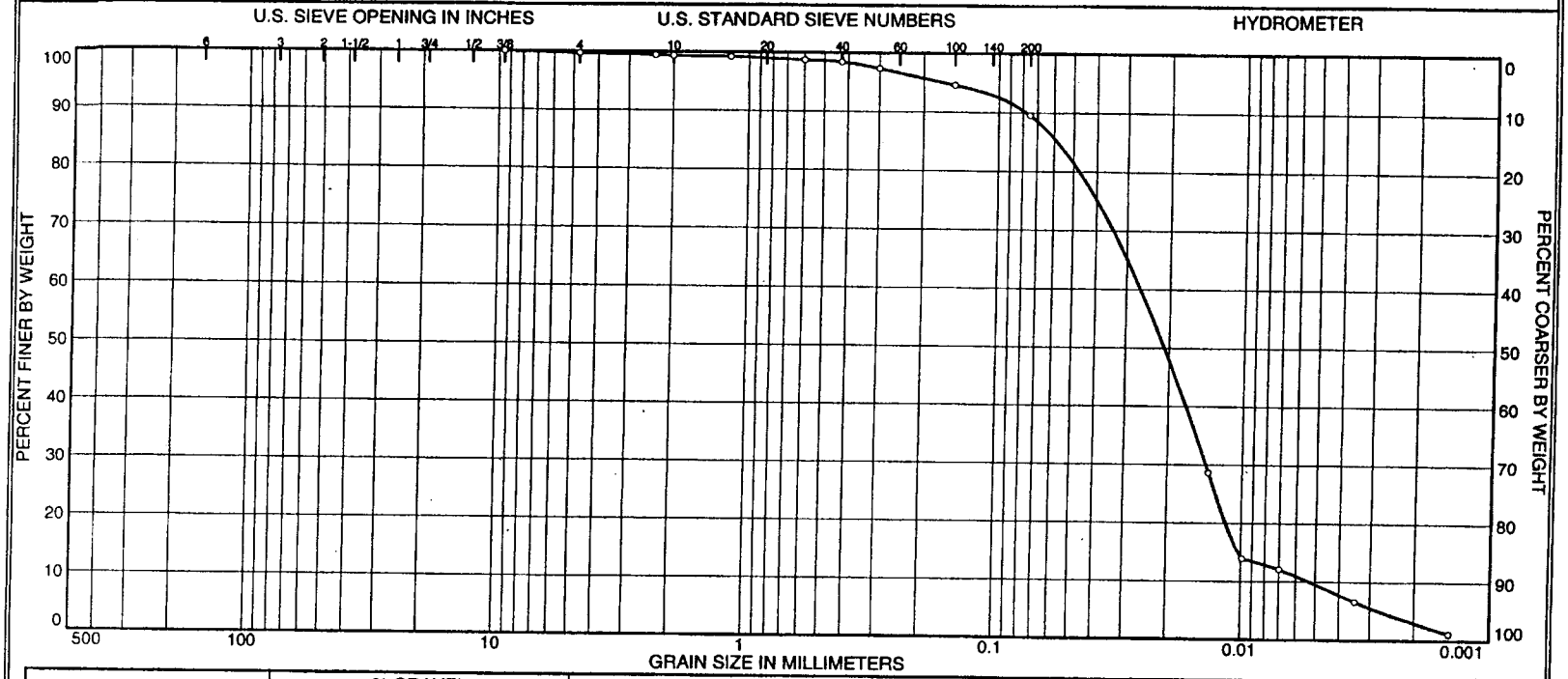
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
250.00	21.5	0.0	1.0	0.0136	1.0	16.1	0.0035	6.4
1440.00	21.5	-1.0	0.0	0.0136	0.0	16.3	0.0014	2.8

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 % GRAVEL = 0.7 (% coarse = 0.0 % fine = 0.7)
% SAND = 10.0 (% coarse = 0.7 % medium = 1.3 % fine = 8.0)
% SILT = 79.9 % CLAY = 9.4

D_{85}= 0.06 D_{60}= 0.03 D_{50}= 0.02
D_{30}= 0.01 D_{15}= 0.01 D_{10}= 0.01
C_c= 1.0298 C_u= 5.8729

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.3	0.4	0.9	8.9	80.0	9.5

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	Ryegrass Clay with 5% Bentonite	BCL #5 Dis.	Test Pad	11/28/01	CL	Lean clay	14.0	37.2	21.3

Client Tom Borschel/ICDF Project

Project INTEC CERCLA Disposal Facility

CH2M Hill

Project No. S01-588058 Plate

INEL MATERIALS LAB

○ Sample BCL #5 Dis. is the dispersion test for BCL #5 Sample. Used an Average Gradation ~~and average LL~~'s and PL's.

Dispersion = 25.2 %

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Clay with 5% Bentonite
Sample No.: BCL #5 Dis.
Elev. or Depth: Test Pad **Sample Length (in./cm.):**
Location: Sampled from ICDF Test Pad
Description: Lean clay
Date: 11/28/01 **Natural Moisture:** 14.0
Liquid Limit: 37.2 **Plastic Limit:** 21.3 **USCS Class.:** CL
Testing Remarks: Sample BCL #5 Dis. is the dispersion test for BCL #5 Sample. Used an Average Gradation and average LL's and PL's.

Mechanical Analysis Data

	Initial
Dry sample and tare=	500.00
Tare =	0.00
Dry sample weight =	500.00

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
3/8 inch	0.00	0.00	100.0
# 4	1.50	0.00	99.7
# 8	1.50	0.00	99.4
# 10	0.50	0.00	99.3
# 16	0.50	0.00	99.2
# 30	2.50	0.00	98.7
# 40	1.50	0.00	98.4
# 50	5.50	0.00	97.3
# 100	14.00	0.00	94.5
# 200	25.00	0.00	89.5

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 99.3
Weight of hydrometer sample: 27.40
Calculated biased weight= 27.59
Automatic temperature correction
Composite correction at 20 deg C = 1.5

Meniscus correction only= 1.0
Specific gravity of solids= 2.60
Specific gravity correction factor= 1.012
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

INEL MATERIALS LAB

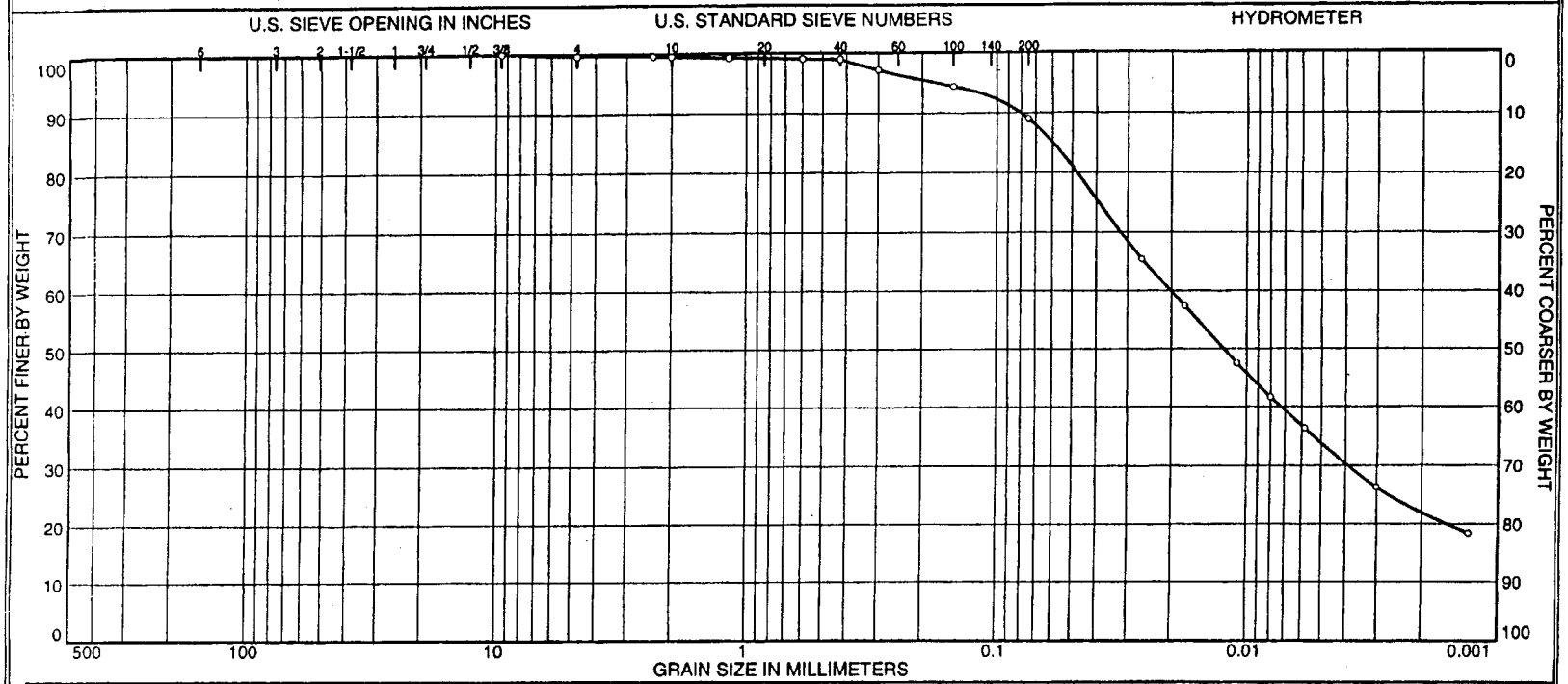
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
15.00	21.5	6.0	7.0	0.0136	7.0	15.1	0.0137	28.6
30.00	21.5	2.0	3.0	0.0136	3.0	15.8	0.0099	13.9
60.00	21.5	1.5	2.5	0.0136	2.5	15.9	0.0070	12.1
250.00	21.5	0.0	1.0	0.0136	1.0	16.1	0.0035	6.6
1440.00	21.5	-1.5	-0.5	0.0136	-0.5	16.4	0.0015	1.1

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 **% GRAVEL =** 0.3 **(% coarse =** 0.0 **% fine =** 0.3)
% SAND = 10.2 **(% coarse =** 0.4 **% medium =** 0.9 **% fine =** 8.9)
% SILT = 80.0 **% CLAY =** 9.5

D_{85}= 0.06 D_{60}= 0.03 D_{50}= 0.02
D_{30}= 0.01 D_{15}= 0.01 D_{10}= 0.01
C_c= 1.4046 C_u= 4.9665

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.3	0.2	0.5	10.0	55.2	33.8

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	Ryegrass Clay with 5% Bentonite	BCL #4	Stockpile	9-05-01	CL	Lean clay	15.2%	34.7	15.7

Client Tom Borschel/ICDF Project
Project INTEC CERCLA Disposal Facility
CH2M Hill
Project No. S01-588058 Plate

INEL MATERIALS LAB

○ BCL #4, Sampled from Mixing Pad

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Clay with 5% Bentonite
Sample No.: BCL #4
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: BCL #4 Sampled from Mixing Pad
Description: Lean clay
Date: 9-05-01 **Natural Moisture:** 15.2%
Liquid Limit: 34.7 **Plastic Limit:** 15.7 **USCS Class.:** CL
Testing Remarks: BCL #4, Sampled from Mixing Pad

Mechanical Analysis Data

		Initial
Dry sample and tare	=	426.70
Tare	=	0.00
Dry sample weight	=	426.70

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
3/8 inch	0.00	0.00	100.0
# 4	1.10	0.00	99.7
# 8	0.80	0.00	99.6
# 10	0.30	0.00	99.5
# 16	0.60	0.00	99.3
# 30	1.00	0.00	99.1
# 40	0.40	0.00	99.0
# 50	7.70	0.00	97.2
# 100	12.20	0.00	94.4
# 200	22.90	0.00	89.0

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 99.5
Weight of hydrometer sample: 76.1
Calculated biased weight= 76.48
Automatic temperature correction
Composite correction at 20 deg C = -3.0

Meniscus correction only= 1.0
Specific gravity of solids= 2.60
Specific gravity correction factor= 1.012
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	22.0	52.0	53.0	0.0135	53.0	7.6	0.0264	65.4
5.00	22.0	46.0	47.0	0.0135	47.0	8.6	0.0177	57.4
15.00	22.0	38.5	39.5	0.0135	39.5	9.8	0.0109	47.5

INEL MATERIALS LAB

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
30.00	22.0	34.0	35.0	0.0135	35.0	10.6	0.0080	41.6
60.00	22.0	30.0	31.0	0.0135	31.0	11.2	0.0058	36.3
250.00	22.0	22.5	23.5	0.0135	23.5	12.4	0.0030	26.3
1440.00	22.0	16.5	17.5	0.0135	17.5	13.4	0.0013	18.4

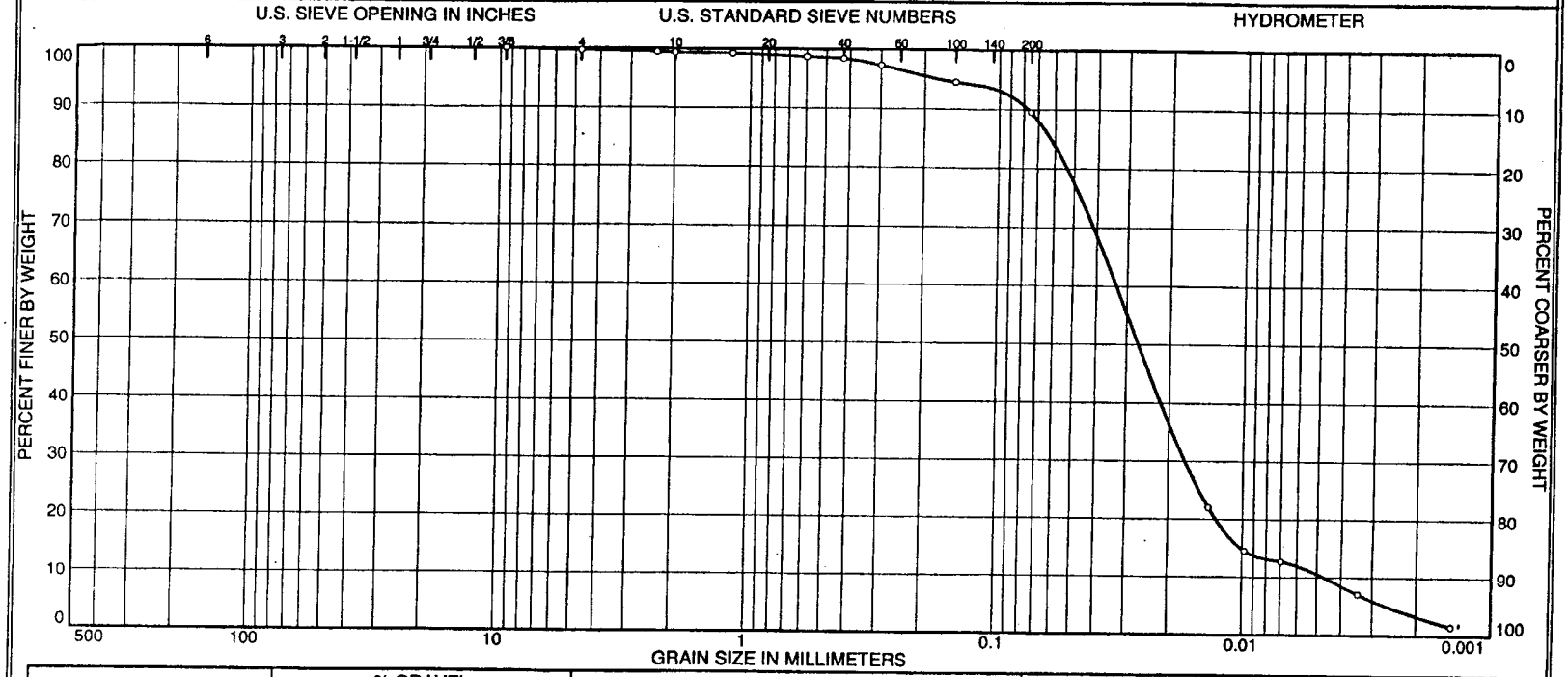
Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 % GRAVEL = 0.3 (% coarse = 0.0 % fine = 0.3)
% SAND = 10.7 (% coarse = 0.2 % medium = 0.5 % fine = 10.0)
% SILT = 55.2 % CLAY = 33.8

D_{85}= 0.06 D_{60}= 0.02 D_{50}= 0.01
D_{30}= 0.00

INEL MATERIALS LAB

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.3	0.4	0.9	8.9	79.0	10.5

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	Ryegrass Clay with 5% Bentonite	BCL #6 Dispersion	Test Pad	11/28/01	CL	Lean clay	14.0%	37.2	21.3

Client Tom Borschel/ICDF Project
Project INTEC CERCLA Disposal Facility
CH2M Hill
Project No. S01-588058 Plate

INEL MATERIALS LAB

○ Sample BCL #6Dispersion is the dispersion test for sample BCL #6. Average gradation and LL, PL used from Samples BCL #'s 1 thru 4.

Dispersion = 29.4%

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Clay with 5% Bentonite
Sample No.: BCL #6 Dispersion
Elev. or Depth: Test Pad **Sample Length (in./cm.):**
Location: Sampled from ICDF Test Pad
Description: Lean clay
Date: 11/28/01 **Natural Moisture:** 14.0%
Liquid Limit: 37.2 **Plastic Limit:** 21.3 **USCS Class.:** CL
Testing Remarks: Sample BCL #6Dispersion is the dispersion test for sample BCL #6. Average gradation and LL, PL used from Samples BCL #'s 1 thru 4.

Mechanical Analysis Data

	Initial
Dry sample and tare=	500.00
Tare =	0.00
Dry sample weight =	500.00

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
3/8 inch	0.00	0.00	100.0
# 4	1.50	0.00	99.7
# 8	1.50	0.00	99.4
# 10	0.50	0.00	99.3
# 16	0.50	0.00	99.2
# 30	2.50	0.00	98.7
# 40	1.50	0.00	98.4
# 50	5.50	0.00	97.3
# 100	14.00	0.00	94.5
# 200	25.00	0.00	89.5

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 99.3
Weight of hydrometer sample: 27.03
Calculated biased weight= 27.22
Automatic temperature correction
Composite correction at 20 deg C = 1.5

Meniscus correction only= 1.0
Specific gravity of solids= 2.60
Specific gravity correction factor= 1.012
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

INEL MATERIALS LAB

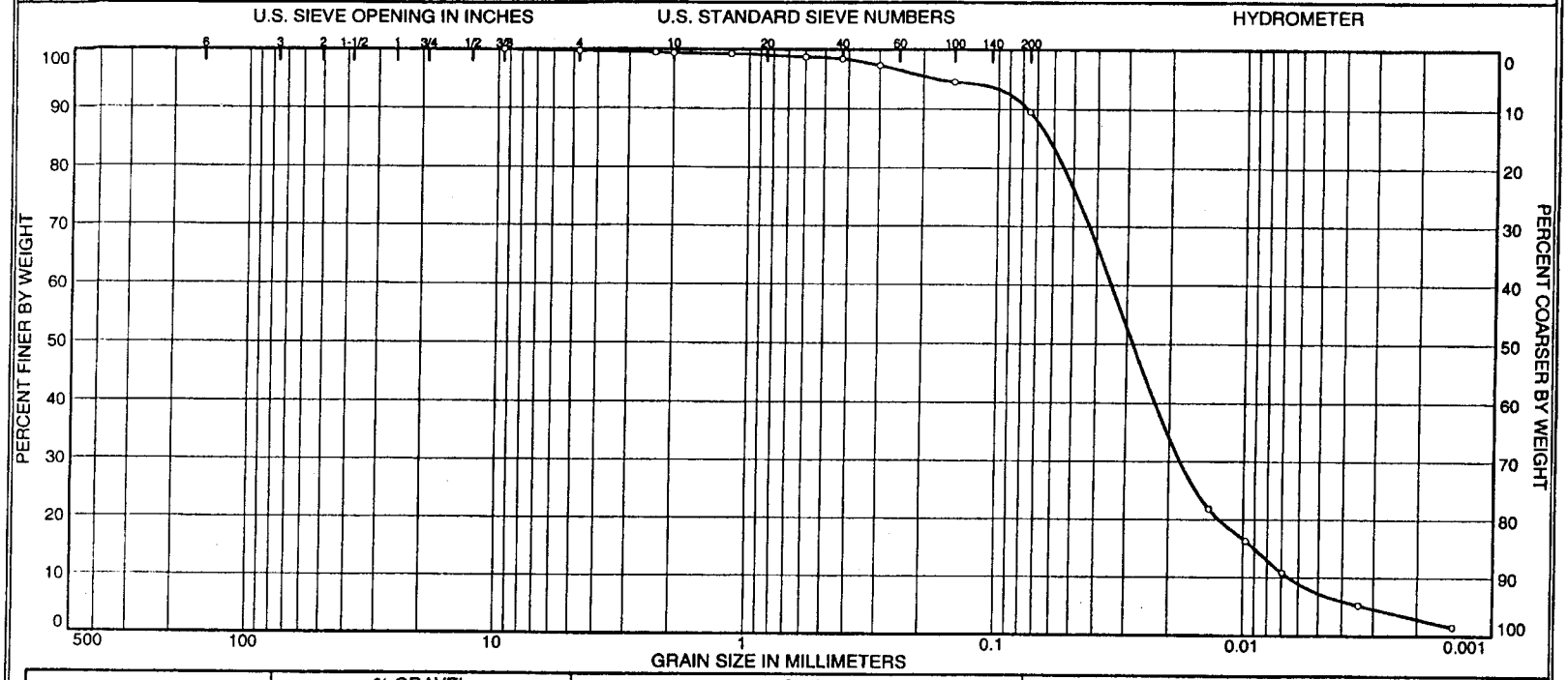
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
15.00	22.0	4.0	5.0	0.0135	5.0	15.5	0.0137	22.0
30.00	22.0	2.0	3.0	0.0135	3.0	15.8	0.0098	14.5
60.00	22.0	1.5	2.5	0.0135	2.5	15.9	0.0070	12.7
250.00	22.0	0.0	1.0	0.0135	1.0	16.1	0.0034	7.1
1440.00	22.0	-1.5	-0.5	0.0135	-0.5	16.4	0.0014	1.5

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 **% GRAVEL** = 0.3 (**% coarse** = 0.0 **% fine** = 0.3)
% SAND = 10.2 (**% coarse** = 0.4 **% medium** = 0.9 **% fine** = 8.9)
% SILT = 79.0 **% CLAY** = 10.5

D_{85}= 0.06 D_{60}= 0.03 D_{50}= 0.03
D_{30}= 0.02 D_{15}= 0.01 D_{10}= 0.00
C_c= 1.8835 C_u= 7.0848

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.3	0.4	0.9	8.9	82.2	7.3

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	Ryegrass Clay with 5% Bentonite	BCL #7 Dispersion	Test Pad	11/28/01	CL	Lean clay	14.0%	37.2	21.3

Client Tom Borschel/ICDF Project
Project INTEC CERCLA Disposal Facility
CH2M Hill
Project No. S01-588058 Plate

INEL MATERIALS LAB

○ Sample BCL #7 Dispersion is the dispersion test for BCL #7 sample. The same average gradation was used.

Dispersion = 21.3 %

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Clay with 5% Bentonite
Sample No.: BCL #7 Dispersion
Elev. or Depth: Test Pad **Sample Length (in./cm.):**
Location: Sampled from ICDF Test Pad
Description: Lean clay
Date: 11/28/01 **Natural Moisture:** 14.0%
Liquid Limit: 37.2 **Plastic Limit:** 21.3 **USCS Class.:** CL
Testing Remarks: Sample BCL #7 Dispersion is the dispersion test for BCL #7 sample. The same average gradation was used.

Mechanical Analysis Data

		Initial
Dry sample and tare	=	500.00
Tare	=	0.00
Dry sample weight	=	500.00

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
3/8 inch	0.00	0.00	100.0
# 4	1.50	0.00	99.7
# 8	1.50	0.00	99.4
# 10	0.50	0.00	99.3
# 16	0.50	0.00	99.2
# 30	2.50	0.00	98.7
# 40	1.50	0.00	98.4
# 50	5.50	0.00	97.3
# 100	14.00	0.00	94.5
# 200	25.00	0.00	89.5

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 99.3
Weight of hydrometer sample: 27.2
Calculated biased weight= 27.39
Automatic temperature correction
Composite correction at 20 deg C = 1.5

Meniscus correction only= 1.0
Specific gravity of solids= 2.60
Specific gravity correction factor= 1.012
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

INEL MATERIALS LAB

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
15.00	22.0	4.0	5.0	0.0135	5.0	15.5	0.0137	21.8
30.00	22.0	2.5	3.5	0.0135	3.5	15.7	0.0098	16.3
60.00	22.0	1.0	2.0	0.0135	2.0	16.0	0.0070	10.8
250.00	22.0	-0.5	0.5	0.0135	0.5	16.2	0.0034	5.2
1440.00	22.0	-1.5	-0.5	0.0135	-0.5	16.4	0.0014	1.5

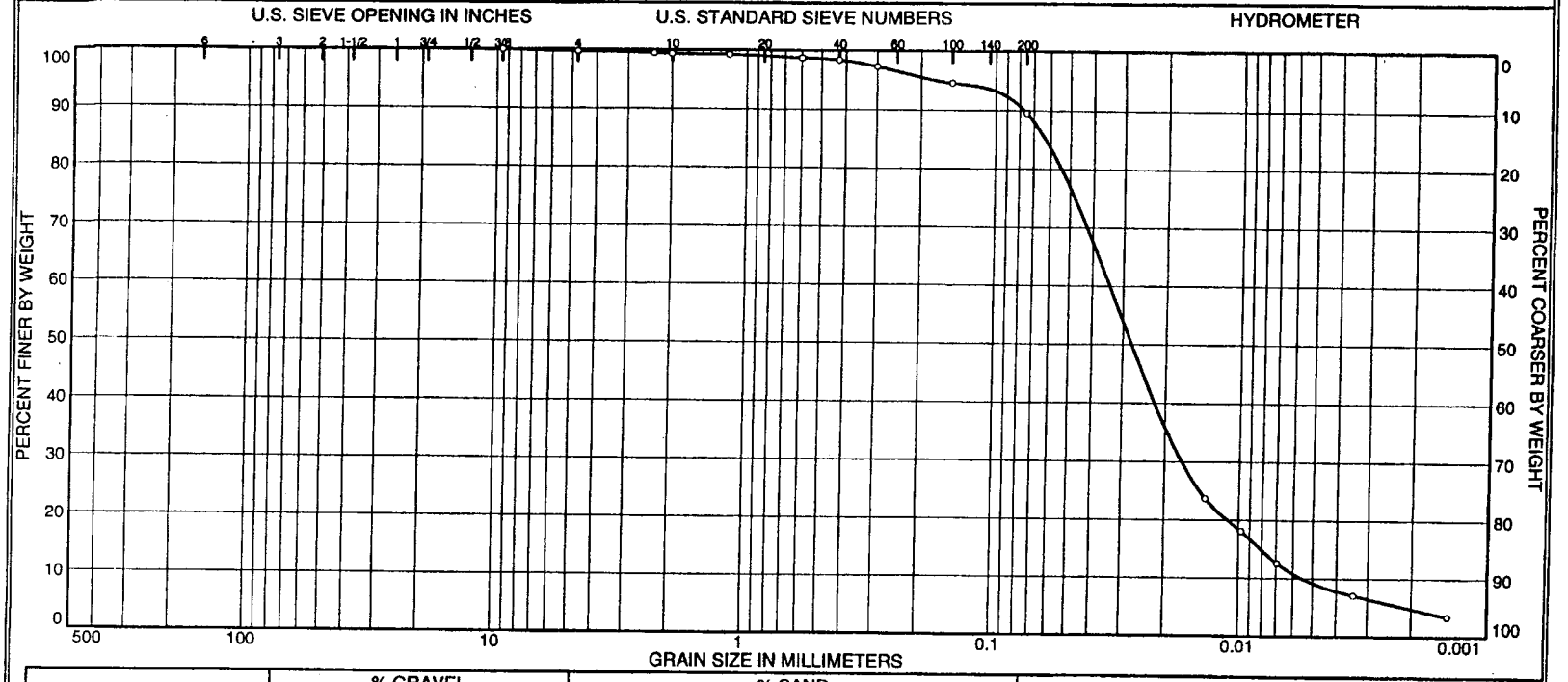
Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 **% GRAVEL** = 0.3 (**% coarse** = 0.0 **% fine** = 0.3)
% SAND = 10.2 (**% coarse** = 0.4 **% medium** = 0.9 **% fine** = 8.9)
% SILT = 82.2 **% CLAY** = 7.3

D_{85}= 0.06 D_{60}= 0.03 D_{50}= 0.03
D_{30}= 0.02 D_{15}= 0.01 D_{10}= 0.01
C_c= 1.4196 C_u= 5.3072

INEL MATERIALS LAB

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.3	0.4	0.9	8.9	80.4	9.1

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	Ryegrass Clay with 5% Bentonite	BCL #8 Dispersion	Test Pad	11/28/01	CL	Lean clay	14.0%	31.2	21.3

Client Tom Borschel/ICDF Project
Project INTEC CERCLA Disposal Facility
CH2M Hill
Project No. S01-588058 Plate

INEL MATERIALS LAB

○ Sample BCL #8 Disp. is the dispersion test for sample BCL #8. Average gradation from BCL #'s 1 thru 4 used.

Dispersion = 28.1 %

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Clay with 5% Bentonite
Sample No.: BCL #8 Dispersion
Elev. or Depth: Test Pad **Sample Length (in./cm.):**
Location: Sampled from ICDF Test Pad
Description: Lean clay
Date: 11/28/01 **Natural Moisture:** 14.0%
Liquid Limit: 31.2 **Plastic Limit:** 21.3 **USCS Class.:** CL
Testing Remarks: Sample BCL #8 Disp. is the dispersion test for sample BCL #8. Average gradation from BCL #'s 1 thru 4 used.

Mechanical Analysis Data

	Initial
Dry sample and tare=	500.00
Tare =	0.00
Dry sample weight =	500.00

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
3/8 inch	0.00	0.00	100.0
# 4	1.50	0.00	99.7
# 8	1.50	0.00	99.4
# 10	0.50	0.00	99.3
# 16	0.50	0.00	99.2
# 30	2.50	0.00	98.7
# 40	1.50	0.00	98.4
# 50	5.50	0.00	97.3
# 100	14.00	0.00	94.5
# 200	25.00	0.00	89.5

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 99.3
Weight of hydrometer sample: 27.2
Calculated biased weight= 27.39
Automatic temperature correction
Composite correction at 20 deg C = 1.5

Meniscus correction only= 1.0
Specific gravity of solids= 2.60
Specific gravity correction factor= 1.012
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

INEL MATERIALS LAB

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
15.00	22.0	4.5	5.5	0.0135	5.5	15.4	0.0137	23.7
30.00	22.0	3.0	4.0	0.0135	4.0	15.6	0.0098	18.1
60.00	22.0	1.5	2.5	0.0135	2.5	15.9	0.0070	12.6
250.00	22.0	0.0	1.0	0.0135	1.0	16.1	0.0034	7.1
1440.00	22.0	-1.0	0.0	0.0135	0.0	16.3	0.0014	3.4

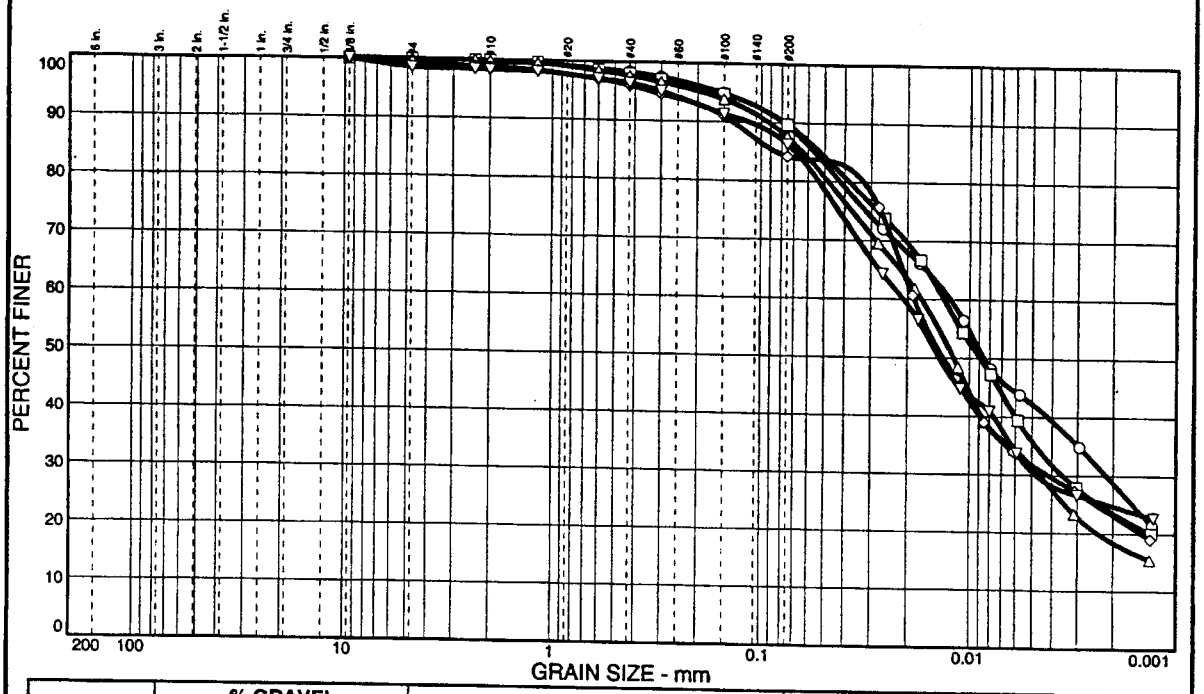
Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 **% GRAVEL** = 0.3 (**% coarse** = 0.0 **% fine** = 0.3)
% SAND = 10.2 (**% coarse** = 0.4 **% medium** = 0.9 **% fine** = 8.9)
% SILT = 80.4 **% CLAY** = 9.1

D_{85}= 0.06 D_{60}= 0.03 D_{50}= 0.03
D_{30}= 0.02 D_{15}= 0.01 D_{10}= 0.01
C_c= 1.5427 C_u= 6.1541

INEL MATERIALS LAB

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.0	0.3	1.4	8.9	47.1	42.3
□	0.0	0.0	0.0	0.1	1.9	8.3	53.8	35.9
△	0.0	0.0	0.0	0.2	2.2	10.1	56.0	31.5
◇	0.0	0.0	0.6	0.6	2.8	11.8	52.5	31.7
▽	0.0	0.0	1.4	0.3	1.9	10.1	55.7	30.6

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	37.8	16.5	0.0558	0.0123	0.0085	0.0022				
□	28.5	14.4	0.0523	0.0133	0.0089	0.0035				
△	28.1	14.8	0.0635	0.0170	0.0119	0.0046				
◇	28.0	15.2	0.0850	0.0185	0.0134	0.0042				
▽	32.9	13.7	0.0688	0.0209	0.0139	0.0048				

MATERIAL DESCRIPTION	USCS	AASHTO
○ Lean clay	CL	A-6(19)
□ Lean clay	CL	A-6(12)
△ Lean clay	CL	A-6(10)
◇ Lean clay with sand	CL	A-6(9)
▽ Lean clay	CL	A-6(15)

Project No. S01-588058 **Client:** Tom Borschel/ICDF Project

Project: INTEC CERCLA Disposal Facility

○ **Location:** RyeGrass Borrow Area

□ **Location:** NCL #2 Ryegrass Borrow Stockpile

△ **Location:** NCL #3 Sampled from Ryegrass Stockpile

◇ **Location:** NCL #4 Ryegrass Borrow Stockpile

▽ **Location:** NCL #5 Ryegrass Borrow Stockpile

Remarks:

○ NCL #1 Sampled from Ryegrass Borrow Area

□ Sampled from Ryegrass stockpile

△ Sampled from Ryegrass Stockpile

◇ Sampled from Ryegrass stockpile

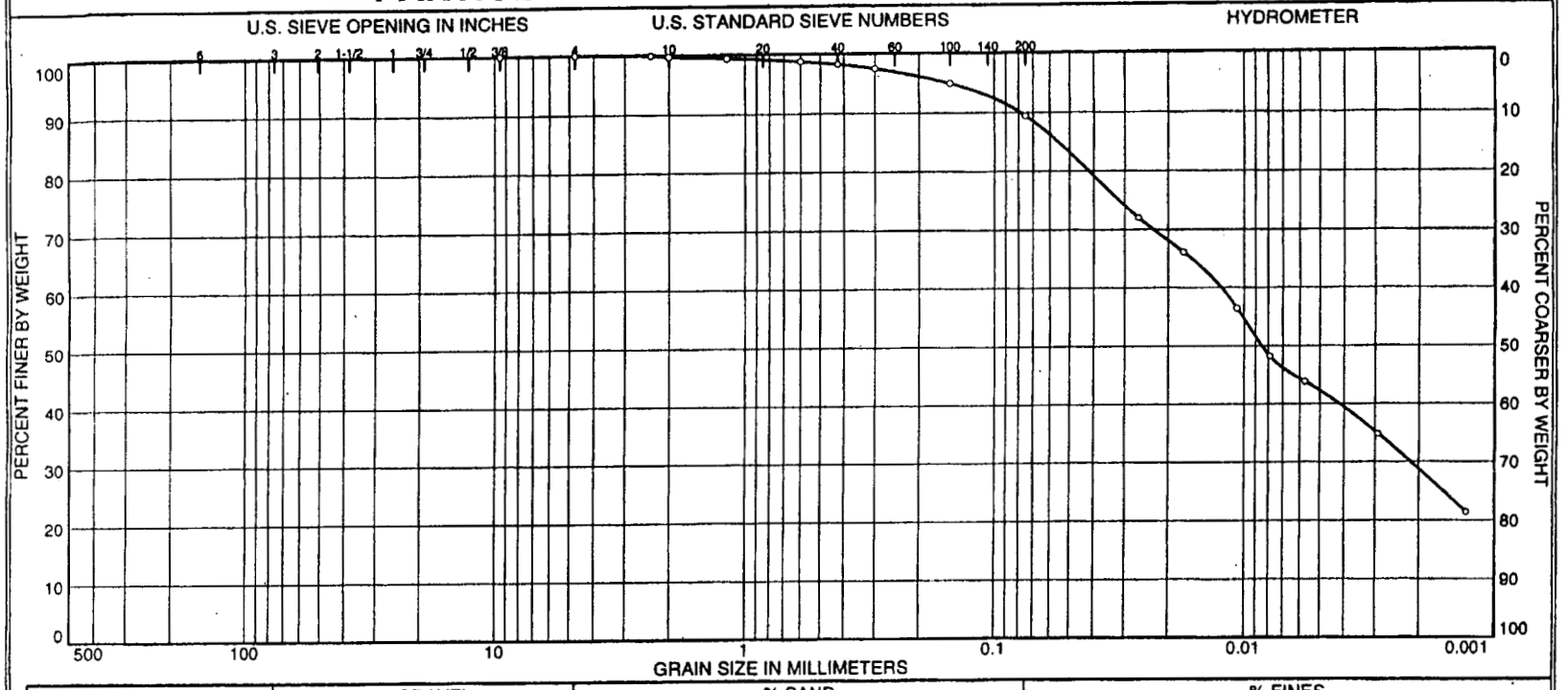
▽ NCL #5, Sampled from Ryegrass Borrow Stockpile

PARTICLE SIZE DISTRIBUTION TEST REPORT

INEL MATERIALS LAB

Plate

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.0	0.3	1.4	8.9	47.1	42.3

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	Ryegrass Flats Soil	NCL #1	Stockpile	8/13/01	CL	Lean clay	8.9%	37.8	16.5

Client Tom Borschel/ICDF Project
Project INTEC CERCLA Disposal Facility
CH2M Hill
Project No. S01-588058 | Plate

INEL MATERIALS LAB

○ NCL #1 Sampled from Ryegrass Borrow Area

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Flats Soil
Sample No.: NCL #1
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: RyeGrass Borrow Area
Description: Lean clay
Date: 8/13/01 **Natural Moisture:** 8.9%
Liquid Limit: 37.8 **Plastic Limit:** 16.5 **USCS Class.:** CL
Testing Remarks: NCL #1

Mechanical Analysis Data

	Initial
Dry sample and tare=	504.50
Tare =	0.00
Dry sample weight =	504.50

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
3/8 inch	0.00	0.00	100.0
# 4	0.00	0.00	100.0
# 8	0.60	0.00	99.9
# 10	0.70	0.00	99.7
# 16	1.50	0.00	99.4
# 30	3.20	0.00	98.8
# 40	2.40	0.00	98.3
# 50	4.00	0.00	97.5
# 100	13.20	0.00	94.9
# 200	28.00	0.00	89.4

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 99.7
Weight of hydrometer sample: 67.8
Calculated biased weight= 68.00
Automatic temperature correction
Composite correction at 20 deg C = -4.0

Meniscus correction only= 1.0
Specific gravity of solids= 2.60
Specific gravity correction factor= 1.012
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	22.0	52.0	53.0	0.0135	53.0	7.6	0.0264	72.0
5.00	22.0	48.0	49.0	0.0135	49.0	8.3	0.0174	66.1
15.00	22.0	41.5	42.5	0.0135	42.5	9.3	0.0107	56.4

INEL MATERIALS LAB

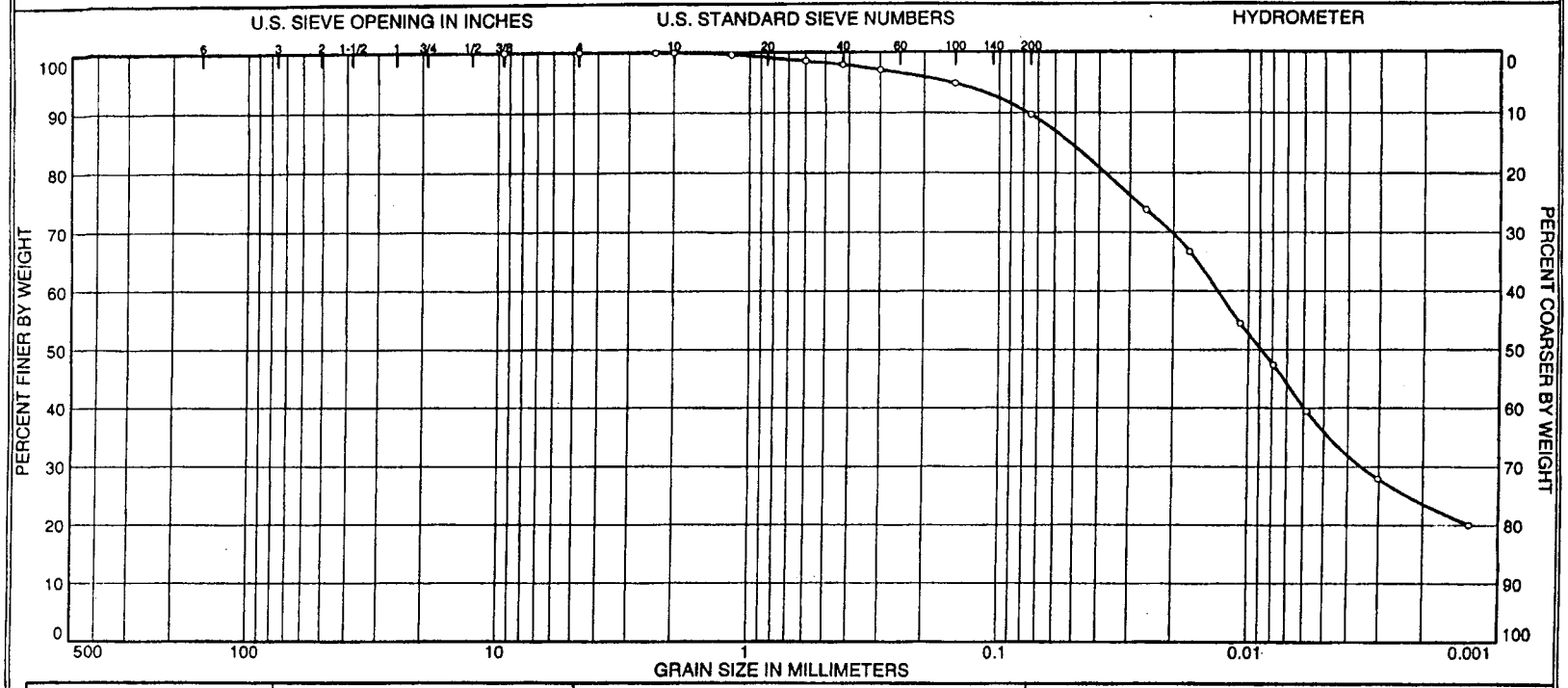
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
30.00	22.0	36.0	37.0	0.0135	37.0	10.2	0.0079	48.2
60.00	22.0	33.0	34.0	0.0135	34.0	10.7	0.0057	43.8
250.00	22.0	27.0	28.0	0.0135	28.0	11.7	0.0029	34.8
1440.00	22.0	18.0	19.0	0.0135	19.0	13.2	0.0013	21.4

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 % GRAVEL = 0.0
% SAND = 10.6 (% coarse = 0.3 % medium = 1.4 % fine = 8.9)
% SILT = 47.1 % CLAY = 42.3

D_{85}= 0.06 D_{60}= 0.01 D_{50}= 0.01
D_{30}= 0.00

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.0	0.1	1.9	8.3	53.8	35.9

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	Ryegrass Flats Soil	NCL #2	Stockpile	8/21/01	CL	Lean clay	8.8%	28.5	14.4

Client Tom Borschel/ICDF Project
Project INTEC CERCLA Disposal Facility
CH2M Hill
Project No. S01-588058 Plate

INEL MATERIALS LAB

○ Sampled from Ryegrass stockpile

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
30.00	22.0	35.5	36.5	0.0135	36.5	10.3	0.0079	47.3
60.00	22.0	30.0	31.0	0.0135	31.0	11.2	0.0058	39.4
250.00	22.0	22.0	23.0	0.0135	23.0	12.5	0.0030	27.9
1440.00	22.0	16.5	17.5	0.0135	17.5	13.4	0.0013	20.0

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 % GRAVEL = 0.0
% SAND = 10.3 (% coarse = 0.1 % medium = 1.9 % fine = 8.3)
% SILT = 53.8 % CLAY = 35.9

D_{85}= 0.05 D_{60}= 0.01 D_{50}= 0.01
D_{30}= 0.00

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Flats Soil
Sample No.: NCL #2
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: NCL #2 Ryegrass Borrow Stockpile
Description: Lean clay
Date: 8/21/01 **Natural Moisture:** 8.8%
Liquid Limit: 28.5 **Plastic Limit:** 14.4 **USCS Class.:** CL
Testing Remarks: Sampled from Ryegrass stockpile at ICDF site

Mechanical Analysis Data

	Initial
Dry sample and tare=	471.50
Tare =	0.00
Dry sample weight =	471.50

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
3/8 inch	0.00	0.00	100.0
# 4	0.10	0.00	100.0
# 8	0.30	0.00	99.9
# 10	0.30	0.00	99.9
# 16	1.30	0.00	99.6
# 30	4.70	0.00	98.6
# 40	2.80	0.00	98.0
# 50	4.00	0.00	97.1
# 100	11.20	0.00	94.8
# 200	24.10	0.00	89.7

Hydrometer Analysis Data

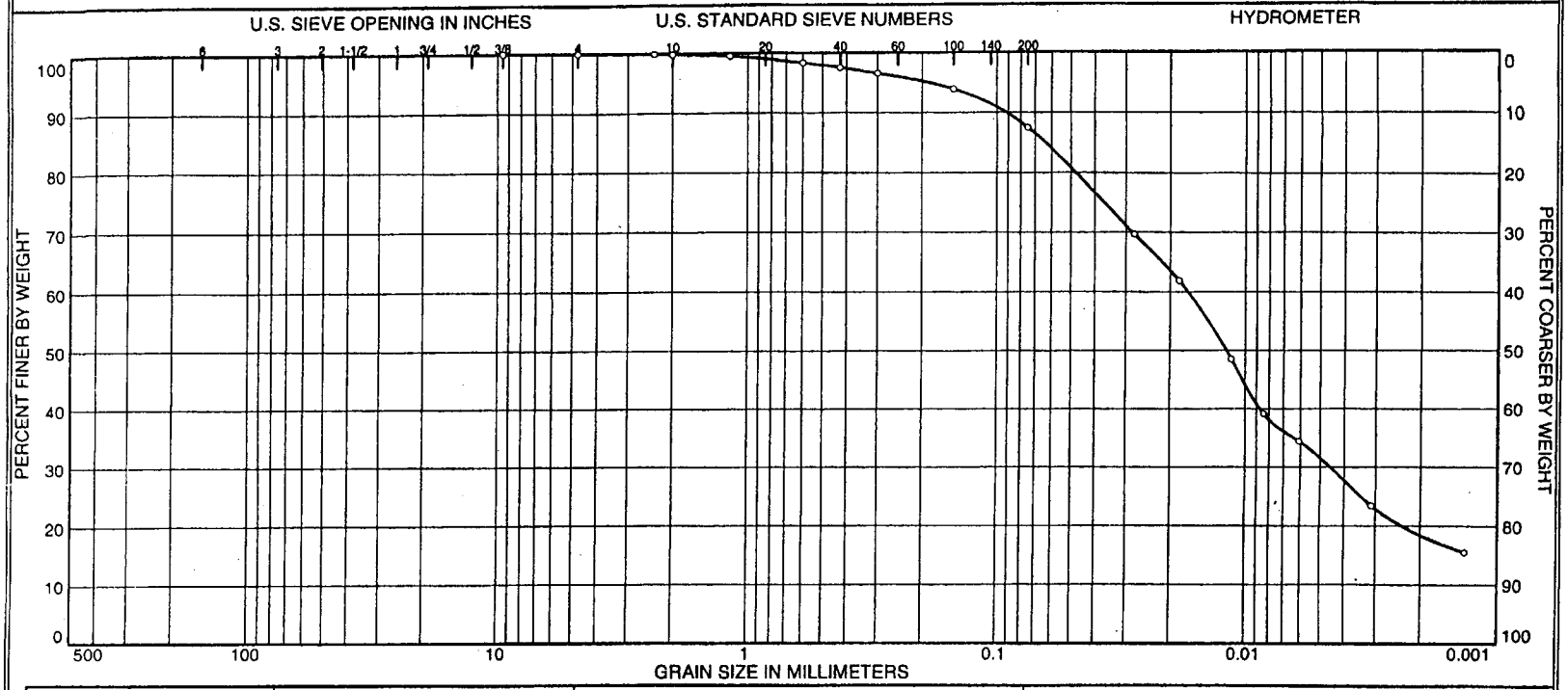
Separation sieve is #10
Percent -#10 based upon complete sample= 99.9
Weight of hydrometer sample: 70.4
Calculated biased weight= 70.47
Automatic temperature correction
Composite correction at 20 deg C = -3.0

Meniscus correction only= 1.0
Specific gravity of solids= 2.60
Specific gravity correction factor= 1.012
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	22.0	54.0	55.0	0.0135	55.0	7.3	0.0258	73.8
5.00	22.0	49.0	50.0	0.0135	50.0	8.1	0.0172	66.7
15.00	22.0	40.5	41.5	0.0135	41.5	9.5	0.0108	54.4

INEL MATERIALS LAB

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.0	0.2	2.2	10.1	56.0	31.5

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	Ryegrass Flats Soil	NCL #3	stockpile	8/21/01	CL	Lean clay	8.6%	28.1	14.8

Client Tom Borschel/ICDF Project
Project INTEC CERCLA Disposal Facility
CH2M Hill
Project No. S01-588058 | Plate

INEL MATERIALS LAB

○ Sampled from Ryegrass Stockpile

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
30.00	22.0	27.5	28.5	0.0135	28.5	11.6	0.0084	39.1
60.00	22.0	24.5	25.5	0.0135	25.5	12.1	0.0061	34.4
250.00	22.0	17.5	18.5	0.0135	18.5	13.3	0.0031	23.4
1440.00	22.0	12.5	13.5	0.0135	13.5	14.1	0.0013	15.5

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 **% GRAVEL** = 0.0
% SAND = 12.5 (**% coarse** = 0.2 **% medium** = 2.2 **% fine** = 10.1)
% SILT = 56.0 **% CLAY** = 31.5

D_{85}= 0.06 D_{60}= 0.02 D_{50}= 0.01
D_{30}= 0.00

INEL MATERIALS LAB

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Flats Soil
Sample No.: NCL #3
Elev. or Depth: stockpile **Sample Length (in./cm.):**
Location: NCL #3 Sampled from Ryegrass Stockpile
Description: Lean clay
Date: 8/21/01 **Natural Moisture:** 8.6%
Liquid Limit: 28.1 **Plastic Limit:** 14.8 **USCS Class.:** CL
Testing Remarks: Sampled from Ryegrass Stockpile at ICDF.

Mechanical Analysis Data

	Initial
Dry sample and tare=	484.20
Tare =	0.00
Dry sample weight =	484.20

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
3/8 inch	0.00	0.00	100.0
# 4	0.00	0.00	100.0
# 8	0.50	0.00	99.9
# 10	0.40	0.00	99.8
# 16	1.50	0.00	99.5
# 30	5.50	0.00	98.4
# 40	3.80	0.00	97.6
# 50	4.80	0.00	96.6
# 100	13.30	0.00	93.9
# 200	30.60	0.00	87.5

Hydrometer Analysis Data

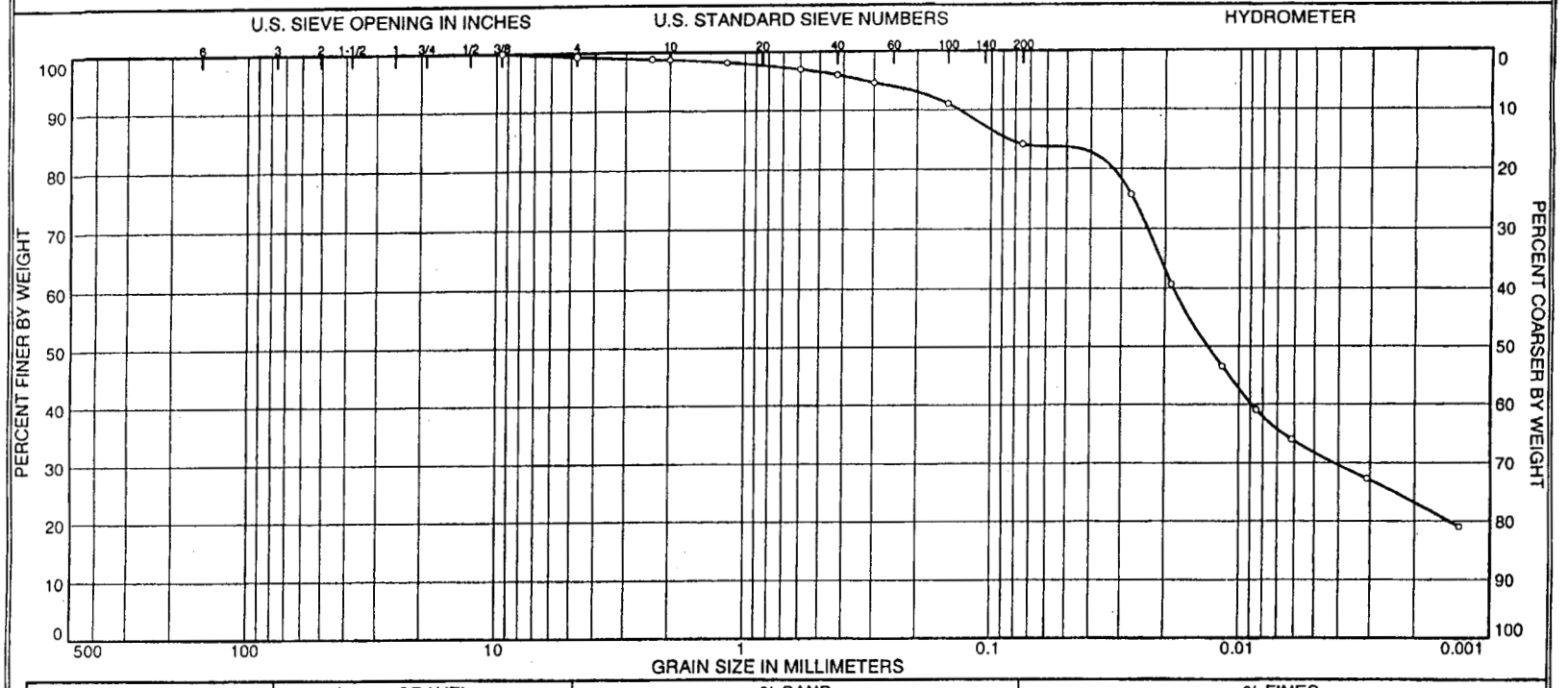
Separation sieve is #10
Percent -#10 based upon complete sample= 99.8
Weight of hydrometer sample: 64.4
Calculated biased weight= 64.53
Automatic temperature correction
Composite correction at 20 deg C = -3.0

Meniscus correction only= 1.0
Specific gravity of solids= 2.60
Specific gravity correction factor= 1.012
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	22.0	47.0	48.0	0.0135	48.0	8.4	0.0277	69.6
5.00	22.0	42.0	43.0	0.0135	43.0	9.2	0.0184	61.8
15.00	22.0	33.5	34.5	0.0135	34.5	10.6	0.0114	48.5

INEL MATERIALS LAB

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	0.6	0.6	2.8	11.8	52.5	31.7

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	Ryegrass Flats Soil	NCL #4	Stockpile	8/21/01	CL	Lean clay with sand	8.3%	28.0	15.2

Client Tom Borschel/ICDF Project
Project INTEC CERCLA Disposal Facility
CH2M Hill
Project No. S01-588058 Plate

INEL MATERIALS LAB

○ Sampled from Ryegrass stockpile

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
30.00	22.0	26.0	27.0	0.0135	27.0	11.9	0.0085	39.0
60.00	22.0	23.0	24.0	0.0135	24.0	12.4	0.0061	34.0
250.00	22.0	19.0	20.0	0.0135	20.0	13.0	0.0031	27.3
1440.00	22.0	14.0	15.0	0.0135	15.0	13.8	0.0013	19.0

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 **% GRAVEL** = 0.6 (**% coarse** = 0.0 **% fine** = 0.6)
% SAND = 15.2 (**% coarse** = 0.6 **% medium** = 2.8 **% fine** = 11.8)
% SILT = 52.5 **% CLAY** = 31.7

D_{85}= 0.09 D_{60}= 0.02 D_{50}= 0.01
D_{30}= 0.00

INEL MATERIALS LAB

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Flats Soil
Sample No.: NCL #4
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: NCL #4 Ryegrass Borrow Stockpile
Description: Lean clay with sand
Date: 8/21/01 **Natural Moisture:** 8.3%
Liquid Limit: 28.0 **Plastic Limit:** 15.2 **USCS Class.:** CL
Testing Remarks: Sampled from Ryegrass stockpile

Mechanical Analysis Data

	Initial
Dry sample and tare=	478.70
Tare =	0.00
Dry sample weight =	478.70

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
3/8 inch	0.00	0.00	100.0
# 4	3.10	0.00	99.4
# 8	2.00	0.00	98.9
# 10	0.80	0.00	98.8
# 16	2.10	0.00	98.3
# 30	6.60	0.00	97.0
# 40	4.50	0.00	96.0
# 50	6.80	0.00	94.6
# 100	17.30	0.00	91.0
# 200	32.60	0.00	84.2

Hydrometer Analysis Data

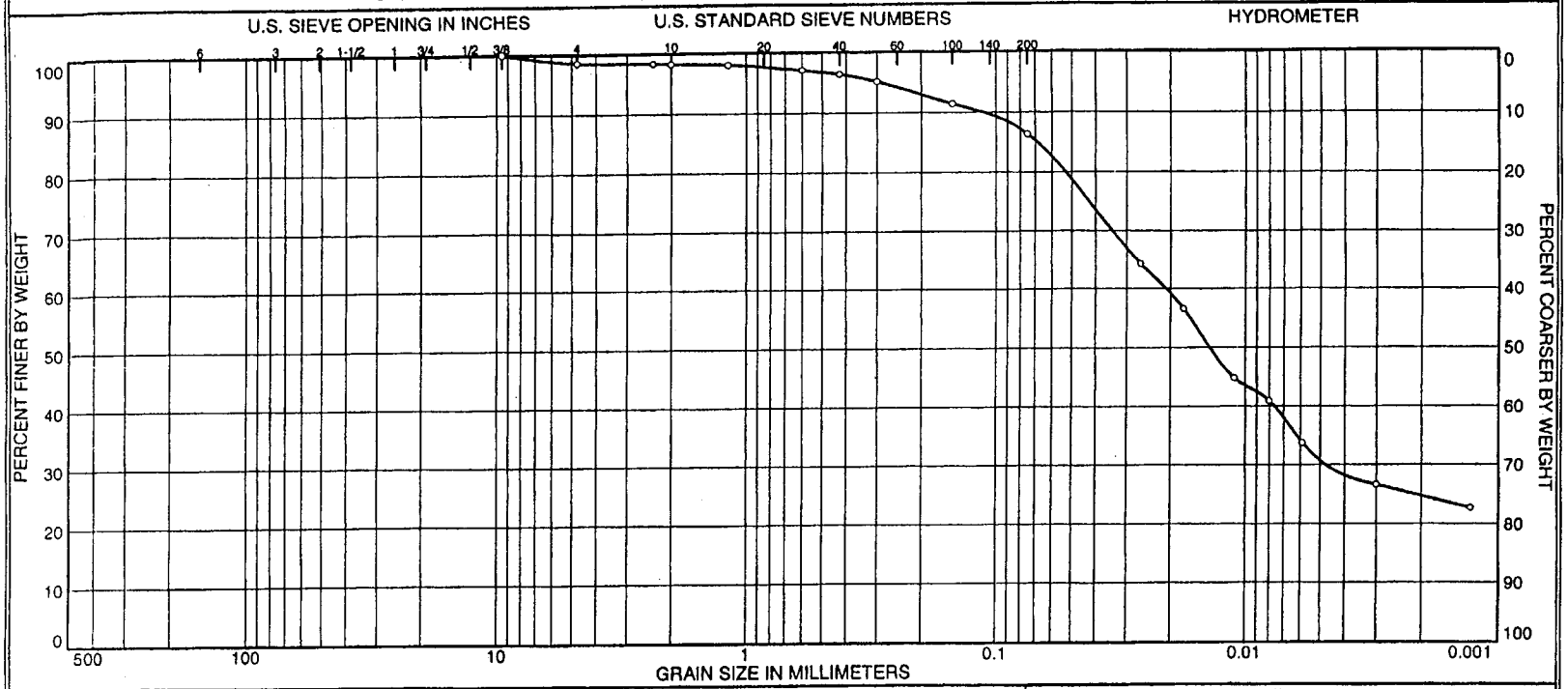
Separation sieve is #10
Percent -#10 based upon complete sample= 98.8
Weight of hydrometer sample: 60.0
Calculated biased weight= 60.73
Automatic temperature correction
Composite correction at 20 deg C = -3.0

Meniscus correction only= 1.0
Specific gravity of solids= 2.60
Specific gravity correction factor= 1.012
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	22.0	48.0	49.0	0.0135	49.0	8.3	0.0275	75.7
5.00	22.0	39.0	40.0	0.0135	40.0	9.7	0.0189	60.7
15.00	22.0	30.5	31.5	0.0135	31.5	11.1	0.0116	46.5

INEL MATERIALS LAB

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL		% SAND			% FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
○	0.0	0.0	1.4	0.3	1.9	10.1	55.7	30.6

	SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
○	Ryegrass Flats Soil	NCL #5	Stockpile	9-5-01	CL	Lean clay	15.8%	32.9	13.7

Client Tom Borschel/ICDF Project
Project INTEC CERCLA Disposal Facility
CH2M Hill
Project No. S01-588058 | Plate

INEL MATERIALS LAB

○ NCL #5, Sampled from Ryegrass Borrow Stockpile

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Sample Data

Source: Ryegrass Flats Soil
Sample No.: NCL #5
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: NCL #5 Ryegrass Borrow Stockpile
Description: Lean clay
Date: 9-5-01 **Natural Moisture:** 15.8%
Liquid Limit: 32.9 **Plastic Limit:** 13.7 **USCS Class.:** CL
Testing Remarks: NCL #5, Ryegrass Clays

Mechanical Analysis Data

	Initial
Dry sample and tare=	323.70
Tare =	0.00
Dry sample weight =	323.70

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
3/8 inch	0.00	0.00	100.0
# 4	4.60	0.00	98.6
# 8	0.50	0.00	98.4
# 10	0.30	0.00	98.3
# 16	0.80	0.00	98.1
# 30	3.10	0.00	97.1
# 40	2.50	0.00	96.4
# 50	4.10	0.00	95.1
# 100	11.80	0.00	91.4
# 200	16.60	0.00	86.3

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 98.3
Weight of hydrometer sample: 76.4
Calculated biased weight= 77.72
Automatic temperature correction
Composite correction at 20 deg C = -3.0

Meniscus correction only= 1.0
Specific gravity of solids= 2.60
Specific gravity correction factor= 1.012
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	22.0	52.0	53.0	0.0135	53.0	7.6	0.0264	64.3
5.00	22.0	46.0	47.0	0.0135	47.0	8.6	0.0177	56.5
15.00	22.0	37.0	38.0	0.0135	38.0	10.1	0.0111	44.8

INEL MATERIALS LAB

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
30.00	22.0	34.0	35.0	0.0135	35.0	10.6	0.0080	40.9
60.00	22.0	28.5	29.5	0.0135	29.5	11.5	0.0059	33.7
250.00	22.0	23.0	24.0	0.0135	24.0	12.4	0.0030	26.6
1440.00	22.0	20.0	21.0	0.0135	21.0	12.9	0.0013	22.7

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 **% GRAVEL** = 1.4 (**% coarse** = 0.0 **% fine** = 1.4)
% SAND = 12.3 (**% coarse** = 0.3 **% medium** = 1.9 **% fine** = 10.1)
% SILT = 55.7 **% CLAY** = 30.6

D_{85}= 0.07 D_{60}= 0.02 D_{50}= 0.01
D_{30}= 0.00

INEL MATERIALS LAB

- Dispersion calc. 11-27-01 Hegeman

1-) BCL #2

BCL #2 % 5 um passing = ± 37 %

BCL #2 Dispersion test % 5 um = ± 10.2 %

$$\% \text{ Disp.} = \frac{10.2}{37} \times 100 = 27.57\%$$

2-) BCL #5

BCL #5 - % 5 um passing = ± 35.7 %

BCL #5 Dis. - " " = ± 9.0 %

$$\% \text{ Disp.} = \frac{9.0}{35.7} \times 100 = 25.2\%$$

3-) BCL #6

BCL #6 - % 5 µm Passing = ± 32.7 %

BCL #6 - Disp. " " = ± 9.6 %

$$\% \text{ Dispersion} = \frac{9.6}{32.7} \times 100 = 29.4\%$$

4-) BCL #7

BCL #7 - % Passing 5 µm = ± 36.2 %

BCL #8 - Disp. " " = ± 7.7 %

$$\% \text{ Dispersion} = \frac{7.7}{36.2} \times 100 = 21.3\%$$

5-) BCL # 8 % Passing 5 μm = ± 33.8 %

BCL # 8 Dispersion " " = ± 9.5 %

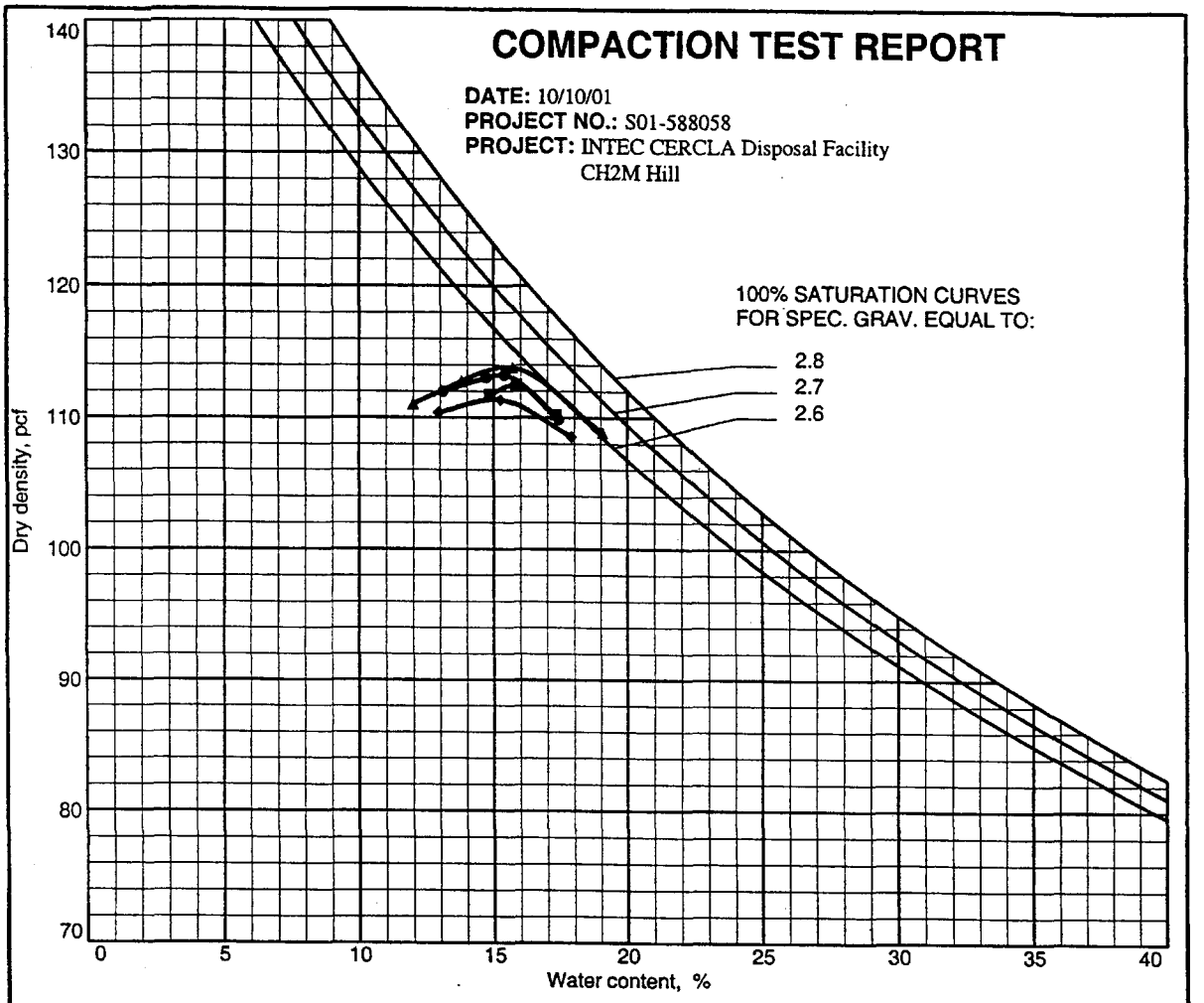
$$\% \text{ Dispersion} = \frac{9.5}{33.8} \times 100 = 28.1\%$$

Appendix A-3

Moisture Density Relationship

COMPACTION TEST REPORT

DATE: 10/10/01
PROJECT NO.: S01-588058
PROJECT: INTEC CERCLA Disposal Facility
CH2M Hill



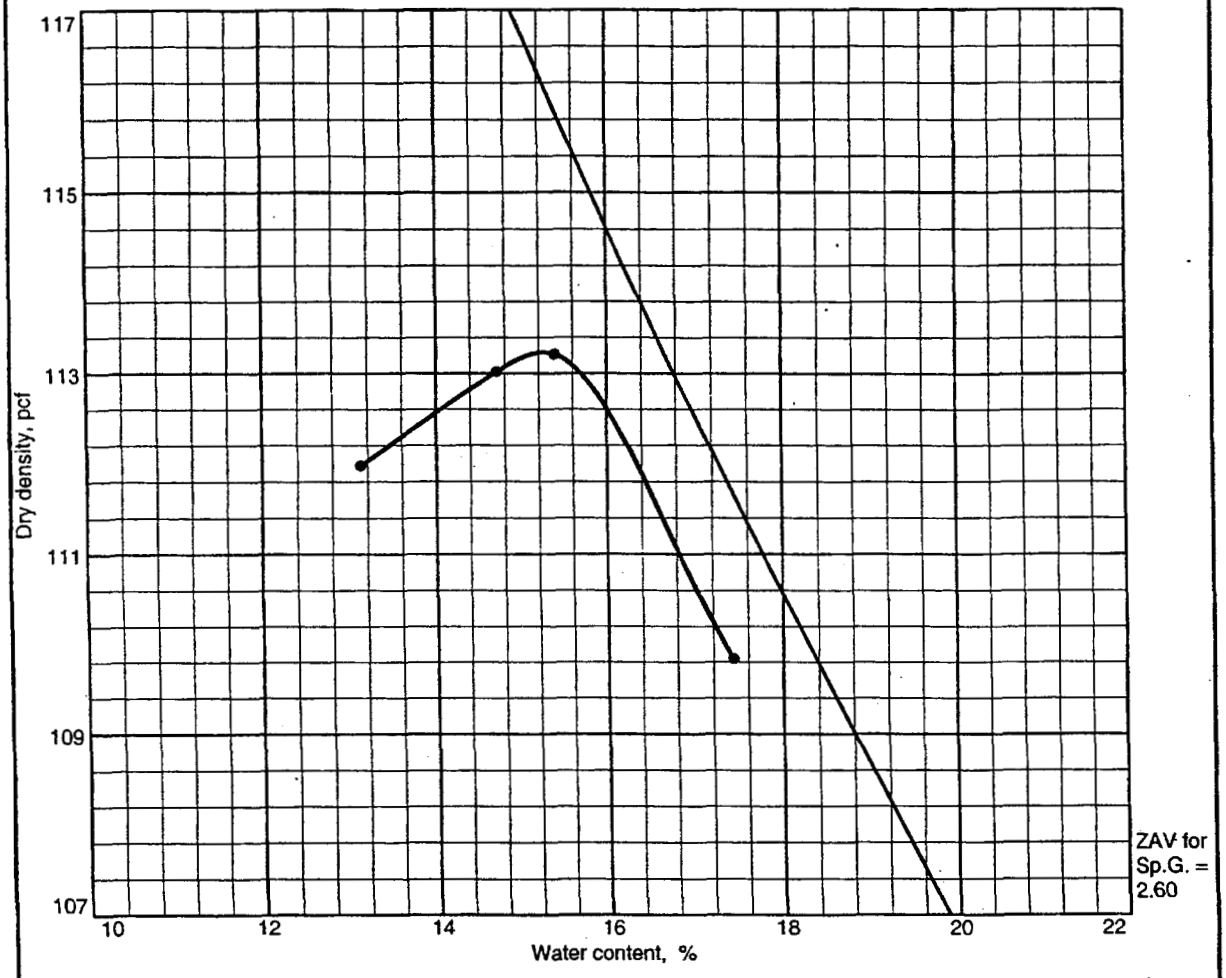
	No.	LOCATION AND DESCRIPTION	TEST SPECIFICATION
●		**Location:** BCL#1 Sampled from Mixing Pad Lean clay	ASTM D 1557-91 Method A Modified
■		**Location:** BCL #2 sampled from Mixing Pad Lean clay	ASTM D 1557-91 Method A Modified
▲		**Location:** BCL #3 sampled from Mixing Pad Lean clay	ASTM D 1557-91 Method A Modified
◆		**Location:** BCL #4 Sampled from Mixing Pad Lean clay	ASTM D 1557-91 Method A Modified

	No.	USCS	LL	PI	NAT. MOIST.	%> No.4	%< No.200	MAX. DRY DEN.	OPT. MOIST.
●		CL	39.2	24.9	15.7%	0.0 %	88.9 %	113.2 pcf	15.3 %
■		CL	37.8	22.6	13.8%	0.7 %	89.3 %	112.5 pcf	15.8 %
▲		CL	37.1	26.0	13.8%	0.2 %	90.1 %	113.8 pcf	15.5 %
◆		CL	34.7	19.0	15.2%	0.3 %	89.0 %	111.4 pcf	15.0 %

Plate

INEL MATERIALS LAB

COMPACTION TEST REPORT



Test specification: ASTM D 1557-91 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
Stockpile	CL	A-6(22)	15.7%	2.60	39.2	24.9	0.0	88.9

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 113.2 pcf Optimum moisture = 15.3 %	Lean clay

Project No. S01-588058 **Client:** Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
• **Location:** BCL#1 Sampled from Mixing Pad

Remarks:
BCL#1 sampled from the Test Liner mixing pad..first sample.

COMPACTION TEST REPORT

INEL MATERIALS LAB

Plate

MOISTURE DENSITY TEST DATA

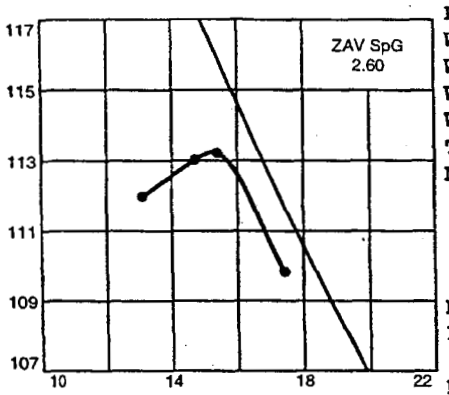
Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Specimen Data

Source: Ryegrass Clay with 5% Bentonite
Sample No.: BCL #1
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: BCL#1 Sampled from Mixing Pad
Description: Lean clay
USCS Classification: CL **AASHTO Classification:** A-6(22)
Natural Moisture: 15.7% **Liquid Limit:** 39.2 **Plasticity Index:** 24.9
Testing Remarks: BCL#1 sampled from the Test Liner mixing pad..first sample.
Percent retained on No.4 sieve: 0.0
Percent passing No. 200 sieve: 88.9 **Specific gravity:** 2.60

Test Data And Results

Type of test: ASTM D 1557-91 Method A Modified



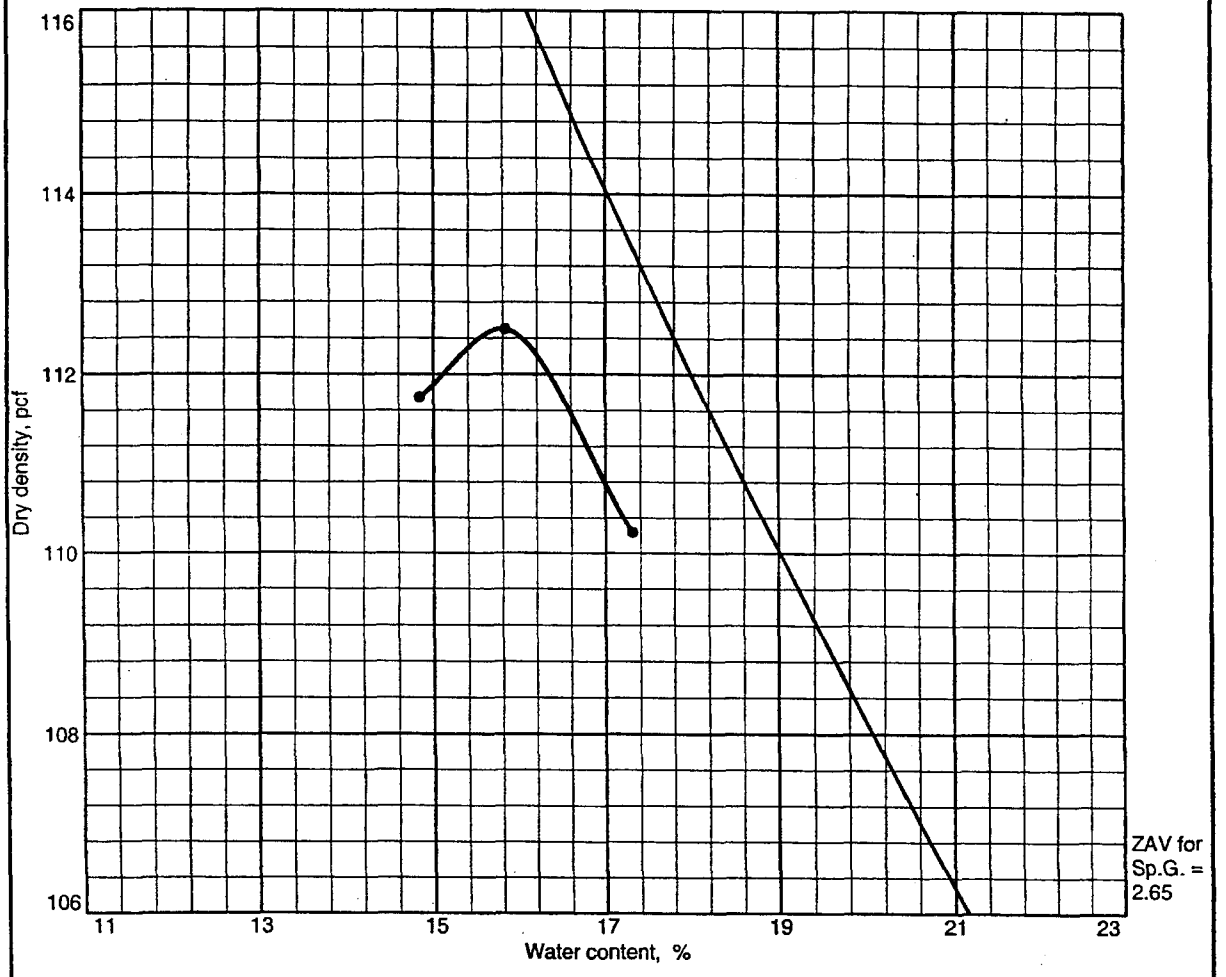
POINT NO.	1	2	3	4
WM + WS	6220.0	6205.0	6160.0	6195.0
WM	4245.0	4245.0	4245.0	4245.0
WW+T	203.20	231.60	288.80	276.20
WD+T	176.10	201.90	255.30	235.20
TARE	0.00	0.00	0.00	0.00
MOIST	15.4	14.7	13.1	17.4
MOISTURE	15.4	14.7	13.1	17.4
DRY DEN	113.2	113.0	112.0	109.8

Max dry den= 113.2 pcf **Opt moisture=** 15.3 %

Oversize Correction Not Applied

INEL MATERIALS LAB

COMPACTION TEST REPORT



Test specification: ASTM D 1557-91 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
Stockpile	CL	A-6(20)	13.8%	2.65	37.8	22.6	0.7	89.3

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 112.5 pcf Optimum moisture = 15.8 %	Lean clay

Project No. S01-588058 **Client:** Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
● **Location:** BCL #2 sampled from Mixing Pad

Remarks:
BCL #2 sampled from Mixing Pad

COMPACTION TEST REPORT

INEL MATERIALS LAB

Plate

MOISTURE DENSITY TEST DATA

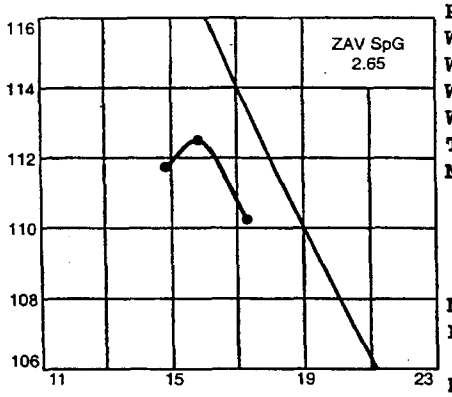
Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Specimen Data

Source: Ryegrass Clay with 5% Bentonite
Sample No.: BCL #2
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: BCL #2 sampled from Mixing Pad
Description: Lean clay
USCS Classification: CL **AASHTO Classification:** A-6(20)
Natural Moisture: 13.8% **Liquid Limit:** 37.8 **Plasticity Index:** 22.6
Testing Remarks: BCL #2 sampled from Mixing Pad
Percent retained on No.4 sieve: 0.7
Percent passing No. 200 sieve: 89.3 **Specific gravity:** 2.65

Test Data And Results

Type of test: ASTM D 1557-91 Method A Modified



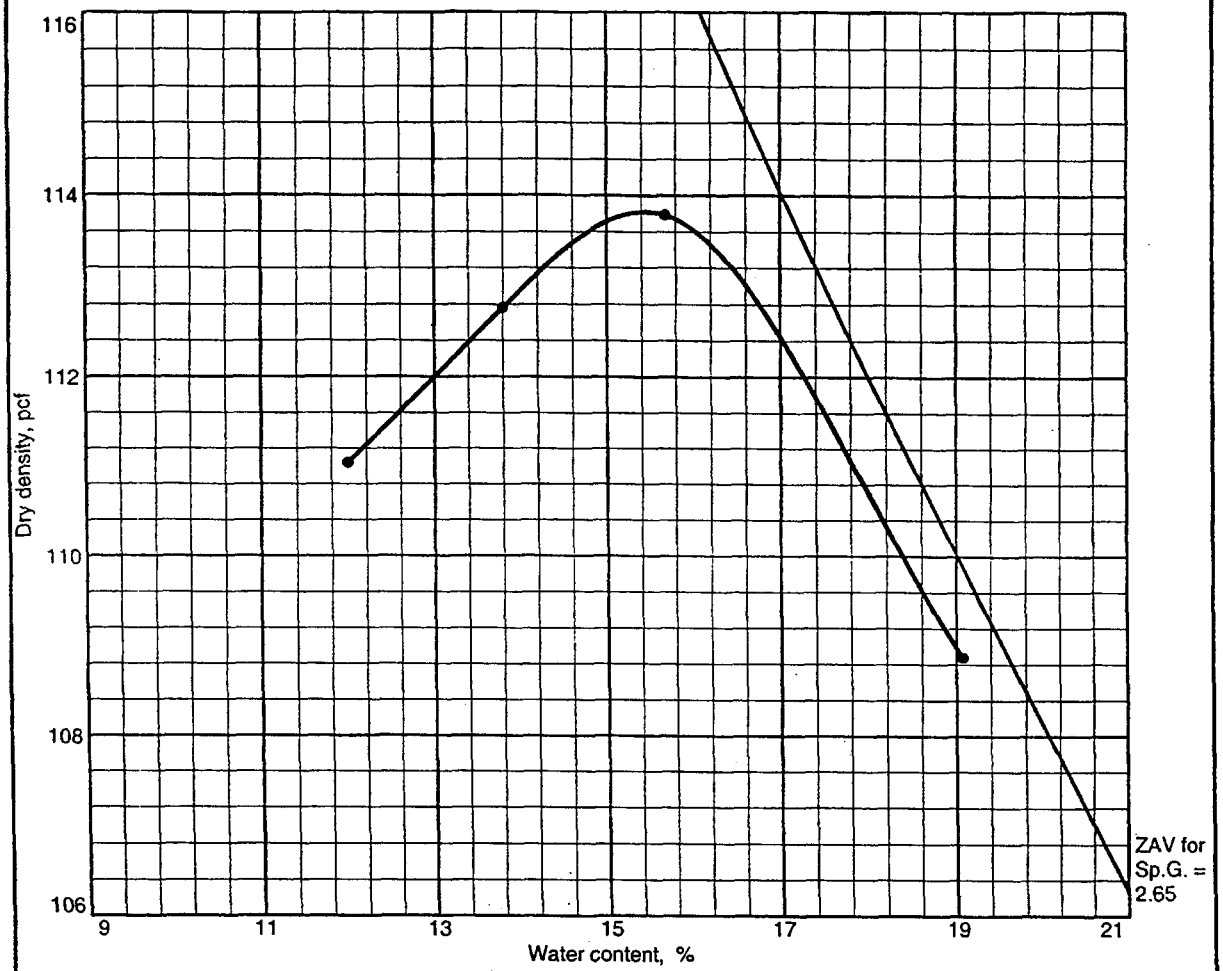
POINT NO.	1	2	3
WM + WS	6185.0	6215.0	6200.0
WM	4245.0	4245.0	4245.0
WW+T	250.70	318.30	305.00
WD+T	218.30	274.80	260.00
TARE	0.00	0.00	0.00
MOIST	14.8	15.8	17.3
MOISTURE	14.8	15.8	17.3
DRY DEN	111.7	112.5	110.2

Max dry den= 112.5 pcf **Opt moisture=** 15.8 %

Oversize Correction Not Applied

INEL MATERIALS LAB

COMPACTION TEST REPORT



Test specification: ASTM D 1557-91 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
Stockpile	CL	A-6(22)	13.8%	2.65	37.1	26.0	0.2	90.1

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 113.8 pcf Optimum moisture = 15.5 %	Lean clay

Project No. S01-588058 **Client:** Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
● **Location:** BCL #3 sampled from Mixing Pad

Remarks:
Sample BCL #3 from Mixing Pad

COMPACTION TEST REPORT

INEL MATERIALS LAB

Plate

MOISTURE DENSITY TEST DATA

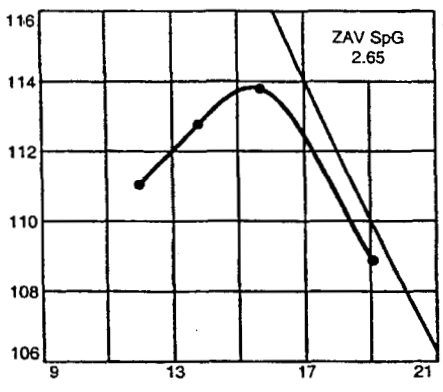
Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Specimen Data

Source: Ryegrass Clay with 5% Bentonite
Sample No.: BCL #3
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: BCL #3 sampled from Mixing Pad
Description: Lean clay
USCS Classification: CL **AASHTO Classification:** A-6(22)
Natural Moisture: 13.8% **Liquid Limit:** 37.1 **Plasticity Index:** 26.0
Testing Remarks: Sample BCL #3 from Mixing Pad
Percent retained on No.4 sieve: 0.2
Percent passing No. 200 sieve: 90.1 **Specific gravity:** 2.65

Test Data And Results

Type of test: ASTM D 1557-91 Method A Modified



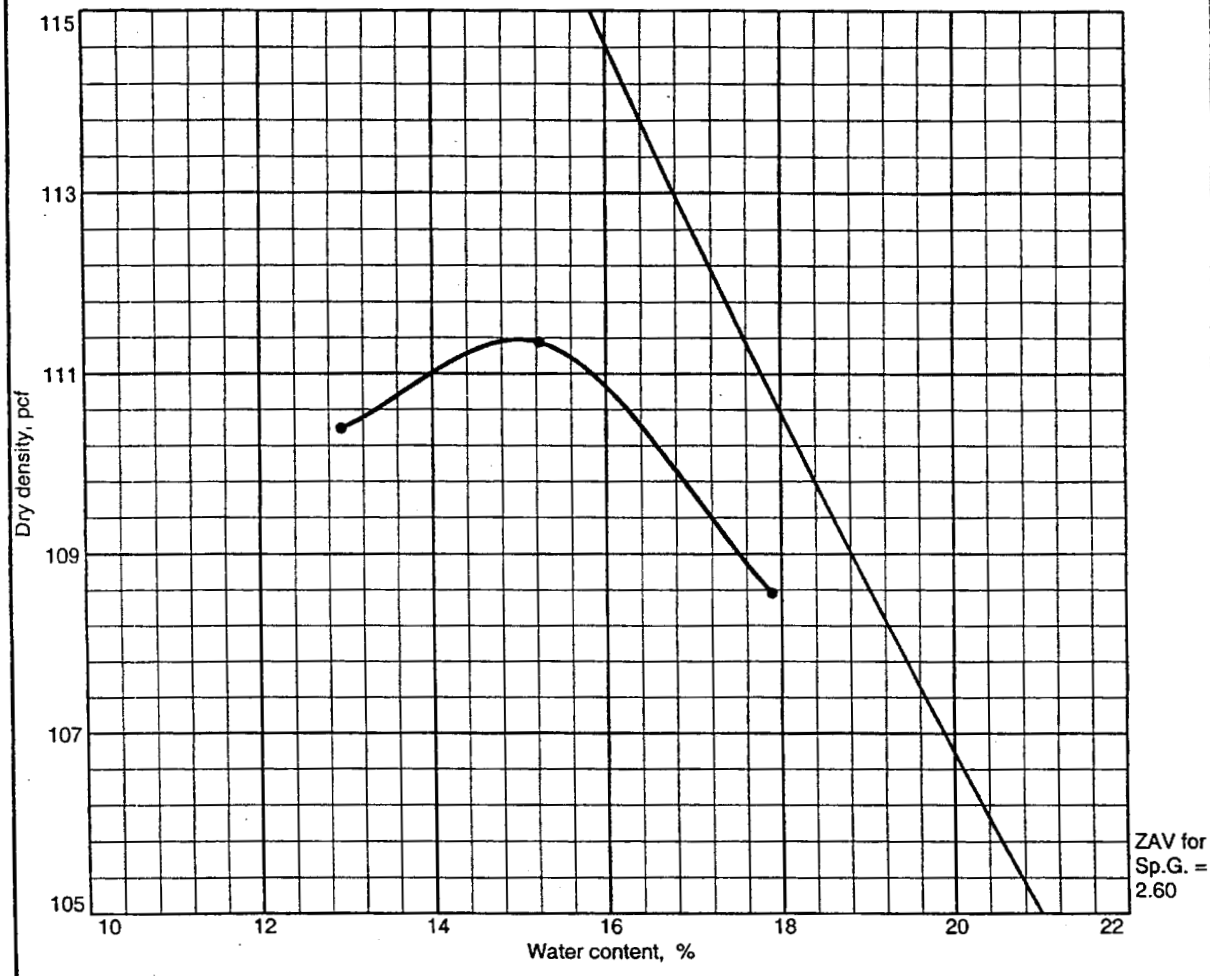
POINT NO.	1	2	3	4
WM + WS	6235.0	6185.0	6205.0	6125.0
WM	4245.0	4245.0	4245.0	4245.0
WW+T	270.00	297.70	347.70	326.00
WD+T	233.40	261.60	292.00	291.10
TARE	0.00	0.00	0.00	0.00
MOIST	15.7	13.8	19.1	12.0
MOISTURE	15.7	13.8	19.1	12.0
DRY DEN	113.8	112.8	108.9	111.0

Max dry den= 113.8 pcf **Opt moisture=** 15.5 %

Oversize Correction Not Applied

INEL MATERIALS LAB

COMPACTION TEST REPORT



Test specification: ASTM D 1557-91 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
Stockpile	CL	A-6(16)	15.2%	2.60	34.7	19.0	0.3	89.0

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 111.4 pcf Optimum moisture = 15.0 %	Lean clay

Project No. S01-588058 **Client:** Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
● **Location:** BCL #4 Sampled from Mixing Pad

Remarks:
Sample BCL #4, Sampled from Mixing Pad

COMPACTION TEST REPORT

INEL MATERIALS LAB

Plate

MOISTURE DENSITY TEST DATA

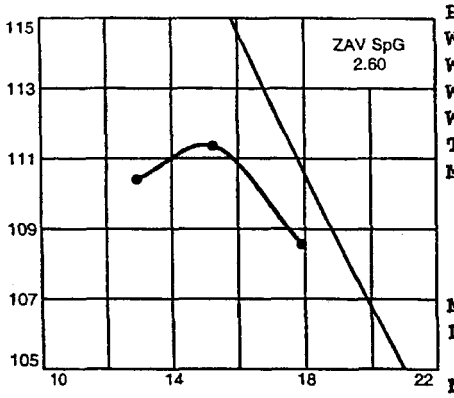
Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Specimen Data

Source: Ryegrass Clay with 5% Bentonite
Sample No.: BCL #4
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: BCL #4 Sampled from Mixing Pad
Description: Lean clay
USCS Classification: CL **AASHTO Classification:** A-6(16)
Natural Moisture: 15.2% **Liquid Limit:** 34.7 **Plasticity Index:** 19.0
Testing Remarks: Sample BCL #4, Sampled from Mixing Pad
Percent retained on No.4 sieve: 0.3
Percent passing No. 200 sieve: 89.0 **Specific gravity:** 2.60

Test Data And Results

Type of test: ASTM D 1557-91 Method A Modified



POINT NO.	1	2	3
WM + WS	6185.0	6130.0	6180.0
WM	4245.0	4245.0	4245.0
WW+T	331.90	331.50	360.40
WD+T	288.00	293.50	305.70
TARE	0.00	0.00	0.00
MOIST	15.2	12.9	17.9
MOISTURE	15.2	12.9	17.9
DRY DEN	111.3	110.4	108.6

Max dry den= 111.4 pcf **Opt moisture=** 15.0 %

Oversize Correction Not Applied

INEL MATERIALS LAB

COMPACTION TEST REPORT

Test specification: ASTM D 1557-91 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
Stockpile	CL	A-6(19)	8.9%	2.65	37.8	21.3	0.0	89.4

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 109.3 pcf Optimum moisture = 19.1 %	Lean clay

Project No. S01-588058 **Client:** Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Location: RyeGrass Borrow Area

Remarks:
Sample NCL #1, Sampled on 8-09-01 by Stacey Lilya and Eric Olhoffer from Ryegrass borrow area.

COMPACTION TEST REPORT

INEL MATERIALS LAB

Plate

MOISTURE DENSITY TEST DATA

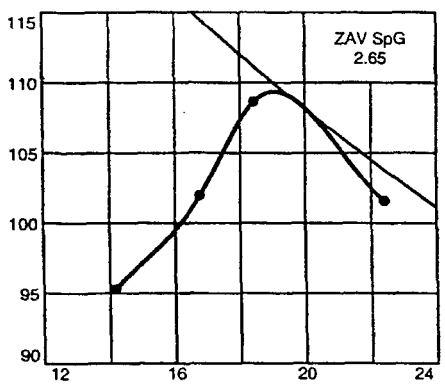
Client: Tom Borschel/ICDF Project
Project: INTEC CERCLA Disposal Facility
CH2M Hill
Project Number: S01-588058

Specimen Data

Source: Ryegrass Flats Soil
Sample No.: NCL #1
Elev. or Depth: Stockpile **Sample Length (in./cm.):**
Location: RyeGrass Borrow Area
Description: Lean clay
USCS Classification: CL **AASHTO Classification:** A-6(19)
Natural Moisture: 8.9% **Liquid Limit:** 37.8 **Plasticity Index:** 21.3
Testing Remarks: Sample NCL #1, Sampled on 8-09-01 by Stacey Lilya and Eric Olhoffer from Ryegrass borrow area.
Percent retained on No.4 sieve: 0.0
Percent passing No. 200 sieve: 89.4 **Specific gravity:** 2.65

Test Data And Results

Type of test: ASTM D 1557-91 Method A Modified



POINT NO.	1	2	3	4
WM + WS	5890.0	6045.0	6190.0	6125.0
WM	4245.0	4245.0	4245.0	4245.0
WW+T	268.90	337.10	244.20	261.10
WD+T	235.50	288.70	206.20	213.30
TARE	0.00	0.00	0.00	0.00
MOIST	14.2	16.8	18.4	22.4
MOISTURE	14.2	16.8	18.4	22.4
DRY DEN	95.3	102.0	108.6	101.6

Max dry den= 109.3 pcf **Opt moisture=** 19.1 %

Oversize Correction Not Applied

INEL MATERIALS LAB

Appendix A-4

Field Density Test Summary

INEEL
ICDF Phase 1
Lane A/ 815

Job No. 011211.00

VECTOR ENGINEERING, INC.
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12438 Loma Rica Drive, Ste. C, Grass Valley, CA 95945 (916) 272-2448 (916) 272-8533 fax

FIELD DENSITY TEST SUMMARY - TEST PAD CLAY LINER

Filename:INEELTPCLFildensumPh1

Date	Test No.	Location	Elevation (lift)	Moisture (%)	Oven Moisture (%)	Dry Density (PCF)	Max. Dry Density	Optimum Moisture (%)	Relative Compaction (%)	Remarks
8/21	TPCL#1A	East side	1	16.6	NA	103.3	113.2	15.3	91%	2 passes
8/21	TPCL#2A	Middle	1	17.2	NA	104.9	113.2	15.3	93%	2 passes
8/21	TPCL#3A	West	1	17.2	NA	105.3	113.2	15.3	93%	2 passes
8/21	TPCL#4A	West	1	17.0	NA	108.6	113.2	15.3	96%	4 passes
8/21	TPCL#5A	Middle	1	15.9	NA	104.6	113.2	15.3	92%	4 passes
8/21	TPCL#6A	East side	1	17.7	NA	100.4	113.2	15.3	89%	4 Passes TPCL#7 retest
8/23	TPCL#7A	East side	1	15.4	NA	108.4	113.2	15.3	96%	Retest #6 6 passes
8/23	TPCL#8A	East side	2	19.5	NA	104.7	113.2	15.3	92%	2 passes
8/23	TPCL#9A	Middle	2	18.2	NA	103.2	113.2	15.3	91%	2 passes
8/23	TPCL#10A	West	2	16.5	NA	103.8	113.2	15.3	92%	2 passes
8/23	TPCL#11A	West	2	18.0	NA	105.0	113.2	15.3	93%	4 passes
8/23	TPCL#12A	Middle	2	16.6	NA	107.3	113.2	15.3	95%	4 passes
8/23	TPCL#13A	East side	2	17.6	NA	106.5	113.2	15.3	94%	4 passes
8/24	TPCL#14A	East side	3	17.4	NA	100.8	113.2	15.3	89%	4 passes
8/24	TPCL#15A	Middle	3	16.3	NA	103.2	113.2	15.3	91%	4 passes
8/24	TPCL#16A	West	3	19.2	NA	105.2	113.2	15.3	93%	4 passes
8/24	TPCL#17A	East side	3	17.6	NA	107.2	113.2	15.3	95%	6 passes
8/24	TPCL#18A	Middle	3	15.5	NA	106.7	113.2	15.3	94%	6 passes
8/24	TPCL#19A	West	3	15.7	NA	106.4	113.2	15.3	94%	6 passes
8/24	TPCL#20A	3' East 19	3	15.7	NA	106.1	113.2	15.3	94%	6 passes
8/27	TPCL#21A	East side	3	16.4	NA	109.5	113.2	15.3	97%	6 passes rework
8/27	TPCL#22A	Middle	3	17.2	NA	110.4	113.2	15.3	98%	ripper dug
8/27	TPCL#23A	West	3	16.4	NA	105.9	113.2	15.3	94%	too deep
8/27	TPCL#24A	East side	4	15.6	NA	110.4	113.2	15.3	98%	6 passes
8/27	TPCL#25A	Middle	4	17.5	NA	109.8	113.2	15.3	97%	6 passes
8/27	TPCL#26A	West	4	14.9	NA	110.7	113.2	15.3	98%	6 passes
8/28	TPCL#27A	East side	5	15.3	NA	109.9	113.2	15.3	97%	5 passes
8/28	TPCL#28A	Middle	5	15.0	NA	111.3	113.2	15.3	98%	5 passes

LEGEND: AEG=ABOVE EXISTING GRADE
ACB=ABOVE CELL BOTTOM
BEG=BELOW EXISTING GRADE
BFG=BELOW FINISH GRADE

EG=EXISTING GRADE
FG=FINISH GRADE

INEEL
ICDF Phase 1
Lane A/ 815

Job No. 011211.00

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FIELD DENSITY TEST SUMMARY - TEST PAD CLAY LINER

Filename:INEELTPCLFilldensumPh1

Date	Test No.	Location	Elevation (lift)	Moisture (%)	Oven Moisture (%)	Dry Density (PCF)	Max. Dry Density	Optimum Moisture (%)	Relative Compaction (%)	Remarks
8/28	TPCL#29A	West	5	15.7	NA	110.8	113.2	15.3	98%	5 passes
8/29	TPCL#30A	East side	6	15.4	NA	107.3	113.2	15.3	95%	5 passes outside
8/29	TPCL#31A	Middle	6	15.3	NA	112.5	113.2	15.3	99%	5 passes center
8/29	TPCL#32A	West	6	16.1	NA	109.7	113.2	15.3	97%	5 passes outside
8/29	TPCL#33A	West	7	16.5	NA	106.0	113.2	15.3	94%	5 passes center
8/29	TPCL#34A	Middle	7	16.5	NA	104.7	113.2	15.3	92%	5 passes outside
8/29	TPCL#35A	East side	7	15.5	NA	106.2	113.2	15.3	94%	5 passes center
8/30	TPCL#36A	West	8	16.3	NA	109.2	113.2	15.3	96%	5 passes outside
8/30	TPCL#37A	Middle	8	15.5	NA	110.7	113.2	15.3	98%	5 passes center
8/30	TPCL#38A	East side	8	15.5	NA	111.0	113.2	15.3	98%	5 passes outside
									#DIV/0!	
8/30	TPCL#39R	East side	8	15.7	NA	111.4	113.2	15.3	98%	5 passes finish grade
									#DIV/0!	

LEGEND: AEG=ABOVE EXISTING GRADE
ACB=ABOVE CELL BOTTOM
BEG=BELOW EXISTING GRADE
BFG=BELOW FINISH GRADE
EG=EXISTING GRADE
FG=FINISH GRADE

INEEL
ICDF Phase 1
Lane B/ 825

Job No. 011211.00

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FIELD DENSITY TEST SUMMARY - TEST PAD CLAY LINER

Filename:INEELTPCLF\ldensumPh1

Date	Test No.	Location	Elevation (lift)	Moisture (%)	Oven Moisture (%)	Dry Density (PCF)	Max. Dry Density	Optimum Moisture (%)	Relative Compaction (%)	Remarks
8/24	TPCL#1B	Middle	1	16.6	NA	104.1	113.2	15.3	92%	2 passes
8/24	TPCL#2B	East	1	15.3	NA	101.5	113.2	15.3	90%	2 passes
8/24	TPCL#3B	West	1	14.6	NA	110.4	113.2	15.3	98%	2 passes
8/24	TPCL#4B	West	1	16.3	NA	107.7	113.2	15.3	95%	4 passes
8/24	TPCL#5B	Middle	1	15.9	NA	111.6	113.2	15.3	99%	4 passes
8/24	TPCL#6B	East	1	17.3	NA	112.0	113.2	15.3	99%	4 passes
8/24	TPCL#7B	East	2	16.3	NA	103.6	113.2	15.3	92%	2 passes
8/24	TPCL#8B	Middle	2	16.3	NA	104.0	113.2	15.3	92%	2 passes
8/24	TPCL#9B	West	2	17.3	NA	100.9	113.2	15.3	89%	2 passes
8/24	TPCL#10B	East	2	17.3	NA	106.4	113.2	15.3	94%	4 passes
8/24	TPCL#11B	Middle	2	15.9	NA	107.5	113.2	15.3	95%	4 passes
8/24	TPCL#12B	West	2	16.2	NA	107.0	113.2	15.3	95%	4 passes
8/27	TPCL#13B	West	3	14.2	NA	109.7	113.2	15.3	97%	4 passes
8/27	TPCL#14B	Middle	3	18.9	NA	103.9	113.2	15.3	92%	4 passes
8/27	TPCL#15B	East	3	13.3	NA	102.0	113.2	15.3	90%	frount wheel only
8/27	TPCL#16B	East	3	15.3	NA	112.1	113.2	15.3	99%	East retest
8/27	TPCL#17B	Middle	3	17.0	NA	108.8	113.2	15.3	96%	Middle retest
8/27	TPCL#18B	West	3	16.1	NA	110.9	113.2	15.3	98%	West retest
8/28	TPCL#19B	East	4	18.3	NA	108.9	113.2	15.3	96%	4 passes
8/28	TPCL#20B	Middle	4	18.0	NA	108.6	113.2	15.3	96%	4 passes
8/28	TPCL#21B	West	4	19.7	NA	105.1	113.2	15.3	93%	4 passes
8/29	TPCL#22B	West	5	16.0	NA	107.6	113.2	15.3	95%	4 passes center
8/29	TPCL#23B	Middle	5	16.0	NA	111.8	113.2	15.3	99%	4 passes outside
8/29	TPCL#24B	East	5	16.1	NA	104.0	113.2	15.3	92%	4 passes center
8/29	TPCL#25B	East	6	16.9	NA	107.1	113.2	15.3	95%	4 passes outside
8/29	TPCL#26B	Middle	6	15.8	NA	106.8	113.2	15.3	94%	4 passes center
8/29	TPCL#27B	West	6	15.5	NA	105.8	113.2	15.3	93%	4 passes outside
8/30	TPCL#28B	East	7	17.4	NA	107.7	113.2	15.3	95%	4 passes center

LEGEND: AEG=ABOVE EXISTING GRADE
ACB=ABOVE CELL BOTTOM
BEG=BELOW EXISTING GRADE
BFG=BELOW FINISH GRADE
EG=EXISTING GRADE
FG=FINISH GRADE

INEEL
ICDF Phase 1
Lane B/ 825

Job No. 011211.00

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FIELD DENSITY TEST SUMMARY - TEST PAD CLAY LINER

Filename:INEELTPCLFIIdensumPh1

Date	Test No.	Location	Elevation (lift)	Moisture (%)	Oven Moisture (%)	Dry Density (PCF)	Max. Dry Density	Optimum Moisture (%)	Relative Compaction (%)	Remarks
8/30	TPCL#29B	Middle	7	15.9	NA	111.5	113.2	15.3	98%	4 passes outside
8/30	TPCL#30B	West	7	16.9	NA	110.2	113.2	15.3	97%	4 passes center
									#DIV/0!	
8/30	TPCL#31R	E	7	16.8	NA	108.2	113.2	15.3	96%	rework lift 7 finish grade

LEGEND: AEG=ABOVE EXISTING GRADE
ACB=ABOVE CELL BOTTOM
BEG=BELOW EXISTING GRADE
BFG=BELOW FINISH GRADE
EG=EXISTING GRADE
FG=FINISH GRADE

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Sand Density (pcf)	95.43

FIELD DENSITY TEST DATA - SAND CONES

Date	8/23	8/23	8/23	8/24	8/24	8/27	8/27	8/28
Test No.	1	2	3	4	5	6	7	8
Depth of Elevation and Datum	1st lift-a	1st lift-b	2nd lift-a	2nd lift-b	3rd lift-a	3rd lift-b	4th lift-a	
Location by Station, Coordinate, etc.	cone#2	cone#1	cone#2	cone#1	cone#2	cone#1	cone#2	
Soil Type-describe or refer to compaction curve	BCL#1	BCL#1	BCL#1	BCL#1	BCL#1	BCL#1	BCL#1	BCL#1
Tare + Wet Soil (g.)	2747	2925	2760	2120	2070	2136	2179	2491
Tare (g.)								
Wet Soil (lb.)	6.056	6.449	6.085	4.674	4.564	4.709	4.804	5.492
Tare + Sand (Initial) (g.)	7835	7680	7850	7700	7740	7685	7635	7731
Tare + Sand (Final) (g.)	3959.9	3650	3950	4250	4400	4305	4202	4075
Sand Used (Gross) (lb.)	8.543	8.885	8.598	7.606	7.363	7.452	7.568	8.060
Sand in Cone and Plate (lb.)	3.920	3.920	3.920	3.920	3.920	3.920	3.920	3.920
Sand Used (Net) (lb.)	4.623	4.965	4.678	3.686	3.443	3.532	3.648	4.140
Wet Density (pcf)	125.0	124.0	124.1	121.0	126.5	127.2	125.7	126.6
Wet Density Corr. For +3/4								
Tare								
Tare + Wet Soil (g)	2747	2925	2760	2532	2510	2136	2179	2491
Tare + Dry Soil (g)	2385	2527	2367	2240	2240	1827	1889	2124
Moisture Loss (g)	362	398	393	292	270	309	290	367
Tare Weight (g)				423	448			
Dry Soil (g)	2385	2527	2367	1817	1792	1827	1889	2124
Moisture Content (%)	15.2	15.7	16.6	16.1	15.1	16.9	15.4	17.3
Dry Density (pcf)	108.5	107.1	106.5	104.3	109.9	108.8	108.9	107.9
Maximum Drt Density (pcf)	113.2	113.2	113.2	113.2	113.2	113.2	113.2	113.2
Compaction (%)	96	95	94	92	97	96	96	95
Weight and % +3/4 Material	0	0	0	0	0	0	0	0
% Compaction Required	92	92	92	92	92	92	92	92
Remarks	Density Test TPCL#7A Lane A	Density TestTPCL#4B Lane B, hit subgrade	Density Test TPCL#12A Lane A	Density Test TPCL#11B Lane B	Density Test TPCL#19A Lane A	Density Test TPCL#17B Lane B	Density Test TPCL#25A Lane B	Density Test TPCL#21B Lane B

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Sand Density (pcf)	95.43

FIELD DENSITY TEST DATA - SAND CONES

Date	8/28	8/29	8/29	8/29	8/29	8/30	8/30	
Test No.	9	10	11	12	13	14	15	16
Depth of Elevation and Datum								
Location by Station, Coordinate, etc.								
Soil Type-describe or refer to compaction curve	BCL#1	BCL#1	BCL#1	BCL#1	BCL#1	BCL#1	BCL#1	BCL#1
Tare + Wet Soil (g.)	2370	2370	2035	2245	2022	2498	2449	
Tare (g.)								
Wet Soil (lb.)	5.225	5.225	4.486	4.949	4.458	5.507	5.399	0.000
Tare + Sand (Initial) (g.)	7890	7805	7885	7785	7745	7903	7798	
Tare + Sand (Final) (g.)	4295	4180	4565	4340	4370	4190	4210	
Sand Used (Gross) (lb.)	7.926	7.992	7.319	7.595	7.441	8.186	7.910	0.000
Sand in Cone and Plate (lb.)	3.920	3.920	3.920	3.920	3.920	3.920	3.920	3.920
Sand Used (Net) (lb.)	4.006	4.072	3.399	3.675	3.521	4.266	3.990	-3.920
Wet Density (pcf)	124.5	122.5	125.9	128.5	120.8	123.2	129.1	0.0
Wet Density Corr. For +3/4								
Tare								
Tare + Wet Soil (g)	2370	2367	2027	2245	2022	2498	2449	
Tare + Dry Soil (g)	2067	2053	1773	1949	1746	2123	2145	
Moisture Loss (g)	303	314	254	296	276	375	304	0
Tare Weight (g)								
Dry Soil (g)	2067	2053	1773	1949	1746	2123	2145	0
Moisture Content (%)	14.7	15.3	14.3	15.2	15.8	17.7	14.2	#DIV/0!
Dry Density (pcf)	106.6	106.2	110.2	111.6	104.3	104.7	113.1	#DIV/0!
Maximum Drt Density (pcf)	113.2	113.2	113.2	113.2	113.2	113.2	113.2	
Compaction (%)	96	94	97	99	92	92	100	#DIV/0!
Weight and % +3/4 Material	0	0	0	0	0	0	0	0
% Compaction Required	92	92	92	92	92	92	92	
Remarks	Density Test TPCL#27A Lane A	Density Test TPCL#30A Lane A	Density Test TPCL#24B Lane B	Density Test TPCL#27B Lane B	Density Test TPCL#33A Lane A	Density Test TPCL#28B Lane B	Density Test TPCL#38A Lane A	

FIELD DENSITY TEST DATA

SAND DENSITY _____ pcf

Date	8-23	8-23	8-23	8-24	8-24	8-27	8-27	8-28
Test No.	#1	#2	#3	#8	#8	6	7	8
Depth or Elevation and Datum	1st lift Lane A	1st lift Lane B	2nd lift Lane B	4	5			
Location by Station, Coordinate, etc.	Core #2	Core #1	Core #2	TPCL#11B (alt)	TPCL#19A Core #2	TPCL#17B	TPCL#25A	TPCL#27A
Soil Type - describe or refer to compaction curve								
Tare + Wet Soil (lb.)	2747	2925	2760	2120	2070	2136	2179	2491
Tare (lb.)								
Wet Soil (lb.)								
Tare + Sand (Initial) (lb.)	7855	7680	7850	7700	7740	7685	7635	7731
Tare + Sand (Final) (lb.)	8.73	3650 g	3950	4250	4400	4305	4202	4075
Sand Used (Gross) (lb.)								
Sand in Cone (lb.)	3.92							
Sand Used (Net) (lb.)								
Wet Density (pcf)								
Wet Density Corrector for +3/4								
Cup + Wet Soil (qm.)								2491
Cup + Dry Soil (qm.)								
Moisture Loss (qm.)								
Cup (qm.)								
Dry Soil (qm.)								
Moisture Content (%)								
Dry Density (pcf)								
Maximum Dry Density (pcf)								
Compaction (%)								
Weight and % +3/4 Material								
% Compaction Required								
Remarks								

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FIELD DENSITY TEST DATA

SAND DENSITY _____ pcf

Date	8-28	8-29 →		8-29 →		8-30	8-30	
Test No.	9	10	11	12	13	14	15	
Depth or Elevation and Datum								
Location by Station, Coordinate, etc.	TPCL#21B	TPCL#30A	TPCL#24B	TPCL#27B SC#2	TPCL#33A SC#1	TPCL#~~28B~~ 28B SC#14 SC#2	TPCL#28A SC#15 SC#~~2~~1	
Soil Type - describe or refer to compaction curve								
Tare + Wet Soil (lb.)	2370	2370	2035	2245	2022	2498	2449	
Tare (lb.)								
Wet Soil (lb.)								
Tare + Sand (Initial) (lb.)	7890	7805	7885	7785	7745	7903	7798	
Tare + Sand (Final) (lb.)	4295	4180	4565	4340	4370	4190	4210	
Sand Used (Gross) (lb.)								
Sand in Cone (lb.)								
Sand Used (Net) (lb.)								
Wet Density (pcf)								
Wet Density Corrector for +3/4	2370							
Cup + Wet Soil (qm.)		2367	2027	2245	2022	2498	2449	
Cup + Dry Soil (qm.)		2053	1773	1949	1746	2123	2145	
Moisture Loss (qm.)								
Cup (qm.)								
Dry Soil (qm.)								
Moisture Content (%)								
Dry Density (pcf)								
Maximum Dry Density (pcf)								
Compaction (%)								
Weight and % +3/4 Material								
% Compaction Required								
Remarks								

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Appendix A-5

Laboratory Permeability Results

Vector Engineering Inc.

12459 Lone Rock, Grass Valley, CA, 530-272-2446

LABORATORY SERVICES

HYDRAULIC CONDUCTIVITY
SUMMARY REPORT
ASTM D - 5084

Client: Northwind Environmental

Project No: 011211.00

Lab Log: 616

Project Name: INTAC/ CDF Test Pad

Report Date: November 12, 2001

Sample Identification:	Lane A TPCL #39R	Lane B TPCL # 31R	1A1 NE	1A2 NW	1A3 SE	2A1 NE
Lab Sample Number:	616A	616B	616C	616D	616E	616F
INITIAL:						
Water Content (%):	19.6	20.9	16.2	14.7	19.9	19.3
Dry Density (pcf):	106	103	111	110	96	97
Saturation (%):	90	88	85	74	72	70
FINAL:						
Water Content (%):	20.7	21.6	19.2	19.4	28.0	25.7
Dry Density (pcf):	106	105	110	108	95	98
Saturation (%):	95	95	98	95	98	96
Hydraulic Conductivity (cm / sec):	1.4E-08	1.2E-08	1.3E-08	5.2E-08	3.8E-08	2.3E-07
Effective Consolidation Pressure (psi):	5	5	5	5	5	5
Gradient Range:						
Relative Compaction (%):						
Notes:						

Sample Identification:	2A2 NW (TOP)	2A2 NW (BOTTOM)	2A3 SW (TOP)	2A3 SW (BOTTOM)	3A1 NE	3A2 NW
Lab Sample Number:	616G	616G1	616H	616H1	616I	616J
INITIAL:						
Water Content (%):	22.6	17.1	17.4	16.9	15.2	14.5
Dry Density (pcf):	93	100	93	102	110	112
Saturation (%):	74	67	58	70	78	78
FINAL:						
Water Content (%):	27.9	22.3	27.1	22.6	19.5	19.0
Dry Density (pcf):	94	103	96	104	109	110
Saturation (%):	95	94	96	97	97	97
Hydraulic Conductivity (cm / sec):	9.3E-07	2.5E-07	4.8E-06	1.4E-07	7.7E-09	2.3E-08
Effective Consolidation Pressure (psi):	5	5	5	5	5	5
Gradient Range:						
Relative Compaction (%):						
Notes:						

NOTES: *De-aired tap water was used as permeant.*
The above Saturation is based upon an assumed Specific Gravity of 2.70

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Perm Summary (rev. 2/29/00)

Entered By: MD

Rev. By:

Lab Log: 616

Vector Engineering Inc.

12436 Loma Rica, Grass Valley, CA, 530-272-2448

LABORATORY SERVICES

HYDRAULIC CONDUCTIVITY

SUMMARY REPORT

ASTM D - 5084

Client: Northwind Environmental

Project No: 011211.00

Lab Log: 611

Project Name: INTAC/ CDF Test Pad

Report Date: November 12, 2001

Sample Identification:	3A3 SW	4A1 NE	4A2 NW	4A3 SE	5A1 NE	5A2 NW
Lab Sample Number:	616K	616L	616M	616N	616O	616P
INITIAL:						
Water Content (%):	15.3	14.8	14.9	15.1	15.6	16.5
Dry Density (pcf):	106	111	109	107	111	110
Saturation (%):	71	78	73	71	81	84
FINAL:						
Water Content (%):	21.1	18.8	20.0	20.4	19.3	19.6
Dry Density (pcf):	105	112	108	107	109	110
Saturation (%):	93	100	96	95	96	99
Hydraulic Conductivity (cm / sec):	6.2E-08	1.1E-08	4.0E-08	2.5E-08	3.0E-08	1.7E-08
Effective Consolidation Pressure (psi):	5	5	5	5	5	5
Gradient Range:						
Relative Compaction (%):						
Notes:						

Sample Identification:	5A3 SE	6A1 NE	6A2 NW	6A3 SE	1B1 NE	1B2 SE
Lab Sample Number:	616Q	616R	616S	616T	616U	616V
INITIAL:						
Water Content (%):	14.8	--	--	--	--	--
Dry Density (pcf):	112					
Saturation (%):	78	--	--	--	--	--
FINAL:						
Water Content (%):	19.3	24.2	24.0	20.4	23.6	21.5
Dry Density (pcf):	110	100	96	106	101	105
Saturation (%):	97	96	86	95	95	96
Hydraulic Conductivity (cm / sec):	8.2E-09	4.2E-07	1.1E-07	1.0E-08	1.1E-07	3.0E-08
Effective Consolidation Pressure (psi):	5	5	5	5	5	5
Gradient Range:						
Relative Compaction (%):						
Notes:						

NOTES:
De-aired tap water was used as permeant.
The above Saturation is based upon an assumed Specific Gravity of 2.70.

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Perm Summary (rev. 2/29/00)

Entered By: MD

Rev. By:

Lab Log: 616

Vector Engineering Inc.

12438 Loma Rica, Grass Valley, CA, 530-272-2446

LABORATORY SERVICES

HYDRAULIC CONDUCTIVITY
SUMMARY REPORT

ASTM D - 5084

Client: Northwind Environmental

Project No. 011211.00

Lab Log: 616

Project Name: INTAC/ CDF Test Pad

Report Date: November 12, 2001

Sample Identification:	1B3 SW	2B1 NE	2B2 NW	2B3 SW	3B1 NE	3B2 NW
Lab Sample Number:	#16W	#16X	#16Y	#16Z	#16AA	#16AB
INITIAL:						
Water Content (%):	16.4	16.3	18.1	16.7	16.8	16.7
Dry Density (pcf):	98	107	94	96	109	110
Saturation (%):	61	77	61	60	83	85
FINAL:						
Water Content (%):	23.3	21.0	26.1	26.4	19.8	19.0
Dry Density (pcf):	100	105	98	96	108	110
Saturation (%):	93	95	97	95	96	95
Hydraulic Conductivity (cm / sec):	1.4E-07	2.7E-08	4.7E-08	2.5E-08	5.8E-09	3.0E-09
Effective Consolidation Pressure (psi):	5	5	5	5	5	5
Gradient Range:						
Relative Compaction (%):						
Notes:						

Sample Identification:	3B3 SE	4B1 NE	4B2 SE	4B3 SW	5B1 NE	5B2 NW
Lab Sample Number:	#16AC	#16AD	#16AE	#16AF	#16AG	#16AH
INITIAL:						
Water Content (%):	17.0	16.8	16.3	16.5	16.5	17.2
Dry Density (pcf):	110	110	113	112	112	111
Saturation (%):	86	85	88	87	88	90
FINAL:						
Water Content (%):	19.7	20.0	19.1	19.1	19.3	19.4
Dry Density (pcf):	109	109	110	110	109	109
Saturation (%):	98	98	97	97	96	97
Hydraulic Conductivity (cm / sec):	3.5E-09	1.2E-08	1.0E-08	7.2E-09	1.2E-08	5.2E-09
Effective Consolidation Pressure (psi):	5	5	5	5	5	5
Gradient Range:						
Relative Compaction (%):						
Notes:						

NOTES: *De-aired tap water was used as permeant.*
The above Saturation is based upon an assumed Specific Gravity of 2.70

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Perm Summary (rev. 2/29/00)

Entered By: MD

Rev. By:

Lab Log: 616

Vector Engineering Inc.

15438 Loma Rica, Grass Valley, CA 530-272-3449

LABORATORY SERVICES

HYDRAULIC CONDUCTIVITY

SUMMARY REPORT

ASTM D - 5084

Client: Northwind Environmental

Project No: 011211.00

Lab Log: 616

Project Name: INTAC/ CDF Test Pad

Report Date: November 12, 2001

Sample Identification:	5B3 SW	5B1 NE	5B2 NW	5B3 SE		
Lab Sample Number:	616AJ	616AJ	616AK	616AL		
INITIAL:						
Water Content (%):	16.9	18.5	18.8	16.9		
Dry Density (pcf):	110	99	104	106		
Saturation (%):	85	72	82	78		
FINAL:						
Water Content (%):	20.2	25.6	22.3	21.5		
Dry Density (pcf):	107	98	104	105		
Saturation (%):	85	96	97	95		
Hydraulic Conductivity (cm / sec):	6.4E-09	9.5E-07	3.1E-07	4.1E-08		
Effective Consolidation Pressure (psi):	5	5	5	5		
Gradient Range:						
Relative Compaction (%):						
Notes:						

Sample Identification:						
Lab Sample Number:						
INITIAL:						
Water Content (%):						
Dry Density (pcf):						
Saturation (%):						
FINAL:						
Water Content (%):						
Dry Density (pcf):						
Saturation (%):						
Hydraulic Conductivity (cm / sec):						
Effective Consolidation Pressure (psi):						
Gradient Range:						
Relative Compaction (%):						
Notes:						

NOTES: *De-aired tap water was used as permeant.*
The above Saturation is based upon an assumed Specific Gravity of 2.70.

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Perm Summary (rev. 2/29/00)

Entered By: MD

Rev. By:

Lab Log: 616

Page 4 of 4

Appendix A-6

Field Permeability (Boutwell)

Vector Engineering, Inc.

12439 Lome Rica, Grass Valley, CA, 530-272-2448

LABORATORY SERVICES

HYDRAULIC CONDUCTIVITY

of SEALED BOREHOLE

Boutwell Method ASTM D-6391

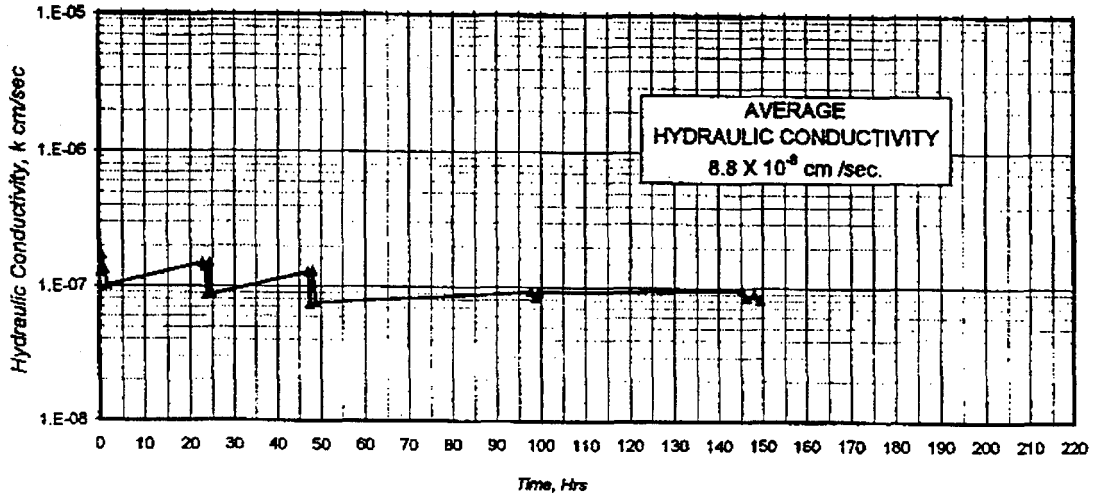
Client / Project Name: **Northwind Environmental**

Project No: **011211.00**

Test Sample Number: **A1**

Sample ID: **INTAC / CDF Test Pad Section A**

Report Date: October 5, 2001



Installation Date:	September 7, 2001
Nominal Depth:	2 ft. Below Surface
Casing Diameter.:	0.5 ft.
Water content, cuttings	16.0 %

Test Data

Time hrs	k, cm/sec.
0.2	1.3E-07
0.6	1.7E-07
1.2	1.3E-07
1.8	1.0E-07
22.6	1.5E-07
23.3	1.4E-07
23.8	8.7E-08
24.3	1.5E-07
25.0	8.7E-08
47.0	1.3E-07
47.5	7.4E-08
48.2	1.3E-07
48.9	7.6E-08
97.8	9.2E-08
98.8	8.4E-08
99.6	9.2E-08
145.4	9.7E-08
146.3	8.5E-08
148.0	9.0E-08
149.4	8.1E-08

Print Date: 11/19/01

Reviewed By:

LSN: **A1**

DCN: TXK-QC-GRAPH (rev. 02/15/01)

Vector Engineering, Inc.

12438 Loma Rica, Grass Valley, CA 530-272-2448

LABORATORY SERVICES

HYDRAULIC CONDUCTIVITY

of SEALED BOREHOLE

Boutwell Method ASTM D-6391

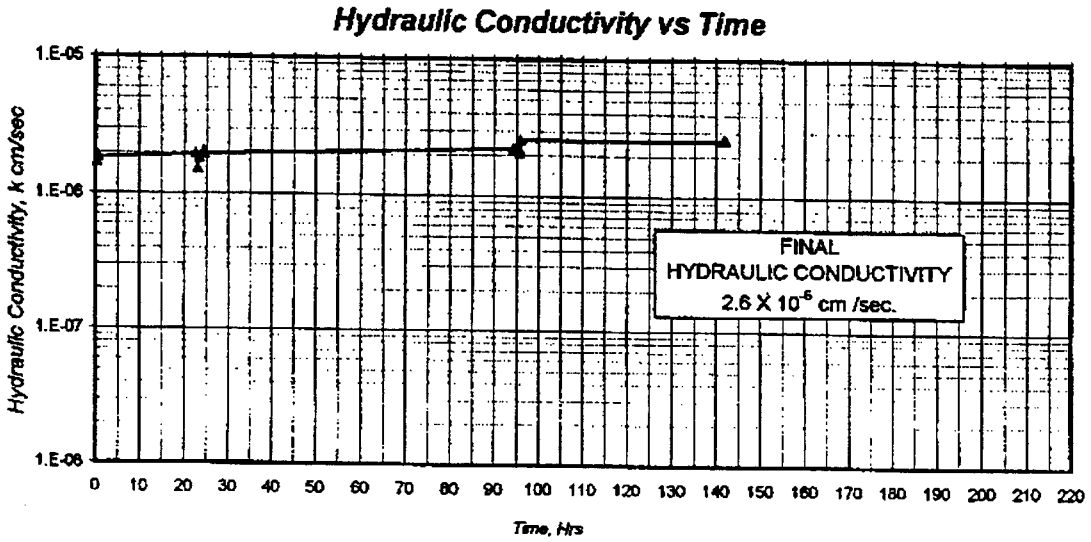
Client / Project Name: **Northwind Environmental**

Project No: **011211.00**

Test Sample Number: **A2**

Sample ID: **INTAC / CDF Test Pad Section A**

Report Date: October 5, 2001



Installation Date:	September 7, 2001
Nominal Depth:	1 ft.Below Surface
Casing Diameter.:	0.5 ft.
Water content, cuttings	17.6

Test Data

Time hrs	k, cm/sec.
0.4	1.7E-06
0.8	1.8E-06
22.6	2.0E-06
23.1	1.5E-06
23.4	1.8E-06
24.3	2.1E-06
24.5	2.0E-06
94.2	2.2E-06
94.9	2.3E-06
95.7	2.1E-06
95.7	2.2E-06
96.0	2.6E-06
141.6	2.6E-06
141.8	2.6E-06
142.1	2.6E-06

Print Date: 11/19/01

Reviewed By:

LSN: A2

DCN: TXK-QC-GRAPH (rev. 02/15/01)

Vector Engineering, Inc.

12438 Loma Rica, Grass Valley, CA 530-272-2448

LABORATORY SERVICES

HYDRAULIC CONDUCTIVITY

of SEALED BOREHOLE

Boulwell Method ASTM D-6391

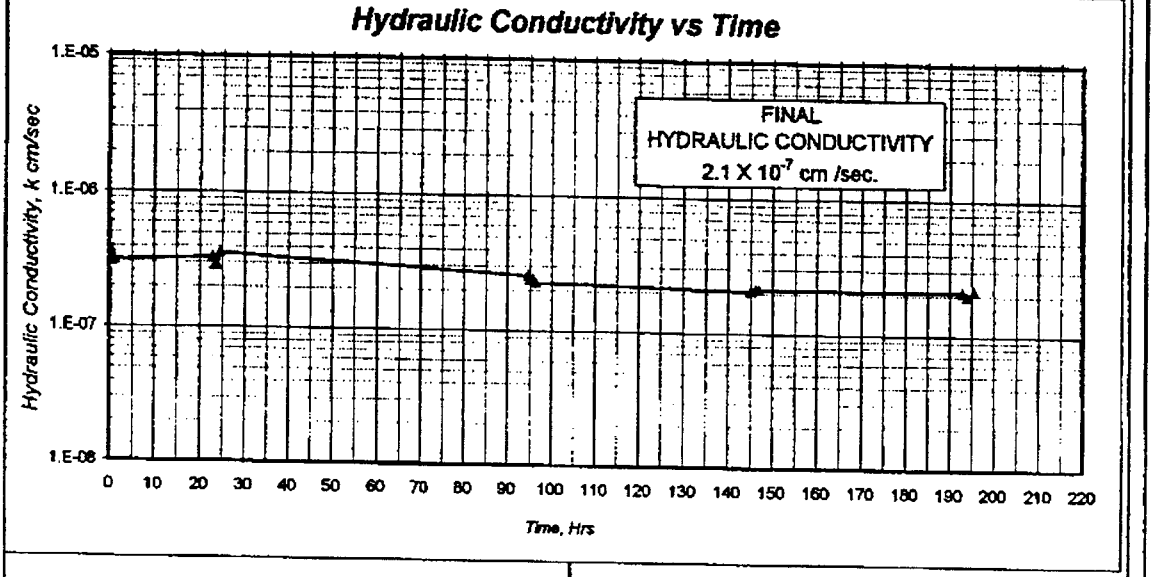
Client / Project Name: **Northwind Environmental**

Project No: **011211.00**

Test Sample Number: **A3**

Sample ID: **INTAC / CDF Test Pad Section A**

Report Date: October 5, 2001



Installation Date:	September 7, 2001
Nominal Depth:	2 ft. Below Surface
Casing Diameter.:	0.5 ft.
Water content, cuttings	14.5

Test Data

Time hrs	k, cm/sec.
0.5	3.7E-07
0.8	3.1E-07
1.2	3.1E-07
22.9	3.3E-07
23.3	2.9E-07
23.8	2.8E-07
24.5	3.6E-07
94.6	2.6E-07
95.0	2.4E-07
95.7	2.4E-07
96.4	2.3E-07
145.3	2.1E-07
146.2	2.1E-07
147.0	2.1E-07
192.8	2.1E-07
193.8	2.0E-07
195.4	2.2E-07

Print Date: 11/19/01

Reviewed By:

LSN: A3

DCN: TXK-QC-GRAPH (rev. 02/15/01)

Vector Engineering, Inc.

12438 Loma Rica, Grass Valley, CA, 530-272-2448

LABORATORY SERVICES

HYDRAULIC CONDUCTIVITY

of SEALED BOREHOLE

Boutwell Method ASTM D-6391

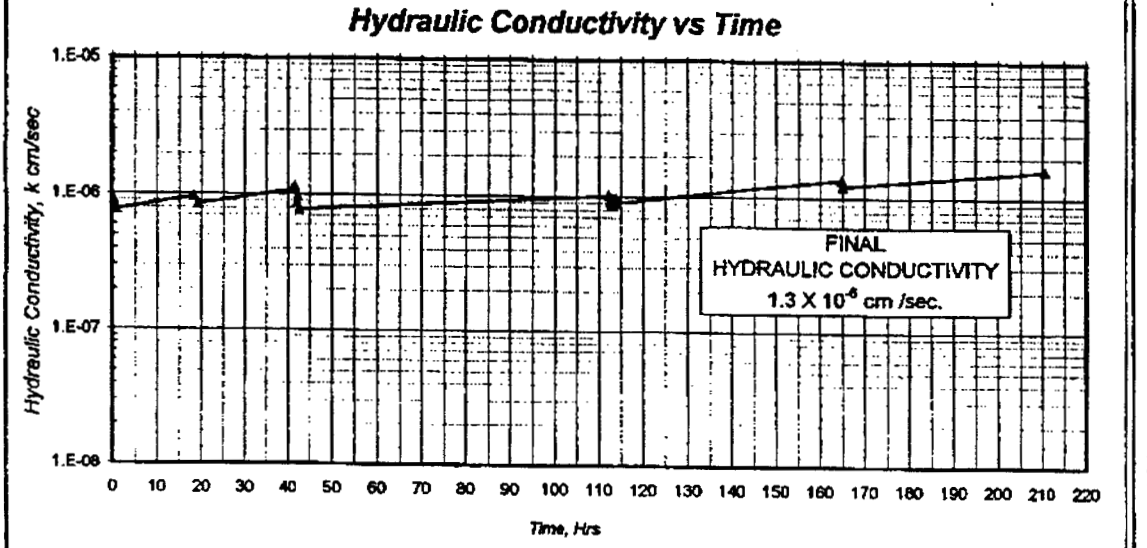
Client / Project Name: **Northwind Environmental**

Project No: **011211.00**

Test Sample Number: **A4**

Sample ID: **INTAC / CDF Test Pad Section A**

Report Date: October 5, 2001



Installation Date:	September 7, 2001
Nominal Depth:	1 ft. Below Surface
Casing Diameter.:	0.5 ft.
Water content, cuttings	15.2

Test Data

Time hrs	k, cm/sec.
0.4	9.0E-07
0.9	7.6E-07
18.2	9.6E-07
19.3	8.4E-07
41.1	1.1E-06
41.6	1.1E-06
42.0	8.7E-07
42.3	9.7E-07
42.6	7.8E-07
112.2	1.0E-06
112.6	9.1E-07
112.8	9.7E-07
113.1	8.7E-07
113.8	9.9E-07
114.0	9.0E-07
164.8	1.4E-06
165.1	1.2E-06
210.7	1.6E-06

Print Date: 11/19/01

Reviewed By:

LSN: A4

DCN: TXK-QC-GRAPH (rev. 02/15/01)

Vector Engineering, Inc.

12438 Loma Rica, Grass Valley, CA, 530-272-2448

LABORATORY SERVICES

HYDRAULIC CONDUCTIVITY

of SEALED BOREHOLE

Boutwell Method ASTM D-6391

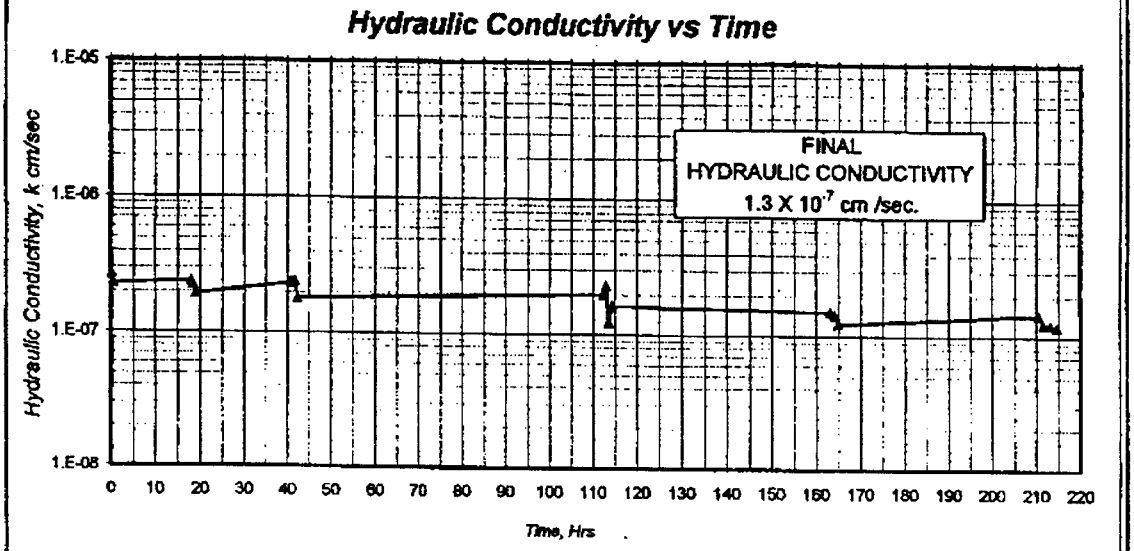
Client / Project Name: Northwind Environmental

Project No: 011211.00

Test Sample Number: A5

Sample ID: INTAC / CDF Test Pad Section A

Report Date: October 5, 2001



Installation Date:	September 7, 2001
Nominal Depth:	2 ft. Below Surface
Casing Diameter.:	0.5 ft.
Water content, cuttings	15.9

Test Data

Time hrs	k, cm/sec.
0.2	2.6E-07
0.6	2.3E-07
18.0	2.4E-07
18.5	2.2E-07
19.1	1.9E-07
40.8	2.3E-07
41.2	2.3E-07
41.7	2.4E-07
42.4	1.8E-07
112.4	2.0E-07
112.9	2.3E-07
113.6	1.2E-07
114.3	1.6E-07
163.2	1.5E-07
164.1	1.4E-07
164.9	1.2E-07
210.7	1.5E-07
211.7	1.2E-07
213.3	1.2E-07
214.8	1.2E-07

Print Date: 11/19/01

Reviewed By:

LSN: A5

DCN: TXX-QC-GRAPH (rev. 02/15/01)

Vector Engineering, Inc.

12438 Loma Rica, Grass Valley, CA 530-272-2448

LABORATORY SERVICES

HYDRAULIC CONDUCTIVITY

of SEALED BOREHOLE

Boutwell Method ASTM D-6391

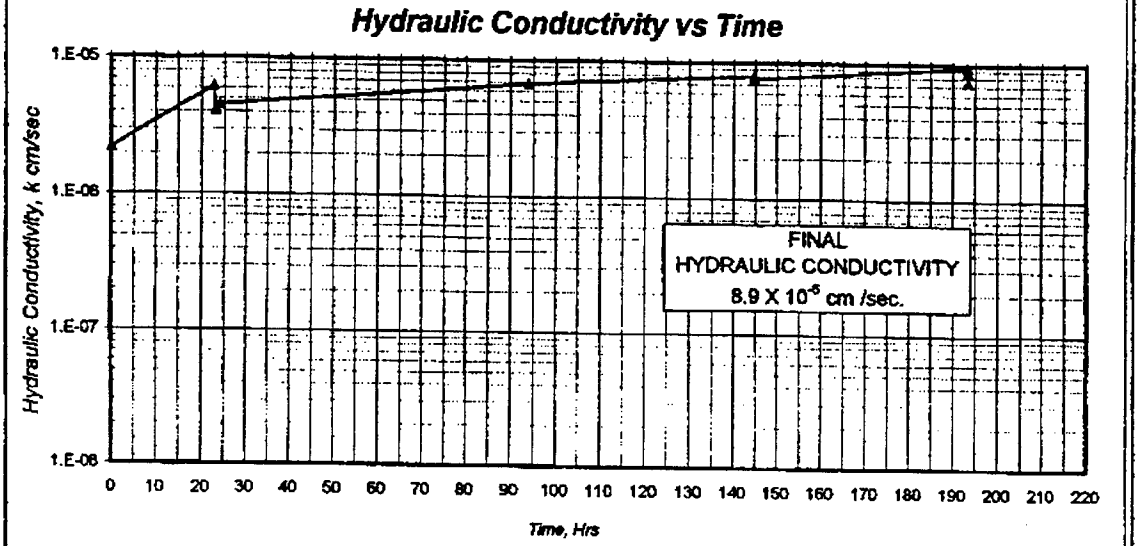
Client / Project Name: Northwind Environmental

Project No: 011211.00

Test Sample Number: A6

Sample ID: INTAC / CDF Test Pad Section A

Report Date: October 5, 2001



Installation Date:	September 7, 2001
Nominal Depth:	1 ft. Below Surface
Casing Diameter.:	0.5 ft.
Water content, cuttings	14.5

Test Data

Time hrs	k, cm/sec
0.2	2.2E-06
22.9	6.1E-06
23.1	4.0E-06
23.3	4.1E-06
24.1	4.5E-06
94.0	6.8E-06
144.8	8.1E-06
144.9	7.6E-06
193.3	9.6E-06
193.3	9.5E-06
193.4	8.8E-06
193.4	7.5E-06

Print Date: 11/19/01

Reviewed By:

LSN: A6

DCN: TXX-QC-GRAPH (rev. 02/15/01)

Vector Engineering, Inc.

12438 Loma Rica, Grass Valley, CA, 530-272-2448

LABORATORY SERVICES

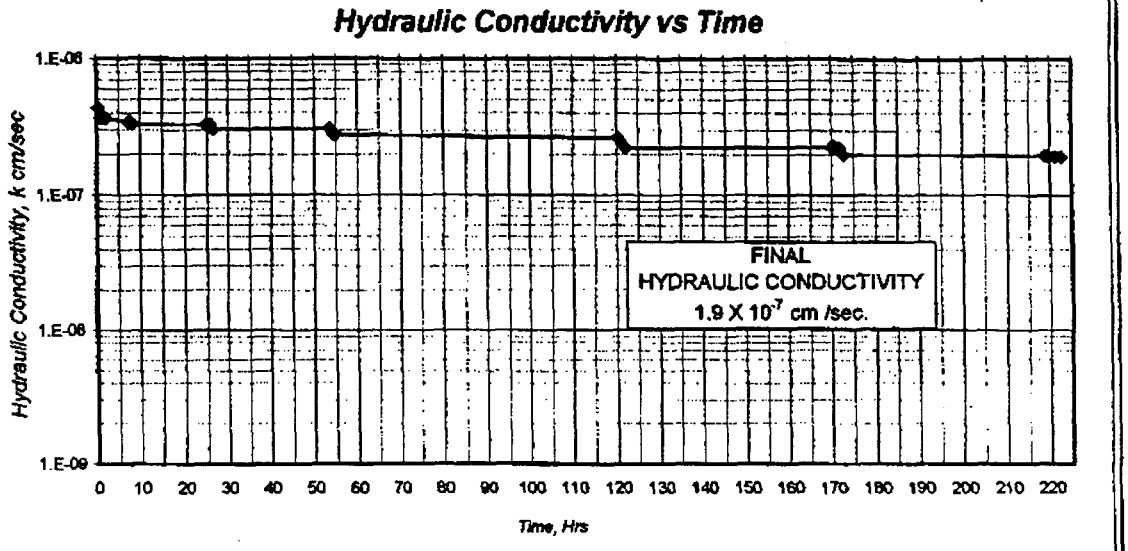
HYDRAULIC CONDUCTIVITY

of SEALED BOREHOLE

Boutwell Method ASTM D-6391

Client / Project Name:	Project No:	Test Sample Number:
Northwind Environmental	011211.00	B1

Sample ID:	Report Date:
INTAC / CDF Test Pad Section B	September 17, 2001



Installation Date:	September 7, 2001
Nominal Depth:	1 ft. Below Surface
Casing Diameter.:	0.5 ft.
Water content, cuttings	15.7

Test Data

Time hrs	k, cm/sec.	Time hrs	k, cm/sec.
0.5	4.3E-07	170.1	2.7E-07
1.1	3.0E-07	170.6	2.4E-07
1.9	3.7E-07	171.0	1.8E-07
2.4	3.6E-07	171.9	2.0E-07
7.4	3.3E-07	172.9	1.7E-07
7.9	3.2E-07	219.0	2.3E-07
8.3	3.1E-07	219.6	1.8E-07
24.9	3.5E-07	221.3	1.9E-07
25.3	3.1E-07	222.7	1.7E-07
25.6	3.3E-07		
26.1	3.1E-07		
26.6	2.5E-07		
53.7	3.2E-07		
54.2	2.7E-07		
54.5	2.8E-07		
54.9	2.4E-07		
120.4	2.6E-07		
120.8	2.2E-07		
121.6	2.2E-07		
122.3	2.0E-07		

Print Date:	Reviewed By:	LSN:
11/19/01		B1

DCN: TXK-QC-GRAPH (rev. 02/15/01)

Vector Engineering, Inc.

12434 Loma Rica, Grass Valley, CA, 530-272-2448

LABORATORY SERVICES

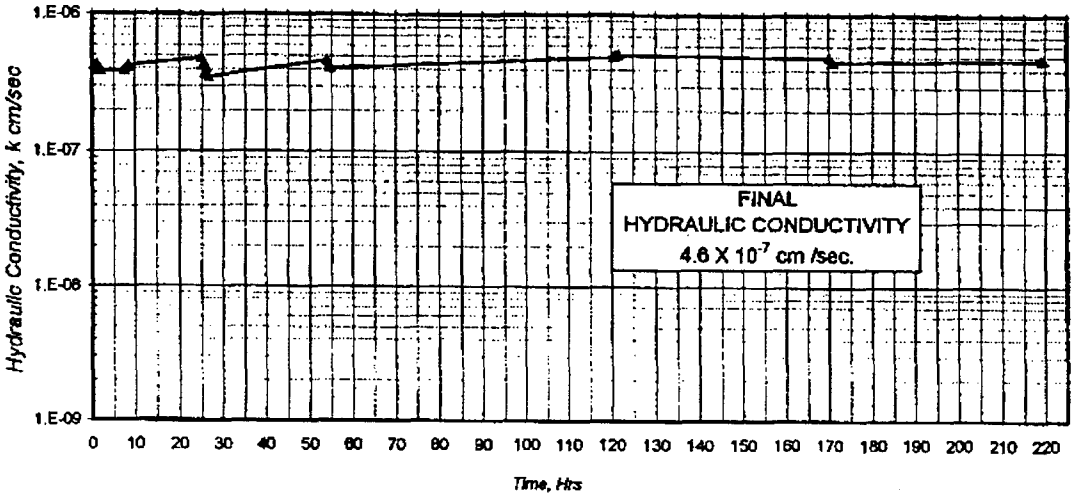
HYDRAULIC CONDUCTIVITY

of SEALED BOREHOLE

Boutwell Method ASTM D-6391

Client / Project Name:	Project No:	Test Sample Number:
Northwind Environmental	011211.00	B2

Sample ID:	Report Date:
INTAC / CDF Test Pad Section B	September 17, 2001



Installation Date:	September 7, 2001
Nominal Depth:	1 ft. Below Surface
Casing Diameter.:	0.5 ft.
Water content, cuttings	16.9

Test Data

Time hrs	k, cm/sec.	Time hrs	k, cm/sec.
0.5	4.2E-07	170.2	4.9E-07
0.9	3.9E-07	170.7	4.5E-07
1.3	4.3E-07	171.1	4.6E-07
1.6	4.1E-07	219.2	4.7E-07
2.1	3.9E-07	219.8	4.7E-07
7.6	3.9E-07		
8.2	4.0E-07		
8.5	4.2E-07		
25.1	4.6E-07		
25.5	4.3E-07		
25.8	3.7E-07		
26.3	4.1E-07		
26.8	3.5E-07		
54.0	4.7E-07		
54.5	4.3E-07		
54.7	4.1E-07		
55.1	4.1E-07		
120.6	5.0E-07		
121.0	5.1E-07		
121.8	5.1E-07		

Print Date:	Reviewed By:	LSN:
11/19/01		B2

DCN: TXK-QC-GRAPH (rev. 02/15/01)

Vector Engineering, Inc.

12438 Loma Rica, Grass Valley, CA 530-272-2448

LABORATORY SERVICES

HYDRAULIC CONDUCTIVITY

of SEALED BOREHOLE

Boutwell Method ASTM D-6391

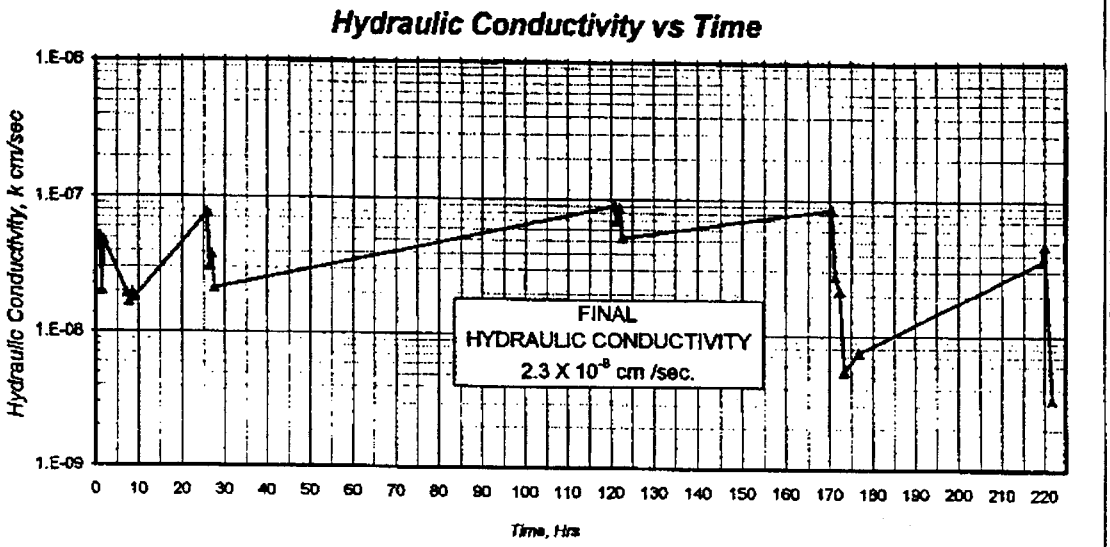
Client / Project Name: Northwind Environmental

Project No: 011211.00

Test Sample Number: B3

Sample ID: INTAC / CDF Test Pad Section B

Report Date: September 17, 2001



Installation Date:	September 7, 2001
Nominal Depth:	2 ft. Below Surface
Casing Diameter.:	0.5 ft.
Water content, cuttings	15.3

Test Data

Time hrs	k, cm/sec.	Time hrs	k, cm/sec.
0.9	5.1E-08	219.6	3.6E-08
1.5	2.0E-08	220.2	4.7E-08
1.9	4.8E-08	221.9	3.4E-09
7.3	1.9E-08		
7.9	1.7E-08		
8.5	1.9E-08		
9.2	1.8E-08		
25.9	7.7E-08		
26.5	3.1E-08		
27.0	3.7E-08		
27.6	2.1E-08		
121.0	9.0E-08		
121.4	7.0E-08		
122.2	8.7E-08		
122.8	5.2E-08		
170.5	8.7E-08		
171.3	2.7E-08		
172.3	2.2E-08		
173.5	5.4E-09		
176.8	7.5E-09		

Print Date: 11/19/01

Reviewed By:

LSN: B3

DCN: TXX-QC-GRAPH (rev. 02/15/01)

Vector Engineering, Inc.

12438 Lome Rica, Grass Valley, CA, 530-272-3448

LABORATORY SERVICES

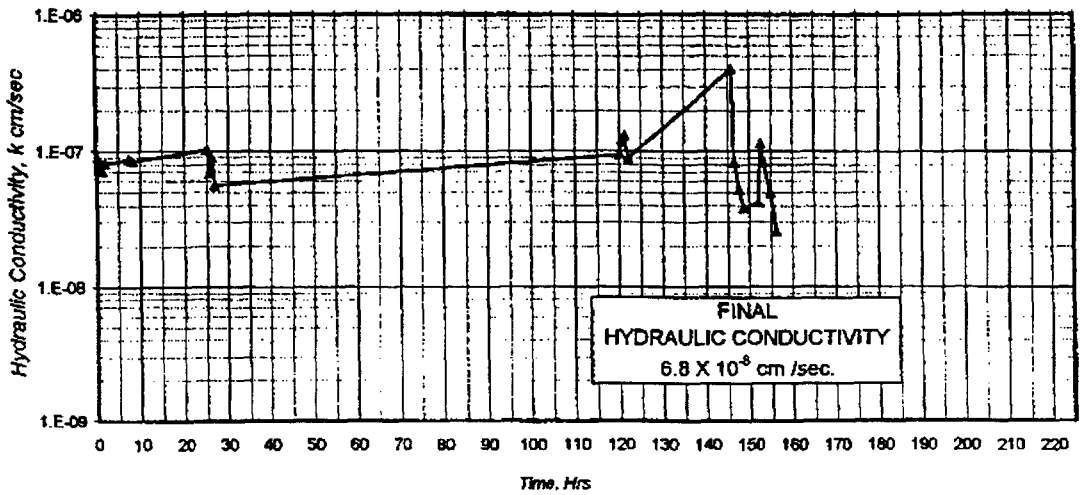
HYDRAULIC CONDUCTIVITY

of SEALED BOREHOLE

Boutwell Method ASTM D-6391

Client / Project Name:	Project No:	Test Sample Number:
Northwind Environmental	011211.00	B4

Sample ID:	Report Date:
INTAC / CDF Test Pad Section B	September 17, 2001



Installation Date:	September 7, 2001
Nominal Depth:	2 ft. Below Surface
Casing Diameter.:	0.5 ft.
Water content, cuttings	15.7

Test Data

Time hrs	k, cm/sec.	Time hrs	k, cm/sec.
0.4	9.0E-08	153.4	8.4E-08
0.9	7.6E-08	155.1	5.0E-08
1.3	7.1E-08	156.4	2.6E-08
1.9	8.1E-08		
7.6	8.7E-08		
8.2	8.4E-08		
25.3	1.0E-07		
25.9	6.9E-08		
26.4	9.0E-08		
27.0	5.6E-08		
120.3	9.4E-08		
120.7	1.2E-07		
121.4	1.3E-07		
122.1	8.9E-08		
146.0	4.0E-07		
146.7	8.3E-08		
147.8	5.2E-08		
148.8	3.9E-08		
152.3	4.2E-08		
152.8	1.1E-07		

Print Date: 11/19/01 Reviewed By: LSN: B4

DCN: TXK-QC-GRAPH (rev. 02/15/01)

Vector Engineering, Inc.

12438 Loma Rica, Grass Valley, CA, 530-272-2448

LABORATORY SERVICES

HYDRAULIC CONDUCTIVITY

of SEALED BOREHOLE

Boutwell Method ASTM D-6391

Client / Project Name: **Northwind Environmental**

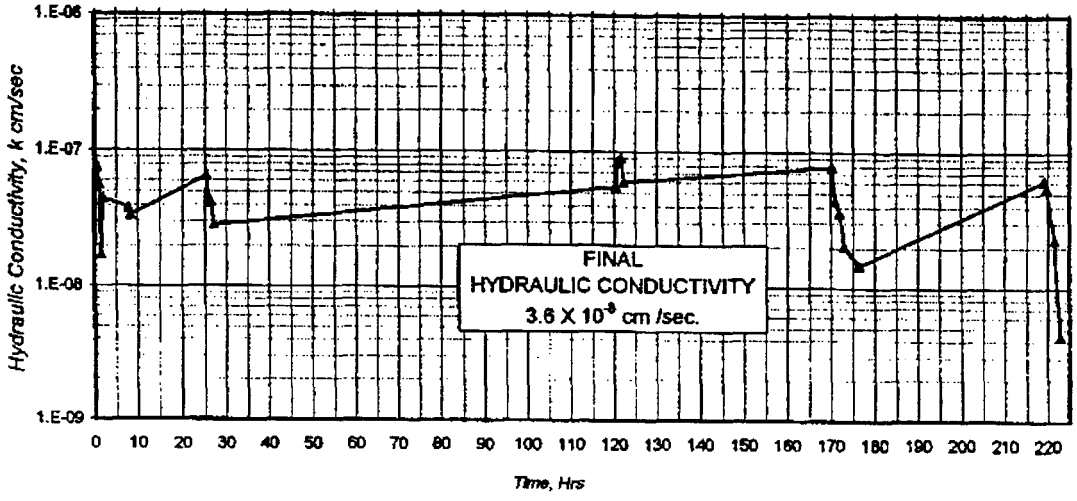
Project No: **011211.00**

Test Sample Number: **B5**

Sample ID: **INTAC / CDF Test Pad Section B**

Report Date: September 17, 2001

Hydraulic Conductivity vs Time



Installation Date:	September 7, 2001
Nominal Depth:	2 ft. 'Below Surface
Casing Diameter.:	0.5 ft.
Water content, cuttings	15.6

Test Data

Time hrs	k, cm/sec.	Time hrs	k, cm/sec.
0.6	7.5E-08	219.8	5.5E-08
1.1	5.7E-08	221.5	2.3E-08
1.5	1.7E-08	222.9	4.3E-09
2.1	4.5E-08		
7.8	3.8E-08		
8.4	3.4E-08		
25.5	6.5E-08		
26.1	4.1E-08		
26.5	4.2E-08		
27.2	2.8E-08		
120.5	5.6E-08		
120.9	8.6E-08		
121.7	9.0E-08		
122.4	6.0E-08		
170.3	7.8E-08		
171.0	4.5E-08		
172.0	3.6E-08		
173.1	2.1E-08		
176.5	1.5E-08		
219.2	6.2E-08		

Print Date: 11/19/01

Reviewed By:

LSN: **B5**

DCN: TXK-QC-GRAPH (rev. 02/15/01)

Vector Engineering, Inc.

12438 Loma Rica, Grass Valley, CA 530-272-2448

LABORATORY SERVICES

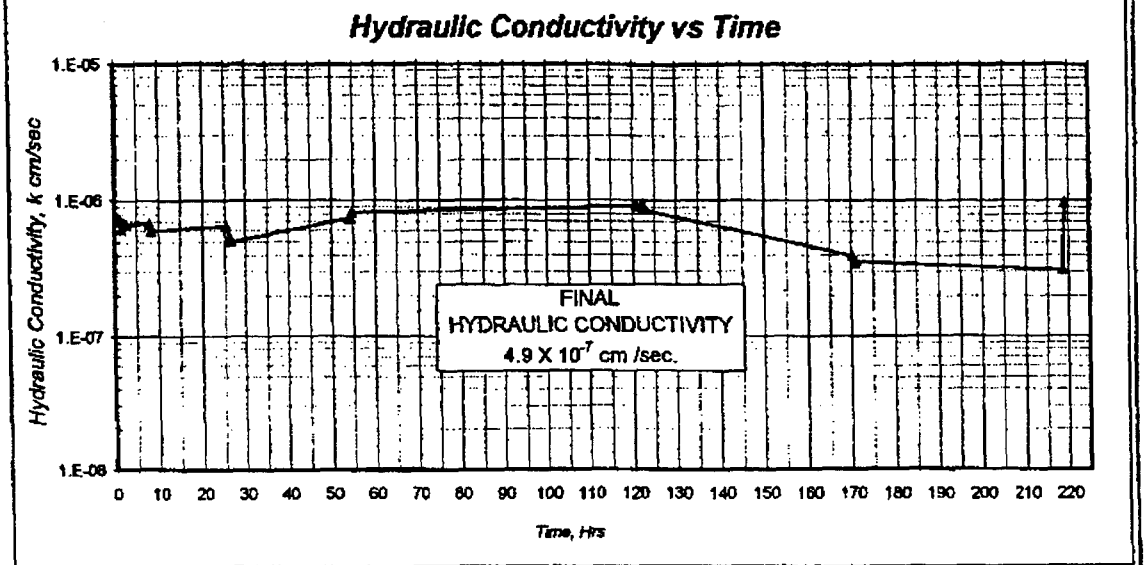
HYDRAULIC CONDUCTIVITY

of SEALED BOREHOLE

Boutwell Method ASTM D-6391

Client / Project Name:	Project No:	Test Sample Number:
Northwind Environmental	011211.00	B6

Sample ID:	Report Date:
INTAC / CDF Test Pad Section B	September 17, 2001



Installation Date:	September 7, 2001
Nominal Depth:	1 ft. Below Surface
Casing Diameter.:	0.5 ft.
Water content, cuttings	16.8

Test Data

Time hrs	k cm/sec.	Time hrs	k cm/sec.
0.7	7.5E-07	218.7	3.1E-07
1.4	7.1E-07	219.2	9.6E-07
1.7	6.1E-07		
2.2	6.8E-07		
2.7	6.7E-07		
8.0	6.8E-07		
8.4	6.0E-07		
25.6	6.5E-07		
26.3	5.5E-07		
26.8	5.0E-07		
54.1	7.4E-07		
54.6	7.4E-07		
54.8	8.2E-07		
120.7	9.1E-07		
121.2	9.0E-07		
122.4	9.4E-07		
122.6	8.6E-07		
170.3	4.0E-07		
170.9	3.5E-07		
171.3	3.6E-07		

Print Date:	Reviewed By:	LSN:
11/19/01		B6

DCN: TXK-QC-GRAPH (rev. 02/15/01)

Appendix A-7

Field Determination of Bentonite Quantity

FIELD DETERMINATION OF BENTONITE QUANTITY

Summary of Bentonitie Application Rate on Mixing Pad

BATCH	Date Started	width(ft)	length(ft)	depth(in)	moisture % (CQC)	Moisture sample #	moisture % (CQA)	Density of nat. clay on mixing table (CQC)	Wet Density of nat. clay on mixing table (CQA)	Dry Density of nat. clay on mixing table (CQA)	Bentonite Placed (measured in sampling pan = grams in 3.5 sf)	passes of spreader 1 Pass = back and forth over pan	Total Sacks Bentonite Placed (2,830. Lbs avg.)	% Bentonite based on total Sacks used
#1	8/16/01	46	100	6.33	9.9	MT#1	12.5				300	0.5	4	
					11.8	MT#2	10.7				138.7	0.5	(11320 lbs)	7.3%
											249.3	0.5		
											309.4	0.5		
											157.8	0.5		
											280.1	1		
#2	8/21/01	47.5	96	6.92		MT#3	14.3		71.5	62.6	170.7	0.5	4	6.7%
						MT#4	17		71.4	61	166.1	0.5	(2 by forklift)	
						MT#5	13		72.9	64.5	153.5	0.5	(11320 lbs)	
											226.9	0.5		
											148.7	0.5		
											162	0.5		
											186.3	0.5		
											139	0.5		
#3	8/22/01	46.5	102	6		MT#6	13.6	63.8			forklift		3	5.6%
						MT#7	14.3				no		(8490 lbs)	
						MT#8	14.8				measurement			
#4	8/23-8/24	48	99	8		MT#9	12.8		72.12	63.9	166	0.5	3.75	5.3%
						MT#10	12.4		72.54	64.5	152	0.5	(10612.5 lbs)	
						MT#11	12.7		70.8	62.8	101.4	0.5		
											179.2	0.5		
											134.9	0.5		
											109.5	0.5		
#5	8/27/01	48	100	8.33							160	0.5	4	5.3%
											180	0.5	(11320 lbs)	
											115	0.5		
#6	8/27/01 PM	49	97	8		MT#12	13.5				140	0.5	3.66	5.1%
											100	0.5	(10357 lbs)	
											125	0.5		
#7	8/28/01 PM	48	100	8.17				65			265	0.5	3.75	5.0%
											175	0.5	(10612.5 lbs)	
											140	0.5		
#8	8/29/01	50	99	8.3				62			321.2	0.5	3.75	5.0%
											102.5	0.5	(10612.5 lbs)	
											133.5	0.5		

Appendix A-8

Bentonite Manufacturers Certificate

BENTONITE MANUFACTURERS CERTIFICATE

WYO-BEN, INC.

CERTIFICATE OF QUALITY

DATE: 07/26/01

FOR:	PHENIX OF IDAHO, INC.
ORDER NO.:	LP3672
PRODUCT:	ENVIROGEL 200
LOT NO:	07240112

FAX TO: LANCE; 208-524-6610
BRIAN; 208-523-1863

THE FOLLOWING RESULTS WERE OBTAINED FROM TESTS RUN ON A COMPOSITE SAMPLE TAKEN FROM THE ABOVE LOT.

VISCOMETER READING @600 RPM	12
VISCOMETER READING @300 RPM	6
PV	6
YP	0
YIELD	67
MOISTURE %	5.0
MESH THRU 200 SCREEN %	80.4
FREE SWELL	24
COLLOID CONTENT	74.6

WE CERTIFY THAT THE TEST RESULTS CONTAINED HEREIN ARE ACCURATE AS REPORTED. THE RESULTS SHOULD BE REPLICATIVE ALLOWING FOR A MARGIN OF TEST PROCEDURE AND OPERATOR ERROR.

WYO-BEN, INC.

BY Rod Partridge
ROD PARTRIDGE
QUALITY ASSURANCE

STUCCO PLANT
WYOMING OPERATIONS OFFICE
P.O. BOX 1072
GREYBULL, WYOMING 82426 USA
307-765-4443 TELEFAX 307-765-2664

SAGE CREEK PLANT
Lovell, Wyoming

LUCERNE PLANT
Thermopolis, Wyoming

CORPORATE HEADQUARTERS
Billings, Montana

WYO-BEN, INC.

CERTIFICATE OF QUALITY

DATE: 08/14/01

TO: **PHENIX OF IDAHO, INC.**
FAX TO: LANCE; (208) 524-6610
BRIAN; (208) 523-1863

PRODUCT: ***ENVIROGEL 200***

THE FOLLOWING RESULTS WERE OBTAINED FROM TESTS RUN ON A COMPOSITE SAMPLE TAKEN FOR THE LOT NUMBER OF THE ABOVE PRODUCT.

ORDER NO.	LP3713
LOT NUMBER	08100112
VISCOMETER READING @600 RPM	16
VISCOMETER READING @300 RPM	9
PV	7
YP	2
YIELD	76
MOISTURE %	6.6
MESH THRU 200 SCREEN %	77.6
FREE SWELL	24
COLLOID CONTENT	77.8

WE HEREBY CERTIFY THAT THE TEST RESULTS CONTAINED HEREIN ARE ACCURATE AS REPORTED. THE TEST RESULTS SHOULD BE REPLICATIVE ALLOWING FOR A MARGIN OF TEST PROCEDURE ERROR AND OPERATOR ERROR.

WYO-BEN, INC.

MICHAEL T. WIRTZBERGER
QUALITY ASSURANCE MANAGER
STUCCO PLANT
WYOMING OPERATIONS OFFICE
P.O. BOX 1072
GREYBULL, WYOMING 82426 USA
307-765-4446 TELEFAX 307-765-2664

SAGE CREEK PLANT
Lovell, Wyoming

LUCERNE PLANT
Thermopolis, Wyoming

CORPORATE HEADQUARTERS
Billings, Montana

TECHNICAL INFORMATION SHEET

WYO-BEN, INC.
550 South 24th Street West, Suite 201
P. O. Box 1979
Billings, Montana 59103
USA
Tel: 406~652-6351 / Fax: 406~656-0748

SUBJECT: **ENVIROGEL® 200**

Powdered pure sodium bentonite for environmental sealing use.

COLOR: Light Gray

TYPICAL CHEMICAL ANALYSIS:

	%
SiO_2	60.34
Al_2O_3	19.28
Fe_2O_3	3.48
Na_2O	2.34
TiO_2	.22
CaO	.38
MgO	1.67
K_2O	.10
Other	.07
H_2O	7.75
L.O.I.	4.37

E.P. TOXICITY ANALYSIS:

	E.P.A. Standard ppm	Typical Analysis ppm
Arsenic	5.0	< 0.1
Barium	100.0	0.5
Cadmium	1.0	< 0.05
Chromium	5.0	< 0.1
Lead	5.0	< 0.1
Mercury	0.2	< 0.02
Selenium	1.0	< 0.05
Silver	5.0	< 0.1

SPECIFIC GRAVITY: 2.55 ± 0.1

SURFACE AREA (m^2/gm):

External Surface	82
All Surfaces	800

BULK DENSITY (lbs/ft^3): 55

TYPICAL PARTICLE SIZE:

U.S. Std. Sieve Size	% Passing
80 mesh (180μ)	98.0
100 mesh (150μ)	95.8
200 mesh (75μ)	80.6
325 mesh (45μ)	51.7

TYPICAL CHARACTERISTICS:

Wet Screen Analysis Residue on U.S. Sieve No. 200	3.0 ± 0.5
pH	9.1 ± 0.4
Moisture Content - %	6-9
Cation Exchange Capacity (CEC meq/100 gm)	70-90
Free Swell (cc/2 gm)	22 ± 4
API Apparent Viscosity (cPs)	13 ± 3
API 30 Min. Fluid Loss (cc.)	15 ± 2

USES:
Soil add mixtures for landfill liners and covers, sewage lagoons and pond liners

Rev 6/99