

**Appendix E**

**Laboratory Test Results**



## Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN      Project Number 171468118  
 Source Section A - Crest, 7.5'-9.0', 9.0'-10.5'      Lab ID 565  
 County Humphreys, TN      Date Received 3-17-09  
 Sample Type SPT Composite      Date Reported 3-30-09

### Test Results

#### Natural Moisture Content

Test Not Performed  
 Moisture Content (%): N/A

#### Atterberg Limits

Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: 46  
 Plastic Limit: 18  
 Plasticity Index: 28  
 Activity Index: 0.93

#### Particle Size Analysis

Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	93.7
No. 4	4.75	89.3
No. 10	2	85.8
No. 40	0.425	81.2
No. 200	0.075	74.8
	0.02	53.9
	0.005	34.7
	0.002	29.6
estimated	0.001	27.5

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	10.7	14.2
Coarse Sand	3.5	4.6
Medium Sand	4.6	---
Fine Sand	6.4	6.4
Silt	40.1	45.2
Clay	34.7	29.6

#### Moisture-Density Relationship

Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

#### California Bearing Ratio

Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

#### Specific Gravity

Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.66

#### Classification

Unified Group Symbol: CL  
 Group Name: Lean clay with sand  
 AASHTO Classification: A-7-6 (20)

Comments: \_\_\_\_\_

Reviewed by: RHB

Project Name TVA Facility Assessment, P2: Johnsonville, TN  
 Source Section A - Crest, 7.5'-9.0', 9.0'-10.5'

 Project Number 171468118  
 Lab ID 565
**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

 Test Method: ASTM D 422  
 Prepared using: ASTM D 421

 Particle Shape: Angular  
 Particle Hardness: Hard and Durable

 Tested By: RHB  
 Test Date: 03-18-2009  
 Date Received 03-17-2009

 Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	93.7
No. 4	89.3
No. 10	85.8

**Analysis for the portion Finer than the No. 10 Sieve**

 Analysis Based on: Total Sample

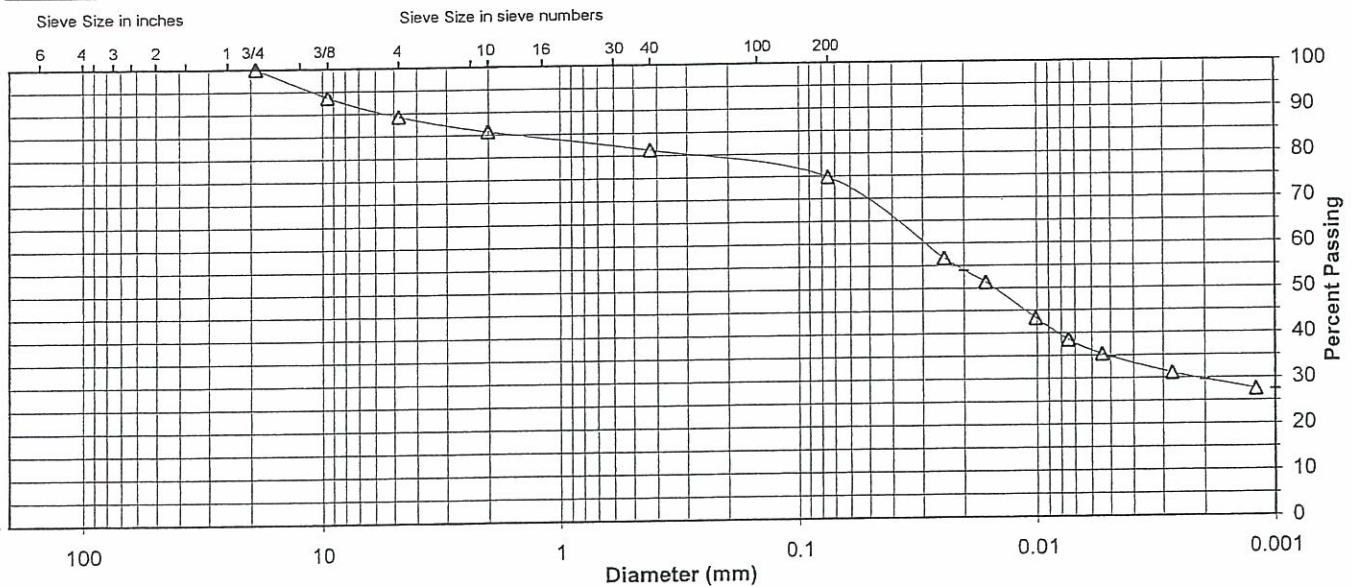
 Specific Gravity 2.66

 Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	81.2
No. 200	74.8
0.02 mm	53.9
0.005 mm	34.7
0.002 mm	29.6
0.001 mm	27.5

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	10.7	3.5	4.6	6.4	40.1	34.7
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	14.2		4.6		6.4	45.2	29.6



Comments \_\_\_\_\_

 Reviewed By RHB



## Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN      Project Number 171468118  
 Source Section A - Crest, 41.0'-42.5', 42.5'-44.0'      Lab ID 566  
 County Humphreys, TN      Date Received 3-17-09  
 Sample Type SPT Composite      Date Reported 4-3-09

### Test Results

#### Natural Moisture Content

Test Not Performed  
 Moisture Content (%): N/A

#### Atterberg Limits

Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: 41  
 Plastic Limit: 22  
 Plasticity Index: 19  
 Activity Index: 0.56

#### Particle Size Analysis

Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	93.5
No. 200	0.075	89.5
	0.02	76.0
	0.005	45.3
	0.002	34.2
estimated	0.001	30.2

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	6.5
Medium Sand	6.5	---
Fine Sand	4.0	4.0
Silt	44.2	55.3
Clay	45.3	34.2

#### Moisture-Density Relationship

Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

#### California Bearing Ratio

Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

#### Specific Gravity

Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.64

#### Classification

Unified Group Symbol: CL  
 Group Name: Lean clay  
 AASHTO Classification: A-7-6 ( 18 )

Comments: \_\_\_\_\_

Reviewed by: RHB

Project Name TVA Facility Assessment, P2: Johnsonville, TN  
Source Section A - Crest, 41.0'-42.5', 42.5'-44.0'

Project Number 171468118  
Lab ID 566

**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

Test Method: ASTM D 422  
Prepared using: ASTM D 421

Particle Shape: N/A  
Particle Hardness: N/A

Tested By: RHB  
Test Date: 03-25-2009  
Date Received: 03-17-2009

Maximum Particle size: No. 10 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

**Analysis for the portion Finer than the No. 10 Sieve**

Analysis Based on: Total Sample

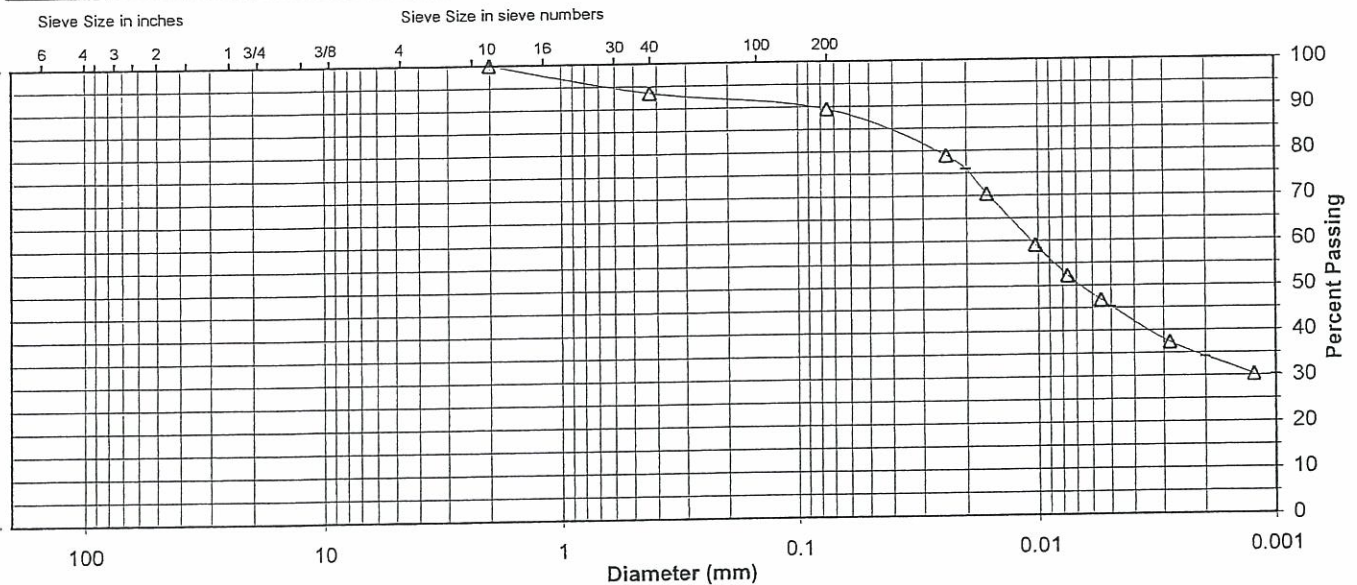
Specific Gravity 2.64

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	93.5
No. 200	89.5
0.02 mm	76.0
0.005 mm	45.3
0.002 mm	34.2
0.001 mm	30.2

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.0	6.5	4.0	44.2	45.3
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.0		6.5	4.0	55.3		34.2



Comments \_\_\_\_\_

Reviewed By RHB



Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source Section A - Toe, 47.5'-49.0', 50.0'-51.5' Lab ID 605  
 County Humphreys, TN Date Received 3-20-09  
 Sample Type SPT Composite Date Reported 4-10-09

Test Results

**Natural Moisture Content**  
 Test Not Performed  
 Moisture Content (%): N/A

**Atterberg Limits**  
 Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: ---  
 Plastic Limit: Non Plastic  
 Plasticity Index: ---  
 Activity Index: N/A

**Particle Size Analysis**  
 Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

**Moisture-Density Relationship**  
 Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	100.0
3/4"	19	99.0
3/8"	9.5	95.0
No. 4	4.75	89.5
No. 10	2	78.8
No. 40	0.425	21.5
No. 200	0.075	6.3
	0.02	3.5
	0.005	2.5
	0.002	1.8
estimated	0.001	1.6

**California Bearing Ratio**  
 Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

Plus 3 in. material, not included: 0 (%)

**Specific Gravity**  
 Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.68

Range	ASTM (%)	AASHTO (%)
Gravel	10.5	21.2
Coarse Sand	10.7	57.3
Medium Sand	57.3	---
Fine Sand	15.2	15.2
Silt	3.8	4.5
Clay	2.5	1.8

**Classification**  
 Unified Group Symbol: SW-SM  
 Group Name: Well-graded sand with silt  
 AASHTO Classification: A-1-b (1)

Comments: \_\_\_\_\_

Reviewed by: RHB

Project Name TVA Facility Assessment, P2: Johnsonville, TN  
Source Section A - Toe, 47.5'-49.0', 50.0'-51.5'

Project Number 171468118  
Lab ID 605

**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

Test Method: ASTM D 422  
Prepared using: ASTM D 421

Particle Shape: Angular  
Particle Hardness: Hard and Durable

Tested By: RHB  
Test Date: 04-02-2009  
Date Received 03-20-2009

Maximum Particle size: 1" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	99.0
3/8"	95.0
No. 4	89.5
No. 10	78.8

**Analysis for the portion Finer than the No. 10 Sieve**

Analysis Based on: Total Sample

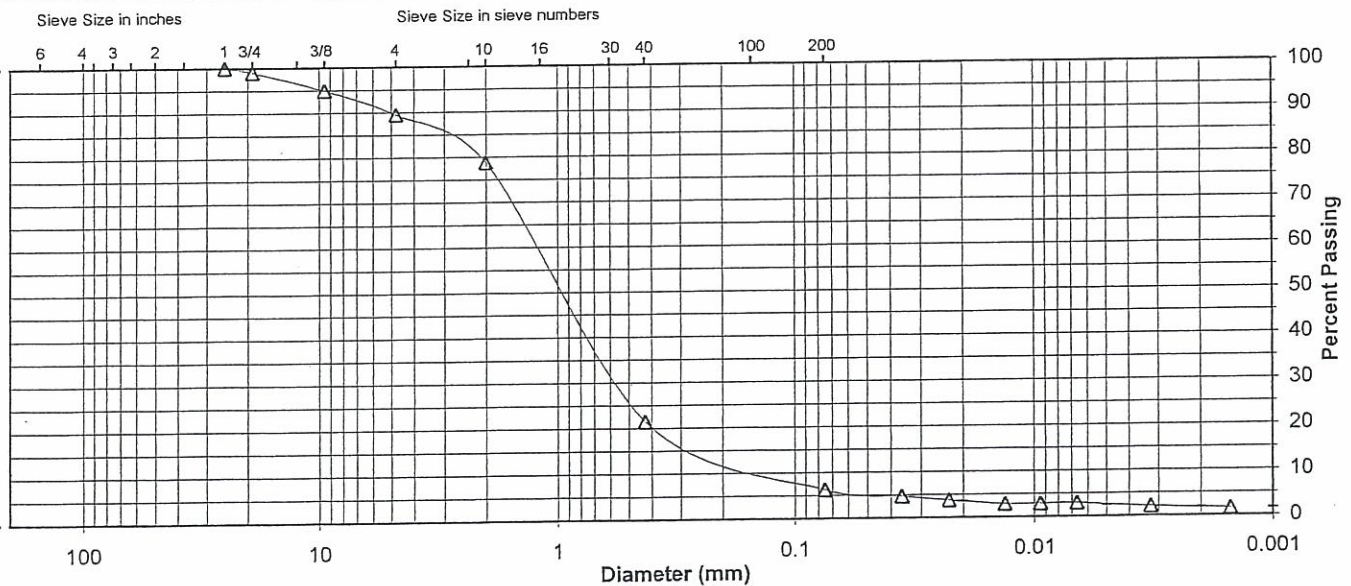
Specific Gravity 2.68

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	21.5
No. 200	6.3
0.02 mm	3.5
0.005 mm	2.5
0.002 mm	1.8
0.001 mm	1.6

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	1.0	9.5	10.7	57.3	15.2	3.8	2.5
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	21.2		57.3	15.2	4.5		1.8



Comments \_\_\_\_\_

Reviewed By RHB



Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source Section B - Crest, 21.0' -22.5', 22.5'-24.0' Lab ID 980  
 County Humphreys, TN Date Received 4-7-09  
 Sample Type SPT Composite Date Reported 4-27-09

Test Results

**Natural Moisture Content**  
 Test Not Performed  
 Moisture Content (%): N/A

**Atterberg Limits**  
 Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: 46  
 Plastic Limit: 15  
 Plasticity Index: 31  
 Activity Index: 1.00

**Particle Size Analysis**  
 Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	94.8
No. 4	4.75	91.8
No. 10	2	87.6
No. 40	0.425	84.7
No. 200	0.075	74.1
	0.02	56.8
	0.005	36.3
	0.002	30.8
estimated	0.001	28.0

**Moisture-Density Relationship**  
 Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	8.2	12.4
Coarse Sand	4.2	2.9
Medium Sand	2.9	---
Fine Sand	10.6	10.6
Silt	37.8	43.3
Clay	36.3	30.8

**California Bearing Ratio**  
 Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

**Specific Gravity**  
 Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.72

**Classification**  
 Unified Group Symbol: CL  
 Group Name: Lean clay with sand  
 AASHTO Classification: A-7-6 ( 21 )

Comments: \_\_\_\_\_

Reviewed by: RHB



Project Name TVA Facility Assessment, P2: Johnsonville, TN  
 Source Section B - Crest, 21.0' -22.5', 22.5'-24.0'

 Project Number 171468118  
 Lab ID 980
**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

 Test Method: ASTM D 422  
 Prepared using: ASTM D 421  
 Particle Shape: Rounded and Angular  
 Particle Hardness: Hard and Durable  
 Tested By: AR  
 Test Date: 04-21-2009  
 Date Received: 04-07-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	94.8
No. 4	91.8
No. 10	87.6

Maximum Particle size: 3/4" Sieve

**Analysis for the portion Finer than the No. 10 Sieve**

Analysis Based on: Total Sample

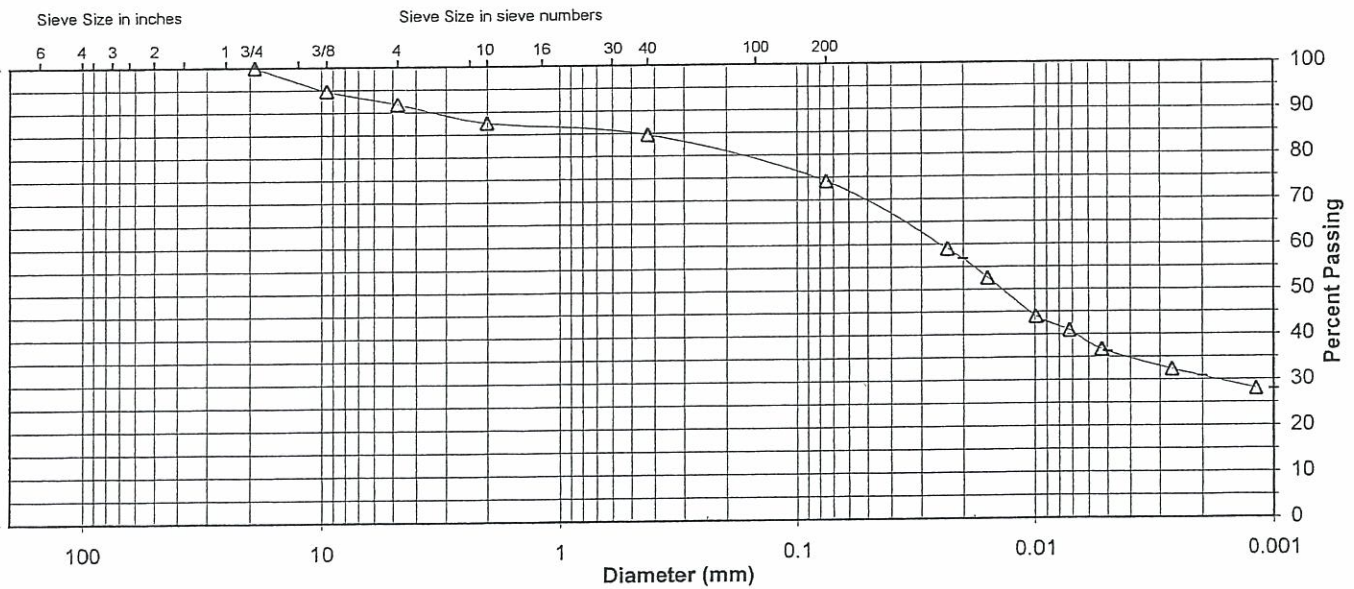
 Specific Gravity 2.72

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	84.7
No. 200	74.1
0.02 mm	56.8
0.005 mm	36.3
0.002 mm	30.8
0.001 mm	28.0

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	8.2	4.2	2.9	10.6	37.8	36.3
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	12.4		2.9		10.6	43.3	30.8



Comments \_\_\_\_\_

 Reviewed By RMB



## Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN      Project Number 171468118  
 Source Section B - Crest, 31.5'-33.0'      Lab ID 628  
 County Humphreys, TN      Date Received 3-20-09  
 Sample Type SPT      Date Reported 4-10-09

### Test Results

#### Natural Moisture Content

Test Method: ASTM D 2216  
 Moisture Content (%): 28.9

#### Atterberg Limits

Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: 25  
 Plastic Limit: 24  
 Plasticity Index: 1  
 Activity Index: 0.11

#### Particle Size Analysis

Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.9
No. 200	0.075	95.3
	0.02	51.1
	0.005	12.2
	0.002	8.8
estimated	0.001	8.6

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.1
Medium Sand	0.1	---
Fine Sand	4.6	4.6
Silt	83.1	86.5
Clay	12.2	8.8

#### Moisture-Density Relationship

Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

#### California Bearing Ratio

Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

#### Specific Gravity

Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.69

#### Classification

Unified Group Symbol: ML  
 Group Name: Silt  
 AASHTO Classification: A-4 (0)

Comments: \_\_\_\_\_

Reviewed by: RHB

Project Name TVA Facility Assessment, P2: Johnsonville, TN  
Source Section B - Crest, 31.5'-33.0'

Project Number 171468118  
Lab ID 628

**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

Test Method: ASTM D 422  
Prepared using: ASTM D 421

Particle Shape: N/A  
Particle Hardness: N/A

Tested By: RHB  
Test Date: 03-31-2009  
Date Received 03-20-2009

Maximum Particle size: No. 10 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

**Analysis for the portion Finer than the No. 10 Sieve**

Analysis Based on: Total Sample

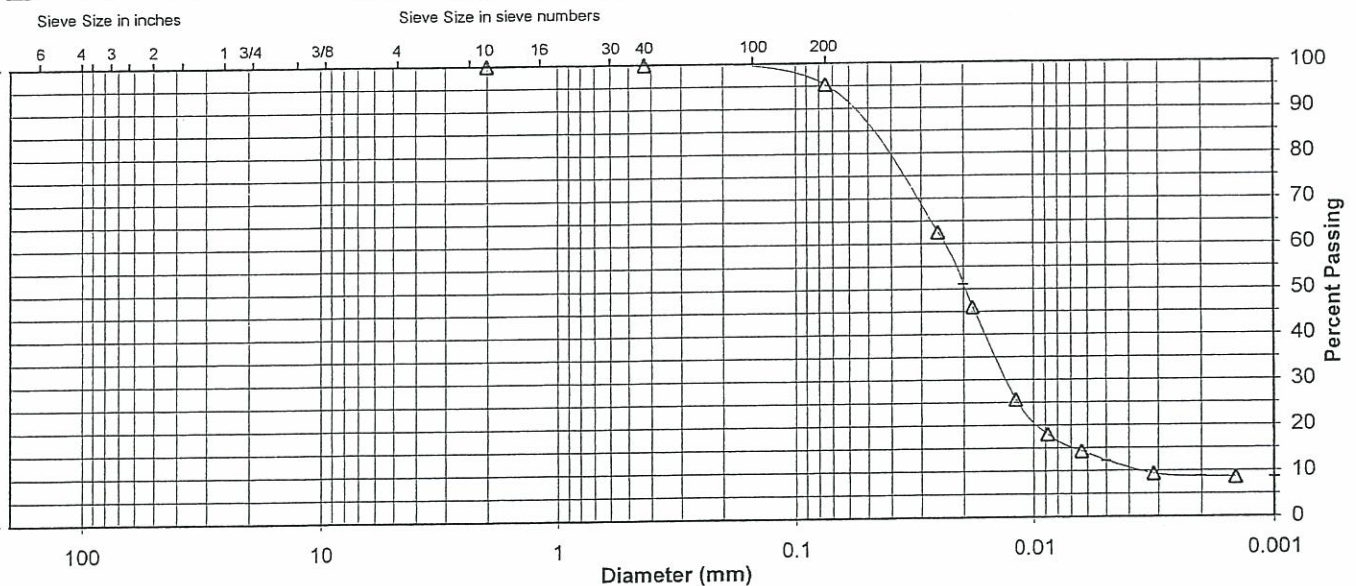
Specific Gravity 2.69

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.9
No. 200	95.3
0.02 mm	51.1
0.005 mm	12.2
0.002 mm	8.8
0.001 mm	8.6

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
		0.0	0.0	0.0	0.1	4.6	83.1
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	0.0		0.1	4.6	86.5		8.8



Comments \_\_\_\_\_

Reviewed By RHB



## Summary of Soil Tests

Project Name	TVA Facility Assessment, P2: Johnsonville, TN	Project Number	171468118
Source	Section C - Toe, 12.0'-13.5', 13.5'-15.0'	Lab ID	716
County	Humphreys, TN	Date Received	3-20-09
Sample Type	SPT Composite	Date Reported	4-10-09

### Test Results

**Natural Moisture Content**

Test Not Performed  
Moisture Content (%):       N/A      

**Atterberg Limits**

Test Method: ASTM D 4318 Method A  
Prepared: Dry

Liquid Limit:       35        
Plastic Limit:       18        
Plasticity Index:       17        
Activity Index:       0.81      

**Particle Size Analysis**

Preparation Method: ASTM D 421  
Gradation Method: ASTM D 422  
Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	91.3
No. 4	4.75	79.5
No. 10	2	71.2
No. 40	0.425	64.5
No. 200	0.075	55.8
	0.02	42.6
	0.005	26.9
	0.002	20.6
estimated	0.001	19.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	20.5	28.8
Coarse Sand	8.3	6.7
Medium Sand	6.7	---
Fine Sand	8.7	8.7
Silt	28.9	35.2
Clay	26.9	20.6

**Moisture-Density Relationship**

Test Not Performed

Maximum Dry Density (lb/ft<sup>3</sup>):       N/A        
Maximum Dry Density (kg/m<sup>3</sup>):       N/A        
Optimum Moisture Content (%):       N/A        
Over Size Correction %:       N/A      

**California Bearing Ratio**

Test Not Performed

Bearing Ratio (%):       N/A        
Compacted Dry Density (lb/ft<sup>3</sup>):       N/A        
Compacted Moisture Content (%):       N/A      

**Specific Gravity**

Test Method: ASTM D 854  
Prepared: Dry

Particle Size:       No. 10        
Specific Gravity at 20° Celsius:       2.75      

**Classification**

Unified Group Symbol:       CL        
Group Name:       Sandy lean clay with gravel      

AASHTO Classification:       A-6 (7)      

Comments: \_\_\_\_\_

Reviewed by:       RHB

Project Name TVA Facility Assessment, P2: Johnsonville, TN  
Source Section C - Toe, 12.0'-13.5', 13.5'-15.0'

Project Number 171468118  
Lab ID 716

**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

Test Method: ASTM D 422  
Prepared using: ASTM D 421

Particle Shape: Rounded  
Particle Hardness: Hard and Durable

Tested By: AR  
Test Date: 04-03-2009  
Date Received 03-20-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	91.3
No. 4	79.5
No. 10	71.2

**Analysis for the portion Finer than the No. 10 Sieve**

Analysis Based on: Total Sample

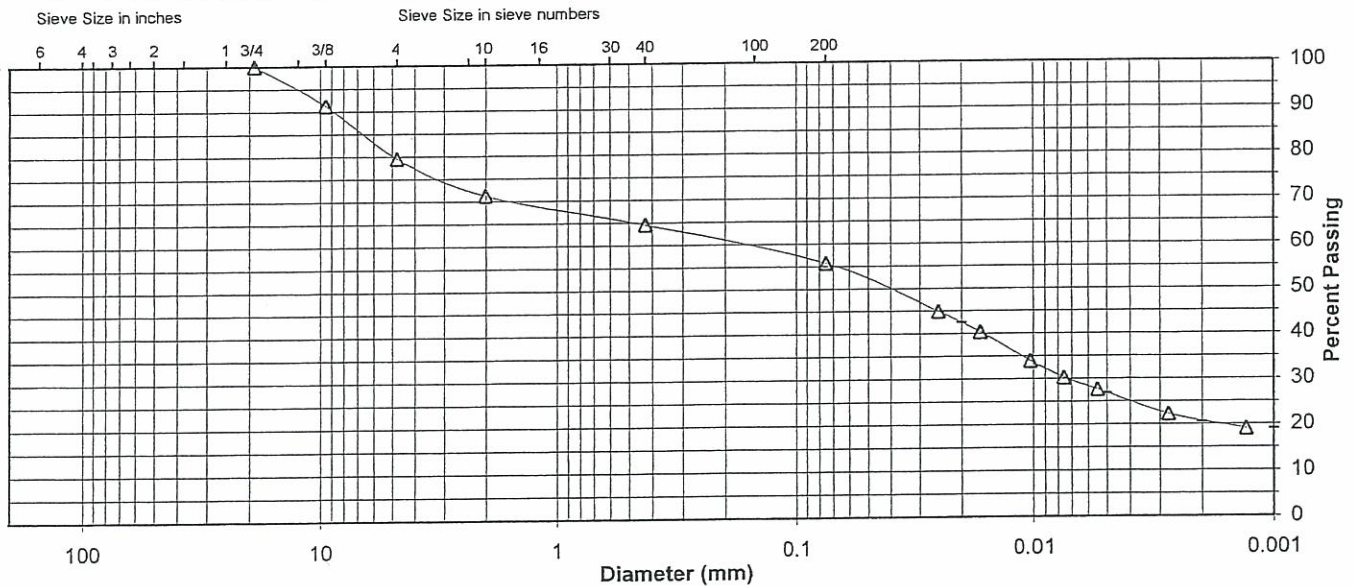
Specific Gravity 2.75

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	64.5
No. 200	55.8
0.02 mm	42.6
0.005 mm	26.9
0.002 mm	20.6
0.001 mm	19.0

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	20.5	8.3	6.7	8.7	28.9	26.9
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	28.8		6.7		8.7	35.2	20.6



Comments \_\_\_\_\_

Reviewed By RHB



Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source Section D - Crest, 6.0'-7.5', 7.5'-9.0' Lab ID 740  
 County Humphreys, TN Date Received 3-20-09  
 Sample Type SPT Composite Date Reported 4-10-09

Test Results

**Natural Moisture Content**  
 Test Not Performed  
 Moisture Content (%): N/A

**Atterberg Limits**  
 Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: 37  
 Plastic Limit: 18  
 Plasticity Index: 19  
 Activity Index: 0.68

**Particle Size Analysis**  
 Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.3
No. 10	2	98.6
No. 40	0.425	97.3
No. 200	0.075	95.3
	0.02	69.4
	0.005	34.2
	0.002	27.6
estimated	0.001	25.1

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.7	1.4
Coarse Sand	0.7	1.3
Medium Sand	1.3	---
Fine Sand	2.0	2.0
Silt	61.1	67.7
Clay	34.2	27.6

**Moisture-Density Relationship**  
 Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

**California Bearing Ratio**  
 Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

**Specific Gravity**  
 Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.69

**Classification**  
 Unified Group Symbol: CL  
 Group Name: Lean clay  
 AASHTO Classification: A-6 ( 18 )

Comments: \_\_\_\_\_

Reviewed by: RHB

Project Name TVA Facility Assessment, P2: Johnsonville, TN  
 Source Section D - Crest, 6.0'-7.5', 7.5'-9.0'

 Project Number 171468118  
 Lab ID 740
**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

 Test Method: ASTM D 422  
 Prepared using: ASTM D 421

 Particle Shape: Angular  
 Particle Hardness: Hard and Durable

 Tested By: RHB  
 Test Date: 04-01-2009  
 Date Received: 03-20-2009

 Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.3
No. 10	98.6

**Analysis for the portion Finer than the No. 10 Sieve**

 Analysis Based on: Total Sample

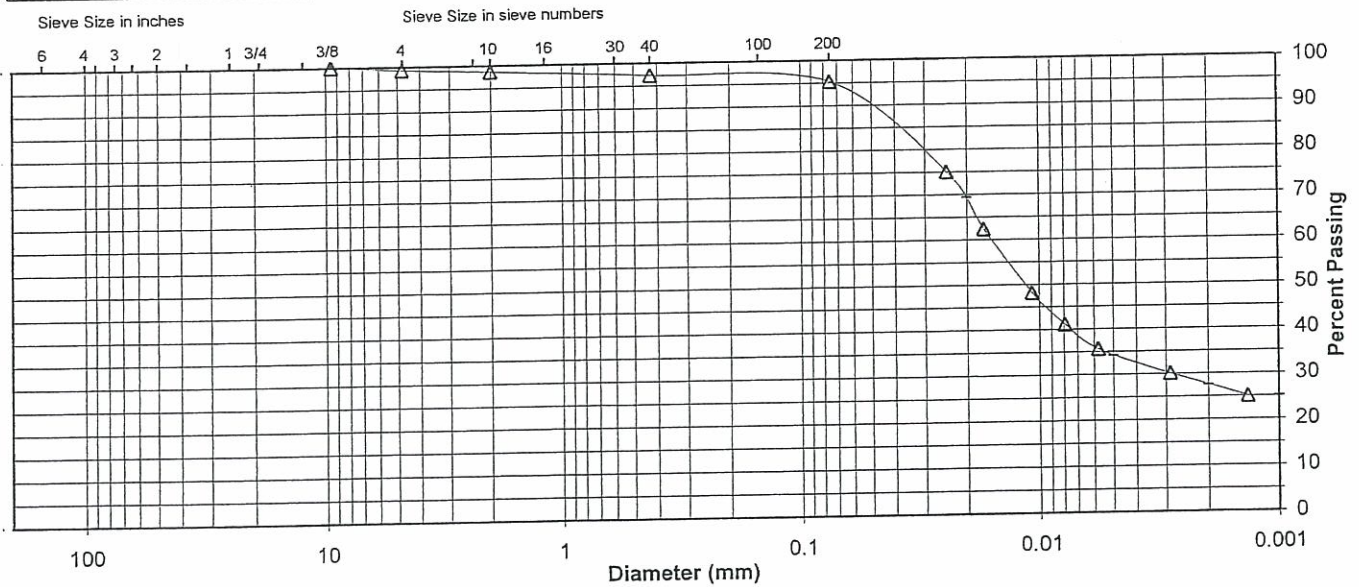
 Specific Gravity 2.69

 Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	97.3
No. 200	95.3
0.02 mm	69.4
0.005 mm	34.2
0.002 mm	27.6
0.001 mm	25.1

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.7	0.7	1.3	2.0	61.1	34.2	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	1.4		1.3		2.0	67.7		27.6



Comments \_\_\_\_\_

 Reviewed By RHB



Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source Section E - Toe, 17.5'-19.0', 19.0'-20.5' Lab ID 562  
 County Humphreys, TN Date Received 3-17-09  
 Sample Type SPT Composite Date Reported 4-3-09

Test Results

**Natural Moisture Content**  
 Test Not Performed  
 Moisture Content (%): N/A

**Atterberg Limits**  
 Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: 40  
 Plastic Limit: 20  
 Plasticity Index: 20  
 Activity Index: 0.63

**Particle Size Analysis**  
 Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

**Moisture-Density Relationship**  
 Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	99.9
No. 40	0.425	99.3
No. 200	0.075	91.3
	0.02	70.8
	0.005	40.5
	0.002	32.1
estimated	0.001	28.9

**California Bearing Ratio**  
 Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

Plus 3 in. material, not included: 0 (%)

**Specific Gravity**  
 Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.64

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.1
Coarse Sand	0.1	0.6
Medium Sand	0.6	---
Fine Sand	8.0	8.0
Silt	50.8	59.2
Clay	40.5	32.1

**Classification**  
 Unified Group Symbol: CL  
 Group Name: Lean clay  
 AASHTO Classification: A-6 ( 19 )

Comments: \_\_\_\_\_

Reviewed by: RHB



Project Name TVA Facility Assessment, P2: Johnsonville, TN  
 Source Section E - Toe, 17.5'-19.0', 19.0'-20.5'

 Project Number 171468118  
 Lab ID 562
**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

 Test Method: ASTM D 422  
 Prepared using: ASTM D 421

 Particle Shape: Angular  
 Particle Hardness: Hard and Durable

 Tested By: RHB  
 Test Date: 03-24-2009  
 Date Received 03-17-2009

Maximum Particle size: No. 4 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	99.9

**Analysis for the portion Finer than the No. 10 Sieve**

Analysis Based on: Total Sample

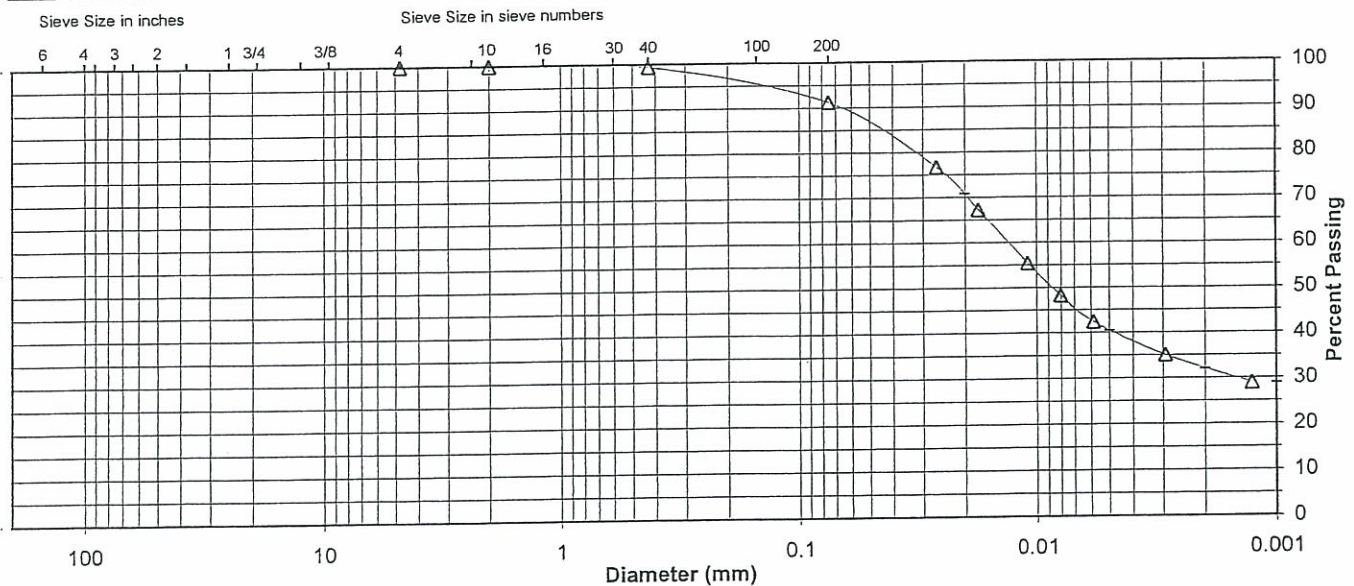
 Specific Gravity 2.64

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.3
No. 200	91.3
0.02 mm	70.8
0.005 mm	40.5
0.002 mm	32.1
0.001 mm	28.9

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.0	0.1	0.6	8.0	50.8	40.5
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	0.1		0.6		8.0	59.2	32.1



Comments \_\_\_\_\_

 Reviewed By RHB



Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source Section E - Toe, 41.5'-43.0', 44.0'-45.5', 46.5'-48.0' Lab ID 563  
 County Humphreys, TN Date Received 3-17-09  
 Sample Type SPT Composite Date Reported 3-30-09

Test Results

**Natural Moisture Content**  
 Test Not Performed  
 Moisture Content (%): N/A

**Atterberg Limits**  
 Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: ---  
 Plastic Limit: Non Plastic  
 Plasticity Index: ---  
 Activity Index: N/A

**Particle Size Analysis**  
 Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

**Moisture-Density Relationship**  
 Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

Particle Size		%
Sieve Size	(mm)	Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	97.1
No. 4	4.75	91.0
No. 10	2	81.4
No. 40	0.425	42.7
No. 200	0.075	6.9
	0.02	3.6
	0.005	2.3
	0.002	2.2
estimated	0.001	2.0

**California Bearing Ratio**  
 Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

Plus 3 in. material, not included: 0 (%)

**Specific Gravity**  
 Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.68

Range	ASTM (%)	AASHTO (%)
Gravel	9.0	18.6
Coarse Sand	9.6	38.7
Medium Sand	38.7	---
Fine Sand	35.8	35.8
Silt	4.6	4.7
Clay	2.3	2.2

**Classification**  
 Unified Group Symbol: SP-SM  
 Group Name: Poorly graded sand with silt  
 AASHTO Classification: A-1-b ( 1 )

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 Reviewed by: RHB

Project Name TVA Facility Assessment, P2: Johnsonville, TN  
 Source Section E - Toe, 41.5'-43.0', 44.0'-45.5', 46.5'-48.0'

 Project Number 171468118  
 Lab ID 563
**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

 Test Method: ASTM D 422  
 Prepared using: ASTM D 421

 Particle Shape: Rounded and Angular  
 Particle Hardness: Hard and Durable

 Tested By: RHB  
 Test Date: 03-18-2009  
 Date Received 03-17-2009

 Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	97.1
No. 4	91.0
No. 10	81.4

**Analysis for the portion Finer than the No. 10 Sieve**

 Analysis Based on: Total Sample

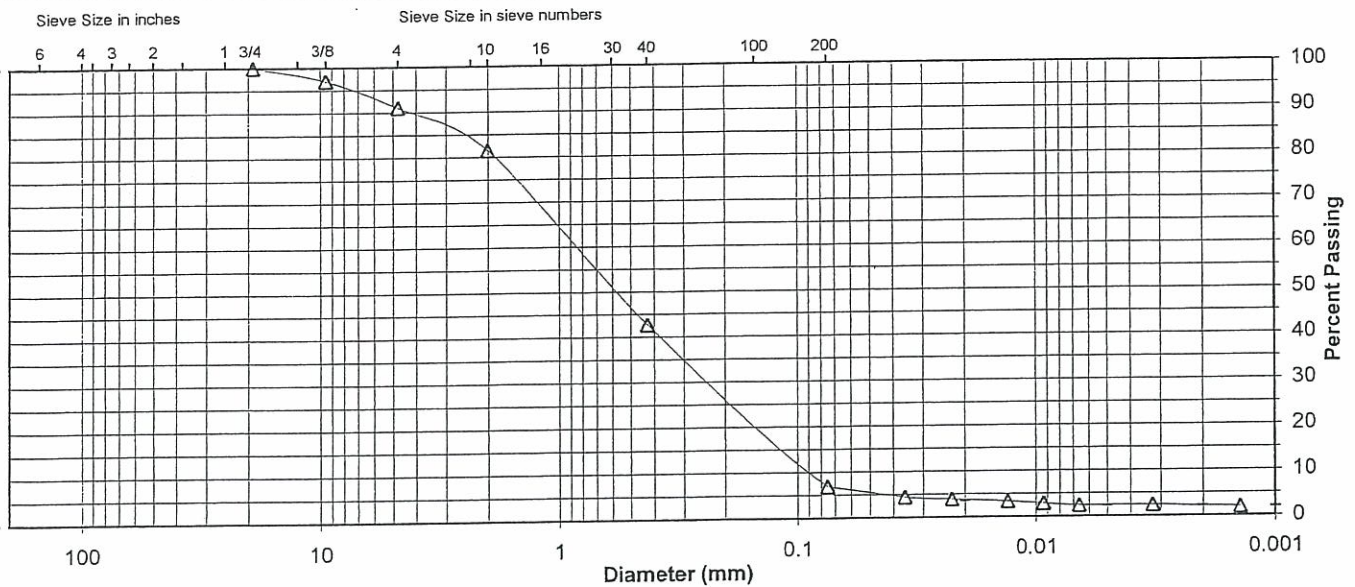
 Specific Gravity 2.68

 Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	42.7
No. 200	6.9
0.02 mm	3.6
0.005 mm	2.3
0.002 mm	2.2
0.001 mm	2.0

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	9.0	9.6	38.7	35.8	4.6	2.3
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt	Clay
	18.6			38.7	35.8	4.7	2.2



Comments \_\_\_\_\_

 Reviewed By RHB



Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source Section F - Crest, 15.0'-16.5' Lab ID 808  
 County Humphreys, TN Date Received 4-7-09  
 Sample Type SPT Composite Date Reported 4-27-09

Test Results

**Natural Moisture Content**  
 Test Method: ASTM D 2216  
 Moisture Content (%): 12.1

**Atterberg Limits**  
 Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: ---  
 Plastic Limit: Non Plastic  
 Plasticity Index: ---  
 Activity Index: N/A

**Particle Size Analysis**  
 Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	100.0
1"	25	95.3
3/4"	19	94.0
3/8"	9.5	84.8
No. 4	4.75	76.2
No. 10	2	61.8
No. 40	0.425	41.0
No. 200	0.075	23.3
	0.02	7.7
	0.005	1.7
	0.002	0.5
estimated	0.001	0.2

**Moisture-Density Relationship**  
 Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	23.8	38.2
Coarse Sand	14.4	20.8
Medium Sand	20.8	---
Fine Sand	17.7	17.7
Silt	21.6	22.8
Clay	1.7	0.5

**California Bearing Ratio**  
 Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

**Specific Gravity**  
 Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.66

**Classification**  
 Unified Group Symbol: SM  
 Group Name: Silty sand with gravel  
 AASHTO Classification: A-1-b (0)

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 Reviewed by: RHB

Project Name TVA Facility Assessment, P2: Johnsonville, TN  
 Source Section F - Crest, 15.0'-16.5'

Project Number 171468118  
 Lab ID 808

**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

Test Method: ASTM D 422  
 Prepared using: ASTM D 421

Particle Shape: Rounded and Angular  
 Particle Hardness: Hard and Durable

Tested By: RHB  
 Test Date: 04-16-2009  
 Date Received 04-07-2009

Maximum Particle size: 1 1/2" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	100.0
1"	95.3
3/4"	94.0
3/8"	84.8
No. 4	76.2
No. 10	61.8

**Analysis for the portion Finer than the No. 10 Sieve**

Analysis Based on: Total Sample

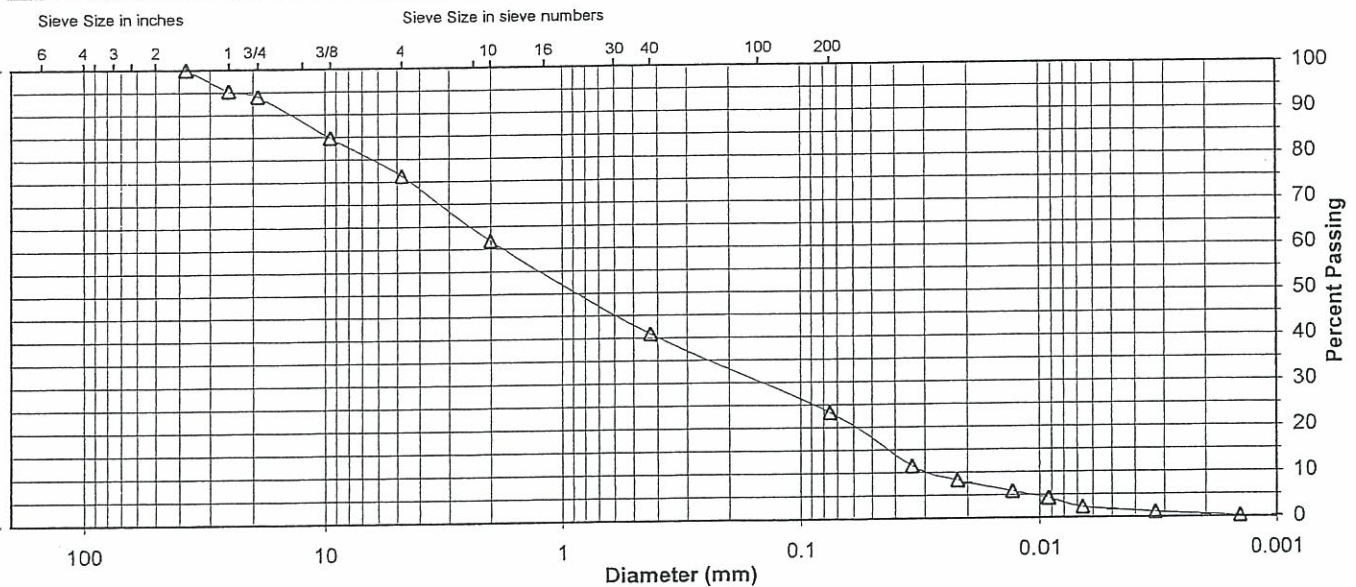
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	41.0
No. 200	23.3
0.02 mm	7.7
0.005 mm	1.7
0.002 mm	0.5
0.001 mm	0.2

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	6.0	17.8	14.4	20.8	17.7	21.6	1.7	
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt		Clay
	38.2			20.8	17.7	22.8		0.5



Comments \_\_\_\_\_

Reviewed By RHB



Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source Section F - Crest, 21.5'-23.0', 23.0'-24.5' Lab ID 811  
 County Humphreys, TN Date Received 4-7-09  
 Sample Type SPT Composite Date Reported 4-27-09

Test Results

**Natural Moisture Content**  
 Test Not Performed  
 Moisture Content (%): N/A

**Atterberg Limits**  
 Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: 40  
 Plastic Limit: 20  
 Plasticity Index: 20  
 Activity Index: 0.59

**Particle Size Analysis**  
 Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	98.4
No. 40	0.425	95.6
No. 200	0.075	88.7
	0.02	74.8
	0.005	46.3
	0.002	34.3
estimated	0.001	30.1

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	1.6
Coarse Sand	1.6	2.8
Medium Sand	2.8	---
Fine Sand	6.9	6.9
Silt	42.4	54.4
Clay	46.3	34.3

**Moisture-Density Relationship**  
 Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

**California Bearing Ratio**  
 Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

**Specific Gravity**  
 Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.71

**Classification**  
 Unified Group Symbol: CL  
 Group Name: Lean clay  
 AASHTO Classification: A-6 ( 18 )

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 Reviewed by: RHB

Project Name TVA Facility Assessment, P2: Johnsonville, TN  
 Source Section F - Crest, 21.5'-23.0', 23.0'-24.5'

 Project Number 171468118  
 Lab ID 811
**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

 Test Method: ASTM D 422  
 Prepared using: ASTM D 421

 Particle Shape: Rounded and Angular  
 Particle Hardness: Hard and Durable

 Tested By: AR  
 Test Date: 04-22-2009  
 Date Received 04-07-2009

Maximum Particle size: No. 4 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	98.4

**Analysis for the portion Finer than the No. 10 Sieve**

Analysis Based on: Total Sample

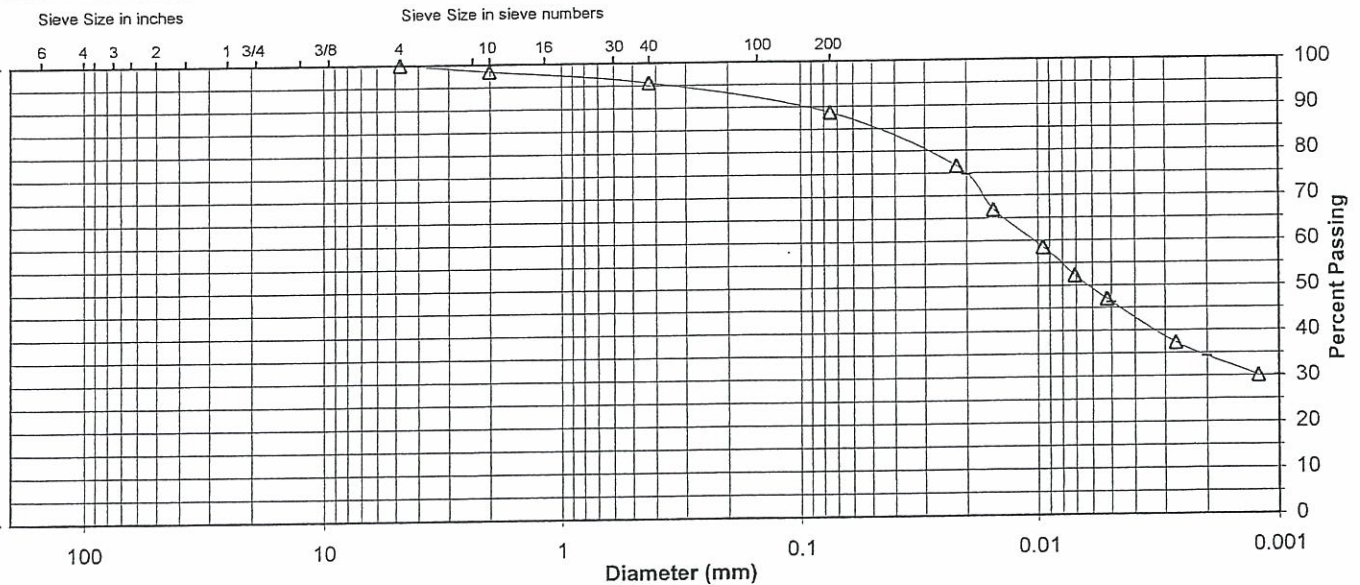
 Specific Gravity 2.71

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	95.6
No. 200	88.7
0.02 mm	74.8
0.005 mm	46.3
0.002 mm	34.3
0.001 mm	30.1

**Particle Size Distribution**

ASTM	Coarse Gravel 0.0	Fine Gravel 0.0	C. Sand 1.6	Medium Sand 2.8	Fine Sand 6.9	Silt 42.4	Clay 46.3
AASHTO	Gravel 1.6		Coarse Sand 2.8		Fine Sand 6.9	Silt 54.4	Clay 34.3



Comments \_\_\_\_\_

 Reviewed By RH8



Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source Section H, 4.5'-6.0', 6.0'-7.5' Lab ID 557  
 County Humphreys, TN Date Received 3-17-09  
 Sample Type SPT Composite Date Reported 4-3-09

Test Results

**Natural Moisture Content**  
 Test Not Performed  
 Moisture Content (%): N/A

**Atterberg Limits**  
 Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: 42  
 Plastic Limit: 18  
 Plasticity Index: 24  
 Activity Index: 0.75

**Particle Size Analysis**  
 Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

**Moisture-Density Relationship**  
 Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	95.3
No. 4	4.75	94.4
No. 10	2	92.9
No. 40	0.425	90.5
No. 200	0.075	85.0
	0.02	65.0
	0.005	37.3
	0.002	31.8
estimated	0.001	29.1

**California Bearing Ratio**  
 Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

Plus 3 in. material, not included: 0 (%)

**Specific Gravity**  
 Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.62

Range	ASTM (%)	AASHTO (%)
Gravel	5.6	7.1
Coarse Sand	1.5	2.4
Medium Sand	2.4	---
Fine Sand	5.5	5.5
Silt	47.7	53.2
Clay	37.3	31.8

**Classification**  
 Unified Group Symbol: CL  
 Group Name: Lean clay with sand  
 AASHTO Classification: A-7-6 (20)

Comments: \_\_\_\_\_

Reviewed by: RAJ



Project Name TVA Facility Assessment, P2: Johnsonville, TN  
 Source Section H, 4.5'-6.0', 6.0'-7.5'

 Project Number 171468118  
 Lab ID 557
**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

 Test Method: ASTM D 422  
 Prepared using: ASTM D 421

 Particle Shape: Rounded and Angular  
 Particle Hardness: Hard and Durable

 Tested By: RHB  
 Test Date: 03-27-2009  
 Date Received: 03-17-2009

 Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	95.3
No. 4	94.4
No. 10	92.9

**Analysis for the portion Finer than the No. 10 Sieve**

 Analysis Based on: Total Sample

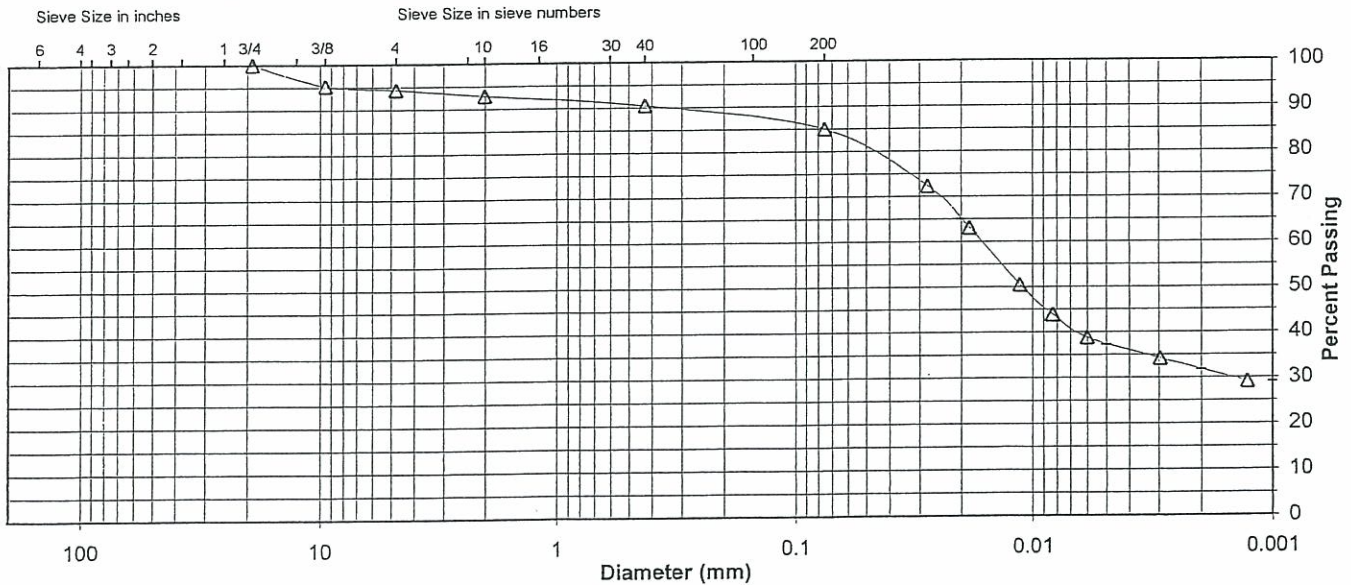
 Specific Gravity 2.62

 Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	90.5
No. 200	85.0
0.02 mm	65.0
0.005 mm	37.3
0.002 mm	31.8
0.001 mm	29.1

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	5.6	1.5	2.4	5.5	47.7	37.3
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt	Clay
	7.1		2.4		5.5	53.2	31.8



Comments \_\_\_\_\_

 Reviewed By RHB



## Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN      Project Number 171468118  
 Source Section H, 22.5'-24.0', 24.0'-25.5'      Lab ID 558  
 County Humphreys, TN      Date Received 3-17-09  
 Sample Type SPT Composite      Date Reported 4-7-09

### Test Results

#### Natural Moisture Content

Test Not Performed  
 Moisture Content (%): N/A

#### Atterberg Limits

Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: ---  
 Plastic Limit: Non Plastic  
 Plasticity Index: ---  
 Activity Index: N/A

#### Particle Size Analysis

Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	99.5
No. 4	4.75	98.6
No. 10	2	97.8
No. 40	0.425	96.6
No. 200	0.075	92.4
	0.02	65.8
	0.005	14.3
	0.002	5.4
estimated	0.001	3.6

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	1.4	2.2
Coarse Sand	0.8	1.2
Medium Sand	1.2	---
Fine Sand	4.2	4.2
Silt	78.1	87.0
Clay	14.3	5.4

#### Moisture-Density Relationship

Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

#### California Bearing Ratio

Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

#### Specific Gravity

Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.36

#### Classification

Unified Group Symbol: ML  
 Group Name: Silt  
 AASHTO Classification: A-4 (0)

Comments: \_\_\_\_\_

Reviewed by: RHB

Project Name TVA Facility Assessment, P2: Johnsonville, TN  
 Source Section H, 22.5'-24.0', 24.0'-25.5'

 Project Number 171468118  
 Lab ID 558
**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

 Test Method: ASTM D 422  
 Prepared using: ASTM D 421

 Particle Shape: Rounded and Angular  
 Particle Hardness: Hard and Durable

 Tested By: eed Input-Sieve  
 Test Date: eed Input-Sieve  
 Date Received 03-17-2009

 Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	99.5
No. 4	98.6
No. 10	97.8

**Analysis for the portion Finer than the No. 10 Sieve**

 Analysis Based on: Total Sample

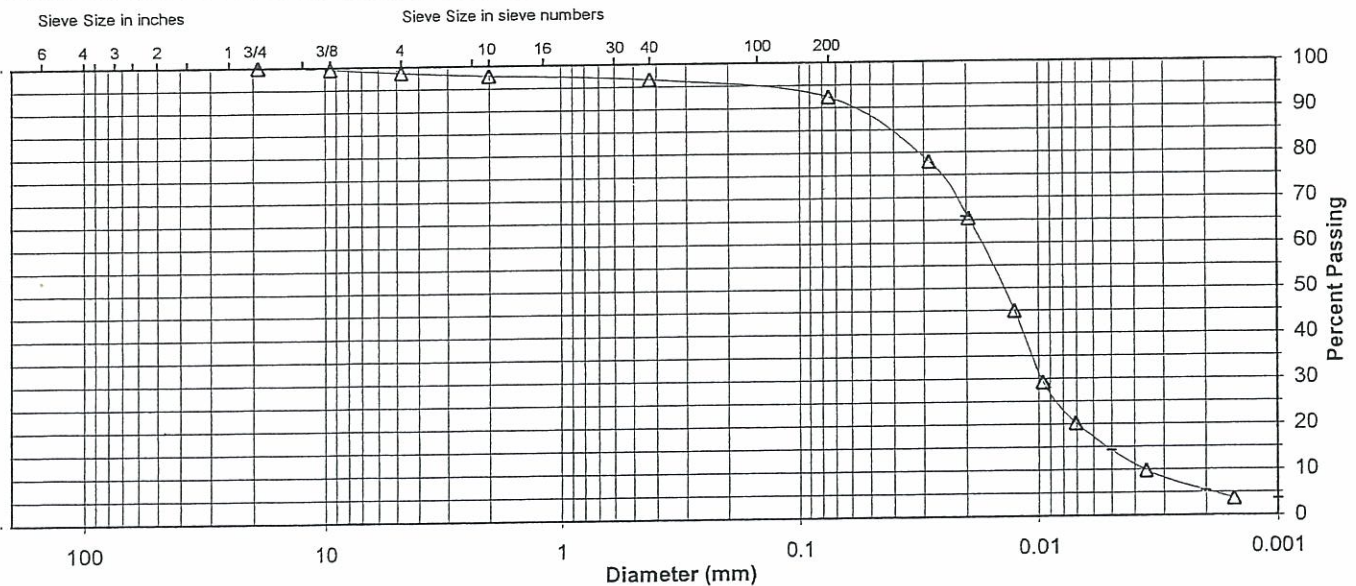
 Specific Gravity 2.36

 Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	96.6
No. 200	92.4
0.02 mm	65.8
0.005 mm	14.3
0.002 mm	5.4
0.001 mm	3.6

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	1.4	0.8	1.2	4.2	78.1	14.3
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	2.2		1.2	4.2	87.0		5.4



Comments \_\_\_\_\_

 Reviewed By RHB



Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source Section H, 36.0'-37.5', 37.5'-39.0' Lab ID 559  
 County Humphreys, TN Date Received 3-17-09  
 Sample Type SPT Composite Date Reported 4-7-09

Test Results

**Natural Moisture Content**  
 Test Not Performed  
 Moisture Content (%): N/A

**Atterberg Limits**  
 Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: 43  
 Plastic Limit: 22  
 Plasticity Index: 21  
 Activity Index: 0.62

**Particle Size Analysis**  
 Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	100.0
No. 10	2	99.9
No. 40	0.425	99.4
No. 200	0.075	93.8
	0.02	75.8
	0.005	45.1
	0.002	34.4
estimated	0.001	30.6

**Moisture-Density Relationship**  
 Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.1
Coarse Sand	0.1	0.5
Medium Sand	0.5	---
Fine Sand	5.6	5.6
Silt	48.7	59.4
Clay	45.1	34.4

**California Bearing Ratio**  
 Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

**Specific Gravity**  
 Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.76

**Classification**  
 Unified Group Symbol: CL  
 Group Name: Lean clay  
 AASHTO Classification: A-7-6 ( 21 )

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 Reviewed by: RHB

Project Name TVA Facility Assessment, P2: Johnsonville, TN  
 Source Section H, 36.0'-37.5', 37.5'-39.0'

Project Number 171468118  
 Lab ID 559

**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

Test Method: ASTM D 422  
 Prepared using: ASTM D 421

Particle Shape: Angular  
 Particle Hardness: Hard and Durable

Tested By: RHB  
 Test Date: 03-20-2009  
 Date Received 03-17-2009

Maximum Particle size: No. 4 Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	100.0
No. 10	99.9

**Analysis for the portion Finer than the No. 10 Sieve**

Analysis Based on: Total Sample

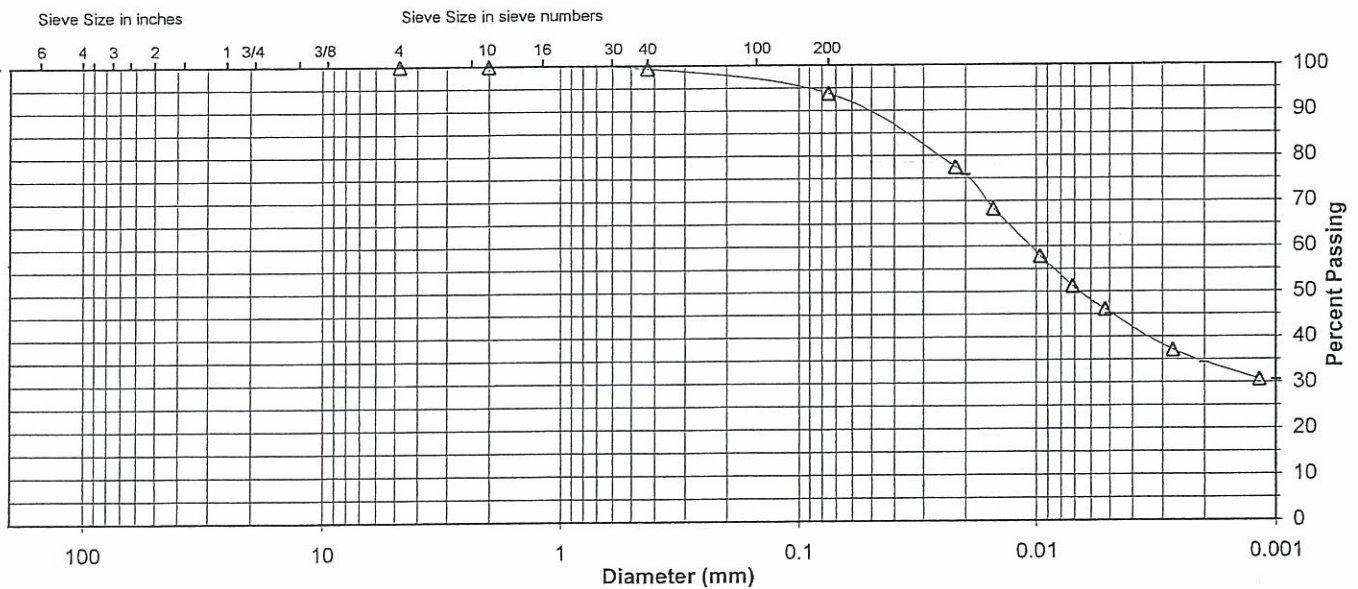
Specific Gravity 2.76

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.4
No. 200	93.8
0.02 mm	75.8
0.005 mm	45.1
0.002 mm	34.4
0.001 mm	30.6

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.0	0.1	0.5	5.6	48.7	45.1	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	0.1		0.5		5.6	59.4		34.4



Comments \_\_\_\_\_

Reviewed By RHB



Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source Section H - Toe, 45.0'-46.5', 47.5'-49.0' Lab ID 564  
 County Humphreys, TN Date Received 3-17-09  
 Sample Type SPT Composite Date Reported 3-30-09

Test Results

**Natural Moisture Content**  
 Test Not Performed  
 Moisture Content (%): N/A

**Atterberg Limits**  
 Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: ---  
 Plastic Limit: Non Plastic  
 Plasticity Index: ---  
 Activity Index: N/A

**Particle Size Analysis**  
 Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

Particle Size		%
Sieve Size	(mm)	
		Passing
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	100.0
3/4"	19	97.3
3/8"	9.5	83.7
No. 4	4.75	60.8
No. 10	2	37.2
No. 40	0.425	15.1
No. 200	0.075	5.9
	0.02	3.5
	0.005	2.1
	0.002	1.7
estimated	0.001	1.6

**Moisture-Density Relationship**  
 Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

**California Bearing Ratio**  
 Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

**Specific Gravity**  
 Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.71

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	39.2	62.8
Coarse Sand	23.6	22.1
Medium Sand	22.1	---
Fine Sand	9.2	9.2
Silt	3.8	4.2
Clay	2.1	1.7

**Classification**  
 Unified Group Symbol: SW-SM  
 Group Name: Well-graded sand with silt and gravel  
 AASHTO Classification: A-1-a (1)

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 Reviewed by: RHB

Project Name TVA Facility Assessment, P2: Johnsonville, TN  
Source Section H - Toe, 45.0'-46.5', 47.5'-49.0'

Project Number 171468118  
Lab ID 564

**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

Test Method: ASTM D 422  
Prepared using: ASTM D 421  
  
Particle Shape: Rounded and Angular  
Particle Hardness: Hard and Durable  
  
Tested By: RHB  
Test Date: 03-19-2009  
Date Received: 03-17-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	97.3
3/8"	83.7
No. 4	60.8
No. 10	37.2

Maximum Particle size: 1" Sieve

**Analysis for the portion Finer than the No. 10 Sieve**

Analysis Based on: Total Sample

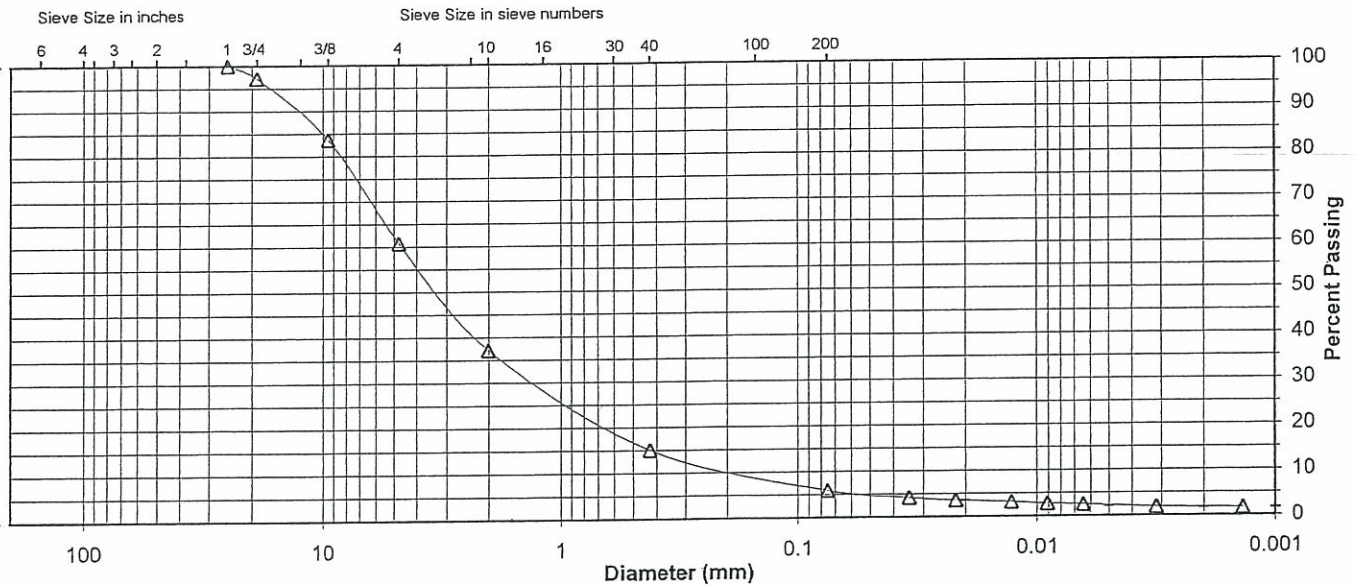
Specific Gravity 2.71

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	15.1
No. 200	5.9
0.02 mm	3.5
0.005 mm	2.1
0.002 mm	1.7
0.001 mm	1.6

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	2.7	36.5	23.6	22.1	9.2	3.8	2.1
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	62.8		22.1	9.2	4.2		1.7



Comments \_\_\_\_\_

Reviewed By RHB



Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source Section I - Crest, 27.0'-28.5', 28.5'-30.0' Lab ID 981  
 County Humphreys, TN Date Received 4-7-09  
 Sample Type SPT Composite Date Reported 4-27-09

Test Results

**Natural Moisture Content**  
 Test Not Performed  
 Moisture Content (%): N/A

**Atterberg Limits**  
 Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: 40  
 Plastic Limit: 19  
 Plasticity Index: 21  
 Activity Index: 0.72

**Particle Size Analysis**  
 Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	99.6
No. 4	4.75	99.4
No. 10	2	97.6
No. 40	0.425	96.7
No. 200	0.075	85.7
	0.02	62.5
	0.005	36.7
	0.002	28.7
estimated	0.001	25.8

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.6	2.4
Coarse Sand	1.8	0.9
Medium Sand	0.9	---
Fine Sand	11.0	11.0
Silt	49.0	57.0
Clay	36.7	28.7

**Moisture-Density Relationship**  
 Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

**California Bearing Ratio**  
 Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

**Specific Gravity**  
 Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.72

**Classification**  
 Unified Group Symbol: CL  
 Group Name: Lean clay  
 AASHTO Classification: A-6 ( 18 )

Comments: \_\_\_\_\_

Reviewed by: RHB



Project Name TVA Facility Assessment, P2: Johnsonville, TN  
Source Section I - Crest, 27.0'-28.5', 28.5'-30.0'

Project Number 171468118  
Lab ID 981

**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

Test Method: ASTM D 422  
Prepared using: ASTM D 421  
  
Particle Shape: Rounded and Angular  
Particle Hardness: Hard and Durable  
  
Tested By: AR  
Test Date: 04-21-2009  
Date Received: 04-07-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	99.6
No. 4	99.4
No. 10	97.6

Maximum Particle size: 3/4" Sieve

**Analysis for the portion Finer than the No. 10 Sieve**

Analysis Based on: Total Sample

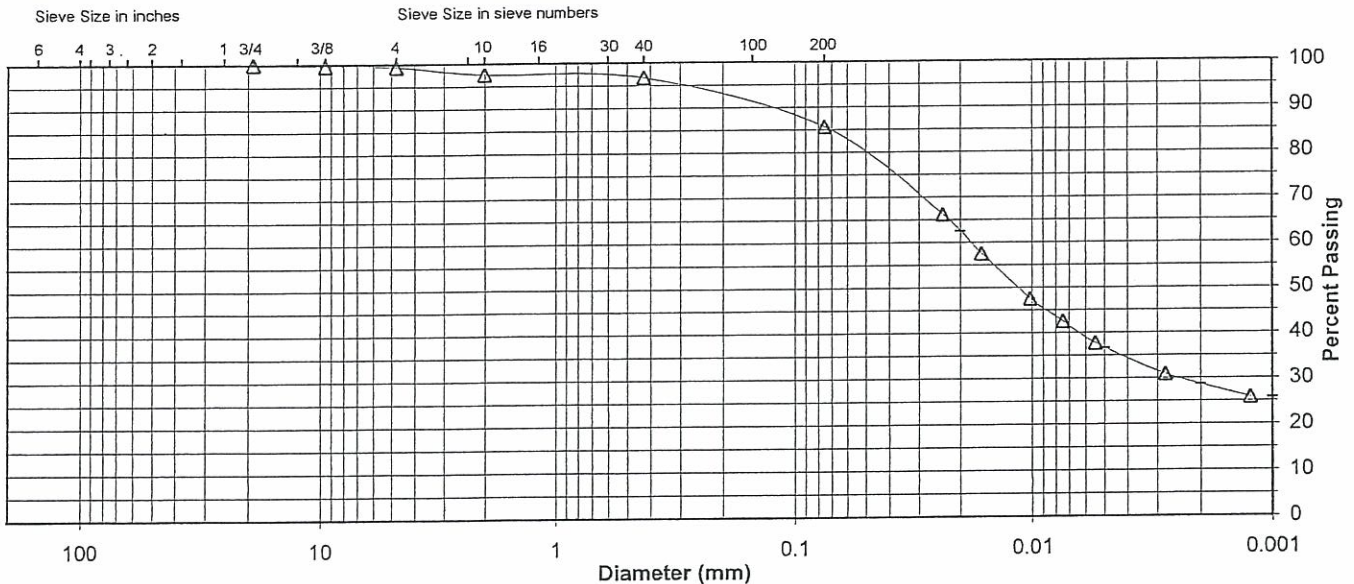
Specific Gravity 2.72

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	96.7
No. 200	85.7
0.02 mm	62.5
0.005 mm	36.7
0.002 mm	28.7
0.001 mm	25.8

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.6	1.8	0.9	11.0	49.0	36.7	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	2.4		0.9		11.0	57.0		28.7



Comments \_\_\_\_\_

Reviewed By RHB



## Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN      Project Number 171468118  
 Source Section K, 4.5'-6.0', 6.0'-7.5'      Lab ID 560  
 County Humphreys, TN      Date Received 3-17-09  
 Sample Type SPT Composite      Date Reported 4-3-09

### Test Results

#### Natural Moisture Content

Test Not Performed  
 Moisture Content (%): N/A

#### Atterberg Limits

Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: 44  
 Plastic Limit: 17  
 Plasticity Index: 27  
 Activity Index: 0.90

#### Particle Size Analysis

Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	93.8
No. 4	4.75	91.6
No. 10	2	89.3
No. 40	0.425	85.8
No. 200	0.075	77.2
	0.02	58.0
	0.005	36.0
	0.002	30.4
estimated	0.001	28.0

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	8.4	10.7
Coarse Sand	2.3	3.5
Medium Sand	3.5	---
Fine Sand	8.6	8.6
Silt	41.2	46.8
Clay	36.0	30.4

#### Moisture-Density Relationship

Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

#### California Bearing Ratio

Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

#### Specific Gravity

Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.66

#### Classification

Unified Group Symbol: CL  
 Group Name: Lean clay with sand  
 AASHTO Classification: A-7-6 (20)

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 Reviewed by: RHB

Project Name TVA Facility Assessment, P2: Johnsonville, TN  
Source Section K, 4.5'-6.0', 6.0'-7.5'

Project Number 171468118  
Lab ID 560

**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

Test Method: ASTM D 422  
Prepared using: ASTM D 421

Particle Shape: Rounded and Angular  
Particle Hardness: Hard and Durable

Tested By: RHB  
Test Date: 03-26-2009  
Date Received 03-17-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	93.8
No. 4	91.6
No. 10	89.3

**Analysis for the portion Finer than the No. 10 Sieve**

Analysis Based on: Total Sample

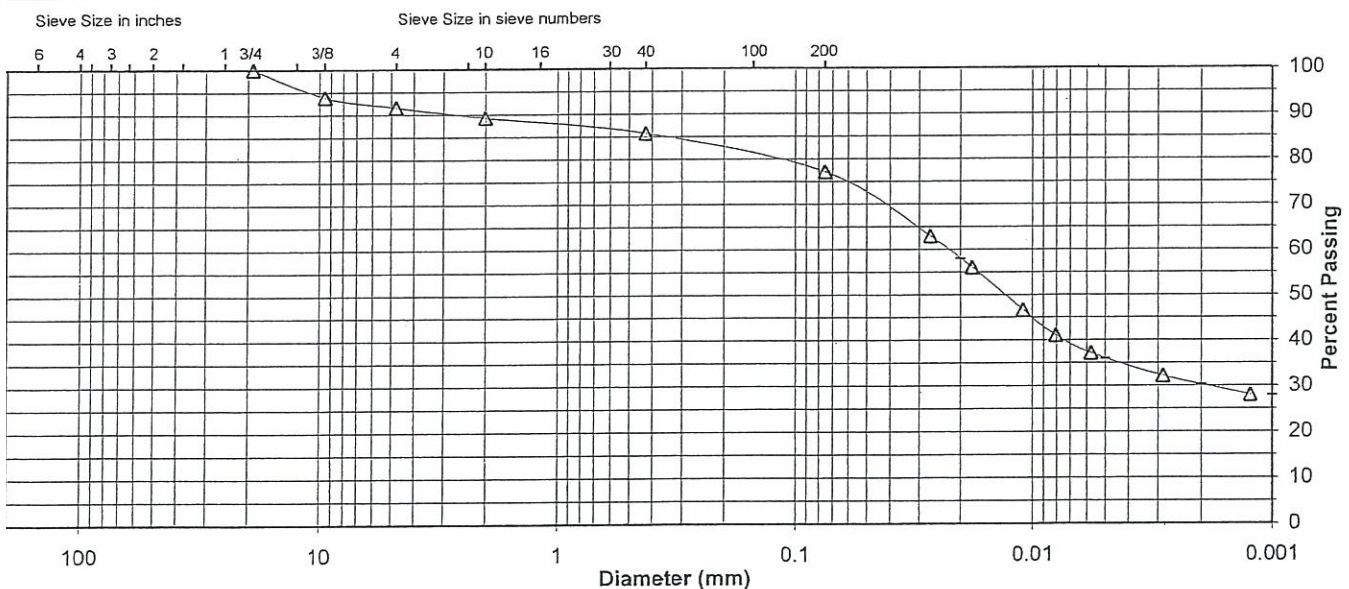
Specific Gravity 2.66

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	85.8
No. 200	77.2
0.02 mm	58.0
0.005 mm	36.0
0.002 mm	30.4
0.001 mm	28.0

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	8.4	2.3	3.5	8.6	41.2	36.0
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	10.7		3.5	8.6	46.8		30.4



Comments \_\_\_\_\_

Reviewed By RHB



## Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN      Project Number 171468118  
 Source Section K, 19.5'-21.0', 21.0'-22.5'      Lab ID 561  
 County Humpheys, TN      Date Received 3-17-09  
 Sample Type SPT Composite      Date Reported 3-30-09

### Test Results

#### Natural Moisture Content

Test Not Performed  
 Moisture Content (%): N/A

#### Particle Size Analysis

Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	100.0
3/4"	19	96.3
3/8"	9.5	92.0
No. 4	4.75	82.4
No. 10	2	60.9
No. 40	0.425	31.2
No. 200	0.075	12.5
	0.02	4.0
	0.005	1.6
	0.002	1.1
estimated	0.001	0.9

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	17.6	39.1
Coarse Sand	21.5	29.7
Medium Sand	29.7	---
Fine Sand	18.7	18.7
Silt	10.9	11.4
Clay	1.6	1.1

#### Atterberg Limits

Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: ---  
 Plastic Limit: Non Plastic  
 Plasticity Index: ---  
 Activity Index: N/A

#### Moisture-Density Relationship

Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

#### California Bearing Ratio

Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

#### Specific Gravity

Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.70

#### Classification

Unified Group Symbol: SM  
 Group Name: Silty sand with gravel  
 AASHTO Classification: A-1-b (0)

Comments: \_\_\_\_\_

Reviewed by: RH

Project Name TVA Facility Assessment, P2: Johnsonville, TN  
 Source Section K, 19.5'-21.0', 21.0'-22.5'

 Project Number 171468118  
 Lab ID 561
**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

 Test Method: ASTM D 422  
 Prepared using: ASTM D 421  
 Particle Shape: Rounded and Angular  
 Particle Hardness: Hard and Durable  
 Tested By: RHB  
 Test Date: 03-19-2009  
 Date Received: 03-17-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	100.0
3/4"	96.3
3/8"	92.0
No. 4	82.4
No. 10	60.9

Maximum Particle size: 1" Sieve

**Analysis for the portion Finer than the No. 10 Sieve**

Analysis Based on: Total Sample

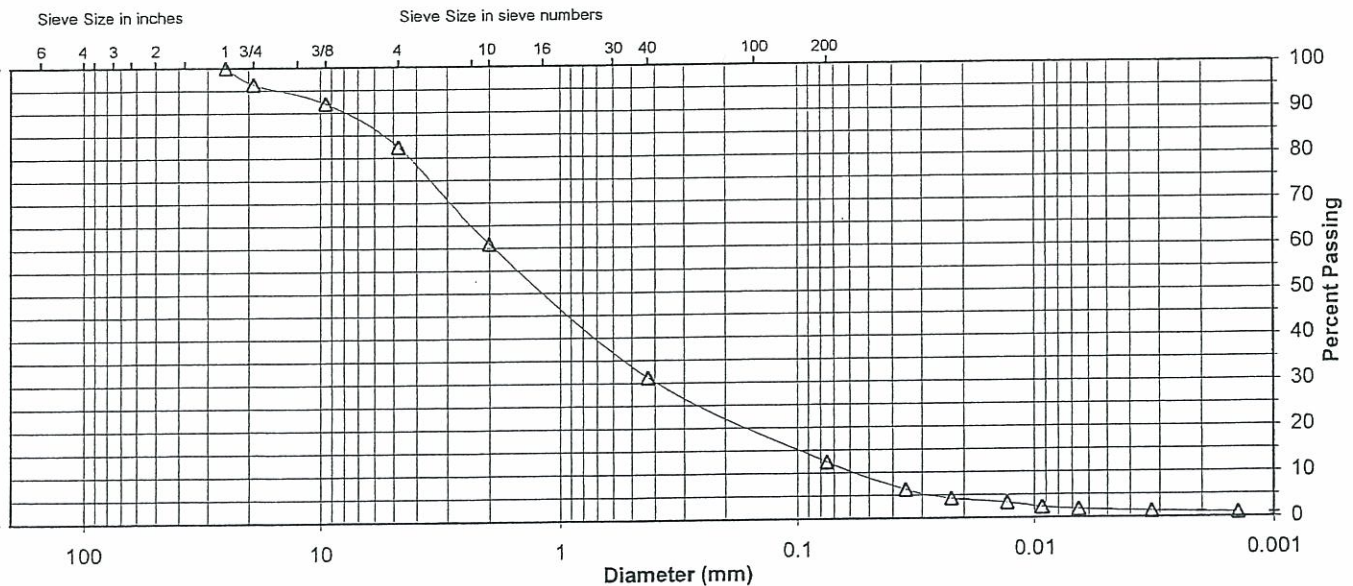
 Specific Gravity 2.7

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	31.2
No. 200	12.5
0.02 mm	4.0
0.005 mm	1.6
0.002 mm	1.1
0.001 mm	0.9

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
		3.7	13.9	21.5	29.7	18.7	10.9	1.6
AASHTO	Gravel			Coarse Sand	Fine Sand	Silt		Clay
	39.1			29.7	18.7	11.4		1.1



Comments \_\_\_\_\_

 Reviewed By RHB



Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source Section K - Toe, 3.0'-4.5', 4.5'-6.0' Lab ID 894  
 County Humphreys, TN Date Received 4-7-09  
 Sample Type SPT Composite Date Reported 4-27-09

Test Results

**Natural Moisture Content**  
 Test Not Performed  
 Moisture Content (%): N/A

**Atterberg Limits**  
 Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: 44  
 Plastic Limit: 19  
 Plasticity Index: 25  
 Activity Index: 0.74

**Particle Size Analysis**  
 Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	100.0
No. 4	4.75	99.1
No. 10	2	98.2
No. 40	0.425	97.1
No. 200	0.075	92.1
	0.02	71.6
	0.005	45.6
	0.002	34.4
estimated	0.001	30.6

**Moisture-Density Relationship**  
 Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

**California Bearing Ratio**  
 Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

**Specific Gravity**  
 Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.73

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.9	1.8
Coarse Sand	0.9	1.1
Medium Sand	1.1	---
Fine Sand	5.0	5.0
Silt	46.5	57.7
Clay	45.6	34.4

**Classification**  
 Unified Group Symbol: CL  
 Group Name: Lean clay  
 AASHTO Classification: A-7-6 ( 24 )

Comments: \_\_\_\_\_

Reviewed by: RHB

Project Name TVA Facility Assessment, P2: Johnsonville, TN  
 Source Section K - Toe, 3.0'-4.5', 4.5'-6.0'

 Project Number 171468118  
 Lab ID 894
**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

 Test Method: ASTM D 422  
 Prepared using: ASTM D 421

 Particle Shape: Rounded and Angular  
 Particle Hardness: Hard and Durable

 Tested By: AR  
 Test Date: 04-21-2009  
 Date Received: 04-07-2009

 Maximum Particle size: 3/8" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	100.0
No. 4	99.1
No. 10	98.2

**Analysis for the portion Finer than the No. 10 Sieve**

 Analysis Based on: Total Sample

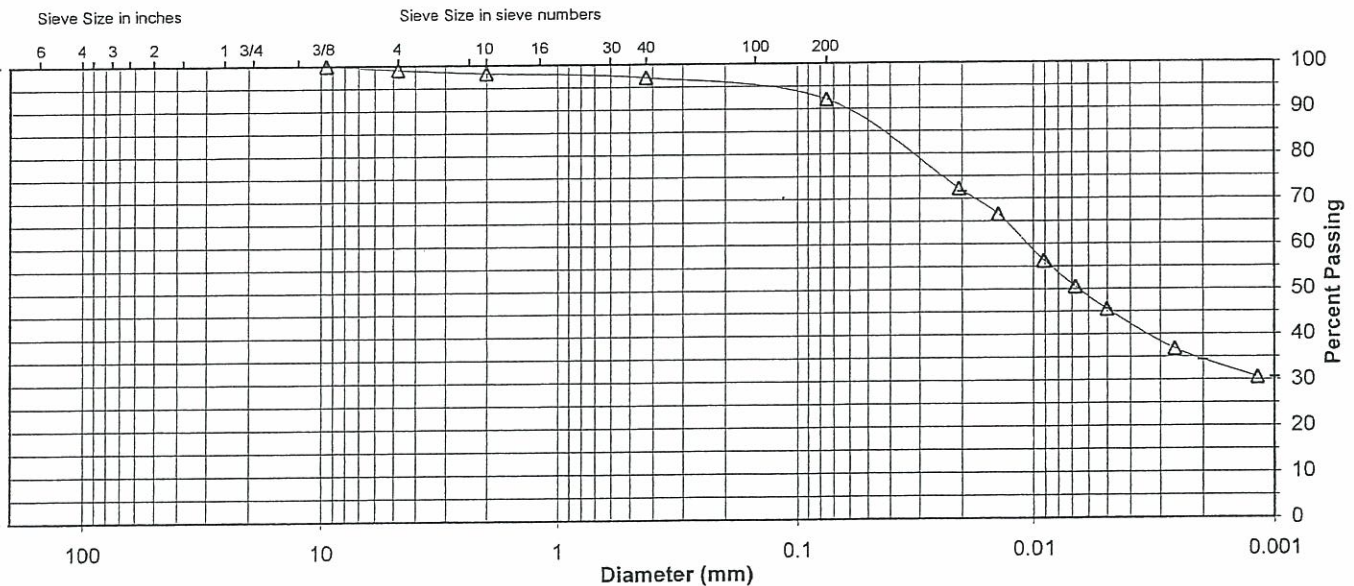
 Specific Gravity 2.73

 Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	97.1
No. 200	92.1
0.02 mm	71.6
0.005 mm	45.6
0.002 mm	34.4
0.001 mm	30.6

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay
	0.0	0.9	0.9	1.1	5.0	46.5	45.6
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt		Clay
	1.8		1.1	5.0	57.7		34.4



Comments \_\_\_\_\_

 Reviewed By RHB



## Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source Section L, 42.0'-43.5', 44.5'-46.0' Lab ID 567  
 County Humphreys, TN Date Received 3-17-09  
 Sample Type SPT Composite Date Reported 4-7-09

### Test Results

#### Natural Moisture Content

Test Not Performed  
 Moisture Content (%): N/A

#### Atterberg Limits

Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: 40  
 Plastic Limit: 21  
 Plasticity Index: 19  
 Activity Index: 0.56

#### Particle Size Analysis

Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	
3/8"	9.5	
No. 4	4.75	
No. 10	2	100.0
No. 40	0.425	99.5
No. 200	0.075	97.1
	0.02	78.3
	0.005	43.4
	0.002	33.5
estimated	0.001	29.6

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	0.0	0.0
Coarse Sand	0.0	0.5
Medium Sand	0.5	---
Fine Sand	2.4	2.4
Silt	53.7	63.6
Clay	43.4	33.5

#### Moisture-Density Relationship

Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

#### California Bearing Ratio

Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

#### Specific Gravity

Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.69

#### Classification

Unified Group Symbol: CL  
 Group Name: Lean clay  
 AASHTO Classification: A-6 (20)

Comments: \_\_\_\_\_

Reviewed by: RHB



Project Name TVA Facility Assessment, P2: Johnsonville, TN  
 Source Section L, 42.0'-43.5', 44.5'-46.0'

Project Number 171468118  
 Lab ID 567

**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

Test Method: ASTM D 422  
 Prepared using: ASTM D 421  
 Particle Shape: N/A  
 Particle Hardness: N/A  
 Tested By: RHB  
 Test Date: 03-20-2009  
 Date Received 03-17-2009

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	100.0

Maximum Particle size: No. 10 Sieve

**Analysis for the portion Finer than the No. 10 Sieve**

Analysis Based on: Total Sample

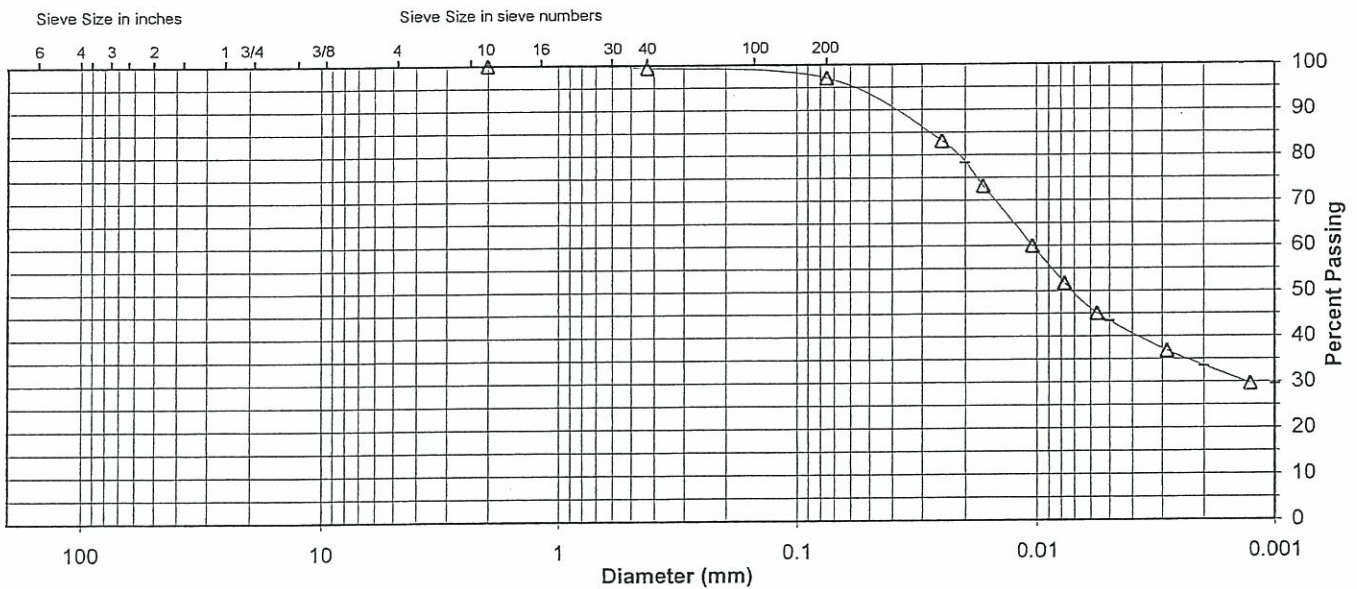
Specific Gravity 2.69

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	99.5
No. 200	97.1
0.02 mm	78.3
0.005 mm	43.4
0.002 mm	33.5
0.001 mm	29.6

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	0.0	0.0	0.5	2.4	53.7	43.4	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	0.0		0.5		2.4	63.6		33.5



Comments \_\_\_\_\_

Reviewed By RHB



Summary of Soil Tests

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source Section M - Toe, 40.0'-41.5', 42.5'-44.0' Lab ID 974  
 County Humphreys, TN Date Received 4-7-09  
 Sample Type SPT Composite Date Reported 4-27-09

Test Results

**Natural Moisture Content**  
 Test Not Performed  
 Moisture Content (%): N/A

**Atterberg Limits**  
 Test Method: ASTM D 4318 Method A  
 Prepared: Dry  
 Liquid Limit: ---  
 Plastic Limit: Non Plastic  
 Plasticity Index: ---  
 Activity Index: N/A

**Particle Size Analysis**  
 Preparation Method: ASTM D 421  
 Gradation Method: ASTM D 422  
 Hydrometer Method: ASTM D 422

Particle Size		% Passing
Sieve Size	(mm)	
3"	75	
2"	50	
1 1/2"	37.5	
1"	25	
3/4"	19	100.0
3/8"	9.5	93.4
No. 4	4.75	78.6
No. 10	2	64.9
No. 40	0.425	44.9
No. 200	0.075	13.2
	0.02	5.9
	0.005	3.0
	0.002	2.0
estimated	0.001	1.9

**Moisture-Density Relationship**  
 Test Not Performed  
 Maximum Dry Density (lb/ft<sup>3</sup>): N/A  
 Maximum Dry Density (kg/m<sup>3</sup>): N/A  
 Optimum Moisture Content (%): N/A  
 Over Size Correction %: N/A

Plus 3 in. material, not included: 0 (%)

Range	ASTM (%)	AASHTO (%)
Gravel	21.4	35.1
Coarse Sand	13.7	20.0
Medium Sand	20.0	---
Fine Sand	31.7	31.7
Silt	10.2	11.2
Clay	3.0	2.0

**California Bearing Ratio**  
 Test Not Performed  
 Bearing Ratio (%): N/A  
 Compacted Dry Density (lb/ft<sup>3</sup>): N/A  
 Compacted Moisture Content (%): N/A

**Specific Gravity**  
 Test Method: ASTM D 854  
 Prepared: Dry  
 Particle Size: No. 10  
 Specific Gravity at 20° Celsius: 2.72

**Classification**  
 Unified Group Symbol: SM  
 Group Name: Silty sand with gravel  
 AASHTO Classification: A-1-b (0)

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 Reviewed by: RAB

Project Name TVA Facility Assessment, P2: Johnsonville, TN  
 Source Section M - Toe, 40.0'-41.5', 42.5'-44.0'

 Project Number 171468118  
 Lab ID 974
**Sieve analysis for the Portion Coarser than the No. 10 Sieve**

 Test Method: ASTM D 422  
 Prepared using: ASTM D 421

 Particle Shape: Rounded and Angular  
 Particle Hardness: Hard and Durable

 Tested By: AR  
 Test Date: 04-21-2009  
 Date Received 04-07-2009

Maximum Particle size: 3/4" Sieve

Sieve Size	% Passing
3"	
2"	
1 1/2"	
1"	
3/4"	100.0
3/8"	93.4
No. 4	78.6
No. 10	64.9

**Analysis for the portion Finer than the No. 10 Sieve**

Analysis Based on: Total Sample

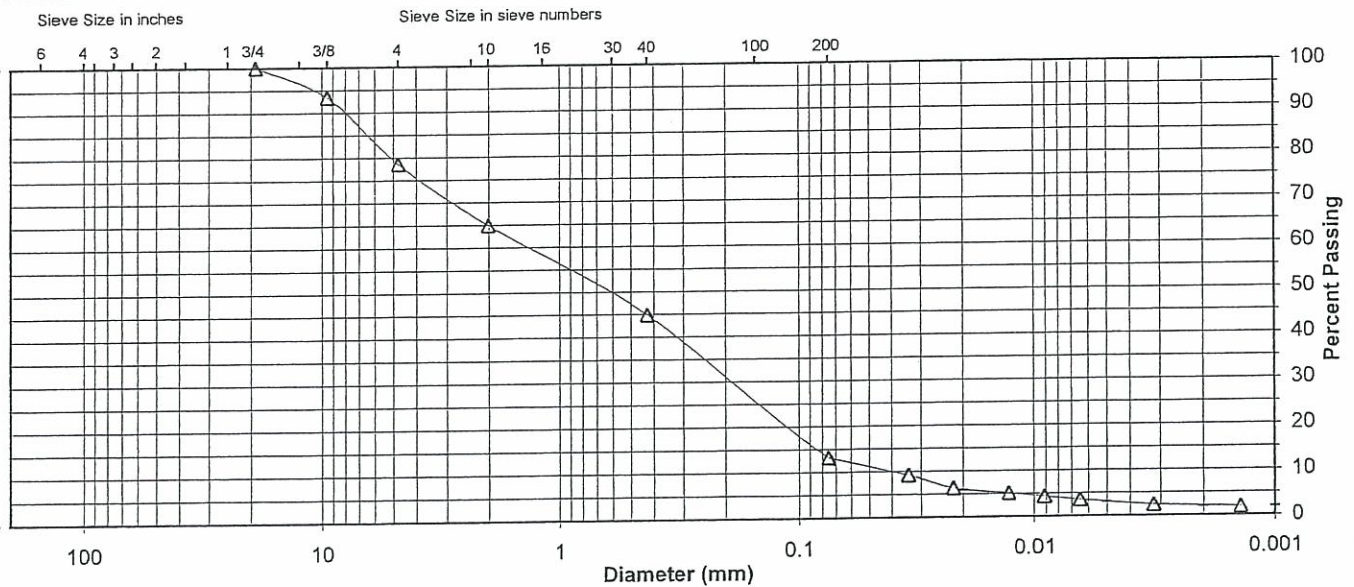
 Specific Gravity 2.72

Dispersed using: Apparatus A - Mechanical, for 1 minute

No. 40	44.9
No. 200	13.2
0.02 mm	5.9
0.005 mm	3.0
0.002 mm	2.0
0.001 mm	1.9

**Particle Size Distribution**

ASTM	Coarse Gravel	Fine Gravel	C. Sand	Medium Sand	Fine Sand	Silt	Clay	
	0.0	21.4	13.7	20.0	31.7	10.2	3.0	
AASHTO	Gravel		Coarse Sand		Fine Sand	Silt		Clay
	35.1		20.0		31.7	11.2		2.0



Comments \_\_\_\_\_

 Reviewed By RHB



# Moisture-Density Data Sheet

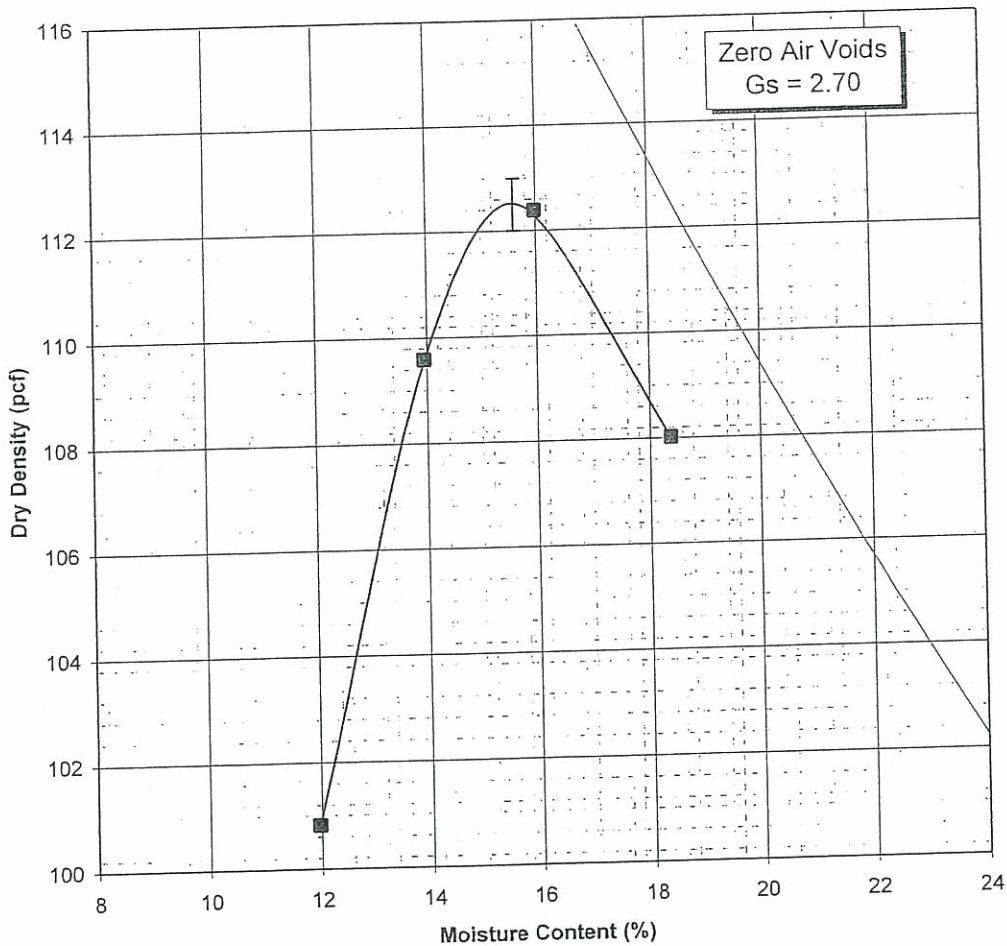
Project: TVA Facility Assessment, P2: Johnsonville, TN  
 Source: Section B, 2.0' - 8.0'  
 Sample Description: lean clay (CL), brown  
 Visual Notes: silty  
 Prepared: Dry

Project No.: 171468118  
 Sample No.: 797  
 Nmc: 17.4 %  
 Test Method: ASTM D 698 - Method A  
 Gs - Fines: Assumed

Oversized Fraction: < 5 % Rammer: Manual

Reviewed By RHB  
 Date: 4/29/2009

Mold Weight 2038 grams		Moisture Determination				
Wet Weight plus Mold (grams)	Wet Weight minus Mold (grams)	Wet Soil and Can Weight (grams)	Dry Soil and Can Weight (grams)	Can Weight (grams)	Water Content (%)	Dry Density (pcf)
3733	1695	252.40	228.90	32.70	12.0	100.8
3913	1875	308.80	275.10	33.60	14.0	109.6
3995	1957	347.30	303.90	32.40	16.0	112.4
3958	1920	302.70	260.10	28.50	18.4	108.0



**Maximum Dry Density 112.5 PCF**  
**Optimum Moisture Content 15.6 %**



# Moisture-Density Data Sheet

Project: TVA Facility Assessment, P2: Johnsonville, TN

Project No.: 171468118

Source: Section E - Crest, 5.0' - 10.0'

Sample No.: 796

Sample Description: lean clay (CL), brown

Nmc: 20.6 %

Visual Notes:

Test Method: ASTM D 698 - Method A

Prepared: Dry

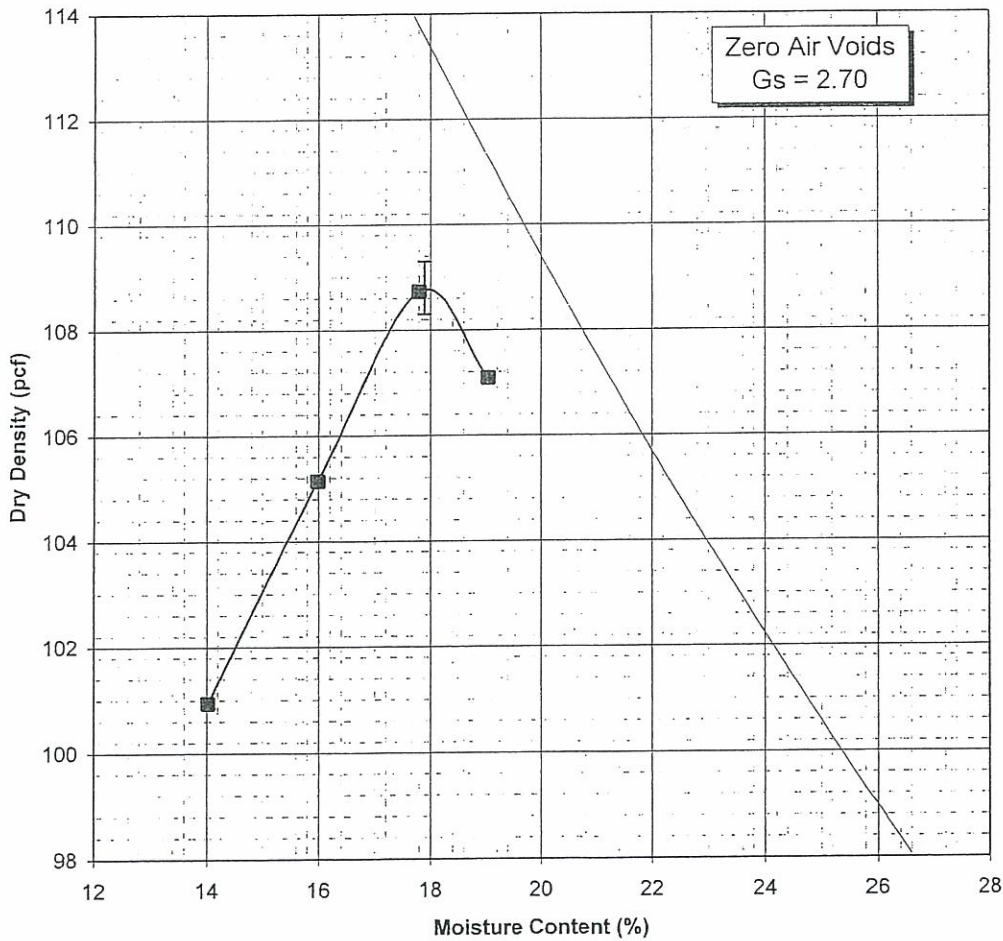
Oversized Fraction: < 5 % Rammer: Manual

Gs - Fines: Assumed

Reviewed By RHB

Date: 4/29/2009

Mold Weight 2038 grams		Moisture Determination				
Wet Weight plus Mold (grams)	Wet Weight minus Mold (grams)	Wet Soil and Can Weight (grams)	Dry Soil and Can Weight (grams)	Can Weight (grams)	Water Content (%)	Dry Density (pcf)
3766	1728	215.70	192.70	28.70	14.0	100.9
3869	1831	272.00	239.00	32.70	16.0	105.1
3961	1923	305.80	264.30	31.20	17.8	108.7
3952	1914	354.00	302.50	32.10	19.0	107.1



**Maximum Dry Density 108.8 PCF**  
**Optimum Moisture Content 17.9 %**



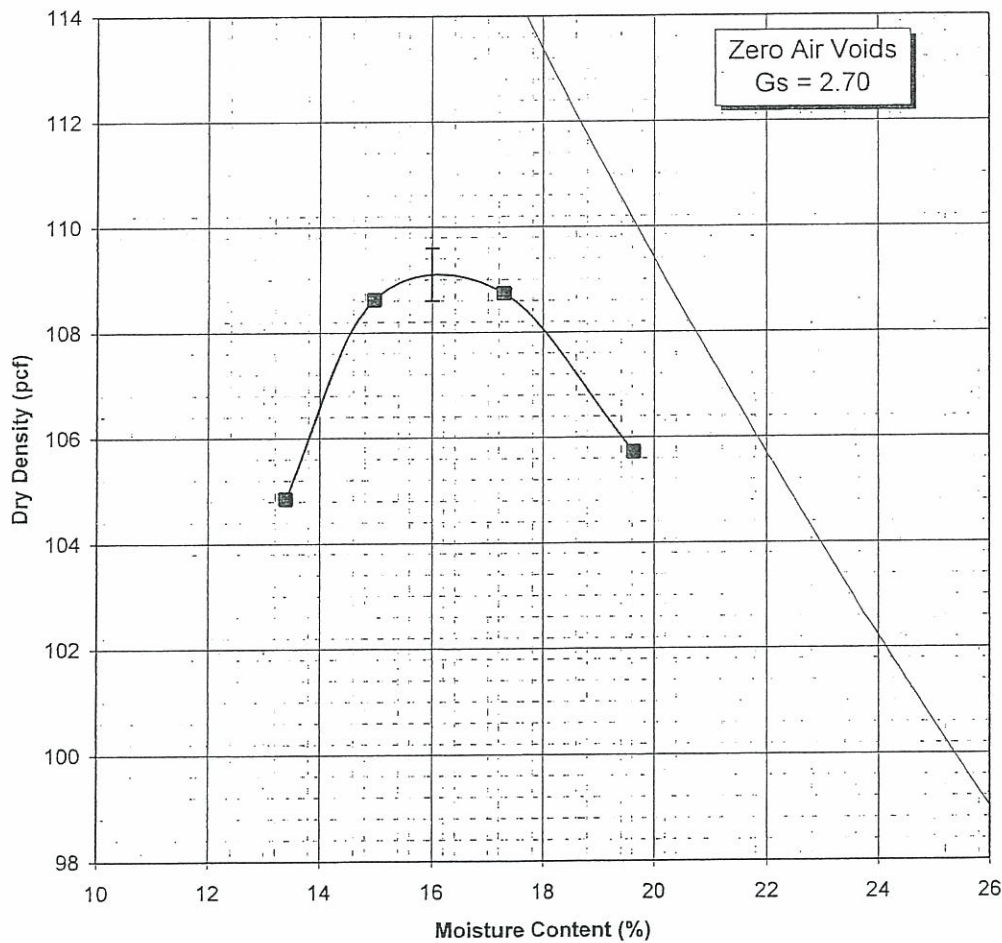
# Moisture-Density Data Sheet

Project: TVA Facility Assessment, P2: Johnsonville, TN  
 Source: Section H - Crest, 3.0' - 10.0'  
 Sample Description: lean clay (CL), brown  
 Visual Notes:  
 Prepared: Dry Oversized Fraction: < 5 % Rammer: Manual

Project No.: 171468118  
 Sample No.: 1110  
 Nmc: 17.6 %  
 Test Method: ASTM D 698 - Method A  
 Gs - Fines: Assumed

Reviewed By RHB  
 Date: 4/30/2009

Mold Weight 2038 grams		Moisture Determination				
Wet Weight plus Mold (grams)	Wet Weight minus Mold (grams)	Wet Soil and Can Weight (grams)	Dry Soil and Can Weight (grams)	Can Weight (grams)	Water Content (%)	Dry Density (pcf)
3823	1785	300.90	269.00	30.90	13.4	104.8
3913	1875	332.50	293.10	30.00	15.0	108.6
3953	1915	335.60	290.60	30.50	17.3	108.7
3937	1899	271.90	232.00	28.80	19.6	105.7



**Maximum Dry Density 109.1 PCF**  
**Optimum Moisture Content 16.0 %**



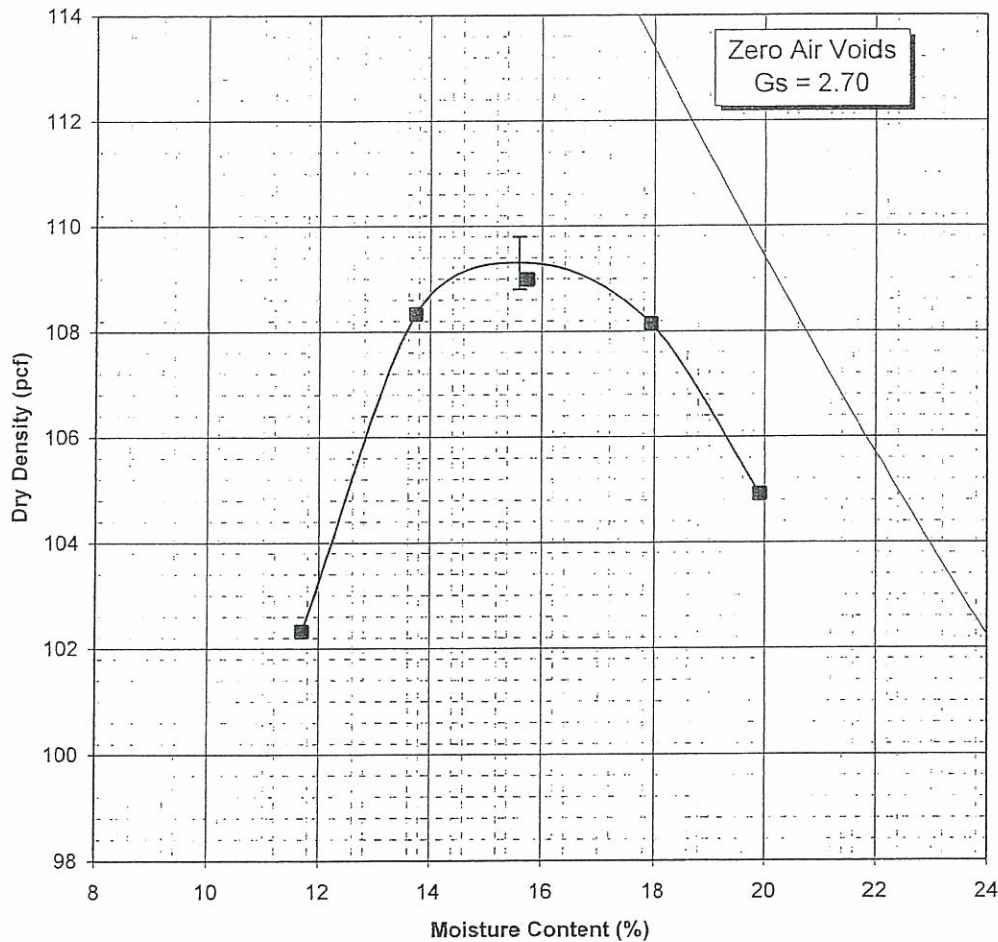
# Moisture-Density Data Sheet

Project: TVA Facility Assessment, P2: Johnsonville, TN  
 Source: Section K - Crest, 3.0' - 10.0'  
 Sample Description: lean clay (CL), brown  
 Visual Notes:  
 Prepared: Dry Oversized Fraction: < 5 % Rammer: Manual

Project No.: 171468118  
 Sample No.: 1111  
 Nmc: 19.3 %  
 Test Method: ASTM D 698 - Method A  
 Gs - Fines: Assumed

Reviewed By: RHB  
 Date: 4/29/2009

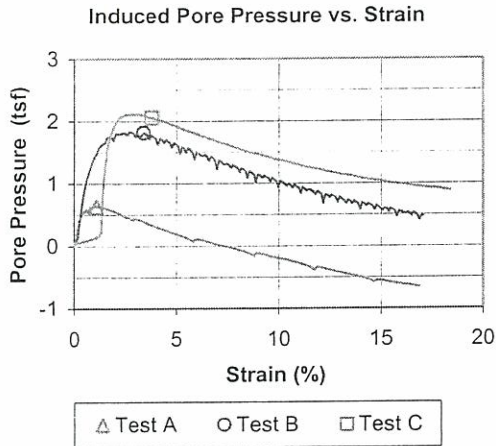
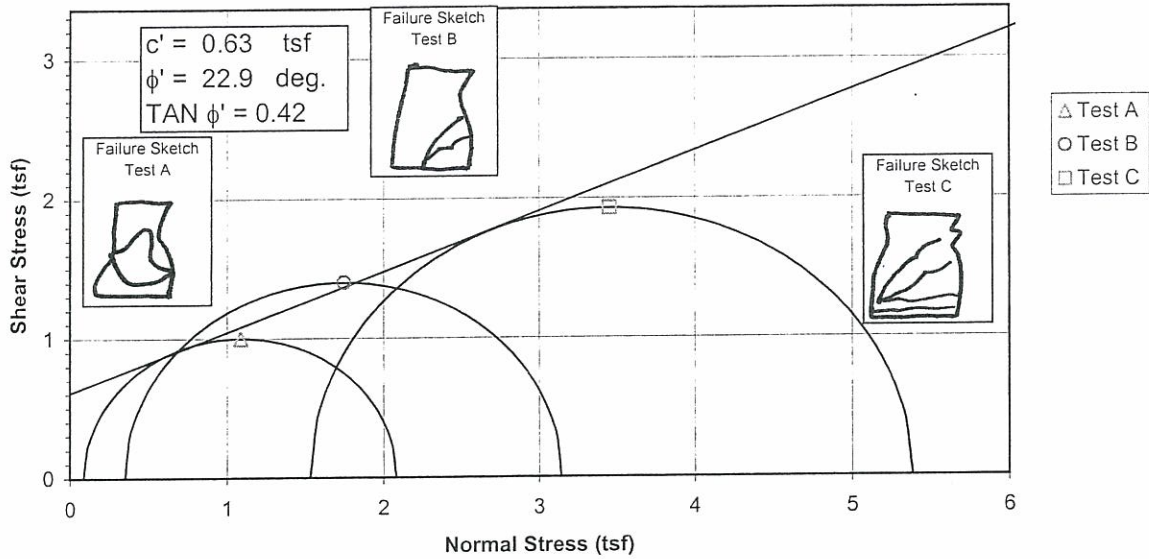
Mold Weight 2038 grams		Moisture Determination					
Wet Weight plus Mold (grams)	Wet Weight minus Mold (grams)	Wet Soil and Can Weight (grams)	Dry Soil and Can Weight (grams)	Can Weight (grams)	Water Content (%)	Dry Density (pcf)	
3754	1716	309.80	280.80	33.00	11.7	102.3	
3888	1850	325.60	290.00	31.00	13.7	108.3	
3932	1894	279.80	246.00	31.40	15.8	109.0	
3953	1915	278.90	240.80	28.50	17.9	108.1	
3927	1889	310.50	264.40	33.00	19.9	104.9	



**Maximum Dry Density 109.3 PCF**  
**Optimum Moisture Content 15.6 %**

Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope



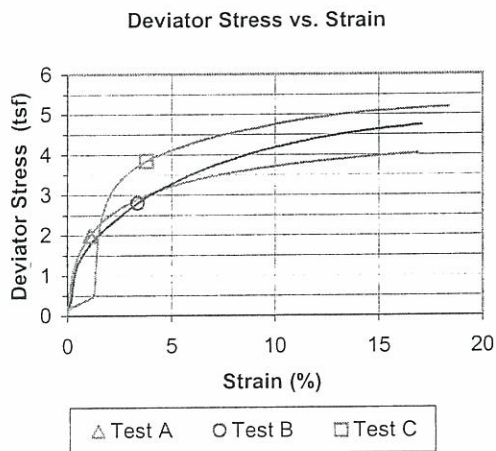
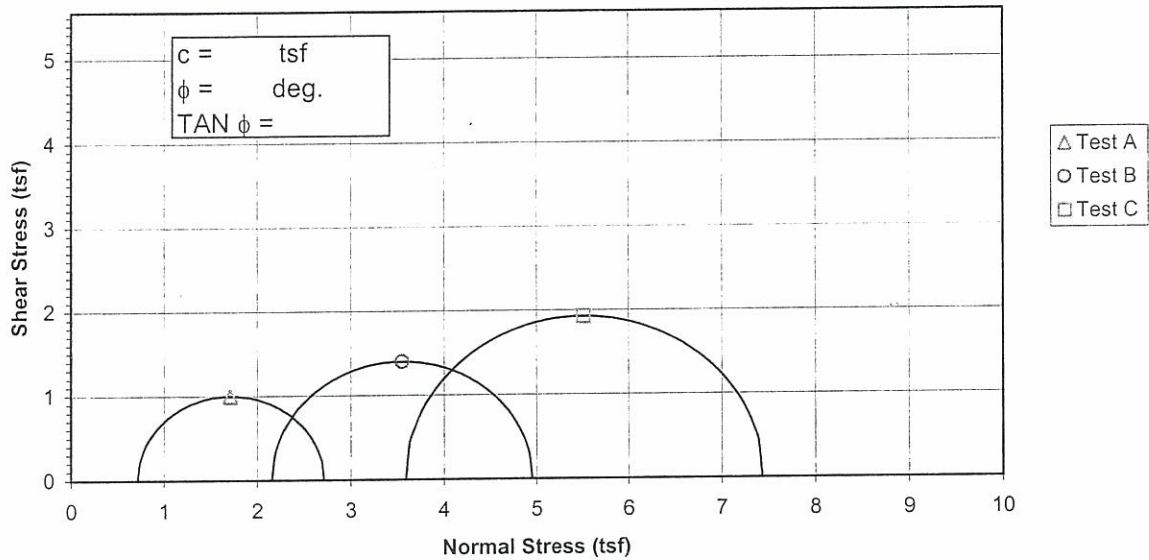
Specimen No.		A	B	C
Initial Data	Water content %	$W_o$ 17.7	17.9	18.8
	Dry Density PCF	$\gamma_{d_o}$ 111.2	110.9	107.8
	Saturation %	$S_o$ 97.1	97.6	93.9
	Void Ratio	$e_o$ 0.482	0.485	0.528
After Shear	Water content %	$W_f$ 18.4	18.1	18.9
	Dry Density PCF	$\gamma_{d_f}$ 110.9	111.6	110.0
	Saturation %	$S_f$ 100.0	100.0	100.0
	Void Ratio	$e_f$ 0.487	0.477	0.499
	Final Back Pressure TSF	$u_c$ 5.76	4.32	2.88
	Minor Principal Stress TSF @ failure	$\sigma_3'f$ 0.09	0.35	1.53
	Maximum Deviator Stress (tsf) @ failure	$(\sigma_1' - \sigma_3')_{max}$ 1.99	2.80	3.83
	Time to $(\sigma_1' - \sigma_3')_{max}$ min.	$t_f$ 6.2	149.0	160.6
	Ultimate Deviator Stress, t/sq ft	$(\sigma_1' - \sigma_3')_{ult}$ n/a	n/a	n/a
	Initial Diameter, in.	$D_o$ 2.886	2.869	2.883
	Initial Height, in.	$H_o$ 6.091	6.044	6.003

Controlled - Strain Test				Initial Height, in.				
Description of Specimens Lean Clay with Gravel (CL), brown, moist, firm								
				Type of Specimen Undisturbed	Type of test R			
LL	PL	PI	Gs 2.64	Project TVA Facility Assessment, P2: Johnsonville, TN				
Remarks:				Boring No. STN-AC-PZ, STN-BC-PZ				
				Sample No. 1575				
				Depth Elev. 5.0'-5.5', 5.0'-5.5', 10.0'-10.5'				
				Laboratory Stantec		Date 5-8-09		
TRIAxIAL COMPRESSION TEST REPORT								



Failure Criterion: Maximum Effective Principal Stress Ratio

**Total Strength Envelope**



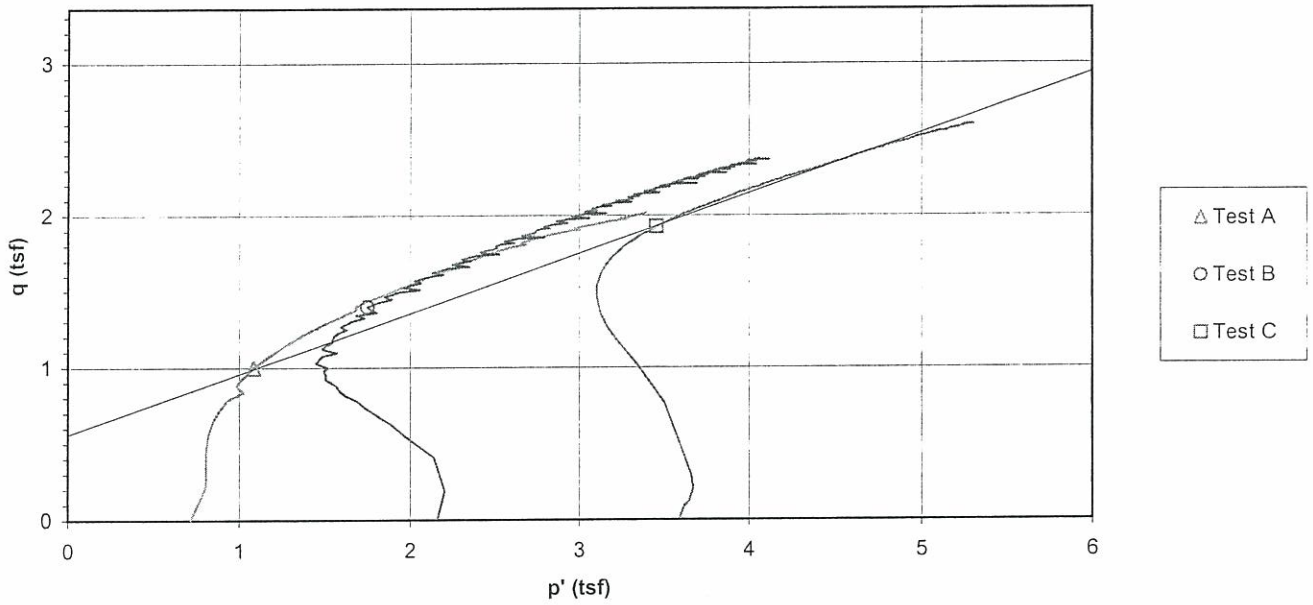
Specimen No.		A	B	C
Initial Data	Water content %	W <sub>o</sub> 17.7	17.9	18.8
	Dry Density PCF	γ <sub>d</sub> <sub>o</sub> 111.2	110.9	107.8
	Saturation %	S <sub>o</sub> 97.1	97.6	93.9
	Void Ratio	e <sub>o</sub> 0.482	0.485	0.528
After Shear	Water content %	W <sub>f</sub> 18.4	18.1	18.9
	Dry Density PCF	γ <sub>d</sub> <sub>f</sub> 110.9	111.6	110.0
	Saturation %	S <sub>f</sub> 100.0	100.0	100.0
	Void Ratio	e <sub>f</sub> 0.487	0.477	0.499
Final Back Pressure TSF		u <sub>c</sub> 5.76	4.32	2.88
Minor Principal Stress TSF		σ <sub>3</sub> 0.72	2.16	3.60
Maximum Deviator Stress (tsf) @ failure		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub> 1.99	2.80	3.83
Time to (σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub> min.		t <sub>f</sub> 6.2	149.0	160.6
Ultimate Deviator Stress, t/sq ft		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>ult</sub> n/a	n/a	n/a
Initial Diameter, in.		D <sub>o</sub> 2.886	2.869	2.883
Initial Height, in.		H <sub>o</sub> 6.091	6.044	6.003

Controlled - Strain Test				Initial Height, in.			
Description of Specimens Lean Clay with Gravel (CL), brown, moist, firm							
				Type of Specimen Undisturbed		Type of test R	
LL	PL	PI	Gs 2.64	Project TVA Facility Assessment, P2: Johnsonville, TN			
Remarks:				Boring No. STN-AC-PZ, STN-BC-PZ			
				Sample No. 1575			
				Depth Elev. 5.0'-5.5', 5.0'-5.5', 10.0'-10.5'			
				Laboratory Stantec		Date 5-8-09	
<b>TRIAXIAL COMPRESSION TEST REPORT</b>							

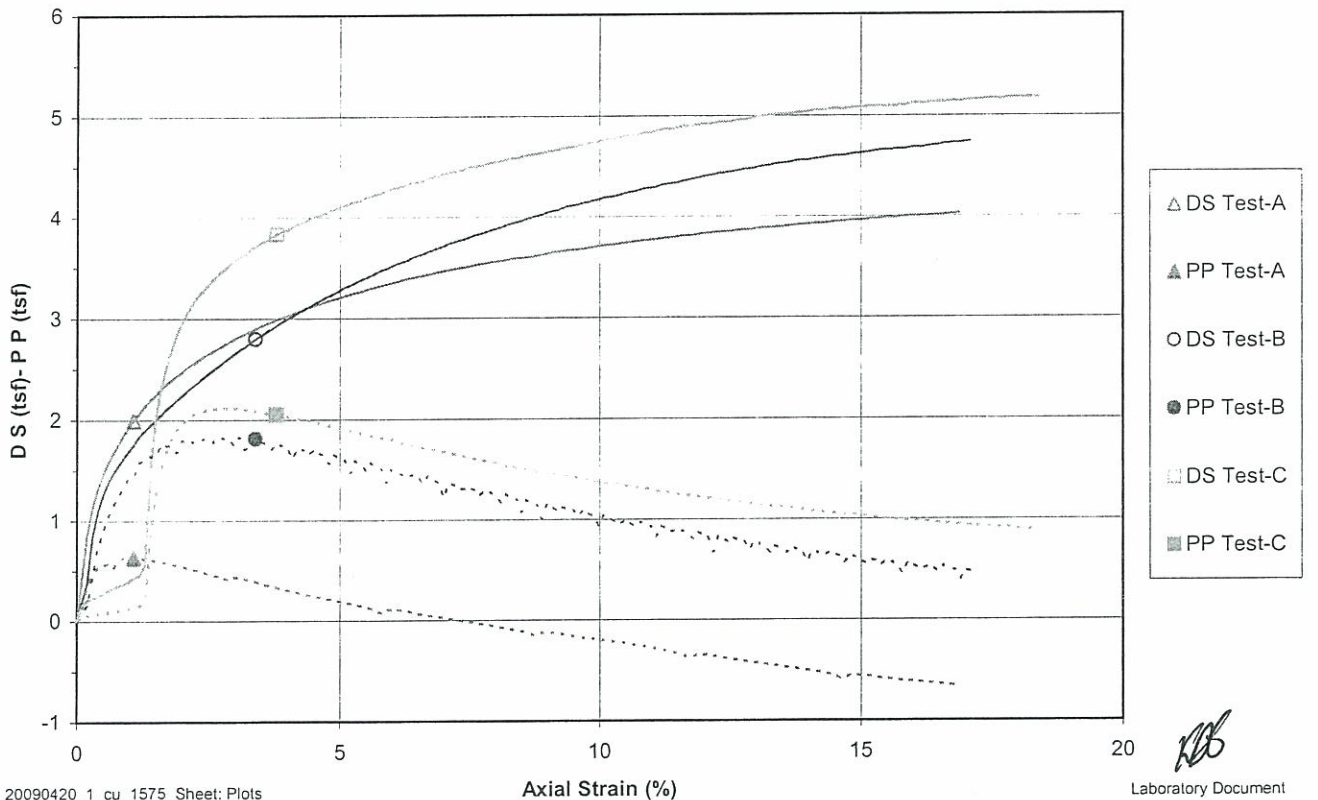
Project TVA Facility Assessment, P2: Johnsonville, TN  
 Sample ID STN-AC-PZ, 5.0'-5.5' & STN-BC-PZ, 5.0'-5.5' & STN-BC-PZ, 10.0'-10.5'  
 Failure Criterion: Maximum Effective Principal Stress Ratio  $\phi' = 23.4 \text{ deg.}$

Project No. 171468118  
 Test Number 1575  
 $c' = 0.61 \text{ tsf}$

p' vs. q Plot

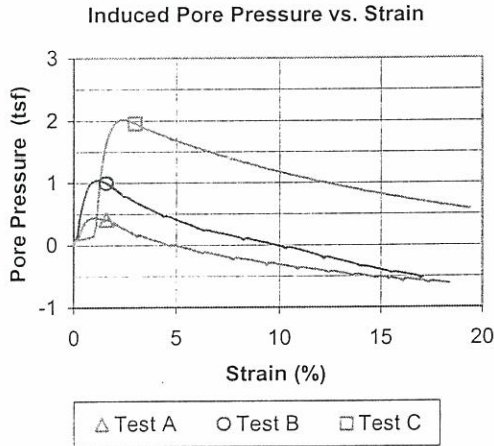
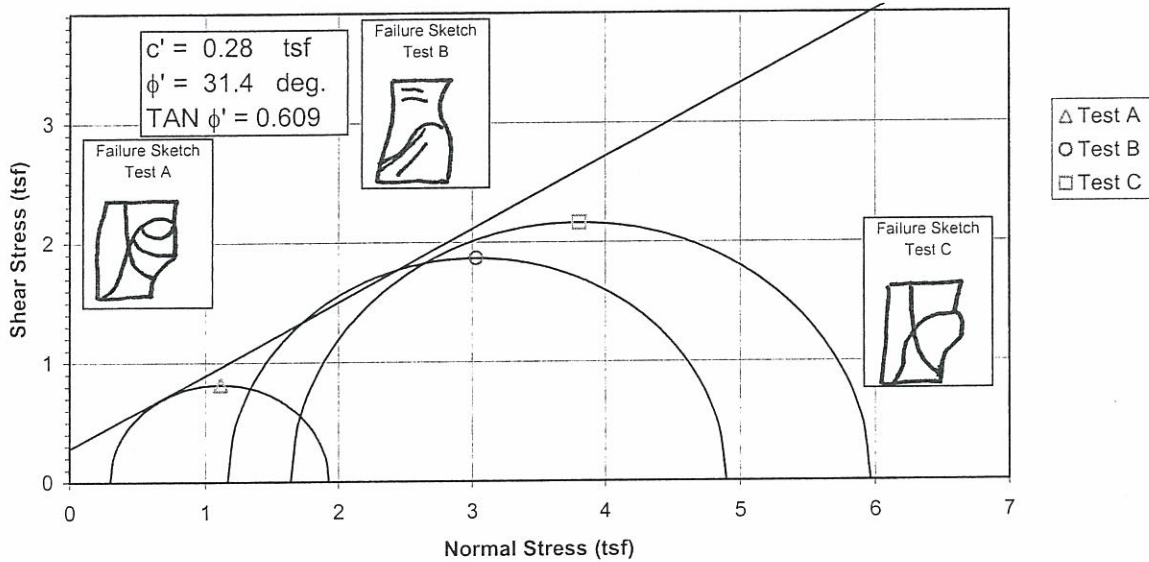


Deviator Stress and Induced Pore Pressure vs. Axial Strain



Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope

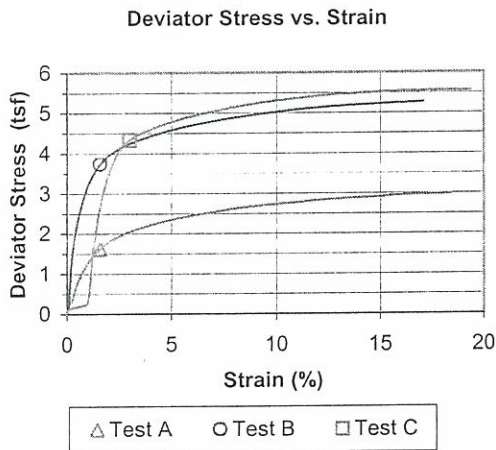
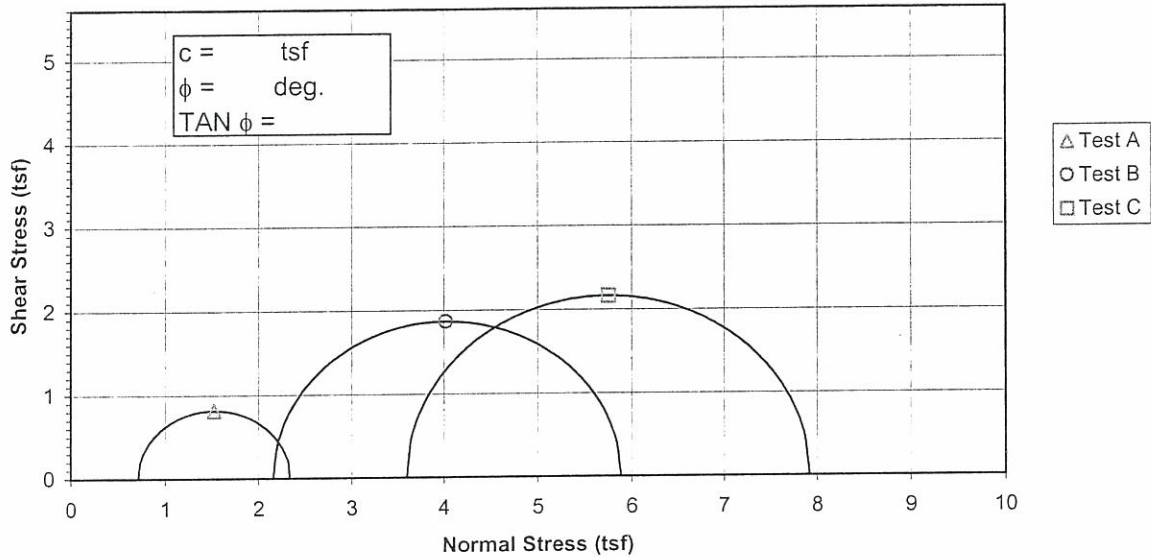


Specimen No.		A	B	C
Initial Data	Water content %	W <sub>o</sub> 25.3	24.6	24.1
	Dry Density PCF	γ <sub>d</sub> <sub>o</sub> 97.9	99.8	100.2
	Saturation %	S <sub>o</sub> 93.3	95.0	93.8
	Void Ratio	e <sub>o</sub> 0.741	0.708	0.701
After Shear	Water content %	W <sub>f</sub> 25.9	24.7	24.1
	Dry Density PCF	γ <sub>d</sub> <sub>f</sub> 99.8	101.8	102.8
	Saturation %	S <sub>f</sub> 100.0	100.0	100.0
	Void Ratio	e <sub>f</sub> 0.708	0.674	0.657
Final Back Pressure TSF		u <sub>c</sub> 5.76	4.32	2.88
Minor Principal Stress TSF @ failure		σ <sub>3</sub> ' <sub>f</sub> 0.30	1.17	1.65
Maximum Deviator Stress (tsf) @ failure		(σ <sub>1</sub> '-σ <sub>3</sub> ') <sub>max</sub> 1.62	3.73	4.32
Time to (σ <sub>1</sub> '-σ <sub>3</sub> ') <sub>max</sub> min.		t <sub>f</sub> 15.2	17.3	41.0
Ultimate Deviator Stress, t/sq ft		(σ <sub>1</sub> '-σ <sub>3</sub> ') <sub>ult</sub> n/a	n/a	n/a
Initial Diameter, in.		D <sub>o</sub> 2.891	2.882	2.887
Initial Height, in.		H <sub>o</sub> 6.097	6.089	5.828

Controlled - Strain Test			
Description of Specimens Lean Clay (CL), light brown to brown, moist, firm			
LL		PL	PI
Gs 2.73		Type of Specimen Undisturbed	
Project		TVA Facility Assessment, P2: Johnsonville, TN	
Remarks:			
Boring No.		STN-AT-PZ	Sample No. 832
Depth Elev. 19.0'-19.5', 19.6'-20.1', 20.2'-20.7'			
Laboratory		Stantec	Date 5-7-09
TRIAxIAL COMPRESSION TEST REPORT			

Failure Criterion: Maximum Effective Principal Stress Ratio

**Total Strength Envelope**



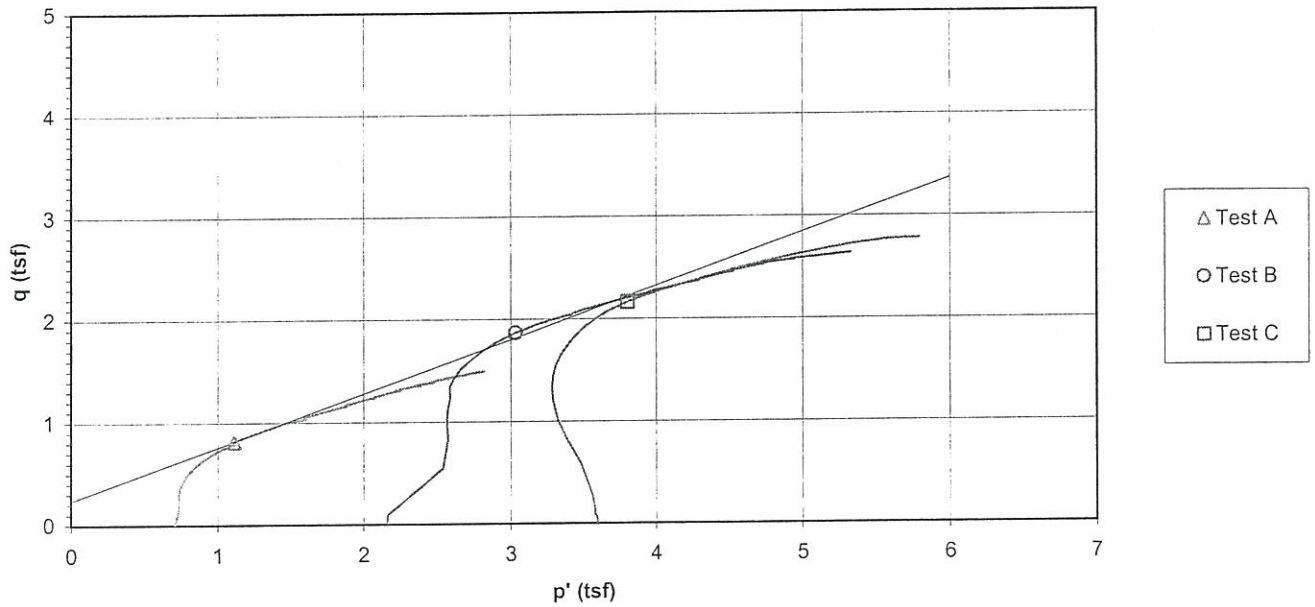
Specimen No.		A	B	C
Initial Data	Water content %	$W_o$ 25.3	24.6	24.1
	Dry Density PCF	$\gamma_{d_o}$ 97.9	99.8	100.2
	Saturation %	$S_o$ 93.3	95.0	93.8
	Void Ratio	$e_o$ 0.741	0.708	0.701
After Shear	Water content %	$W_f$ 25.9	24.7	24.1
	Dry Density PCF	$\gamma_{d_f}$ 99.8	101.8	102.8
	Saturation %	$S_f$ 100.0	100.0	100.0
	Void Ratio	$e_f$ 0.708	0.674	0.657
	Final Back Pressure TSF	$u_c$ 5.76	4.32	2.88
Minor Principal Stress TSF		$\sigma_3$ 0.72	2.16	3.60
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1 - \sigma_3)_{max}$ 1.62	3.73	4.32
Time to $(\sigma_1 - \sigma_3)_{max}$ , min.		$t_f$ 15.2	17.3	41.0
Ultimate Deviator Stress, t/sq ft		$(\sigma_1 - \sigma_3)_{ult}$ n/a	n/a	n/a
Initial Diameter, in.		$D_o$ 2.891	2.882	2.887
Initial Height, in.		$H_o$ 6.097	6.089	5.828

Controlled - Strain Test		Lean Clay (CL), light brown, moist, firm		
Description of Specimens		Lean Clay (CL), light brown, moist, firm		
		Type of Specimen	Undisturbed	Type of test R
LL	PL	PI	Gs 2.73	Project TVA Facility Assessment, P2: Johnsonville, TN
Remarks:				
		Boring No.	STN-AT-PZ	Sample No. 832
		Depth Elev.	19.0'-19.5', 19.6'-20.1', 20.2'-20.7'	
		Laboratory	Stantec	Date 5-7-09
<b>TRIAXIAL COMPRESSION TEST REPORT</b>				

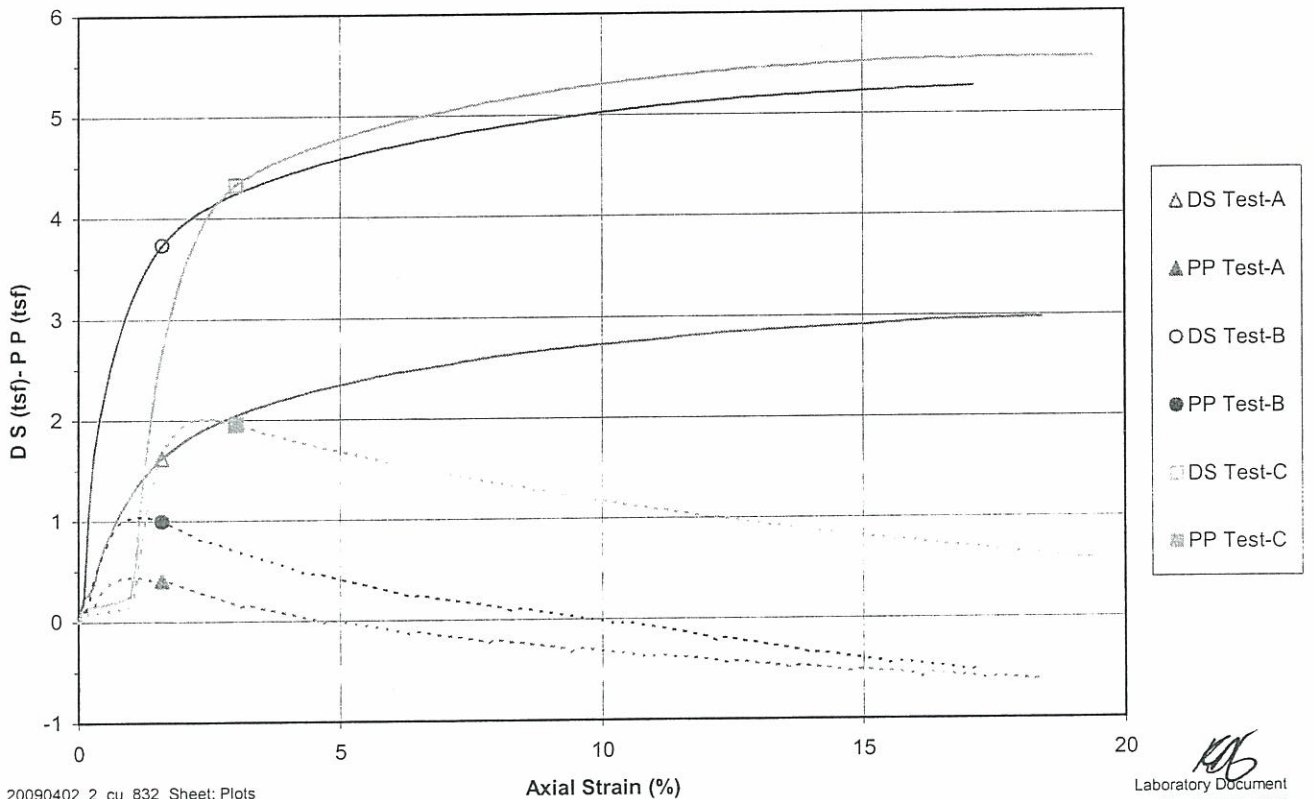
Project TVA Facility Assessment, P2: Johnsonville, TN  
 Sample ID STN-AT-Z, 19.0'-19.5' & STN-AT-PZ, 19.6'-20.1' & STN-AT-PZ, 20.2'-20.7'  
 Failure Criterion: Maximum Effective Principal Stress Ratio  $\phi' = 31.4 \text{ deg.}$

Project No. 171468118  
 Test Number 832  
 $c' = 0.28 \text{ tsf}$

p' vs. q Plot

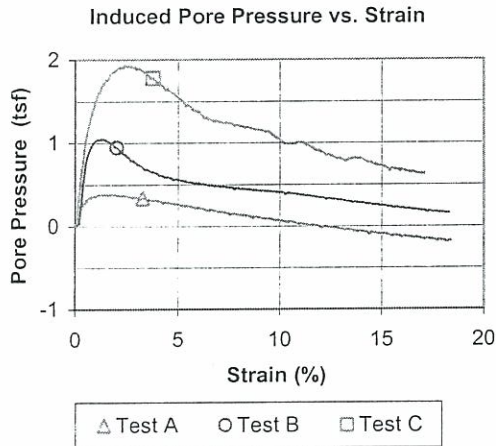
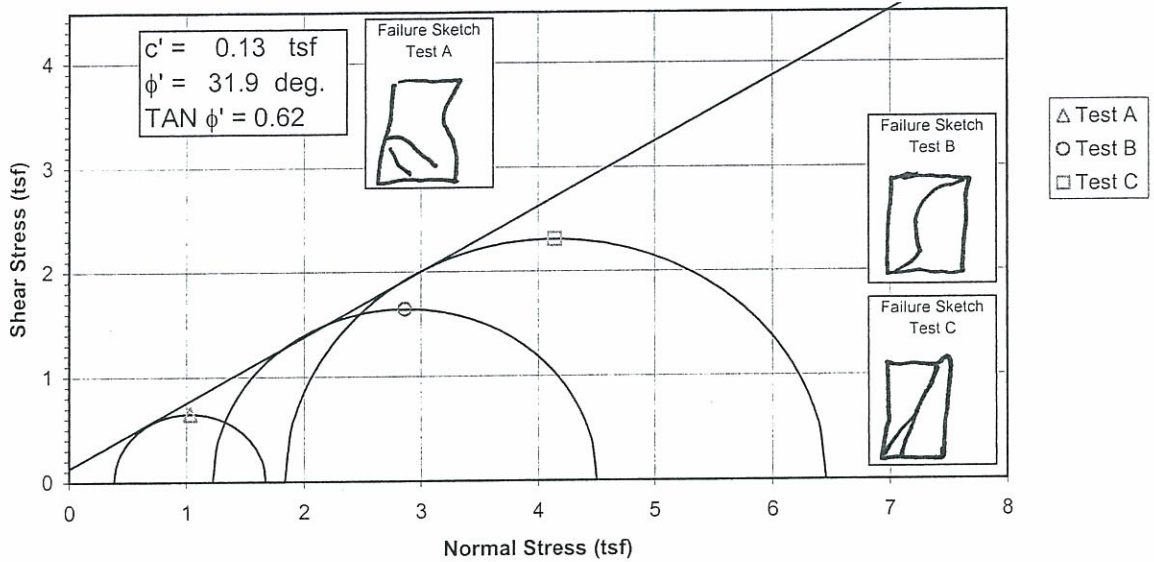


Deviator Stress and Induced Pore Pressure vs. Axial Strain



Failure Criterion: Maximum Effective Principal Stress Ratio

**Effective Strength Envelope**

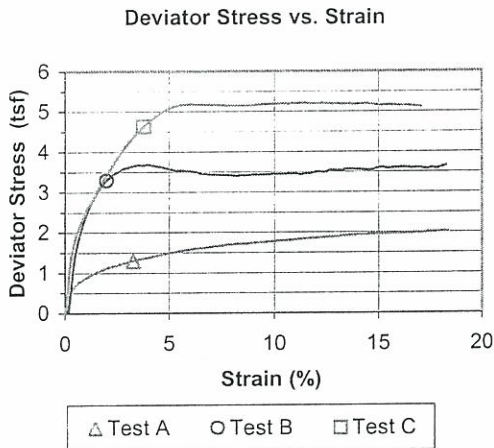
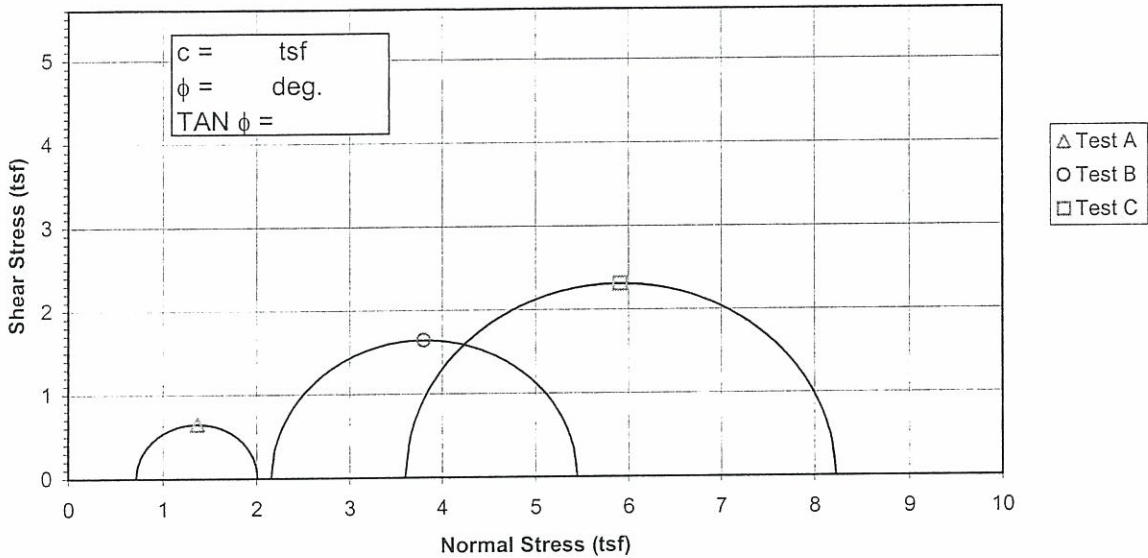


Specimen No.			A	B	C
Initial Data	Water content %	$W_o$	25.9	24.0	22.9
	Dry Density PCF	$\gamma_{d_o}$	97.9	101.2	102.4
	Saturation %	$S_o$	96.0	96.1	94.9
	Void Ratio	$e_o$	0.734	0.678	0.658
After Shear	Water content %	$W_f$	25.9	24.1	22.5
	Dry Density PCF	$\gamma_{d_f}$	99.7	102.5	105.4
	Saturation %	$S_f$	100.0	100.0	100.0
	Void Ratio	$e_f$	0.703	0.656	0.611
	Final Back Pressure TSF	$u_c$	5.76	4.32	2.88
	Minor Principal Stress TSF @ failure	$\sigma_3'f$	0.38	1.23	1.84
	Maximum Deviator Stress (tsf) @ failure	$(\sigma_1' - \sigma_3')_{max}$	1.29	3.29	4.63
	Time to $(\sigma_1' - \sigma_3')_{max}$ min.	$t_f$	72.4	57.9	136.6
	Ultimate Deviator Stress, t/sq ft	$(\sigma_1' - \sigma_3')_{ult}$	n/a	n/a	n/a
	Initial Diameter, in.	$D_o$	2.883	2.880	2.841
	Initial Height, in.	$H_o$	6.240	6.017	6.071

Controlled - Strain Test				Initial Height, in.			
Description of Specimens				Lean Clay (CL), brown, moist, firm			
				Type of Specimen		Type of test	
				Undisturbed		R	
LL	PL	PI	Gs	Project			
			2.72	TVA Facility Assessment, P2: Johnsonville, TN			
Remarks:				Boring No.		Sample No.	
				STN-AC		549	
				Depth Elev.			
				45.5' - 47.5'			
				Laboratory		Date	
				Stantec		5-6-09	
<b>TRIAXIAL COMPRESSION TEST REPORT</b>							

Failure Criterion: Maximum Effective Principal Stress Ratio

**Total Strength Envelope**



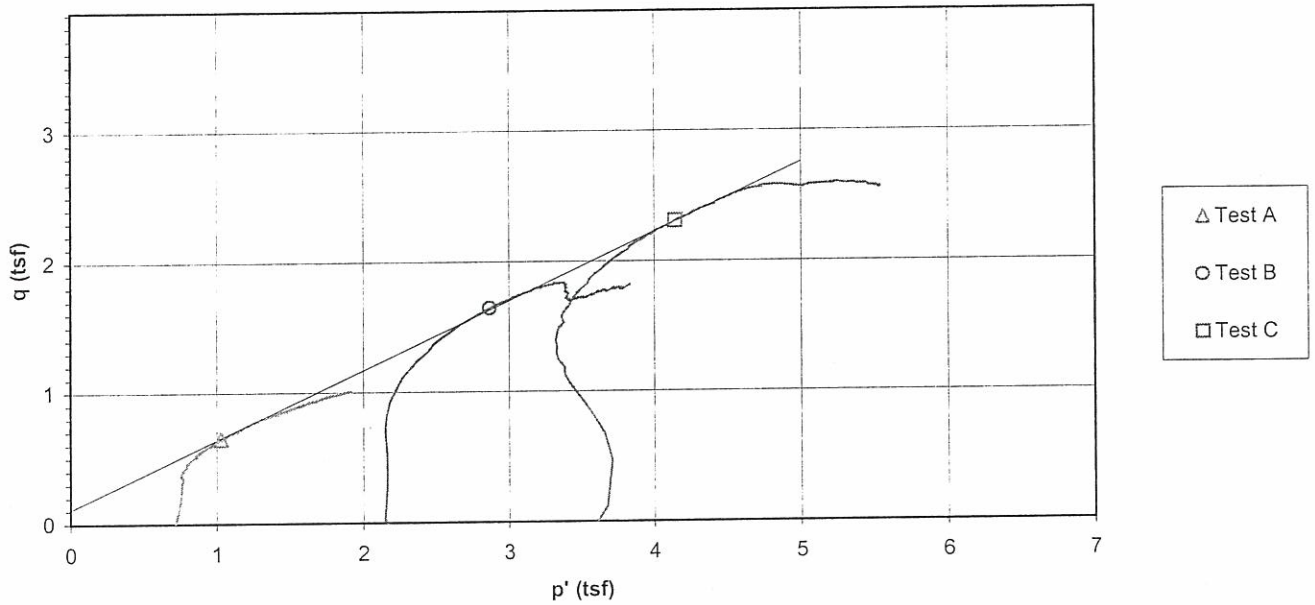
Specimen No.		A	B	C	
Initial Data	Water content %	W <sub>o</sub>	25.9	24.0	22.9
	Dry Density PCF	γ <sub>d</sub> <sub>o</sub>	97.9	101.2	102.4
	Saturation %	S <sub>o</sub>	96.0	96.1	94.9
	Void Ratio	e <sub>o</sub>	0.734	0.678	0.658
After Shear	Water content %	W <sub>f</sub>	25.9	24.1	22.5
	Dry Density PCF	γ <sub>d</sub> <sub>f</sub>	99.7	102.5	105.4
	Saturation %	S <sub>f</sub>	100.0	100.0	100.0
	Void Ratio	e <sub>f</sub>	0.703	0.656	0.611
	Final Back Pressure TSF	u <sub>c</sub>	5.76	4.32	2.88
	Minor Principal Stress TSF	σ <sub>3</sub>	0.72	2.16	3.60
	Maximum Deviator Stress (tsf) @ failure	(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub>	1.29	3.29	4.63
	Time to (σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub> min.	t <sub>f</sub>	72.4	57.9	136.6
	Ultimate Deviator Stress, t/sq ft	(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>ult</sub>	n/a	n/a	n/a
	Initial Diameter, in.	D <sub>o</sub>	2.883	2.880	2.841
	Initial Height, in.	H <sub>o</sub>	6.240	6.017	6.071

Controlled - Strain Test		Lean Clay (CL), brown, moist, firm		
Description of Specimens		Lean Clay (CL), brown, moist, firm		
		Type of Specimen	Undisturbed	Type of test
LL	PL	PI	Gs 2.72	R
Project		TVA Facility Assessment, P2: Johnsonville, TN		
Remarks:		Boring No.	STN-AC	Sample No.
		Depth Elev.	45.5' - 47.5'	
		Laboratory	FMSM Engineers	Date
		5-6-09		
<b>TRIAXIAL COMPRESSION TEST REPORT</b>				

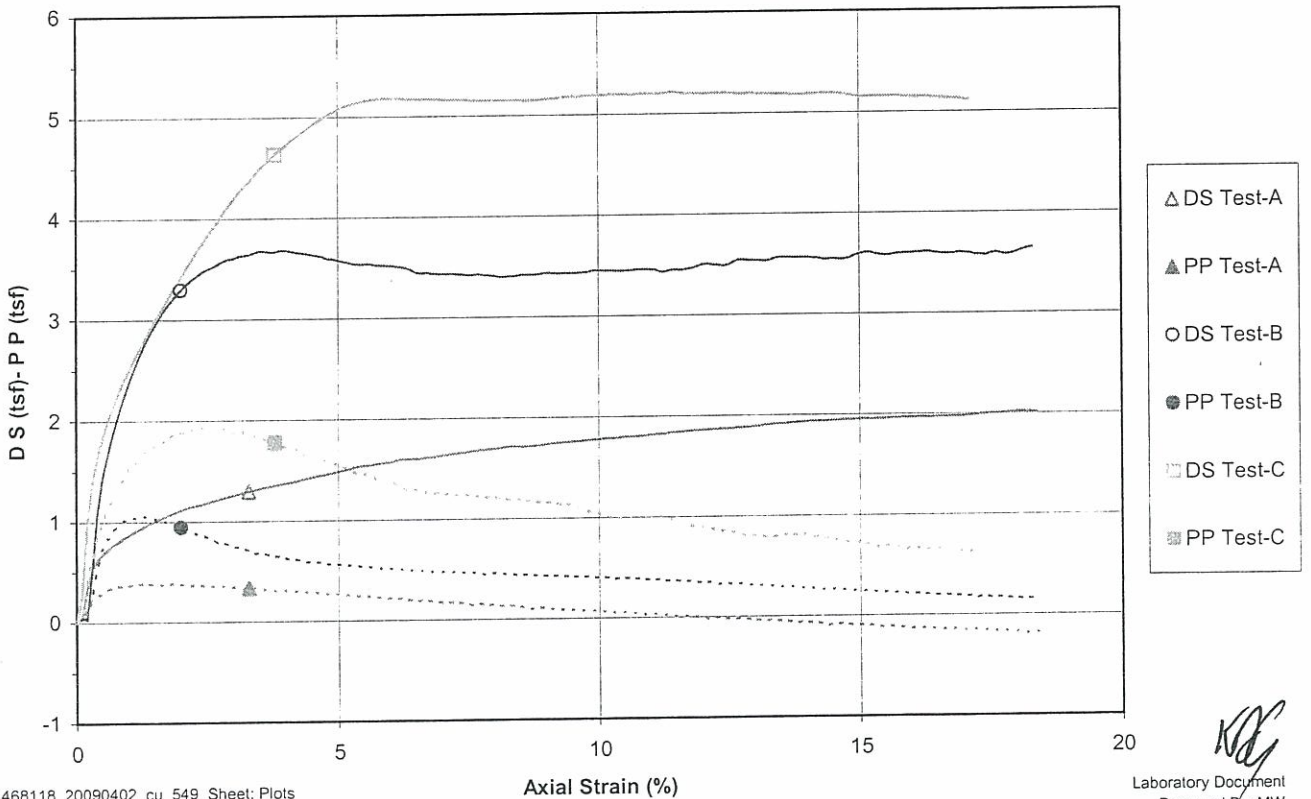
Project TVA Facility Assessment, P2: Johnsonville, TN  
 Sample ID STN-AC, ST-2, 45.6'-46.1', 46.2'-46.7', 46.8'-47.3'  
 Failure Criterion: Maximum Effective Principal Stress Ratio  $\phi' = 31.9$  deg.

Project No. 171468118  
 Test Number 549  
 $c' = 0.13$  tsf

p' vs. q Plot



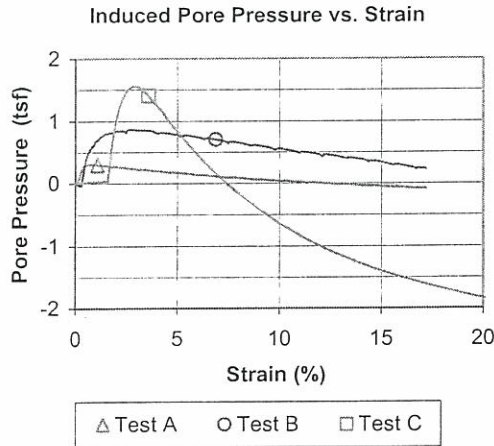
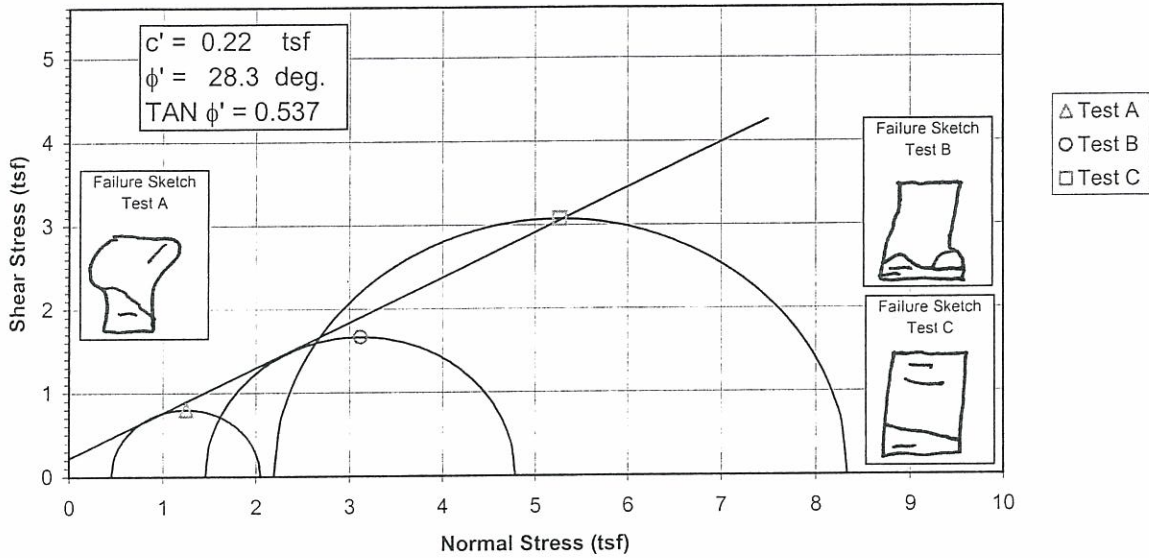
Deviator Stress and Induced Pore Pressure vs. Axial Strain





Failure Criterion: Maximum Effective Principal Stress Ratio

**Effective Strength Envelope**

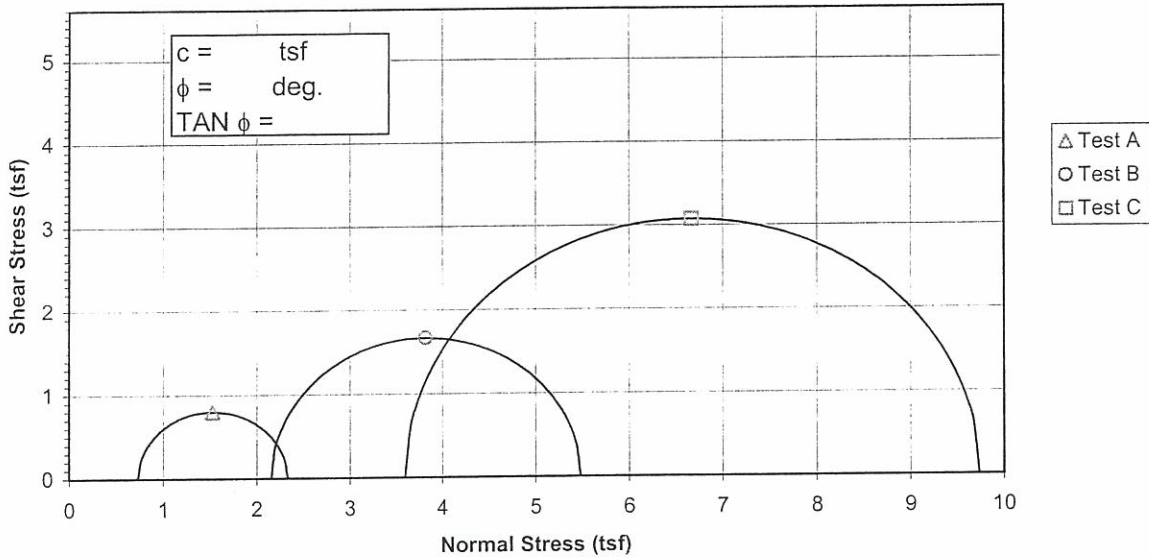


Specimen No.		A	B	C
Initial Data	Water content %	$W_o$ 23.8	22.5	18.6
	Dry Density PCF	$\gamma_{d_o}$ 102.2	104.5	110.6
	Saturation %	$S_o$ 98.9	99.3	95.9
	Void Ratio	$e_o$ 0.650	0.612	0.524
After Shear	Water content %	$W_f$ 22.7	19.2	19.2
	Dry Density PCF	$\gamma_{d_f}$ 104.4	111.1	111.0
	Saturation %	$S_f$ 100.0	100.0	100.0
	Void Ratio	$e_f$ 0.614	0.517	0.518
Final Back Pressure TSF		$u_c$ 5.76	4.32	2.88
Minor Principal Stress TSF @ failure		$\sigma_3'f$ 0.46	1.46	2.20
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1' - \sigma_3')_{max}$ 1.63	3.33	6.14
Time to $(\sigma_1' - \sigma_3')_{max}$ min.		$t_f$ 8.5	61.2	14.6
Ultimate Deviator Stress, t/sq ft		$(\sigma_1' - \sigma_3')_{ult}$ n/a	n/a	n/a
Initial Diameter, in.		$D_o$ 1.412	1.416	1.410
Initial Height, in.		$H_o$ 3.043	3.011	3.041

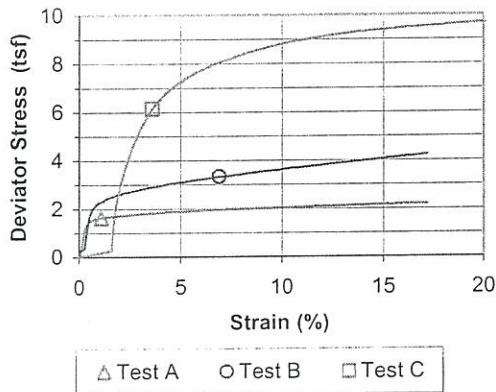
Controlled - Strain Test		Lean Clay with Sand (CL), gray brown, moist, firm		
Description of Specimens		Lean Clay with Sand (CL), gray brown, moist, firm		
		Type of Specimen	Undisturbed	Type of test
LL		PL	PI	Gs 2.7
Project		TVA Facility Assessment, P2: Johnsonville, TN		
Remarks:		Boring No. STM-B-1, STN-B-C, STN-EC-A		
		Sample No.	836	
		Depth Elev.	22.7'-23.2', 33.0'-33.5', 31.7'-32.2'	
		Laboratory	Stantec	Date 5-20-09
<b>TRIAXIAL COMPRESSION TEST REPORT</b>				

Failure Criterion: Maximum Effective Principal Stress Ratio

**Total Strength Envelope**



Deviator Stress vs. Strain

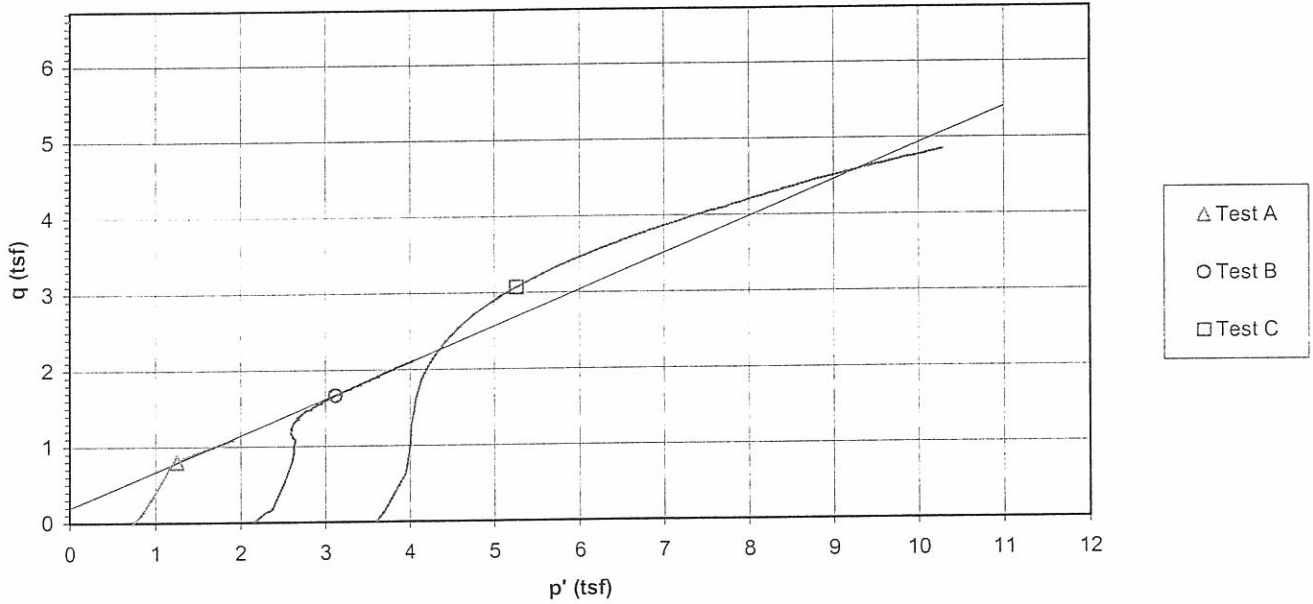


Specimen No.		A	B	C
Initial Data	Water content %	W <sub>o</sub> 23.8	22.5	18.6
	Dry Density PCF	γ <sub>d<sub>o</sub></sub> 102.2	104.5	110.6
	Saturation %	S <sub>o</sub> 98.9	99.3	95.9
	Void Ratio	e <sub>o</sub> 0.650	0.612	0.524
After Shear	Water content %	W <sub>f</sub> 22.7	19.2	19.2
	Dry Density PCF	γ <sub>d<sub>f</sub></sub> 104.4	111.1	111.0
	Saturation %	S <sub>f</sub> 100.0	100.0	100.0
	Void Ratio	e <sub>f</sub> 0.614	0.517	0.518
	Final Back Pressure TSF	u <sub>c</sub> 5.76	4.32	2.88
Minor Principal Stress TSF		σ <sub>3</sub> 0.72	2.16	3.60
Maximum Deviator Stress (tsf) @ failure		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub> 1.63	3.33	6.14
Time to (σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub> min.		t <sub>f</sub> 8.5	61.2	14.6
Ultimate Deviator Stress, t/sq ft		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>ult</sub> n/a	n/a	n/a
Initial Diameter, in.		D <sub>o</sub> 1.412	1.416	1.410
Initial Height, in.		H <sub>o</sub> 3.043	3.011	3.041
Controlled - Strain Test				
Description of Specimens Lean Clay with Sand (CL), gray brown, moist, firm				
		Type of Specimen Undisturbed	Type of test R	
LL	PL	PI	Gs 2.7	Project TVA Facility Assessment, P2: Johnsonville, TN
Remarks:		Boring No. STM-B-1, STN-B-C, STN-EC-A		
		Sample No. 836		
		Depth Elev. 22.7'-23.2', 33.0'-33.5', 31.7'-32.2'		
		Laboratory Stantec	Date 5-20-09	
<b>TRIAXIAL COMPRESSION TEST REPORT</b>				

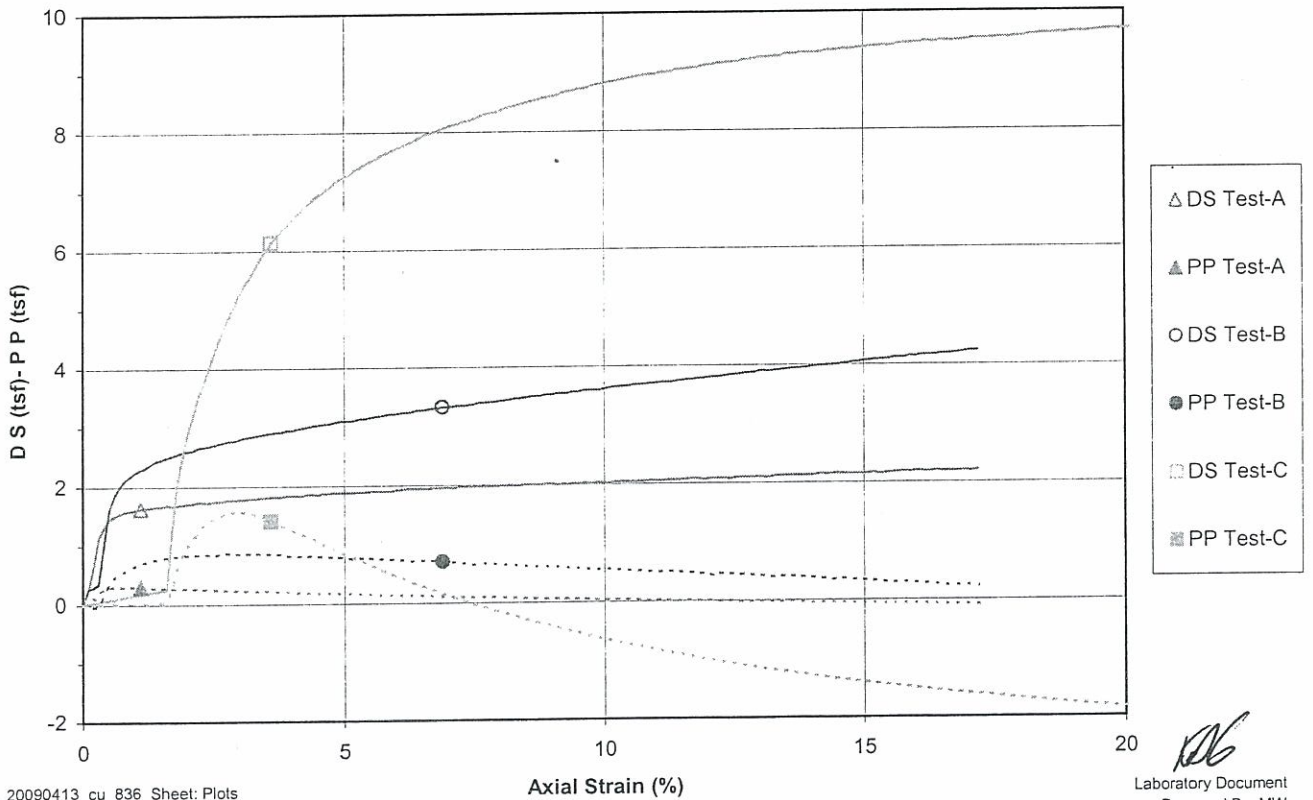
Project TVA Facility Assessment, P2: Johnsonville, TN  
 Sample ID STN-B-1, 22.7'-23.2' & STN-BC, 33.0'-33.5' & STN-EC-A, 31.7'-32.2'  
 Failure Criterion: Maximum Effective Principal Stress Ratio  $\phi' = 28.3$  deg.

Project No. 171468118  
 Test Number 836  
 $c' = 0.22$  tsf

p' vs. q Plot

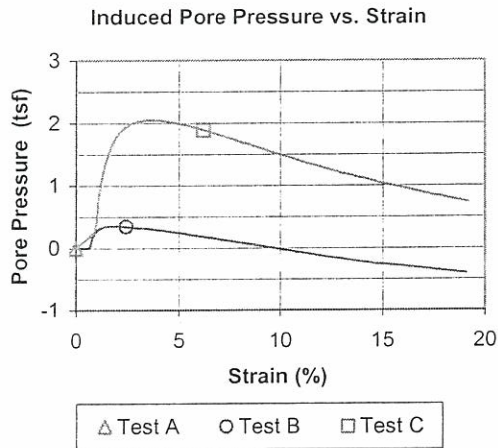
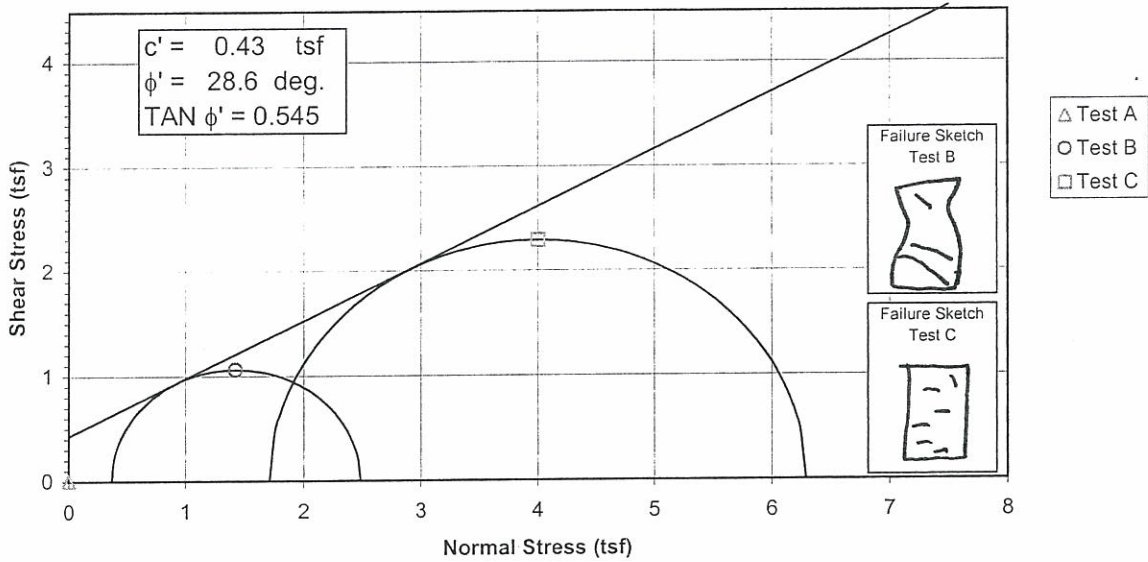


Deviator Stress and Induced Pore Pressure vs. Axial Strain



Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope



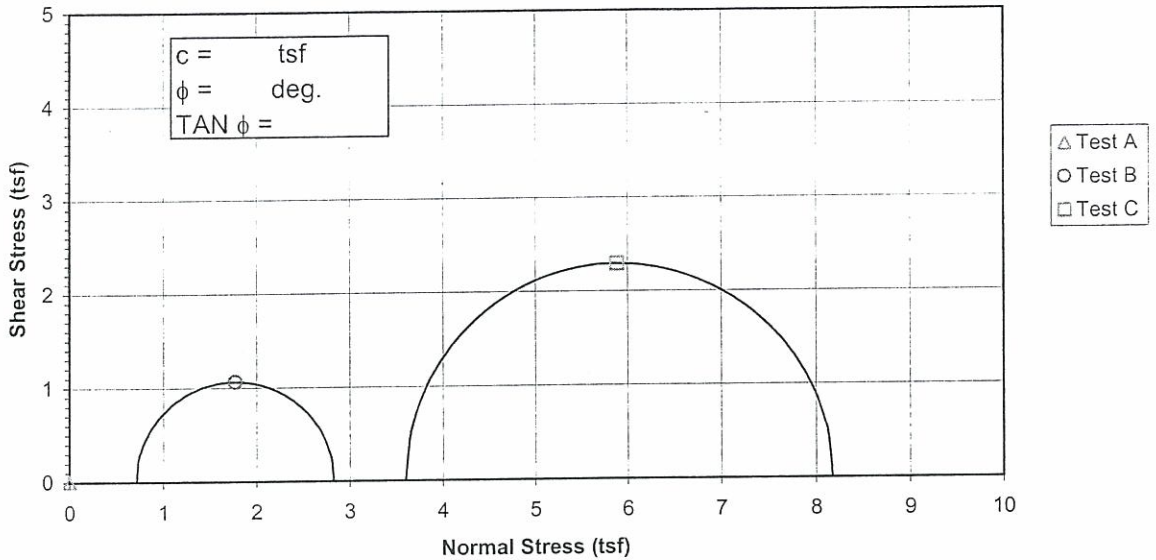
Specimen No.			A	B	C
Initial Data	Water content %	$W_o$	#####	22.2	22.1
	Dry Density PCF	$\gamma_{d_o}$	#####	102.1	103.7
	Saturation %	$S_o$	#####	92.2	95.5
	Void Ratio	$e_o$	#####	0.651	0.626
After Shear	Water content %	$W_f$	#####	23.1	20.5
	Dry Density PCF	$\gamma_{d_f}$	#####	103.8	108.4
	Saturation %	$S_f$	#####	100.0	100.0
	Void Ratio	$e_f$	#####	0.623	0.554
	Final Back Pressure TSF	$u_c$	0.00	5.76	2.88
	Minor Principal Stress TSF @ failure	$\sigma_3'f$	0.00	0.37	1.71
	Maximum Deviator Stress (tsf) @ failure	$(\sigma_1' - \sigma_3')_{max}$	0.00	2.11	4.58
	Time to $(\sigma_1' - \sigma_3')_{max}$ min.	$t_f$	0.0	3.5	48.7
	Ultimate Deviator Stress, t/sq ft	$(\sigma_1' - \sigma_3')_{ult}$	0.00	n/a	n/a
	Initial Diameter, in.	$D_o$	#####	1.411	1.408
Controlled - Strain Test	Initial Height, in.	$H_o$	#####	3.040	3.043

Description of Specimens		Lean Clay (CL), brown, moist, firm			
		Type of Specimen	Undisturbed	Type of test	R
LL	PL	PI	Gs 2.7	Project	TVA Facility Assessment, P2: Johnsonville, TN
Remarks:		Boring No.	STN-B-3	Sample No.	547
		Depth Elev.	20.5'-21.0', 21.1'-21.6'		
		Laboratory	Stantec	Date	5-20-09
<b>TRIAXIAL COMPRESSION TEST REPORT</b>					

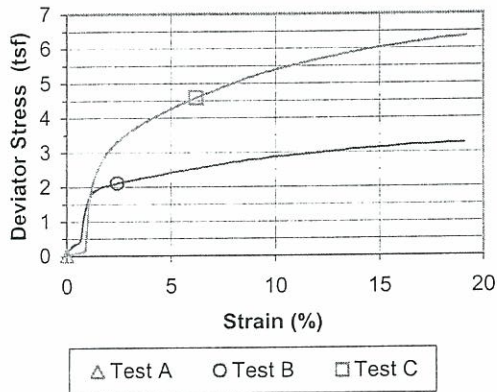
406

Failure Criterion: Maximum Effective Principal Stress Ratio

**Total Strength Envelope**



**Deviator Stress vs. Strain**



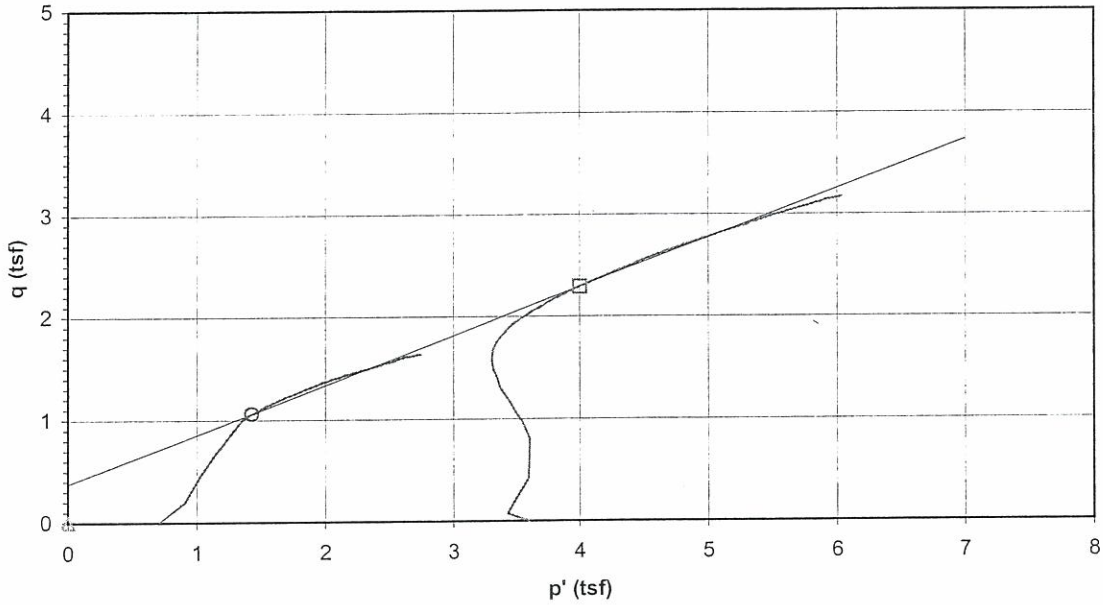
Specimen No.		A	B	C	
Initial Data	Water content %	W <sub>o</sub> #####	22.2	22.1	
	Dry Density PCF	γ <sub>d<sub>o</sub></sub> #####	102.1	103.7	
	Saturation %	S <sub>o</sub> #####	92.2	95.5	
	Void Ratio	e <sub>o</sub> #####	0.651	0.626	
After Shear	Water content %	W <sub>f</sub> #####	23.1	20.5	
	Dry Density PCF	γ <sub>d<sub>f</sub></sub> #####	103.8	108.4	
	Saturation %	S <sub>f</sub> #####	100.0	100.0	
	Void Ratio	e <sub>f</sub> #####	0.623	0.554	
Final Back Pressure TSF		u <sub>c</sub>	0.00	5.76	2.88
Minor Principal Stress TSF		σ <sub>3</sub>	0.00	0.72	3.60
Maximum Deviator Stress (tsf) @ failure		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub>	0.00	2.11	4.58
Time to (σ <sub>1</sub> -σ <sub>3</sub> ) <sub>Max</sub> . min.		t <sub>f</sub>	0.0	3.5	48.7
Ultimate Deviator Stress, t/sq ft		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>ult</sub>	0.00	n/a	n/a
Initial Diameter, in.		D <sub>o</sub> #####	1.411	1.408	
Initial Height, in.		H <sub>o</sub> #####	3.040	3.043	

Controlled - Strain Test				Initial Height, in.		H <sub>o</sub> #####	3.040	3.043	
Description of Specimens Lean Clay (CL), brown, moist, firm									
				Type of Specimen	Undisturbed	Type of test R			
LL	PL	PI	Gs	2.7	Project				TVA Facility Assessment, P2: Johnsonville, TN
Remarks:									
				Boring No.	STN-B-3	Sample No.	547		
				Depth Elev.	20.5'-21.0', 21.1'-21.6'				
				Laboratory	Stantec	Date	5-20-09		
<b>TRIAXIAL COMPRESSION TEST REPORT</b>									

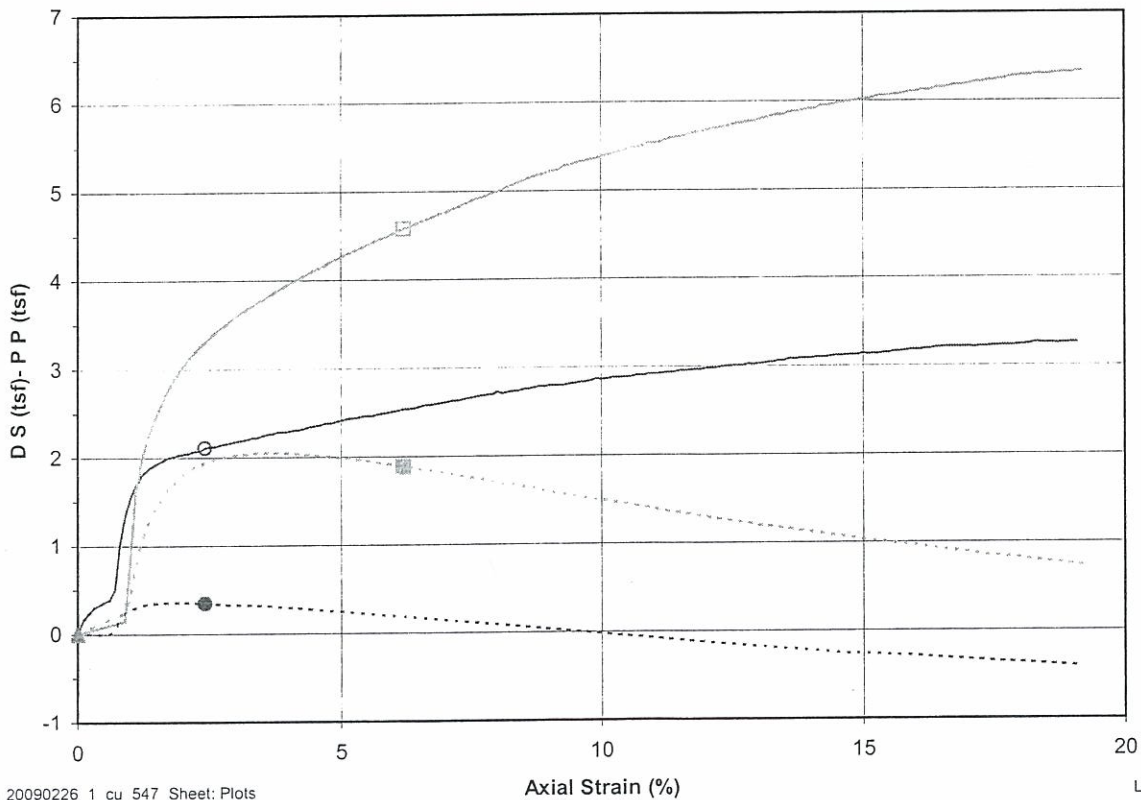
Project TVA Facility Assessment, P2: Johnsonville, TN  
 Sample ID STN-B-3, 20.5'-21.0', 21.1'-21.6'  
 Failure Criterion: Maximum Effective Principal Stress Ratio  $\phi' = 28.6$  deg.

Project No. 171468118  
 Test Number 547  
 $c' = 0.43$  tsf

p' vs. q Plot



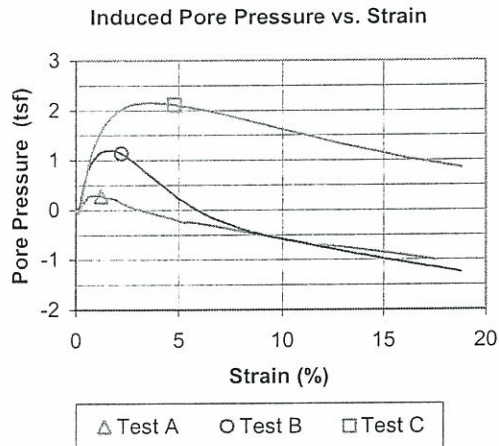
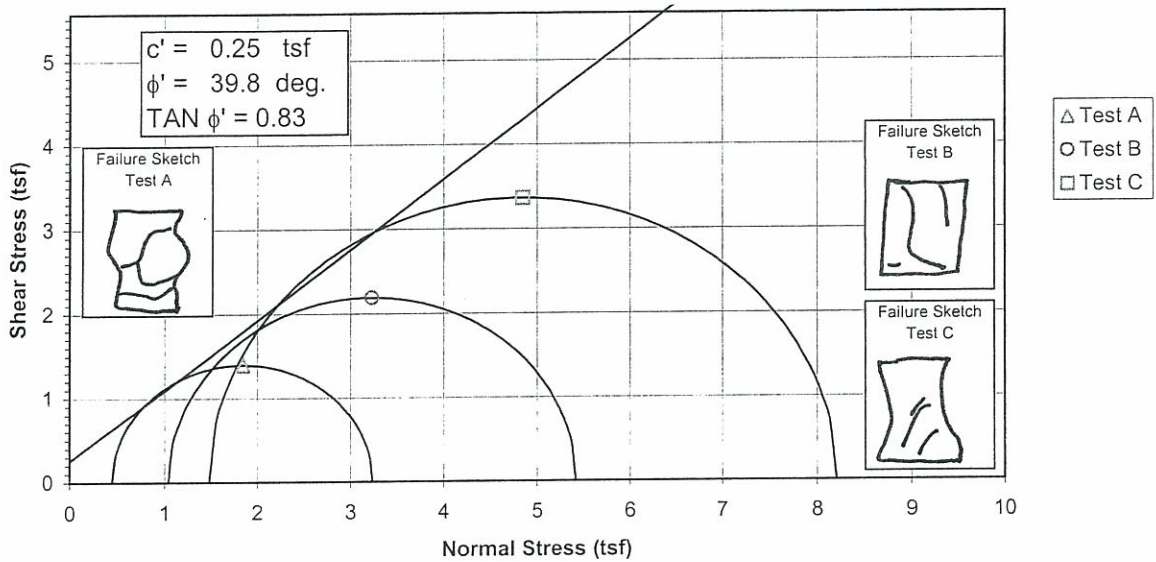
Deviator Stress and Induced Pore Pressure vs. Axial Strain



*KOB*

Failure Criterion: Maximum Effective Principal Stress Ratio

**Effective Strength Envelope**

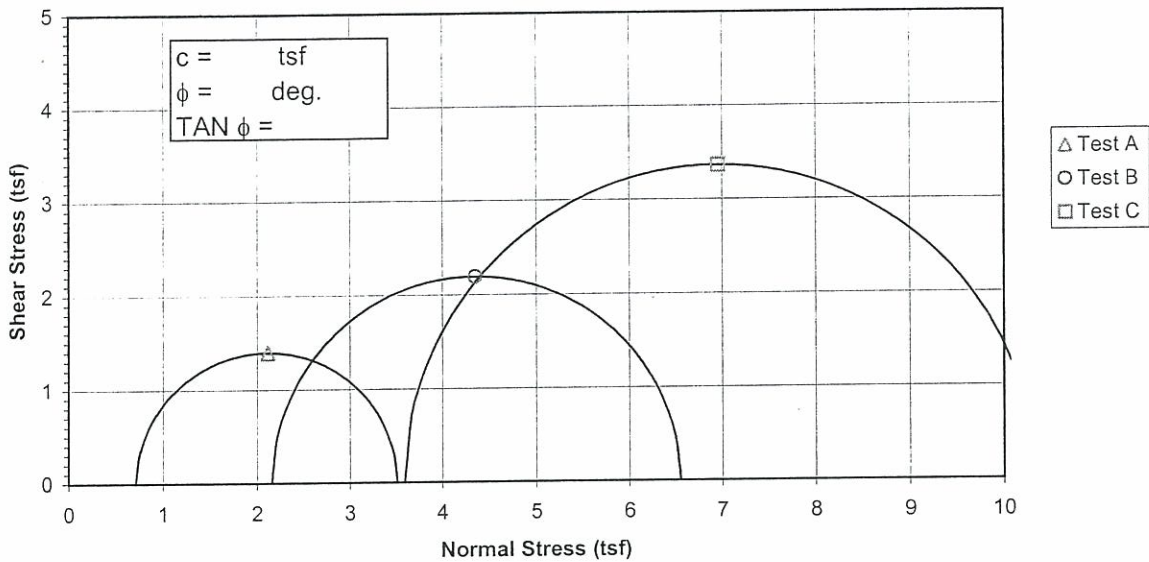


Specimen No.		A	B	C
Initial Data	Water content %	$W_o$ 19.1	17.7	18.7
	Dry Density PCF	$\gamma_{d_o}$ 108.3	110.4	108.3
	Saturation %	$S_o$ 95.0	93.5	93.6
	Void Ratio	$e_o$ 0.534	0.504	0.533
After Shear	Water content %	$W_f$ 20.9	18.5	19.6
	Dry Density PCF	$\gamma_{d_f}$ 106.7	111.2	109.2
	Saturation %	$S_f$ 100.0	100.0	100.0
	Void Ratio	$e_f$ 0.556	0.493	0.521
	Final Back Pressure TSF	$u_c$ 5.76	4.32	2.88
	Minor Principal Stress TSF @ failure	$\sigma_3'f$ 0.45	1.05	1.48
	Maximum Deviator Stress (tsf) @ failure	$(\sigma_1' - \sigma_3')_{max}$ 2.80	4.39	6.72
	Time to $(\sigma_1' - \sigma_3')_{max}$ min.	$t_f$ 6.8	12.4	7.3
	Ultimate Deviator Stress, t/sq ft	$(\sigma_1' - \sigma_3')_{ult}$ n/a	n/a	n/a
	Initial Diameter, in.	$D_o$ 1.415	1.414	1.414
	Initial Height, in.	$H_o$ 3.026	3.081	3.042

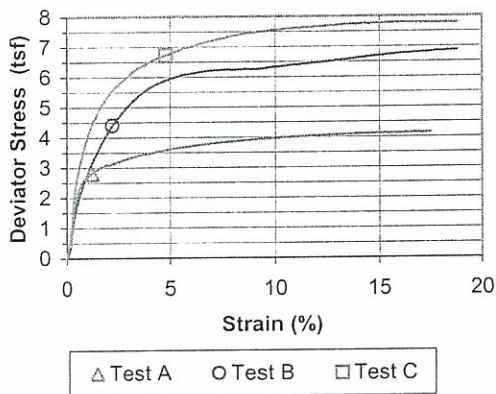
Controlled - Strain Test				Initial Height, in.			
Description of Specimens				Lean Clay (CL), brown, moist, firm			
				Type of Specimen		Undisturbed	
				Type of test		R	
LL	PL	PI	Gs	2.66			
Remarks:				Project TVA Facility Assessment, P2: Johnsonville, TN			
				Boring No. STN-FC-PZ, STN-GC-PZ			
				Sample No. 842			
				Depth Elev. 5.1'-5.6', 5.7'-6.2', 5.7'-6.2'			
				Laboratory		Stantec	
				Date		5-18-09	
<b>TRIAXIAL COMPRESSION TEST REPORT</b>							

Failure Criterion: Maximum Effective Principal Stress Ratio

**Total Strength Envelope**



Deviator Stress vs. Strain



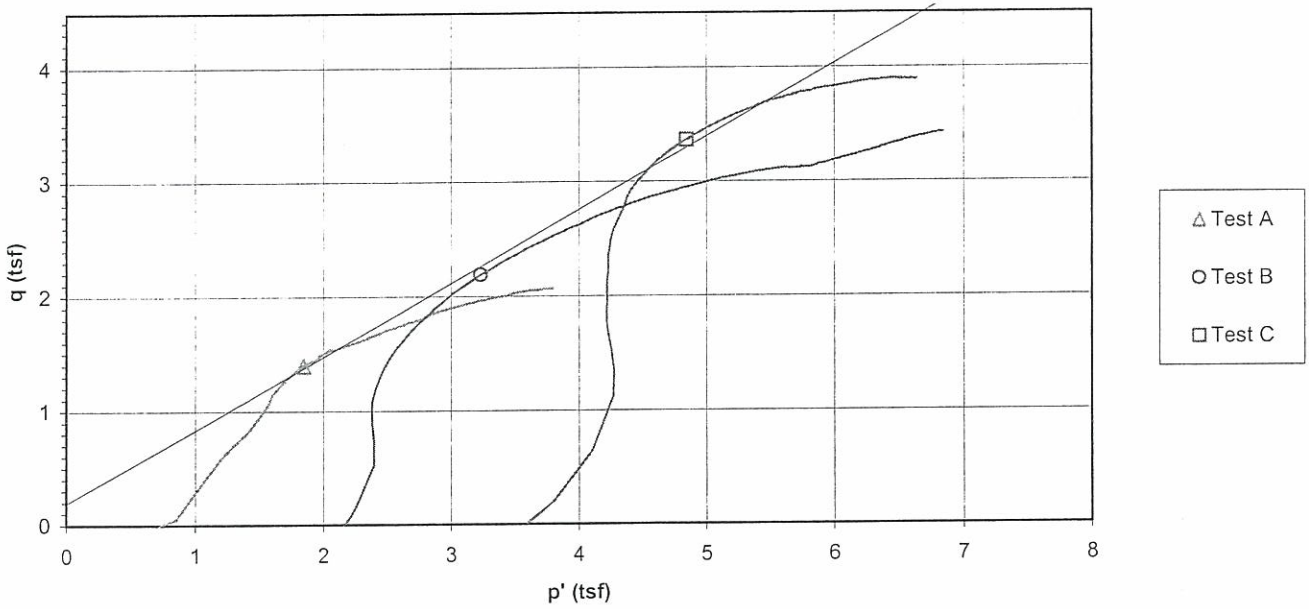
Specimen No.		A	B	C	
Initial Data	Water content %	W <sub>o</sub> 19.1	17.7	18.7	
	Dry Density PCF	γ <sub>d</sub> <sub>o</sub> 108.3	110.4	108.3	
	Saturation %	S <sub>o</sub> 95.0	93.5	93.6	
	Void Ratio	e <sub>o</sub> 0.534	0.504	0.533	
After Shear	Water content %	W <sub>f</sub> 20.9	18.5	19.6	
	Dry Density PCF	γ <sub>d</sub> <sub>f</sub> 106.7	111.2	109.2	
	Saturation %	S <sub>f</sub> 100.0	100.0	100.0	
	Void Ratio	e <sub>f</sub> 0.556	0.493	0.521	
	Final Back Pressure TSF	u <sub>c</sub> 5.76	4.32	2.88	
Minor Principal Stress TSF		σ <sub>3</sub>	0.72	2.16	3.60
Maximum Deviator Stress (tsf) @ failure		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub>	2.80	4.39	6.72
Time to (σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub> min.		t <sub>f</sub>	6.8	12.4	7.3
Ultimate Deviator Stress, t/sq ft		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>ult</sub>	n/a	n/a	n/a
Initial Diameter, in.		D <sub>o</sub>	1.415	1.414	1.414
Initial Height, in.		H <sub>o</sub>	3.026	3.081	3.042
Controlled - Strain Test					
Description of Specimens Lean Clay (CL), brown, moist, firm					
			Type of Specimen Undisturbed	Type of test R	
LL	PL	PI	Gs 2.66	Project TVA Facility Assessment, P2: Johnsonville, TN	
Remarks:			Boring No. STN-FC-PZ, STN-GC-PZ		
			Sample No. 842		
			Depth Elev. 5.1'-5.6', 5.7'-6.2', 5.7'-6.2'		
			Laboratory Stantec	Date 5-18-09	
<b>TRIAXIAL COMPRESSION TEST REPORT</b>					



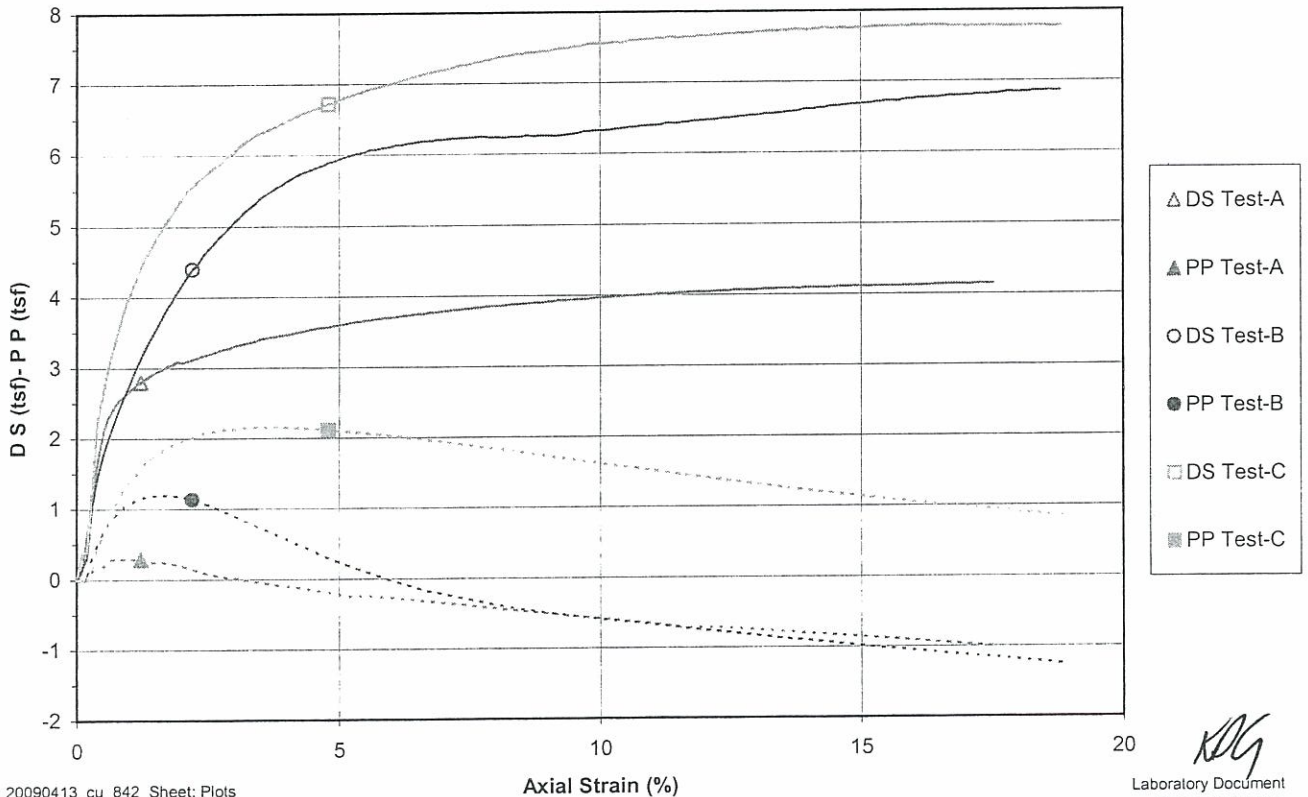
Project TVA Facility Assessment, P2: Johnsonville, TN  
 Sample ID STN-FC-PZ, 5.1'-5.6' & STN-FC-PZ, 5.7'-6.2' & STN-GC-PZ, 5.7'-6.2'  
 Failure Criterion: Maximum Effective Principal Stress Ratio  $\phi' = 39.8$  deg.

Project No. 171468118  
 Test Number 842  
 $c' = 0.25$  tsf

p' vs. q Plot

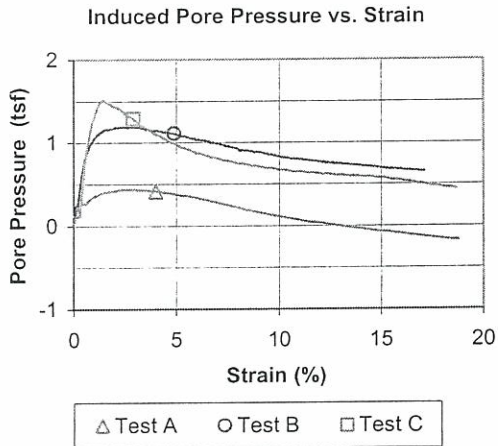
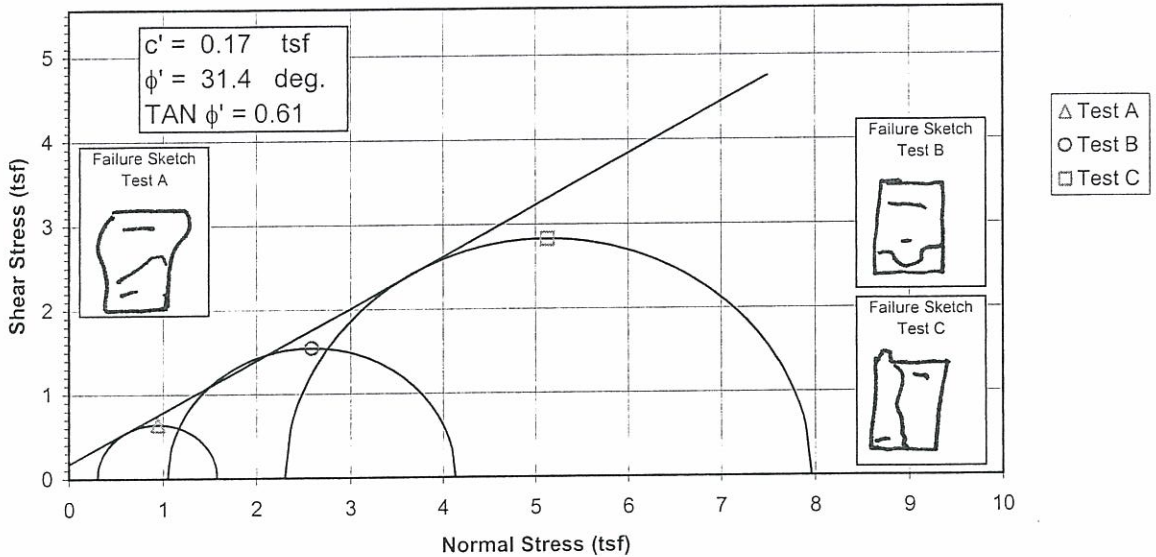


Deviator Stress and Induced Pore Pressure vs. Axial Strain



Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope

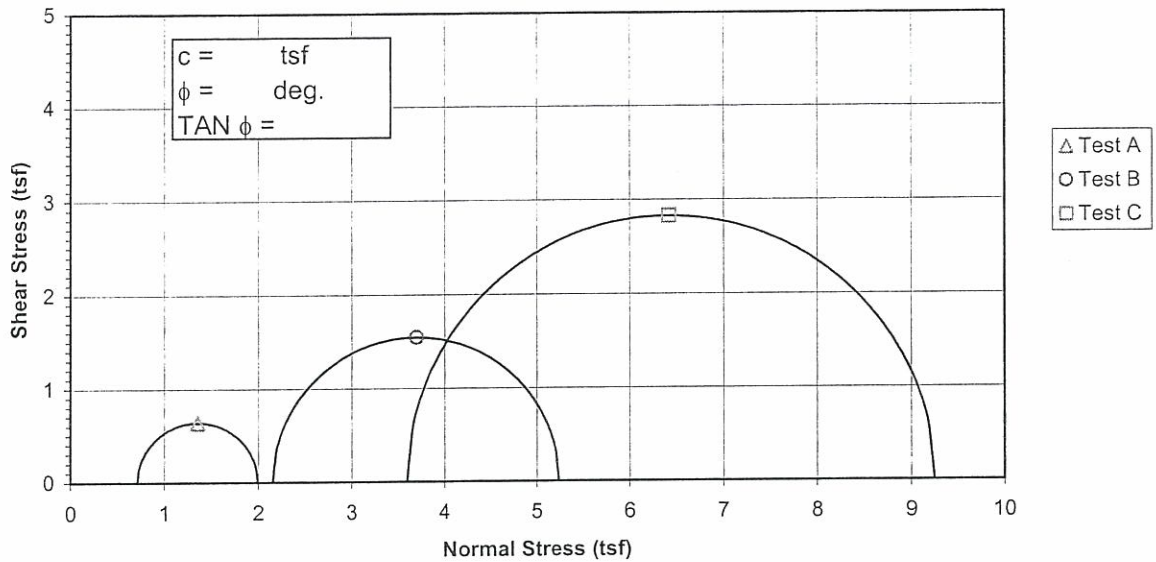


Specimen No.		A	B	C
Initial Data	Water content %	$W_o$ 23.4	25.8	20.4
	Dry Density PCF	$\gamma_{d_o}$ 102.6	98.8	103.7
	Saturation %	$S_o$ 99.4	99.8	88.9
	Void Ratio	$e_o$ 0.630	0.693	0.614
After Shear	Water content %	$W_f$ 22.4	21.6	22.3
	Dry Density PCF	$\gamma_{d_f}$ 104.6	106.0	104.6
	Saturation %	$S_f$ 100.0	100.0	100.0
	Void Ratio	$e_f$ 0.599	0.579	0.599
	Final Back Pressure TSF	$u_c$ 5.76	4.32	2.88
	Minor Principal Stress TSF @ failure	$\sigma_3'f$ 0.31	1.05	2.31
	Maximum Deviator Stress (tsf) @ failure	$(\sigma_1' - \sigma_3')_{max}$ 1.28	3.08	5.65
	Time to $(\sigma_1' - \sigma_3')_{max}$ min.	$t_f$ 16.6	184.1	29.2
	Ultimate Deviator Stress, t/sq ft	$(\sigma_1' - \sigma_3')_{ult}$ n/a	n/a	5.48
	Initial Diameter, in.	$D_o$ 1.420	1.419	1.418
	Initial Height, in.	$H_o$ 3.024	3.017	3.046

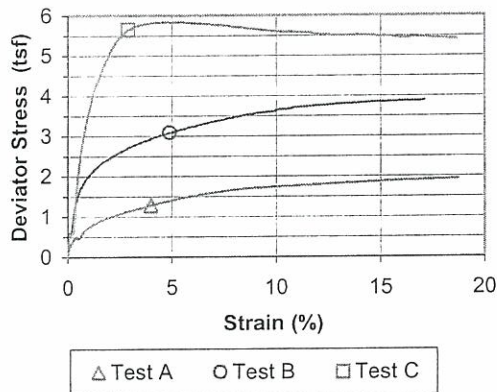
Controlled - Strain Test				Initial Height, in.				$H_o$	3.024	3.017	3.046
Description of Specimens Lean Clay (CL), light brown, moist, firm											
						Type of Specimen Undisturbed			Type of test R		
LL	PL	PI	Gs	2.68		Project TVA Facility Assessment, P2: Johnsonville, TN					
Remarks:											
						Boring No. STN-FC		Sample No. 1586			
Depth Elev. 44.5'-45.0', 35.1'-35.6', 45.1'-45.6'											
						Laboratory Stantec			Date 5-18-09		
TRIAXIAL COMPRESSION TEST REPORT											

Failure Criterion: Maximum Effective Principal Stress Ratio

**Total Strength Envelope**



Deviator Stress vs. Strain



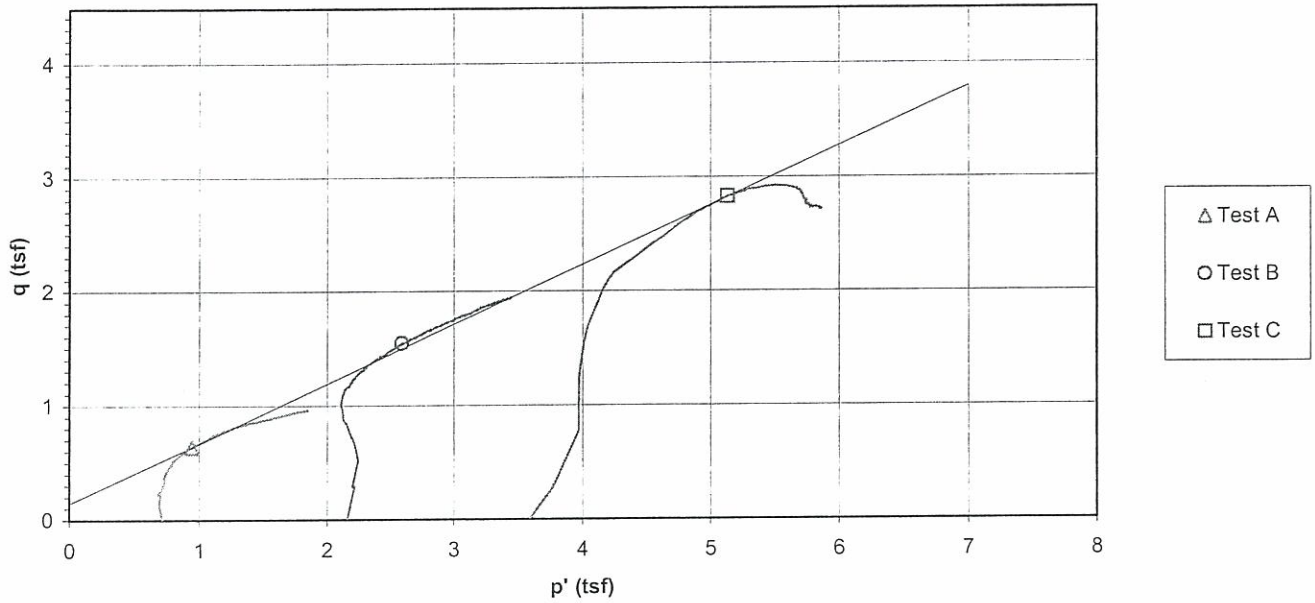
Specimen No.		A	B	C
Initial Data	Water content %	W <sub>o</sub> 23.4	25.8	20.4
	Dry Density PCF	γ <sub>d<sub>o</sub></sub> 102.6	98.8	103.7
	Saturation %	S <sub>o</sub> 99.4	99.8	88.9
	Void Ratio	e <sub>o</sub> 0.630	0.693	0.614
After Shear	Water content %	W <sub>f</sub> 22.4	21.6	22.3
	Dry Density PCF	γ <sub>d<sub>f</sub></sub> 104.6	106.0	104.6
	Saturation %	S <sub>f</sub> 100.0	100.0	100.0
	Void Ratio	e <sub>f</sub> 0.599	0.579	0.599
	Final Back Pressure TSF	u <sub>c</sub> 5.76	4.32	2.88
Minor Principal Stress TSF		σ <sub>3</sub> 0.72	2.16	3.60
Maximum Deviator Stress (tsf) @ failure		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub> 1.28	3.08	5.65
Time to (σ <sub>1</sub> -σ <sub>3</sub> ) <sub>Max</sub> min.		t <sub>f</sub> 16.6	184.1	29.2
Ultimate Deviator Stress, t/sq ft		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>ult</sub> n/a	n/a	5.48
Initial Diameter, in.		D <sub>o</sub> 1.420	1.419	1.418
Initial Height, in.		H <sub>o</sub> 3.024	3.017	3.046

Controlled - Strain Test				Initial Height, in.				H <sub>o</sub>	3.024	3.017	3.046
Description of Specimens Lean Clay (CL), light brown, moist, firm											
						Type of Specimen Undisturbed			Type of test R		
LL	PL	PI	Gs	2.68		Project TVA Facility Assessment, P2: Johnsonville, TN					
Remarks:											
						Boring No. STN-FC		Sample No. 1586			
						Depth Elev. 44.5'-45.0', 35.1'-35.6', 45.1'-45.6'					
						Laboratory Stantec			Date 5-18-09		
<b>TRIAXIAL COMPRESSION TEST REPORT</b>											

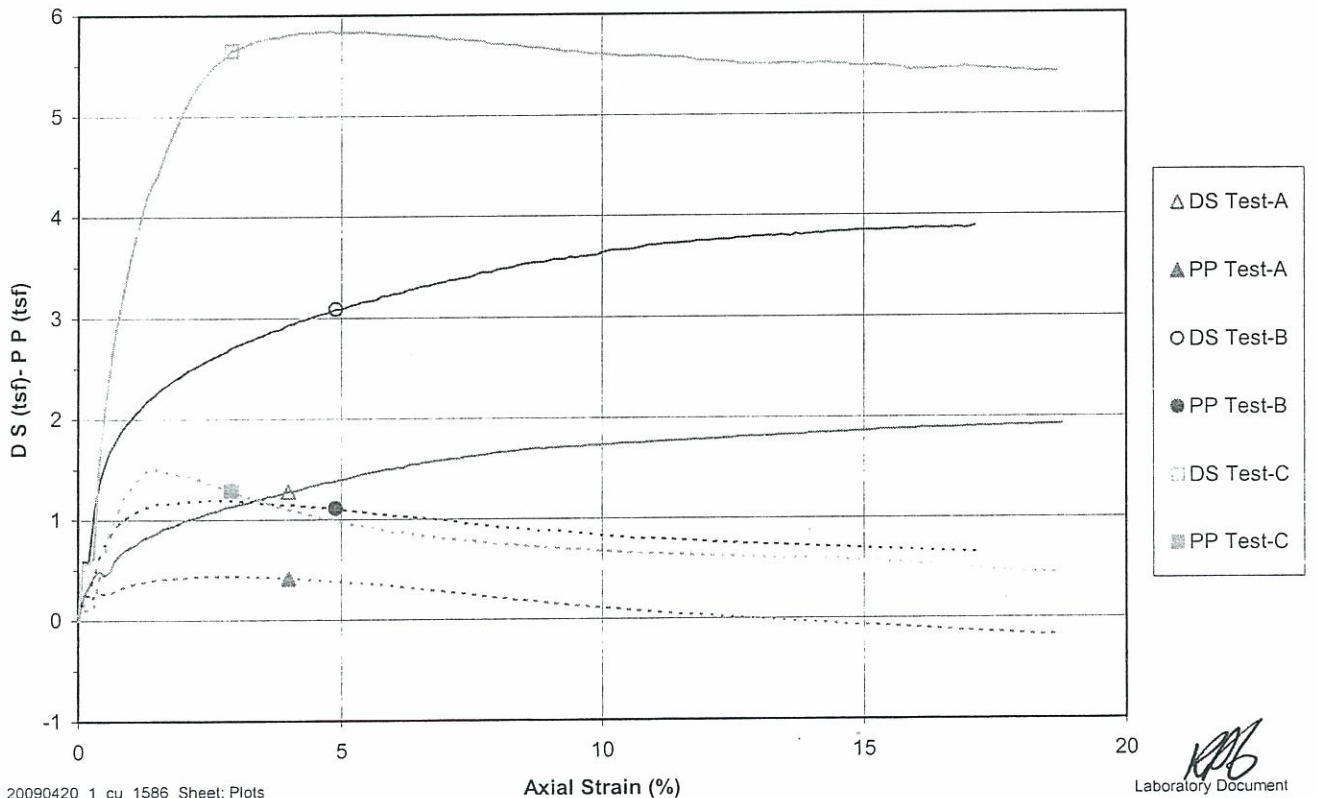
Project TVA Facility Assessment, P2: Johnsonville, TN  
 Sample ID STN-FC, 44.5'-45.0' & STN-FC, 35.1'-35.6' & STN-FC, 45.1'-45.6'  
 Failure Criterion: Maximum Effective Principal Stress Ratio  $\phi' = 31.4 \text{ deg.}$

Project No. 171468118  
 Test Number 1586  
 $c' = 0.17 \text{ tsf}$

p' vs. q Plot

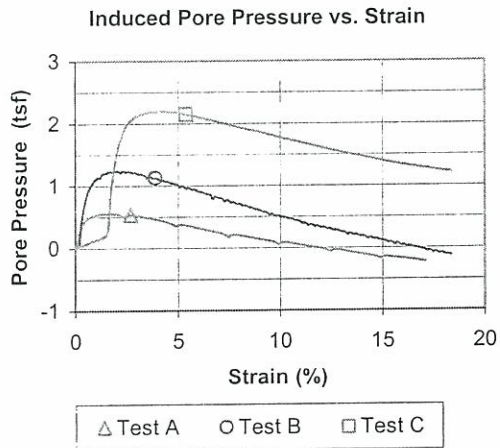
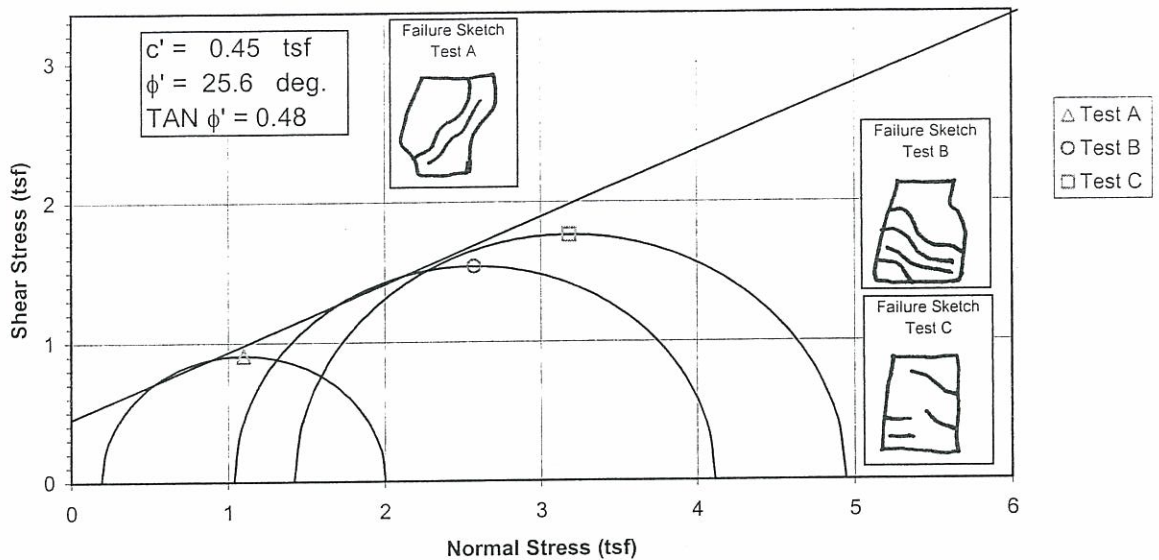


Deviator Stress and Induced Pore Pressure vs. Axial Strain



Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope

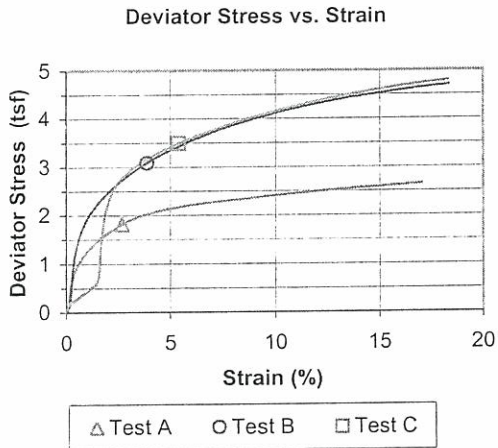
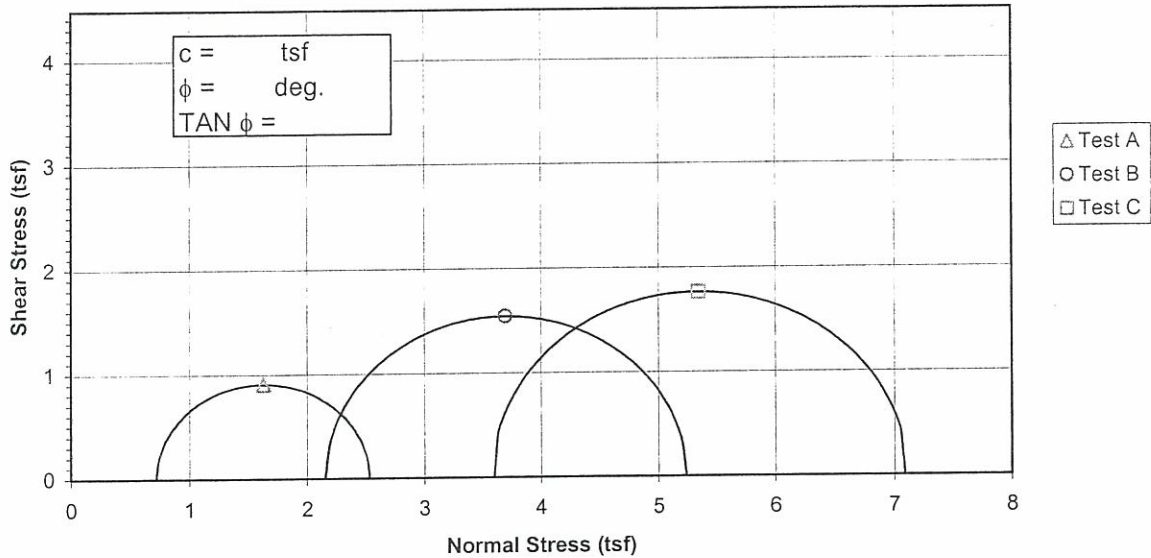


Specimen No.			A	B	C
Initial Data	Water content %	$W_o$	20.3	18.6	17.8
	Dry Density PCF	$\gamma_{d_o}$	104.0	109.6	109.7
	Saturation %	$S_o$	90.6	95.8	91.9
	Void Ratio	$e_o$	0.597	0.516	0.514
After Shear	Water content %	$W_f$	21.8	19.0	17.4
	Dry Density PCF	$\gamma_{d_f}$	105.2	110.4	113.4
	Saturation %	$S_f$	100.0	100.0	100.0
	Void Ratio	$e_f$	0.579	0.505	0.464
	Final Back Pressure TSF	$u_c$	5.76	4.32	2.88
	Minor Principal Stress TSF @ failure	$\sigma_3'f$	0.20	1.04	1.42
	Maximum Deviator Stress (tsf) @ failure	$(\sigma_1' - \sigma_3')_{max}$	1.82	3.08	3.49
	Time to $(\sigma_1' - \sigma_3')_{max}$ min.	$t_f$	12.0	141.1	185.0
	Ultimate Deviator Stress, t/sq ft	$(\sigma_1' - \sigma_3')_{ult}$	n/a	n/a	n/a
	Initial Diameter, in.	$D_o$	2.880	2.885	2.892
	Initial Height, in.	$H_o$	6.011	6.009	6.043

Controlled - Strain Test				Initial Height, in.		$H_o$	6.011	6.009	6.043
Description of Specimens Lean Clay (CL), brown, moist, firm									
				Type of Specimen	Undisturbed			Type of test	R
LL	PL	PI	Gs	2.66	Project TVA Facility Assessment, P2: Johnsonville, TN				
Remarks:				Boring No. STN-GC-PZ, STN-HC-PZ & STN-IC-PZ					
						Sample No.		840	
				Depth Elev.		5.1'-5.6', 5.1'-5.6' & 10.2'-10.7'			
				Laboratory		Stantec		Date 5-13-09	
TRIAXIAL COMPRESSION TEST REPORT									

Failure Criterion: Maximum Effective Principal Stress Ratio

**Total Strength Envelope**



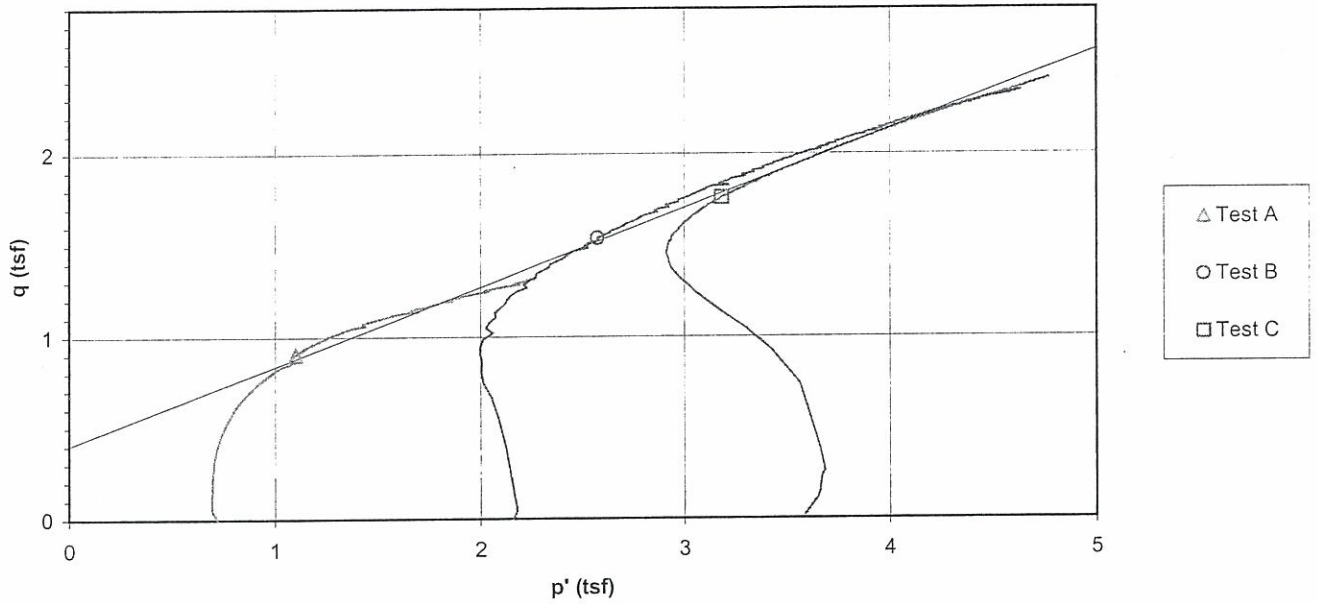
Specimen No.		A	B	C
Initial Data	Water content %	W <sub>o</sub> 20.3	18.6	17.8
	Dry Density PCF	γ <sub>d</sub> <sub>o</sub> 104.0	109.6	109.7
	Saturation %	S <sub>o</sub> 90.6	95.8	91.9
	Void Ratio	e <sub>o</sub> 0.597	0.516	0.514
After Shear	Water content %	W <sub>f</sub> 21.8	19.0	17.4
	Dry Density PCF	γ <sub>d</sub> <sub>f</sub> 105.2	110.4	113.4
	Saturation %	S <sub>f</sub> 100.0	100.0	100.0
	Void Ratio	e <sub>f</sub> 0.579	0.505	0.464
	Final Back Pressure TSF	u <sub>c</sub> 5.76	4.32	2.88
	Minor Principal Stress TSF	σ <sub>3</sub> 0.72	2.16	3.60
	Maximum Deviator Stress (tsf) @ failure	(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub> 1.82	3.08	3.49
	Time to (σ <sub>1</sub> -σ <sub>3</sub> ) <sub>Max</sub> min.	t <sub>f</sub> 12.0	141.1	185.0
	Ultimate Deviator Stress, t/sq ft	(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>ult</sub> n/a	n/a	n/a
	Initial Diameter, in.	D <sub>o</sub> 2.880	2.885	2.892
	Initial Height, in.	H <sub>o</sub> 6.011	6.009	6.043

Controlled - Strain Test		Initial Height, in.		H <sub>o</sub>	6.011	6.009	6.043
Description of Specimens Lean Clay (CL), brown, moist, firm							
				Type of Specimen	Undisturbed	Type of test R	
LL	PL	PI	Gs	2.66	Project TVA Facility Assessment, P2: Johnsonville, TN		
Remarks:				Boring No. STN-GC-PZ, STN-HC-PZ & STN-IC-PZ			
				Sample No. 840			
				Depth Elev. 5.1'-5.6', 5.1'-5.6' & 10.2'-10.7'			
				Laboratory Stantec		Date 5-13-09	
<b>TRIAXIAL COMPRESSION TEST REPORT</b>							

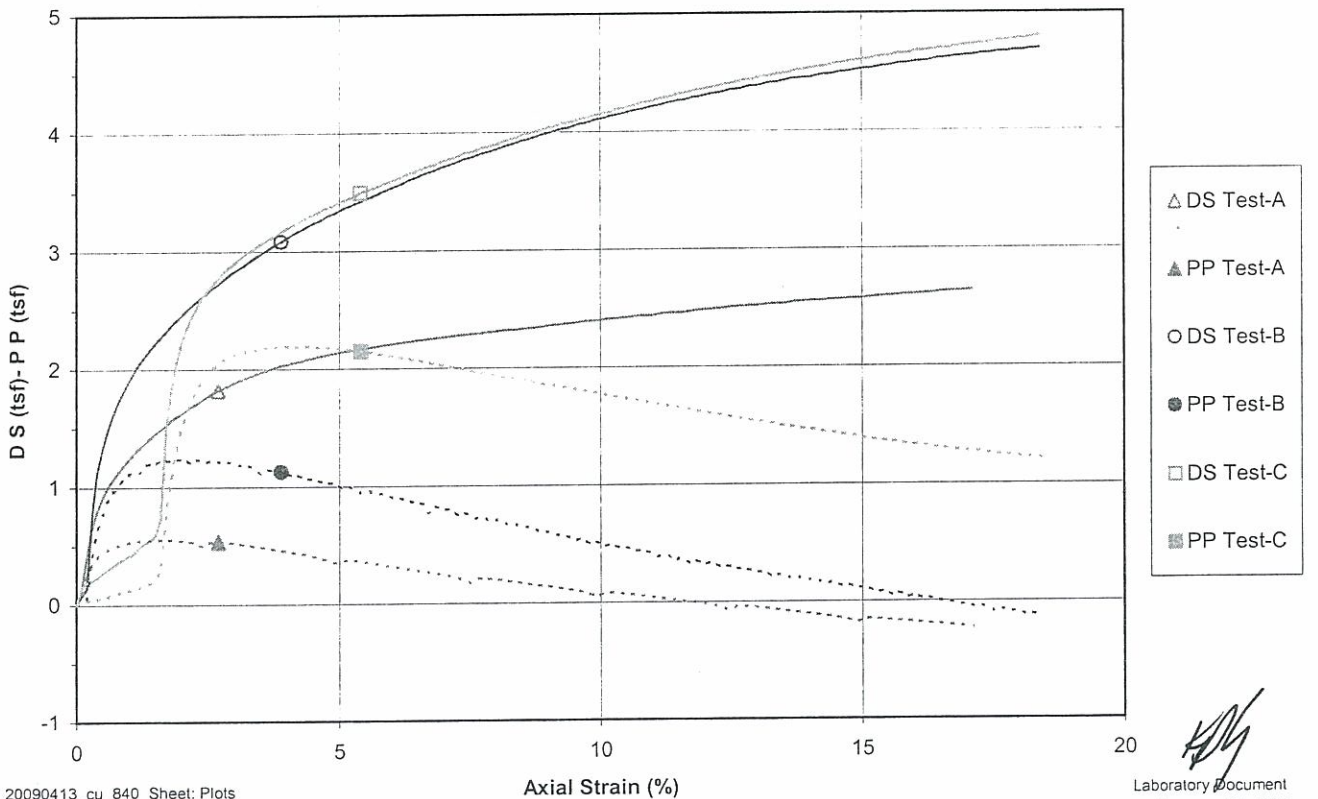
Project TVA Facility Assessment, P2: Johnsonville, TN  
 Sample ID STN-GC-PZ, 5.1' - 5.6' & STN-HC-PZ, 5.1' - 5.6' & STN-IC-PZ, 10.2' - 10.7'  
 Failure Criterion: Maximum Effective Principal Stress Ratio  $\phi' = 25.6 \text{ deg.}$

Project No. 171468118  
 Test Number 840  
 $c' = 0.45 \text{ tsf}$

p' vs. q Plot

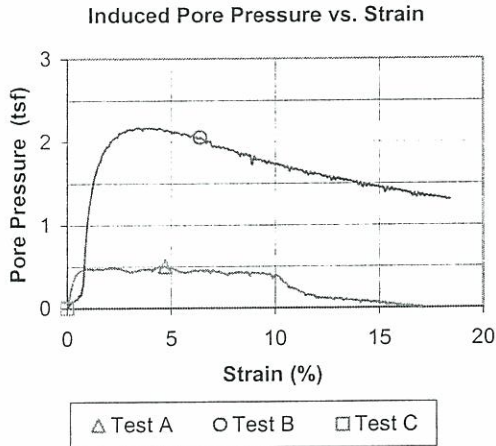
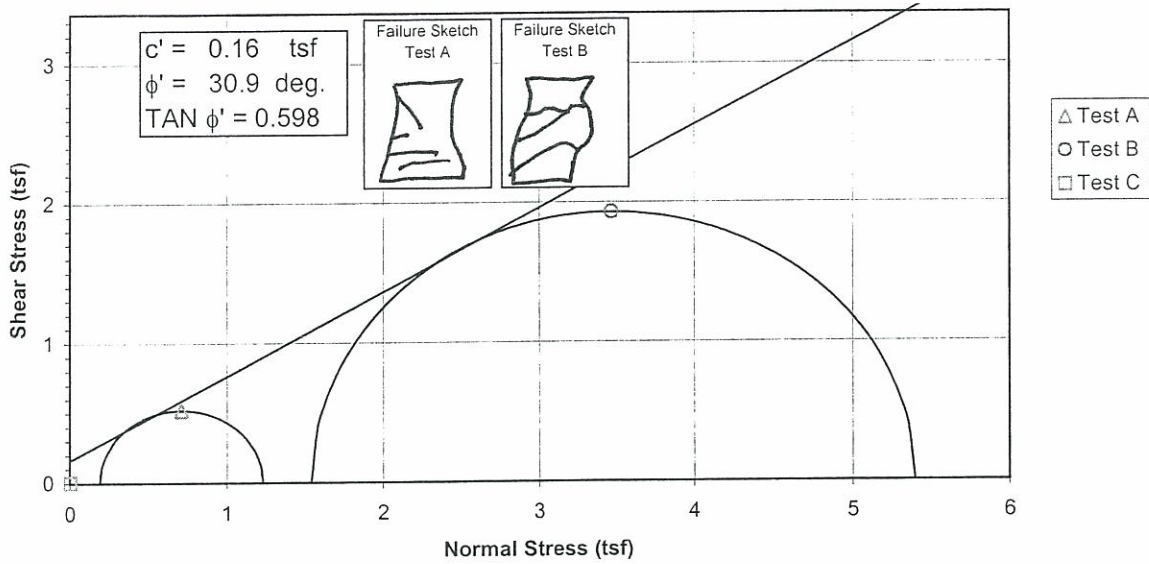


Deviator Stress and Induced Pore Pressure vs. Axial Strain



Failure Criterion: Maximum Effective Principal Stress Ratio

**Effective Strength Envelope**



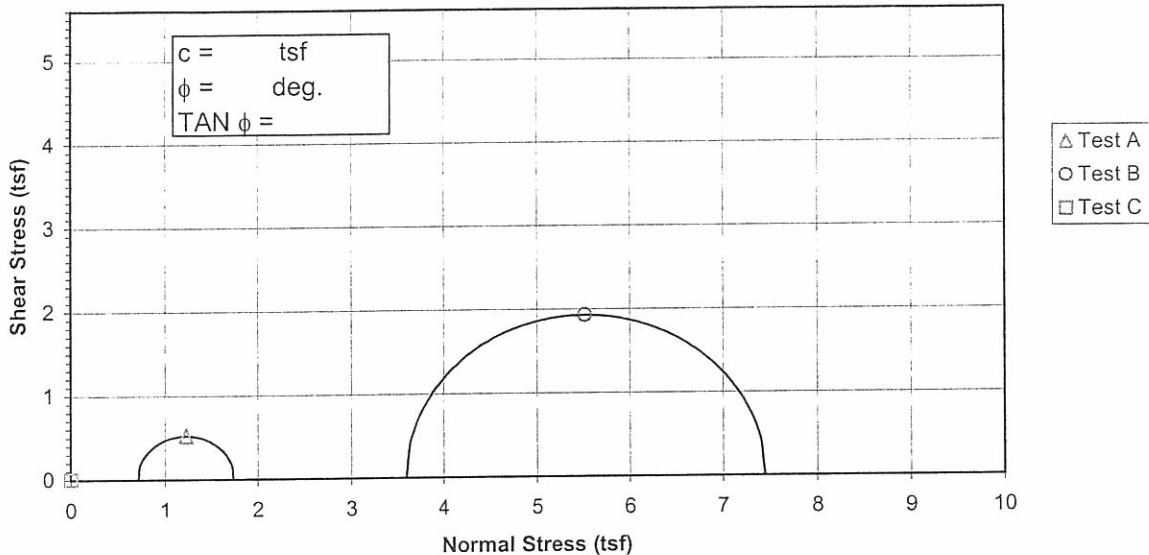
Specimen No.		A	B	C
Initial Data	Water content %	$W_o$ 21.7	22.5	#####
	Dry Density PCF	$\gamma_{d_o}$ 104.4	104.2	#####
	Saturation %	$S_o$ 92.6	95.6	#####
	Void Ratio	$e_o$ 0.645	0.648	#####
After Shear	Water content %	$W_f$ 21.2	20.3	#####
	Dry Density PCF	$\gamma_{d_f}$ 108.4	110.1	#####
	Saturation %	$S_f$ 100.0	100.0	#####
	Void Ratio	$e_f$ 0.583	0.559	#####
Final Back Pressure TSF		$u_c$ 5.76	2.88	0.00
Minor Principal Stress TSF @ failure		$\sigma_3'f$ 0.19	1.54	0.00
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1' - \sigma_3')_{max}$ 1.01	3.85	0.00
Time to $(\sigma_1' - \sigma_3')_{max}$ min.		$t_f$ 236.2	268.2	0.0
Ultimate Deviator Stress, t/sq ft		$(\sigma_1' - \sigma_3')_{ult}$ n/a	n/a	0.00
Initial Diameter, in.		$D_o$ 2.886	2.882	#####
Initial Height, in.		$H_o$ 6.069	6.005	#####

Controlled - Strain Test				Initial Height, in.		$H_o$	6.069	6.005	#####
Description of Specimens Lean Clay (CL), brown, moist, firm									
					Type of Specimen	Undisturbed		Type of test R	
LL	PL	PI	Gs	2.75	Project TVA Facility Assessment, P2: Johnsonville, TN				
Remarks:					Boring No. STN-GC, STN-IC-PZ				
					Sample No.		837		
					Depth Elev. 22.6'-23.1' & 30.1'-30.6'				
					Laboratory		Stantec		
					Date		5-13-09		
<b>TRIAXIAL COMPRESSION TEST REPORT</b>									

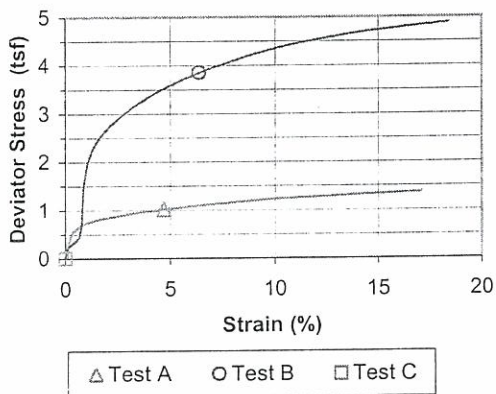


Failure Criterion: Maximum Effective Principal Stress Ratio

**Total Strength Envelope**



**Deviator Stress vs. Strain**



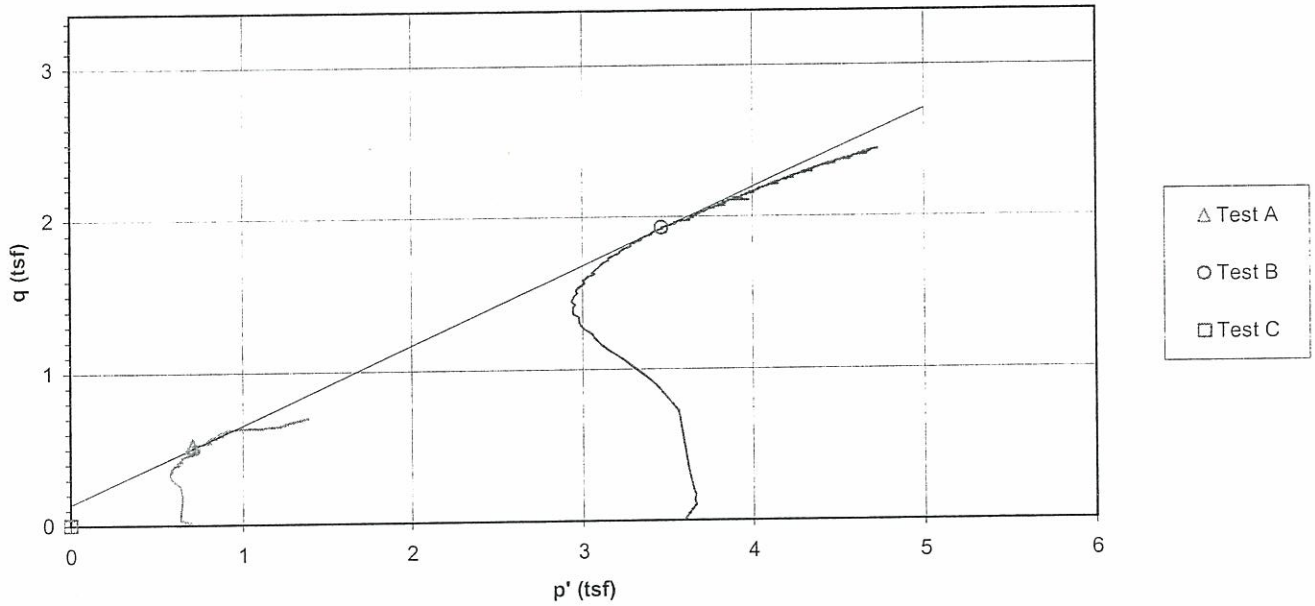
Specimen No.		A	B	C
Initial Data	Water content %	W <sub>o</sub> 21.7	22.5	#####
	Dry Density PCF	γ <sub>d</sub> <sub>o</sub> 104.4	104.2	#####
	Saturation %	S <sub>o</sub> 92.6	95.6	#####
	Void Ratio	e <sub>o</sub> 0.645	0.648	#####
After Shear	Water content %	W <sub>f</sub> 21.2	20.3	#####
	Dry Density PCF	γ <sub>d</sub> <sub>f</sub> 108.4	110.1	#####
	Saturation %	S <sub>f</sub> 100.0	100.0	#####
	Void Ratio	e <sub>f</sub> 0.583	0.559	#####
Final Back Pressure TSF		u <sub>c</sub> 5.76	2.88	0.00
Minor Principal Stress TSF		σ <sub>3</sub> 0.72	3.60	0.00
Maximum Deviator Stress (tsf) @ failure		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub> 1.01	3.85	0.00
Time to (σ <sub>1</sub> -σ <sub>3</sub> ) <sub>Max</sub> min.		t <sub>f</sub> 236.2	268.2	0.0
Ultimate Deviator Stress, t/sq ft		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>ult</sub> n/a	n/a	0.00
Initial Diameter, in.		D <sub>o</sub> 2.886	2.882	#####
Initial Height, in.		H <sub>o</sub> 6.069	6.005	#####

Controlled - Strain Test		Initial Height, in.		H <sub>o</sub> 6.069	6.005	#####
Description of Specimens Lean Clay (CL), brown, moist, firm						
				Type of Specimen Undisturbed	Type of test R	
LL	PL	PI	Gs 2.75	Project TVA Facility Assessment, P2: Johnsonville, TN		
Remarks:				Boring No. STN-GC, STN-IC-PZ		
				Sample No. 837		
				Depth Elev. 22.6'-23.1' & 30.1'-30.6'		
				Laboratory Stantec		Date 5-13-09
<b>TRIAXIAL COMPRESSION TEST REPORT</b>						

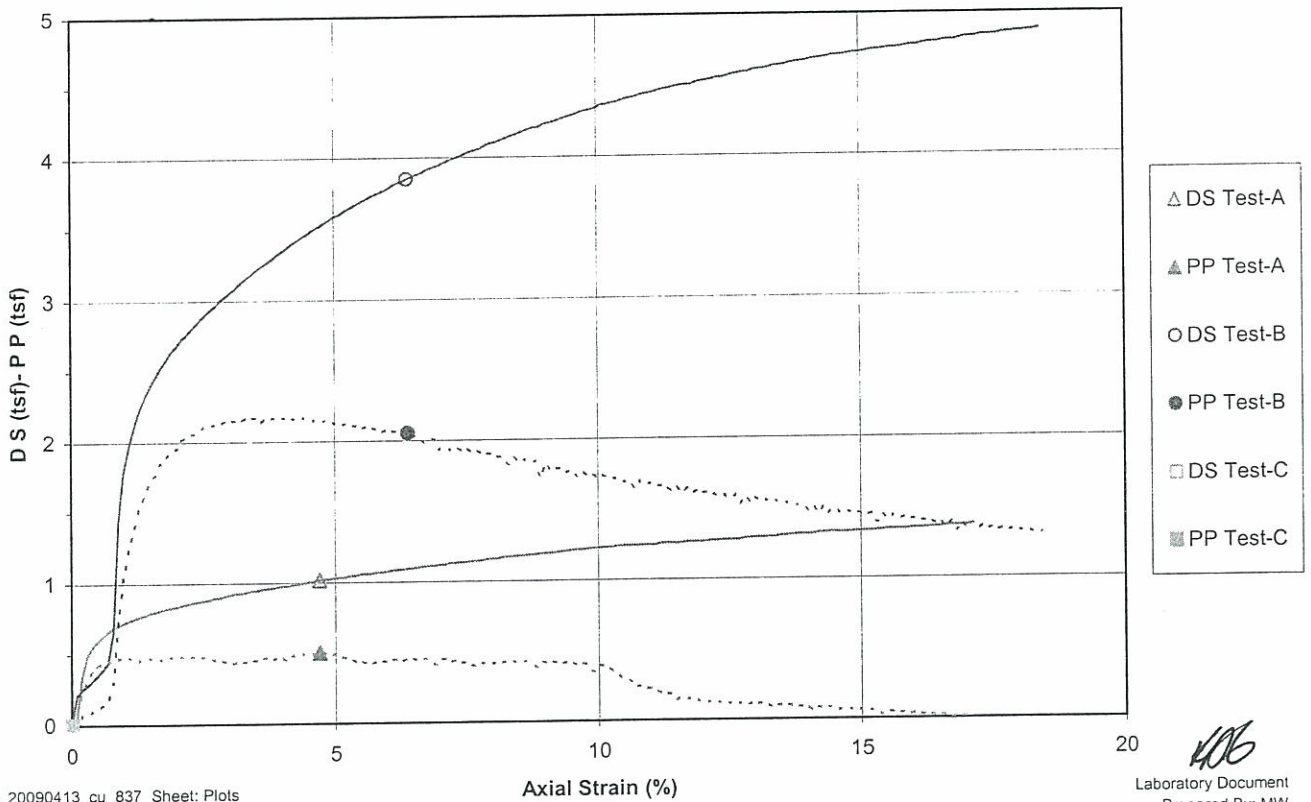
Project TVA Facility Assessment, P2: Johnsonville, TN  
 Sample ID STN-GC, 22.6' - 23.1' & STN-IC-PZ, 30.1' - 30.6'  
 Failure Criterion: Maximum Effective Principal Stress Ratio  $\phi' = 30.9 \text{ deg.}$

Project No. 171468118  
 Test Number 837  
 $c' = 0.16 \text{ tsf}$

p' vs. q Plot

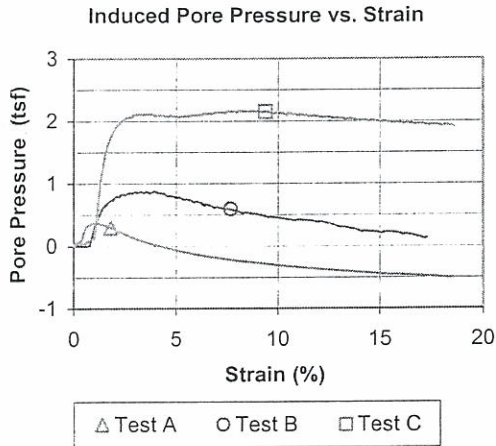
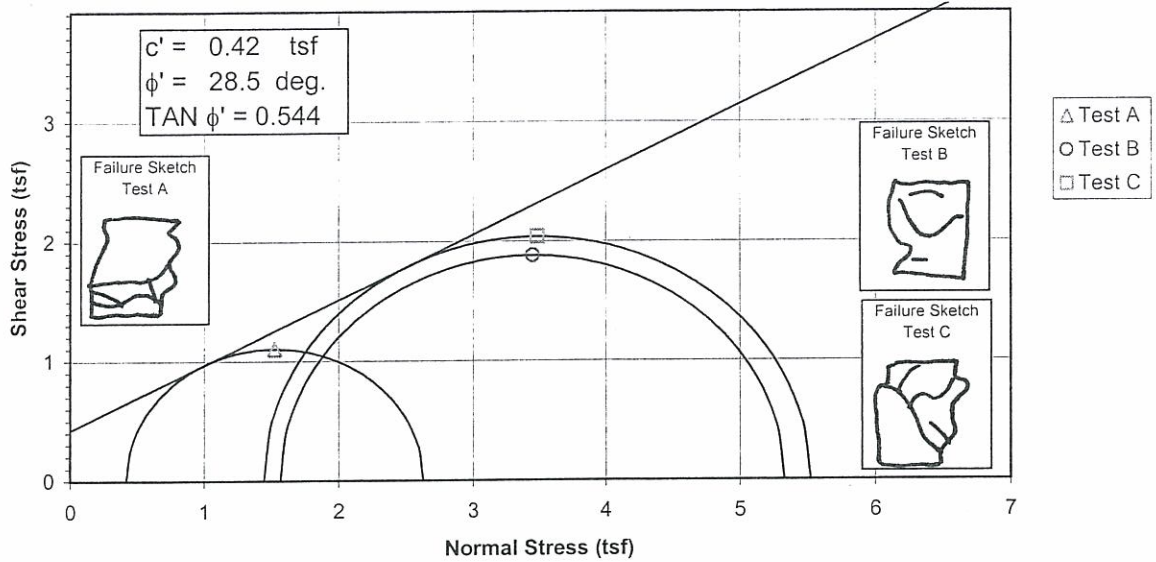


Deviator Stress and Induced Pore Pressure vs. Axial Strain



Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope

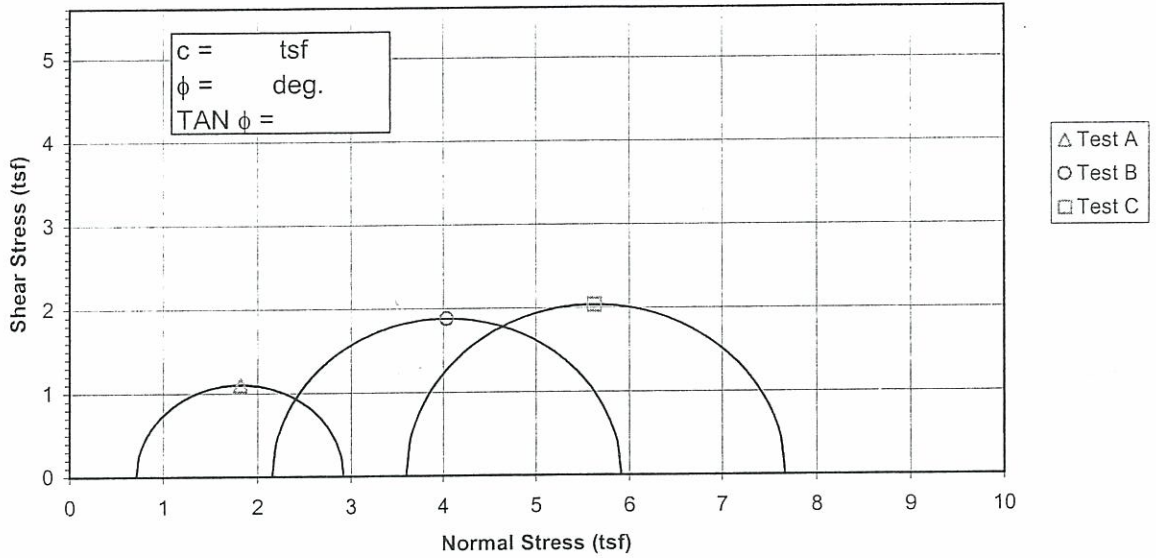


Specimen No.		A	B	C
Initial Data	Water content %	$W_o$ 21.5	24.4	23.8
	Dry Density PCF	$\gamma_{d_o}$ 100.9	100.9	98.7
	Saturation %	$S_o$ 86.5	98.3	90.8
	Void Ratio	$e_o$ 0.671	0.670	0.708
After Shear	Water content %	$W_f$ 23.8	22.0	22.7
	Dry Density PCF	$\gamma_{d_f}$ 102.7	105.8	104.5
	Saturation %	$S_f$ 100.0	100.0	100.0
	Void Ratio	$e_f$ 0.642	0.593	0.613
	Final Back Pressure TSF	$u_c$ 5.76	4.32	2.88
	Minor Principal Stress TSF @ failure	$\sigma_3'f$ 0.42	1.57	1.45
	Maximum Deviator Stress (tsf) @ failure	$(\sigma_1' - \sigma_3')_{max}$ 2.20	3.76	4.07
	Time to $(\sigma_1' - \sigma_3')_{max}$ min.	$t_f$ 4.1	225.0	163.5
	Ultimate Deviator Stress, t/sq ft	$(\sigma_1' - \sigma_3')_{ult}$ n/a	n/a	n/a
	Initial Diameter, in.	$D_o$ 1.417	1.417	1.413
	Initial Height, in.	$H_o$ 3.024	3.049	3.034

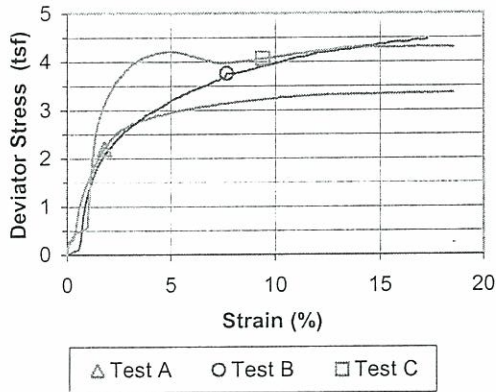
Controlled - Strain Test				Lean Clay (CL), dark brown, moist, firm					
Description of Specimens				Lean Clay (CL), dark brown, moist, firm					
				Type of Specimen	Undisturbed		Type of test	R	
LL	PL	PI	Gs	2.7				Project	TVA Facility Assessment, P2: Johnsonville, TN
Remarks:				Boring No. STN -IT-PZ, STN-FC, STN-IT-PZ				Sample No.	1585
				Depth Elev.				10.1'-10.6', 19.6'-20.1', 10.7'-11.2'	
				Laboratory		Stantec		Date	5-20-09
<b>TRIAXIAL COMPRESSION TEST REPORT</b>									

Failure Criterion: Maximum Effective Principal Stress Ratio

**Total Strength Envelope**



**Deviator Stress vs. Strain**



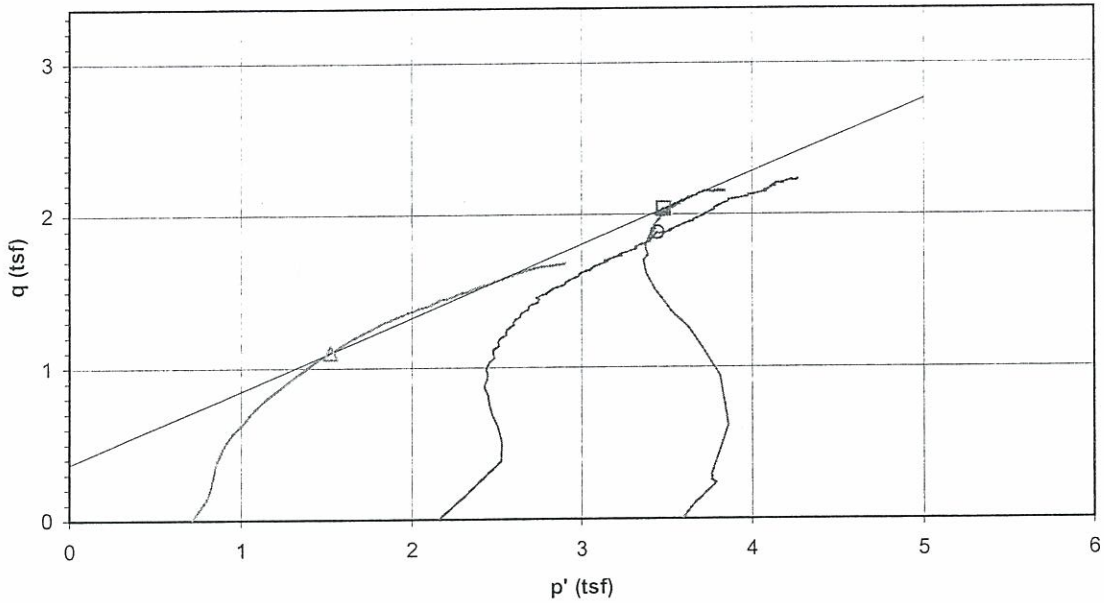
Specimen No.			A	B	C
Initial Data	Water content %	$W_o$	21.5	24.4	23.8
	Dry Density PCF	$\gamma_{d_o}$	100.9	100.9	98.7
	Saturation %	$S_o$	86.5	98.3	90.8
	Void Ratio	$e_o$	0.671	0.670	0.708
After Shear	Water content %	$W_f$	23.8	22.0	22.7
	Dry Density PCF	$\gamma_{d_f}$	102.7	105.8	104.5
	Saturation %	$S_f$	100.0	100.0	100.0
	Void Ratio	$e_f$	0.642	0.593	0.613
	Final Back Pressure TSF	$u_c$	5.76	4.32	2.88
Minor Principal Stress TSF		$\sigma_3$	0.72	2.16	3.60
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1 - \sigma_3)_{max}$	2.20	3.76	4.07
Time to $(\sigma_1 - \sigma_3)_{max}$ , min.		$t_f$	4.1	225.0	163.5
Ultimate Deviator Stress, t/sq ft		$(\sigma_1 - \sigma_3)_{ult}$	n/a	n/a	n/a
Initial Diameter, in.		$D_o$	1.417	1.417	1.413
Initial Height, in.		$H_o$	3.024	3.049	3.034

Controlled - Strain Test				Initial Height, in.		$H_o$	3.024	3.049	3.034
Description of Specimens Lean Clay (CL), dark brown, moist, firm									
					Type of Specimen	Undisturbed		Type of test $\bar{R}$	
LL	PL	PI	Gs	2.7	Project TVA Facility Assessment, P2: Johnsonville, TN				
Remarks:					Boring No. STN -IT-PZ, STN-FC, STN-IT-PZ				
					Sample No. 1585				
					Depth Elev. 10.1'-10.6', 19.6'-20.1', 10.7'-11.2'				
					Laboratory		FMSM Engineers		Date 5-20-09
<b>TRIAXIAL COMPRESSION TEST REPORT</b>									

Project TVA Facility Assessment, P2: Johnsonville, TN  
 Sample ID STN-IT-PZ, 10.1' - 10.6' & STN-FC, 19.6' - 20.1' & STN-IT-PZ, 10.7' - 11.2'  
 Failure Criterion: Maximum Effective Principal Stress Ratio  $\phi' = 28.5 \text{ deg.}$

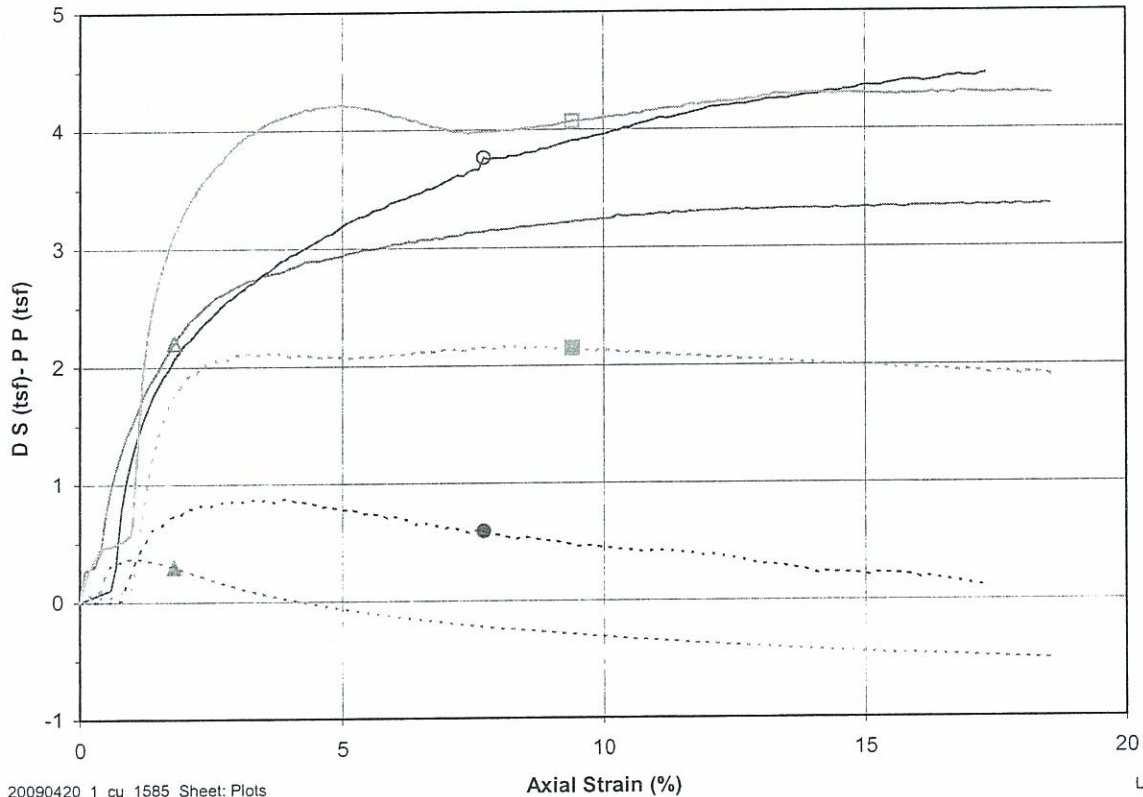
Project No. 171468118  
 Test Number 1585  
 $c' = 0.42 \text{ tsf}$

p' vs. q Plot



- △ Test A
- Test B
- Test C

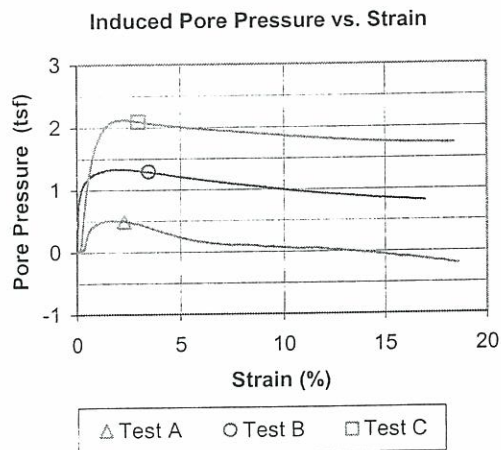
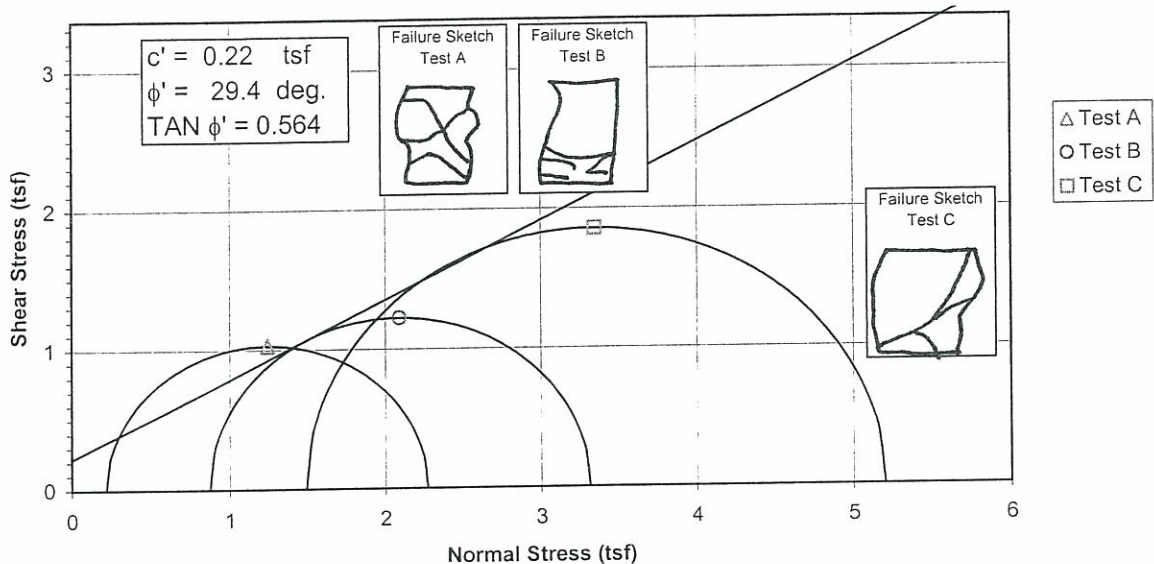
Deviator Stress and Induced Pore Pressure vs. Axial Strain



- △ DS Test-A
- ▲ PP Test-A
- DS Test-B
- PP Test-B
- DS Test-C
- PP Test-C

Failure Criterion: Maximum Effective Principal Stress Ratio

Effective Strength Envelope

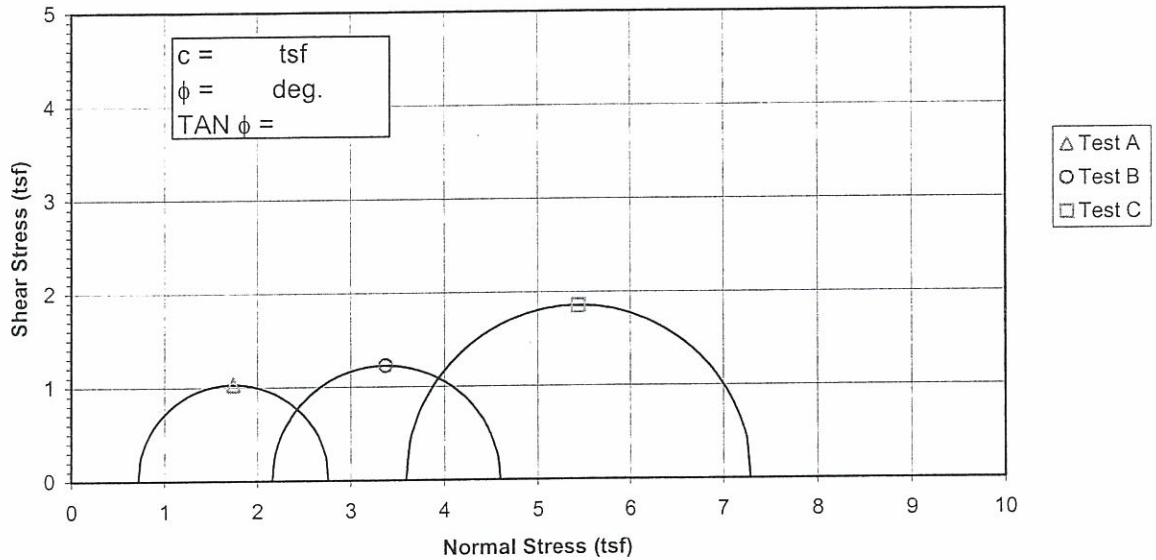


Specimen No.		A	B	C
Initial Data	Water content %	$W_o$ 43.5	22.4	21.4
	Dry Density PCF	$\gamma_{d_o}$ 84.4	101.4	103.1
	Saturation %	$S_o$ 117.4	91.0	90.7
	Void Ratio	$e_o$ 1.004	0.668	0.640
After Shear	Water content %	$W_f$ 36.2	21.8	20.8
	Dry Density PCF	$\gamma_{d_f}$ 85.4	106.3	108.1
	Saturation %	$S_f$ 100.0	100.0	100.0
	Void Ratio	$e_f$ 0.980	0.592	0.565
	Final Back Pressure TSF	$u_c$ 5.76	4.32	2.88
Minor Principal Stress TSF @ failure		$\sigma_3'f$ 0.22	0.87	1.50
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1' - \sigma_3')_{max}$ 2.04	2.44	3.69
Time to $(\sigma_1' - \sigma_3')_{max}$ min.		$t_f$ 20.0	127.6	66.4
Ultimate Deviator Stress, t/sq ft		$(\sigma_1' - \sigma_3')_{ult}$ n/a	n/a	n/a
Initial Diameter, in.		$D_o$ 2.828	2.893	2.894
Initial Height, in.		$H_o$ 5.960	6.132	6.007

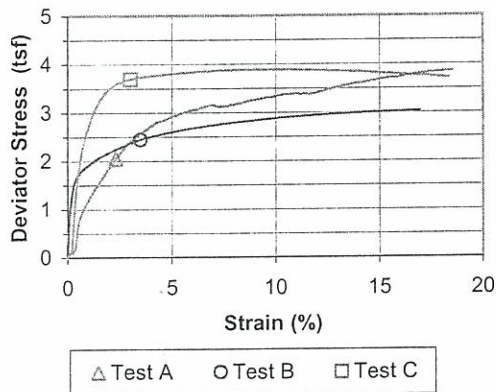
Controlled - Strain Test				Initial Diameter, in.		$D_o$ 2.828	2.893	2.894
Description of Specimens				Initial Height, in.		$H_o$ 5.960	6.132	6.007
Lean Clay (CL), brown, moist, firm, organics				Type of Specimen		Undisturbed		Type of test R
LL	PL	PI	Gs	2.71	Project		TVA Facility Assessment, P2: Johnsonville, TN	
Remarks:				Boring No.		STN-GT	Sample No. 553	
				Depth Elev.		12.0'-12.5', 12.5'-13.0', 13.0'-13.5'		
				Laboratory		Stantec	Date 5-6-09	
<b>TRIAXIAL COMPRESSION TEST REPORT</b>								

Failure Criterion: Maximum Effective Principal Stress Ratio

**Total Strength Envelope**



Deviator Stress vs. Strain

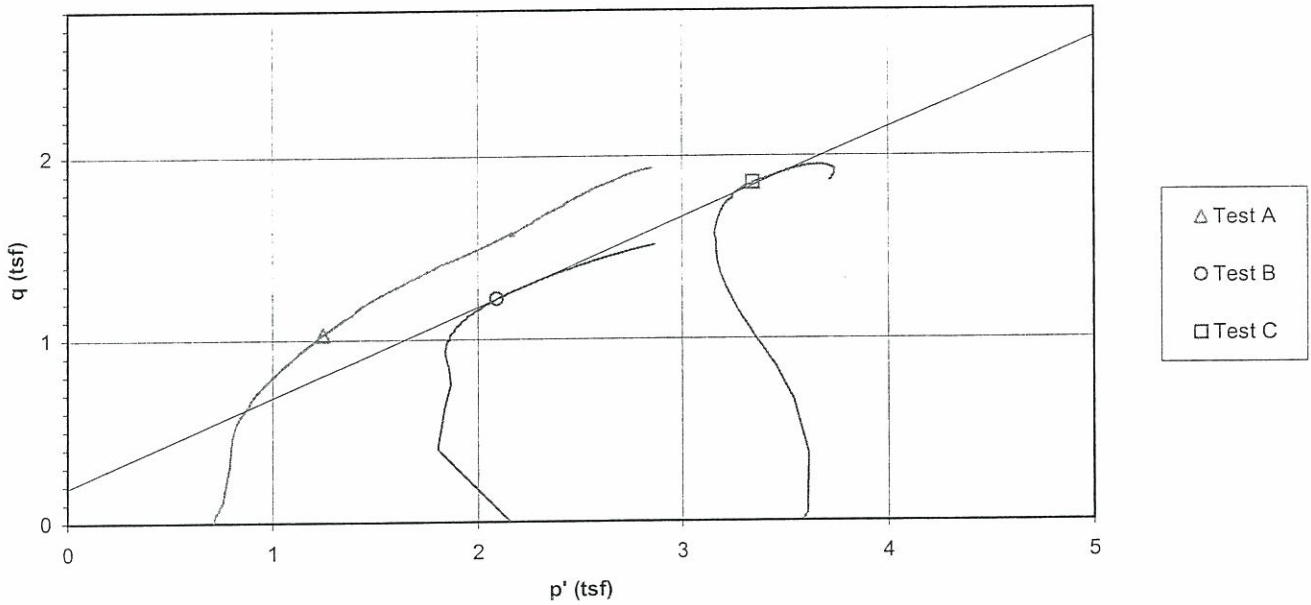


Specimen No.		A	B	C
Initial Data	Water content %	W <sub>o</sub> 43.5	22.4	21.4
	Dry Density PCF	γ <sub>d</sub> <sub>o</sub> 84.4	101.4	103.1
	Saturation %	S <sub>o</sub> 117.4	91.0	90.7
	Void Ratio	e <sub>o</sub> 1.004	0.668	0.640
After Shear	Water content %	W <sub>f</sub> 36.2	21.8	20.8
	Dry Density PCF	γ <sub>d</sub> <sub>f</sub> 85.4	106.3	108.1
	Saturation %	S <sub>f</sub> 100.0	100.0	100.0
	Void Ratio	e <sub>f</sub> 0.980	0.592	0.565
	Final Back Pressure TSF	u <sub>c</sub> 5.76	4.32	2.88
Minor Principal Stress TSF		σ <sub>3</sub> 0.72	2.16	3.60
Maximum Deviator Stress (tsf) @ failure (σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub>		2.04	2.44	3.69
Time to (σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub> min.		t <sub>f</sub> 20.0	127.6	66.4
Ultimate Deviator Stress, t/sq ft (σ <sub>1</sub> -σ <sub>3</sub> ) <sub>ult</sub>		n/a	n/a	n/a
Initial Diameter, in.		D <sub>o</sub> 2.828	2.893	2.894
Initial Height, in.		H <sub>o</sub> 5.960	6.132	6.007
Controlled - Strain Test				
Description of Specimens Lean Clay (CL), brown, moist, firm, organics				
		Type of Specimen Undisturbed	Type of test R	
LL	PL	PI	Gs 2.71	Project TVA Facility Assessment, P2: Johnsonville, TN
Remarks:		Boring No. STN-GT	Sample No. 553	
		Depth Elev. 12.0'-12.5', 12.5'-13.0', 13.0'-13.5'		
		Laboratory Stantec	Date 5-6-09	
<b>TRIAXIAL COMPRESSION TEST REPORT</b>				

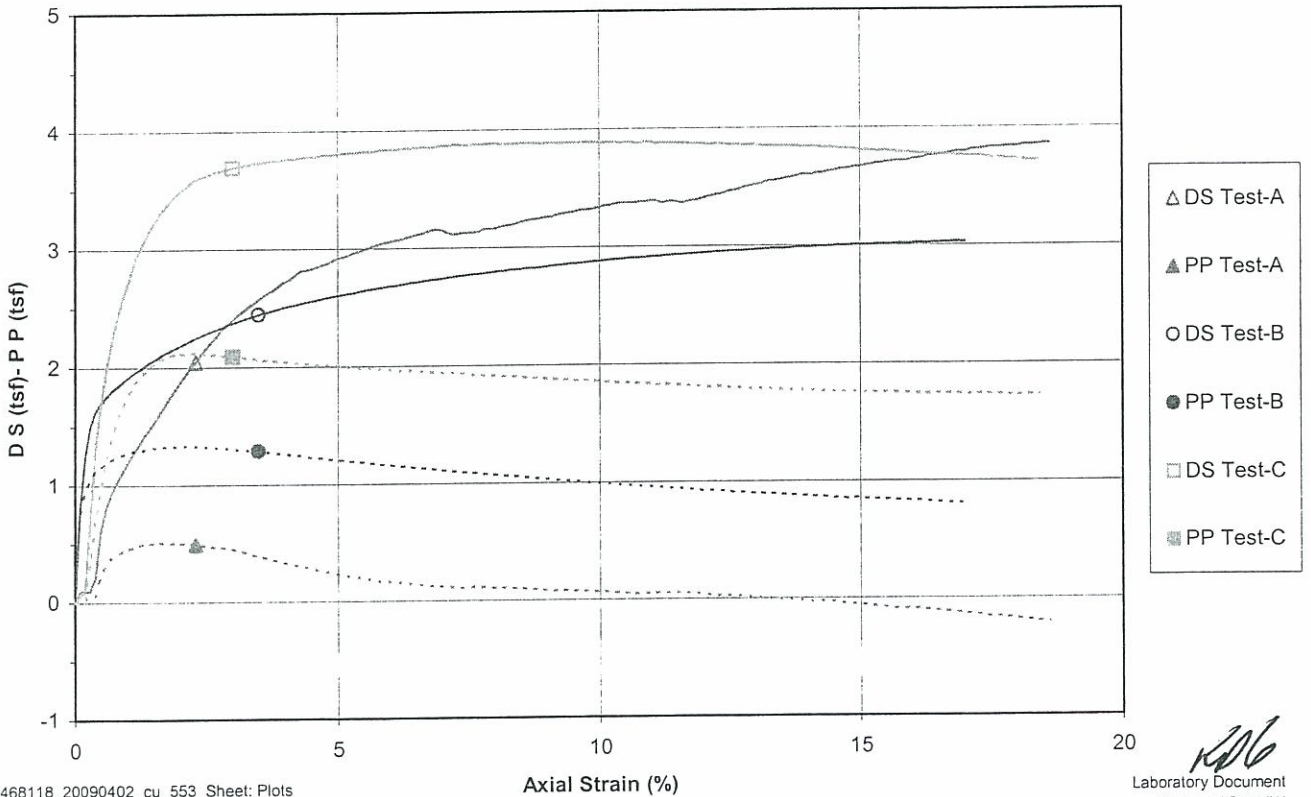
Project TVA Facility Assessment, P2: Johnsonville, TN  
 Sample ID STN-GT, ST-1, 12.0'-12.5', 12.5'-13.0', 13.0'-13.5'  
 Failure Criterion: Maximum Effective Principal Stress Ratio  $\phi' = 29.4 \text{ deg.}$

Project No. 171468118  
 Test Number 553  
 $c' = 0.22 \text{ tsf}$

p' vs. q Plot



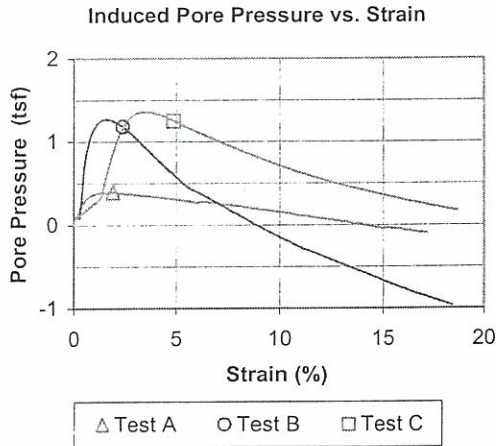
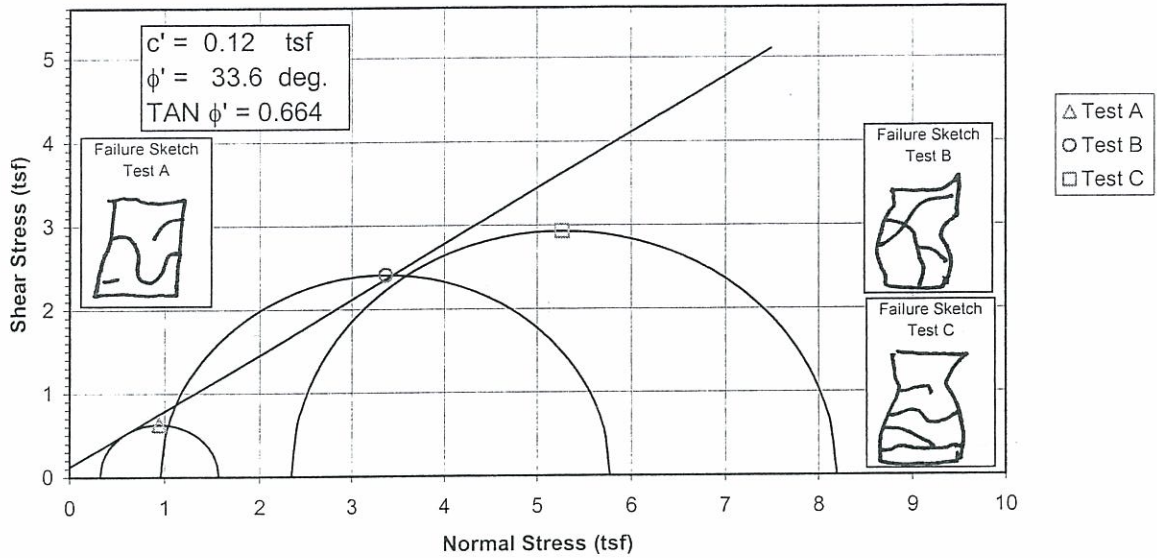
Deviator Stress and Induced Pore Pressure vs. Axial Strain





Failure Criterion: Maximum Effective Principal Stress Ratio

**Effective Strength Envelope**

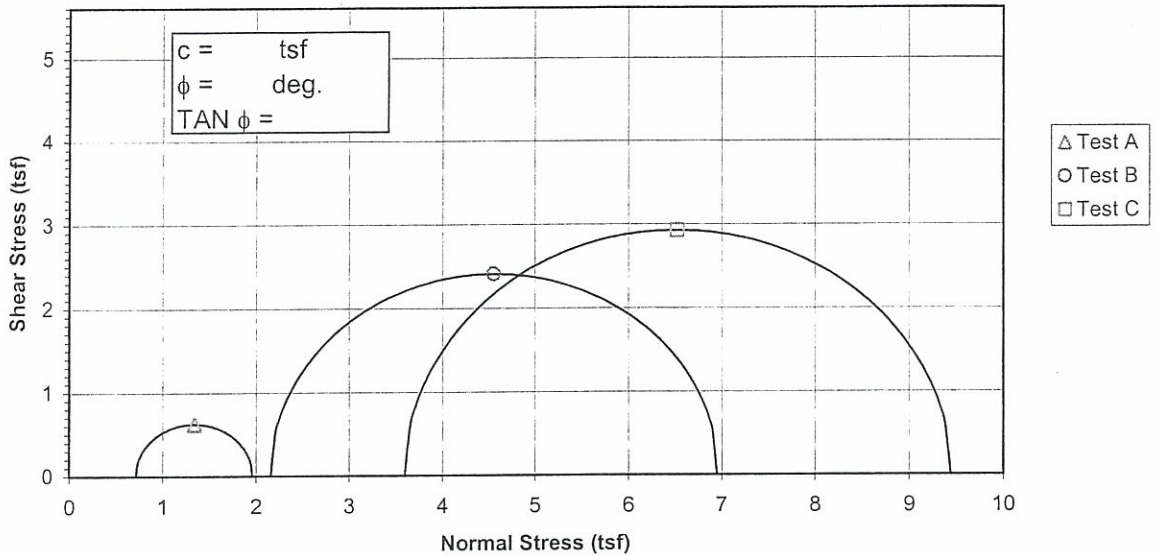


Specimen No.		A	B	C
Initial Data	Water content %	$W_o$ 20.1	17.0	18.8
	Dry Density PCF	$\gamma_{d_o}$ 104.4	110.6	108.7
	Saturation %	$S_o$ 88.3	87.8	92.2
	Void Ratio	$e_o$ 0.614	0.524	0.551
After Shear	Water content %	$W_f$ 22.4	17.8	19.2
	Dry Density PCF	$\gamma_{d_f}$ 105.1	113.9	111.0
	Saturation %	$S_f$ 100.0	100.0	100.0
	Void Ratio	$e_f$ 0.604	0.480	0.518
Final Back Pressure TSF		$u_c$ 5.76	4.32	2.88
Minor Principal Stress TSF @ failure		$\sigma_3'f$ 0.32	0.96	2.34
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1' - \sigma_3')_{max}$ 1.24	4.80	5.84
Time to $(\sigma_1' - \sigma_3')_{max}$ min.		$t_f$ 5.6	5.3	60.9
Ultimate Deviator Stress, t/sq ft		$(\sigma_1' - \sigma_3')_{ult}$ n/a	n/a	n/a
Initial Diameter, in.		$D_o$ 1.417	1.408	1.412
Initial Height, in.		$H_o$ 3.035	3.028	3.014

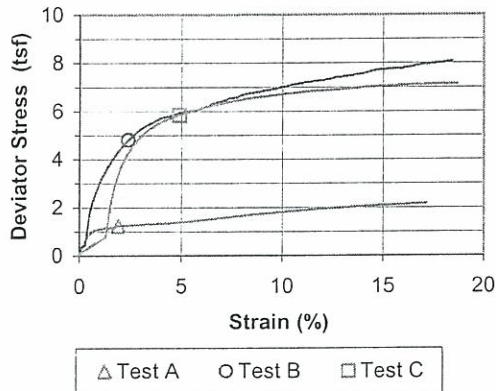
Controlled - Strain Test				Initial Height, in.			
Description of Specimens Lean Clay (CL), brown, moist, firm							
				Type of Specimen Undisturbed	Type of test R		
LL	PL	PI	Gs 2.7	Project TVA Facility Assessment, P2: Johnsonville, TN			
Remarks:				Boring No. STN-JC-PZ, STN-KC-PZ		Sample No. 1593	
				Depth Elev. 5.1'-5.6', 5.1'-5.6', 10.1'-10.6'			
				Laboratory Stantec		Date 5-22-09	
<b>TRIAXIAL COMPRESSION TEST REPORT</b>							

Failure Criterion: Maximum Effective Principal Stress Ratio

**Total Strength Envelope**



**Deviator Stress vs. Strain**



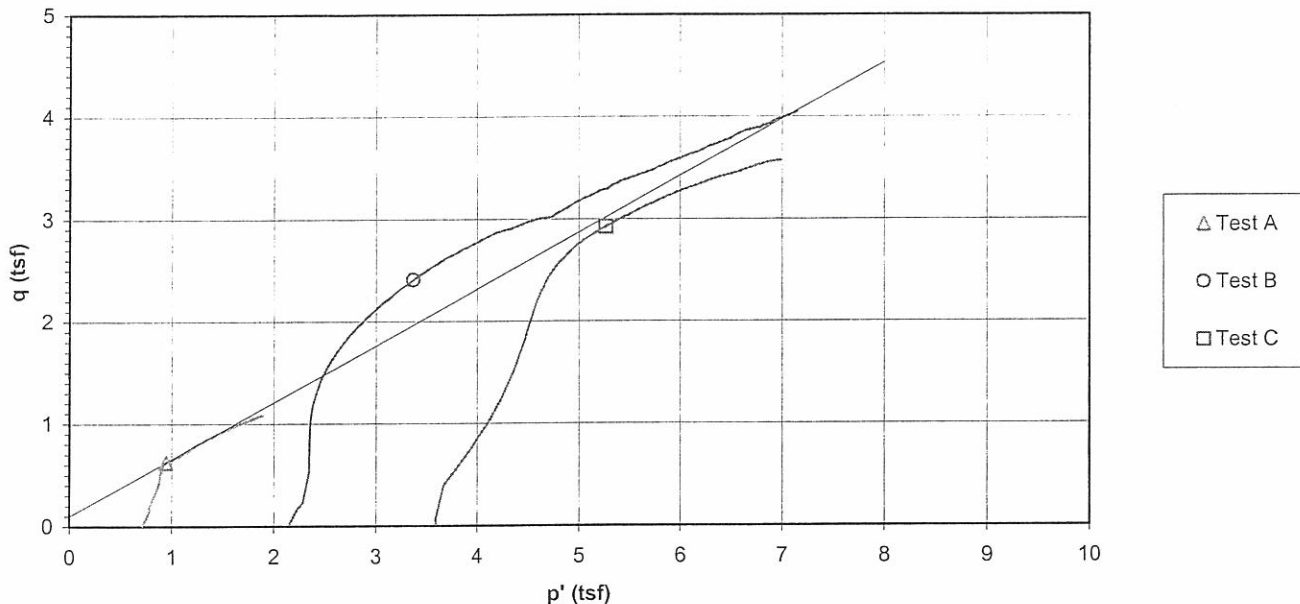
Specimen No.		A	B	C
Initial Data	Water content %	W <sub>o</sub> 20.1	17.0	18.8
	Dry Density PCF	γ <sub>d</sub> <sub>o</sub> 104.4	110.6	108.7
	Saturation %	S <sub>o</sub> 88.3	87.8	92.2
	Void Ratio	e <sub>o</sub> 0.614	0.524	0.551
After Shear	Water content %	W <sub>f</sub> 22.4	17.8	19.2
	Dry Density PCF	γ <sub>d</sub> <sub>f</sub> 105.1	113.9	111.0
	Saturation %	S <sub>f</sub> 100.0	100.0	100.0
	Void Ratio	e <sub>f</sub> 0.604	0.480	0.518
	Final Back Pressure TSF	u <sub>c</sub> 5.76	4.32	2.88
Minor Principal Stress TSF		σ <sub>3</sub> 0.72	2.16	3.60
Maximum Deviator Stress (tsf) @ failure		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub> 1.24	4.80	5.84
Time to (σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub> min.		t <sub>f</sub> 5.6	5.3	60.9
Ultimate Deviator Stress, t/sq ft		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>ult</sub> n/a	n/a	n/a
Initial Diameter, in.		D <sub>o</sub> 1.417	1.408	1.412
Initial Height, in.		H <sub>o</sub> 3.035	3.028	3.014

Controlled - Strain Test				Initial Height, in.				H <sub>o</sub>	3.035	3.028	3.014
Description of Specimens Lean Clay (CL), brown, moist, firm											
						Type of Specimen Undisturbed			Type of test R		
LL	PL	PI	Gs	2.7		Project TVA Facility Assessment, P2: Johnsonville, TN					
Remarks:						Boring No. STN-JC-PZ, STN-KC-PZ					
						Sample No.			1593		
						Depth Elev. 5.1'-5.6', 5.1'-5.6', 10.1'-10.6'					
						Laboratory Stantec			Date 5-22-09		
<b>TRIAXIAL COMPRESSION TEST REPORT</b>											

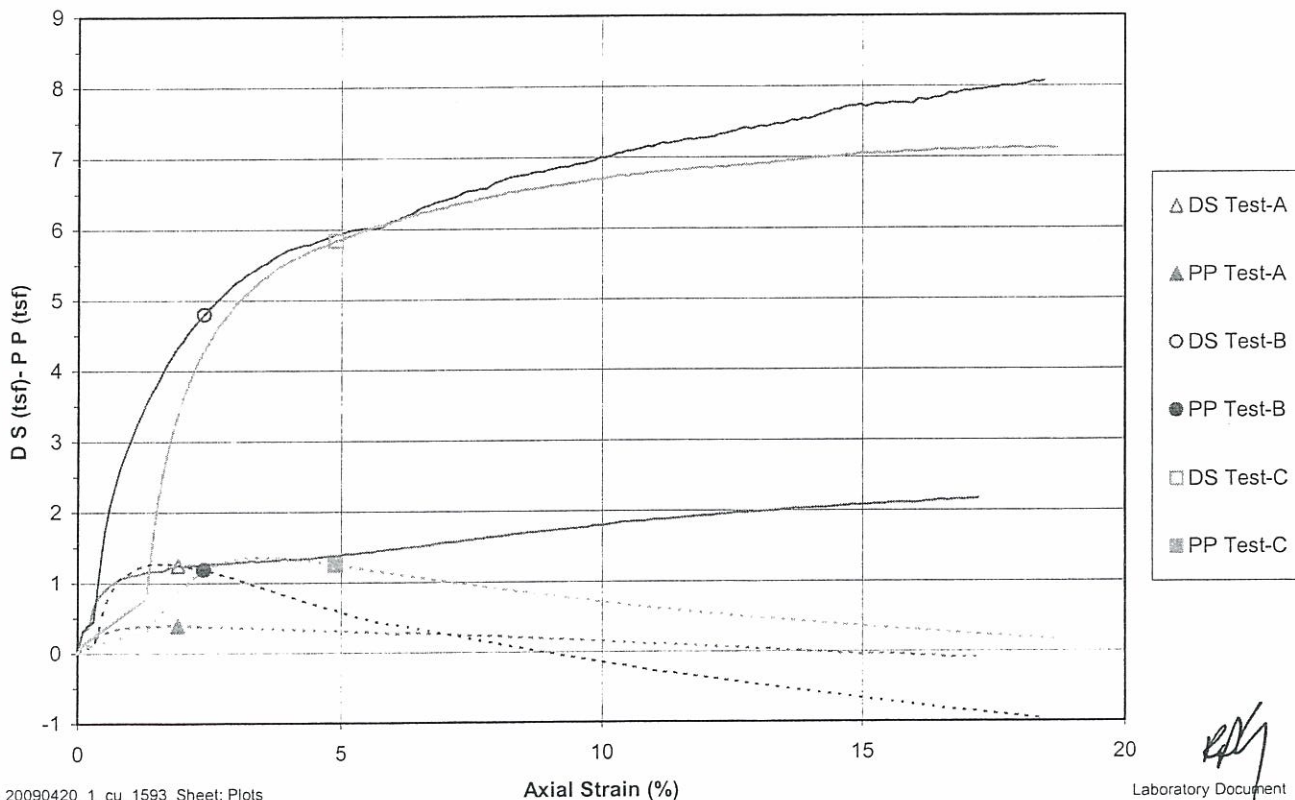
Project TVA Facility Assessment, P2: Johnsonville, TN  
 Sample ID STN-JC-PZ, 5.1'-5.6' & STN-KC-PZ, 5.1'-5.6' & STN-KC-PZ, 10.1'-10.6'  
 Failure Criterion: Maximum Effective Principal Stress Ratio  $\phi' = 33.6$  deg.

Project No. 171468118  
 Test Number 1593  
 $c' = 0.12$  tsf

p' vs. q Plot

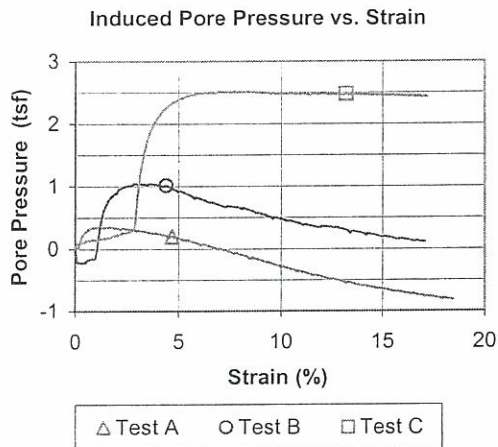
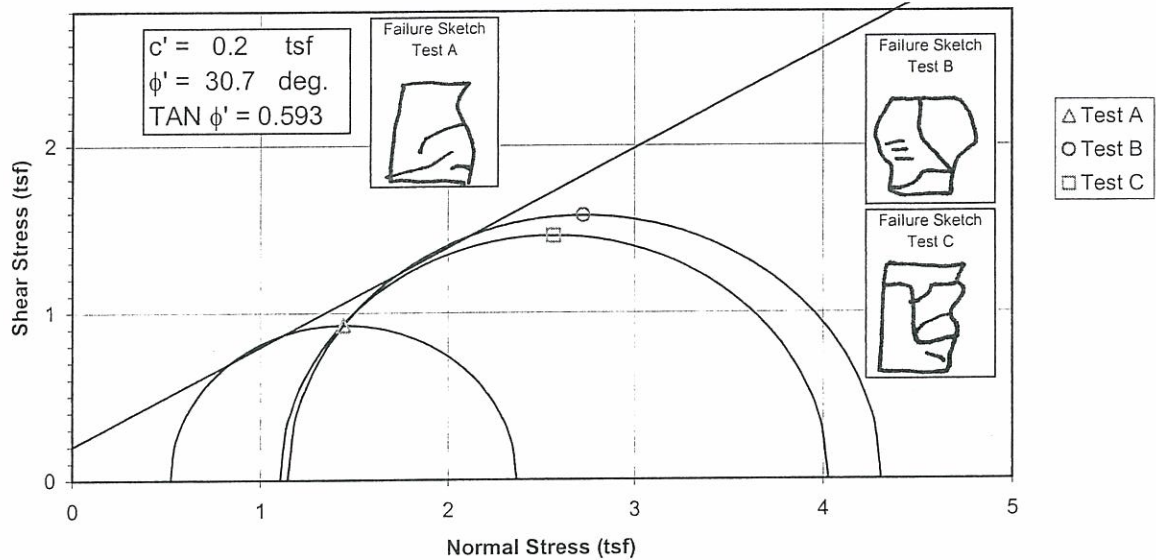


Deviator Stress and Induced Pore Pressure vs. Axial Strain



Failure Criterion: Maximum Effective Principal Stress Ratio

**Effective Strength Envelope**

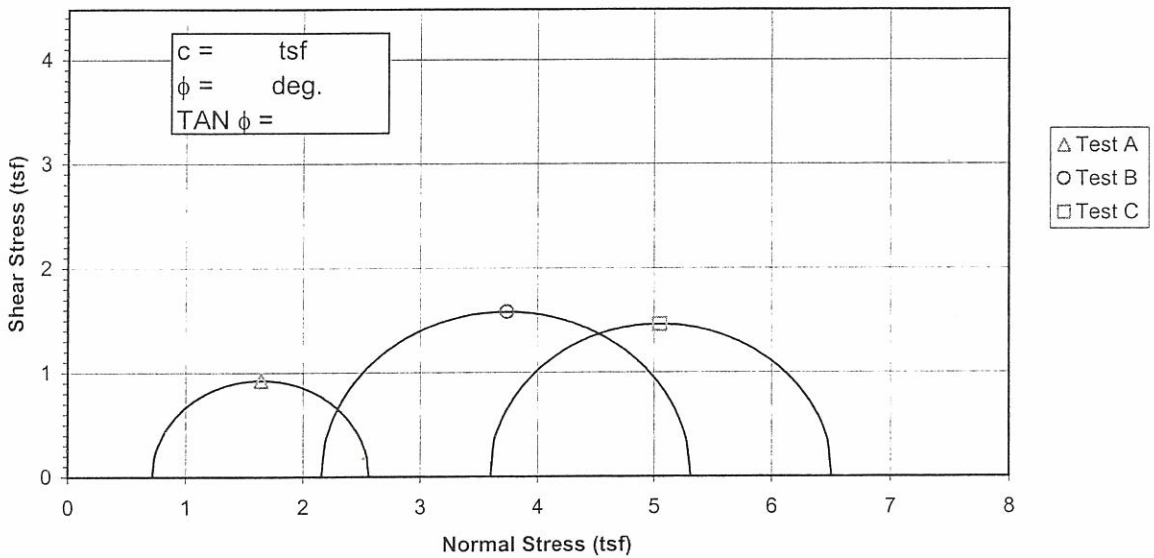


Specimen No.		A	B	C
Initial Data	Water content %	$W_o$ 21.1	23.1	20.5
	Dry Density PCF	$\gamma_{d_o}$ 106.5	99.6	94.4
	Saturation %	$S_o$ 97.4	89.4	70.1
	Void Ratio	$e_o$ 0.588	0.699	0.792
After Shear	Water content %	$W_f$ 21.9	22.6	20.9
	Dry Density PCF	$\gamma_{d_f}$ 106.1	105.0	108.1
	Saturation %	$S_f$ 100.0	100.0	100.0
	Void Ratio	$e_f$ 0.594	0.612	0.565
Final Back Pressure TSF		$u_c$ 5.76	4.32	2.88
Minor Principal Stress TSF @ failure		$\sigma_3'f$ 0.52	1.15	1.11
Maximum Deviator Stress (tsf) @ failure		$(\sigma_1' - \sigma_3')_{max}$		1.85 3.16 2.90
Time to $(\sigma_1' - \sigma_3')_{max}$ min.		$t_f$		95.1 91.3 407.9
Ultimate Deviator Stress, t/sq ft		$(\sigma_1' - \sigma_3')_{ult}$		n/a n/a n/a
Initial Diameter, in.		$D_o$ 2.741	2.837	2.878
Initial Height, in.		$H_o$ 6.032	5.967	5.834

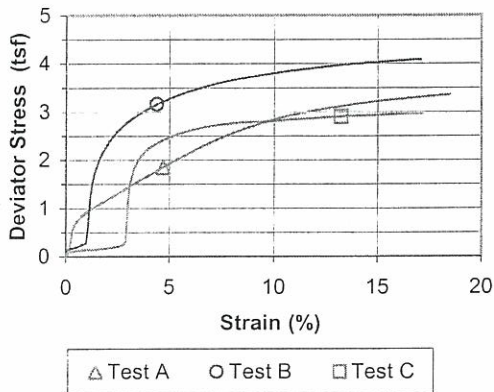
Controlled - Strain Test				Initial Height, in.				
Description of Specimens Lean Clay (CL), brown, moist, firm								
				Type of Specimen Undisturbed	Type of test R			
LL	PL	PI	Gs 2.71	Project TVA Facility Assessment, P2: Johnsonville, TN				
Remarks:								
				Boring No. STN-LC & STN-MC	Sample No. 501			
Depth Elev. 28.8'-29.3', 29.4'-29.9', 28.9'-29.4'								
				Laboratory Stantec	Date 5-6-09			
<b>TRIAXIAL COMPRESSION TEST REPORT</b>								

Failure Criterion: Maximum Effective Principal Stress Ratio

**Total Strength Envelope**



Deviator Stress vs. Strain



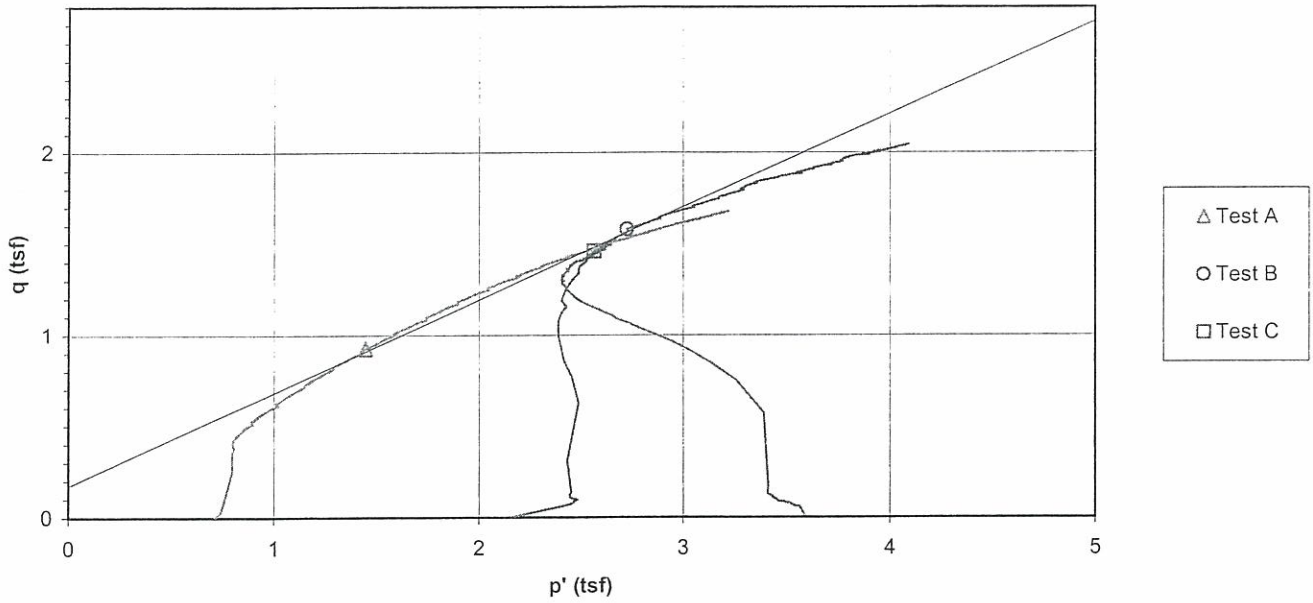
Specimen No.		A	B	C
Initial Data	Water content %	W <sub>o</sub> 21.1	23.1	20.5
	Dry Density PCF	γ <sub>d</sub> <sub>o</sub> 106.5	99.6	94.4
	Saturation %	S <sub>o</sub> 97.4	89.4	70.1
	Void Ratio	e <sub>o</sub> 0.588	0.699	0.792
After Shear	Water content %	W <sub>f</sub> 21.9	22.6	20.9
	Dry Density PCF	γ <sub>d</sub> <sub>f</sub> 106.1	105.0	108.1
	Saturation %	S <sub>f</sub> 100.0	100.0	100.0
	Void Ratio	e <sub>f</sub> 0.594	0.612	0.565
Final Back Pressure TSF		u <sub>c</sub> 5.76	4.32	2.88
Minor Principal Stress TSF		σ <sub>3</sub> 0.72	2.16	3.60
Maximum Deviator Stress (tsf) @ failure		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub> 1.85	3.16	2.90
Time to (σ <sub>1</sub> -σ <sub>3</sub> ) <sub>Max</sub> . min.		t <sub>f</sub> 95.1	91.3	407.9
Ultimate Deviator Stress, t/sq ft		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>ult</sub> n/a	n/a	n/a
Initial Diameter, in.		D <sub>o</sub> 2.741	2.837	2.878
Initial Height, in.		H <sub>o</sub> 6.032	5.967	5.834

Controlled - Strain Test				Initial Height, in.			
Description of Specimens Lean Clay (CL), brown, moist, firm							
				Type of Specimen Undisturbed		Type of test R	
LL	PL	PI	Gs 2.71	Project TVA Facility Assessment, P2: Johnsonville, TN			
Remarks:							
				Boring No. STN-LC & STN-MC		Sample No. 501	
Depth Elev. 28.8'-29.3', 29.4'-29.9', 28.9'-29.4'							
				Laboratory Stantec		Date 5-6-09	
<b>TRIAXIAL COMPRESSION TEST REPORT</b>							

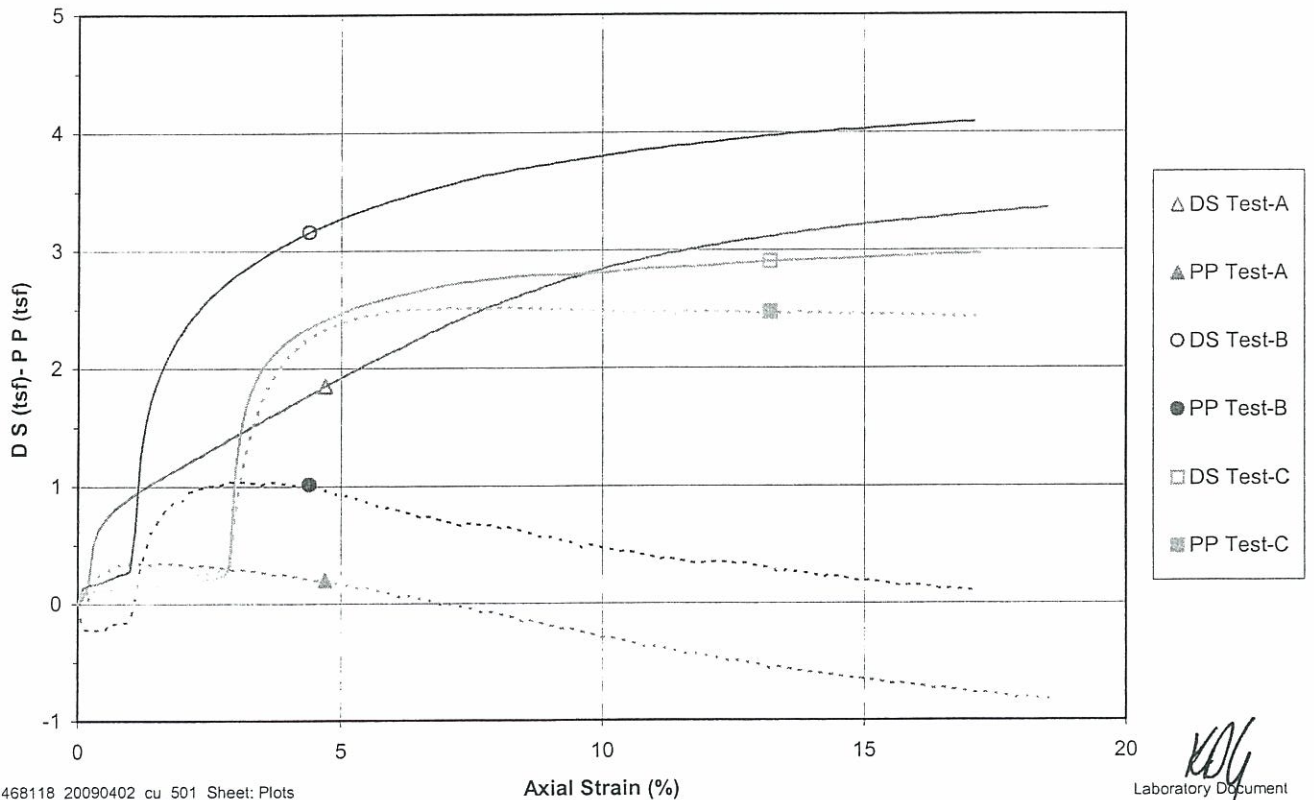
Project TVA Facility Assessment, P2: Johnsonville, TN  
 Sample ID STN-LC, ST-1, 28.8'-29.3', 29.4'-29.9'; STN-MC, ST-1, 28.9'-29.4'  
 Failure Criterion: Maximum Effective Principal Stress Ratio  $\phi' = 30.7$  deg.

Project No. 171468118  
 Test Number 501  
 $c' = 0.20$  tsf

p' vs. q Plot

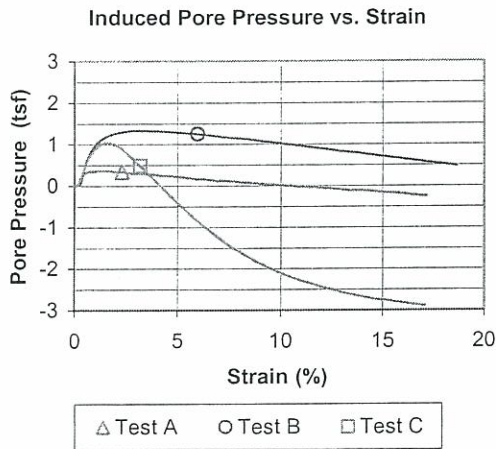
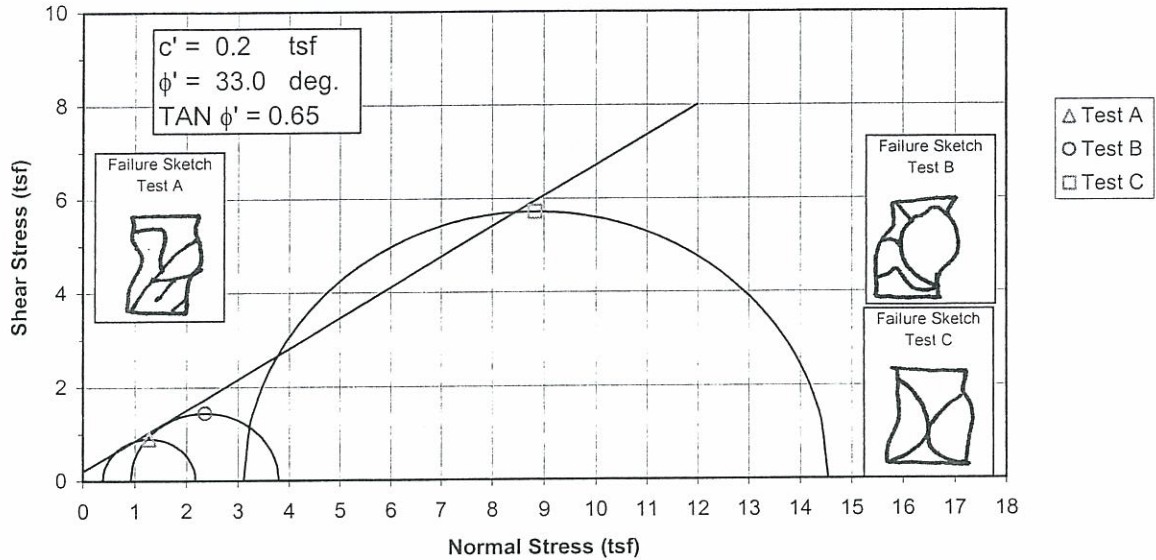


Deviator Stress and Induced Pore Pressure vs. Axial Strain



Failure Criterion: Maximum Effective Principal Stress Ratio

**Effective Strength Envelope**

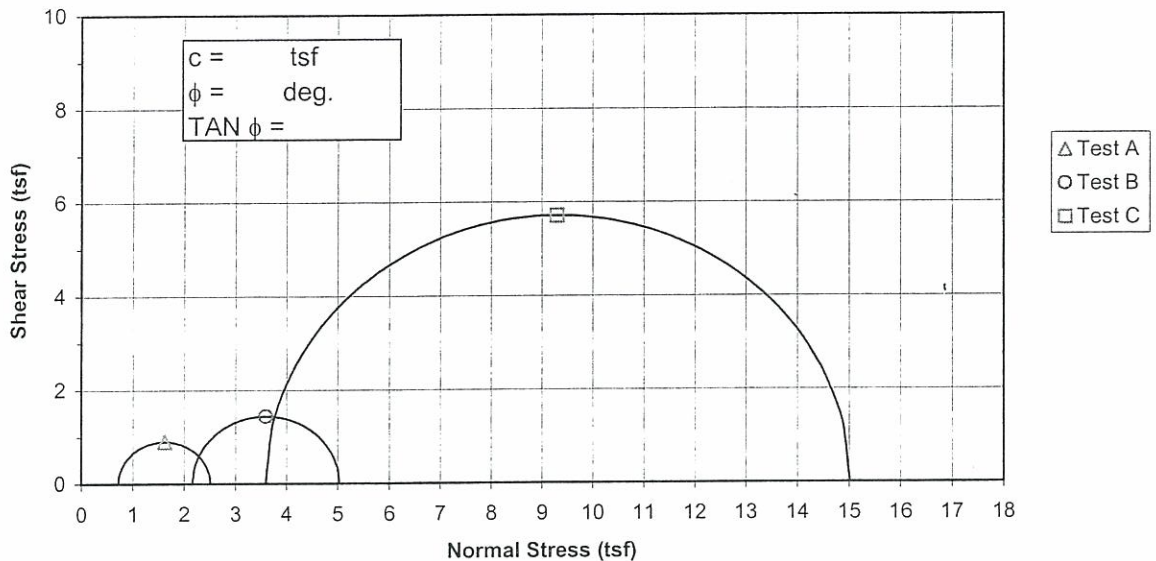


Specimen No.		A	B	C
Initial Data	Water content %	$W_o$ 21.4	19.6	15.3
	Dry Density PCF	$\gamma_{d_o}$ 102.5	106.1	116.8
	Saturation %	$S_o$ 89.8	89.9	93.5
	Void Ratio	$e_o$ 0.645	0.589	0.443
After Shear	Water content %	$W_f$ 22.7	19.5	16.0
	Dry Density PCF	$\gamma_{d_f}$ 104.5	110.4	117.7
	Saturation %	$S_f$ 100.0	100.0	100.0
	Void Ratio	$e_f$ 0.614	0.527	0.432
	Final Back Pressure TSF	$u_c$ 5.76	4.32	2.88
	Minor Principal Stress TSF @ failure	$\sigma_3^f$ 0.39	0.92	3.12
	Maximum Deviator Stress (tsf) @ failure	$(\sigma_1 - \sigma_3)_{max}$ 1.79	2.88	11.42
	Time to $(\sigma_1 - \sigma_3)_{max}$ min.	$t_f$ 6.5	28.1	17.2
	Ultimate Deviator Stress, t/sq ft	$(\sigma_1 - \sigma_3)_{ult}$ n/a	n/a	n/a
	Initial Diameter, in.	$D_o$ 1.410	1.406	1.416
	Initial Height, in.	$H_o$ 3.043	3.027	3.018

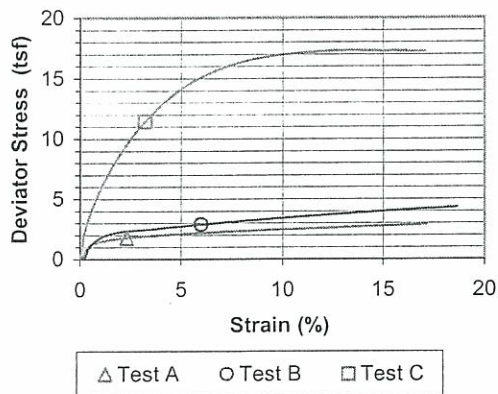
Controlled - Strain Test				Initial Height, in.			
Description of Specimens Lean Clay (CL), brown, moist, firm							
				Type of Specimen	Undisturbed	Type of test	
						R	
LL	PL	PI	Gs	Project			
			2.7	TVA Facility Assessment, P2: Johnsonville, TN			
Remarks:							
				Boring No.	STN-KT-PZ	Sample No.	1599
				Depth Elev.	12.0'-12.5', 12.5'-13.0', 13.0'-13.5'		
				Laboratory	Stantec	Date	5-20-09
<b>TRIAXIAL COMPRESSION TEST REPORT</b>							

Failure Criterion: Maximum Effective Principal Stress Ratio

**Total Strength Envelope**



**Deviator Stress vs. Strain**



Specimen No.		A	B	C
Initial Data	Water content %	W <sub>o</sub> 21.4	19.6	15.3
	Dry Density PCF	γ <sub>d</sub> <sub>o</sub> 102.5	106.1	116.8
	Saturation %	S <sub>o</sub> 89.8	89.9	93.5
	Void Ratio	e <sub>o</sub> 0.645	0.589	0.443
After Shear	Water content %	W <sub>f</sub> 22.7	19.5	16.0
	Dry Density PCF	γ <sub>d</sub> <sub>f</sub> 104.5	110.4	117.7
	Saturation %	S <sub>f</sub> 100.0	100.0	100.0
	Void Ratio	e <sub>f</sub> 0.614	0.527	0.432
Final Back Pressure TSF		u <sub>c</sub> 5.76	4.32	2.88
Minor Principal Stress TSF		σ <sub>3</sub> 0.72	2.16	3.60
Maximum Deviator Stress (tsf) @ failure		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub> 1.79	2.88	11.42
Time to (σ <sub>1</sub> -σ <sub>3</sub> ) <sub>max</sub> , min.		t <sub>f</sub> 6.5	28.1	17.2
Ultimate Deviator Stress, t/sq ft		(σ <sub>1</sub> -σ <sub>3</sub> ) <sub>ult</sub> n/a	n/a	n/a
Initial Diameter, in.		D <sub>o</sub> 1.410	1.406	1.416
Initial Height, in.		H <sub>o</sub> 3.043	3.027	3.018

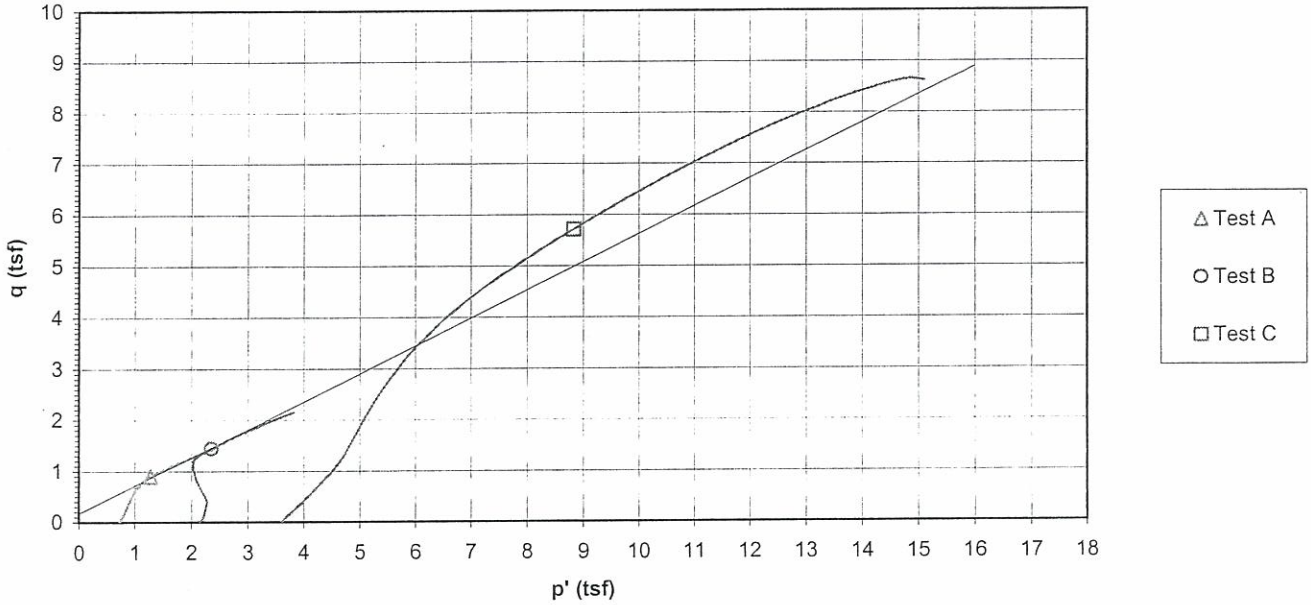
Controlled - Strain Test				Initial Height, in.				H <sub>o</sub>	3.043	3.027	3.018
Description of Specimens Lean Clay (CL), brown, moist, firm											
						Type of Specimen Undisturbed		Type of test R			
LL	PL	PI	Gs	2.7		Project TVA Facility Assessment, P2: Johnsonville, TN					
Remarks:											
						Boring No. STN-KT-PZ		Sample No. 1599			
						Depth Elev. 12.0'-12.5', 12.5'-13.0', 13.0'-13.5'					
						Laboratory Stantec		Date 5-20-09			
<b>TRIAXIAL COMPRESSION TEST REPORT</b>											



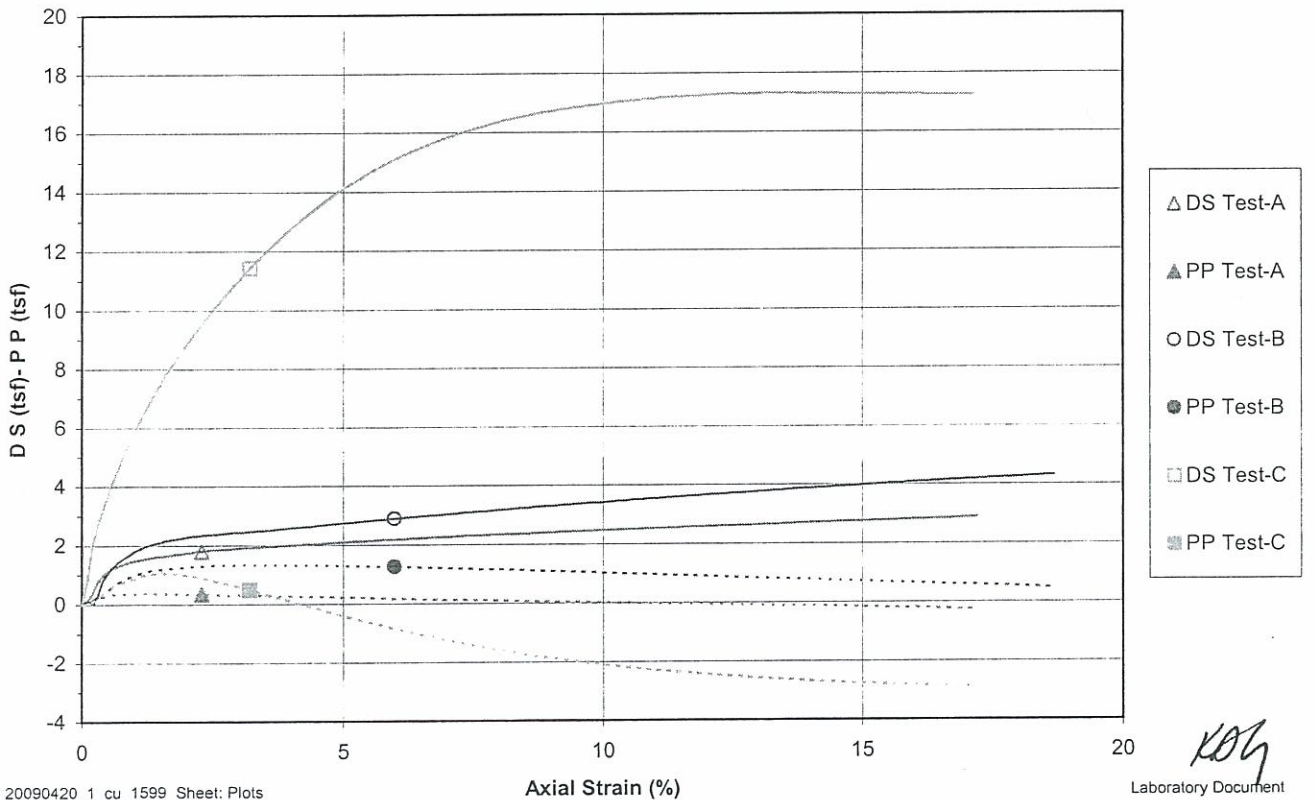
Project TVA Facility Assessment, P2: Johnsonville, TN  
 Sample ID STN-KT-PZ, 12.0'-12.5' & STN-KT-PZ, 12.5'-13.0' & STN-KT-PZ, 13.0'-13.5'  
 Failure Criterion: Maximum Effective Principal Stress Ratio  $\phi' = 33.0$  deg.

Project No. 171468118  
 Test Number 1599  
 $c' = 0.20$  tsf

p' vs. q Plot



Deviator Stress and Induced Pore Pressure vs. Axial Strain



Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source STN-B-8, 10.0'-11.3' Lab ID 548A  
 Visual Description Lean Clay (CL), red brown, moist, firm

Recovered 0.6'  
 Test Interval 10.0' - 10.6'

Specimen Type: Undisturbed

LL N/A  
 PL N/A  
 PI N/A

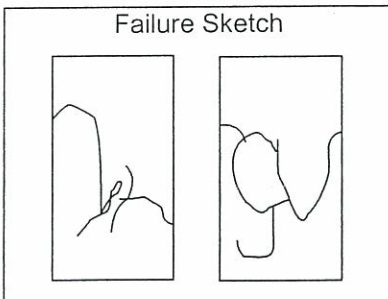
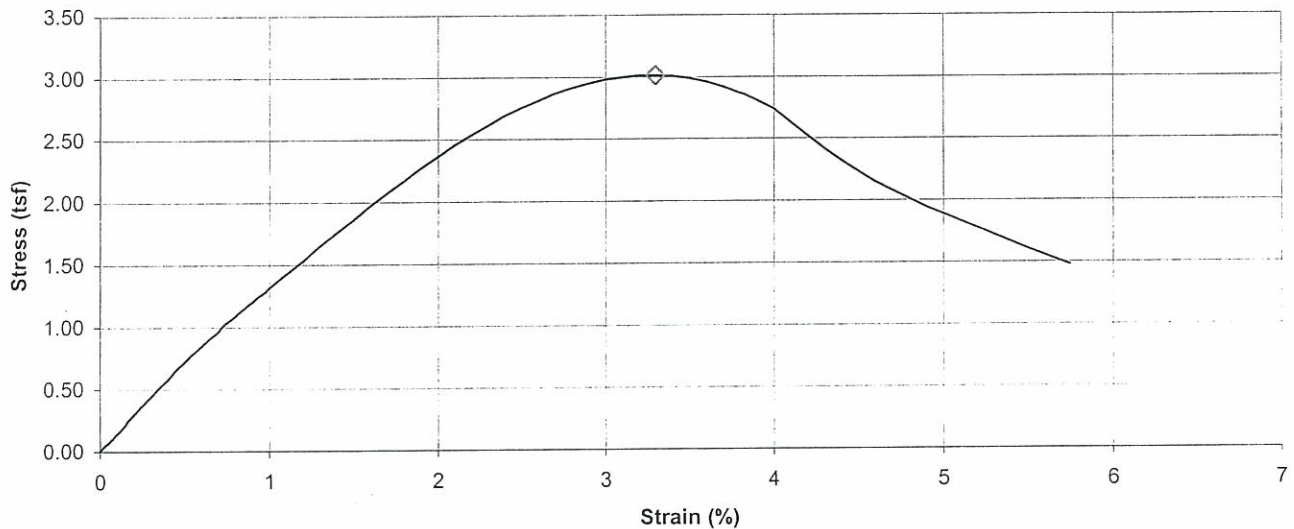
Date Extruded 03/19/2009  
 Date Tested 04/09/2009

Initial Wet Density (pcf) 124.8  
 Initial Dry Density (pcf) 103.8  
 Initial Moisture Content (%) 17.6  
 At Test Moisture Content (%) 20.2  
 Specific Gravity N/A  
 Degree of Saturation (%) N/A  
 Average Height (in) 6.173  
 Average Diameter (in) 2.888  
 Height to Diameter Ratio 2.1

Initial MC Taken Before Test, From Trimmings  
 At Test MC Taken After Test, From Center of Specimen

Unconfined Compressive Strength (tsf) 3.01  
 Undrained Shear Strength (tsf) 1.51  
 Strain at Maximum Stress (%) 3.3  
 Strain rate to failure (% / min.) 1.00

**Stress vs. Strain**



Pocket Penetrometer Reading (tsf) N/A  
 Torvane Reading (kg/cm<sup>2</sup>) N/A

Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Reviewed By *[Signature]*

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source STN-DT, ST-1, 18.0'-20.0' Lab ID 550B  
 Visual Description Lean Clay (CL), brown, moist, firm

Recovered 1.1'  
 Test Interval 18.5' - 19.0'

Specimen Type: Undisturbed

LL N/A  
 PL N/A  
 PI N/A

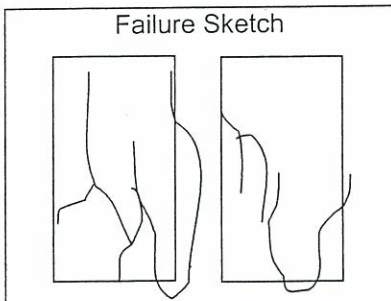
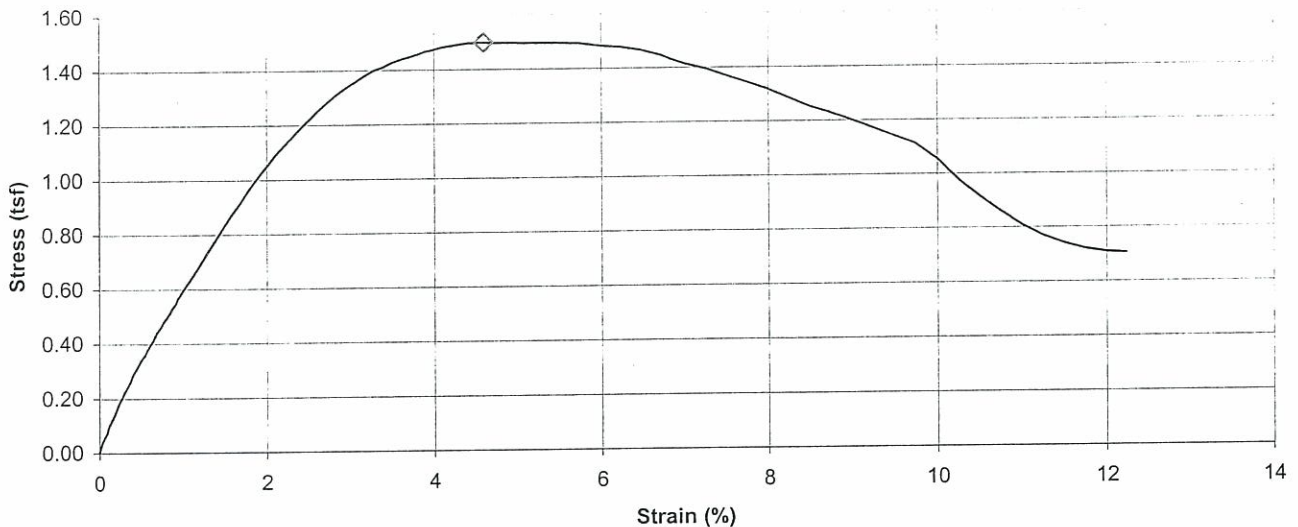
Date Extruded 03/20/2009  
 Date Tested 04/09/2009

Initial Wet Density (pcf) 124.9  
 Initial Dry Density (pcf) 100.2  
 Initial Moisture Content (%) 24.6  
 At Test Moisture Content (%) 24.7  
 Specific Gravity N/A  
 Degree of Saturation (%) N/A  
 Average Height (in) 6.020  
 Average Diameter (in) 2.887  
 Height to Diameter Ratio 2.1

Initial MC Taken Before Test, From Trimmings  
 At Test MC Taken After Test, From Center of Specimen

Unconfined Compressive Strength (tsf) 1.50  
 Undrained Shear Strength (tsf) 0.75  
 Strain at Maximum Stress (%) 4.6  
 Strain rate to failure (% / min.) 1.00

**Stress vs. Strain**



Pocket Penetrometer Reading (tsf) N/A  
 Torvane Reading (kg/cm<sup>2</sup>) N/A

Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Reviewed By KD

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source STN-ET, ST-2, 12.5'-14.5' Lab ID 552B  
 Visual Description Lean Clay (CL), light brown, moist, firm

Recovered 1.2'  
 Test Interval 13.1' - 13.6'

Specimen Type: Undisturbed

LL N/A  
 PL N/A  
 PI N/A

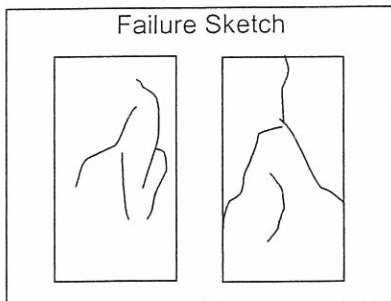
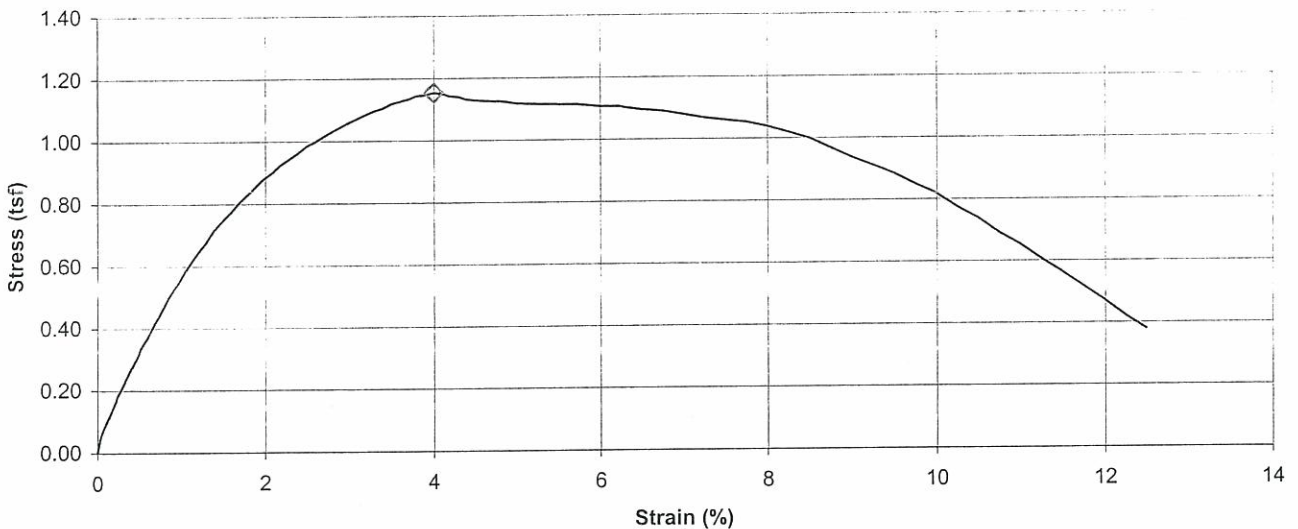
Date Extruded 03/20/2009  
 Date Tested N/A

Initial Wet Density (pcf) 123.3  
 Initial Dry Density (pcf) 97.4  
 Initial Moisture Content (%) 26.6  
 At Test Moisture Content (%) N/A  
 Specific Gravity N/A  
 Degree of Saturation (%) N/A  
 Average Height (in) 6.054  
 Average Diameter (in) 2.884  
 Height to Diameter Ratio 2.1

Initial MC Taken Before Test, From Trimmings  
 At Test MC Taken N/A

Unconfined Compressive Strength (tsf) 1.15  
 Undrained Shear Strength (tsf) 0.58  
 Strain at Maximum Stress (%) 4.0  
 Strain rate to failure (% / min.) 1.00

**Stress vs. Strain**



Pocket Penetrometer Reading (tsf) N/A  
 Torvane Reading (kg/cm<sup>2</sup>) N/A

Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Reviewed By *RJG*

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source STN-HM, ST-1, 6.0'-8.0' Lab ID 554  
 Visual Description Lean Clay with Sand (CL), brown, moist, firm

Recovered 0.5'  
 Test Interval 6.0' - 6.5'

Specimen Type: Undisturbed

LL N/A  
 PL N/A  
 PI N/A

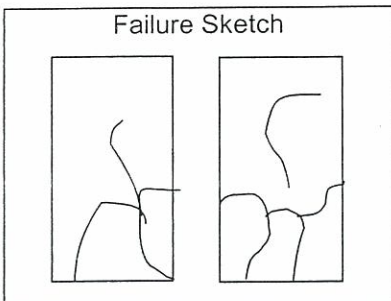
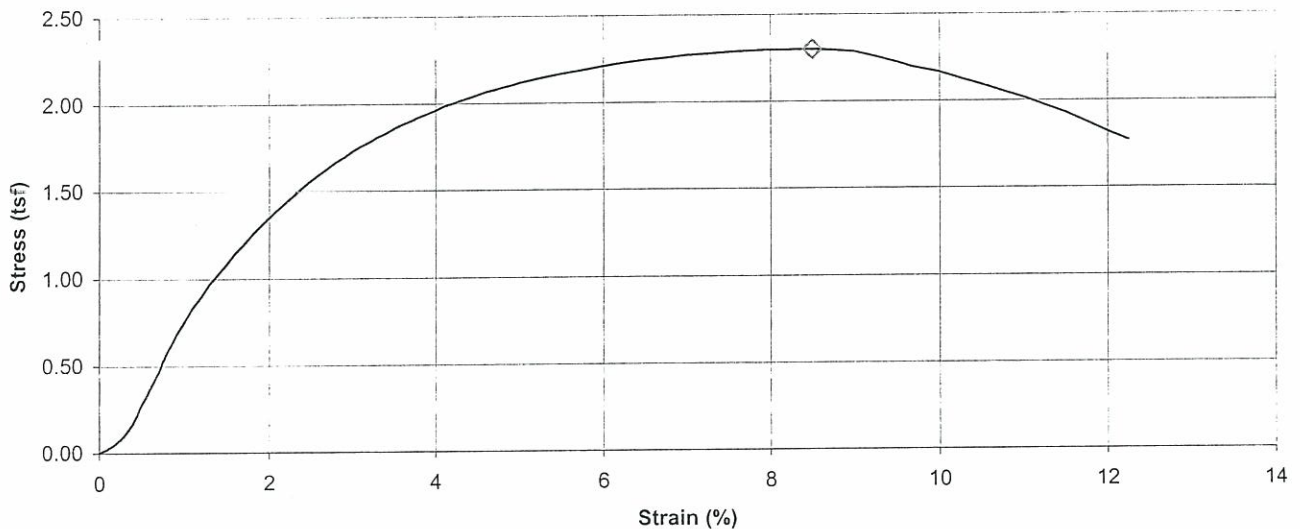
Date Extruded 03/20/2009  
 Date Tested 04/09/2009

Initial Wet Density (pcf) 127.8  
 Initial Dry Density (pcf) 105.0  
 Initial Moisture Content (%) 19.6  
 At Test Moisture Content (%) 21.7  
 Specific Gravity N/A  
 Degree of Saturation (%) N/A  
 Average Height (in) 6.055  
 Average Diameter (in) 2.883  
 Height to Diameter Ratio 2.1

Initial MC Taken Before Test, From Trimmings  
 At Test MC Taken After Test, From Center of Specimen

Unconfined Compressive Strength (tsf) 2.30  
 Undrained Shear Strength (tsf) 1.15  
 Strain at Maximum Stress (%) 8.5  
 Strain rate to failure (% / min.) 1.00

**Stress vs. Strain**



Pocket Penetrometer Reading (tsf) N/A  
 Torvane Reading (kg/cm<sup>2</sup>) N/A

Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Reviewed By *KAG*

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source STN-ET, ST-1, 6.0'-8.0' Lab ID 551  
 Visual Description Lean Clay (CL), brown, moist, firm, pockets of gravel in specimen

Recovered 0.9'  
 Test Interval 6' - 6.5'

Specimen Type: Undisturbed

LL N/A  
 PL N/A  
 PI N/A

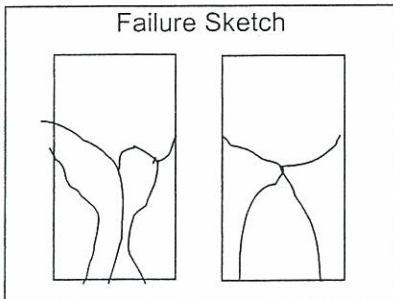
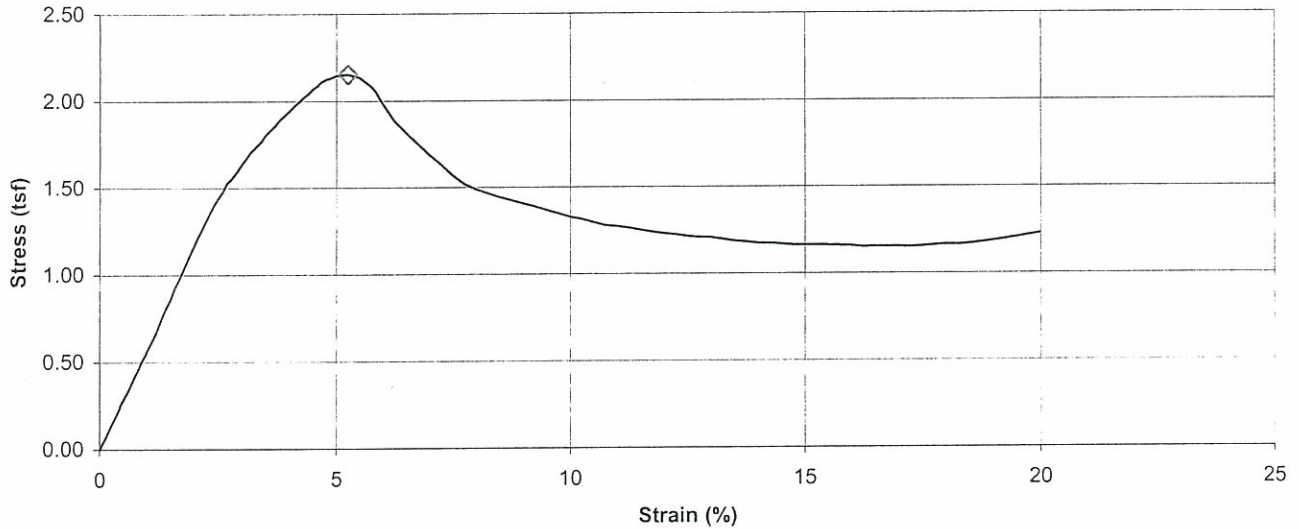
Date Extruded 03/20/2009  
 Date Tested 04/09/2009

Initial Wet Density (pcf) 125.3  
 Initial Dry Density (pcf) 104.2  
 Initial Moisture Content (%) 18.9  
 At Test Moisture Content (%) 20.2  
 Specific Gravity N/A  
 Degree of Saturation (%) N/A  
 Average Height (in) 6.131  
 Average Diameter (in) 2.883  
 Height to Diameter Ratio 2.1

Initial MC Taken Before Test, From Trimmings  
 At Test MC Taken After Test, From Center of Specimen

Unconfined Compressive Strength (tsf) 2.15  
 Undrained Shear Strength (tsf) 1.08  
 Strain at Maximum Stress (%) 5.2  
 Strain rate to failure (% / min.) 1.00

**Stress vs. Strain**



Pocket Penetrometer Reading (tsf) N/A  
 Torvane Reading (kg/cm<sup>2</sup>) N/A

Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Reviewed By *KJG*

Project Name TVA Facility Assessment, P2: Johnsonville, TN Project Number 171468118  
 Source STN-JC, ST-1, 28.5'-30.5' Lab ID 555  
 Visual Description Lean Clay (CL), brown, moist, firm, Mn

Recovered 0.9'  
 Test Interval 28.6' - 29.1'

Specimen Type: Undisturbed

LL N/A  
 PL N/A  
 PI N/A

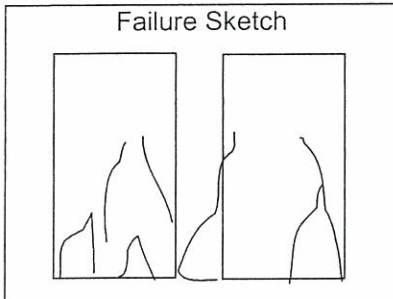
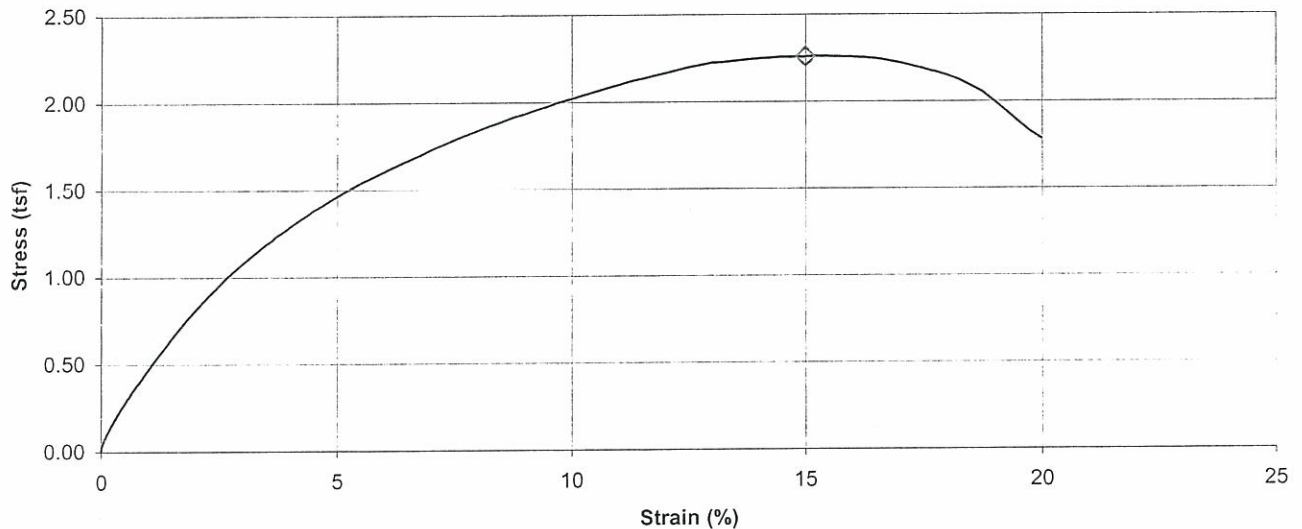
Date Extruded 03/20/2009  
 Date Tested 04/09/2009

Initial Wet Density (pcf) 127.1  
 Initial Dry Density (pcf) 102.2  
 Initial Moisture Content (%) 23.3  
 At Test Moisture Content (%) 24.3  
 Specific Gravity N/A  
 Degree of Saturation (%) N/A  
 Average Height (in) 6.101  
 Average Diameter (in) 2.884  
 Height to Diameter Ratio 2.1

Initial MC Taken Before Test, From Trimmings  
 At Test MC Taken After Test, From Center of Specimen

Unconfined Compressive Strength (tsf) 2.26  
 Undrained Shear Strength (tsf) 1.13  
 Strain at Maximum Stress (%) 15.0  
 Strain rate to failure (% / min.) 1.00

**Stress vs. Strain**



Pocket Penetrometer Reading (tsf) N/A  
 Torvane Reading (kg/cm<sup>2</sup>) N/A

Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
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Reviewed By 