

***FIGURES***

# LOG OF BORING NO. DH1- 1

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

triadeng.com



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
5	●	X	Coarse <u>COAL REFUSE</u>									
10	●	X				4-3-3						
15	●	X										
20	●	X	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, loose to medium dense	20.0		7-4-3						
25	●	X	- more clayey (25.0' - 26.5')			3-5-9						
30	●	X	- SPOIL/FILL -									

BORING C00553.GPJ 2/27/01

Completion Depth: **96.8 feet**  
 Date Boring Started: **12/1/00**  
 Date Boring Completed: **12/2/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of approximately 35 ft. during drilling operations.**

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# LOG OF BORING NO. DH1- 1

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			MATERIAL DESCRIPTION									
	X	○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp to wet, loose to medium dense - w/few coal fragments (30.0' - 31.5')  - wet @ 35 ft., w/some sub-angular sandstone and shale fragments (35.0' - 36.5')  - numerous sandstone fragments and some root traces  - brown sand lens (55.0' - 55.5')  - gray sandstone boulder (57.0' - 60.5')  - SPOIL/FILL -			5-6-15						
35	X	○		5-5-6								
40	X	○		10-12-9								
45	X	○		11-9-8								
50	X	○		2-3-3								
55	X	○		10-9-7								
60	X	○										

BORING C00553.GPJ 2/27/01

Completion Depth: **96.8 feet**  
 Date Boring Started: **12/1/00**  
 Date Boring Completed: **12/2/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of approximately 35 ft. during drilling operations.**

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# LOG OF BORING NO. DH1- 1

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>▬ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
			Brown <u>CLAYEY SAND</u> with sandstone fragments, damp to wet, loose to medium dense  - SPOIL/FILL -			50/2"							
65			65.0			10-14-19							
			Brown and gray <u>CLAYEY SAND to SANDY CLAY</u> with some sandstone fragments, damp, dense to very dense										
70						19-21-21							
75						11-34-39							
80			81.0	50	0	50/1"							
			Brown <u>SANDSTONE</u> , medium hard, weathered, friable gray, fractured (82.5' - 83.6')										
			83.6										
			VOID  (Partially Filled)										
				17	4								
90													

BORING C00553.GPJ 2/27/01

Completion Depth: **96.8 feet**  
 Date Boring Started: **12/1/00**  
 Date Boring Completed: **12/2/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of approximately 35 ft. during drilling operations.**

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# LOG OF BORING NO. DH1- 1

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
			VOID	91.5								
			<u>COAL</u> , broken	92.9								
95			Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth	100	70							
			96.8									
			Bottom of Test Boring @ 96.8 ft.									
100												
105												
110												
115												
120												

Completion Depth: **96.8 feet**  
 Date Boring Started: **12/1/00**  
 Date Boring Completed: **12/2/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of approximately 35 ft. during drilling operations.**

BORING - C00553.GPJ 2/27/01

# LOG OF BORING NO. DH1- 2

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> <div style="width: 65%;"> <p>Coarse <u>COAL REFUSE</u></p> <hr style="border: 0.5px solid black;"/> <p>4.0</p> <p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, loose to very dense</p> <p style="text-align: center;">- boulder (17.0' - 18.0')</p> <p style="text-align: center;">- more clayey, with plant root traces (25.0' - 26.5')</p> <p style="text-align: center;">- SPOIL/FILL -</p> <p style="text-align: center;">- boulder (29.5' - 30.5')</p> </div> </div>										
10						4-5-5							
15						4-4-4							
20						6-5-6							
25						3-5-5							

BORING C00553.GPJ 2/27/01

Completion Depth: **101.9 feet**  
 Date Boring Started: **12/4/00**  
 Date Boring Completed: **12/4/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 50 ft. during drilling operations.**

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# LOG OF BORING NO. DH1- 2

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊗ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
			Brown <u>CLAYEY SAND</u> with some sandstone fragments, damp, loose to very dense			29-5-4							
35			- boulder (35.0' - 36.0')			50/5"							
			- boulder (38.5' - 39.2')										
40			- very clayey, w/possible slurry laminations (40.0' - 41.5')			7-10-40							
45			- possible slurry laminations (46.0' - 46.5')			21-25-38							
50			- wet, w/possible slurry fines @ 50.0 ft.			16-12-11							
			- SPOIL/FILL -										
55													
			Brown <u>CLAYEY SAND to SANDY CLAY</u> with some sandstone fragments, wet, very dense			24-12-28							
60													

BORING C00553.GPJ 2/28/01

Completion Depth: **101.9 feet**  
 Date Boring Started: **12/4/00**  
 Date Boring Completed: **12/4/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 50 ft. during drilling operations.**

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# LOG OF BORING NO. DH1- 2

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
	X	□	Brown <u>CLAYEY SAND</u> to <u>SANDY CLAY</u> with some sandstone fragments, wet, very dense			12-25-39						
65	X	□				30-50/4"						
			Brown <u>SANDSTONE</u> , medium hard, fine to medium grained, weathered, friable									
70	X	□		75	48	50/3"						
			- gray and brown with occasional carbonaceous laminations (74.1' - 83.4')									
75				100	78							
80												
83.4												
			VOID									
			(Partially Filled)									
85												
90				26	23							

BORING C00553.GPJ 2/28/01

Completion Depth: **101.9 feet**  
 Date Boring Started: **12/4/00**  
 Date Boring Completed: **12/4/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 50 ft. during drilling operations.**

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# LOG OF BORING NO. DH1- 2

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="font-size: small;"> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid black; border-style: dashed; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid black; border-style: solid; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
			VOID  (Partially Filled)									
95		[Wavy pattern]	Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth	94.4								
				97.5								
100		[Diagonal lines]	Gray <u>SANDSTONE</u> with shale laminations, medium hard to hard, fine grained	98	98							
				101.9								
			Bottom of Test Boring @ 101.9 ft.									
105												
110												
115												
120												

BORING C00553.GPJ 2/27/01

Completion Depth: **101.9 feet**  
 Date Boring Started: **12/4/00**  
 Date Boring Completed: **12/4/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 50 ft. during drilling operations.**

# LOG OF BORING NO. DH1-3

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1055.6 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p> <span style="border: 1px solid black; padding: 2px;">X</span> Split Spoon  <span style="border: 1px solid black; padding: 2px;">X</span> Shelby Tube  <span style="border: 1px solid black; padding: 2px;">█</span> Rock Core                 </p> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> <div style="width: 65%;"> <p>Coarse <u>COAL REFUSE</u></p> <p style="text-align: right;">2.0</p> <p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, loose to medium dense</p> <p style="text-align: center;">- trace coal fragments (15.0' - 16.5')</p> <p style="text-align: center;">-SPOIL/FILL-</p> </div> </div>										
5													
10						6-6-9							
15						5-4-2							
20						3-5-6							
25						6-4-4							
30													

BORING C00553.GPJ 2/27/01

Completion Depth: **106.9 feet**  
 Date Boring Started: **12/4/00**  
 Date Boring Completed: **12/5/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 40.0 ft. during drilling operations.**

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# LOG OF BORING NO. DH1- 3

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1055.6 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="font-size: small;"> <span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; border-style: dashed; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; border-style: solid; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
	X	o	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, loose to medium dense  - SPOIL/FILL -			12-5-15						
35	X	o	Brown <u>CLAYEY SAND to SANDY CLAY</u> with some sandstone fragments, moist, medium dense	35.0		16-24-23						
40	X	o	Brown <u>SANDSTONE</u> , medium hard, medium grained, weathered, friable	40.5		17-50/5"						
45		/	- gray, medium hard to hard from 43.4 ft.  - occasional carbonaceous laminations (46.9' - 54.6')	95	71	50/0"						
50		/	- occasional iron stains ((53.8' - 55.7'))									
55		/		100	94							
60		/										

BORING: C00553.GPJ 2/27/01

Completion Depth: **106.9 feet**  
 Date Boring Started: **12/4/00**  
 Date Boring Completed: **12/5/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 40.0 ft. during drilling operations.**

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# LOG OF BORING NO. DH1- 3

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1055.6 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊠ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>⊠ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
65		/	<p>Gray <u>SANDSTONE</u>, medium hard to hard, medium grained</p> <p>- iron-stained horizontal fracture @ 66.0 ft.</p> <p>- brown w/some iron-staining (68.9' - 70.1') and (70.6' - 71.1')</p>	99	85								
70		/											
75		/		100	95								
80		/	<p>- modulus of rupture (84.2' - 85.0') - 485 psi (85.4' - 86.0') - 346 psi</p> <p>- unconfined compressive strength (83.9' - 84.2') - 6,100 psi (85.0' - 85.4') - 5,464 psi</p> <p>- iron-stained @ 87.5 ft.</p>										
85		/		55	50								
87.6		/	VOID										
90		/											

BORING\_C00553.GPJ 3/2/01

Completion Depth: **106.9 feet**  
 Date Boring Started: **12/4/00**  
 Date Boring Completed: **12/5/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 40.0 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH1- 3

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

triadeng.com



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1055.6 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
			VOID									
		[Symbol]	Gray <u>SANDSTONE</u> , medium hard to hard, medium grained, iron-stained	91.5								
95				70	56							
			VOID									
			Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth	95.4								
100				76	64							
			Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained	97.4								
105				103.5	100	100						
			Bottom of Test Boring @ 106.9 ft.	106.9								
110												
115												
120												

BORING: C00553.GPJ 2/27/01

Completion Depth: **106.9 feet**  
 Date Boring Started: **12/4/00**  
 Date Boring Completed: **12/5/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 40.0 ft. during drilling operations.**

# LOG OF BORING NO. DH1-4

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1054.9 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p> <span style="border: 1px solid black; padding: 2px;">X</span> Split Spoon  <span style="border: 1px solid black; padding: 2px;">X</span> Shelby Tube  <span style="border: 1px solid black; padding: 2px;">█</span> Rock Core                 </p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
		X	Coarse <u>COAL REFUSE</u>										
2.0													
		○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, loose to medium dense										
5													
		X	- trace coal and organic fragments (10.0' - 11.5')			6-5-8							
10													
		X	- mostly sandstone fragments (15.0' - 16.5')			14-12-6							
15													
		X				4-3-4							
20													
		X				4-5-5							
25													
		X	- SPOIL/FILL -										
30			- brown and gray, with trace coal, wood fragments, possible slurry fines (30.0' - 31.5')										

BORING C00553.GPJ 2/27/01

Completion Depth: **106.7 feet**  
 Date Boring Started: **12/6/00**  
 Date Boring Completed: **12/6/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 83.9 ft. upon drilling completion.**

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# LOG OF BORING NO. DH1- 4

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1054.9 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
	X	○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, loose to medium dense			13-8-7						
35	X	○	- few wood fragments (35.0' - 36.5')			6-7-7						
40	X	○	- brown and gray w/trace wood fragments (40.0' - 41.5')			5-6-6						
			- SPOIL/FILL -									
45	X	○		45.0								
	X	○	Brown <u>CLAYEY SAND</u> to <u>SANDY CLAY</u> with some sandstone fragments, damp, very dense			31-38-42						
50	X	○		50.3		50/4"						
	█	█	Gray <u>SANDSTONE</u> , medium hard to hard, medium grained	100	0							
			- coal band (50.3' - 50.7')									
55			- iron-stained, w/occasional carbonaceous laminations (50.7' - 51.0')	99	84							
			- iron-stained (53.2' - 53.5') and (54.0' - 57.0')									
60												

BORING C00553.GPJ 2/27/01

Completion Depth: **106.7 feet**  
 Date Boring Started: **12/6/00**  
 Date Boring Completed: **12/6/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 83.9 ft. upon drilling completion.**

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# LOG OF BORING NO. DH1- 4

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1054.9 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>Gray <u>SANDSTONE</u>, medium hard to hard, medium grained</p> <p>- iron-stained, w/occasional carbonaceous inclusions (63.4' - 68.0')</p> <p>- weathered, w/numerous diagonal fractures (65.8' - 67.4')</p> <p>- unconfined compressive strength (78.9' - 79.3') - 4,950 psi (83.2' - 83.8') - 3,291 psi</p> <p>- modulus of rupture (78.0' - 78.7') - 280 psi (84.0' - 84.5') - 388 psi</p> <p>- vertical fracture w/iron stain (81.7' - 83.2') and (84.5' - 85.5')</p>									
65				100	69							
70												
75				100	100							
80												
85			85.5									
			VOID  (Partially Filled)	47	21							

BORING: C00553.GPJ 3/7/01

Completion Depth: **106.7 feet**  
 Date Boring Started: **12/6/00**  
 Date Boring Completed: **12/6/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 83.9 ft. upon drilling completion.**

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# LOG OF BORING NO. DH1- 4

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1054.9 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
			VOID									
		[Symbol]	Gray <u>SHALEY SANDSTONE</u>	91.1								
				91.8								
			VOID (Partially Filled)									
95				12	0							
				96.2								
		[Symbol]	Gray <u>SANDSTONE</u>	96.7								
				0	0							
			Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth									
100				93	89							
				103.9								
		[Symbol]	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine grained									
105				100	100							
				106.7								
			Bottom of Test Boring @ 106.7 ft.									
110												
115												
120												

BORING C00553.GPJ 3/7/01

Completion Depth: **106.7 feet**  
 Date Boring Started: **12/6/00**  
 Date Boring Completed: **12/6/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 83.9 ft. upon drilling completion.**

# LOG OF BORING NO. DH1- 5

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1054.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊗ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
		⊗	Coarse <u>COAL REFUSE</u>										
		○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, loose to dense										
5		○											
10		⊗				6-5-7							
15		⊗	- mostly sandstone fragments (15.0' - 16.5')			5-7-6							
20		⊗	- more clayey (20.0' - 26.5')			4-4-4							
25		⊗	- root and plant traces (25.0' - 26.5')			11-8-4							
30		○	- wet @ 30.0 ft.										
			- SPOIL/FILL										

BORING C00553.GPJ 2/27/01

Completion Depth: **109.3 feet**  
 Date Boring Started: **12/6/00**  
 Date Boring Completed: **12/8/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 31.5 ft. during drilling operations.**

*Continued Next Page*



# LOG OF BORING NO. DH1- 5

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**Project Description:** Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky

Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1054.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>▣ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
35	⊗	○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, loose to dense  - boulder (31.5' - 33.0')			16-13-36							
40	⊗	○	- trace coal fragments (40.0' - 41.0')  - boulder (41.0' - 43.5')  - SPOIL/FILL -			6-5-25							
45	⊗	○	45.0			1-11-50/5"							
50	⊗	○	Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, dense			11-50/3"							
55	⊗	○	55.0			17-20-21							
60	⊗	○	Brown <u>SANDSTONE</u> , medium hard, medium grained, weathered, friable			50/3"							

BORING C00553.GPJ 2/27/01

Completion Depth: **109.3 feet**  
 Date Boring Started: **12/6/00**  
 Date Boring Completed: **12/8/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

**Remarks:** Groundwater was first noted at a depth of 31.5 ft. during drilling operations.

*Continued Next Page*

# LOG OF BORING NO. DH1- 5

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1054.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊠ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>□ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
			Brown SANDSTONE, medium hard, medium grained, weathered, friable	100	100	50/3"							
			- gray, medium hard to hard from 60.6 ft.										
65			- diagonal fracture @ 65.2 ft.										
			- vertical fracture (66.6' - 66.9')	99	74								
70			- occasional carbonaceous inclusions (67.5' - 86.1')										
75													
			- modulus of rupture (82.0' - 82.5') - 249 psi (84.0' - 84.6') - 275 psi	99	99								
			- unconfined compressive strength (83.2' - 83.7') - 5,920 psi (84.6' - 85.1') - 4,230 psi										
85			- sandy shale band (85.4' - 86.1')										
			86.1										
			VOID										
			- void sample (87.3' - 90.6') brown sand and gravel	31	30								

Completion Depth: **109.3 feet**  
 Date Boring Started: **12/6/00**  
 Date Boring Completed: **12/8/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 31.5 ft. during drilling operations.**

*Continued Next Page*

BORING C00553.GPJ 3/2/01

# LOG OF BORING NO. DH1-5

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1054.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>  VOID  (Partially Filled)									
95		[Symbol]	96.4									
		[Symbol]	Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth	50	34							
100		[Symbol]	103.6									
		[Symbol]	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained	100	100							
105		[Symbol]	109.3									
		[Symbol]	Bottom of Test Boring @ 109.3 ft.									
110		[Symbol]										
115		[Symbol]										
120		[Symbol]										

BORING C00553.GPJ 2/27/01

Completion Depth: **109.3 feet**  
 Date Boring Started: **12/6/00**  
 Date Boring Completed: **12/8/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 31.5 ft. during drilling operations.**

# LOG OF BORING NO. DH1- 6

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1051.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			MATERIAL DESCRIPTION									
5		X	Coarse <u>COAL REFUSE</u>									
10		X										
15		X										
20		X										
25		X										
30		X										

BORING C00553.GPJ 2/27/01

Completion Depth: **99.8 feet**  
 Date Boring Started: **12/8/00**  
 Date Boring Completed: **12/8/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 40.0 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH1- 6

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>Coarse <u>COAL REFUSE</u></p>									
35				35.0								
			<p>Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp, loose to dense</p>			8-8-11						
40			<p>- wet @ 40.0 ft.</p>	75			17	46	37			
			<p>- shelly tube (40.0' - 42.0') brown and gray silty to clayey sand with sandstone fragments</p>									
45			<p>- shelly tube (45.0' - 46.0') large sandstone fragment with some silty sand</p>	80								
			<p>- mostly sandstone fragments ( 50.0' - 61.5')</p>			8-8-10						
55						11-25-24						
60			<p>- SPOIL/FILL -</p>									

BORING C00553 GP J 3/2/01

**Completion Depth: 99.8 feet**  
**Date Boring Started: 12/8/00**  
**Date Boring Completed: 12/8/00**  
**Engineer/Geologist: JEN/JTS**  
**Project No.: C00553**

**Remarks: Groundwater was first noted at a depth of 40.0 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH1- 6

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp to wet, loose to medium dense</p> <p>- trace coal fragments (60.0' - 61.5')</p> <p style="text-align: center;">- SPOIL/FILL -</p>			9-10-11						
65						12-18-14						
70			70.0			19-25-26						
75			Brown <u>CLAYEY SAND</u> to <u>SANDY CLAY</u> with some sandstone fragments, damp, dense to very dense			24-49-50/6"						
80						35-36-24						
85						9-15-19-27						
			88.3			20-40-50/3"						
90			<u>COAL SLURRY</u>									

BORING C00553.GPJ 3/2/01

Completion Depth: **99.8 feet**  
 Date Boring Started: **12/8/00**  
 Date Boring Completed: **12/8/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 40.0 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH1- 6

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1051.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> <span>Split Spoon</span> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="width: 15px; height: 15px; border: 1px solid black; border-style: dashed; margin-right: 5px;"></div> <span>Shelby Tube</span> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="width: 15px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> <span>Rock Core</span> </div>										
		COAL	90.2 90.9	98	45								
95		CLAY SHALE	Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth										
			98.1	100	42								
100		SANDSTONE	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained										
			99.8										
			Bottom of Test Boring @ 99.8 ft.										
105													
110													
115													
120													

BORING C00553.GPJ 2/27/01

Completion Depth: **99.8 feet**  
 Date Boring Started: **12/8/00**  
 Date Boring Completed: **12/8/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 40.0 ft. during drilling operations.**

# LOG OF BORING NO. DH1-7

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.1 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
5		X	Coarse <u>COAL REFUSE</u>									
10		X										
15		X										
20		X										
25		X										
30		X										
30		X										
30		X										
30		X										
30		X										

BORING C00553.GPJ 2/27/01

Completion Depth: **100.4 feet**  
 Date Boring Started: **12/8/00**  
 Date Boring Completed: **12/9/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 50.0 ft. during drilling operations.**

*Continued Next Page*



# LOG OF BORING NO. DH1-7

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.1 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>Coarse <u>COAL REFUSE</u></p> <p style="text-align: right;">32.0</p> <p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, loose to very dense</p>									
35	X					14-8-5						
40	X					8-7-6						
45	X		- very clayey ( 45.0 - 51.5 ft. )			4-4-4						
50	X		- with some plant roots ( 50.0 - 51.5 ft. )			4-4-5						
55	X		- wet @ 55.0 ft.			14-24-26						
			- mostly sandstone fragments ( 55.0 - 56.5 ft. )									
			- SPOIL/FILL -									

BORING C00553.GPJ 2/27/01

Completion Depth: **100.4 feet**  
 Date Boring Started: **12/8/00**  
 Date Boring Completed: **12/9/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 50.0 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH1-7

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.1 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
	⊗	○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, loose to very dense  - SPOIL/FILL -			5-13-11							
65	⊗	○	Brown <u>CLAYEY SAND to SANDY CLAY</u> with some sandstone fragments, damp, dense to very dense  - boulder @ 73.7 ft.	65.0		8-15-16							
70	⊗	○				19-22-27-40							
75	⊗	○				21-26-64-50/2"							
80	⊗	○		21	0								
85	⊗	○		14	0								
85.7	■	■	<u>COAL</u>	85.7									
90	■	■		94	0								

BORING C00553.GPJ 2/27/01

Completion Depth: **100.4 feet**  
 Date Boring Started: **12/8/00**  
 Date Boring Completed: **12/9/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 50.0 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH1-7

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.1 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
		☒	<u>COAL</u>									
92.0												
95		☒	Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth	100	68							
99.5												
100		☒	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine grained									
100.4												
			Bottom of Test Boring @ 100.4 ft.									
105												
110												
115												
120												

BORING C00553.GPJ 2/28/01

Completion Depth: **100.4 feet**  
 Date Boring Started: **12/8/00**  
 Date Boring Completed: **12/9/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 50.0 ft. during drilling operations.**

# LOG OF BORING NO. DH1- 8

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1053.2 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			MATERIAL DESCRIPTION									
5		[X]	Coarse <u>COAL REFUSE</u>									
5.0												
10		[O]	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, dense to very dense									
15												
20												
25												
30			- SPOIL/FILL -									

BORING C00553.GPJ 2/27/01

Completion Depth: **105.1 feet**  
 Date Boring Started: **12/11/00**  
 Date Boring Completed: **12/11/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 82.0 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DH1- 8

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**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1053.2 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; align-items: flex-start;"> <div style="width: 15%; border-right: 1px solid black; padding-right: 5px;"> <p style="font-size: 8px;">Legend:</p> <div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;"><span style="width: 15px; height: 10px; border: 1px solid black; border-style: dashed; margin-right: 5px;"></span> Split Spoon</div> <div style="display: flex; align-items: center;"><span style="width: 15px; height: 10px; border: 1px solid black; border-style: dashed; margin-right: 5px;"></span> Shelby Tube</div> <div style="display: flex; align-items: center;"><span style="width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Rock Core</div> </div> </div> <div style="width: 85%; padding-left: 5px;"> <p style="text-align: center; margin-top: 0;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
35			Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, dense to very dense										
40													
45													
50						17-15-23							
55			- SPOIL/FILL -										
55			55.0			26-50/1"							
60			Brown <u>CLAYEY SAND to SANDY CLAY</u> with some sandstone fragments, damp, very dense										

BORING C00553.GPJ 2/27/01

**Completion Depth: 105.1 feet**  
**Date Boring Started: 12/11/00**  
**Date Boring Completed: 12/11/00**  
**Engineer/Geologist: JEN/CEM**  
**Project No.: C00553**

**Remarks: Water was noted at a depth of 82.0 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DH1- 8

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1053.2 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
	X	□	Split Spoon Shelby Tube Rock Core <b>MATERIAL DESCRIPTION</b>									
		□	Brown <u>CLAYEY SAND</u> to <u>SANDY CLAY</u> with some sandstone fragments, damp, very dense			28-26-32						
65		□		65.0		50/2"						
		□	Brown <u>SANDSTONE</u> , medium hard, medium to coarse grained, weathered, friable	92	73							
70		□	- high angle fracture ( 67.0 - 67.6 ft. )									
		□	- with occasional diagonal fractures ( 67.6 - 68.7 ft. )									
		□	- gray ( 67.6 - 84.2 ft. )									
75		□	- modulus of rupture (79.5' - 80.1') - 344 psi (83.0' - 83.8') - 398 psi	102	89							
		□	- unconfined compressive strength (81.2' - 81.7') - 5,700 psi (82.6' - 83.0') - 4,125 psi									
		□	- void ( 84.0 - 84.2 ft. )									
		□	- gray shale ( 84.2 - 85.0 ft. )									
85		□	VOID	85.0								
		□	- void sample (85.0' - 91.4') brown sand and gravel									
90		□										

BORING\_C00553.GPJ 3/2/01

Completion Depth: **105.1 feet**  
 Date Boring Started: **12/11/00**  
 Date Boring Completed: **12/11/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 82.0 ft. upon drilling completion.**

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# LOG OF BORING NO. DH1- 8

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1053.2 feet</b>												
		Split Spoon Shelby Tube Rock Core										
95			VOID  (filled w/sand and gravel)	100	90							
			95.3									
100			Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth									
			104.3	100	94							
105			Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained									
			105.1									
			Bottom of Test Boring @ 105.1 ft.									
110												
115												
120												

BORING C00553.GPJ 2/27/01

Completion Depth: **105.1 feet**  
 Date Boring Started: **12/11/00**  
 Date Boring Completed: **12/11/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 82.0 ft. upon drilling completion.**

# LOG OF BORING NO. DH1- 9

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.1 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; align-items: flex-start;"> <div style="width: 150px; border-right: 1px solid black; margin-right: 5px;"> </div> <div style="width: 100%; padding-left: 5px;"> <p>Coarse <u>COAL REFUSE</u></p> </div> </div>									

Completion Depth: **104.8 feet**  
 Date Boring Started: **12/12/00**  
 Date Boring Completed: **12/12/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 29.0 ft. upon drilling completion.**

*Continued Next Page*

BORING C00553.GPJ 2/27/01



# LOG OF BORING NO. DH1- 9

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1051.1 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊠ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
35			<p>Coarse <u>COAL REFUSE</u></p>										
40													
45													
50			<p>- wet @ 50.0 ft.</p>										
55			<p style="text-align: right;">55.0</p> <p>Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp to wet, medium dense to very dense</p> <p style="text-align: center;">- SPOIL/FILL -</p>										
60													

BORING C00553.GPJ 2/27/01

Completion Depth: **104.8 feet**  
 Date Boring Started: **12/12/00**  
 Date Boring Completed: **12/12/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 29.0 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DH1- 9

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.1 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p> <span style="border: 1px solid black; padding: 2px;">X</span> Split Spoon  <span style="border: 1px solid black; padding: 2px;">X</span> Shelby Tube  <span style="border: 1px solid black; padding: 2px;">█</span> Rock Core                 </p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
65	X	○	Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp to wet, medium dense to very dense  - boulder @ 66.0 ft.  - mostly brown @ 68 ft., w/trace coal fragments			15-11-16-18 14-21-18-16 16-15-14-15 50/3"							
70	X	○	- w/trace wood fragments (70.0' - 74.0') - SPOIL/FILL -			37-15-47-24 9-18-14-37 10-17-28-50/3"							
75	X	○	Brown <u>CLAYEY SAND to SANDY CLAY</u> with some sandstone fragments, damp, very dense			35-39-46-42 24-38-39-50/5"							
80	X	○	- boulder @ 82 ft.			16-27-44-42 31-36-55-54 50-82/6"							
85	█	█		10	0								

BORING C00553.GPJ 2/27/01

Completion Depth: **104.8 feet**  
 Date Boring Started: **12/12/00**  
 Date Boring Completed: **12/12/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 29.0 ft. upon drilling completion.**  
  
*Continued Next Page*

# LOG OF BORING NO. DH1-9

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.1 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="font-size: small;"> <span style="display: inline-block; width: 1em; height: 1em; border: 1px solid black; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 1em; height: 1em; border: 1px solid black; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 1em; height: 1em; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
92.5		[Symbol]	Brown <u>CLAYEY SAND to SANDY CLAY</u> with some sandstone fragments, damp to wet, very dense - trace coal fragments @ 92 ft.	56	0							
95		[Symbol]	Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth									
100		[Symbol]	Gray <u>SANDSTONE</u> with shale laminations, medium hard to hard, fine to medium grained	101	91							
101.0		[Symbol]										
104.8		[Symbol]	Bottom of Test Boring @ 104.8 ft.									
105		[Symbol]										
110		[Symbol]										
115		[Symbol]										
120		[Symbol]										

BORING C00553.GPJ 2/27/01

Completion Depth: **104.8 feet**  
 Date Boring Started: **12/12/00**  
 Date Boring Completed: **12/12/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

**Remarks: Water was noted at a depth of 29.0 ft. upon drilling completion.**





# LOG OF BORING NO. DH1-10

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.1 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="font-size: small;"> <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
	X	o	Brown and gray <u>CLAYEY SAND</u> with some sandstone fragments, damp to wet, medium dense to dense  - SPOIL/FILL -			18-19-25						
65	X	o	Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, medium dense to very dense	65.0		13-20-31						
70	X	o				23-36-47-28						
75	X	o				18-15-10-11						
77	X	o				12-17-9-9						
77.0	X	o				20-16-50/4"						
80	X	o	Brown <u>SANDSTONE</u> , medium hard, medium grained, weathered, friable	80.6	88	33	50/1"					
85	X	o	VOID  - void sample (80.6' - 85.7') brown silty sand with rock fragments  7.2% gravel 82.6% sand 10.2% silt and clay	15	0							
90	X	o										

BORING C00553.GPJ 2/27/01

Completion Depth: **109.9 feet**  
 Date Boring Started: **12/13/00**  
 Date Boring Completed: **12/13/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 50.0 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH1-10

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.1 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		Split Spoon Shelby Tube Rock Core	<b>MATERIAL DESCRIPTION</b>									
			<u>SANDSTONE BOULDER</u>	90.3 91.3	37	7						
			VOID	94.4								
95			Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth									
100					100	80						
105			Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine grained	104.9								
110				109.9	100	94						
			Bottom of Test Boring @ 109.9 ft.									
115												
120												

BORING C00553.GPJ 2/27/01

Completion Depth: **109.9 feet**  
 Date Boring Started: **12/13/00**  
 Date Boring Completed: **12/13/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 50.0 ft. during drilling operations.**

# LOG OF BORING NO. DH1-11



**Project Description:** Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky

Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1057.8 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <p>⊠ Split Spoon</p> <p>⊞ Shelby Tube</p> <p>■ Rock Core</p> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> <div style="width: 55%;"> <p>Coarse <u>COAL REFUSE</u> 0.5</p> <p>Brown <u>CLAYEY SAND</u> with some sandstone fragments, damp</p> <p style="text-align: center;">AUGER W/OUT SAMPLING</p> </div> </div>										
5													
10													
15													
20													
25													
30			26.0										
			Gray <u>SANDSTONE</u> , medium hard to hard, medium grained										

BORING C00553.GPJ 2/28/01

Completion Depth: **111.0 feet**  
 Date Boring Started: **12/13/00**  
 Date Boring Completed: **12/14/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 86.5 ft. upon drilling completion.**

*Continued Next Page*





# LOG OF BORING NO. DH1-11

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1057.8 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>⊠ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>▢ Rock Core</p> </div> <div style="width: 65%; text-align: center;"> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
65		⊠	<p>Gray <u>SANDSTONE</u>, medium hard to hard, medium grained</p> <p>- fractured (66.1' - 66.5')</p>	100	91								
70		⊠	<p>- occasional carbonaceous laminations (69.1' - 90.4')</p>										
75		⊠		100	92								
80		⊠											
85		⊠	<p>- iron-stained (83.6' - 86.0')</p>	89	89								
90		⊠											
<p>Completion Depth: <b>111.0 feet</b></p> <p>Date Boring Started: <b>12/13/00</b></p> <p>Date Boring Completed: <b>12/14/00</b></p> <p>Engineer/Geologist: <b>JEN/JTS</b></p> <p>Project No.: <b>C00553</b></p>			<p>Remarks: <b>Water was noted at a depth of 86.5 ft. upon drilling completion.</b></p>										

BORING C00553.GPJ 2/27/01

# LOG OF BORING NO. DH1-11

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1057.8 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
90.4		▽	VOID									
95			- void sample (92.6' - 96.2') brown silty sand with rock fragments  1.3% gravel 93.3% sand 5.4% silt and clay	0	0							
100			- void sample (96.1' - 97.1') gray silty sand with rock fragments  15.8% gravel 55.0% sand 29.2% silt and clay									
100.5		/ / / / /	Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth	0	0							
105				100	92							
106.3		/ / / / /	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained									
110				100	60							
111.0			Bottom of Test Boring @ 111.0 ft.									
115												
120												

BORING\_C00553.GPJ 2/28/01

Completion Depth: **111.0 feet**  
 Date Boring Started: **12/13/00**  
 Date Boring Completed: **12/14/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 86.5 ft. upon drilling completion.**

# LOG OF BORING NO. DH1-12

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1056.2 feet</b> Split Spoon Shelby Tube Rock Core									
			Coarse <u>COAL REFUSE</u> 1.0									
			Brown <u>CLAYEY SAND</u> with some sandstone fragments, damp									
5			AUGER W/OUT SAMPLING									
10												
15												
20												
25												
30												

BORING C00553.GPJ 2/28/01

Completion Depth: **99.4 feet**  
 Date Boring Started: **1/4/01**  
 Date Boring Completed: **1/4/01**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DH1-12

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1056.2 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="font-size: small;"> <span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; border-style: dashed; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; border-style: solid; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
		o	Brown <u>CLAYEY SAND</u> with some sandstone fragments, damp		32.0							
35		/	Brown <u>SANDSTONE</u> , medium hard, medium grained, weathered and iron-stained	100	28							
			- gray, medium hard to hard from approx. 37 ft.									
40			- clay lens @ 37.8 ft.	100	68							
45												
50			- numerous carbonaceous laminations (49.7' - 54.0')	100	86							
55												
60				98	92							

BORING C00553.GPJ 2/27/01

Completion Depth: **99.4 feet**  
 Date Boring Started: **1/4/01**  
 Date Boring Completed: **1/4/01**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DH1-12

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1056.2 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <p>Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1056.2 feet</b></p> <p> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid black; border-style: dashed; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid black; border-style: solid; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </p> </div> <div style="width: 55%; text-align: center;"> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
65		✓	Gray <u>SANDSTONE</u> , medium hard to hard, medium grained  - iron-stained vertical fracture @ 65.3 ft.  - fractured, w/occasional shale clasts (66.6' - 67.6')  - carbonaceous laminations (68.1' - 69.1')  - vertical fracture (72.3' - 72.7')	100	56								
70		✓											
75		✓		100	96								
80		✓											
85		✓		93	93								
89.4		✓		89.1									

BORING C00553.GPJ 2/27/01

Completion Depth: **99.4 feet**  
 Date Boring Started: **1/4/01**  
 Date Boring Completed: **1/4/01**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DH1-12

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1056.2 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
		<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p> Split Spoon</p> <p> Shelby Tube</p> <p> Rock Core</p> </div> <div style="width: 65%; text-align: center;"> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>											
-95			VOID										
			- void sample (89.4' - 99.4') brown silty sand with rock fragments, trace coal slurry 39.3% gravel; 35.8% sand; 24.9% silt and clay	13	0								
			- void sample (93.7' - 96.0') - brown silty sand with rock fragments 42.7% gravel; 37.2% sand; 20.1% silt and clay										
			99.2										
-100			Gray CLAY SHALE, very soft										
			99.4										
			Bottom of Test Boring @ 99.4 ft.										
-105													
-110													
-115													
-120													

BORING C00553.GPJ 2/28/01

Completion Depth: **99.4 feet**  
 Date Boring Started: **1/4/01**  
 Date Boring Completed: **1/4/01**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:





# LOG OF BORING NO. DH1-13

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
		<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <p>Location: <b>See Drawing No. C00553-1</b></p> <p>Surface El.: <b>1054.0 feet</b></p> <p> <span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; border-style: dashed; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; border-style: solid; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </p> </div> <div style="width: 55%; text-align: center;"> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>											
35		○	Brown <u>CLAYEY SAND</u> with sandstone fragments										
40		○	CASING ADVANCE W/OUT SAMPLING										
45		○	- SPOIL/FILL -										
50		○		50.0									
55		○	Brown <u>CLAYEY SAND to SANDY CLAY</u> with some sandstone fragments										
60		○											

BORING C00553.GPJ 2/27/01

Completion Depth: **96.0 feet**  
 Date Boring Started: **1/10/01**  
 Date Boring Completed: **1/11/01**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 78.4 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DH1-13

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1054.0 feet</b> Legend: ☒ Split Spoon ⊠ Shelby Tube ◻ Rock Core									
			Brown <u>CLAYEY SAND</u> to <u>SANDY CLAY</u> with sandstone fragments <span style="float: right;">63.0</span>									
65			Gray <u>SANDSTONE</u> , hard, medium grained  CASING ADVANCE W/OUT SAMPLING									
70												
75												
80												
85			VOID <span style="float: right;">85.5</span>	0		WOT/1.5' - 4'						
			- trace sand recovered (85.7' - 87.7') - brown and gray silty sand with some gravel, trace roots (87.7' - 89.7')	30		94/2'	34	43	24			
90												
Completion Depth: <b>96.0 feet</b> Date Boring Started: <b>1/10/01</b> Date Boring Completed: <b>1/11/01</b> Engineer/Geologist: <b>JEN/CEM</b> Project No.: <b>C00553</b>				Remarks: <b>Water was noted at a depth of 78.4 ft. upon drilling completion.</b>								

BORING C00553.GPJ 2/28/01

*Continued Next Page*

# LOG OF BORING NO. DH1-13

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1054.0 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊠ Split Spoon</p> <p>⊞ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
	⊠		VOID	25		160/2'	29	61	10				
	⊠		- less clayey, w/ cobble size sandstone fragments (89.7' - 91.7')	15		18/2'	47	35	18				
	⊠		- sand, gravel, and cobbles (91.7' - 95.6')	52		67/2.3'	43	37	20				
95	⊠		95.6										
	⊠		96.0										
			Gray <u>CLAY SHALE</u> , very soft to soft										
			Bottom of Test Boring @ 96.0 ft.										
100													
105													
110													
115													
120													

BORING: C00553.GPJ 3/2/01

Completion Depth: **96.0 feet**  
 Date Boring Started: **1/10/01**  
 Date Boring Completed: **1/11/01**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 78.4 ft. upon drilling completion.**

# LOG OF BORING NO. DH2-1

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;"> <p>☒ Split Spoon</p> <p>☒ Shelby Tube</p> <p>☐ Rock Core</p> </div> <div> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>									
5		☒	<p>Coarse <u>COAL REFUSE</u></p> <hr style="border: 0.5px solid black;"/> <p style="text-align: right; margin-right: 50px;">5.0</p> <p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, very loose to very dense</p>									
10		☒				5-3-5						
15		☒				2-6-3						
20		☒				3-3-4						
25		☒				4-4-6						
30			-									
			- SPOIL/FILL -									

BORING C00553.GPJ 2/27/01

Completion Depth: **100.5 feet**  
 Date Boring Started: **11/28/00**  
 Date Boring Completed: **11/28/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 39.0 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH2-1

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>Location: See Drawing No. C00553-1</p> <p>Surface El.: 1052.4 feet</p> <p> <input type="checkbox"/> Split Spoon  <input type="checkbox"/> Shelby Tube  <input type="checkbox"/> Rock Core                 </p> </div> <div style="width: 65%; text-align: center;"> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
35	X	○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, very loose to very dense  - wet @ 39.0 ft.  - SPOIL/FILL -			3-4-6							
							2-15-9-8						
							4-4-9-7						
40	X	○					4-7-11-13						
							18-1-1-1						
45	X	○					4-6-6-7						
							7-7-9-9						
50	X	○					2-5-8-10						
							4-4-12-11						
							12-30-28-23						
55	X	○	55.0			8-24-25-29							
			Brown <u>SANDY CLAY to CLAYEY SAND</u> with some sandstone fragments, damp, dense to very dense			15-26-27-37							
							16-28-28-28						
60	X	○											

BORING: C00553.GPJ 2/27/01

Completion Depth: **100.5 feet**  
 Date Boring Started: **11/28/00**  
 Date Boring Completed: **11/28/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 39.0 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH2-1

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>▣ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
65			Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, dense to very dense			26-26-30-33							
							11-24-18-31						
							19-21-23-25						
							18-18-29-37						
							16-24-25-38						
70				70.5		11-60/6"							
			Brown <u>SANDSTONE</u> , medium hard, medium grained, weathered, friable										
75			- very soft and weathered @ 73.2 ft. and 74.5 ft.	95	91								
80													
85				73	26								
			- tool drop (86.5' - 88.0')										
				88.0									
			<u>COAL</u>										

BORING C00553.GPJ 2/27/01

Completion Depth: **100.5 feet**  
 Date Boring Started: **11/28/00**  
 Date Boring Completed: **11/28/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 39.0 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH2-1

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p><u>COAL</u></p> <p>- unconfined compressive strength (91.5' - 91.7') - 1,290 psi</p> <p>- unconfined compressive strength (95.0' - 95.3') - 3,690 psi</p>									
95		[Symbol: Split Spoon]	96.0	100	27							
100		[Symbol: Shelby Tube]	100.5									
			<p>Gray <u>CLAY SHALE</u>, very soft to soft</p>									
			<p>Bottom of Test Boring @ 100.5 ft.</p>									
105												
110												
115												
120												

Completion Depth: **100.5 feet**  
 Date Boring Started: **11/28/00**  
 Date Boring Completed: **11/28/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 39.0 ft. during drilling operations.**

BORING C00553.GPJ 2/27/01

# LOG OF BORING NO. DH2-2

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1053.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; align-items: center;"> <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px;"></div> Split Spoon  <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></div> Shelby Tube  <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px; background-color: black;"></div> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
		X	Coarse <u>COAL REFUSE</u>									
4.0												
5		o	Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp, loose to medium dense									
10		X				3-4-7						
15		X				4-2-5						
20		X				2-3-4						
25		X				4-4-5						
30			- SPOIL/FILL -									

BORING: C00553.GPJ 2/27/01

Completion Depth: **100.5 feet**  
 Date Boring Started: **11/29/00**  
 Date Boring Completed: **11/30/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 35 ft. during drilling operations.**

*Continued Next Page*



# LOG OF BORING NO. DH2-2

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1053.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="font-size: small;"> <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
35	X	○	Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp, loose to medium dense  - wet, w/mostly sandstone fragments @ 35.0 ft.			4-9-9						
40	X	○				8-7-9						
45	X	○				5-5-9						
50	X	○	- SPOIL/FILL -			9-8-10						
55	X	○				13-16-27						
60	X	○	Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, dense			13-15-26						

BORING C00553.GPJ 2/27/01

Completion Depth: **100.5 feet**  
 Date Boring Started: **11/29/00**  
 Date Boring Completed: **11/30/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 35 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH2-2

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1053.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; align-items: center;"> <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px; margin-bottom: 5px;"></div> Split Spoon  <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px; margin-bottom: 5px;"></div> Shelby Tube  <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px; margin-bottom: 5px;"></div> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
	X	•••••	Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, dense			28-19-18						
65	X	•••••	65.5			16-50/5"						
		/ / / / /	Brown <u>SANDSTONE</u> , medium hard, medium grained  - weathered and iron-stained (65.6' - 69.2')  - gray, hard from 69.2 ft.	89	76							
70		/ / / / /										
		/ / / / /		100	100							
75		/ / / / /										
		/ / / / /										
80		/ / / / /										
		/ / / / /										
85		/ / / / /	86.7									
		/ / / / /	VOID  (Partilly Filled)									
90		/ / / / /										

BORING C00553.GPJ 2/27/01

Completion Depth: **100.5 feet**  
 Date Boring Started: **11/29/00**  
 Date Boring Completed: **11/30/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 35 ft. durnig drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH2-2

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1053.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>  Split Spoon   Shelby Tube   Rock Core                 </p> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> <div style="width: 65%; text-align: center;"> <p>VOID (Partially Filled)</p> </div> </div>	49	40								
95			96.8										
			Gray <u>CLAY SHALE</u> , very soft to soft										
100			100.5										
			Bottom of Test Boring @ 100.5 ft.										
105													
110													
115													
120													

BORING C00553.GPJ 3/2/01

Completion Depth: **100.5 feet**  
 Date Boring Started: **11/29/00**  
 Date Boring Completed: **11/30/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 35 ft. during drilling operations.**

# LOG OF BORING NO. DH2-3

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1054.9 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>Coarse <u>COAL REFUSE</u></p>									
5			5.0									
			Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense									
10						7-4-5						
15						5-9-14						
20						6-50/5"						
25						6-4-6						
			- mostly sandstone fragments (30.0' - 31.5')									
			- SPOIL/FILL -									
30												

BORING C00553.GPJ 3/14/01

Completion Depth: **100.5 feet**  
 Date Boring Started: **11/30/00**  
 Date Boring Completed: **11/30/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 83.9 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DH2-3

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1054.9 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			MATERIAL DESCRIPTION									
	X	○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense			10-8-12						
35	X	○	- sandstone boulder @ 35.0 ft.			50/5"						
40	X	○	- mostly sandstone fragments (40.0' - 41.5')			14-18-7						
			- SPOIL/FILL -									
45	X	○		45.0								
	X	○	Brown <u>SANDY CLAY to CLAYEY SAND</u> with some sandstone fragments, damp, dense			22-22-23						
50	X	○				16-21-22						
55	X	○				17-18-19						
60	X	○	Brown <u>SANDSTONE</u> , medium hard									
				59.0								

BORING C00553.GPJ 2/27/01

Completion Depth: **100.5 feet**  
 Date Boring Started: **11/30/00**  
 Date Boring Completed: **11/30/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 83.9 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DH2-3

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1054.9 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 15%;"> <p>⊠ Split Spoon</p> <p>⊡ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 85%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
		[Diagonal hatching symbol]	Brown <u>SANDSTONE</u> , medium hard, medium grained  - diagonal fracture @ 64.6 ft.  - clay seam @ 65.6 ft.  - gray, hard, with occasional carbonaceous inclusions from 67.6 ft.	98	66	50/1"							
65		[Diagonal hatching symbol]											
70		[Diagonal hatching symbol]											
75		[Diagonal hatching symbol]		100	85								
80		[Diagonal hatching symbol]											
85		[Diagonal hatching symbol]											
88.4		[Diagonal hatching symbol]	VOID										
90		[Diagonal hatching symbol]											

BORING C00553.GPJ 2/27/01

Completion Depth: **100.5 feet**  
 Date Boring Started: **11/30/00**  
 Date Boring Completed: **11/30/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 83.9 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DH2-3

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1054.9 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>Location: <b>See Drawing No. C00553-1</b></p> <p>Surface El.: <b>1054.9 feet</b></p> <p> <input type="checkbox"/> Split Spoon  <input type="checkbox"/> Shelby Tube  <input type="checkbox"/> Rock Core                 </p> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> <div style="width: 75%;"> <p style="text-align: center;">VOID</p> <p style="text-align: center;">(Partially Filled)</p> </div> </div>	40	33							
95												
98.9		~										
100		~	<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>Gray <u>CLAY SHALE</u>, very soft to soft</p> </div> <div style="width: 75%;"> <p>Bottom of Test Boring @ 100.5 ft.</p> </div> </div>									
100.5												
105												
110												
115												
120												

BORING C00553.GPJ 2/27/01

Completion Depth: **100.5 feet**  
 Date Boring Started: **11/30/00**  
 Date Boring Completed: **11/30/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 83.9 ft. upon drilling completion.**





# LOG OF BORING NO. DH2-4

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1049.5 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>Coarse <u>COAL REFUSE</u></p> <p>- wet @ 33.0 ft., w/some possible slurry</p>									
35												
40				40.0		8-9-8						
			<p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense</p>									
45						4-8-8						
50						7-7-10						
55						10-7-8						
			- SPOIL/FILL -									
60												

Completion Depth: **120.1 feet**  
 Date Boring Started: **11/30/00**  
 Date Boring Completed: **12/1/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 40 ft. during drilling operations.**

*Continued Next Page*

BORING: C00553.GPJ 2/27/01

# LOG OF BORING NO. DH2-4

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1049.5 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			MATERIAL DESCRIPTION									
65	X	○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense  - mostly sandstone fragments with some clay (60.0' - 71.5')  - w/some possible coal fines (65.0' - 66.5')			4-10-4						
70	X	○				13-15-16						
75	X	○	- very sandy (75.0' - 76.5')			10-13-9						
80	X	○	- filter cake (80.0' - 81.5')			25-20-33						
85	X	○	- SPOIL/FILL -			5-7-8						
85.0			85.0									
90	X	○	Brown <u>SANDY CLAY to CLAYEY SAND</u> with some sandstone fragments, damp, dense to very dense  20-21-20			27-29-38						

BORING: C00553.GPJ 2/28/01

Completion Depth: **120.1 feet**  
 Date Boring Started: **11/30/00**  
 Date Boring Completed: **12/1/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 40 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH2-4

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1049.5 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>▣ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
95	⊗	⊗	Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, dense to very dense			53-62/6"							
				24-29-29-29									
				14-25-20-25									
				23-36-33									
100			Brown <u>SHALE</u> , soft, weathered	100.0		50/2"							
				101.0									
105			Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained - iron-stained to 102.1 ft.  - vertical fracture @ 103.6 ft. and 108.5 ft.	93	71								
110													
115			- coal/shale band (116.0' - 116.5')	100	75								
				117.1									
			<u>COAL</u>	118.2									
			Gray <u>CLAY SHALE</u> , soft										
120													

BORING: C00553.GPJ 2/28/01

Completion Depth: **120.1 feet**  
 Date Boring Started: **11/30/00**  
 Date Boring Completed: **12/1/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 40 ft. during drilling operations.**

*Continued Next Page*





# LOG OF BORING NO. DH2-5

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1051.2 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, very loose to medium dense</p>			3-2-2						
35						5-8-12						
40			- trace coal fragments @ 40.0 ft.			8-11-19						
45			- wet @ 45 ft., w/mostly sandstone fragments			10-8-16						
50			- gray sandstone fragments (50.0' - 51.5')			6-5-7						
55			- mostly sand w/some sandstone fragments (55.0' - 56.5')			7-8-13						
			- SPOIL/FILL -									

BORING C00553.GPJ 2/27/01

Completion Depth: **110.0 feet**  
 Date Boring Started: **12/1/00**  
 Date Boring Completed: **12/2/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 45 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH2-5

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1051.2 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp to wet, very loose to medium dense</p> <p>- mostly gravel-size sandstone fragments (60.0' - 61.5')</p>			12-6-7						
65						10-15-13						
70						5-6-9						
75			- SPOIL/FILL -									
			76.0			10-16-24						
			Brown <u>SANDY CLAY to CLAYEY SAND</u> with some sandstone fragments, damp, very dense									
80						22-27-28						
85						20-50/5"						
90												

Completion Depth: **110.0 feet**  
 Date Boring Started: **12/1/00**  
 Date Boring Completed: **12/2/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 45 ft. during drilling operations.**

*Continued Next Page*

BORING C00553.GPJ 2/27/01

# LOG OF BORING NO. DH2-5

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.2 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
	X	X	Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, very dense			16-24-30						
	X	X	- very clayey @ 92.5 ft., w/some coal fragments			20-26-27						
95				95.0		50/1"						
		W	Gray <u>CLAY SHALE</u> , very soft to soft		84	39						
100												
				102.1								
		S	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained		98	90						
105												
				110.0								
110			Bottom of Test Boring @ 110.0 ft.									
115												
120												

BORING C00553.GPJ 2/27/01

Completion Depth: **110.0 feet**  
 Date Boring Started: **12/1/00**  
 Date Boring Completed: **12/2/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 45 ft. during drilling operations.**





# LOG OF BORING NO. DH2-6

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.0 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense</p>			6-5-7						
35						5-7-8						
40			- very sandy, with numerous gray sandstone fragments (45.0' - 46.5')			20-15-13						
45						4-3-18						
50			- wet @ 50.0 ft.			11-8-8						
55			- brown and gray, very sandy, w/some coal fragments (55.0' - 56.5')			7-7-10						
			- SPOIL/FILL -									
60												

BORING C00553.GPJ 2/27/01

Completion Depth: **105.2 feet**  
 Date Boring Started: **12/2/00**  
 Date Boring Completed: **12/4/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Goundwater was first noted at a depth of 50 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH2-6

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.0 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense</p> <p>- w/small wood fragments @ 60 ft.</p>			5-7-6						
65			- SPOIL/FILL -			11-11-19						
70			70.0			17-25-31						
			<p>Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, dense to very dense</p>									
75			w/gray mottling from 75 ft.			17-25-31						
80						21-32-31						
85						13-23-18						
90			90.0									

BORING C00553.GPJ 2/27/01

Completion Depth: **105.2 feet**  
 Date Boring Started: **12/2/00**  
 Date Boring Completed: **12/4/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 50 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH2-6

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.0 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
	X	[Symbol]	<u>COAL</u>			22-27-37						
	X	[Symbol]		93.5		15-18-37						
95		[Symbol]	Gray <u>CLAY SHALE</u> , very soft to soft			50/2"						
100		[Symbol]	Gray <u>SANDSTONE</u> with shale laminations, medium hard to hard, fine to medium grained	100	90							
105		[Symbol]	Bottom of Test Boring @ 105.2 ft.									
110												
115												
120												

Completion Depth: **105.2 feet**  
 Date Boring Started: **12/2/00**  
 Date Boring Completed: **12/4/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 50 ft. during drilling operations.**

BORING C00553.GPJ 2/27/01

# LOG OF BORING NO. DH2-7

**Project Description:** Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky

triadeng.com



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.7 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			MATERIAL DESCRIPTION									
5		X	Coarse <u>COAL REFUSE</u>									
10		X										
15		X										
20		X										
23.0		X										
25		O	Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense									
30		O	- SPOIL/FILL -									

BORING C00553.GPJ 2/27/01

Completion Depth: **105.5 feet**  
 Date Boring Started: **12/14/00**  
 Date Boring Completed: **12/15/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

**Remarks:** Groundwater was first noted at a depth of 45 ft. during drilling operations.

*Continued Next Page*

# LOG OF BORING NO. DH2-7



**Project Description:** Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky

Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.7 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
35			Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense  - wet, w/sandstone boulder @ 45 ft.  - mostly sandstone fragments (55.0' - 56.5')  - SPOIL/FILL -									
45	X			50-17-14								
50	X			5-7-9								
55	X			11-9-14								
60												

Completion Depth: **105.5 feet**  
 Date Boring Started: **12/14/00**  
 Date Boring Completed: **12/15/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

**Remarks:** Groundwater was first noted at a depth of 45 ft. during drilling operations.

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BORING C00553.GPJ 2/27/01

# LOG OF BORING NO. DH2-7

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.7 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊠ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>⊠ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
			Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense  - SPOIL/FILL -			50/2"							
65	⊠	⊠	Brown and gray <u>SANDY CLAY to CLAYEY SAND</u> with some sandstone fragments, damp, medium dense to very dense			11-11-17							
70	⊠	⊠				25-25-28							
75	⊠	⊠				50/4"							
80	⊠	⊠		37	0								
81.3	⊠	⊠	Brown <u>SANDSTONE</u> , medium hard, medium grained, weathered										
83.5	⊠	⊠		88	42								
85	⊠	⊠	Gray <u>SHALE</u> , soft - interbedded sandstone (84.3' - 84.8')										
86.0	⊠	⊠											
90	⊠	⊠	<u>COAL</u>										

BORING: C00553.GPJ 2/28/01

Completion Depth: **105.5 feet**  
 Date Boring Started: **12/14/00**  
 Date Boring Completed: **12/15/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 45 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH2-7

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.7 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>  <div style="font-size: small;"> <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 10px; height: 10px; background-color: black; margin-right: 5px;"></span> Rock Core                 </div>									
		<u>COAL</u>		93	9							
95		94.1	Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard w/depth									
100		101.6	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained	99	86							
105		105.5	Bottom of Test Boring @ 105.5 ft.									
110												
115												
120												

BORING C00553.GPJ 2/27/01

Completion Depth: **105.5 feet**  
 Date Boring Started: **12/14/00**  
 Date Boring Completed: **12/15/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 45 ft. during drilling operations.**



# LOG OF BORING NO. DH2-8

**Project Description:** Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1057.0 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>Coarse <u>COAL REFUSE</u> 1.3</p> <p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense</p>									
5												
10						4-4-12						
15						7-8-10						
20						5-44-50/4"						
25			- SPOIL/FILL -									
26.0						13-24-24						
			Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, dense to very dense									
30												

BORING C00553.GPJ 2/27/01

Completion Depth: **84.4 feet**  
 Date Boring Started: **12/8/00**  
 Date Boring Completed: **12/9/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DH2-8

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1057.0 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>⊗ Split Spoon                      ⊠ Shelby Tube                      ■ Rock Core</p>									
			Brown <b>SANDY CLAY</b> to <b>CLAYEY SAND</b> with some sandstone fragments, damp, dense to very dense			16-37-35						
35						13-24-24						
			37.0									
40			Gray <b>SANDSTONE</b> , medium hard to hard, medium grained - iron-stained (37.0' - 39.5')			50/2"						
			- occasional carbonaceous laminations (39.5' - 44.1')	100	75							
45												
			- numerous carbonaceous laminations (47.0' - 52.4')	100	84							
50												
			- iron-stained vertical fracture (59.9' - 60.4')									
55												
60												

BORING C00553.GPJ 2/27/01

Completion Depth: **84.4 feet**  
 Date Boring Started: **12/8/00**  
 Date Boring Completed: **12/9/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DH2-8

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1057.0 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
		<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>⊠ Split Spoon</p> <p>⊡ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 65%; text-align: center;"> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
65		⊠	Gray <u>SANDSTONE</u> , medium hard to hard, medium grained  - iron-stained (59.9' - 63.9')	99	79							
70		⊠		100	100							
75		⊠										
80		⊠	- clay seam (79.1' - 80.0')  - Boring abandoned @ 84.4 ft. after drilling rods became stuck in hole	40	6							
85		⊠	Bottom of Test Boring @ 84.4 ft.									

BORING C00553.GPJ 2/27/01

**Completion Depth: 84.4 feet**  
**Date Boring Started: 12/8/00**  
**Date Boring Completed: 12/9/00**  
**Engineer/Geologist: JEN/JTS**  
**Project No.: C00553**

Remarks:

# LOG OF BORING NO. DH2-9

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1056.0 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊗ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
		⊗	Coarse <u>COAL REFUSE</u>										
		○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense										
5			CASING ADVANCE W/OUT SAMPLING										
10													
15													
20		⊗				12-12-10-54							
25		⊗				39-20-14-9							
25		⊗				34-35-26-20							
25		⊗				16-23-50/2"							
25		⊗				50/1"							
			- SPOIL/FILL -										
30													

BORING C00553.GPJ 2/28/01

Completion Depth: **100.1 feet**  
 Date Boring Started: **1/17/01**  
 Date Boring Completed: **1/18/01**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 84.7 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DH2-9

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1056.0 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p>Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1056.0 feet</b></p> <p> <input type="checkbox"/> Split Spoon  <input type="checkbox"/> Shelby Tube  <input type="checkbox"/> Rock Core                 </p> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p>									
			<p>Brown <u>CLAYEY SAND</u> sandstone fragments, damp, medium dense to very dense</p> <p style="text-align: center;">- SPOIL/FILL -</p>			50/1"						
35			<p>Brown <u>CLAYEY SAND</u> to <u>SANDY CLAY</u> with some sandstone fragments, damp to wet, dense to very dense</p>			5-14-18-17						
			34.0			18-30-36-41						
						32-75/5"						
						29-57-50/1"						
40						28-42-42-40						
						21-27-30-32						
45			<p style="text-align: center;">CASING ADVANCE W/OUT SAMPLING (46.0' - 51.6')</p>			27-24-27-29						
			49.5									
50			<p>Brown <u>SANDSTONE</u>, medium hard, medium grained, weathered, friable</p>									
55			<p>- occasional diagonal fractures (56.1' - 61.4')</p>	98	46							
60												

BORING C00553.GPJ 2/28/01

Completion Depth: **100.1 feet**  
 Date Boring Started: **1/17/01**  
 Date Boring Completed: **1/18/01**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 84.7 ft. upon drilling completion.**

*Continued Next Page*



# LOG OF BORING NO. DH2-9

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1056.0 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>  <div style="font-size: small;"> <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </div>									
	X		VOID			wot/2'						
	X		- slurry w/sand and gravel (89.8' - 93.1')			21/2'	27	32	41			
	X		- gray sandstone cobble (93.1' - 93.8')			40/2'	34	24	42		27	21
95	X		- slurry, sand, and gravel (93.8' - 95.8')			37/2'	47	42	11			
	X		- silty sand with rock fragments (95.8' - 97.8')			wot/2.1'	21	31	48		33	26
	X		- slurry with sand and gravel (97.8' - 99.9')			20/2"						
100	X		- gray clay shale (mine floor) @ 99.9 ft.	100.1								
			Bottom of Test Boring @ 100.1 ft.									
105												
110												
115												
120												

BORING C00553.GPJ 3/2/01

**Completion Depth: 100.1 feet**  
**Date Boring Started: 1/17/01**  
**Date Boring Completed: 1/18/01**  
**Engineer/Geologist: JEN/JTS**  
**Project No.: C00553**

**Remarks: Water was noted at a depth of 84.7 ft. upon drilling completion.**





# LOG OF BORING NO. DH3-1

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1050.0 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊠ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
35		⊠	Coarse <u>COAL REFUSE</u>										
45		⊠	- wet @ 45 ft.			6-6-6							
50		⊠	50.5			4-18-30							
55		⊠	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to dense										
60		⊠	- SPOIL/FILL -			5-4-7							

BORING C00553.GPJ 2/27/01

Completion Depth: **120.1 feet**  
 Date Boring Started: **12/5/00**  
 Date Boring Completed: **12/5/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 45 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH3-1

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1050.0 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
65	⊗	○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to dense			6-10-11							
						12-19-16							
70	⊗	○				9-9-8							
75	⊗	○	- SPOIL/FILL -										
75	⊗	○	75.0			5-10-39							
80	⊗	○	Brown <u>SANDY CLAY to CLAYEY SAND</u> with some sandstone fragments, damp, very dense			16-26-32-29							
						20-50/3"							
						50/1"							
85	■	■			20	0							

BORING C00553.GPJ 2/27/01

Completion Depth: **120.1 feet**  
 Date Boring Started: **12/5/00**  
 Date Boring Completed: **12/5/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 45 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH3-1

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1050.0 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <p>Location: <b>See Drawing No. C00553-1</b></p> <p>Surface El.: <b>1050.0 feet</b></p> <p> <input type="checkbox"/> Split Spoon  <input type="checkbox"/> Shelby Tube  <input type="checkbox"/> Rock Core                 </p> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> <div style="width: 55%;"> <p><b>Brown SANDY CLAY to CLAYEY SAND</b> with some sandstone fragments, damp, very dense</p> </div> </div>										
95				48	14								
100			101.8	8	8								
105			<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <p><b>Gray SANDSTONE</b> with shale laminations, medium hard, fine to medium grained</p> </div> <div style="width: 55%;"> <p><b>Gray SANDSTONE</b> with shale laminations, medium hard, fine to medium grained</p> </div> </div>	88	81								
110													
115				100	98								
120													

BORING: C00553.GPJ 2/27/01

Completion Depth: **120.1 feet**  
 Date Boring Started: **12/5/00**  
 Date Boring Completed: **12/5/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 45 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH3-1

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1050.0 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 60%;"> <p> <span style="display: inline-block; width: 1em; height: 1em; border: 1px solid black; border-style: dashed; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 1em; height: 1em; border: 1px solid black; border-style: dashed; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 1em; height: 1em; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </p> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> <div style="width: 35%; text-align: right;"> <p>120.1</p> </div> </div>										
125			Bottom of Test Boring @ 120.1 ft.										
130													
135													
140													
145													
150													

BORING C00553.GPJ 2/27/01

Completion Depth: **120.1 feet**  
 Date Boring Started: **12/5/00**  
 Date Boring Completed: **12/5/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 45 ft. during drilling operations.**



# LOG OF BORING NO. DH3-2

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; align-items: center;"> <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px;"></div> Split Spoon  <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></div> Shelby Tube  <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px; background-color: black;"></div> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
		X	Coarse <u>COAL REFUSE</u>									
		O	Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to dense									
32.0												
35		X				5-8-7						
40		X	- wet @ 40 ft.			7-6-21						
45		X				5-9-6						
50		X				8-15-13						
55		X	- boulder @ 51 ft.			7-20-50/1"						
			- SPOIL/FILL -									
60												
			32.0									
			60.0									

BORING C00553.GPJ 2/27/01

Completion Depth: **110.5 feet**  
 Date Boring Started: **12/6/00**  
 Date Boring Completed: **12/6/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 40 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH3-2

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
	X		Brown <u>SANDY CLAY to CLAYEY SAND</u> with some sandstone fragments, damp, medium dense to dense			20-26-33						
65	X		- boulder @ 65 ft.			50/6"						
70	X		- trace coal fragments @ 70 ft.			17-19-20						
75	X					17-19-17						
80	X					6-5-10						
85	X					38-18-22-28						
	X		- SPOIL/FILL -			14-30-50/2"						
			87.8									
			<u>COAL</u>									
90												

BORING C00553.GPJ 2/27/01

Completion Depth: **110.5 feet**  
 Date Boring Started: **12/6/00**  
 Date Boring Completed: **12/6/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 40 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH3-2

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1051.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="font-size: small;"> <span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; border-style: dashed; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; border-style: solid; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
		COAL		73	0							
95.0		[Wavy pattern]	Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth.	100	40							
103.0		[Diagonal lines]	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained	100	96							
110.5			Bottom of Test Boring @ 110.5 ft.									

BORING C00553.GPJ 2/27/01

Completion Depth: **110.5 feet**  
 Date Boring Started: **12/6/00**  
 Date Boring Completed: **12/6/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 40 ft. during drilling operations.**



# LOG OF BORING NO. DH3-3

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.7 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; align-items: flex-start;"> <div style="width: 20px; height: 100%; border-left: 1px solid black; margin-right: 5px;"></div> <div style="width: 100%; height: 100%; border-left: 1px solid black; border-right: 1px solid black; position: relative;"> <!-- Material Description --> <div style="position: absolute; top: 0; left: 0; right: 0; height: 100%; background-color: #e0e0e0; border: 1px solid black; display: flex; align-items: center; justify-content: center; text-align: center;"> <p>Coarse <u>COAL REFUSE</u></p> </div> <!-- Stratification Lines --> <div style="position: absolute; top: 0; left: 0; right: 0; height: 100%; border: 1px solid black; border-style: dashed; opacity: 0.5;"></div> </div> </div>										
5													
10													
15													
20													
25													
30			30.0										

BORING C00553.GPJ 2/27/01

Completion Depth: **105.1 feet**  
 Date Boring Started: **12/6/00**  
 Date Boring Completed: **12/7/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 35 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH3-3

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.7 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="font-size: small;"> <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; border-style: dashed; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; border-style: solid; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
	X	○	Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp, loose to medium dense			5-3-6						
35	X	○	- wet @ 35 ft.			3-3-6						
40	X	○	- Unable to push shelly tube @ 40 ft. due to rock fragments			31-28-9						
45	X	○				3-6-21						
			- SPOIL/FILL									
50	X	○		50.0		23-26-28						
			Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, dense									
55	X	○				18-25-26						
60												

BORING C00553.GPJ 2/27/01

Completion Depth: **105.1 feet**  
 Date Boring Started: **12/6/00**  
 Date Boring Completed: **12/7/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 35 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH3-3

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.7 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>Legend:   Split Spoon   Shelby Tube   Rock Core</p>									
	X	-	Brown <u>SANDY CLAY to CLAYEY SAND</u> with some sandstone fragments, damp, dense			32-24-22						
65	X	-	- boulder @ 65 ft.			50/3"						
70	-	-	Gray <u>SANDSTONE</u> , fine to medium grained, medium hard to hard	70.0		50/2"						
75			- iron-stained vertical fracture (70.8' - 71.1')	89	81							
85				99	66							
86.7												
			<u>COAL</u>									
90												

BORING C00553.GPJ 2/27/01

Completion Depth: **105.1 feet**  
 Date Boring Started: **12/6/00**  
 Date Boring Completed: **12/7/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 35 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH3-3

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.7 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊠ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
95			<p><u>COAL</u></p> <p>- unconfined compressive strength (93.0' - 93.3') - 3,600 psi</p> <p>- unconfined compressive strength (95.5' - 95.8') - 3,780 psi</p> <p style="text-align: right;">96.6</p>	100	22								
100			<p>Gray <u>CLAY SHALE</u>, very soft to soft, becoming sandier and medium hard with depth</p> <p style="text-align: right;">101.8</p>										
105			<p>Gray <u>SANDSTONE</u> with shale laminations, medium hard to hard, fine to medium grained</p> <p style="text-align: right;">105.1</p>	100	100								
			<p style="text-align: center;">Bottom of Test Boring @ 105.1 ft.</p>										
110													
115													
120													

BORING C00553.GPJ 2/27/01

Completion Depth: **105.1 feet**  
 Date Boring Started: **12/6/00**  
 Date Boring Completed: **12/7/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 35 ft. during drilling operations.**

# LOG OF BORING NO. DH3-4

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1053.9 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊗ Shelby Tube</p> <p>▣ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
5		○	Coarse <u>COAL REFUSE</u>										
10		○											
15		○											
18.0		○											
20		○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to dense										
21.2		○	- shelly tube (20.0' - 21.2') brown and gray clayey sand with sandstone fragments	83									
25		○	- mostly sandstone fragments (25.0' - 26.5')										
26.5		○	- attempted shelly tube @ 25.0 ft. (no recovery)	0		24-10-8							
30		○	- SPOIL/FILL -										

BORING C00553.GPJ 2/28/01

Completion Depth: **105.1 feet**  
 Date Boring Started: **12/7/00**  
 Date Boring Completed: **12/7/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 35 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH3-4

**Project Description:** Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1053.9 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>Legend:   Split Spoon   Shelby Tube   Rock Core</p>									
	X	•••••	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to dense			4-5-29						
35	X	•••••				31-21-11						
40	X	•••••				10-10-11						
			- SPOIL/FILL -									
45	X	•••••	Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, very dense	45.0								
50	X	•••••				22-26-27						
55	X	•••••				20-23-30						
	X	•••••	Gray <u>SANDSTONE</u> , medium hard to hard, medium grained, with occasional coal laminations			50/5"						
			- iron-stained, moderately weathered (55.0' - 64.2')									
60												

BORING C00553.GPJ 2/27/01

Completion Depth: **105.1 feet**  
 Date Boring Started: **12/7/00**  
 Date Boring Completed: **12/7/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 35 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH3-4

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1053.9 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; align-items: flex-start;"> <div style="width: 15px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> Split Spoon  <div style="width: 15px; height: 15px; border: 1px solid black; margin-right: 5px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></div> Shelby Tube  <div style="width: 15px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
65			Gray <u>SANDSTONE</u> , medium hard to hard, medium grained, with occasional coal laminations  - diagonal fracture @ 62.5 ft.  - iron-stained diagonal fracture (66.6' - 66.8')	96	74	50/1"						
70				100	94							
75												
80				99	99							
85												
			87.6									
			VOID									
90												

BORING: C00553.GPJ 2/27/01

Completion Depth: **105.1 feet**  
 Date Boring Started: **12/7/00**  
 Date Boring Completed: **12/7/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 35 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH3-4

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1053.9 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>  <div style="text-align: center;">VOID</div> - void sample (87.6' - 97)' slurry and sand  1.1% gravel 78.9% sand 20.0% silt and clay	34	17							
95			97.0									
			Broken Coal and Mine Rubble									
			98.1									
100			Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard increasing depth									
			102.8	100	42							
105			Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained									
			105.1									
			Bottom of Test Boring @ 105.1 ft.									
110												
115												
120												

BORING C00553.GPJ 2/28/01

Completion Depth: **105.1 feet**  
 Date Boring Started: **12/7/00**  
 Date Boring Completed: **12/7/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 35 ft. during drilling operations.**



# LOG OF BORING NO. DH4-1

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1050.9 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			MATERIAL DESCRIPTION									
5		X	Coarse <u>COAL REFUSE</u>									
10		X										
15		X										
20		X										
25		X										
30		X										

BORING C00553.GPJ 2/27/01

Completion Depth: **111.2 feet**  
 Date Boring Started: **12/14/00**  
 Date Boring Completed: **12/18/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 43 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH4-1

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1050.9 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>☒ Split Spoon ☒ Shelby Tube ☐ Rock Core</p>									
35		☒	Coarse <u>COAL REFUSE</u>									
43.0			43.0									
45		☒	Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp to wet, medium dense to dense									
			- very sandy (43.0' - 51.0')			5-7-10-16						
						8-9-16-17						
50		☒				10-18-22-12						
						7-10-10-10						
						5-6-9-10						
55		☒				5-10-18-17						
						7-18-29-15						
			- SPOIL/FILL -			15-13-11-15						
60		☒										

BORING: C00553.GPJ 2/27/01

Completion Depth: **111.2 feet**  
 Date Boring Started: **12/14/00**  
 Date Boring Completed: **12/18/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 43 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DH4-1

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1050.9 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>  Split Spoon   Shelby Tube   Rock Core                 </p>									
65	X	o	Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp to wet, medium dense to dense  - root traces (61.0' - 63.0')  - SPOIL/FILL -			15-13-11-15						
			66.9			8-9-8-9						
						3-8-20-28						
70	X	o	Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, dense to very dense - some gray mottling and trace coal fragments (67.0' - 69.0')			8-30-48-75						
				71		28-52-37-43						
75	X	o	- shelly tube (71.0' - 71.7') brown and gray clayey sand to sandy clay with some sandstone fragments			15-10-18-19						
						50/3"						
80	X	o	Brown <u>SANDSTONE</u> , soft, weathered, friable, fine grained			20-34-29-20						
			80.0			4-40-59-60						
						42-65-74-56						
85	X	o	<u>COAL</u>			81-64/2"						
			85.2			36-50/2"						
90	X	o		95	0							

BORING C00553.GPJ 2/27/01

Completion Depth: **111.2 feet**  
 Date Boring Started: **12/14/00**  
 Date Boring Completed: **12/18/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 43 ft. during drilling operations.**  
  

*Continued Next Page*

# LOG OF BORING NO. DH4-1

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1050.9 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; align-items: center;"> <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">Split Spoon</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="width: 20px; height: 20px; border: 1px solid black; border-style: dashed; margin-right: 5px;"></div> <div style="font-size: 0.8em;">Shelby Tube</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="width: 20px; height: 20px; border: 2px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">Rock Core</div> </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
		<b>COAL</b>		100	24							
95		[Wavy pattern]	Gray <b>CLAY SHALE</b> , very soft to soft, becoming sandier and medium hard with depth		94.5							
100		[Wavy pattern]		100	92							
105		[Diagonal lines]	Gray <b>SANDSTONE</b> with shale laminations, medium hard, fine to medium grained  - iron-stained (107.5' - 108.0')		101.4							
110		[Diagonal lines]		100	96							
115			Bottom of Test Boring @ 111.2 ft.		111.2							
120												

BORING C00553.GPJ 2/27/01

Completion Depth: **111.2 feet**  
 Date Boring Started: **12/14/00**  
 Date Boring Completed: **12/18/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 43 ft. during drilling operations.**

# LOG OF BORING NO. DHP-1

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1056.0 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="font-size: small;"> <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; border-style: dashed; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; border-style: solid; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
		X	Coarse <u>COAL REFUSE</u>									
5		o	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense									
10		X				9-8-4						
15		X	- trace slurry (15.0' - 16.5')			6-9-7						
20		X				3-5-6						
25		X	- boulders (21.7' - 27.0')			50/0"						
30		o	- SPOIL/FILL -									
			30.0									

BORING C00553.GPJ 2/27/01

Completion Depth: **107.0 feet**  
 Date Boring Started: **12/5/00**  
 Date Boring Completed: **12/6/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 75.5 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DHP-1

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1056.0 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> Split Spoon  <div style="width: 15px; height: 15px; border: 1px solid black; margin-right: 5px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></div> Shelby Tube  <div style="width: 15px; height: 15px; border: 1px solid black; margin-right: 5px; background-color: black;"></div> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
35	X	-	Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, very dense			18-28-28						
39.5	X	-				12-17-38						
40	█	-	Brown <u>SANDSTONE</u> , medium hard, medium grained, moderately weathered, friable	85	20	50/0"						
45	█	-	- gray, hard from 43 ft.									
50	█	-		99	80							
55	█	-	- w/occasional carbonaceous laminations (43.0' - 53.8')									
60	█	-		100	97							

BORING C00553.GPJ 2/27/01

**Completion Depth: 107.0 feet**  
**Date Boring Started: 12/5/00**  
**Date Boring Completed: 12/6/00**  
**Engineer/Geologist: JEN/JTS**  
**Project No.: C00553**

**Remarks: Water was noted at a depth of 75.5 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DHP-1

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1056.0 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			MATERIAL DESCRIPTION									
65		[Symbol]	Gray <u>SANDSTONE</u> , hard, medium grained									
			- iron-stained (63.5' - 66.4')									
			- fractured (65.9' - 66.4')	99	87							
70			- iron-stained (70.0' - 72.8') and (76.4' - 76.6')									
			- iron-stained vertical fracture ((77.0' - 77.4')	99	93							
75												
80												
85												
				100	81							
90			Gray <u>SHALE</u> , soft to medium hard	88.7								

BORING: C00553.GPJ 2/27/01

Completion Depth: **107.0 feet**  
 Date Boring Started: **12/5/00**  
 Date Boring Completed: **12/6/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 75.5 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DHP-1

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1056.0 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊠ Split Spoon</p> <p>⊞ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
90.8		⊞	<u>COAL</u>										
			- unconfined compressive strength (91.3' - 91.5') - 3,970 psi										
95			- unconfined compressive strength (96.6' - 96.9') - 4,040 psi										
			- unconfined compressive strength (97.5' - 97.8') - 2,940 psi	99	24								
98.4													
100		⊞	Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth										
105		⊞		100	86								
105.6		⊞	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained.										
107.0													
			Bottom of Test Boring @ 107 ft.										
110													
115													
120													

BORING C00553.GPJ 2/27/01

Completion Depth: **107.0 feet**  
 Date Boring Started: **12/5/00**  
 Date Boring Completed: **12/6/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 75.5 ft. upon drilling completion.**



# LOG OF BORING NO. DHP-2

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1055.7 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			MATERIAL DESCRIPTION									
5	●		AUGER WITHOUT SAMPLING									
10	●											
15	●											
20	●											
25	●											
30	●											

BORING C00553.GPJ 2/27/01

Completion Depth: **105.0 feet**  
 Date Boring Started: **1/9/00**  
 Date Boring Completed: **1/9/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 45 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHP-2

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1055.7 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
35			AUGER WITHOUT SAMPLING									
40												
45												
50				50.0								
55		[Diagonal Fracture Symbol]	Gray <u>SANDSTONE</u> , medium hard to hard, medium grained - soft weathered zone @ 53.2 ft.  - iron-stained (53.2' - 54.0') and (56.7' - 57.5')  - diagonal fracture @ 51.3 ft. and 56.8 ft.	94	63							
60												

BORING C00553.GPJ 2/27/01

Completion Depth: **105.0 feet**  
 Date Boring Started: **1/9/00**  
 Date Boring Completed: **1/9/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 45 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHP-2

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1055.7 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			MATERIAL DESCRIPTION									
65		✓	Gray SANDSTONE, medium hard to hard, medium grained  - low-angle fracture @ 62.3 ft.  - fractured (62.8' - 63.8')  - iron-stained, w/occasional vugs (62.8' - 67.8')  - clay seam (66.8' - 67.0')  - iron-stained (70.9' - 71.9')	100	67							
75		✓	- iron-stained vertical fracture (81.3' - 84.3') and (87.0' - 87.3')	100	100							
85		✓	- iron-stained (80.0' - 87.5')	80	29							
90		✓										

BORING C00553.GPJ 2/27/01

Completion Depth: **105.0 feet**  
 Date Boring Started: **1/9/00**  
 Date Boring Completed: **1/9/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 45 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHP-2

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1055.7 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> Split Spoon  <div style="width: 15px; height: 15px; border: 1px solid black; margin-right: 5px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></div> Shelby Tube  <div style="width: 15px; height: 15px; border: 1px solid black; margin-right: 5px; background-color: black;"></div> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
90.3		▲▲▲▲▲	Dark gray <u>CARBONACEOUS SHALE</u> , medium hard									
91.6		■	<u>COAL</u>									
95		■		100	10							
100		▲▲▲▲▲	Gray <u>CLAY SHALE</u> , very soft to soft									
100.3		▲▲▲▲▲										
105		▲▲▲▲▲		95	58							
105.0		▲▲▲▲▲	Bottom of Test Boring @ 105 ft.									
110												
115												
120												

BORING: C00553.GPJ 2/27/01

Completion Depth: **105.0 feet**  
 Date Boring Started: **1/9/00**  
 Date Boring Completed: **1/9/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 45 ft. during drilling operations.**

# LOG OF BORING NO. DHX- 1

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1055.8 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
		<div style="display: flex; justify-content: space-between;"> <div style="width: 15%;"> <p>☒ Split Spoon</p> <p>☒ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>											
			<p>Coarse <u>COAL REFUSE</u> <span style="float: right;">0.5</span></p> <p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense</p>										
5													
10						10-16-14							
15			- boulder ( 15.0 - 16.5 ft. )			45-27-36							
			-boulder ( 20.0 - 22.0 ft. )										
			- boulder ( 25.0 - 26.0 ft. )										
20						50/2"							
25						47-50/4"							
			- SPOIL/FILL -										
30				30.0									

BORING C00553.GPJ 2/27/01

Completion Depth: **106.8 feet**  
 Date Boring Started: **12/11/00**  
 Date Boring Completed: **12/11/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 84.6 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DHX-1

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1055.8 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>									
35	⊗	⊗	<p>Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, medium dense to very dense</p>			7-13-10						
38.0						15-48-50/3"						
40	⊗	⊗	<p>Gray <u>SANDSTONE</u>, medium hard to hard, medium grained</p> <ul style="list-style-type: none"> <li>- brown, weathered and friable (38.0' - 40.4')</li> <li>- with occasional carbonaceous laminations (42.1 - 48.6 ft.)</li> <li>- iron stained vertical fracture (49.7 - 50.0 ft.)</li> <li>- with numerous carbonaceous laminations (48.6 - 56.5 ft.)</li> </ul>	93	0	50/3"						
45												
50				100	86							
55												
60				99	90							

BORING C00553.GPJ 2/28/01

Completion Depth: **106.8 feet**  
 Date Boring Started: **12/11/00**  
 Date Boring Completed: **12/11/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 84.6 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DHX-1

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1055.8 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>⊠ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>⊠ Rock Core</p> </div> <div style="width: 65%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
65		⊠	Gray <u>SANDSTONE</u> , medium hard to hard, medium grained  - fractured ( 68.0 - 68.3 ft. )  - iron stained ( 70.2 - 71.8 ft. )  - vertical iron stained fracture ( 76.6 - 76.9 ft. )  - vertical iron stained fracture ( 77.8 - 78.4 ft. )	100	93								
70		⊠											
75		⊠		95	77								
80		⊠											
85		⊠		100	100								
		⊠		87.4									
		⊠	<u>VOID</u>	89.4	18	8							
90		⊠											

BORING C00553.GPJ 2/27/01

Completion Depth: **106.8 feet**  
 Date Boring Started: **12/11/00**  
 Date Boring Completed: **12/11/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

**Remarks: Water was noted at a depth of 84.6 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DHX-1

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1055.8 feet</b> Split Spoon Shelby Tube Rock Core									
			Gray <u>SANDSTONE</u> , iron stained, medium hard to hard, fine to medium grained									
			<u>VOID</u> - void sample (89.4' - 91.9') brown silty sand with rock fragments  17.9% gravel 55.0% sand 27.1% silt and clay	96.9	42	18						
95			Gray <u>SHALE</u> , soft to medium hard  - with occasional siltstone lenses ( 96.9 - 98.2 ft. ) - clayey, soft ( 98.2 - 99.6 ft. )  - silty, medium hard ( 99.6 - 103.7 ft. )									
100				103.7								
			Gray <u>SANDSTONE</u> with occasional shale laminations, medium hard, fine grained	98	70							
105				106.8								
			Bottom of Test Boring @ 106.8 ft.									
110												
115												
120												

BORING C00553.GPJ 2/28/01

Completion Depth: **106.8 feet**  
 Date Boring Started: **12/11/00**  
 Date Boring Completed: **12/11/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 84.6 ft. upon drilling completion.**



# LOG OF BORING NO. DHX- 2

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1055.5 feet</b> Split Spoon Shelby Tube Rock Core									
			Coarse <u>COAL REFUSE</u> <span style="float: right;">0.7</span>									
			Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense									
5			AUGER W/OUT SAMPLING									
10												
15												
20												
25												
30			- SPOIL/FILL -									

BORING C00553.GPJ 2/28/01

Completion Depth: **106.6 feet**  
 Date Boring Started: **12/12/00**  
 Date Boring Completed: **12/13/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 83.9 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 2

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1055.5 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="font-size: small;"> <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid black; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid black; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 15px; height: 15px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </div> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p>									
35		○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense									
40		○	AUGER W/OUT SAMPLING									
45		○	- SPOIL/FILL -									
50		○	52.0									
55		▧	Gray <u>SANDSTONE</u> , medium hard to hard, medium grained									
60		▧	- brown, weathered and friable (52.0' - 56.4')	100	97							

BORING C00553.GPJ 3/2/01

Completion Depth: **106.6 feet**  
 Date Boring Started: **12/12/00**  
 Date Boring Completed: **12/13/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 83.9 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 2

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1055.5 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊠ Split Spoon</p> <p>⊞ Shelby Tube</p> <p>▣ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
		⊠	Gray SANDSTONE, medium hard to hard, medium grained	100	100								
65		⊠	- weathered, iron stained, with occasional clayey shale lenses, soft	99	71								
		⊠	- iron stained ( 69.5 - 70.1 ft. )										
70		⊠	- iron stained vertical fracture ( 69.8 - 70.1 ft. )										
75		⊠		100	89								
80		⊠											
85		⊠											
88.5		⊠											
90		⊠	VOID	39	38								

BORING C00553.GPJ 2/27/01

Completion Depth: **106.6 feet**  
 Date Boring Started: **12/12/00**  
 Date Boring Completed: **12/13/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 83.9 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 2

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1055.5 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			MATERIAL DESCRIPTION									
95			VOID  - void sample - coal slurry with sand and gravel  3.2% gravel 26.7% sand 70.1% silt and clay									
			98.5									
100		~	Gray <u>SHALE</u> , soft to medium hard - clayey, soft ( 98.5 - 101.7 ft. )  - silty, medium ( 101.7 - 104.3 ft. )	89	60							
			104.3									
105		/	Gray <u>SANDSTONE</u> with occasional shale laminations, medium hard, fine grained									
			106.6									
110			Bottom of Test Boring @ 106.6 ft.									
115												
120												

BORING C00553.GPJ 3/27/01

Completion Depth: **106.6 feet**  
 Date Boring Started: **12/12/00**  
 Date Boring Completed: **12/13/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 83.9 ft. upon drilling completion.**

# LOG OF BORING NO. DHX- 3

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.3 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
5		⊗	Coarse <u>COAL REFUSE</u>										
5.0		○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense										
10		○											
15		○											
20		○											
25		○											
30		○	- SPOIL/FILL -										

BORING: C00553.GPJ 2/27/01

Completion Depth: **105.4 feet**  
 Date Boring Started: **12/11/00**  
 Date Boring Completed: **12/11/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 50.0 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 3

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.3 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
		<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 60%; text-align: center;"> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>											
35		○	<p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense</p>										
40		○											
45		○											
50		○											
55		○											
60		○		- SPOIL/FILL -									
				60.0									

BORING C00553.GPJ 2/28/01

Completion Depth: **105.4 feet**  
 Date Boring Started: **12/11/00**  
 Date Boring Completed: **12/11/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 50.0 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 3

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.3 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
	X	•••••	Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, medium dense to very dense			12-21-28						
65	X	•••••				22-31-32						
70				70.0		50/1"						
		/ / / / /	Brown <u>SANDSTONE</u> , medium hard, medium to coarse grained, moderately weathered, friable - diagonal fracture at 72.1 ft.	95	56							
75												
			<u>COAL</u>  - unconfined compressive strength (89.5' - 89.8') - 4,770 psi  - unconfined compressive strength (91.6' - 91.9') - 3,100 psi	82.5								
80					2	0						
85												
90				100	86							

BORING C00553.GPJ 2/28/01

Completion Depth: **105.4 feet**  
 Date Boring Started: **12/11/00**  
 Date Boring Completed: **12/11/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 50.0 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 3

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.3 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p> <span style="display: inline-block; width: 1em; height: 1em; border: 1px solid black; margin-right: 0.5em;"></span> Split Spoon  <span style="display: inline-block; width: 1em; height: 1em; border: 1px solid black; margin-right: 0.5em;"></span> Shelby Tube  <span style="display: inline-block; width: 1em; height: 1em; border: 1px solid black; margin-right: 0.5em;"></span> Rock Core                 </p>									
		COAL	<p>- unconfined compressive strength (93.5' - 93.8') - 3,270 psi</p>		93.8							
95		Gray CLAY SHALE, very soft to soft		100	56							
100		Gray SANDSTONE with shale laminations, medium hard, fine grained			100.8							
105		Bottom of Test Boring @ 105.4 ft.		46	22							
105.4												
110												
115												
120												

BORING: C00553.GPJ 2/28/01

Completion Depth: **105.4 feet**  
 Date Boring Started: **12/11/00**  
 Date Boring Completed: **12/11/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 50.0 ft. during drilling operations.**



# LOG OF BORING NO. DHX- 4

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. c00553-1 Surface El.: 1051.8 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			MATERIAL DESCRIPTION									
5		X	Coarse <u>COAL REFUSE</u>									
10		X										
15		X										
20		X										
25		X	- SPOIL/FILL -									
26.0		X										
30		O	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense									

BORING C00553.GPJ 2/27/01

Completion Depth: **104.8 feet**  
 Date Boring Started: **12/14/00**  
 Date Boring Completed: **12/15/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 67 ft. during drilling operations.**

*Continued Next Page*



# LOG OF BORING NO. DHX- 4

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. c00553-1</b> Surface El.: <b>1051.8 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			MATERIAL DESCRIPTION									
65		○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense			4-5-8-6						
70		○	- with some plant roots at 69.0 ft.			3-6-7-5						
		○	- less sand with trace of coal slurry (69.0 - 71.0 ft.)			1/12"-2-3						
		○	- with coal slurry and sandstone fragments (73.0 - 75.0 ft.)			WOT/24"						
75		○	- with numerous sandstone fragments (77.0 - 79.0 ft.)			WOT/12"-4-2						
		○				11-12-10-16						
		○				15-10-6-6						
80		○				WOT/24"						
		○				40-20-14-10						
		○				3-8-6-9						
85		○	- with trace slurry (85.0 - 91.0 ft.)			WOT/12"-5-2						
		○				5-6-4-5						
		○	- SPOIL/FILL -									

BORING C00553.GPJ 2/28/01

Completion Depth: **104.8 feet**  
 Date Boring Started: **12/14/00**  
 Date Boring Completed: **12/15/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 67 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 4

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			Location: <b>See Drawing No. c00553-1</b> Surface El.: <b>1051.8 feet</b>										
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20px;">  Split Spoon   Shelby Tube   Rock Core                 </div> <div style="width: 80%;"> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
91.0			Brown <b>CLAYEY SAND</b> with sandstone fragments, damp to wet, medium dense to very dense			WOT/18"-7 50/2"							
93.0			<b>COAL</b>	92	28								
95.0			Gray <b>CLAY SHALE</b> , very soft to soft, becoming sandier and medium hard with depth										
100.0				98	94								
103.9													
104.8			Gray <b>SANDSTONE</b> with shale laminations, medium hard, fine to medium grained										
			Bottom of Test Boring @ 104.8 ft.										

BORING: C00553.GPJ 2/28/01

Completion Depth: **104.8 feet**  
 Date Boring Started: **12/14/00**  
 Date Boring Completed: **12/15/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 67 ft. during drilling operations.**

# LOG OF BORING NO. DHX- 5

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1051.2 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			MATERIAL DESCRIPTION									
5		X	Coarse <u>COAL REFUSE</u>									
10		X										
15		X										
20		X										
25		X	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense									
30		X	- SPOIL/FILL -									

BORING C00553.GPJ 2/27/01

Completion Depth: **104.8 feet**  
 Date Boring Started: **12/15/00**  
 Date Boring Completed: **12/18/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 65 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 5

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.2 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit		
			<div style="display: flex; align-items: flex-start;"> <div style="width: 150px; border-right: 1px solid black; padding-right: 5px;"> <p style="font-size: small;"> <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </p> </div> <div style="flex-grow: 1;"> <p style="text-align: center; font-weight: bold; margin-bottom: 10px;">MATERIAL DESCRIPTION</p> <p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense</p> </div> </div>											
35														
40														
45														
50														
55														
60			- SPOIL/FILL -											

BORING C00553.GPJ 2/27/01

**Completion Depth: 104.8 feet**  
**Date Boring Started: 12/15/00**  
**Date Boring Completed: 12/18/00**  
**Engineer/Geologist: JEN/CEM**  
**Project No.: C00553**

**Remarks: Groundwater was first noted at a depth of 65 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 5

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.2 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 15%;"> <p>⊗ Split Spoon</p> <p>⊗ Shelby Tube</p> <p>▬ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
65	⊗	○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense  - SPOIL/FILL -										
			65.0			27-50/5"							
	⊗	○	Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, very dense			1.4							
70	⊗	○	70.5			17-28-35-50/6"							
	⊗	○	Brown <u>SANDSTONE</u> , medium hard, medium to coarse grained, moderately weathered, friable	94	31	50/3"							
75	⊗	○	77.1										
			VOID										
			- void sample (79.7' - 82.7') brown silty sand										
			0.1% gravel 93.9% sand 6.0% silt and clay										
85				33	23								
90													

BORING\_C00553.GPJ 2/27/01

Completion Depth: **104.8 feet**  
 Date Boring Started: **12/15/00**  
 Date Boring Completed: **12/18/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 65 ft. during drilling operations.**

*Continued Next Page*





# LOG OF BORING NO. DHX- 6

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.8 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
5		⊗	Coarse <u>COAL REFUSE</u>										
5.0		○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense										
10		○											
15		○											
20		○											
25		○											
30		○	- SPOIL/FILL -										

BORING C00553.GPJ 2/28/01

Completion Depth: **105.8 feet**  
 Date Boring Started: **12/18/00**  
 Date Boring Completed: **12/19/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 65 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 6

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.8 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; align-items: flex-start;"> <div style="width: 15%; border-right: 1px solid black; padding-right: 5px;"> <p style="font-size: small;">Legend:</p> <div style="display: flex; justify-content: space-between; margin-bottom: 5px;"> <span style="width: 15px; height: 10px; border: 1px solid black; border-style: dashed; margin-right: 5px;"></span> Split Spoon</div> <div style="display: flex; justify-content: space-between; margin-bottom: 5px;"> <span style="width: 15px; height: 10px; border: 1px solid black; border-style: solid; margin-right: 5px;"></span> Shelby Tube</div> <div style="display: flex; justify-content: space-between;"> <span style="width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </div> </div> <p style="text-align: center; font-weight: bold; margin-top: 10px;">MATERIAL DESCRIPTION</p> </div> <div style="width: 85%; padding-left: 5px;"> <p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense</p> </div>									

BORING C00553.GPJ 2/28/01

Completion Depth: **105.8 feet**  
 Date Boring Started: **12/18/00**  
 Date Boring Completed: **12/19/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 65 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 6

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.8 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 15%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>▣ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
65		○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense  - SPOIL/FILL -										
		⊗	Brown <u>CLAYEY SAND</u> to <u>SANDY CLAY</u> with some sandstone fragments, damp, very dense - boulder at 67.9 ft.										
69.3		⊗		69	0								
70		▤	Brown <u>SANDSTONE</u> , medium hard, medium to coarse grained, moderately weathered, friable										
75		▤		97	59								
		▤	- weathered, clayey, very soft ( 81.1 - 81.9 ft. )										
80		▤											
		▤	Gray <u>SHALE</u> , soft										
81.9		▤											
		▤	<u>COAL</u>										
84.9		▤		99	12								
85		▤											
90		▤											

BORING C00553.GPJ 2/28/01

Completion Depth: **105.8 feet**  
 Date Boring Started: **12/18/00**  
 Date Boring Completed: **12/19/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 65 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 6

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1051.8 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			MATERIAL DESCRIPTION									
		☒	<u>COAL</u>									
95		☒	Gray <u>CLAYEY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth  - core loss (100.8' - 105.8') due to core barrel malfunction	95	60							
100		☒										
105		☒	- sandstone @ 105.8 ft.	2	0							
		☒	Bottom of Test Boring @ 105.8 ft.									

BORING C00553.GPJ 2/28/01

Completion Depth: **105.8 feet**  
 Date Boring Started: **12/18/00**  
 Date Boring Completed: **12/19/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 65 ft. during drilling operations.**

# LOG OF BORING NO. DHX-7

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
5		⊗	<p>Coarse <u>COAL REFUSE</u></p>										
10		⊗											
15		⊗											
18.0		⊗											
20		⊗	<p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense</p>										
25		⊗											
30		⊗	- SPOIL/FILL -										

BORING C00553.GPJ 2/27/01

Completion Depth: **101.4 feet**  
 Date Boring Started: **12/19/00**  
 Date Boring Completed: **12/19/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 77 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX-7

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊠ Split Spoon</p> <p>⊞ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> <p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense</p> </div> </div>										
35													
40													
45													
50													
55													
60			- SPOIL/FILL -										

BORING C00553.GPJ 2/28/01

Completion Depth: **101.4 feet**  
 Date Boring Started: **12/19/00**  
 Date Boring Completed: **12/19/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 77 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX-7

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
			Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, medium dense to very dense  - SPOIL/FILL -										
65			65.0										
			Brown <u>CLAYEY SAND</u> to <u>SANDY CLAY</u> with some sandstone fragments, damp, dense to very dense  - with some coal fragments and organics ( 69.0 - 71.5 ft. )  - boulder at 71.5 ft.  - with some gray mottling ( 73.0 - 75.0 ft. )  - wet ( 77.0 - 79.0 ft. )			19-32-24-27  14-27-30-31  10-24-25-30  30-50/2"  19-28-28-19  24-21-22-23  15-16-15-15  wot/18"							
70													
75													
			- sampler advanced from weight of tools ( 79.0 - 80.5 ft. )										
80			80.5										
			Brown <u>SANDSTONE</u> , medium hard, medium to coarse grained, moderately weathered, friable			2-33-48-38							
			<u>COAL</u>			25-50/6"-50/2"							
85													
			- clayey shale lens ( 88.7 - 89.3 ft. )	100	0								
90													

BORING C00553.GPJ 2/28/01

Completion Depth: **101.4 feet**  
 Date Boring Started: **12/19/00**  
 Date Boring Completed: **12/19/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 77 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX-7

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; border: 1px solid black; margin-right: 5px;"></div> Split Spoon  <div style="width: 15px; height: 15px; border: 1px solid black; margin-right: 5px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></div> Shelby Tube  <div style="width: 15px; height: 15px; border: 1px solid black; margin-right: 5px; background-color: black;"></div> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
			<b>COAL</b>									
			Gray <b>SHALE</b> , soft to medium hard - clayey, soft ( 91.6 - 94.3 ft. )  - silty medium hard ( 94.3 - 95.5 ft. )	91.6								
95												
			Gray <b>SANDSTONE</b> with shale laminations, medium hard, fine to medium grained	95.5								
100				100	87							
				101.4								
			Bottom of Test Boring @ 101.4 ft.									
105												
110												
115												
120												

BORING C00553.GPJ 2/27/01

Completion Depth: **101.4 feet**  
 Date Boring Started: **12/19/00**  
 Date Boring Completed: **12/19/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 77 ft. during drilling operations.**



# LOG OF BORING NO. DHX- 8

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1051.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			MATERIAL DESCRIPTION									
5		[X]	Coarse <u>COAL REFUSE</u>									
10		[X]										
15		[X]										
20		[X]										
25		[X]	25.0									
25		[O]	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp to wet, very loose to medium dense									
30		[O]	- SPOIL/FILL -									

BORING C00553.GPJ 2/27/01

Completion Depth: **100.0 feet**  
 Date Boring Started: **12/19/00**  
 Date Boring Completed: **12/19/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 65 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 8

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; align-items: flex-start;"> <div style="width: 15%; text-align: center;"> <p>35</p> <p>40</p> <p>45</p> <p>50</p> <p>55</p> <p>60</p> </div> <div style="width: 85%; border-left: 1px solid black; border-right: 1px solid black; padding: 5px;"> <p><b>MATERIAL DESCRIPTION</b></p> <p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp to wet, very soft to medium dense</p> <p style="text-align: center; margin-top: 200px;">- FILL/SPOIL -</p> </div> </div>										

BORING C00553.GPJ 2/27/01

Completion Depth: **100.0 feet**  
 Date Boring Started: **12/19/00**  
 Date Boring Completed: **12/19/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 65 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 8

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp to wet, very loose to medium dense</p>									
65						16-6-6-4						
			- with trace coal fragments ( 67.0 - 69.0 ft. )			wot/12"-4-4						
			- with trace root fragments ( 69.0 - 71.0 ft. )									
70						2-3-2-2						
						12-6-4-6						
						wot/12"-4-6						
75												
						5-5-5-7						
						27-50/2"						
80						17-12-10-11						
			- with some slurry and weathered coal fragments ( 81.0 - 83.0 ft. )									
						7-8-9-13						
						wot/18"-5						
85												
			- with numerous sandstone fragments ( 85.0 - 87.0 ft. )			4-6-7-6						
			- with some weathered coal and shale fragments at 88.5 ft.									
			- SPOIL/FILL -			wot/24"						
90												

BORING C00553.GPJ 2/28/01

Completion Depth: **100.0 feet**  
 Date Boring Started: **12/19/00**  
 Date Boring Completed: **12/19/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 65 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 8



**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1051.4 feet</b> Split Spoon Shelby Tube Rock Core									
			<u>COAL</u>			50/3"						
95			Gray <u>CLAYEY SHALE</u> , very soft to soft, becoming sandier with depth  - very sandy ( 99.0 - 100.0 ft. )	91	51							
100			Bottom of Test Boring @ 100.0 ft.									
105												
110												
115												
120												

BORING C00553.GPJ 2/27/01

Completion Depth: **100.0 feet**  
 Date Boring Started: **12/19/00**  
 Date Boring Completed: **12/19/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 65 ft. during drilling operations.**

# LOG OF BORING NO. DHX- 9



**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.0 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;"> <p>⊠ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
5		⊠	Coarse <u>COAL REFUSE</u>										
10		⊠											
15		○	Brown and gray <u>CLAYEY SAND</u> with sandstone fragments, damp										
20		○											
25		○											
30		○	- SPOIL/FILL -										

BORING C00553.GPJ 2/27/01

Completion Depth: **105.0 feet**  
 Date Boring Started: **12/20/00**  
 Date Boring Completed: **12/20/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 60 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 9

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.0 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; align-items: flex-start;"> <div style="width: 150px; border-right: 1px solid black; padding-right: 5px;"> </div> <div style="padding-left: 10px;"> <p><b>MATERIAL DESCRIPTION</b></p> <p>Brown <u>CLAYEY SAND</u> with sandstone fragments, damp</p> <p style="text-align: center;">- wet @ 60 ft.</p> <p style="text-align: center;">- SPOIL/FILL -</p> </div> </div>										

BORING C00553.GPJ 2/28/01

Completion Depth: **105.0 feet**  
 Date Boring Started: **12/20/00**  
 Date Boring Completed: **12/20/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 60 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 9

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.0 feet</b> Split Spoon Shelby Tube Rock Core									
65			Brown and gray <u>CLAYEY SAND</u> with some sandstone fragments, damp,  - SPOIL/FILL -	65.0								
			Brown <u>CLAYEY SAND</u> to <u>SANDY CLAY</u> with little sandstone fragments, damp, very dense  - boulders @ 67 ft. and 69 ft.			20-30-50/5"						
						49-50/4"						
						50/6"						
70			Brown <u>SANDSTONE</u> , medium hard, medium grained, weathered and friable - diagonal fracture (71.3' - 71.7')	70.6								
			- vertical fracture (73.7' - 74.0') and 79.2' - 79.5')	89	43							
			- shale band (81.8' - 83.0')									
			<u>COAL</u>	96	18							
90												

BORING C00553.GPJ 2/27/01

Completion Depth: **105.0 feet**  
 Date Boring Started: **12/20/00**  
 Date Boring Completed: **12/20/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 60 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX- 9

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.0 feet</b>									
			Split Spoon									
			Shelby Tube									
			Rock Core									
			<b>COAL</b>									
			92.5									
95			Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with increasing depth	97	54							
100				100	96							
			103.9									
105			Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained									
			105.0									
			Bottom of Test Boring @ 105.0 ft.									
110												
115												
120												

BORING C00553.GPJ 2/27/01

Completion Depth: **105.0 feet**  
 Date Boring Started: **12/20/00**  
 Date Boring Completed: **12/20/00**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 60 ft. during drilling operations.**



# LOG OF BORING NO. DHX-10

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1055.3 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 55%; text-align: center;"> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
		⊗	Coarse <u>COAL REFUSE</u> <span style="float: right;">1.5</span>										
5		○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp										
10		○											
15		○											
20		○											
25		○											
30		○	- SPOIL/FILL -										

BORING C00553.GPJ 2/27/01

Completion Depth: **106.7 feet**  
 Date Boring Started: **12/20/00**  
 Date Boring Completed: **12/20/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DHX-10

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1055.3 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
35		○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp										
40		○											
45		○	- SPOIL/FILL -	45.0									
45		⊗	Brown <u>SANDY CLAY</u> to <u>CLAYEY SAND</u> with some sandstone fragments, damp, medium dense to very dense			8-5-6-11							
50		⊗				23-14-30-41							
50		⊗		50.9		38-34-42-55/5"							
55		⊗	Brown <u>SANDSTONE</u> , medium hard, medium grained, weathered and friable			30-65-60-69							
55		⊗	- medium hard ( 54.4 - 57.8 ft. )			23-33-50/5"							
55		■	- gray, medium hard to hard from approximately 56 ft.	100	91								
60		■											

BORING C00553.GPJ 2/27/01

Completion Depth: **106.7 feet**  
 Date Boring Started: **12/20/00**  
 Date Boring Completed: **12/20/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DHX-10

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1055.3 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>⊠ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>⊠ Rock Core</p> </div> <div style="width: 65%; text-align: center;"> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>									
65		⊠	<p>Gray <u>SANDSTONE</u>, medium hard to hard, medium grained</p> <p>- with occasional carbonaceous laminations ( 61.1 - 62.2 ft. )</p> <p>- iron stained, weathered, medium hard ( 62.2 - 62.4 ft. )</p> <p>- iron stained ( 62.9 - 65.5 ft. )</p> <p>- weathered, medium hard ( 66.7 - 67.5 ft. )</p> <p>- with occasional coal spars ( 76.2 - 77.3 ft. )</p> <p>- fractured ( 76.4 - 76.7 ft. )</p> <p>- iron stained ( 80.3 - 84.7 ft. )</p>	100	81							
70		⊠										
75		⊠		100	92							
80		⊠										
85		⊠	84.7									
		⊠	VOID  (Partially Filled)	32	29							

BORING C00553.GPJ 2/28/01

Completion Depth: **106.7 feet**  
 Date Boring Started: **12/20/00**  
 Date Boring Completed: **12/20/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DHX-10

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1055.3 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>VOID</b>  (Partially Filled)									
95			95.1									
			Gray <u>SHALE</u> , soft to medium hard									
			- clayey, soft ( 95.1 - 97.6 ft. )	61	5							
			- silty, medium hard ( 97.6 - 98.1 ft. )									
100			- sandstone lens, medium hard ( 98.1 - 98.7 ft. )									
			- silty, medium hard ( 98.7 - 102.4 ft. )									
			102.4									
			Gray <u>SANDSTONE</u> , medium hard to hard, fine grained									
105				98	98							
			106.7									
			Bottom of Test Boring @ 106.7 ft.									
110												
115												
120												

BORING C00553.GPJ 2/28/01

Completion Depth: **106.7 feet**  
 Date Boring Started: **12/20/00**  
 Date Boring Completed: **12/20/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

# LOG OF BORING NO. DHX-11

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1054.5 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>⊠ Split Spoon</p> <p>⊞ Shelby Tube</p> <p>□ Rock Core</p> </div> <div style="width: 65%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
5		○	Brown <u>CLAYEY SAND TO SANDY CLAY</u> with sandstone fragments, damp										
10		○											
15		○											
20		○											
25		○											
30		○											

BORING C00553.GPJ 2/27/01

Completion Depth: **106.3 feet**  
 Date Boring Started: **12/20/00**  
 Date Boring Completed: **12/21/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DHX-11

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1054.5 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;"> <p>⊠ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>⊠ Rock Core</p> </div> <div> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
35		○	Brown <u>CLAYEY SAND TO SANDY CLAY</u> with sandstone fragments, damp										
40		○											
45		○											
50		○											
55		/	52.0  Brown <u>SANDSTONE</u> , medium hard, medium grained, weathered and friable - soft to medium hard ( 52.0 - 56.5 ft. )  - with occasional clay lenses, soft ( 56.7 - 57.2 ft. )  - fractured ( 57.5 - 57.7 ft. )	81	50								
60		/											

BORING C00553.GPJ 2/27/01

Completion Depth: **106.3 feet**  
 Date Boring Started: **12/20/00**  
 Date Boring Completed: **12/21/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DHX-11

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1054.5 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="font-size: small;"> <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
65		✓	Brown <u>SANDSTONE</u> , medium hard, medium grained, weathered and friable - gray ( 66.3 - 66.9 ft. )  - gray shale lens ( 66.1 - 66.3 ft. )  - gray, medium hard to hard from 69 ft.	99	89							
70		✓	- with occasional coal spars ( 72.9 - 78.8 ft. )									
75		✓		99	94							
80		✓										
85		✓		90	75							
		✓	85.7									
		✓	87.1									
		✓	<u>COAL</u>	100	0							

BORING C00553.GPJ 2/28/01

Completion Depth: **106.3 feet**  
 Date Boring Started: **12/20/00**  
 Date Boring Completed: **12/21/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DHX-11

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1054.5 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>COAL</b></p> <p>- poor recovery due to inner barrel malfunction ( 91.3 - 97.0 ft. )</p>	100	0							
95			<p>96.3</p> <p><b>Gray SHALE</b>, soft to medium hard</p> <p>- clayey, soft ( 96.3 - 98.5 ft. )</p> <p>- silty, medium hard ( 98.5 - 105.5 ft. )</p>	32	0							
100				99	99							
105			<p>105.5</p> <p>106.3</p> <p><b>Gray SANDSTONE</b> with shale laminations, medium hard, fine to medium grained</p>									
110			<p>Bottom of Test Boring @ 106.3 ft.</p>									
115												
120												

BORING C00553.GPJ 2/27/01

Completion Depth: **106.3 feet**  
 Date Boring Started: **12/20/00**  
 Date Boring Completed: **12/21/00**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:





# LOG OF BORING NO. DHX-12

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.5 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; align-items: center;"> <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px;"></div> Split Spoon  <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></div> Shelby Tube  <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px; background-color: black;"></div> Rock Core                 </div> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p>									
35			Coarse <u>COAL REFUSE</u>									
40												
45												
50												
			51.0			11-27-16-10						
			Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, very dense			woh/18"-5						
55						3-5-10-9						
						8-14-20-13						
			- SPOIL/FILL -			9-9-11-26						
60												

BORING C00553.GPJ 2/27/01

Completion Depth: **100.0 feet**  
 Date Boring Started: **1/4/01**  
 Date Boring Completed: **1/4/01**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 60 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX-12

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.5 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>⊗ Split Spoon                      ⊠ Shelby Tube                      ■ Rock Core</p>									
65	⊗	○	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp, very dense  - SPOIL/FILL -  - shelly tube (66.0' - 67.0') - interface between fill material and natural ground	66.5	90	4-25-20-15 18-11-23-19 20-35-44-47						
70	⊗	○	Brown <u>CLAYEY SAND TO SANDY CLAY</u> with some sandstone fragments, damp, very dense - shelly tube (68.0' - 69.0') brown clayey sand to sandy clay with some sandstone fragments  - shelly tube (72.0' - 72.8') brown clayey sand to sandy clay with sandstone fragments			11-17-27-42	13	45	42			
75	⊗	○	- gray at 74.0 ft.  - brown at 78.0 ft.  - shelly tube (80.0' - 80.5')		100	29-41-48-50/5" 31-26-46-48 20-22-27-36						
80	⊗	○	- weathered shale at 82.0 ft.		60	21-50/5"						
85	■	■	<u>COAL</u>	82.5								
90	■	■			89	6						

BORING C00553.GPJ 3/2/01

Completion Depth: **100.0 feet**  
 Date Boring Started: **1/4/01**  
 Date Boring Completed: **1/4/01**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 60 ft. during drilling operations.**

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# LOG OF BORING NO. DHX-12

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.5 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
		☒	<u>COAL</u>									
92.3		☒	Gray <u>CLAY SHALE</u> , very soft to soft -becomes sandier and medium hard with depth	100	65							
100.0		☐	Bottom of Test Boring @ 100.0 ft.									
105												
110												
115												
120												

BORING C00553.GPJ 2/27/01

Completion Depth: **100.0 feet**  
 Date Boring Started: **1/4/01**  
 Date Boring Completed: **1/4/01**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 60 ft. during drilling operations.**

# LOG OF BORING NO. DHX-13

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.1 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>⊠ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>⊠ Rock Core</p> </div> <div style="width: 65%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
5		⊠	Coarse <u>COAL REFUSE</u>										
10		⊠											
15		⊠											
20		⊠											
25		⊠											
30		⊠											

BORING C00553.GPJ 2/27/01

Completion Depth: **105.5 feet**  
 Date Boring Started: **12/21/00**  
 Date Boring Completed: **1/3/01**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 60 ft. during drilling operations.**

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# LOG OF BORING NO. DHX-13

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.1 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;">  Split Spoon   Shelby Tube   Rock Core                 </div> <div> <p><b>MATERIAL DESCRIPTION</b></p> <p style="font-size: 1.2em;">Coarse <u>COAL REFUSE</u></p> </div> </div>										
35													
40													
45													
50													
55													
60			60.0										

BORING C00553.GPJ 2/27/01

Completion Depth: **105.5 feet**  
 Date Boring Started: **12/21/00**  
 Date Boring Completed: **1/3/01**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 60 ft. during drilling operations.**

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# LOG OF BORING NO. DHX-13

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1051.1 feet</b>												
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>									
65			Brown <u>CLAYEY SAND</u> with sandstone fragments, wet, medium dense to dense  - with less clay and numerous sandstone fragments ( 64.0 - 66.0 ft. )			17-17-9-12						
						4-11-11-11						
						10-10-11-9						
						13-14-17-13						
						10-8-8-11						
70			- very wet at 70.0 ft.  - SPOIL/FILL -			WOH/18"-14-18						
						19-20-15-31						
75			Brown <u>CLAYEY SAND TO SANDY CLAY</u> with some sandstone fragments, damp, very dense - shelly tube (74.0' - 75.0') and (76.0' - 77.3')									
						21-38-50/2"						
80						38-41-43-48						
						31-32-30-50/6"						
85			- shelly tube (84.0' - 86.0') gray clayey sand with sandstone fragments									
						22-56-34-30						
						27-57-50/3"						
			- sandstone boulder at 89.0 ft.									

BORING C00553.GPJ 2/28/01

Completion Depth: **105.5 feet**  
 Date Boring Started: **12/21/00**  
 Date Boring Completed: **1/3/01**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 60 ft. during drilling operations.**

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# LOG OF BORING NO. DHX-13

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1051.1 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="font-size: small;"> <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; border-style: dashed; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; border-style: solid; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>									
95	X	X	Brown <u>CLAYEY SAND TO SANDY CLAY</u> with some sandstone fragments, damp, very dense - sandstone boulder at 89.0 ft.	39	12	50-62-55-60 60/5"						
95.6												
100		W	Gray <u>CLAY SHALE</u> , very soft to soft, becoming sandier and medium hard with depth	100	94							
102.0												
105		D	Gray <u>SANDSTONE</u> with shale laminations, medium hard, fine to medium grained									
105.5												
110			Bottom of Test Boring @ 105.5 ft.									
115												
120												

BORING C00553.GPJ 2/27/01

Completion Depth: **105.5 feet**  
 Date Boring Started: **12/21/00**  
 Date Boring Completed: **1/3/01**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 60 ft. during drilling operations.**



# LOG OF BORING NO. DHX-14

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1054.4 feet</b> Split Spoon Shelby Tube Rock Core									
0.5		X	Coarse <u>COAL REFUSE</u>									
5		o	Brown <u>CLAYEY SAND</u> with sandstone fragments, damp									
10			AUGER W/OUT SAMPLING									
15												
20												
25												
30												

BORING - C00553.GPJ 2/28/01

Completion Depth: **102.4 feet**  
 Date Boring Started: **1/14/01**  
 Date Boring Completed: **1/14/01**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DHX-14

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1054.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; align-items: flex-start;"> <div style="width: 150px; border-right: 1px solid black; padding-right: 5px;"> <p style="font-size: small;">Location: <b>See Drawing No. C00553-1</b></p> <p style="font-size: small;">Surface El.: <b>1054.4 feet</b></p> <div style="display: flex; gap: 5px; font-size: x-small;"> <div style="border: 1px solid black; width: 15px; height: 10px; margin-right: 5px;"></div> Split Spoon</div> <div style="border: 1px solid black; width: 15px; height: 10px; margin-right: 5px;"></div> Shelby Tube</div> <div style="border: 1px solid black; width: 15px; height: 10px; margin-right: 5px;"></div> Rock Core</div> <p style="text-align: center; font-weight: bold; margin-top: 10px;">MATERIAL DESCRIPTION</p>									

Brown CLAYEY SAND with sandstone fragments, damp

AUGER W/OUT SAMPLING

BORING: C00553.GPJ 2/28/01

Completion Depth: **102.4 feet**  
 Date Boring Started: **1/14/01**  
 Date Boring Completed: **1/14/01**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DHX-14

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1054.4 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="font-size: small;"> <span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Split Spoon  <span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Shelby Tube  <span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Rock Core                 </div> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p>									
		✓	Brown SANDSTONE, medium hard, medium grained, weathered and friable	100	30							
65		✓	- gray, medium hard to hard from 65 ft.	100	92							
70		✓										
75		✓	- with occasional coal spars ( 75.2 - 76.0 ft. )									
		✓	- iron-stained ( 77.8 - 80.2 ft. )	99	95							
80		✓										
84.3		✓	84.3									
85		✓	<u>COAL</u>	98	44							
		✓	- gray shale lens, soft ( 84.3 - 85.3 ft. )									
90		✓										

BORING\_C00553.GPJ 2/28/01

**Completion Depth: 102.4 feet**  
**Date Boring Started: 1/14/01**  
**Date Boring Completed: 1/14/01**  
**Engineer/Geologist: JEN/JTS**  
**Project No.: C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DHX-14

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1054.4 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>COAL</b></p> <p>- gray shale lens, soft ( 91.9 - 92.4 ft. )</p>	100	0							
94.3			<p>Gray <b>SHALE</b>, soft to medium hard</p> <p>- clayey, soft ( 94.3 - 98.1 ft. )</p> <p>- silty, medium hard ( 98.1 - 101.1 ft. )</p>	98	65							
101.1			<p>Gray <b>SANDSTONE</b>, medium hard to hard, fine grained</p>	102.4								
			<p>Bottom of Test Boring @ 102.4 ft.</p>									

BORING\_C00553.GPJ 2/28/01

Completion Depth: **102.4 feet**  
 Date Boring Started: **1/14/01**  
 Date Boring Completed: **1/14/01**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

# LOG OF BORING NO. DHX-15

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1053.1 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p><b>MATERIAL DESCRIPTION</b></p> <p style="text-align: center; font-size: 1.2em;">AUGER W/OUT SAMPLING</p> </div> </div>									
5												
10												
15												
20												
25												
30												

BORING: C00553.GPJ 2/28/01

Completion Depth: **100.2 feet**  
 Date Boring Started: **1/9/01**  
 Date Boring Completed: **1/9/01**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 85 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DHX-15

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1053.1 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊠ Split Spoon</p> <p>⊞ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
35		⊠	AUGER W/OUT SAMPLING										
40		⊠											
45		⊠											
50		⊠											
55		⊠											
60		⊠											

BORING\_C00553.GPJ\_2/28/01

Completion Depth: **100.2 feet**  
 Date Boring Started: **1/9/01**  
 Date Boring Completed: **1/9/01**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 85 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DHX-15



**Project Description:** Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky

Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Location: See Drawing No. C00553-1 Surface El.: 1053.1 feet									
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>									
65			AUGER W/OUT SAMPLING									
70												
75			75.0									
			Gray <u>SANDSTONE</u> , hard, medium grained	98	98							
80												
85												
			87.1									
			<u>VOID</u>	46	44							
90												
Completion Depth: <b>100.2 feet</b> Date Boring Started: <b>1/9/01</b> Date Boring Completed: <b>1/9/01</b> Engineer/Geologist: <b>JEN/CEM</b> Project No.: <b>C00553</b>			<b>Remarks:</b> Water was noted at a depth of 85 ft. upon drilling completion.									

BORING C00553.GPJ 2/28/01

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# LOG OF BORING NO. DHX-15

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1053.1 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<u>VOID</u>									
95			- coal and mine rubble ( 96.1 - 97.1 ft. )									
		[Wavy Line Symbol]	Gray <u>CLAY SHALE</u> , very soft to soft	98	46							
100			Bottom of Test Boring @ 100.2 ft.									
105												
110												
115												
120												

BORING: C00553.GPJ 2/27/01

Completion Depth: **100.2 feet**  
 Date Boring Started: **1/9/01**  
 Date Boring Completed: **1/9/01**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 85 ft. upon drilling completion.**



# LOG OF BORING NO. DHX-16

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**

triadeng.com



Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1052.9 feet</b> Split Spoon Shelby Tube Rock Core									
5		X	AUGER W/OUT SAMPLING									
10		X										
15		X										
20		X										
25		X										
30		X										

BORING C00553.GPJ 2/28/01

Completion Depth: **95.1 feet**  
 Date Boring Started: **1/10/01**  
 Date Boring Completed: **1/10/01**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 60 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX-16

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

triadeng.com



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.9 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊠ Split Spoon</p> <p>⊞ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>										
35		⊠	AUGER W/OUT SAMPLING										
40		⊠											
45		⊠											
50		⊠											
55		⊠											
60		⊠											

BORING C00553.GPJ 2/28/01

**Completion Depth: 95.1 feet**  
**Date Boring Started: 1/10/01**  
**Date Boring Completed: 1/10/01**  
**Engineer/Geologist: JEN/CEM**  
**Project No.: C00553**

**Remarks: Groundwater was first noted at a depth of 60 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX-16

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

triadeng.com



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.9 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
			AUGER W/OUT SAMPLING									
65				65.0								
			Gray <u>SANDSTONE</u> , medium hard to hard, medium grained	98	49							
			- brown, weathered and friable (65.0' - 69.9')									
70												
				100	99							
75												
				98	90							
80												
			Gray <u>SHALE</u> , soft	83.2								
85				84.9								
			<u>COAL</u>									
90												

BORING: C00553.GPJ 2/28/01

Completion Depth: **95.1 feet**  
 Date Boring Started: **1/10/01**  
 Date Boring Completed: **1/10/01**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

Remarks: **Groundwater was first noted at a depth of 60 ft. during drilling operations.**

*Continued Next Page*

# LOG OF BORING NO. DHX-16

**Project Description: Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**

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Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1052.9 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; align-items: center;"> <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px;"></div> <div>Split Spoon</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px;"></div> <div>Shelby Tube</div> </div> <div style="display: flex; align-items: center; margin-top: 5px;"> <div style="width: 20px; height: 20px; border: 1px solid black; margin-right: 5px;"></div> <div>Rock Core</div> </div> <p style="text-align: center; margin-top: 10px;"><b>MATERIAL DESCRIPTION</b></p>										
		■	<u>COAL</u>	100	1								
95.1		▨											
95		▨	Gray <u>CLAY SHALE</u> , very soft	95.1									
			Bottom of Test Boring @ 95.1 ft.										
100													
105													
110													
115													
120													

BORING C00553.GPJ 2/27/01

Completion Depth: **95.1 feet**  
 Date Boring Started: **1/10/01**  
 Date Boring Completed: **1/10/01**  
 Engineer/Geologist: **JEN/CEM**  
 Project No.: **C00553**

**Remarks: Groundwater was first noted at a depth of 60 ft. during drilling operations.**

# LOG OF BORING NO. DHX-17

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1056.7 feet</b> Split Spoon Shelby Tube Rock Core									
			Coarse <u>COAL REFUSE</u>	0.5								
			Brown <u>CLAYEY SAND TO SANDY CLAY</u> with little sandstone fragments, damp, very dense									
5			AUGER W/OUT SAMPLING									
10												
15												
20												
25												
30												

BORING C00553.GPJ 2/28/01

Completion Depth: **101.1 feet**  
 Date Boring Started: **1/22/01**  
 Date Boring Completed: **1/22/01**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DHX-17

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1056.7 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>⊠ Split Spoon</p> <p>⊡ Shelby Tube</p> <p>▣ Rock Core</p> </div> <div style="width: 65%;"> <p><b>MATERIAL DESCRIPTION</b></p> </div> </div>									
35		○	<p>Brown <u>CLAYEY SAND TO SANDY CLAY</u> with little sandstone fragments, damp, very dense</p> <p style="text-align: center;">AUGER W/OUT SAMPLING</p>									
40												
43.0			43.0									
45		▤	<p>Gray <u>SANDSTONE</u>, hard, fine to medium grained</p>									
50			<p>- with numerous carbonaceous laminations ( 50.4 - 51.3 ft. )</p> <p>- iron stained, medium hard to hard ( 51.5 - 52.0 ft. )</p>	75	53							
55				100	100							
60												

BORING C00553.GPJ 2/28/01

Completion Depth: **101.1 feet**  
 Date Boring Started: **1/22/01**  
 Date Boring Completed: **1/22/01**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DHX-17

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1056.7 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<p><b>MATERIAL DESCRIPTION</b></p> <p>Gray <u>SANDSTONE</u>, hard, fine to medium grained</p> <p>- iron-stained, medium hard to hard ( 61.4 - 66.4 ft. )</p> <p>- clayey shale lens, soft ( 62.6 - 62.7 ft. )</p> <p>- diagonal fracture ( 62.7 - 62.9 ft. )</p> <p>- diagonal fracture ( 63.1 - 63.6 ft. )</p> <p>- clayey shale lens, soft ( 63.3 - 63.5 ft. )</p> <p>- clayey shale lens, soft ( 65.3 - 66.1 ft. )</p>									
65		[Symbol]		100	56							
70		[Symbol]										
75		[Symbol]		100	100							
80		[Symbol]										
85		[Symbol]		100	100							
90		[Symbol]										

BORING C00553.GPJ 2/28/01

Completion Depth: **101.1 feet**  
 Date Boring Started: **1/22/01**  
 Date Boring Completed: **1/22/01**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:

*Continued Next Page*

# LOG OF BORING NO. DHX-17

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1056.7 feet</b> Split Spoon Shelby Tube Rock Core									
			Gray SANDSTONE, hard, fine to medium grained	91.1	86	57						
-95			VOID - void sample (91.6' - 99.0') coal slurry with sand  0.7% gravel 22.2% sand 77.1% silt and clay									
-100				101.1								
			Bottom of Test Boring @ 101.1 ft.									
-105												
-110												
-115												
-120												

BORING C00553.GPJ 2/28/01

Completion Depth: **101.1 feet**  
 Date Boring Started: **1/22/01**  
 Date Boring Completed: **1/22/01**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks:



# LOG OF BORING NO. DHX-18

Project Description: **Big Branch Slurry Impoundment Investigation**  
**Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	MATERIAL DESCRIPTION	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1056.8 feet</b> Split Spoon Shelby Tube Rock Core									
			Coarse <u>COAL REFUSE</u> <span style="float: right;">0.5</span> Brown <u>CLAYEY SAND</u> with sandstone fragments  CASING ADVANCE W/OUT SAMPLING  Gray <u>SANDSTONE</u> , medium hard to hard <span style="float: right;">29.2</span>									

BORING C00553.GPJ 2/28/01

Completion Depth: **97.6 feet**  
 Date Boring Started: **1/22/01**  
 Date Boring Completed: **1/23/01**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 85.2 ft. upon drilling completion.**

*Continued Next Page*



# LOG OF BORING NO. DHX-18

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: See Drawing No. C00553-1 Surface El.: 1056.8 feet	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit	
			<div style="display: flex; justify-content: space-between;"> <div style="width: 20%;"> <p>⊗ Split Spoon</p> <p>⊠ Shelby Tube</p> <p>■ Rock Core</p> </div> <div style="width: 80%;"> <p style="text-align: center;"><b>MATERIAL DESCRIPTION</b></p> <p style="text-align: center;">Gray <u>SANDSTONE</u>, medium hard to hard</p> </div> </div>										
65													
70													
75													
80													
85													
87.9			87.9										
90			VOID										

BORING C00553.GPJ 2/28/01

Completion Depth: **97.6 feet**  
 Date Boring Started: **1/22/01**  
 Date Boring Completed: **1/23/01**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 85.2 ft. upon drilling completion.**

*Continued Next Page*

# LOG OF BORING NO. DHX-18

Project Description: **Big Branch Slurry Impoundment Investigation  
Martin County, Kentucky**



Depth, feet	Sample Type	Symbol / USCS	Location: <b>See Drawing No. C00553-1</b> Surface El.: <b>1056.8 feet</b>	Recovery %	RQD	Penetration Blows / 6 inches	Gravel %	Sand %	Silt and Clay %	Water Content %	Liquid Limit	Plastic Limit
			<b>MATERIAL DESCRIPTION</b>									
95	X		VOID - no recovery (88.3' - 90.3')  - silty sand and gravel (90.3' - 92.3')  - silty sand w/trace gravel (92.3' - 94.3')  - silty sand w/trace gravel (94.3' - 96.3')  - gravel (96.3' - 97.6')	97.6								
100			Bottom of Test Boring @ 97.6 ft.									
105												
110												
115												
120												

BORING C00553.GPJ 2/28/01

Completion Depth: **97.6 feet**  
 Date Boring Started: **1/22/01**  
 Date Boring Completed: **1/23/01**  
 Engineer/Geologist: **JEN/JTS**  
 Project No.: **C00553**

Remarks: **Water was noted at a depth of 85.2 ft. upon drilling completion.**

***APPENDIX A***

***LABORATORY TESTING***

**GRAIN SIZE DISTRIBUTION**

**TRIAXIAL SHEAR STRENGTH**

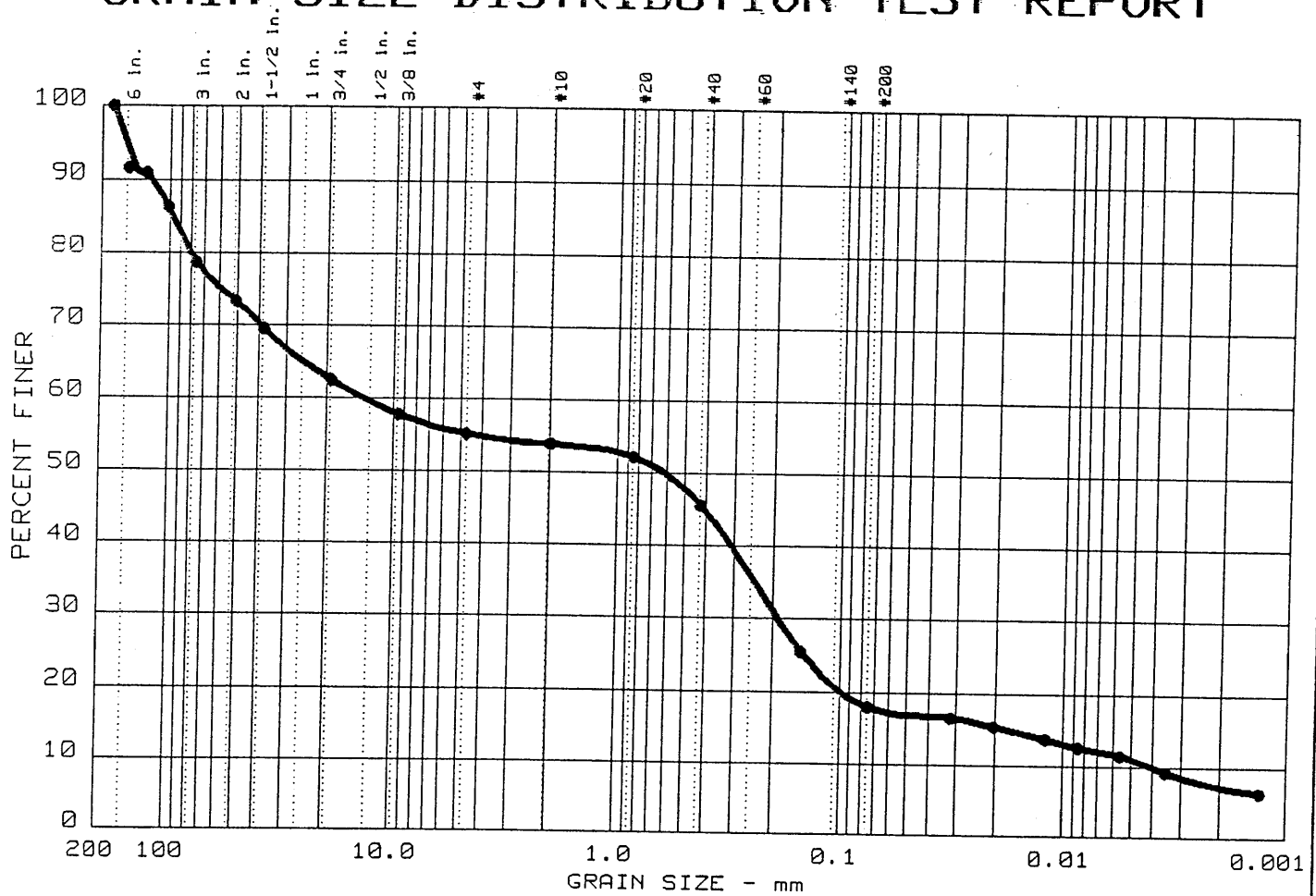
**PERMEABILITY**

**UNIAXIAL COMPRESSIVE STRENGTH**

**MODULUS OF RUPTURE**

***GRAIN SIZE DISTRIBUTION***

# GRAIN SIZE DISTRIBUTION TEST REPORT



●	% +75 <sub>mm</sub>	% GRAVEL	% SAND	% SILT	% CLAY
●	21.3	23.5	37.1	6.9	11.2

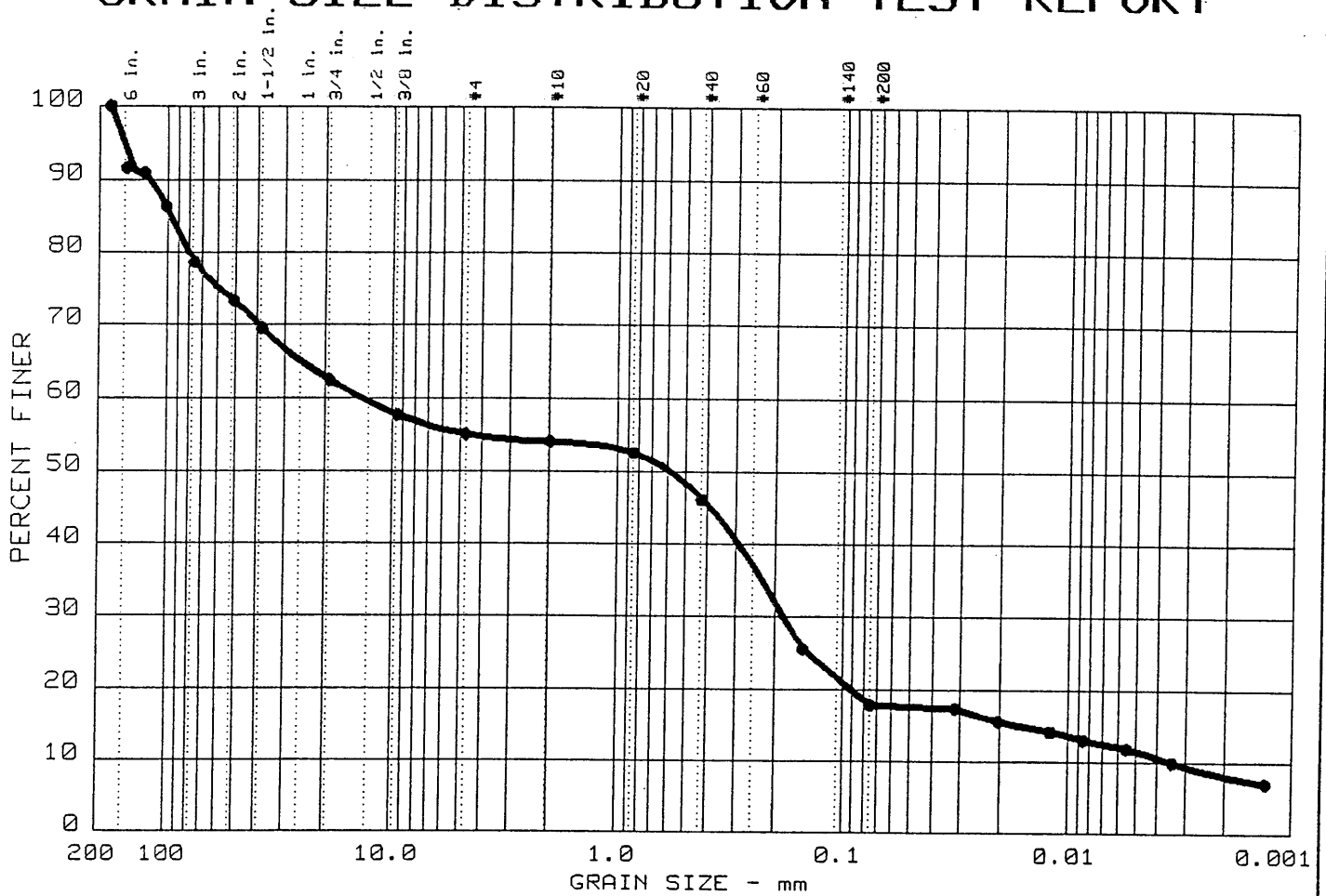
LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
● NP	NP	96.61	13.34	0.60	0.191	0.0162	0.0039	0.69	3388.4

MATERIAL DESCRIPTION	USCS	AASHTO
● LT. BROWN SILTY SAND WITH ROCK FRAGMENTS	GM	A-1-b

Project No.: C00553  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 ● Location: TP-1, S-1  
 Date: 03/01/01

Remarks:  
 Specific Gravity = 2.7  
 Figure No. \_\_\_\_\_

# GRAIN SIZE DISTRIBUTION TEST REPORT



% +75 mm	% GRAVEL	% SAND	% SILT	% CLAY
21.3	23.5	37.2	6.3	11.7

LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
NP	NP	96.61	13.34	0.58	0.184	0.0144	0.0034	0.75	3944.6

MATERIAL DESCRIPTION	USCS	AASHTO
● LT. BROWN SILTY SAND WITH ROCK FRAGMENTS	GM	A-1-b

Project No.: C00553  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 ● Location: TP-1, S-2  
  
 Date: 03/01/01

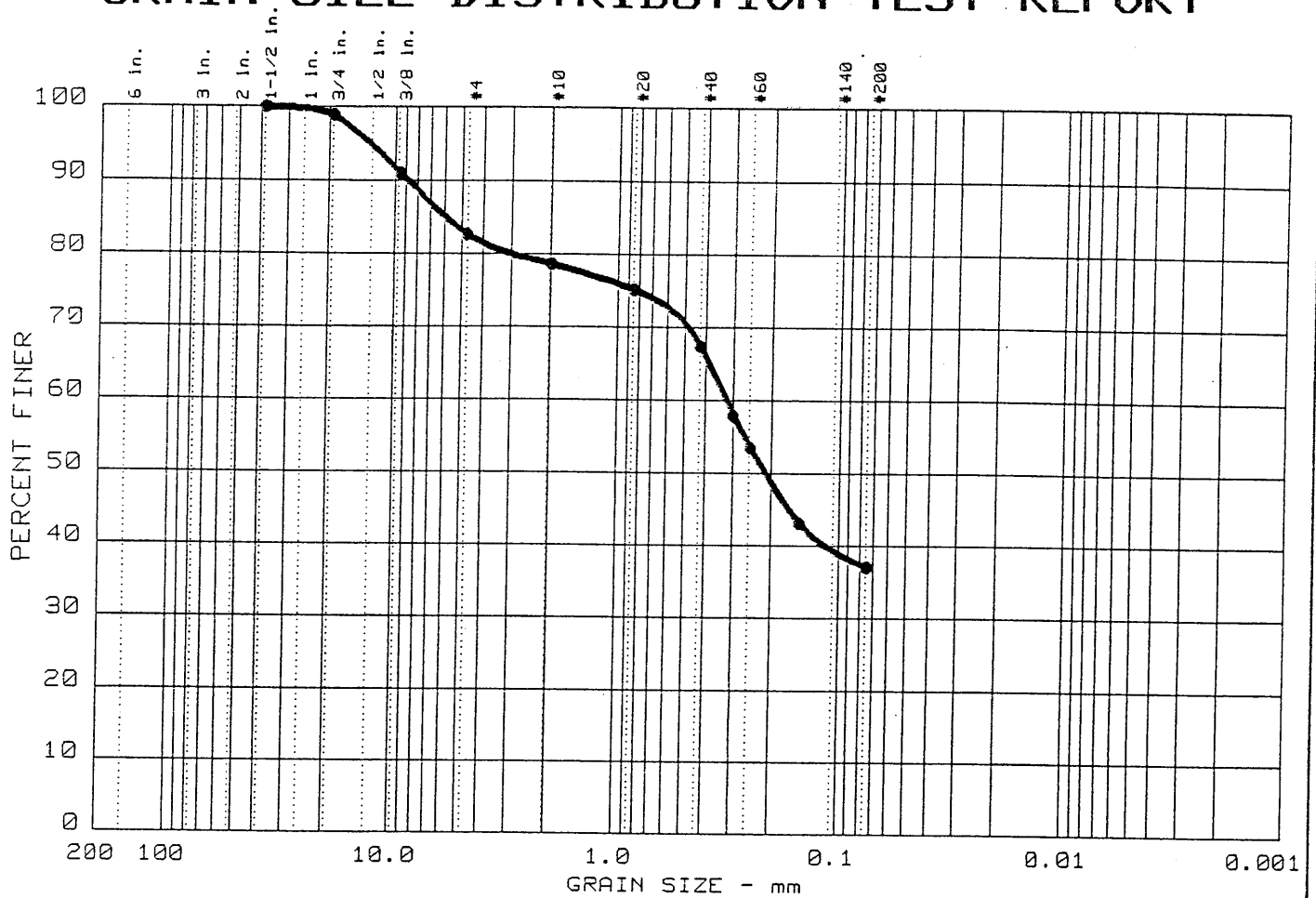
Remarks:  
  
 Specific Gravity = 2.7

GRAIN SIZE DISTRIBUTION TEST REPORT  
**TRIAD ENGINEERING, INC.**

Figure No. \_\_\_\_\_



# GRAIN SIZE DISTRIBUTION TEST REPORT



%+75 mm	% GRAVEL	% SAND	% SILT	% CLAY
0.0	17.3	45.6	37.1	

LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
		5.89	0.32	0.21					

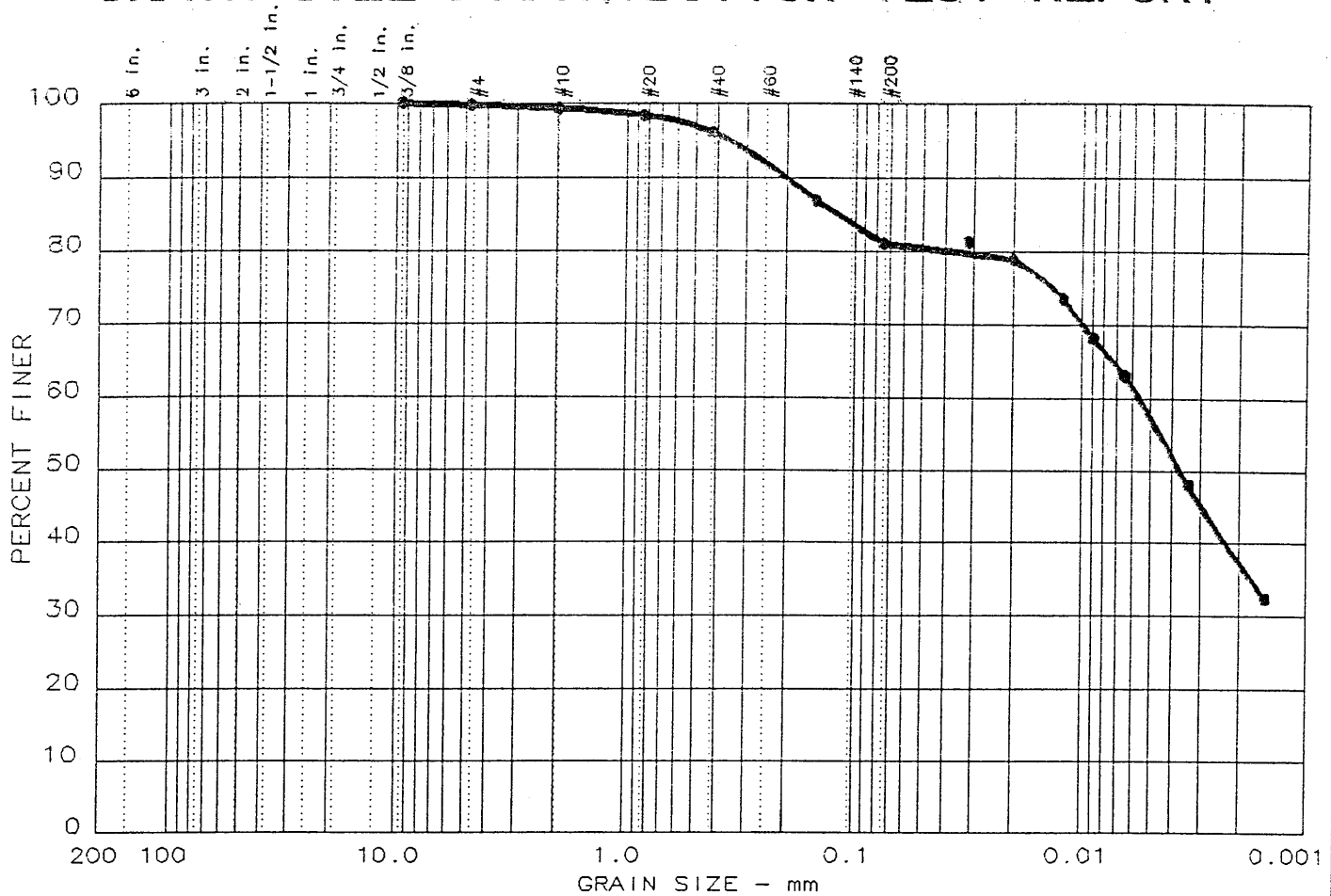
MATERIAL DESCRIPTION	USCS	AASHTO
● LT. BROWN SANDY SILT WITH ROCK FRAGMENTS	SM	A-4(0.0)

Project No.: C00553  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 ● Location: DH1-6, DEPTH: 40.0' - 42.0'  
 Date: 03/01/01

Remarks:

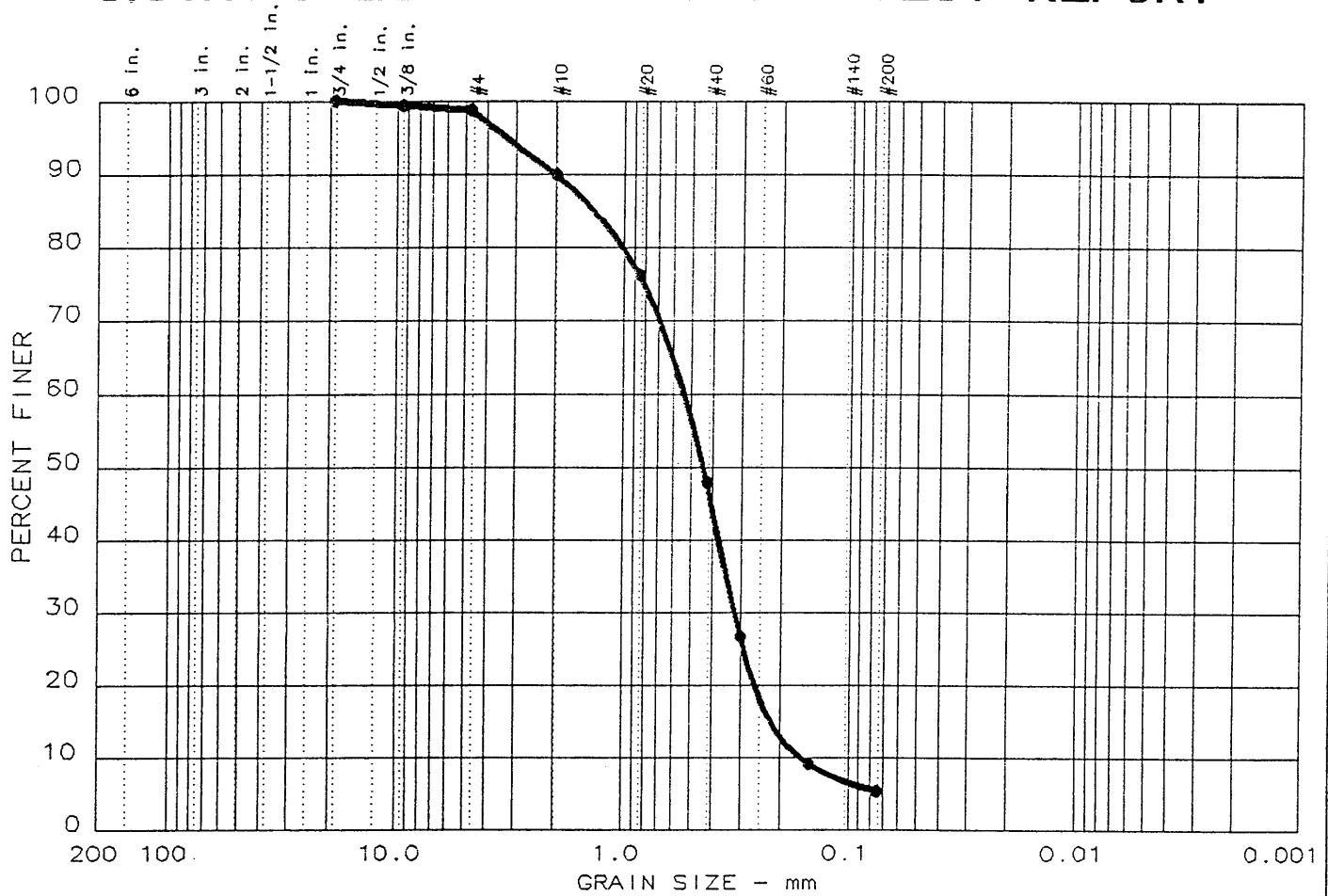
Figure No. \_\_\_\_\_

# GRAIN SIZE DISTRIBUTION TEST REPORT





# GRAIN SIZE DISTRIBUTION TEST REPORT



%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
0.0	1.3	93.3	5.4	

LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
		1.35	0.53	0.44	0.318	0.2195	0.1627	1.16	3.3

MATERIAL DESCRIPTION	USCS	AASHTO
● BROWN SILTY SAND WITH ROCK FRAGMENTS	SP-SM	A-1-b

Project No.: C00553  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 ● Location: DH1-11, DEPTH: 92.6' - 96.2'

Date: 02/19/2001

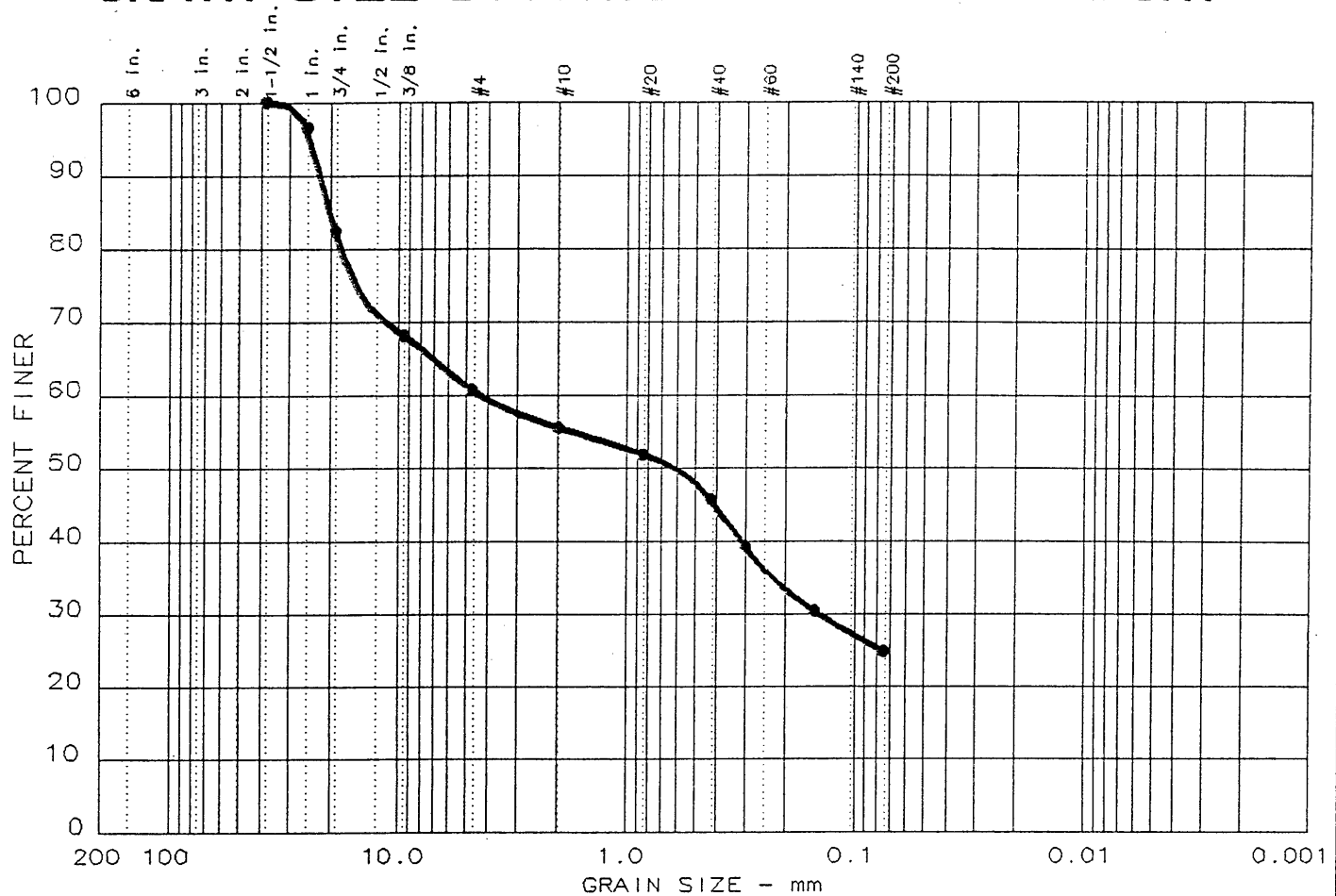
GRAIN SIZE DISTRIBUTION TEST REPORT  
**TRIAD ENGINEERING, INC.**

Remarks:

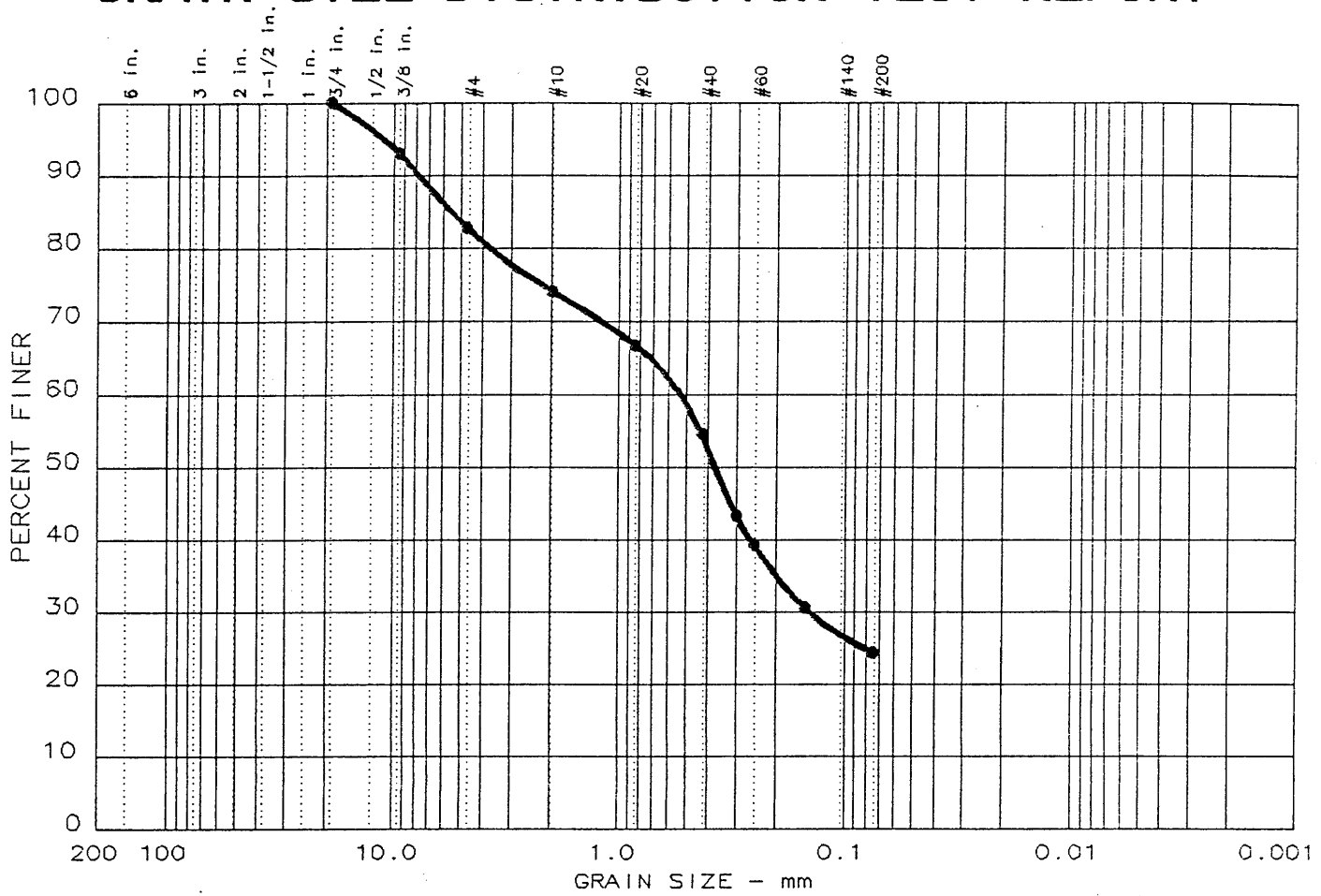
Figure No. \_\_\_\_\_



# GRAIN SIZE DISTRIBUTION TEST REPORT



# GRAIN SIZE DISTRIBUTION TEST REPORT



%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
0.0	17.2	58.3	24.5	

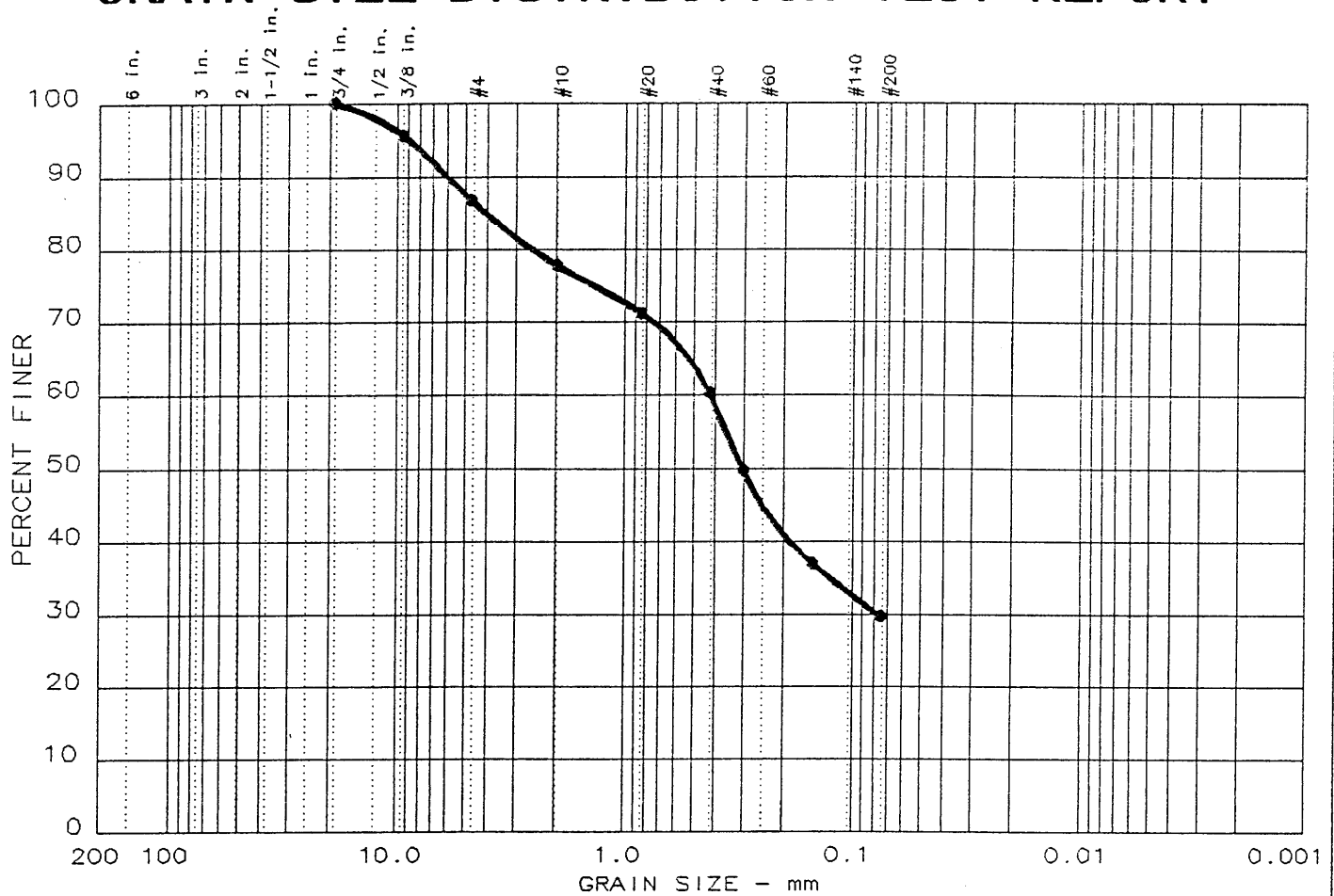
LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
		5.56	0.52	0.37	0.142				

MATERIAL DESCRIPTION	USCS	AASHTO
● GRAY SILTY SAND WITH ROCK FRAGMENTS	SM	A-2-4(0.0)

Project No.: C00553  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 ● Location: DH1-12, DEPTH: 90.1' - 99.4'  
 Date: 02/23/2001

Remarks:

# GRAIN SIZE DISTRIBUTION TEST REPORT



%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
0.0	13.3	56.9	29.8	

LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
		4.12	0.42	0.30	0.076				

MATERIAL DESCRIPTION	USCS	AASHTO
● BROWN SILTY SAND WITH ROCK FRAGMENTS	SM	A-2-4(0.0)

Project No.: C00553  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 ● Location: DH1-12, DEPTH: 90.7' - 99.2'

Date: 02/19/2001

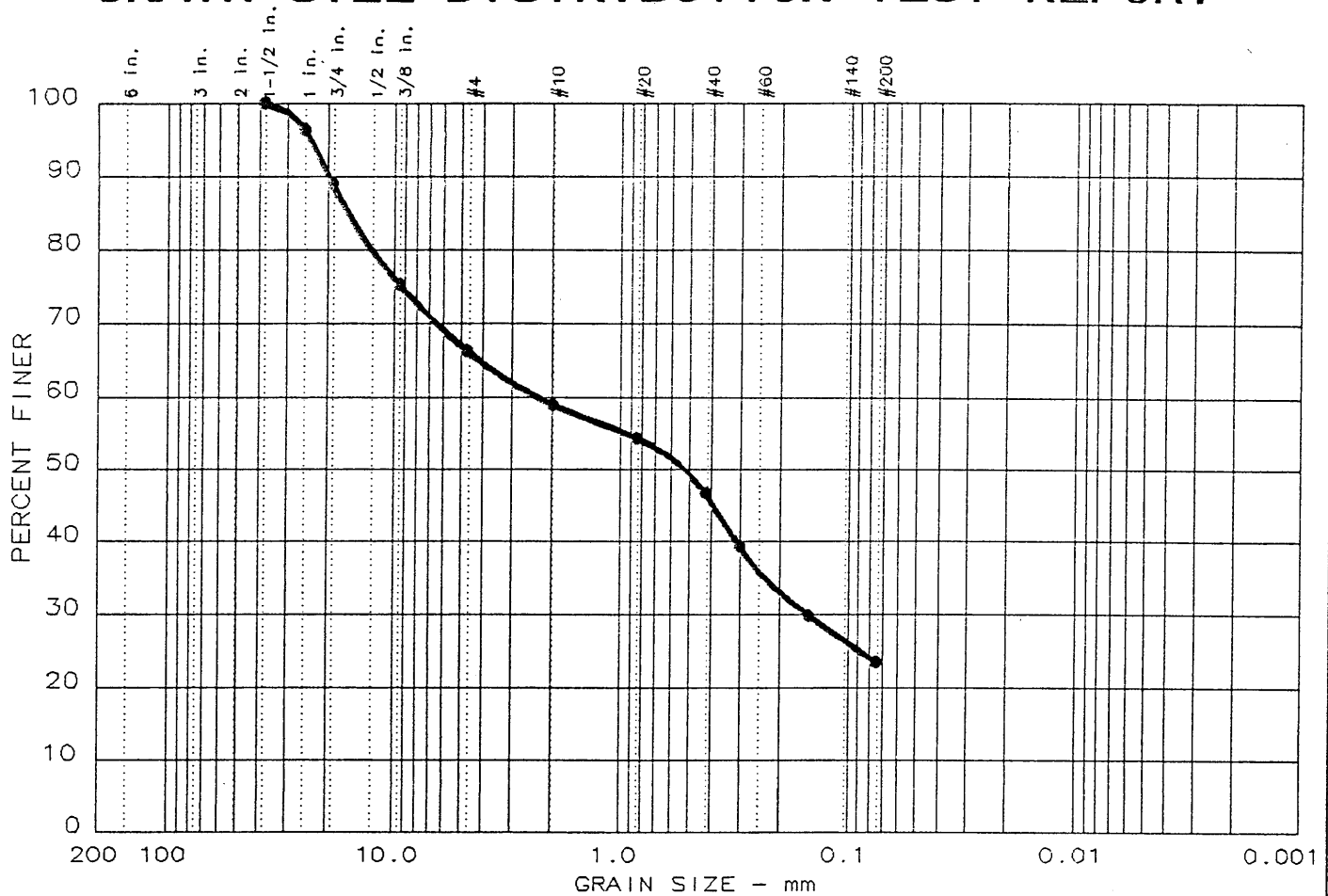
**GRAIN SIZE DISTRIBUTION TEST REPORT**  
**TRIAD ENGINEERING, INC.**

Remarks:

Figure No. \_\_\_\_\_



# GRAIN SIZE DISTRIBUTION TEST REPORT



%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
0.0	33.7	42.7	23.6	

LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
		16.20	2.34	0.52	0.151				

MATERIAL DESCRIPTION	USCS	AASHTO
● BROWN & GRAY SILTY SAND WITH ROCK FRAGMENTS	SM	A-1-b

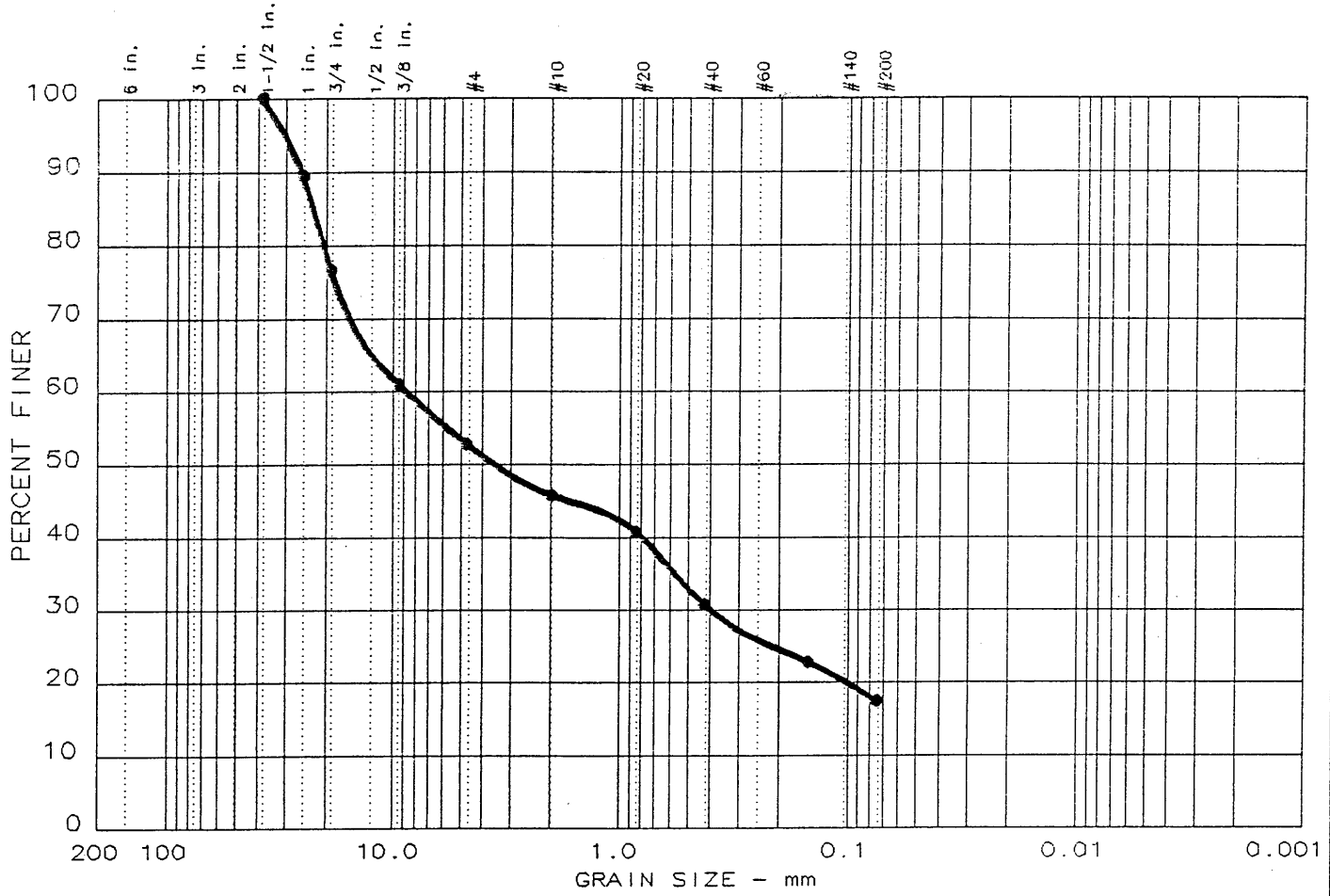
Project No.: C00553  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 ● Location: DH1-13, DEPTH: 87.7' - 89.7'

Date: 02/19/2001

Remarks:



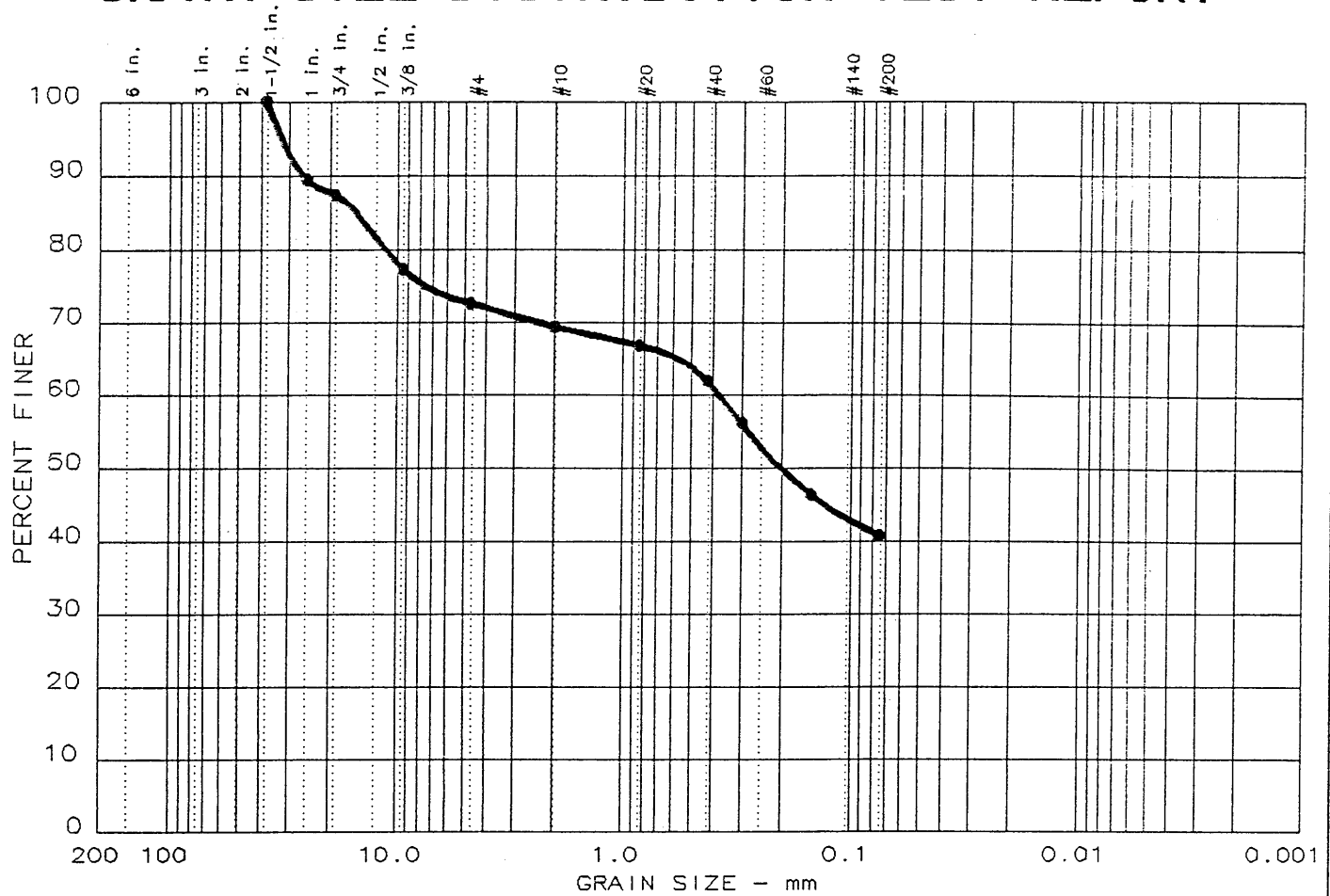
# GRAIN SIZE DISTRIBUTION TEST REPORT







# GRAIN SIZE DISTRIBUTION TEST REPORT



%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
0.0	27.4	31.8	40.8	

LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
26.8	6	15.31	0.37	0.20					

MATERIAL DESCRIPTION	USCS	AASHTO
● BLACK SANDY SILT WITH ROCK FRAGMENTS (SLURRY)	SC-SM	A-4(0.0)

Project No.: C00553  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 ● Location: DH2-9, DEPTH: 93.8' - 95.8'  
  
 Date: 02/23/2001

Remarks:  
  
 Specific Gravity = 2.03  
  
 Figure No. \_\_\_\_\_



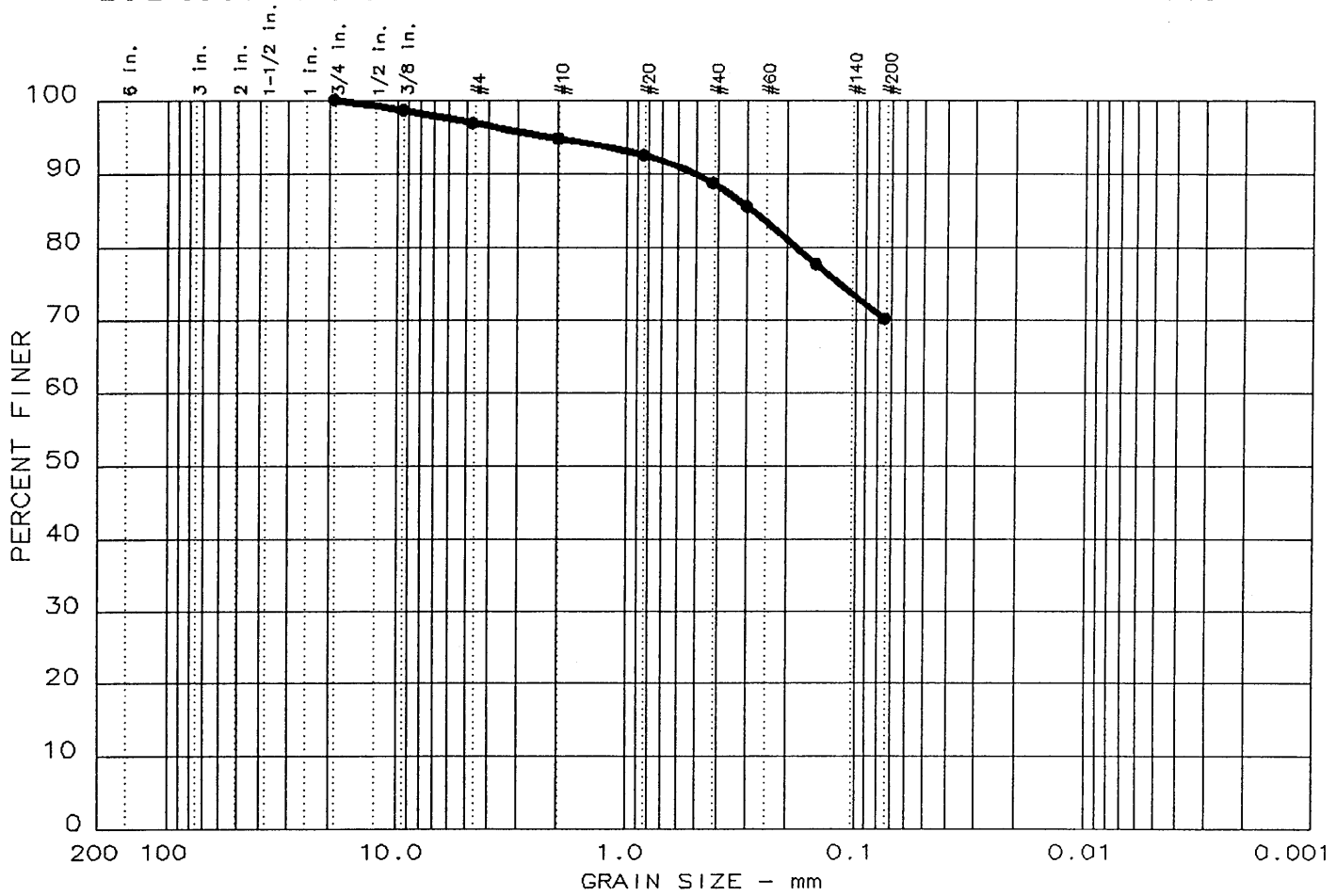








# GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	3.2	26.7	70.1	

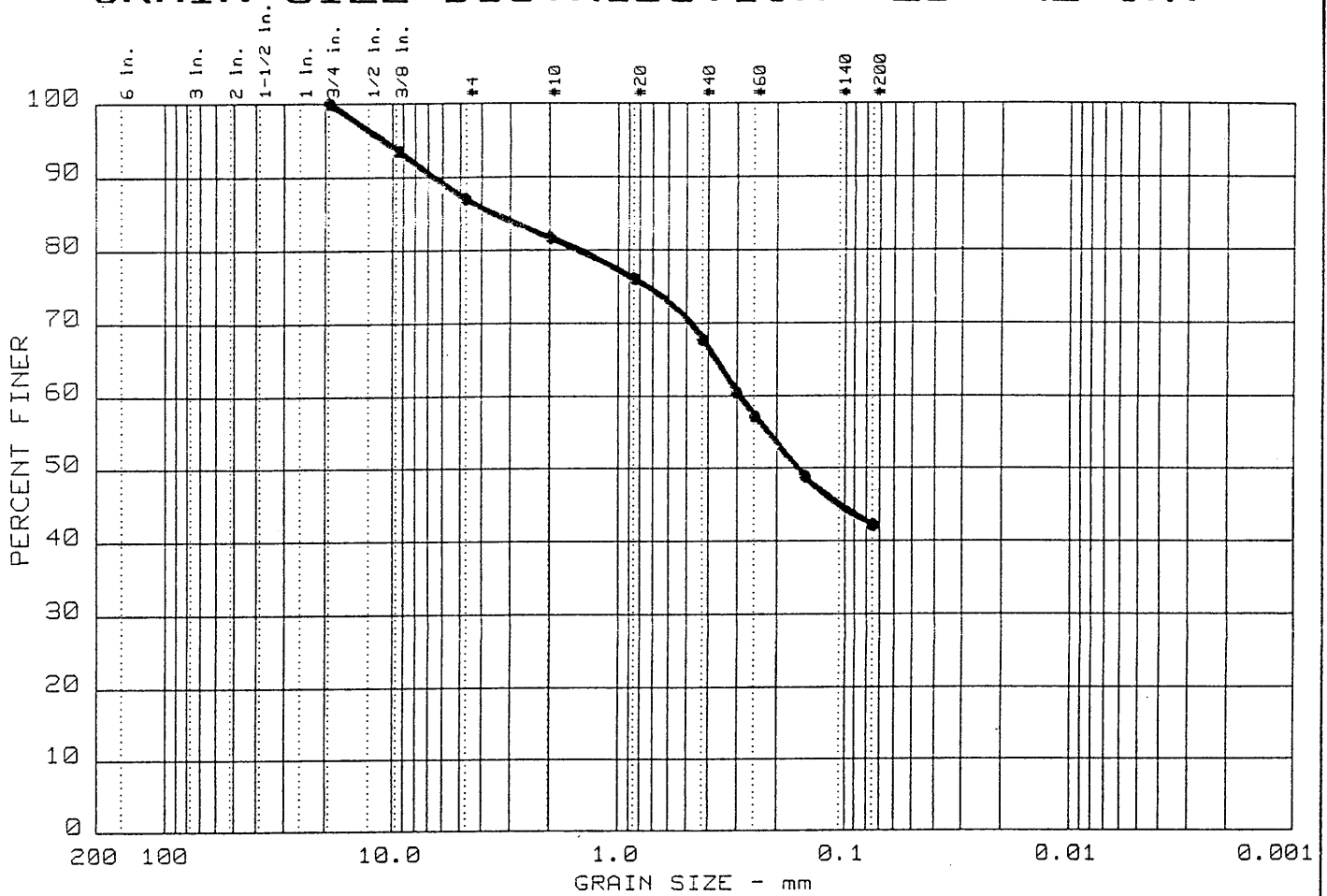
	LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
●	36.3	9.7	0.29							

MATERIAL DESCRIPTION	USCS	AASHTO
● BLACK SANDY SILT WITH ROCK FRAGMENTS (SLURRY)	ML	A-4(6.3)

Project No.: C00553 Project: BIG BRANCH SLURRY IMPOUNDMENT ● Location: DHX-2, (IN VOID)  Date: 02/19/2001	Remarks:
-----------------------------------------------------------------------------------------------------------------------	----------



# GRAIN SIZE DISTRIBUTION TEST REPORT



%+75 mm	% GRAVEL	% SAND	% SILT	% CLAY
0.0	12.9	44.8	42.3	

LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
		3.51	0.29	0.16					

MATERIAL DESCRIPTION	USCS	AASHTO
● LT. BROWN SANDY SILT WITH ROCK FRAGMENTS	SM	A-4(0.0)

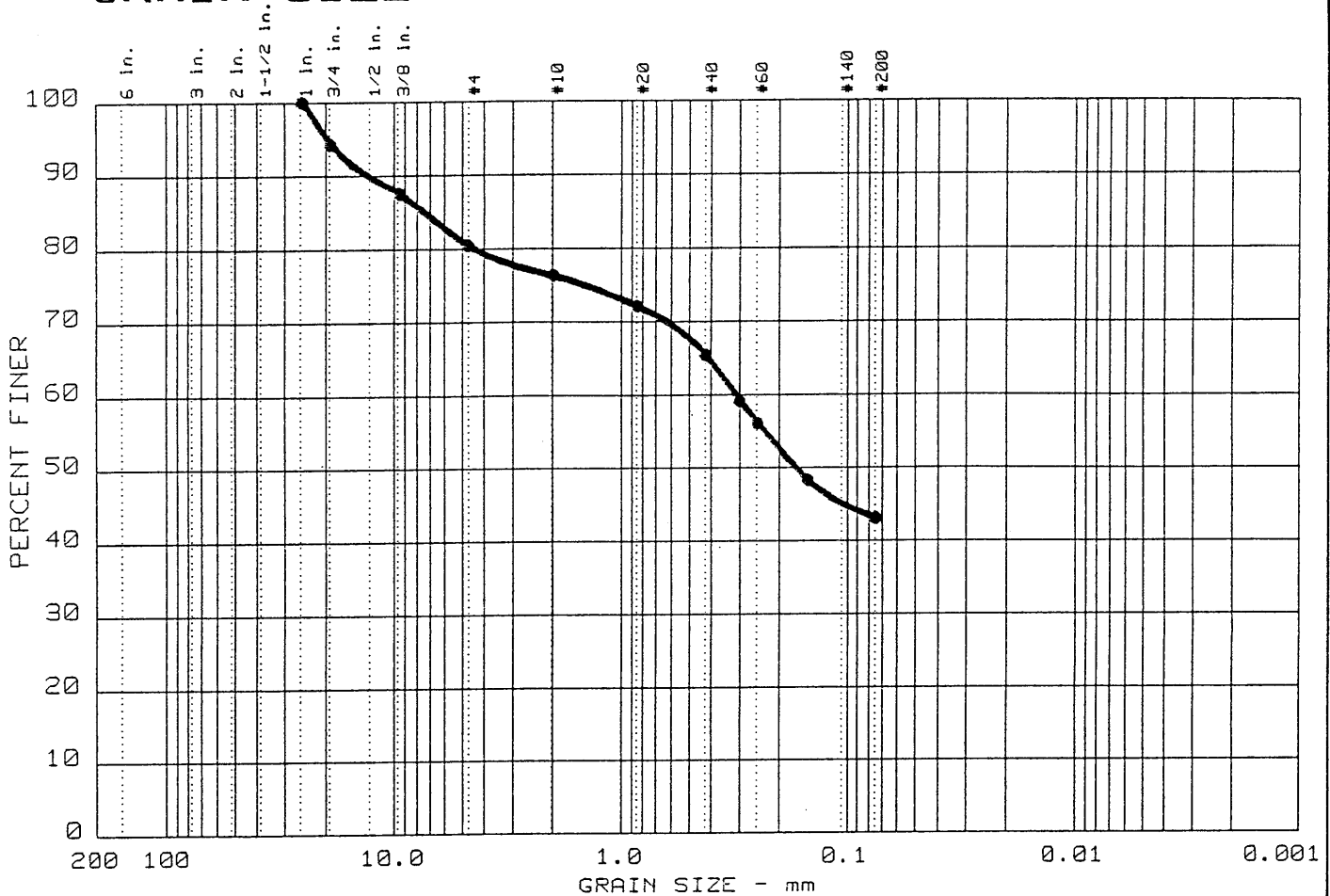
Project No.: C00553  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 ● Location: DHX-12, DEPTH: 68.0' - 69.0'

Date: 03/01/01

Remarks:

Figure No. \_\_\_\_\_

# GRAIN SIZE DISTRIBUTION TEST REPORT



%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
0.0	19.4	37.3	43.3	

LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
		7.33	0.31	0.17					

MATERIAL DESCRIPTION	USCS	AASHTO
● BROWN SANDY SILT WITH ROCK FRAGMENTS	SM	A-4(0.0)

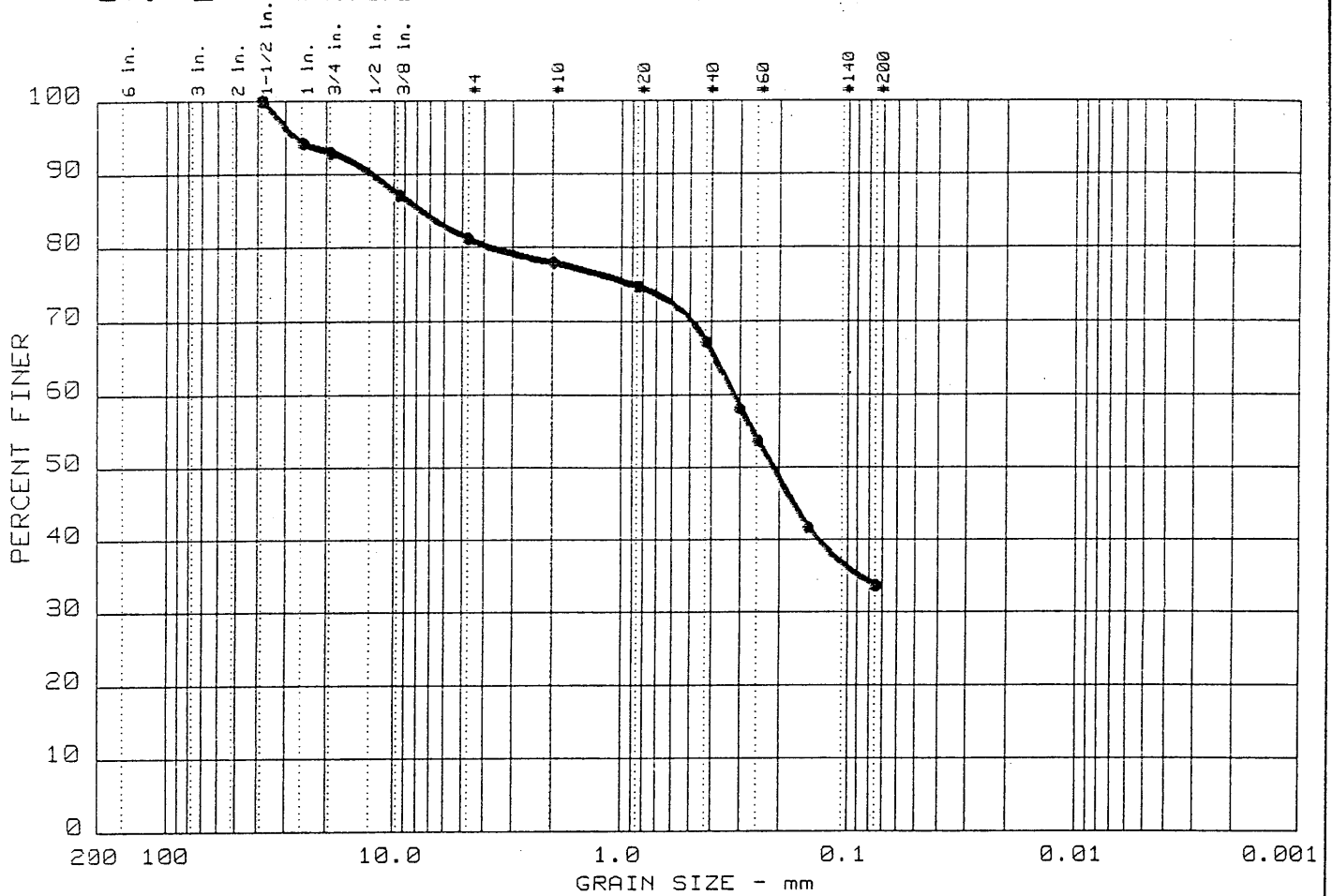
Project No.: C00553  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 ● Location: DHX-13, DEPTH: 76.0' - 77.3'

Date: 03/01/01

Remarks:

Figure No. \_\_\_\_\_

# GRAIN SIZE DISTRIBUTION TEST REPORT



% +75 mm	% GRAVEL	% SAND	% SILT	% CLAY
0.0	18.8	47.5	33.7	

LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
		7.50	0.32	0.21					

MATERIAL DESCRIPTION	USCS	AASHTO
● LT. BROWN SILTY SAND WITH ROCK FRAGMENTS	SM	A-2-4(0.0)

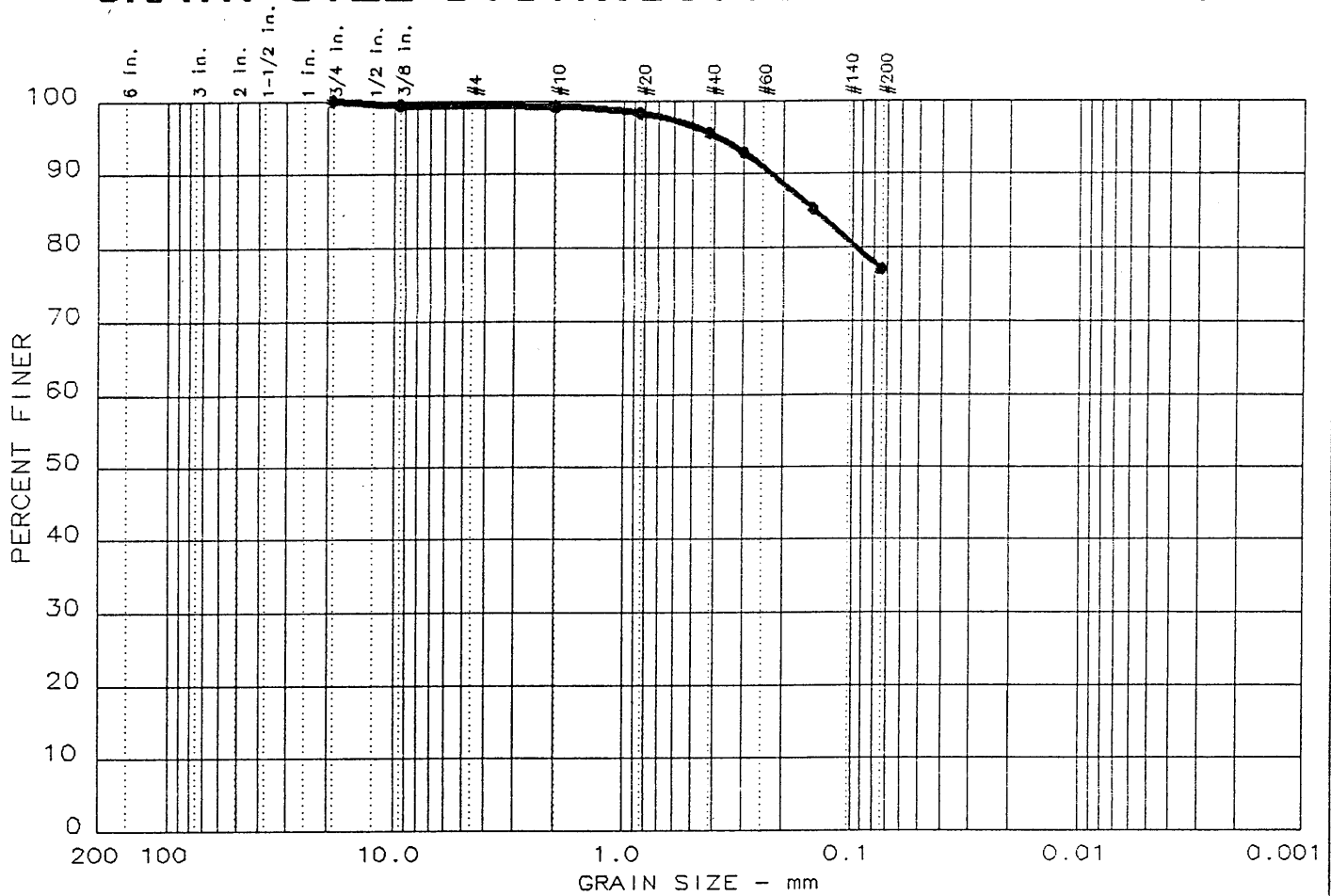
Project No.: C00553  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 ● Location: DHX-13, DEPTH: 84.0' - 86.0'

Date: 03/01/01

Remarks:

Figure No. \_\_\_\_\_

# GRAIN SIZE DISTRIBUTION TEST REPORT



%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.7	22.2	77.1	

LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
38.2	10.7	0.15							

MATERIAL DESCRIPTION	USCS	AASHTO
● BLACK SANDY SILT WITH ROCK FRAGMENTS (SLURRY)	ML	A-6(8.6)

Project No.: C00553  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 ● Location: DHX-17, DEPTH: 91.6' - 99.0'

Date: 02/19/2001

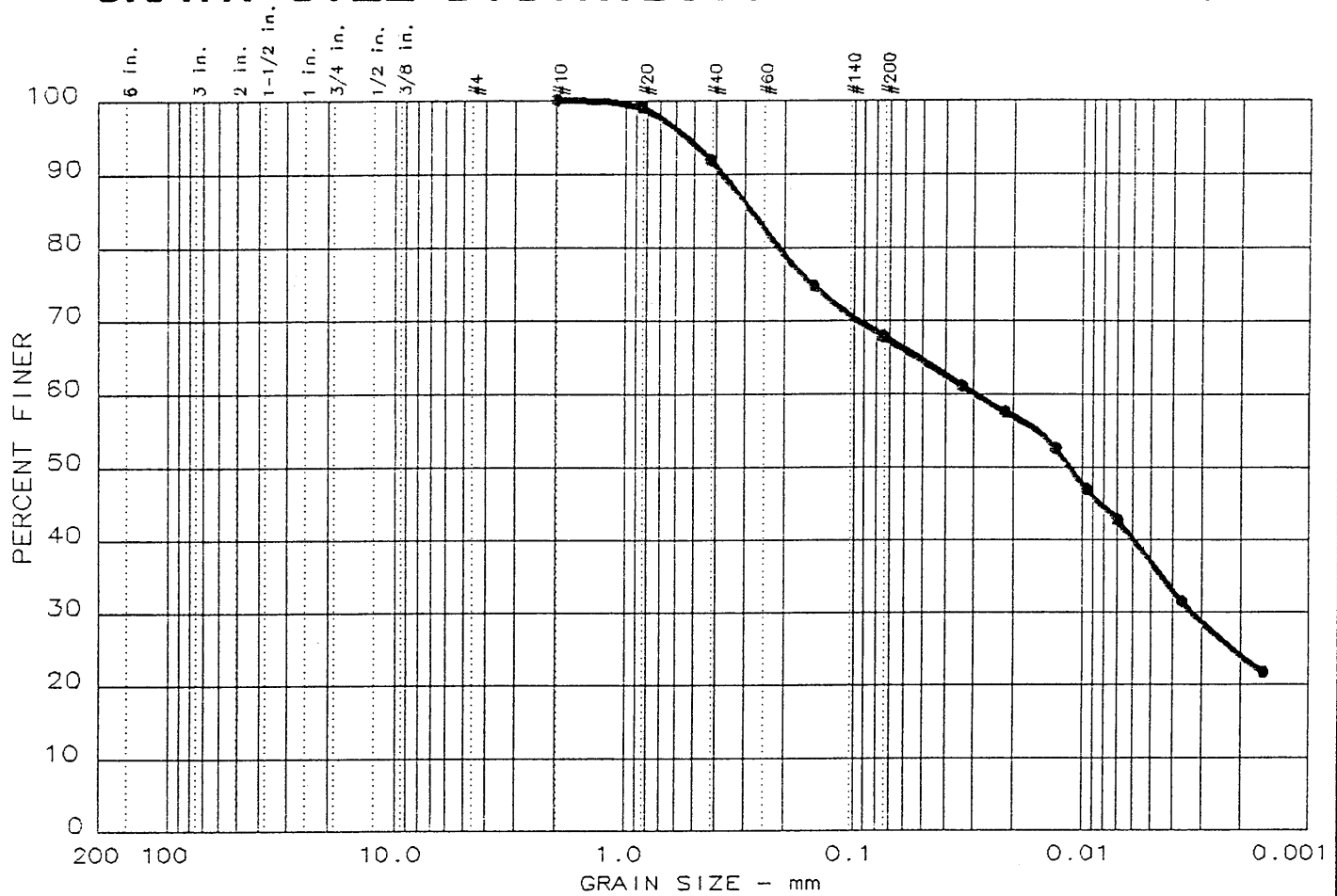
Remarks:

Figure No. \_\_\_\_\_





# GRAIN SIZE DISTRIBUTION TEST REPORT



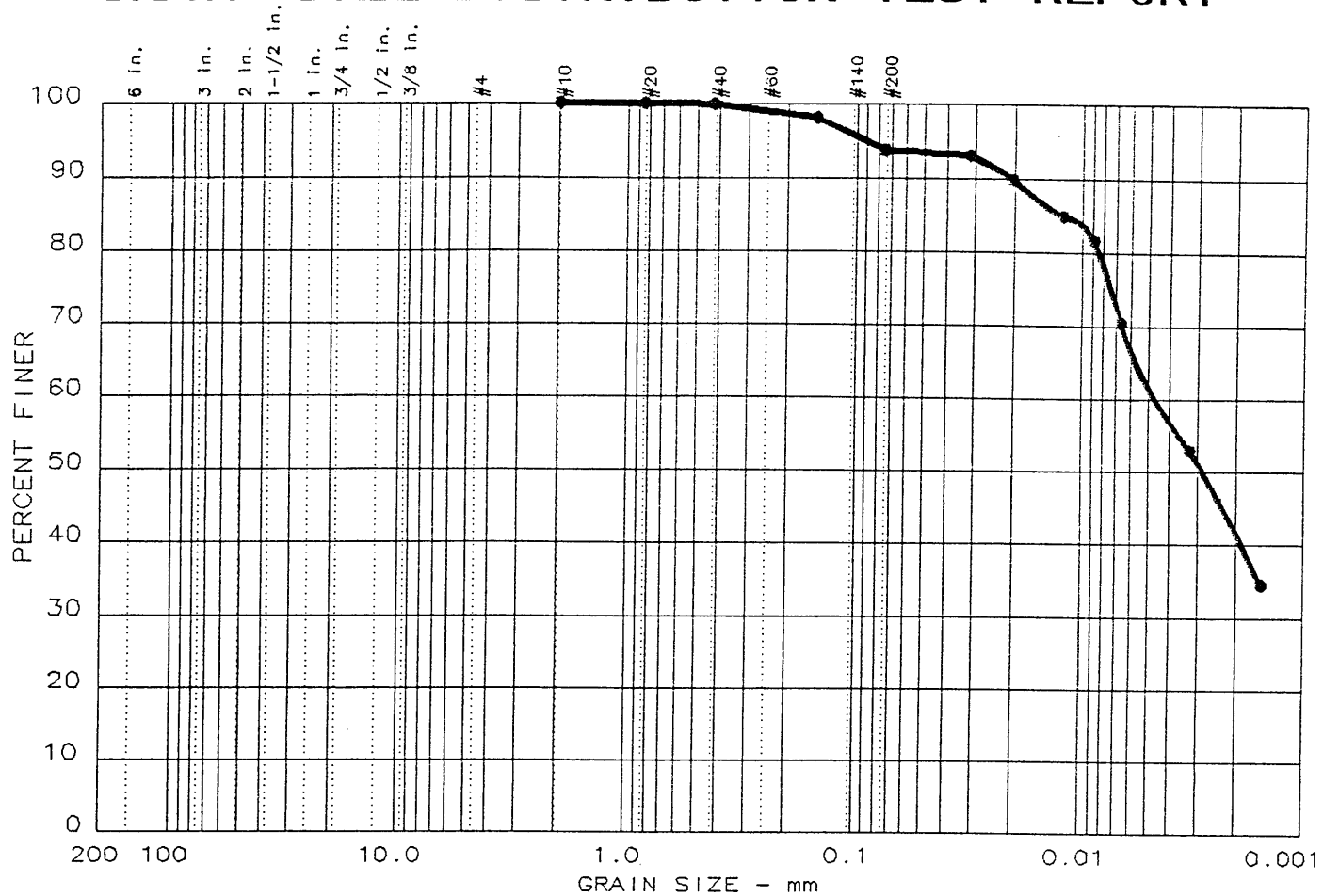
%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	32.2	30.8	37.0

LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
32.1	8.1	0.28		0.01	0.003				

MATERIAL DESCRIPTION	USCS	AASHTO
● BLACK SANDY SILT (SLURRY)	ML	A-4(4.2)

Project No.: C00553 Project: BIG BRANCH SLURRY IMPOUNDMENT ● Location: SP-2 (BIG BRANCH IMPOUNDMENT)  Date: 02/23/2001	Remarks:  Specific Gravity = 2.07
GRAIN SIZE DISTRIBUTION TEST REPORT <b>TRIAD ENGINEERING, INC.</b>	
Figure No. _____	

# GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75 <sub>mm</sub>	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.0	6.3	32.2	61.5

LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
● 32.1	8.1			0.00					

MATERIAL DESCRIPTION	USCS	AASHTO
● BLACK SANDY SILT (SLURRY)	ML	A-4(7.9)

Project No.: CO0553  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 ● Location: SP-3 (BIG BRANCH IMPOUNDMENT)

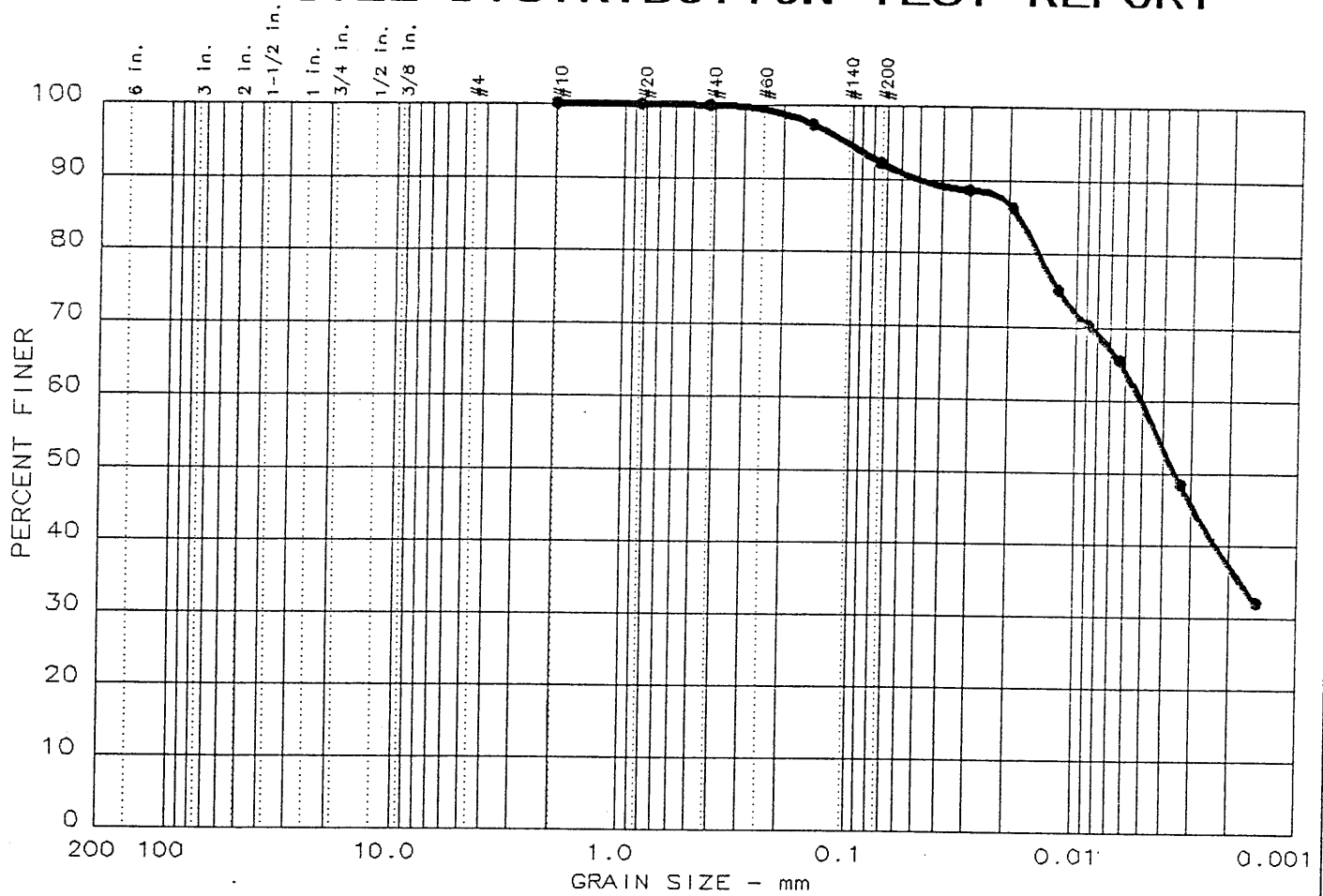
Date: 02/23/2001

Remarks:

Specific Gravity = 2.07

Figure No. \_\_\_\_\_

# GRAIN SIZE DISTRIBUTION TEST REPORT



●	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.0	7.8	32.5	59.7

●	LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
●	40.2	10.1			0.00					

MATERIAL DESCRIPTION	USCS	AASHTO
● BLACK SANDY CLAY (SLURRY)	ML	A-4(11.4)

Project No.: C00553  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 ● Location: SP-4 (BIG BRANCH IMPOUNDMENT)

Date: 02/23/2001

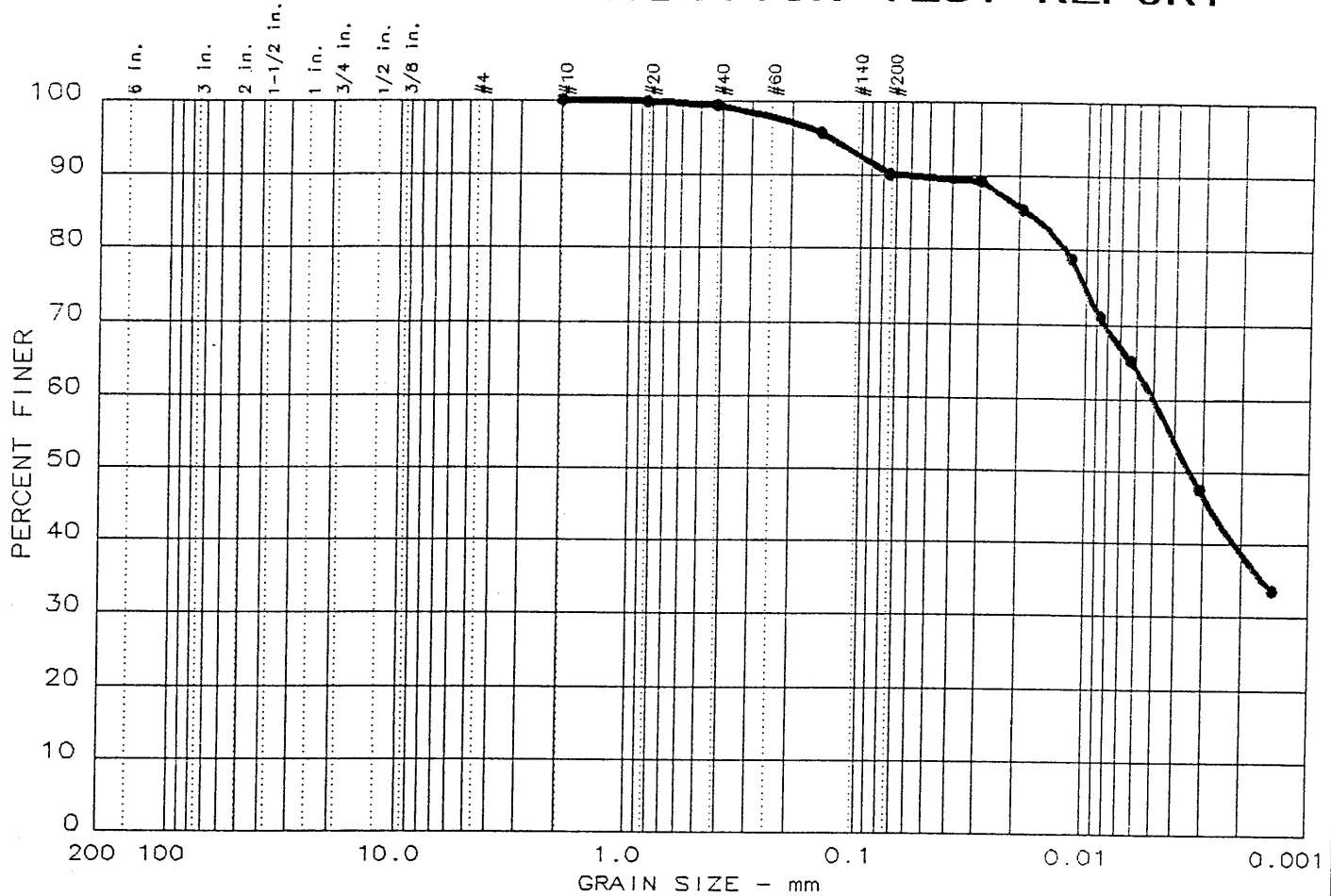
Remarks:

Specific Gravity = 2.20

Figure No. \_\_\_\_\_



# GRAIN SIZE DISTRIBUTION TEST REPORT



	%+75mm	% GRAVEL	% SAND	% SILT	% CLAY
●	0.0	0.0	10.0	30.1	59.9

	LL	PI	D <sub>85</sub>	D <sub>60</sub>	D <sub>50</sub>	D <sub>30</sub>	D <sub>15</sub>	D <sub>10</sub>	C <sub>c</sub>	C <sub>u</sub>
●	38.3	9.0			0.00					

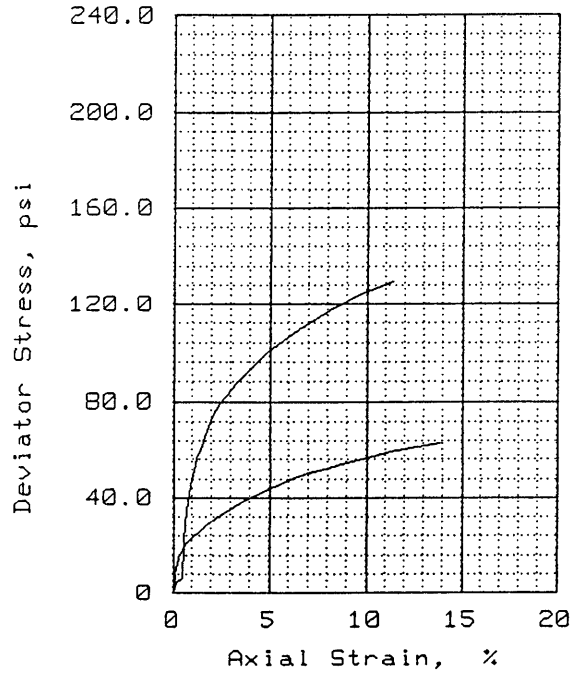
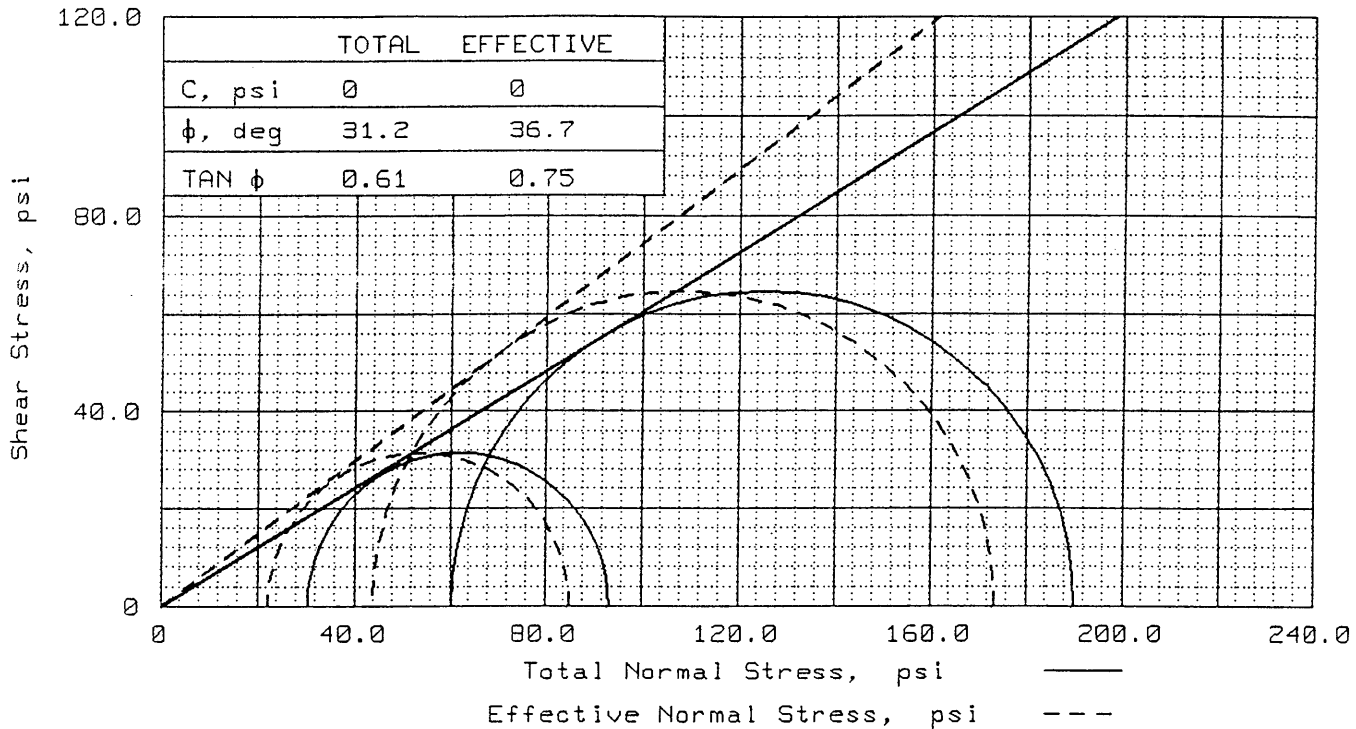
MATERIAL DESCRIPTION	USCS	AASHTO
● BLACK SANDY CLAY (SLURRY)	ML	A-4(9.7)

Project No.: C00553  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 ● Location: WOLF CREEK #1  
 Date: 02/23/2001

Remarks:  
 Specific Gravity = 2.18  
 Figure No. \_\_\_\_\_

GRAIN SIZE DISTRIBUTION TEST REPORT  
**TRIAD ENGINEERING, INC.**

***TRIAXIAL SHEAR STRENGTH***



SAMPLE NO.		1	2
INITIAL	WATER CONTENT, %	14.1	11.3
	DRY DENSITY, pcf	122.2	122.4
	SATURATION, %	105.8	85.6
	VOID RATIO	0.354	0.351
	DIAMETER, in	2.80	2.82
	HEIGHT, in	5.85	6.21
AT TEST	WATER CONTENT, %	11.9	12.9
	DRY DENSITY, pcf	125.7	123.3
	SATURATION, %	99.4	99.8
	VOID RATIO	0.316	0.341
	DIAMETER, in	2.77	2.81
	HEIGHT, in	5.80	6.20
Strain rate, %/min		0.015	0.015
BACK PRESSURE, psi		50.0	50.0
CELL PRESSURE, psi		80.0	110.0
FAILURE STRESS, psi		63.0	129.7
PORE PRESSURE, psi		58.2	66.6
ULTIMATE STRESS, psi			
PORE PRESSURE, psi			
$\bar{\sigma}_1$ FAILURE, psi		84.8	173.1
$\bar{\sigma}_3$ FAILURE, psi		21.8	43.4

TYPE OF TEST:  
 CU with pore pressures  
 SAMPLE TYPE: UNDISTURBED  
 DESCRIPTION: LT. BROWN SANDY  
 SILT WITH ROCK FRAGMENTS  
 LL=            PL=            PI=  
 SPECIFIC GRAVITY= 2.65  
 REMARKS:

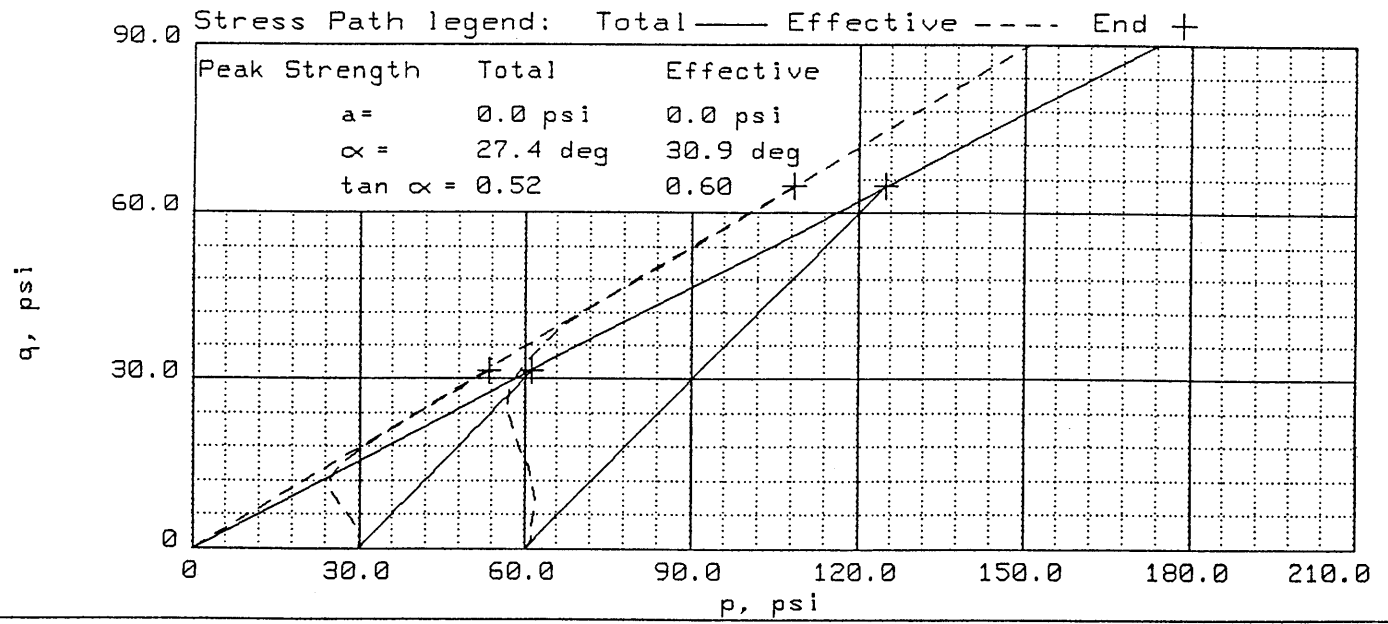
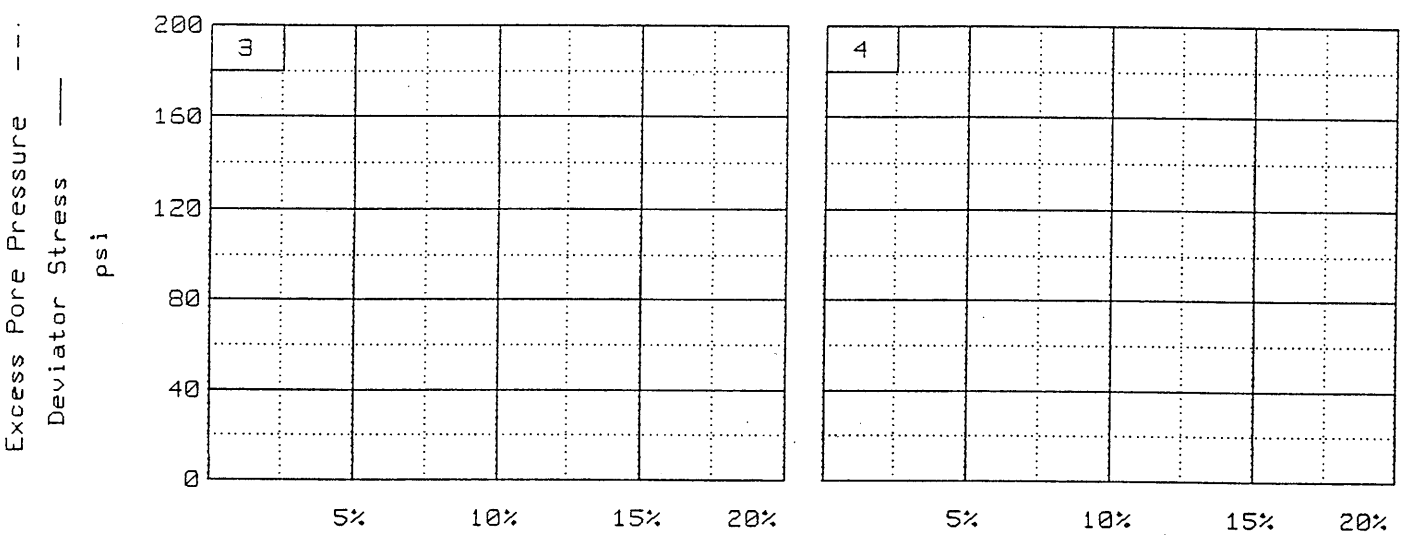
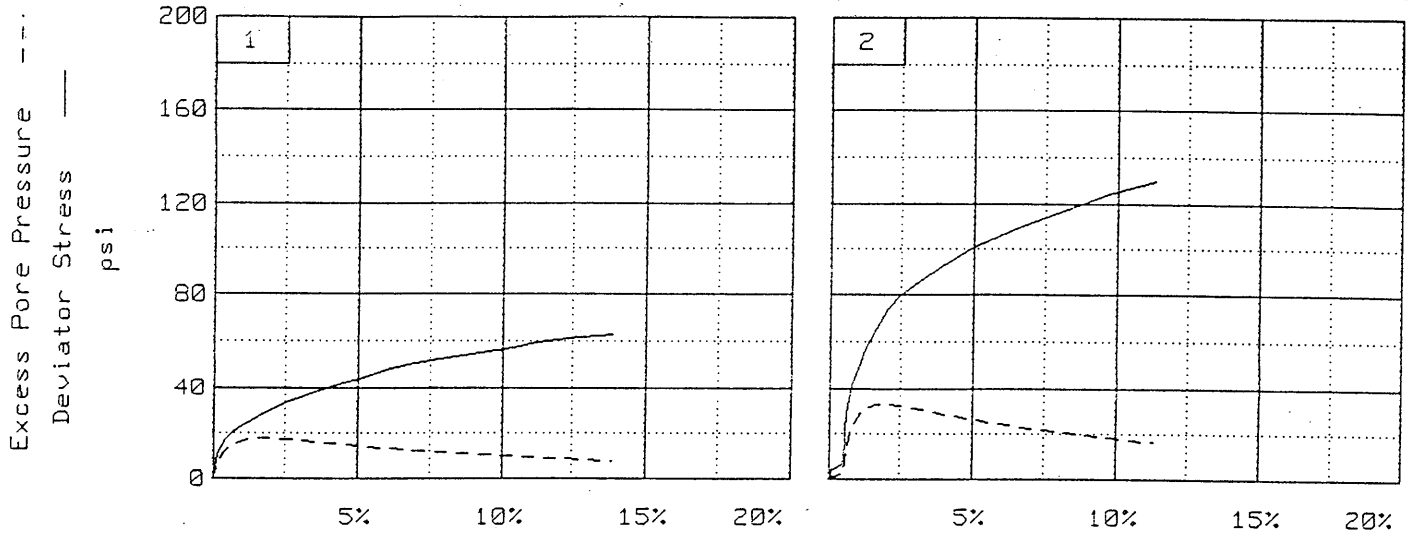
CLIENT: US DEPARTMENT OF LABOR  
 PROJECT: BIG BRANCH SLURRY IMPOUNDMENT  
 SAMPLE LOCATION: DH1-6, DEPTH: 40.0'-42.0'  
 PROJ. NO.: C00553                      DATE: 02/27/01

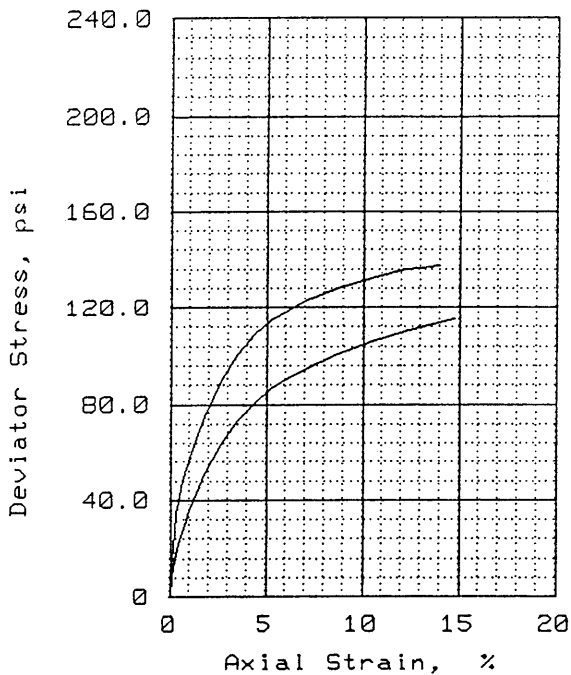
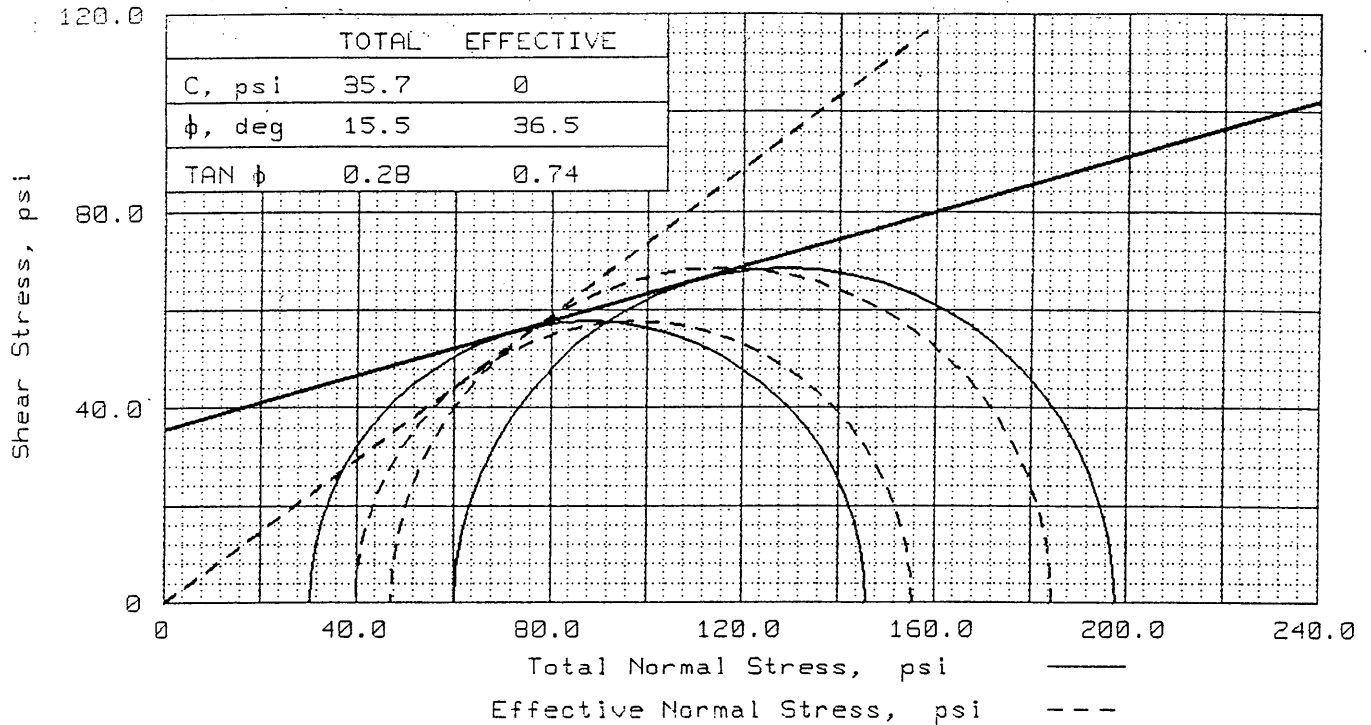
TRIAxIAL SHEAR TEST REPORT

**TRIAD ENGINEERING, INC.**

FIG. NO.







SAMPLE NO.		1	2
INITIAL	WATER CONTENT, %	12.6	12.6
	DRY DENSITY, pcf	125.3	125.0
	SATURATION, %	104.1	103.3
	VOID RATIO	0.321	0.323
	DIAMETER, in	2.85	2.85
	HEIGHT, in	5.79	5.82
AT TEST	WATER CONTENT, %	11.4	11.1
	DRY DENSITY, pcf	126.7	127.8
	SATURATION, %	99.1	99.7
	VOID RATIO	0.306	0.295
	DIAMETER, in	2.84	2.83
	HEIGHT, in	5.77	5.78
Strain rate, %/min		0.015	0.015
BACK PRESSURE, psi		50.0	50.0
CELL PRESSURE, psi		80.0	110.0
FAILURE STRESS, psi		115.6	137.5
PORE PRESSURE, psi		40.5	63.1
ULTIMATE STRESS, psi			
PORE PRESSURE, psi			
$\bar{\sigma}_1$ FAILURE, psi		155.1	184.4
$\bar{\sigma}_3$ FAILURE, psi		39.5	46.9

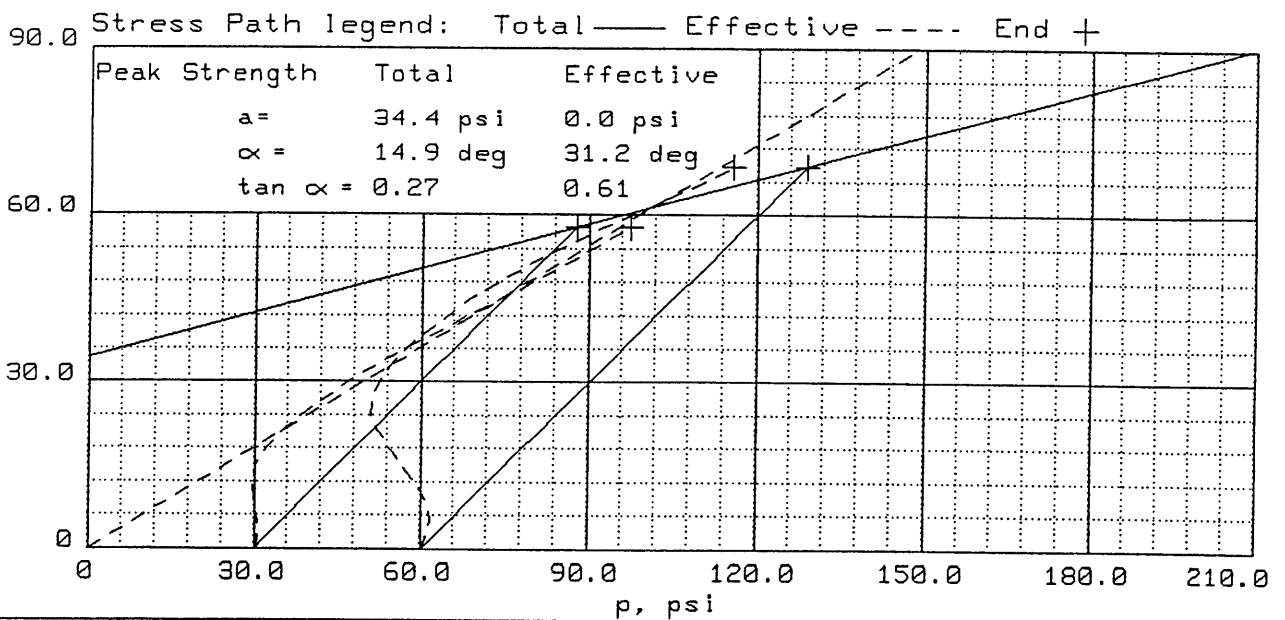
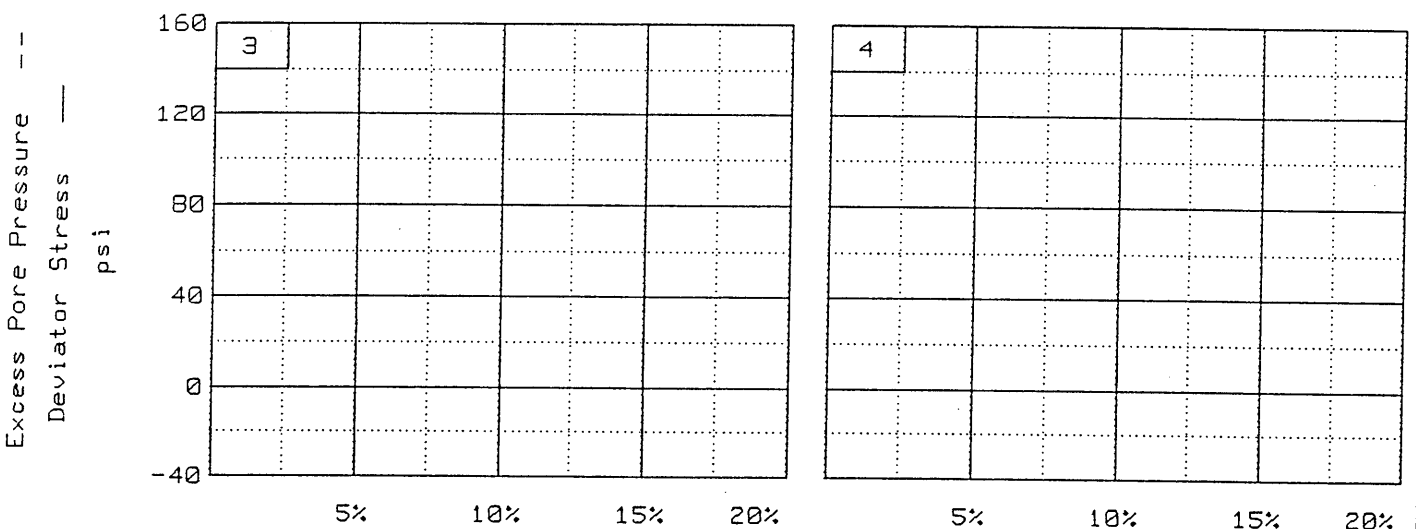
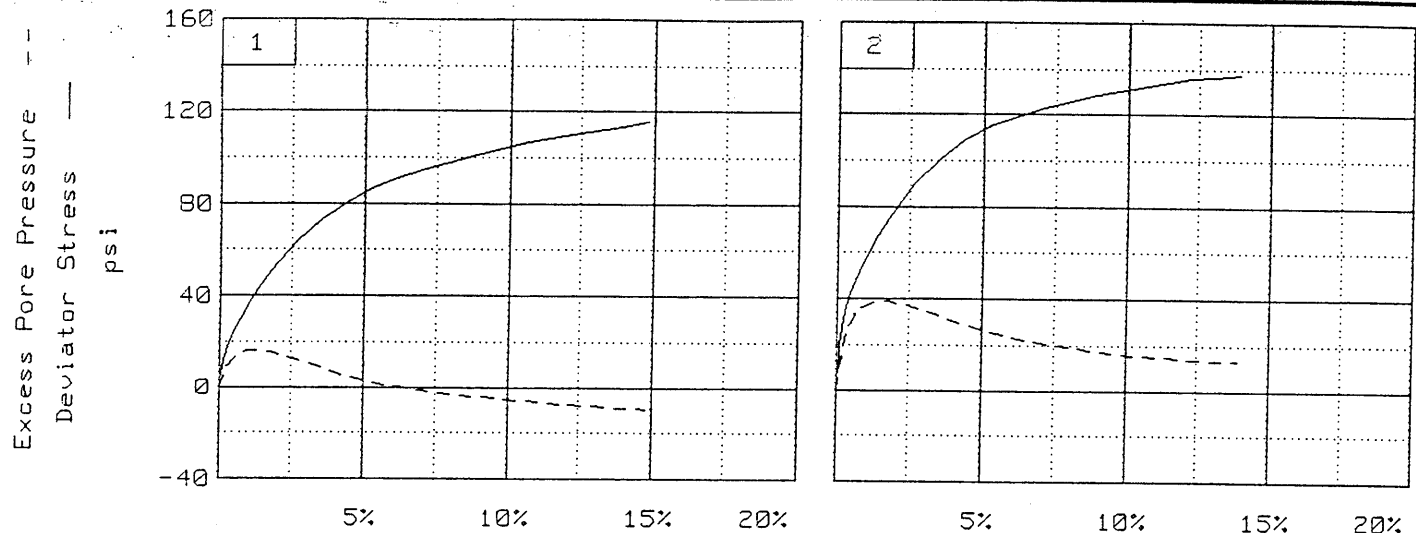
TYPE OF TEST:  
 CU with pore pressures  
 SAMPLE TYPE: UNDISTURBED  
 DESCRIPTION: LT. BROWN SILTY  
 SAND WITH ROCK FRAGMENTS  
 LL=            PL=            PI=  
 SPECIFIC GRAVITY= 2.65  
 REMARKS:

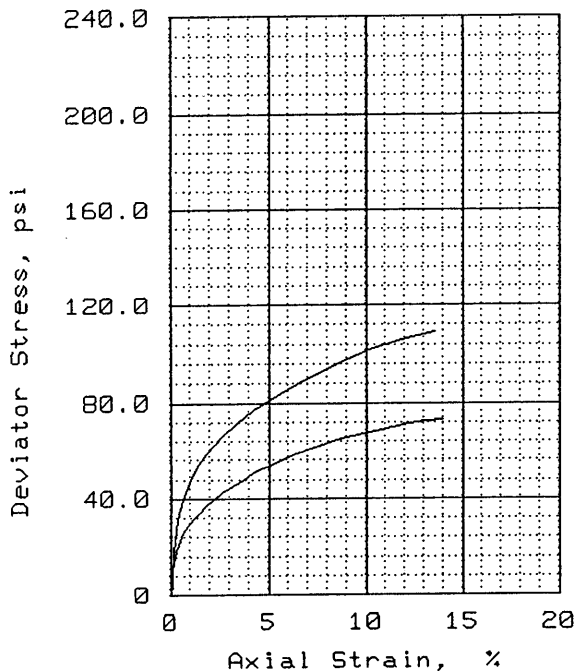
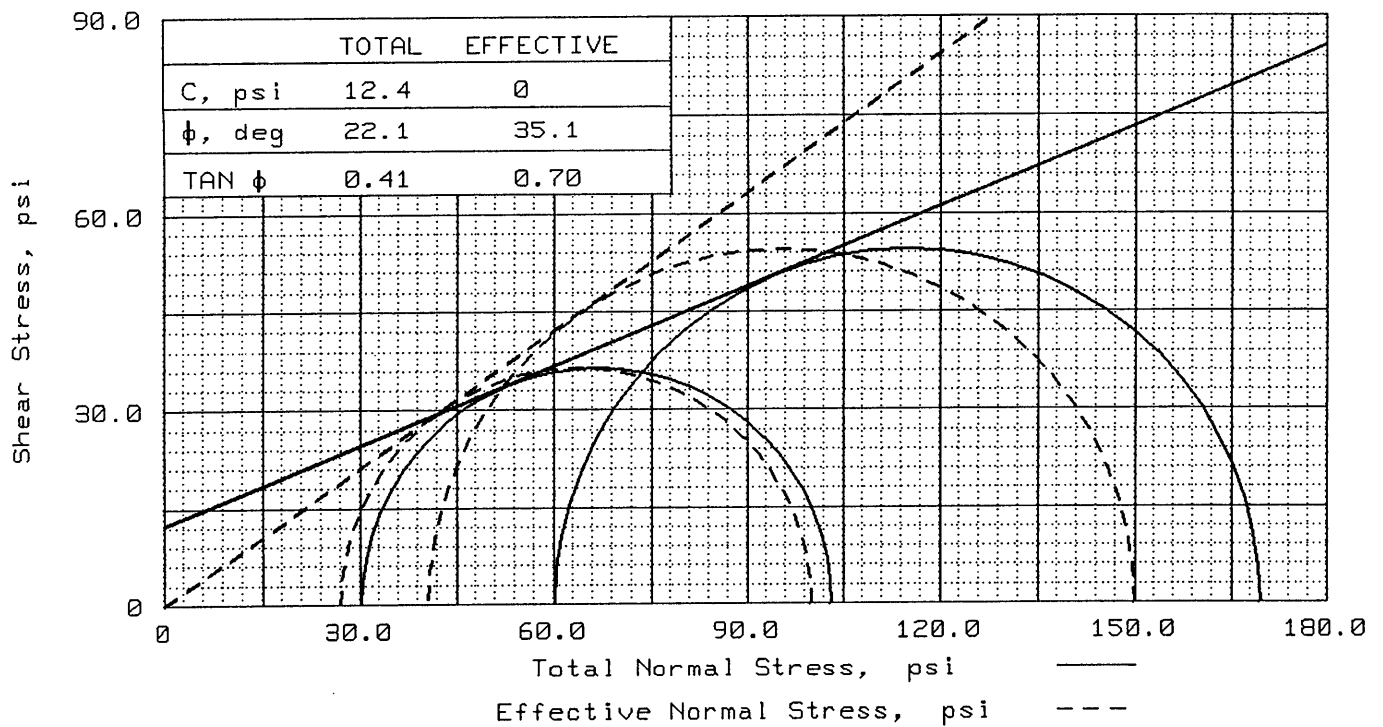
CLIENT: US DEPARTMENT OF LABOR  
 PROJECT: BIG BRANCH SLURRY IMPOUNDMENT  
 SAMPLE LOCATION: DHX-13  
 DEPTH: 84.0' - 86.0'  
 PROJ. NO.: C00553                      DATE: 03/05/01

TRIAxIAL SHEAR TEST REPORT

**TRIAD ENGINEERING, INC.**

FIG. NO.





SAMPLE NO.		1	2
INITIAL	WATER CONTENT, %	14.4	14.8
	DRY DENSITY, pcf	121.8	120.9
	SATURATION, %	106.5	106.5
	VOID RATIO	0.358	0.368
	DIAMETER, in	2.85	2.85
	HEIGHT, in	5.79	6.01
AT TEST	WATER CONTENT, %	12.5	11.9
	DRY DENSITY, pcf	124.1	125.6
	SATURATION, %	99.7	99.6
	VOID RATIO	0.333	0.317
	DIAMETER, in	2.83	2.81
	HEIGHT, in	5.75	5.93
Strain rate, %/min		0.015	0.015
BACK PRESSURE, psi		50.0	50.0
CELL PRESSURE, psi		80.0	110.0
FAILURE STRESS, psi		73.0	109.3
PORE PRESSURE, psi		53.2	69.6
ULTIMATE STRESS, psi			
PORE PRESSURE, psi			
$\bar{\sigma}_1$ FAILURE, psi		99.8	149.7
$\bar{\sigma}_3$ FAILURE, psi		26.8	40.4

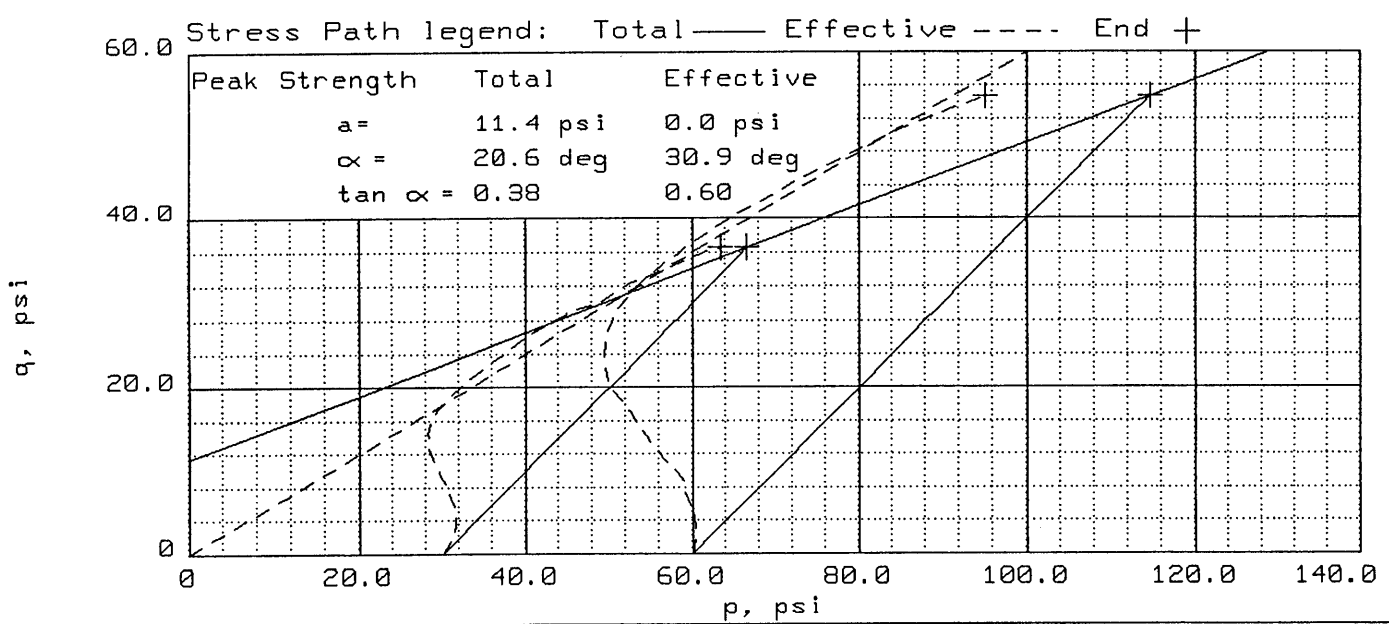
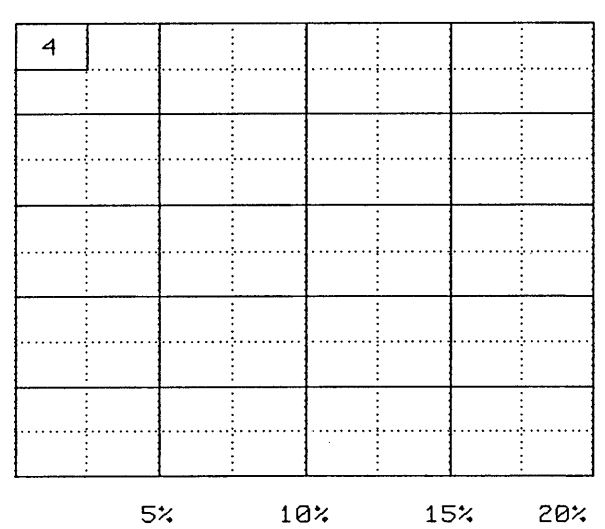
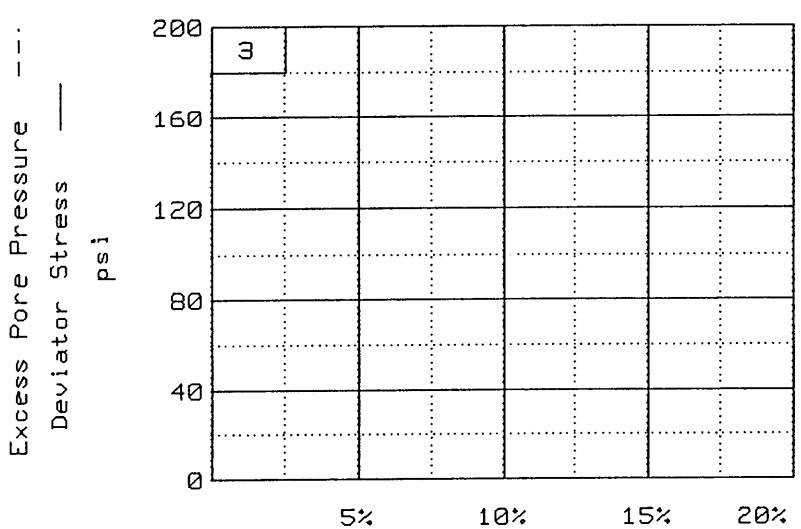
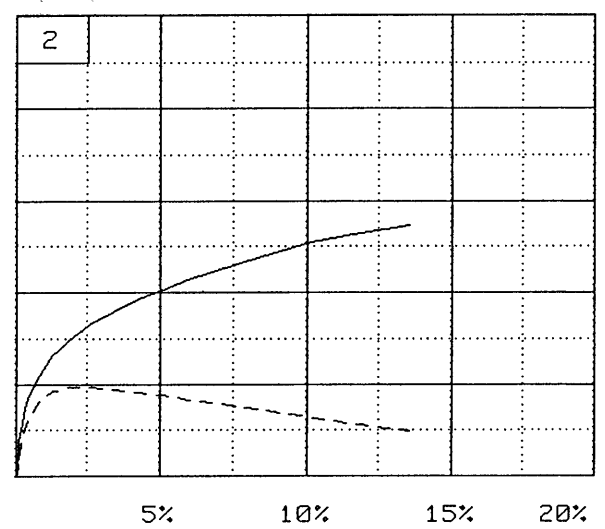
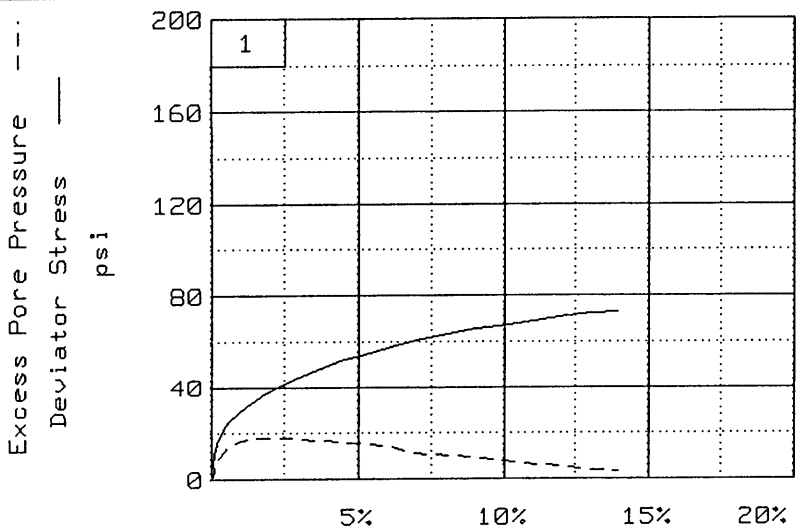
TYPE OF TEST:  
 CU with pore pressures  
 SAMPLE TYPE: UNDISTURBED  
 DESCRIPTION: BROWN SANDY SILT  
 WITH ROCK FRAGMENTS  
 LL=            PL=            PI=  
 SPECIFIC GRAVITY= 2.65  
 REMARKS:

CLIENT: US DEPARTMENT OF LABOR  
 PROJECT: BIG BRANCH SLURRY IMPOUNDMENT  
 SAMPLE LOCATION: DHX-12 & 13  
 DEPTH: 68.0' - 69.0' & 76.0' - 77.3'  
 PROJ. NO.: C00553            DATE: 02/28/01

TRIAxIAL SHEAR TEST REPORT

**TRIAD ENGINEERING, INC.**

FIG. NO.



Client: US DEPARTMENT OF LABOR  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 Location: DHX-12 & 13 DEPTH: 68.0' - 69.0' & 76.0' - 77.3'  
 File: C00553-1 Project No.: C00553 Page 2/2 Fig. No. \_\_\_\_\_

***PERMEABILITY***

# FLEXIBLE WALL PERMEABILITY TEST

(ASTM D5084, METHOD - C)

PROJECT: Big Branch Slurry Impoundment JOB NO.: 000553 DATE: 2/9/01  
 SAMPLE INFO: DH1-6 SAMPLE DESCRIPTION: Brown sandy silt with rock fragments  
 PREPARED BY: MAD TESTED BY: MAD PERMEAMETER NO.: 4

STANDARD PROCTOR ( )      TEST SPECIMEN COMPACTION EFFORT      OTHER ( )  
 MODIFIED PROCTOR ( )      UNDISTURBED (X)

MOISTURE CONTENT	SPECIMEN COMPACTION	PERMEABILITY
CONTAINER NO. <u>MAN</u> WET WT. <u>305.84</u> GMS DRY WT. <u>278.79</u> GMS TARE WT. <u>87.2</u> GMS WT. MOISTURE <u>27.05</u> GMS WT. DRY SOIL <u>191.59</u> GMS MOISTURE CONTENT <u>14.1</u> %	MAX. DRY DENSITY _____ PCF OPTIMUM MOISTURE _____ % WET WT. <u>1318.8</u> GMS HEIGHT <u>5.850</u> IN DIAMETER <u>2.80</u> IN VOLUME <u>0.0208</u> CU. FT. WET UNIT WT. <u>139.8</u> PCF DRY UNIT WT. <u>122.5</u> PCF PERCENT COMPACTION _____ %	$K = -(C/t) \ln(1 - D(T))$ WHERE: MANOMETER CONSTANTS M1 = <u>0.03018</u> M2 = <u>1.04095</u> C = TEST CONSTANT (M1) (L/A) / 12.56 T = TRIAL CONSTANT M2/Z Z = DIFF. IN MERCURY MENISCI AT t=0, CM t = TIME INTERVAL, SEC D = MERCURY DISPLACED OVER TIME t, CM L = SPECIMEN LENGTH, CM A = SPECIMEN AREA, CM <sup>2</sup>

### MANOMETER DATA

(K)	(Z)	(t)	(D)	(K)	(Z)	(t)	(D)
CALCULATED COEFF. OF PERMEABILITY	DATE	TIME (HRS)	VOLUME OF MERCURY (CM)	DIFFERENCE IN MERCURY MENISCI AT t=0 (CM)	TIME INTERVAL (SEC)	DIFF. IN VOLUME (CM)	
$3.9 \times 10^{-6}$	2/12/01	10:38	24.5	0.8	----	----	
		10:48	3.4	23.7	600	21.1	
$4.0 \times 10^{-6}$	2/12/01	1:07	28	0.5	----	----	
		1:17	3.4	27.5	600	24.6	
$4.6 \times 10^{-6}$	2/13/01	1:02	28	0.5	----	----	
		1:10	3.9	27.5	480	24.1	

COEFFICIENT OF PERMEABILITY  
 $K = 4.2 \times 10^{-6}$  CM/SEC  
 AVG. TEMP. 21.7 °C  
 VISCOSITY CORRECTION FOR TEMPERATURE:  
0.9600

REMARKS: CONFINING PRESSURE 10 PSI (CELL PRESSURE 70 PSI, BACK PRESSURE 60 PSI)

$K = 4.0 \times 10^{-6}$  CM/SEC  
20

# FLEXIBLE WALL PERMEABILITY TEST

(ASTM D5084, METHOD - C)

PROJECT: Big Branch Slurry Impoundment      JOB NO.: C00553      DATE: 2/12/01  
 SAMPLE INFO: DHX-13    76.0'-77.3'      SAMPLE DESCRIPTION: Brown sandy silt with rock fragments  
 PREPARED BY: MAD      TESTED BY: MAD      PERMEAMETER NO.: 3

STANDARD PROCTOR ( )      **TEST SPECIMEN COMPACTION EFFORT**      MODIFIED PROCTOR ( )      UNDISTURBED (X)      OTHER ( )

MOISTURE CONTENT	SPECIMEN COMPACTION	PERMEABILITY
CONTAINER NO. <u>LY</u> WET WT. <u>334.12</u> GMS DRY WT. <u>302.24</u> GMS TARE WT. <u>86.7</u> GMS WT. MOISTURE <u>31.88</u> GMS WT. DRY SOIL <u>215.54</u> GMS MOISTURE CONTENT <u>14.8</u> %	MAX. DRY DENSITY _____ PCF OPTIMUM MOISTURE _____ % WET WT. <u>1390.9</u> GMS HEIGHT <u>6.005</u> IN    DIAMETER <u>2.845</u> IN VOLUME <u>0.02208</u> CU. FT. WET UNIT WT. <u>138.9</u> PCF DRY UNIT WT. <u>120.9</u> PCF PERCENT COMPACTION _____ %	$K = -(C/t) \ln(1 - D(T))$ WHERE: MANOMETER CONSTANTS M1= <u>0.03018</u> M2= <u>1.04095</u> C= TEST CONSTANT (M1) (L/A)/12.56 T= TRIAL CONSTANT M2/Z Z= DIFF. IN MERCURY MENISCI AT t=0, CM t= TIME INTERVAL, SEC D= MERCURY DISPLACED OVER TIME t, CM L= SPECIMEN LENGTH, CM A= SPECIMEN AREA, CM <sup>2</sup>

### MANOMETER DATA

(K)	(Z)	(t)	(D)			
CALCULATED COEFF. OF PERMEABILITY	DATE	TIME (HRS)	VOLUME OF MERCURY (CM)	DIFFERENCE IN MERCURY MENISCI AT t=0 (CM)	TIME INTERVAL (SEC)	DIFF. IN VOLUME (CM)
$9.2 \times 10^{-8}$	2/15/01	1:08	29.2	0.5	----	----
		4:38	9.2	28.7	12,600	20
$9.4 \times 10^{-8}$	2/16/01	3:51	28.4	0.6	----	----
		4:39	21.4	27.8	2,880	7
$8.3 \times 10^{-8}$	2/19/01	11:44	28.9	0.6	----	----
		4:54	6.5	28.3	18,600	22.4

COEFFICIENT OF PERMEABILITY  
 $K = 9.0 \times 10^{-8}$  CM/SEC  
 AVG. TEMP. 21.8 °C  
 VISCOSITY CORRECTION FOR TEMPERATURE:  
0.9577

REMARKS:    CONFINING PRESSURE 10 PSI    (CELL PRESSURE 70 PSI, BACK PRESSURE 60 PSI)

$K = \frac{8.6 \times 10^{-8}}{20}$  CM/SEC



# FLEXIBLE WALL PERMEABILITY TEST

(ASTM D5084, METHOD - C)

PROJECT: Big Branch Slurry Impoundment      JOB NO.: 000553      DATE: 2/26/01  
 SAMPLE INFO: DHX-13, Depth: 84.0'-86.0'      SAMPLE DESCRIPTION: Light brown silty sand with rock fragments  
 PREPARED BY: MAD      TESTED BY: MAD      PERMEAMETER NO.: 4

STANDARD PROCTOR ( )      TEST SPECIMEN COMPACTION EFFORT      MODIFIED PROCTOR ( )      UNDISTURBED (X)      OTHER ( )

MOISTURE CONTENT	SPECIMEN COMPACTION	PERMEABILITY
CONTAINER NO. <u>T</u>	MAX. DRY DENSITY _____ PCF	$K = -(C/t) \ln(1 - D(T))$ WHERE: MANOMETER CONSTANTS M1 = <u>0.03013</u> M2 = <u>1.04095</u> C = TEST CONSTANT (ML) (L/A) / 12.56 T = TRIAL CONSTANT M2/2 D = DIFF. IN MERCURY MENISCI AT t=0, CM t = TIME INTERVAL, SEC D = MERCURY DISPLACED OVER TIME t, CM L = SPECIMEN LENGTH, CM A = SPECIMEN AREA, CM <sup>2</sup> COEFFICIENT OF PERMEABILITY $K = 1.4 \times 10^{-7} \text{ CM/SEC}$ AVG. TEMP. <u>22.7</u> °C VISCOSITY CORRECTION FOR TEMPERATURE: <u>0.9377</u>
WET WT. <u>226.19</u> GMS	OPTIMUM MOISTURE _____ %	
DRY WT. <u>215.5</u> GMS	WET WT. <u>1372.0</u> GMS	
TARE WT. <u>130.6</u> GMS	HEIGHT <u>5.820</u> IN      DIAMETER <u>2.850</u> IN	
WT. MOISTURE <u>10.69</u> GMS	VOLUME <u>0.0215</u> CU. FT.	
WT. DRY SOIL <u>84.9</u> GMS	WET UNIT WT. <u>140.7</u> PCF	
MOISTURE CONTENT <u>12.6</u> %	DRY UNIT WT. <u>124.9</u> PCF	
	PERCENT COMPACTION _____ %	

### MANOMETER DATA

(K)	DATE	TIME (HRS)	VOLUME OF MERCURY (CM)	DIFFERENCE IN MERCURY MENISCI AT t=0 (CM)	TIME INTERVAL (SEC)	DIFF. IN VOLUME (CM)
$1.4 \times 10^{-7}$	2/27/01	12:58	28.5	0.5	----	----
		3:34	20.6	28	2,160	7.9
$1.4 \times 10^{-7}$	2/28/01	8:09	27.7	0.6	----	----
		11:18	5.8	27.1	11,340	21.9
$1.3 \times 10^{-7}$	2/28/01	3:37	28.9	0.5	----	----
		4:59	14.6	28.4	4,920	14.3

REMARKS:      CONFINING PRESSURE 10 PSI      (CELL PRESSURE 70 PSI, BACK PRESSURE 60 PSI)

$K = 1.3 \times 10^{-7} \text{ CM/SEC}$   
20

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***UNIAXIAL COMPRESSIVE STRENGTH***

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ST. ALBANS, WV 25177  
PHONE No. (304) 755-0721  
FAX. No. (304) 755-1880



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## ROCK CORE COMPRESSIVE STRENGTH WORKSHEET

PROJECT No. C00553 DATE: 2/15/01

PROJECT NAME: Big Branch Slurry Impoundment

CORE No. DH1-3 (83.9'-84.2') TYPE OF CURE \_\_\_\_\_

LENGTH (AFTER CAP) #1: 3.960 in.

#2: 3.965 in. AVERAGE: 3.963 in.

#3: 3.960 in.

DIAMETER #1: 1.980 in.

#2: 1.980 in. AVERAGE: 1.980 in.

#3: 1.980 in.

LENGTH TO DIAMETER RATIO (L/D) 2.00

AREA: 3.08 in.<sup>2</sup> CORRECTION FACTOR: 1

LOAD: 18,800 lbs PSI: 6,100

CORRECTED PSI: 6,100

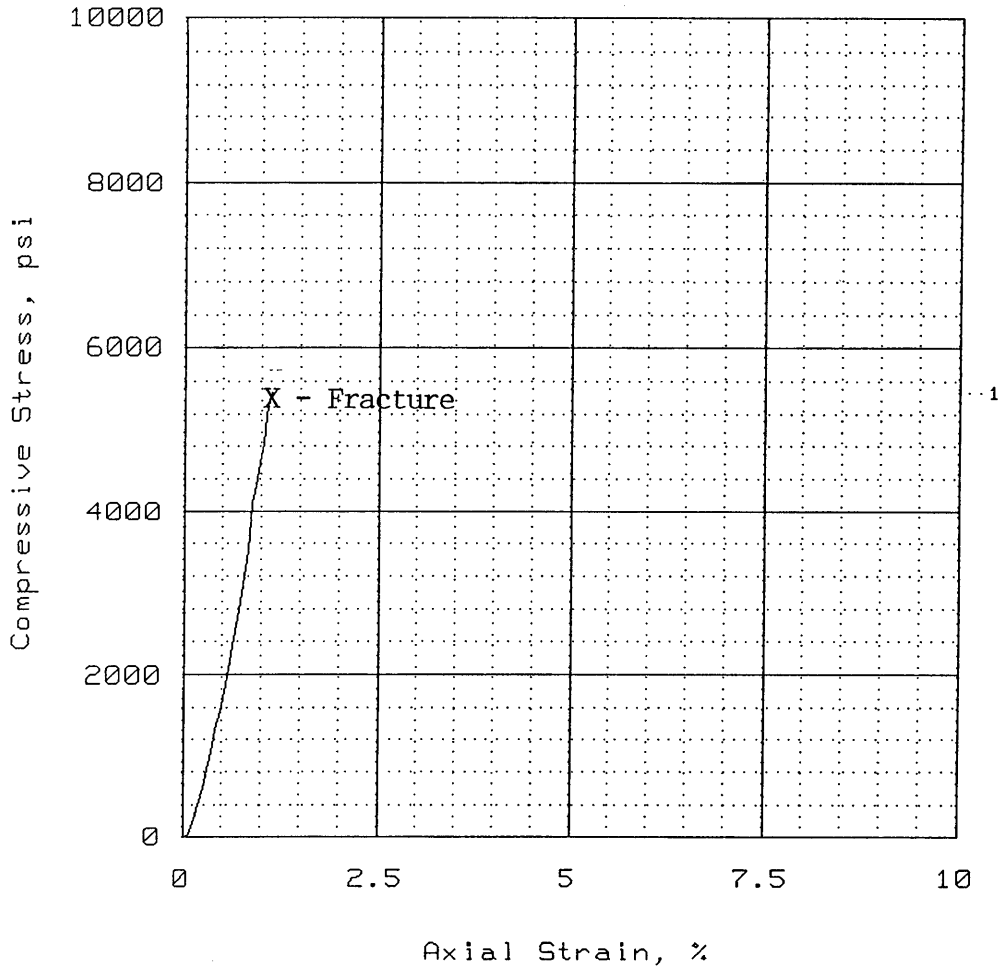
REMARKS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TESTED BY: J.M. Sayre CHECKED BY: M. Ali Dastgheib

## UNCONFINED COMPRESSION TEST



Sample number:	1			
Unconfined strength, psi	5464			
Undrained shear strength, psi	2732			
Strain rate, %/min				
Water content, %	0.0			
Void ratio	535.7343			
Saturation, %	0.0			
Dry density, pcf	0.3			
Specimen diameter, in	1.99			
Specimen height, in	3.92			

Description: LT. GRAY MED. GRAINED SANDSTONE

LL =	PL =	PI =	GS = 2.7	Type: ROCK
------	------	------	----------	------------

Project No.: C00553  
 Date: 03/01/01  
 Remarks:

Client: US DEPARTMENT OF LABOR  
 Project: BIG BRANCH SLURRY IMPOUNDMENT  
 Location: DH1-3  
 DEPTH: 85.0' - 85.4'

UNCONFINED COMPRESSION TEST  
**TRIAD ENGINEERING, INC.**

Fig No.

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## ROCK CORE COMPRESSIVE STRENGTH WORKSHEET

PROJECT No. C00553 DATE: 2/15/01

PROJECT NAME: Big Branch Slurry Impoundment

CORE No. DH1-4 (78.9'-79.3') TYPE OF CURE \_\_\_\_\_

LENGTH (AFTER CAP) #1: 3.715 in.

#2: 3.720 in. AVERAGE: 3.717 in.

#3: 3.720 in.

DIAMETER #1: 1.975 in.

#2: 1.975 in. AVERAGE: 1.975 in.

#3: 1.975 in.

LENGTH TO DIAMETER RATIO (L/D) 1.88

AREA: 3.06 in.<sup>2</sup> CORRECTION FACTOR: 0.994

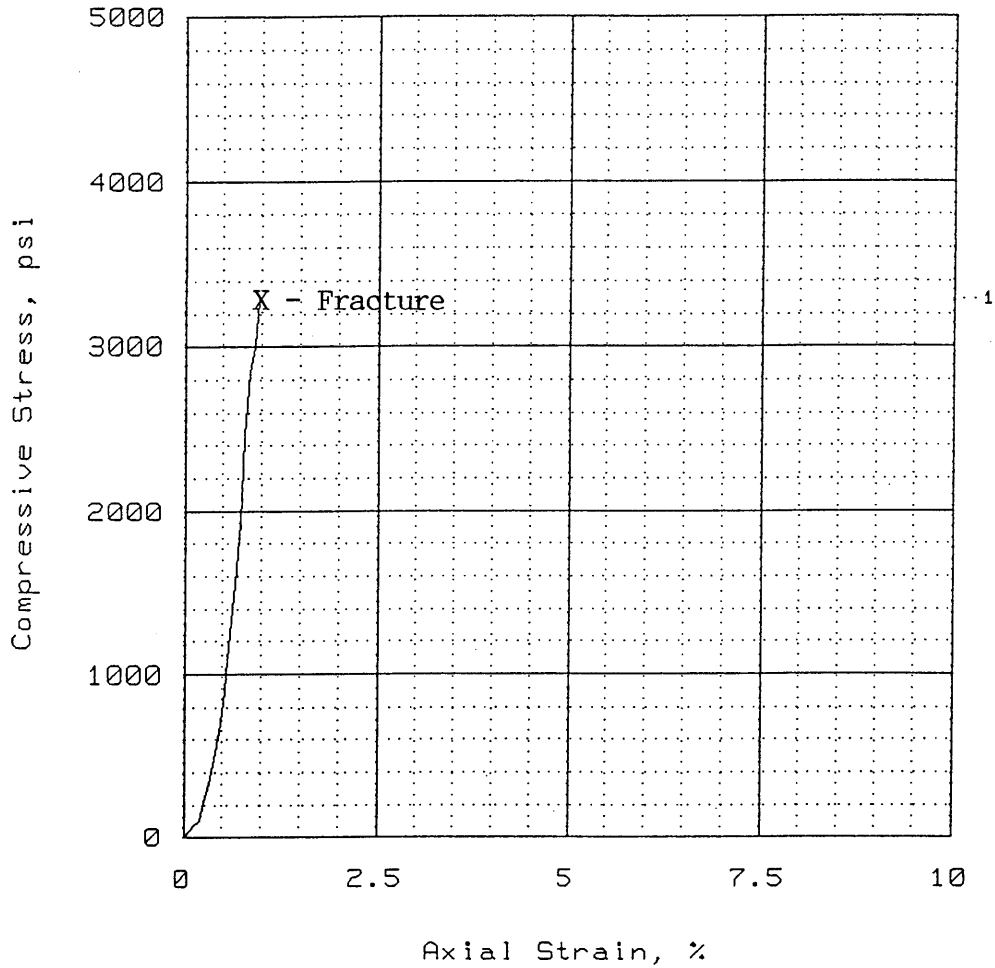
LOAD: 15,250 lbs PSI: 4,980

CORRECTED PSI: 4,950

REMARKS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

TESTED BY: J.M. Sayre CHECKED BY: M. Ali Dastgheib

# UNCONFINED COMPRESSION TEST



Sample number:	1			
Unconfined strength, psi	3291			
Undrained shear strength, psi	1645			
Strain rate, %/min				
Water content, %	0.0			
Void ratio				
Saturation, %	0.0			
Dry density, pcf				
Specimen diameter, in	1.98			
Specimen height, in	3.88			

Description: LT. BROWN MED. GRAINED SANDSTONE

LL =      PL =      PI =      GS = 2.7      Type: ROCK

Project No.: C00553

Date: 03/01/01

Remarks:

Client: US DEPARTMENT OF LABOR

Project: BIG BRANCH SLURRY IMPOUNDMENT

Location: DH1-4

DEPTH: 83.2' -83.8'

UNCONFINED COMPRESSION TEST

**TRIAD ENGINEERING, INC.**

Fig No.

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## ROCK CORE COMPRESSIVE STRENGTH WORKSHEET

PROJECT No. C00553 DATE: 2/15/01

PROJECT NAME: Big Branch Slurry Impoundment

CORE No. DH1-5 (83.2'-83.7') TYPE OF CURE \_\_\_\_\_

LENGTH (AFTER CAP) #1: 3.855 in.  
#2: 3.870 in. AVERAGE: 3.862 in.

#3: 3.860 in.

DIAMETER #1: 1.970 in.

#2: 1.970 in. AVERAGE: 1.970 in.

#3: 1.970 in.

LENGTH TO DIAMETER RATIO (L/D) 1.96

AREA: 3.05 in.<sup>2</sup> CORRECTION FACTOR: 1

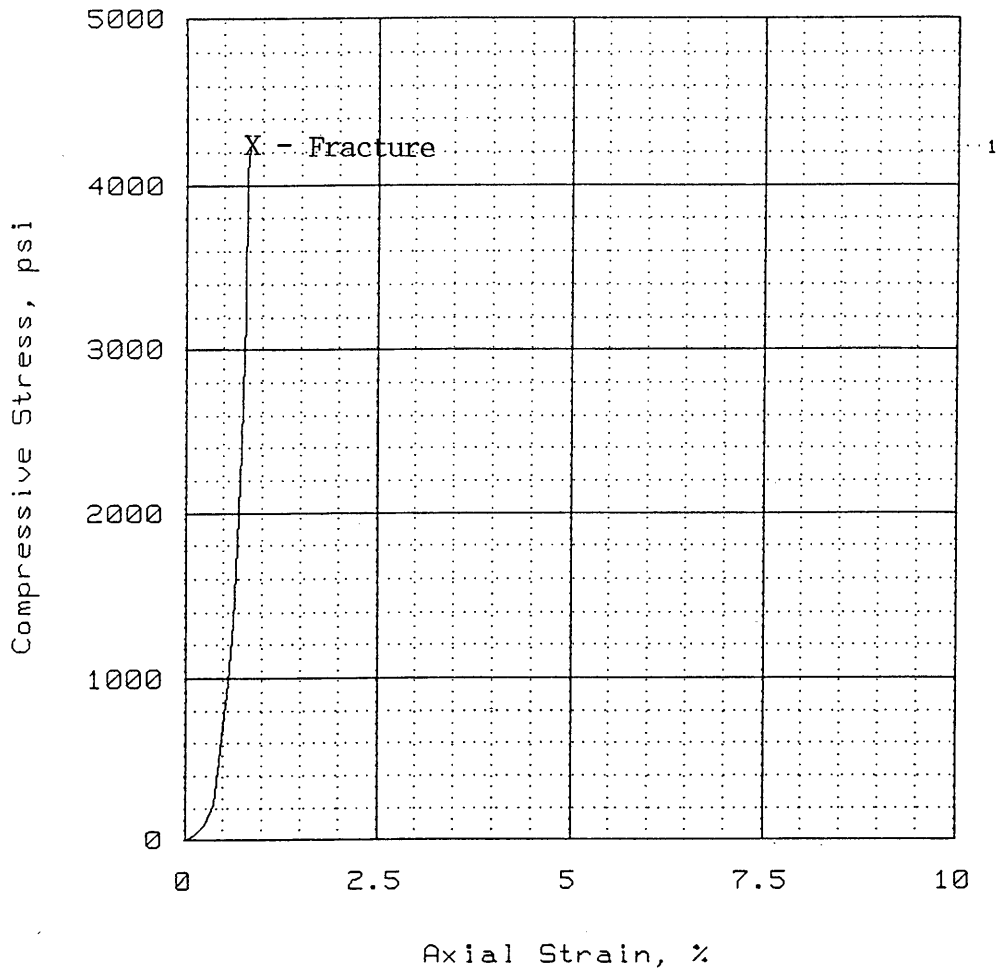
LOAD: 18,050 lbs PSI: 5,920

CORRECTED PSI: 5,920

REMARKS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

TESTED BY: J.M. Sayre CHECKED BY: M.Ali Dastgheib

# UNCONFINED COMPRESSION TEST



Sample number:	1			
Unconfined strength, psi	4230			
Undrained shear strength, psi	2115			
Strain rate, %/min				
Water content, %	0.0			
Void ratio				
Saturation, %	0.0			
Dry density, pcf				
Specimen diameter, in	1.97			
Specimen height, in	4.07			

Description: LT. GRAY MED. GRAINED SANDSTONE

LL =      PL =      PI =      GS = 2.7      Type: ROCK

Project No.: C00553  
 Date: 03/01/01  
 Remarks:

Fig No.

Client: US DEPARTMENT OF LABOR

Project: BIG BRANCH SLURRY IMPOUNDMENT

Location: DH1-5  
 DEPTH: 84.6' -85.1'

UNCONFINED COMPRESSION TEST

**TRIAD ENGINEERING, INC.**



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## ROCK CORE COMPRESSIVE STRENGTH WORKSHEET

PROJECT No. C00553 DATE: 2/15/01

PROJECT NAME: Big Branch Slurry Impoundment

CORE No. DH1-8 (81.2'-81.7') TYPE OF CURE \_\_\_\_\_

LENGTH (AFTER CAP) #1: 3.900 in.

#2: 3.900 in. AVERAGE: 3.903 in.

#3: 3.905 in.

DIAMETER #1: 1.985 in.

#2: 1.980 in. AVERAGE: 1.983 in.

#3: 1.985 in.

LENGTH TO DIAMETER RATIO (L/D) 1.97

AREA: 3.09 in.<sup>2</sup> CORRECTION FACTOR: 1

LOAD: 17,600 lbs PSI: 5,700

CORRECTED PSI: 5,700

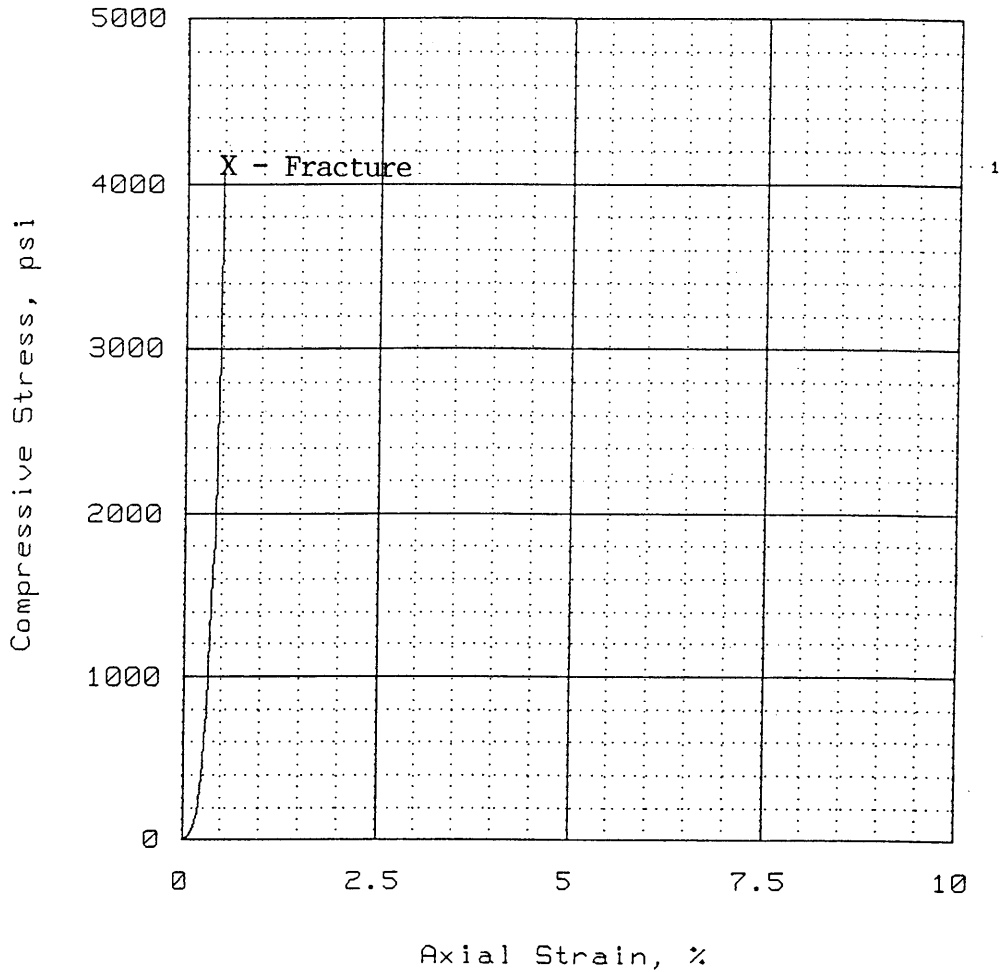
REMARKS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TESTED BY: M. Ali Dastgheib CHECKED BY: M. Ali Dastgheib

# UNCONFINED COMPRESSION TEST



Sample number:	1			
Unconfined strength, psi	4125			
Undrained shear strength, psi	2063			
Strain rate, %/min				
Water content, %	0.0			
Void ratio				
Saturation, %	0.0			
Dry density, pcf				
Specimen diameter, in	1.98			
Specimen height, in	4.09			

Description: LT. GRAY MED. GRAINED SANDSTONE

LL =      PL =      PI =      GS = 2.75      Type: ROCK

Project No.: C00553  
 Date: 03/01/01  
 Remarks:

Fig No.

Client: US DEPARTMENT OF LABOR

Project: BIG BRANCH SLURRY IMPOUNDMENT

Location: DH1-B  
 DEPTH: 82.6' - 83.0'

UNCONFINED COMPRESSION TEST  
**TRIAD ENGINEERING, INC.**

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## ROCK CORE COMPRESSIVE STRENGTH WORKSHEET

PROJECT No. C00553 DATE: 2/16/01

PROJECT NAME: Big Branch Slurry Impoundment

CORE No. DH2-1 (91.5'-91.7') TYPE OF CURE \_\_\_\_\_

LENGTH (AFTER CAP) #1: 3.150 in.  
#2: 3.155 in. AVERAGE: 3.153 in.

#3: 3.155 in.

DIAMETER #1: 1.980 in.

#2: 1.955 in. AVERAGE: 1.970 in.

#3: 1.975 in.

LENGTH TO DIAMETER RATIO (L/D) 1.60

AREA: 3.05 in.<sup>2</sup> CORRECTION FACTOR: 0.968

LOAD: 4,050 lbs PSI: 1,330

CORRECTED PSI: 1,290

REMARKS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

TESTED BY: M. Ali Dastgheib CHECKED BY: M. Ali Dastgheib

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## ROCK CORE COMPRESSIVE STRENGTH WORKSHEET

PROJECT No. C00553 DATE: 2/16/01

PROJECT NAME: Big Branch Slurry Impoundment

CORE No. DH2-1 (95.0'-95.3') TYPE OF CURE \_\_\_\_\_

LENGTH (AFTER CAP) #1: 3.290 in.

#2: 3.295 in. AVERAGE: 3.293 in.

#3: 3.295 in.

DIAMETER #1: 1.980 in.

#2: 1.985 in. AVERAGE: 1.985 in.

#3: 1.990 in.

LENGTH TO DIAMETER RATIO (L/D) 1.65

AREA: 3.09 in.<sup>2</sup> CORRECTION FACTOR: 0.972

LOAD: 11,750 lbs PSI: 3,800

CORRECTED PSI: 3,690

REMARKS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TESTED BY: M. Ali Dastgheib CHECKED BY: M. Ali Dastgheib

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## ROCK CORE COMPRESSIVE STRENGTH WORKSHEET

PROJECT No. C00553 DATE: 2/16/01

PROJECT NAME: Big Branch Slurry Impoundment

CORE No. DH3-3 (93.0'-93.3') TYPE OF CURE \_\_\_\_\_

LENGTH (AFTER CAP) #1: 2.975 in.  
#2: 2.985 in. AVERAGE: 2.978 in.

#3: 2.975 in.

DIAMETER #1: 1.975 in.

#2: 1.980 in. AVERAGE: 1.977 in.

#3: 1.975 in.

LENGTH TO DIAMETER RATIO (L/D) 1.51

AREA: 3.07 in.<sup>2</sup> CORRECTION FACTOR: 0.961

LOAD: 11,500 lbs PSI: 3,750

CORRECTED PSI: 3,600

REMARKS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

TESTED BY: M. Ali Dastgheib CHECKED BY: M. Ali Dastgheib

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## ROCK CORE COMPRESSIVE STRENGTH WORKSHEET

PROJECT No. C00553 DATE: 2/16/01

PROJECT NAME: Big Branch Slurry Impoundment

CORE No. DH3-3 (95.5'-95.8') TYPE OF CURE \_\_\_\_\_

LENGTH (AFTER CAP) #1: 3.400 in.

#2: 3.400 in. AVERAGE: 3.403 in.

#3: 3.405 in.

DIAMETER #1: 1.980 in.

#2: 1.995 in. AVERAGE: 1.988 in.

#3: 1.990 in.

LENGTH TO DIAMETER RATIO (L/D) 1.71

AREA: 3.10 in.<sup>2</sup> CORRECTION FACTOR: 0.977

LOAD: 12,000 lbs PSI: 3,870

CORRECTED PSI: 3,780

REMARKS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

TESTED BY: M. Ali Dastgheib CHECKED BY: M. Ali Dastgheib

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## ROCK CORE COMPRESSIVE STRENGTH WORKSHEET

PROJECT No. C00553 DATE: 2/16/01

PROJECT NAME: Big Branch Slurry Impoundment

CORE No. DHP-1 (91.3'-91.5') TYPE OF CURE \_\_\_\_\_

LENGTH (AFTER CAP) #1: 2.730 in.  
#2: 2.735 in. AVERAGE: 2.728 in.

#3: 2.720 in.

DIAMETER #1: 1.990 in.

#2: 1.985 in. AVERAGE: 1.987 in.

#3: 1.985 in.

LENGTH TO DIAMETER RATIO (L/D) 1.37

AREA: 3.10 in.<sup>2</sup> CORRECTION FACTOR: 0.944

LOAD: 13,050 lbs PSI: 4,210

CORRECTED PSI: 3,970

REMARKS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

TESTED BY: M. Ali Dastgheib CHECKED BY: M. Ali Dastgheib

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## ROCK CORE COMPRESSIVE STRENGTH WORKSHEET

PROJECT No. C00553 DATE: 2/16/01

PROJECT NAME: Big Branch Slurry Impoundment

CORE No. DHP-1 (96.6'-96.9') TYPE OF CURE \_\_\_\_\_

LENGTH (AFTER CAP) #1: 3.075 in.

#2: 3.082 in. AVERAGE: 3.077 in.

#3: 3.075 in.

DIAMETER #1: 2.000 in.

#2: 1.990 in. AVERAGE: 1.993 in.

#3: 1.990 in.

LENGTH TO DIAMETER RATIO (L/D) 1.54

AREA: 3.11 in.<sup>2</sup> CORRECTION FACTOR: 0.963

LOAD: 13,050 lbs PSI: 4,196

CORRECTED PSI: 4,040

REMARKS: \_\_\_\_\_

TESTED BY: M. Ali Dastgheib CHECKED BY: M. Ali Dastgheib



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## ROCK CORE COMPRESSIVE STRENGTH WORKSHEET

PROJECT No. C00553 DATE: 2/16/01

PROJECT NAME: Big Branch Slurry Impoundment

CORE No. DHP-1 (97.5'-97.8') TYPE OF CURE \_\_\_\_\_

LENGTH (AFTER CAP) #1: 3.790 in.

#2: 3.800 in. AVERAGE: 3.797 in.

#3: 3.800 in.

DIAMETER #1: 2.000 in.

#2: 2.005 in. AVERAGE: 1.998 in.

#3: 1.990 in.

LENGTH TO DIAMETER RATIO (L/D) 1.900

AREA: 3.13 in.<sup>2</sup> CORRECTION FACTOR: 0.996

LOAD: 9,250 lbs PSI: 2,955

CORRECTED PSI: 2,940

REMARKS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TESTED BY: M. Ali Dastgheib CHECKED BY: M. Ali Dastgheib

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## ROCK CORE COMPRESSIVE STRENGTH WORKSHEET

PROJECT No. C00553 DATE: 2/16/01

PROJECT NAME: Big Branch Slurry Impoundment

CORE No. DHX-3 (89.5'-89.8') TYPE OF CURE \_\_\_\_\_

LENGTH (AFTER CAP) #1: 3.450 in.

#2: 3.455 in. AVERAGE: 3.456 in.

#3: 3.457 in.

DIAMETER #1: 1.980 in.

#2: 1.980 in. AVERAGE: 1.980 in.

#3: 1.980 in.

LENGTH TO DIAMETER RATIO (L/D) 1.74

AREA: 3.08 in.<sup>2</sup> CORRECTION FACTOR: 0.979

LOAD: 15,000 lbs PSI: 4,870

CORRECTED PSI: 4,770

REMARKS: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

TESTED BY: M. Ali Dastgheib CHECKED BY: M. Ali Dastgheib

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## ROCK CORE COMPRESSIVE STRENGTH WORKSHEET

PROJECT No. C00553 DATE: 2/16/01

PROJECT NAME: Big Branch Slurry Impoundment

CORE No. DHX-3 (91.6'-91.9') TYPE OF CURE \_\_\_\_\_

LENGTH (AFTER CAP) #1: 4.500 in.

#2: 4.510 in. AVERAGE: 4.502 in.

#3: 4.497 in.

DIAMETER #1: 1.985 in.

#2: 1.950 in. AVERAGE: 1.974 in.

#3: 1.987 in.

LENGTH TO DIAMETER RATIO (L/D) 2.28

AREA: 3.06 in.<sup>2</sup> CORRECTION FACTOR: 1

LOAD: 9,500 lbs PSI: 3,100

CORRECTED PSI: 3,100

REMARKS: \_\_\_\_\_

TESTED BY: M. Ali Dastgheib CHECKED BY: M. Ali Dastgheib

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P.O. BOX 1435  
ST. ALBANS, WV 25177  
PHONE No. (304) 755-0721  
FAX. No. (304) 755-1880



ST. ALBANS, LOGAN & MORGANTOWN, WEST VIRGINIA  
WINCHESTER & HARRISONBURG, VIRGINIA  
GREENSBURG, PENNSYLVANIA

## ROCK CORE COMPRESSIVE STRENGTH WORKSHEET

PROJECT No. C00553 DATE: \_\_\_\_\_

PROJECT NAME: Big Branch Slurry Impoundment

CORE No. DHX-3 (93.5'-93.8') TYPE OF CURE \_\_\_\_\_

LENGTH (AFTER CAP) #1: 3.950 in.

#2: 3.965 in. AVERAGE: 3.957 in.

#3: 3.955 in.

DIAMETER #1: 1.975 in.

#2: 1.975 in. AVERAGE: 1.975 in.

#3: 1.995 in.

LENGTH TO DIAMETER RATIO (L/D) 2.00

AREA: 3.06 in.<sup>2</sup> CORRECTION FACTOR: 1

LOAD: 10,000 lbs PSI: 3,270

CORRECTED PSI: 3,270

REMARKS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

TESTED BY: M. Ali Dastgheib CHECKED BY: M. Ali Dastgheib

***MODULUS OF RUPTURE***

TRIAD ENGINEERING, INC.  
MODULUS OF RUPTURE ( $R_o$ )  
3-POINT

PROJECT NO.: C00553 PROJECT NAME: Big Branch Slurry Impoundment

BORING NO.: DH1-3 DEPTH: 84.2'-85.0'

DESCRIPTION: Brown sandstone, medium grained

DATE: 2/14/01 TESTED BY: M.A. Dastgheib

$$R_o = \frac{8F_c L}{\pi D^3}$$

LOAD ( $F_c$ ) = 350 lbs

LENGTH (L) = 4.190 in.

DIAMETER (D) = 1.975 in

MODULUS OF RUPTURE = 485 (PSI)

TRIAD ENGINEERING, INC.  
MODULUS OF RUPTURE ( $R_o$ )  
3-POINT

PROJECT NO.: C00553 PROJECT NAME: Big Branch Slurry Impoundment

BORING NO.: DH1-3 DEPTH: 85.4'-86.0'

DESCRIPTION: Brown and gray sandstone, medium grained

DATE: 2/14/01 TESTED BY: M.A. Dastgheib

$$R_o = \frac{8F_c L}{\pi D^3}$$

LOAD ( $F_c$ ) = 250 lbs

LENGTH (L) = 4.190 in.

DIAMETER (D) = 1.975 in

MODULUS OF RUPTURE = 346 (PSI)

**TRIAD ENGINEERING, INC.**  
**MODULUS OF RUPTURE (R<sub>o</sub>)**  
**3-POINT**

PROJECT NO.: C00553 PROJECT NAME: Big Branch Slurry Impoundment

BORING NO.: DH1-4 DEPTH: 78.0'-78.7'

DESCRIPTION: Brown and gray sandstone, medium grained

DATE: 2/14/01 TESTED BY: M.A. Dastgheib

$$R_o = \frac{8F_c L}{\pi D^3}$$

LOAD (F<sub>c</sub>) = 200 lbs

LENGTH (L) = 4.190 in.

DIAMETER (D) = 1.965 in

MODULUS OF RUPTURE = 280 (PSI)



**TRIAD ENGINEERING, INC.**  
**MODULUS OF RUPTURE (R<sub>o</sub>)**  
**3-POINT**

PROJECT NO.: C00553 PROJECT NAME: Big Branch Slurry Impoundment

BORING NO.: DH1-4 DEPTH: 84.0'-84.5'

DESCRIPTION: Brown sandstone, medium grained

DATE: 2/14/01 TESTED BY: M.A. Dastgheib

$$R_o = \frac{8F_c L}{\pi D^3}$$

LOAD (F<sub>c</sub>) = 280 lbs

LENGTH (L) = 4.190 in.

DIAMETER (D) = 1.975 in

MODULUS OF RUPTURE = 388 (PSI)

TRIAD ENGINEERING, INC.  
MODULUS OF RUPTURE ( $R_o$ )  
3-POINT

PROJECT NO.: C00553 PROJECT NAME: Big Branch Slurry Impoundment

BORING NO.: DH1-5 DEPTH: 82.0'-82.5'

DESCRIPTION: Brown sandstone, medium grained

DATE: 2/14/01 TESTED BY: M.A. Dastgheib

$$R_o = \frac{8F_c L}{\pi D^3}$$

LOAD ( $F_c$ ) = 250 lbs

LENGTH (L) = 4.190 in.

DIAMETER (D) = 1.970 in

MODULUS OF RUPTURE = 249 (PSI)

TRIAD ENGINEERING, INC.  
MODULUS OF RUPTURE ( $R_o$ )  
3-POINT

PROJECT NO.: C00553 PROJECT NAME: Big Branch Slurry Impoundment

BORING NO.: DH1-5 DEPTH: 84.0'-84.6'

DESCRIPTION: Gray sandstone, medium grained

DATE: 2/14/01 TESTED BY: M.A. Dastgheib

$$R_o = \frac{8F_c L}{\pi D^3}$$

LOAD ( $F_c$ ) = 200 lbs

LENGTH (L) = 4.190 in.

DIAMETER (D) = 1.980 in

MODULUS OF RUPTURE = 275 (PSI)

**TRIAD ENGINEERING, INC.**  
**MODULUS OF RUPTURE (R<sub>o</sub>)**  
**3-POINT**

PROJECT NO.: C00553 PROJECT NAME: Big Branch Slurry Impoundment

BORING NO.: DH1-8 DEPTH: 79.5'-80.1'

DESCRIPTION: Gray sandstone, medium grained

DATE: 2/14/01 TESTED BY: M.A. Dastgheib

$$R_o = \frac{8F_c L}{\pi D^3}$$

LOAD (F<sub>c</sub>) = 250 lbs

LENGTH (L) = 4.190 in.

DIAMETER (D) = 1.980 in

MODULUS OF RUPTURE = 344 (PSI)

TRIAD ENGINEERING, INC.  
MODULUS OF RUPTURE (R<sub>o</sub>)  
3-POINT

PROJECT NO.: C00553 PROJECT NAME: Big Branch Slurry Impoundment

BORING NO.: DH1-8 DEPTH: 83.0'-83.8'

DESCRIPTION: Gray sandstone, medium grained

DATE: 2/14/01 TESTED BY: M.A. Dastgheib

$$R_o = \frac{8F_c L}{\pi D^3}$$

LOAD (F<sub>c</sub>) = 290 lbs

LENGTH (L) = 4.190 in.

DIAMETER (D) = 1.980 in

MODULUS OF RUPTURE = 398 (PSI)

***APPENDIX B***

***CHEMICAL ANALYSIS OF  
SELECTED SLURRY SAMPLES***

CT&E Environmental Services Inc.  
Laboratory Division: Charleston Laboratory

John Meeks  
TRIAD ENGINEERING INC

Laboratory Number TA1-CO-P271-006

Page 1

CW #1  
2000' UPSTREAM OF CONF. AT STRAIGHT FORK

COC  
Date Sampled 01/06/01 00:00  
Date Received 02/13/01 11:00

Type F Matrix WATER  
Sampled by CLIENT

% Solids 71

032001 1358 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
ACRYLAMIDE	79-06-1	ND	U	0.26	mg/L	Y SW8316	03/19/01 23:26 ra	1.0



# CT&E Environmental Services Inc.

Laboratory Division

## Laboratory Analysis Report

TRIAD ENGINEERING INC  
MCCC BIG BRANCH IMPOUNDMENT  
CT&E Laboratory Delivery Group Number: TA1-B0-P338 Page 1

DATE: 03/15/01

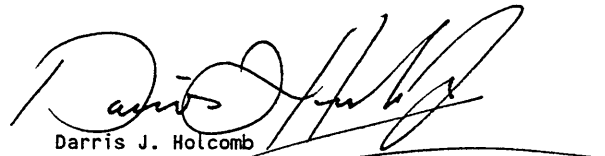
COC:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in an attached case narrative. Release of the data contained in the hard copy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

A case narrative is not required.

<u>Reference</u>	<u>Sample Description</u>	<u>Sampled</u>	<u>Laboratory Number</u>
DH 1-11 SLURRY SAMPLE 1-ME	SLURRY SAMPLE 1 96.1-97.1 FEET	12/14/2000	TA1-B0-P338-001
DH 2-9 SLURRY SAMPLE 5-ME	SLURRY BAG SAMPLE 5 97.8-100.1 FEET	01/18/2001	TA1-B0-P338-002
WOLF CREEK #1	1.7 MILES DOWNSTREAM OF BIG ANDY CULVERT	01/06/2001	TA1-B0-P338-003
DH 2-9 SLURRY SAMPLE 2-ME	SLURRY BAG SAMPLE 2 91.8-93.8 FEET	01/18/2001	TA1-B0-P338-004
SP #5	100' UPSTREAM OF DRILL PAD 20' FROM SHORE	01/06/2001	TA1-B0-P338-005
CW #1	2000' UPSTREAM OF CONF. AT STRAIGHT FORK	01/06/2001	TA1-B0-P338-006

Submitted by,



Darris J. Holcomb  
Project Manager



CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-001

Page 1

DH 1-11 SLURRY SAMPLE 1-ME  
 SLURRY SAMPLE 1 96.1-97.1 FEET

COC  
 Date Sampled 12/14/00 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 77

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DILF
ALUMINUM	7429-90-5	2700		19	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
ANTIMONY	7440-36-0	ND	U	0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
ARSENIC	7440-38-2	2.6		0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
BARIIUM	7440-39-3	34		0.19	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
BERYLLIUM	7440-41-7	0.65		0.19	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
BORON	7440-42-8	ND	U	19	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
CADMIUM	7440-43-9	ND	U	0.19	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
CALCIUM	7440-70-2	640		9.7	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
MIUM	7440-47-3	5.8		0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
OSALT	7440-48-4	5.8		0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
COPPER	7440-50-8	11		0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
IRON	7439-89-6	16000		9.7	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
LEAD	7439-92-1	6.1		0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
MAGNESIUM	7439-95-4	1200		9.7	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
MANGANESE	7439-96-5	230		1.9	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
MOLYBDENUM	7439-98-7	ND	U	0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
NICKEL	7440-02-0	9.0		0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
POTASSIUM	7440-09-7	650		190	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
SELENIUM	7782-49-2	ND	U	0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
SILICON	7440-21-3	1100		19	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
SILVER	7440-22-4	ND	U	0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
SODIUM	7440-23-5	ND	U	190	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
THALLIUM	7440-28-0	ND	U	0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
TITANIUM	7440-32-6	45		0.19	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
VANADIUM	7440-62-2	7.7		0.97	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
ZINC	7440-66-6	27		3.9	mg/Kg	Y SW6010B	02/21/01 02:23 JWJ	1.0
Total Solids (Percent)		77		0.010	%	EPA160.3	02/15/01 15:30 MHS	1.0
Acidity (Soluble)		1800		260	mg/Kg	Y	02/20/01 14:44 TF	100
Alkalinity (Soluble)		640		260	mg/Kg	Y	02/20/01 14:44 TF	100
LIBRARY SEARCH		ND	U			SW8270C	02/26/01 12:12 tjh	1.0
PHENOL	108-95-2	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
BIS(2-CHLOROETHYL)ETHER	111-44-4	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-001

Page 2

DH 1-11 SLURRY SAMPLE 1-ME  
 SLURRY SAMPLE 1 96.1-97.1 FEET

COC  
 Date Sampled 12/14/00 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 77

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DILF
2-CHLOROPHENOL	95-57-8	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
1,3-DICHLOROBENZENE	541-73-1	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
1,4-DICHLOROBENZENE	106-46-7	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
1,2-DICHLOROBENZENE	95-50-1	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2-METHYLPHENOL	95-48-7	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
3- & 4-METHYLPHENOL		ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
N-NITROSODI-N-PROPYLAMINE	621-64-7	ND	U	4900	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
HEXACHLOROETHANE	67-72-1	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
BENZENE	98-95-3	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
ISOPHORONE	78-59-1	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2-NITROPHENOL	88-75-5	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2,4-DIMETHYLPHENOL	105-67-9	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
BIS(2-CHLOROETHOXY) METHANE	111-91-1	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2,4-DICHLOROPHENOL	120-83-2	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
1,2,4-TRICHLOROBENZENE	120-82-1	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
NAPHTHALENE	91-20-3	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
4-CHLOROANILINE	106-47-8	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
HEXACHLOROBUTADIENE	87-68-3	ND	U	4900	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2-METHYLNAPHTHALENE	91-57-6	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2,4,6-TRICHLOROPHENOL	88-06-2	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2,4,5-TRICHLOROPHENOL	95-95-4	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2-CHLORONAPHTHALENE	91-58-7	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2-NITROANILINE	88-74-4	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
DIMETHYLPHTHALATE	131-11-3	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
ACENAPHTHYLENE	208-96-8	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2,6-DINITROTOLUENE	606-20-2	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
3-NITROANILINE	99-09-2	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
ACENAPHTHENE	83-32-9	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2,4-DINITROPHENOL	51-28-5	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
4-NITROPHENOL	100-02-7	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
DIBENZOFURAN	132-64-9	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2,4-DINITROTOLUENE	121-14-2	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
DIMETHYLPHTHALATE	84-66-2	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
4-CHLORODIPHENYLETHER	7005-72-3	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
FLUORENE	86-73-7	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-001

Page 3

DH 1-11 SLURRY SAMPLE 1-ME  
 SLURRY SAMPLE 1 96.1-97.1 FEET

COC  
 Date Sampled 12/14/00 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 77

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
4-NITROANILINE	100-01-6	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
N-NITROSODIPHENYLAMINE	86-30-6	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
4-BROMOPHENYL PHENYL ETHER	101-55-3	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
HEXACHLOROBENZENE	118-74-1	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
PENTACHLOROPHENOL	87-86-5	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
PHENANTHRENE	85-01-8	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
ANTHRACENE	120-12-7	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
1-BUTYLPHTHALATE	84-74-2	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
FLUORANTHENE	206-44-0	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
PYRENE	129-00-0	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
BUTYL BENZYL PHTHALATE	85-68-7	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
3,3-DICHLOROBENZIDINE	91-94-1	ND	U	4900	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
BENZO(A)ANTHRACENE	56-55-3	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
CHRYSENE	218-01-9	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
BIS(2-ETHYLHEXYL) PHTHALATE	117-81-7	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
DI-N-OCTYLPHTHALATE	117-84-0	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
BENZO(B)FLUORANTHENE	205-99-2	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
BENZO(K)FLUORANTHENE	207-08-9	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
BENZO(A)PYRENE	50-32-8	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
DIBENZO(A,H)ANTHRACENE	53-70-3	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
BENZO(G,H,I)PERYLENE	191-24-2	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
BENZYL ALCOHOL	100-51-6	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
BENZOIC ACID	65-85-0	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
BIS(2-CHLOROISOPROPYL)ETHER	108-60-1	ND	U	2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
SURROGATE RESULTS								
NITROBENZENE-D5	4165-60-0	6200		2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
NITROBENZENE-D5	4165-60-0	25			% REC	Y SW8270C	02/26/01 12:12 tjh	1.0
2-FLUOROBIPHENYL	321-60-8	13000		2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2-FLUOROBIPHENYL	321-60-8	55			% REC	Y SW8270C	02/26/01 12:12 tjh	1.0
TERPHENYL-D14	1718-51-0	15000		2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
TERPHENYL-D14	1718-51-0	62			% REC	Y SW8270C	02/26/01 12:12 tjh	1.0
NOL-D5	4165-62-2	13000		2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
NOL-D5	4165-62-2	54			% REC	Y SW8270C	02/26/01 12:12 tjh	1.0
2-FLUOROPHENOL	367-12-4	13000		2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2-FLUOROPHENOL	367-12-4	55			% REC	Y SW8270C	02/26/01 12:12 tjh	1.0

CT&E Environmental Services Inc.  
Laboratory Division: Charleston Laboratory

John Meeks  
TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-001

Page 4

DH 1-11 SLURRY SAMPLE 1-ME  
SLURRY SAMPLE 1 96.1-97.1 FEET

COC  
Date Sampled 12/14/00 00:00  
Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
Sampled by CLIENT

% Solids 77

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
2,4,6-TRIBROMOPHENOL	118-79-6	7700		2400	ug/Kg	Y SW8270C	02/26/01 12:12 tjh	1.0
2,4,6-TRIBROMOPHENOL	118-79-6	32			% REC	Y SW8270C	02/26/01 12:12 tjh	1.0

CT&E Environmental Services Inc.  
Laboratory Division: Charleston Laboratory

John Meeks  
TRIAD ENGINEERING INC

Laboratory Number TA1-C0-P271-001

Page 1

DH 1-11 SLURRY SAMPLE 1-ME  
SLURRY SAMPLE 1 96.1-97.1 FEET

COC  
Date Sampled 12/14/00 00:00  
Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
Sampled by CLIENT

% Solids 77

032001 1358 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
ACRYLAMIDE	79-06-1	ND	U	0.23	mg/L	Y SW8316	03/19/01 21:58 ra	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-002

Page 1

DH 2-9 SLURRY SAMPLE 5-ME  
 SLURRY BAG SAMPLE 5 97.8-100.1 FEET

COC  
 Date Sampled 01/18/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 78

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
ALUMINUM	7429-90-5	2800		19	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
ANTIMONY	7440-36-0	ND	U	0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
ARSENIC	7440-38-2	2.9		0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
BARIIUM	7440-39-3	58		0.19	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
BERYLLIUM	7440-41-7	0.62		0.19	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
BORON	7440-42-8	ND	U	19	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
CADMIUM	7440-43-9	ND	U	0.19	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
CALCIUM	7440-70-2	780		9.5	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
CELESIUM	7440-47-3	5.1		0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
COBALT	7440-48-4	5.6		0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
COPPER	7440-50-8	12		0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
IRON	7439-89-6	10000		9.5	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
LEAD	7439-92-1	7.6		0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
MAGNESIUM	7439-95-4	1300		9.5	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
MANGANESE	7439-96-5	190		1.9	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
MOLYBDENUM	7439-98-7	ND	U	0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
NICKEL	7440-02-0	8.9		0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
POTASSIUM	7440-09-7	830		190	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
SELENIUM	7782-49-2	1.0		0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
SILICON	7440-21-3	1200		19	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
SILVER	7440-22-4	ND	U	0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
SODIUM	7440-23-5	ND	U	190	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
THALLIUM	7440-28-0	ND	U	0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
TITANIUM	7440-32-6	50		0.19	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
VANADIUM	7440-62-2	8.0		0.95	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
ZINC	7440-66-6	28		3.8	mg/Kg	Y SW6010B	02/21/01 02:31 JWJ	1.0
Total Solids (Percent)		78		0.010	%	EPA160.3	02/15/01 15:30 MHS	1.0
Acidity (Soluble)		3600		250	mg/Kg	Y	02/20/01 14:44 TF	100
Alkalinity (Soluble)		890		250	mg/Kg	Y	02/20/01 14:44 TF	100
LIBRARY SEARCH		ND	U			SW8270C	02/26/01 13:06 tjh	1.0
PHENOL	108-95-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BIS(2-CHLOROETHYL)ETHER	111-44-4	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-002

Page 2

DH 2-9 SLURRY SAMPLE 5-ME  
 SLURRY BAG SAMPLE 5 97.8-100.1 FEET

COC  
 Date Sampled 01/18/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 78

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
2-CHLOROPHENOL	95-57-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
1,3-DICHLOROENZENE	541-73-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
1,4-DICHLOROENZENE	106-46-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
1,2-DICHLOROENZENE	95-50-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2-METHYLPHENOL	95-48-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
3- & 4-METHYLPHENOL		ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
N-NITROSODI-N-PROPYLAMINE	621-64-7	ND	U	4600	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
HEXACHLOROETHANE	67-72-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BENZENE	98-95-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
ISOPHORONE	78-59-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2-NITROPHENOL	88-75-5	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2,4-DIMETHYLPHENOL	105-67-9	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BIS(2-CHLOROETHOXY) METHANE	111-91-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2,4-DICHLOROPHENOL	120-83-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
1,2,4-TRICHLOROENZENE	120-82-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
NAPHTHALENE	91-20-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
4-CHLOROANILINE	106-47-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
HEXACHLOROBUTADIENE	87-68-3	ND	U	4600	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2-METHYLNAPHTHALENE	91-57-6	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2,4,6-TRICHLOROPHENOL	88-06-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2,4,5-TRICHLOROPHENOL	95-95-4	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2-CHLORONAPHTHALENE	91-58-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2-NITROANILINE	88-74-4	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
DIMETHYLPHTHALATE	131-11-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
ACENAPHTHYLENE	208-96-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2,6-DINITROTOLUENE	606-20-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
3-NITROANILINE	99-09-2	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
ACENAPHTHENE	83-32-9	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2,4-DINITROPHENOL	51-28-5	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
4-NITROPHENOL	100-02-7	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
DIBENZOFURAN	132-64-9	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
DINITROTOLUENE	121-14-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
METHYLPHTHALATE	84-66-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
4-CHLORODIPHENYLETHER	7005-72-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
FLUORENE	86-73-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-002

Page 3

DH 2-9 SLURRY SAMPLE 5-ME  
 SLURRY BAG SAMPLE 5 97.8-100.1 FEET

COC  
 Date Sampled 01/18/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 78

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
4-NITROANILINE	100-01-6	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
N-NITROSODIPHENYLAMINE	86-30-6	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
4-BROMOPHENYL PHENYL ETHER	101-55-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
HEXACHLOROBENZENE	118-74-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
PENTACHLOROPHENOL	87-86-5	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
PHENANTHRENE	85-01-8	3300		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
ANTHRACENE	120-12-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
-BUTYLPHTHALATE	84-74-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
FLUORANTHENE	206-44-0	6300		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
PYRENE	129-00-0	5100		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BUTYL BENZYL PHTHALATE	85-68-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
3,3-DICHLOROBENZIDINE	91-94-1	ND	U	4600	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BENZO(A)ANTHRACENE	56-55-3	3100		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
CHRYSENE	218-01-9	3200		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BIS(2-ETHYLHEXYL) PHTHALATE	117-81-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
DI-N-OCTYLPHTHALATE	117-84-0	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BENZO(B)FLUORANTHENE	205-99-2	2900		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BENZO(K)FLUORANTHENE	207-08-9	2700		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BENZO(A)PYRENE	50-32-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
DIBENZO(A,H)ANTHRACENE	53-70-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BENZO(G,H,I)PERYLENE	191-24-2	2500		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BENZYL ALCOHOL	100-51-6	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BENZOIC ACID	65-85-0	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
BIS(2-CHLOROISOPROPYL)ETHER	108-60-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
SURROGATE RESULTS								
NITROBENZENE-D5	4165-60-0	5400		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
NITROBENZENE-D5	4165-60-0	23			% REC	Y SW8270C	02/26/01 13:06 tjh	1.0
2-FLUOROBIPHENYL	321-60-8	14000		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2-FLUOROBIPHENYL	321-60-8	62			% REC	Y SW8270C	02/26/01 13:06 tjh	1.0
TERPHENYL-D14	1718-51-0	16000		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
TERPHENYL-D14	1718-51-0	68			% REC	Y SW8270C	02/26/01 13:06 tjh	1.0
F OL-D5	4165-62-2	15000		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
F OL-D5	4165-62-2	65			% REC	Y SW8270C	02/26/01 13:06 tjh	1.0
2-FLUOROPHENOL	367-12-4	15000		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2-FLUOROPHENOL	367-12-4	64			% REC	Y SW8270C	02/26/01 13:06 tjh	1.0



CT&E Environmental Services Inc.  
Laboratory Division: Charleston Laboratory

John Meeks  
TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-002

Page 4

DH 2-9 SLURRY SAMPLE 5-ME  
SLURRY BAG SAMPLE 5 97.8-100.1 FEET

COC  
Date Sampled 01/18/01 00:00  
Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
Sampled by CLIENT

% Solids 78

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
2,4,6-TRIBROMOPHENOL	118-79-6	11000		2300	ug/Kg	Y SW8270C	02/26/01 13:06 tjh	1.0
2,4,6-TRIBROMOPHENOL	118-79-6	48			% REC	Y SW8270C	02/26/01 13:06 tjh	1.0

CT&E Environmental Services Inc.  
Laboratory Division: Charleston Laboratory

John Meeks  
TRIAD ENGINEERING INC

Laboratory Number TA1-C0-P271-002

Page 1

DH 2-9 SLURRY SAMPLE 5-ME  
SLURRY BAG SAMPLE 5 97.8-100.1 FEET

COC  
Date Sampled 01/18/01 00:00  
Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
Sampled by CLIENT

% Solids 78

032001 1358 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
ACRYLAMIDE	79-06-1	ND	U	0.25	mg/L	Y SW8316	03/19/01 22:36 ra	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-003

Page 1

WOLF CREEK #1  
 1.7 MILES DOWNSTREAM OF BIG ANDY CULVERT

COC  
 Date Sampled 01/06/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 68

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
ALUMINUM	7429-90-5	4800		22	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
ANTIMONY	7440-36-0	ND	U	1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
ARSENIC	7440-38-2	4.6		1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
BARIUM	7440-39-3	170		0.22	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
BERYLLIUM	7440-41-7	1.2		0.22	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
BORON	7440-42-8	ND	U	22	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
CADMIUM	7440-43-9	ND	U	0.22	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
CALCIUM	7440-70-2	1400		11	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
CERIUM	7440-47-3	9.1		1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
COBALT	7440-48-4	7.5		1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
COPPER	7440-50-8	28		1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
IRON	7439-89-6	10000		11	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
LEAD	7439-92-1	14		1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
MAGNESIUM	7439-95-4	2100		11	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
MANGANESE	7439-96-5	92		2.2	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
MOLYBDENUM	7439-98-7	ND	U	1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
NICKEL	7440-02-0	16		1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
POTASSIUM	7440-09-7	1700		220	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
SELENIUM	7782-49-2	3.1		1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
SILICON	7440-21-3	1400		22	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
SILVER	7440-22-4	ND	U	1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
SODIUM	7440-23-5	ND	U	220	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
THALLIUM	7440-28-0	ND	U	1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
TITANIUM	7440-32-6	130		0.22	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
VANADIUM	7440-62-2	16		1.1	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
ZINC	7440-66-6	35		4.4	mg/Kg	Y SW6010B	02/21/01 02:38 JWJ	1.0
Total Solids (Percent)		68		0.010	%	EPA160.3	02/15/01 15:30 MHS	1.0
Acidity (Soluble)		7600		300	mg/Kg	Y	02/20/01 14:44 TF	100
Alkalinity (Soluble)		1600		300	mg/Kg	Y	02/20/01 14:44 TF	100
Undecane	629-59-4	1900	J		ug/Kg	SW8270C	02/26/01 14:00 tjh	1.0
Naphthalene, 1-hexyl-	2876-53-1	2100	J		ug/Kg	SW8270C	02/26/01 14:00 tjh	1.0
Naphthalene, 1,6-dimethyl-	575-43-9	1900	J		ug/Kg	SW8270C	02/26/01 14:00 tjh	1.0
Heptane, 2,6-dimethyl-	1072-05-5	2000	J		ug/Kg	SW8270C	02/26/01 14:00 tjh	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-003

Page 2

WOLF CREEK #1  
 1.7 MILES DOWNSTREAM OF BIG ANDY CULVERT

COC  
 Date Sampled 01/06/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 68

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
PHENOL	108-95-2	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BIS(2-CHLOROETHYL)ETHER	111-44-4	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2-CHLOROPHENOL	95-57-8	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
1,3-DICHLOROBENZENE	541-73-1	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
1,4-DICHLOROBENZENE	106-46-7	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
1,2-DICHLOROBENZENE	95-50-1	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2-METHYLPHENOL	95-48-7	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2- & 4-METHYLPHENOL		ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
DITROSODI-N-PROPYLAMINE	621-64-7	ND	U	5400	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
HEXACHLOROETHANE	67-72-1	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
NITROBENZENE	98-95-3	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
ISOPHORONE	78-59-1	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2-NITROPHENOL	88-75-5	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2,4-DIMETHYLPHENOL	105-67-9	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BIS(2-CHLOROETHOXY) METHANE	111-91-1	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2,4-DICHLOROPHENOL	120-83-2	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
1,2,4-TRICHLOROBENZENE	120-82-1	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
NAPHTHALENE	91-20-3	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
4-CHLOROANILINE	106-47-8	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
HEXACHLOROBUTADIENE	87-68-3	ND	U	5400	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2-METHYLNAPHTHALENE	91-57-6	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2,4,6-TRICHLOROPHENOL	88-06-2	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2,4,5-TRICHLOROPHENOL	95-95-4	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2-CHLORONAPHTHALENE	91-58-7	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2-NITROANILINE	88-74-4	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
DIMETHYLPHTHALATE	131-11-3	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
ACENAPHTHYLENE	208-96-8	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2,6-DINITROTOLUENE	606-20-2	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
3-NITROANILINE	99-09-2	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
ACENAPHTHENE	83-32-9	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2,4-DINITROPHENOL	51-28-5	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
1-NITROPHENOL	100-02-7	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BENZOFURAN	132-64-9	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2,4-DINITROTOLUENE	121-14-2	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
DIETHYLPHTHALATE	84-66-2	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-003

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WOLF CREEK #1  
 1.7 MILES DOWNSTREAM OF BIG ANDY CULVERT

COC  
 Date Sampled 01/06/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 68

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
4-CHLORODIPHENYLETHER	7005-72-3	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
FLUORENE	86-73-7	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
4-NITROANILINE	100-01-6	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
N-NITROSODIPHENYLAMINE	86-30-6	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
4-BROMOPHENYL PHENYL ETHER	101-55-3	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
HEXACHLORO BENZENE	118-74-1	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
PENTACHLOROPHENOL	87-86-5	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
ANTHRENE	85-01-8	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
ANTHRACENE	120-12-7	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
DI-N-BUTYLPHTHALATE	84-74-2	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
FLUORANTHENE	206-44-0	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
PYRENE	129-00-0	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BUTYL BENZYL PHTHALATE	85-68-7	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
3,3-DICHLORO BENZIDINE	91-94-1	ND	U	5400	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BENZO(A)ANTHRACENE	56-55-3	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
CHRYSENE	218-01-9	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BIS(2-ETHYLHEXYL) PHTHALATE	117-81-7	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
DI-N-OCTYLPHTHALATE	117-84-0	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BENZO(B)FLUORANTHENE	205-99-2	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BENZO(K)FLUORANTHENE	207-08-9	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BENZO(A)PYRENE	50-32-8	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
DIBENZO(A,H)ANTHRACENE	53-70-3	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BENZO(G,H,I)PERYLENE	191-24-2	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BENZYL ALCOHOL	100-51-6	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BENZOIC ACID	65-85-0	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
BIS(2-CHLOROISOPROPYL)ETHER	108-60-1	ND	U	2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
SURROGATE RESULTS								
NITROBENZENE-D5	4165-60-0	6300		2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
NITROBENZENE-D5	4165-60-0	24			% REC	Y SW8270C	02/26/01 14:00 tjh	1.0
2-FLUOROBIPHENYL	321-60-8	9500		2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2-FLUOROBIPHENYL	321-60-8	35			% REC	Y SW8270C	02/26/01 14:00 tjh	1.0
PHENYL-D14	1718-51-0	10000		2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
PHENYL-D14	1718-51-0	38			% REC	Y SW8270C	02/26/01 14:00 tjh	1.0
PHENOL-D5	4165-62-2	11000		2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
PHENOL-D5	4165-62-2	40			% REC	Y SW8270C	02/26/01 14:00 tjh	1.0

CT&E Environmental Services Inc.  
Laboratory Division: Charleston Laboratory

John Meeks  
TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-003

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WOLF CREEK #1  
1.7 MILES DOWNSTREAM OF BIG ANDY CULVERT

COC  
Date Sampled 01/06/01 00:00  
Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
Sampled by CLIENT

% Solids 68

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
2-FLUOROPHENOL	367-12-4	10000		2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2-FLUOROPHENOL	367-12-4	38			% REC	Y SW8270C	02/26/01 14:00 tjh	1.0
2,4,6-TRIBROMOPHENOL	118-79-6	6500		2700	ug/Kg	Y SW8270C	02/26/01 14:00 tjh	1.0
2,4,6-TRIBROMOPHENOL	118-79-6	24			% REC	Y SW8270C	02/26/01 14:00 tjh	1.0

CT&E Environmental Services Inc.  
Laboratory Division: Charleston Laboratory

John Meeks  
TRIAD ENGINEERING INC

Laboratory Number TA1-C0-P271-003

Page 1

WOLF CREEK #1  
1.7 MILES DOWNSTREAM OF BIG ANDY CULVERT

COC  
Date Sampled 01/06/01 00:00  
Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
Sampled by CLIENT

% Solids 68

032001 1358 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
ACRYLAMIDE	79-06-1	ND	U	0.26	mg/L	Y SW8316	03/19/01 22:48 ra	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-004

Page 1

DH 2-9 SLURRY SAMPLE 2-ME  
 SLURRY BAG SAMPLE 2 91.8-93.8 FEET

COC  
 Date Sampled 01/18/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 74

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
ALUMINUM	7429-90-5	3600		20	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
ANTIMONY	7440-36-0	ND	U	1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
ARSENIC	7440-38-2	5.0		1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
BARIUM	7440-39-3	140		0.20	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
BERYLLIUM	7440-41-7	1.1		0.20	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
BORON	7440-42-8	ND	U	20	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
CADMIUM	7440-43-9	ND	U	0.20	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
CALCIUM	7440-70-2	1200		10	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
CHLORINE	7440-47-3	11		1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
COBALT	7440-48-4	7.3		1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
COPPER	7440-50-8	26		1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
IRON	7439-89-6	9100		10	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
LEAD	7439-92-1	13		1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
MAGNESIUM	7439-95-4	1400		10	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
MANGANESE	7439-96-5	68		2.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
MOLYBDENUM	7439-98-7	ND	U	1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
NICKEL	7440-02-0	15		1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
POTASSIUM	7440-09-7	1300		200	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
SELENIUM	7782-49-2	4.5		1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
SILICON	7440-21-3	1300		20	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
SILVER	7440-22-4	ND	U	1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
SODIUM	7440-23-5	ND	U	200	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
THALLIUM	7440-28-0	ND	U	1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
TITANIUM	7440-32-6	170		0.20	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
VANADIUM	7440-62-2	26		1.0	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
ZINC	7440-66-6	29		4.1	mg/Kg	Y SW6010B	02/21/01 03:08 JWW	1.0
Total Solids (Percent)		74		0.010	%	EPA160.3	02/15/01 15:30 MHS	1.0
Acidity (Soluble)		7200		270	mg/Kg	Y	02/20/01 14:44 TF	100
Alkalinity (Soluble)		1000		270	mg/Kg	Y	02/20/01 14:44 TF	100
Naphthalene, 1,3-dimethyl-	575-41-7	2200	J		ug/Kg	SW8270C	02/26/01 14:53 tjh	1.0
Naphthalene, 1,5-dimethyl-	571-61-9	4000	J		ug/Kg	SW8270C	02/26/01 14:53 tjh	1.0
Octadecane, 2,6-dimethyl-	75163-97-2	6900	J		ug/Kg	SW8270C	02/26/01 14:53 tjh	1.0
Naphthalene, 1-methyl-7-(1-methylethyl)-	490-65-3	4400	J		ug/Kg	SW8270C	02/26/01 14:53 tjh	1.0



CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

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 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-004

Page 2

DH 2-9 SLURRY SAMPLE 2-ME  
 SLURRY BAG SAMPLE 2 91.8-93.8 FEET

COC  
 Date Sampled 01/18/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 74

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
Eicosane	112-95-8	2300	J		ug/Kg	SW8270C	02/26/01 14:53 tjh	1.0
Heptadecane, 4-methyl-	26429-11-8	2200	J		ug/Kg	SW8270C	02/26/01 14:53 tjh	1.0
Tetracosane	646-31-1	27000	J		ug/Kg	SW8270C	02/26/01 14:53 tjh	1.0
PHENOL	108-95-2	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BIS(2-CHLOROETHYL)ETHER	111-44-4	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2-CHLOROPHENOL	95-57-8	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
1,3-DICHLOROBENZENE	541-73-1	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
1,4-DICHLOROBENZENE	106-46-7	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
1,2-DICHLOROBENZENE	95-50-1	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2-METHYLPHENOL	95-48-7	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
3- & 4-METHYLPHENOL		ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
N-NITROSODI-N-PROPYLAMINE	621-64-7	ND	U	4000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
HEXACHLOROETHANE	67-72-1	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
NITROBENZENE	98-95-3	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
ISOPHORONE	78-59-1	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2-NITROPHENOL	88-75-5	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2,4-DIMETHYLPHENOL	105-67-9	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BIS(2-CHLOROETHOXY) METHANE	111-91-1	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2,4-DICHLOROPHENOL	120-83-2	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
1,2,4-TRICHLOROBENZENE	120-82-1	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
NAPHTHALENE	91-20-3	4100		2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
4-CHLOROANILINE	106-47-8	3800		2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
HEXACHLOROBUTADIENE	87-68-3	ND	U	4000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2-METHYLNAPHTHALENE	91-57-6	5900		2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2,4,6-TRICHLOROPHENOL	88-06-2	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2,4,5-TRICHLOROPHENOL	95-95-4	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2-CHLORONAPHTHALENE	91-58-7	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2-NITROANILINE	88-74-4	ND	U	10000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
DIMETHYLPHTHALATE	131-11-3	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
ACENAPHTHYLENE	208-96-8	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2,4-DINITROTOLUENE	606-20-2	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
3,4-DICHLOROANILINE	99-09-2	ND	U	10000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
ACENAPHTHENE	83-32-9	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2,4-DINITROPHENOL	51-28-5	ND	U	10000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-004

Page 3

DH 2-9 SLURRY SAMPLE 2-ME  
 SLURRY BAG SAMPLE 2 91.8-93.8 FEET

COC  
 Date Sampled 01/18/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 74

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
4-NITROPHENOL	100-02-7	ND	U	10000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
DIBENZOFURAN	132-64-9	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2,4-DINITROTOLUENE	121-14-2	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
DIETHYLPHTHALATE	84-66-2	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
4-CHLORODIPHENYLETHER	7005-72-3	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
FLUORENE	86-73-7	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
4-NITROANILINE	100-01-6	ND	U	10000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
4 6-DINITRO-2-METHYLPHENOL	534-52-1	ND	U	10000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
TROSODIPHENYLAMINE	86-30-6	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
4-BROMOPHENYL PHENYL ETHER	101-55-3	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
HEXACHLOROBENZENE	118-74-1	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
PENTACHLOROPHENOL	87-86-5	ND	U	10000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
PHENANTHRENE	85-01-8	2800		2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
ANTHRACENE	120-12-7	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
DI-N-BUTYLPHTHALATE	84-74-2	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
FLUORANTHENE	206-44-0	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
PYRENE	129-00-0	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BUTYL BENZYL PHTHALATE	85-68-7	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
3,3-DICHLOROBENZIDINE	91-94-1	ND	U	4000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BENZO(A)ANTHRACENE	56-55-3	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
CHRYSENE	218-01-9	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BIS(2-ETHYLHEXYL) PHTHALATE	117-81-7	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
DI-N-OCTYLPHTHALATE	117-84-0	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BENZO(B)FLUORANTHENE	205-99-2	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BENZO(K)FLUORANTHENE	207-08-9	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BENZO(A)PYRENE	50-32-8	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
DIBENZO(A,H)ANTHRACENE	53-70-3	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BENZO(G,H,I)PERYLENE	191-24-2	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BENZYL ALCOHOL	100-51-6	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BENZOIC ACID	65-85-0	ND	U	2200	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
BIS(2-CHLOROISOPROPYL)ETHER	108-60-1	ND	U	2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
SURROGATE RESULTS								
M OCBENZENE-D5	4165-60-0	8200		2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
H OCBENZENE-D5	4165-60-0	40			% REC	Y SW8270C	02/26/01 14:53 tjh	1.0
2-FLUOROBIPHENYL	321-60-8	13000		2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2-FLUOROBIPHENYL	321-60-8	65			% REC	Y SW8270C	02/26/01 14:53 tjh	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-004

Page 4

DH 2-9 SLURRY SAMPLE 2-ME  
 SLURRY BAG SAMPLE 2 91.8-93.8 FEET

COC  
 Date Sampled 01/18/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 74

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
TERPHENYL-D14	1718-51-0	16000		2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
TERPHENYL-D14	1718-51-0	78			% REC	Y SW8270C	02/26/01 14:53 tjh	1.0
PHENOL-D5	4165-62-2	16000		2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
PHENOL-D5	4165-62-2	79			% REC	Y SW8270C	02/26/01 14:53 tjh	1.0
2-FLUOROPHENOL	367-12-4	15000		2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2-FLUOROPHENOL	367-12-4	74			% REC	Y SW8270C	02/26/01 14:53 tjh	1.0
2,4,6-TRIBROMOPHENOL	118-79-6	11000		2000	ug/Kg	Y SW8270C	02/26/01 14:53 tjh	1.0
2,4,6-TRIBROMOPHENOL	118-79-6	55			% REC	Y SW8270C	02/26/01 14:53 tjh	1.0

CT&E Environmental Services Inc.  
Laboratory Division: Charleston Laboratory

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TRIAD ENGINEERING INC

Laboratory Number TA1-C0-P271-004

Page 1

DH 2-9 SLURRY SAMPLE 2-ME  
SLURRY BAG SAMPLE 2 91.8-93.8 FEET

COC  
Date Sampled 01/18/01 00:00  
Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
Sampled by CLIENT

% Solids 74

032001 1358 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
ACRYLAMIDE	79-06-1	ND	U	1.0	mg/L	Y SW8316	03/19/01 23:01 ra	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

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 TRIAD ENGINEERING INC

Laboratory Number TA1-80-P338-005

Page 1

SP #5  
 100' UPSTREAM OF DRILL PAD 20' FROM SHORE

COC  
 Date Sampled 01/06/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 69

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
ALUMINUM	7429-90-5	5900		22	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
ANTIMONY	7440-36-0	ND	U	1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
ARSENIC	7440-38-2	5.1		1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
BARIUM	7440-39-3	150		0.22	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
BERYLLIUM	7440-41-7	0.91		0.22	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
BORON	7440-42-8	ND	U	22	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
CADMIUM	7440-43-9	ND	U	0.22	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
CALCIUM	7440-70-2	1200		11	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
CHROMIUM	7440-47-3	10		1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
COBALT	7440-48-4	8.1		1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
COPPER	7440-50-8	30		1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
IRON	7439-89-6	12000		11	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
LEAD	7439-92-1	13		1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
MAGNESIUM	7439-95-4	2600		11	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
MANGANESE	7439-96-5	97		2.2	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
MOLYBDENUM	7439-98-7	ND	U	1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
NICKEL	7440-02-0	18		1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
POTASSIUM	7440-09-7	1500		220	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
SELENIUM	7782-49-2	2.9		1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
SILICON	7440-21-3	1800		22	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
SILVER	7440-22-4	ND	U	1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
SODIUM	7440-23-5	ND	U	220	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
THALLIUM	7440-28-0	ND	U	1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
TITANIUM	7440-32-6	120		0.22	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
VANADIUM	7440-62-2	17		1.1	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
ZINC	7440-66-6	43		4.3	mg/Kg	Y SW6010B	02/21/01 03:15 JWJ	1.0
Total Solids (Percent)		69		0.010	%	EPA160.3	02/15/01 15:30 MHS	1.0
Acidity (Soluble)		11000		290	mg/Kg	Y	02/20/01 14:44 TF	100
Alkalinity (Soluble)		1100		290	mg/Kg	Y	02/20/01 14:44 TF	100
Fluorene	112-40-3	2000	J		ug/Kg	SW8270C	02/26/01 15:47 tjh	1.0
Naphthalene, 1-methyl-	90-12-0	2000	J		ug/Kg	SW8270C	02/26/01 15:47 tjh	1.0
Naphthalene, 2,3-dimethyl-	581-40-8	2300	J		ug/Kg	SW8270C	02/26/01 15:47 tjh	1.0
Dodecane, 2-methyl-8-propyl-	55045-07-3	2600	J		ug/Kg	SW8270C	02/26/01 15:47 tjh	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-005

Page 2

SP #5  
 100' UPSTREAM OF DRILL PAD 20' FROM SHORE

COC  
 Date Sampled 01/06/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 69

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
Octadecane	593-45-3	4900	J		ug/Kg	SW8270C	02/26/01 15:47 tjh	1.0
PHENOL	108-95-2	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
BIS(2-CHLOROETHYL)ETHER	111-44-4	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2-CHLOROPHENOL	95-57-8	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
1,3-DICHLOROBENZENE	541-73-1	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
1,4-DICHLOROBENZENE	106-46-7	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
1,2-DICHLOROBENZENE	95-50-1	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2-METHYLPHENOL	95-48-7	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
3- & 4-METHYLPHENOL		ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
N-NITROSODI-N-PROPYLAMINE	621-64-7	ND	U	5200	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
HEXACHLOROETHANE	67-72-1	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
NITROBENZENE	98-95-3	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
ISOPHORONE	78-59-1	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2-NITROPHENOL	88-75-5	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2,4-DIMETHYLPHENOL	105-67-9	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
BIS(2-CHLOROETHOXY) METHANE	111-91-1	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2,4-DICHLOROPHENOL	120-83-2	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
1,2,4-TRICHLOROBENZENE	120-82-1	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
NAPHTHALENE	91-20-3	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
4-CHLOROANILINE	106-47-8	2600		2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
HEXACHLOROBUTADIENE	87-68-3	ND	U	5200	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2-METHYLNAPHTHALENE	91-57-6	3000		2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2,4,6-TRICHLOROPHENOL	88-06-2	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2,4,5-TRICHLOROPHENOL	95-95-4	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2-CHLORONAPHTHALENE	91-58-7	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2-NITROANILINE	88-74-4	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
DIMETHYLPHTHALATE	131-11-3	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
ACENAPHTHYLENE	208-96-8	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2,6-DINITROTOLUENE	606-20-2	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
3-NITROANILINE	99-09-2	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
1-NAPHTHENE	83-32-9	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2,4-DINITROPHENOL	51-28-5	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
4-NITROPHENOL	100-02-7	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
DIBENZOFURAN	132-64-9	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-005

Page 3

SP #5  
 100' UPSTREAM OF DRILL PAD 20' FROM SHORE

COC  
 Date Sampled 01/06/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 69

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
2,4-DINITROTOLUENE	121-14-2	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
DIETHYLPHthalate	84-66-2	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
4-CHLORODIPHENYLEther	7005-72-3	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
FLUORENE	86-73-7	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
4-NITROANILINE	100-01-6	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
N-NITROSODIPHENYLAMINE	86-30-6	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
4-BROMOPHENYL PHENYL ETHER	101-55-3	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
CHLOROBenzene	118-74-1	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
PENTACHLOROPHENOL	87-86-5	ND	U	13000	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
PHENANTHRENE	85-01-8	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
ANTHRACENE	120-12-7	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
DI-N-BUTYLPHthalate	84-74-2	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
FLUORANTHENE	206-44-0	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
PYRENE	129-00-0	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
BUTYL BENZYL PHthalate	85-68-7	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
3,3-DICHLOROBENZIDINE	91-94-1	ND	U	5200	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
BENZO(A)ANTHRACENE	56-55-3	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
CHRYSENE	218-01-9	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
BIS(2-ETHYLHEXYL) PHthalate	117-81-7	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
DI-N-OCTYLPHthalate	117-84-0	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
BENZO(B)FLUORANTHENE	205-99-2	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
BENZO(K)FLUORANTHENE	207-08-9	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
BENZO(A)PYRENE	50-32-8	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
DIBENZO(A,H)ANTHRACENE	53-70-3	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
BENZO(G,H,I)PERYLENE	191-24-2	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
BENZYL ALCOHOL	100-51-6	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
BENZOIC ACID	65-85-0	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
BIS(2-CHLOROISOPROPYL)ETHER	108-60-1	ND	U	2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
SURROGATE RESULTS								
NITROBENZENE-D5	4165-60-0	7000		2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
NITROBENZENE-D5	4165-60-0	27			% REC	Y SW8270C	02/26/01 15:47 tjh	1.0
UOROBIPHENYL	321-60-8	14000		2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
UOROBIPHENYL	321-60-8	53			% REC	Y SW8270C	02/26/01 15:47 tjh	1.0
TERPHENYL-D14	1718-51-0	15000		2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
TERPHENYL-D14	1718-51-0	57			% REC	Y SW8270C	02/26/01 15:47 tjh	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-005

Page 4

SP #5  
 100' UPSTREAM OF DRILL PAD 20' FROM SHORE

COC  
 Date Sampled 01/06/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 69

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
PHENOL-D5	4165-62-2	18000		2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
PHENOL-D5	4165-62-2	70			% REC	Y SW8270C	02/26/01 15:47 tjh	1.0
2-FLUOROPHENOL	367-12-4	14000		2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2-FLUOROPHENOL	367-12-4	54			% REC	Y SW8270C	02/26/01 15:47 tjh	1.0
2,4,6-TRIBROMOPHENOL	118-79-6	12000		2600	ug/Kg	Y SW8270C	02/26/01 15:47 tjh	1.0
2,4,6-TRIBROMOPHENOL	118-79-6	48			% REC	Y SW8270C	02/26/01 15:47 tjh	1.0



CT&E Environmental Services Inc.  
Laboratory Division: Charleston Laboratory

John Meeks  
TRIAD ENGINEERING INC

Laboratory Number TA1-C0-P271-005

Page 1

SP #5  
100' UPSTREAM OF DRILL PAD 20' FROM SHORE

COC  
Date Sampled 01/06/01 00:00  
Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
Sampled by CLIENT

% Solids 69

032001 1358 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
ACRYLAMIDE	79-06-1	ND	U	1.0	mg/L	Y SW8316	03/19/01 23:14 ra	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-80-P338-006

Page 1

CW #1  
 2000' UPSTREAM OF CONF. AT STRAIGHT FORK

COC  
 Date Sampled 01/06/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 71

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
ALUMINUM	7429-90-5	4800		21	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
ANTIMONY	7440-36-0	ND	U	1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
ARSENIC	7440-38-2	4.5		1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
BARIUM	7440-39-3	170		0.21	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
BERYLLIUM	7440-41-7	1.2		0.21	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
BORON	7440-42-8	ND	U	21	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
CADMIUM	7440-43-9	ND	U	0.21	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
CAESIUM	7440-70-2	1400		10	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
CELESIUM	7440-47-3	8.4		1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
COBALT	7440-48-4	7.3		1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
COPPER	7440-50-8	28		1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
IRON	7439-89-6	9800		10	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
LEAD	7439-92-1	13		1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
MAGNESIUM	7439-95-4	2000		10	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
MANGANESE	7439-96-5	100		2.1	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
MOLYBDENUM	7439-98-7	ND	U	1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
NICKEL	7440-02-0	15		1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
POTASSIUM	7440-09-7	1700		210	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
SELENIUM	7782-49-2	3.3		1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
SILICON	7440-21-3	2300		21	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
SILVER	7440-22-4	ND	U	1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
SODIUM	7440-23-5	ND	U	210	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
THALLIUM	7440-28-0	ND	U	1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
TITANIUM	7440-32-6	100		0.21	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
VANADIUM	7440-62-2	15		1.0	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
ZINC	7440-66-6	37		4.2	mg/Kg	Y SW6010B	02/21/01 03:23 JWJ	1.0
Total Solids (Percent)		71		0.010	%	EPA160.3	02/15/01 15:30 MHS	1.0
Acidity (Soluble)		6200		280	mg/Kg	Y	02/20/01 14:44 TF	100
Alkalinity (Soluble)		1600		280	mg/Kg	Y	02/20/01 14:44 TF	100
Decane, 2,6,10,14-tetramethyl-	1921-70-6	2000	J		ug/Kg	SW8270C	02/26/01 16:40 tjh	1.0
PHENOL	108-95-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BIS(2-CHLOROETHYL)ETHER	111-44-4	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-006

Page 2

CW #1  
 2000' UPSTREAM OF CONF. AT STRAIGHT FORK

COC  
 Date Sampled 01/06/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 71

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
2-CHLOROPHENOL	95-57-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
1,3-DICHLOROBENZENE	541-73-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
1,4-DICHLOROBENZENE	106-46-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
1,2-DICHLOROBENZENE	95-50-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
2-METHYLPHENOL	95-48-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
3- & 4-METHYLPHENOL		ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
N-NITROSODI-N-PROPYLAMINE	621-64-7	ND	U	4700	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
HEXACHLOROETHANE	67-72-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
MONOCHLOROBENZENE	98-95-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
ISOPHORONE	78-59-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
2-NITROPHENOL	88-75-5	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
2,4-DIMETHYLPHENOL	105-67-9	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BIS(2-CHLOROETHOXY) METHANE	111-91-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
2,4-DICHLOROPHENOL	120-83-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
1,2,4-TRICHLOROBENZENE	120-82-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
NAPHTHALENE	91-20-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
4-CHLOROANILINE	106-47-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
HEXACHLOROBUTADIENE	87-68-3	ND	U	4700	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
4-CHLORO-3-METHYLPHENOL	59-50-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
2-METHYLNAPHTHALENE	91-57-6	2400		2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
HEXACHLOROCYCLOPENTADIENE	77-47-4	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
2,4,6-TRICHLOROPHENOL	88-06-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
2,4,5-TRICHLOROPHENOL	95-95-4	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
2-CHLORONAPHTHALENE	91-58-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
2-NITROANILINE	88-74-4	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
DIMETHYLPHTHALATE	131-11-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
ACENAPHTHYLENE	208-96-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
2,6-DINITROTOLUENE	606-20-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
3-NITROANILINE	99-09-2	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
ACENAPHTHENE	83-32-9	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
2,4-DINITROPHENOL	51-28-5	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
4-NITROPHENOL	100-02-7	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
DIBENZOFURAN	132-64-9	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
1,3-DINITROTOLUENE	121-14-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
DIMETHYLPHTHALATE	84-66-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
4-CHLORODIPHENYLETHER	7005-72-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
FLUORENE	86-73-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0

CT&E Environmental Services Inc.  
 Laboratory Division: Charleston Laboratory

John Meeks  
 TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-006

Page 3

CW #1  
 2000' UPSTREAM OF CONF. AT STRAIGHT FORK

COC  
 Date Sampled 01/06/01 00:00  
 Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
 Sampled by CLIENT

% Solids 71

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
4-NITROANILINE	100-01-6	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
4,6-DINITRO-2-METHYLPHENOL	534-52-1	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
N-NITROSODIPHENYLAMINE	86-30-6	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
4-BROMOPHENYL PHENYL ETHER	101-55-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
HEXACHLOROBENZENE	118-74-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
PENTACHLOROPHENOL	87-86-5	ND	U	12000	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
PHENANTHRENE	85-01-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
ANTHRACENE	120-12-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
1-BUTYLPHTHALATE	84-74-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
FLUORANTHENE	206-44-0	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
PYRENE	129-00-0	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BUTYL BENZYL PHTHALATE	85-68-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
3,3-DICHLOROBENZIDINE	91-94-1	ND	U	4700	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BENZO(A)ANTHRACENE	56-55-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
CHRYSENE	218-01-9	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BIS(2-ETHYLHEXYL) PHTHALATE	117-81-7	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
DI-N-OCTYLPHTHALATE	117-84-0	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BENZO(B)FLUORANTHENE	205-99-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BENZO(K)FLUORANTHENE	207-08-9	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BENZO(A)PYRENE	50-32-8	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
INDENO(1,2,3-CD)PYRENE	193-39-5	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
DIBENZO(A,H)ANTHRACENE	53-70-3	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BENZO(G,H,I)PERYLENE	191-24-2	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BENZYL ALCOHOL	100-51-6	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BENZOIC ACID	65-85-0	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
BIS(2-CHLOROISOPROPYL)ETHER	108-60-1	ND	U	2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
SURROGATE RESULTS								
NITROBENZENE-D5	4165-60-0	9600		2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
NITROBENZENE-D5	4165-60-0	41			% REC	Y SW8270C	02/26/01 16:40 tjh	1.0
2-FLUOROBIPHENYL	321-60-8	10000		2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
2-FLUOROBIPHENYL	321-60-8	42			% REC	Y SW8270C	02/26/01 16:40 tjh	1.0
TERPHENYL-D14	1718-51-0	12000		2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
TERPHENYL-D14	1718-51-0	52			% REC	Y SW8270C	02/26/01 16:40 tjh	1.0
P L-D5	4165-62-2	15000		2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
PHENOL-D5	4165-62-2	64			% REC	Y SW8270C	02/26/01 16:40 tjh	1.0
2-FLUOROPHENOL	367-12-4	12000		2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
2-FLUOROPHENOL	367-12-4	53			% REC	Y SW8270C	02/26/01 16:40 tjh	1.0

CT&E Environmental Services Inc.  
Laboratory Division: Charleston Laboratory

John Meeks  
TRIAD ENGINEERING INC

Laboratory Number TA1-B0-P338-006

Page 4

CW #1  
2000' UPSTREAM OF CONF. AT STRAIGHT FORK

COC  
Date Sampled 01/06/01 00:00  
Date Received 02/13/01 11:00

Type F Matrix SLUDGE  
Sampled by CLIENT

% Solids 71

031501 1145 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
2,4,6-TRIBROMOPHENOL	118-79-6	8700		2300	ug/Kg	Y SW8270C	02/26/01 16:40 tjh	1.0
2,4,6-TRIBROMOPHENOL	118-79-6	37			% REC	Y SW8270C	02/26/01 16:40 tjh	1.0

CT&E Environmental Services Inc.  
Laboratory Division: Charleston Laboratory

John Meeks  
TRIAD ENGINEERING INC

Laboratory Number TA1-C0-P271-006

Page 1

CW #1  
2000' UPSTREAM OF CONF. AT STRAIGHT FORK

COC  
Date Sampled 01/06/01 00:00  
Date Received 02/13/01 11:00

Type F Matrix WATER  
Sampled by CLIENT

% Solids 71

032001 1358 Ver. 4.0.187

ANALYSIS FOR REQUESTED PARAMETERS

Analyzed Parameter	CAS No.	Result	Flg	RLimit	Units	S Method	Date/Time/Anl	DilF
ACRYLAMIDE	79-06-1	ND	U	0.26	mg/L	Y SW8316	03/19/01 23:26 ra	1.0

***APPENDIX C***

***GEOPHYSICAL INVESTIGATION***



**Final Report  
Geophysical Survey  
Big Branch Slurry Impoundment  
Martin County Coal Corporation  
Martin County, KY  
Enviroscan Reference Number 120015**

**Prepared For: Triad Engineering, Inc.  
Prepared By: Enviroscan, Inc.  
January 23, 2001**





January 23, 2001

Mr. John Nottingham  
**Triad Engineering, Inc.**  
4980 Teays Valley Road  
Scott Depot, WV 25560

RE: Geophysical Survey  
Big Branch Slurry Impoundment  
Martin County Coal Corporation  
Martin County, KY  
Enviroscan Reference Number 120015

Dear Mr. Nottingham:

Pursuant to our proposal, dated December 11, 2000, Enviroscan, Inc. completed a geophysical survey of the above-referenced site between December 18 through 20, 2000. The methods and results of the survey are described in the following text and figures.

## Survey Purpose

The geophysical survey area lies in a dammed valley that has been used by the Martin County Coal Corporation as a coal washing slurry impoundment. According to information provided by Triad Engineering, Inc. (Triad) and the Mine Safety and Health Administration (MSHA), the impoundment bottom failed, releasing semi-liquid coal slurry into nearby mine workings. The purpose of the geophysical survey was to determine whether there is geophysical evidence to constrain the location of the presumed conduit or breakthrough from the impoundment into the mine workings. The survey area consists of a recently constructed earthen drilling pad extending out into the slurry impoundment. The locations of selected recent boreholes (by others) within the survey area are depicted on Figure 1.

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January 23, 2001  
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## Survey Method

Based on the site conditions and survey purpose, Enviroscan performed a mise-a-la-masse electrical profiling survey. The mise-a-la-masse method is commonly used in the mining industry to map the extent of conductive ore bodies. The principles of the mise-a-la-masse method are depicted in Appendix A, and are described in detail in e.g. Telford, W.M., Geldart, L.P., and Sheriff, R.E., 1990, Applied Geophysics, Cambridge University Press. The method is based on the idea that an electrically conductive subsurface body (in this case the slurry-filled mine working and conduit/breakthrough area) will radiate the signal from an inserted current electrode. Concentrations of current flow at the ground surface are expected to mimic the footprint of the conductive body.

In this case, mine workings containing electrically conductive slurry were energized by a current source electrode inserted through borehole DH1-11. A current sink electrode was placed on the far western shore of the impoundment – at a distance of over 1500 feet representing essentially electrical infinity. The approximate footprint of the slurry-filled mine workings, and the possible breakthrough zone were then delineated by mapping the current flow from the energized mine workings. Current flow was mapped as voltage using a pair of voltage electrodes (with a constant 20-foot spacing) attached to a high-impedance microvolt meter. The voltage electrodes were walked along linear profiles radiating from the current electrode borehole, with the voltage electrodes arranged collinearly with the borehole. For each measurement, the midpoint of the voltage electrodes was measured using a backpack-mounted Trimble Pathfinder global positioning system (GPS) receiver in contact with 6 to 8 position-fixing satellites. Real-time communication with OmniStar resulted in differential GPS (DGPS) positioning with an accuracy of plus or minus approximately two feet. The applied signal was generated by an Advanced GeoSciences Sting R1-IP earth resistivity meter. The voltage measurements were also collected and digitally recorded by the Sting R1-IP.

The field survey was conducted on the nights of December 19 and 20, 2000. Nighttime work was necessitated by the contemporary drilling efforts on the site. In order to minimize “leakage” of electrical current from the mine workings, drilling steel was removed from any active holes prior to commencement of the electrical survey, and readings were spread across two nights, to allow avoidance of the drill rigs themselves. Note that a drill rod is reportedly stuck in borehole DHX-2 (see Figure 1), but it extends no closer than approximately 10 feet to the top of the coal seam.

Mr. Nottingham  
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Page 3

The field voltages from the survey stations depicted in Figure 1 were subjected to removal of a geometric factor derived from standard equations for a gradient array (see e.g. Telford et al., 1990). The corrected voltages were contoured using the statistical kriging algorithm in SURFER by Golden Software, and are depicted in Figure 2. Note that Figures 1, 2 and 3 also depict a depression that was GPS-surveyed by Enviroscan in the field, and which the drillers reported was suffering active subsidence during the drilling operations.

The main feature of Figure 2 is a zone of high voltage that mimics the reported westward extent of mine workings near the surficial depression. This high voltage zone presumably mimics the footprint of a subsurface electrically conductive zone in contact with the electrode inserted through DH1-11. A portion of the mine workings containing slurry (or other wet and therefore electrically conductive earth materials) would produce such a zone. The footprint of this zone is shown in gray on Figure 3. Note that it presumably extends some distance eastward (beyond the geophysical survey data coverage).

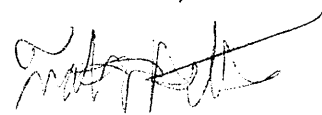
Superimposed on the overall high voltage anomaly are two distinct peaks (and a third subtle peak). The footprints of the two main peaks are highlighted on Figure 3. These peaks should represent areas where a portion of the electrically conductive target extends closer to the ground surface – e.g. areas of current leakage from the electrified mine workings. Such current leakage would certainly occur through the breakthrough/conduit from the slurry impoundment, and could also occur along natural mineralized or oxidized near-vertical joints or fractures intersecting the mine workings. Note that none of the three anomaly peaks coincide with contemporary drilling operations or features, and are therefore interpreted as representing actual subsurface conditions rather than artifacts or interference.

ENVIROSCAN, INC.

Mr. Nottingham  
January 23, 2001  
Page 4

We have appreciated this opportunity to work with you. If you have any questions, please do not hesitate to contact me.

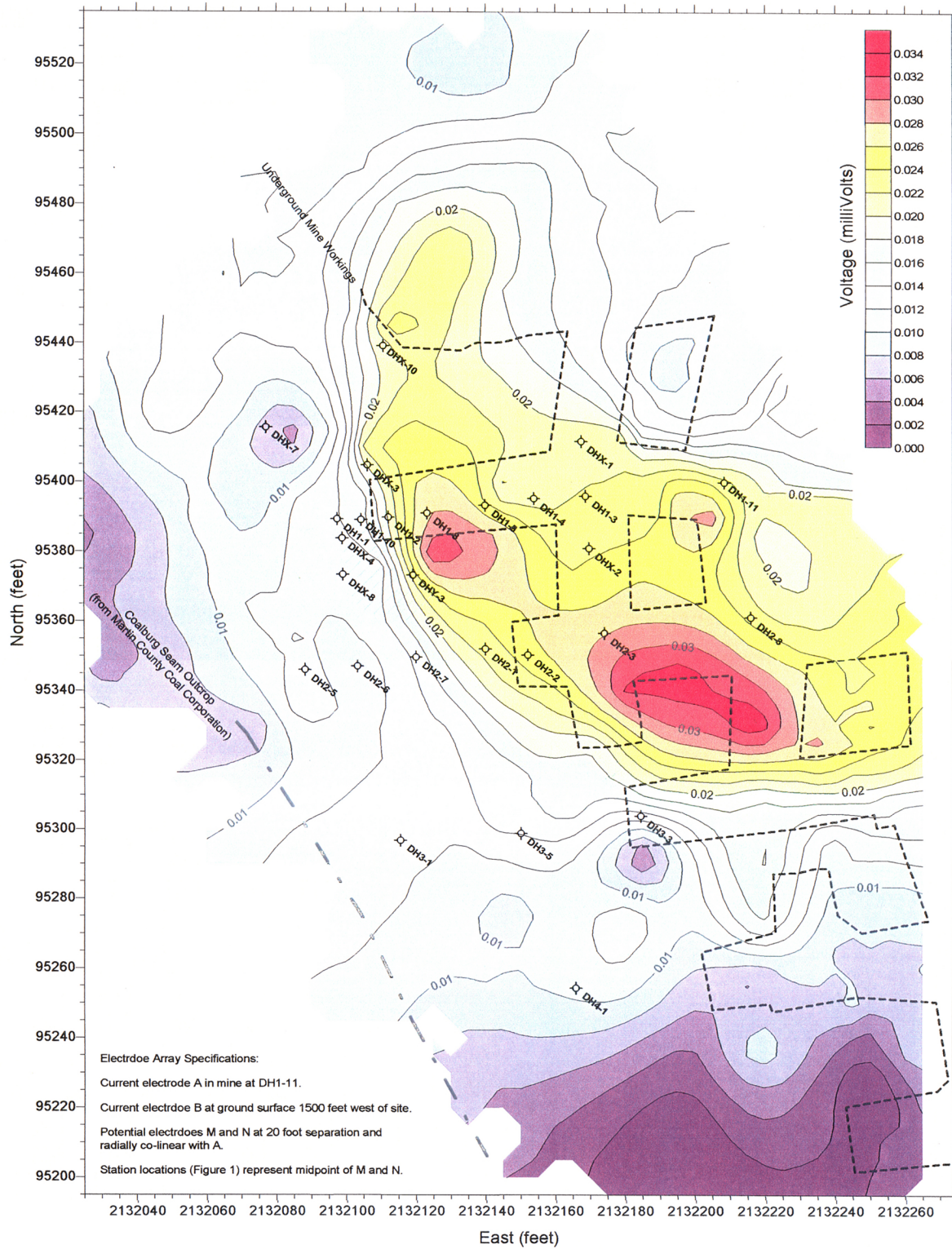
Sincerely,  
**Enviroscan, Inc.**



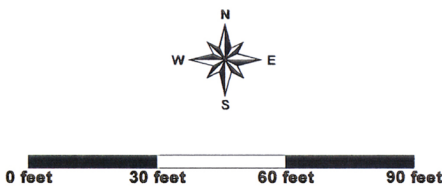
Timothy D. Bechtel, Ph.D., P.G.  
Principal Geophysicist

enc.: Figure 1: Geophysical Survey Data Coverage  
Figure 2: Mise a la Masse Survey Data  
Figure 3: Mise a la Masse Survey Interpretation  
Appendix A: Mise-a-la-Masse Method Schematic





Electrode Array Specifications:  
 Current electrode A in mine at DH1-11.  
 Current electrode B at ground surface 1500 feet west of site.  
 Potential electrodes M and N at 20 foot separation and radially co-linear with A.  
 Station locations (Figure 1) represent midpoint of M and N.



Legend:  
 + Mise a la Masse Survey Station  
 ⬠ Drill Hole (by others)

Notes:  
 Coordinates in KY North State Plane Grid, NAD-83 geodetic datum.  
 Survey stations and drill hole locations from DGPS survey by Enviroscan, Inc.  
 Mine plan and coal outcrop lines digitized from portions of "MSHA Drilling Program" map provided by MSHA.

Figure 2

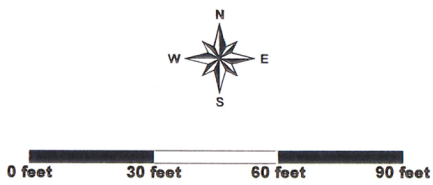
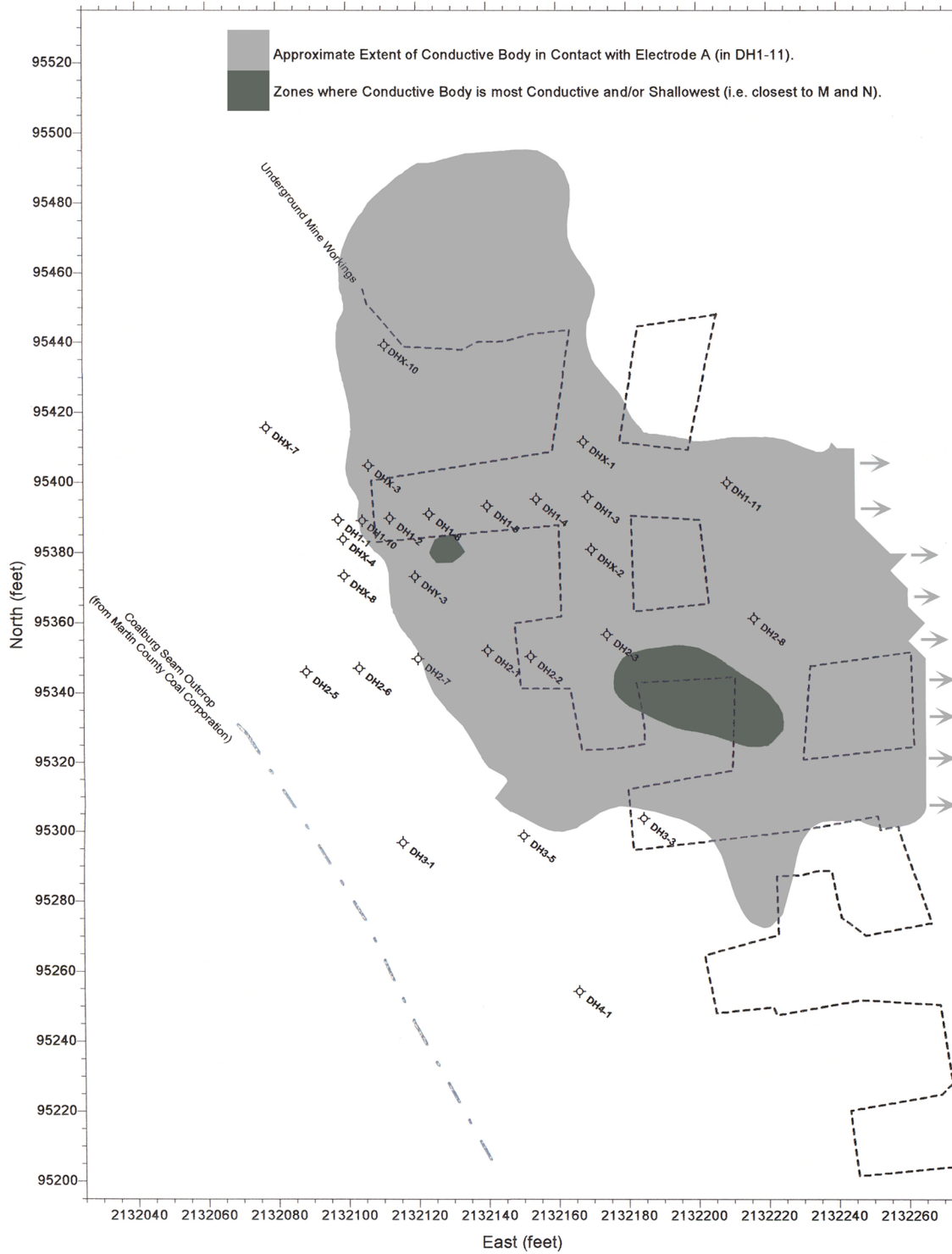
Mise a la Masse Survey Data

Big Branch Slurry Impoundment  
 Martin County Coal Corporation  
 Martin Co., KY

Enviroscan, Inc.  
 Project No. 120016  
 Rev. 01/03/01







Legend:  
 + Mise a la Masse Survey Station  
 ◇ Drill Hole (by others)

Notes:  
 Coordinates in KY North State Plane Grid, NAD-83 geodetic datum.  
 Survey stations and drill hole locations from DGPS survey by Enviroscan, Inc.  
 Mine plan and coal outcrop lines digitized from portions of "MSHA Drilling Program" map provided by MSHA.

Figure 3

Mise a la Masse  
 Survey Interpretation

Big Branch Slurry Impoundment  
 Martin County Coal Corporation  
 Martin Co., KY

Enviroscan, Inc.  
 Project No. 120015  
 Rev. 01/05/01

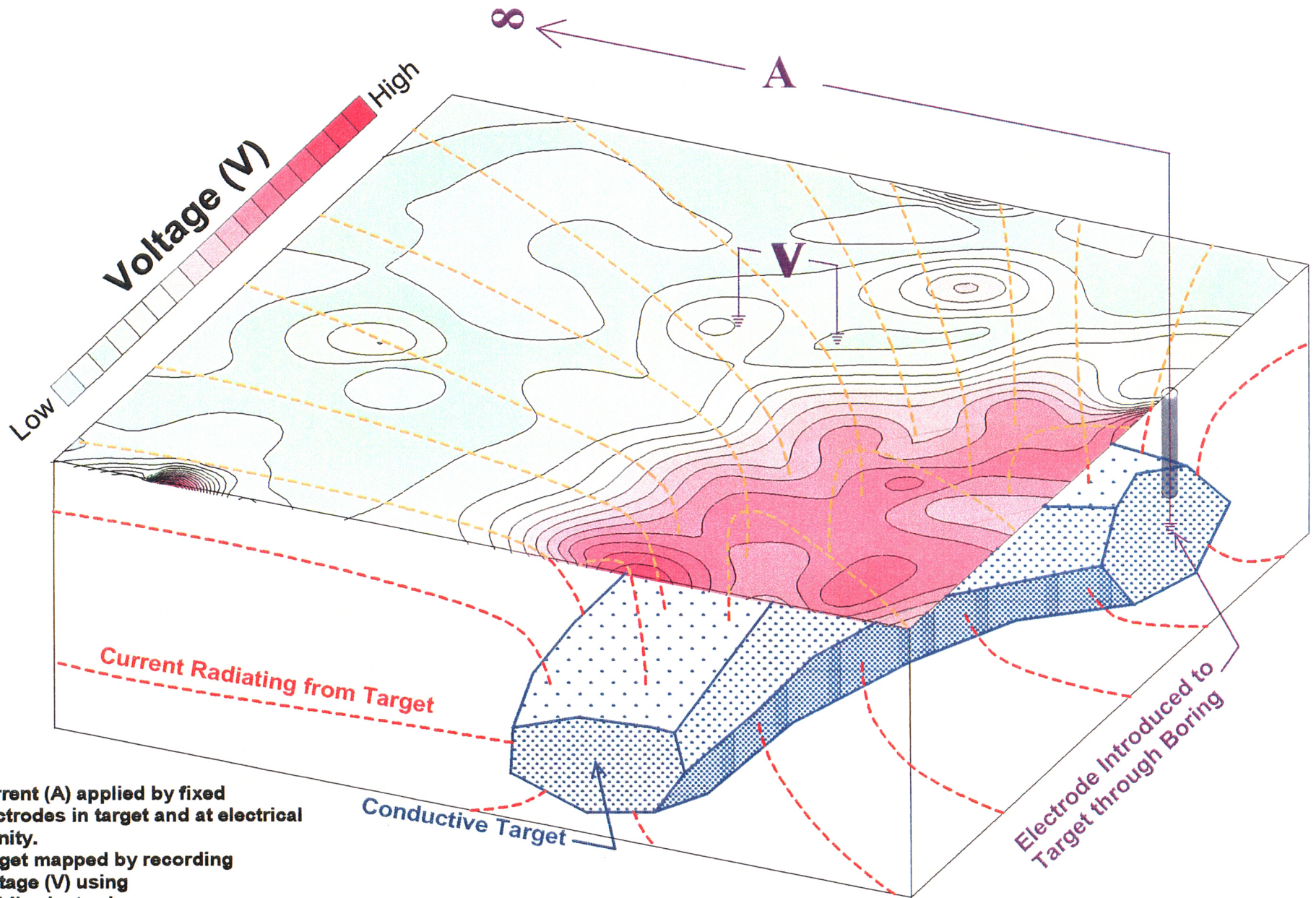


ENVIROSCAN, INC.

## **Appendix A**

### **Mise-a-la-Masse Method Schematic**





Current (A) applied by fixed electrodes in target and at electrical infinity.  
 Target mapped by recording Voltage (V) using mobile electrodes.

# Mise a la Masse Method Schematic

Rev. 01/2001

***DRAWINGS***



MINE WORKINGS  
IN COALBURG SEAM

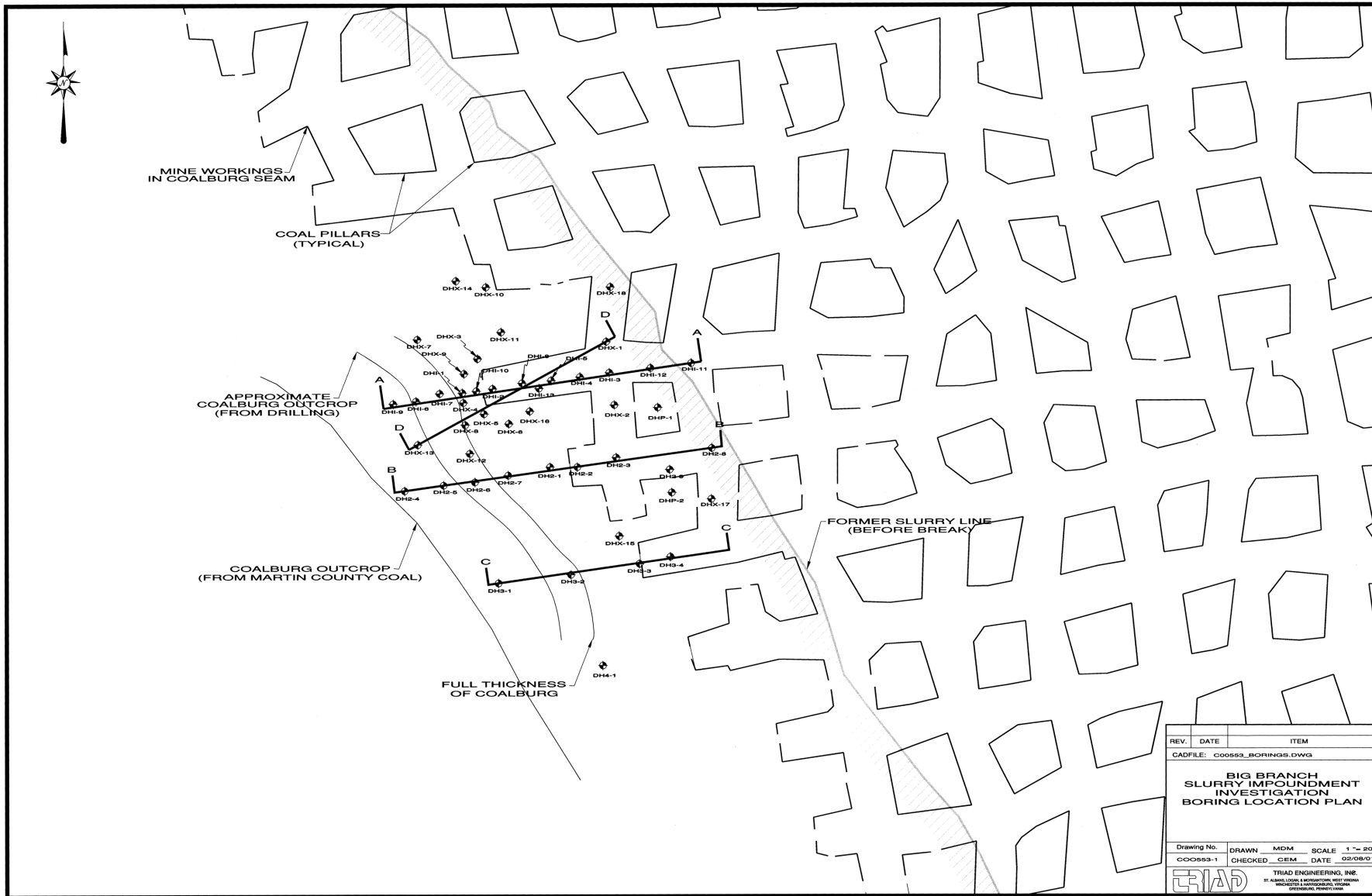
COAL PILLARS  
(TYPICAL)

APPROXIMATE  
COALBURG OUTCROP  
(FROM DRILLING)

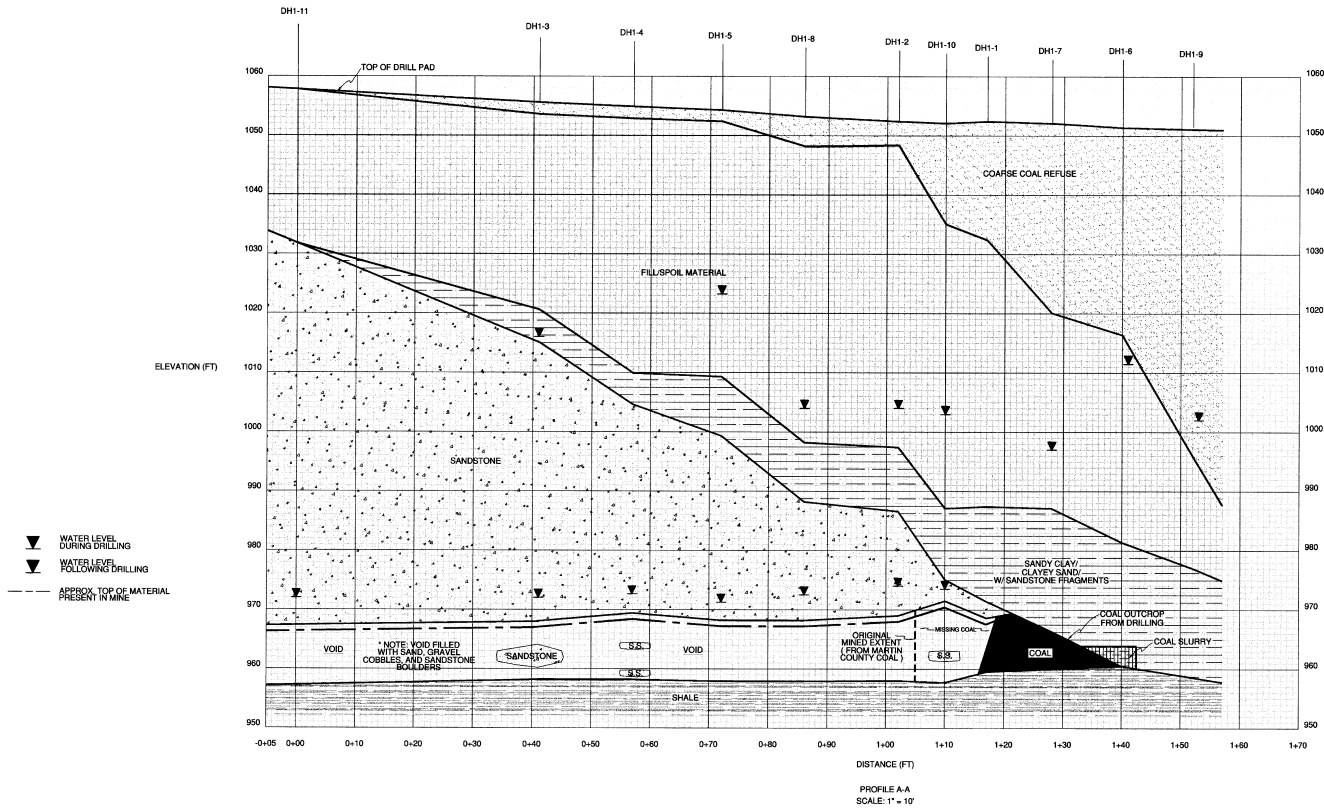
COALBURG OUTCROP  
(FROM MARTIN COUNTY COAL)


FULL THICKNESS  
OF COALBURG

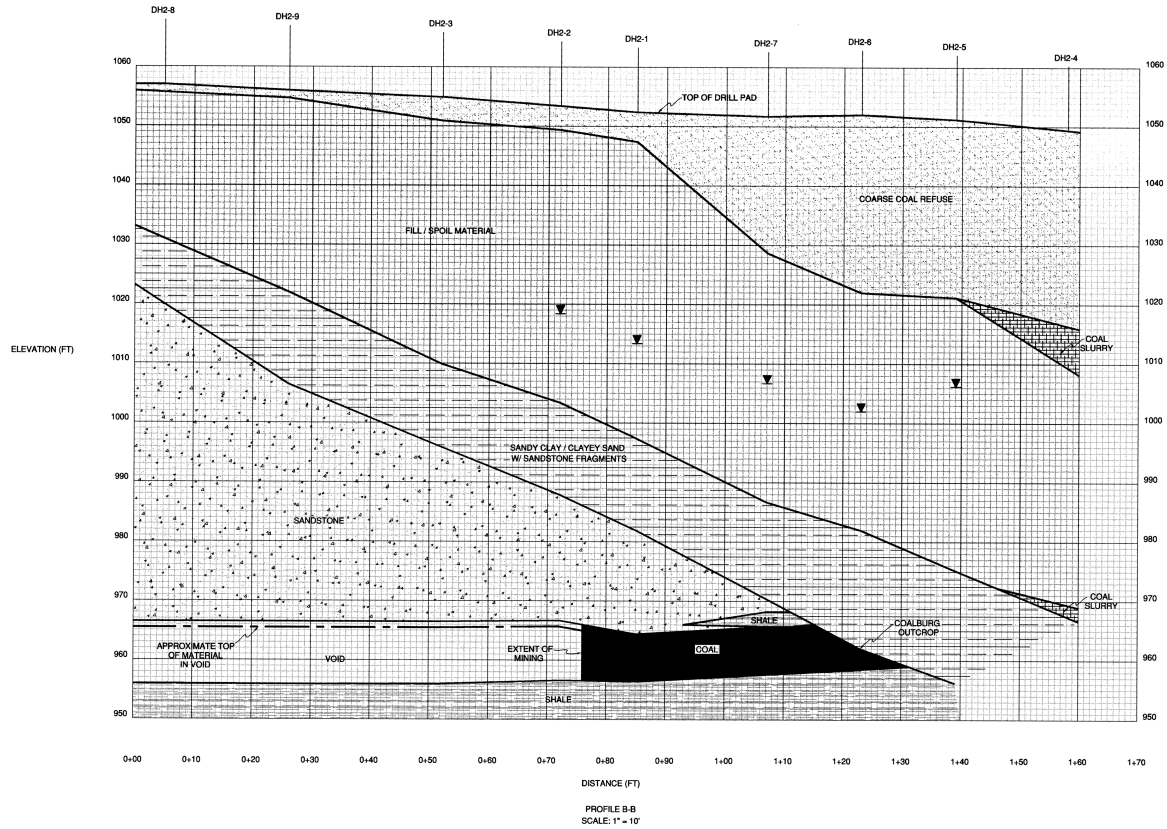
FORMER SLURRY LINE  
(BEFORE BREAK)




REV.	DATE	ITEM		
CADFILE: C00553_BORINGS.DWG				
<b>BIG BRANCH SLURRY IMPOUNDMENT INVESTIGATION BORING LOCATION PLAN</b>				
Drawing No.	DRAWN	MDM	SCALE	1" = 20'
C00553-1	CHECKED	CEM	DATE	02/08/01
		TRIAD ENGINEERING, INC. 57 BANK LOUIS & MORGENTHAU, WEST VIRGINIA PROJECTS & INVESTIGATIONS, PITTSBURGH GREENSBORO, PENNSYLVANIA		



1	01/22/01	
REV.	DATE	ITEM
CADFILE: A-A.DWG		
PROFILE A-A SIXES BRANCH SLURRY IMPOUNDMENT INVESTIGATION MARTIN COUNTY, KENTUCKY		
Drawing No.	DRAWN MDM	SCALE 1" = 10'
C00553-2	CHECKED GEM	DATE 01/22/01
 TRIAD ENGINEERING, INC. <small>87 ALBING DRIVE • WINDY HOLLOW, WEST VIRGINIA          WINCHESTER • WYOMING, VIRGINIA          GREENSBORO, PENNSYLVANIA</small>		



REV.	DATE	ITEM
CADFILE: B-B.DWG		
PROFILE B-B BIG BRANCH SLURRY IMPOUNDMENT INVESTIGATION MARTIN COUNTY, KENTUCKY		
Drawing No. C00853-3	DRAWN MDM	SCALE 1" = 10'
	CHECKED GEM	DATE 02/01/01
 TRIAD ENGINEERING, INC. <small>51 AARONS CREEK &amp; MEMPHIS AVENUE, SUITE 1000            WINCHESTER, KENTUCKY 40391            (606) 755-1100</small>		





