

**Appendix AA**  
**Boring Logs**  
**(Focused Investigation)**



PROJECT NUMBER

11022948 ST B2

BORING NUMBER

SG-1

SHEET 1 OF 1

# SOIL BORING LOG

PROJECT Stepan Company

LOCATION Aromatics Area

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 3.75" ID, HSA Mobile B-61 Rotary Drill Rig

WATER LEVELS N/A

START 9-14-93

FINISH 9-15-93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
20	0.0				0 to 1.3' <u>SILTY SAND WITH GRAVEL</u> (SM), gray brown, light brown, reddish brown, light gray-black, dry, coal ash, siltstone rock fragments	300-pound hammer PID=Photoionization Detector 2 and 3" ID Split Spoons 0.0 ppm spoon (PID)
	2.0		1.3	3-5-4-3		
40					0 to 0.6' same as above, reddish brown-black, dry, crushed brick 0.6' to 0.8' <u>SILTY SAND</u> (SM), black, moist, medium-fine sand	0.0 ppm spoon (PID) 18.1 ppm spoon (PID) odor
	4.0		0.8	1-3-3-3		
60					0 to 0.7' Alternating <u>SILTY SAND</u> (SM) and <u>SILTY SAND WITH GRAVEL</u> (SM), brown to light gray, dry-moist, light gray; consolidated sandstone fragments 0.7' to 1.2' <u>SANDSTONE</u> , brownish, gray, dry, fine-medium sand, 5-10% silt, trace 1-3 mm laminations (colored) black staining on sample in shoe, emits odor	End drilling 9-14-93 rig breakdown Begin drilling 9-15-93 2" ID Split Spoon odor odor
	6.0		1.2	2-4-8-14		
80					0 to 0.9' <u>SANDSTONE</u> (SP), buff-light tan, dry-moist, friable, trace hard brown sandstone at 6.7 0.9' to 1.7' <u>SILTSTONE</u> , buff, moist to dry, massive, friable, fractured, trace laminations, trace black angular stones (organic fragments?)	2" ID Split Spoon
	8.0		1.7	15-14-17-26		
					END OF BORING @ 8.0'	



PROJECT NUMBER  
NJ022948.ST.82

BORING NUMBER  
SG-2

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT Stepan Company

LOCATION Aromatics Area

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 4.25-inch H.S.A. Mobil B-61 Rotary Drill Rig

WATER LEVELS N/A

START 9/15/93

FINISH 9/15/93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
2.0	0.0				0 to 0.2' Road Gravel, medium coarse	2" ID split spoon, 300-pound hammer Sweet odor
	1.0				0 to 0.7' <u>SILTY GRAVEL WITH SAND</u> (GM), reddish brown, dry, siltstone fragments, 0.7 to 0.8' <u>SILTY GRAVEL</u> (GM), black, coal fragments, sweet odor	
	2.0		1.4	7-8-6-2	0.8 to 1.4' <u>SILTY GRAVEL</u> (GM), reddish brown, red, brown, moist, crushed brick, siltstone grading to light brown <u>SILT</u> (ML)	
4.0	3.0				0 to 0.3' <u>SILTY SAND WITH GRAVEL</u> (SM), brown-black 0.3 to 0.8' <u>SILTY SAND WITH GRAVEL</u> (SM), same as above except olive brown, moist-wet	3.5" ID split spoon odor Ludlum Model 3 Reading 0 to 0.3 : 1500 counts per minute (cpm) 0.8 to 1.7 : 600 cpm
	4.0		1.3	3-8-22-39	0.8 to 1.3' Transition from above to <u>SANDY SILT WITH GRAVEL</u> (ML), reddish brown mottled with light grey, moist, residual soils above bedrock	
	5.0				Alternating semi-consolidated siltstone and <u>SANDY SILT WITH GRAVEL</u> (ML), reddish brown, dry	
6.0	6.0		1.7	28-17-14-14		
	7.0				END OF BORING AT 7.0 FEET	
8.0						



PROJECT NUMBER

NJC22948.ST.B2

BORING NUMBER

SG-3

SHEET 1 OF 1

# SOIL BORING LOG

PROJECT Stepan Company

LOCATION Aromatics Area

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 4.25-inch H.S.A. Mobil B-51 Rotary Drill Rig

WATER LEVELS N/A

START 9/14/93

FINISH 9/14/93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
0.0						
1.5						
2.0			1.8	4-6-3-9	<u>SILTY GRAVEL WITH SAND</u> (GM), highly variable, intervals of <u>SILTY SAND WITH GRAVEL</u> (SM), moist, moist-wet zone in SM layer at 1.8', siltstone fragments to 3.5" diameter in shoe, coal frags, glass	3.5" ID split spoon, 300-lb hammer <u>FILL MATERIAL</u>
3.5						
4.0			0.6	3-3-3-3	<u>SILTY SAND WITH GRAVEL</u> (SM), dark brown, moist, trace coal frags, brown, spongy peat-like material in shoe, black petroleum-like material on tip, moist-wet at tip	3.5" ID split spoon
5.5						
6.0			1.9	4-4-7-7	0 to 1.6' <u>SILTY SAND WITH GRAVEL</u> (SM), same as above, except saturated, approx 20% gravel, trace 3-4" crushed brick, siltstone fragments 1.6 to 1.9' <u>SILTY GRAVEL WITH SAND</u> (GM), black, fine matrix, white subrounded gravel to 2"	3" split spoon <u>FILL MATERIAL</u>
7.5						
8.0					END OF BORING AT 7.5 FEET	



## PROJECT NUMBER

NJ022948.ST.B2

## BORING NUMBER

SG-4

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT Stepan Company

LOCATION Aromatics Area

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 4.25-inch H.S.A. Mobil 9-61 Rotary Drill Rig

WATER LEVELS N/A

START 9/15/93

FINISH 9/15/93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
2.0	0.0				SILTY SAND (SM) to SANDY SILT WITH GRAVEL (ML), brown-black, moist, variable gravel, trace crushed brick, coal fragments, cinder	2.0" ID split spoon, 300-lb hammer
	2.0		1.4	3-14-10-6		
4.0					SILTY SAND WITH GRAVEL (SM), gradational from moderate brown to brownish black coal fragments, crushed brick, cinder 0.5 to 3", moist	3" ID split spoon Sweet odor at tip of spoon
	4.0		1.4	7-6-7-5		
6.0					0 to 0.2' Crushed brick fragments, red, 3" and above 0.2 to 0.8' SILTY SAND (SM), dark grey with blackish grey zones, moist-wet, wet 0.8 to 0.9' gradational contact with semi-consolidated grey sandy siltstone 0.9 to 1.2' grading into grey-brown/tannish brown SILTY SAND (SM) and SILTY SANDSTONE, moist-wet	3" ID split spoon 0.2 to 0.8' - Sweet odor
	6.0		1.5	4-5-16-15		
8.0					1.2 to 1.4' SILTY SAND (SM), alternating dark brown and dark grey layers, moist-wet END OF BORING AT 6.0 FEET	


**PROJECT NUMBER**

NJ022984.ST.B2

**BORING NUMBER**

SG-5

SHEET 1 OF 1

**SOIL BORING LOG**
**PROJECT** Stepan Company

**LOCATION** Aromatics Area

**ELEVATION** N/A

**DRILLING CONTRACTOR** Kendrick Drilling, Inc.

**DRILLING METHOD AND EQUIPMENT** 4.25" ID, HSA Mobile B-61 Rotary Drill Rig

**WATER LEVELS** N/A

**START** 9-14-93

**FINISH** 9-14-93

**LOGGER** P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
2.0	0.0				No sample	300-pound hammer PID=Photoionization Detector
	1.0				Alternating <u>SILTY SAND WITH GRAVEL</u> and <u>SILTY GRAVEL</u> (SM-GM)  SM: Mottled orange-yellow brown to reddish brown, moist, coal ash, cinder fill sediments  GM: black-brownish black, moist, tar like-viscous, wet (with solvent?), coal fragments, fine gravel, 1/4 to 1/2"	2" ID splitspoon  Level C drilling
	3.0		1.5	3-2-1-1		
4.0					0 to 0.3' <u>SILTY SAND WITH GRAVEL</u> (SM), brownish black-brown 0.3 to 0.6' <u>POORLY GRADED GRAVEL WITH SILT</u> (GM), black, moist, coal, fragments, 1/8 to 1/4" 0.6 to 1.6' transition from above, <u>SILTY SAND WITH GRAVEL</u> (SM), black, fibrous material, trace petroleum hydrocarbon material black viscous (within fiber matrix), some sandy silt, coal fragments 1.6 to 1.8' transition into <u>SANDY SILT</u> (ML), pinkish brown, reddish brown, wet, micaceous, black zones	3" ID splitspoon  Level C drilling
	5.0		1.8	1-2-1-2		
6.0					0 to 0.5' same as above, (ML) mottled black and reddish brown, wet cohesive  0.5 to 1.6 transitional residual soil ( <u>SILTY SAND TO SANDY SILT WITH GRAVEL</u> ) gravel consists of reddish brown, siltstone rock fragments, black to blackish brown, dark brown residual <u>hydrocarbon material</u> , around gravel fragments (1/8 to >3")	3" ID splitspoon 1 to 7', 482-951 ppm headspace (PID)
	7.0		1.6	3-4-4-5		
8.0					END OF BORING @ 7.0'	



PROJECT NUMBER

NJ022948.ST.B2

BORING NUMBER

SG-6

SHEET 1 OF 1

# SOIL BORING LOG

PROJECT Stepan Company

LOCATION Aromatics Area

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 4.25-inch H.S.A. Mobil B-61 Rotary Drill Rig

WATER LEVELS N/A

START 9/13/93

FINISH 9/13/93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
2.0	0.0					PID=Photoionization Detector
	1.0					
	1.5			3-2-1-1	0 to 1.1' <u>SILTY SAND WITH GRAVEL</u> (SM), dark brown-black, mottled, moist, coal fragments, cinder 1.1 to 1.5' <u>SILTY SAND</u> (SM), brownish black, moist-wet	3" ID split spoon, 300-pound hammer Strong odor, 49.1 ppm in spoon (PID) Sweet odor, oil sheen, possible petroleum hydrocarbon product
4.0	3.0					
	4.0			1-1-1-4	0 to 0.4' <u>SILTY SAND</u> (SM) same as above 0.4 to 1.7' <u>SILTY SAND WITH GRAVEL</u> (SM), grey brown/brown, moist, 15% gravel	3" split spoon
	5.0					
6.0	6.0			1-2-7-10	0 to 0.3' Transition from <u>SANDY SILT WITH GRAVEL</u> (ML) as above to <u>POORLY GRADED SAND WITH SILT</u> (SP-SM), grey/steel grey, wet 0.3 to 1.7' Sharp contact into residual bedrock <u>SANDY SILT WITH GRAVEL</u> (ML), reddish brown-brownish red, moist-dry becoming more competent with depth, subrounded gravel to 0.4 Transition into weathered <u>SILTSTONE</u> at 1.2', very micaceous, fractured, dry, trace of mottling, buff-white	3" split spoon
	7.0					
					END OF BORING AT 7.0 FEET	
8.0						



## PROJECT NUMBER

NJ022948.ST.B2

## BORING NUMBER

SG-7

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT Stepan Company

LOCATION Aromatics Area

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 4.25" ID, HSA Mobile B-61 Rotary Drill Rig

WATER LEVELS Approximately 4' BGS

START 9-14-93

FINISH 9-14-93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS  6" -6" -6" (N)	SOIL DESCRIPTION	COMMENTS
	INTERVAL	NUMBER AND TYPE	RECOVERY		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
2.0	0.0		1.4	3-3-9-9	0 to 0.7' <u>SILTY SAND WITH GRAVEL</u> (SM), brown-brownish gray, moist, trace rootlets  0.7 to 0.9' Asphalt consolidated <u>WELL GRADED SAND WITH GRAVEL</u> (SW)  0.9 to 1.4' same as 0 to 0.7' (SW) crushed brick, coal cinder, coal ash, mottled yellowish brown-browns, black red, dry	300-pound hammer  PID=Photoionozation Detector 0-2' 3" splitspoon
	2.0		0.4	2-1-1-1	0 to 0.3' same as above, crushed brick  0.3 to 0.4' <u>SILTY GRAVEL</u> (GM), black, moist-wet, coal fragments	2-4' 2" splitspoon  57 ppm (PID) @ tip of spoon, odor
4.0	4.0				END OF BORING @ 4.0'	
8.0						
8.0						





## PROJECT NUMBER

NJ022948.ST.B2

## BORING NUMBER

SG-8

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT Stepan Company

LOCATION Aromatics Area

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 4.25-inch H.S.A. Mobil B-61 Rotary Drill Rig

WATER LEVELS N/A

START 9/13/93

FINISH 9/13/93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
	0.0					PID=Photoionization Detector
	1.0					
2.0			0.8	15-24-12-8	<u>SILTY SAND WITH GRAVEL</u> (SM), dark brown, moist-dry, 25-30% gravel to 1.5" max, trace asphalt fragments	3" ID split spoon, 300-lb hammer <u>FILL</u> Odor while augering to 3.0'
	3.0					
4.0			1.3	2-2-2-3	<u>SANDY SILT WITH GRAVEL</u> (ML), dark brown to blackish brown, moist, moist/wet zones, 35-45% coarse fraction	Strong odor, 11.4 ppm on spoon (PID) Blackish brown color correlates with wet zones
	5.0					
6.0			1.4	1-1-4-6	0 to 0.8' Transition from <u>SANDY SILT WITH GRAVEL</u> (ML) as above to <u>SILTY SAND WITH GRAVEL</u> (SM), reddish brown, moist-wet, dark brown to black around fine gravel, some mottling 0.8 to 1.4' <u>SILTY SAND WITH GRAVEL</u> (SM), becoming reddish brown, moist, trace black mottles, subrounded gravel	Water probably at approx. 5.0 ft
	7.0					
8.0					END OF BORING AT 7.0 FEET	



PROJECT NUMBER  
NJ022948.ST.82

BORING NUMBER  
SG-9

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT Stepan Company

LOCATION Aromatics Area

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 3.75-inch H.S.A. Mobil B-61 Rotary Drill Rig

WATER LEVELS

START 9/13/93

FINISH 9/13/93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
2.0	0.0		1.3	9-7-7	<u>SILTY GRAVEL WITH SAND</u> (GM), dark greyish brown, moist, trace asphalt debris, coal frags	PID=Photoionization Detector Start Drilling @ 1100 2" ID split spoon, 300-lb hammer
	1.5		1.6	4-3-3-3	<u>SILTY SAND WITH GRAVEL</u> (SM), brownish orange (oxidized zones), moist, coal, ash, white frags, reddish brown silty sand at tip of spoon (very moist), approx. 20% fine gravel	
4.0	3.5		1.7	2-1-1-4	0 to 0.4' <u>SILTY SAND</u> (SM), reddish brown, moist, 15% fine gravel 0.4 to 0.8' <u>SILTY SAND WITH GRAVEL</u> (SM), loose, mottled, dry, coal fill 0.8 to 1.7' <u>SILTY SAND</u> (SM), reddish to pinkish brown, moist, 5-10% gravel	0.0 ppm background (PID) 0.5 ppm in spoon (PID)
	5.5		1.9	11-12-20-50	0 to 0.3' <u>SILTY SAND WITH GRAVEL</u> (SM), black, moist 0.3 to 0.8' <u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW), reddish brown to greyish red brown, dry, loose, >2" gravel 0.8 to 1.9' <u>SILTSTONE</u> , reddish brown, friable, weathered Rock	odor, 30 ppm (PID) headspace odor
8.0	7.5				END OF BORING AT 7.5 FEET	Spoon refusal at 7.5 ft (50 blows/6")



PROJECT NUMBER

NJ022948.ST.B2

BORING NUMBER

SG-10

SHEET 1 OF 1

# SOIL BORING LOG

PROJECT Stepan Company

LOCATION Central Tank Farm

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 4.25" ID, HSA Mobile B-61 Rotary Drill Rig

WATER LEVELS

START 9-16-93

FINISH 9-16-93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
2.0	0.0				0 to 0.6' concrete 0.6 to 1.0' <u>SILTY GRAVEL</u> (GM). No sample	300-pound hammer (description based on auger returns)
	1.0				0 to 0.6' <u>SILTY SAND</u> (SM), dark brown, pinkish brown, moist, trace gravel, gradational contact with black, (SW) zones which appear contaminated	2" splitspoon sweet odor
	3.0		1.2	4-2-1-2	0.6 to 1.2' <u>WELL GRADED SAND</u> to <u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW, SW-SM), black, moist to wet, fine gravel, coal fragments, elutes oil sheen in water	strong odor zone
4.0	5.0		1.5	2-7-8-7	0 to 0.9' Same as above moist-wet @ 0.4 gradational contact from silty gravel to 0.9 to 1.5 <u>SILTY SAND WITH GRAVEL</u> (SM), reddish brown-black, mottled, >3" gravel	3" ID Split Spoon odor
	7.0		1.1	3-7-8-10	Alternating <u>SILTY SAND WITH GRAVEL</u> (SM) and <u>WELL GRADED SAND</u> (SP), reddish brown-black, moist-wet, gravel consists of siltstone fragments, (SP) consists of coarse sand, trace coal	2" ID Split Spoon strong odor
8.0					END BORING @ 7.0'	



## PROJECT NUMBER

NJ022948.ST.B2

## BORING NUMBER

SG-II

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT Stepan CompanyLOCATION Aromatics AreaELEVATION N/ADRILLING CONTRACTOR Kendrick Drilling, Inc.DRILLING METHOD AND EQUIPMENT 3.75-inch H.S.A. Mobil B-61 Rotary Drill RigWATER LEVELS N/ASTART 9/17/93FINISH 9/17/93LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS  6" - 6" - 6" (N)	SOIL DESCRIPTION  SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS  DEPTH OF CASING, DRILLING RATE DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
2.0	0.0				0 to 0.8' Concrete	2" ID split spoon, 300-lb hammer
	1.0					
			1.8	9-9-8-3	0 to 0.2' <u>SILTY SAND WITH GRAVEL</u> (SM), fine gravel  0.2 to 0.5' <u>SILTY GRAVEL</u> (GM), reddish brown (siltstone gravel fragments)  0.5 to 1.2' <u>SILTY SAND WITH GRAVEL</u> (SM) to <u>WELL GRADED SAND</u> (SW), grey brown to brownish black, moist, coal frags, coal fill, ash cinders  1.2 to 1.8' <u>SILTY SAND</u> (SM), brown, moist, trace of reddish brown, siltstone fragments to 1" max.	
	3.0					
4.0			1.5	1-1-2-2	0 to 0.2' <u>SILTY SAND WITH GRAVEL</u> (SM), light grey, (weathered concrete or carry over from above)  0.2 to 1.2' <u>SILTY SAND WITH GRAVEL</u> (SM), moderate brown, moist-wet, 15% gravel to 3" max, siltstone (reddish brown)  1.2 to 1.5' <u>WELL GRADED SAND WITH SILT</u> (SW-SM), black, moist-wet, <15% fine gravel	sweet odor in 4.2 to 4.5 ft interval
	5.0					
6.0			0.3	3-4-5-5	<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), reddish brown, moist-wet	
	7.0					
8.0					END OF BORING AT 7.0 FEET	



## PROJECT NUMBER

NJ022984.ST.B2

## BORING NUMBER

SG-12

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT Stepan Company

LOCATION Central Tank Farm

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 4.25" ID. HSA Mobile B-61 Rotary Drill Rig

WATER LEVELS N/A

START 9-16-93

FINISH 9-16-93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
20	0.0				0 to 0.3' Asphalt	300-pound hammer
	1.0				0.3' to 1.0' POORLY GRADED GRAVEL WITH SILT (GP-GM), blue gray, 2 to 3.5" gravel	
			1.0	7-7-2-2	POORLY GRADED GRAVEL WITH SILT (GP-GM) same as above except gray-brown, sandy silt matrix, moist	
40	3.0					Railroad Fill
			0.8	4-6-5	3.0' to 4.0' POORLY GRADED GRAVEL WITH SILT (GP-GM), same as above 4.0' to 4.5' Gradational from weathered friable concrete to hard, competent concrete, end of boring	
	4.5				END OF BORING @ 4.5'	hit obstruction at 3.3' 3 blows, possible utility, moving boring 1.0' south towards original SG-12 (see logbook for discussion, page 18-19) spoon refusal
60						
80						



PROJECT NUMBER

NJ022948.ST.B2

BORING NUMBER

SG-13

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT Stepan Company

LOCATION Aromatics Area

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT Tripod Mounted Cathead, 140-lb hammer

WATER LEVELS

START 9/17/93

FINISH 9/17/93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
2.0	0.0				0 to 0.7' <u>SILTY GRAVEL WITH SAND</u> (GM), reddish brown, moist-wet 0.7 to 1.1' <u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), grey-black, moist/wet, coal fill, fine gravel 1.1 to 1.3' <u>SILTY SAND WITH GRAVEL</u> (SM), reddish brown	3.5" ID split spoon, 140-lb hammer Water at surface leaking into hole from water tower overflow
	2.0		1.3	7-7-7-24		
4.0					<u>SILTY GRAVEL WITH SAND</u> (GM), reddish brown, moist-wet, 0.25-3" siltstone fragments	Hydrocarbon odor 3" ID split spoon
			1.5	54-39-36-27		
6.0	4.0				0 to 0.2' <u>SILTY GRAVEL WITH SAND</u> (GM) same as above 0.2 to 0.4' <u>SILTY SAND</u> (SM), dark brown, moist, odor 0.4 to 0.5' <u>SILTSTONE FRAGMENTS</u> dry, horizontal breaks, likely parallel to bedding	0.2 to 0.4' - Fill material 2" ID split spoon
			0.5	18-16-15-14 (31)		
8.0	6.0				END OF BORING AT 6.0 FEET	



## PROJECT NUMBER

NJ022948.ST.B2

## BORING NUMBER

SG-14

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT Steban Company

LOCATION Aromatics Area

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 3.75-inch H.S.A. Mobil B-61 Rotary Drill Rig

WATER LEVELS N/A

START 9/16/93

FINISH 9/16/93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
2.0	0.0				0 to 0.6' Concrete 0.6 to 1.0' Coal Fill	3.5" ID split spoon, 300-lb hammer
	1.0				0 to 0.2' <u>SILTY GRAVEL</u> (GM), red-black, dry, 2-3" crushed brick and siltstone fragments 0.2 to 0.6' <u>POORLY GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), dark grey/brown, med-coarse sand, fine gravel 0.6 to 1.25' <u>POORLY GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), same as above except dark-medium brown, trace coal/ash	
	3.0		1.4	14-15-13-10	1.25' to 1.4' <u>SANDY SILT</u> (ML), oxidized yellowish white/whitish buff, moist 0 to 0.2' <u>SANDY SILT</u> (ML), same as above	
4.0			1.4	4-3-1-1	0.2 to 0.55' <u>SILTY GRAVEL</u> (GM), reddish brown, moist, 3" siltstone fragments 0.55 to 1.4' <u>SILT WITH SAND</u> (ML), black grading to blackish olive grey at 0.9', moist-wet	3" ID split spoon Hydrocarbon odor (0.55 to 1.4' interval)
	5.0				0 to 1.1' <u>SILT WITH SAND</u> (ML), as above except black, wet 1.1 to 2.0' <u>SILTY SAND</u> (SM), brown-tannish brown, trace black laminations (having odor), moist-wet	2" ID split spoon Hydrocarbon odor (0.0 to 1.1' interval)
6.0			2.0	1-WOR-3-4		
	7.0				END OF BORING AT 7.0 FEET	
8.0						



## PROJECT NUMBER

NJ022948.ST.B2

## BORING NUMBER

SG-15

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT Stepan Company

LOCATION Aromatics Area

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 3.75" ID HSA, Model S-61 Rotary Drill Rig

WATER LEVELS N/A

START 9/15/93

FINISH 9/15/93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
20	0.0		1.3	11-11-15-24	SILTY SAND WITH GRAVEL (SM), lt-dk brown to black, dry/moist, 20-25% gravel >3", reddish brown siltstone fragments in shoe, trace of coal fragments, oxidized zones, metal frags.	PID=Photoionization Detector 3.5" ID split spoon, 300-lb hammer Level C PPE
	2.0		0.0	15-5-1-1	NO RECOVERY, moist-wet SILTY SAND (SM) and WELL GRADED SAND WITH SILT (SW) on sides of spoon	approx 39.0 ppm (PID) 3.5" ID split spoon Sludgy material Wet and black sandy silt on auger return
40	4.0		1.4	1-1-2-3	0 to 0.6' SILT WITH SAND (ML), black, wet, trace fibrous material, woody 0.6 to 1.1' POORLY GRADED SAND WITH SILT (SP-SM), medium-dark grey, blackish zones, dry/moist, grading to below. 1.1 to 1.4' SILTY SAND (SM), dark grey, (1.1-1.2), greyish brown, moist, becoming moist-wet, wet at tip of shoe, micaceous	3" ID split spoon  End level C sweet odor at tip of spoon
60	6.0				END OF BORING AT 6.0 FEET	
80						




**PROJECT NUMBER**

NJ022948.ST.B2

**BORING NUMBER**

SG-16

SHEET 1 OF 1

**SOIL BORING LOG**
**PROJECT** Stepan Company

**LOCATION** Aromatics Area

**ELEVATION** N/A

**DRILLING CONTRACTOR** Kendrick Drilling, Inc.

**DRILLING METHOD AND EQUIPMENT** 3.75" ID HSA, Mobil B-51 Rotary Drill Rig

**WATER LEVELS** N/A

**START** 9/15/93

**FINISH** 9/15/93

**LOGGER** P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION  SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
2.0	0.0				<u>SILTY GRAVEL WITH SAND</u> (GM), brown-grey brown, crushed brick, SM zone with gravel at tip of spoon, dk brown, moist, trace coal frags, crushed brick	2.0" ID split spoon, 300-lb hammer
	2.0		0.8	4-5-5-3		
4.0					0 to 0.3' <u>SILTY SAND</u> (SM), med brown with lt grey and black mottles, moist, trace coal debris  0.3 to 1.4' <u>SILTY SAND WITH GRAVEL</u> (SM), lt grey-black, crushed brick, siltstone fragments	3.0" ID split spoon
			1.4	3-4-2-1		
6.0	4.0				<u>SILTY SAND WITH GRAVEL</u> (SM), black, coal fill, 20-25% gravel, white ash flakes, moist-wet at tip of spoon, loose	2.0" ID split spoon
			0.9	1-1-1-1		sweet odor (faint)
8.0	6.0				0 to 0.2' grading from above to <u>SANDY SILT</u> (ML), tannish brown, wet  0.2 to 1.1' <u>SANDY SILT</u> (ML), med brown-tannish brown, moist-wet, trace fragments of reddish brown siltstone	2.0" ID split spoon  No apparent odor
			1.1	1-2-3-3		
8.0	8.0				END OF BORING AT 8.0 FEET	



<b>PROJECT NUMBER</b> NJ022948.ST.B2	<b>BORING NUMBER</b> SG-17	<b>SHEET</b> <b>OF</b>
<b>SOIL BORING LOG</b>		

<b>PROJECT</b> Stepan Company	<b>LOCATION</b> Aromatics Area
<b>ELEVATION</b> N/A	<b>DRILLING CONTRACTOR</b> Kendrick Drilling, Inc.
<b>DRILLING METHOD AND EQUIPMENT</b> 3 7/8-inch H.S.A. Mobil B-61 Rotary Drill Rig	
<b>WATER LEVELS</b>	<b>START</b> 9/16/93 <b>FINISH</b> 9/16/93 <b>LOGGER</b> P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
2.0	0.0				0 to 0.8' Concrete	2" ID split spoon, 300-lb hammer
	1.0					
	1.5		1.5	9-10-6-6	SILTY SAND WITH GRAVEL (SM), black/lt brown/white (overall: lt greyish black), mottled, moist, coal ash, cinder, coal, brick frags, trace weathered concrete	
4.0	3.0					3" ID split spoon
	4.0		0.6	4-4-2-2	SILTY SAND WITH GRAVEL (SM), as above, black coal fill	
	5.0					
6.0	6.0		1.4	2-3-5-4	0 to 0.4' SANDY SILT (ML), black, wet-moist, grading to below 0.4 to 1.3' SILTY SAND (SM), dark brown grading to med brown with dark brown and black zones 1.3 to 1.5' SANDY SILT (ML), black-brown, moist, odor, sheen	2" ID split spoon  Viscous petroleum fluid within soil matrix, Petroleum Hydrocarbon odor
	7.0					
					END OF BORING AT 7.0 FEET	
8.0						



PROJECT NUMBER  
NJ022948.ST.92

BORING NUMBER  
SG-18

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT Stegan Company

LOCATION Central Tank Farm

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 4.25" ID, HSA Mobile B-61 Rotary Drill Rig

WATER LEVELS N/A

START 9-16-93

FINISH 9-16-93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
	0.0				0-10" Concrete	300-pound hammer
	1.0					
2.0			1.4	5-7-11-6	Alternating <u>SILTY SAND</u> , <u>SILTY SAND WITH GRAVEL</u> , <u>WELL GRADED SAND WITH GRAVEL</u> (SM, SW), grayish black, dark brown, trace buff-white (coal ash), moist, coal ash, coal fragments, cinder	2" splitspoon
	3.0					
4.0			1.8	3-1-2-1	0 to 0.4' <u>SILTY SAND WITH GRAVEL</u> (SM), light reddish brown, brown, moist, gradation into 0.4' TO 1.8' Alternating <u>SILTY SAND</u> (SM) and <u>SILT WITH GRAVEL</u> (ML) blackish brown-dark brown, hydrocarbon stains, <u>WET</u> , trace poorly graded sand at 0.6'-0.7', stained	3" splitspoon  hydrocarbon odor
	5.0					
6.0			1.5	3-4-6-9	0 to 0.3' <u>SILT WITH GRAVEL</u> (ML) same as above, black, oil sheen 0.3' to 1.5' Alternating <u>SILTSTONE</u> , (semi-consolidated) friable & <u>SILT WITH SAND</u> (ML), reddish brown, moist-dry <u>no</u> hydrocarbon staining	2" splitspoon  hydrocarbon odor
	7.0					
8.0					END OF BORING @ 7.0'	



PROJECT NUMBER  
NJ022948.ST.B2

BORING NUMBER  
SG-18A

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT Stegan Company

LOCATION Central Tank Farm

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 4.25" ID, HSA Mobile B-61 Rotary Drill Rig

WATER LEVELS N/A

START 9-17-93

FINISH 9-17-93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" -6" -6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
0.0					0-10" Concrete	300-pound hammer
1.0					No sample collected	* See boring log SG-18 for 1-7' description. SG-18A located 18" east of SG-18
2.0						
3.0						
4.0			0.4	2-1-0-1	SILTY SAND (SM), light gray, gray-black to brownish gray mottled, moist, loose, 10-15% gravel 1.8" recovery on second spoon	2" ID splitspoon  hydrocarbon odor  went back down same hole with 3.5" ID spoon (3-5.5') to improve recovery for analytical sampling
5.5					END OF BORING @ 5.5'	
6.0						
7.0						
8.0						



## PROJECT NUMBER

NJ022948 ST.B2

## BORING NUMBER

SG-19

SHEET 1 OF 1

## SOIL BORING LOG

PROJECT Stepan Company

LOCATION Aromatics Area

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 4.25-inch H.S.A. Mobil B-61 Rotary Drill Rig

WATER LEVELS 1.4

START 9/17/93

FINISH 9/17/93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
20	0.0				0 to 0.8' Concrete.	
	1.0					
			1.3	7-7-9-6	0 to 1.1' <u>SILTY SAND</u> (SM), dark brown, grading to coal fill (ash, cinder, coal), light blackish grey  1.1 to 1.3' <u>Semi-consolidated silty sandstone</u> , buff-yellowish white, friable, weathered, chalky, reddish brown siltstone fragments at 1.2 to 1.3'	2" ID split spoon, 300-lb hammer
40	3.0					
			1.7	2-2-2-1	0 to 0.6' Alternating layers of <u>SILTSTONE</u> and <u>COAL FILL</u> , 2-3" fragments of black coal and yellowish-white-buff weathered concrete (semi-consolidated)  0.6 to 0.9' <u>SILTY SAND WITH GRAVEL</u> (SM), brown, moist-wet, cubic fragments of white porcelain tile  0.9 to 1.7' <u>SANDY SILT</u> (ML), black, moist, product stained soils, hydrocarbon odor	3" ID split spoon  Strong hydrocarbon odor
	5.0					
60			1.6	1-0-3	<u>SANDY SILT</u> (ML), black grading to brown/black, moist-wet, mottled, reddish brown siltstone fragment in shoe at 1.6'	Spoon bounce at 6.5'. Didn't drive split spoon due to concern for underground utilities
	6.6					
80					END OF BORING AT 6.6 FEET	



<b>PROJECT NUMBER</b> NJ022948 ST B	<b>BORING NUMBER</b> OBMW-18	<b>SHEET</b> 1 <b>OF</b> 1
<b>SOIL BORING LOG</b>		

**PROJECT** Stepan Company **LOCATION** Maywood, NJ  
**ELEVATION** N/A **DRILLING CONTRACTOR** Kendrick Drilling, Inc.  
**DRILLING METHOD AND EQUIPMENT** 4.25" ID, HS4 Mobile B-61 Rotary Drill Rig  
**WATER LEVELS** 9.03' BGS 4-22-93 **START** 9-22-93 **FINISH** 9-22-93 **LOGGER** P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
2.0	0.0		1.4	4-8-15-23	0 to 0.2' Poorly graded gravel (Trap rock, road fill) 0.2' to 0.8' <u>SILTY SAND WITH GRAVEL</u> (SM), moderate brown, reddish brown, moist, 1/2-2.5" siltstone rock fragments, trace coal fragments 0.8' to 1.4' <u>SILTY GRAVEL WITH SAND</u> (GM), dark brown, moist, highly variable, metal, brick, glass fragments, wood silt with sand zones	300-pound hammer, 2-3.5" ID splitspoon PID=Photoionization Detector  acid, weathered hydrocarbon odor, 0.0 ppm spoon (PID)
	2.0		1.3	17-19-18-20	0 to 0.2' <u>SILTY GRAVEL WITH SAND</u> (GM), same as above grading to crushed red-orange brick 0.2' to 0.7' siltstone and sandstone rock fragments, reddish brown, dry, friable horizontal partings 0.7' to 1.3' <u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), moderate to reddish brown, dry, fine to coarse sand, fine gravel, trace semi-consolidated	29.9 ppm spoon (PID)  2" splitspoon
4.0	4.0		1.5	8-14-12-10	<u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), same as above except alternating sandy silt, siltstone, silty sandstone rock fragments (semi-consolidated) dry, reddish brown-moderate brown, silty sand at 1.2'	maximum 1019 ppm spoon (PID), weathered hydrocarbon odor 2" splitspoon
6.0	6.0		1.6	3-10-7-7	<u>SILTY SAND WITH GRAVEL</u> (SM), reddish brown, moist, 3/4-2" gravel (siltstone, granite fragments) siltstone in shoe, oil sheen on spoon, soils appeared saturated with product	>2300 ppm spoon (PID) 3" splitspoon moisture within soils evaporates quickly
8.0	8.0		0.7	8-4-3-2	<u>SILTY SAND</u> (SM), reddish brown, to <u>SANDY SILT</u> , semi-consolidated, moist, trace moist-wet horizon petroleum hydrocarbon or moisture ? sheen on spoon evaporates quickly	860 ppm spoon (PID) 2" splitspoon
10.0	10.0		0.7	25-50/11	0 to 0.5' <u>LEAN SILT</u> (ML), reddish brown, moist, wet spoon 0.5' to 0.7' <u>SILTY SANDSTONE</u> , reddish brown, with dark gray-brown mottles at partings, friable, weathered, horizontal partings, wet	1600 ppm spoon (PID) 3" splitspoon oil sheen in spoon Auger Refusal @ 11.5'
	11.5				END OF BORING @ 11.5'	Monitoring Well OBMW-18 installed



PROJECT NUMBER

NJ022948, ST B2

BORING NUMBER

08MW-19

SHEET 1 OF 2

# SOIL BORING LOG

PROJECT Stepan Company

LOCATION Maywood, NJ

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 4.25-inch H.S.A. Mobil B-61 Rotary Drill Rig

WATER LEVELS N/A

START 9/20/93

FINISH 9/20/93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
2.0	0.0				0 to 0.4' <u>SILTY SAND WITH GRAVEL</u> (SM), dark brown, moist, trace reddish brown silt 0.4 to 0.65' <u>WEATHERED CONCRETE</u> 0.65 TO 1.3' <u>SILTY GRAVEL</u> (GM), brownish, dry, 0.75 to 3" gravel	PID=Photoionization Detector 3.5" ID split spoon, 300-lb hammer 0.0 ppm (PID) in spoon
	2.0		1.3	8-22-15-16		
4.0					0 to 1.15' <u>WELL GRADED GRAVEL WITH SAND</u> (GW), brown, dry, 0.75-3" gravel 1.15 to 1.2' <u>SILT</u> (ML), grey, laminations of rusted metal	2" ID split spoon 0.0 ppm (PID) in spoon
			1.2	5-3-4-3		
6.0	4.0				0 to 0.3' <u>SILT WITH SAND</u> (ML), light grey, dry, rootlets, organic matter 0.3 to 1.1' <u>SILT</u> (ML), grey-white, laminated, friable, semi-consolidated, trace of rootlets, ash	3" ID split spoon 0.2 Mr/Hr, upto 320 cpm at tip
			1.1	3-4-4-4		
8.0	6.0				0 to 0.2' <u>SILT</u> (ML), as above 0.2 to 0.55' <u>SILT</u> (ML), light grey/brown, dry, trace rootlets 0.55 to 1.3' <u>SILT WITH GRAVEL</u> (ML), light orange to reddish brown, dry, grading to moist, oxidized <u>SILT WITH SAND</u> (ML) at 1.3', firm, mottled black/orange brown, trace rootlets	2" ID split spoon 0.1 Mr/Hr, approx 200 cpm in 0 to 0.2' interval 20-60 cpm in 0.2 to 1.3' interval
			1.7	4-4-4-5		
10.0	8.0				0 to 1.4' <u>SILT WITH SAND</u> (ML) to <u>SANDY SILT</u> (ML), moist-dry, becoming more moist with depth, brown grading to reddish brown <u>SILT</u> (ML) at 0.85 to 0.9', light grey, trace black laminations, organics <u>SANDY SILT</u> (ML) at 1.2 to 1.4', dark grey, moist, mottled black/ dark grey areas (organics debris), trace oxidized brown, planar orientations to black zones	3.5" split spoon 40-60 cpm, 0.0 ppm (PID) in spoon, faint odor
			1.4	9-10-18-19		
	10.0					



## PROJECT NUMBER

NJ022948-ST-B2

## BORING NUMBER

OBMW-19

SHEET 2 OF 2

## SOIL BORING LOG

PROJECT Stepan Company

LOCATION Maywood, NJ

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 4.25-inch H.S.A. Mobil B-61 Rotary Drill Rig

WATER LEVELS N/A

START 9/20/93

FINISH 9/20/93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
20	10.0		1.5	6-9-7-10	0 to 0.9' <u>SILTY SAND</u> (SM), grey-light brown, moist-wet, trace of laminations, fine-very fine sand, black coarse sand (SP) pocket at 0.8 to 0.9'  0.9 to 1.2' <u>SILTY SAND</u> (SM), mottled buff-orange brown, trace of black laminations (<1mm)  1.2 to 1.5' <u>SILTY SAND WITH GRAVEL</u> (SM), moist-wet, mottled, dark grey-black around gravel (0.5 to 0.75")	3" split spoon  potential capillary fringe at 10.0 ft Wet mark on spoon
	12.0		1.6	16-12-23-16	0 to 0.3' <u>SILTY SAND</u> (SM), mottled dark grey-brown, wet  0.3 to 1.6' alternating <u>SILT WITH SAND</u> (ML) and <u>SILTSTONE</u> , dry, reddish brown, trace light grey mottles, fine sand, micaceous, transitional BEDROCK?	2" split spoon
14.0	14.0		0.6	11-70/1"	0 to 0.6' <u>SILTY GRAVEL WITH SAND</u> (GM) to <u>SILT</u> (ML), dark reddish brown to dark blackish brown, wet  0.6 to 0.65' <u>SILTSTONE WITH SAND</u> , dark reddish brown along bedding planes, oxidized zones, micaceous, moderate hardness	
	15.0				END OF BORING AT 15.0 FEET	Installed Monitoring Well OBMW-19 See Monitoring Well Construction Diagram for Details
16.0						
18.0						





PROJECT NUMBER

NW022948 ST B2

BORING NUMBER

BT-15

SHEET 1 OF 1

# SOIL BORING LOG

PROJECT Stepan Company

LOCATION Maywood, NJ

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 3.75" ID, HSA Mobile B-61 Rotary Drill Rig

WATER LEVELS

START 9-21-93

FINISH 9-21-93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 6" - 6" - 6" (N)	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	NUMBER AND TYPE	RECOVERY			
2.0	0.0		1.7	14-8-9-6	0-.2 <u>SILTY GRAVEL</u> (GM), (Trap rock, road fill) .2-.8 <u>SILTY GRAVEL</u> (GM), reddish brown siltstone rock fragments .8-1.2 <u>WELL GRADED SAND WITH SILT</u> (SW-SM), dark brown, 1.2-1.4 siltstone 1.4-1.7 <u>LEAN CLAY WITH SAND</u> (CL), buff-yellowish white, moist, mottled, weathered ash, grades at 1.7 to dark brown-white silt gravel with sand, (coal cinder)	300-pound hammer, 2-3.5" ID split spoon PID=Photoionization Detector 0.0 ppm spoon (PID)
	2.0		1.1	3-2-1-1	0-.2 same as above .2-.55 <u>SILTY SAND WITH GRAVEL</u> (SM), moist, orange brown, fine-coarse sand, fine gravel .55-1.1 <u>SANDY SILT</u> (ML), brownish gray, grading to black gray, reddish brown in shoe	0.0 ppm, faint sweet odor 2" split spoon
4.0	4.0		0.4	2-3-3-6	0-.3 <u>WELL GRADED SAND WITH SILT AND GRAVEL</u> (SW-SM), reddish brown, moist, loose, 1/2-3/4" gravel .3-.4 <u>SILTY SAND</u> (SM), gray, moist-wet, fine-medium sand	3" split spoon
6.0	6.0		1.7	10-4-3-5	0-.2 <u>POORLY GRADED SAND WITH SILT</u> (SP-SM), light gray, wet, fine sand grading to: .2-.6 <u>SILTY SAND</u> (SM), dark gray, wet-moist, grading to: siltstone fragments .9-1.7 <u>SILT WITH SAND AND GRAVEL</u> (ML), reddish brown, wet, siltstone fragments	11.7 ppm spoon (PID) 2" split spoon
8.0	8.0		1.8	3-1-5-15	0-1.8 <u>SANDY SILT TO SILTY SAND WITH GRAVEL</u> (ML-SM), reddish brown, black along partings in rock (oxidized), coarse gravel @ .6-.8 (siltstone) @ 1.3-1.7 <u>SANDSTONE</u> , oxidized, fractured, 2-5mm silt laminations	
10.0	10.0		0.5	70/6	0-.03 <u>SHALE SILTSTONE</u> laminations, micaceous, mud-cracks .03-.4 <u>SILTY SAND WITH GRAVEL</u> (SM), reddish brown, moist fine-coarse sand, subrounded 1.5" gravel (gray-black) .4-.5 <u>SILTY SANDSTONE</u> , reddish brown, moist, friable, weathered	spoon refusal @ 10.5' 3" split spoon Augered to 12' very slow
12.0	12.0				END OF BORING @ 12.0'	

PROJECT NUMBER

NJ022948.ST.B2

BORING NUMBER

PT-2S

SHEET 1 OF 2

## SOIL BORING LOG

PROJECT Stepan Company

LOCATION Aromatics Area

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 3.75" ID, HSA Mobile Drill B-81

WATER LEVELS

START 9-21-93

FINISH 9-21-93

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS 0' - 8' - 8' (N)	SOIL DESCRIPTION  SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS  DEPTH OF CASING, DRILLING RATE DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY			
0	2		1.8	12-14-11-11 (25)	<u>SILTY GRAVEL WITH SAND</u> (GM), grading to <u>SILTY SAND WITH GRAVEL</u> (SM), brown to reddish brown grading to blackish gray, moist-dry, GM at tip. Coal fragments, asphalt fragments, glass shards	0 to 2' 3.5 ID spiltspoon 300# hammer PID=Photolocalization Detector 7.8 ppm spoon PID
	4		1.0	4-8-9-8 (15)	Alternating <u>SILT</u> (ML), <u>SILTY SAND</u> (SM), siltstone, gray, reddish brown, moist to dry @ .8' to .8' <u>SILTY SAND</u> (SM), black, @ .8'-1.0' wood	2" ID spiltspoon  8.8 ppm spoon PID strong, sweet odor
	8		1.4	4-2-2-1 (4)	0'-3.5' wood timber 3.5'-.8' <u>SILTY SAND WITH GRAVEL</u> (SM), dark brown, moist-wet, gradation to: .8'-1.4' <u>SILTY GRAVEL WITH SAND</u> (GM), black, moist, coal fragments, cinder, black viscous, tar-like material within soil matrix, trace fibrous material	3" ID spiltspoon  92.8 ppm spoon PID strong odor, .8'-1.4'
5.0	8		1.5	1-4-4-4 (8)	0'-.45' As above, gradation to <u>SILT</u> (ML), <u>WITH SAND</u> , black, moist-wet, unconformable contact @ .45', possible hydrocarbon material coating soil grains .45'-1.5' <u>POORLY GRADED SAND WITH SILT</u> (SP-SM), dark gray, to blackish gray, mottled zones, wet, fine sand, trace 1 mm laminations (colored) light gray at tip	2" ID spiltspoon 192 ppm spoon PID strong odor
	10		1.55	5-8-7-7 (13)	0'-.3' gradation from above, <u>SANDY SILT</u> (ML), light to moderate gray, moist .3'-1.55' <u>SILT WITH SAND</u> (ML), reddish brown, moist to dry, trace sandy silt, micaceous, 30-40% semi-consolidated <u>SILTSTONE</u> rock fragments, mottled around fractures	2" ID spiltspoon 15 to 39 ppm spoon PID  stronger, high PID response within silt, siltstone layers
	12		1.5	9-10-11-11 (21)	0'-1.5' Same as above, alternating semi-consolidated <u>SILTSTONE</u> , reddish brown to dark grayish red brown (mottled) to: <u>SILT WITH SAND AND GRAVEL</u> (ML), dark gray, brown-reddish brown, moist-wet, micaceous	3" ID spiltspoon Darker colors typically correspond to weathered zones or horizons 38 to 84 ppm spoon PID, sweet odor



PROJECT NUMBER  
NJ022948.ST.B2

BORING NUMBER  
PT-2S

SHEET 2 OF 2

## SOIL BORING LOG

PROJECT Stepan Company

LOCATION Aromatics Area

ELEVATION N/A

DRILLING CONTRACTOR Kendrick Drilling, Inc.

DRILLING METHOD AND EQUIPMENT 3.75" ID, HSA Mobile Drill B-8I

WATER LEVELS

START 8-21-83

FINISH 9-21-83

LOGGER P. van Noort

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS  8' - 8" - 8" (N)	SOIL DESCRIPTION  SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS  DEPTH OF CASING, DRILLING RATE DRILLING FLUID LOSS TESTS AND INSTRUMENTATION
	INTERVAL	TYPE AND NUMBER	RECOVERY			
15.0	12		1.8	18-43-20-39 (83)	0' to 1' <u>POORLY GRADED SAND WITH SILT</u> (SP-SM), black reddish brown, wet .1' to .2' <u>SILT</u> (ML), reddish brown, moist .2' to .5' <u>POORLY GRADED SAND WITH SILT</u> (SP-SM), dark brown-black, semi-consolidated, black material coating grains, elutes oil sheen in water .5' to .7' <u>WELL GRADED SAND</u> (SW), pink-red brown, semi-consolidated, fine to coarse sand, dry .7' to 1.1' <u>SANDY SILT</u> grading to <u>SILTY SAND</u> (SM), reddish brown, grading to: 1.1 to 1.5' <u>POORLY GRADED SAND</u> (SP), black, moist, semi-consolidated, (same as .2' to .5') oxidized? 1.5 to 1.8' <u>SILT WITH SAND</u> (ML), reddish brown, moist, semi-consolidated, fractured, mottled, gray-red brown 0'-.5' <u>SILTSTONE</u> , reddish brown, moist-dry, highly weathered silt flssile, horizontal partings, trace vertical partings, soil-like horizons (ML)	2" ID split spoon 17.8 ppm spoon
	14					
			.5	17-70/2"		spoon refusal at 14.5' Augered to 15'
	18				END OF BORING @ 15'	Monitoring well installed
20.0						