



May 2, 2001

Mr. David Burke  
Pennsylvania Department of Environmental Protection  
Southeast Regional Office  
Lee Park, Suite 6010  
Conshohocken, Pennsylvania 19428

RE: 14 Service Building/Pollock Street Sewer Naphtha Investigation  
Sunoco Philadelphia Refinery, Point Breeze Processing Area  
3144 Passyunk Avenue, Philadelphia, Pennsylvania

Dear Mr. Burke:

This letter report has been prepared to summarize the investigation related to the subsurface release of naphtha in the area of the 14 Service Building located within the Sunoco Philadelphia Refinery, Point Breeze Processing Area. Included are summaries of release mitigation activities and soil boring installation activities.

#### **Background**

On December 13, 2000, during a regular sewer outfall inspection, non-aqueous phase liquid (NAPL) was observed seeping from the Pollock Street sewer outfall into the Pollock Street Coffor Dam, located in the Schuylkill River. Sunoco, Inc. (R&M) (Sunoco) maintains sorbant booms around the sewer outfall and coffer dam, which consequently contained the NAPL and prevented impact to the Schuylkill River. Sunoco utilized a vac-truck to remove the NAPL contained in the coffer dam and behind the sorbant booms in the river. NAPL was not observed during subsequent outfall and coffer dam inspections.

NAPL was again observed seeping into the Pollock Street Coffor Dam from the Pollock Street sewer on December 26, 2000. Sunoco again utilized a vac-truck to remove the NAPL from the coffer dam. NAPL continued to be observed in the coffer dam through January 29, 2001, and had been observed on several occasions through April 6, 2001. Throughout this time, Sunoco continued to remove the NAPL utilizing a vac-truck and a dedicated skimmer-pump. A sample of the NAPL was collected and identified by the Sunoco Laboratory as naphtha.

#### **Release Identification and Abatement Measures**

Sunoco identified an out-of-service underground pipeline located approximately 60 feet south of 14 Service Building as the probable source of the naphtha release. The pipeline location is shown on the attached Figure. The pipeline is buried at a depth of approximately 16 feet below grade, and runs from a series of transfer pumps located south of 14 Service Building, under the road approximately 100 feet to the east where it resurfaces.

On January 25, 2001 Sunoco attempted to excavate and inspect a portion of the underground pipeline near the transfer pumps. However, ground water was encountered at approximately 6 feet below grade, and could not be removed from the excavation at a rate faster than infiltration. Sunoco then pressure tightness tested the pipeline to determine its integrity. The pipeline failed the tightness test and Sunoco abandoned the underground section by filling it with concrete and blanking the flange at both ends.

It is believed that the naphtha migrated from the now abandoned underground pipeline through the backfill of sewer laterals north to the Pollock Street sewer where it crosses the Philadelphia Refinery approximately 60 feet north of 14 Service Building. Because the Pollock Street sewer is constructed of brick, an infiltration pathway for naphtha into the sewer was most likely readily available.

### **Soil Boring Investigation**

To determine if there was naphtha remaining in the subsurface and to determine its pathway from the release point to the Pollock Street sewer, on March 12 through 16, 2001, twenty-three (23) soil borings were installed in the area of 14 Service Building. A temporary well point was installed in each soil boring so that naphtha accumulation could be gauged. The soil boring locations are shown on the attached Figure.

The soil borings were installed utilizing a Geoprobe to a depth of 20 feet below grade. Only soil boring SB-17 met refusal at a depth less than 20 feet below grade. Boring logs and temporary well construction diagrams are also attached. As shown on the boring logs, soils in the area of 14 Service Building consist primarily of dry to slightly moist fine sand and silt to a depth of approximately 15 to 20 feet below grade. At approximately 15 to 20 feet below grade a wet coarse sand and fine gravel was encountered in many of the soil borings.

NAPL stained soils were observed in approximately half of the soil borings (SB-1, SB-4, SB-6, SB-9, SB-10, SB-11, SB-12, SB-14, SB-19, SB-21, SB-22, and SB-23) at depths ranging from approximately 5 to 19 feet below grade. Liquid NAPL was encountered only in SB-23 at a depth of approximately 15 to 17 feet below grade. There is not an identifiable pattern to the distribution of soils containing NAPL staining. In addition, an adequate volume of NAPL could not be secured to determine if the NAPL observed was naphtha.

The temporary well points have been gauged 4 times for depth to NAPL and/or depth to water since their installation. A table summarizing the gauging data collected to date is attached. NAPL has been detected in SB-1, SB-6, SB-7, SB-12, SB-15, SB-16, SB-18, SB-19, SB-20, and SB-23 at a thickness of 0.01 feet or greater. The maximum NAPL thickness measured to date was 0.11 feet in SB-7 and SB-19, both on April 29, 2001. With the exception of SB-6, SB-7, and SB-12, temporary well points containing NAPL are located to the west and northwest of the release point.

Based on gauging data collected on March 19, 2001, a vac-truck was utilized on March 29, 2001 to develop select well points (SB-1, SB-15, SB-16, SB-17, SB-18, SB-19, SB-20, and SB-23). The well points were developed in an attempt to increase the NAPL thickness in those wells so that a NAPL sample could be collected for identification. Based on gauging data collected since the select wells were developed, it appears that developing the wells has removed any NAPL that was present prior to development. In all cases, the NAPL thickness did not recover to the pre-development thickness. The maximum NAPL thickness detected since well development was 0.03 feet in SB-6, a non-developed well point.

### **Conclusions**

In summary, the following data has been collected to date:

- Naphtha was observed in the Pollock Street Cofferdam December 26, 2000 through January 29, 2001, and had been observed on several occasions through April 6, 2001.
- The underground pipeline where the release originated was abandoned in place in late January 2001.
- Once the underground pipeline where the release originated was abandoned, the flow of naphtha from the Pollock Street sewer into the Pollock Street Cofferdam subsided. NAPL has not been observed in the coffer dam since April 6, 2001. Therefore, it appears that the source has been removed.

- Twenty-three (23) soil borings/temporary well points were installed in the area of the release on March 12 through 16, 2001. Minimal NAPL was observed only in approximately 12 borings. Minimal NAPL was encountered during the installation of the 23 soil borings and temporary well points and during subsequent well point gauging. This suggests that the naphtha released did not significantly impact the area proximal to the release.
- The temporary well points were gauged for depth to NAPL and depth to water four (4) times. Trace to approximately 0.10 feet of NAPL was detected in eleven (11) of the temporary points. Well points in which NAPL was detected are located predominantly to the west and northwest of the release point. On March 29, 2001, the temporary wells that had exhibited NAPL were developed utilizing a vac-truck. Since development, the original NAPL thickness has not returned to the developed wells.
- Because it does not appear that the area proximal to the release point was significantly impacted by the naphtha release, it is likely that there was a preferential flow pathway from the release point to the Pollock Street sewer. Because the majority of the well points in which NAPL was detected are to the west and northwest of the release point the preferential flow was most likely in that direction. The most likely preferential flow path has been identified as the backfill around the underground sewer pipelines that run along the west side of the release area and 14 service building, and intersect with the Pollock Street sewer.

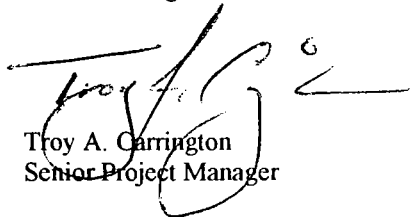
Based on the data collected to date, it appears that the source of the naphtha release has been removed and that impact to the area immediately adjacent to the release point was minimal. In addition, the backfill around the underground sewer lines that run along the west side of the release area has been identified as the most likely pathway of naphtha from the release point to the Pollock Street sewer. As such, Handex feels that no further investigation is warranted with regard to this issue.

If you have any questions regarding the information contained in this letter please feel free to contact either Mr. James Oppenheim of Sunoco at (215) 339-2436 or either of the undersigned at (410) 674-3200.

Sincerely,



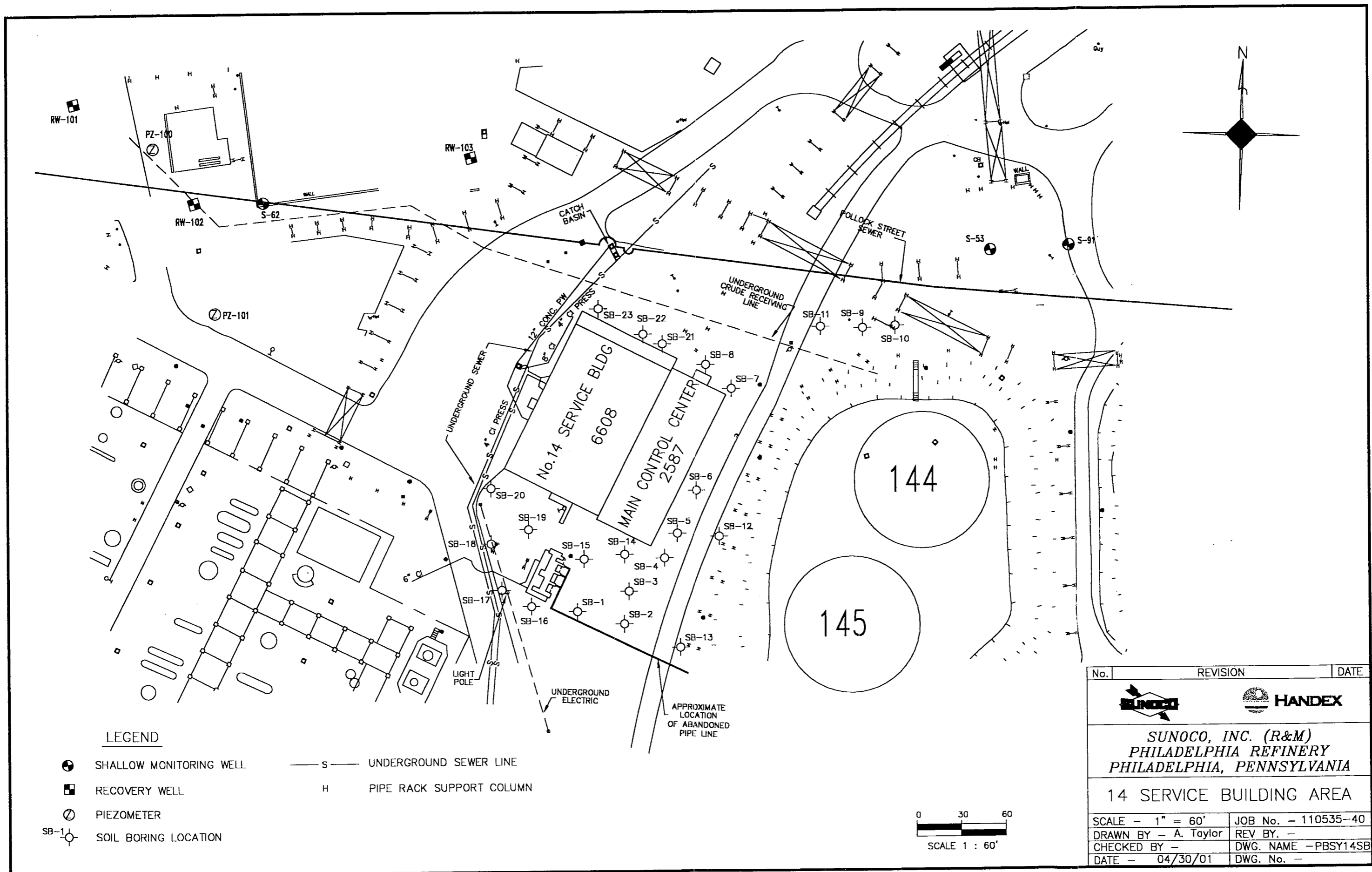
David M. Leety  
Senior Geologic Scientist



Troy A. Carrington  
Senior Project Manager



Attachments

cc: Mr. James Oppenheim, Sunoco, Inc. (R&M), Philadelphia, Pennsylvania



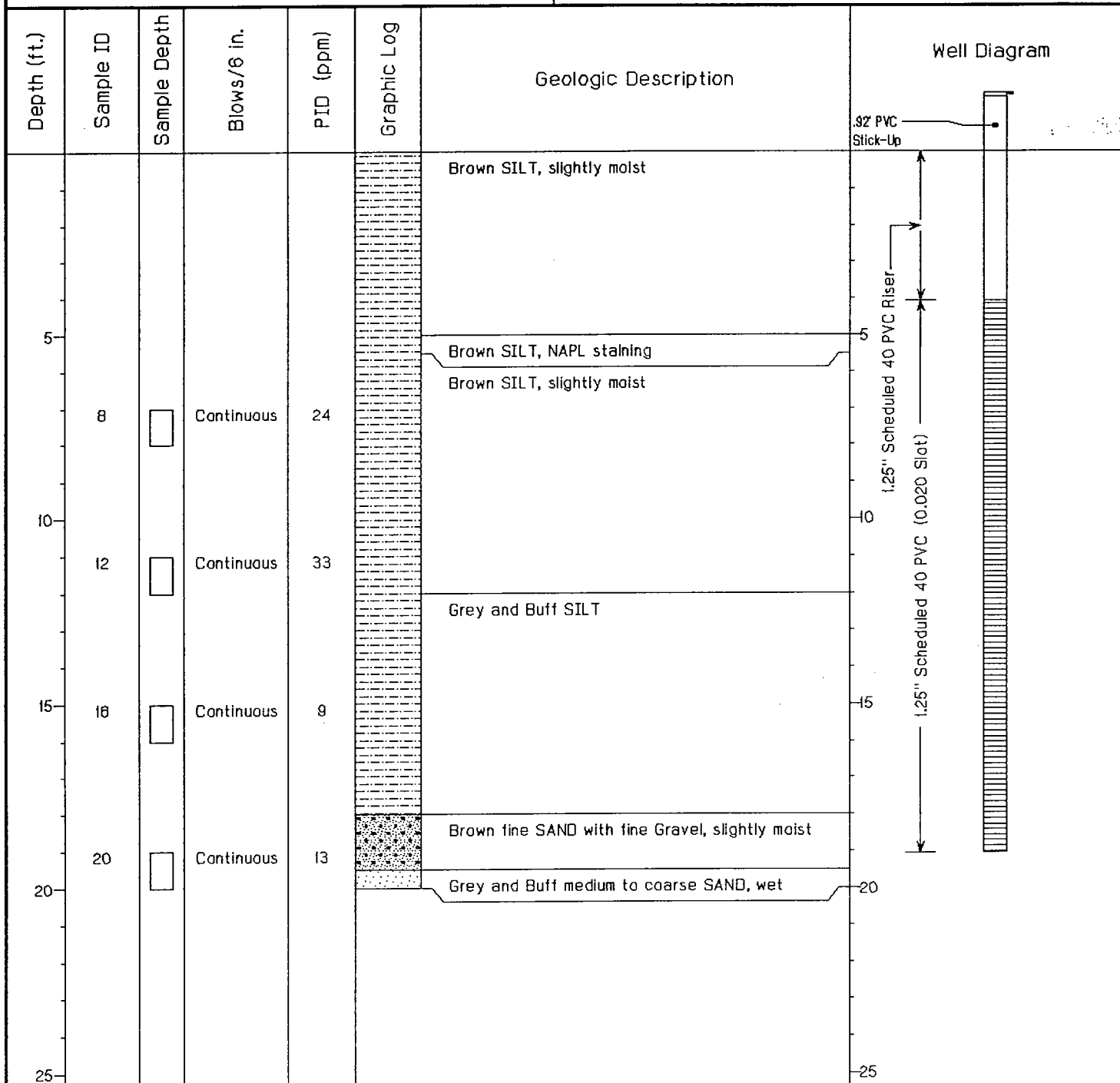
LEGEND

- SHALLOW MONITORING WELL
- RECOVERY WELL
- ⊙ PIEZOMETER
- SB-1 SOIL BORING LOCATION
- S — UNDERGROUND SEWER LINE
- H PIPE RACK SUPPORT COLUMN

No.	REVISION	DATE
 		
SUNOCO, INC. (R&M) PHILADELPHIA REFINERY PHILADELPHIA, PENNSYLVANIA		
14 SERVICE BUILDING AREA		
SCALE — 1" = 60'	JOB No. — 110535-40	
DRAWN BY — A. Taylor	REV BY. —	
CHECKED BY —	DWG. NAME — PBSY14SB	
DATE — 04/30/01	DWG. No. —	

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**WELL LOG: SB-1**Permit #: **N/A**Drill Date: **March 15, 2001**Use: **Temporary Point**Location: **Point Breeze, Philadelphia Refinery**Owner Loc #: **14 Service Building**Owner: **Sunoco**Handex Loc #: **110535.040.T3075.900**Owner Address: **3144 Passyunk Avenue, Philadelphia, PA** BORING - Depth: **20 ft.** Diameter: **2 in.**Drilling Method: **Geoprobe** CASING - Length: **5 ft.** Diameter: **1.25 in.**Sampling Method: **Direct-Push (Geoprobe)** SCREEN - Length: **15 ft.** Diameter: **1.25 in.**Static Water Level: WELL - Depth: **19.08 ft.**Geologist: **David Leety**Driller: **B.L. Myers Brothers**

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**WELL LOG: SB-2**Permit #: **N/A**Drill Date: **March 13, 2001**Use: **Temporary Point**Location: **Point Breeze, Philadelphia Refinery**Owner Loc #: **14 Service Building**Owner: **Sunoco**Handex Loc #: **110535.040.T3075.900**Owner Address: **3144 Passyunk Avenue, Philadelphia, PA** BORING - Depth: **20 ft.**Diameter: **2 in.**Drilling Method: **Geoprobe**CASING - Length: **5 ft.**Diameter: **1.25 in.**Sampling Method: **Direct-Push (Geoprobe)**SCREEN - Length: **15 ft.**Diameter: **1.25 in.**

Static Water Level:

WELL - Depth: **18.58 ft.**

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	PID (ppm)	Graphic Log	Geologic Description	Well Diagram
						Large to medium GRAVEL, moist	
						Brown fine Sandy SILT, slightly moist	
5							
8	8	<input type="checkbox"/>	Continuous	90			
10	12	<input type="checkbox"/>	Continuous	21		Brown SILT, moist	
15	18	<input type="checkbox"/>	Continuous	11		Brown SAND, wet	
						Brown SILT, very slightly moist	
						Brown SAND, wet	
20							
25							25

Geologist: **David Leety**Driller: **B.L. Myers Brothers**

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**WELL LOG: SB-3**Permit #: **N/A**Drill Date: **March 13, 2001**Use: **Temporary Point**Location: **Point Breeze, Philadelphia Refinery**Owner Loc #: **14 Service Building**Owner: **Sunoco**Handex Loc #: **110535.040.T3075.900**Owner Address: **3144 Passyunk Avenue, Philadelphia, PA** BORING - Depth: **20 ft.** Diameter: **2 in.**Drilling Method: **Geoprobe** CASING - Length: **5 ft.** Diameter: **1.25 in.**Sampling Method: **Direct-Push (Geoprobe)** SCREEN - Length: **15 ft.** Diameter: **1.25 in.**Static Water Level: WELL - Depth: **19.08 ft.**

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	PID (ppm)	Graphic Log	Geologic Description	Well Diagram
						Large to medium GRAVEL, moist	
5	8	<input type="checkbox"/>	Continuous	294		Brown fine Sandy SILT, slightly moist	
10	12	<input type="checkbox"/>	Continuous	42		Brown SILT, moist	
15	16	<input type="checkbox"/>	Continuous	8.7		Brown SAND, wet	
						Brown SILT, very slightly moist	
20						Brown SAND, wet	
25							

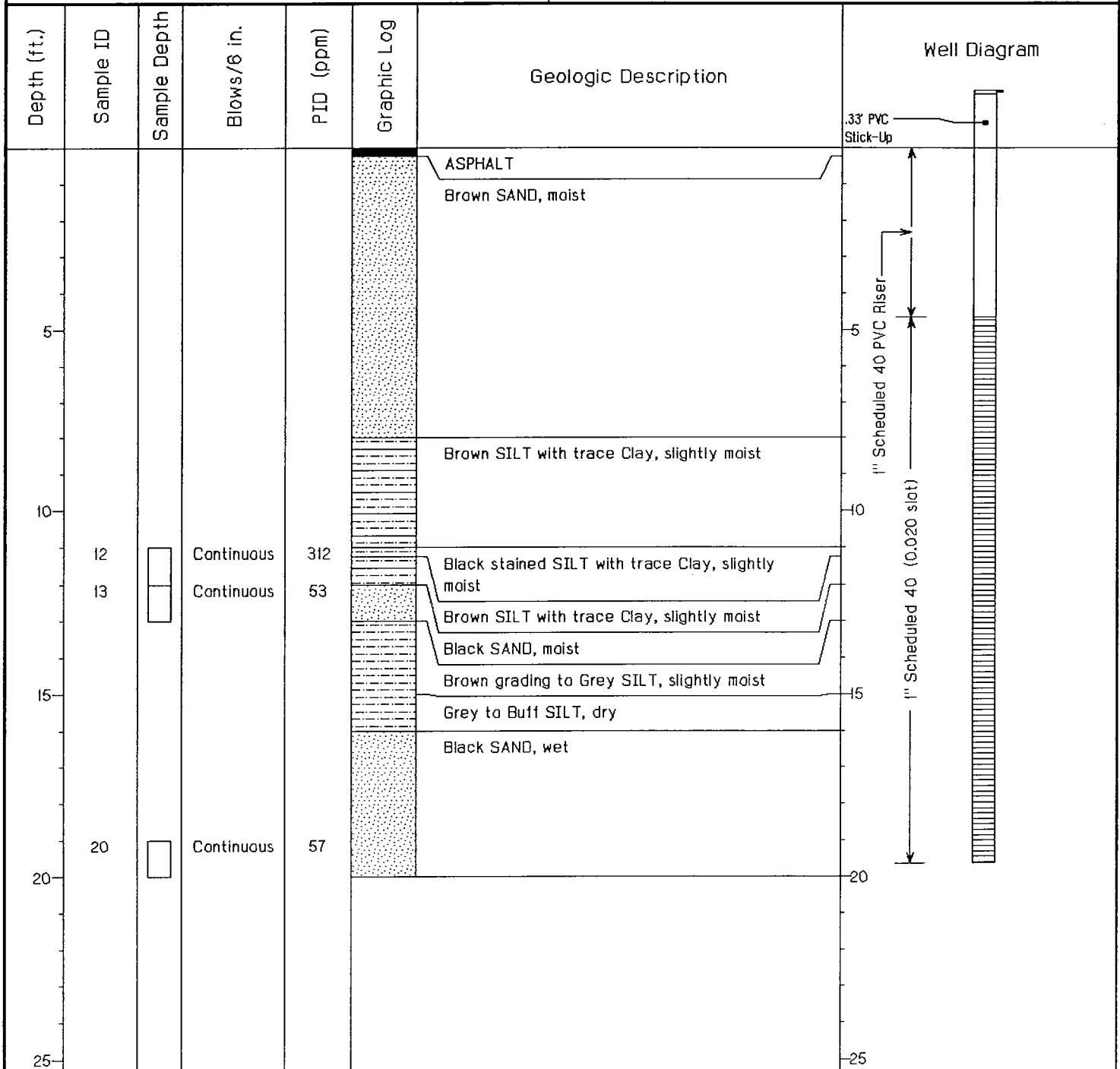
Geologist: **David Leety**Driller: **B.L. Myers Brothers**

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**WELL LOG: SB-4**Permit #: **N/A**Drill Date: **March 13, 2001**Use: **Temporary Point**Location: **Point Breeze, Philadelphia Refinery**Owner Loc #: **14 Service Building**Owner: **Sunoco**Handex Loc #: **110535.040.T3075.900**Owner Address: **3144 Passyunk Avenue, Philadelphia, PA**BORING - Depth: **20 ft.**Diameter: **2 in.**Drilling Method: **Geoprobe**CASING - Length: **5 ft.**Diameter: **1.25 in.**Sampling Method: **Direct-Push (Geoprobe)**SCREEN - Length: **15 ft.**Diameter: **1.25 in.**

Static Water Level:

WELL - Depth: **19.67 ft.**

Geologist: David Leety

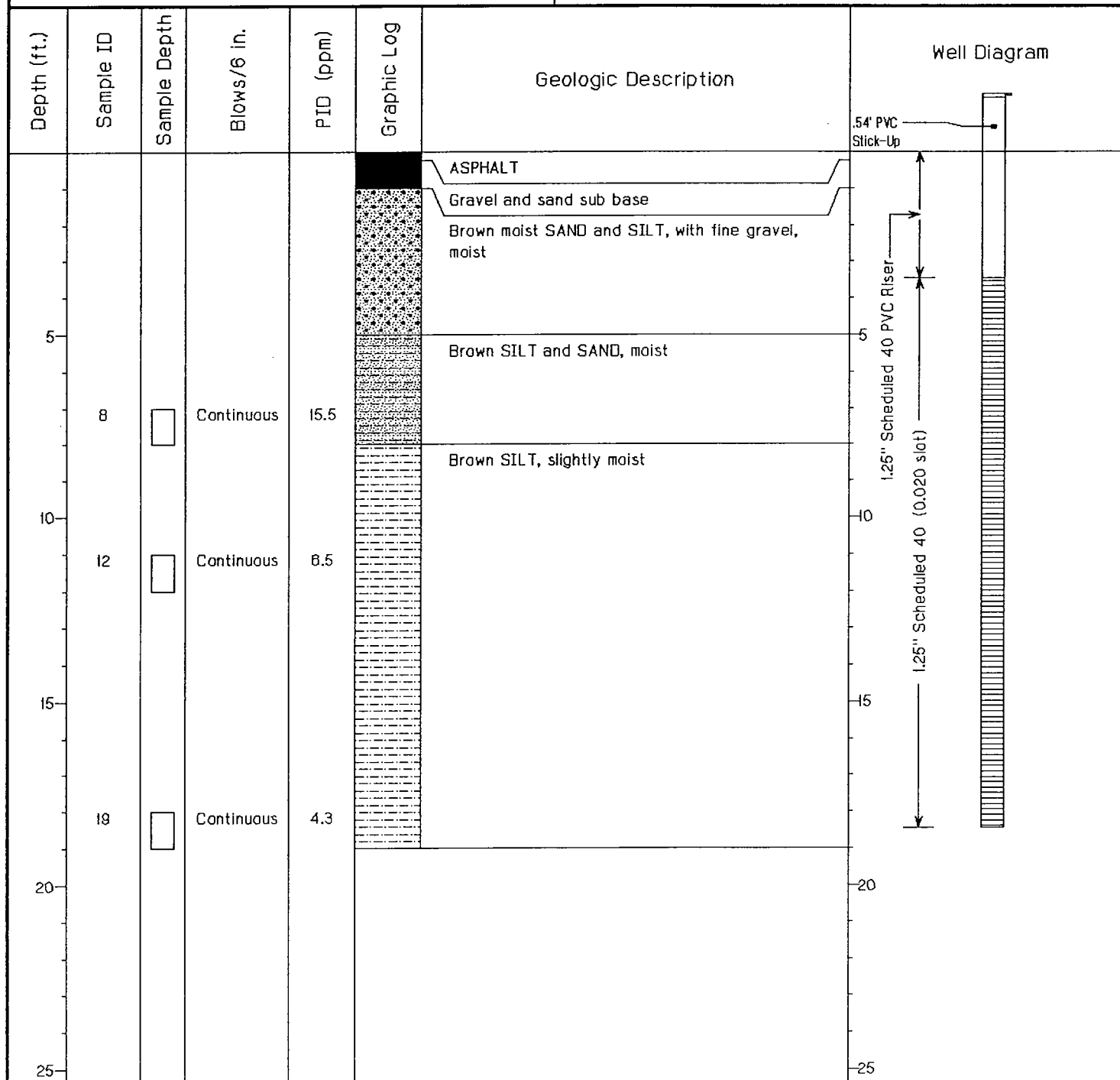
Driller: B.L. Myers Brothers



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**WELL LOG: SB-5**Permit #: **N/A**Drill Date: **March 13, 2001**Use: **Temporary Point**Location: **Point Breeze, Philadelphia Refinery**Owner Loc #: **14 Service Building**Owner: **Sunoco**Handex Loc #: **110535.040.T3075.900**Owner Address: **3144 Passyunk Avenue, Philadelphia, PA**BORING - Depth: **19 ft.**Diameter: **2 in.**Drilling Method: **Geoprobe**CASING - Length: **5 ft.**Diameter: **1.25 in.**Sampling Method: **Direct-Push (Geoprobe)**SCREEN - Length: **15 ft.**Diameter: **1.25 in.**

Static Water Level:

WELL - Depth: **18.46 ft.**

Geologist: David Leety

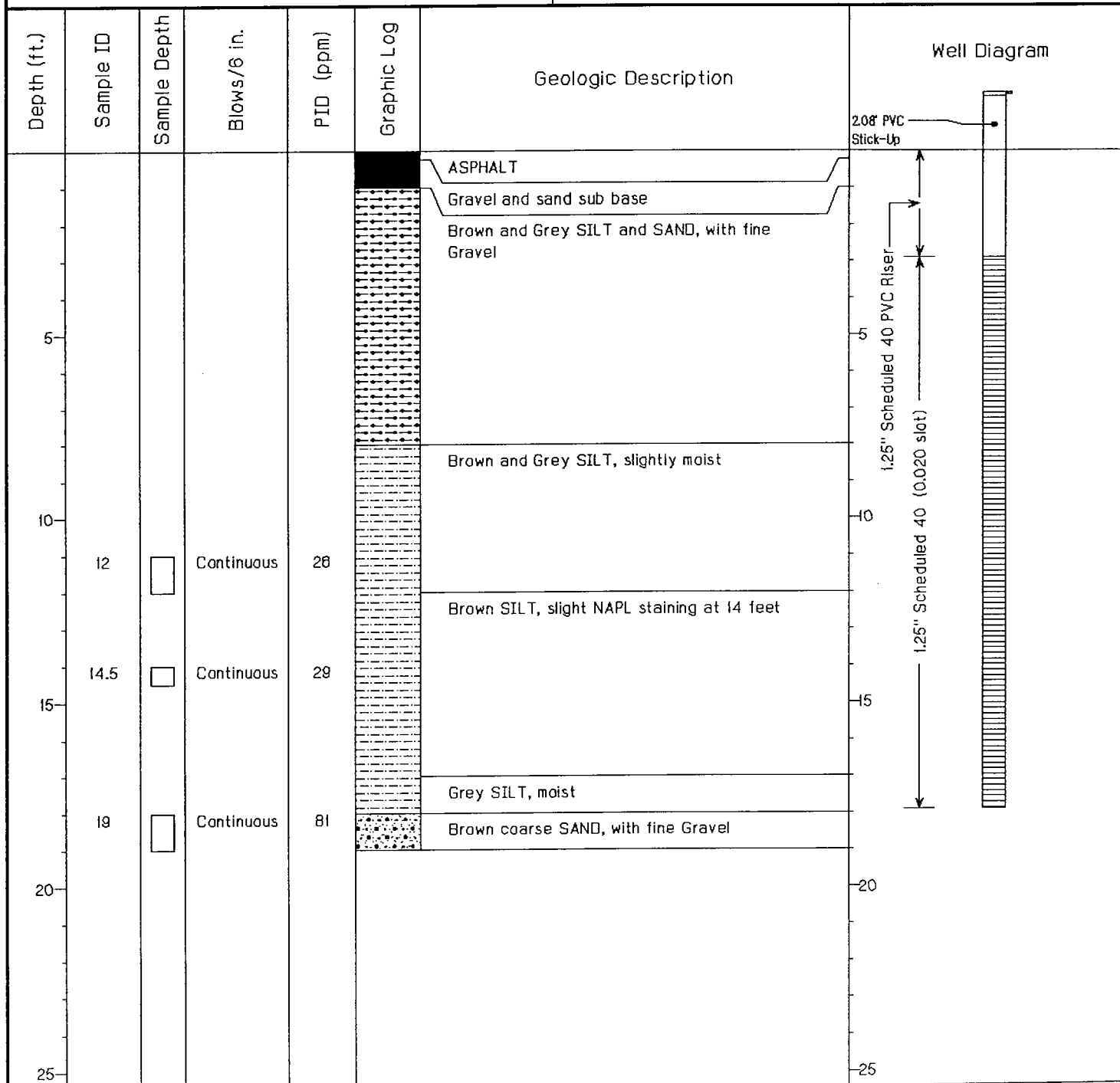
Driller: B.L. Myers Brothers

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**WELL LOG: SB-6**Permit #: **N/A**Drill Date: **March 13, 2001**Use: **Temporary Point**Location: **Point Breeze, Philadelphia Refinery**Owner Loc #: **14 Service Building**Owner: **Sunoco**Handex Loc #: **110535.040.T3075.900**Owner Address: **3144 Passyunk Avenue, Philadelphia, PA** BORING - Depth: **20 ft.**Diameter: **2 in.**Drilling Method: **Geoprobe**CASING - Length: **5 ft.**Diameter: **1.25 in.**Sampling Method: **Direct-Push (Geoprobe)**SCREEN - Length: **15 ft.**Diameter: **1.25 in.**

Static Water Level:

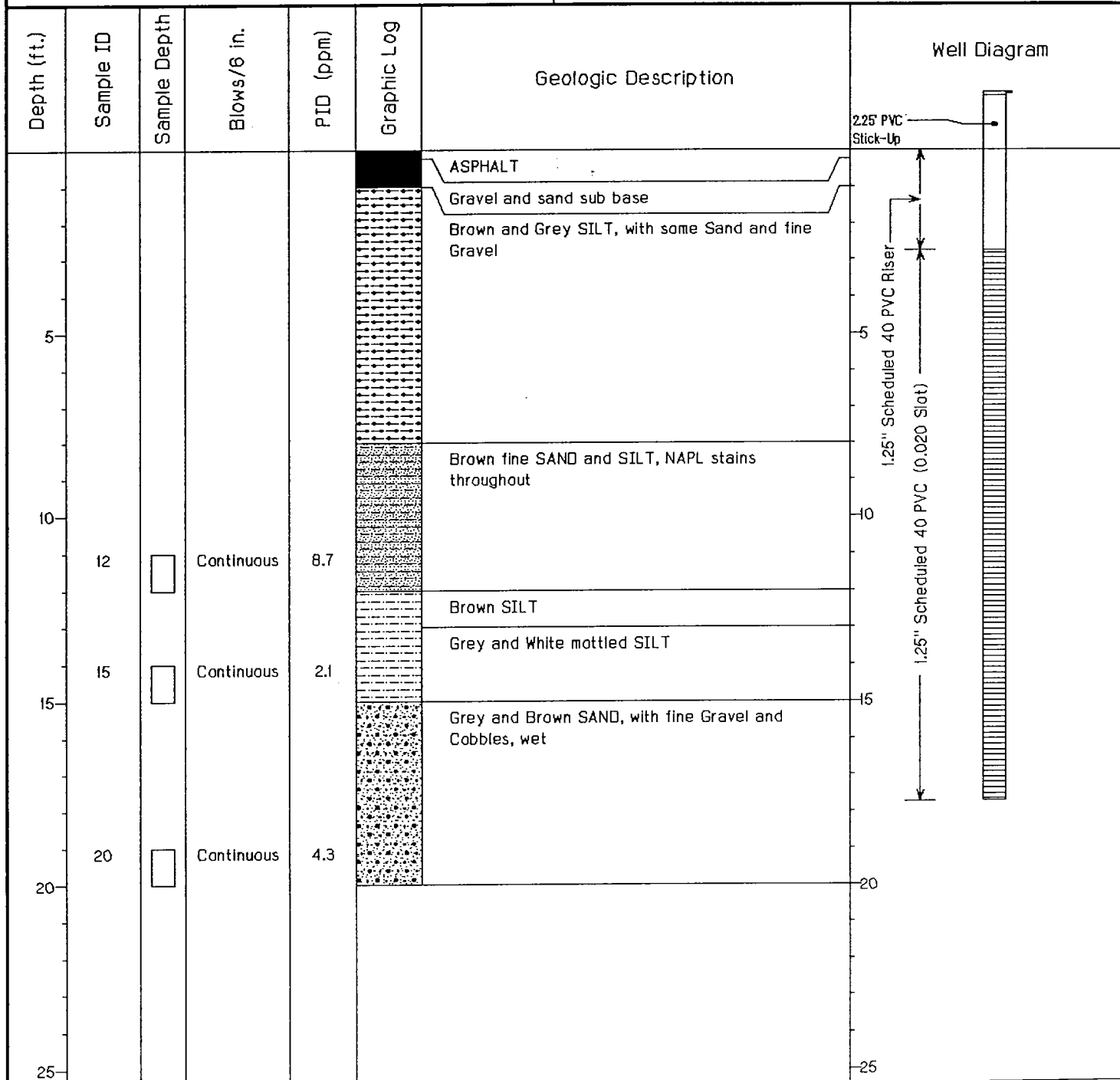
WELL - Depth: **17.92 ft.**Geologist: **David Leety**Driller: **B.L. Myers Brothers**

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**WELL LOG: SB-7**Permit #: *N/A*Drill Date: *March 13, 2001*Use: *Temporary Point*Location: *Point Breeze, Philadelphia Refinery*Owner Loc #: *14 Service Building*Owner: *Sunoco*Handex Loc #: *110535.040.T3075.900*Owner Address: *3144 Passyunk Avenue, Philadelphia, PA*BORING - Depth: *20 ft.*Diameter: *2 in.*Drilling Method: *Geoprobe*CASING - Length: *5 ft.*Diameter: *1.25 in.*Sampling Method: *Direct-Push (Geoprobe)*SCREEN - Length: *15 ft.*Diameter: *1.25 in.*

Static Water Level:

WELL - Depth: *17.75 ft.*

Geologist: David Leety

Driller: B.L. Myers Brothers

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**WELL LOG: SB-8**

Permit #: <b>N/A</b>	Drill Date: <b>March 15, 2001</b>	Use: <b>Temporary Point</b>
Location: <b>Point Breeze, Philadelphia Refinery</b>	Owner Loc #: <b>14 Service Building</b>	
Owner: <b>Sunoco</b>	Handex Loc #: <b>110535.040.T3075.900</b>	
Owner Address: <b>3144 Passyunk Avenue, Philadelphia, PA</b>	BORING - Depth: <b>20 ft.</b>	Diameter: <b>2 in.</b>
Drilling Method: <b>Geoprobe</b>	CASING - Length: <b>5 ft.</b>	Diameter: <b>1.25 in.</b>
Sampling Method: <b>Direct-Push (Geoprobe)</b>	SCREEN - Length: <b>15 ft.</b>	Diameter: <b>1.25 in.</b>
Static Water Level:	WELL - Depth: <b>18.08 ft.</b>	

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	PID (ppm)	Graphic Log	Geologic Description	Well Diagram
						Brown SILT and SAND, with medium Gravel	
5	8	<input type="checkbox"/>	Continuous	2		Brown Sandy SILT, wet	
10	12	<input type="checkbox"/>	Continuous	15		Brown Sandy SILT, mottled and moist	
15	18	<input type="checkbox"/>	Continuous	28		Brown medium SAND, wet to moist	
						Brown and Grey SILT, mottled	
						Brown SILT, wet	
20	20	<input type="checkbox"/>	Continuous	33		Grey medium SAND and GRAVEL, wet	
25							

Geologist: David Leety

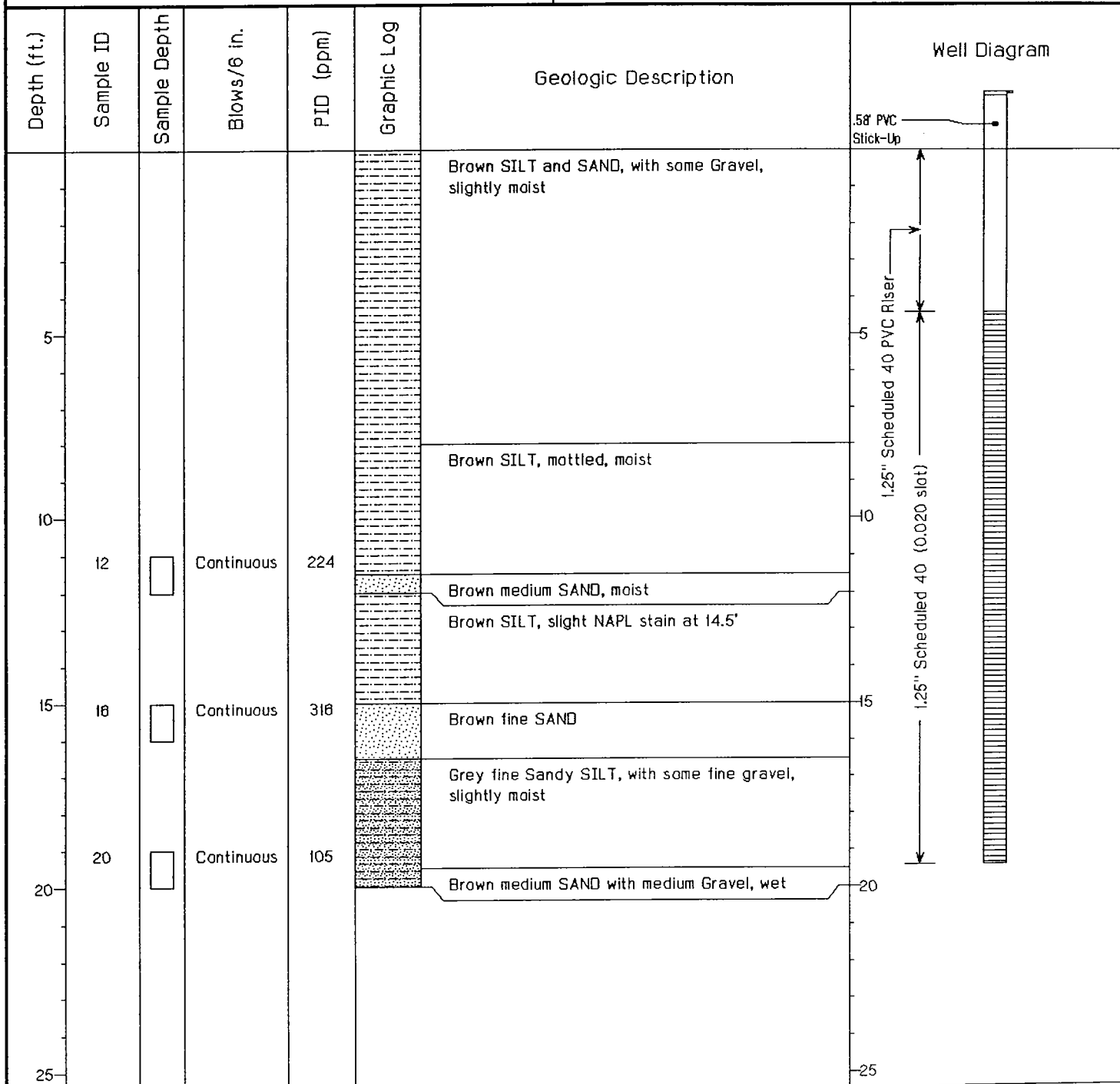
Driller: B.L. Myers Brothers

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**WELL LOG: SB-9**Permit #: *N/A*Drill Date: *March 15, 2001*Use: *Temporary Point*Location: *Point Breeze, Philadelphia Refinery*Owner Loc #: *14 Service Building*Owner: *Sunoco*Handex Loc #: *110535.040.T3075.900*Owner Address: *3144 Passyunk Avenue, Philadelphia, PA*BORING - Depth: *20 ft.*Diameter: *2 in.*Drilling Method: *Geoprobe*CASING - Length: *5 ft.*Diameter: *1.25 in.*Sampling Method: *Direct-Push (Geoprobe)*SCREEN - Length: *15 ft.*Diameter: *1.25 in.*

Static Water Level:

WELL - Depth: *19.42 ft.*

Geologist: David Leety

Driller: B.L. Myers Brothers

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**WELL LOG: SB-10**

Permit #: <b>N/A</b>	Drill Date: <b>March 15, 2001</b>	Use: <b>Temporary Point</b>
Location: <b>Point Breeze, Philadelphia Refinery</b>	Owner Loc #: <b>14 Service Building</b>	
Owner: <b>Sunoco</b>	Handex Loc #: <b>110535.040.T3075.900</b>	
Owner Address: <b>3144 Passyunk Avenue, Philadelphia, PA</b>	BORING - Depth: <b>20 ft.</b>	Diameter: <b>2 in.</b>
Drilling Method: <b>Geoprobe</b>	CASING - Length: <b>5 ft.</b>	Diameter: <b>1.25 in.</b>
Sampling Method: <b>Direct-Push (Geoprobe)</b>	SCREEN - Length: <b>15 ft.</b>	Diameter: <b>1.25 in.</b>
Static Water Level:	WELL - Depth: <b>19.67 ft.</b>	

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	PID (ppm)	Graphic Log	Geologic Description	Well Diagram
						Brown SILT and SAND, with some Gravel, slightly moist	
5	8	<input type="checkbox"/>	Continuous	103		Brown and black fine SAND and SILT, slight NAPL staining	
10	12	<input type="checkbox"/>	Continuous	143		Brown SILT, slight NAPL staining	
15	16	<input type="checkbox"/>	Continuous	125		Brown fine SAND and SILT with some fine to medium Gravel, NAPL stains	
20	20	<input type="checkbox"/>	Continuous	255		Brown medium SAND and SILT, with fine to medium Gravel	
20						Brown coarse SAND with fine Gravel, wet	
25							

Geologist: David Leety

Driller: B.L. Myers Brothers



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**WELL LOG: SB-11**

Permit #: <b>N/A</b>	Drill Date: <b>March 15, 2001</b>	Use: <b>Temporary Point</b>
Location: <b>Point Breeze, Philadelphia Refinery</b>		Owner Loc #: <b>14 Service Building</b>
Owner: <b>Sunoco</b>		Handex Loc #: <b>110535.040.T3075.900</b>
Owner Address: <b>3144 Passyunk Avenue, Philadelphia, PA</b>		BORING - Depth: <b>20 ft.</b> Diameter: <b>2 in.</b>
Drilling Method: <b>Geoprobe</b>		CASING - Length: <b>5 ft.</b> Diameter: <b>1.25 in.</b>
Sampling Method: <b>Direct-Push (Geoprobe)</b>		SCREEN - Length: <b>15 ft.</b> Diameter: <b>1.25 in.</b>
Static Water Level:		WELL - Depth: <b>15.46 ft.</b>

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	PID (ppm)	Graphic Log	Geologic Description	Well Diagram
						Brown SILT and SAND, with some Gravel, slightly moist	<p>4.54' PVC Stick-Up</p> <p>1.25" Scheduled 40 PVC Riser</p> <p>1.25" Scheduled 40 PVC (0.020 slot)</p>
5	8	<input type="checkbox"/>	Continuous	143		Brown SILT, moist	
						Brown and black fine SAND and SILT, little NAPL staining	
10	12	<input type="checkbox"/>	Continuous	115		Brown SILT, little NAPL staining	
15	18	<input type="checkbox"/>	Continuous	75		Brown SILT and fine SAND, with fine Gravel, slightly moist	
20	20	<input type="checkbox"/>	Continuous	178		Brown medium to coarse SAND, with fine Gravel, moist to wet	
25							

Geologist: David Leety

Driller: B.L. Myers Brothers



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# WELL LOG: SB-12

Permit #: <b>N/A</b>	Drill Date: <b>March 15, 2001</b>	Use: <b>Temporary Point</b>
Location: <b>Point Breeze, Philadelphia Refinery</b>		Owner Loc #: <b>14 Service Building</b>
Owner: <b>Sunoco</b>		Handex Loc #: <b>110535.040.T3075.900</b>
Owner Address: <b>3144 Passyunk Avenue, Philadelphia, PA</b>		BORING - Depth: <b>20 ft.</b> Diameter: <b>2 in.</b>
Drilling Method: <b>Geoprobe</b>		CASING - Length: <b>5 ft.</b> Diameter: <b>1.25 in.</b>
Sampling Method: <b>Direct-Push (Geoprobe)</b>		SCREEN - Length: <b>15 ft.</b> Diameter: <b>1.25 in.</b>
Static Water Level:		WELL - Depth: <b>19.04 ft.</b>

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	PID (ppm)	Graphic Log	Geologic Description	Well Diagram
5	8	<input type="checkbox"/>	Continuous	13		Brown SILT, moist	<p>.98" PVC Stick-Up</p> <p>1.25" Scheduled 40 PVC Riser</p> <p>1.25" Scheduled 40 PVC (0.020 slot)</p>
10	12	<input type="checkbox"/>	Continuous	48	 	Black SILT Brown SILT	
15	18	<input type="checkbox"/>	Continuous	15		Brown SILT, minor NAPL staining	
						Grey SILT and fine SAND, with fine Gravel	
						Grey medium SAND and fine to medium Gravel, wet	
20	20	<input type="checkbox"/>	Continuous	75		Grey coarse SAND with fine to medium Gravel, NAPL at 19.5'	
25							

Geologist: David Leety

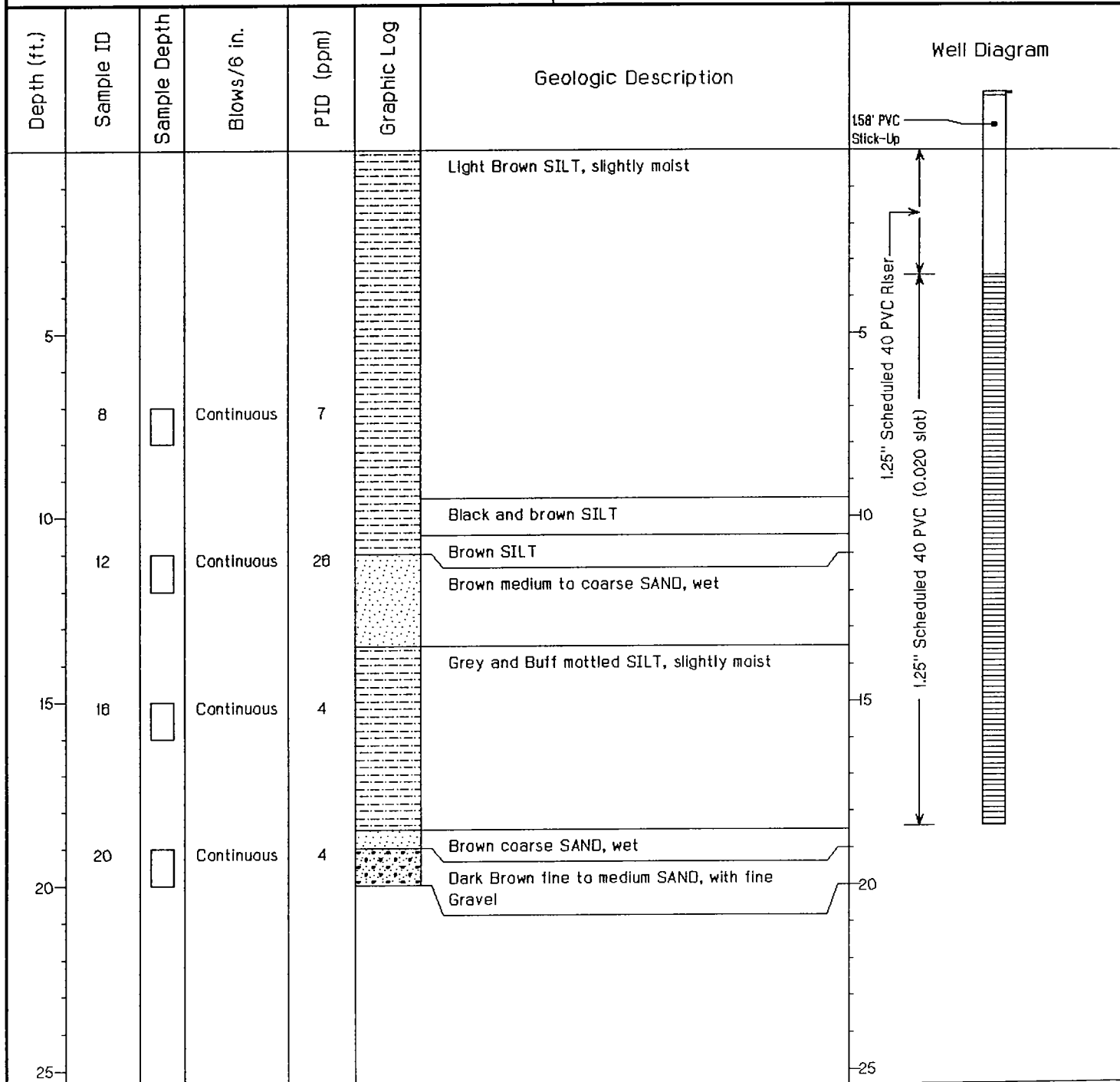
Driller: B.L. Myers Brothers

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**WELL LOG: SB-13**Permit #: **N/A**Drill Date: **March 15, 2001**Use: **Temporary Point**Location: **Point Breeze, Philadelphia Refinery**Owner Loc #: **14 Service Building**Owner: **Sunoco**Handex Loc #: **110535.040.T3075.900**Owner Address: **3144 Passyunk Avenue, Philadelphia, PA**BORING - Depth: **20 ft.**Diameter: **2 in.**Drilling Method: **Geoprobe**CASING - Length: **5 ft.**Diameter: **1.25 in.**Sampling Method: **Direct-Push (Geoprobe)**SCREEN - Length: **15 ft.**Diameter: **1.25 in.**

Static Water Level:

WELL - Depth: **18.42 ft.**Geologist: **David Leety**Driller: **B.L. Myers Brothers**

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**WELL LOG: SB-14**

Permit #: <b>N/A</b>	Drill Date: <b>March 15, 2001</b>	Use: <b>Temporary Point</b>
Location: <b>Point Breeze, Philadelphia Refinery</b>		Owner Loc #: <b>14 Service Building</b>
Owner: <b>Sunoco</b>		Handex Loc #: <b>110535.040.T3075.900</b>
Owner Address: <b>3144 Passyunk Avenue, Philadelphia, PA</b>		BORING - Depth: <b>20 ft.</b> Diameter: <b>2 in.</b>
Drilling Method: <b>Geoprobe</b>	CASING - Length: <b>5 ft.</b>	Diameter: <b>1.25 in.</b>
Sampling Method: <b>Direct-Push (Geoprobe)</b>	SCREEN - Length: <b>15 ft.</b>	Diameter: <b>1.25 in.</b>
Static Water Level:		WELL - Depth: <b>18.42 ft.</b>

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	PID (ppm)	Graphic Log	Geologic Description	Well Diagram
5	8	<input type="checkbox"/>	Continuous	24		Brown SILT, slightly moist	
10	12	<input type="checkbox"/>	Continuous	24		Brown SILT, slight NAPL staining	
15	18	<input type="checkbox"/>	Continuous	2		Grey and Brown mottled SILT	
						Grey SILT, with little fine gravel	
20	20	<input type="checkbox"/>	Continuous	2		Grey SILT, with coarse Sand and Gravel	
25							

Geologist: David Leety

Driller: B.L. Myers Brothers



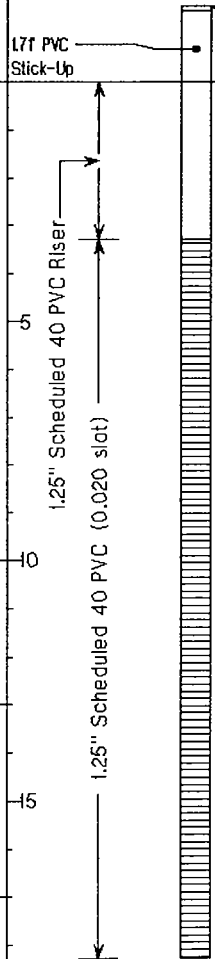

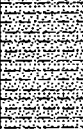





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**WELL LOG: SB-15**Permit #: *N/A*Drill Date: *March 15, 2001*Use: *Temporary Point*Location: *Point Breeze, Philadelphia Refinery*Owner Loc #: *14 Service Building*Owner: *Sunoco*Handex Loc #: *110535.040.T3075.900*Owner Address: *3144 Passyunk Avenue, Philadelphia, PA*BORING - Depth: *20 ft.*Diameter: *2 in.*Drilling Method: *Geoprobe*CASING - Length: *5 ft.*Diameter: *1.25 in.*Sampling Method: *Direct-Push (Geoprobe)*SCREEN - Length: *15 ft.*Diameter: *1.25 in.*

Static Water Level:

WELL - Depth: *18.29 ft.*

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	PID (ppm)	Graphic Log	Geologic Description	Well Diagram
5	8		Continuous	24		Brown SILT, slightly moist	 <p>1.75 inch PVC Stick-Up</p> <p>1.25 inch Scheduled 40 PVC Riser</p> <p>1.25 inch Scheduled 40 PVC (0.020 slot)</p>
10	12		Continuous	4		Brown fine SAND and SILT	
15	16		Continuous	2		Grey and Brown mottled SILT	
20	20		Continuous	2		Brown coarse SAND with fine to medium Gravel, wet	
20						Grey SILT, with coarse Sand and Gravel	
25							

Geologist: David Leety

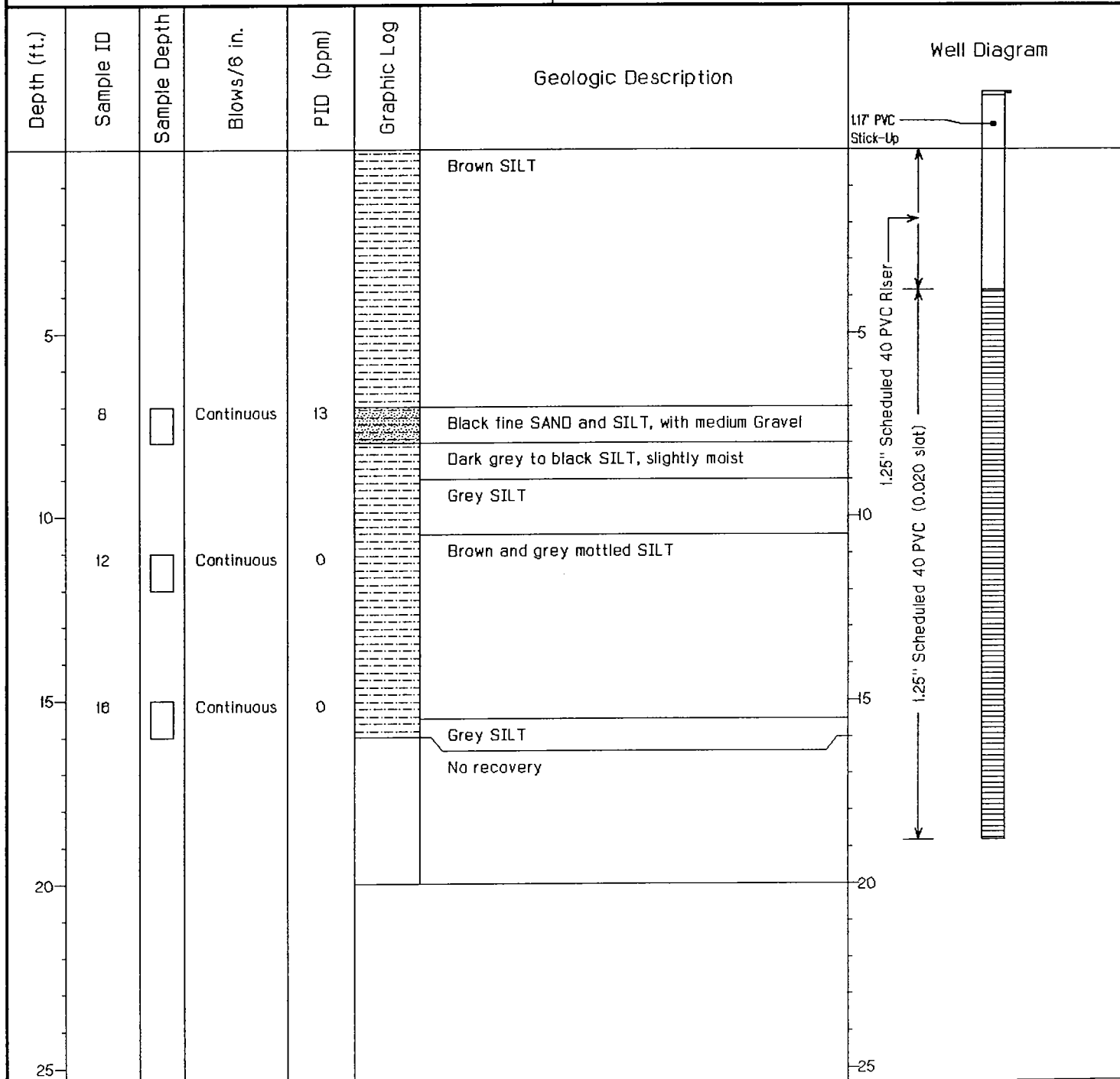
Driller: B.L. Myers Brothers

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**WELL LOG: SB-16**Permit #: **N/A**Drill Date: **March 16, 2001**Use: **Temporary Point**Location: **Point Breeze, Philadelphia Refinery**Owner Loc #: **14 Service Building**Owner: **Sunoco**Handex Loc #: **110535.040.T3075.900**Owner Address: **3144 Passyunk Avenue, Philadelphia, PA**BORING - Depth: **20 ft.**Diameter: **2 in.**Drilling Method: **Geoprobe**CASING - Length: **5 ft.**Diameter: **1.25 in.**Sampling Method: **Direct-Push (Geoprobe)**SCREEN - Length: **15 ft.**Diameter: **1.25 in.**

Static Water Level:

WELL - Depth: **18.83 ft.**

Geologist: David Leety

Driller: B.L. Myers Brothers

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**WELL LOG: SB-17**Permit #: **N/A**Drill Date: **March 18, 2001**Use: **Temporary Point**Location: **Point Breeze, Philadelphia Refinery**Owner Loc #: **14 Service Building**Owner: **Sunoco**Handex Loc #: **110535.040.T3075.900**Owner Address: **3144 Passyunk Avenue, Philadelphia, PA**BORING - Depth: **15 ft.**Diameter: **2 in.**Drilling Method: **Geoprobe**CASING - Length: **5 ft.**Diameter: **1.25 in.**Sampling Method: **Direct-Push (Geoprobe)**SCREEN - Length: **10 ft.**Diameter: **1.25 in.**

Static Water Level:

WELL - Depth: **14.42 ft.**

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	PID (ppm)	Graphic Log	Geologic Description	Well Diagram
5	8	<input type="checkbox"/>	Continuous	95		Brown SILT	
						Grey SILT, slightly moist	
10	12	<input type="checkbox"/>	Continuous	9		Grey and light brown mottled SILT	
						Light brown SILT	
15	15	<input type="checkbox"/>	Continuous	29		Grey fine SAND with medium rounded Cobbles	
20							
25							

Geologist: David Leety

Driller: B.L. Myers Brothers

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**WELL LOG: SB-18**Permit #: **N/A**Drill Date: **March 16, 2001**Use: **Temporary Point**Location: **Point Breeze, Philadelphia Refinery**Owner Loc #: **14 Service Building**Owner: **Sunoco**Handex Loc #: **110535.040.T3075.900**Owner Address: **3144 Passyunk Avenue, Philadelphia, PA**BORING - Depth: **20 ft.**Diameter: **2 in.**Drilling Method: **Geoprobe**CASING - Length: **5 ft.**Diameter: **1.25 in.**Sampling Method: **Direct-Push (Geoprobe)**SCREEN - Length: **15 ft.**Diameter: **1.25 in.**

Static Water Level:

WELL - Depth: **16.83 ft.**

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	PID (ppm)	Graphic Log	Geologic Description	Well Diagram
						Dark brown and black SILT, moist	
5	5	<input type="checkbox"/>	Continuous	190			
	8	<input type="checkbox"/>	Continuous	87		Brown SILT, slightly moist	
						Brown and grey mottled SILT	
10	12	<input type="checkbox"/>	Continuous	41		Brown SILT	
15	18	<input type="checkbox"/>	Continuous	103			
						Brown medium SAND, with fine to medium rounded Gravel	
20	20	<input type="checkbox"/>	Continuous	201			
25							

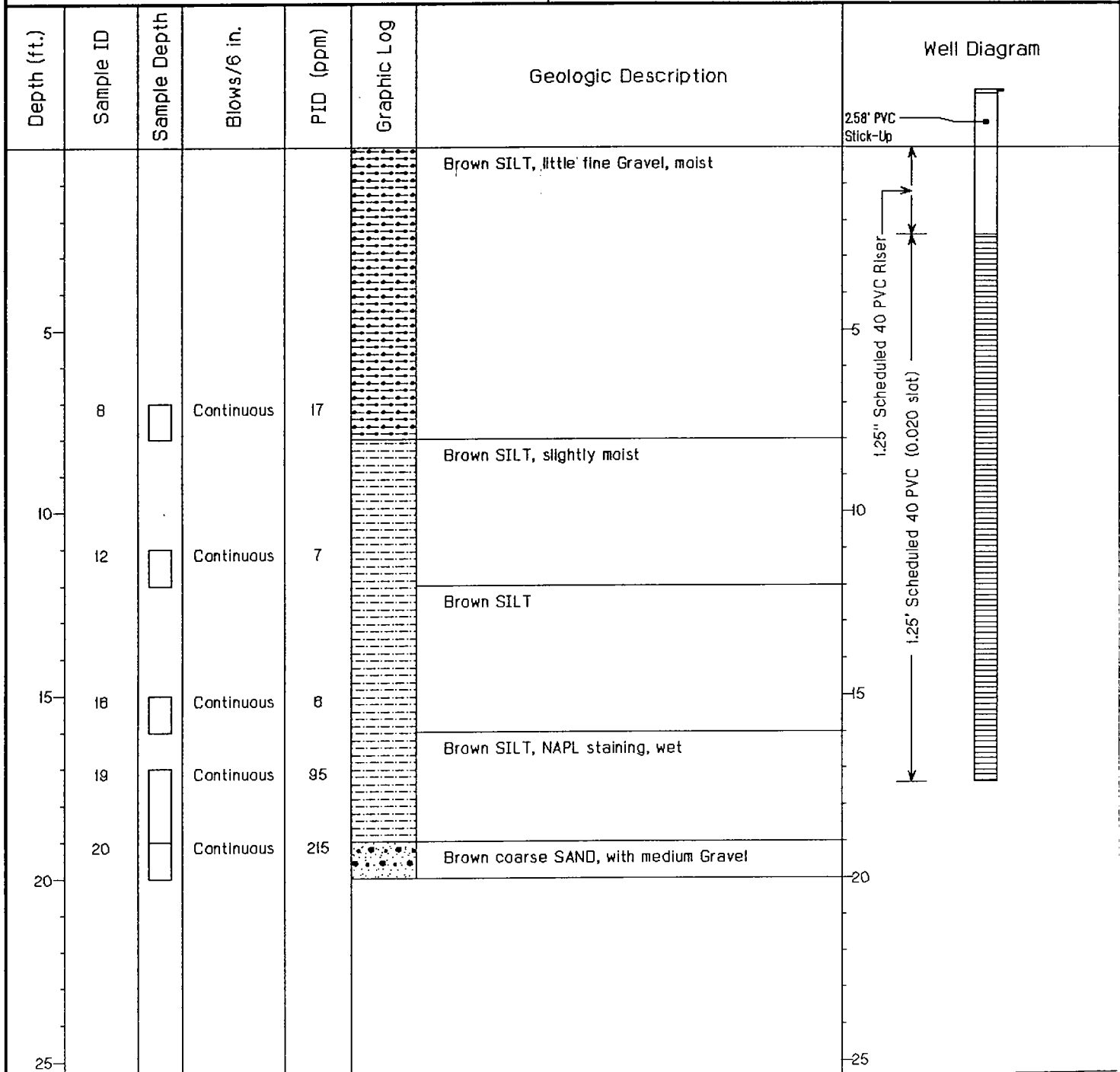
Geologist: **David Leety**Driller: **B.L. Myers Brothers**

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**WELL LOG: SB-19**Permit #: **N/A**Drill Date: **March 18, 2001**Use: **Temporary Point**Location: **Point Breeze, Philadelphia Refinery**Owner Loc #: **14 Service Building**Owner: **Sunoco**Handex Loc #: **110535.040.T3075.900**Owner Address: **3144 Passyunk Avenue, Philadelphia, PA**BORING - Depth: **20 ft.**Diameter: **2 in.**Drilling Method: **Geoprobe**CASING - Length: **5 ft.**Diameter: **1.25 in.**Sampling Method: **Direct-Push (Geoprobe)**SCREEN - Length: **15 ft.**Diameter: **1.25 in.**

Static Water Level:

WELL - Depth: **17.42 ft.**Geologist: **David Leety**Driller: **B.L. Myers Brothers**

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**WELL LOG: SB-20**Permit #: *N/A*Drill Date: *March 16, 2001*Use: *Temporary Point*Location: *Point Breeze, Philadelphia Refinery*Owner Loc #: *14 Service Building*Owner: *Sunoco*Handex Loc #: *110535.040.T3075.900*Owner Address: *3144 Passyunk Avenue, Philadelphia, PA*BORING - Depth: *20 ft.*Diameter: *2 in.*Drilling Method: *Geoprobe*CASING - Length: *5 ft.*Diameter: *1.25 in.*Sampling Method: *Direct-Push (Geoprobe)*SCREEN - Length: *15 ft.*Diameter: *1.25 in.*

Static Water Level:

WELL - Depth: *16.25 ft.*

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	PID (ppm)	Graphic Log	Geologic Description	Well Diagram
5	8	<input type="checkbox"/>	Continuous	15		Dark grey and black SILT, moist	
10	12	<input type="checkbox"/>	Continuous	15		Brown and grey mottled SILT, slightly moist	
15	18	<input type="checkbox"/>	Continuous			Grey SILT, slightly moist	
20	20	<input type="checkbox"/>	Continuous	359		Brown medium SAND, with fine to medium Gravel, wet	
25							

Geologist: David Leety

Driller: B.L. Myers Brothers

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**WELL LOG: SB-21**

Permit #: <b>N/A</b>	Drill Date: <b>March 16, 2001</b>	Use: <b>Temporary Point</b>
Location: <b>Point Breeze, Philadelphia Refinery</b>		Owner Loc #: <b>14 Service Building</b>
Owner: <b>Sunoco</b>		Handex Loc #: <b>110535.040.T3075.900</b>
Owner Address: <b>3144 Passyunk Avenue, Philadelphia, PA</b>		BORING - Depth: <b>20 ft.</b> Diameter: <b>2 in.</b>
Drilling Method: <b>Geoprobe</b>	CASING - Length: <b>5 ft.</b>	Diameter: <b>1.25 in.</b>
Sampling Method: <b>Direct-Push (Geoprobe)</b>	SCREEN - Length: <b>15 ft.</b>	Diameter: <b>1.25 in.</b>
Static Water Level:		WELL - Depth: <b>18.04 ft.</b>

Depth (ft.)	Sample ID	Sample Depth	Blows/6 in.	PID (ppm)	Graphic Log	Geologic Description	Well Diagram
						Gray SILT, slightly moist	
5							
10	12	<input type="checkbox"/>	Continuous	39		Grey and brown mottled SILT, slightly moist, NAPL staining	
	14	<input type="checkbox"/>	Continuous	82		Grey and brown mottled SILT, slightly moist	
15	18	<input type="checkbox"/>	Continuous	48		Grey and brown mottled SILT, moist, NAPL staining	
						Grey and brown mottled SILT	
						Grey and brown mottled SILT, NAPL staining	
20	20	<input type="checkbox"/>	Continuous	13		Brown fine SAND, slightly moist	
25							

Geologist: David Leety

Driller: B.L. Myers Brothers



**WELL LOG: SB-22**

Use: *Temporary Point*

Owner Loc #: **14 Service Building**

Handex Loc #: **110535.040.T3075.900**

Diameter: **2 in.**

Diameter: **1.25 in.**

Diameter: **1.25 in.**

WELL - Depth: **18.83 ft.**

L17' PVC  
Stick-Up

### Well Diagram

### Geologic Description

Grey SILT, moist, NAPL staining at 9'-10'

Grey medium SAND, wet  
Grey SILT

Brown and grey mottled SILT, moist, NAPL staining

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Brown and grey mottled SILT, moist

Brown medium SAND, wet

Brown fine SAND

25" Scheduled 40 PVC Riser

1 25" Schedulld 40 pvc (0.020 slot)

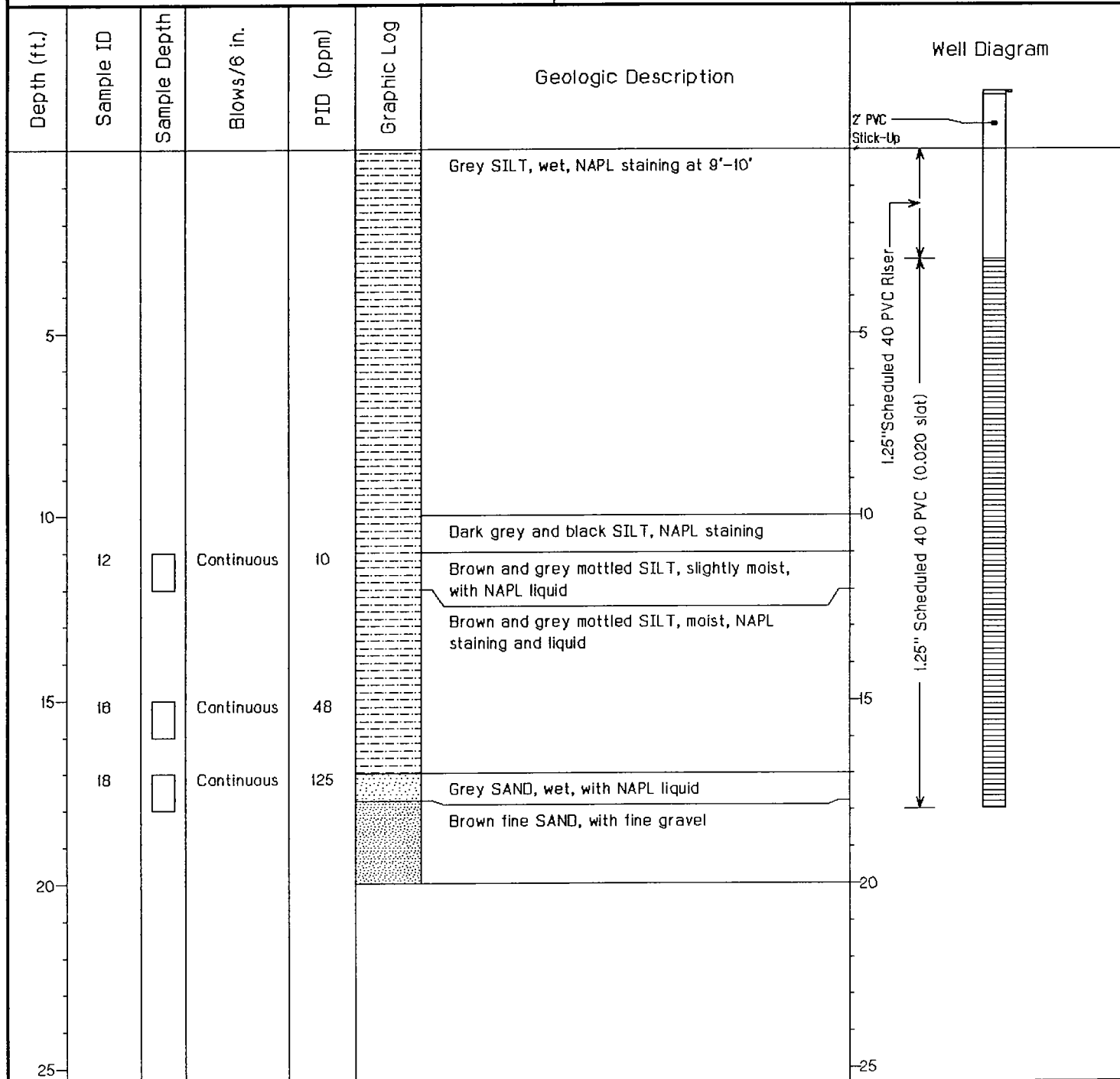
Driller: B.L. Myers Brothers

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**WELL LOG: SB-23**Permit #: **N/A**Drill Date: **March 16, 2001**Use: **Temporary Point**Location: **Point Breeze, Philadelphia Refinery**Owner Loc #: **14 Service Building**Owner: **Sunoco**Handex Loc #: **110535.040.T3075.900**Owner Address: **3144 Passyunk Avenue, Philadelphia, PA**BORING - Depth: **20 ft.**Diameter: **2 in.**Drilling Method: **Geoprobe**CASING - Length: **5 ft.**Diameter: **1.25 in.**Sampling Method: **Direct-Push (Geoprobe)**SCREEN - Length: **15 ft.**Diameter: **1.25 in.**

Static Water Level:

WELL - Depth: **18 ft.**Geologist: **David Leety**Driller: **B.L. Myers**

Sunoco Philadelphia Refinery  
Point Breeze Processing Area  
14 Service Building Area

**Soil Boring Temporary Well Point Gauging Data**

Well Point Location	Date	Depth to NAPL (feet)	Depth to Water (feet)	NAPL Thickness (feet)	Comments
SB-1	03/19/2001	2.80	2.85	0.05	Well developed.
	03/29/2001	2.80	2.85	0.05	
	04/05/2001	2.19	2.19	Trace	
	04/17/2001	2.18	2.18	Trace	
SB-2	03/19/2001		8.99		
	03/29/2001		8.80		
	04/05/2001		8.48		
	04/17/2001		8.20		
SB-3	03/19/2001		7.17		
	03/29/2001		7.29		
	04/05/2001		6.88		
	04/17/2001		6.91		
SB-4	03/19/2001		7.41		
	03/29/2001		7.55		
	04/05/2001		6.97		
	04/17/2001		7.34		
SB-5	03/19/2001		7.75		
	03/29/2001		7.79		
	04/05/2001		7.40		
	04/17/2001		7.66		
SB-6	03/19/2001		7.92		
	03/29/2001		9.00		
	04/05/2001	8.45	8.45	Trace	
	04/17/2001	8.86	8.89	0.03	
SB-7	03/19/2001		8.85		
	03/29/2001	6.89	7.00	0.11	
	04/05/2001	6.74	6.74	Trace	
	04/17/2001		6.85		
SB-8	03/19/2001		5.73		
	03/29/2001		8.00		
	04/05/2001		5.81		
	04/17/2001		5.73		
SB-9	03/19/2001		7.94		
	03/29/2001		8.14		
	04/05/2001		7.72		
	04/17/2001		7.84		
SB-10	03/19/2001		19.62		
	03/29/2001		19.61		
	04/05/2001		19.54		
	04/17/2001		19.12		

Sunoco Philadelphia Refinery  
Point Breeze Processing Area  
14 Service Building Area

**Soil Boring Temporary Well Point Gauging Data**

Well Point Location	Date	Depth to NAPL (feet)	Depth to Water (feet)	NAPL Thickness (feet)	Comments
SB-11	03/19/2001		9.39		
	03/29/2001		9.55		
	04/05/2001		9.40		
	04/17/2001		9.41		
SB-12	03/19/2001	17.62	17.72	0.10	
	03/29/2001	17.57	17.57	Trace	
	04/05/2001	16.38	16.38	Trace	
	04/17/2001	NA	NA	NA	Well damaged at grade
SB-13	03/19/2001		8.43		
	03/29/2001		8.66		
	04/05/2001		8.15		
	04/17/2001		8.57		
SB-14	03/19/2001		7.64		
	03/29/2001		7.77		
	04/05/2001		7.49		
	04/17/2001		7.47		
SB-15	03/19/2001	3.96	3.96	Trace	
	03/29/2001	4.10	4.11	0.01	Well developed.
	03/29/2001		4.37		0.13 feet cut from TOC.
	04/05/2001		4.11		
	04/17/2001		4.13		
SB-16	03/19/2001	2.80	2.82	0.02	
	03/29/2001	2.92	2.93	0.01	Well developed.
	03/29/2001	3.94	3.94	Trace	0.13 feet cut from TOC
	04/05/2001		2.79		
	04/17/2001		2.89		
SB-17	03/19/2001		7.32		
	03/29/2001		7.99		Well developed.
	04/05/2001		14.22		
	04/17/2001		13.25		
SB-18	03/19/2001	5.06	5.09	0.03	
	03/29/2001	5.25	5.31	0.06	Well developed.
	03/29/2001		3.40		1.67 feet cut from TOC
	04/05/2001		3.25		
	04/17/2001	3.46	3.46	Trace	
SB-19	03/19/2001	4.58	4.62	0.04	
	03/29/2001	4.69	4.80	0.11	Well developed.
	03/29/2001	14.83	14.84	0.01	1.0 feet cut from TOC
	04/05/2001		12.75		
	04/17/2001		14.10		

Sunoco Philadelphia Refinery  
Point Breeze Processing Area  
14 Service Building Area

**Soil Boring Temporary Well Point Gauging Data**

Well Point Location	Date	Depth to NAPL (feet)	Depth to Water (feet)	NAPL Thickness (feet)	Comments
SB-20	03/19/2001	6.44	6.44	Trace	Well developed. 2.0 feet cut from TOC
	03/29/2001	6.55	6.56	0.01	
	03/29/2001	4.02	4.02	Trace	
	04/05/2001		3.93		
	04/17/2001		4.05		
SB-21	03/19/2001				obstruction at 4.84
	03/29/2001				obstruction at 4.84
	04/05/2001				obstruction at 4.84
	04/17/2001				obstruction at 4.84
SB-22	03/19/2001	4.92	4.92	Trace	
	03/29/2001		8.10		
	04/05/2001		4.96		
	04/17/2001		5.08		
SB-23	03/19/2001	5.53	5.55	0.02	Well developed.
	03/29/2001		5.66		
	03/29/2001		5.01		
	04/05/2001		4.87		
	04/17/2001		4.98		