DRAFT REPORT

132055

Middletown Airfield Site

Middletown, Pennsylvania

Focused Feasibility Study
Volume II - Appendices A - B

Under Contract with

U.S. Army Corps of Engineers

215 N. 17th Street

Omaha, Nebraska 68102-4978

Prepared for:

Air Force Regional Compliance Office

77 Forsyth Street, SW, Suite 295

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1 JULY1996

ERM Program Management Company
855 Springdale Drive
Exton, Pennsylvania 19341

Appendix A
HTW Drilling Logs and Well Construction Information

Industrial Area Wells

Figure 4-1

HTW DRILLING LOG

HOLE NO. ERM-15

1. COMPANY NAME: ERM	2. DRILLING SUBCONTRACTOR: ADT-MA
SHEET 1 OF 3 SHEETS	
3. PROJECT: HIA Middletown	4. LOCATION: Middletown, PA
5. DRILLER: Tom Brown / John Bowers	6. MANUFACTURER'S DESIGNATION OF DRILL: Mobile B59
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 6.25 I.D. / 12" O.D. > HSA; 2" stainless steel split spoons; 3" " " " "; 140 lb hammer	8. HOLE LOCATION: ERM-15
	9. SURFACE ELEVATION: Unknown
	10. DATE STARTED: 6/6/94 — 11. DATE COMPLETED: 6/7/94
12. OVERBURDEN THICKNESS: > 15' (Not Bedrock encountered)	13. DEPTH GROUNDWATER ENCOUNTERED: 4.7' D.H.
14. DEPTH DRILLED INTO ROCK: NA	15. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 4.7', No elapsed time
16. TOTAL DEPTH OF HOLE: 2" Sampler to 15' (Augered to 13.5')	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
2 Samples	2 Jars		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None	X	X	X			— %

23. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	22. SIGNATURE OF INSPECTOR
Well Installed ERM-15		X		David A. Miller

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0	Reddish brown, poorly graded Sand with silt. Dry. Slightly compact, but friable, soft (Fine Sand)	No odor 0.4 ppm PID	NS	ERM-15 (0-2) (QA/QC) collected	19, 79, 61, 66	5YR, 4/3, (SP-SM) -Recovery 1.4' -3" split spoon
	1						
	2	Dark reddish brown, poorly graded Sand (fine) w/silt. Dry. More friable + softer than 0-2'	No odor 0.3 ppm PID	Yes unsaturated	ERM-15 (2-4)	35, 34 32, 32	5YR, 3/3 (SP-SM) Recovery - 1.6' -3" split spoon
	3						
	4	Dark brown, poorly graded Fine Sand w/silt. Slightly higher silt content. Friable but becomes slightly plastic probably a result of the moisture content over	No odor 0.0 ppm PID	Yes Saturated	ERM-15 (4-6)	9, 16, 25, 52.	7YR, 3/3 (SP-SM) -water @ 4.7' Recovery 1.3' -3" split spoon
	5						

PROJECT: HIA - Middletown

HOLE NO. ERM-15

HTW DRILLING LOG

HOLE NO. ERM-15

PROJECT: HIA Middletown

INSPECTOR: David a. Geller

SHEET 2 OF 3 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
		Trace gravel @ ≈ 5.5-6.0' (0.2-0.5" diameter)					
	6						
		(No lithologic or chemical Analysis Samples collected) →					
	7						
	8	Brown Poorly graded sand (fine) w/silt + Gravel. Gravel ≥25%. Gravel Size (0.3-1.5") Hard to can't be dug w/a spoon easily due to gravel content.	0.0 ppm PID No odor	NS	NS	18, 22, 32, 45	7YR, 4/4, (SP-SM) 0.4' recovery Saturated 2" split spoon
	9						
	10						
		(No lithologic or Analytical Samples collected) →					
	11						
	12						
	13	Dark gray Poorly graded fine Sand w/gravel. Gravel 15% (Gravel not present until 13')	0.0 ppm PID No odor	NS	NS	6, 7 9, 13	2.5Y, 4/1 (SP) 1.3' recovery 2" split spoon
	14						13.5' Total Augered depth

PROJECT: HIA-Middletown

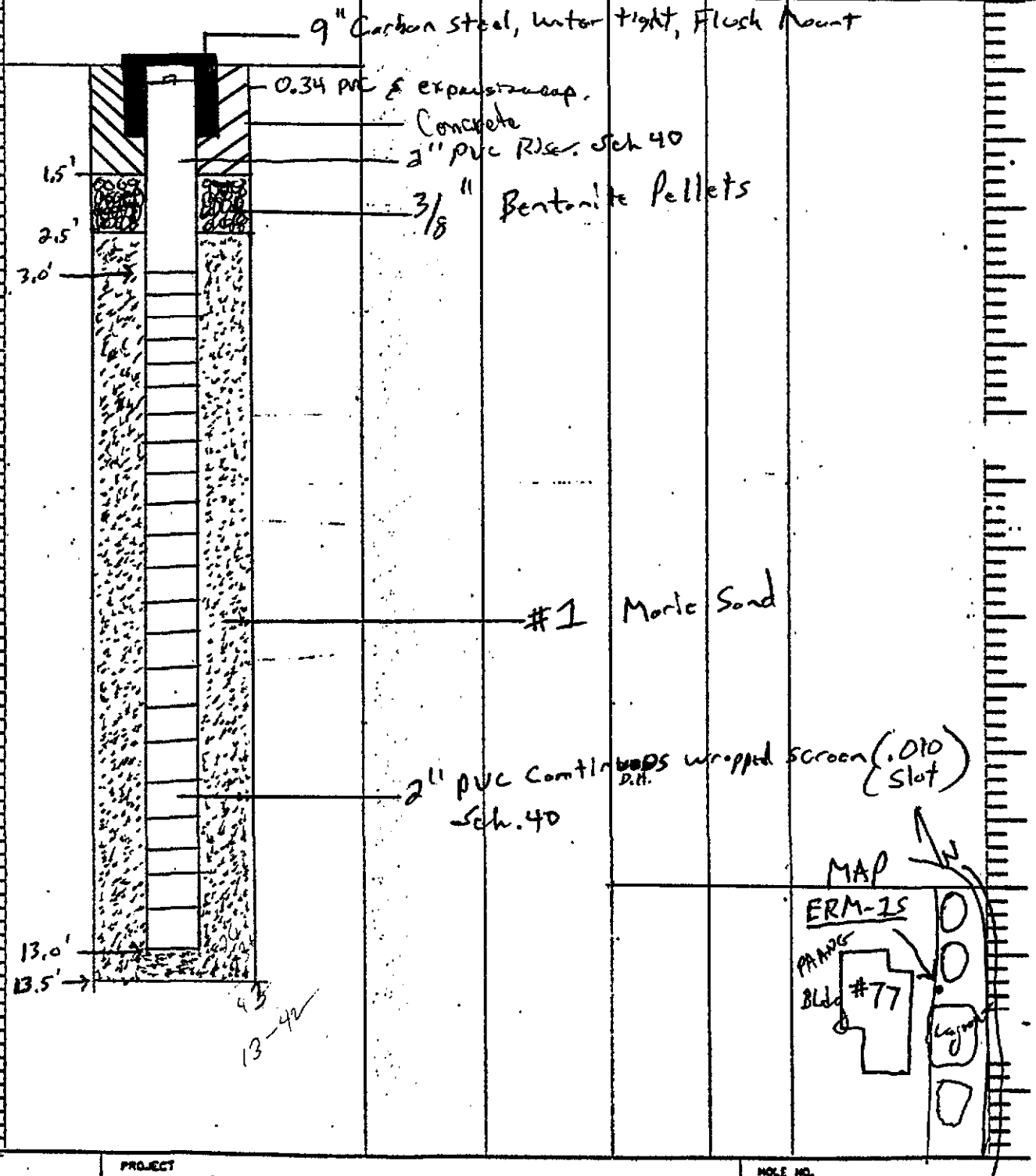
HOLE NO. ERM-15

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.
HIA Middletown	David A. Heller	ERM-1S
		SHEET 3 OF 3 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	15	See Above for 13-15' interval description					Spoon only from 13-15'

ERM-1S Well Construction



PROJECT: HIA - Middletown

HOLE NO.: ERM-1S

HTW DRILLING LOG

HOLE NO. ERM-1I

1. COMPANY NAME	ERM
2. DRILLING SUBCONTRACTOR	Hydrogroup
SHEET 1 OF 4 SHEETS	
3. PROJECT	HIA Middletown
4. LOCATION	Middletown, PA
5. NAME OF DRILLER	Jesse Arnett
6. MANUFACTURER'S DESIGNATION OF DRILL	Barber rig
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	11.5" Bit (Air hammer) 11.75" I.D., 12.75" O.D. Casing 7.5" Bit (roller bit) 7.75" I.D. Casing
8. HOLE LOCATION	Industrial Area Mid wastewater Lagoon
9. SURFACE ELEVATION	~295'
10. DATE STARTED	7/19/94
11. DATE COMPLETED	7/26/94
12. OVERBURDEN THICKNESS	≈24'
13. DEPTH DRILLED INTO ROCK	≈76'
14. TOTAL DEPTH OF HOLE	99', 8"
15. DEPTH GROUNDWATER ENCOUNTERED	≈5-7' (Air drilling w/ H_2O injection)
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	≈5-7' (immediately)
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	
18. GEOTECHNICAL SAMPLES	No
DISTURBED	
UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES	NA
20. SAMPLES FOR CHEMICAL ANALYSIS	No
VOC	
METALS	
OTHER (SPECIFY)	
OTHER (SPECIFY)	
OTHER (SPECIFY)	
21. TOTAL CORE RECOVERY	%
22. DISPOSITION OF HOLE	monitoring well installed
BACKFILLED	
MONITORING WELL	X
OTHER (SPECIFY)	
23. SIGNATURE OF INSPECTOR	David A. Hale

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	5	Well graded gravel with Sand. Gravel size ≈ 0.25-0.75" (Coarse) (→> 19mm) Gravel is sub rounded to Round	0.0 ppm				(GW), Sand ≥ 15% - Color of gravel varies.
	10	Well graded gravel Gravel size ≈ 0.25-1.0" (Coarse) - less sand, slightly larger gravel	0.0 ppm (slight sewage like odor)				(GW), Sand ≤ 15% - Color of gravel varies
	15	- Well graded gravel with Sand - Gravel size ≈ 0.25-0.75" (Coarse) - Gravel is sub rounded to Round	0.0 ppm				(GW), Sand ≥ 15% - Color of gravel varies
	20	- Dusky Red Sandy lean clay w/gravel - Gravel size: < .50" - low plasticity (Saprolite?)	0.0 ppm	(Feed rate speed up. Easily drilled through)			(CL) (2.5YR, 4/4) Sand ≤ 15% Sand % > Gravel %
	25	See next pg.					

PROJECT: HIA - Middletown

HOLE NO. ERM-1I

HTW DRILLING LOG

HOLE NO. ERM-1I

PROJECT: HIA Middletown | INSPECTOR: Dave Haller | SHEET 2 OF 4 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
		Dusky red fine SANDSTONE. Soft to moderately hard. Moderately weathered. Cuttings are subrounded.	0.0 ppm				(2.5YR, 4/4)
	30	- Weak red fine SANDSTONE - Moderately hard (harder than above) - Slightly weathered - Cuttings are subrounded - Color change @ ≈38' └ Also, size of cuttings chips decreased substantially.	0.0 ppm				(2.5YR, 5/3)
	40						(2.5YR, 3/3) smaller rock chips - more competent.
	45	- Dusky red calcarious or dolomitic fine SANDSTONE - Slightly higher silt content than above (bordering on siltstone) - Soft to Moderately Hard - Unweathered - Roundness: Angular to Subangular - chip size (cuttings): 2-20mm - (fresh surfaces react w/10% HCl)	0.0 ppm				(2.5YR, 3/3) Increase in H_2O production @ ≈48' Decrease in H_2O production @ ≈54' (Driller says it's softer)
	60						
	65	Reddish brown calcarious or dolomitic SILTSTONE. Very little sand. Soft. Unweathered. Angular to Subangular cuttings chips. Chip size: 2-20mm	0.0 ppm				(5YR, 4/3)
	70	Reddish brown calcarious or dolomitic SANDSTONE. - Moderately hard - Unweathered - Angular to Subangular	130 ppm @ ≈67'				(5YR, 4/3)

HTW DRILLING LOG

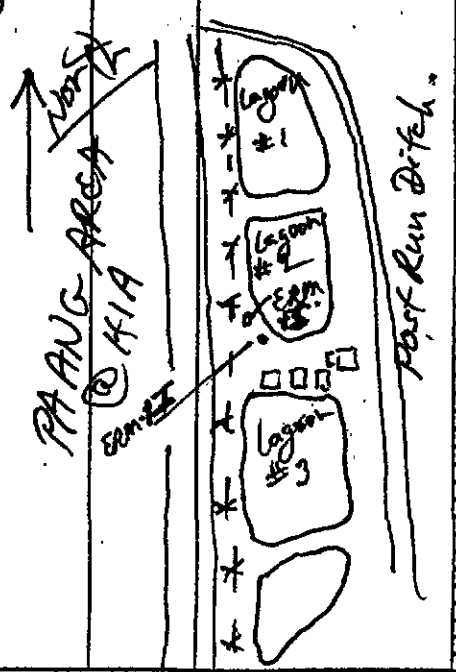
HOLE NO. ERM-1I

PROJECT: HIA Middletown

INSPECTOR: Dave Heller

SHEET 3 OF 4 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	75	Reddish brown calcareous or dolomitic SILTSTONE. Soft. Unweathered. Angular to Subangular cuttings - 2mm Calcite filled vein in chip w/slightly larger grain size	302 ppm @ ≈72'				5YR, 4/3
	80	Reddish brown calcareous or dolomitic SANDSTONE - Finer grained than 67-72' - Moderately hard - Unweathered - Angular to Subangular cuttings - Small 1-4mm dolomite clasts (from ≈77-82')	63 ppm @ ≈77'				5YR, 4/3
	85		421 ppm @ ≈82'				2.5YR, 4/4 slightly darker reddish brown - No dolomitic clasts.
	90	Fine to medium grained matrix supported quartz conglomerate. Unweathered - Hardness: Moderate to Hard (varies) - Round cuttings - Some orthoclase + plagioclase clasts - Some larger clasts noted in rolloff	1028 ppm @ ≈88'				2.5YR, 4/3 - Notably less slightly lighter
	95	Same as 77-88' (darker red) 2.5YR, 4/4 - No dolomitic clasts	240 ppm @ ≈94'				Fracture Zone - Notably larger chips - Increase in H2O.
	100	Same as 88-94'	0.0 ppm @ ≈98'				
		Boring terminated @ 100'6" (Measured depth = 99'8") ≈ total of injection water used = 1000 gallons. - See pg. 4 of this log for well construction. - 12" casing advanced to 39' - 8" casing advanced to 95'. - All casing was temporary					



PROJECT: HIA Middletown

HOLE NO. ERM-1I

HTW DRILLING LOG

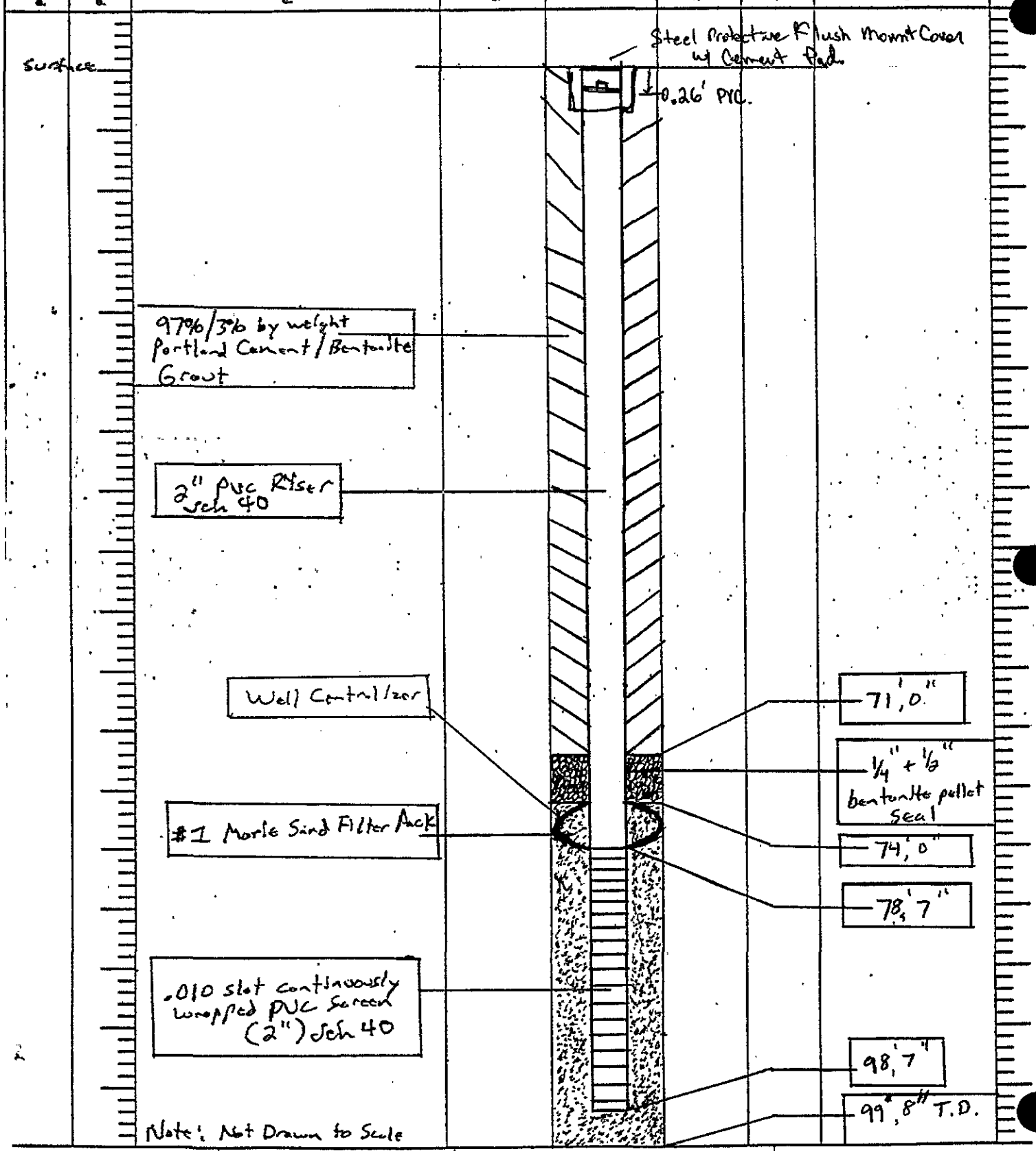
HOLE NO. ERM-II

PROJECT: H1A Middletown

INSPECTOR: Dave Heller

SHEET 4 OF 4 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.



PROJECT: H1A Middletown

HOLE NO. ERM-II

HTW DRILLING LOG

HOLE NO. IAP-ERM2S

1. COMPANY NAME	ERM - PMC
2. DRILLING SUBCONTRACTOR	ADT - MA
SHEET 1 OF 3 SHEETS	
3. PROJECT	HIA - Middletown
4. LOCATION	Middletown, PA
5. NAME OF DRILLER	Troy Brown
6. MANUFACTURER'S DESIGNATION OF DRILL	Mobile Drill Rig
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	B-59 Mobile Rig; 6 1/4" I.D. Augers; 3" S.S. Split spoons; 300 lb S.W. Hammer
8. HOLE LOCATION	See Sheet # 2
9. SURFACE ELEVATION	Not Surveyed
10. DATE STARTED	8-8-94
11. DATE COMPLETED	
12. OVERBURDEN THICKNESS	≅ 14.5'
13. DEPTH DRILLED INTO ROCK	4.0'
14. TOTAL DEPTH OF HOLE	≅ 18.5'
15. DEPTH GROUNDWATER ENCOUNTERED	≅ 8.0'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA
18. GEOTECHNICAL SAMPLES	2 Samples
DISTURBED	✓
UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES	NA
20. SAMPLES FOR CHEMICAL ANALYSIS	4 Samples
VOC	✓
METALS	
OTHER (SPECIFY)	
OTHER (SPECIFY)	
OTHER (SPECIFY)	
21. TOTAL CORE RECOVERY	— %
22. DISPOSITION OF HOLE	Monitoring Well ERM-2S Installed.
BACKFILLED	✓
MONITORING WELL	
OTHER (SPECIFY)	
23. SIGNATURE OF INSPECTOR	Warren N. Fay

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0.0	Organic Rich soil, loose, dry to moist.	0 ppm PID. No odor	NS	IAP-ERM 2S(SSC)	NA	OL-OH 2.5Y 4/3 olive brown
	0.5					Augered to 1.0'	
	1.0	Split spoon 1.0' to 3.0'					
		Silt w/ trace sand (v.f. grain - subrounded) cohesive moist poorly graded unit	2 ppm PID, No Odor	IAP-ERM 2S(1.0-3.0)	IAP-ERM 2S(1.0-3.0)	7, 10, 15, 16	2.0' recovery. 7.5 YR 3/3 ML
	2.0'						
	3.0'	Split spoon 3.0' to 5.0'					
		"Same as above"	2 ppm, No odor	NS	IAP-ERM 2S(3.0-5.0)	11, 8, 6, 7	.8' recovery.
	4.0'	Silt w/ Gravel (≤1.0" Dia) subrounded cohesive. V. moist poorly graded					7.5YR 2.5/3 very dark brown ML.
	5.0'						

PROJECT: HIA - Middletown

HOLE NO. IAP-ERM2S ERM-2S

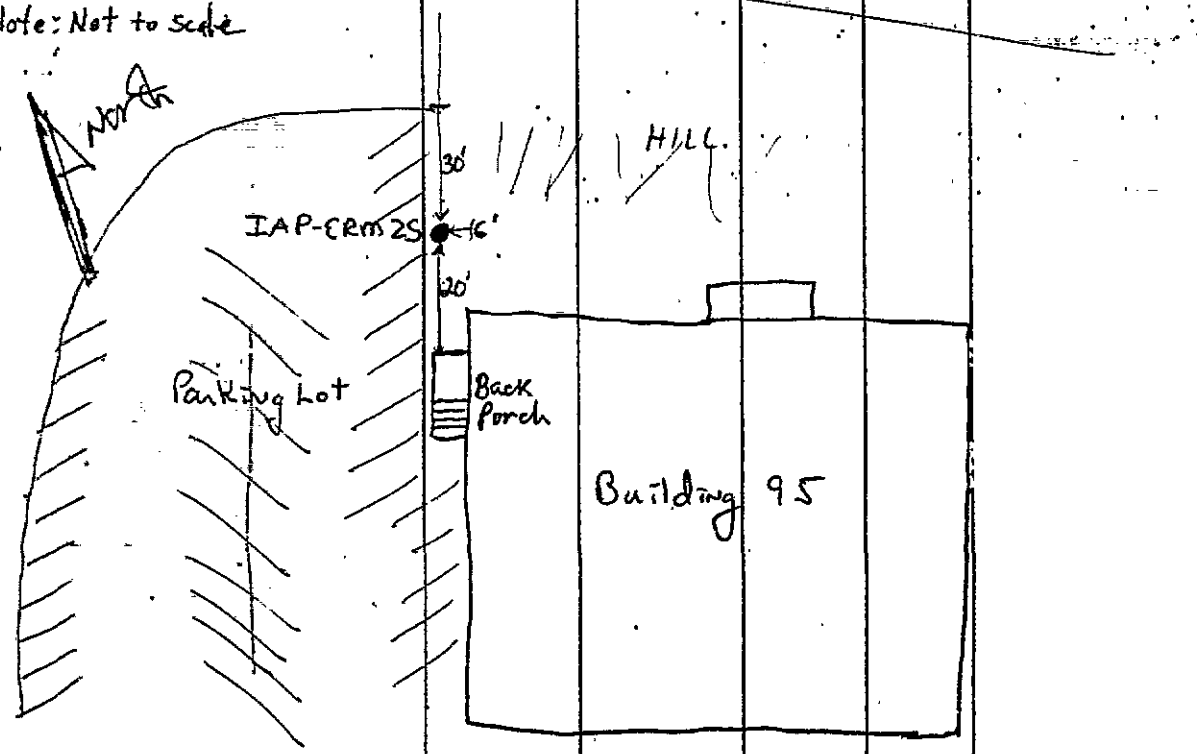
HTW DRILLING LOG

HOLE NO. IAP-ERM 2S

PROJECT: HIA - Middletown | INSPECTOR: Warren Fox | SHEET 2 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	5.0	Split spoon 5.0' to 7.0'					
		"Same as above"	2 ppm PID, No Odor	NS	IAP-ERM 2S(5.0-7.0)	5,2,1,1	1.2' recovery
	6.0'						
	7.0'	Split Spoon 7.0' to 9.0'					
		Clay to 14' Stiff, right, saturated gray color with light brown mottling, poorly graded	0 ppm No odor.	IAP-ERM 2S(8.0)	~~IAP-ERM~~ (WF)	7,8,12,13	2.0' recovery 2.5Y 7/1 light gray CL — Saturated at ≅8.0'
	8.0'						
		Bottom of borehole at ~~18.0'~~ ~~14.5'~~ ~~18.5'~~ ~~TD~~ at 18.5' bgs. JFH. Rock is silty sandstone	~~Depth to Rx~~				
18.5' JFH		(WNF) 8-8-94					

Well location:
Note: Not to scale



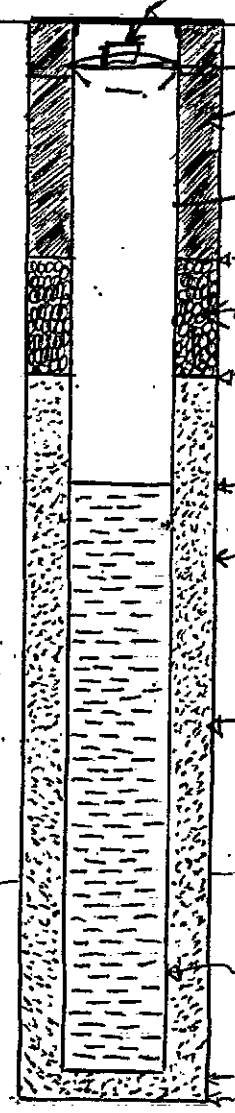
HTW DRILLING LOG

HOLE NO. IAP-ERM2S

PROJECT: HIA - Middletown | INSPECTOR: Warren Fox | SHEET 3 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.

ERM-2S



Ground surface

Materials Used For Well Installation

- 6 lbs 100 lb bags. Morie Sand
- 65 lbs (50 lb, 5 gallon) bucket of Bentonite pellets (3/8" DIA) (1 1/3 buckets)
- 2 bags (94 lbs/bag) portland cement w/ 3% Bent seal

Note: Not to Scale - BGS - Below Ground Surface

ERM-2S

PROJECT: HIA - Middletown | HOLE NO. IAP-ERM2S

HTW DRILLING LOG

HOLE NO. IAP-ERM3S

1. COMPANY NAME: ERM-PMC	2. DRILLING SUBCONTRACTOR: ADT-MA
SHEET 1 OF 2 SHEETS	
3. PROJECT: HIA-Middletown	4. LOCATION: Middletown, PA
5. NAME OF DRILLER: Troy Brown	6. MANUFACTURER'S DESIGNATION OF DRILL: Mobile Rig
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: B-59 Mobile Rig; 6¼" I.D. Augers to 3.0'; 3" O.D. S.S. Split spoons; 300 lb hammer; 6" Roller bit to 22' with air.	8. HOLE LOCATION: See Sheet #2
	9. SURFACE ELEVATION: Not Surveyed
	10. DATE STARTED: 8-16-94 / 11. DATE COMPLETED: 8-16-94
12. OVERBURDEN THICKNESS: ≥ 22.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 14.0'
13. DEPTH DRILLED INTO ROCK: Not Encountered	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —
14. TOTAL DEPTH OF HOLE: 22.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
1 Sample	✓		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
2 Samples	✓					— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
WELL ERM-3S INSTALLED	✓			Warren N. Rupp

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0.0	Concrete sidewalk	0 ppm PID, No Odor	NS	NS	NA	augured through after jackhammer
	0.5'						
	1.0'	Split spoon 1.0' to 3.0' Silt w/ sand, gravel and cobbles mixed loose, subrounded to angular moist, poorly graded.	10 ppm, No Odor			9, 22, 12, 17	2' Recovery 10YR4/2 dark grayish brown ML
	2.0'						
	3.0'	Split spoon 3.0' to 3.5' Hit rock, boulder? white quartz rock - Possibly Marble					Split spoon refusal at 3.5'
	4.0'	Roller bit ~~augured~~ w/ air. 3.5' interval past rock to total depth. Not logged to total depth. Round boulders from 3.0' to 22' / cobbles Total depth = 22.0' bgs. Sandstone and quartz stones ≤ 3" in diameter (river rocks)					Constant caving of hole. ERM-3S
	5.0'						

PROJECT: HIA-Middletown

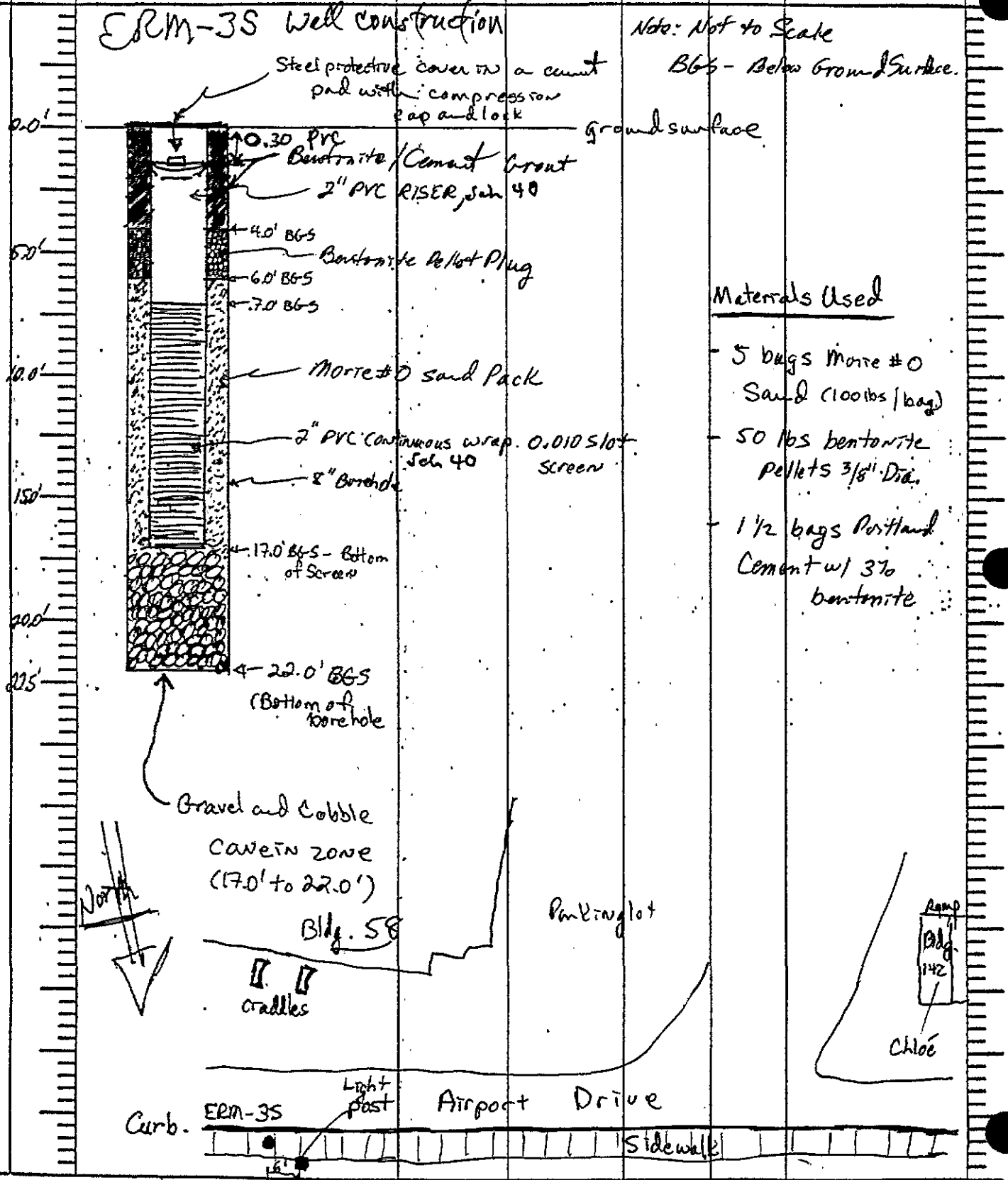
HOLE NO. IAP-ERM3S

HTW DRILLING LOG

HOLE NO. IAP-ERM 3S

PROJECT: HIA - Middletown | INSPECTOR: Warren Foo | SHEET 2 OF 2 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.



Materials Used

- 5 bags Morie #0 Sand (100 lbs/bag)
- 50 lbs bentonite pellets 3/8" Dia.
- 1 1/2 bags Portland Cement w/ 3% bentonite

PROJECT: HIA - Middletown | HOLE NO. IAP-ERM 3S

HTW DRILLING LOG

HOLE NO. IAB-ERM4S

1. COMPANY NAME: ERM-PMC	2. DRILLING SUBCONTRACTOR: NDT-MA
SHEET 1 OF 3 SHEETS	
3. PROJECT: HIA - Middletown	4. LOCATION: Middletown, PA
5. NAME OF DRILLER: Troy Brown	6. MANUFACTURER'S DESIGNATION OF DRILL: Mobile Rig.
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: B-59 mobile rig; 6 1/4" I.D. Augers; 3" O.D. S.S. split spoons; 300 lb hammer	8. HOLE LOCATION: See Sheet
	9. SURFACE ELEVATION: Not Surveyed
	10. DATE STARTED: 8-15-94
	11. DATE COMPLETED: 8-15-94
12. OVERBURDEN THICKNESS: >19.5'	15. DEPTH GROUNDWATER ENCOUNTERED: ≅ 9.0'
13. DEPTH DRILLED INTO ROCK: Not Encountered	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —
14. TOTAL DEPTH OF HOLE: 19.5'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
2 Samples	✓		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
4 Samples	✓					— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well ERM-4S installed	✓			Warren H. Fel

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0.0'	Asphalt, rock, bedded ≤4" Dia	0ppm PID No Odor	NS	NS	NA	Parking lot asphalt
	0.5'				Augered to 1.0'		
	1.0'	Split Spoon 1.0' to 3.0'					
		Silt w/trace of sand. f. grain (sub-angular) ≤15% poorly graded loose moist	0ppm, No Odor	IAB-ERM4S (1.0-3.0)	IAB-ERM 4S (1.0-3.0)	5, 7, 9, 13,	2.0' Recovery. 10YR 3/2 very dark grayish brown. ML
	2.0'						
	3.0'	Split Spoon 3.0' to 5.0'					
		Sand (f. grain - subrounded) loose moist unknown poorly graded	0ppm, No Odor	NS	IAB-ERM 4S (3.0-5.0)	13, 6, 5, 6	2.0' recovery 10YR 4/6 dark yellowish brown SP
	4.0'						
	5.0'						

PROJECT: HIA - Middletown

HOLE NO. ERM-4S IAB-ERM4S

HTW DRILLING LOG

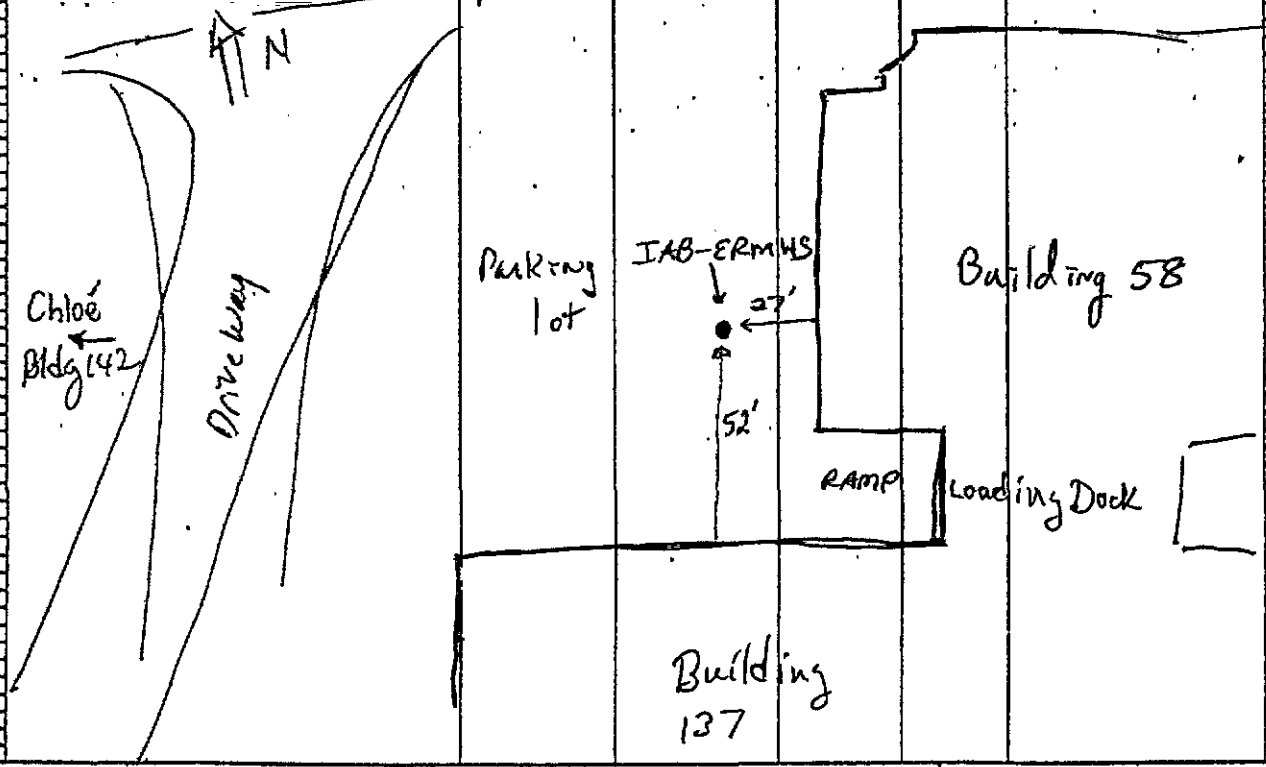
HOLE NO. IAB-ERM4S

PROJECT: HIA - Middletown

INSPECTOR: Warren Fox

SHEET 2 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	5.0	Split spoon 5.0' to 7.0'					
		Sand (c. grain. sub-rounded) loose moist poorly graded uniform with gravel ≤1/4" D. sub rounded.	30 ppm No Odor	NS	IAB-ERM 4S(5.0-7.0)	7,8,9, 10	2.0' recovery 10YR 4/4 dark yellowish brown SP
	6.0'						
	7.0'	Split spoon 7.0' to 9.0'					
		"Same as above" to 9.0'.	0 ppm, No odor.	NS	IAB-ERM 4S (7.0-8.0)	12, 12, 9, 18.	2' recovery
	9.0'	(9.0' to 19.5')					
		Sand - f. grain - sub rounded loose, wet. poorly graded		TD=19.5'			2.5Y 4/3 olive brown SP
	19.5'	Saturated at 9.0'.		IAB-ERM 4S(9.0)			



PROJECT: HIA - Middletown

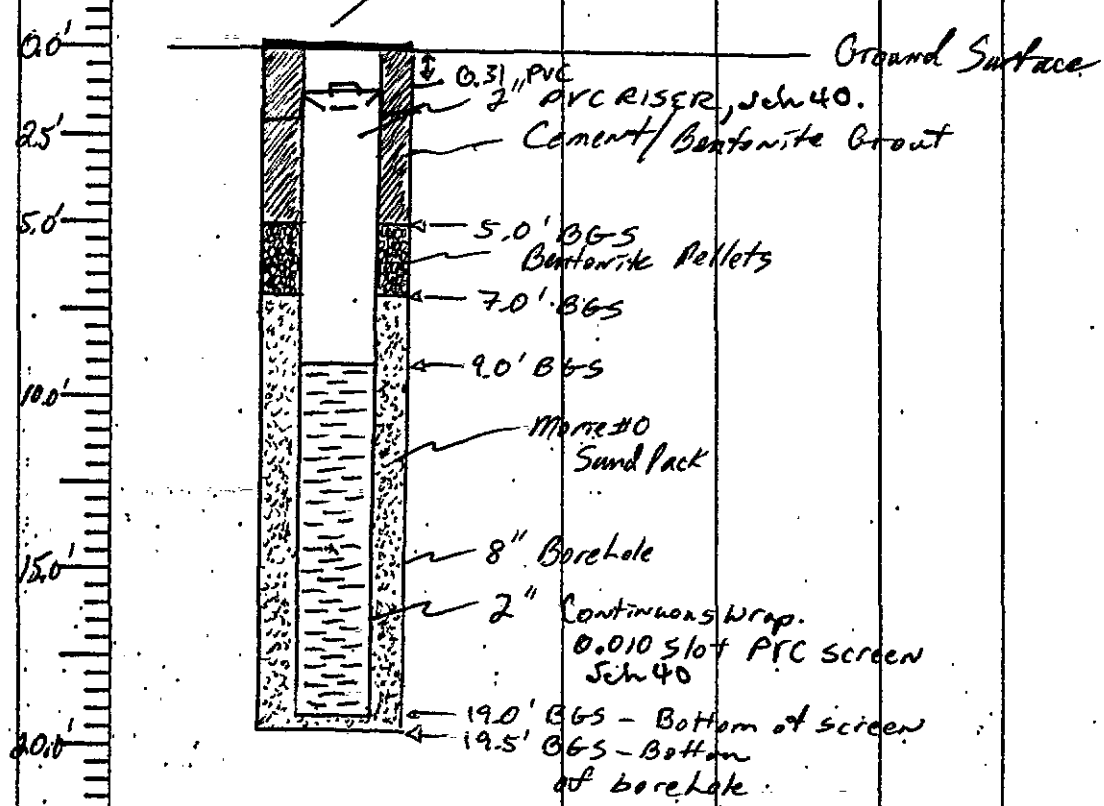
HOLE NO. IAB-ERM4S

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.	SHEET
HIA - Middletown	Warren Fox	IAB-ERM4S	3 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.

ERM-4S construction diagram.



Note: Not to Scale
BGS = Below Ground Surface

Materials Used.

- 4½ Bags (100 lbs/bag) Morie #0 Sand
- 65 lbs bentonite pellets 3/8" Dia. round.
- bags cement (94 lbs/bag) with 3% bentseal. portland.

ERM-4S

PROJECT	HOLE NO.
HIA - Middletown	IAB-ERM4S

HTW DRILLING LOG

HOLE NO. IAB-ERM5S

1. COMPANY NAME: ERM - PMC	2. DRILLING SUBCONTRACTOR: ADT - MA
SHEET 1 OF 3 SHEETS	
3. PROJECT: HIA - Middletown	4. LOCATION: Middletown, PA
5. NAME OF DRILLER: Troy Brown	6. MANUFACTURER'S DESIGNATION OF DRILL: Mobile Drill Rig
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: B-59 Mobile Rig; 6 1/4" I.D. Augers; 3" O.D. SS-split Spoons; 300 lbs Hammer	8. HOLE LOCATION: See Sheet #3
	9. SURFACE ELEVATION: Not Surveyed.
	10. DATE STARTED: 8-10-94 / 11. DATE COMPLETED: 8-10-94
12. OVERBURDEN THICKNESS: ≥20.5'	15. DEPTH GROUNDWATER ENCOUNTERED: ≅10.0'
13. DEPTH DRILLED INTO ROCK: Not Encountered	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —
14. TOTAL DEPTH OF HOLE: 20.5'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
2 Samples	✓		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
3 Samples	✓					— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well ERM-5S Installed	✓			Warren N. Fay

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0.0'	Concrete & Gravel Augered to 1.5'	0ppm PID, No Odor	NS	NS	NA	Concrete thru way.
	0.5'						
	1.0'						
		Split Spoon 1.5' to 3.5'					
	2.0'	Sand (f. grain) subround w/ Silt ≤15% loose moist poorly graded uniform	0ppm, No Odor	IAB-ERM5S (1.5-3.5)	IAB-ERM 5S(1.5-3.5)	4,3,5,5	2.0' recovery SP 10 YR 4/4 dark yellowish brown
	3.0'						
		Split spoon 3.5' to 5.5'					
	4.0'	"Same as Above"	0ppm No odors	NS	IAB-ERM 5S(3.5-5.5)	4,5,12,12	1.5' recovery "
		Gravel w/ Sand and cobbles subround coarse grain					GP
	5.0'						ERM-5S

PROJECT: HIA - Middletown

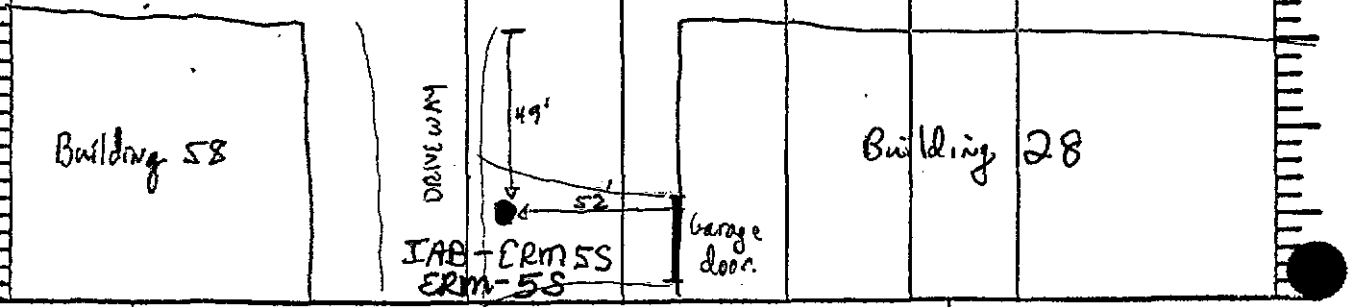
HOLE NO. IAB-ERM5S

HTW DRILLING LOG

HOLE NO. IAB-ERM 5S

PROJECT: HIA - Middletown | INSPECTOR: Warren Fox | SHEET 2 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	5.0	poorly graded					
		split spoon 5.5' to 7.5'					
		Rounded cobbles and gravel ≤ 1" Dia	0 ppm PID, No Odor	NS	NS	60, 100/3	Split Spoon refusal. .5' recovery GP.
	6.0						
		Concrete pad 1.2" thick					
	7.0'	Augered Interval					
		Split Spoon 7.7' to 9.7'					
	8.0'	Gravel w/ sand (from. grain) and cobbles all subrounded ≤ 1¼" Dia. loose Dry poorly graded. uniform	0 ppm, No Odor	NS	IAB-ERM 5S (7.7-9.7)	10, 17, 23, 21	1.4' recovery. GP. 2.5Y 6/2 light brownish gray.
	9.0'						
		Split Spoon 9.5' to 11.5' (Hole 3' South of original boring.					
	10.0'	Gravel w/ sand and cobbles (sub-rounded, loose saturated - at 10.0' poorly graded.	282 ppm, Solvents odor in gray portion.	IAB-ERM 5S (10.0)	NS	8, 16, 12, 13	2.0' recovery 7.5Y R 4/6 Strong brown GP
	11.0'	gray odor / PID zone.					2.5Y 4/1 dark gray
	20.5	Same as Above	TD = 20.5'				
		Augered to 20.5' and set well. at 20.0' WNE 8-10-91					
	120	Well location Map. Bldg 267					



PROJECT: HIA- Middletown | HOLE NO. IAB-ERM 5S

HTW DRILLING LOG

HOLE NO. IAB-ERM5S

PROJECT: HIA - Middletown

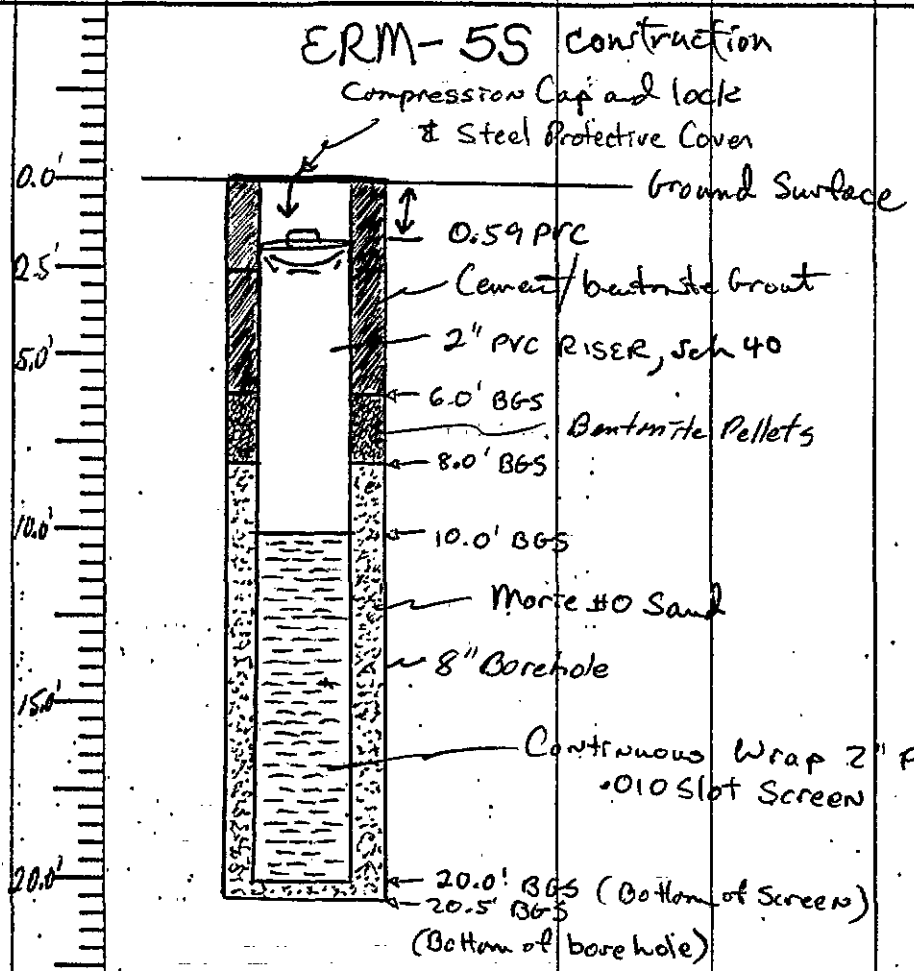
INSPECTOR: Warren Fox

SHEET 3 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.

ERM-5S Construction

Note: Not to Scale
BGS - Below Ground Surface



Materials Used

- 4 bags (100lbs/bag) Morie #0 Sand
- 65 lbs (50 lbs / 5 gal. pail) Bentonite Pellets 3/8" Dia.
- 2 bags Cement 100lbs/bag Portland w/ 3% bent seal.

ERM-5S

PROJECT: HIA - Middletown

HOLE NO. IAB-ERM5S

HTW DRILLING LOG

HOLE NO. IAP-ERM6S

1. COMPANY NAME	ERM-PMC
2. DRILLING SUBCONTRACTOR	ADT-MA
SHEET 1 OF 3 SHEETS	
3. PROJECT	HIA - Middletown
4. LOCATION	Middletown, PA
5. NAME OF DRILLER	Troy Brown
6. MANUFACTURER'S DESIGNATION OF DRILL	B-59 Mobile Drill Rig
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	B-59 Mobile Rig; 6 1/4" I.D. Hagers; 3" S.S. split Spoons; 300 lb hammer.
8. HOLE LOCATION	See Sheet #3
9. SURFACE ELEVATION	Not Surveyed
10. DATE STARTED	8-9-94
11. DATE COMPLETED	8-9-94
12. OVERBURDEN THICKNESS	>25'
13. DEPTH DRILLED INTO ROCK	Not Encountered
14. TOTAL DEPTH OF HOLE	25.0'
15. DEPTH GROUNDWATER ENCOUNTERED	14.5'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	
18. GEOTECHNICAL SAMPLES	2 Samples — DISTURBED ✓ — UNDISTURBED
19. TOTAL NUMBER OF CORE BOXES	NA
20. SAMPLES FOR CHEMICAL ANALYSIS	Samples — VOC ✓ — METALS — OTHER (SPECIFY) — OTHER (SPECIFY) — OTHER (SPECIFY)
21. TOTAL CORE RECOVERY	NA %
22. DISPOSITION OF HOLE	Well ERM-6S installed — BACKFILLED ✓ — MONITORING WELL — OTHER (SPECIFY)
23. SIGNATURE OF INSPECTOR	Warren N. Fay

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0.0'	Organic, loose, moist Augered Interval - No samples collected.	0ppm PID. No odor	NS	NS	NA	OL-OH
	0.5'						
	1.0'	Split spoon 1.0' to 3.0' Poorly graded Gravel cemented, angular gray and rock. gray and red. Cobbles (sub-rounded) Had to auger to 3.0'.	0ppm, No Odor	NS	NS	65/100 one 6"	.6' recovery Split spoon refusal at 2.0'. GP
	2.0'						
	3.0'	Split spoon 3.0' to 5.0' Split spoon refusal at 3.5'.	0ppm, No odor	~~IAPNS~~ IAP-ERM6S (3.0-5.0)	NS	50/5"	GP. No recovery Cobbles. rounded
	4.0'						
	5.0'						

PROJECT HIA - Middletown

HOLE NO. ERM-6S IAP-ERM6S

HTW DRILLING LOG

HOLE NO. IAP-ERM 6S

PROJECT: HIA - Middletown

INSPECTOR: Warren Fox

SHEET 2 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	5.0'	Split Spoon 5.0' to 7.0'					
		Sand f.grain - subrounded loose, moist poorly graded uniform (trace of silt <15%)	0ppm PID, No Odor	NS	IAP-ERM 6S(5.0-7.0)	3,5,3,4	1.8' recovery 10YR 4/4 dark yellowish brown SP.
	6.0						
	7.0'	"Same as above" w/ Gravel (≤15%)	0ppm, No odor	NS	IAP-ERM 6S(7.0-9.0)	5,7,8,9	1.0' recovery SP
	8.0'						
	9.0'	Gravel w/ sand ≥15% subangular loose dry poorly graded m.to fine grain - subrounded. (w/ cobbles ≤ 1½" Dia.)	0ppm, No Odor	NS	IAP-ERM 6S(9.0-11.0)	11,14,18,24	1.7' recovery 10YR 4/4 dark yellowish brown GP
	10.0'						
	11.0'	Same as above. Cobbles ≤ 1/2" Diam (subrounded)	0ppm, No odor	NS	IAP-ERM 6S	23,16,27,36	2.0' recovery 2.5YR 4/4 olive brown GP
	12.0'						
	13.0'	Same as above	0ppm, No Odor	IAP-ERM 6S(14.5-15.0)	NS	10,7,11,10	1.5' recovery 10YR 3/2 very dark grayish brown 10YR (WS) SP
	14.0'	Sand (medium grain - angular wet loose poorly graded	0ppm, No Odor				

PROJECT: HIA - Middletown

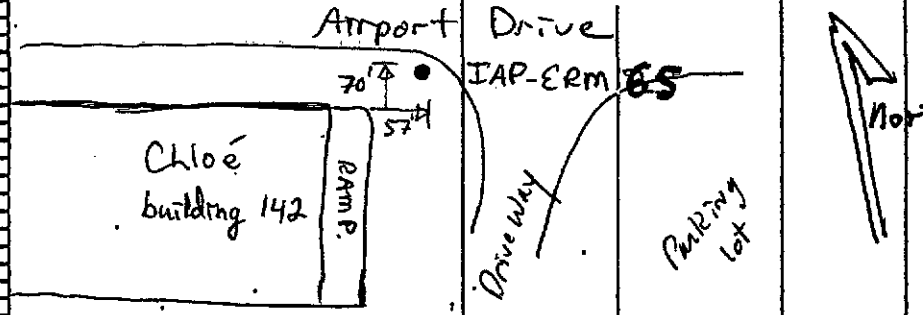
HOLE NO. IAP-ERM 6S

HTW DRILLING LOG

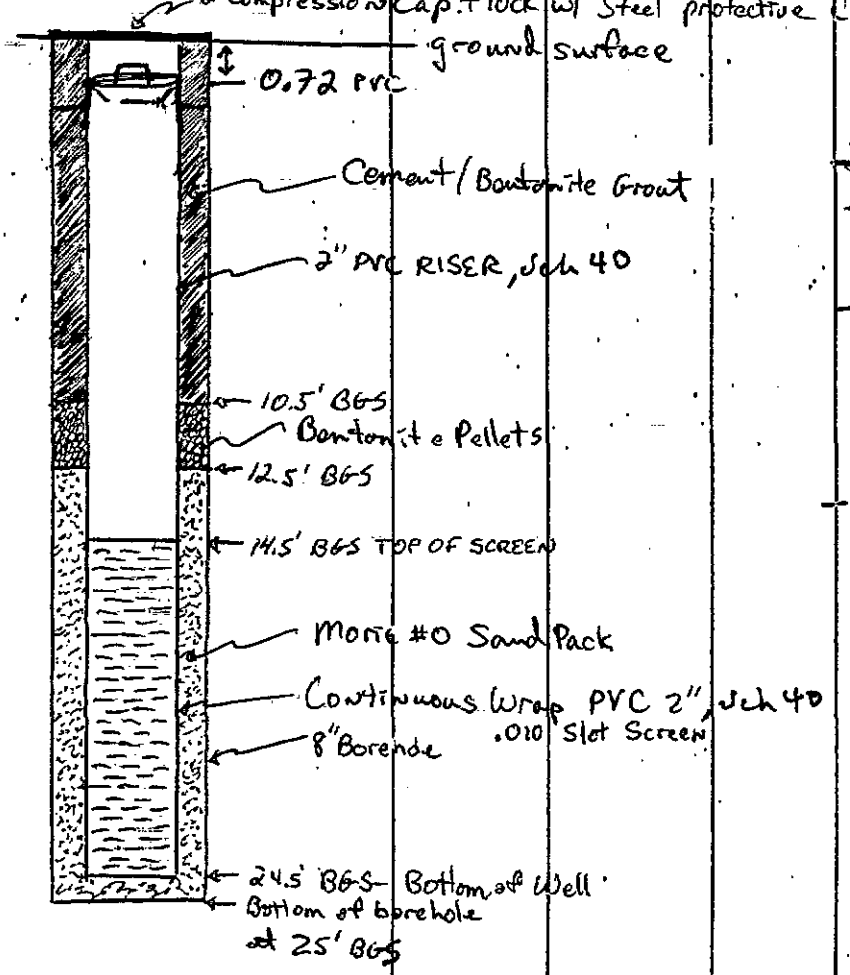
HOLE NO. IAP-ERM6S

PROJECT: HIA - Middletown | INSPECTOR: Warren Fox | SHEET 3 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	15.0	trace of angular gravel too, <5% 1/8" Dia.	See Bottom of sheet #2 Same as Above		to TD	= 25.0'	
	25.0'	Boring location					



ERM-6S Well Construction Diagram



Note: Not to scale
BGS - Below Ground surface

Materials Used

- 6 100lb bags morie #0 sand
- 65 lbs (50lbs - 5 gallon) buckets of bentonite pellets, 3/8" Dia. (+ 1/3 buckets)
- 4 bags cement portland (94lbs/bag) w/ 3% bent seal

PROJECT: HIA - Middletown | HOLE NO. IAP-ERM6S

HTW DRILLING LOG

ERM-10I

1. COMPANY NAME	ERM-PMC
2. DRILLING SUBCONTRACTOR	Hydro Group
SHEET 1 OF 4 SHEETS	
3. PROJECT	HIA - Middletown
4. LOCATION	Middletown, PA
5. NAME OF DRILLER	Steve Blair / Bernie Conway
6. MANUFACTURER'S DESIGNATION OF DRILL	Barber Rig DR-12
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	8" + 12" outer casing with 8" + 12" hammers. For Dual Rotary Barber Rig. Temporary 12" casing to 36' 8" casing to 80'
8. HOLE LOCATION	See Sheet #
9. SURFACE ELEVATION	Not Surveyed
10. DATE STARTED	11-9-94
11. DATE COMPLETED	11-11-94
12. OVERBURDEN THICKNESS	23', Competent Rock at 32'
13. DEPTH DRILLED INTO ROCK	79.0'
14. TOTAL DEPTH OF HOLE	102.0'
15. DEPTH GROUNDWATER ENCOUNTERED	Unknown - ± 23' ?
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—
18. GEOTECHNICAL SAMPLES	None
DISTURBED	X
UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES	—
20. SAMPLES FOR CHEMICAL ANALYSIS	None
VOC	
METALS	
OTHER (SPECIFY)	
OTHER (SPECIFY)	
OTHER (SPECIFY)	
21. TOTAL CORE RECOVERY	— %
22. DISPOSITION OF HOLE ERM-10I	Well Installed.
BACKFILLED	
MONITORING WELL	X
OTHER (SPECIFY)	
23. SIGNATURE OF INSPECTOR	Warren N. Fox

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0.0	~~Well Graded~~ Gravel (fill material) loose, poorly sorted dry rounded (to subangular trace of silt pieces).	0 ppm PID, No Odor	NS	NS	NA	2.5Y 3/2 very dark grayish brown (GW) 3mm to 40 mm
	5.0	Similar material (more of the smaller fraction 70% ≤ 10mm)	0 ppm PID, No Odor	NS	NS	NA	10YR 3/2 very dark grayish brown but many colors white to black. 2mm to 35mm
	10.0	~~Well Graded~~ Gravel-rounded (GW) loose dry (water added to poorly sorted mashewd)	0.4 ppm PID, No Odor	NS	NS	NA	mainly - 10YR 5/3 brown, but many colors 2mm to 34mm
	15.0	~~Well Graded~~ Gravel rounded (GW) loose, wet poorly sorted with sand. Coarse grained-rounded	0.2 ppm PID, No Odor	NS	NS	NA	2.5Y 3/2 very dark grayish brown 1mm to 40mm
	20.0	Siltstone w/ some fine grain sand (rounded) soft weathered quartz clasts-subrounded (2mm to 12mm) (HCL -)	0.4 ppm PID, No Odor	NS	NS	NA	5YR 3/2 dark reddish brown 1.0mm to 08mm
Bed-rock →	23'						
	25.0						

reviewed 9 Feb 95 TFH

PROJECT: HIA - Middletown

HOLE NO.: ERM-10I

Figure 4-1 (Continued)

HTW DRILLING LOG

HOLE NO. ERM-10I

PROJECT: HIA - Middletown

INSPECTOR: Warren Fox

SHEET 2 OF 4 SHEETS

EV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	25.0'	Siltstone soft weathered trace of quartz clasts HCL — (≤5mm angular)	0.6 ppm PID No Odor	NS	NS	NA	2.5YR 3/3 dusky red. 1.0 to 32 mm
	30.0'	Siltstone m. hard weathered No clasts HCL+, Dolomitic Cementation	0.4 ppm PID No Odor	NS	NS	NA	2.5YR 3/2 dusky red 1.0 to 26 mm
competent Gry.	32'						
	35.0'	Same as above.	0.1 ppm PID No Odor	NS	NS	NA	2.5YR 4/6 dark red. 1.0 to 18 mm
	40.0'	Siltstone m. hard weathered. No clasts - HCL(+) Dol. Cement. Clay balls (pos. fractures)	0.8 ppm PID No Odor	NS	NS	NA	2.5YR 3/4 dusky red 1.0 to 20 mm
	45.0'	Similar material (smaller cuttings)	1.0 ppm PID No Odor	NS	NS	NA	2.5YR 3/3 dusky red. 1.0 to 10 mm
soft	50.0'	Sandstone w/ Silt/wacke m. hard, lt. gray sub-rounded weathered Clasts of calcite and quartz — Subrounded ≤10mm Dol. cementation angular	1.0 ppm PID No Odor	NS	NS	NA	2.5YR 3/2 dusky red 1.0 to 36 mm
soft water	55.0'	Wacke / Silty sandstone m. hard m. gray sub-rounded weathered clast of calcite/quartz ≤3mm — cutting smaller. most Rp. ≤5mm Dolomitic Cementation.	0 ppm PID No Odor	NS	NS	NA	2.5YR 3/3 dusky red 1.0 to 15 mm
harder	60.0'	Siltstone w/ sand. - hard f. grain - angular - m. weathered. - Dol. Cementation. Trace quartz clasts ≤ 4mm angular	0 ppm PID No Odor	NS	NS	NA	2.5YR 3/4 dusky red 1.0 to 30 mm
soft again	65.0'	Sandstone w/ silt m. hard. lt. gray sub-rounded weathered Clasts of quartz ≤ 3mm Subrounded HCL(+) Dol Cement	0 ppm PID No Odor	NS	NS	NA	2.5YR 3/3 dusky red. 1.0 to 22 mm
	70.0'						

PROJECT: HIA - Middletown

HOLE NO. ERM-10I

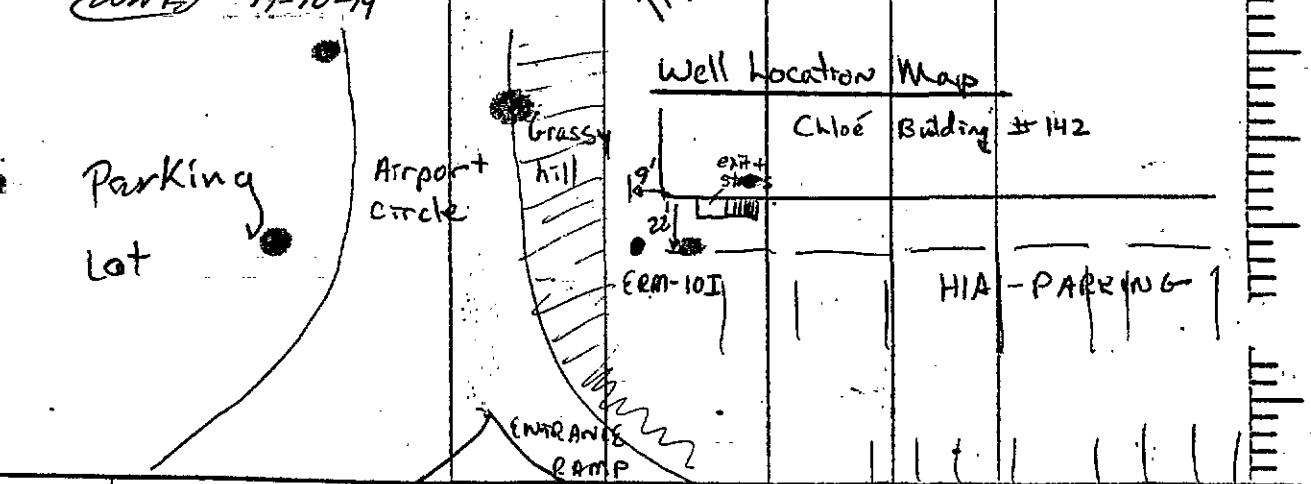
Figure 4-1 (Continued)

HTW DRILLING LOG

HOLE NO. ERM-10I

PROJECT: HIA-Middletown | INSPECTOR: Warren Fox | SHEET 3 OF 4 SHEETS

ELEV. a	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	70.0'	Siltstone m. hard weathered clasts of quartz ≤ 10mm sub rounded Dol. Cementation	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red 1.0 to 12 mm
	75.0'	Same Material	0.5 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red. 1.0 to 26 mm
	80.0'	Siltstone w/ Sand f. grain rounded m. hard weathered Dol. Cement. Quartz clasts ≤ 4mm sub angular (≥ 10%)	6.0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red 1.0 to 10 mm
	85.0'	similar material.	50 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red. 1.0 to 8 mm
	90.0'	Similar siltstone w/ sand. clasts are sub rounded Quartz - ≤ 5% clay balls too ≤ 5mm	0.5 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red 1.0 to 12 mm
	95.0'	Wacke/~~argillaceous~~ SILTY sandstone JRH high amount of quartz clasts sub angular ≤ 5mm. hard. weathered. traces limestone angular gray ≤ 5mm	0.5 ppm PID, No Odor	NS	NS	NA	2.5YR 4/4 dusky red. 1.0 to 8 mm
	100.0'	102' Bottom of borehole WWG 11-10-94					



PROJECT: HIA-Middletown | HOLE NO. ERM-10I

Figure 4-1 (Continued)

HTW DRILLING LOG.

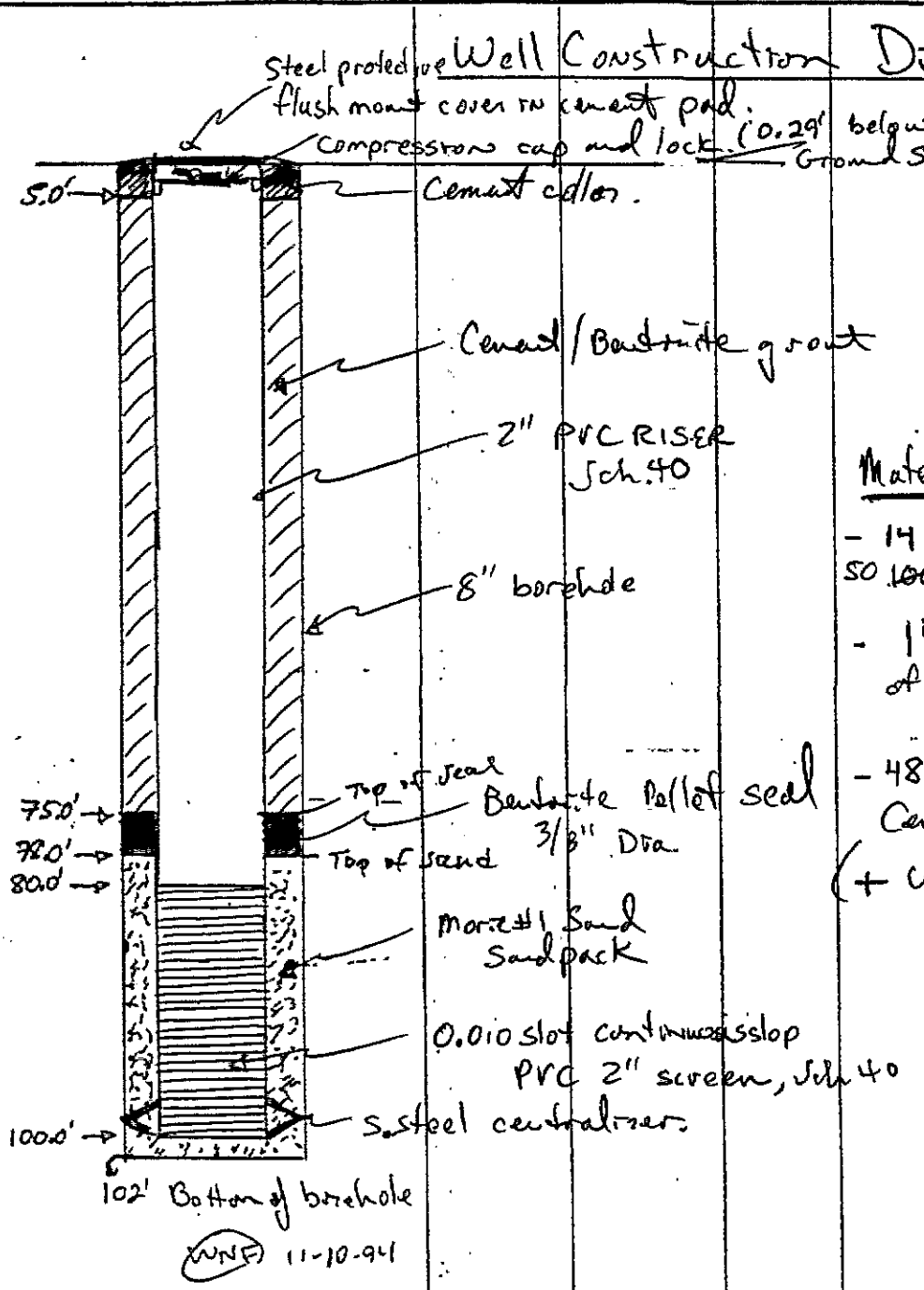
HOLE NO. ERM-10I

PROJECT HIA - Middletown

INSPECTOR Warren Fox

SHEET 4 OF 4 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.



Materials Used

- 14 bag of sand 50 ~~100~~ lbs/bag.
- 1¼ bags/buckets of bentonite pellets
- 48 bag of portland Cement 94 lbs/bag. (+ with 3% bentonite powder)

Note: Not to Scale
Measurements taken from below ground surface (BGS)

PROJECT HIA - Middletown HOLE NO. ERM-10I

HTW DRILLING LOG

HOLE NO. IAB-ERM27S

1. COMPANY NAME	ERM-PMC
2. DRILLING SUBCONTRACTOR	ADT-MA
SHEET 1 OF 3 SHEETS	
3. PROJECT	HIA-Middletown
4. LOCATION	Middletown, PA
5. NAME OF DRILLER	Troy Brown
6. MANUFACTURER'S DESIGNATION OF DRILL	Mobile Drill Rig
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	B-59 Mobile Rig; 6 1/4" I.D. Augers; 3" O.D. S.S. split spoon; 300 lb hammer
8. HOLE LOCATION	See Sheet #
9. SURFACE ELEVATION	Not Surveyed
10. DATE STARTED	8-16-94
11. DATE COMPLETED	17 (WD) 8-17-94; 8-~~16~~-94
12. OVERBURDEN THICKNESS	≥ 19.5' (20.0')
13. DEPTH DRILLED INTO ROCK	Not Encountered
14. TOTAL DEPTH OF HOLE	JFH ~~19.5'~~ (20.0') = 20.0'
15. DEPTH GROUNDWATER ENCOUNTERED	≈ 9.5'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—
18. GEOTECHNICAL SAMPLES	2 Sample
DISTURBED	✓
UNDISTURBED	
19. TOTAL NUMBER OF CORE BOXES	NA
20. SAMPLES FOR CHEMICAL ANALYSIS	4 Samples
VOC	✓
METALS	
OTHER (SPECIFY)	
OTHER (SPECIFY)	
OTHER (SPECIFY)	
21. TOTAL CORE RECOVERY	— %
22. DISPOSITION OF HOLE	Well ERM-27S Installed
BACKFILLED	-
MONITORING WELL	✓
OTHER (SPECIFY)	
23. SIGNATURE OF INSPECTOR	Warren N. Fay

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0.0'	Steel reinforced Concrete with gray gravel ≤ 1½" dia angular below.	0ppm PID, No odor	NS	NS	NA	Airfield Pad
	0.5'						
	1.0'						
	2.0'	Split spoon 2.0' to 4.0'					
		Silt w/gravel ≥ #10 tight dry poorly graded ~~uniform~~	0ppm, No odor	IAB-ERM 27S(2.0-4.0)	IAB-ERM 27S(2-4)	11, 17, 17, 17	2.0' recovery 10YR 3/2 very dark grayish brown ML
	3.0'						
	4.0'	Split spoon 4.0' to 6.0'					
		Same as above - more gravel slightly less tight ~~mess~~ (WD)	0ppm, No odor	NS	IAB-ERM 27S(4-6)	2, 8, 9, 7	2.0' recovery ML
	5.0'						ERM-27S

PROJECT HIA-Middletown

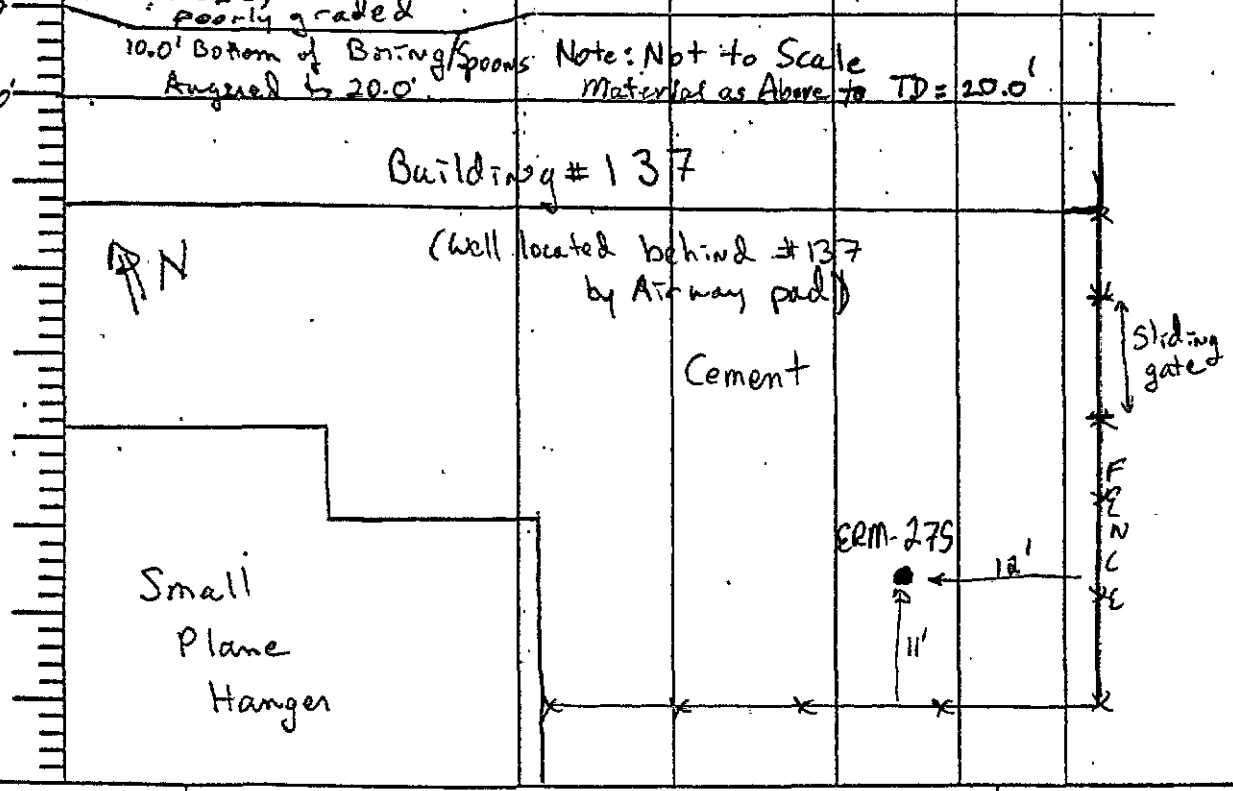
HOLE NO. IAB-ERM27S

HTW DRILLING LOG

HOLE NO. IAB-ERM275

PROJECT HIA - Middletown | INSPECTOR Warren Fox | SHEET 2 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	5.0'	See Sheet #1 (4.0' to 6.0')					
	6.0'	Split Spoon 6.0' to 8.0' Silt (only trace of gravel) cohesive, moist uniform poorly graded, some mottled texture	0ppm PID, No Odor	NS	IAB-ERM 275(6-8)	6, 7, 5, 7	2.0' recovery 2.5Y 5/6 light olive brown ML
	7.0'						
	8.0'	Split spoon 8.0' to 10.0' Same as above v. moist	0ppm, No Odor	NS	IAB-ERM 275(8-9)	7, 16, 28, 41	2.0' recovery ML
	9.0'	Saturated (≅9.0') Sand (c. grain - sub-angular) w/gravel angular loose, poorly graded	—	IAB-ERM 275 (9.5)	—	—	10YR 4/3 brown SP
	10.0'	10.0' Bottom of Boring/Spoons Augered to 20.0'	Note: Not to Scale Material as Above to TD = 20.0'				
	20.0'						



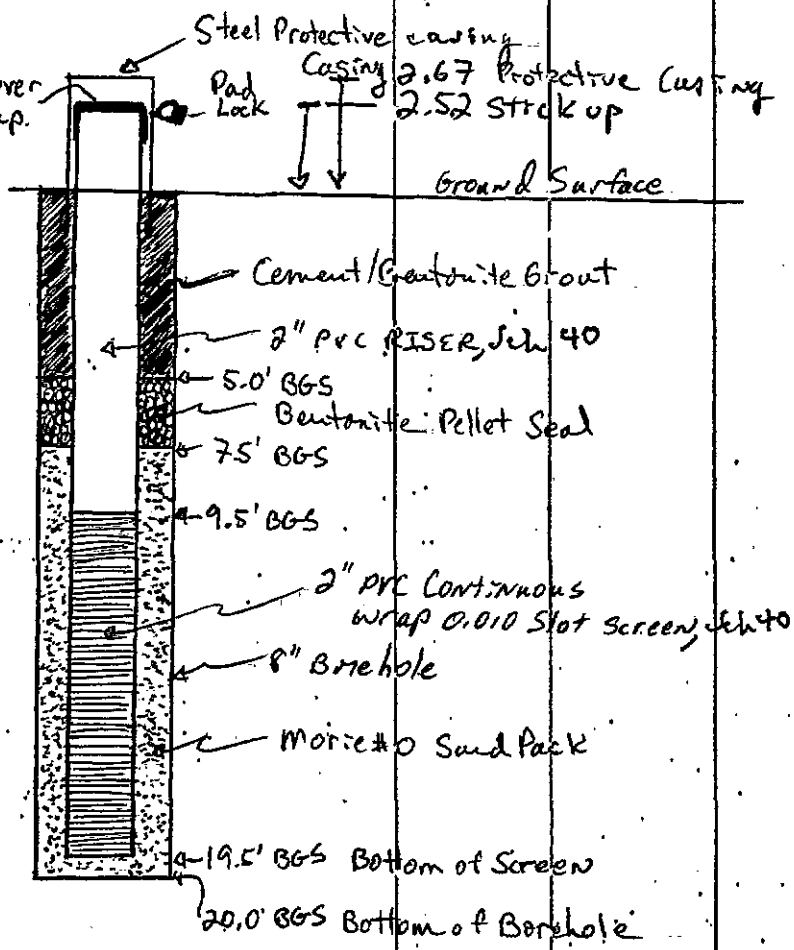
PROJECT HIA - Middletown | HOLE NO. IAB-ERM275

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.	SHEET
HIA - Middletown	Warren Fox	IAB-ERM27S	3 of 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.

ERM-27S



Note: Not to Scale

BGS = Below Ground Surface

Materials Used

- 4 bags Morie #0 Sand (100lbs/bag)
- 70 lbs Bentonite Pellets (3/8" Dia.)
- 3 bags Portland Cement w/ 3% bentonite
- 1-6" Dia Protective Steel Casing over riser.

ERM-27S

HTW DRILLING LOG

HOLE NO. IAP-ERM 28S

1. COMPANY NAME: ERM - PMC	2. DRILLING SUBCONTRACTOR: ADT - MA
SHEET 1 OF 3 SHEETS	
3. PROJECT: HIA - Middletown	4. LOCATION: Middletown, PA
5. NAME OF DRILLER: Troy Brown	6. MANUFACTURER'S DESIGNATION OF DRILL: Mobile Drill Rig -
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: B-59 Mobile Rig. 6 1/4" I.D. Augers 3" O.D.S. Split spoons 300 lb hammer	8. HOLE LOCATION: See Sheet #3
	9. SURFACE ELEVATION: Not Surveyed
	10. DATE STARTED: 8-11-94 / 11. DATE COMPLETED: 8-11-94
12. OVERBURDEN THICKNESS: 13.5'	15. DEPTH GROUNDWATER ENCOUNTERED: 13.5'
13. DEPTH DRILLED INTO ROCK: 8.5' (WE)	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —
14. TOTAL DEPTH OF HOLE: 22.0' (Auger Refusal)	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
2 Samples	✓		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
5 Samples	✓					— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well ERM-28S Installed.	✓			Warren N. Fay

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0.0'	Organic / Gravel / Cobble soil loose, dry.	0 ppm PID No Odor	NS	NS	NA	OL-OH
	0.5'				augered to 1.0'		
	1.0'	Split spoon 1.0' to 3.0'					
		Silt w/ gravel ≤ 1/4" Dia subround moist cohesive uniform	15 ppm, No Odor	IAP-ERM 28S (1.0-3.0)	IAP-ERM 28S (1.0-3.0)	16, 8, 10, 11	2.0' recovery 10YR 4/2 Dark grayish brown ML
	2.0'	(< Gray clay mottling.)					
	3.0'	Split spoon 3.0' to 5.0'					
		Similar material (less gray clay mottling)	0 ppm, No Odor.	NS	IAP-ERM 28S (3.0-5.0)	22, 8, 7, 52	1.5' recovery ML
	4.0'						
	5.0'						ERM-28S

PROJECT: HIA - Middletown

HOLE NO. IAP-ERM28S

HTW DRILLING LOG

HOLE NO. IAP-ERM 28S

PROJECT: HIA - Middletown

INSPECTOR: Warren Fox

SHEET 2 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	5.0'	Split Spoon 5.0' to 7.0'					
		Silt w/ Sand (f. grain - subround)	0ppm PID, No Odor	NS	IAP-ERM 28S(5.0-7.0)	31, 21, 17, 8	6' recovery. 10YR4/4 dark yellowish brown ML
	7.0'	Split spoon 7.0' to 9.0'					
		Clay. tight moist poorly graded (gravel between color change 1" dia.	0ppm, No odor	NS	IAP-ERM 28S(7.0-9.0)	6, 6, 5, 7.	2' recovery 2.5Y 3/1 Very DARK GREY CL (8-10) 5GY 5/1 P. CHART: Fo GIEY Greenish Gray
	9.0	Augered 9.0' to 10.0'	NA	NS	NS	NA	
	10.0	Split spoon 10.0' to 12.0'					
		Silt w/ clay tight, cohesive mottled with gray poorly graded moist			NS	4, 5, 6, 11.	2.0' recovery 7.5YR 4/6 strong brown ML (2.5Y 6/1 gray)
	12.0	Split spoon 12.0' to 14.0'					
		Same as above		IAP-ERM 28S (13.6)	IAP-ERM 28S(12-13.6)	25, 35, 68, 100/.1	2.0' recovery
		Sand f. grain subangular v. tight poorly graded moist. w/ cobbles ≥15" subrounded					2.5YR 3/4 dusky red SP
		Bedrock at 13.6'	Bed Rock - Red/Silty Sandstone				
		Split spoon refused. 13.5. hand drilling to 22.0'					
		O.N.F 8-11-94	Tried to drill further - Auger Refusal				

PROJECT: HIA - Middletown

HOLE NO. IAP-ERM 28S

HTW DRILLING LOG

HOLE NO. IAP-ERM28S

PROJECT: HIA - Middletown

INSPECTOR: Warren Fox

SHEET 3 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.

Boring location — POST RAN DRILL

IAP-ERM 28 S

N

60'

Parking Lot

Note: Not to Scale

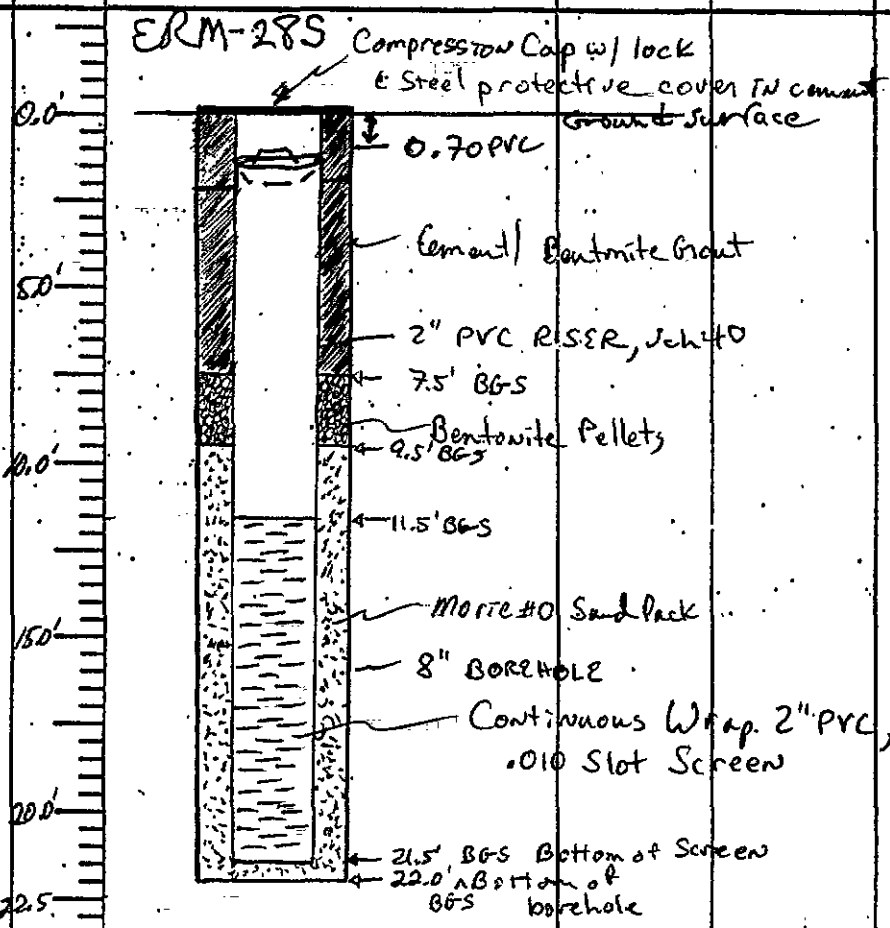
BGS - Below Ground Surface

82'

Bldg. 183

Building 100

ERM-28S



Materials Used

- 6 bags (100 lb/bag) Morie #0 sand
- 65 lbs bentonite pellets, 3/8" Dia
- 4 bags cement 100 lbs/bag portland w/ 5% bent, seal

ERM-28S

PROJECT: HIA - Middletown

HOLE NO. IAP-ERM28S

HTW DRILLING LOG

HOLE NO. ERM-32I

SHEET 1 OF 4 SHEETS

1. COMPANY NAME: ERM	2. DRILLING SUBCONTRACTOR: Hydrogroup
3. PROJECT: HIA	4. LOCATION: Middletown, PA
5. NAME OF DRILLER: Steve Blair	6. MANUFACTURER'S DESIGNATION OF DRILL: Barber
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 12" bit + casing (air hammer); 8" air hammer + casing; 12" to 38'; 8" to 80'	8. HOLE LOCATION: See Map Page 3
	9. SURFACE ELEVATION: Not Surveyed
	10. DATE STARTED: 12/8/94 — 11. DATE COMPLETED: 12/16/94
12. OVERBURDEN THICKNESS: ≈25'	15. DEPTH GROUNDWATER ENCOUNTERED: ≈36' while drilling
13. DEPTH DRILLED INTO ROCK: ≈77.5'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 11.57' / ≈30 hrs
14. TOTAL DEPTH OF HOLE: 102.5' boring / screen 80-100'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None	X		N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None						— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well Installed ERM-32I		X		D. Haller

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0	0-0.5' - Concrete 0.5-5.0' - well graded gravel / asphalt fill - Angular - Subangular - Gravel size 5 - 20mm Soft (WE) (GW)	2.8 ppm @ ≈3'				5YR, 6/1 to 6/4 - varying shades of gray. (GW)
	5	Well Graded Gravel Sand < 15% Subrounded to round Gravel size → 5-35mm (River Gravel ?)	8.1 ppm @ ≈7'				VARYING Colors Gray, black, lt. pink, brown (GW)
	10		9.3 ppm @ ≈12'				
	15						
	20		19.5 ppm @ ≈17'				
	25	(trace bedrock chips) in 23' sample - color Δ @ 23'	48 ppm @ ≈23'				

reviewed 8 Feb 95 JFH

PROJECT: HIA - Middletown

HOLE NO. ERM-32I

PROJECT	INSPECTOR	ERM-32I SHEET 2 OF 4 SHEETS
HIA-Middletown	D. Haller	

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	25	Weak red calcareous or dolomitic SILTSTONE.	464 ppm @ ≈27'				(2.5YR, 5/4) cuttings: 1-20mm
		- Apparent carbonate clasts - slightly weathered. Trace (Mn?) staining on some chips					
	30	- Moderately hard	86 ppm @ ≈33'				cuttings: 1-30mm
		- trace subround to round gravel in 27' and 33' samples ↳ fill in material?					
	35	- cuttings: subangular/subround.		▽ ≈36'			
			91 ppm @ ≈37'				cuttings: 1-20mm
	40						
		43-47' fractured: Drill rate + cuttings size ↑	0.0 ppm @ ≈43'				cuttings: 1-20mm
	45		0.0 ppm @ ≈47'				cuttings: 1-20mm
	50		0.0 ppm @ ≈53'				cuttings: 1-50mm
	55	55-58 ↑ water production	0.0 ppm @ ≈58'				cuttings: 1-25mm
	60		11.6 ppm @ ≈63'				cuttings: 1-25mm
	65		194 ppm @ ≈68'				cuttings: 1-30mm
	70	@ ≈69' ↓ water production ↑ drill rate					

(trace med-coarse sand stained subangular quartz + dolomite in 68'+73' samples)

PROJECT: HIA-Middletown

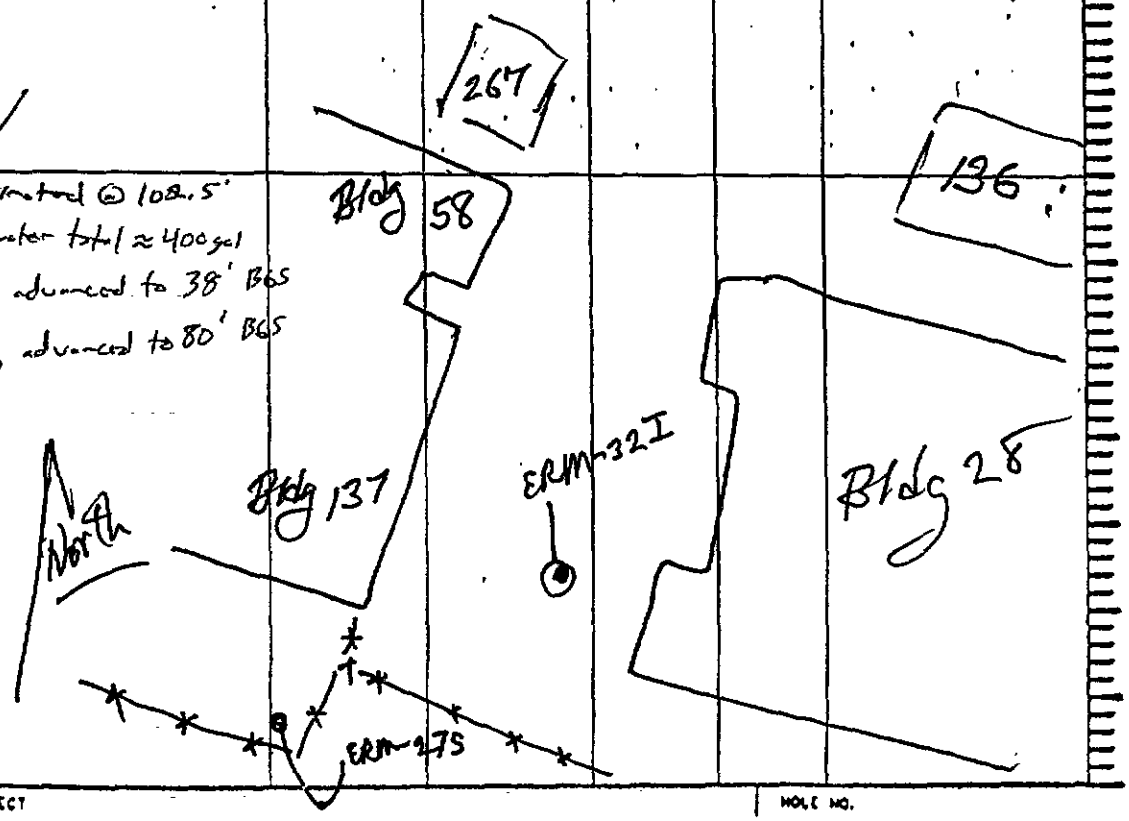
HOLE NO.: ERM-32I

ERM-32I

PROJECT: H1A-Middletown | INSPECTOR: D. Haller | SHEET 3 OF 4 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	75	(Same as above)	274 ppm @ ≈73'				cuttings: 1-25mm
			341 ppm @ ≈78'				cuttings: 1-25mm
	80	water production @ ≈79'					
			158 ppm @ ≈83'				cuttings: 1-10mm
	85		78 ppm @ ≈87'				cuttings: 1-10mm
	90		147 ppm @ ≈93'				cuttings: 1-10mm
	95		136 ppm @ ≈97'				cuttings: 1-10mm
	100						

Boring terminated @ 102.5'
- Injection water total ≈ 400 gal
- 12" casing advanced to 38' BGS
- 8" casing advanced to 80' BGS



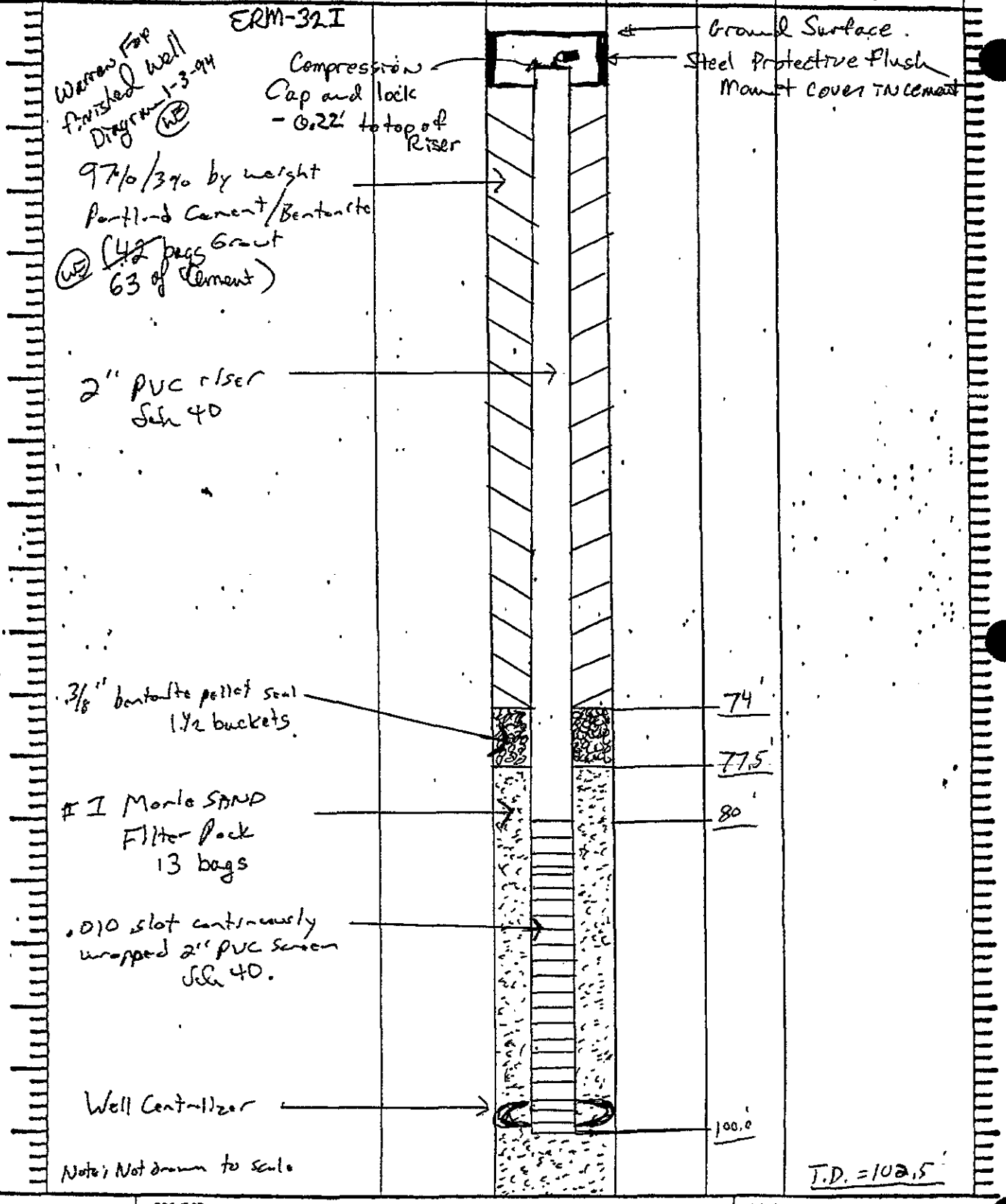
PROJECT: H1A-Middletown | HOLE NO.: ERM-32I

PROJECT	INSPECTOR	ERM-32I SHEET 4 OF 4 SHEETS
HIA - Middletown	D. Haller	

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.

ERM-32I

Warren Fox finished well Diagram 1-3-94 (WF)



PROJECT: HIA - Middletown

HOLE NO.: ERM-32I

HTW DRILLING LOG

HOLE NO. ERM-32D

1. COMPANY NAME: ERM-PMC ~~ERM-FEH~~	2. DRILLING SUBCONTRACTOR: Hydrogroup, Inc.
SHEET 1 of 8 SHEETS	
3. PROJECT: HIA - Middletown	4. LOCATION:
5. NAME OF DRILLER: Steve Blair	6. MANUFACTURER'S DESIGNATION OF DRILL: Barber
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Dual Rotary Barber Rig. 12" Casing to 38' 8" Casing to 280' Casings were temporary.	8. HOLE LOCATION: See Sheet-8
	9. SURFACE ELEVATION: Not Surveyed
	10. DATE STARTED: 12-15-94
	11. DATE COMPLETED: 1-3-95
12. OVERBURDEN THICKNESS: 22'	15. DEPTH GROUNDWATER ENCOUNTERED: 32'
13. DEPTH DRILLED INTO ROCK: 280'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: Unknown
14. TOTAL DEPTH OF HOLE: 302'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None	Y		None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None						— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well Installed		Y		Charles Salamon (WNF)

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0	6" of concrete					10YR 4/3 brown (silt) 5 to 35mm
		GW, well graded gravel in silt, subrounded loose	1 ppm PID				
	5						
	10	GW, well graded gravel in silt, rounded loose Petroleum odor but low readings on PID	0 ppm PID				10 YR 4/3 brown (silt) 1 to 45 mm
	15	GW, well graded gravel in silt, rounded loose	0 ppm PID				Same
	20	SAME	25 ppm PID				SAME
		bedrock @ 22'					

reviewed 9 Feb 95 JFSff

PROJECT: HIA - Middletown

HOLE NO. ERM-32D

HTW DRILLING LOG

HOLE NO. ERM-32D

PROJECT: HIA-Middletown

INSPECTOR: C. Salomon

SHEET 2 OF 8 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	25	Siltstone weathered (moderately) moderately hard	2.5 ppm	NA	NA	NA	2.5YR 4/3 pieces are 5 to 20mm
	30	SAME water @ 32'	4.0 ppm 60 ppm from top of cylinder				SAME
	35	SAME					SAME
	40	silty Sandstone (wacke) very fine grain, rounded grains mod. weathered quartz and dolomite clasts Hard.	0 ppm PID				2.5YR 4/3 pieces 1 to 5mm
	45	SAME large pieces with fracture faces	0 ppm PID				2.5YR 4/3 pieces 1 to 50 mm
	50	SAME	0 ppm PID				2.5 YR 4/3 pieces 1 to 50 mm
	55	Siltstone unweathered hard	0 ppm PID				2.5 YR 4/3 pieces 1 to 35mm
	60	SAME smaller pieces	0 ppm PID				2.5 YR 4/3 pieces 1 to 5mm
	65	silty Sandstone (wacke) very fine grain, rounded unweathered Hard fracture faces on large pieces FRACTURE from 68 to 70'	0 ppm PID				2.5 YR 4/3 pieces 1 to 50 mm

HTW DRILLING LOG

PROJECT: HIA - Middletown
INSPECTOR: C. Salomon
HOLE NO.: ERM-32D
SHEET 5 OF 8 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	70	SAME Large pieces with fracture faces, quartz crystals soft drilling 68'-74'	0 PPM PID	NA	NA	NA	2.5 YR 4/3 pieces 1 to 50mm
	75	SAME slightly smaller pieces being ejected. No fracture faces Harder drilling water zone ≈ 74'	0 PPM PID				2.5 YR 4/3 pieces 1 to 35mm
	80	SAME smaller pieces	0 PPM PID				2.5 YR 4/3 pieces 1 to 5 mm
	85	SAME some larger pieces soft (moderate)	0 PPM PID				2.5 YR 4/3 pieces 1 to 15mm
	90	Siltstone unweathered Moderately soft Small fracture at 93' (soft drilling)	0 PPM PID				2.5 YR 4/3 pieces 1 to 35mm
	95	Same some dolomite ~~dol~~ CS SP/RO/PY clasts fracture faces on larger pieces	0 PPM PID				SAME
	100	SAME	0 PPM PID				SAME
	105	SAME	0 PPM PID				SAME
	110	Siltstone slightly weathered mod. soft fracture @ 109' - increased water	0 PPM PID				SAME
		SAME	0 PPM PID				SAME

HTW DRILLING LOG

HOLE NO. ERM-32D

PROJECT: HIA Middletown

INSPECTOR: C. Salomon

SHEET 4 OF 8 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	120	SAME	0 PPM PID	NA	NA	NA	SAME
	125	SAME	0 PPM PID				
	130	SAME Fracture - larger pieces, quartz and calcite crystal	0 PPM PID				2.5 YR 4/3 pieces 1mm to 60mm
	135	SAME -smaller pieces, no quartz or calcite Increased water at 136'	0 PPM PID				2.5 YR 4/3 pieces 1 to 20mm
	140	SAME	0 PPM PID				2.5 YR 4/3 pieces 1 to 25mm
	145	increased penetration at 143' possible fracture SAME larger pieces with fracture faces and calcite crystals	0 PPM PID				SAME pieces 1 to 60mm
	150	SAME smaller pieces, no fracture faces or calcite Increased water at 151' Harder drilling at 153'	0 PPM PID				SAME pieces 1 to 30 mm
	155	Silty Sandstone / Wacke (WF) very fine grain, rounded Hard quartz and dolomite clasts unweathered	0 PPM PID				SAME pieces 1 to 20 mm
	160	Siltstone Slightly weathered Hard Large pieces with fracture faces	0 PPM PID				SAME pieces 1 to 65mm

HTW DRILLING LOG

HOLE NO. ERM-32D

PROJECT HIA- Middletown | INSPECTOR C. Salomon | SHEET 3 of 8 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	165	SAME	21 PPM PID	NA	NA	NA	SAME pieces 1 to 40 mm
	170	SAME increased penetration rate at 173'-175'	24 PPM PID				SAME SAME
	175	~~Silty~~ SANDSTONE / Wacke (WF) very fine grain, subrounded mod. Hard. unweathered	10 ppm PID				SAME pieces 1 to 25mm
	180	SAME	10 ppm PID				SAME SAME
	185	Siltstone mod. weathered mod. soft	7 ppm PID				SAME pieces 1 to 10mm
	190	SAME some larger pieces	6 PPM PID				SAME pieces 1 to 45mm
		Soft zone (increased penetration rate) 193'	7PPM PID				SAME pieces 1 to 25mm
	195	SAME					
	200	SAME Smaller pieces	20 PPM PID				SAME pieces 1 to 7mm
	205	SAME	7 PPM PID				SAME SAME
		increased ~~penetra~~ penetration rate 209'-211' OBS 12/21/94					

MW DRILLING LOG

DATE ~~8/3-8/20/91~~ | INSPECTOR C. Salamon | HOLE NO. ERM-32D | SHEET 6 of 8 SHEETS

& HIA-Middletown

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	210	Slity Sandstone / Wacke (WF) very fine grain, subrounded mod. Hard unweathered some large pieces with fracture faces	10 PPM PID	NA	NA	NA	2.5YR 6/3 pieces 1 to 40mm
	215	Siltstone unweathered mod. Hard unweathered	8.5 PPM PID				SAME SAME
	220	Same with smaller pieces	7 PPM PID.				SAME pieces 1 to 15mm
	225	Same larger pieces	7 PPM PID				SAME pieces 1 to 35mm
	230	SAME	8 PPM PID				SAME SAME
		Large fracture @ 232' Increase in water output					
	235	Slity Sandstone / Wacke (WF) very fine grain, subrounded sl. weathered sl. soft calcite crystals on fracture faces	2 PPM PID.				SAME pieces 1 to 15mm
	240	SAME larger pieces	5 PPM PID				SAME pieces 1 to 70mm
	245	Same smaller pieces	8 PPM PID				SAME pieces 1 to 20mm
	250	Same large fracture at 250-252'	10 PPM PID				SAME SAME

Sl = Slightly
Mod. = moderately

PROJECT HIA- Middletown | HOLE NO. ERM-32D

HTW DRILLING LOG

HOLE NO. ERM-32D

SHEET 7 OF 8 SHEETS

PROJECT: H1A-Middletown

INSPECTOR: C. Salomon

ELEV. A.	DEPTH B.	DESCRIPTION OF MATERIALS C.	FIELD SCREENING RESULTS D.	GEOTECH SAMPLE OR CORE BOX NO. E.	ANALYTICAL SAMPLE NO. F.	BLOW COUNTS G.	REMARKS H.
	255	SAME	10 PPM PID				SAME SAME
	260	Siltstone sl. weathered sl. soft	10 PPM PID				SAME pieces 1 to 15 mm
	265	~~Sandstone~~ Wacke (WF) very fine grain, subrounded Mod. Hard unweathered very large pieces with fracture faces	10 ppm PID				SAME pieces 1 to 120 mm
	270	SAME some quartz & calcite Large fracture 271 to 275	10 ppm PID				SAME SAME
	275	Siltstone sl. weathered sl. soft	10 PPM PID				SAME pieces 1 to 25 mm
	280	SAME	10 PPM				~~open~~ SAME SAME open hole from 280-300
	285		10 PPM				
	290		10 PPM				
	295		10 PPM				
	300		10 PPM				

PROJECT: H1A-Middletown

HOLE NO. ERM-7D

HTW DRILLING LOG

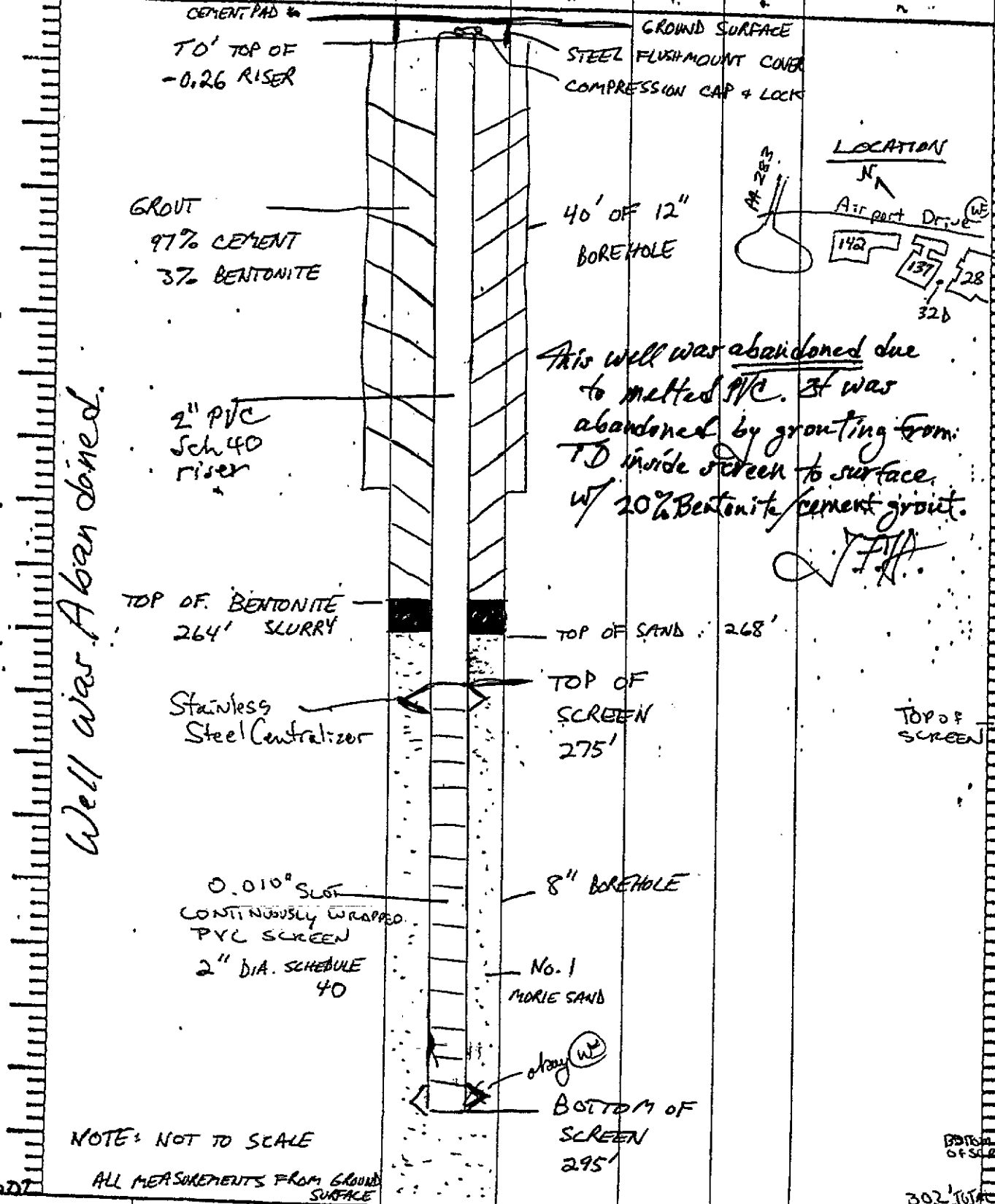
PROJECT: HIA MIDDLETOWN -32-D

INSPECTOR: D. VANKEUREN / Warren Fox

HOLE NO. ERM-32D

SHEET 8 OF 8 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.



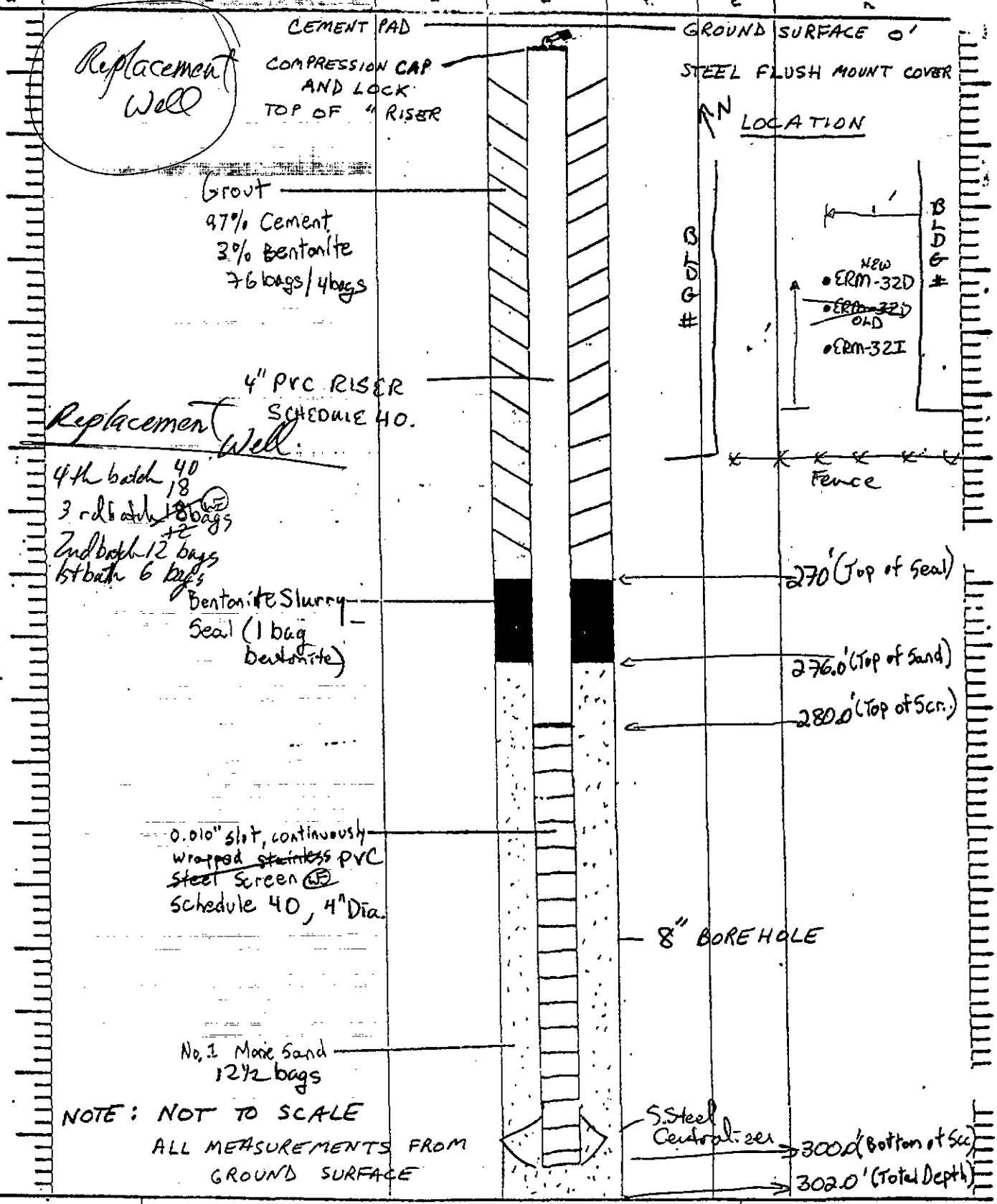
PROJECT: H 12 MIDDLETOWN

HOLE NO. 32-D

HTW DRILLING LOG

PROJECT: HIA, Middletown
INSPECTOR: WARREN FOX
HOLE NO.: ERM-32D
SHEET: OF SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE & CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS



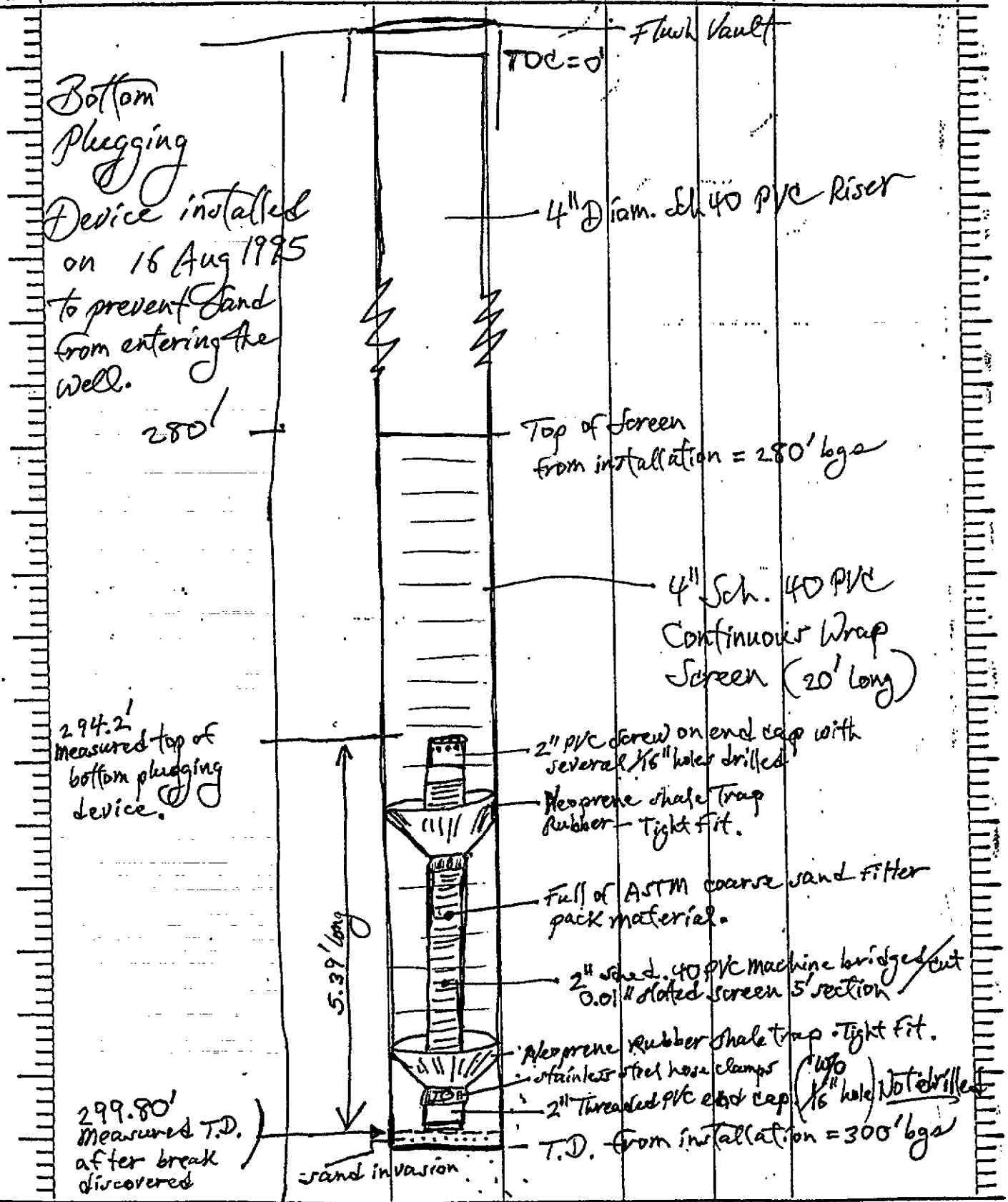
PROJECT: HIA, Middletown
HOLE NO.: ERM-32D

HTW DRILLING LOG

ERM-32D

HIA Middletown | INSPECTOR Jeffrey F. Herrick | SHEET 1 OF 1 SHEETS

DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO f.	BLOW COUNTS g.	REMARKS h.



PROJECT HIA Middletown | HOLE NO. ERM-32D

HTW DRILLING LOG

HOLE NO. ERM-33I

1. COMPANY NAME: ERM-emc	2. DRILLING SUBCONTRACTOR: Hydro Group.
SHEET 1 OF 4 SHEETS	
3. PROJECT: HIA - Middletown	4. LOCATION: Middletown, PA
5. NAME OF DRILLER: Steve Blair / Bennie Conner	6. MANUFACTURER'S DESIGNATION OF DRILL: Barber Rig DR-12
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Dual Rotary - Barber Rig 8" and 12" casing w/ air hammer. Temporary 8" casing to 8' 12" casing to 36'	8. HOLE LOCATION: See Sheet # 3.
	9. SURFACE ELEVATION: Not Surveyed.
	10. DATE STARTED: 11-21-94 / 11. DATE COMPLETED:
12. OVERBURDEN THICKNESS: 20.0' to bedrock.	15. DEPTH GROUNDWATER ENCOUNTERED: Unknown
13. DEPTH DRILLED INTO ROCK: 122'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A
14. TOTAL DEPTH OF HOLE: 142'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None	0		None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None						— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well ERM-33I Installed		✓		Warren N. Fox

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h. (Size)
	0.0	Fill material Gravel w/ silt loose, poorly graded (brown) dry. Subangular	0 ppm PID, No Odor	NS	NS	NA	5Y 4/1 dark gray. 3mm to 25mm
	5.0'	Gravel with silt. subrounded multicolor poorly graded loose dry.	1 ppm PID, No Odor	NS	NS	NA	2.5Y 4/3 olive brown 3mm to 30mm
	10.0'	Same gravel with more white quartz clasts.	0 ppm PID, No Odor petroleum odor at 13'	NS	NS	NA	2.5Y 4/3 olive brown 2mm to 33mm
	15.0'	Gravel with silt and poorly graded fine sand. loose subrounded many colors	0 ppm PID, No Odor	NS	NS	NA	10YR 4/4 dark yellowish brown 2 mm to 25 mm
	20.0'	Siltstone w/ traces of med. sand subangular gravel clasts to 1" m. hard weathered HCL(-)	1.1 ppm PID, No Odor	NS	NS	NA	5YR 3/3 dark reddish brown. 2.0 mm to 31 mm
	25.0'						

PROJECT: HIA - Middletown

HOLE NO. ERM-33I

Figure 4-1 (Continued)

HTW DRILLING LOG

HOLE NO. ERM-33I

PROJECT: HIA - Middletown | INSPECTOR: Warren Fox | SHEET 2 OF 45 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	25.0'	Sandstone with Silt (Wacke) h. weathered m. soft clayey of quartz (subrounded) HCL(-)	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red.
29' 5 gpm water							2.0mm to 15 mm
	30.0'	Same material	0 ppm PID, No Odor.	NS	NS	NA	2.5YR 3/3 dusky red.
							1.0 mm to 40.0 mm
	35.0'	Siltstone w/sand fine grain Subangular m. soft weathered clayey of quartz, angular ≤10mm Dia. Dolomitic Cementation	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red.
							1.0 mm to 40 mm
	40.0'	Siltstone m. hard weathered Dolomitic Cementation No clasts	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red
							1.0mm to 25 mm
50 FT	45.0'	Similar siltstone cutting smaller. (trace of clayballs) ≤3% ≤4mm dia	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/4 dusky red.
							1.0mm to 12 mm
	50.0'	Siltstone m. hard weathered Dol. cementation No clasts 3mm clay balls (traces)	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/4 dusky red.
							1.0mm to 25 mm
Broke	55.0'	Same Material (smaller cuttings)	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red
							1.0mm to 10 mm
11-22-94 50 FT	60.0'	Siltstone m. hard weathered Dol. Cementation No Clasts	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red.
							1.0mm to 12 mm
	65.0'	Sandstone w/Silt hard (Wacke) m. weathered f-c grained - subangular Clasts of quartz, subangular (≤ 10mm)	1.0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red
	70.0'						1.0 mm to 35 mm

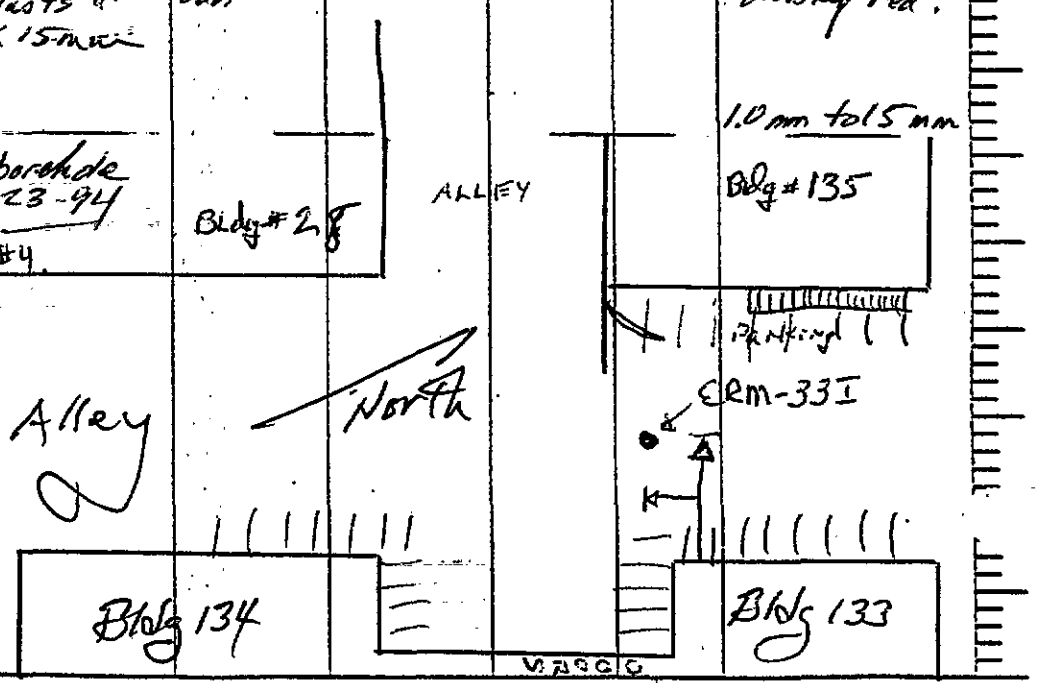
Figure 4-1 (Continued)

HTW DRILLING LOG

HOLE NO. ERM-33I

PROJECT HIA - Middletown | INSPECTOR Warren Fox | SHEET 3 OF 45 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	70.0'	Siltstone hard m.weathered Dol. cementation Trace of quartz clasts (<3mm 2%) subangular + Dol. clasts 5mm angular	2.0 ppm PID No Odor	NS	NS	NA	2.5YR 3/3 dusky red. 1.0mm to 20 mm
	75.0'	Same Material as above	1.5 ppm PID No Odor	NS	NS	NA	2.5YR 3/4 dusky red. 1.0mm to 55 mm
	80.0'	Siltstone m.hard weathered Dol. Cementation No Clasts, Small clay balls 5% 5 to 3mm	0.0 ppm PID No Odor	NS	NS	NA	2.5YR 3/3 dusky red. 1.0mm to 10 mm
	85.0'	Same Material w/ Trace of qtz clasts ≤ 2mm angular	2.0 ppm PID No Odor	NS	NS	NA	2.5YR 3/2 dusky red 1.0mm to 10 mm
	90.0'	Wacke - m.hard m.weathered Dol. Cementation, high amount of qtz clasts subangular (≤ 10mm 40%)	1.5 ppm PID No Odor	NS	NS	NA	2.5YR 3/4 dusky red. 1.0mm to 10 mm
	95.0'	Similar material larger clasts of quartz ≤ 15mm	5.0 ppm PID No Odor	NS	NS	NA	2.5YR 3/4 dusky red. 1.0mm to 15 mm
	100.0'	102' Bottom of borehole 11-23-94 (WNE) See Sheet #4	Bldg # 28	ALLEY			Bldg # 135



PROJECT HIA - Middletown | HOLE NO. ERM-33I

Figure 4-1 (Continued)

HTW DRILLING LOG

HOLE NO. ERM-33I

PROJECT: HIA-Middletown | INSPECTOR: Warren Fox | SHEET 4 OF 4 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	100'	Wacke m. hard m. weathered Dol Cementation High amt of Clast ≤ 5 mm angular	0ppm PID, No Odor	NS	NS	NA	2.5 YR 3/4 dusky red 1.0mm to 8mm
	110'	Sandstone w/ Silt m hard (Wacke) weathered f. grain (sub rounded) Dol. Cementation Clasts of Quartz ≤ 5mm subangular	0ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red. 1.0mm to 13mm
	115'	Similar to above w/ dull white calcite fragments (weathered)	0ppm PID, No Odor	NS	NS	NA	2.5 YR 3/3 dusky red 1.0mm to 13 mm
	120'	Sandstone w/ silt m. hard m. weathered Dol. Cementation Clasts of Quartz ≤ 10 mm angular	0ppm PID, No Odor	NS	NS	NA	2.5 YR 3/3 dusky red 1.0mm to 12mm
	125'	Siltstone trace of f. grain sand rounded m hard weathered Dol Cementation Clasts of Qtz ≤ 3mm angular	0ppm PID, No Odor	NS	NS	NA	2.5YR 3/4 dusky red 1.0mm to 10mm
	130'	Same Material Sandstone w/ Silt m-grain subangular	0ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red 1.0mm to 12mm
	135'	m. hard weathered Dol Cementation Clasts of Qtz ≤ 5mm angular (5%)	0ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red. 1.0mm to 6mm
	140'	142' Bottom of borehole at 142' 11-25-94					

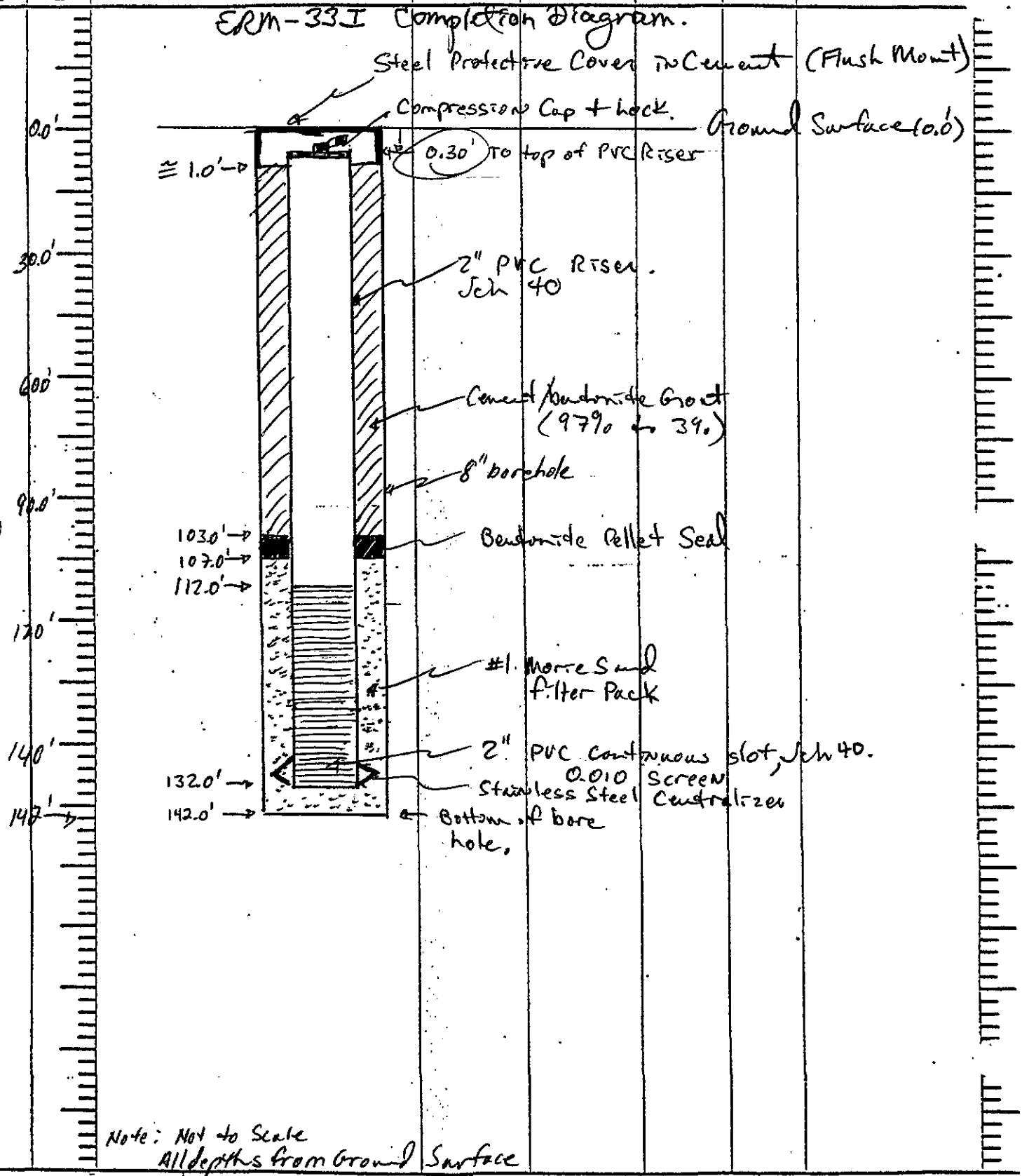
Figure 4-1 (Continued)

HTW DRILLING LOG

HOLE NO. ERM-33I

PROJECT HIA - Middletown | INSPECTOR Carl Pidge / W. Foy | SHEET 5 OF 5 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS



PROJECT HIA - Middletown | HOLE NO. ERM-33I

HTW DRILLING LOG

HOLE NO. ERM-34S

1. COMPANY NAME: ERM-PMC	2. DRILLING SUBCONTRACTOR: ADT
SHEET 1 OF 3 SHEETS	
3. PROJECT: HIA-MIDDLETOWN	4. LOCATION: MIDDLETOWN, PA
5. NAME OF DRILLER: TROY BROWN	6. MANUFACTURER'S DESIGNATION OF DRILL: MOBILE B-59
SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" SPLIT SPOON (6); 140 LB HAMMER; 6 5/8" ID HOLLOW STEM AUGER TO 19.2'	8. HOLE LOCATION: WEST SIDE OF ANG FIRE HOUSE
	9. SURFACE ELEVATION: NOT SURVEYED
	10. DATE STARTED: 4/3/95 — 11. DATE COMPLETED: 4/4/95
12. OVERBURDEN THICKNESS: ~19'	15. DEPTH GROUNDWATER ENCOUNTERED: ~9'
13. DEPTH DRILLED INTO ROCK: 0'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 8.88', 2 DAYS
14. TOTAL DEPTH OF HOLE: 19.25'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
2	✓		

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Backfilled ERM-34S		✓		Derek Evans

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0' 1' 2'	CONCRETE APRON					
	3' 4'	SILT (ML) TR FINE SAND TR CLAY SMOOTH DRY	0.0 PPM	IAB-ERM 34S (2.0-4.0)	NS	10, 13, 15, 20	7.5 YR 4/4 16" REC
	5' 6'	SAME AS ABOVE SLIGHTLY MOIST	0.7 PPM	NS	NS	13, 35, 33, 28	7.5 YR 4/4 4" REC
	7' 8'	GRAVELLY SILT W/ SAND (ML) TR. CLAY FINE TO COARSE SAND FINE, SUBROUNDED TO SUB-ANGULAR GRAVEL SLIGHTLY MOIST	0.0 PPM	NS	NS	24, 28, 22, 21	7.5 YR 4/6 2" REC
	9' 10'	(SW) WELL GRADED SAND W/ GRAVEL TR. CLAY AND SILT FINE TO COARSE SAND (MOSTLY MED) FINE TO COARSE GRAVEL (SUB-ANGULAR TO ROUNDED) SL. MOIST TO WET MED. DENSE	0.4 PPM	NS	NS	20, 20, 30, 25	2.5Y 3/2 15" REC

PROJECT: HIA-MIDDLETOWN — HOLE NO. ERM-34S

HTW DRILLING LOG

HOLE NO. ERM-345

PROJECT: HIA - MIDDLETOWN

INSPECTOR: D. EVANS

SHEET 2 OF 3 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	10'	CUTTINGS: WELL GRADED GRAVEL WITH SAND AND SILT ROUNDED TO VERY ROUNDED, FINE TO COARSE GRAVEL					
	11'						
	12'						
	13'	POORLY GRADED SAND (SP) MOSTLY MEDIUM SAND, LITTLE FINE, TRACE COARSE TRACE FINE, ROUNDED GRAVEL TRACE SILT LOOSE TO MEDIUM DENSE, WET SOME BLACK LAYERS (MN?)	1.1 PPM	IAB-ERM 345 (13.0-15.0)	NS	20, 3, 5, 9	5Y 3/1 10YR 4/3 17" REC
	14'						
	15'						
	16'						
	17'						
	18'	POORLY GRADED SAND WITH GRAVEL SAME SAND AS ABOVE WITH MORE FINE, ROUNDED GRAVEL NO BLACK LAYERS (SP)	1.0 PPM	NS	NS	10, 34, 100/3" (REFUSAL)	10YR 4/3 24" REC
	19'						
		DUSKY RED WEATHERED BEDROCK SILTSTONE	BOTTOM OF BOREHOLE = 19.2'				
	20'						
	21'						
	22'						
	23'						
	24'						
	25'						
	26'						

HTW DRILLING LOG

HOLE NO. ERM-345

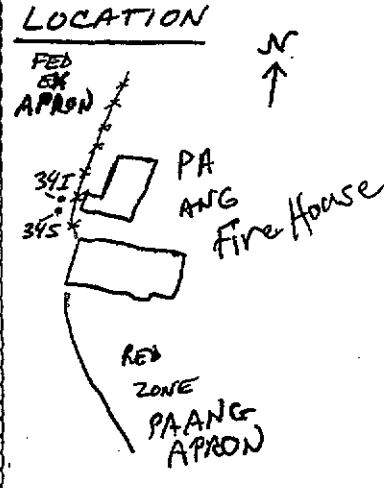
PROJECT: HIA - MIDDLETOWN

INSPECTOR: D. EVANS

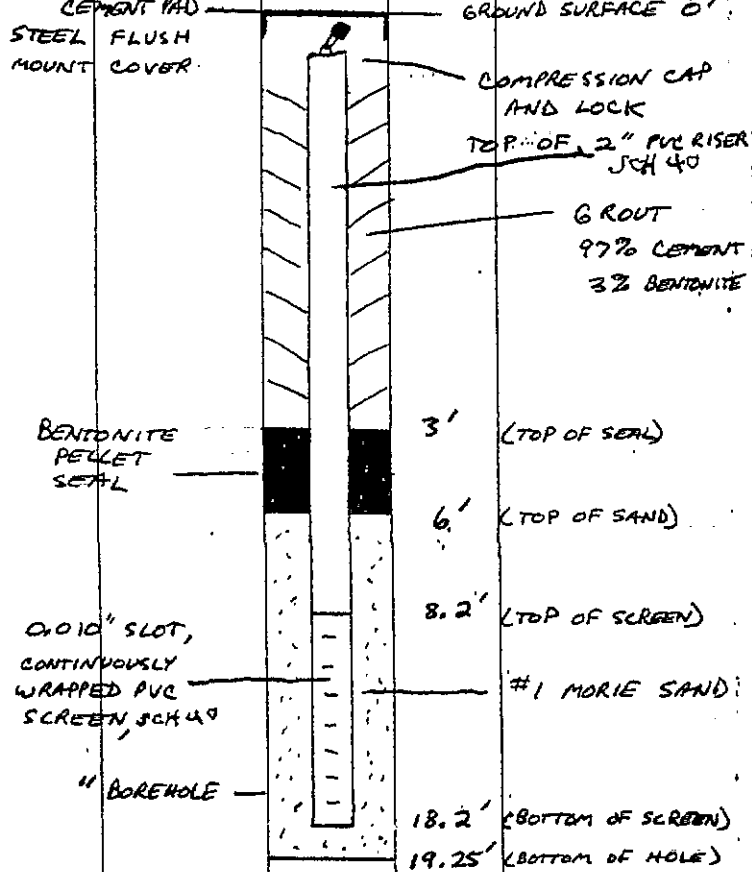
SHEET 3 OF 3 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS

LOCATION



WELL CONSTRUCTION



NOTE: NOT TO SCALE
ALL MEASUREMENTS FROM GROUND SURFACE

WELL MATERIALS

10' 10 SLOT CONTINUOUSLY WRAPPED 2" PVC SCREEN

8.2' PVC RISER - SCHEDULE 40

SAND: 5 1/4 BAGS

BENTONITE PELLETS: 2 3/4 BUCKETS

HTW DRILLING LOG

ERM-34I

1. COMPANY NAME: ERM-PMC	2. DRILLING SUBCONTRACTOR: Hydro Group
SHEET 1 OF 4 SHEETS	
3. PROJECT: HIA-Middletown	4. LOCATION: Middletown PA
5. NAME OF DRILLER: Steve Blair / Bernie Connor.	6. MANUFACTURER'S DESIGNATION OF DRILL: Barber Rig DR-12
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Dual Rotary Drilling 8" and 12" Casing w/ hammers (Casing driven within). Temporary 8" Casing to 12" Casing to 36'	8. HOLE LOCATION: See Sheet #3
	9. SURFACE ELEVATION: Not Surveyed
	10. DATE STARTED: 11-15-94
	11. DATE COMPLETED:
12. OVERBURDEN THICKNESS: 23.0' (24.' competent rock)	15. DEPTH GROUNDWATER ENCOUNTERED: UNKNOWN (≅ 18.0'?)
13. DEPTH DRILLED INTO ROCK: 79.0'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —
14. TOTAL DEPTH OF HOLE: 102.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None	X		N/A

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None	* Note: Hard rx / metal fragments at 23' bgs. lower intervals reflect metal that fell down hole from 23'					%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well ERM-34I Installed		X		Warren N. Fox (WF)

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0.0	~~Poorly~~ Poorly Graded Gravel and slag rock. angular poorly graded loose dry (GP)	0.1 ppm PID, No Odor.	NS	NS	NA	5Y 5/1 gray
	5.0'	~~Poorly Graded~~ (GP) Gravel subrounded loose dry poorly graded (No slag).	0.0 ppm PID, No Odor	NS	NS	NA	3 to 22mm 2.5Y 4/4 olive brown also very multicolored white to black 2 to 28mm
	10.0'	Same Gravel (w/ silt) but larger. (GP) (cobbles 65mm Dia) moist.	0.2 ppm PID, No Odor	NS	NS	NA	2.5Y 3/1 very dark gray (~~white~~ (WF)) 4mm to 65mm
	15.0'	~~Poorly Graded~~ Gravel (trace of silt) loose subrounded (GP) moist (mostly quartz river rock)	0.8 ppm PID No Odor	NS	NS	NA	7.5YR 2.5/1 black. Multi colored (white to black) 2.0 to 40mm
	20.0'	Siltstone soft weathered No dolomite Clasts of quartz and gravel (≤10mm) angular	0.3 ppm PID, No odor	NS	NS	NA	5YR 3/3 dark reddish brown 1.0 to 30mm
23' RX	25.0	metal fragments in hole.					

PROJECT: HIA - Middletown

HOLE NO. ERM-34 I

reviewed 9 Feb 95 JFH

Figure 4-1 (Continued)

HTW DRILLING LOG

HOLE NO. ERM-34I

PROJECT: HIA - Middletown | INSPECTOR: Warren Fox | SHEET 2 OF 4 SHEETS

ELEV. b	DEPTH	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	25.0'	Siltstone m. soft weathered Dolomite Cementation trace of angular qts clasts ≤4mm	2.5 ppm PID, No Odor	NS	NS	NA	5YR 3/3 dark reddish brown 1.0 to 25mm
28' metal cuttings in hole 2	30.0'	Similar Material mostly larger cuttings w/traces of clay (balls ≤5mm	6.0 ppm PID, No Odor	NS	NS	NA	2.5YR 1/3 dusky red. 1.0 to 30mm
from 23' to 34'	35.0'	Siltstone m. hard weathered Dolomite cementation trace of dol. clasts ≤3mm subangular	0.1 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red. 1.0 to 40mm
metal balls from 23' in hole	40.0'	Siltstone m. hard to m. soft. weathered Dol. cementation smaller cuttings (mostly ≤10mm)	0.0 ppm PID, No Odor.	NS	NS	NA	2.5YR 3/3 dusky red 1.0 to 15mm
soft	45.0'	Same as above	1.8 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red 1.0 to 30mm
pts of water	50.0'	Siltstone m. hard. weathered Dol. Cementation Clasts/frosty layers of dolomite, angular ≤3mm	1.2 ppm PID, No Odor.	NS	NS	NA	2.5YR 3/3 dusky red. 1.0 to 20mm
	55.0'	Similar material. No clasts Traces of clay.	1.0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red 1.0 to 25mm
	60.0'	Siltstone m. soft weathered Dol. Cementation No clasts/clay	0.0 ppm PID, No odor	NS	NS	NA	2.5YR 3/4 dusky red. 1.0 to 40mm
50 FT	65.0'	Siltstone m. soft. weathered Dol. Cementation Clasts of Dolomite, angular ≤2mm Dia.	6.0 ppm. PID, No Odor.	NS — very slow rise w/ PID,	NS	NA	2.5YR 3/3 dusky rd. 1.0 to 20mm.
	70.0'						

Figure 4-1 (Continued)

HTW DRILLING LOG

HOLE NO. ERM-34 I

PROJECT: HIA - Middletown | INSPECTOR: Warren Fox | SHEET 3 OF 4 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	70.0	Sandstone w/ silt (wacke) f.to m. hard weathered grain-sub-angular Dolomite cementation Clasts of gravels + Calcite - Subangular ≤ 8mm	2.0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red. 1.0 to 38 mm
	75.0'	Similar Material clasts ≤ 12mm	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red 1.0 to 20 mm
	80.0	Same material. clasts smaller (≤ 5mm)	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red. 1.0 to 12 mm
	85.0'	Siltstone / wacke m. hard weathered Dol. cementation Clasts ≤ 3mm subangular	0.8 ppm PID, No Odor	NS	NS	NA	2.5YR 3/4 dusky red 1.0 to 15 mm
	90.0'	Siltstone hard m. weathered Dol. Cementation no clasts	0.2 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red 1.0 to 12 mm
	95.0'	Similar siltstone w/ trace ≤ 2% clasts of dolomite on cuttings.	ppm PID, Odor	NS	NS	NA	2.5YR 3/3 dusky red 1.0 to 20 mm
	100.0'	102' Bottom of borehole	WNE 11-16-94				

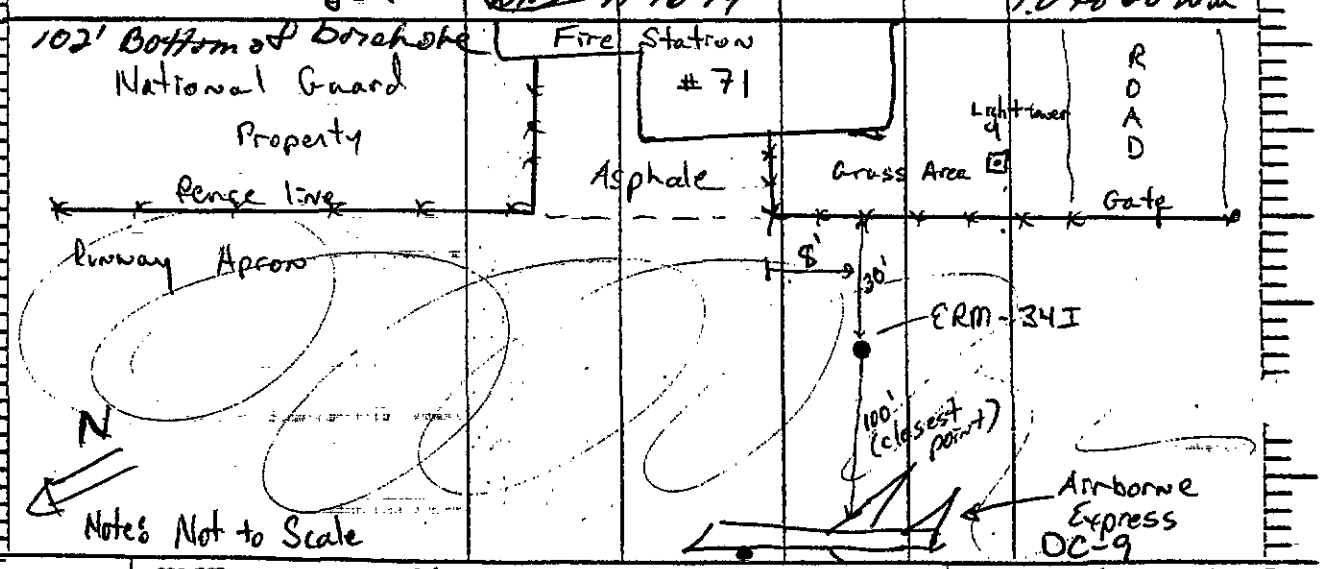
Soft

73' water Hondo

v. soft lots of water

less water

much water again.



PROJECT: HIA - Middletown | HOLE NO. ERM-34 I

Figure 4-1 (Continued)

HTW DRILLING LOG

HOLE NO. ERM-34 I

PROJECT HIA - Middletown

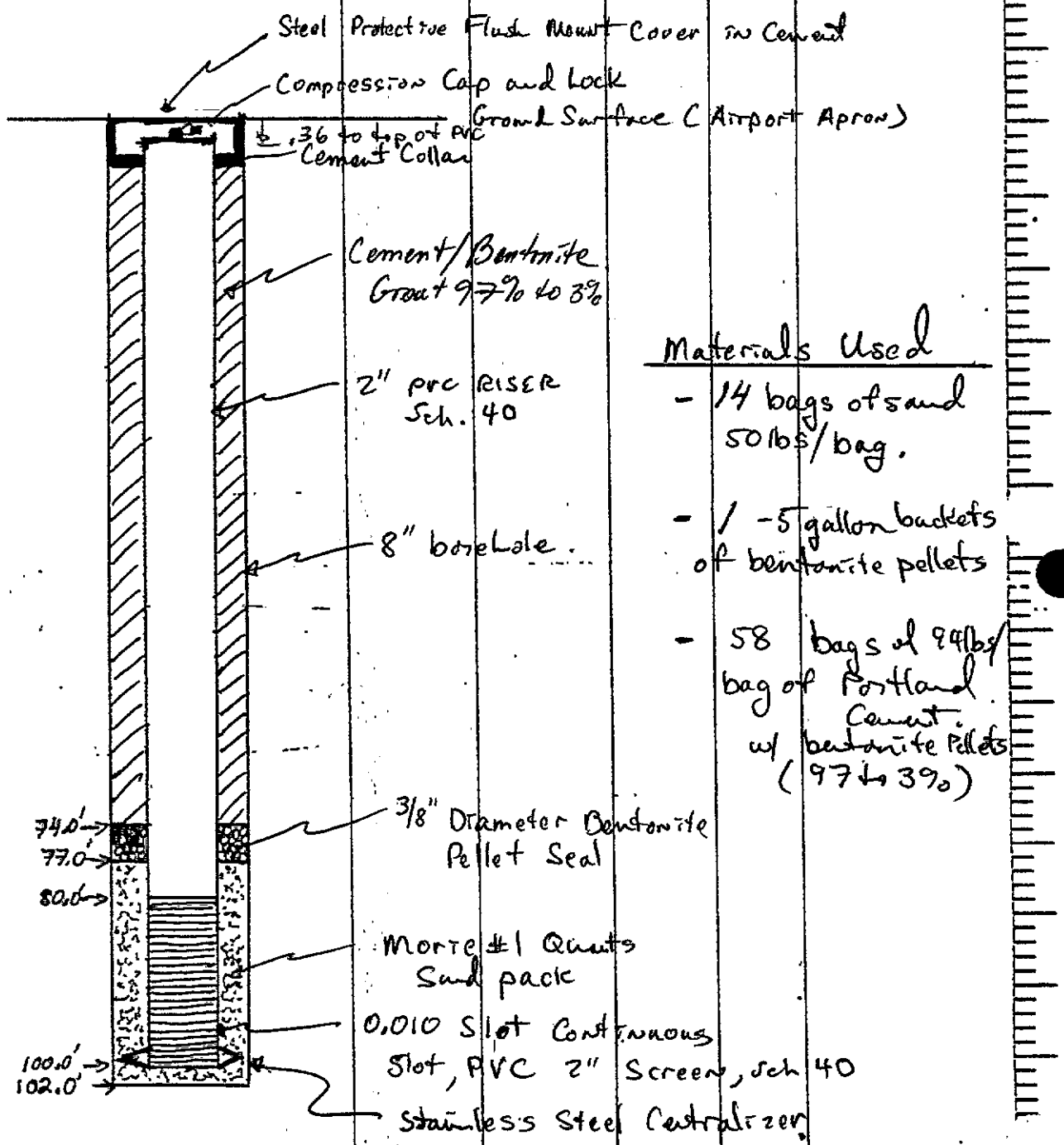
INSPECTOR Warren Fox

SHEET 4 OF 4 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.

ERM-34I

Well Construction Diagram



Materials Used

- 14 bags of sand 50 lbs/bag.
- 1 - 5 gallon buckets of bentonite pellets
- 58 bags of 94 lbs/bag of Portland Cement w/ bentonite Pellets (97 to 3%)

Note: All measurements taken from Below Ground Surface (BGS)
Not to Scale

PROJECT HIA - Middletown

HOLE NO. ERM-34 I

HTW DRILLING LOG

HOLE NO. ERM-35S

1. COMPANY NAME: ERM-PMC
2. DRILLING SUBCONTRACTOR: ADT
SHEET 1 OF 3 SHEETS
3. PROJECT: HIA - MIDDLETOWN
4. LOCATION: MIDDLETOWN, PA
5. NAME OF DRILLER: TROY BROWN
6. MANUFACTURER'S DESIGNATION OF DRILL: MOBILE B-59
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 2" SPLIT SPOON (5); 140 LB HAMMER; 6 5/8" I.D. HOLLOW STEM AUGER TO 20.5'
8. HOLE LOCATION: SOUTH EDGE OF PA ANG
9. SURFACE ELEVATION: NOT SURVEYED
10. DATE STARTED: 3/30/95
11. DATE COMPLETED: 3/30/95
12. OVERBURDEN THICKNESS: ~ 19.5'
13. DEPTH DRILLED INTO ROCK: ~ 1'
14. TOTAL DEPTH OF HOLE: 20.5'
15. DEPTH GROUNDWATER ENCOUNTERED: ~ 14'
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 11.60', 8 DAYS
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):
18. GEOTECHNICAL SAMPLES: 2 — DISTURBED ✓ — UNDISTURBED
19. TOTAL NUMBER OF CORE BOXES: ~~
20. SAMPLES FOR CHEMICAL ANALYSIS: VOC ~~ — METALS ~~ — OTHER (SPECIFY) ~~ — OTHER (SPECIFY) ~~ — OTHER (SPECIFY) ~~
21. TOTAL CORE RECOVERY: ~~ %
22. DISPOSITION OF HOLE: Well ERM-35S installed — BACKFILLED — MONITORING WELL ✓ — OTHER (SPECIFY)
23. SIGNATURE OF INSPECTOR: Derek Evans

ELEV. a.	DEPTH b. (FT)	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0–2	SILTY SAND WITH GRAVEL (SM) MOSTLY FINE SAND, TRACE MEDIUM TO COARSE. FINE, SUBROUNDED TO ROUNDED GRAVEL TRACE CLAY MEDIUM DENSE, DRY SOME ROOTS AND GRASS	0.0 PPM	NS	NS	11, 25, 17, 18	10YR 3/3 20" REC
	2–4	SILTY SAND WITH GRAVEL (SM) FINE TO COARSE SAND, MOSTLY MEDIUM FINE TO COARSE, SUBROUNDED TO ROUNDED GRAVEL TRACE CLAY SOME HEAVY BLACK STAINING (MN?) MEDIUM DENSE TO DENSE, DRY	0.1 PPM	NS	NS	18, 38, 48, 40	10YR 3/3 11" REC
	4–6	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) FINE TO COARSE SAND, MOSTLY MEDIUM FINE, SUBROUNDED TO ROUNDED GRAVEL TRACE CLAY MEDIUM DENSE TO LOOSE, DRY	0.0 PPM	NS	NS	17, 11, 10, 9	10YR 4/4 14" REC
	6–8	SILT (ML) TRACE FINE TO COARSE SAND TRACE FINE, ROUNDED GRAVEL TRACE CLAY SMOOTH SLIGHTLY MOIST	0.1 PPM	IAB-ERM35S (6.0-8.0)	NS	4, 5, 10, 12	5Y 3/1 10YR 3/3 23" REC
	8–10		0.0 PPM	NS	NS	12, 12, 15, 13	10YR 3/3 19" REC

PROJECT: HIA - MIDDLETOWN
HOLE NO. ERM-35S

HTW DRILLING LOG

HOLE NO. ERM-35S

PROJECT HIA - MIDDLETOWN | INSPECTOR D. EVANS | SHEET 2 OF 3 SHEETS

ELEV. b	DEPTH (FT)	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	10	CUTTINGS: SAME AS LAST SPLIT SPOON BUT MORE GRAVEL					
	11						
	12	CUTTINGS BALLING UP					
	13						
	14	WELL GRADED SAND WITH SILT AND GRAVEL (SW-SM) FINE TO COARSE SAND, MOSTLY MED FINE TO COARSE, SUBROUNDED TO ROUNDED GRAVEL. MEDIUM DENSE TO VERY DENSE, WET	0.0 PPM	IAB-ERM 35S (13.0-15.0)	NS	22, 50, 48, 54	10YR 3/3 16" REC
	15						
	16	WATER ENTERS HOLE AFTER SPLIT SPOON SAMPLE MOIST CUTTINGS					
	17						
	18	CUTTINGS: SAME AS ABOVE BUT WITH HIGHER % GRAVEL					
	19	HIT WEATHERED BEDROCK					
	20	CHIPS OF DUSKY RED SANDY SILTSTONE MODERATE TO HIGHLY WEATHERED FINE TO MEDIUM SAND (10-15%)	0.0 PPM	NS	NS	100/5" (REFUSAL)	2.5 YR 3/3 5" REC
	21	ABUNDANT MICA SOFT SOME BLACK STAINING	BOTTOM OF BOREHOLE = 20.5'				

HTW DRILLING LOG

HOLE NO. ERM-35S

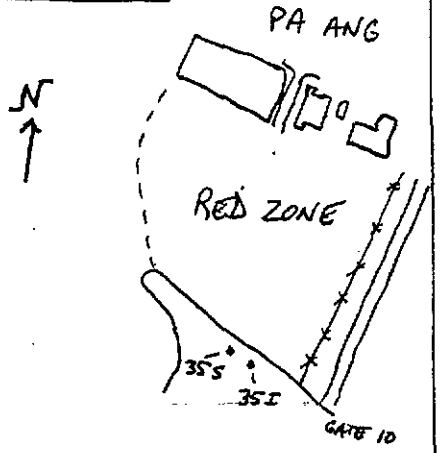
PROJECT: H1A - MIDDLETOWN

INSPECTOR: D. EVANS

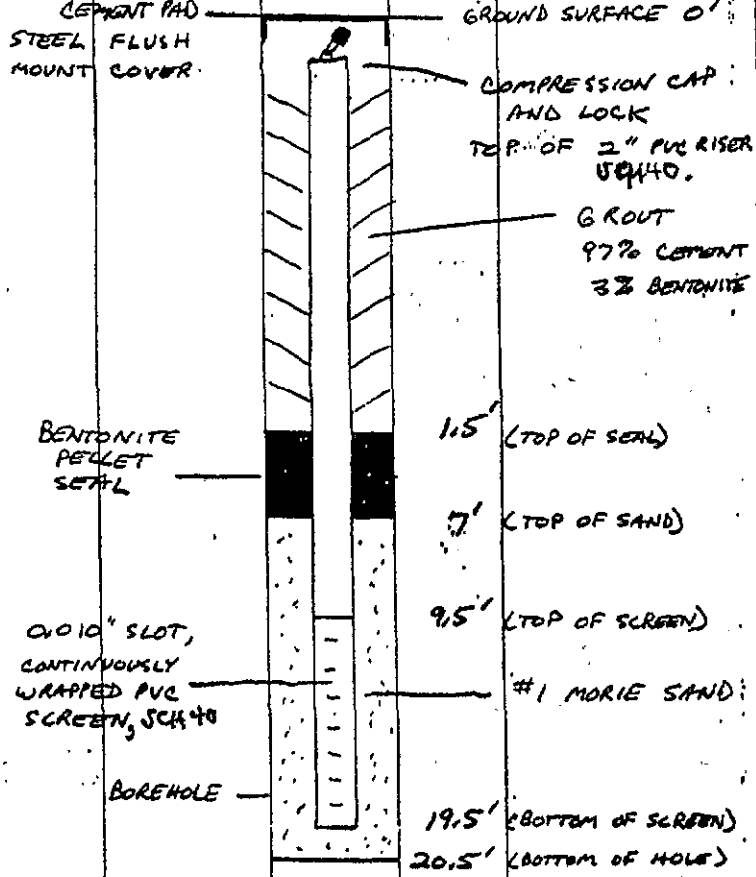
SHEET 3 OF 3 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS

LOCATION



WELL CONSTRUCTION



WELL MATERIALS

10' .10 SLOT CONTINUOUSLY WRAPPED 2" PVC SCREEN

9.5' PVC RISER - SCHEDULE 40

SAND: 7 BAGS

BENTONITE PELLETS: 4 BUCKETS

NOTE: NOT TO SCALE
ALL MEASUREMENTS FROM GROUND SURFACE

PROJECT: H1A - MIDDLETOWN

HOLE NO. ERM-35S

HTW DRILLING LOG

HOLE NO. ERM-35I

1. COMPANY NAME: ERM	2. DRILLING SUBCONTRACTOR: Hydro Group
SHEET 1 OF 4 SHEETS	
3. PROJECT: HIA- Middletown	4. LOCATION: Middletown, PA
5. NAME OF DRILLER: Steve Blair / Ray Kimmel /	6. MANUFACTURER'S DESIGNATION OF DRILL: Barber Rig DR-12
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Barber Rig - Dual Rotary 8" and 12" casing with hammer. Cuttings 8" drilled to -80.0' 12" to 39.0'	8. HOLE LOCATION: See Sheet #3
	9. SURFACE ELEVATION: Unknown
	10. DATE STARTED: 2-2-95 / 11. DATE COMPLETED: 2-10-95
12. OVERBURDEN THICKNESS: 22.0' (35.0' Competent Rock)	15. DEPTH GROUNDWATER ENCOUNTERED: Unknown (≅ 18')
13. DEPTH DRILLED INTO ROCK: 80.0'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —
14. TOTAL DEPTH OF HOLE: 102.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None	Y		

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None						— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well ERM-35I Installed		Y		Wm N. Fa

TRACE = (<10%)

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS (PID) d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS (Color / Cuttings)
	0.0	Gravel w/ silt loose, dry sub rounded to angular poorly graded, w. graded uniform sorted	0 ppm, No Odor	NS	NS	NA	10YR 5/4 yellowish brown GW-GM 3mm to 12mm
	5.0'	Similar material (larger gravel)	0 ppm, Faint Odor (petroleum)	"	"	"	10YR 5/3 brown 3mm to 20mm
	10.0'	Gravel w silt loose, moist poorly graded sorted uniform, subangular	0 ppm, No Odor	"	"	"	10YR 4/3 brown 1.0 to 28mm
	15.0'	Similar gravel. rounded through to angular	0 ppm, No Odor	"	"	"	7.5YR 5/3 brown 1.0 to 25mm
	20.0'	Siltstone w/trace of v.f. sand s. rounded v. weathered soft, wet Some gravel - Rounded ≤15 mm	0 ppm, No Odor	"	"	"	2.5YR 3/4 dusky red. 1.0 to 25mm
	25.0'						

reviewed 2/6/95 JFB

PROJECT: HIA - Middletown

HOLE NO. ERM-35I

HTW DRILLING LOG

HOLE NO. ERM-35I

PROJECT: HIA - Middletown | INSPECTOR: Warren Fox | SHEET 2 OF 4 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS PID d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS Color/Cuttings
	25.0	Siltstone soft m. weathered with rounded gravel ≤ 5 mm Dol. Cementation	0 ppm, No Odor	NS	NS	NA	2.5YR 3/3 dusky red
							1.0 to 30 mm
	30.0	Siltstone w/ trace of v.f. sand subrounded m. hard weathered No Clasts Dol. Cementation	0 ppm, No Odor	"	"	"	2.5YR 3/3 dusky red
							1.0 to 35 mm
	35.0	Similar Material	0 ppm, No Odor	"	"	"	2.5YR 3/2 dusky red
							1.0 to 15 mm
	40.0	Sandy Siltstone (f.g. subrounded) m. hard weathered No Clasts Dol. Cementation	0 ppm, No Odor	"	"	"	2.5YR 3/3 Dusky red
							1.0 to 20 mm
	45.0	Siltstone m. hard s. weathered No Clasts Dol. Cementation	0 ppm, No Odor	"	"	"	2.5YR 3/4 Dusky red
							1.0 to 20 mm
	50.0	Same Material	0 ppm, No Odor	"	"	"	2.5YR 3/3 dusky red
							1.0 to 25 mm
	55.0	Similar Material Trace of carbonate clasts ≤ 4mm weathered	0 ppm, No Odor	"	"	"	2.5YR 3/3 dusky red.
							1.0 to 12 mm
	60.0	Similar Material (No clasts)	0 ppm, No Odor	"	"	"	2.5YR 3/3 dusky red
							1.0 to 15 mm
	65.0	Same Material	0 ppm, No Odor	"	"	"	2.5YR 3/3 dusky red
							1.0 to 28 mm
	70.0						

Notes: 35.0 — hard (51') — 55.0 — Siltstone (57') — 62.0 — 64.0 — hard 5 feet 2 — 65.0

HTW DRILLING LOG

HOLE NO. ERM-35I

PROJECT: HIA-Middletown | INSPECTOR: Warren Fox | SHEET 3 OF 4 SHEETS

ELEV. b.	DEPTH a.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS PID d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	70.0'	Siltstone m. hard s. weathered No clasts Dol. Cementation	0 ppm, No Odor	NS	NS	NA	2.5YR 3/4 dusky red
	75.0'						1.0 to 60 mm
		Same Material (no clasts)	0 ppm, No Odor	"	"	"	2.5YR 3/3 dusky red
	80.0'						1.0 to 30 mm
		Similar Material clasts of weathered silty material (slight green) ≤ 4 mm.	0 ppm, No Odor	"	"	"	2.5YR 3/4 dusky red
	85.0'						1.0 to 12 mm
		Sandy Siltstone f.gr. sub rounded m. hard s. weathered Clasts ≅ 10% Qtz subrounded Dol. Cementation.	0 ppm, No Odor	"	"	"	2.5YR 3/3 dusky red
	90.0'						1.0 to 8.0 mm
		Similar Material (clasts ≥ 40%, sub angular ≤ 10 mm	0 ppm, No Odor	"	"	"	2.5YR 3/4 dusky red
Fracture	95.0'						1.0 to 18 mm
		Siltstone m. hard s. weathered Trace of Qtz clasts subrounded ≤ 8 mm	0 ppm, No Odor	"	"	"	2.5YR 3/3 dusky red
	100.0'						
	102'	Dol. Cementation.					1.0 to 10 mm

Harder →
"

Bottom of Bore hole at 102' 2-3-95 (WNA)

(PA National Guard Area)

PAANG Cement Apron

APRON

Engine Test Cell

Red Restricted Line

Gate #10

Edge 17' N

NORTH

last fence post. 75'

Asphalt Drive

Log Road

ERM-35I

Grass Area

Note: Site location map not to Scale.

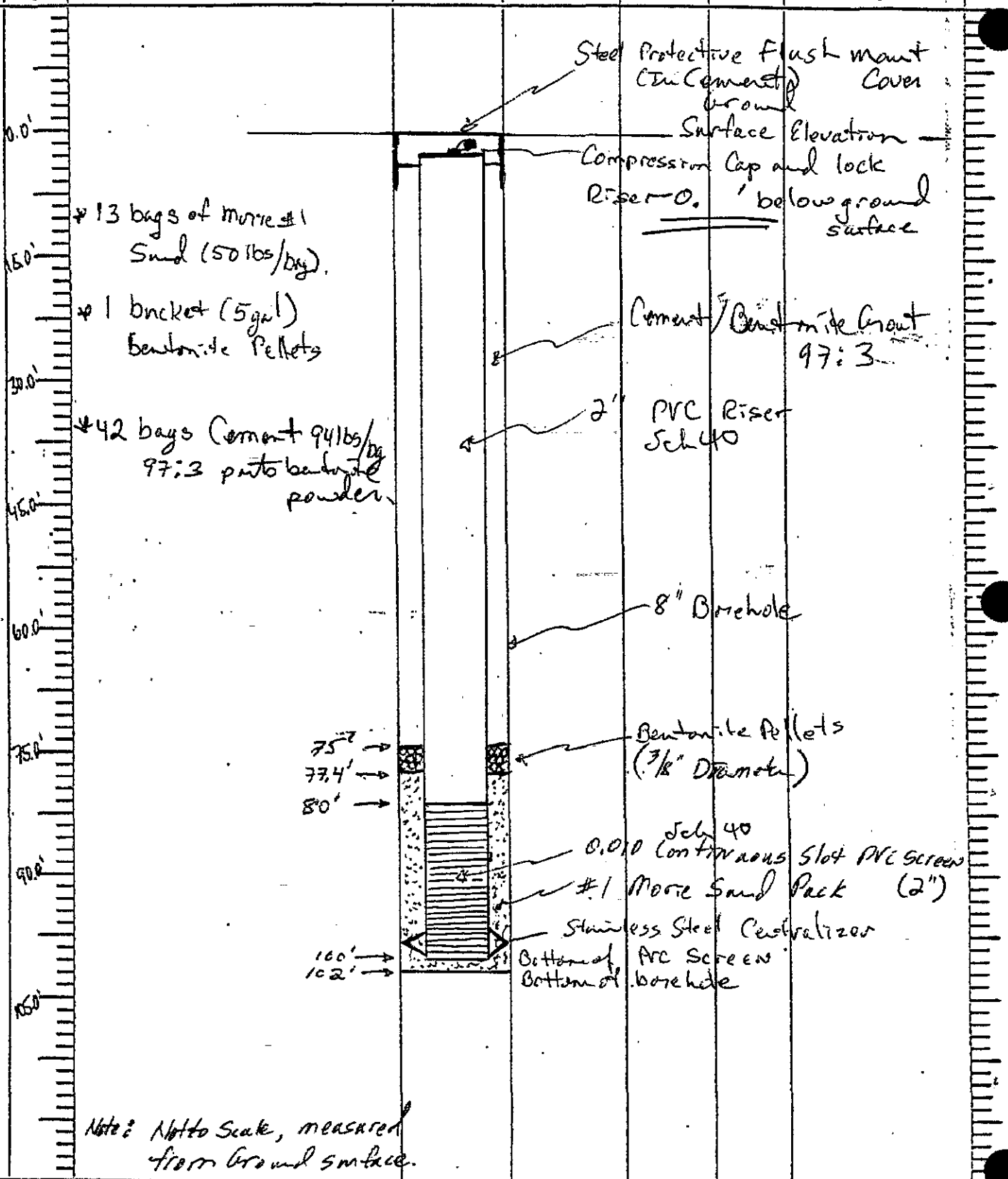
PROJECT: HIA-Middletown | HOLE NO. ERM-35I

HTW DRILLING LOG

HOLE NO. ERM-35I

PROJECT HIA-Middletown | INSPECTOR Warren Fox | SHEET 4 OF 4 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.



PROJECT HIA - Middletown | HOLE NO. ERM-35I

Capture Zone Wells

HTW DRILLING LOG

HOLE NO. ERM-215

SHEET 1 OF SHEETS

1. COMPANY NAME: ERM-PMC	2. DRILLING SUBCONTRACTOR: ADT-MA
3. PROJECT: Middletown HIA	4. LOCATION: Middletown PA
5. NAME OF DRILLER: Troy Brown	6. MANUFACTURER'S DESIGNATION OF DRILL: Mobil B-59
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: B-59; 6 5/8" ID Augers; 2" Split Spoons; 140 lb hammer; Roller bit 5 7/8"	8. HOLE LOCATION: See page #3
	9. SURFACE ELEVATION: Not Surveyed
	10. DATE STARTED: 1/30/95
	11. DATE COMPLETED: 2/3/95 Flushmt installed
12. OVERBURDEN THICKNESS: 22 1/2'	15. DEPTH GROUNDWATER ENCOUNTERED: ~21' BGS
13. DEPTH DRILLED INTO ROCK: 13 1/2'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 19' BGS @ 805 7/31/95
14. TOTAL DEPTH OF HOLE: 36'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NS	✓		

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
NA						

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Monitoring Well ERM-215		✓		James T. Ryan

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0–1	4" Asphalt over GRAVEL "WELL GRADED" GRAVEL" (FILL)					AUGER cuttings GW-
	2–3	V. Fine to "SILTY SAND" Fine Sand, LITTLE SILT, TR GRAVEL, Stratified w. thin silt layers, dry, v. dense	0ppm	NS	NA	38, 68 47, 27	7.5YR 3/4 SM Rec 20"
	4–5	"Poorly Graded Sand" Fine* to Coarse, trace gravel (subrounded to rounded) V. dense, dry	0ppm	NS	NA	30, 32 26, 24	7.5 YR 4/4 SP Rec 18"
	6–7	Same "Poorly Graded Sand" with black mottling	0ppm	NS	NA	11, 11 16, 28	7.5 YR 4/4 SP Rec 17"
	8–9	Fine to Coarse Sand, Well Graded Sand with gravel (Subangular to rounded), tr silt, V. dense, dry to Sl. moist	0ppm	NS	NA	21, 26 23, 30	7.5 YR 4/4 SW- Rec 12"

PROJECT: Middletown

HOLE NO. ERM-215

HTW DRILLING LOG

HOLE NO. ERM-215

PROJECT Middletown | INSPECTOR J. Ryan | SHEET 2 OF SHEETS

ELEV. b.	DEPTH	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	10	@ 10' Gravel					↑ Drill rig
	11	subrounded to rounded - GW					starts to chatter
	12	Well Graded Gravel					CUTTINGS
	13						
	14						
	15	Fine to Coarse Sand = Well Graded Gravel w/ Sand and gravel, trace Silt - (subangular	0ppm	NS	NA	20,75 77,50/3"	7.5 YR 4/4
	16	V. dense to rounded) Sl. MOIST					GW Rec 8"
	17	grading back GW to pure Gravel Well Graded Gravel					drill rig chatters to ~19' BGS
	18						
	19						CUTTINGS
	20	Fine to Coarse Sand and gravel (rounded to subrounded) V. dense, "Saturated" Well Graded Gravel w/ Sand	0ppm	NS	NA	44,50/1" refusal	AUGER PLUG COMES UP WET 7 YR 4/4 GW 6" Rec
	21						
	22	GRAVEL Well Graded Gravel @ 22½'					@ 22½' chattering stops - begin smooth hard drilling "BEDRX"
	23	SILTY SANDSTONE					
	24	"WACKE" LIGHTLY WEATHERED TO HIGHLY WEATHERED					ADVANCE AUGERS TO 25'
	25	Decomposed zones noticed in cuttings					2.5 YR 3/4
	26	good water bearing fracture @ ~26'					
	27						
	28						
	29						

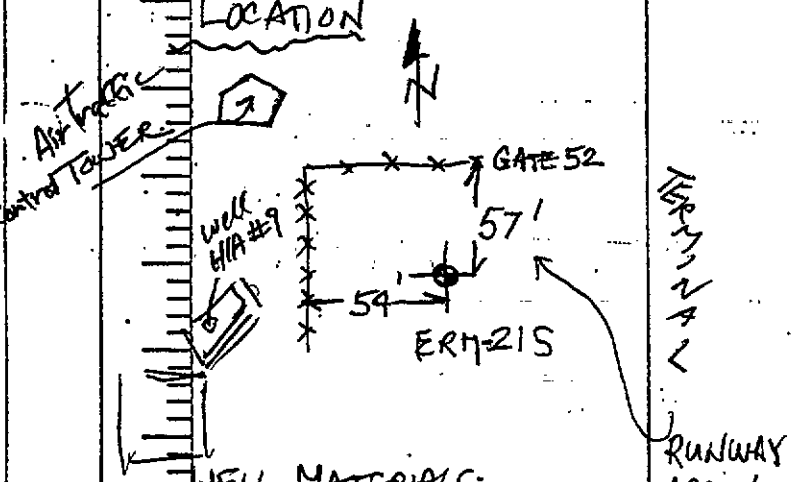
HTW DRILLING LOG

HOLE NO. ERM-21S

PROJECT Middletown | INSPECTOR J. Ryan | SHEET 3 OF SHEETS

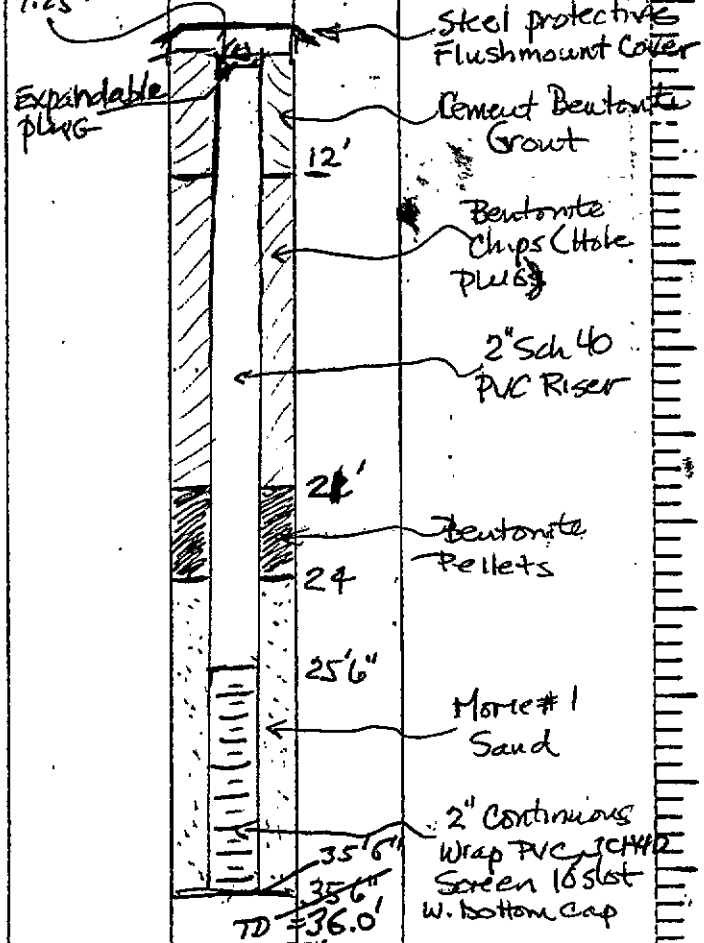
ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	30						
	31						
	32						
	33						
	34						
	35						
	36	EOB @ 36'					

LOCATION



WELL MATERIALS:
10' Continuous wrap PVC 2" 10 slot
Sand 2½ bags
Bent pellets 1 bucket
Bent Hole plug 8 bags
Riser: 25' PVC Sch 40

ERM-21S
WELL CONSTRUCTION:



PROJECT Middletown | HOLE NO. ERM-21S

Figure 4-1

HTW DRILLING LOG

HOLE NO. ERM-21I

1. COMPANY NAME: ERM - PMC	2. DRILLING SUBCONTRACTOR: Hydro Group
SHEET 1 OF 6 SHEETS	
3. PROJECT: HIA - Middletown	4. LOCATION: Middletown, PA
5. DRILLER: Steve Blair / Bernie Connor	6. MANUFACTURER'S DESIGNATION OF DRILL: Barber Rig, DR-12
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Temp Casing 12" to 26.5' 8" to 180.0'; Dual Rotary - Barber Rig. 12" casing and 8" casing advanced with 12" & 8" air hammer	8. HOLE LOCATION: See Map - Sheet #6
	9. SURFACE ELEVATION: Not Surveyed
	10. DATE STARTED: 1-4-95
	11. DATE COMPLETED:
12. OVERBURDEN THICKNESS: ≅ 20.0' (26.0' Consolidated Rx)	13. DEPTH GROUNDWATER ENCOUNTERED: Unknown (≅ 22.0') Fractures - 94', 102', 124'?
14. DEPTH DRILLED INTO ROCK: 180.0'	15. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A
16. TOTAL DEPTH OF HOLE: 202.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): None

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None	X		None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None						0 %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well Installed		X		Warren Tap

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS c.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS Cuttings % / Color
	0.0'	Poorly Graded Gravel w/sand: Gravel with fine sand (angular) (GP) (possible slag) poorly graded, dry	PID: 0ppm, No Odor	NS	NS	NA	2.5Y 4/1 Dark gray; 20 to 40mm
	5.0	Poorly Graded Gravel w/ sand: Gravel also fine sand angular (GP) more gravel than above poorly graded, dry	0ppm, No Odor	"	"	"	2.5Y 4/1 Dark gray; 2.0 to 10mm
	10.0'	Poorly Graded Gravel (GP): Gravel with less sand. fine to coarse grained subrounded gravel is also subrounded, dry, poorly graded.	0ppm No Odor	"	"	"	10YR3/4 dark yellowish brown; 2.0 to 30mm
	15.0'	Poorly Graded Gravel: trace of med. sand (subangular) loose rounded to subrounded water added (wet) poorly graded. (GP)	1.0ppm No Odor	"	"	"	10YR4/2 dark grayish brown; 5 to 25 mm
	20.0'	Siltstone soft weathered uniform (chips of cuttings subrounded)	1.4ppm, No Odor	"	"	"	5YR4/6 Yellowish red; 3 to 20mm
H+ Bedrock + Water	25.0'						

reviewed 9/26/95 JFP

PROJECT: HIA - Middletown

HOLE NO. ERM-21I

HTW DRILLING LOG

HOLE NO. ERM-21I

PROJECT: HIA - Middletown | INSPECTOR: Warren Fox | SHEET 2 of 6 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS PID	CLOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS Cuttings w Color
	25.0'	Siltstone weathered soft no clasts HCL(-) uniform cuttings, angular	0.7 ppm, No Odor	NS	NS	NA	5YR 3/4 dark reddish brown 1.0 to 25 mm
	30.0'	Siltstone (Siltstone) trace of fine sand (sub-angular) weathered soft, no clasts HCL(-) uniform cuttings (angular)	0.8 ppm, No Odor	"	"	"	2.5YR 3/2 dusky red. 1.0 to 30 mm
	35.0'	Same Material	1.8 ppm No Odor	"	"	"	2.5YR 3/3 dusky red 1.0 to 35 mm
	40.0'	Same Material	0.0 ppm No Odor	"	"	"	2.5YR 3/3 dusky red. 1.0 to 30 mm
	45.0'	Siltstone m. soft m. weathered clasts of quartz and dolomite angular ~~<15 mm~~ 10 mm and smaller HCL(+)	0.0 ppm, No Odor	"	"	"	2.5YR 3/4 dusky red. 1.0 to 10 mm
FRACTURE H_2O	50.0'	Siltstone m. soft m. weathered clasts of quartz HCL - (subrounded)	0.0 ppm, No Odor	"	"	"	2.5YR 3/3 dusky red 1.0 to 15 mm
	55.0'	Siltstone m. hard m. weathered no clasts HCL (-)	0.0 ppm No Odor	"	"	"	2.5YR 3/3 dusky red. 1.0 to 20 mm
	60.0'	Siltstone m. hard m. weathered trace of quartz clasts <2% angular HCL(+) Some dolomitic cementation <20%	0.0 ppm, No Odor	"	"	"	2.5YR 3/3 dusky red 1.0 to 30 mm
	65.0'	Siltstone with trace of fine sand (sub-angular) m. hard m. weathered HCL + (Dol cementation)	0 ppm, No Odor	"	"	"	2.5YR 3/2 dusky red 1.0 to 15 mm
	70.0' X						

HTW DRILLING LOG

PROJECT: HIA - Middletown | INSPECTOR: Warren Fox | HOLE NO. ERM 21 I | SHEET 3 of 6 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS PID	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS Color/Cuttings
	70.0'	Siltstone m. hard m. weathered no clasts/Quartz HCl + (Dol. Cementation)	0 ppm, No Odor	NS	NS	NA	2.5YR 3/4 dusky red
	75.0'						1.0 to 42 mm
		Siltstone w/ trace of fine sand (subangular) m. hard to hard m. weathered, Dol. cementation clasts of quartz and calcite (angular)	0.0 ppm, No Odor.	"	"	"	2.5YR 3/4 dusky red
	80.0'			≤5mm	≤10%		1.0 to 35 mm
		Same as above but less clasts ≤5%	0.0 ppm No Odor	"	"	"	2.5YR 3/3 dusky Red
	85.0'						1.0 to 15 mm
		Siltstone m. hard m. weathered no clasts Dolomite Cementation	0.0 ppm, No Odor	"	"	"	2.5YR 3/3 dusky red
	90.0'						1.0 to 13 mm
		Same Material	0.0 ppm No Odor	"	"	"	2.5YR 3/3. dusky red
94' Water							
	95.0'						1.0 to 55 mm
		Siltstone m. hard weathered few quartz clasts (subangular) ≤4mm mottled with gray, weathered dolomite.	0.0 ppm, No Odor	"	"	"	2.5YR 3/4 dusky red
	100.0'						1.0 to 30mm
102' Water		Silty Sandstone/Wacke m. soft. weathered lt. gray. quartz clasts, subrounded Dol. Cementation	0.0 ppm, No Odor Subrounded (≤3mm).	"	"	"	2.5YR 3/3 dusky red.
	105.0'						1.0 to 12 mm
		Siltstone m. ~~hard~~ soft (WF) weathered fragments/clasts of quartz calcite and dolomite. ≤5mm, subangular. Dol. cementation.	0.0 ppm, No Odor	"	"	"	2.5YR 3/4 dusky red.
	110.0'						1.0 to 40mm
		Similar siltstone. * No Fragments/clasts.	0.0 ppm, No Odor.	"	"	"	2.5YR 2.5/4 very dusky red.
	115.0'						1.0 to 23mm

HTW DRILLING LOG

HOLE NO. ERM-21I

PROJECT: HIA - Middletown | INSPECTOR: Warren Fop | SHEET 4 of 6 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS PID d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS Color / Cuttings
	115.0'	Siltstone m. soft weathered no clasts Dol. cementation with mottled gray/green weathered dolomite in cuttings.	0.0ppm, No Odor	NS	NS	NA	2.5YR 3/3 dusky red 1.0 to 15 mm
	120.0'	Silty Sandstone / Wacke V. hard at 124'. Dol. cementation m. weathered f. sand. sub rounded clasts of calcite/dol. rounded, weathered. ≤4-5mm quartz clasts subrounded to	0.0ppm, No Odor	"	"	"	2.5YR 3/2 dusky red Water at 124' 1.0 to 30mm
	125.0'	Silty Sandstone / Wacke m. grain sand - sub angular mod hard m. weathered, Dol. Cementation. trace of quartz/calcite clasts. sub rounded ≤5mm.	0.0ppm, No Odor	"	"	"	2.5YR 3/3 dusky red " Still Water " 1.0 to 15mm
	130.0'	Same material.	0.0ppm, No Odor.	"	"	"	2.5YR 3/4 dusky red " Water to 130.0' 1.0 to 5mm
	135.0'	Siltstone m. hard m. weathered No clasts trace calcite on cuttings white / green dolomitic cementation	0.0ppm, No Odor	"	"	"	2.5YR 3/2 Dusky Red 1.0 to 10mm
	140.0'	Siltstone hard. s.m. weathered. No Clasts Dol. Cementation	0.0ppm, No Odor	"	"	"	2.5YR 3/2 Dusky Red 1.0 to 45 mm
	145.0'	Similar material (trace ≤5% calcite fragments on cuttings).	0.0ppm, No Odor	"	"	"	2.5YR 3/2 dusky red 1.0 to 21mm
	150.0'	Siltstone hard s. weathered (clast) trace of angular calcite ≤5mm (green) Dol. Cementation.	0.0ppm, No Odor	"	"	"	2.5YR 3/2 dusky red 1.0 to 28mm
	155.0'	Same as above (but no calcite clasts)	0.0ppm, No Odor	"	"	"	2.5YR 3/3 dusky red 1.0 to 30mm
	160.0'						

Hot spot!

PROJECT: HIA - Middletown | HOLE NO. ERM-21I

HTW DRILLING LOG

PROJECT: HIA - Middletown | INSPECTOR: Warren Fox | HOLE NO. ERM-21F | SHEET 5 of 6 SHEETS

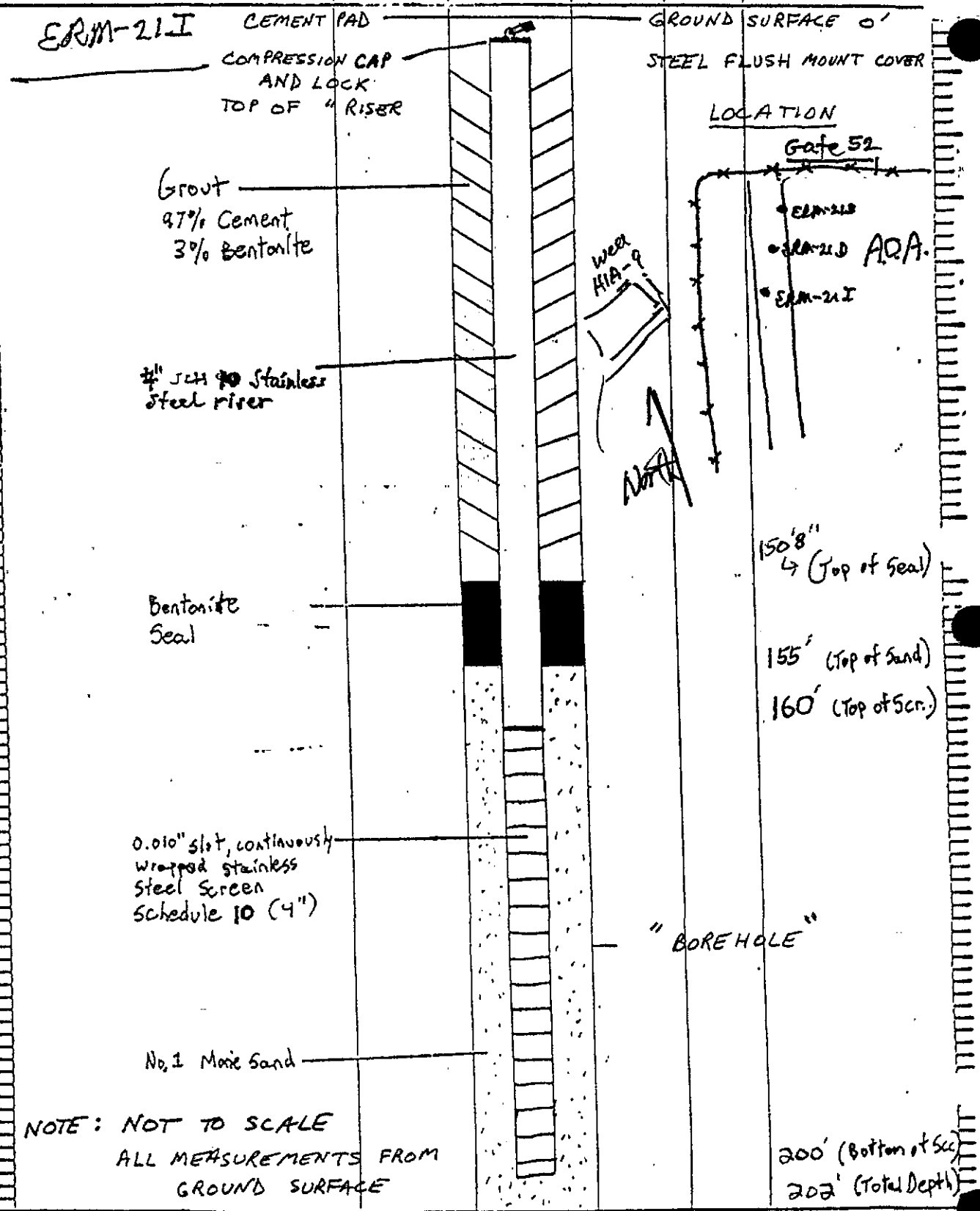
ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS Color / Cuttings
	160.0	Silty sandstone / Wacke hard s.weathering No clasts Dol. Cementation. fine grain subangular	0.0ppm, No Odor	NS	NS	NA	2.5YR 3/2 dusky red
	Softer			≥165' lots of water.			
	165.0'						1.0 to 20 mm
	Watered	Siltstone hard s.weathered No clasts Dol. Cementation	0.0ppm No Odor	"	"	"	2.5YR 3/2 dusky red
	170.0'						1.0 to 15mm
		Similar Material	0.0ppm No Odor	"	"	"	2.5YR 3/3 dusky red
	175.0'						1.0 to 35mm
		Similar Material	0.0ppm No Odor	"	"	"	2.5YR 3/2 dusky red
	180.0'						1.0 to 30mm
		Similar Material	0.0ppm No Odor	"	"	"	2.5YR 3/2 dusky red
	185.0'						1.0 to 13 mm
		Siltstone hard s.weathered No clasts pot calcite (white) deposits on (≤5%) weathered cuttings, Dol. cementation	0.0ppm No Odor	"	"	"	2.5YR 3/3 dusky red
	190.0'						1.0 to 10mm
		Siltstone hard s.weathered. No clasts Dol. Cementation.	1.0 ppm No Odor	"	"	"	2.5YR 3/2 dusky red
	195.0'						1.0 to 15mm
		Similar to above w/ traces of calcite deposits on cuttings.	1.8ppm No Odor	"	"	"	2.5YR 3/3 dusky red
	200.0'						1.0 to 8mm
		202.0' Bottom of borehole 1-9-95 WNF					
		Well Diagram on Sheet Six will follow after borehole is video logged!					

HTW DRILLING LOG

HOLE NO. ERM-21I

PROJECT HIA, Middletown | INSPECTOR D. Haller | SHEET 6 OF 6 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS



PROJECT HIA, Middletown | HOLE NO. ERM-21I

HTW DRILLING LOG

HOLE NO. ERM-21D

1. COMPANY NAME: ERM	2. DRILLING SUBCONTRACTOR: HYDRO GROUP
SHEET 1 OF 15 SHEETS	
3. PROJECT: HIA - MIDDLETOWN	4. LOCATION: MIDDLETOWN, PA
5. NAME OF DRILLER: JESSE ARNETT	6. MANUFACTURER'S DESIGNATION OF DRILL: BARBER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 16" BIT & CASING TO 24'; 12" BIT & CASING TO 199'; 8" BIT + Casing to 603' = Temporary Casings. Dual Rotary	8. HOLE LOCATION: NW Corner of Apron, near Firehouse
	9. SURFACE ELEVATION:
	10. DATE STARTED: 2/22/95
	11. DATE COMPLETED: 3/9/95 (drilling)
12. OVERBURDEN THICKNESS: ~ 22'	15. DEPTH GROUNDWATER ENCOUNTERED:
13. DEPTH DRILLED INTO ROCK: ≈ 581'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED:
14. TOTAL DEPTH OF HOLE: 603'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
						%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		Derek Evans / D. Haller

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0	FILL MATERIAL POORLY GRADED FINE GRAVEL LOOSE DRY (GP) ANGULAR	0.4 PPM @ 3'	NS	NS	NA	VARIOUS COLORS 5B 4/1 2 TO 15 mm
	5'	WELL GRADED GRAVEL FINE TO COARSE LOOSE MOIST (GW) ROUNDED TO SUBANGULAR	0.0 PPM @ 7'				VARIOUS COLORS 2.5 YR 4/4 5Y 6/1 2 TO 25 mm
	10'		0.0 PPM @ 12'				
	15'		0.0 PPM @ 17'				
	20'	Bedrock (SILTSTONE) (SWITCHED OVER FROM 16" TO 12" AT 24')	0.0 PPM @ 22'	HIT WEATHERED BRX AT ≈ 22.5' HIT COMPETENT BRX AT ≈ 23'			
	25'						

PROJECT: HIA - MIDDLETOWN

HOLE NO. ERM-21D

HTW DRILLING LOG

HOLE NO. ERM-21D

PROJECT: HIA - MIDDLETOWN

INSPECTOR: D. EVANS

SHEET 2 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	25'	RED SILTSTONE SLIGHTLY WEATHERED SOFT ABUNDANT MICA ~~CALCITIC~~ DOLOMITIC CALCAREOUS	0.0 PPM @ 27'	NS	NS	NA	2.5YR 4/3 CUTTINGS: SUBROUNDED 2 TO 30 mm
	30'		0.0 PPM @ 32'				
	35'	RED SANDY SILTSTONE SLIGHTLY WEATHERED MOD. HARD FINE-GRAINED SAND ABUND. MICA CALCAREOUS SOME DOLOMITE NODULES	4.1 PPM @ 38'				SAME AS ABOVE
	40'	RED SILTSTONE SLIGHTLY WEATHERED MOD. HARD ABUND. MICA CALCAREOUS	0.0 PPM @ 43'				SAME AS ABOVE 2 TO 20 mm
	45'		0.0 PPM @ 49'				
	50'	RED SANDY SILTSTONE TO RED SILTY FINE-GRAINED SANDSTONE (WACKE) UNWEATHERED CALCAREOUS TO DOLOMITIC MOD. HARD ABUND. MICA	0.0 PPM @ 53'				SAME AS ABOVE
	55'	RED FINE TO MEDIUM-GRAINED SILTY SANDSTONE UNWEATHERED SOME PIECES OF CALCITE MOD. HARD CALCAREOUS TRACE FINE GRAVEL	0.0 PPM @ 57'				2.5YR 4/2 CUTTINGS: SUBROUNDED 2 TO 20 mm
	60'	RED SILTSTONE UNWEATHERED CALCITE PPT. ON SURFACES OF SOME CUTTINGS MOD. HARD ABUND. MICA CALCAREOUS	0.0 PPM @ 64'				2.5YR 3/2 CUTTINGS: SUBANGULAR 2 TO 20 mm
	65'		0.0 PPM @ 68'				
	70'						

HTW DRILLING LOG

HOLE NO. ERM-21D

PROJECT: HIA - MIDDLETOWN

INSPECTOR: A. EVANS

SHEET 3 OF 15 SHEETS

ELEV. b.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	70	SEE PREVIOUS PAGE	0.6 PPM @ 72'	NS	NS	NA	SEE PREVIOUS PAGE
	75'		0.0 PPM @ 79'				
	80'	RED SANDY SILTSTONE (FINE TO MOD. SAND) AND RED ~~SANDY~~ SILTY FINE-GRAINED SANDSTONE (WACKE) UNWEATHERED MOD. HARD ABUND. MICA CALCAREOUS-DOLOMITIC SOME CALCITE PPT.	0.0 PPM @ 83'				2.5YR 3/2 CUTTINGS: SUBROUNDED 2 TO 20 mm
	85'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC SOME CALCITE PPT.	2.7 PPM @ 88'				SAME AS ABOVE
	90'	RED SILTY FINE TO COARSE-GRAINED SANDSTONE (WACKE) UNWEATHERED MOD. HARD CALCAREOUS SOME CALCITE PPT AND GRAVEL-SIZED LITHIC FRAGMENTS	2.1 PPM @ 92'				2.5 YR 4/2 CUTTINGS: SUBROUNDED TO ROUNDED 2 TO 25 mm
	95'	RED SANDY SILTSTONE FINE TO MEDIUM SAND UNWEATHERED MOD. HARD ABUND. MICA CALCAREOUS-DOLOMITIC SOME SMOOTHED SURFACES AND CALCITE PPT.	3.1 PPM @ 97'				2.5YR 3/3 CUTTINGS: SUBANGULAR 2 TO 25 mm
	100'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA CALCAREOUS	0.0 PPM @ 102'	(POSSIBLE FRACTURE AT ~104')			2.5YR 3/2 CUTTINGS: SUBANGULAR 2 TO 25 mm
	105'	RED SILTSTONE AND RED SANDY SILTSTONE UNWEATHERED SOFT ABUND MICA CALCAREOUS-DOLOMITIC FINE-GRAINED SAND	0.0 PPM @ 107'				SAME AS ABOVE
	110'	RED SILTY FINE TO MEDIUM-GRAINED SANDSTONE (WACKE) UNWEATHERED MOD HARD DOLOMITIC SOME DISCOLORATION -WHITE & BLACK SAND ON SOME CUTTINGS	0.0 PPM @ 112'				2.5YR 3/3 CUTTINGS: SUBROUNDED 2 TO 30 mm
	115'						

HTW DRILLING LOG

HOLE NO. ERM-21D

PROJECT: HIA - MIDDLETOWN

INSPECTOR: D. EVANS

SHEET 4 OF 15 SHEETS

ELEV. L.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	120 115'	RED SILTY FINE TO MEDIUM-GRAINED SANDSTONE (WACKE) WITH TR. SOME COARSE TO FINE GRAVEL. UNWEATHERED MOD. HARD DOLOMITIC. GRAVEL - ANGULAR QUARTZ, DOLOMITE, K-FELDSPAR	0.0 PPM @ 117'				2.5 YR 3/3 CUTTINGS: SUBROUNDED TO ANGULAR 2-30 mm
	125'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	0.0 PPM @ 122'	MODERATE WATER PRODUCTION ~ 4000 GAL			2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 20 mm
	130'		0.0 PPM @ 128'				2 TO 30 mm
	135'	RED SILTY FINE TO MEDIUM GRAINED SANDSTONE (WACKE) WITH TRACE FINE GRAVEL. UNWEATHERED MOD. HARD DOLOMITIC. GRAVEL - ANGULAR QUARTZ, DOLOMITE, K-FELDSPAR	0.0 PPM @ 132'				2.5YR 5/4 CUTTINGS: SUBROUNDED 2 TO 20 mm
	140'	RED BRECCIA MATRIX SUPPORTED UNWEATHERED HARD FINE TO RED SAND AND SILT MATRIX DOLOMITIC. CLASTS - QUARTZ, DOLOMITE, FELDSPAR	0.0 PPM @ 138'	PRODUCTION			MATRIX: 2.5YR 5/4 CLASTS: ASSORTED COLORS ANGULAR TO SUBROUNDED 2 TO 30 mm
			0.0 PPM @ 142'				CUTTINGS: ANGULAR TO SUBROUNDED 2 TO 25 mm
	145'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	0.0 PPM @ 148'	HIGH WATER ~ 10,000 GAL			2.5YR 3/2 CUTTINGS: SUBANGULAR 2 TO 20 mm
	150'		0.0 PPM @ 152'				
	155'		0.0 PPM @ 157'				
	160'						

HTW DRILLING LOG

PROJECT: HIA - MIDDLETOWN | INSPECTOR: D. EVANS | HOLE NO. ERM-21D | SHEET 5 OF 15 SHEETS

EV. L.	DEPTH B.	DESCRIPTION OF MATERIALS C.	FIELD SCREENING RESULTS G.	GEOTECH SAMPLE OR CORE BOX NO. H.	ANALYTICAL SAMPLE NO. I.	BLOW COUNTS J.	REMARKS M.
	160'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	0.0 PPM @ 162'	NS	NS	ND	2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 15 mm
	165'		0.0 PPM @ 167'	HIGH WATER PRODUCTION			
	170'	RED SANDY SILTSTONE FINE TO COARSE SAND UNWEATHERED MOD. HARD DOLOMITIC SOME COARSE SAND SIZED LITHIC FRAGMENTS	0.0 PPM @ 172'				2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 10 mm
	175'	RED SILTSTONE UNWEATHERED MOD. HARD ABUNDANT MICA DOLOMITIC	0.0 PPM @ 178'				2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 25 mm
	180'	SOME CALCITE/DOLOMITE PRECIPITATION ON THE SURFACES OF SOME CUTTINGS (WHITE)	0.0 PPM @ 183'				
	185'		0.3 PPM @ 187'				
	190'		0.3 PPM @ 192'				
	195'	(Begin drilling 8" @ 199' BGS)	0.2 PPM @ 197'				
	200'		2.9 ppm @ ≈203'				cuttings: 1-55 mm
	205'	Dusky red Dolomitic SANDY SILTSTONE, (Sand component is fine grained). Unweathered	2.0 ppm ≈207'				2.5 YR 3/2 cuttings: 1-60 mm

PROJECT: HIA - MIDDLETOWN | HOLE NO. ERM-21D

HTW DRILLING LOG

HOLE NO. ERM-21D

PROJECT: H/A Middletown | INSPECTOR: D. Haller | SHEET 6 OF 15 SHEETS

ELEV. L.	DEPTH B.	DESCRIPTION OF MATERIALS C.	FIELD SCREENING RESULTS D.	GEOTECH SAMPLE OR CORE BOX NO E.	ANALYTICAL SAMPLE NO. F.	BLOW COUNTS G.	REMARKS H.
		Hard. Carbonates in matrix only cuttings; Subangular					
	210	Weak red calcareous/dolomitic fine to medium grained SANDSTONE (WACKE) = SILTY SANDSTONE	2.1 ppm @ ≈214'				2.5YR, 5/3 cuttings: 1-60mm
	215	- Unweathered - Hard. Sand is subrounded - Carbonate clasts are 2-8mm, mostly dolomite, and seem to increase in frequency w/depth	0.0 ppm @ ≈218'				cuttings: 1-30mm
	220	- cuttings: Subangular/Subround. - Trace Subangular fine gravel throughout (5-8mm)	0.0 ppm @ ≈223'	≈ 3,000 gallons / 20' interval			cuttings: 1-60mm
	225		0.0 ppm @ ≈227'				cuttings: 1-30mm
	230		0.0 ppm @ ≈233'				cuttings: 1-20mm
	235		0.0 ppm @ ≈237'				cuttings: 1-20mm
	240		0.0 ppm @ ≈243'				cuttings: 1-15mm
	245	Dusky red calcareous/dolomitic SILTSTONE. Lots of carbonates in 247' sample. 1-15mm dolomite clasts and calcite precipitation on some cuttings/fracture surfaces	0.0 ppm @ ≈247'				2.5YR, 4/4 cuttings: 1-45mm
	250	- No apparent carbonate clasts > silt sized in other samples. - Hard - Unweathered	0.0 ppm @ ≈254'				cuttings: 1-15mm
	255	- Cuttings: Subangular/Subround					

HTW DRILLING LOG

HOLE NO. ERM-21D

PROJECT: HIA - Middletown | INSPECTOR: D. Haller | SHEET 7 OF 15 SHEETS

ELEV. L.	DEPTH B.	DESCRIPTION OF MATERIALS C.	FIELD SCREENING RESULTS D.	GEOTECH SAMPLE OR CORE BOX NO E.	ANALYTICAL SAMPLE NO. F.	BLOW COUNTS G.	REMARKS H.
	255	SAME AS ABOVE → SILTSTONE	0.0 ppm @ ≈257'				cuttings; 1-20mm
	260		0.0 ppm @ ≈263'				cuttings: 1-45mm
	265		0.0 ppm @ ≈267'				cuttings: 1-55mm
	270	WEAK RED Dolomitic Fine SANDSTONE (WACKE) - No apparent Dolomite clasts > fine sand sized.	0.0 ppm @ ≈273'				2.5YR, 5/3 cuttings; 1-15mm
	275	- Hard - Unweathered - cuttings: Subangular/Subround	0.0 ppm @ ≈277'				cuttings; 1-30mm
	280		0.0 ppm @ ≈283'				cuttings; 1-10mm
	285	Dusky red dolomitic SILTSTONE - No apparent dolomite clasts > silt sized - Moderately hard - hard - Unweathered - cuttings; Subangular	0.0 ppm @ ≈287'				2.5YR, 4/4 cuttings: 1-20mm
	290		0.0 ppm @ ≈293'				cuttings; 1-30mm
	295	weak red dolomitic Fine SANDSTONE (WACKE) - No apparent dolomite clasts > fine sand sized - Hard - Unweathered - Trace fine quartz gravel (subangular) - cuttings: Subangular/subround	0.0 ppm @ ≈297'				2.5YR, 5/3 cuttings: 1-25mm
	300						

Total 90 gallons

HTW DRILLING LOG

HOLE NO. ERM-21D

PROJECT: HIA - Middletown | INSPECTOR: D. Haller | SHEET 8 OF 15 SHEETS

ELEV. L	DEPTH B	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS D	GEOTECH SAMPLE OR CORE BOX NO E	ANALYTICAL SAMPLE NO. F	BLOW COUNTS G	REMARKS H
		SAME as above (SANDSTONE) (WACKE)	0.0 ppm @ ≈304'				cuttings: 1-15mm
	305		0.0 ppm @ ≈307'				cuttings: 1-15mm
	310	Dusky red dolomitic SILTSTONE No dolomite clasts > silt sized - Moderately hard - Unweathered - cuttings: subangular/subround	0.0 ppm @ ≈313'				cuttings: 1-15mm (2.5YR, 4/4)
	315	Dusky red dolomitic fine grained SANDSTONE (WACKE) - Hard, Unweathered - No dolomite clasts > fine sand - cuttings: Subangular/subround	0.0 ppm @ ≈317'				(2.5YR, 4/3) cuttings: 1-45mm
	320	Reddish brown dolomitic SILTSTONE. No dolomite clasts > silt sized. - Moderately hard - Unweathered - cuttings: subangular	0.0 ppm @ ≈323'				5YR, 4/3 cuttings: 1-30mm
	325		0.0 ppm @ ≈327'				cuttings: 1-15mm
	330	Dusky red dolomitic fine SANDSTONE (WACKE) - Hard - Unweathered - No dolomite clasts > fine sand sized. - cuttings: subangular/subround	0.0 ppm @ ≈333'				(2.5YR, 4/4) cuttings: 1-30mm
	335		0.0 ppm @ ≈337'				cuttings: 1-10mm
	340	SAME AS 330-340. fine SANDSTONE (WACKE) - 3 or 4 dolomite clasts in 344' sample (1-3mm in size).	0.0 ppm @ ≈344'				cuttings: 1-35mm
	345		0.0 ppm @ ≈348'				cuttings: 1-30mm
	350						

~6000 gallons / 90 min

* (Disregard this dashed line) No lithology change (D.H.) 3/6/95

HTW DRILLING LOG

HOLE NO. ERM-21D

PROJECT: HIA - Middletown

INSPECTOR: D. Haller

SHEET 9 OF 15 SHEETS

ELEV. b.	DEPTH a.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	350	Dusky red dolomitic SILTSTONE					2.5YR, 4/3
		- Trace 1-4mm dolomite clasts	0.0ppm @ ≈353'				cuttings: 1-60mm
		- Also dolomite precipitation on several cuttings/fracture surfaces					
	355	- Several tiny (≈1mm) dolomite filled fractures.	0.0ppm @ ≈357'				cuttings: 1-50mm
		- Moderately hard					
		- Unweathered. cuttings: Subangular					
	360	Dusky red calcitic/dolomitic fine SANDSTONE (WACKE)	0.0ppm @ ≈363'				2.5YR, 4/2
		- Dolomite appears to be in matrix only (grains & sand sized)					cuttings: 1-20mm
	365	- Calcite precipitate on several cuttings/fracture surfaces.					
		- hard	0.0ppm @ ≈369'				cuttings: 1-40mm
		- Unweathered					
		- cuttings: Subangular/Subround					
	370	Dusky red dolomitic SILTSTONE	0.0ppm @ ≈373'				2.5YR, 4/3
		- Trace 1-5mm dolomite clasts along w/ precipitate on 2 or 3 chips/sample.					cuttings: 1-40mm
		- Moderately hard					
	375	- Unweathered					
		- cuttings: Subangular	0.0ppm @ ≈377'				cuttings: 1-25mm
	380		0.0ppm @ ≈383'				cuttings: 1-20mm
		(Mica-rich from 383 down) 1-2% mica					
	385		0.0ppm @ ≈387'				cuttings: 1-40mm
	390		0.0ppm @ ≈392'				cuttings: 1-20mm
	395		0.0ppm @ ≈397'				cuttings: 1-20mm

≈ 6,000 - 7,000 gallons / 20 min run

PROJECT: HIA - Middletown

HOLE NO. ERM-21D

HTW DRILLING LOG

HOLE NO. ERM-21D

PROJECT: HIA - Middletown | INSPECTOR: D. Haller | SHEET 10 OF 15 SHEETS

EV. b.	DEPTH a.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
		SAME AS ABOVE - SILTSTONE					
	400		0.0 ppm @ ≈403'				cuttings: 1-30mm
	405		0.0 ppm @ ≈407'				cuttings: 1-30mm
	410		0.0 ppm @ ≈413'				cuttings: 1-20mm
	415						
		Dusky red dolomitic fine SANDSTONE (WACKE) - Dolomite appears to be in matrix only (No dolomite clasts > fine sand sized) - Hard, Unweathered - cuttings: Subangular/subround.	0.0 ppm @ ≈417'				(2.5YR, 4/2) cuttings: 1-10mm
	420		0.0 ppm @ ≈423'				cuttings: 1-20mm
	425		0.0 ppm @ ≈427'				cuttings: 1-20mm
	430						
		Dusky red dolomitic SILTSTONE - Trace 1-3 mm dolomite clasts and dolomite precipitate on one chip. - moderately hard, Unweathered - trace mica - cuttings: Subangular	0.0 ppm @ ≈433'				(2.5YR, 3/2) cuttings: 1-40mm
	435						
		weak red calcitic/dolomitic fine SANDSTONE (WACKE), No apparent carbonates ≥ fine sand sized. - Hard - Unweathered - cuttings: Subangular/subround	0.0 ppm @ ≈437'				(2.5YR, 5/3) cuttings: 1-30mm
	440						
		Dusky red dolomitic SILTSTONE - Trace 1-6 mm dolomite clasts (dolomite is more frequent in 443' sample)	0.0 ppm @ ≈443'				(2.5YR, 3/3) cuttings: 1-30mm
	445	- Moderately hard					

≈ 8,000 - 10,000 gallons / 90' interval

PROJECT: HIA - Middletown | HOLE NO. ERM-21D

HTW DRILLING LOG

PROJECT: H1A - Middletown | INSPECTOR: D. Haller | HOLE NO. ERM-21D | SHEET 11 of 15 SHEETS

ELEV. b	DEPTH a	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	445	- Unweathered - cuttings: subangular	0.0 ppm @ ≈447'				cuttings: 1-25mm
	450						
		Dusky red dolomitic fine to medium grained SANDSTONE (WACKE) - Dolomite is in matrix only - Sand is subrounded - Hard to very hard - Unweathered - cuttings: subangular/subround	0.0 ppm @ ≈453' 0.0 ppm @ ≈457'				(2.5 YR, 3/3) cuttings: 1-15mm cuttings: 1-5mm
	455						
	460		0.0 ppm @ ≈463'				cuttings: 1-15mm
	465						
		Dusky red dolomitic SILTSTONE - Very trace 1-2mm dolomite clasts. (Hardly any carbonates > silt sized) - Moderately hard - Unweathered. Trace mica - cuttings: subangular	0.0 ppm @ ≈467' 0.0 ppm @ ≈473'				(2.5 YR, 3/3) cuttings: 1-20mm cuttings: 1-30mm
	470						
	475						
		(Dolomite precipitation on some cuttings / fracture surfaces in 477' sample)	0.0 ppm @ ≈477'				cuttings: 1-25mm
	480						
			0.0 ppm @ ≈483'				cuttings: 1-20mm
	485						
			0.0 ppm @ ≈487'				cuttings: 1-20mm
	490						

19,000 - 12,000 gallons / 20' interval

HTW DRILLING LOG

HOLE NO. ERM-21D

PROJECT: H1A - Middletown

INSPECTOR: D. Heller

SHEET 12 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
		SAME AS ABOVE - SILTSTONE	0.0 ppm @ ≈493'				cuttings: 1-20mm
	495	WEAK Red dolomitic fine SANDSTONE (WACKE). Dolomite in matrix only. - Hard - Unweathered - cuttings: Subangular/subround	0.0 ppm @ ≈497'				2.5YR, 5/3 cuttings: 1-25mm
	500	Dusky red dolomitic SILTSTONE. - Very trace 1-2mm dolomite clasts. - 2 or 3 chips per sample have very small scale (1-2mm) healed fractures or carbonate precipitate on surfaces - Moderately hard - Unweathered - Trace mica - cuttings: Subangular/subround.	0.0 ppm @ ≈503'				cuttings: 1-20mm 2.5YR, 3/3
	505		0.0 ppm @ ≈507'				cuttings: 1-20mm
	510		0.0 ppm @ ≈513'				cuttings: 1-20mm
	515		0.0 ppm @ ≈517'				cuttings: 1-20mm
	520	Dusky red dolomitic fine SANDSTONE (WACKE). Dolomite in matrix only. - Hard - Unweathered - cuttings: Subangular/subround	0.0 ppm @ ≈523'				2.5YR, 3/3 cuttings: 1-20mm
	525	- 1 quartz pebble - Subround - ≈5mm in 522' sample	0.0 ppm @ ≈527'				cuttings: 1-15mm
	530		0.0 ppm @ ≈533'				cuttings: 1-10mm
	535		0.0 ppm @ ≈537'				cuttings: 1-10mm
	540						

≈ 25,000 gallons / 20' interval

HTW DRILLING LOG

PROJECT: HIA-Middletown | INSPECTOR: D. Haller | HOLE NO. ERM-21D | SHEET 13 OF 15 SHEETS

ELEV. b.	DEPTH a.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	540	SAME AS ABOVE (Fine SANDSTONE (WACKE)	0.0 ppm @ ≈543'				cuttings; 1-20mm
	545	Dusky red calcitic/dolomitic SILTSTONE. (more dolomite than calcite). Trace 1-3mm dolomite clasts throughout. Also 1-2 chips per sample have dolomite precipitation on surfaces. No apparent calcite clasts > silt sized.	0.0 ppm @ ≈547'				2.5YR, 4/3 cuttings; 1-20mm
	550		0.0 ppm @ ≈553'				cuttings; 1-30mm
	555	- Moderately Hard - Unsmoothed (Except trace dolomite discoloration in 557' sample) - cuttings; Subangular - Very trace mica (<1%)	0.0 ppm @ ≈557'				cuttings; 1-40mm
	560		0.0 ppm @ ≈563'				cuttings; 1-30mm
	565		0.0 ppm @ ≈567'				cuttings; 1-25mm
	570		0.0 ppm @ ≈572'				cuttings; 1-20mm
	575		0.0 ppm @ ≈577'				cuttings; 1-20mm
	580		0.0 ppm @ ≈584'				cuttings; 1-25mm
	585		OR 2.6 ppm @ ≈587'				cuttings; 1-20mm

≈15,000 Gallons (20' Interval)

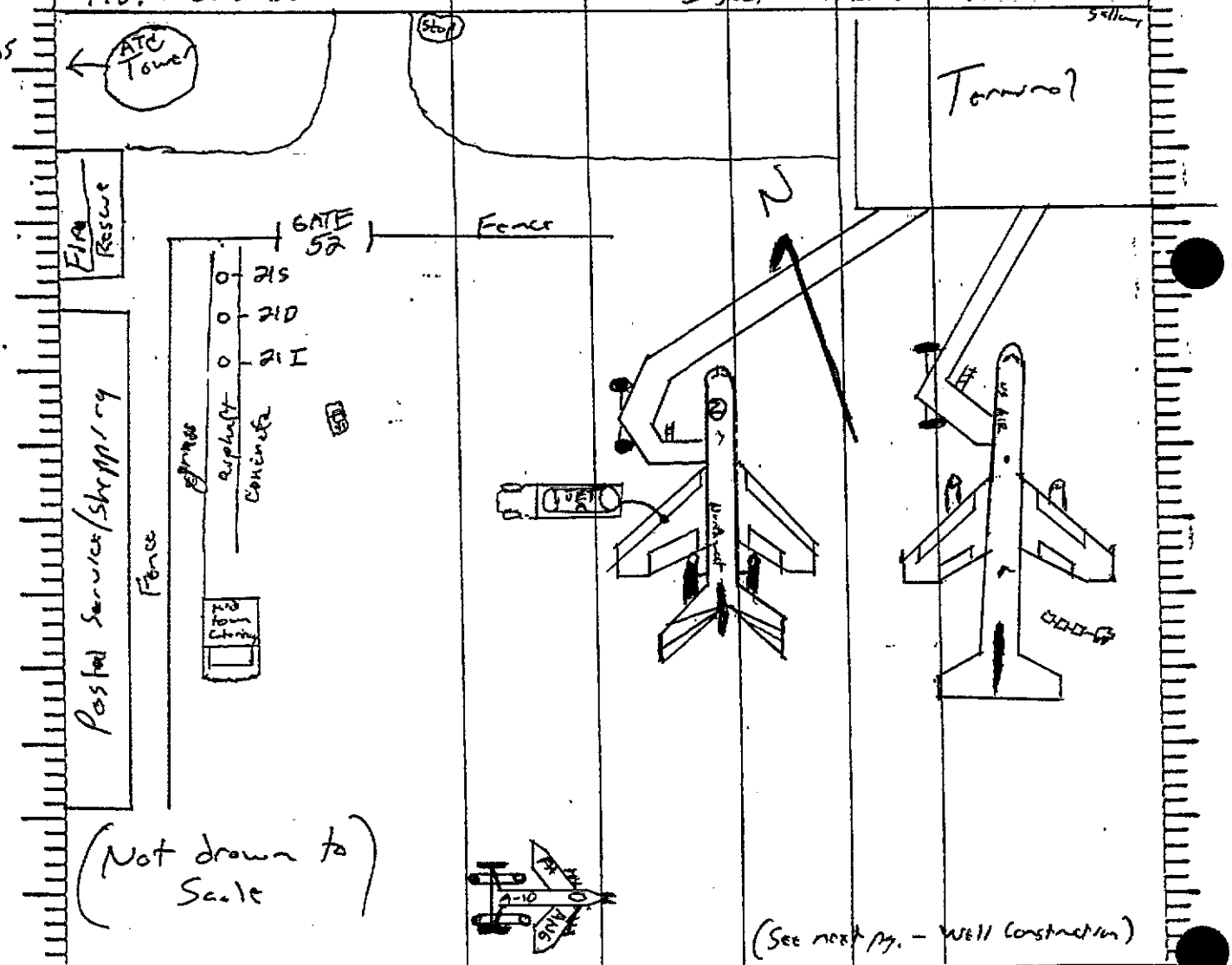
PROJECT: HIA-Middletown | HOLE NO. ERM-21D

HTW DRILLING LOG

HOLE NO. ERM-21D

PROJECT: HIA-Middletown | INSPECTOR: D. Hilker | SHEET 14 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	590	SAME AS ABOVE (SILTSTONE)	0.2 ppm @ ≈593'	≈ 15,000 gallons on intake			cuttings: 1-30mm
	595		1.1 ppm @ 597'				cuttings: 1-20mm
	600		2.3 ppm @ 602'				cuttings; 1-10mm
		T.D. = 603' BGS		Injection water (est) for 8" ≈ 1500 gallons			
	605						



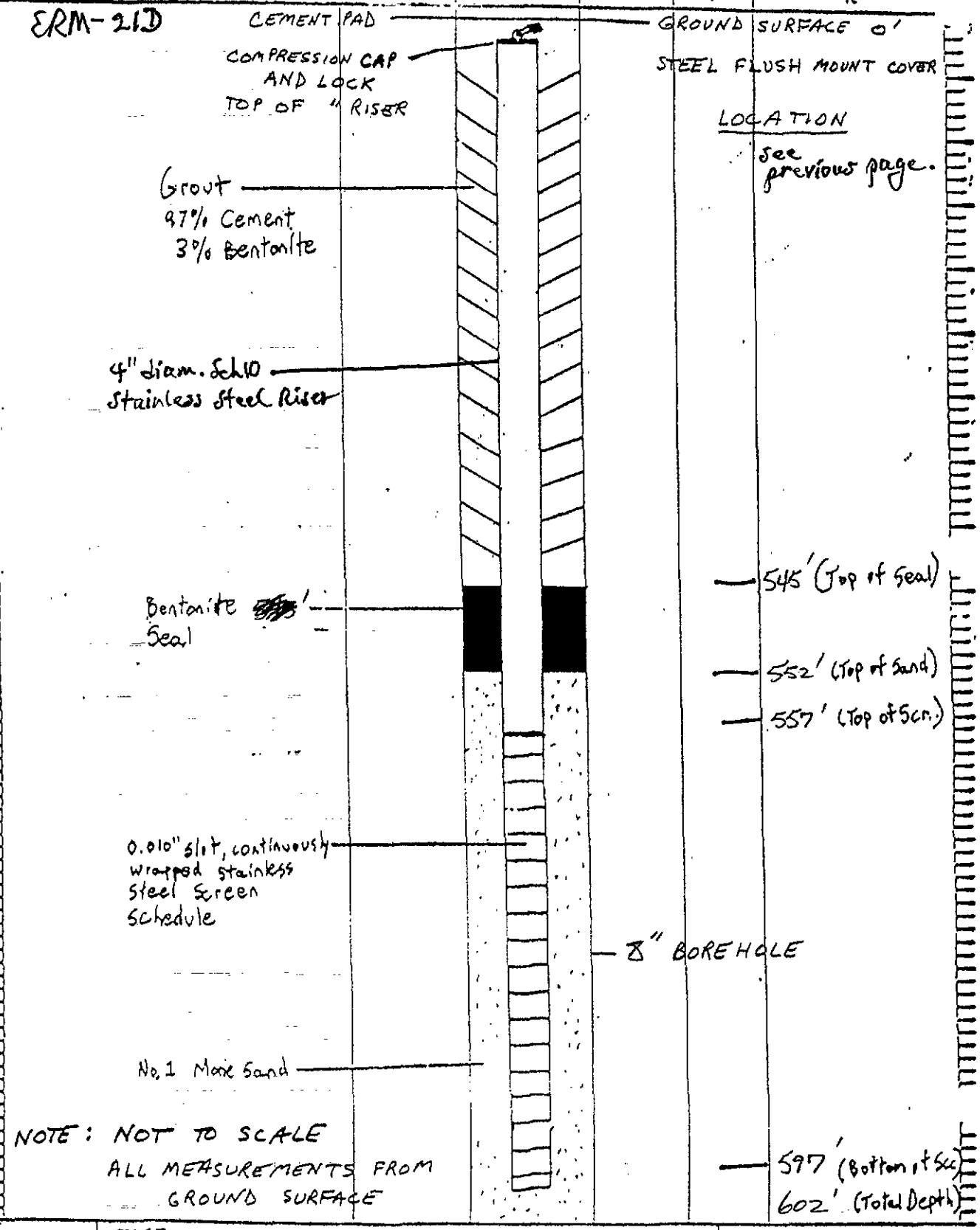
(See next pg. - Well Construction)

PROJECT: HIA-Middletown | HOLE NO. ERM-21D

ERM-21-D

PROJECT: HIA, Middletown | INSPECTOR: D. Menzie | SHEET 15 OF 15 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOLOGIC SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS



PROJECT: HIA, Middletown | HOLE NO. ERM-21-D

HTW DRILLING LOG

HOLE NO. TAB ERM-22S

SHEET 1 OF 4 SHEETS

1. COMPANY NAME: ERM-PMC	2. DRILLING SUBCONTRACTOR: ADT-MA
3. PROJECT: Middletown HIA	4. LOCATION: Middletown PA
5. NAME OF DRILLER: Troy Brown	6. MANUFACTURER'S DESIGNATION OF DRILL: Mobil
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: B-59 - HSA; HSA 6 5/8" I.D. Augers to 50'; 2" Split Spoon (6); 140 lb Hammer; Roller bit 30-44'	8. HOLE LOCATION: See page # 4
	9. SURFACE ELEVATION: Not Surveyed
	10. DATE STARTED: 1/24/95
	11. DATE COMPLETED: 2/3/95 Installed Flush Mounts
12. OVERBURDEN THICKNESS: ~28	15. DEPTH GROUNDWATER ENCOUNTERED: 29'
13. DEPTH DRILLED INTO ROCK: 16'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: ½ hr 25' 6"
14. TOTAL DEPTH OF HOLE: 44' 2" ~ 44.2'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 1/26/95

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NA	✓		

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
NA						%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Monitoring Well ERM-22S		✓		[signature]

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0	Asphalt 0-4" over gravel Fine to Med SILTY SAND w/ Gravel (Topsoil)	0 ppm	NS	NA	NA AUGERED	7.5Y 3/2 SM
	1.0	Fill: Fine to V. Fine "SILTY SAND w/ GRAVEL" Sand, Little Silt, Gravel (brick, road stone) V. DENSE, dry SS 1-3'	0 ppm	NS	NA	31, 57 95, 87	7.5Y 4/2 SM 15" rec
	2.0						
	3.0	Fill: "SILT W. Fine SAND", Gravel, trace brick, cinders, etc. SS 3-5'	0 ppm	NS	NA	10, 18, 11, 7	7.5Y 3/2 ML 24" rec
	4.0						
	5.0	5.5' Strata break	0 ppm	IAB-ERM-22S (5.0-7.0)	NA	3, 15, 8, 7	
	6.0	V. Fine to Fine Sand LITTLE SILT, DENSE, SLIGHTLY MOIST SS 5-7' "SILTY SAND" STRATIFICATION NOTICED WET @ 7.5-8.0					5YR 3/4 SM 24" rec
	7.0		0 ppm	NS	NA	10, 8 12, 13	5YR 3/4 SM 22" Rec
	8.0						
	9.0	Fine to Med Sand, trace SILT SS 7-9' "POORLY GRADED SAND"					SP

PROJECT: MIDDLETOWN

HOLE NO. TAB ERM-22S

HTW DRILLING LOG

HOLE NO. IAB-ERM-22S

1. COMPANY NAME	ERM-PMC
2. DRILLING SUBCONTRACTOR	ADT-MA
SHEET 2 OF 4 SHEETS	
3. PROJECT	HIA Middletown
4. LOCATION	Middletown, PA
5. NAME OF DRILLER	Troy Brown
6. MANUFACTURER'S DESIGNATION OF DRILL	Mobil
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	B-59, 6 5/8" Augers, 2" Split Spoon, 140 lb hammer
8. HOLE LOCATION	See page 4
9. SURFACE ELEVATION	Not Surveyed
10. DATE STARTED	1/24/95
11. DATE COMPLETED	
12. OVERBURDEN THICKNESS	28'
13. DEPTH DRILLED INTO ROCK	
14. TOTAL DEPTH OF HOLE	
15. DEPTH GROUNDWATER ENCOUNTERED	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	
18. GEOTECHNICAL SAMPLES	DISTURBED ✓ / UNDISTURBED
19. TOTAL NUMBER OF CORE BOXES	
20. SAMPLES FOR CHEMICAL ANALYSIS	NA
VOC	
METALS	
OTHER (SPECIFY)	
OTHER (SPECIFY)	
OTHER (SPECIFY)	
21. TOTAL CORE RECOVERY	%
22. DISPOSITION OF HOLE	Monitoring Well ERM-22S
BACKFILLED	
MONITORING WELL	
OTHER (SPECIFY)	
23. SIGNATURE OF INSPECTOR	[signature]

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	10						
	11						
	12						
	13						
	14						
	15	WELL GRADED SAND					
	16	F-C Sand, TRACE-LITTLE ~~Gravel~~, SILT, ~~Some~~ AND GRAVEL, V. DENSE, WET 16-16.5: SS15-1 @ 9" (POUND to Subrounded)	ppm	NS	NA	24, 37, 90, 50/4" refusal	5YR 4/3 ~~SW-GP~~ SW
1/25/95	17	805 Water level measurement - DRY					
	18	AND GRAVEL					CUTTINGS 5YR 4/3 SW-
	19	dry					

PROJECT: Middletown

HOLE NO.: IAB ERM-22S

HTW DRILLING LOG

HOLE NO. ERM-225

PROJECT: MIDDLETOWN 02005.08

INSPECTOR: J. Ryan

SHEET 3 of 4 SHEETS

ELEV. b.	DEPTH	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	20						@20'
	21	Same as above AND GRAVEL SUBROUNDED TO ROUNDED (RIVER GRAVELS)		NS	NA	63,63 51,48	@ 8:45 remove roller bit — put auger back on. (Soil) Hole will not stay open. Cuttings to 25' — To Advance augers needed to roller bit ahead.
	22	WELL GRADED GRAVEL & COBBLES (SUBROUNDED TO ROUNDED POOR SPHERICITY) GW					
	23						
	24						
	25						
	26						
	27						
	28	BEDROCK	CUTTINGS				@28' down hole pressure from 300 - 800psi drilling becomes smooth — NO MORE chattering
	29	SANDY SILTSTONE, LIGHTLY WEATHERED TO WEATHERED					
	30						2.5YR 3/4 Reddish Brown
	31						
	32	LIGHTLY WEATHERED TO UNWEATHERED					
	33						
	34						
	35						
	36						
	37						
	38						

PROJECT: Middletown

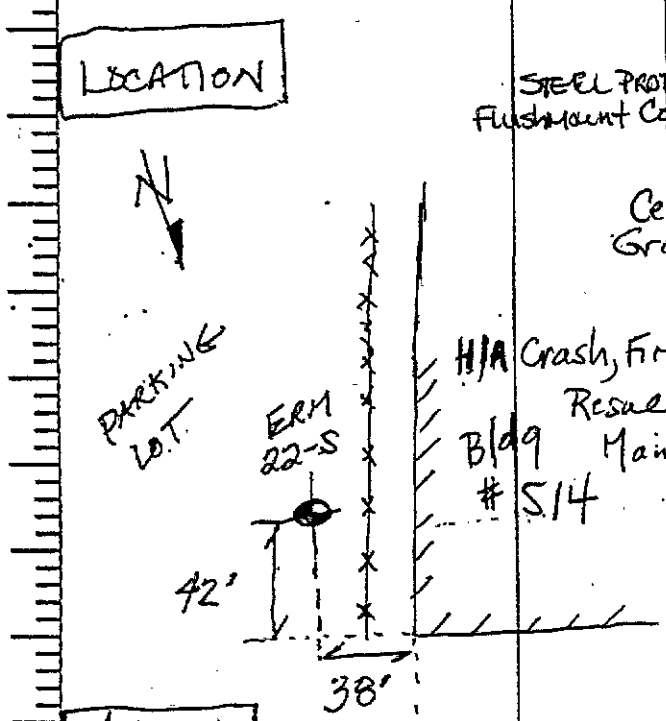
HOLE NO. 1AB ERM-225

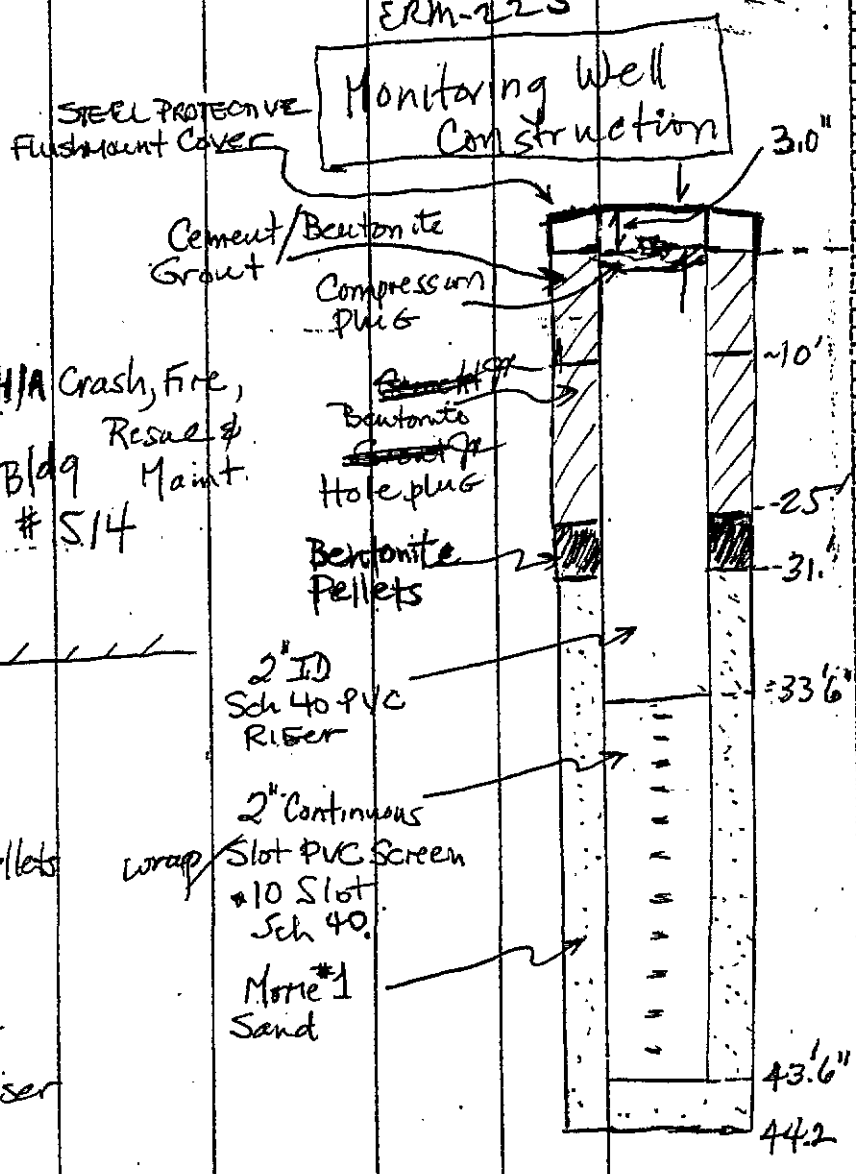
HTW DRILLING LOG

HOLE NO. ERM-22S

PROJECT: MIDDLETOWN | INSPECTOR: J. Ryan | SHEET 4 OF 4 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	39						
	40						
	41						
	42						
	43						
	44	EOB 44'					





Materials

2½ bags sand
½ bucket bentonite pellets
11 bags hole plug
10' 2" Continuous Slot PVC Screen 10 slot
33' 2" Sch 40 PVC Riser

PROJECT: MIDDLETOWN | HOLE NO. IAB ERM-22S

HTW DRILLING LOG

HOLE NO. ERM-22I

1. COMPANY NAME: ERM PNC	2. DRILLING SUBCONTRACTOR: Hydro Group
SHEET 1 OF 7 SHEETS	
3. PROJECT: HIA - Middletown	4. LOCATION: Middletown, PA
5. NAME OF DRILLER: Steve Blair / Raymond Rimmel	6. MANUFACTURER'S DESIGNATION OF DRILL: Barber Rig
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Temporary 12" casing to 39' 8" casing to 180' — 8" dual 12" casing w/ hammers, Dual Rotary Barber Rig DR-12	8. HOLE LOCATION: See Sheet #6
	9. SURFACE ELEVATION: Not Surveyed
	10. DATE STARTED: 11-5-94 — 11. DATE COMPLETED:
12. OVERBURDEN THICKNESS: ≅28' (34.0' Completed Dep)	15. DEPTH GROUNDWATER ENCOUNTERED: Unknown (≅ 20.0')
13. DEPTH DRILLED INTO ROCK: 174'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —
14. TOTAL DEPTH OF HOLE: 202'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None	∅		None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None						%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well ERM-22I installed		∅		Warren N. Fay

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0.0'	SM SILTY SAND — Silty organic rich soil w/ coarse grain, sand angular, dry loose.	0ppm PID, No Odor	NS	NS	NA	GLEY chart 2.5/N2.5 Black.
	5.0'	Silty sand. SM m.grain. sub rounded. w/ gravel ≤ 3mm rounded, dry loose	0ppm PID, No Odor	NS	NS.	NA	1.0 to 8.0mm. 2.5Y 4/4 olive brown
	10.0'	Similar silty sand with gravel ≤ 25 mm Dia. SM	0ppm PID No Odor.	NS	NS.	NA	1.0mm or smaller 10YR 3/4 dark yellowish brown
	15.0'	~~Well Graded~~ Gravel subangular to subrounded. loose moist GW	0ppm PID, No Odor	NS	NS	NA	≤ 2mm 7.5YR3/1 very dark gray multiple colors
	20.0'	Same material GW	0ppm PID, No Odor.	NS	NS	NA	3.0 to 25mm. 10YR 3/1 very dark gray Multiple Colors
	25.0'						3.0 to 40mm

reviewed 9 Feb 95 JFH

PROJECT: HIA - Middletown

HOLE NO. ERM-22I

HTW DRILLING LOG

PROJECT: HIA-Middletown | INSPECTOR: Warren Fop | HOLE NO. ERM-22I | SHEET 2 OF 7 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	25.0'	Gravel w/ silty sandstone, to subrounded, fine grain, rounded, weathered, m. soft — HCL (GWT; silty sandstone; 28' Bed Rx rock)	0 ppm PID, No Odor	NS	NS	NA	5YR 3/3 dark reddish brown; 2mm to 25 mm
	30.0'	Siltstone, weathered, m. soft, trace of rounded gravel (1.0 to 10 mm), No Dol. Cementation — HCL (impeded Rd.)	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/4 dusky red; 1.0 to 20 mm
	35.0'	Siltstone, weathered, m. soft, No gravel, trace of clasts — HCL + Dol. Cementation, angular < 4mm (No of quartz or calcite)	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red; 1.0 to 18 mm
	40.0'	Siltstone, weathered, m. hard, No Clasts, Dolomitic Cementation	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red; 1.0 to 28 mm
	45.0'	Siltstone, weathered, m. hard, Dol. Cementation, >5% Clasts of calcite, angular ≤3mm	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red; 1.0 to 18 mm
	50.0'	Similar Material, Red clasts are only trace, <5%	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red; 1.0 to 12 mm
	55.0'	Siltstone, hard, m. weathered, Dolomitic Cementation, No Clasts (Water fracture)	0 ppm PID, No Odor	NS	NS; Some cuttings are 2.5YR 4/6 dark red mix.	NA	2.5YR 3/2 dusky red; 1.0 to 3.5 mm
	60.0'	Siltstone, hard, m. weathered, Dol. Cementation, trace quartz clasts ≤ 4 mm angular	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red; 1.0 to 16 mm
	65.0'	Silty Sandstone / Wacke, m. hard, f. grain, m. weathered, sub rounded, Dol. Cementation, lots of Qtz clasts ≤ 3mm sub angular (Soft)	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/4 dusky red; 1.0 to 5.0 mm
	70.0'						

PROJECT: HIA — Middletown | HOLE NO. ERM-22I

HTW DRILLING LOG

PROJECT: H/A - Middletown | INSPECTOR: Warren Fox | HOLE NO. ERM-22I | SHEET 3 of 7 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	70.0'	Siltstone m. weathered m. soft. Dolomitic Cementation No Clasts	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/4 dusky red
	75.0'	Similar Material	0 ppm PID, No Odor	NS	NS	NA	1.0 to 22 mm 2.5YR 2.5/2 very dusky red
Water	80.0'	Siltstone m. weathered m. ~~soft~~ Hard Dolomitic Cementation Trace calcite (white, angular ≤ 4mm).	0.1 ppm PID, No Odor	NS	NS	NA	1.0 to 24 mm 2.5YR 3/4 dusky red.
Little	85.0'	Similar Material. No clasts of calcite	0 ppm PID, No Odor	NS	NS	NA	1.0 to 20 mm 2.5YR 3/3 dusky red
Water	90.0'	Siltstone m. hard m. weathered Dolomitic Cementation No clasts at all	0.6 ppm PID, No Odor	NS	NS	NA	1.0 to 20 mm 2.5YR 3/3 dusky red
	95.0'	Same Material as Above	0.7 ppm PID, No Odor	NS	NS	NA	1.0 to 18 mm 2.5YR 3/2 dusky red
	100.0'	Same Material No clasts	0.4 ppm PID, No Odor; mostly ≤ 10 mm	NS	NS	NA	1.0 to 22 ~~16~~ mm 2.5YR 2.5/3 Very dusky red.
	105.0'	Siltstone m. hard m. weathered Dol Cementation. No clasts - cuttings were noticeably smaller -	ppm PID, Odor; mostly ≤ 5mm	NS	NS (larger)	NA	1.0 to 35 mm 2.5YR 3/3 dusky red
Soft Water 1141	110.0' 115.0'	Siltstone m. hard m. weathered Dol. Cementation. Some cuttings have white dolomite crystals on them (HCl+)	0.6 ppm PID, No Odor	NS	NS	NA	1.0 to 40 mm 2.5YR 3/3 dusky red; 1.0 to 25 mm

PROJECT: H/A - Middletown | HOLE NO. ERM-22I

HTW DRILLING LOG

HOLE NO. ERM-22I

PROJECT: HIA- Middletown | INSPECTOR: Warren Fox | SHEET 4 OF 7 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	115.0'	Siltstone hard m. weathered Dolomitic Cementation, No clasts, frosted surfaces of dolomite (white) on some chips/pieces	.4 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red 1.0 to 80 mm
	120.0'	Similar Material. No dolomitic deposits	0.2 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red 1.0 to 25 mm
Lost water	125.0'	Similar Material No deposits	0.7 ppm PID, No Odor	NS	NS	NA	2.5YR 2.5/2 very dusky red 1.0 to 12 mm
(Water Big)	130.0'	Siltstone v. hard. S. weathered. Dolomitic Cementation Calcite veins 2mm thick, white chunks	0.4 ppm PID, Odor	NS	NS	NA	2.5YR 2.5/3 very dusky red 1.0 to 30 mm
	135.0'	Similar material. No veins of calcite only traces of white calcite clasts ≤2mm. whole	1.0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red 1.0 to 20 mm
	140.0'	Siltstone v. hard S. weathered Dolomitic Cementation trace of calcite ≤2mm clasts	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red. 1.0 to 30 mm
	145.0'	Same Material	0 ppm PID, No Odor	NS	NS	NA	2.5YR 2.5/2 very dusky red 1.0 to 25 mm
Lots of water at 151'	150.0'	Siltstone V. hard S. weathered. Dol. Cementation only traces of calcite also noted few clay balls 3/4 mm Dia. (Mudstone)? (WF)	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red 1.0 to 23 mm
	155.0'	Similar to above but No clay balls!	0 ppm PID, No Odor	NS	NS	NA	2.5YR 2.5/2 dusky red 1.0 to 20 mm
	160.0'						

HTW DRILLING LOG

PROJECT: HIA - Middletown
INSPECTOR: Warren Fox
HOLE NO.: ERM-22I
SHEET 5 OF 7 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	160.0	Siltstone trace of fine sand - subrounded hard m. weathered Dolomitic cementation No clasts	0 ppm PID, No Odor	NS	NS	NA	2.5YR 2.5/2 very dusky red.
	165.0						1.0 to 10 mm
		Sandstone w/silt fine grain subrounded m. hard m. weathered Dol. cementation.	0 ppm PID, No Odor	NS	NS	NA	0.5YR 3/3 dusky red
	170.0						1.0 to 10 mm
		Wacke/silty sandstone m. hard f. gray sub-angular m. weathered (Trace Dol. cementation)	0.2 ppm PID, No Odor	NS	NS	NA	2.5YR 4/3 (mix) dusky red. Some gray stain
	175.0	Clasts of quartz and limestone ≤ 8 mm angular					1.0 to 10 mm
		Siltstone m. hard m. weathered Dol. Cementation No clasts.	0.1 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red.
	180.0						1.0 to 17 mm
		Same as above w/ clay traces (balls ≤ 3mm)	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/4 dusky red
	185.0						1.0 to 11 mm
		Siltstone m. hard m. weathered Dol. Cementation Trace of calcite clasts ≤ 2mm angular (w/ clay balls ≤ 5%)	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky Red
	190.0						1.0 to 14 mm
		Same Material trace ≤ 5% clay balls are ≤ 3mm dia.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red
	195.0						1.0 to 12 mm
		(Still the same) siltstone with m. hard small balls of m. weathered, clay (trace 5% or less) calcite clasts are also trace. ≤ 2mm. Dran. and angular.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red
	200.0						1.0 to 10 mm
		Bottom of borehole at 202' WNF 11-7-94					

PROJECT: HIA - Middletown
HOLE NO.: ERM-22I

HTW DRILLING LOG

HOLE NO. ERM-22I

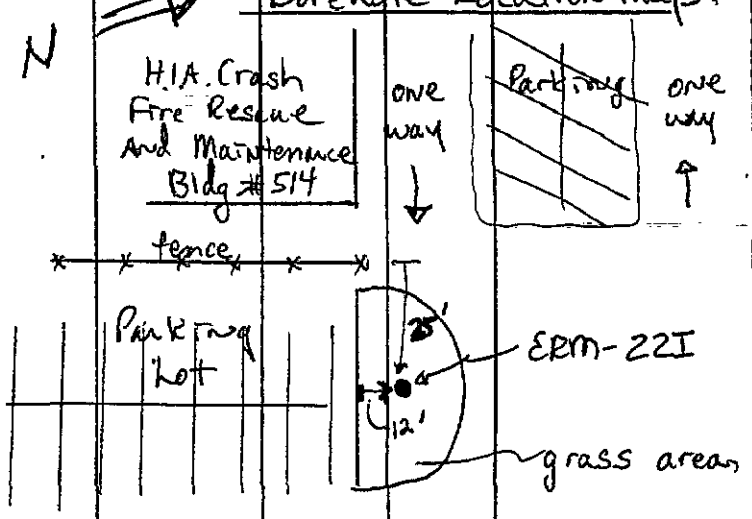
PROJECT HIA - Middletown

INSPECTOR Warren Fop

SHEET 6 OF 6 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.

Borehole Location Map:



PROJECT HIA- Middletown

HOLE NO. ERM-22I

Figure 4-1 (Continued)

HTW DRILLING LOG

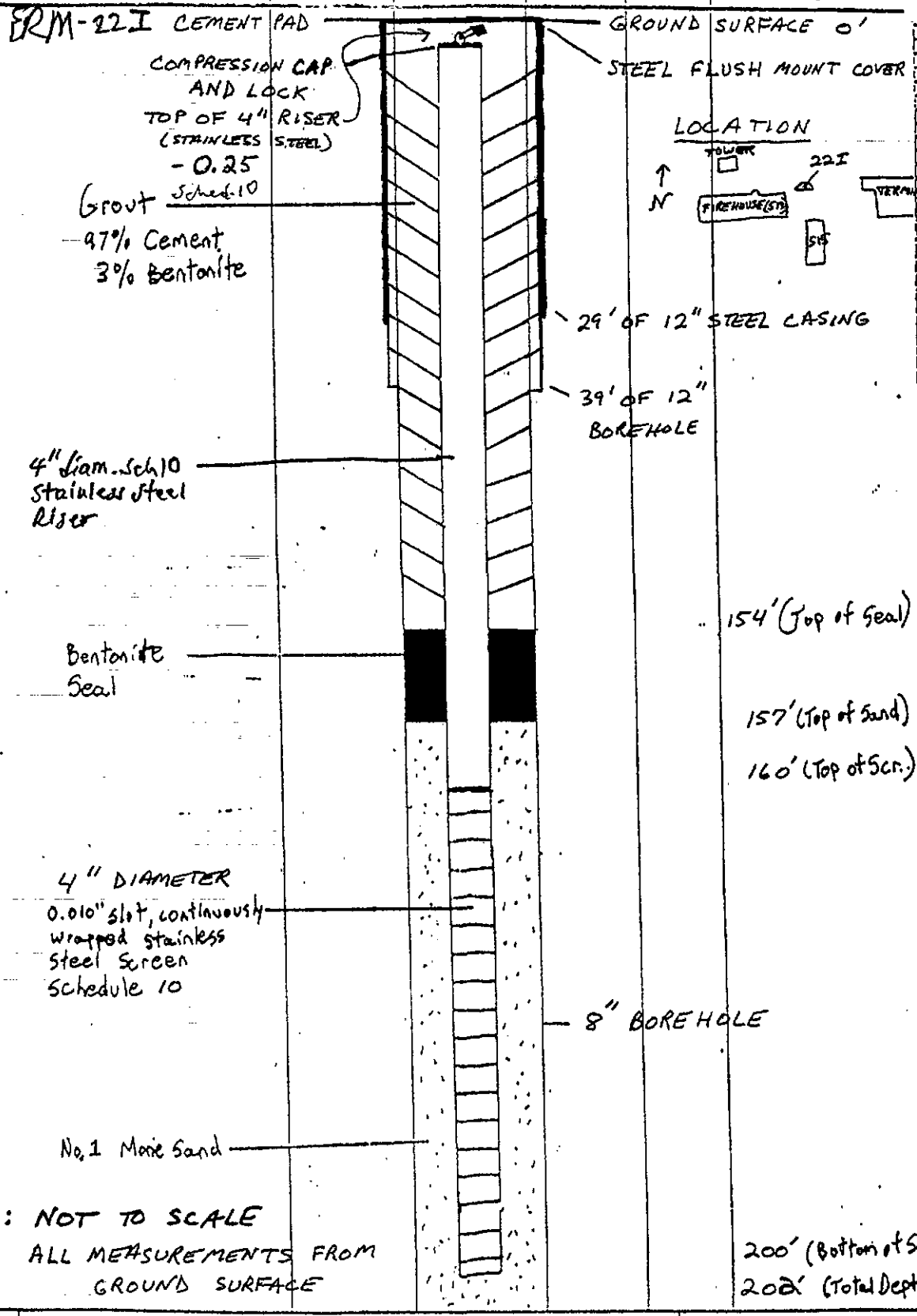
HOLE NO. ERM-22I

PROJECT: HIA, Middletown

INSPECTOR: DEREK EVANS/MATT VONNIEDA

SHEET 7 OF 7 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE C- CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS



PROJECT: HIA, Middletown

HOLE NO. 22I

HTW DRILLING LOG

HOLE NO. ERM-22D

1. COMPANY NAME: ERM	2. DRILLING SUBCONTRACTOR: HYDRO GROUP
SHEET 1 OF 14 SHEETS	
3. PROJECT: HIA - MIDDLETOWN	4. LOCATION: MIDDLETOWN, PA
5. NAME OF DRILLER:	6. MANUFACTURER'S DESIGNATION OF DRILL: BARBER RIG
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 16" CASING AND BIT TO 37'; 12" CASING AND BIT TO 199'; 8" CASING AND BIT TO 603'; All casings are temporary.	8. HOLE LOCATION: Near Fire Crash Rescue Bldg # 514
	9. SURFACE ELEVATION:
	10. DATE STARTED: 2/1/95
	11. DATE COMPLETED: 2/15/95
12. OVERBURDEN THICKNESS: ≈ 28'-30'	15. DEPTH GROUNDWATER ENCOUNTERED:
13. DEPTH DRILLED INTO ROCK: ≈ 575'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED:
14. TOTAL DEPTH OF HOLE: 603'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
	/	/	/	/		%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well constructed	/	Yes	/	Derek R. Evans

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS (cutting sizes)
	0	FILL MATERIAL GRAVEL - FINE TO COARSE LOOSE WELL GRADED (GW) MOIST ANGULAR	0.0 PPM @ 3'	NS	NS	NA	VARIOUS COLORS 5Y 4/1 2.5Y 5/4 2 TO 25 mm
	5'	FILL MATERIAL + RIVER GRAVEL FILL: FINE GRAVEL + POORLY GRADED, LOOSE, ANGULAR (GW-GP) GRAVEL: FINE TO COARSE, WELL GRADED, LOOSE, SUBROUNDED	0.0 PPM @ 8'	Poor to	Well Graded Gravel		FILL: 5Y 2.5/1 2 TO 5 mm GRAVEL: VARIOUS COLORS 2.5YR 5/4 2 TO 25 mm
	10'	GRAVEL FINE TO COARSE (GW) LOOSE WELL GRADED ROUNDED TO SUBROUNDED	0.0 PPM @ 13'				VARIOUS COLORS 2.5YR 4/4 5Y 6/1 2 TO 20 mm
	15'	SAME AS ABOVE	2.2 PPM @ 18'				SAME AS ABOVE 2 TO 18 mm
	20'	SAME AS ABOVE	3.9 PPM @ 23'				SAME AS ABOVE 2 TO 30 mm
	25'						

JTP 1/3/95

PROJECT: HIA - MIDDLETOWN

HOLE NO. ERM-22D

HTW DRILLING LOG

HOLE NO. ERM-22D

PROJECT: HIA - MIDDLETOWN

INSPECTOR: D. EVANS

SHEET 2 OF 14 SHEETS

ELEV. L	DEPTH B.	DESCRIPTION OF MATERIALS C.	FIELD SCREENING RESULTS D.	GEOTECH SAMPLE OR CORE BOX NO E.	ANALYTICAL SAMPLE NO. F.	BLOW COUNTS G.	REMARKS cuttings size
	25'	GRAVEL FINE TO COARSE LOOSE WELL GRADED ROUND TO SUBROUNDED	4.3 PPM @ 28'	NS (HIT WEATHERED BRX AT ~28')	NS	NA	VARIOUS COLORS 2.5 YR 4/4 5 Y 6/1 2 TO 30 mm
	30'	WEAK RED SILTY FINE-GRAINED SANDSTONE (WACKE) MODERATELY WEATHERED SOFT DOLOMITIC SOME LITHIC FRAGMENTS	4.2 PPM @ 33'				2.5 YR 5/4 CUTTINGS: SUBANGULAR 15 TO 20 mm
	35'	WEAK RED SILTSTONE SLIGHTLY WEATHERED MOD. HARD CALCAREOUS/DOLOMITIC ABUNDANT MICA	0.0 PPM @ 38'	SWITCHED FROM 16" TO 12" AT 37' (HIT COMPETANT BRX AT ~38')			2.5 YR 5/4 CUTTINGS: SUBANGULAR 2 TO 10 mm
	40'	WEAK RED SILTSTONE SLIGHTLY WEATHERED HARD CALCAREOUS ABUND. MICA	0.0 PPM @ 43'				2.5 YR 5/4 CUTTINGS: SUBROUNDED 2 TO 30 mm
	45'	RED SANDY SILTSTONE FINE-GRAINED SAND UNWEATHERED HARD DOLOMITIC ABUND. MICA	0.0 PPM @ 47'				2.5 YR 3/2 ~~SAME AS~~ DE ~~ABOVE~~ CUTTINGS: ~~SUBROUNDED~~ SUBROUNDED 2 TO 25 mm
	50'	RED SILTSTONE UNWEATHERED HARD DOLOMITIC ABUND. MICA CALCITE VEINS CALCITE PPT. ON SURFACES OF SOME CUTTINGS	0.6 PPM @ 52'				2.5 YR 3/2 CUTTINGS: SUBROUNDED 2 TO 20 mm
	55'	SAME AS ABOVE WITHOUT CALCITE PPT. SMALL % CLAY OBVIOUS MICA ABUND. AND COARSER THAN ABOVE	0.0 PPM @ 57'				SAME AS ABOVE
	60'	RED SANDY SILTSTONE FINE-GRAINED SAND UNWEATHERED HARD DOLOMITIC ABUND. MICA CALCITE PPT ON SURFACES OF SOME CUTTINGS	0.0 PPM @ 63'				SAME AS ABOVE 2 TO 35 mm
	65'	RED FINE TO MEDIUM-GRAINED SILTY SANDSTONE AND SANDY SILTSTONE (FINE SAND) UNWEATHERED SS: MOD. HARD SILTSTONE: HARD DOLOMITIC	1.8 PPM @ 68'				SAME AS ABOVE.
	70'						

HTW DRILLING LOG

HOLE NO. ERM-22D

PROJECT HIA - MIDDLETOWN

INSPECTOR D. EVANS

SHEET 3 OF 14 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	70'	RED SILTSTONE UNWEATHERED MOD. HARD DOLOMITIC ABUND. MICA	2.1 PPM @ 72'	NS	NS	NA	2.5 YR 3/2 CUTTINGS: SUBROUNDED 2 TO 25 mm
	75'	SAME AS ABOVE	2.6 PPM @ 78'				SAME AS ABOVE 2 TO 55 mm
	80'	SAME AS ABOVE WITH CALCITE PPT. ON SOME CUTTINGS SURFACES	2.5 PPM @ 82'				SAME AS ABOVE
	85'	SAME AS ABOVE	2.8 PPM @ 88'				SAME AS ABOVE 2 TO 30 mm
	90'	SAME AS ABOVE WITH SOME COARSER MICA AND CLAY PRESENT	2.5 PPM @ 93'				SAME AS ABOVE 2 TO 15 mm
	95'	RED SILTSTONE UNWEATHERED MOD. HARD DOLOMITIC ABUND. MICA CALCITE PPT. ON SOME CUTTINGS SURFACES	0.0 PPM @ 98'				SAME AS ABOVE 2 TO 25 mm
	100'	SAME AS ABOVE WITHOUT CALCITE PPT.	0.0 PPM @ 102'				SAME AS ABOVE 2 TO 15 mm
	105'	SAME AS ABOVE	4.1 PPM @ 108'				SAME AS ABOVE 2 TO 25 mm
	110'	SAME AS ABOVE	2.4 PPM @ 112'				SAME AS ABOVE
	115'						

START PRODUCING SIGNIFICANT AMOUNT OF WATER

HTW DRILLING LOG

HOLE NO. ERM - 22D

PROJECT HIA - MIDDLETOWN | INSPECTOR D. EVANS | SHEET 4 OF 13 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	115'	RED SILTSTONE UNWEATHERED MOD. HARD DOLOMITIC ABUNDANT MICA CALCITE VEINS AND PPT ON SOME SURFACES	0.0 PPM @ 118'	NS	NS	NA	2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 40 mm
	120'	SAME AS ABOVE	0.0 PPM @ 122'				SAME AS ABOVE
	125'	SAME AS ABOVE	0.0 PPM @ 127'				SAME AS ABOVE
	130'	SAME AS ABOVE WITHOUT CALCITE PPT.	0.0 PPM @ 132'				SAME AS ABOVE 2 TO 30 mm
	135'	SAME AS ABOVE WITH CALCITE PPT. ON SOME CUTTINGS SURFACES	0.0 PPM @ 138'				SAME AS ABOVE
	140'	SAME AS ABOVE WITH SOME CALCITE NODULES AS WELL	0.0 PPM @ 142'				SAME AS ABOVE 2 TO 20 mm
	145'	SAME AS ABOVE WITH CALCITE IN THE FORM OF NODULES ONLY	0.0 PPM @ 147'				SAME AS ABOVE 2 TO 30 mm
	150'	SAME AS ABOVE	0.0 PPM @ 152'				SAME AS ABOVE 2 TO 40 mm
	155'	SAME AS ABOVE WITH CALCITE IN THE FORM OF PPT. ON SURFACES OF SOME CUTTINGS	0.0 PPM @ 158'				SAME AS ABOVE 2 TO 50 mm
	160'						

STEADY WATER PRODUCTION

HTW DRILLING LOG

HOLE NO. ERM-22D

PROJECT: HIA - MIDDLETOWN

INSPECTOR: D. EVANS

SHEET 5 OF 18 SHEETS

EV. b.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	160'	RED SILTSTONE AND RED SILTY FINE-GRAINED SANDSTONE (WACKE) UNWEATHERED SS: HARD SILTSTONE: MOD. HARD DOLOMITIC	0.0 PPM @ 163'	NS	NS	NA	2.5YR 3/2 2.5YR 5/4 CUTTINGS: SUBROUNDED 2 TO 40 mm
	165'	RED SANDY SILTSTONE UNWEATHERED MOD. HARD FINE-GRAINED SAND DOLOMITIC ABUNDANT MICA	0.0 PPM @ 168'				SAME AS ABOVE 2 TO 50 mm
	170'	RED FINE TO MEDIUM-GRAINED SILTY SANDSTONE UNWEATHERED HARD DOLOMITIC	0.0 PPM @ 172'				SAME AS ABOVE 2 TO 20 mm
	175'	RED BRECCIA WITH SOME ROUND CLASTS CALCAREOUS SILT MATRIX MATRIX SUPPORTED UNWEATHERED MOD. HARD	0.0 PPM @ 178'				MATRIX: 2.5 YR 5/4 CLASTS: ASSORTED COLORS ANGULAR TO ROUNDED CUTTINGS: ANGULAR TO ROUNDED 1-10 mm
	180'	RED SILTSTONE UNWEATHERED MOD. HARD DOLOMITIC ABUND. MICA	0.0 PPM @ 182'				2.5 YR 3/2 CUTTINGS: SUBROUNDED 2-40 mm
	185'	SAME AS ABOVE	0.0 PPM @ 188'				SAME AS ABOVE
	190'	RED SANDY SILTSTONE FINE-GRAINED SAND UNWEATHERED MOD. HARD DOLOMITIC ABUND. MICA	0.0 PPM @ 192'				SAME AS ABOVE
	195'	SAME AS ABOVE	0.0 PPM @ 198'	SWITCHED AT 199'	FROM 12"	TO 8"	SAME AS ABOVE
	200'	SAME AS ABOVE CALCAREOUS	1.0 PPM @ 203'				SAME AS ABOVE 2 TO 30 mm
	205'						

HIGH WATER PRODUCTION

HTW DRILLING LOG

HOLE NO. ERM-22D

PROJECT: HIA - MIDDLETOWN | INSPECTOR: D. EVANS | SHEET 6 OF 13 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	205'	RED SILTY FINE-GRAINED SANDSTONE (WACKE) UNWEATHERED MOD. HARD CALCAREOUS	1.3 PPM @ 209'	NS	NS	NA	2.5 YR 5/4 CUTTINGS: ROUNDED TO SUBROUNDED 2 TO 12 mm
	210'	RED SILTSTONE WITH SOME FINE TO MEDIUM-GRAINED SAND AND MICA UNWEATHERED SOFT DOLOMITIC	0.0 PPM @ 213'				2.5 YR 3/2 CUTTINGS: SUBROUNDED 2 TO 10 mm
	215'	RED SILTSTONE UNWEATHERED SOFT ABUND. MICA DOLOMITIC	0.6 PPM @ 217'				SAME AS ABOVE 2 TO 30 mm
	220'	RED SILTY FINE-GRAINED SILTY SANDSTONE (WACKE) UNWEATHERED MOD. HARD DOLOMITIC	2.4 PPM @ 222'				SAME AS ABOVE 2 TO 20 mm
	225'	RED FINE TO MEDIUM-GRAINED SILTY SANDSTONE WITH TRACE COARSE ANGULAR GRAVEL UNWEATHERED HARD CALCAREOUS	1.3 PPM @ 228'				2.5 YR 5/4 CUTTINGS: SUBROUNDED 2 TO 25 mm
	230'	SAME AS ABOVE	1.2 PPM @ 232'				SAME AS ABOVE
	235'	RED SILTY FINE TO MEDIUM-GRAINED SANDSTONE (WACKE) WITH TRACE COARSE ANGULAR GRAVEL UNWEATHERED HARD CALCAREOUS TRACE PIECES OF CALCITE LARGE AMT. CALCITE PAT. ON SOME CUTTINGS SURFACES	1.3 PPM @ 237'				SAME AS ABOVE
	240'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	0.0 PPM @ 243'				2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 15 mm
	245'	RED SANDY SILTSTONE FINE-GRAINED SAND UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	0.4 PPM @ 248'				SAME AS ABOVE 2 TO 25 mm
	250'						

HIGH WATER PRODUCTION

HTW DRILLING LOG

HOLE NO. ERM - 22D

PROJECT: HIA - MIDDLETOWN

INSPECTOR: D. EVANS

SHEET 7 OF 13 SHEETS

EV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS Cuttings Sizes
	250'	RED SILTY FINE TO MEDIUM - GRAINED SANDSTONE (WACKE) UNWEATHERED HARD DOLOMITIC SOME SIGNIFICANT CALCITE PPT ON FEW CUTTINGS	1.0 PPM @ 253'	NS	NS	NA	2.5 YR 5/4 CUTTINGS: SUBROUNDED 2 TO 20 mm
	255	SAME AS ABOVE WITH SOME FINE TO COARSE GRAVEL CONSISTING OF ANGULAR CALCITE AND QUARTZ	1.5 PPM @ 257'				SAME AS ABOVE 2 TO 25 mm
	260'	RED BRECCIA CALCAREOUS FINE TO MEDIUM - GRAINED SAND + SILT MATRIX MATRIX SUPPORTED HARD TO VERY HARD UNWEATHERED, CALCITE + QUARTZ CLASTS	0.0 PPM @ 263'				MATRIX: 2.5YR 5/4 CLASTS: ASSORTED COLORS - ANGULAR - SUBANGULAR 2 TO 15 mm CUTTINGS: 2 TO 25 mm ANGULAR TO SUBANGULAR
	265'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC SOME DOLOMITE NODULES	0.0 PPM @ 267'				2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 20 mm
	270'	SAME AS ABOVE WITHOUT DOLOMITE NODULES	1.4 PPM @ 273'				SAME AS ABOVE 2 TO 30 mm
	275'	SAME AS ABOVE	1.5 PPM @ 277'				SAME AS ABOVE
	280'	SAME AS ABOVE CALCAREOUS - DOLOMITIC CALCITE PPT. ON SURFACES OF SOME CUTTINGS	1.3 PPM @ 283'				SAME AS ABOVE 2 TO 25 mm
	285'	SAME AS ABOVE	1.1 PPM @ 288'				SAME AS ABOVE
	290'	RED SILTY FINE - MEDIUM - GRAINED SANDSTONE (WACKE) ~20-40% SILT UNWEATHERED HARD CALCAREOUS - DOLOMITIC	1.0 PPM @ 293'				2.5 YR 5/4 CUTTINGS: SUBROUNDED 2 TO 30 mm
	295'						

HIGH WATER PRODUCTION

HTW DRILLING LOG

HOLE NO. ERM - 22D

PROJECT: HIA - MIDDLETOWN

INSPECTOR: D. EVANS

SHEET 8 OF 14 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	295'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA CALCAREOUS SOME CALCITE NODULES	1.2 PPM @ 297'	NS	NS	NA	2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 30 mm
	300'	SAME AS ABOVE EXCEPT DOLOMITIC NO CALCITE NODULES	1.5 PPM @ 303'				SAME AS ABOVE
	305'	SAME AS ABOVE	1.2 PPM @ 308'				SAME AS ABOVE
	310'	SAME AS ABOVE	0.0 PPM @ 313'				SAME AS ABOVE
	315'	RED SANDY SILTSTONE FINE-GRAINED SAND (20-40%) MOD. HARD TO HARD ABUND. MICA DOLOMITIC	0.0 PPM @ 319'				SAME AS ABOVE 2 TO 20 mm
	320'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	0.0 PPM @ 323'				SAME AS ABOVE
	325'	SAME AS ABOVE	0.0 PPM @ 328'				SAME AS ABOVE
	330'	SAME AS ABOVE	0.0 PPM @ 333'				SAME AS ABOVE
	335'	RED SILTY FINE-GRAINED SANDSTONE (WACKE) UNWEATHERED HARD CALCAREOUS	0.0 PPM @ 338'				2.5 YR 5/4 CUTTINGS: SUBANGULAR 2 TO 30 mm
	340'						

HIGH WATER PRODUCTION

HTW DRILLING LOG

HOLE NO. ERM-22D

PROJECT: HIA - MIDDLETOWN

INSPECTOR: D. EVANS

SHEET 9 OF 14 SHEETS

EV. L.	DEPTH B.	DESCRIPTION OF MATERIALS C.	FIELD SCREENING RESULTS D.	GEOTECH SAMPLE OR CORE BOX NO E.	ANALYTICAL SAMPLE NO. F.	BLOW COUNTS G.	REMARKS H.
	340'	RED FINE TO MEDIUM-GRAINED SANDSTONE WITH SOME FINE TO COARSE GRAVEL UNWEATHERED HARD, CALCAREOUS GRAVEL-ANGULAR CALCITE & QUARTZ	SILTY 0.0 PPM @ 343'	NS	NS	NA	2.5 YR 5/4 CUTTINGS: SUBROUNDED 2 TO 20 mm
	345'	SAME AS ABOVE BUT SILTY SANDSTONE	0.4 PPM @ 348'				SAME AS ABOVE
	350'	RED SILTSTONE AND FINE TO COARSE GRAVEL (POSSIBLY BROKEN BRECCIA) UNWEATHERED HARD CALCAREOUS - SOME CALCITE PPT. GRAVEL-ANGULAR CALCITE, QUARTZ, FELDSPAR, OTHER	1.2 PPM @ 352'				2.5 YR 3/2 ASSORTED COLORS CUTTINGS: ANGULAR TO SUBANGULAR 2 TO 20 mm
	355'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	2.3 PPM @ 358'				2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 25 mm
	360'	RED BRECCIA CALCAREOUS SAND AND SILT MATRIX MATRIX SUPPORTED COARSE SAND AND GRAVEL CLASTS CONSISTING OF CALCITE, QUARTZ, K-FELDSPAR AND OTHER UNWEATHERED, HARD	1.1 PPM @ 364'				MATRIX: 2.5 YR 5/4 CLASTS: ASSORTED COLORS ANGULAR - SUBANGULAR CUTTINGS: ANGULAR - SUBROUNDED 2 TO 10 mm
	365'	RED SILTY FINE-GRAINED SANDSTONE WITH TRACE MEDIUM SAND UNWEATHERED HARD CALCAREOUS	1.5 PPM @ 368'				2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 15 mm
	370'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC SOME DOLOMITE NODULES	1.4 PPM @ 373'				SAME AS ABOVE 2 TO 20 mm
	375'	SAME AS ABOVE WITHOUT DOLOMITE NODULES	1.1 PPM @ 378'				SAME AS ABOVE
	380'	RED SILTY FINE-GRAINED SANDSTONE (WACKE) UNWEATHERED HARD CALCAREOUS	0.0 PPM @ 384'				2.5 YR 5/4 CUTTINGS: SUBROUNDED 2 TO 10 mm
	385'						

HIGH WATER PRODUCTION

HTW DRILLING LOG

HOLE NO. ERM-22D

PROJECT: HIA - MIDDLETOWN

INSPECTOR: D. EVANS

SHEET 10 OF 14 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	385'	RED SANDY SILTSTONE FINE-GRAINED SAND UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC SOME SMOOTHED CUTTINGS SURFACES	0.0 PPM @ 388'	NS	NS	NA	2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 20 mm
	390'	RED SILTY FINE-GRAINED SANDSTONE (WACKE) UNWEATHERED MOD. HARD DOLOMITIC	0.0 PPM @ 394'				SAME AS ABOVE SUBROUNDED
	395'	SAME AS ABOVE	0.7 PPM @ 398'				SAME AS ABOVE
	400'	RED SILTY FINE TO MEDIUM SANDSTONE (WACKE) UNWEATHERED HARD CALCAREOUS	0.0 PPM @ 403'				2.5 YR 5/4 CUTTINGS: SUBROUNDED 2 TO 15 mm
	405'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	0.0 PPM @ 408'				2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 25 mm
	410'	SAME AS ABOVE	0.0 PPM @ 413'				SAME AS ABOVE
	415'	RED SILTY FINE TO MEDIUM GRAINED SANDSTONE (WACKE) UNWEATHERED HARD CALCAREOUS	0.0 PPM @ 418'				2.5 YR 5/4 CUTTINGS: SUBROUNDED 2 TO 25 mm
	420'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	61.2 PPM @ 423'				2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 15 mm
	425'	SAME AS ABOVE	40.7 PPM @ 428'				SAME AS ABOVE
	430'						

HIGH WATER PRODUCTION

HTW DRILLING LOG

HOLE NO. ERM-22D

PROJECT: HIA - MIDDLETOWN

INSPECTOR: D. EVANS

SHEET 11 OF 14 SHEETS

EV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	430'	RED SANDY SILTSTONE FINE-GRAINED SAND UNWEATHERED HARD DOLOMITIC	0.0 PPM @ 434'	NS	NS	NA	2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 30 mm
	435'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	0.0 PPM @ 438'				SAME AS ABOVE 2 TO 10 mm
	440'	SAME AS ABOVE	0.0 PPM @ 443'				SAME AS ABOVE
	445'	SAME AS ABOVE	0.0 PPM @ 448'				SAME AS ABOVE
	450'	RED SANDY SILTSTONE FINE-GRAINED SAND UNWEATHERED MOD. HARD ABUND. MICA, DOLOMITIC	0.0 PPM @ 453'				SAME AS ABOVE
	455'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	0.0 PPM @ 458'				SAME AS ABOVE
	460'	MIXTURE OF ABOVE AND SILTY FINE-GRAINED SANDSTONE (WACKE) SS: UNWEATHERED HARD CALCAREOUS CALCITE PPT. ON SURFACES OF SOME CUTTINGS	50.2 PPM @ 463'				SAME AS ABOVE SS: 2.5 YR 5/4
	465'	RED SANDY SILTSTONE FINE-GRAINED SAND UNWEATHERED HARD ABUND. MICA CALCAREOUS	25.1 PPM @ 468'				2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 10 mm
	470'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	88.4 PPM @ 473'				SAME AS ABOVE.
	475'						

HIGH WATER PRODUCTION

HTW DRILLING LOG

HOLE NO. ERM-22D

PROJECT: HIA - MIDDLETOWN

INSPECTOR: D. EVANS

SHEET 12 OF 14 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	475'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC - CALCAREOUS SOME SMALL CALCITE NODULES	33.5 PPM @ 478'	NS	NS	NA	2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 15 mm
	480'	RED SILTY FINE-GRAINED SANDSTONE (WACKE) UNWEATHERED HARD CALCAREOUS	0.0 PPM @ 483'				2.5 YR 5/4 CUTTINGS: SUBROUNDED 2 TO 20 mm
	365'	MIXTURE OF RED SILTSTONE OF 475-480' INTERVAL AND RED BRECCIA OF 360-365' INTERVAL SOME CALCITE PPT. ON SURFACES OF SOME CUTTINGS	0.0 PPM @ 488'				SAME AS 475-480' AND 360-365' INTERVALS 2 TO 20 mm
	490'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	0.0 PPM @ 492'				2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 15 mm
	495'	SAME AS ABOVE SOME COARSER MICA (F.S.) AND CALCITE PPT.	0.0 PPM @ 498'				SAME AS ABOVE 2 TO 20 mm
	500'	RED SANDY SILTSTONE FINE-GRAINED SAND UNWEATHERED HARD ABUND. MICA CALCAREOUS	1.5 PPM @ 504'				SAME AS ABOVE 2 TO 10 mm
	505'	RED SILTY FINE-GRAINED SANDSTONE (WACKE) UNWEATHERED HARD CALCAREOUS	2.0 PPM @ 508'				2.5 YR 5/4 CUTTINGS: SUBROUNDED 2 TO 15 mm
	510'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA - SOME COARSE FLAKES CALCAREOUS	0.0 PPM @ 513'				2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 10 mm
	515'	SAME AS ABOVE WITHOUT COARSE MICA DOLOMITIC	0.0 PPM @ 518'				SAME AS ABOVE
	520'						

HIGH WATER PRODUCTION

HTW DRILLING LOG

HOLE NO. ERM-22D

PROJECT: HIA - MIDDLETOWN

INSPECTOR: D. EVANS

SHEET 13 OF 14 SHEETS

ELEV. b.	DEPTH a.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	520'	RED SANDY SILTSTONE FINE-GRAINED SAND UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC CALCITE PPT. ON SURFACES OF SOME CUTTINGS	0.6 PPM @ 523'	NS	NS	NA	2.5 YR 3/2 CUTTINGS: SUBANGULAR 2 TO 15 mm
	525'	SAME AS ABOVE WITHOUT SAND	1.2 PPM @ 528'				SAME AS ABOVE 2 TO 20 mm
	530'	SAME AS ABOVE WITH SOME MEDIUM SAND-SIZED MICA	1.0 PPM @ 533'				SAME AS ABOVE 2 TO 10 mm
	535'	RED SANDY SILTSTONE FINE-GRAINED SAND UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC CALCITE PPT ON SOME SURFACES	0.3 PPM @ 537'				SAME AS ABOVE
	540'	SAME AS ABOVE HARD	0.0 PPM @ 543'				SAME AS ABOVE
	545'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	0.0 PPM @ 548'				SAME AS ABOVE
	550'	SAME AS ABOVE WITH FINE-GRAINED SAND (SANDY SILTSTONE)	0.0 PPM @ 552'				SAME AS ABOVE
	555'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC CALCITE PPT ON SOME SURFACES	0.0 PPM @ 558'				SAME AS ABOVE 2 TO 20 mm
	560'	SAME AS ABOVE WITHOUT CALCITE PPT.	0.0 PPM @ 563'				SAME AS ABOVE 2 TO 10 mm
	565'						

VERY HIGH WATER PRODUCTION

HTW DRILLING LOG

HOLE NO. ERM-22D

PROJECT: HIA - MIDDLE TOWN | INSPECTOR: D. EVANS | SHEET 14 OF 14 SHEETS

ELEV. b.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	565'	RED SANDY SILTSTONE		NS	NS	NA	2.5 YR 3/2
		FINE-GRAINED SAND UNWEATHERED MOD. HARD DOLOMITIC ABUND. MICA	0.0 PPM @ 567'	EXTREMELY HIGH WATER PRODUCTION			CUTTINGS: SUBANGULAR 2 TO 10 mm
	570'						
		(UNABLE TO GET SAMPLE BECAUSE OF VERY HIGH WATER PRESSURE)	0.0 PPM				
	575'						
		RED SANDY SILTSTONE					2.5 YR 3/2
		FINE TO MEDIUM-GRAINED SAND UNWEATHERED MOD. HARD DOLOMITIC ABUND MICA	0.0 PPM @ 578'	NOTICABLE REDUCTION, BUT STILL STEADY WATER PRODUCTION			CUTTINGS: SUBANGULAR 2 TO 20 mm
	580'						
		RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	0.0 PPM @ 583'				SAME AS ABOVE 2 TO 10 mm
	585'						
		SAME AS ABOVE CALCAREOUS	0.0 PPM @ 588'				SAME AS ABOVE 2 TO 15 mm
	590'						
		SAME AS ABOVE DOLOMITIC	0.0 PPM @ 593'				SAME AS ABOVE 2 TO 20 mm
	595'						
		SAME AS ABOVE	0.0 PPM @ 598'				SAME AS ABOVE
	600'						

TOTAL DEPTH OF BOREHOLE = 603'

INJECTED WATER TOTAL ≈ 5620 GAL.

DRILLING COMPLETED ON 2/15/95 BY D.E.

WELL INSTALLATION WILL BE COMPLETED AT A LATER DATE

HTH DRILLING LOG

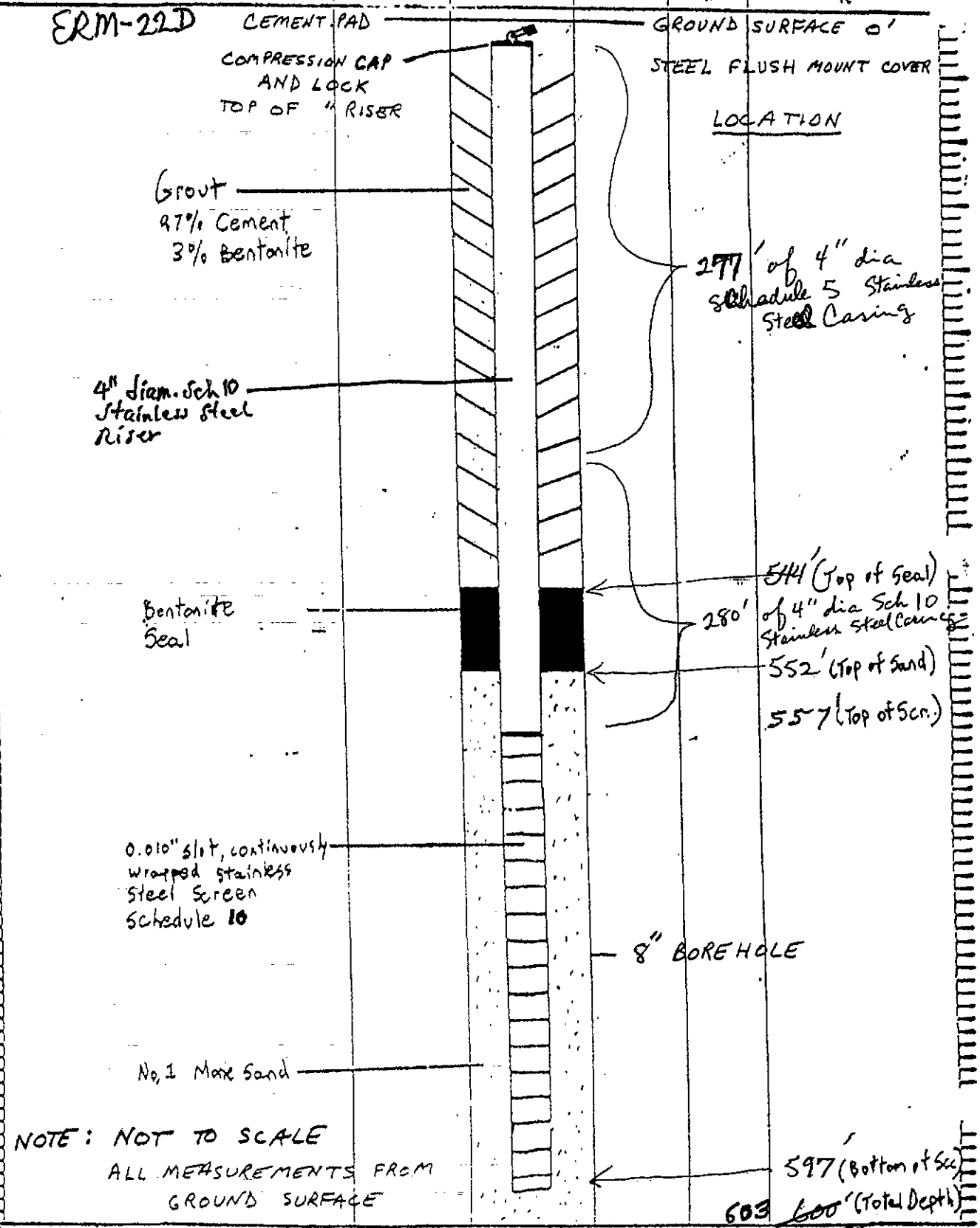
ERM-22-D

PROJECT: HIA, Middletown

INSPECTOR: D. Menzie

SHEET ___ OF ___ SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	REPRESENTATIVE SAMPLE OR CORE FOR NO.	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS



PROJECT: HIA, Middletown

HOLE NO. ERM-22-D

HTW DRILLING LOG

HOLE NO. ERM-235

1. COMPANY NAME: ERM-PMC	2. DRILLING SUBCONTRACTOR: ADT-MA
SHEET 1 OF 3 SHEETS	
3. PROJECT: Middletown HIA	4. LOCATION: ~~See page #~~ Middletown PA
5. NAME OF DRILLER: Troy Brown	6. MANUFACTURER'S DESIGNATION OF DRILL: Mobil
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: B-59, HSA; 6 3/4" ID Augers; 2" Split Spoons; 140 lb hammer; Roller bit 5 7/8"	8. HOLE LOCATION: See page #3
	9. SURFACE ELEVATION: Not surveyed
	10. DATE STARTED: 1/31/95
	11. DATE COMPLETED: 2/3/95 Installed Flushmounts
12. OVERBURDEN THICKNESS: ≈ 26'	15. DEPTH GROUNDWATER ENCOUNTERED: 13'4"
13. DEPTH DRILLED INTO ROCK: 0'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED
14. TOTAL DEPTH OF HOLE: 26'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	✓		

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
NA						%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
MONITORING WELL ERM-235				[signature]

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0	Topsoil - V Fine Sd and Silt, vegetation dry	0 ppm to 4 ppm	NS	NA	9, 18 19, 10	10 YR 3/4 Rec 20"
	1–2	V. Fine Silty Sand, ~~some~~ or ~~little~~ GRAVEL, dense, dry "SILTY SAND w. GRAVEL"	0 ppm	NS	NA	6, 8 15, 14	10 YR 3/4 SM Rec 6"
	3–4						
	5		0 ppm	NS	NA	9, 10 9, 10	10 YR 3/4 SM Rec 9"
	6						
	7	~~POORLY GRADED SAND~~ Fine* - Coarse Sand, ~~some~~ with gravel, v. dense, dry (Subangular to subrounded)	0 ppm w. Gravel	1AB ERM-235 (8.0-10.0)	NA	5, 8 18, 15	7.5 YR 4/4 SP
	8–9		0 ppm	~~[illegible]~~	NA	12, 19 19, 18	7.5 YR 4/4 SP
	10						

PROJECT: Middletown

HOLE NO. ERM-235

HTW DRILLING LOG

HOLE NO. ERM-23S

PROJECT Middletown | INSPECTOR J. Ryan | SHEET 2 OF 3 SHEETS

EL. b.	DEPTH	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	10						
	11	SAND & GRAVEL grading to PURE GRAVEL (Subrounded to rounded)					CUTTINGS
	12						
	13						
	14	"POORLY GRADED GRAVEL W/SAND"					
	15	Fine-Coarse Sand and Gravel (Subrounded to rounded), trace Silt, v. dense, saturated w. thin clayey silt seam	0ppm	IAB-ERM-23S (15-22)	NA	12/16 16,24	10YR 4/4 SW-GP
	16						
	17						
	18	increase gravel content					
	19						
	20						
	21	same as above	0ppm	IAB ERM-23S (15-22)	NA	5,12, 11,10	10YR 4/4 SW-GP
	22						
	23						
	24						
	25	same as above color change	0ppm	NS	NA	22, 4/3" refusal	7.5YR 3/0
	26	Poss BEDRX					spoon was bouncing
	27						
	28						

PROJECT MIDDLETOWN | HOLE NO. ERM-23S

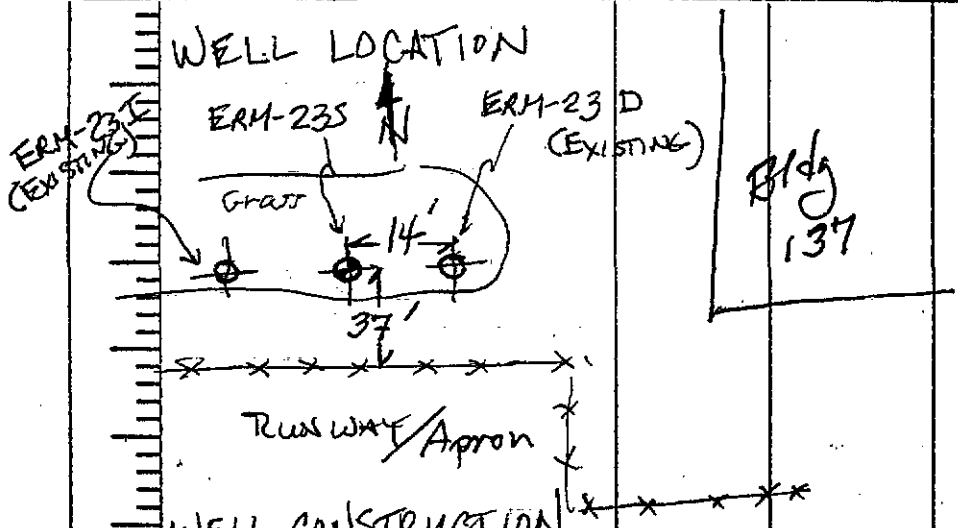
HTW DRILLING LOG

HOLE NO. ERM-23S

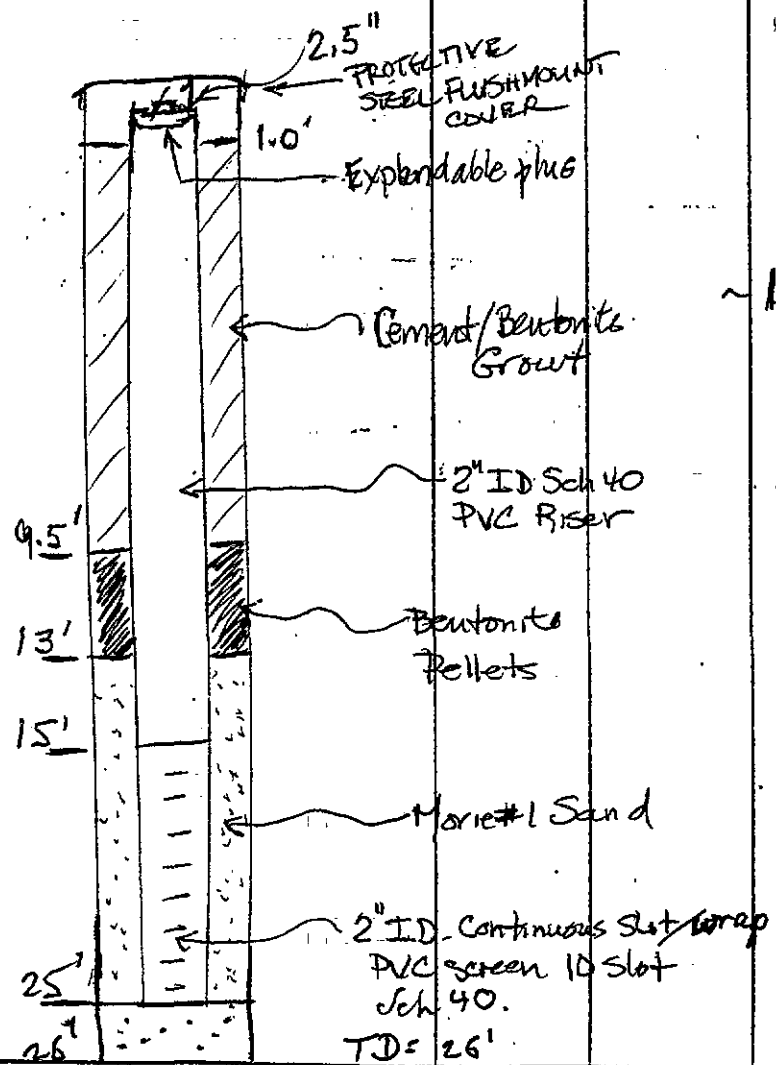
PROJECT Middletown | INSPECTOR J. Ryan | SHEET 3 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.

WELL LOCATION



WELL CONSTRUCTION ERM-23S



WELL MATERIALS:

10' Continuous slot PVC Screen .10 slot
4 bags Sand Morie#1
1 bucket bentonite pellets
~15' 2" Sch 40 PVC riser
3 bags Cement
1/4 bag bentonite

PROJECT | HOLE NO.

HTA DRILLING LOG

ERM-23I

1. COMPANY NAME	ERM-PMC
2. DRILLING SUBCONTRACTOR	Hydro Group
SHEET 1 OF ~~67~~ 6 SHEETS	
3. PROJECT	HTA - Middletown
4. LOCATION	Middletown, PA
5. NAME OF DRILLER	Steve Blair / Bernie Connor
6. MANUFACTURER'S DESIGNATION OF DRILL	Barber Rig - DR-12
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	12" casing and 8" sonic advanced w/ 17" + 8" air hammers, Barber Drill Rig, Dual Rotary. Temporary 12" casing to 65.5', 8" casing to 100'
8. HOLE LOCATION	See Sheet #
9. SURFACE ELEVATION	Not Surveyed
10. DATE STARTED	10-27-94
11. DATE COMPLETED	
12. OVERBURDEN THICKNESS	≅ 28.0' (40'-Comp dat Rx)
13. DEPTH GROUNDWATER ENCOUNTERED	≅ 28.0'
14. DEPTH DRILLED INTO ROCK	172.0'
15. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	—
16. TOTAL DEPTH OF HOLE	200.0'
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	—
18. GEOTECHNICAL SAMPLES: None	DISTURBED: ✓ / UNDISTURBED:
19. TOTAL NUMBER OF CORE BOXES	None
20. SAMPLES FOR CHEMICAL ANALYSIS: None	VOC / METALS / OTHER (SPECIFY) / OTHER (SPECIFY) / OTHER (SPECIFY)
21. TOTAL CORE RECOVERY	— %
22. DISPOSITION OF HOLE: Well installed	BACKFILLED / MONITORING WELL: ✓ / OTHER (SPECIFY)
23. SIGNATURE OF INSPECTOR	Warren N. Fox

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0.0'	Gravel and cobbles w/ silt, sub rounded, loose, wet (water introduced)	0ppm PID, No Odor	NS	NS	NA	10YR 4/3 brown. Pieces 1.0 to 35mm Dia.
	5.0'	C. grain gravel trace cobbles (crumbled), sub-rounded, loose, wet, Quartz clasts fragments trace (sub angular)	0ppm PID, No Odor	NS	NS	NA	10YR 4/3 brown. 1.0 to 15mm
	10.0'	Gravel and Cobbles (broken), rounded, conglomeritic (pieces), loose, wet, Possible river gravel	0ppm PID, No Odor	NS	NS	NA	7.5YR 4/3 brown. 1.0 to 35mm
	15.0'	Similar to above but pieces are sub angular, very diverse, wet	3.8 ppm PID, No Odor	NS	NS	NA	5Y 3/2 dark olive gray, (Salt + pepper color mix). 1.0 to 15mm
	20.0'	Coarse Gravel + ~~Cobbles~~ (WC), rounded, loose, wet ~~Cong~~ (WC), good mix of colors	3.6 ppm PID, No Odor	NS	NS	NA	5Y 3/2 dark olive gray Salt + Pepper. 1.0 to 30mm
	25.0'						

Possible Fill Material

PROJECT	HTA - Middletown
HOLE NO.	ERM-23I

HTW DRILLING LOG

HOLE NO. ERM-23I

PROJECT: HIA - Middletown

INSPECTOR: Warren Fox

SHEET 2 OF 67 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
26' Water	25.0	Similar ~~cobbles~~ (WS) ~~and~~ gravel. ~~and~~ (WS) w/ silt.	0 ppm PID, No Odor	NS	NS	NA	7.5YR 4/4 brown
	30.0	Coarse (WS) ~~cobbles and~~ gravel subrounded in silt and clay. m. soft	0 ppm PID No Odor	NS	NS	NA	1.0 to 28mm Dia. 7.5YR 4/4 brown
BRX @ 28-35'	35.0	Sandstone sub rounded v. weathered m hard (-) HCl, No clasts	0 ppm PID, No Odor	NS	NS	NA	1.0 to 40mm. 5YR 4/3 reddish brown
Competent Bedrock	40.0	Siltstone v. weathered m. hard (-) HCl, No clasts trace of fine white sand (rounded	0 ppm PID No Odor	NS	NS	NA	1.0 to 45mm 5YR 3/4 dark reddish brown
	45.0	Siltstone v. weathered m. hard + HCl - Dolomitic cement. w/ Dol. clasts (1.0 to 5mm Dia.)	0 ppm PID, No Odor	NS	NS	NA	1.0 to 25mm 5YR 3/4 dark reddish brown
	50.0	Same material (w/ calcite clasts ≤ 3mm angular.)	0 ppm PID No Odor	NS	NS	NA	1.0 to 30mm 2.5YR 2.5/4 very dusky red.
	55.0	Siltstone weathered. m. hard No clasts trace of dolomitic cementation. (HCl +)	2 ppm PID No Odor	NS	NS	NA	1.0 to 20mm 2.5YR 3/3 dusky red
	60.0	Same material No Clasts	0.5 ppm PID No Odor	NS	NS	NA	1.0 to 6.0mm 2.5YR 3/4 dusky Red.
	65.0	Similar material. HCL + Dolomitic cementation Note: w/ Clay balls in cuttings	0 ppm PID No Odor	NS	NS	NA	1.0 to 32 mm 2.5YR 3/4 dusky Red
	70.0		Same color as rock. ~~No~~ Soft from 67' to 69'				1.0 to 30mm - Clay balls.

PROJECT: HIA - Middletown

HOLE NO. ERM-23I

HTW DRILLING LOG

PROJECT: HA - Middletown | INSPECTOR: Warren Fox | HOLE NO. ERM-23I | SHEET 3 OF 7 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	40.0	Siltstone weathered m. soft no clasts HCl + Dolomitic Cementation	3 ppm PID, No Odor. softer at 69.0' / Producing Water	NS	NS	NA	10 2.5YR 3/4 dusky Red
	50.0	Sandstone with silt f. grain. sub angular. m. weathered m. ~~hard~~ soft trace of quartz clasts 1mm Dia.	5 ppm PID No Odor	NS	NS	NA	1.0 to 15 mm 2.5YR 3/3 dusky Red.
	60.0	Siltstone w/ trace of calcite veins m. hard m. weathered HCl + (Dolomitic Cementation).	3 ppm PID, No Odor	NS	NS	NA	1.0 to 22 mm 2.5YR 2.5/3 very dusky red.
harder	70.0						1.0 to 30 mm
fracture soft	80.0	Similar Material but no calcite only Dolomite clasts (v. soft)	2 ppm PID, No Odor	NS	NS	NA	2.5YR 2.5/3 very dusky red.
hard	90.0	Siltstone m. hard m. weathered. No clasts Cementation Dolomitic ~~Cementation~~	2.0 ppm PID, No Odor	NS	NS	NA	1.0 to 25 mm 2.5YR 3/6 dark red
	100.0	Same as above but mottled with a lighter dusky red color.	2.0 ppm PID, No Odor	NS	NS	NA	1.0 to 10 mm 2.5YR 3/3 dusky red.
	110.0	Siltstone m. hard m. weathered. trace of dolomite clasts (≤2mm) Dolomitic Cementation.	0 ppm PID No Odor	NS	NS	NA	1.0 to 15 mm 2.5YR 2.5/4 dark red.
	120.0	Same as above No clasts however.	2.0 ppm PID, No Odor	NS	NS	NA	1.0 to 20 mm 2.5YR 3/3 Dusky red.
lots of water	130.0	Siltstone m. hard m. weathered. trace of quartz 2mm. subangular.	0.3 ppm PID No Odor	NS	NS	NA	1.0 to 10 mm 2.5YR 3/3 dusky red.
	140.0		Water Zone - Fracture				1.0 to 12 mm

PROJECT: HA - Middletown | HOLE NO. ERM-23I

HIA DRILLING LOG

ERM-23I

PROJECT: HIA - Middletown | INSPECTOR: Warren Fox | SHEET 4 OF 6 SHEETS

ELEV. (a)	DEPTH (b)	DESCRIPTION OF MATERIALS (c)	FIELD SCREENING RESULTS (d)	GEOTECH SAMPLE OR CORE BOX NO (e)	ANALYTICAL SAMPLE NO. (f)	BLOW COUNTS (g)	REMARKS (h)
	115.0'	Siltstone - hard m. weathered no clasts like above Dolomitic Cementation (Trace of fine sand - subangular)	0.3 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red. 1.0 to 12 mm
	120.0'	Similar material.	0.6 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 Dusky Red
	125.0'	Similar material. Softer.	0.0 ppm PID, No Odor	NS	NS	NA	1.0 to 10 mm 2.5YR 3/3 dusky red.
Softer	130.0'	Siltstone. harder m. weathered trace of quartz clasts ≤ 6mm. dolomitic Cementation.	0.0 ppm PID No Odor	NS	NS	NA	1.0 to 8.0 mm 2.5YR 3/3 dusky red
	135.0'	Sandstone w/ silt f.grain - subangular hard m. weathered quartz clasts ≤ 5 mm.	0.0 ppm PID, No Odor	NS	NS	NA	1.0 to 10 mm 2.5YR 3/2 dusky red.
Softer 139.0'	140.0'	Sandstone w/ silt f.grain Silty argillaceous - Wacke hard m. weathered. subangular quartz clasts - subrounded ≤ 5 mm	0.3 ppm PID, No Odor	NS	NS	NA	1.0 to 8.0 mm 2.5YR 3/2 dusky red.
	145.0'	Silty argillaceous Sandstone / Wacke Same as above clasts of dolomitic calcite ≤ 10 mm sub-angular	0 ppm PID, No Odor	NS	NS	NA	1.0 to 10 mm 2.5YR 3/3 dusky Red
	150.0'	Same clastic material.	0 ppm PID, No Odor	NS	NS	NA	1.0 to 12 mm 2.5YR 3/3 dusky Red
	155.0'	Similar material clasts are smaller. ≤ 5 mm	0.4 ppm PID, No Odor	NS	NS	NA	1.0 to 10 mm 2.5YR 3/2 dusky red
	160.0'						1.0 to 12 mm

PROJECT: HIA - Middletown | HOLE NO. ERM-23I

HTW DRILLING LOG

PROJECT: HIA - Middletown | INSPECTOR: Warren Foy | HOLE NO. ERM-23I | SHEET 5 OF ~~6~~ 7 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	160.0	Silty Argillaceous Sandstone / Wacke. Hard, S. weathering, clasts ≤ 10mm subangular. w/ Dolomite/calcite/limestone/quartz.	0.7ppm PID, No Odor	NS	NS	NA	2.5YR 25/2 very dusky red. 1.0 to 20mm
	165.0	Siltstone m. hard, m. weathered. No clasts, Dolomitic Cementation	0.0ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky Red 1.0 to 12mm
	170.0	Same material	0.5 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky Red 1.0 to 20mm
	175.0	Siltstone trace of f. sand round m. hard. m. weathered. No Clasts, Dolomitic C.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red. 1.0 to 10 mm
	180.0	Same material	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky Red. 1.0 to 20mm
10'5" Total.	185.0	Similar Material h. weathered, still No clasts	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky Red 1.0 to 12mm
	190.0	Sandstone with silt f. grain. subrounded m. weathered hard. clasts of quartz-calcite subrounded ≤ 8mm.	0 ppm PID No Odor	NS	NS	NA	2.5YR 3/2 dusky red 1.0 to 10mm
	195.0	similar to above clasts ≤ 4 mm Dia.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red 1.0 to 5mm
	200.0	200' bottom of bore hole 10-31-94 WNF					

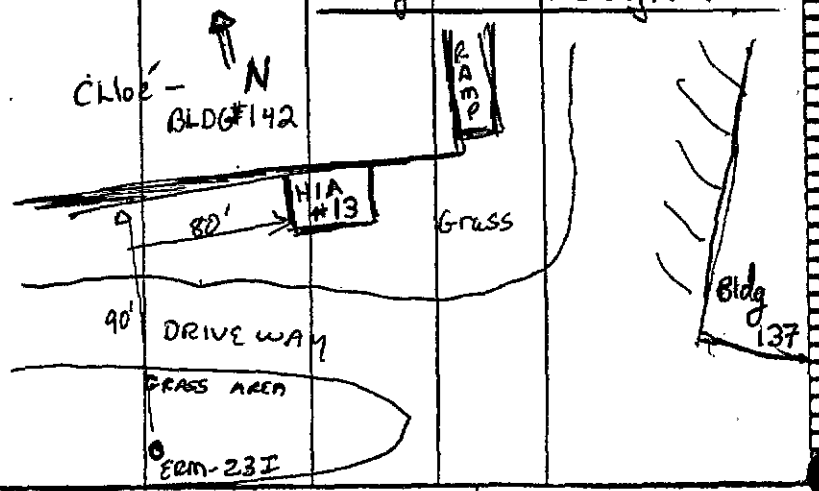
HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.
HIA-Middletown	Warren Fox	ERM-23I
		SHEET 6 OF ~~6~~ 7 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.

Notes Not to Scale.

Boring Location Diagram

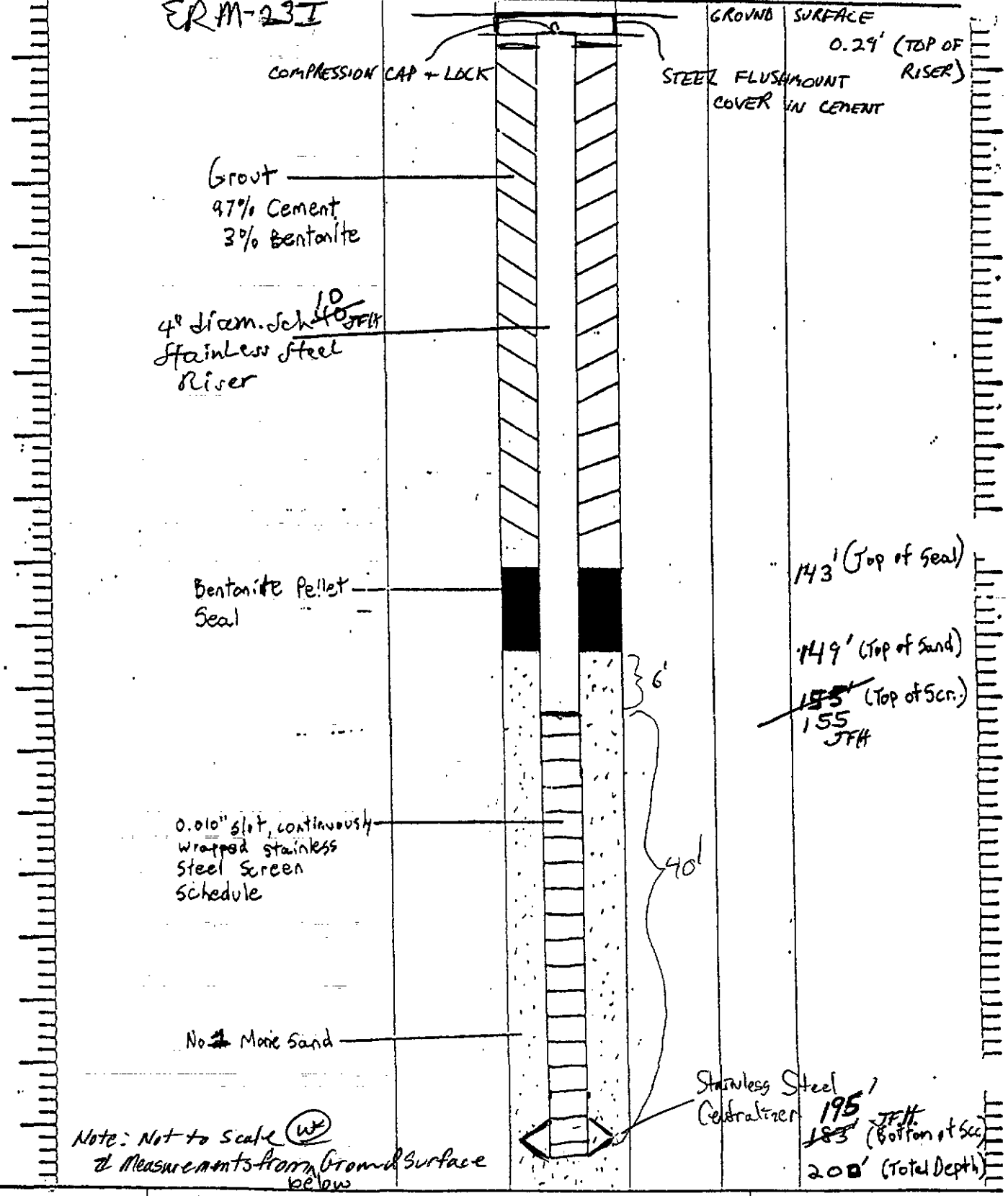


PROJECT	HOLE NO.
HIA-Middletown	ERM-23I

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.
HIA, Middletown	C. SALOMON / Walter Fox	ERM-23I
		SHEET 7 of 7 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE or CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS



HTW DRILLING LOG

HOLE NO. ERM-23D

SHEET 1 OF 15 SHEETS

1. COMPANY NAME: ERM	2. DRILLING SUBCONTRACTOR: Hydrogroup
3. PROJECT: HIA-Middletown	4. LOCATION: Middletown, PA
5. NAME OF DRILLER	6. MANUFACTURER'S DESIGNATION OF DRILL: Barber
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 16" casing + bit to 40'; 12" casing + bit to 200'; 8" casing + bit to 535'; 8" bit to 602; all casings temporary.	8. HOLE LOCATION: near HIA production well #13
	9. SURFACE ELEVATION
	10. DATE STARTED: 12/28/94 — 11. DATE COMPLETED: 1/16/95
12. OVERBURDEN THICKNESS: ≈ 29'	15. DEPTH GROUNDWATER ENCOUNTERED
13. DEPTH DRILLED INTO ROCK: ≈ 573'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED
14. TOTAL DEPTH OF HOLE: 602'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
constructed well ERM-23D		yes		D. Haller

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0	Brown well graded gravel w/silt and sand. Sand ≤15%. Gravel → subround to round. Gravel size → 5-35 mm	0.0 ppm @ ≈2'				GW-GM. Varying colors in gravel. -Sand+silt → 7.5YR 4/2
	5	Well Graded Gravel (River gravel) Sand <15%. Gravel is subrounded to round. Gravel size → 5-40 mm	0.0 ppm @ ≈8'				GW. -Varying colors (grey, brown, orange, red)
	10		0.0 ppm @ ≈13'				
	15		0.0 ppm @ ≈17'				
	20		20.8 ppm @ ≈23'				
	25						

reviewed 9 Feb 95 JFH

PROJECT: HIA-Middletown

HOLE NO. ERM-23D

HTW DRILLING LOG

HOLE NO. ERM-23D

PROJECT: H1A Middletown | INSPECTOR: D. Haller | SHEET 2 OF 15 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	25	Same as above (GW)	58.1 ppm @ ≈28'				↓
		(Note: Hit weathered bedrock @ ≈29' BGS)					
	30	Dusky red calcareous or dolomitic SILTSTONE. - Carbonates in (matrix) only → no notable carbonates > silt sized - very soft to soft - Slight to moderately weathered - cuttings: subangular/subround	27.3 ppm @ ≈33'				(2.5 YR, 4/3) cuttings: 1-25mm
	35		28.7 ppm @ ≈37'				cuttings: 1-25mm
	40	- NOTE: Rock becomes slightly harder + less weathered w/depth	0.0 ppm @ ≈41'	Switch from 16" to 12" diameter drilling @ 40'			(2.5 YR, 4/4) cuttings: 1-45mm (slight color change)
	45		0.0 ppm @ ≈47'				cuttings: 1-15mm
	50		0.0 ppm @ ≈53'				cuttings: 1-20mm
	55		0.0 ppm @ ≈57'				cuttings: 1-40mm
	60	Moderately Hard / No notable weathering	0.0 ppm @ ≈63'				cuttings: 1-35mm
	65		0.0 ppm @ ≈67'				cuttings: 1-30mm
	70		0.0 ppm @ ≈73'				cuttings: 1-30mm

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.	SHEET
H/A-Middletown	D. Haller	ERM-23D	3 OF 15 SHEETS

ELEV. b.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
		Same as above (Dusky red calcareous or dolomitic SILTSTONE, -No carbonates > silt sized -Moderately hard -Unweathered	0.0 ppm @ ≈77'				cuttings: 1-25mm
	80		0.0 ppm @ 83'				cuttings: 1-20mm
	85		0.0 ppm @ 87'				cuttings: 1-25mm
	90		0.0 ppm @ 93'				cuttings: 1-35mm
	95		0.0 ppm @ 97'				cuttings: 1-20mm
	100	Weak red calcareous or dolomitic very fine sandstone (wacke) (silty). Trace 1-4mm dolomite clasts Moderately hard to hard. Unweathered cuttings: Subangular/subround	0.0 ppm @ ≈104'				2.5YR, 5/3 cuttings: 1-20mm
	105	Weak red calcareous or dolomitic SILTSTONE Very trace dolomite clasts (2-3 clasts ≈ 5-7mm in dia) Moderately hard. Unweathered cuttings: Subangular/subround	0.0 ppm @ ≈107'				2.5YR, 5/4 cuttings: 1-30mm
	110		0.0 ppm @ ≈113'				cuttings: 1-15mm
	115	Weak red calcareous or dolomitic very fine to fine grained (silty) SANDSTONE (WACKE) Moderately hard to hard, Unweathered cuttings: Subrounded/Subangular	0.0 ppm @ ≈117'				2.5YR, 5/3 cuttings: 1-25mm

HTW DRILLING LOG

HOLE NO. ERM-23D

PROJECT: HIA Middletown | INSPECTOR: D. Haller | SHEET 4 OF 15 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	120	Dusky red calcareous or dolomitic SILTSTONE. No carbonates > silt size. Hard. Unweathered. Cuttings: Subrounded/subangular	0.0 ppm @ ≈123'				2.5YR, 4/3 cuttings: 1-30mm
	125	Weak red calcareous or dolomitic SANDY BRECCIA (Matrix supported). Trace 1-5 mm dolomite clasts. Hard to very hard. Unweathered.	0.0 ppm @ ≈127'				2.5YR, 5/3 cuttings: 1-25mm
	130	Clasts are fine grained sized, subangular, and of pretty uniform size. Matrix is fine to medium subrounded sand.	0.0 ppm @ ≈133'				cuttings: 1-25mm
	135	cuttings: Subangular/subrounded	0.0 ppm @ ≈137'				cuttings: 1-20mm
	140	Weak red calcareous or dolomitic fine SANDSTONE (WACKE). No notable carbonate clasts. Hard. Unweathered. cuttings: subangular/subrounded (SILTY)	0.0 ppm @ ≈144'				2.5YR, 5/3 cuttings: 1-15mm
	145	(SAME AS 125-140) SANDY BRECCIA	0.0 ppm @ ≈148'				2.5YR, 5/3 cuttings: 1-10mm
	150	Dusky red calcareous or dolomitic SILTSTONE. - No notable carbonate clasts. - Moderately Hard to hard. - Unweathered. - cuttings: subangular	0.0 ppm @ ≈153'				2.5YR, 4/3 cuttings: 1-15mm
	155		0.0 ppm @ ≈157'				cuttings: 1-30mm
	160		0.0 ppm @ ≈164'				cuttings: 1-25mm
	165	See next pg. for log of this interval (Lith. Δ)		HIGH WATER PRODUCTION			

PROJECT: HIA - Middletown | HOLE NO. ERM-23D

HTW DRILLING LOG

PROJECT: HIA-Middletown | INSPECTOR: D. Holder | HOLE NO. ERM-23D | SHEET 5 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	170	Weak red calcareous or dolomitic fine grained SILTY SANDSTONE (WACKE)	0.0 ppm @ ≈173'	HIGH WATER PRODUCTION			2.5 YR, 5/3 cuttings: 1-15mm
		Trace 1-7mm dolomitic clasts throughout					
		-Unweathered	0.0 ppm @ ≈173'				cuttings: 1-15mm
		-Hard					
	175	-cuttings: Subangular/Subround					
			0.0 ppm @ ≈175'				cuttings: 1-20mm
	180						
			0.0 ppm @ ≈184'				cuttings: 1-10mm
	185						
		Dusky red calcareous or dolomitic SILTSTONE. Trace 1-10mm dolomite clasts					2.5 YR, 4/3
		-Moderately hard	0.0 ppm @ ≈189'				cuttings: 1-20mm
	190	-Unweathered					
		-cuttings: Subangular					
			0.0 ppm @ ≈193'				cuttings: 1-20mm
	195						
			0.0 ppm @ ≈197'				cuttings: 1-10mm
	200	Switch to 8" drilling @ 200' BGS.					
		Dusky red calcareous or dolomitic fine to medium grained SANDSTONE (WACKE). No apparent carbonate clasts. Hard. Unweathered. SILTY Sand is subround	0.0 ppm @ ≈203'	Decrease in water production. Most likely a result of decrease in hole diameter			2.5 YR, 4/3 cuttings: 1-20mm
	205	cuttings: Subangular/Subround					
		Dusky red calcareous or dolomitic fine grained SANDSTONE (WACKE)					2.5 YR, 4/3
		-No apparent carbonate clasts	0.0 ppm @ ≈207'				cuttings: 1-15mm
		-Moderately hard to hard					
	210	-Unweathered SILTY					
		-cuttings: Subrounded					
			0.0 ppm @ ≈213'				cuttings: 1-10mm
	215						

PROJECT: HIA-Middletown | HOLE NO. ERM-23D

HTW DRILLING LOG

HOLE NO. ERM-23D

PROJECT: HIA Middletown

INSPECTOR: D. Haller

SHEET 6 OF 15 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	215	Dusky red calcareous or silty dolomitic fine to medium grained SANDSTONE (mudstone). Hard. Unweathered. Trace 1-5mm dolomite clasts. Med-coarse sand is subangular. Cuttings: Subangular/Subround	0.0ppm @ ≈217'				cuttings: 1-10mm
	220		0.0ppm @ ≈223'				cuttings: 1-25mm
	225		0.0ppm @ ≈227'				cuttings: 1-30mm
	230	(Seems to be fractured around 232-233' BGS.)	0.0ppm @ ≈233'				cuttings: 1-50mm
	235		0.0ppm @ ≈238'				cuttings: 1-20mm
	240	Dusky red calcareous or dolomitic matrix supported sandy BREccia - Hard - Unweathered - trace 1-6mm dolomite clasts - matrix: fine-medium subrounded sand - clasts: Subangular/angular fine gravel - cuttings: Subangular	0.0ppm @ ≈244'				2.5YR, 4/3 cuttings: 1-15mm
	245		0.0ppm @ ≈247'				cuttings: 1-25mm
	250	Dusky red calcareous or dolomitic SILTSTONE. Moderately hard to hard. Unweathered. Trace 1-5mm dolomite clasts and subangular fine gravel (fall in from above + not blown). Cuttings: Subangular/Subround.	0.0ppm @ ≈253'				2.5YR, 4/3 cuttings: 1-10mm
	255		0.0ppm @ ≈257				cuttings: 1-30mm
	260						

Water production steady, but not excessive

PROJECT: HIA Middletown

HOLE NO. ERM-23D

HTW DRILLING LOG

PROJECT: HIA Middletown | INSPECTOR: D. Heller | HOLE NO. ERM-23D | SHEET 7 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	265	Same as above	0.0 ppm @ ≈263'				cuttings 1-35mm
			0.0 ppm @ ≈267'				cuttings: 1-20mm
	270	Dusky red (2.5YR, 3/4) SILTSTONE (same as above except color change) (Also no apparent carbonate clasts → carbonates are silt sized (cement)).	0.0 ppm @ ≈273'				(2.5YR, 3/4) cuttings: 1-30mm
	275		0.0 ppm @ ≈277'				cuttings: 1-10mm
	280		0.0 ppm @ ≈283'				cuttings: 1-10mm
	285		0.0 ppm @ ≈287'				cuttings: 1-10mm
	290		0.0 ppm @ ≈293'				cuttings: 1-10mm
	295		0.0 ppm @ ≈297'				cuttings: 1-15mm
	300		0.0 ppm @ ≈303'				cuttings: 1-20mm
	305		0.0 ppm @ ≈307'				cuttings: 1-30mm
	310						

Low, but steady water production (≈300-400 gal/gal from 265-310' BGS)

PROJECT: HIA Middletown | HOLE NO. ERM-23D

HTW DRILLING LOG

PROJECT: HIA Middletown | INSPECTOR: D. Haller | HOLE NO. ERM-23D | SHEET 8 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	310	SAME AS ABOVE	0.0 ppm @ ≈313'	Low, but steady water production			cuttings: 1-10mm
	315		0.0 ppm @ ≈317'				cuttings: 1-50mm
	320		0.0 ppm @ ≈323				cuttings: 1-30mm
	325		0.0 ppm @ ≈327'				cuttings: 1-40mm
	330		0.0 ppm @ ≈333				cuttings: 1-40mm
	335		0.0 ppm @ ≈337'				cuttings: 1-25mm
	340		0.0 ppm @ ≈343'	High water production starting @ around 340'/365			cuttings: 1-15mm
	345		0.0 ppm @ ≈348'				cuttings: 1-30mm
	350		0.0 ppm @ ≈353				cuttings: 1-20mm
	355						

HTW DRILLING LOG

PROJECT: HIA Middletown | INSPECTOR: D. Haller | HOLE NO. ERM-23D | SHEET 9 of 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
		Same as above (SILTSTONE)	0.0 ppm @ ≈358'	HIGH WATER PRODUCTION			cuttings: 1-10mm
	360						
			0.0 ppm @ ≈363'				cuttings: 1-20mm
	365						
			0.0 ppm @ ≈367'				cuttings: 1-30mm
	370						
		-very trace course sand sized subangular quartz clasts in 373' and 378' samples	0.0 ppm @ ≈373'				cuttings: 1-70mm
	375	-Trace subrounded 1-3mm dolomite (very) clasts in 373' and 378' samples	0.0 ppm @ ≈378'				cuttings: 1-45mm
	380	(Seems to be fractured from about 370' to ≈385')	0.0 ppm @ ≈384'				cuttings: 1-60mm
	385	(Bright water production decline @ ≈388' → Seems less fractured.)	0.0 ppm @ ≈388'				cuttings: 1-20mm
	390		0.0 ppm @ ≈393'				cuttings: 1-20mm
	395		0.0 ppm @ ≈397'				cuttings: 1-15mm
	400		0.0 ppm @ ≈404'				cuttings: 1-30mm
	405						

HTW DRILLING LOG

HOLE NO. ERM-23D

PROJECT: HIA Middletown | INSPECTOR: D. Haller | SHEET 10 OF 15 SHEETS

ELEV. b	DEPTH a	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	405	Same as above (SILTSTONE) (I haven't seen a change in lithology since 250' BGS)	0.0 ppm @ ≈409'	HIGH WATER PRODUCTION			cuttings: 1-20mm
	410		0.0 ppm @ ≈414'				cuttings: 1-25mm
	415	Dusky Red calcareous or dolomitic fine grained SILTY SANDSTONE (WACKE) - Hard - Unweathered except slight yellow stainy on several cuttings chip/fracture surfaces. - Trace 1-5mm subrounded dolomite clasts throughout but seem to be concentrated in 426' and 433' samples - cuttings: Subangular/Subround	0.0 ppm @ ≈417'				(2.5YR, 4/3) cuttings: 1-30mm
	420		0.0 ppm @ ≈423'				cuttings: 1-25mm
	425		0.0 ppm @ ≈426'				cuttings 1-35mm
	430		0.0 ppm @ ≈433'				cuttings: 1-30mm
	435	Dusky red calcareous or dolomitic SILTSTONE - No apparent carbonates > silt sized. Very trace fine sand. - Hard - Unweathered - cuttings: Subangular/subrounded	0.0 ppm @ ≈438'				(2.5YR, 4/3) cuttings: 1-5mm
	440		0.0 ppm @ ≈443'				cuttings: 1-30mm
	445		0.0 ppm @ ≈447'				cuttings: 1-20mm
	450		0.0 ppm @ ≈454'				cuttings: 1-25mm

HTW DRILLING LOG

PROJECT: HIA Middletown
INSPECTOR: D. Heller
HOLE NO.: ERM-23D
SHEET 11 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
		Same as above (siltstone)					
	455		0.0 ppm @ ≈457'	HIGH WATER PRODUCTION	1/12/95		cuttings: 1-20mm
	460	Black (Mn?) staining on several cuttings from 463' sample → fracture surfaces	0.0 ppm @ ≈463'				cuttings: 1-50mm
	465	off white/buff precipitate on several cuttings surfaces from the 473' sample and on one chip from the 463' sample.	0.0 ppm @ ≈467'		Slow Drilling		cuttings: 1-30mm
	470	Precipitate looked like dolomite but it didn't fizz → was tough to scrape it off and get a sufficient amount to hit w/HCl.	0.0 ppm @ ≈473'				cuttings: 1-35mm
	475		0.0 ppm @ ≈477'				cuttings: 1-95mm
	480		0.0 ppm @ ≈484'		1/12/95		cuttings: 1-20mm
	485		0.0 ppm @ ≈487'		Slow Drilling		cuttings: 1-15mm
	490		0.0 ppm @ ≈493'				cuttings: 1-20mm
	495		0.0 ppm @ ≈498				cuttings: 1-25mm
	500						

PROJECT: HIA Middletown
HOLE NO.: ERM-23D

HTW DRILLING LOG

HOLE NO. ERM-23D

PROJECT HIA Middletown | INSPECTOR D. Haller | SHEET 12 OF 15 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	500	weak red calcareous or dolomitic fine to medium grained SILTY SANDSTONE (WACKE). very trace angular fine gravel. Medium sand is subround to round. No apparent carbonates. V.Hard. Unweathered cuttings; Subangular	0.0 ppm @ ≈503'	HIGH WATER PRODUCTION	SLOW DRILLING		(2.5YR, 5/3) cuttings: 1-25mm
	505	Dusky red calcareous or dolomitic SILTSTONE. No apparent carbonates > silt sized. Very trace fine sand Hard unweathered cuttings; subangular/subrounded	0.0 ppm @ ≈507'				(2.5YR, 4/3) cuttings: 1-10mm
	510		0.0 ppm @ ≈513'				cuttings: 1-10mm
	515		0.0 ppm @ ≈518'				cuttings: 1-35mm
	520		0.0 ppm @ ≈523'				cuttings: 1-10mm
	525	white precipitate (dolomite?) on several cuttings chips surfaces/ fracture surfaces from 528' sample	0.0 ppm @ ≈528'				cuttings: 1-25mm
	530		0.0 ppm @ ≈533'				cuttings: 1-25mm
	535		0.0 ppm @ ≈538'				cuttings: 1-35mm
	540		0.0 ppm @ ≈543'				cuttings: 1-20mm
	545						

HTW DRILLING LOG

HOLE NO. ERM-23D

PROJECT: HIA Middletown

INSPECTOR: D. Heller

SHEET 13 OF 15 SHEETS

ELEV. b.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	550	white precipitate (dolomite?) on several cuttings chips surfaces/fracture surfaces from 547' sample	0.0 ppm @ ≈547'				cuttings; 1-45mm
			0.0 ppm @ ≈552'				cuttings; 1-20mm
	555	(siltstone) ↓	0.0 ppm @ ≈557'				cuttings: 1-10mm
	560		0.0 ppm @ ≈562'				cuttings: 1-10mm
	565	white precipitate as noted above (568' sample)	0.0 ppm @ ≈568'				cuttings: 1-15mm
	570		0.0 ppm @ ≈573'				cuttings: 1-10mm
	575	(siltstone) ↓	0.0 ppm @ ≈578'				cuttings: 1-15mm
	580		0.0 ppm @ ≈584'				cuttings: 1-15mm
	585		0.0 ppm @ ≈588'				cuttings: 1-10mm
	590		0.0 ppm @ ≈593'				cuttings: 1-10mm
	595						

HIGH WATER PRODUCTION

PROJECT: HIA Middletown

HOLE NO. ERM-23D

HTW DRILLING LOG

HOLE NO. ERM-23D

PROJECT: HIA-Middletown

INSPECTOR: D. Haller

SHEET 14 OF 15 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	600	(siltstone)	0.0 ppm @ ≈598'	HIGH WATER PRODUCTION			cuttings 1-8mm
		Boring terminated @ 602' BGS Injection water total ≈5000 gal 16" casing advanced to 40' 12" casing advanced to 200' 8" Casing advanced to 555' -Drilling completed on 1/16/95 by D.H. well Installation will be completed @ a later date					

PROJECT: HIA Middletown

HOLE NO. ERM-23D

HTW DRILLING LOG

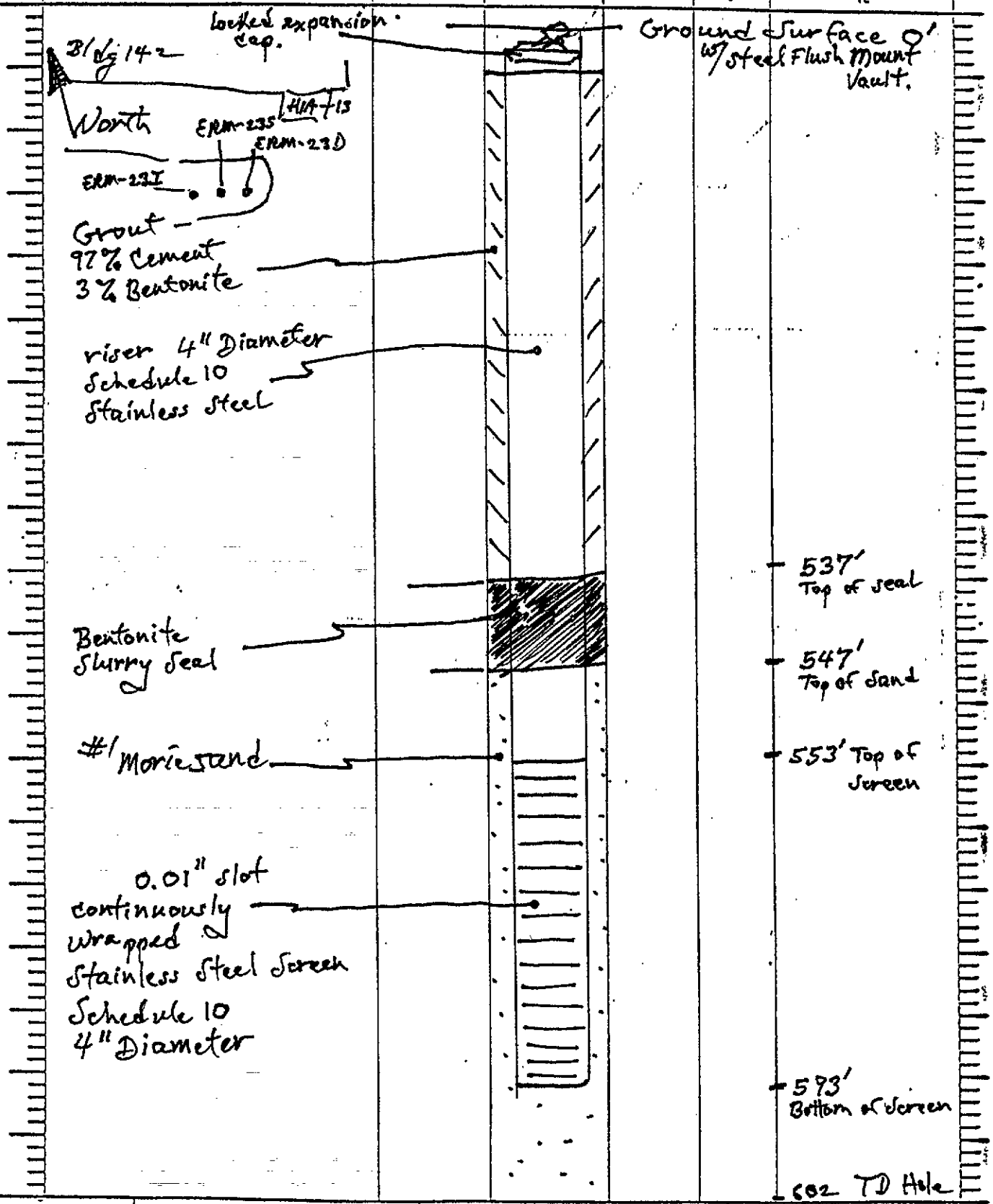
HOLE NO. ERM-23D

PROJECT Middletown

INSPECTOR J.F. Herrick / D. Heller

SHEET 15 OF 15 SHEETS

ELEV. L	DEPTH B.	DESCRIPTION OF MATERIALS C.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.



PROJECT Middletown

HOLE NO. ERM-23D

HTW DRILLING LOG

HOLE NO. ERM-24S

1. COMPANY NAME: ERM-PMC	2. DRILLING SUBCONTRACTOR: ADT-MA
SHEET 1 OF 3 SHEETS	
3. PROJECT: Middletown HIA	4. LOCATION: Middletown PA
5. NAME OF DRILLER: Troy Brown	6. MANUFACTURER'S DESIGNATION OF DRILL: Mobil
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: B-59; 6 5/8" ID Augers; 2" Split Spoons; 140 lb hammer	8. HOLE LOCATION: See Page #
	9. SURFACE ELEVATION: Not Surveyed
	10. DATE STARTED: 2/2/95 — 11. DATE COMPLETED: 2/3/95 Installed Flushmts
12. OVERBURDEN THICKNESS: >25	15. DEPTH GROUNDWATER ENCOUNTERED: 12' 4" @ 2:10 pm
13. DEPTH DRILLED INTO ROCK: NA	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED:
14. TOTAL DEPTH OF HOLE: 25'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NA			

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
NA						%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Monitoring Well ERM-24S		✓		

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0	3" asphalt over gravel					
	1	FILL: F-C SILTY SAND with GRAVEL, dense @2, Cinders, brick frags, moist	0ppm	NS	NA	15,15 12,48	7.5YR 2/0 SM Rec 18"
	3	FILL: SILT, TRACE OF GRAVEL, hard dry, petroleum odor	55ppm	NS	NA	30,29 13,27	10YR 3/2 ML Rec 15"
	5	POORLY GRADED F-C Sand with gravel, v dense, slightly moist. (Subrounded to rounded)	30ppm	NS	NA	40,33 34,30	10YR 4/6 SP Rec 17" Ambient 1 ppm
	7	increasing gravel content	3ppm	NS	NA	32, 100/3"	10YR 4/6 Ambient 1.5 ppm SP Rec 26
	9	WELL GRADED GRAVEL & COBBLES DOLOMITIC					GW CUTTINGS
	10						

PROJECT: Middletown PA — HOLE NO. ERM-24S

HTW DRILLING LOG

HOLE NO. ERH-245

PROJECT Middletown | INSPECTOR J. Ryan | SHEET 2 OF 3 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	10						CUTTINGS
	11						
	12	FINE TO COARSE WELL GRADED GRAVEL & COBBLES (DOLOMITIC COBBLES) subrounded to rounded					GW
	13						
	14						
	15						
	16	F-C Sand and gravel (rounded to subrounded) dense, saturated	0ppm	NS	NA	24,19 23,23	10YR 4/6 SW Rec 14"
	17						
	18	WELL GRADED SAND W GRAVEL					WL @ 2:10 pm 12'4"
	19						Driller notes Running sands
	20	Same as above	0ppm	NS	NA	WR/12" 15,34	10YR 4/6 SW Rec 6"
	21						
	22						WL in auger 12'9"
	23						
	24						
	25	EOB'					

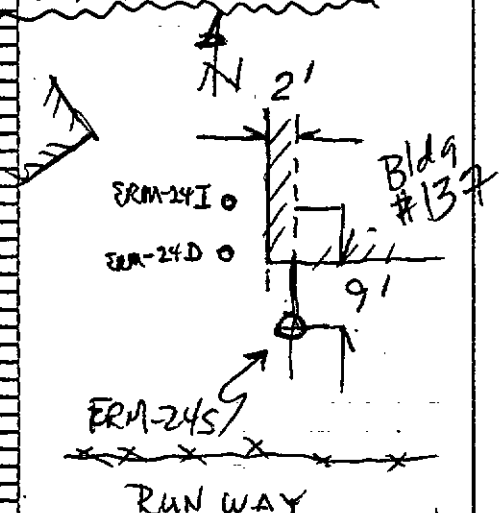
HTW DRILLING LOG

HOLE NO. ERM-24S

PROJECT Middletown | INSPECTOR J. Ryan | SHEET 3 OF 3 SHEETS

ELEV. L.	DEPTH B.	DESCRIPTION OF MATERIALS C.	FIELD SCREENING RESULTS D.	GEOTECH SAMPLE OR CORE BOX NO E.	ANALYTICAL SAMPLE NO. F.	BLOW COUNTS G.	REMARKS H.

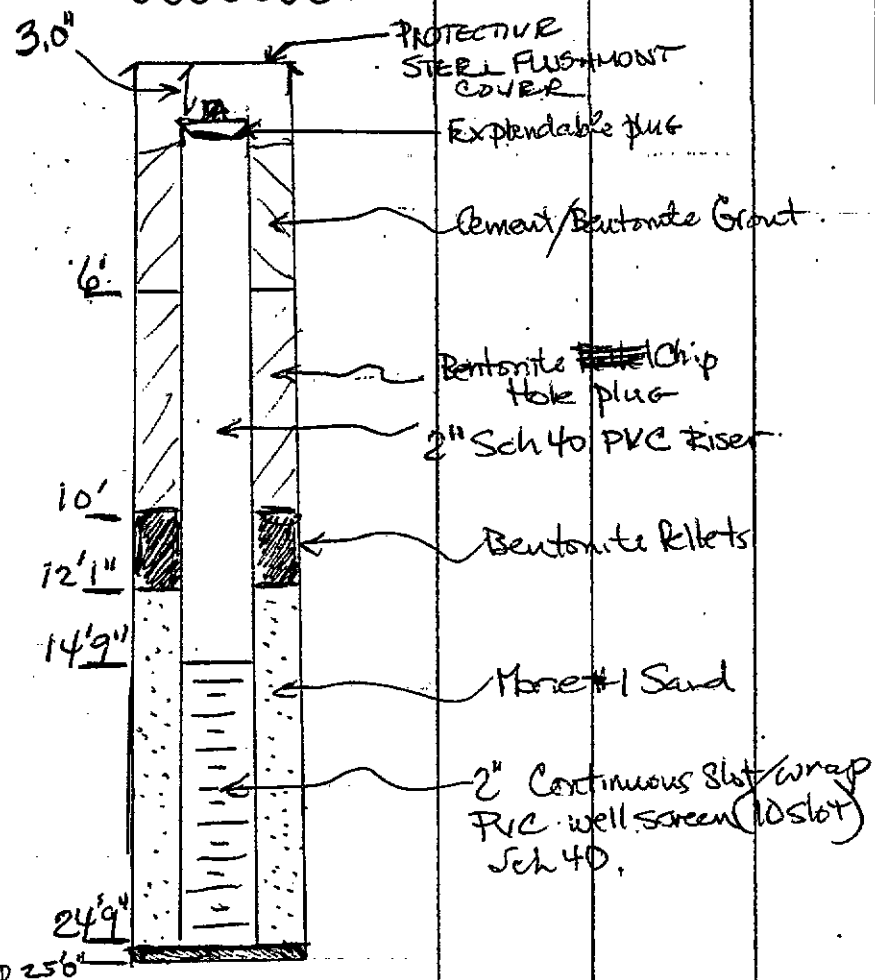
WELL LOCATION: ERM-24S



WELL MATERIALS

Sand: ~~8~~ 4 bags
Hole plug 3 bags
Cement 3 bags
Bentonite Pellets 1 bucket
10' Continuous Slot 2" PVC Screen (10 slot)
15' 2" Sch 40 PVC Riser

WELL CONSTRUCTION



PROJECT MIDDLETOWN | HOLE NO. ERM-24S

Figure 4-1

HTW DRILLING LOG

HOLE NO. ERM-24I

1. COMPANY NAME: ERM - PMC	2. DRILLING SUBCONTRACTOR: Hydro Group
SHEET 1 OF 1 SHEETS	
3. PROJECT: HIA - Middletown	4. LOCATION: Middletown, PA
5. NAME OF DRILLER: Steve Blair / Bennie Cornon	6. MANUFACTURER'S DESIGNATION OF DRILL: Barber Drill Rig DR-12
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Barber Drill Rig; Dual Rotary; 8" casing and Hammer; 12" casing and Hammer; Temporary 8" casing to 160'; 12" casing to 39'	8. HOLE LOCATION: See Sheet #6
	9. SURFACE ELEVATION: Not Surveyed
	10. DATE STARTED: 11-2-94
	11. DATE COMPLETED:
12. OVERBURDEN THICKNESS: 26-30' ≈ 26' Competent rock at 34'	13. DEPTH GROUNDWATER ENCOUNTERED: Unknown
14. DEPTH DRILLED INTO ROCK: 176'	15. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —
16. TOTAL DEPTH OF HOLE: TD = 202'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None	X		None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None						— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well ERM-24I Installed		X		Warren N. Fay

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0.0'	~~Well Graded~~ Gravel - Coarse (GW) Subrounded 1.0 to 10mm loose Fill gray gravel rock dry dry (water added however)	1ppm PID, No Odor	NS	NS	NA	10YR 3/3 dark brown 1.0 to 30 mm
	5.0'	Well Graded (GW) Similar Gravel - coarse subrounded w/ chips of fill rock (gray) moistened loose	1ppm PID, Organic Odor	NS	NS	NA	10YR 4/2 dark grayish brown 1.0 to 25 mm
	10.0'	Well Graded (GW) Gravel - smaller size w/ rock fragments 1 to 5mm. rounded gravel. loose	1ppm PID, No Odor	NS	NS	NA	10YR 4/3 brown 1.0 to 25 mm
	15.0'	Well Graded (GW) Gravel with fine to med. Sand. Gravel 1 to 5mm rounded sand - subround. loose, wet.	0ppm PID, No Odor	NS	NS	NA	10YR 4/3 brown 1.0 to 40 mm
	20.0'	Well Graded (GW) Gravel Subrounded to angular trace of angular coarse Sand. wet.	1ppm PID No Odor	NS	NS	NA	10YR 3/3 dark brown 1.0 to 40 mm
Soft	20.0'	Soft					

reviewed 9Feb95 JFF

PROJECT: HIA - Middletown

HOLE NO. ERM-24I

HTW DRILLING LOG.

HOLE NO. ERM-24I

PROJECT: HIA - Middletown

INSPECTOR: Warren Fox

SHEET 2 OF 6 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	25.0	~~Well Graded~~ w/ SAND Gravel and silty fg (GW) subrounded sand. Soft Signs of weathering in chips.	0ppm PID, No Odor.	NS	NS	NA	2.5YR 3/4 dusky red. 1.0 to 30mm
	30.0	Siltstone w/ gravel m. soft weathered subrounded inside 10mm and quartz clasts rounded	0ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red 1.0 to 20 mm
	35.0	Siltstone weathered m. soft No clasts Uniform Dolomitic Cementation -HCl(+)	4 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red. 1.0 to 15 mm
	40.0	Same as above	2.9 ppm PID, No Odor	NS	NS	NA	2.5YR 3/4 dusky Red 1.0 to 25 mm
	45.0	Siltstone weathered Dol. m. to soft. trace of quartz dusts white (≤ 3mm).	8.0ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red 1.0 to 25 mm
Soft (medium)	50.0	Same material No Quartz	7.5ppm PID, No Odor	NS	NS	NA	2.5 YR 3/3 dusky Red. 1.0 to 15 mm
Soft (medium)	55.0	Siltstone weathered m. soft (fracture zone) quartz clasts angular to subround (≤ 5mm) Dolomitic (cementation)	2.0ppm PID, No Odor.	NS	NS	NA	2.5YR 2.5/2 dusky red. 1.0 to 10 mm
Still Soft.	60.0	Siltstone ~~fracture~~ JFT Sandy Siltstone weathered, m. hard Clasts of quartz and calcite (≤ 3mm) w/ Dolomitic Cementation.	1ppm PID, No Odor	NS	NS	NA	2.5 YR 3/2 dusky Red 1.0mm to 15mm
	65.0	Same as above 13'-16'	0.5ppm PID No Odor	NS	NS	NA	2.5 YR 3/2 dusky Red 1.0 to 10mm
	70.0						

PROJECT: ~~ERM-24I~~ HIA - Middletown

HOLE NO. ERM-24I

HTW DRILLING LOG

HOLE NO. ERM-24I

PROJECT: HIA- Middletown

INSPECTOR: Warren Fox

SHEET 3 OF 7 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	70.0	Sandstone with Silt f. grain. sub rounded weathered (HCL+) m. hard. w/ Dol. Cementation.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky Red
	75.0'						1.0 to 15 mm
		Siltstone/~~backstone~~ to Sandy trace of fine angular sand. weathered. m. hard Dolomite/Quartz/Calcite Clasts ≤5mm.	Siltstone ppm PID, No Odor	NS	NS	NA	2.5 YR 3/2 dusky red
	80.0'						1.0 to 18 mm
very soft.		Siltstone weathered m. hard Dolomitic Cementation trace Calcite Clasts ≤2mm angular	0 ppm PID, No Odor.	NS	NS	NA	2.5YR 3/6 dark red
	85.0'						1.0 to 12 mm
		Similar material clasts of calcite bigger ≤4mm	1ppm PID, No Odor	NS	NS	NA	2.5 YR 3/3 dusky red.
	90.0'						1.0 to 25 mm
		Siltstone weathered m. hard clasts of calcite, angular ≤4mm Dol. Cementation	.7 ppm PID, No Odor	NS	NS	NA	2.5 YR 3/3 dusky red
	95.0'						1.0 to 15 mm
fracture soft with		Similar Material - only trace of dolomite/calcite clasts ≤3mm (sub-angular)	.9 ppm PID, No Odor	NS	NS	NA	2.5 YR 3/3 dusky red.
	100.0'						1.0 to 30 mm.
		Silty sandstone f. grain sub angular weathered m. hard clasts of calcite/dol. angular ≤5mm Dol. cementation	0.0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/4 dusky Red
	105.0'						1.0 to 15mm
		Same material - but clasts of quartz only (trace of, ≤3mm)	1.0 ppm PID, No Odor	NS	NS	NA	2.5 YR 3/4 dusky red.
	110.0'						1.0 to 20mm
		Silty Sandstone weathered hard Quartz clasts ≤3mm angular. w/trace of limestone (angular gray)	0.7 ppm PID, No Odor	NS	NS	NA	2.5 YR 3/2 dusky red
	115.0'						1.0 to 10mm

PROJECT: HIA- Middletown

HOLE NO. ERM-24 II

HTW DRILLING LOG

HOLE NO. ERM-24I

PROJECT: HIA-Middletown | INSPECTOR: Warren Fox | SHEET 4 OF 7 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	115.0'	Siltstone m. hard to hard weathered Dol. cementation Clasts of calcite ≤ 8mm angular	1.2 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red. 1.0 to 40 mm
Water	120'	Siltstone m. weathered hard Dolomitic Cementation No Clasts	0.9 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red. 1.0 to 24 mm
	125.0'	Same Material Still No clasts	0.0 ppm. PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red 1.0 to 20 mm
	130.0'	Sandy Siltstone (w/ med. grain subrounded sand). weathered. m. hard. matrix support Dol. cementation	0.6 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3. dusky red 1.0 to 20 mm
	135.0'	Similar sandy siltstone (w/ sand) also clasts of quartz and dolomite ≤ 4mm, subangular.	1.3 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red. 1.0 to 30 mm
water	140.0'	Sandy Siltstone (w/ f. gr. sand) subrounded. weathered. m. hard, matrix support. Dol. cementation	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red. 1.0 to 22 mm
	145.0'	Sandy Siltstone (w/ f. gr sand. sub angular) weathered m. hard matrix support Dol. cementation Calcite clasts (trace) ≤ 2mm angular	3.0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red. 1.0 to 40 mm
	150.0'	Same Material	5.0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red 1.0 to 45 mm
	155.0'	Sandy Siltstone (w/ f. grain sand) hard subangular. m. weathered, matrix support Dol. Cementation Quartz clasts in rock - subrounded ≤ 4mm	1.0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red. 1.0 to 30 mm
	160.0'						

PROJECT: HIA- Middletown | HOLE NO. ERM-24I

HTW DRILLING LOG

HOLE NO. ERM-24I

PROJECT: HIA - Middletown

INSPECTOR: Warren Fox / Jeffrey Herrick

SHEET 5 of 8 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	160.0'	@165 Silty fine sandstone/wacke, well graded, subrnd sands (fine grained). hard, trace dolomite other 5mm chips angular. Little to no HCl fizz	0.0 ppm				2.5YR 4/3 Dusky Red 2-7mm chips
	165.0'	@170' Silty fine sandstone/wacke well graded, sands are fine, subrnd. hard, trace calcite chips (white) trace rounded fine Qtz gravels No HCl	0.0 ppm	Hole not making water dry zone			2.5YR 4/3 Dusky Red 2-6mm chips.
	170.0'	@175' Silty fine sandstone/wacke to a Pebbly Silty fine sandstone/wacke well graded sands fine, subrnd. hard. Some pebbles Qtz. noted ≈ 10%? other Rock chips noted.	0.0 ppm				2.5YR 4/3 Dusky Red. 2-6mm chips
	175.0'	@180' as above.	∅	Picked up H_2O @ 178			2.5YR 4/3 Dusky Red 2-6mm chips
	180.0'	@185' Pebbly Silty fine sandstone/Pebbly wacke v. well graded, hard, pebble + sands are subrnd to sub angular. pebbles are Qtz + other lithic frags.	0.0 ppm				2.5YR 4/3 Dusky Red 2-6mm
	185.0'	@190' Sandy siltstone. well graded, up fine sand, hard no Qtz gravels other lithic frags.	0.0 ppm	Continued water inflow			2.5YR 4/3 Dusky Red 5-10mm chips
	190.0'	@195' Mat'l as above	∅				2.5YR 4/3 Dusky Red. as above
	195.0'	@200' Mat'l as above	0.0				as above
	200.0'	TD=202'					

PROJECT: HIA - Middletown

HOLE NO. ERM-24I

HTW DRILLING LOG

PROJECT: HIA - Middletown

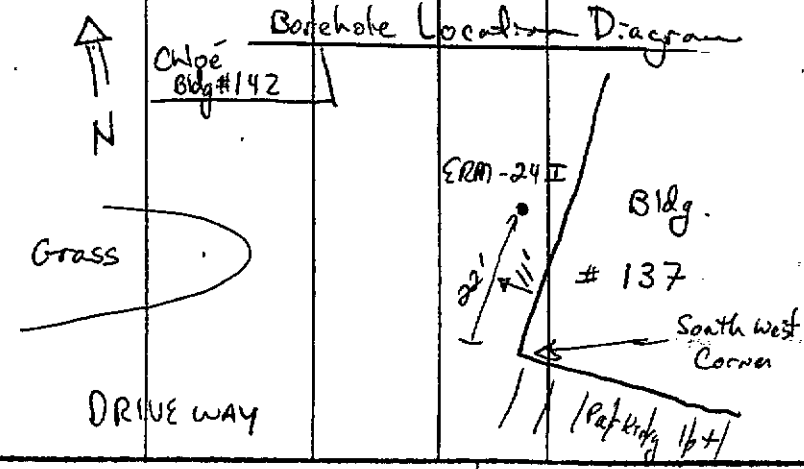
INSPECTOR: Warren Fox

HOLE NO.: ERM-24I

SHEET 6 of 6 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS

Borehole Location Diagram



PROJECT: HIA - Middletown

HOLE NO.: ERM-24I

Figure 4-1 (Continued)

HTW DRILLING LOG

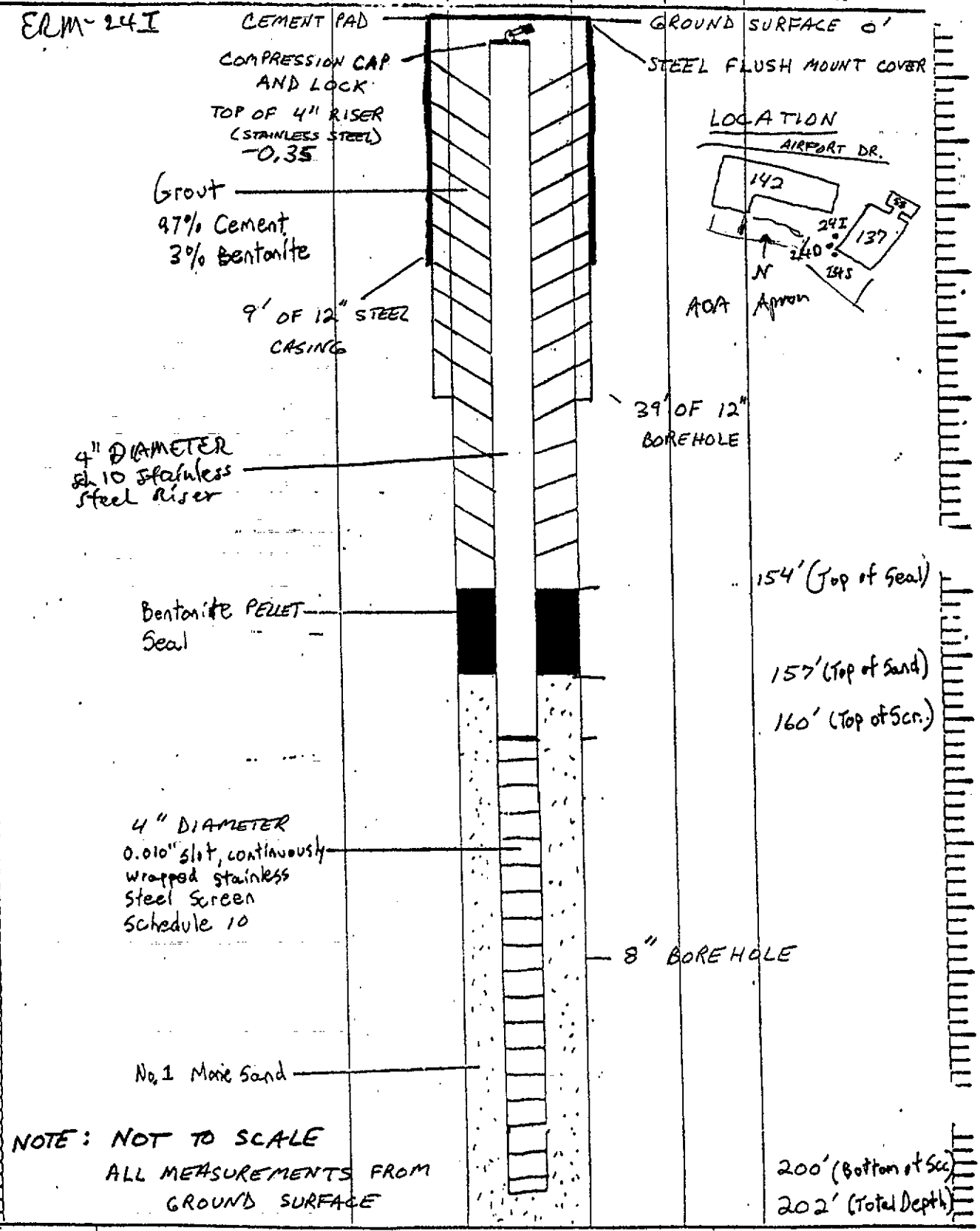
HOLE NO. ERM-24I

PROJECT: HIA, Middletown

INSPECTOR: DEREK EVANS / MATT VONNIEDA

SHEET 7 OF 7 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	UNDISTURBED SAMPLE NO.	BLOW COUNTS	REMARKS



PROJECT HIA, Middletown HOLE NO. 24 I

HTW DRILLING LOG

HOLE NO. ERM-24D

1. COMPANY NAME: ERM	2. DRILLING SUBCONTRACTOR: Hydrogroup
SHEET 1 OF 15 SHEETS	
3. PROJECT: HIA-Middletown	4. LOCATION: Middletown, PA
5. NAME OF DRILLER: J. Arnett	6. MANUFACTURER'S DESIGNATION OF DRILL: Barber
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 16" bit + casing to 39'; 12" bit + casing to 200'; 8" bit + casing to 602'; T.D. = 603' BGS. Temporary casing!	8. HOLE LOCATION: Behind Bldg. 514, 137.
	9. SURFACE ELEVATION:
	10. DATE STARTED: 1/19/95
	11. DATE COMPLETED: 1/30/95
12. OVERBURDEN THICKNESS: ≈ 25'	15. DEPTH GROUNDWATER ENCOUNTERED:
13. DEPTH DRILLED INTO ROCK: ≈ 578'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED:
14. TOTAL DEPTH OF HOLE: 603' BGS.	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
/			

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
/	/	-	/	/	/	%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Built well ERM-24D	/	Yes		D. Haller

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0	Very dark gray poorly graded fine to medium gravel. Trace coarse gravel. Sand <15% Gravel is angular/subangular Gravel size: 5-20 mm	0.0 ppm @ ≈3'				SY, 3/1 GP (Fill)
	5	Well Graded Gravel (River gravel) Sand <15% Gravel is subrounded to round Gravel size: 5-45 mm	2.6 ppm @ ≈8'				GW Varying colors; (white, black, gray, orange, red, pink brown)
	10		0.6 ppm @ ≈13'				
	15		0.0 ppm @ ≈16'				
	20		0.0 ppm @ ≈22'				
	25						

reviewed 2/8/95 JFH

PROJECT: HIA Middletown

HOLE NO. ERM-24D

HTW DRILLING LOG

HOLE NO. ERM-24D

PROJECT: HIA - Middletown | INSPECTOR: D. Haller | SHEET 2 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	25	Dusky red calcareous or dolomitic SILTSTONE	0.0 ppm @ ≈28'				2.5YR, 3/3 cuttings; 1-25mm
		-Carbonates in "matrix" only → (No notable carbonates > silt sized)					
	30	-very soft to soft	0.0 ppm @ ≈33'				cuttings; 1-20mm
		-Slightly weathered					
		-Cuttings; Subangular					
	35		0.0 ppm @ ≈37'				cuttings: 1-30mm
		(weathering decreases w/depth)		Note: (16" casing advanced to 39' BGS)			
	40		0.0 ppm @ ≈43'				cuttings: 1-25mm
	45		0.0 ppm @ ≈48'				cuttings; 1-30mm
	50	Dusky red calcareous or dolomitic silty fine to medium grained SANDSTONE (wacke); Unweathered. Hard Sand is sub-round. (No apparent carbonate clasts) cuttings; Subangular/Subrounded	0.0 ppm @ ≈53'				2.5YR, 4/3 cuttings: 1-30mm (carbonates in matrix only)
	55	Dusky red calcareous or dolomitic SILTSTONE. No carbonates > silt sized. Soft. Unweathered cuttings: Subangular	0.0 ppm @ ≈57'				2.5YR, 3/3 (Same as 25-50') cuttings; 1-10mm
	60	weak red calcareous or dolomitic matrix supported SANDY BRECCIA matrix: fine to medium subround sand	0.0 ppm @ ≈63'				2.5YR, 5/3 cuttings: 1-20mm
	65	clasts: angular/subangular 5-30mm gravel -trace 1-6mm dolomite clasts	0.0 ppm @ ≈67'				cuttings: 1-30mm
	70	-Hard to very hard -Unweathered cuttings; Subangular					

HTW DRILLING LOG

PROJECT: HIA-Middletown | INSPECTOR: D. Haller | HOLE NO. ERM-24D | SHEET 3 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
		Same as above (SANDY BRECCIA)	0.0 ppm @ ≈73'	HIGH WATER PRODUCTION			cuttings: 1-25mm
	75						
			0.0 ppm @ ≈78'				cuttings: 1-20mm
	80						
			0.0 ppm @ ≈83'				cuttings: 1-20mm
	85						
			0.0 ppm @ ≈88'				cuttings: 1-25mm
	90						
		Dusky red calcareous or dolomitic SILTSTONE. No carbonates? Silt sized, soft unweathered cuttings: subangular	0.0 ppm ≈93'				2.5YR, 3/3 cuttings: 1-15mm
	95						
			0.0 ppm ≈97'				cuttings: 1-10mm
	100						
			0.0 ppm ≈103'				cuttings: 1-25mm
	105						
		Dusky red calcareous or dolomitic fine to medium grained SANDSTONE (WACKE) - Trace 1-5mm dolomite clasts - Hard - unweathered - Sand is subrounded - cuttings: subangular/subround	0.0 ppm ≈107'				2.5YR, 4/2 cuttings: 1-20mm
				SILTY SANDSTONE			
	110						
			0.0 ppm ≈113'				cuttings: 1-15mm
	115						
			0.0 ppm ≈118'				cuttings: 1-30mm
	120						

HTW DRILLING LOG

HOLE NO. ERM-24D

PROJECT: HIA-Middletown | INSPECTOR: D. Heller | SHEET 4 OF 15 SHEETS

ELEV. b	DEPTH a	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	120	SAME AS ABOVE (Fine to medium SANDSTONE)	0.0ppm @ ≈123'	HIGH WATER PRODUCTION			cuttings: 1-25mm
	125	Dusky red calcareous or dolomitic SILTSTONE -No carbonate clasts >silt sized -Hard-Moderately hard -Unweathered -cuttings: Subangular/subround	0.0ppm @ ≈128'				2.5YR, 3/2 cuttings: 1-15mm
	130		0.0ppm @ ≈133'				cuttings: 1-25mm
	135	Weak red calcareous or dolomitic fine grained SILTY SANDSTONE (WACKE) -No apparent carbonate clasts → carbonates in matrix only. -Hard -Unweathered -cuttings: Subangular/subround	0.0ppm @ ≈138'				2.5YR, 5/3 cuttings: 1-25mm
	140		0.0ppm @ ≈143'				cuttings: 1-20mm
	145		0.0ppm @ ≈147				cuttings: 1-30mm
	150		0.0ppm @ ≈153'				cuttings: 1-20mm
	155		0.0ppm @ ≈158'				cuttings: 1-30mm
	160		0.0ppm @ ≈163'				cuttings: 1-25mm
	165	See next page for log					

HTW DRILLING LOG

PROJECT: HIA-Middletown | INSPECTOR: D. Heller | HOLE NO. ERM-24D | SHEET 5 OF 15 SHEETS

ELEV. b.	DEPTH a.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
		Dusky red SILTSTONE	0.0 ppm ≈168'	HIGH WATER PRODUCTION			cuttings: 1-30 mm
	170	Moderately Hard					2.5YR, 3/2
		Unweathered					
		cuttings: subangular/subrounded	0.0 ppm ≈173'				cuttings: 1-20mm
	175						
		Weak red calcareous or dolomitic matrix supported SANDY BRECCIA	0.0 ppm ≈178'				2.5YR, 5/3 cuttings: 1-15mm
	180	Matrix: fine to medium subrounded sand					
		clasts: subangular 5-12mm gravel	0.0 ppm ≈183'				cuttings: 1-15mm
	185	-Hard to very Hard					
		-Unweathered					
		-Trace 1-3mm dolomitic clasts	0.0 ppm 188'				cuttings: 1-15mm
		-cuttings: subangular					
	190						
			0.0 ppm 193'				cuttings: 1-15mm
	195	SILTY					
		Dusky red calcareous or dolomitic fine SANDSTONE (WACKE)	0.0 ppm ≈197'	(Note: 12" casing advanced to 200' BGS)			2.5YR, 3/2 cuttings: 1-10mm
		-Moderately Hard					
		-Unweathered					
		-No apparent carbonate clasts					
	200	-cuttings: subrounded					
			0.0 ppm ≈203'	Water production decrease due to smaller diameter (Strill ≈ 3-4 gpm sol/20' run)			cuttings: 1-15mm
	205						
		Dusky red calcareous or dolomitic SILTSTONE	0.0 ppm ≈208'				2.5YR, 4/3 cuttings: 1-25mm
		-No carbonate clasts > silt sized					
		-Unweathered					
	210	-Moderately hard					
		-cuttings: subangular	0.0 ppm ≈213'				cuttings: 1-35mm
	215						

PROJECT: HIA-Middletown | HOLE NO. ERM-24D

HTW DRILLING LOG

HOLE NO. ERM-24D

PROJECT: H/A-Middletown | INSPECTOR: D. Heller | SHEET 6 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	215	(Same as above - SILTSTONE)	0.0 ppm @ ≈217'				cuttings: 1-30mm
		-trace medium sand (quartz chips) in 217' sample					
	220						
		-≈1mm wide sealed fracture from 223' sample	0.0 ppm @ ≈223'				cuttings: 1-25mm
	225	(very trace mica flakes throughout siltstone interval)	0.0 ppm @ ≈227'				cuttings: 1-25mm
	230		0.0 ppm @ ≈233'				cuttings: 1-25mm
	235		0.0 ppm @ ≈238'				cuttings: 1-20mm
	240		0.0 ppm @ ≈243'				cuttings: 1-25mm
	245		0.0 ppm @ ≈248'				cuttings: 1-15mm
	250		0.0 ppm @ ≈253'				cuttings: 1-30mm
	255		0.0 ppm @ ≈258'				cuttings: 1-25mm
	260		0.0 ppm @ ≈263				cuttings: 1-25mm

Steady water production (at 3-5000 gallons/20' run)

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.	SHEET
H/A - Middletown	D. Haller	ERM-24D	7 OF 15 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	265	SILTY Weak red calcareous or dolomitic fine to medium SANDSTONE (WACKE)	0.0 ppm @ ≈268'	Steady water Production (3-5000 gallons/20 min)			2.5YR, 3/3 cuttings: 1-20mm
		Hard. Unweathered. -Carbonates in matrix only -Sand is subrounded -cuttings: Subangular/Subround					
	270	Dusky red calcareous or dolomitic SILTSTONE -No apparent carbonates > silt sized except for some slight precipitation on cuttings/fracture surfaces from the 278' sample. -moderately Hard to hard -Unweathered -cuttings: Subangular	0.0 ppm @ ≈273'				2.5YR, 3/3 cuttings: 1-20mm
	275		0.0 ppm @ ≈278'				cuttings: 1-20mm
	280		0.0 ppm @ ≈284'				cuttings: 1-20mm
	285		0.0 ppm @ ≈287'				cuttings: 1-25mm
	290	(Trace 1-3mm dolomite clasts in the 293' sample.)	0.0 ppm @ ≈293'				cuttings: 1-20mm
	295		0.0 ppm @ ≈298'				cuttings: 1-20mm
	300	(≈1-2mm wide healed fracture in a chip from 303')	0.0 ppm @ ≈303'				cuttings: 1-15mm
	305		0.0 ppm @ ≈307'				cuttings: 1-20mm
	310						

HTW DRILLING LOG

HOLE NO. ERM-24D

PROJECT: HIA-Middletown | INSPECTOR: D. Heller | SHEET 8 OF 15 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	310	Same as above → SILTSTONE					
		(Dolomitic precipitate on a cuttings chip surface/(fracture surface) in the 313' sample)	0.0 ppm @ ≈313'	3-5000 gallons 20' run			cuttings: 1-20mm
	315	(Dolomite precipitate on 2 cuttings chips in the 318' sample)	0.0 ppm @ ≈318'				cuttings: 1-15mm
	320		0.0 ppm @ ≈323'	Steady Water Production			cuttings: 1-15mm
	325		0.0 ppm @ ≈327'				cuttings: 1-20mm
	330		0.0 ppm @ ≈334'				cuttings: 1-20mm
	335		0.0 ppm @ ≈336'				cuttings: 1-40mm
	340		0.0 ppm @ ≈343'				cuttings: 1-40mm
	345	SILTY weak red calcareous or dolomitic fine grained SANDSTONE. - Carbonate in matrix only - Trace medium sand - Sand is subrounded - Hard - Unweathered - cuttings: Subangular/Subround	0.0 ppm @ ≈348'	HIGH WATER PRODUCTION			(2.5YR, 5/3) cuttings: 1-10mm
	350		0.0 ppm @ ≈354'				cuttings: 1-15mm
	355						

See next pg.

HTW DRILLING LOG

PROJECT: H/A-Middletown | INSPECTOR: D. Haller | HOLE NO. ERM-24D | SHEET 9 OF 15 SHEETS

ELEV. b.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
		Dusky red calcareous or dolomitic SILTSTONE.	0.0ppm @ ≈358'				(2.5YR, 4/3)
	360	No apparent carbonates					cuttings: 1-15mm
		> silt sized	0.0ppm @ ≈363'				cuttings: 1-20mm
		-Hard					
		-Unweathered					
	365	-cuttings: subangular/subrounded					
			0.0ppm @ ≈366'				cuttings: 1-30mm
	370	-Trace 1-3mm dolomite clasts in 373' sample	0.0ppm @ ≈373'				cuttings: 1-15mm
	375		0.0ppm @ ≈377'				cuttings: 1-15mm
	380		0.0ppm @ ≈383'				cuttings: 1-40mm
	385	-Trace fine rounded sand and mica in 388' sample	0.0ppm @ ≈388'				cuttings: 1-20mm
	390		0.0ppm @ ≈393'				cuttings: 1-20mm
	395		0.0ppm @ ≈397'				cuttings: 1-10mm
	400		0.0ppm @ ≈403'				cuttings: 1-10mm
	405						

HIGH WATER PRODUCTION

HTW DRILLING LOG

PROJECT: HIA-Middletown | INSPECTOR: D. Haller | HOLE NO.: ERM-24D | SHEET 10 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	405	SAME AS ABOVE (SILTSTONE)	0.0 ppm @ ≈407'	HIGH WATER PRODUCTION			cuttings: 1-10mm
	410		0.0 ppm @ ≈413'				cuttings: 1-15mm
	415		0.0 ppm ≈417'				cuttings: 1-25mm
	420		0.0 ppm @ ≈423'				cuttings: 1-25mm
	425	weak red calcareous or dolomitic fine SANDSTONE (WACKE) (SILTY) - Carbonates in matrix only - Hard - Unweathered - cuttings: subangular/subround	0.0 ppm @ ≈427'				2.5YR, 5/3 cuttings: 1-10mm
	430	Dusky red calcareous or dolomitic SILTSTONE, No apparent carbonates - silt sized - Hard - Unweathered - cuttings: subangular/subround	0.0 ppm @ ≈433'				2.5YR, 4/3 cuttings: 1-10mm
	435	weak red calcareous or dolomitic fine SANDSTONE (WACKE) (SILTY) - Carbonates in matrix only - Hard - Unweathered - cuttings: subangular/subround	0.0 ppm ≈438'				2.5YR, 5/3 cuttings: 1-15mm
	440		0.0 ppm @ ≈443'				cuttings: 1-20mm
	445	(Trace 1-6mm dolomite clasts in 448' sample)	0.0 ppm @ ≈448'				cuttings: 1-15mm
	450						

HTW DRILLING LOG

HOLE NO. ERM-24D

PROJECT H1A - Middletown

INSPECTOR D. Heller

SHEET 11 OF 15 SHEETS

EV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	455		0.0 ppm @ ≈454'				cuttings; 1-30 mm
		Dusky red calcareous or dolomitic SILTSTONE. No apparent carbonate clasts > silt size. Hard. Unweathered.	0.0 ppm @ ≈458'				2.5YR, 4/3 cuttings; 1-10 mm
	460	Cuttings; subangular. Trace fine subrounded sand and mica flakes throughout.	0.0 ppm @ ≈463'				cuttings; 1-15 mm
	465		0.0 ppm @ ≈467'				cuttings; 1-30 mm
	470		0.0 ppm @ ≈473'				cuttings; 1-30 mm
	475		0.0 ppm @ ≈478'				cuttings; 1-40 mm
	480		0.0 ppm @ ≈483'				cuttings; 1-35 mm
	485		0.0 ppm @ ≈487'				cuttings; 1-10 mm
	490		0.0 ppm @ ≈493'				cuttings; 1-30 mm
	495	(≈1' fracture @ ≈499')	0.0 ppm @ ≈498'				cuttings; 1-45 mm
	500						

HIGH WATER PRODUCTION

PROJECT H1A - Middletown

HOLE NO. ERM-24D

HTW DRILLING LOG

HOLE NO. ERM-24D

PROJECT: HIA - Middletown

INSPECTOR: D. Haller

SHEET 12 OF 15 SHEETS

ELEV. L	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	500	(SAME AS ABOVE) SILTSTONE	0.0 ppm @ ≈503'				cuttings: 1-35 mm
	505	(≈1' fracture @ ≈508')	0.0 ppm @ ≈507'				cuttings: 1-10 mm
	510		0.0 ppm @ ≈513'				cuttings: 1-30 mm
	515	Weak red calcareous or dolomitic fine to medium grained SILTY SANDSTONE (WACKE). Trace 1-4 mm dolomitic clasts. Hard. Unweathered. (SAND & subround) cuttings: Subangular/subround	0.0 ppm @ ≈518'				2.5YR, 5/3 cuttings: 1-20 mm
	520	Dusky red calcareous or dolomitic SILTSTONE. No apparent carbonate clasts > silt sized. Hard. unweathered. Trace fine sand and mica flakes throughout. cuttings: Subangular	0.0 ppm @ ≈523'				2.5YR, 4/3 cuttings: 1-10 mm
	525		0.0 ppm @ ≈527'				cuttings: 1-30 mm
	530		0.0 ppm @ ≈533'				cuttings: 1-20 mm
	535		0.0 ppm @ ≈538'				cuttings: 1-20 mm
	540		0.0 ppm @ ≈543'				cuttings: 1-20 mm
	545		0.0 ppm @ ≈548'				cuttings: 1-20 mm

HIGH WATER PRODUCTION

HIW DRILLING LOG

OBJECT	INSPECTOR	HOLE NO.	SHEET
HIA - Middletown	D. Heller	ERM-24D	13 of 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	550	SAME AS ABOVE (SILTSTONE)					
			0.0 ppm @ ≈553'				cuttings; 1-20 mm
	555	(Dolomite filled fractures from cuttings chips @ 558')	0.0 ppm @ ≈558'				cuttings; 1-55 mm
	560		0.0 ppm @ ≈563'				cuttings; 1-25 mm
	565		0.0 ppm @ ≈568'				cuttings; 1-10 mm
	570		0.0 ppm @ ≈573'				cuttings; 1-30 mm
	575	SILTY Weak red calcareous or dolomitic fine grained SANDSTONE (WACKE) -Carbonates in matrix only -Hard -Unweathered -cuttings; subangular	0.0 ppm @ ≈578'				cuttings; 1-5 mm 2.54R, 5/3
	580		0.0 ppm @ ≈584'				cuttings; 1-10 mm
	585		0.0 ppm @ ≈587'				cuttings; 1-10 mm
	590	Dusky red calcareous or dolomitic SILTSTONE. No apparent carbonates → silt sized. Hard. Unweathered -cuttings; Subangular	0.0 ppm @ ≈593'				2.5YR, 4/3 cuttings; 1-15 mm
	595						

HIGH WATER PRODUCTION

HTW DRILLING LOG

HOLE NO. ERM-24D

OJECT: HIA - Middletown

INSPECTOR: D. Haller

SHEET 14 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	595	SAME AS ABOVE (SILTSTONE)	0.0 ppm @ ≈598'				cuttings: 1-5mm
	600						
	605	Boring terminated @ 603' BGS. 16" Casing advanced to 39' BGS 12" Casing advanced to 200' BGS 8" Casing advanced to 602' BGS Injection water total ≈ 4400 gallons -Drilling completed on 1/30/95 -Well installation will occur @ a later date.					

PROJECT: HIA-Middletown

HOLE NO. ERM-24D

HYDROGEOLOGIC DRILLING LOG

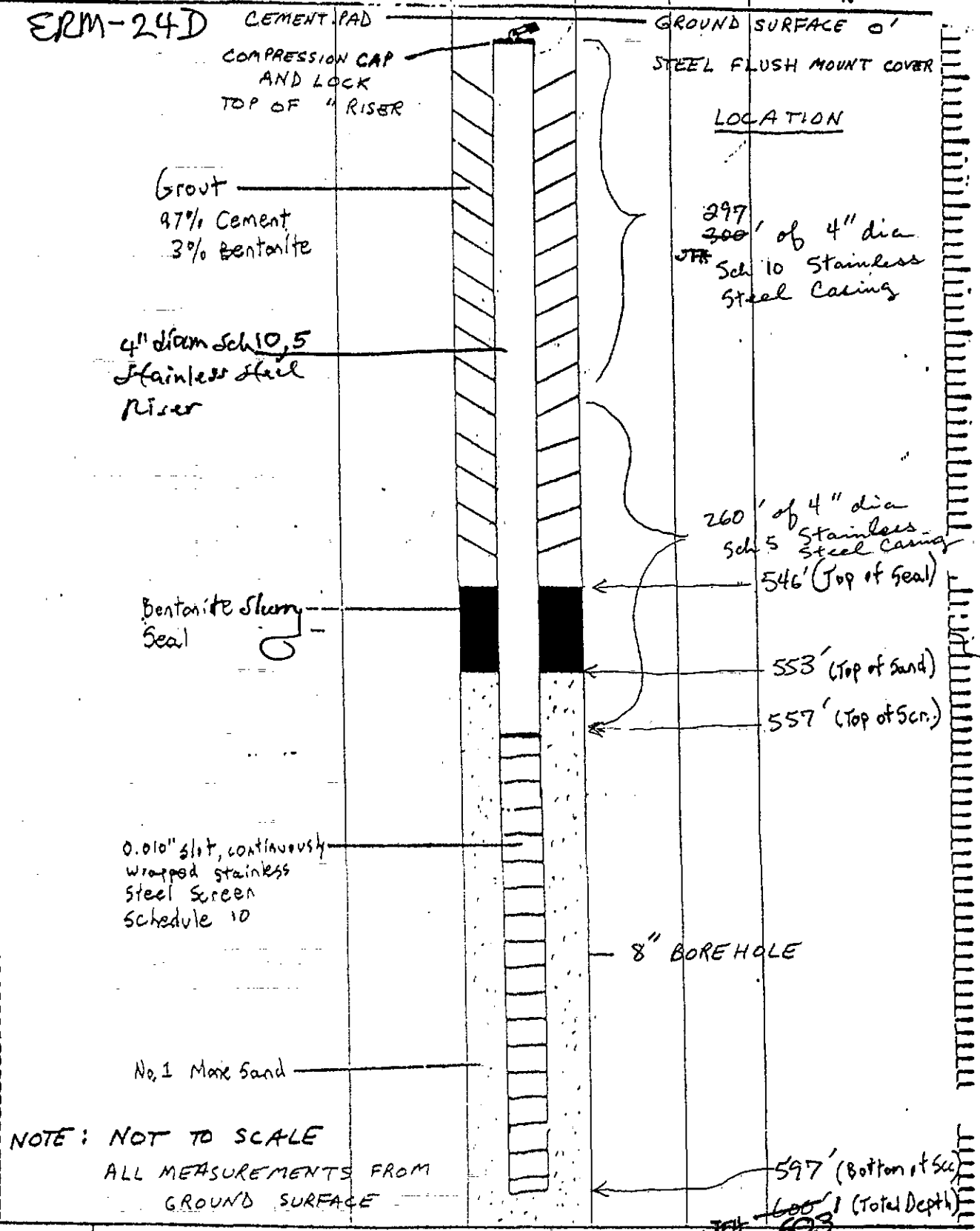
PROJECT: HIA, Middletown

INSPECTOR: D. Meazie

ERM-24-D

SHEET 15 OF 15 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD HYDROGEOLOGIC RESULTS	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS



PROJECT: HIA, Middletown

ERM-24-D

HTW DRILLING LOG

HOLE NO. ERM 255

1. COMPANY NAME: ERM-PMC	2. DRILLING SUBCONTRACTOR: ADT-MA
SHEET 1 OF 4 SHEETS	
3. PROJECT: MIDDLETOWN HIA	4. LOCATION: Middletown PA
5. NAME OF DRILLER: Troy Brown	6. MANUFACTURER'S DESIGNATION OF DRILL: Mobil
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: B-59 HSA; 10 5/8" ID AUGERS; 2" Split Spoon; 140 lb hammer; Roller bit	8. HOLE LOCATION: See Page # 4
	9. SURFACE ELEVATION: Not Surveyed
	10. DATE STARTED: 1245 1/26/95
	11. DATE COMPLETED: 2/3/95 Installed Flushmount
12. OVERBURDEN THICKNESS: ~26' BGS	15. DEPTH GROUNDWATER ENCOUNTERED: ~34' on 1/27/94
13. DEPTH DRILLED INTO ROCK: ~22'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 1/27/94 @ 900 am ~34'
14. TOTAL DEPTH OF HOLE: ~48'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): 1/30/95 @ 900 am 29.8'

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	✓		

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
NA						%

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Monitoring well ERM-255		✓		

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0	0-3" Asphalt over gravel; TOPSOIL					
	1	Fill: Black & brown Fine SAND, SILT w. GRAVEL, WOOD, CINDERS DRY, DENSE	0ppm	NS	NA	34, 63, 79, 53	10YR 3/3 SM 4" Rec
	2						
	3	Possfill: SILT w. trace f-M Sand, trace gravel moist, STIFF to V. STIFF	0ppm	NS	NA	14, 11, 10, 12	7.5 YR 4/4 ML Rec 20"
	4						
	5	Same as above "SILT" TR. BRICK	0ppm	NS	NA	9, 9 10, 10	5YR 4/1 ML Rec 18"
	6						
	7		0ppm	NS	NA	4, 6 7, 29	
	8	"SILT", TRACE VF & Fine SD, MOTTLED Moist - V. Moist STIFF					ML 10YR 5/3 Rec 20"
	9						

PROJECT: MIDDLETOWN

HOLE NO. DAB-ERM-255

HTW DRILLING LOG

HOLE NO. ERM-25S

PROJECT: MIDDLETOWN PA | INSPECTOR: J. Ryan | SHEET 2 OF 4 SHEETS

ELEV. b.	DEPTH	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	10						
	11						
	12	AS ABOVE					
	13						
	14						
	15	SILT MOTTLED DARK BROWN-BLACK TRACE V FINE SD, TRACE GRAVEL STIFF TO V. STIFF SLIGHTLY MOIST	0ppm	IAB-ERM255 (15.0-17.0)	NA	6,12 16,32	10YR 7/1 ML
	16						
	17						
	18	WELL GRADED GRAVEL W. SAND					
	19	Fine to Coarse SD, AND GRAVEL (DOLOMITE, SUBANGULAR-ROUNDED) TRACE SILT, DENSE TO V. DENSE, DRY TO SL. MOIST					
	20						
	21		0.1 ppm	NS	NA	20,27 28,35	10YR 6/4 GW
	22						
	23						
	24						
	25						
	26	SANDY SILTSTONE H. WEATHERED TO DECOMPOSED DRY	0ppm	NS	NA	WR 21,43 45	20" REC 10R 3/4 SWITCH TO ROLLER BIT
	27						
	28						
	29						

AUGERS

ROLLER BIT

PROJECT: MIDDLETOWN | HOLE NO. ERM-25S

HTW DRILLING LOG

HOLE NO. FRM-255

PROJECT MIDDLETOWN | INSPECTOR J. Ryan | SHEET 3 OF 4 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	30						
	31						CUTTINGS
	32						
	33						
	34						
	35	FINE SILTY SANDSTONE "WACKE" W. quartz fragments/clasts HIGHLY WEATHERED TO DECOMPOSED -					
	36						
	37						
	38						
	39	DRY —					
1/27/95	40	No cutting return.					1/27/95 Water in hole @ ~34 water from above or small water bearing fracture
	41						
	42						
	43						
	44						
	45						Discussed well installation w. Jeffrey will set well 46-36'
	46						
	47						
	48						
	49	EOB @ 48'					

PROJECT MIDDLETOWN | HOLE NO. IAB FRM-255

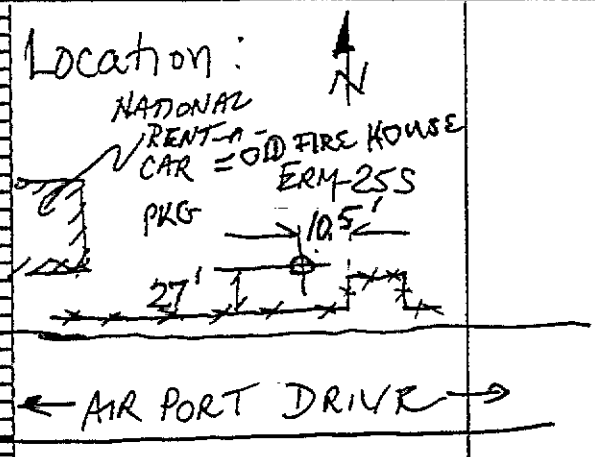
HTW DRILLING LOG

HOLE NO. ERM-25S

PROJECT MIDDLETOWN HIA | INSPECTOR J. RYAN | SHEET 4 OF 4 SHEETS

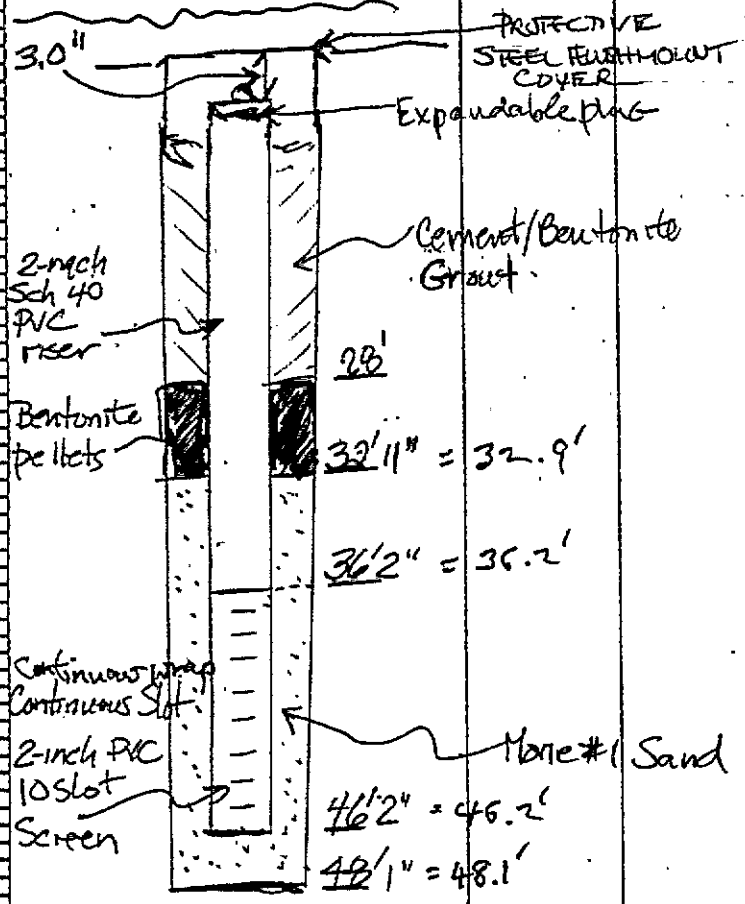
ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS

Location:



ERM-25S

WELL CONSTRUCTION:



WELL MATERIALS:

10' 2" .10slot PVC Screen

38' 2" Sch 40 PVC Riser

Sand 2½ bags (100lb)

Bentonite pellets 1 bucket

Cement 6 bags (94lbs)

Bentonite powder ½ bag

PROJECT Middletown. HOLE NO. ERM-25S

HTW DRILLING LOG

HOLE NO. ERM-25I

1. COMPANY NAME: ERM-PMC	2. DRILLING SUBCONTRACTOR: Hydro Group
SHEET 1 OF 7 SHEETS	
3. PROJECT: HIA - Middletown	4. LOCATION: Middletown, PA
5. NAME OF DRILLER: Steve Blair / Bernie Connor	6. MANUFACTURER'S DESIGNATION OF DRILL: Barber Rig DR-12
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Barber Rig - DR-12; Dual Rotary; 8" + 12" steel casing w/ air hammer bits; all casings temporary.	8. HOLE LOCATION: See Sheet #6
	9. SURFACE ELEVATION: Not Surveyed
	10. DATE STARTED: 10-19-94 / 11. DATE COMPLETED:
12. OVERBURDEN THICKNESS: 25.0' Rx - 40.0 harder.	15. DEPTH GROUNDWATER ENCOUNTERED: Unknown (≥ 25')?
13. DEPTH DRILLED INTO ROCK: 173'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA
14. TOTAL DEPTH OF HOLE: 202'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None	ø		—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None	/	/				— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well ERM-25I Installed	/	ø	/	Warren N. Keep

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0.0	Silt with sand fine grain sand (subangular) cohesive wet (water introduced) uniform	0 ppm PID, No Odor	NS	NS	NA	2.5Y 4/3 olive brown
	5.0'	Clay w/ gravel subangular ≤1/2" Diam cohesive wet uniform (gravel-qtz and limestone)	0 ppm PID, No Odor	NS	NS	NA	2.5Y 5/3 light olive brown
	10.0	Clay with (WE) 10-19-94 coarse sand angular cohesive wet uniform	0 ppm PID, No Odor	NS	NS	NA	2.5Y 5/4 light olive brown
	15.0'	Gravel ~~to cobbles~~ (WE) 1/4" to 1" Diameter subrounded Quartz and sandstone.	0 ppm PID, No Odor (Clay and Cobbles - round - at 17') H. gray (qtz - sandstones)	NS	NS	NA	2.5Y. 4/2 dark grayish brown
	20.0'	Same as above (but much darker)	0 ppm PID, No Odor	NS	NS	NA	2.5Y 3/1 very dark gray.

25.0'

PROJECT: HIA - Middletown

HOLE NO. ERM-25I

HTW DRILLING LOG

HOLE NO. ERM-25I

PROJECT: HIA - Middletown | INSPECTOR: Warren Fox | SHEET 2 OF 7 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	250	Siltstone w/ sand & coarse gravel f. grain, rounded (W) v. weathered soft ~~cobbles~~ HCL(−) as above	0 ppm PID, No Odor	NS	NS	NA	5YR 4/3 reddish brown
				(29.0' rock)			1.0 mm to 25 mm Dia.
	300'	Siltstone weathered m. soft w/ clasts of quartz ≤ 3mm (−) HCL subrounded	0 ppm PID, No Odor	NS	NS	NA	5YR 3/4 dark reddish brown
							1.0 to 4mm
	350'	Siltstone − HCL+ weathered m. soft w/ clasts of calcite ≤ 10mm Dia. subangular → Dolomite Cementation.	0 ppm PID No Odor	NS	NS	NA	5YR 3/3 dark reddish brown
							1.0 to 20 mm
	400'	Sandstone w/ silt f. to m. grain subrounded weathered m. hard. lots of calcite clasts, angular ≤ 4mm Quartz f.gr. subround. ≤ 3mm	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red
				Bryant 400 hardness			1.0 to 12 mm
	450'	Silty Argillaceous Sandstone (W) subangular clasts (Wacke) Quartz, calcite (+HCl) ≤ 3mm. weathered m. hard.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red
							1.0 to 15mm
	500'	Similar Material Few limestone fragments (<5% 2cm Dia.)	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky Red
							1.0 to 12 mm
	550'	(W) Argillaceous Sandstone Silty conglomerate (w/ siltstone) subangular f. grain. m. hard weathered w/ calcite HCl(+) + dolomitic Cementation	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red.
Water Produced →	590'						
							1.0 to 10mm
	600'	Siltstone weathered m. hard. HCl(+) Dol. cementation.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red
							1.0 to 15mm
	650'	Silty (W) Argillaceous Sandstone conglomerate subangular weathered m. soft. − calcite − quartz − sandstone.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/4 dusky red
soft							
							1.0 to 3mm
	700'					NA	

HTW DRILLING LOG

PROJECT: HIA - Middletown
INSPECTOR: Warren Fox
HOLE NO.: ERM-25I
SHEET 3 OF 7 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
soft	70.0'	Siltstone. m. weathered m. hard no clasts mottled slightly - lighter red. Dolomitic cementation.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red.
harder again	75.0'						1.0 to 50 mm Dia.
soft		Siltstone weathered m. soft Clasts of calcite ≤ 3mm angular - Dol. cementation.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red
	80.0'						1.0 to 10 mm
		Siltstone weathered m. soft trace of quartz ≤ 2mm angular. calcite/Dol. cementation	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/4 dusky Red
	85.0'						1.0 to 25 mm
harder		Same material	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3. dusky red
	90.1'						1.0 to 15 mm
		Siltstone weathered m. soft trace of calcite ≤ 2mm Dol. Cemetation angular	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red
	95.0'						1.0 to 10 mm
		Siltstone weathered m hard Dol. clasts (angular) ≤ 4mm Dol. cementation.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 4/8 dark red
	100.0'						1.0 to 15 mm
soft.		Silty Argillaceous Sandstone conglomerate (OP) subangular weathered m. soft. - calcite clasts sandstone.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red
	105.0'						1.0 to 4 mm
		Siltstone with dolomite band dolomitic cementation. m. hard m. weathered.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red
	110.0'						1.0 to 15 mm
		Siltstone w/sand f. grain rounded m. hard. m. weathered Dolomite cementation w/ clast within	0 ppm PID, No Odor	NS	NS	NA	2.5YR 2.5/2 very dusky red.
	115.0'						1.0 to 20 mm

PROJECT: HIA - Middletown
HOLE NO.: ERM-25I

HTW DRILLING LOG

HOLE NO. ERM-25I

PROJECT: HIA - Middletown

INSPECTOR: Warren Fop

SHEET 4 OF 7 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	115.0'	Siltstone w/ sand f.grain rounded m. hard m. weathered Dol. cementation - No clasts	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red
	120.0'						1.0 to 12 mm
		Same as above but has. Quartz Clasts ≤ 2mm Dia.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red
	125.0'						1.0 to 30 mm
		Sandstone w/ silt m. hard m. weathered Dol cementation & trace clasts Quartz clasts (round) <6mm	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red.
	130.0'						1.0 to 30mm
		Sandstone w/ Silt hard m. weathered Dol. cementation Quartz clasts ≤5mm sub. rounded	0 ppm PID, No Odor	NS	NS	NA	2.5YR 2.5/2 very dusky red
134 Water	135.0'						1.0 to 15 mm
		Siltstone m. hard weathered Dol. cementation No clasts	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red.
Softer ↑ fracture	137' 139' 140.0'						1.0 to 5mm
		Siltstone w/ sand. trace f.grain round m. hard m. weathered. Dolomitic Cementation	0 ppm PID, No Odor	NS	NS	NA	2.5YR 2.5/3 very dusky red
Soft ↕ lots of water	145.0' 148						1.0 to 32 mm
		Same as above w/ Trace of dolomite clasts within ≤ 4mm	0 ppm PID, No Odor	NS	NS	NA	2.5YR 2.5/3 very dusky red.
	150.0'						1.0 to 25 mm
		Siltstone w/ trace of f.gr. sand. m. hard m. weathering Dol. cementation.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red
	155.0'						1.0 to 30mm
Soft V. T.		Sandstone w/ silt. v.f. grain subrounded m hard m. weathered Dolomitic Cementation	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red
	160.0'						1.0 to 20mm

PROJECT: HIA - Middletown

HOLE NO. ERM-25I

HTW DRILLING LOG

PROJECT: HIA - Middletown | INSPECTOR: Warren Foy | HOLE NO. ERM-25 I | SHEET 5 of 8 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
Still Soft	160	Siltstone m. hard m. weathered no clasts Dolomitic Cementation	0ppm PID No Odor	NS	NS	NA	2.5YR 3/3 dusky red
Hard	163'						1.0 to 10mm Dia.
Soft	165.0'	Same material as above.	0ppm PID, No Odor	NS	NS	NA	10R 3/2 dusky red
	170.0'						1.0 to 20mm
Soft.		Similar material but Softer. - m. soft	0ppm. PID, No Odor	NS	NS	NA	2.5YR 2.5/3 very dusky red
	175'						1.0 to 25mm
		Siltstone m. soft m. weathered Dolomitic cementation - Non clast - trace of calcite within.	0ppm PID, No Odor	NS	NS	NA	2.5YR 2.5/4 very dusky red.
	180'						1.0 to 15mm
HARD		Siltstone hard m. weathered Dol. cementation Clasts of $CaCO_3$/Calcite < 3mm angular	0ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red.
	185'						1.0 to 20mm
SOFTER		Same material but Calcite banding in cuttings	0ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky Red.
water zone	190'						1.0 to 30mm.
		Same Material	0ppm PID, No Odor	NS	NS	NA	2.5YR 2.5/4 very dusky red
	195'						1.0 to 30mm
198		Sandy siltstone hard m. weathered Dol. cementation poss. trace of calcite (very small) v. fine - rounded	No Reading No Odor	NS (198' of Loader material)	NS	NA	2.5YR 3/3 dusky Red.
	200'						1.0 to 18mm Dia.
		Bottom of bore hole at 202! WNF 10-20-94					

PROJECT: HIA-Middletown | HOLE NO. ERM-25 I

HYA DRILLING LOG

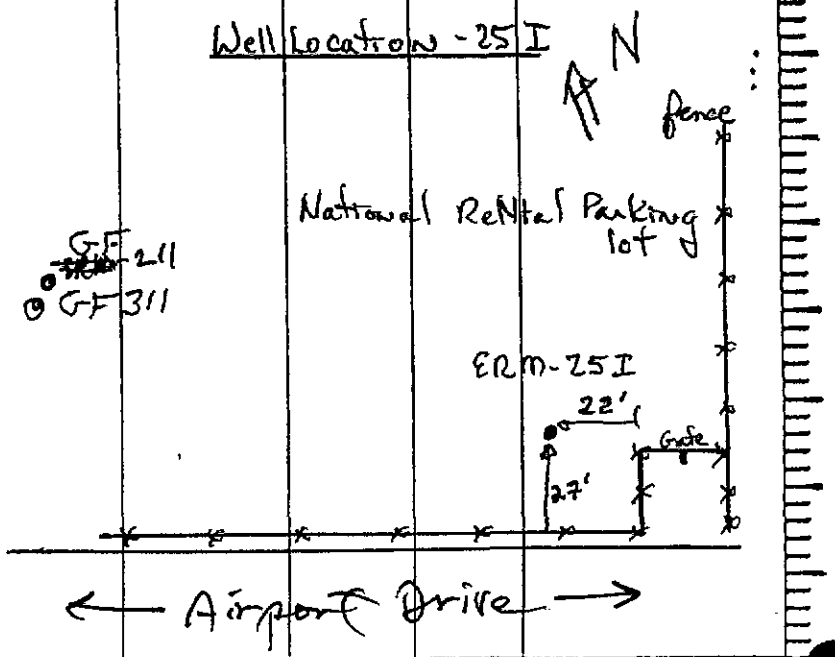
ERM-25I

PROJECT: HIA - Middletown

INSPECTOR: Warren Fox

SHEET 6 OF 7 SHEETS

ELEV. B.	DEPTH B.	DESCRIPTION OF MATERIALS C.	FIELD SCREENING RESULTS D.	GEOTECH SAMPLE OR CORE BOX NO. E.	ANALYTICAL SAMPLE NO. F.	BLOW COUNTS G.	REMARKS H.



PROJECT: HIA - Middletown

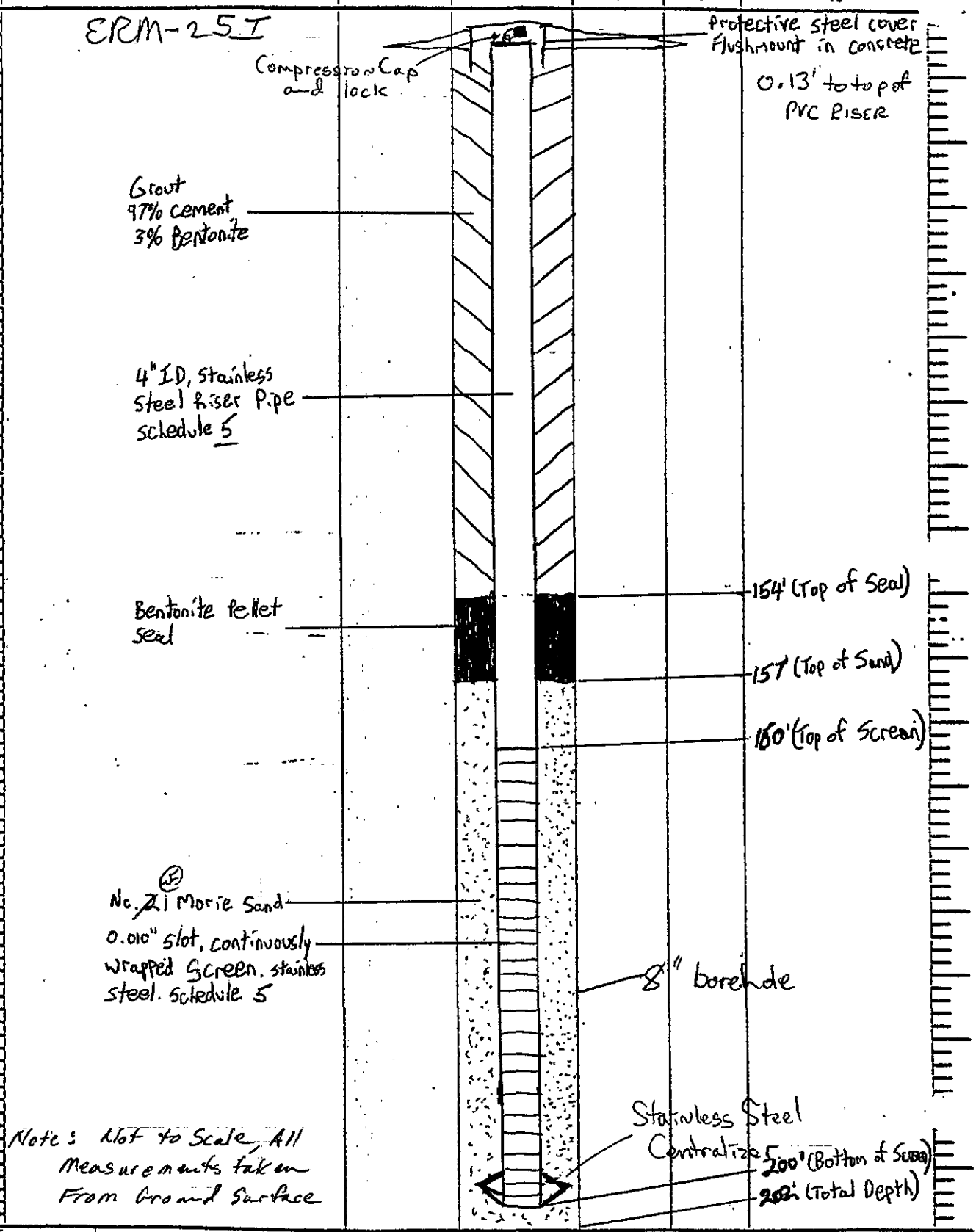
HOLE NO.: ERM-25I

Figure 4-1 (Continued)

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.	SHEET
HIA Middletown	C. Salmon / Warren Fox	ERM-25I	7 of 7 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS



PROJECT	HOLE NO.
HIA Middletown	ERM-25I

HTW DRILLING LOG

HOLE NO. ERM-25D

1. COMPANY NAME	ERM
2. DRILLING SUBCONTRACTOR	HYDRO GROUP
SHEET 1 OF 14 SHEETS	
3. PROJECT	HIA - MIDDLETOWN
4. LOCATION	MIDDLETOWN, PA
5. NAME OF DRILLER	JESSE ARNETT
6. MANUFACTURER'S DESIGNATION OF DRILL	BARBER
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	16" BIT + CASING TO 39' 16" BIT TO 40' 12" BIT + CASING TO 200' 8" BIT + CASING TO 596' 8" BIT TO 603' ALL CASINGS ARE TEMPORARY Dual Rotary Drilling
8. HOLE LOCATION	NATIONAL PARKING LOT
9. SURFACE ELEVATION	
10. DATE STARTED	3/1/95
11. DATE COMPLETED	3/14/95
12. OVERBURDEN THICKNESS	~ 28'-30'
13. DEPTH DRILLED INTO ROCK	575'
14. TOTAL DEPTH OF HOLE	603'
15. DEPTH GROUNDWATER ENCOUNTERED	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	
18. GEOTECHNICAL SAMPLES	DISTURBED / UNDISTURBED
19. TOTAL NUMBER OF CORE BOXES	
20. SAMPLES FOR CHEMICAL ANALYSIS	VOC / METALS / OTHER (SPECIFY) / OTHER (SPECIFY) / OTHER (SPECIFY)
21. TOTAL CORE RECOVERY	%
22. DISPOSITION OF HOLE	BACKFILLED / MONITORING WELL (X) / OTHER (SPECIFY)
23. SIGNATURE OF INSPECTOR	Derek R. Evans

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0'	FILL MATERIAL WITH SOME WOOD CINDERS POORLY GRADED FINE GRAVEL LOOSE CALCAREOUS DRY ANGULAR (GP)	0.0 PPM @ 3'	NS	NS	NA	VARIOUS COLORS MAINLY: 5B 4/1 2 TO 10 mm
	5'	GRAVELLY SILT GRAVEL SAME AS ABOVE BUT FINE TO COARSE MOIST (ML) VERY SOFT SLIGHTLY COHESIVE, FRIABLE	0.0 PPM @ 7'				GRAVEL: 5B 4/1 2 TO 25 mm SILT: 10 YR, 6/6 ROUND BALLS - 2 TO 25 mm
	10'	SILT MOIST (ML) VERY SOFT FRIABLE SLIGHTLY COHESIVE BALLS	0.0 PPM @ 12'				10 YR 6/6 ROUND BALLS 2 TO 15 mm
	15'	WELL GRADED GRAVEL FINE TO COARSE MOIST (GW) LOOSE SUBROUNDED TO WELL ROUNDED	0.0 PPM @ 17' 4.7 PPM @ 24'				VARIOUS COLORS 2.5 YR 4/4 5Y 6/1 2 TO 25 mm
	20'						
	25'						

PROJECT: HIA - MIDDLETOWN

HOLE NO. ERM-25D

HTW DRILLING LOG

HOLE NO. ERM-25D

PROJECT: HIA - MIDDLETOWN | INSPECTOR: D. EVANS | SHEET 2 OF 14 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	25'	SEE PREVIOUS PAGE	3.1 PPM @ 27'	NS	NS	NA	SEE PREVIOUS PAGE
				HIT WEATHERED BRX AT ≈ 28' HIT COMPETENT BRX AT ≈ 29'			
	30'	RED SILTSTONE HIGHLY ~~SLIGHTLY~~ WEATHERED TO (DE) MODERATELY WEATHERED SOFT ABUNDANT MICA (DE) BLACK STAINING (POSSIBLY ~~Mn~~ Mn)	2.1 PPM @ 34'				2.5YR 4/3 CUTTINGS: SUBROUNDED 2 TO 15 mm
	35'		2.0 PPM @ 37'				
		(SWITCHED OVER FROM 16" TO 12" AT ~~38.5~~ 39' (DE))					
	40'	RED SILTSTONE SLIGHTLY WEATHERED MODERATELY HARD TO SOFT ABUNDANT MICA SOME BLACK STAINING DOLOMITIC SOME DOLOMITE NODULES	0.0 PPM @ 43'				2.5 YR 4/3 CUTTINGS: ~~SUARO~~ (DE) SUBANGULAR 2 TO 10 mm
	45'	SOME CUTTINGS WITH FINE SAND AND SOME CUTTINGS WITH MUD/CLAY MIXED WITH SILT IN THE 45-50' INTERVAL	0.0 PPM @ 47'				2 TO 15 mm
	50'	RED BRECCIA FINE TO MEDIUM-GRAINED SAND AND SILT MATRIX MATRIX SUPPORTED - CALCAREOUS TO DOLOMITIC HARD UNWEATHERED CALCITE, QUARTZ, K-FELDSPAR CLASTS	0.0 PPM @ 52'				MATRIX: 2.5 YR 5/4 CLASTS: ASSORTED COLORS ANGULAR TO SUB-ROUNDED 2 TO 10 mm
	55'		0.0 PPM @ 57'				CUTTINGS: ANGULAR TO SUB-ROUNDED 2 TO 15 mm
	60'		0.0 PPM @ 62'				
	65'	RED SILTSTONE WITH SOME BRECCIA UNWEATHERED MODERATELY HARD DOLOMITIC ABUNDANT MICA BRECCIA IS SAME AS ABOVE	0.2 PPM @ 67'				2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 TO 20 mm
	70'						

ERM-25D

PROJECT: HIA - MIDDLETOWN | INSPECTOR: D. EVANS | SHEET 3 OF 14 SHEETS

ELEV. L	DEPTH B.	DESCRIPTION OF MATERIALS C.	FIELD SCREENING RESULTS D.	GEOTECH SAMPLE OR CORE BOX NO E.	ANALYTICAL SAMPLE NO. F.	BLOW COUNTS G.	REMARKS H.
	70'	RED SILTY FINE TO MEDIUM-GRAINED SANDSTONE (WACKE) UNWEATHERED HARD CALCAREOUS	0.0 PPM @ 72'	NS	NS	NA	2.5 YR 5/4 CUTTINGS: SUBROUNDED 2 TO 30 mm
	75'		0.0 PPM @ 77'				
	80'	RED SILTSTONE UNWEATHERED MOD. HARD ABUNDANT MICA CALCAREOUS	0.0 PPM @ 82'				2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 TO 20 mm
	85'		0.0 PPM @ 87'				
	90'	RED SANDY SILTSTONE UNWEATHERED FINE-GRAINED SAND MOD. HARD SOME SMOOTH SURFACES ABUND. MICA CALCAREOUS	0.0 PPM @ 92'				2.5 YR 3/3 CUTTINGS: SUBROUNDED 2 TO 80 mm
	95'	SURFACES NOT AS SMOOTH IN 95-100' INTERVAL	0.0 PPM @ 98'				CUTTINGS: SUBANGULAR 2 TO 15 mm
	100'	RED SILTSTONE UNWEATHERED SOME SMOOTH SURFACES MOD. HARD ABUND. MICA CALCITE AND DOLOMITE PPC ON SOME SURFACES CALCAREOUS	0.0 PPM @ 102'				2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 TO 20 mm
	105'		0.0 PPM @ 107'				
	110'	RED SANDY SILTSTONE AND RED BRECCIA UNWEATHERED FINE TO COARSE SAND BRECCIA SAME AS 50-65' INTERVAL MOD. HARD TO HARD CALCAREOUS	0.0 PPM @ 112'				2.5 YR 3/3 2.5 YR 5/4 CUTTINGS: ANGULAR TO SUB-ROUNDED 2 TO 30 mm
	115'						

PROJECT | HOLE NO.

HYDROLOGIC DRILLING LOG

ERM-25D

PROJECT: HIA - MIDDLETOWN

INSPECTOR: D. EVANS

SHEET 4 OF 14 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	115'	RED SANDY SILTSTONE FINE SAND UNWEATHERED MOD. HARD ABUND. MICA CALCAREOUS	0.0 PPM @ 118'	NS	NS	NA	2.5YR 3/3 CUTTINGS: SUBANGULAR 2 TO 10 mm
	120'	RED SILTY FINE TO COARSE SAND STONE (WACKE) UNWEATHERED WITH TRACE FINE ANGULAR GRAVEL MOD. HARD CALCAREOUS TRACE FINE GRAVEL-SIZED LITHIC FRAGMENTS	0.0 PPM @ 123'				2.5 YR 3/3 CUTTINGS: SUBROUNDED 2 TO 30 mm
	125'		0.0 PPM @ 127'				
	130'		0.0 PPM @ 132'				
	135'	RED BRECCIA FINE TO ~~MEDIUM~~ COARSE-GRAINED SAND AND SILT MATRIX MATRIX SUPPORTED CALCAREOUS MATRIX UNWEATHERED HARD CALCITE, QUARTZ, K-FELDSPAR CLASTS	0.0 PPM @ 137'				MATRIX: 2.5YR 5/4 CLASTS: ASSORTED COLORS ANGULAR TO SUB-ROUNDED 2 TO 15 mm CUTTINGS: ANGULAR TO SUB-ROUNDED 2 TO 20 mm
	140'		0.0 PPM @ 142'				
	145'	RED SILTSTONE AND RED SANDY SILTSTONE UNWEATHERED FINE TO MEDIUM SAND MOD. HARD ABUND. MICA CALCAREOUS SOME DOLOMITE NODULES SOME CALCITE PPT. ON SURFACES OF SOME CUTTINGS	0.0 PPM @ 147'				2.5 YR 3/3 CUTTINGS: SUBANGULAR TO SUBROUNDED 2 TO 20 mm
	150'		0.0 PPM @ 152'				
	155'	RED SILTSTONE TO SILTY FINE-GRAINED SANDSTONE (WACKE) UNWEATHERED SOME CALCITE PPT. MOD. HARD ABUNDANT MICA CALCAREOUS TO DOLOMITIC	0.0 PPM @ 158'				2.5 YR 3/3 2.5 YR 5/4 CUTTINGS: SUBANGULAR TO SUBROUNDED 2 TO 20 mm
	160'						

PROJECT: HIA - MIDDLETOWN

HOLE NO. ERM-25D

PROJECT HIA - MIDDLETOWN | INSPECTOR D. EVANS | ERM-25D | SHEET 5 OF 14 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	160'	SEE PREVIOUS PAGE AS ABOVE	0.0 PPM @ 162'	NS	NS	NA	SEE PREVIOUS PAGE
	165'		0.0 PPM @ 167'				
	170'		0.0 PPM @ 172'				
	175'		0.0 PPM @ 179'				
	180'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA CALCAREOUS	0.0 PPM @ 182'	SIGNIFICANT WATER PRODUCTION (~ 4000 GAL/RUN)			2.5YR 3/3 CUTTINGS: SUBANGULAR 2 TO 15 mm
	185'		0.0 PPM @ 187'				
	190'		0.0 PPM @ 192'				
	195'		0.0 PPM @ 196'				2 TO 25 mm
	200'	(SWITCHED OVER FROM 12" TO 8" AT 200')	0.0 PPM @ 203'	REDUCTION IN WATER VOLUME			2 TO 10 mm
	205'						

PROJECT HIA - MIDDLETOWN | HOLE NO. ERM-25D

HTH DRILLING LOG

ERM-25D

PROJECT: HIA - MIDDLETOWN | INSPECTOR: D. EVANS | SHEET 6 OF 14 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	205'	SEE PREVIOUS PAGE DOLOMITE NODULES	0.0 PPM @ 207'	NS	NS	NA	SEE PREVIOUS PAGE 2 TO 15 mm
	210'	DOLOMITE NODULES AND CALCITE VEINS	0.0 PPM @ 212'				2 TO 20 mm
	215'	DOLOMITE NODULES. ~~AND CALCITE VEINS~~ (DE) (DE)	0.0 PPM @ 217'				2 TO 15 mm
	220'	DOLOMITE NODULES AND CALCITE PPT ON SOME SURFACES	0.0 PPM @ 222'				2 TO 10 mm
	225'	CALCITE PPT. ON SOME SURFACES	0.0 PPM @ 227'				2 TO 15 mm
	230'	RED SILTY FINE TO MEDIUM-GRAINED SANDSTONE (WACKE) UNWEATHERED MOD. HARD CALCAREOUS SOME DOLOMITE NODULES	0.0 PPM @ 232' 0.0 PPM @ 237'				2.5YR 5/4 CUTTINGS: SUBROUNDED 2 TO 10 mm
	240'	RED SILTSTONE UNWEATHERED MOD. HARD DOLOMITIC ABUND. MICA	0.0 PPM @ 242'	SIGNIFICANT WATER PRODUCTION			2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 TO 10 mm
	245	SOME DOLOMITE NODULES	0.0 PPM @ 248'				
	250'						

HYDROCARBON DRILLING LOG

PROJECT: H/A - MIDDLETOWN | INSPECTOR: D. EVANS | ERM-25D | SHEET 7 OF 14 SHEETS

ELEV. L	DEPTH D.	DESCRIPTION OF MATERIALS C.	FIELD SCREENING RESULTS E.	GEOTECH SAMPLE OR CORE BOX NO. G.	ANALYTICAL SAMPLE NO. I.	BLOW COUNTS E.	REMARKS M.
	250'	SEE PREVIOUS PAGE NO DOLOMITE NODULES	0.0 PPM @ 252'	NS	NS	NA	SEE PREVIOUS PAGE
	255'	↓ ↓	0.0 PPM @ 258'	PRODUCTION WATER SIGNIFICANT (~ 2500 - 3500 GAL/RUN)			
	260'	SOME CALCITE PPT ON SOME SURFACES	0.0 PPM @ 262'				
	265'	↓ ↓	0.0 PPM @ 268'				2 TO 15 mm
	270'	RED SANDY SILTSTONE UNWEATHERED FINE SAND MOD. HARD DOLOMITIC ABUND. MICA	0.0 PPM @ 272'				2.5YR 3/3 CUTTINGS: SUBANGULAR 2 TO 8 mm
	275'	RED SILTSTONE UNWEATHERED MOD. HARD DOLOMITIC ABUND. MICA	0.0 PPM @ 279'				2.5YR 3/3 CUTTINGS: SUBANGULAR 2 TO 10 mm
	280'		0.0 PPM @ 282'				
	285'		0.0 PPM @ 287'				2 TO 15 mm
	290'	RED SILTY FINE-GRAINED SANDSTONE (WACKE) WITH TRACE FINE GRAVEL UNWEATHERED CALCAREOUS HARD ANGULAR GRAVEL	0.0 PPM @ 294'				2.5YR 5/4 CUTTINGS: SUBROUNDED 2 TO 15 mm
	295'						

HIA DRILLING LOG

ERM-25D

PROJECT: HIA - MIDDLETOWN | INSPECTOR: D. EVANS | SHEET 8 OF 14 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	295'	RED SANDY SILTSTONE UNWEATHERED FINE-GRAINED SAND MOD. HARD ABUND. MICA CALCAREOUS	0.0 PPM @ 298'	NS	NS	NA	2.5YR 3/3 CUTTINGS: SUBANGULAR 2 TO 15 mm
	300'	RED SILTSTONE UNWEATHERED MOD. HARD ABUNDANT MICA CALCAREOUS CALCITE PPT. OF SOME SURFACES SOME BLACK STAINING (Mn?)	0.0 PPM @ 303'				2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 TO 15 mm
	305'	CALCITE VEINS NO BLACK STAINING	0.0 PPM @ 307'				
	310'	NO BLACK STAINING	0.0 PPM @ 313'				2 TO 10 mm
	315'	RED SANDY SILTSTONE UNWEATHERED FINE-GRAINED SAND MOD. HARD ABUND. MICA CALCAREOUS	0.0 PPM @ 318'				2.5YR 3/3 CUTTINGS: SUBANGULAR 2 TO 20 mm
	320'		0.0 PPM @ 322'				
	325'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA CALCAREOUS ABUND. DOLOMITE NODULES	0.0 PPM @ 327'				2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 TO 15 mm
	330'	CALCITE PPT. ON SOME SURFACES	0.0 PPM @ 332'				
	335'		0.0 PPM @ 338'				
	340'						

SIGNIFICANT WATER PRODUCTION (2500 - 3500 GAL/RUN)

PROJECT: HIA - MIDDLETOWN | HOLE NO. ERM-25D

HIA DRILLING LOG

PROJECT	INSPECTOR	ERM-25D
HIA - MIDDLETOWN	D. EVANS	SHEET 9 OF 14 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	340'	RED SILTY FINE TO MEDIUM-GRAINED SANDSTONE (WACKE) UNWEATHERED HARD CALCAREOUS	0.0 PPM @ 344'	NS	NS	NA	2.5YR 5/4 CUTTINGS: SUBROUNDED 2 TO 10 mm
	345'		0.0 PPM @ 348'				
	350'	RED SANDY SILTSTONE UNWEATHERED FINE-GRAINED SAND (30-45%) MOD. HARD SOME SMOOTHED SURFACES DOLOMITIC CALCITE PIT ON SOME SURFACES	0.0 PPM @ 352'				2.5YR 3/3 CUTTINGS: SUBANGULAR 2 TO 10 mm
	355'	RED SILTY FINE-GRAINED SANDSTONE (WACKE) UNWEATHERED HARD CALCAREOUS SOME SMOOTHED SURFACES	0.0 PPM @ 358'				2.5YR 3/3 CUTTINGS: SUBANGULAR 2 TO 10 mm
	360'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	0.0 PPM @ 363'				2.5YR 3/3 CUTTINGS: SUBANGULAR 2 TO 10 mm
	365'	RED SILTY FINE TO MEDIUM-GRAINED SANDSTONE (WACKE) UNWEATHERED HARD CALCAREOUS TO DOLOMITIC	0.0 PPM @ 368'				2.5YR 5/4 CUTTINGS: SUBROUNDED 2 TO 10 mm
	370'	TRACE FINE GRAVEL (ANGULAR)	0.0 PPM @ 372'				
	375'	RED SANDY SILTSTONE UNWEATHERED FINE-GRAINED SAND MOD. HARD ABUND. MICA CALCAREOUS	0.0 PPM @ 377'				2.5YR 3/3 CUTTINGS: SUBANGULAR 2 TO 15 mm
	380'	CALCITE PIT ON SOME SURFACES	0.0 PPM @ 382'				
	385'						

MODERATE WATER PRODUCTION (~4000 GAL/RUN)

HIA DRILLING LOG

ERM-25D

PROJECT: HIA - MIDDLETOWN | INSPECTOR: D. EVANS | SHEET 10 OF 14 SHEETS

ELEV. L	DEPTH M	DESCRIPTION OF MATERIALS C	FIELD SCREENING RESULTS C	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO.	BLOW COUNTS C	REMARKS N
	385'	SEE PREVIOUS PAGE CALCITE PPT ON SOME SURFACES	0.0 PPM @ 387'	NS	NS	NA	~~2.5YR 3/3~~ DE ~~CUTTINGS:~~ SEE PREVIOUS PAGE
	390'	FEW DOLOMITE NODULES	0.0 PPM @ 392'	WATER PRODUCTION (~ 4000 GAL/RUN)			
	395'	FEW DOLOMITE NODULES SOME CALCITE PPT.	0.0 PPM @ 399'				
	400'	RED BRECCIA FINE TO MEDIUM-GRAINED, CALCAREOUS SAND AND SILT MATRIX MATRIX SUPPORTED VERY HARD UNWEATHERED CALCITE, QUARTZ, CLASTS (FINE TO COARSE GRAINED SIZED)	0.0 PPM @ 402'	MODERATE			MATRIX: 2.5YR 5/4 CLASTS: ASSORTED COLORS ANGULAR TO SUB-ROUNDED CUTTINGS: ANGULAR TO SUBROUNDED, 2 TO 15 mm
	405'	RED SILTY FINE TO MEDIUM-GRAINED SANDSTONE (WACKE) UNWEATHERED HARD CALCAREOUS SOME CUTTINGS DISCOLORED (WHITE)	0.0 PPM @ 408'				~~MATRIX~~ DE 2.5YR 5/4 CUTTINGS: SUBROUNDED 2 TO 10 mm
	410'	RED BRECCIA SAME AS 400-405' INTERVAL	0.0 PPM @ 412'				SAME AS 400-405' INTERVAL ~~2 TO 5 mm~~ DE
	415'		0.0 PPM @ 418'	WATER PRODUCTION (~ 5000 - 5500 GAL/RUN)			2 TO 5 mm
	420'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA CALCAREOUS	0.0 PPM @ 423'	MODERATE			2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 TO 10 mm
	425'		0.0 PPM @ 427'				2 TO 15 mm
	430'						

PROJECT: HIA - MIDDLETOWN | HOLE NO. ERM-25D

HIA DRILLING LOG

PROJECT	INSPECTOR	ERM-25D
HIA - MIDDLETOWN	D. EVANS	SHEET 11 OF 14 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	430'	RED SANDY SILTSTONE UNWEATHERED FINE-GRAINED SAND MOD. HARD ABUND. MICA CALCAREOUS	0.0 PPM @ 432'	NS	NS	NA	2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 mm TO 15 mm
	435'	RED SILTY FINE-GRAINED SANDSTONE (WACKE) UNWEATHERED MOD. HARD TO HARD DOLOMITIC	0.0 PPM @ 438'	MODERATE WATER PRODUCTION (~ 5200 - 5520 GAL / RUN)			2.5 YR 5/4 CUTTINGS: SUBROUNDED 2 TO 10 mm
	440'		0.1 PPM @ 442'				
	445'	CALCAREOUS	0.0 PPM @ 448'				
	450'	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA CALCAREOUS	0.2 PPM @ 453'				2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 TO 10 mm
	455'	CALCAREOUS TO DOLOMITIC	0.3 PPM @ 458'				2 TO 20 mm
	460'	CALCAREOUS TO DOLOMITIC SOME SMOOTHED SURFACES	0.2 PPM @ 462'				2 TO 20 mm
	465'	RED SANDY SILTSTONE UNWEATHERED FINE TO COARSE-GRAINED SAND (10-20%) MOD. HARD ABUND. MICA CALCAREOUS SOME CALCITE PPT. ON SURFACES	0.0 PPM @ 468'				2.5 YR 5/4 CUTTINGS: SUBANGULAR TO SUBROUNDED 2 TO 20 mm
	470'	20-40% SAND NO CALCITE PPT. ON SURFACES	0.0 PPM @ 472'				
	475'						

HIA DRILLING LOG

ERM-25D

PROJECT: HIA - MIDDLETOWN | INSPECTOR: D. EVANS | SHEET 12 OF 14 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	475'	RED SILTSTONE UNWEATHERED MOD. HARD ABUNDANT MICA CALCAREOUS CALCITE PPT. ON SOME SURFACES	0.0 PPM @ 478' 0.0 PPM @ 482'	NS	NS	NA	2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 TO 15 mm
	480'						
	485'	RED SANDY SILTSTONE UNWEATHERED FINE TO MEDIUM-GRAINED SAND (20-30%) MOD. HARD ABUND. MICA CALCAREOUS	0.2 PPM @ 487' 0.3 PPM @ 492'	MODERATE WATER PRODUCTION (~ 5000 - 5500 GAL/RUN)			2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 TO 15 mm
	490'						
	495'	30-45% FINE SAND HARD	0.3 PPM @ 498'				2.5 YR 5/4 2 TO 10 mm
	500'	30-45% FINE SAND HARD	0.2 PPM @ 502'				
	505'	30-45% FINE SAND HARD CALCITE PPT. ON SOME SURFACES	0.2 PPM @ 507'				
	510'	30-45% FINE SAND SOME SMOOTHED SURFACES	0.3 PPM @ 512'				
	515'	20-30% FINE SAND	0.7 PPM @ 518'				2 TO 15 mm
	520'						

PROJECT: HIA - MIDDLETOWN | HOLE NO. ERM-25D

DRILLERS LOG

PROJECT: HIA - MIDDLETOWN | INSPECTOR: D. EVANS | ERM-25D | SHEET 13 OF 14 SHEETS

EV. b.	DEPTH a.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	520'	SEE PREVIOUS PAGE FINE TO COARSE SAND CALCITE PPT. ON SOME SURFACES	0.8 PPM @ 523'	NS	NS	NA	SEE PREVIOUS PAGE 2 TO 20 mm
	525'	RED BRECCIA FINE TO COARSE-GRAINED, CALCAREOUS SAND AND SILT MATRIX MATRIX SUPPORTED UNWEATHERED VERY HARD CALCITE, QUARTZ CLASTS - FINE TO COARSE GRAVEL SIZED	0.2 PPM @ 528' 0.5 PPM @ 533' 1.2 PPM @ 539'	PRODUCTION WATER (~5000 - 6000 GAL/RUN)			MATRIX: 2.5YR 5/4 CLASTS: ASSORTED COLORS ANGULAR TO SUB-ROUNDED CUTTINGS: ANGULAR TO SUB-ROUNDED 2 TO 10 mm
	530'						
	535'						
	540'	RED SANDY SILTSTONE UNWEATHERED FINE-GRAINED SAND MOD. HARD TO HARD ABUNDANT MICA CALCAREOUS TO DOLOMITIC	0.7 PPM @ 542'				2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 TO 20 mm
	545'	RED SILTY FINE TO MEDIUM-GRAINED SANDSTONE (WACKE) UNWEATHERED HARD CALCAREOUS	1.2 PPM @ 547'				2.5 YR 5/4 CUTTINGS: SUBROUNDED 2 TO 10 mm
	550'	RED BRECCIA SAME AS 525-540' INTERVAL	1.4 PPM @ 553'				SAME AS 525-540' INTERVAL
	555'	RED SILTY FINE TO MEDIUM-GRAINED SANDSTONE (WACKE) UNWEATHERED HARD CALCAREOUS	0.0 PPM @ 558'	MODERATE			2.5 YR 5/4 CUTTINGS: SUBROUNDED 2 TO 10 mm
	560'	RED SANDY SILTSTONE UNWEATHERED FINE TO MEDIUM-GRAINED SAND MOD. HARD ABUND. MICA CALCAREOUS TO DOLOMITIC	0.0 PPM @ 562'				2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 TO 10 mm
	565'						

PROJECT: HIA - MIDDLETOWN | HOLE NO. ERM-25D

ERM-25D

PROJECT	INSPECTOR	SHEET 19 OF 24 SHEETS
HIA - MIDDLETOWN	D. EVANS	

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	565'	RED SILTY FINE TO MEDIUM-GRAINED SANDSTONE (WACKE) UNWEATHERED MOD. HARD CALCAREOUS	0.0 PPM @ 567'	NS	NS	NA	2.5 YR 5/4 CUTTINGS: SUBROUNDED 2 TO 10 MM
	570'						
		RED BRECCIA FINE TO COARSE-GRAINED, CALCAREOUS SAND AND SILT MATRIX MATRIX SUPPORTED UNWEATHERED VERY HARD CALCITE, QUARTZ CLASTS - FINE TO COARSE GRAVEL SIZED	0.0 PPM @ 572' 0.0 PPM @ 579' 0.0 PPM @ 583'	PRODUCTION MODERATE WATER (~5500 GAL/RUN)			MATRIX: 2.5YR 5/4 CLASTS: ASSORTED COLORS ANGULAR TO SUB-ROUNDED CUTTINGS: ANGULAR TO SUB-ROUNDED 2 TO 10 MM
	575'						
	580'						
	585'						
		RED SANDY SILTSTONE UNWEATHERED FINE-GRAINED SAND (20-30%) MOD. HARD ABUND. MICA CALCAREOUS 30-40% FINE SAND	0.0 PPM @ 587' 0.0 PPM @ 592'				2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 TO 10 MM
	590'						
	595'						
		RED ~~FINE~~ SILTY FINE TO MEDIUM-GRAINED SANDSTONE (WACKE) WITH TRACE FINE GRAVEL UNWEATHERED HARD CALCAREOUS GRAVEL: ANGULAR QUARTZ + CALCITE	0.0 PPM @ 596'				2.5 YR 5/4 CUTTINGS: ANGULAR TO SUB-ROUNDED 2 TO 10 MM
	600'						

TOTAL DEPTH OF BOREHOLE = 603'

INJECTED WATER TOTAL ≈ 4620 GAL.

DRILLING COMPLETED ON 3/14/95 BY D.E.

WELL INSTALLATION WILL BE COMPLETED AT A LATER DATE

HTW DRILLING LOG

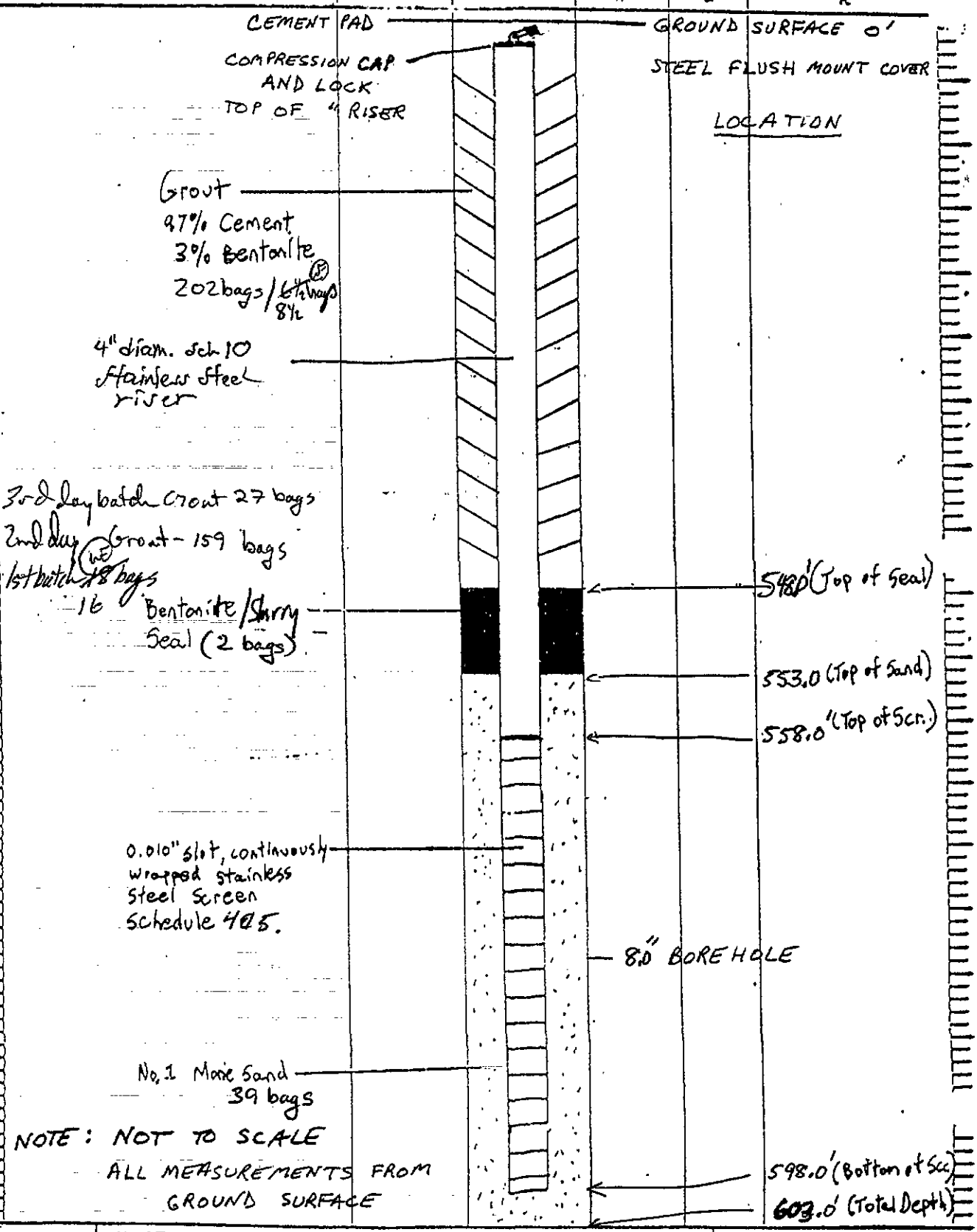
HOLE NO. ERM-25D

PROJECT: HIA, Middletown

INSPECTOR: WARREN FOX

SHEET: OF SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS



PROJECT: HIA, Middletown

HOLE NO. ERM-25D

HTW DRILLING LOG

HOLE NO. ERM-26S

1. COMPANY NAME: ERM-PMC	2. DRILLING SUBCONTRACTOR: ADT-MA
3. PROJECT: Middletown HIA	4. LOCATION: MIDDLETOWN, PA
5. NAME OF DRILLER: Troy Brown	6. MANUFACTURER'S DESIGNATION OF DRILL: Mobil
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: B-59 HSA; 6 3/8" Hollow Stem Augers; 2 1/2" Split Spoon; 140 lb hammer; 5 7/8" Roller bit	8. HOLE LOCATION: See page # 4
	9. SURFACE ELEVATION: Not Surveyed
	10. DATE STARTED: 2/1/95
	8. DATE COMPLETED: 2/3/95 Installed Flushmount
12. OVERBURDEN THICKNESS: ~25'	15. DEPTH GROUNDWATER ENCOUNTERED: ~35'
13. DEPTH DRILLED INTO ROCK: 25-46'3"	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 33.1' @ 730 2/2/95
14. TOTAL DEPTH OF HOLE: 46'3"	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NA			

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
NA	/	/	/	/	/	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Monitoring Well ERM-26S	/	✓	/	[signature]

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0	TOPSOIL					
	1	SILT, TRACE CLAY STIFF, MOIST	0ppm	NS	NA	5,5 15,10	10YR 5/6 ML Rec 20"
	2						
	3		0ppm	NS	NA	9,11 13,15	10YR 5/6 ML Rec 18"
	4	trace Fine to Med Sand.					
	5		0.2ppm	NS	NA	10,15 11,15	10YR 5/6 ML Rec 21"
	6	trace coarse Sand, fine gravel V. MOIST					
	7		0ppm	NS	NA	10,8 6,6	10YR 5/4 ML Rec 20"
	8						
	9	MOIST.	0ppm	NS	NA	2,2 3,3	10YR 5/6 ML Rec 17"
	10						

PROJECT: MIDDLETOWN

HOLE NO. ERM-26S

HTW DRILLING LOG

HOLE NO. RRM-26S

PROJECT Middletown HIA | INSPECTOR J. Ryan | SHEET 2 OF SHEETS

ELEV. b.	DEPTH	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	10						Ambient: 0ppm
	11						
	12						
	13						
	14	GRAVEL	SILTY SAND W/GRAVEL				CUTTINGS
	15	SILTY Fine to Coarse Sand, with				18,23	5YR 5/8
	16	[redacted] gravel, [redacted], TRACE CLAY	0ppm	NS	NA	60,55	SW-[redacted]
	17	GRAVEL (Subrounded to rounded) V. dense, MOIST					Rec 24"
	18						Ambient: 0ppm
	19						
	20	WELL GRADED F-C Sand, with [redacted] gravel					7.5YR 6/2
	21	(Subrounded to Rounded) trace silt, dense,	0ppm	NS	NA	21,18, 27,25	SW-[redacted]
	22	sl. moist.					Rec 18"
	23						Ambient 0ppm
	24						2.5YR 3/4
	25	Decomposed Rock	0ppm	NS	NA	100/5"	SP
	26	V. Fine-Med Sand, TRACE SILT, dry, v. dense					
	27						
	28						
	29						

PROJECT Middletown | HOLE NO. RRM-26S

HTW DRILLING LOG

PROJECT: Middletown | INSPECTOR: J. Ryan | HOLE NO. ERN 265 | SHEET 3 OF SHEETS

EV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	30						
	31						Cutting coming up dry
	32						
	33						
	34	@34 = TD					
	35	Silty Fine Sandstone w. Silica clast (Subrounded to rounded)					Start to lose return
	36						Water return @ ~35'
	37	WEATHERED TO HIGHLY WEATHERED					
	38						
	39						
	40						
	41						
	42						
	43						
	44						
	45						
	46	EOB 46'3"					

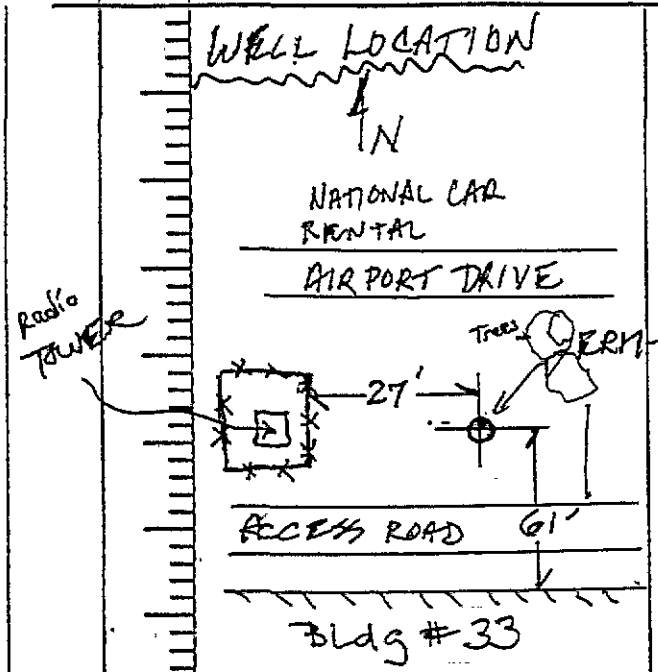
PROJECT: MIDDLETOWN | HOLE NO. ERN-265

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.
Middletown HIA	J. Ryan	ERM 26S
		SHEET 4 OF 4 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.

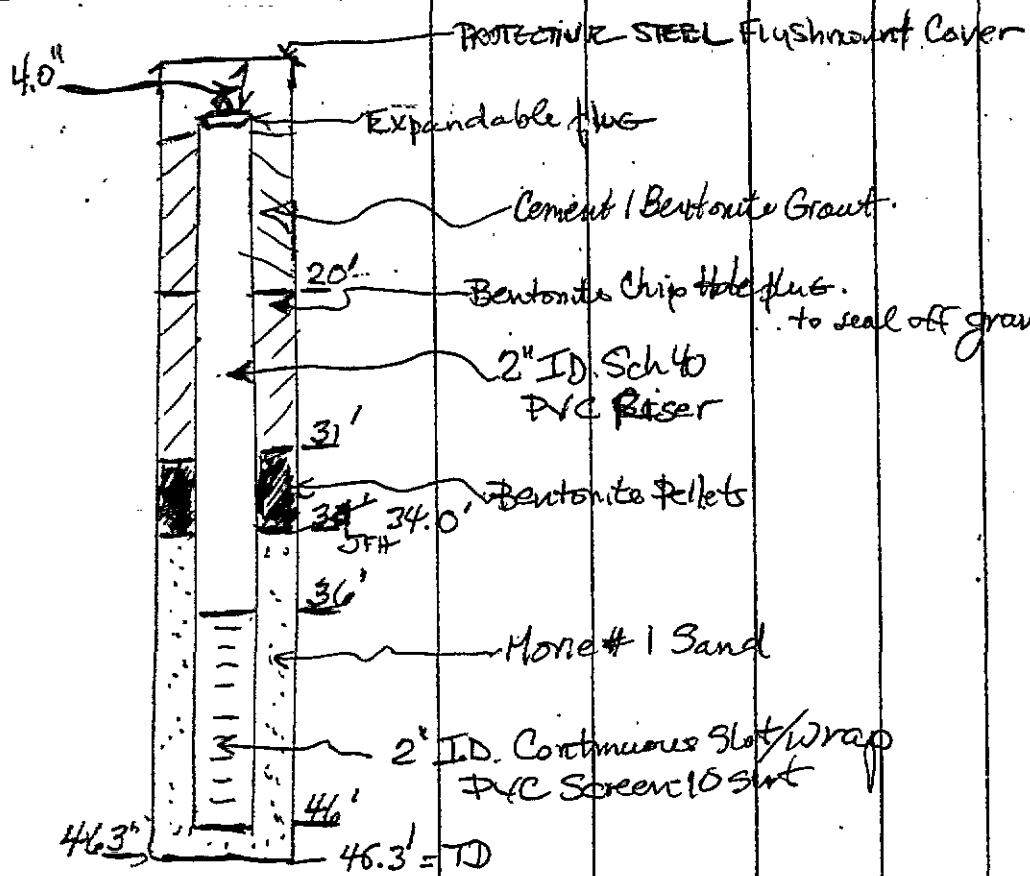
WELL LOCATION



WELL MATERIALS

10' 2" Continuous slot PVC Screen (10 slot)
36' 2" Sch 40 PVC Riser
Sand 2 bags
Bentonite pellets 1 bucket
Bentonite Hole plug 7 bags
Cement 5 bags

WELL CONSTRUCTION ERM-26S



HTW DRILLING LOG

HOLE NO. ERM-26I

1. COMPANY NAME: ERM - PMC	2. DRILLING SUBCONTRACTOR: Hydro Group
SHEET 1 OF 6 SHEETS	
3. PROJECT: HIA - Middletown	4. LOCATION: Middletown, PA
5. NAME OF DRILLER: Steve Blatt / Bernie Connor	6. MANUFACTURER'S DESIGNATION OF DRILL: Barber Rig DR-12
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: Dual Rotary Barber Rig 8" and 12" casing and hammer. Temporary 12" casing to 60' 8" casing to 202'	8. HOLE LOCATION: See Sheet #6
	9. SURFACE ELEVATION: Not Surveyed
	10. DATE STARTED: 10-13-94 / 11. DATE COMPLETED:
12. OVERBURDEN THICKNESS: 34'-35' (55' competent Bry)	15. DEPTH GROUNDWATER ENCOUNTERED: Unknown (≥ 25' BGS?)
13. DEPTH DRILLED INTO ROCK: 168'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: N/A
14. TOTAL DEPTH OF HOLE: 202'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): N/A

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
None	X		None

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None						— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well Installed		X		Warren N. Fox

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0.0'	Silt with sand (+ trace only) v.f. grain. Saturated cohesive weak poorly graded Note: (water added during drilling)	9 ppm PID No Odor	NS	NS	NA	10YR 5/4 yellowish brown
	5.0'	Clay w/ gravel (1" dia) rounded cohesive saturated poorly sorted	15 ppm PID No Odor (Driller noted a smell - 192 ppm in casing - moisture & 0 ppm PID in breathing zone)	NS	NS	NA	10YR 5/6 yellowish brown
	10.0'	Gravel (river gravel?) round to subrounded loose wet 1/8" to 1" Diameter. (Quartz)	7.5 ppm PID No Odor	NS	NS	NA	10YR 4/2 dark grayish brown
	15.0'	Same as above 1/8" to 1" Dia.	17 ppm PID, No Odor.	NS	NS	NA	10YR 4/2 dark grayish brown
	20.0'	Similar Gravel 1/8" to 3/4" Dia.	7.8 ppm PID, No Odor	NS	NS	NA	10YR 3/3 dark brown
	25.0'						

PROJECT: HIA - Middletown

HOLE NO. ERM-26I

HTW DRILLING LOG

HOLE NO. ERM-26I

PROJECT: HIA - Middletown | INSPECTOR: Warren Fox | SHEET 2 OF 6 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	25.0'	Gravel a lot more smaller material. round 1/8" to 3/4" wet ⊕ lots	0ppm PID, No Odor	NS	NS	NA	10YR 3/3 dark brown (are gravels from white thru brown)
	30.0'	Gravel (weak-sandy) very weathered f.grained, rounded (−) HCL, 1/8" to 1" Dia. uniform	0ppm PID, NO odor	NS	NS	NA	5YR 3/3 dark reddish brown
			* (−34' Bedrock)				
	35.0'	Wacky - ~~agill~~ argillaceous, Silty sandstone / conglomerate gravel m. hard weathered (−) HCL subrounded 1/8" to 1/4"	0ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red.
	40.0'	Similar to above w/ trace of dolomite (+ HCL)	0ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red. 1.0 to 9.0 mm dia.
	45.0'	Sandy Siltstone (dolomitic) (w/ argillaceous trace) weathered trace of quartz m. hard angular cuttings, + HCL	0ppm PID, No Odor	NS	NS	NA	2.5 YR 3/3 dusky red 1.0 to 25 mm
	50.0'	Same as above	0ppm PID, No Odor.	NS	NS	NA	2.5YR 3/3 dusky red
			* (−55' Competent Bedrock)				1.0 to 30 mm
	55.0'	Siltstone weathered m. hard trace calcite/dolomite (<5%) clasts ≤ 5mm dolomitic cementation.	0ppm PID, No Odor	NS	NS	NA	2.5 YR 3/3 dusky red. 1.0 to 18 mm
	60.0'	Siltstone weathered m. hard. no clasts of quartz. + HCL - dolomitic cementation.	36ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 dusky red 1.0 to 15 mm
	65.0'	Same as above ⊕ HCL.	16ppm PID, No Odor.	NS	NS	NA	2.5YR 3/4 dusky red.
			* Driller commented fractures				1.0 to 28 mm
	70.0'						

HTW DRILLING LOG

PROJECT: HIA - Middletown | INSPECTOR: Warren Fox | HOLE NO. ERM-26I | SHEET 3 OF 6 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	70.0	~~Argillaceous~~ (Wa) Sandstone / Wacky Silty (Conglomerate) w/ gravel (1/8" to 1/4") Lo subangular s. hard (softer than above) m. weathered, trace of dolomite	3ppm PID, No Odor	NS	NS	NA	2.5YR 4/3 dusky red (multi colored) 1/8" to 3/8" Dia.
	75.0'	Siltstone m. hard weathered no clasts HCl + $CaCO_3$ cementation	0ppm PID, No Odor (78' - harder again)	NS	NS	NA	2.5YR 3/2 dusky red
	80.0'	Siltstone w/ sand m. hard weathered no clasts (—) HCl. (trace m. grain subround)	0ppm PID, No Odor	NS	NS	NA	1mm to 15mm 2.5YR 2.5/2 very dusky red
	85.0'	Sandstone w/ silt f.m. grain, sub round m. hard m. weathered HCl (+) $CaCO_3$ cementation (w/ small deposits on chips)	0ppm PID, No Odor	NS	NS	NA	1mm to 20mm 2.5YR 3/2 dusky red
	90.0'	Similar to above but v.f. to f. grained.	0ppm PID, No Odor	NS	NS	NA	1.0 to 25mm 2.5YR 2.5/2 Very Dusky Red
	95.0'	Sandstone w/ silt m. hard, weathered quartz clasts, angular (1/8" dia) f. grain sand. (+) HCl ($CaCO_3$-cementation)	0ppm PID, No Odor.	NS	NS	NA	1.0 to 20mm 2.5YR 3/2 Dusky red.
WATER	100.0'	Sandstone w/ silt f. grain. subrounded m. weathered m. hard. (+) HCl - dolomite cementation	2 ppm PID, No Odor	Note: Water at 100' to 102' NS	NS	NA	1.0 to 12mm 2.5YR 3/2 Dusky Red.
	105.0'	Similar to above w/ trace of quartz clasts ≤ 12mm subrounded.	0ppm PID, Odor	NS (softer at 111')	NS	NA	1.0 to 20.0mm 2.5YR 3/3 Dusky Red
	110.0'	Sandstone w/ silt m. hard weathered v.f. grain, sub rounded no quartz - trace of dolomite (+) HCl.	0ppm PID, Odor	NS	NS	NA	1.0 to 30mm 2.5YR 3/3 Dusky Red
	115.0'						1.0 to 22mm

HTW DRILLING LOG

HOLE NO. ERM-26I

PROJECT HIA - Middletown | INSPECTOR Warren Fox | SHEET 4 OF 6 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
Water Zone	115.0'	Sandstone with silt m. hard weathered f grain sub rounded trace quartz clasts <4mm	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 Dusky Red 1.0 to 25mm dia.
	120.0'	Silty ~~Argillaceous~~ (E) sandstone m. grain sub ~~angular~~ (E) w/gravel rounded ≤3mm dia. quartz (+) HCL - dolomitic cementation	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/4 Dusky Red 1.0 to 25mm
SOFT	125.0'	Siltstone fairly soft weathered +HCL - dolomitic cement small chips ≤10mm	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 Dusky Red 1.0 to 10mm
Soft Zone Fracture	130.0'	Same as above.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 Dusky Red 1.0 to 18mm
	135.0'	Siltstone m. hard weathered HCL (+) dolomitic cement. trace of sand f grain rounded.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 Dusky Red 1.0 to 15mm
K. Soft Fractures	140.0'	Same Siltstone as above No trace of sand however.	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/3 Dusky Red 1.0 to 10mm
	145.0'	Siltstone m. soft weathered +HCL - dolomitic cement. trace of " clasts in stone chunks	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/2 dusky red ≤3mm dia. 1.0 to 18mm.
	150.0'	Same as above Smaller traces of HCL very (+) dolomite/calcite clasts	0 ppm PID, No Odor	NS	NS	NA	2.5YR 2.5/3 very dusky red. 1.0 to 20mm
Soft Fracture	155.0'	Same as above no clasts however	0 ppm PID, No Odor	NS	NS	NA	2.5YR 3/4 dusky red 1.0 to 10mm
	160.0'						

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.	SHEET
HIA - Middletown	Warren Fox	ERM-26I	5 of 6 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	100.0'	Siltstone weathered m.hard No clasts HCL(+) Dol. cementation	0ppm PID, No Odor	NS	NS	NA	2.5YR 3/6 dark red
158' to 170' soft fractured	150'	Similar siltstone w/ calcite clasts angular ≤ 8mm dia. HCL+ Dol. Cementation	0ppm PID, No Odor	NS	NS	NA	1.0mm to 15mm dia. 2.5YR 3/3 dusky Red
	170.0'	Siltstone w/ traces of v.f. sand grains - Sangular HCL(+) dol cementation No clasts. m.hard	0ppm PID, No Odor	NS	NS	NA	1.0mm to 25mm 2.5YR 3/2 dusky red
	180.0'	Same material as above	0ppm PID, No Odor	NS	NS	NA	1.0 to 12mm 2.5YR 2.5/3 very dusky red
	185.0'	Siltstone with slightly calcite within (mottled) m.hard slightly weathered HCL(+) dol. cemedation	0ppm PID, No Odor	NS	NS	NA	1.0 to 21mm 2.5YR 3/2 dusky red
	190.0'	Similar to above - also has clasts of calcite/dolomite ≤2mm	0 ppm PID, No Odor	NS	NS	NA	1.0 to 15mm 2.5YR 3/3 dusky red
Soft fracture	195.0'	Sandstone w/ silt v.f. grain sub rounded m.hard slightly weathered HCL+ clasts of calcite - sub angular	0 ppm PID, No Odor	NS	NS	NA	1.0 to 25mm 2.5YR 3/3 dusky red
	200.0'	Sandstone w/ trace silt f.grain - subrounded m. hard slightly weathered clasts of quartz and calcite/dolomite ≤ 3mm Sub rounded	0 ppm PID, No Odor	NS	NS	NA	1.0 to 22mm 2.5YR 2.5/2 very dusky red
	202.0'	202.0' Bottom of Borehole (WNF) 10-17-94					1.0 to 7.0mm

HYR DRILLING LOG

HOLE NO. ERM-26I

PROJECT HIA — Middletown

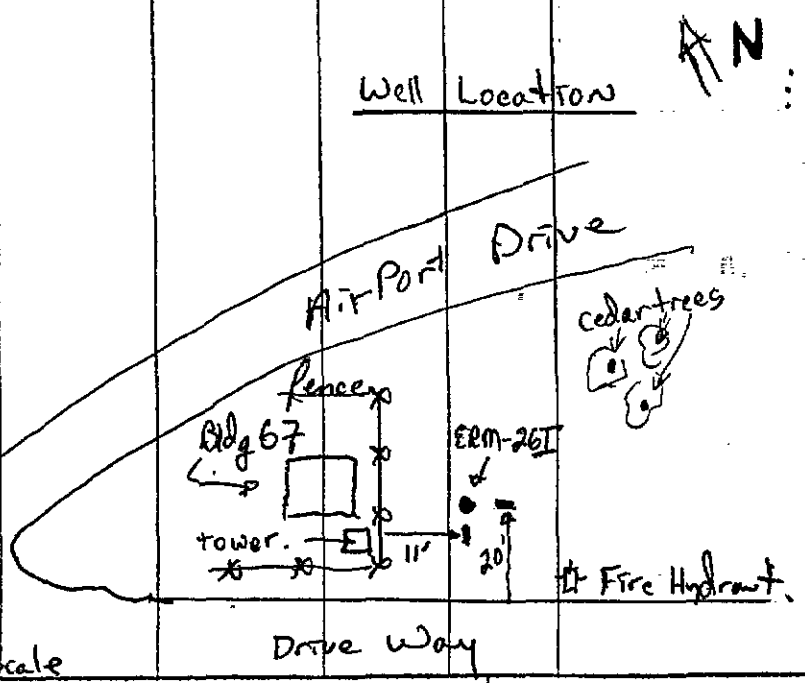
INSPECTOR Warren Fox

SHEET 6 OF 6 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS

Well Installation Diagram

Ground Surface



Note: Not to Scale

PROJECT HIA - Middletown

HOLE NO. ERM-26I

Figure 4-1 (Continued)

HTW DRILLING LOG

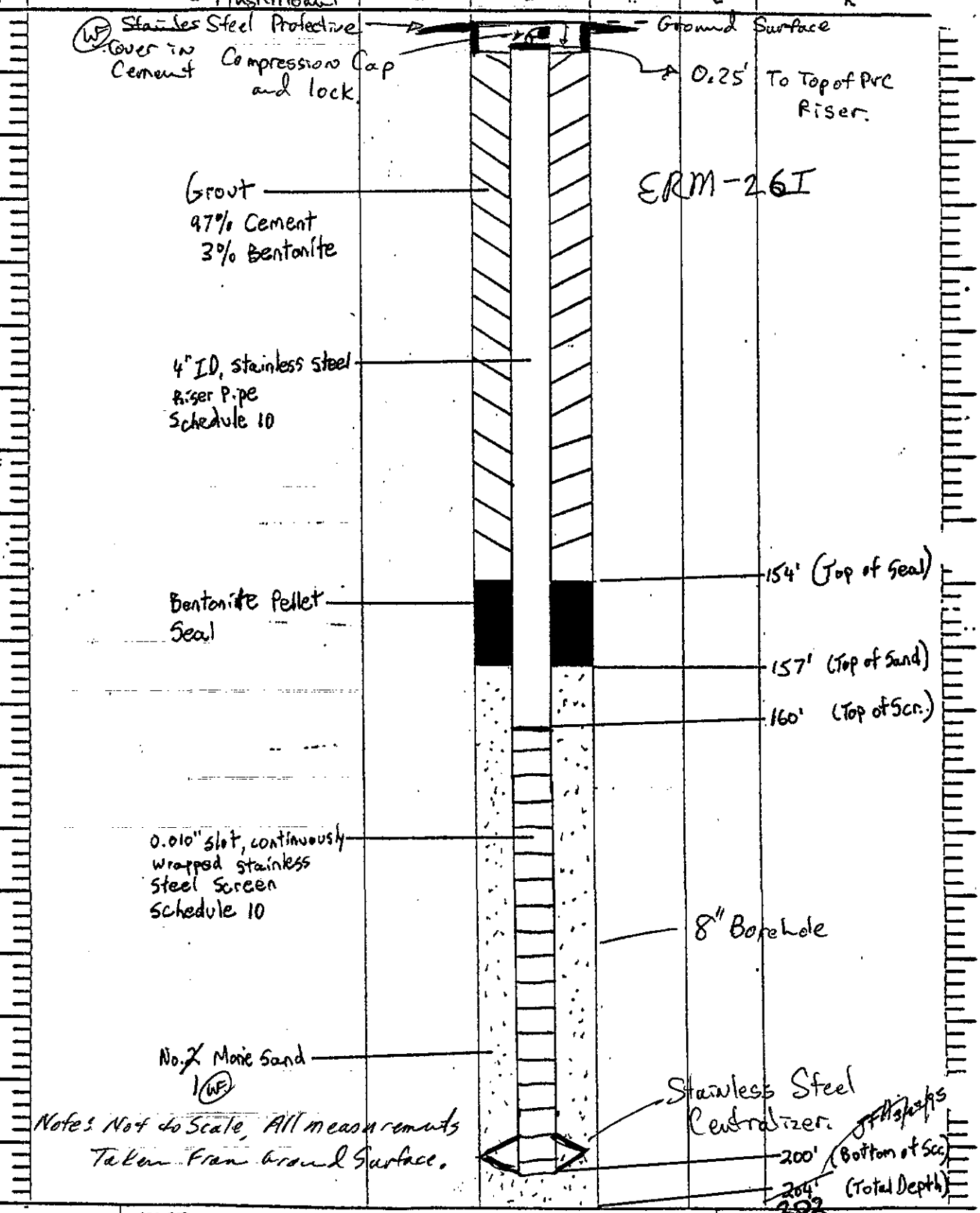
HOLE NO. ERM-26I

PROJECT: HIA, Middletown

INSPECTOR: C. Salomon / Warren Fox

SHEET ___ OF ___ SHEETS

ELEV. L	DEPTH b.	DESCRIPTION OF MATERIALS c. Flush Mount	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.



PROJECT: HIA, Middletown

HOLE NO. ERM-26I

HTW DRILLING LOG

HOLE NO. ERM-26D

SHEET 1 OF 15 SHEETS

1. COMPANY NAME: ERM-PMC, ~~INC~~	2. DRILLING SUBCONTRACTOR: Hydrogroup
3. PROJECT: H/A Middletown	4. LOCATION: Middletown, PA
5. NAME OF DRILLER: Jesse Arnet	6. MANUFACTURER'S DESIGNATION OF DRILL: Barber
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 16" Dual Rotary; 12" " ; 8" " ; Barber - Dual Rotary; DR-12; All casing are temporary.	8. HOLE LOCATION: See Sheet 15 (WE)
	9. SURFACE ELEVATION: Not Surveyed (WE)
	10. DATE STARTED: 11/23/94
	11. DATE COMPLETED:
12. OVERBURDEN THICKNESS: 30'	15. DEPTH GROUNDWATER ENCOUNTERED: UNKNOWN (≅ 26')
13. DEPTH DRILLED INTO ROCK: 570'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: —
14. TOTAL DEPTH OF HOLE: ~~600~~ 602'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): —

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
NONE	Y		—

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None (WE)						— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well Installed (WE)		Y		Warren Fox for Charles Salomon

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
		Brown silt w/sand (Elastic silt) - plastic, loose → easily formed/shaped - Sand % 7 trace-10% (WE) subround to - Sand + Gravel < 30% subangular - Poorly graded - Moist (recent infiltration → rain 11/21)	6.8 ppm @ ≈ 4.0'				7.5YR, 5/4 (ML) - trace organics
	5	Brown lean clay w/sand (WE) Subround to - Medium plasticity Subangular - Sand % 7 trace-10% - Sand + Gravel < 30% - moist (recent infiltration → rain 11/21)	13.0 ppm @ ≈ 8.0'				7.5YR, 5/4 (CL)
	10	Well graded gravel (various colors) - Sand < 15% - Subround to round, some is well rounded. - 3-15mm from 13' sample	168 ppm @ ≈ 13.0'				Mixed colors brown to gray (GW)
	15	- 3-30mm from 17' sample	297 ppm @ ≈ 17.0'				
	20	- 3-45mm gravel from 23' sample	0.0 ppm @ ≈ 23'				
	25						

reviewed 8 Feb 95 JFH

PROJECT: H/A-Middletown

HOLE NO. ERM-26D

PROJECT	INSPECTOR	SHEET 2 OF 15 SHEETS
HIA Middletown	D. Haller / C. Solomon	ERM-MOD

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	25	3-60 mm gravel from 28' sample	0.0 ppm @ ≈28'	NA	NA	NA	
	30	Dusky red calcareous or dolomitic SILTSTONE. - trace fine sand - trace 1-5 mm dolomite clasts - 3, 95 mm quartz clasts from 37' sample.	0.0 ppm @ ≈33'				2.5 YR, 4/3 cuttings: 1-30 mm
	35	- moderately to slightly weathered - moderately hard - cuttings: subangular	0.0 ppm @ ≈37'				cuttings: 1-30 mm
	40	Same material	0 ppm				Change to 12" bit 1-30 mm 2.5 YR 4/3
	45	Same material	0 ppm				1-30 mm 2.5 YR 4/3
	50	Same material	0 ppm				1-30 mm 2.5 YR 4/3
	55	Same material with quartz and gypsum crystals	0 ppm				1-30 mm 2.5 YR 4/3
	60	Same material	0 ppm				1-30 mm 2.5 YR 4/3
	65	Same material	0 ppm				1-30 mm 2.5 YR 4/3

HIW DRILLING LOG

PROJECT: HIA Middletown

INSPECTOR: C. Salomon

HOLE NO.: ERM-26D

SHEET 3 of 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	70	Same material	0 ppm	NA	NA	NA	
	75	SILTY Sandstone/(wacke) very fine grain subangular quartz and dolomite clasts ≤5mm (WE) slightly weathered cuttings subangular moderately hard	0 ppm				Cuttings 1-30mm 2.5 YR 4/3
	80	Same material	0 ppm				1-30 m
	85	Same material	0 ppm				1-30 mm
	90	Same material only fine grain instead of very fine hard. Increased quartz clasts ≤5mm (WE)	0 ppm				OBS 1-10mm ~~30~~ 12/5/94
	95	Same material	0 ppm				1-30mm
	100	Siltstone Hard unweathered cuttings subrounded quartz clasts	0 ppm				Cuttings 1 to 15mm
	105	Sandstone/(wacke) fine grain subrounded quartz clasts ≤5mm (E) slightly weathered hard	0 PPM				Cuttings 1 to 20mm

HTW DRILLING LOG

PROJECT: HIA Middletown
INSPECTOR: C. Salomon
HOLE NO. ERM-26D
SHEET 4 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	110	Same material	0 ppm	NA	NA	NA	Cuttings 1 to 25mm 2.5 YR 4/3
	115	Siltstone unweathered Hard cuttings angular	0 ppm				Cuttings 1 to 35mm 2.5 YR 4/3
	120	Same material cuttings subrounded	0 ppm				cuttings 1 to 25mm 2.5 YR 4/3
	125	Same material	0 ppm				Cuttings 1 to 20mm 2.5 YR 4/3
	130	Same material cuttings subangular	0 ppm				Cuttings 1 to 35mm 2.5 YR 4/3
	135	Same material	0 ppm				Cuttings 1 to 15mm 2.5 YR 4/3
	140	Same material	0 ppm				Cuttings 1 to 25mm 2.5 YR 4/3
	145	same material with dolomite clasts ≤ 5mm (LB)	0 ppm				Cuttings 1 to 20mm 2.5 YR 4/3
	150	same material	0 ppm				cuttings 1 to 10mm 2.5 YR 4/3

HTW DRILLING LOG

PROJECT: HIA Middletown
INSPECTOR: C. Salomon
HOLE NO.: ERM-26D
SHEET 5 of 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	155	SAME Material	0 ppm				cuttings 1 to 10mm 2.5 YR 4/3
	160	same material	0 ppm				cuttings 1 to 15mm 2.5 YR 4/3
	165	Same material	0 ppm				Cuttings 1 to 5mm 2.5 YR 4/3
	170	same material	0 ppm				cuttings 1 to 15mm 2.5 YR 4/3
	175	Same material	0 ppm				cuttings 1 to 25mm 2.5 YR 4/3
	180	Silty Sandstone/(wacke) fine grain sub rounded Quartz and dolomite clasts ≤ 5mm hard slightly weathered	0 ppm				cuttings 1 to 10mm 2.5 YR 4/3
	185	same material	0 ppm				cuttings 1 to 15mm 2.5 YR 4/3
	190	Same material	0 ppm				Cuttings 1 to 20mm 2.5 YR 4/3
	195	Same material	0 ppm				Cuttings 1 to 35mm

HTW DRILLING LOG

PROJECT: HIA Middletown

INSPECTOR: C. Salomon

HOLE NO.: ERM-26D

SHEET 6 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	200	siltstone unweathered hard dolomite clasts ≤ 5mm cuttings subrounded	0 ppm	NA	NA	NA	cuttings 1 to 5mm 2.5YR 4/3
	205	Same material	0 ppm				cuttings 1 to 25mm 2.5YR 4/3
	210	same material	0 ppm				Cuttings 1 to 7mm 2.5YR 4/3
	215	Same material	0 ppm				Cuttings 1 to 5mm 2.5YR 4/3
	220	same material	0 ppm				cuttings 1 to 5mm 2.5YR 4/3 Change to 8" bit.
	225	Same material	0 ppm				cuttings 1 to 5mm 2.5YR 4/3
	230		0 ppm				SAME
	235		0 ppm				SAME
	240		0 ppm				SAME

HTW DRILLING LOG

PROJECT: HIA Middletown

INSPECTOR: C. Salomon

HOLE NO.: ERM-26D

SHEET 7 of 15 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO.	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	245	Silty Sandstone/(wacke) very fine grain unweathered very hard sub angular grains quartz and dolomite clasts ≤5mm (WC)	0 ppm	NA	NA	NA	cuttings 1 to 20mm 2.5 YR 4/3
	250	Same	0 ppm				
	255	Siltstone unweathered hard	0 ppm				cuttings 1 to 25mm 2.5 YR 4/3
	260	Same	0 ppm				Cuttings 1 to 15mm 2.5 YR 4/3
	265	Silty Sandstone/(wacke) very fine grain unweathered very hard subrounded grains quartz and dolomite clasts ≤5mm (WC)	0 ppm				Cuttings 1 to 7mm 2.5 YR 4/3
	270	Same	0 ppm				cuttings 1 to 18mm 2.5 YR 4/3
	275	Same	0 ppm				Cuttings 1 to 10mm 2.5 YR 4/3
	280	Same	0 ppm				cuttings 1 to 8mm 2.5 YR 4/3
	285	Same	0 ppm				cuttings 1 to 30mm 2.5 YR 4/3

PROJECT: HIA-Middletown

HOLE NO.: ERM-26D

HIW DRILLING LOG

PROJECT: HIA Middletown
INSPECTOR: C. Salomon
HOLE NO.: ERM-26D
SHEET 8 OF 15 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE OR CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS
	290	Same	0 ppm	NA	NA	NA	2.5 YR 4/3 Cuttings 1 to 10 mm
	295	Same	0 ppm				Cuttings 1 to 3 mm 2.5 YR 4/3
	300		0 ppm				Cuttings 1 to 15 mm 2.5 YR 4/3
	305		0 ppm				Cuttings 1 to 8 mm 2.5 YR 4/3
	310		0 ppm				Cuttings 1 to 20 mm 2.5 YR 4/3
	315	Siltstone unweathered very hard	0 ppm				Cuttings 1 to 15 mm 2.5 YR 4/3
	320	Same	0 ppm				Cuttings 1 to 20 mm 2.5 YR 4/3
	325	Same	0 ppm				Cuttings 1 to 35 mm 2.5 YR 4/3
	330	Same large pieces w/fracture faces	0 ppm				Cutting 10 to 65 mm 2.5 YR 4/3

HTW DRILLING LOG

PROJECT: HIA Middletown

INSPECTOR: C. Salomon / Warren Fox / Carl Ridge

HOLE NO.: ERM-26D

SHEET 9 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	335	Siltstone w/ trace of Fine sand - subrounded very hard slightly weathered NO clasts HCl (-)	0 ppm PID No Odor	NS	NS	NA	2.5YR 3/3 dusky red
	340	Similar Material trace of Qtz clasts 1 to 3mm angular	0 ppm PID No Odor	NS	NS	NA	1.0 to 20 mm 2.5YR 4/3 dusky red.
	345	Siltstone v. hard slightly weathered NO clasts / HCl (-)					1.0 to 40 mm 2.5YR 4/3 dusky red.
	350	Same Material DRILLER REPORTS INCREASED	DRILL SPEED 353-355 FT BGS				1.0 to 10 mm 2.5YR 4/3 dusky Red.
	355	LOGGED FROM 355 FT BGS BY CARL RIDGE (ERM) SILTY SANDSTONE/(WACKE) VERY FINE GRAIN, UNWEATHERED FRIABLE, SUB-ROUNDED	0 ppm PID	NS	13 DEC 04 NS	NA	1.0 to 10 mm 2.5YR 4/3 DUSKY RED FRIABLE 1.0 - 20 mm
	360	SAME	0 ppm PID	NS	NS	NA	
	365	SAME					
	370	SAME INCREASED DRILL SPEED 372-373.5 FT BGS					
	375	SAME					
	380						

HTW DRILLING LOG

PROJECT: HIA- MIDDLETOWN
INSPECTOR: CARL PIOKE
HOLE NO. ERM-26D
SHEET 16 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
375		SILTY SANDSTONE/(WACKE) VERY FINE GRAIN UNWEATHERED FRIABLE	0ppm PID	NS	NS	NA	2.5YR 4/3
385		SAME FINE TO COARSE GRAIN	0ppm PID	NS	NS	NA	2.5YR 4/3
390		SAME VERY FINE TO MED	0ppm PID	NS	NS	NA	2.5YR 4/3
395		SAME	0ppm PID	NS	NS	NA	2.5YR 4/3
400		SAME	0ppm PID	NS	NS	NA	SAME
405		SAME FINE TO COARSE	0ppm PID	NS	NS	NA	SAME
410		SAME FINE TO MED	0ppm PID	NS	NS	NA	SAME
415		SAME TO ≈ 419 FT	0ppm PID	NS	NS	NA	SAME
420	419-	SILTSTONE, VERY HARD NOT WEATHERED FRIABLE	0ppm PID	NS	NS	NA	2.5YR 4/3 1-20mm

HTW DRILLING LOG

PROJECT: H/A - Middletown

INSPECTOR: Carl Pridge / C. Solomon

HOLE NO.: ERM-26D

SHEET 4 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
425		SILTSTONE, VERY HARD FRIABLE NOT WEATHERED	0ppm PID	NS	NS	NA	254/R 4/3 1-2 drill
430		SILTY SANDSTONE/(WACKE) VERY FINE TO FINE GRAIN UNWEATHERED FRIABLE	0ppm PID	NS	NS	NA	SAME
435		SAME	0ppm PID	NS	NS	NA	SAME
440		SAME	0ppm PID				Same
445		SAME	0 ppm PID				Same
		C. Solomon logs from 450' bgs					
450		Silty Sandstone very fine grain, subrounded unweathered	0 ppm PID				Same
455		same	0PPM PID				SAME
460		SAME	0PPM PID				SAME
465		SAME	0PPM PID				SAME

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.
HIA - Middletown	C. Salomon	ERM-26D
		SHEET 12 of 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	470	SAME	0 ppm PID	NA	NA	NA	2-5 YR 4/3 1 to 10 mm
	475	SAME	0 ppm PID				SAME
	480	SAME	0 ppm PID				SAME
	485	SAME large broken pieces. Drilling went very quickly from 480 to 485. Possible fracture zone	0 ppm PID				SAME 5 to 50 mm
	490	SAME smaller pieces Harder drilling	0 ppm PID				SAME 1 to 10 mm
	495	SAME	0 ppm PID				SAME
	500	SAME	0 ppm PID				SAME
	505	SAME	0 ppm PID				SAME
	510	siltstone ~~slight~~ highly calc Unweathered Hard	0 ppm PID				SAME

HTW DRILLING LOG

PROJECT: HIA - Middletown
INSPECTOR: C. Salomon
HOLE NO. ERM-26D
SHEET 13 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	515	SAME	0 PPM PID	NA	NA	NA	SAME
	520	Silty Sandstone/(wacke) very fine Grain quartz & dolomite clasts	0 PPM PID				2.5YR 4/3 1 to 10MM
	525	Same	0 PPM PID				SAME
	530	SAME	0 PPM PID				SAME
	535	SAME	0 PPM PID				SAME
	540	SAME	0 PPM PID				SAME
	545	SAME	0 PPM PID				SAME
	550	SAME	0 PPM PID				SAME
	555	SAME	0 PPM PID				SAME

PROJECT: HIA - Middletown
CBS 12/20/94
HOLE NO. ERM-26D

HTW DRILLING LOG

PROJECT: H/A-Middletown
INSPECTOR: C. Salomon
HOLE NO. ERM-26D
SHEET 14 OF 15 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	560	SAME	0 PPM PID	NA	NA	NA	SAME
	565	SAME	0 PPM PID				SAME
	570	SAME	0 PPM PID				SAME
	575	SAME	0 PPM PID				SAME
	580	SAME	0 PPM PID				SAME
	585	SAME	0 PPM PID				SAME
	590	SAME	0 PPM PID				SAME
	595						
	~~600~~ 602'	END of Boring					

JFH

PROJECT: H/A-Middletown
HOLE NO. ERM-26D

Figure 4-1 (Continued)

HTW DRILLING LOG

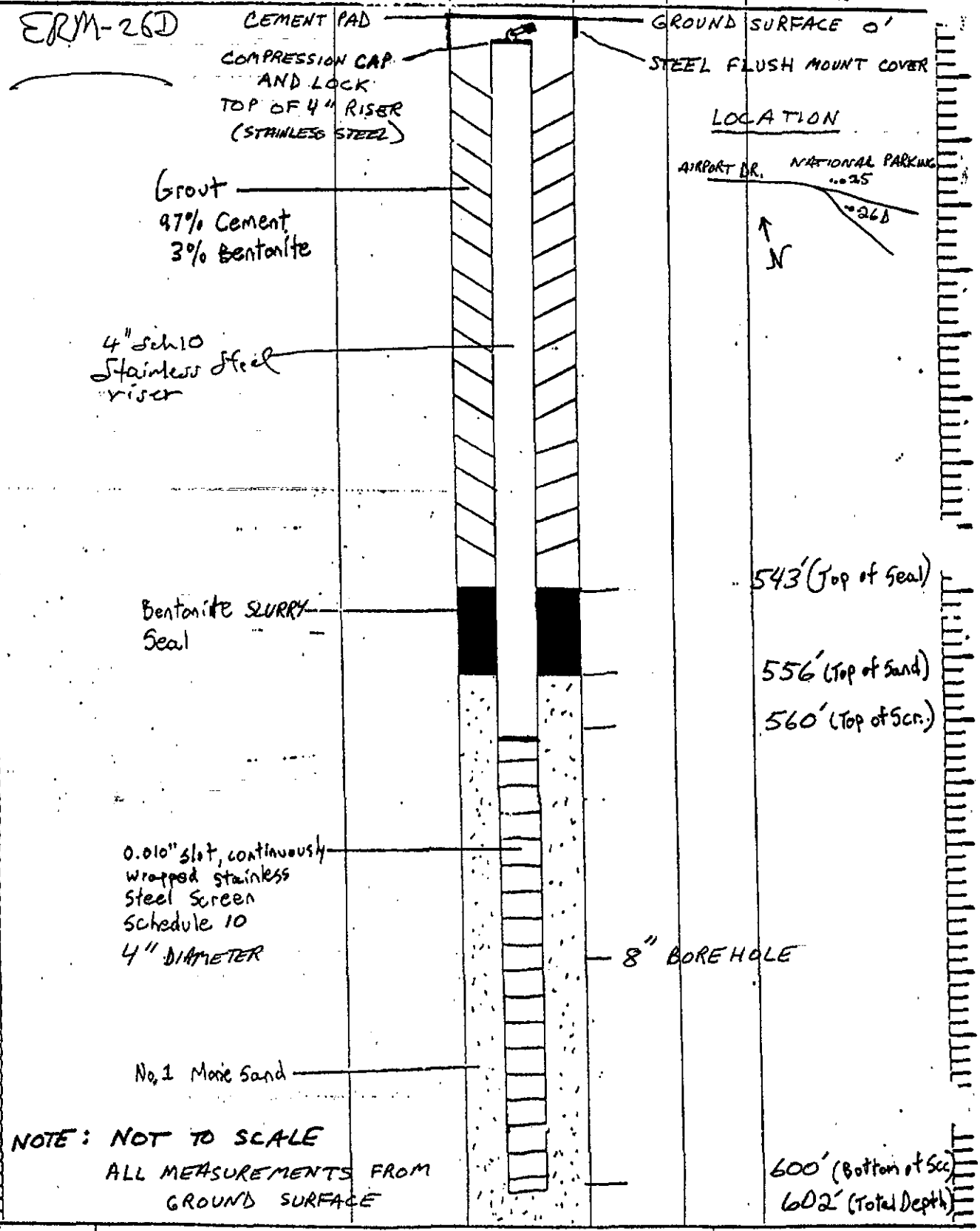
HOLE NO. ERM-26D

PROJECT: HIA, Middletown

INSPECTOR: DEREK EVANS

SHEET 15 OF 15 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	BOTTOM SAMPLE or CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS



PROJECT: HIA, Middletown

HOLE NO. ERM-26D

Runway Wells

HTW DRILLING LOG

HOLE NO. ERM-18S

1. COMPANY NAME	ERM PMAC
2. DRILLING SUBCONTRACTOR	ADT-MA
SHEET 1 OF 3 SHEETS	
3. PROJECT	HIA-MIDDLETOWN
4. LOCATION	HIA-MIDDLETOWN PA
5. NAME OF DRILLER	TOM BROWN / JOHN BOWDS
6. MANUFACTURER'S DESIGNATION OF DRILL	MOBICE RIG B-59
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT	HSA RIG B-59 3" SPOONS #140 HAMMER 6 1/4" I.D. Augers
8. HOLE LOCATION	ERM-18S
9. SURFACE ELEVATION	UNKNOWN
10. DATE STARTED	7 JUNE 94
11. DATE COMPLETED	8 JUNE 94
12. OVERBURDEN THICKNESS	
15. DEPTH GROUNDWATER ENCOUNTERED	13.25 BGS
13. DEPTH DRILLED INTO ROCK	
16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED	NA
14. TOTAL DEPTH OF HOLE	21 FT BGS
17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)	NA

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
2 Samples	2 Jars		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None	X	X	X			— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
ERM-18S Well Installed		X		Carl Ridge

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0 1	VERY PALE BROWN C SILT W/SAND MED-COARSE 0-0.5 DRY GRAVEL WELL GRADED W/SILT AND SAND DRY 0.5-1.9 1/8-1 1/4-INCH WELL ROUNDED	0.0ppm PID	NONE / 0-0.5'	NONE	13-45 43-40	10YR, 7/4 GW-GM RECOVERY 1.9 FT 3-INCH SPOON
	2	2.0-2.8 SAME AS (0.5-1.9 FT) 2.8-~~4.3~~ 3.3 DAMP SP-SM ~~4.3-4.7~~ DAMP SW-SM 3.3-3.7 3.7-3.8 DAMP SP-SM	0.0ppm PID	YES UPPER 0.8 FT DRY	NONE	12-17 15-13	10YR, 7/4 GW-GM REC. 1.8 3-INCH SPOON 10YR, 4/2 2.8-3.8 FT
	4	4.0-4.6 WELL GRADED SAND W/SILT MED-COARSE DAMP 4.6-5.5 POORLY GRADED GRAVEL DAMP W/SAND MED-COARSE 1/4 TO 1-INCH WELL ROUNDED	0.0ppm PID	NO		11-19 20-22	SW-SM 10YR/4/2 4.0-4.6 ~~WGA~~ GW 4.6-5.5

PROJECT: HIA-MIDDLETOWN

HOLE NO. ERM-18S

HTW DRILLING LOG

HOLE NO. ERM-18S

PROJECT HIA-MIDDLETOWN | INSPECTOR CARL PIDAL | SHEET 2 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
							10YR, 4/2
	6	6-6.7 ~~GP~~ GW SAME AS DAME 4.6-5.5 FT BGS	0.0 ppm PID			27-15 19-22 REC 1.8 FT	10YR, 4/2 1.8 FT REC
		6.7-7.8 SW-SM SAME AS 4.0-4.6 FT BGS INCREASED WETNESS AT 6.7 FT BGS	~~ND~~	NO	NO		
	8	8-9 ~~GP~~ GW 1/4 TO 2-INCH WELL ROUNDED MED TO COARSE TRACE SILT	0.0 ppm PID	NO	NO	9-7 5-6	10YR, 4/2 1 FOOT RECOVERY
		10-11.3 SAME GW AS 8-9 FT BGS 2.5-INCH TO 1/4 INCH TRACE SILT	0.0 ppm PID	NO	NO	11-13 58-38	10YR 4/2 1.3 FT REC
		15-17 GW SAME 2.5 TO 1/4-INCH WELL ROUNDED GRAVEL MED TO COARSE TRACE SILT	0.0 ppm PID	YES WET	NO	67-100 87-63	10 YR 3/2 2.0 FT REC.

HTW DRILLING LOG

HOLE NO. ERM-18S

PROJECT HIA-MIDDLETOWN | INSPECTOR CARL PIDLE | SHEET 3 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
19		DUSKY RED GW WELL GRADED GRAVEL WITH SAND FINE TO COARSE TRACE SILT GRAVEL 1/4-2.5 INCH WELL ROUNDED	0.0 ppm PID	NO	NO	17-45 100/0.2'	2.5YR 3/2 0.9 FT RECOVERY
21		TERMINAL DEPTH 21 FT BGS					

SCREEN 10.5 TO 20.5 FT BGS
SAND 8 TO 21 FT BGS
BENT 4.7 TO 6.8 FT BGS
GROUT 1.5 TO 4.7 FT BGS

HTW DRILLING LOG

HOLE NO. ERM-18S

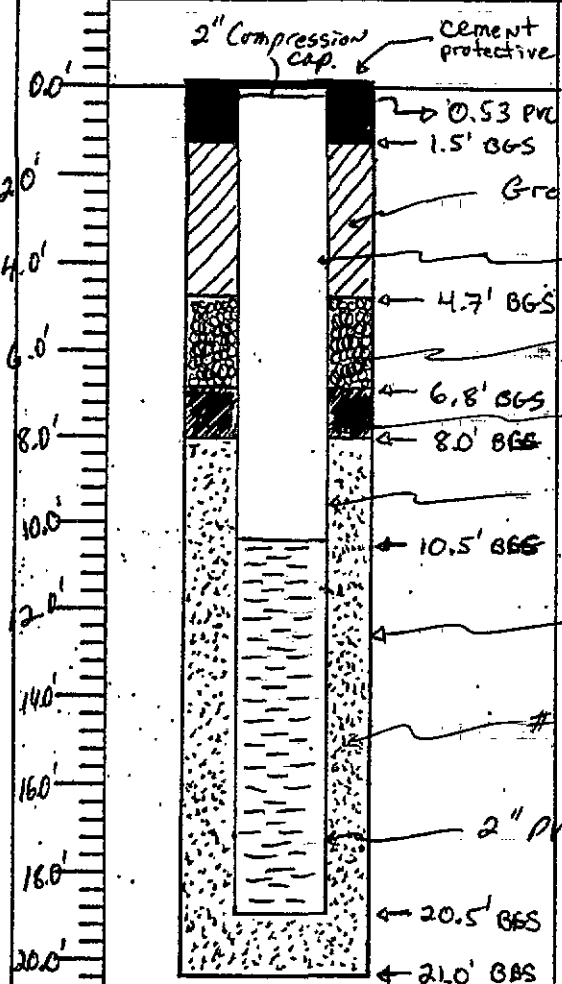
PROJECT HIA Middletown

INSPECTOR Carl Pidge

SHEET 1 OF 1 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.

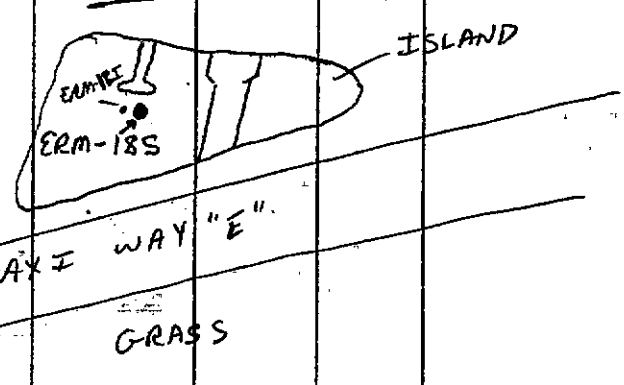
ERM-18S
Well Construction Diagram



ADA
Air Carrier
Apron

N

Well Location



Note:
Not to scale
BGS = Below Ground Surface

PROJECT HIA - Middletown

HOLE NO. ERM-18S

HTW DRILLING LOG

HOLE NO. ERM-18I

1. COMPANY NAME: ERM	2. DRILLING SUBCONTRACTOR: Hydrogroup
SHEET 1 OF 5 SHEETS	
3. PROJECT: HIA - Middletown	4. LOCATION: Middletown, PA
5. NAME OF DRILLER: Steve Blair	6. MANUFACTURER'S DESIGNATION OF DRILL: Barber
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 12" casing advanced to 39' BGS; 8" casing advanced to 102' BGS; all casings were temporary.	8. HOLE LOCATION: Runway Area - grassy Island.
	9. SURFACE ELEVATION:
	10. DATE STARTED: 2/14/95 — 11. DATE COMPLETED: 2/17/95
12. OVERBURDEN THICKNESS: ≈25'	15. DEPTH GROUNDWATER ENCOUNTERED: ≈15' BGS
13. DEPTH DRILLED INTO ROCK: ≈97.5'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED:
14. TOTAL DEPTH OF HOLE: 122.5' BGS	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY):

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
	/	/	/

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %
	/	/	/	/	/	/	

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Built well ERM-18I	/	/	/	L. Haden

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0	Dark reddish brown poorly graded Sand w/ silt. Gravel <15% Clay and organics <15% - loose - Sand is subrounded	0.5 ppm @ ≈2'				5YR, 3/2 SP-SM
	5	Well Graded Gravel (River gravel) Sand <15% Gravel is subrounded to round Gravel Size: 5-40 mm Sand <15% (Coarse-subangular)	0.2 ppm @ ≈8'				GW Varying colors: (white, black, gray, orange, red, pink, brown)
	10		1.1 ppm @ ≈13'				
	15		0.7 ppm @ ≈17'				
	20		0.2 ppm @ ≈23'				
	25						

JFH 4/3/95

PROJECT: HIA - Middletown

HOLE NO. ERM-18I

HTW DRILLING LOG

HOLE NO. ERM-18I

PROJECT: HIA - Middletown

INSPECTOR: D. Haller

SHEET 2 OF 5 SHEETS

ELEV. b.	DEPTH a.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	25	Weak red calcareous or dolomitic fine to medium SILTY SANDSTONE (WACKE)	0.0 ppm @ ≈27'	(Hit bedrock @ ≈25' 1365)			(2.5YR, 4/2) cuttings; 1-25mm
		-Moderately hard					
	30	-Slightly weathered					
		-Sand is subangular/subround	0.0 ppm @ ≈33'				cuttings; 1-40mm
		-cuttings; subangular					
	35		0.0 ppm @ ≈37'				cuttings; 1-30mm
	40	Weak Red Calcareous or dolomitic SILTSTONE					(10 YR, 4/3)
		-unweathered.	0.0 ppm @ ≈43'				cuttings; 1-30mm
		-Moderately hard to hard					
	45	-No notable carbonate clasts > silt sized.					
		-cuttings; subangular	0.0 ppm @ ≈47'				cuttings; 1-25mm
	50	Trace 1-3mm dolomite clasts in 53' sample.	0.0 ppm @ ≈53'				cuttings; 1-25mm
	55		0.0 ppm @ ≈57'				cuttings; 1-20mm
	60	Weak red calcareous or dolomitic fine grained SILTY SANDSTONE (WACKE)	0.0 ppm @ ≈63'				(10 YR, 5/3) cuttings; 1-25mm
		-Hard					
		-Unweathered					
		-No notable carbonate clasts					
	65	-cuttings; subangular/subround					
		(Note: Started producing water @ ≈65' (≈1000-1500 gallons/100' run)	0.0 ppm @ ≈67'				cuttings; 1-30mm
		(Trace 1-7mm dolomite clasts in the 67' sample.)					
	70	Weak red notably ~~supported~~ SANDY OREGOLITH. Hard, Unweathered	0.0 ppm @ ≈73'				(10YR, 5/3) cuttings; 1-05mm
		-Matrix; fine-medium subround sand					

HTW DRILLING LOG

PROJECT	INSPECTOR	HOLE NO.	SHEET
HIA - Middletown	D. Haller	ERM-18I	3 OF 5 SHEETS

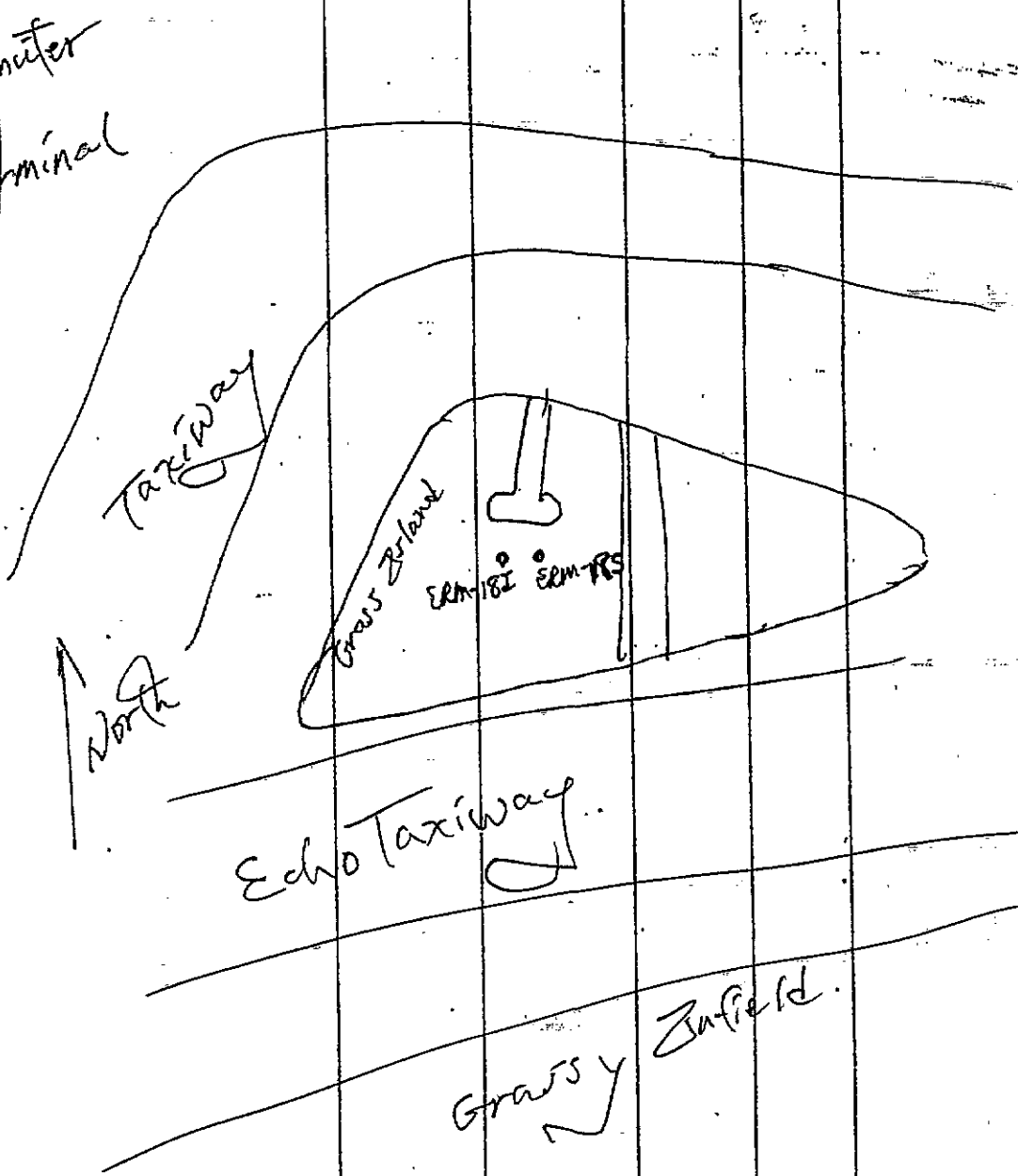
ELEV. b	DEPTH D.	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
		clasts; fine gravel → subangular and some gravel sized carbonate clasts.					
	75	cuttings: subangular					
		weak red calcareous or dolomitic SILTSTONE, Trace 1-5 mm dolomite clasts. Hard. Unweathered except slight discoloration on dolomite clasts	0.0 ppm ⊙ ≈77'				2.5YR, 4/2 cuttings: 1-20mm
		- cuttings: Subangular.					
	80		0.0 ppm ⊙ ≈83'				cuttings; 1-20mm
	85	(Increase in H_2O production ⊙ ≈ 89')	0.0 ppm ⊙ ≈87'				cuttings: ~~1-15mm~~ 1-65mm
	90		0.0 ppm ⊙ ≈93'				cuttings; 1-35mm
	95	weak red calcareous or dolomitic fine grained SILTY SANDSTONE (WACKE)	0.0 ppm ⊙ ≈97'				2.5YR, 5/3 cuttings; 1-25mm
		- Hard					
	100	- Unweathered					
		- Trace 1-4mm dolomite clasts					
		- Cuttings; Subangular	0.0 ppm ⊙ ≈103'				cuttings: 1-15mm
	105		0.0 ppm ⊙ ≈107'				cuttings: 1-15mm
	110	weak red calcareous or dolomitic SILTSTONE. Trace 1-4mm dolomite clasts. Hard.	0.0 ppm ⊙ ≈113'				2.5YR, 4/2 cuttings; 1-20mm
		- Unweathered.					
	115	- Cuttings; Subangular					
		weak red calcareous or dolomitic fine grained SILTY SANDSTONE (WACKE)					2.5YR, 5/3
		- Hard. Unweathered	0.0 ppm ⊙ ≈117'				cuttings: 1-15mm
		- Trace 1-4mm dolomite clasts					
	120	- cuttings: Subangular					

HTW DRILLING LOG

HOLE NO. ERM-18I

PROJECT: HIA - Middletown | INSPECTOR: D. Haller | SHEET 4 OF 5 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
		Boring terminated @ 122.5' BGS					
	125	12" casing advanced to 39' BGS } temporary casings					
		8" casing advanced to 102' BGS }					
		Injection water total ≈ 700 gallons					



PROJECT: HIA - Middletown | HOLE NO. ERM-18I

Figure 4-1 (Continued)

HTW DRILLING LOG

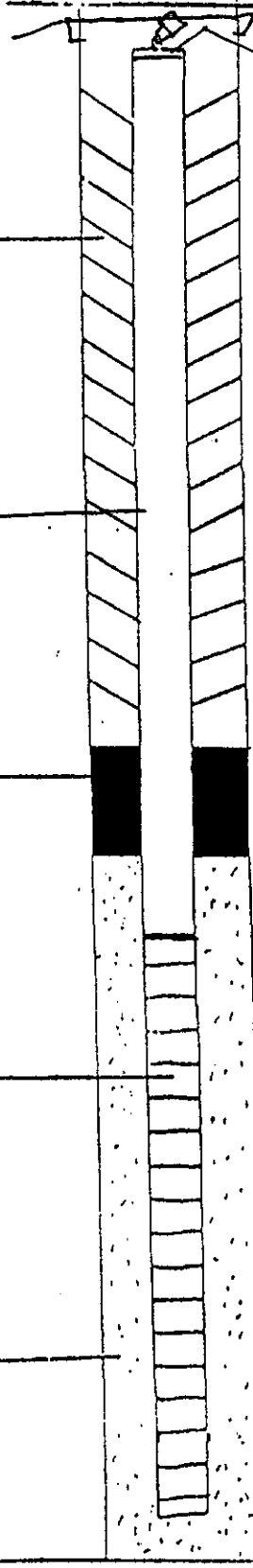
HOLE NO. ERM-18I

PROJECT HIA, Middletown

INSPECTOR D. Haller

SHEET 5 OF 5 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE C- CORE BOX NO	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS



93.5' (Top of Seal)

97.0 (Top of Sand)

100.0 (Top of Scr.)

120.0 (Bottom of Scr.)

122.5' (Total Depth)

PROJECT HIA, Middletown

HOLE NO. ERM-18I

HTW DRILLING LOG

HOLE NO. ERM-19S

1. COMPANY NAME: ERM-PMC	2. DRILLING SUBCONTRACTOR: ADT-MA TRENTON NJ
SHEET 1 OF 3 SHEETS	
3. PROJECT: HIA-MIDDLETOWN	4. LOCATION: HIA-MIDDLETOWN PA
5. NAME OF DRILLER: Tom Brown	6. MANUFACTURER'S DESIGNATION OF DRILL: B-59
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: HSA 6.25 ID; 3" SPOONS; #140 HAMMER	8. HOLE LOCATION: OFF ECHO TAXIWAY IN GRASS INFIELD
	9. SURFACE ELEVATION: Unknown
	10. DATE STARTED: 8 JUNE 94
	11. DATE COMPLETED: 9 JUNE 94
12. OVERBURDEN THICKNESS: ~~21'~~ 19.5' JFH	15. DEPTH GROUNDWATER ENCOUNTERED: 13.0'
13. DEPTH DRILLED INTO ROCK: Bedrock not encountered	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA
14. TOTAL DEPTH OF HOLE: ~~21'~~ 19.5' JFH	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
2 Samples	2 Jars		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None						— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
Well Installed		✗		Carl Ridge (WF)

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
0		0-0.6 SW-SM VERY FINE TO FINE WITH SILT		NO PID 0.0ppm	NO	14-40 28-18 REC 1.6FT	10YR ~~5/6~~ 3/3 0-0.6 FT
1		0.6-1.6 SW-SM VF TO FINE TRACE SILT DRY				3-inch SPOON	10YR/5/6 0.6-1.6FT
2		2-4 SW-SM VF TO MED SAND TRACE SILT		~~NO~~ PID 0.0 ppm YO 3-4 ft "DRY"	NO	REC 2.0FT 3" SPOON	2-3.5 10YR 5/6 3.5-4.0 10YR 2/1 AND 10YR 5/4 LAMINATIONS
4		4-6 SAME AS 2-4		NO 0.0 ppm PID	NO	REC 2.0 3" SPOON	10YR 5/6
4 cont							

PROJECT: HIA-MIDDLETOWN

HOLE NO. ERM-19S

HTW DRILLING LOG

HOLE NO. ERM-19S

PROJECT HIA-MIDDLETOWN

INSPECTOR Cam Plowe

SHEET 2 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	5	SW-SM SAND VERY FINE TO MEDIUM TRACE SILT DMC	0.0 ppm PID	NO	NO		10YR 5/6
	6	6-6.8 SP-SM VERY FINE SAND AND SILT 6.8-8.0 SW-SM FINE TO COARSE TRACE SILT DMC	0.0 ppm PID	NO	NO	8-8 8-8 REC 2.0FT	6-6.8 10YR 5/6 6.8-8.0 10YR 5/6
	7						
	8	8-8.6 SAME AS 6.8-8.0 8.6-10 SAME AS 6-6.8FT	0.0 ppm PID	NO	NO	10-12 7-7 REC 2FT	10YR/5/6 8-9.4 9.4-10 10YR 5/8
	9	WET ≈ 9.8FT BGS					
	10	10-12 SW-SM FINE TO COARSE TRACE SILT WET	0.0 ppm PID	NO	NO	13-8 10-8 REC 1.1FT	10YR 4/4
	12-15 NO SAMPLE augered interval						

PROJECT HIA-MIDDLETOWN HOLE NO. ERM-19S

HTW DRILLING LOG

HOLE NO. ERM-19S

PROJECT HIA - MIDDLETOWN | INSPECTOR CARL PIDGE | SHEET 3 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	15	GW WELL GRADED GRAVEL WITH SAND GRAVEL 1/4 - 1 INCH WELL ROUNDED SAND TRACE SILT MED TO COARSE SPOON VERY WET NOTE: PRIOR TO DRILLING 15-17FT SPOON WITH AUGERS AT 15FT BGS WATER IN ERM-19S TO 11.4FT BGS	0.0 ppm PID	YES 15-16FT BGS WET	NO	8-16 14-14 REC 1.0FT	10YR 4/2
	17	TERMINAL DEPTH 19.5 FT BGS SCREEN 9-19FT BGS SAND 6.8-19.5FT BGS BENT 4.3 - 6.8FT BGS GROUT 1.5 - 4.3 FT BGS					

HTW DRILLING LOG

HOLE NO. ERM-19S

PROJECT: MIDDLETOWN AT HIA

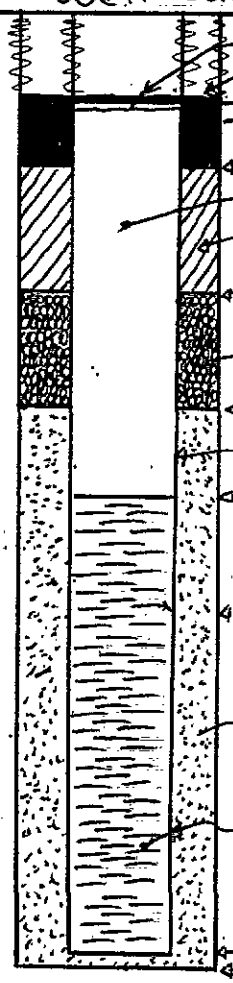
INSPECTOR: CARL PIDGE

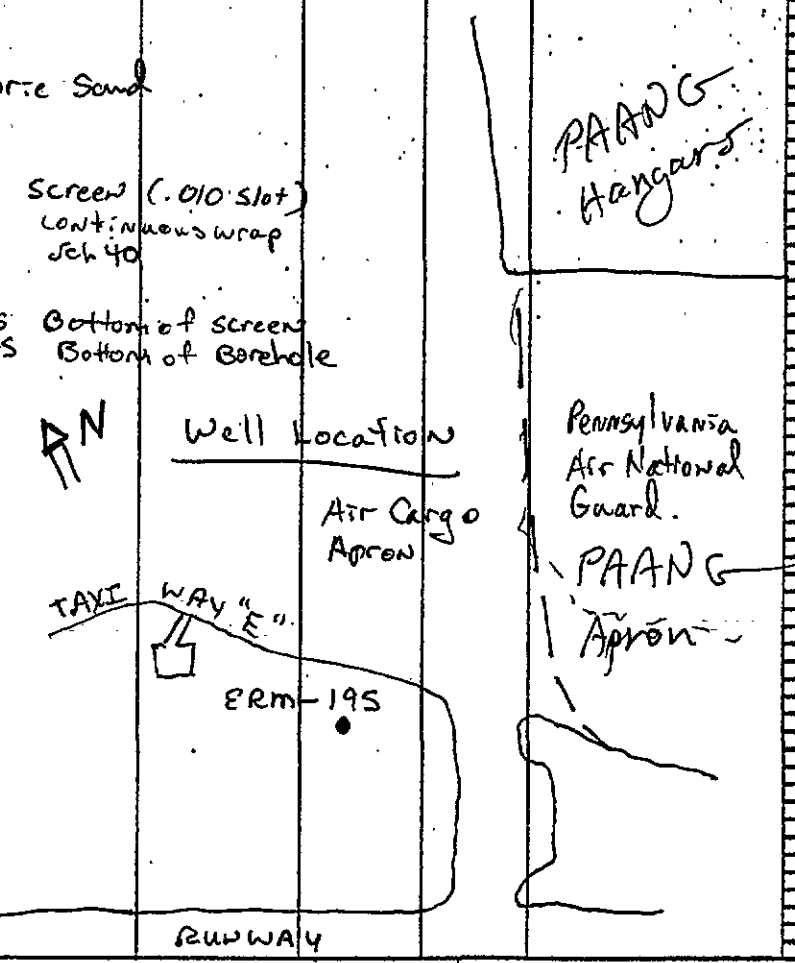
SHEET 1 OF 1 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.

ERM-19S

Well Construction Diagram





Note:
Not to Scale
BGS- Below Ground Surface

PROJECT: HIA - MIDDLETOWN

HOLE NO. ERM-19S

HTW DRILLING LOG

HOLE NO. ERM-20S

1. COMPANY NAME: ERM-PMC	2. DRILLING SUBCONTRACTOR: ADT-MA
SHEET 1 OF 3 SHEETS	
3. PROJECT: HIA-MIDDLETOWN	4. LOCATION: HIA - MIDDLETOWN, PA
5. NAME OF DRILLER: Tom Brown	6. MANUFACTURER'S DESIGNATION OF DRILL: B-59
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: 6.25" HSA, 3-inch spoon, 300# hammer; 6.25 ID HSA, 3-INCH SPOON, #300 HAMMER	8. HOLE LOCATION: SOUTH SIDE OF RUNWAY 31
	9. SURFACE ELEVATION: UNKNOWN
	10. DATE STARTED: 9 JUNE 94 / 11. DATE COMPLETED:
12. OVERBURDEN THICKNESS: >26.0'	15. DEPTH GROUNDWATER ENCOUNTERED: 18.8'
13. DEPTH DRILLED INTO ROCK: Not encountered	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: NA
14. TOTAL DEPTH OF HOLE: 26.0'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY): NA

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES
2 Samples	✓		NA

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY
None						— %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
ERM-20S Well Installed		x		Carl Pidgeon (WE)

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
0	1	0-0.3 SW-SM WELL GRADED SAND w/SILT 0.3-1.5 SW-SM WELL GRADED SAND w/SILT TRACE GRAVEL VFINE TO MED. 2.5YR 4/3	~~0.0~~ air 0.0 ppm PID	NO	NO	7-27 15-32 REC 1.5 FT	3-inch 300# hammer
	2 3	5YR 4/1 GW 2-4 WELL GRADED GRAVEL w/ SAND APPEARS SLAG FILL 1/4 - 2.5 INCH ANGULAR WITH VUGS.	0.0 ppm PID	NO	NO	27-42 22-21 2.0 FT REC	
	4	Same as 2-4H	0.0 ppm PID	YES 4-5 FT DRY	NO	28-18 13-12 REC 1.6 FT	

PROJECT: HIA-MIDDLETOWN | HOLE NO. ERM-20S

HTW DRILLING LOG

HOLE NO. ERM-20S

PROJECT H/A-MIDDLETOWN

INSPECTOR Carl Pidal ERM

SHEET 2 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
		4-6 5YR 4/1 GW SAME AS 2-4 FT					
	6	5YR 4/1 GW SAME 6-8	0.0 ppm PID	NO	NO	10-11 19-22 REC 2.0 FT	DAMP FROM 7.8 FT BGS
	8	8-10 FT SAME GW 5YR/4/1	0.0 ppm PID	NO	NO	57-100/0.3' REC 0.7 FT	DAMP
		NO SPOON 10-15 FT BGS					
	15	15-17 SAME GW 5YR 4/1 APPEARS AS SLAG DAMP	0.0 ppm PID	NO	NO	29-24 26-13 REC 2.0 FT	DAMP
	17						

HTW DRILLING LOG

HOLE NO. ERM-20S

PROJECT HIA-MIDDLETOWN

INSPECTOR CARL PIDGE

SHEET 3 OF 3 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	20	20-21.9 GW SLAG APPEARANCE 5YR 4/1 1/8-2.5 INCH ANGULAR FRAGMENTS WITH FINE TO COARSE SAND	ppm PID	YES "WET" 0905 HRS.	NO	24-26 18-16 1.9 REC FT	
	22						
	23	augered interval					
	24	NO SPOONS					
	25						
	26	TERMINAL BOREHOLE DEPTH 26FT BGS 6.25" HSA SCREEN 15.8 TO 25.8 FT BGS SAND 13 TO 26 FT BGS CAVE 11 TO 13 FT BGS BENT 9 TO 11 FT BGS GROUT 1.5 TO 9 FT BGS					

PROJECT HIA-MIDDLETOWN HOLE NO. ERM-20S

HTW DRILLING LOG

HOLE NO. ERM-20S

PROJECT: HIA - Middletown

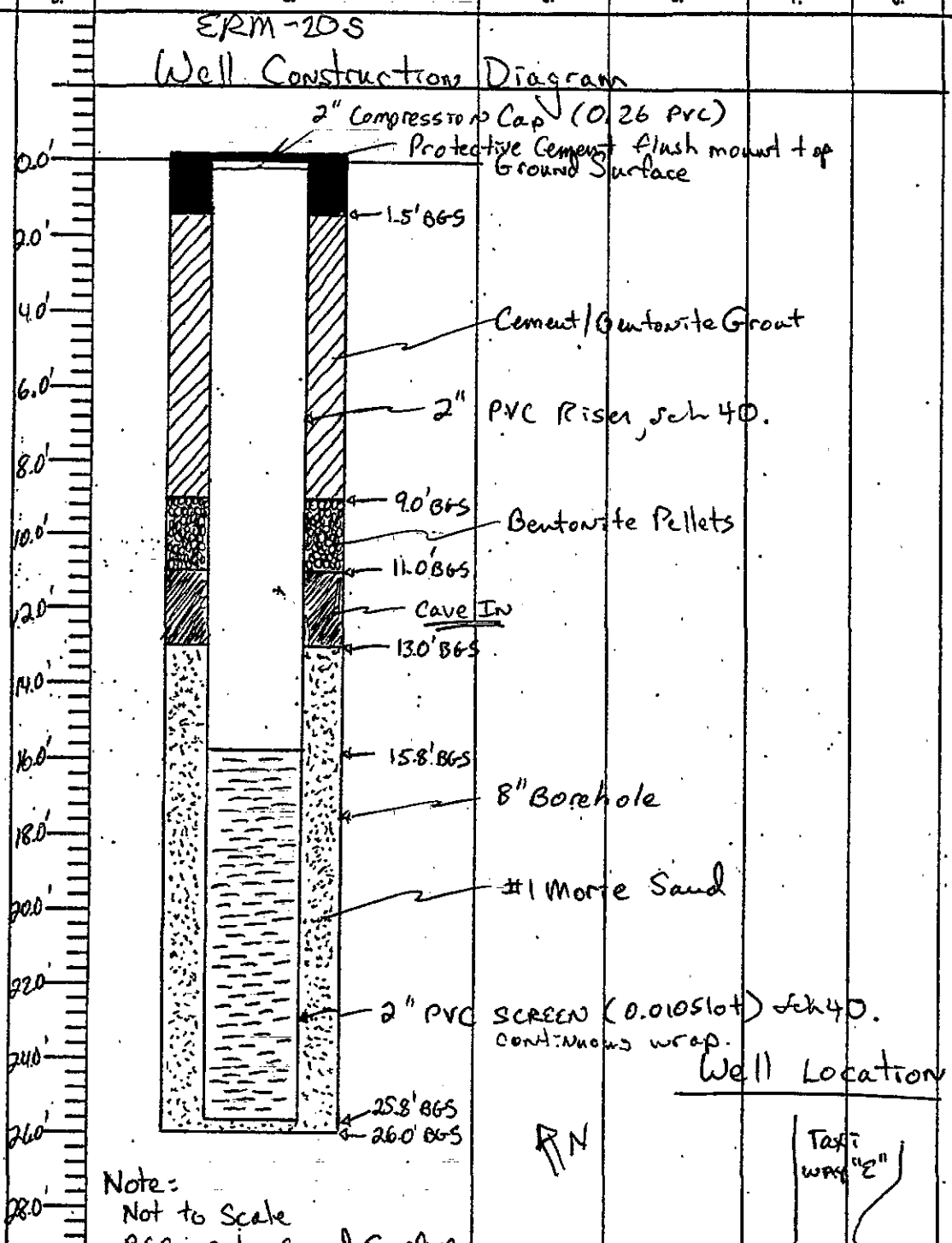
INSPECTOR: Carl Pidge

SHEET 1 OF 1 SHEETS

ELEV. a.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.

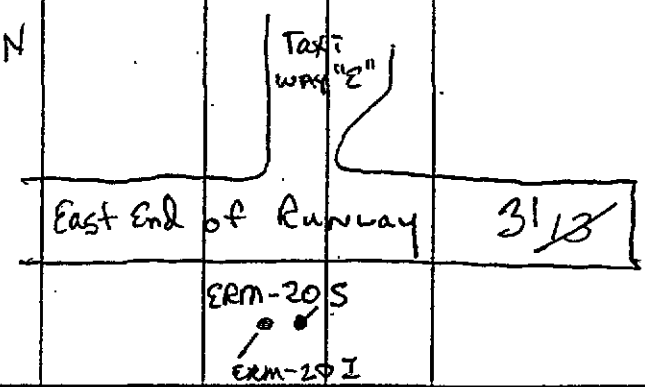
ERM-20S

Well Construction Diagram



Note:
Not to Scale
BGS - Below Ground Surface

Well Location



PROJECT: HIA - Middletown

HOLE NO. ERM-20S

HTW DRILLING LOG

HOLE NO. ERM-20I

1. COMPANY NAME: ERM - PMC	2. DRILLING SUBCONTRACTOR: ADT
SHEET 1 OF 4 SHEETS	
3. PROJECT: HIA - MIDDLETOWN	4. LOCATION: MIDDLETOWN, PA
5. NAME OF DRILLER: TROY BROWN	6. MANUFACTURER'S DESIGNATION OF DRILL: MOBILE DRILL B-59
7. SIZES AND TYPES OF DRILLING AND SAMPLING EQUIPMENT: HSA for rotary casings were temporary.	10 1/4" ID HSA TO 27.5' 6 5/8" ID HSA TO 25' 6" CASING SET TO 27.5' 6" ROLLERBIT TO ~100' 5" CASING SET TO 66.5' 4 7/8" ROLLERBIT TO 123'
8. HOLE LOCATION: RUNWAY	
9. SURFACE ELEVATION: NOT SURVEYED	
10. DATE STARTED: 4/5/95	11. DATE COMPLETED: 4/20/95
12. OVERBURDEN THICKNESS: ~25'	13. DEPTH GROUNDWATER ENCOUNTERED: ~15'
14. DEPTH DRILLED INTO ROCK: ~~27.5~~ ~97'	16. DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED
15. TOTAL DEPTH OF HOLE: 123'	17. OTHER WATER LEVEL MEASUREMENTS (SPECIFY)

18. GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	19. TOTAL NUMBER OF CORE BOXES

20. SAMPLES FOR CHEMICAL ANALYSIS	VOC	METALS	OTHER (SPECIFY)	OTHER (SPECIFY)	OTHER (SPECIFY)	21. TOTAL CORE RECOVERY %

22. DISPOSITION OF HOLE	BACKFILLED	MONITORING WELL	OTHER (SPECIFY)	23. SIGNATURE OF INSPECTOR
		X		Derek Evans

ELEV. a.	DEPTH b (FT)	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS c.	GEOTECH SAMPLE OR CORE BOX NO. e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	0	WELL GRADED SAND W/ GRAVEL FINE TO COARSE SAND FINE TO COARSE, SUBROUNDED TO SUB-ANGULAR GRAVEL (40-45%) TRACE SILT & CLAY DRY, LOOSE (SW)	0.0 PPM @ 3'	NS	NS	NA	10YR 3/4
	5	WELL GRADED GRAVEL W/ SAND FINE TO COARSE, VERY ANGULAR TO SUBANGULAR GRAVEL FINE TO COARSE SAND (GW) LOOSE, DRY	0.5 PPM @ 7.5'				FINES: 10YR 4/2 GRAVEL: 5 BG 5/1 5 TO 35 mm
	10	GRAVEL IS SLAG - FILL MATERIAL SHINY BLUE-GRAY VERY ANGULAR / JAGGED-EDGED TO SUBROUNDED SOME VESSICULAR FORM SOME BLACK, OILY SURFACES	1.7 PPM @ 12.5'				
	15		3.4 PPM @ 17.5'				
	20		3.0 PPM @ 22.5'				
	25						

PROJECT: HIA - MIDDLETOWN

HOLE NO. ERM-20I

HTW DRILLING LOG

HOLE NO. ERM-20I

PROJECT: HIA - MIDDLETOWN

INSPECTOR: D. EVANS

SHEET 2 OF 4 SHEETS

ELEV. b	DEPTH a	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	25'	RED SILTSTONE (BE) HIGHLY WEATHERED SOFT ABUNDANT MICA CALCAREOUS / DOLOMITIC (FIZZES, BUT HIGHLY WEATHERED + MUSSY)	1.9 PPM @ 29'	NS	NS	NA	2.5 YR 4/4 CUTTINGS: SUBANGULAR 2 TO 5 mm
	30'	RED SILTSTONE MODERATELY WEATHERED TO SLIGHTLY WEATHERED MODERATELY HARD ABUNDANT MICA DOLOMITIC	0.8 PPM @ 33'				2.5 YR 4/4 CUTTINGS: SUBANGULAR 2 TO 8 mm
	35'	SLIGHTLY WEATHERED	1.1 PPM @ 38'				2.5 YR 4/3 SUBANGULAR 2 TO 10 mm
	40'	RED SANDY SILTSTONE FINE TO COARSE SAND (20-40%) SLIGHTLY WEATHERED SOFT - MOD. HARD ABUNDANT MICA DOLOMITIC	0.4 PPM @ 43'				2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 TO 10 mm
	45'	RED BRECCIA MATRIX SUPPORTED SLIGHTLY WEATHERED SOFT FINE TO COARSE SAND AND SILT MATRIX DOLOMITIC CLASTS - QUARTZ, DOLOMITE	0.0 PPM @ 48'				MATRIX: 2.5 YR 5/4 CLASTS: ASSORTED COLORS ANGULAR TO SUB-ROUNDED 2 TO 8 mm CUTTINGS: ANGULAR TO SUB-ROUNDED 2 TO 12 mm
	50'		0.0 PPM @ 53'				
	55'		0.0 PPM @ 58'				
	60'	RED SILTY FINE TO MOD GRAINED SANDSTONE (WACKE) SLIGHTLY WEATHERED SOFT TO MOD. HARD LESS THAN 15% SILT	0.0 PPM @ 63'				2.5 YR 5/3 CUTTINGS: SUBROUNDED 2 TO 12 mm
	65'	RED BRECCIA SAME AS 45'-60' INTERVAL	0.0 PPM @ 68'				
	70'						

PROJECT: HIA-MIDDLETOWN

HOLE NO. ERM-20I

HTW DRILLING LOG

HOLE NO. ERM-20I

PROJECT: HIA - MIDDLETOWN

INSPECTOR: D. EVANS

SHEET 3 OF 4 SHEETS

ELEV. b.	DEPTH b.	DESCRIPTION OF MATERIALS c.	FIELD SCREENING RESULTS d.	GEOTECH SAMPLE OR CORE BOX NO e.	ANALYTICAL SAMPLE NO. f.	BLOW COUNTS g.	REMARKS h.
	70	RED SILTY FINE TO MEDIUM-GRAINED SANDSTONE (WACKE) 25-40% SILT UNWEATHERED MOD HARD DOLOMITIC	0.0 PPM @ 73'	NS	NS	NA	2.5 YR 3/3 CUTTINGS: SUBROUNDED 2 TO 15 mm
	75	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	0.0 PPM @ 78'				2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 TO 20 mm
	80	RED BRECCIA SAME AS 45-60' INTERVAL	0.0 PPM @ 83'				SAME AS 45-60' INTERVAL
	85	RED SILTY FINE TO MEDIUM-GRAINED SANDSTONE (WACKE) UNWEATHERED 25-40% SILT MOD. HARD DOLOMITIC	0.0 PPM @ 88'				2.5 YR 3/3 CUTTINGS: SUBROUNDED 2 TO 10 mm
	90	RED SILTSTONE UNWEATHERED MOD. HARD ABUND. MICA DOLOMITIC	0.0 PPM @ 93'				2.5 YR 3/3 CUTTINGS: SUBANGULAR 2 TO 10 mm
	95	TRACE FINE ~~TO COARSE~~ GRAVEL (DB) (ROUNDED TO SUBANGULAR) SOME DOLOMITE AND CALCITE CHIPS AND DOLOMITE NODULES SOME SMOOTHED SURFACES	0.0 PPM @ 98'				2 TO ~~25~~ 15 mm (DB)
	100	SAME AS ABOVE WITH TRACE (DB) ~~SOME FINE ANGULAR GRAVEL~~ ~~SMOOTHED~~ QUARTZITE GRAVEL (ANGULAR), (FINE)	0.0 PPM @ 103'				2 TO 10 mm
	105	SAME AS ABOVE BUT WITH ONLY TRACE FINE GRAVEL, NO CALCITE OR DOLOMITE	0.0 PPM @ 108'				2 TO 10 mm
	110	SAME AS ABOVE NO GRAVEL CALCAREOUS TO DOLOMITIC SOME SMALL DOLOMITE NODULES	0.0 PPM @ 113'				2 TO 15 mm
	115						

HTW DRILLING LOG

HOLE NO. ERM - 20 I

PROJECT HIA - MIDDLETOWN

INSPECTOR D. EVANS

SHEET 4 OF 4 SHEETS

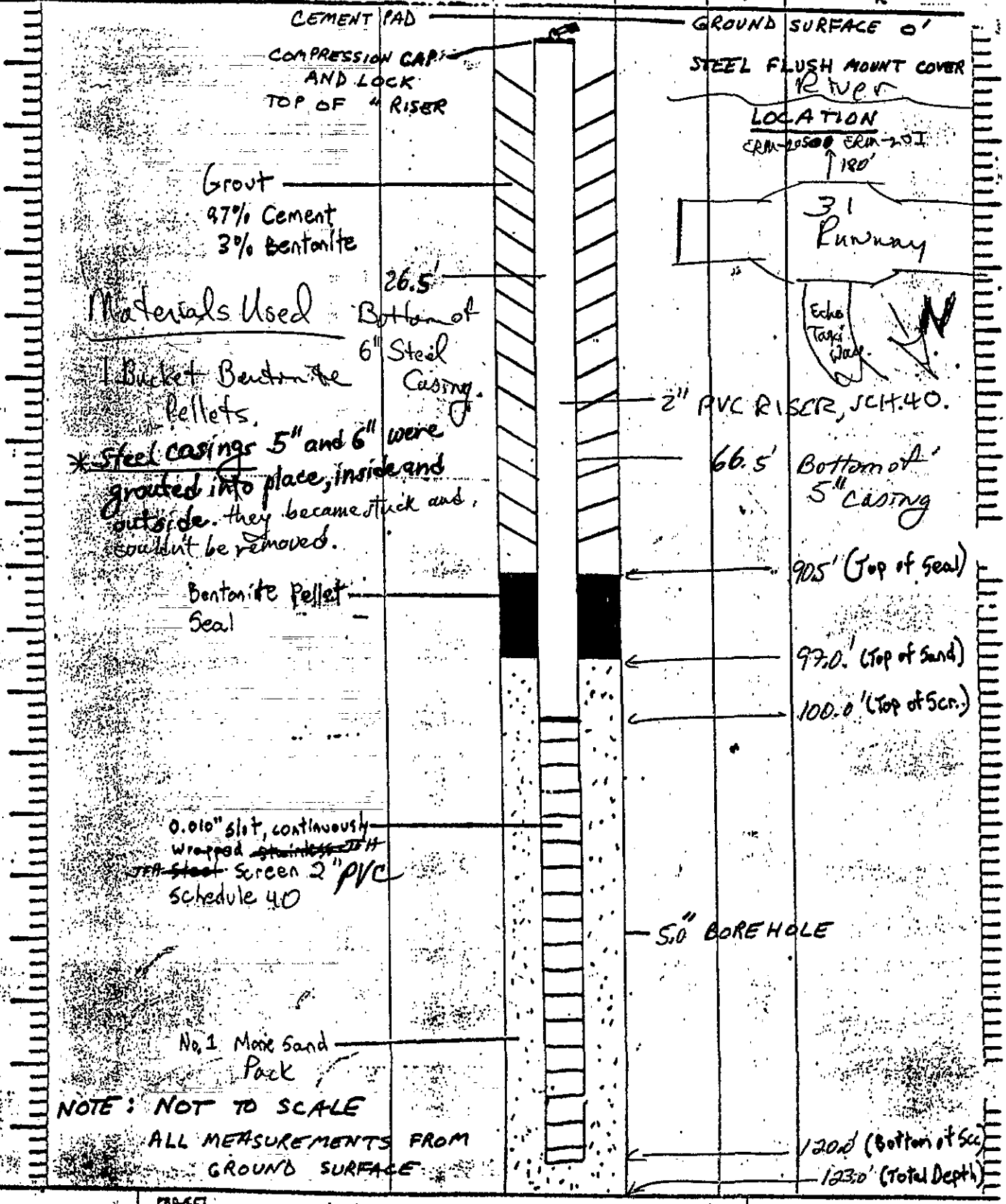
ELEV. L	DEPTH b	DESCRIPTION OF MATERIALS c	FIELD SCREENING RESULTS d	GEOTECH SAMPLE OR CORE BOX NO e	ANALYTICAL SAMPLE NO. f	BLOW COUNTS g	REMARKS h
	115'	RED SILTSTONE UNWEATHERED MOD. HARD ABUNDANT MICA CALCAREOUS	1.3 PPM @ 118'	NS	NS	NA	2.5 YR 3/3 CUTTINGS: 2 TO 15 MM SUBANGULAR
	120'						
	125'	BOTTOM OF HOLE = 123'					

Figure 4-1 (Continued)

HTW DRILLING LOG.

PROJECT	INSPECTOR	HOLE NO.
HIA, Middletown	WARREN FOX / CHRIS EVANS	ERM-20I
		SHEET 1 OF 1 SHEETS

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	FIELD SCREENING RESULTS	GEOTECH SAMPLE & CORE BOX NO.	ANALYTICAL SAMPLE NO.	BLOW COUNTS	REMARKS



PROJECT	HOLE NO.
HIA, Middletown	