85

G-000-301.1

CONSTRUCTION OF THREE DEEP MONITORING WELLS AT THE FERNALD, FEED MATERIALS PRODUCTION CENTER
JUNE 1987

06/30/87

WEST/WMCO
34
REPORT

[redacted]

G-000-0085

Argonne National Laboratory
Argonne, Illinois

Borehole Lithologic and Well Completion Information For:

Construction of Three Deep Monitoring Wells at the Fernald Feed Materials Production Center

June 1987

PROPERTY OF
U.S. DEPT. OF ENERGY
REFERENCE MATERIAL

DO NOT REMOVE

WESTON
MANAGERS DESIGNERS/CONSULTANTS

WELL A

WELL COMPLETION RECORD

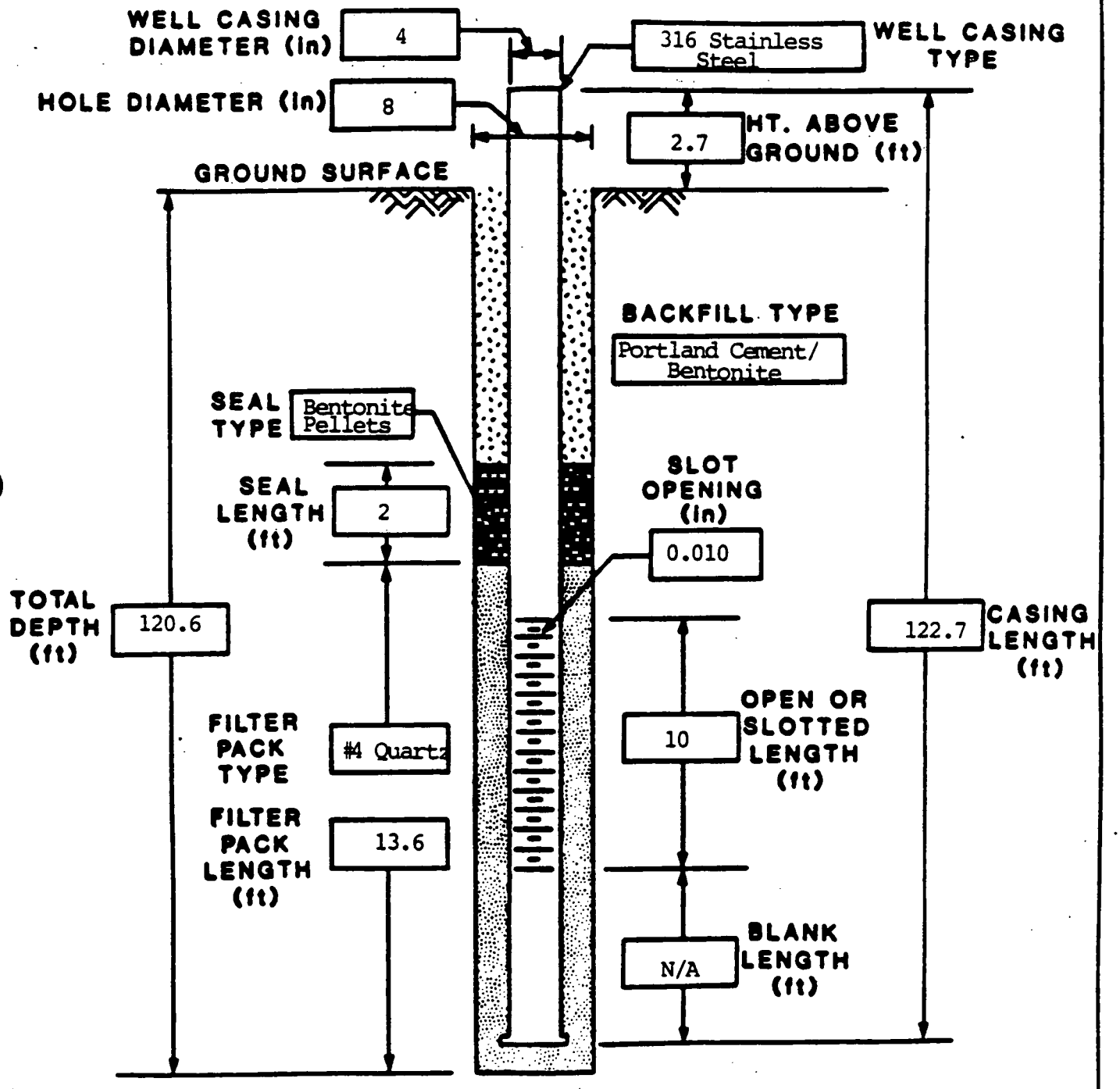
SITE ID: FMPC LOCATION ID: Well A DATE INSTALLED: 25 May 87

APPROX. SITE COORDINATES: (FT.) S 27 + 50.25 E 38; + 40.5

OPEN AREA PER LINEAL FT. ($IN^2/FT.$) N/A

FORMATION OF COMPLETION: Glacial Outwash

FIELD REP.: James Spratt DRILLER: S.C. Patterson



COMMENTS: HT above ground does not represent surveyed elevations.

BOREHOLE/WELL CONSTRUCTION LOG

WESTON

SITE ID: FMPC LOCATION ID: Well A FIELD REP: J. Spratt

APPROX. SITE COORDINATES (FT.): S27 +50.25 E 38 + 40.5

GROUND ELEVATION (FT. MSL): N/A COMPLETION DATE: 25 May 1987

BOREHOLE SUMMARY

DRILLER: S.C. Patterson
Cable Tool

RIG TYPE: Bucyrus Erie 22W

BIT TYPE	HOLE DIA. (in.)	END DEPTH (ft.)	FLUID TYPE
Cable Tool	8	120.6	Potable Water

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END DEPTH (ft.)
P	Steel	10	4
B	316 Stainless Steel	4	112.7
S	Stainless, 0.010 Slot	4	122.7

* P-Protective S-Screen B-Blank O-Open N-None

Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END DEPTH (ft.)
B	Portland Cement/Bentonite	105
S	Bentonite Pellets	107
F	No. 4 Quartz Sand	120.6

* B - Backfill S - Seal F - Filter Pack

Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING	05/23 05/24	0800 0800	1805 1600
CASING	05/24	1630	1700
FILTER PACK	05/24	1700	1730
SEAL	05/24	1730	1800
BACKFILL	05/25	0810	1500
DEVELOPMENT	05/28	1010	1210
OTHER	N/A		

WELL DEVELOPMENT

Surged (4" block) w/2' drop for 45 min.

Overpumped (red jacket CN1100, 1.5 hp, rated 22 gpm) at 20 gpm for 50 min. 1000 gal. removed.

Sand pump (bailer) used for coarser sediments. Well depth: before: 120.6, after 120.6

COMMENTS: Static water level, 05/25, 54.33 feet below top of casing.

BOREHOLE AND TEST PIT SUMMARY

SITE ID: FMPC
LOCATION ID: Well A
LOCATION COORDINATES:
S 27 + 50.25
E 38 + 40.5
GROUND ELEVATION (FT. MSL): NK

BH-BOREHOLE/TP-TEST PIT: BH
DRILLER/EXCAVATOR: Bowser Morner
COMPLETION DATE: 25 May 1987
BOREHOLE DIAMETER (IN): 8
TOTAL DEPTH (FT.): 120.6

WELL SUMMARY

WELL OWNER:
INSTALLER: WESTON
INSTALLATION DATE: 25 May 1987
CASING ELEV. (FT. MSL): NK
CASING LENGTH (FT.): 122.7
CASING DIA. (IN.): 4
SEAL (END) DEPTH (FT.): 107

FILTER PACK LENGTH (FT.): 13.6
FORMATION OF COMPLETION: Glacial Outwash
STRATIGRAPHIC ORDER: N/A
OPEN/SCREEN DEPTH (FT.): 112.7
OPEN/SCREEN LENGTH (FT.): 10
OPEN/SCREEN AREA (IN.^{2}/FT.): NK
*FLOW RELATIONSHIP: NK

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT.)	UNIFIED SOIL/ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT.)	SAMPLE METHOD	N* VALUE
0							
1							
2	MH		Yellow (10 yr7/6) SILT, clayey	01	2-4	S	NK
3			Dry-moist, cohesive				
4	MH		Yellow (10 yr 7/6-10 yr 4/6)	02	4-6	S	NK
5			SILT ,clayey, dry-moist, cohesive				
6	MH		Yellow (10 yr 7/6) SILT	03	6-8	S	NK
7			clayey, dry-moist, cohesive				
8	MH-CH		Red-gray (7.5 yr 5/6) CLAY	04	8-10	S	NK
9			and CLAY, moist, plastic				
10							

FLOW RELATIONSHIP:
U-Upgradient
D-Downgradient
C-Cross Gradient
O-On Site
N-Not Known

SAMPLE METHODS:
A-Auger Cuttings
S-2" O.D. 1.38" I.D. drive sample
U-3" O.D. 2.42" I.D. tube sample
T-3" O.D. thin-walled Shelby tube
H-6 1/2 Hollow Stem Auger
C-4 1/2 Continous Flight Auger
GB-Gear Bit
NX-NX Rock Coring
NQ-NQ Wireline Rock Coring
B-Undisturbed Block Sample
D-Disturbed Bulk Sample

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N * VALUE
15	MH		Blue-gray (7.5 yr 5/10) SILT,	05	15-17	S	NK
			clayey, little gravel, dry-				
			moist, cohesive				
20	MH		Blue-gray (7.5 yr 5/10)	06	20-22	S	NK
			SILT, clayey, some gravel,				
			dry-moist.				
25	SP		Lt. Brn. (7.5 yr 5/6) med.	07	25-27	S	NK
			SAND, dry.				
30	SP		Lt. brn (7.5 yr 5/6) fn.-med. SAND, dry.	08	30-32	S	NK

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 8 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N * VALUE
35	SP		Lt. brn (7.5 yr 5/6) SAND	09	35-37	S	NK
			fine-med., dry.				
40	SP		Lt. brn. (7.5 yr 5/6, 6/6	10	40-42	S	NK
			SAND, fn.-med., little				
			gravel.				
45	SP		Lt.brn (7.5 yr 5/6) SAND	11	45-47	S	NK
			med., and gravel, trace rock				
			frags., dry.				
50	SP		Lt. brn.(7.5 yr 5/6) SAND	12	50-52	S	NK

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 6 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N* VALUE
			med., and gravel, dry.				
55	SP		Lt. gray (7.5 yr 4/0) SAND,	13	55-57	S	NK
			med.-coarse, and gravel, dry.				
60	SP		Lt. gray (7.5 yr 4/0) SAND,	14	60-62	S	NK
			med.-coarse, trace gravel, wet				
65	SP		Lt. gray (7.5 yr 4/0) SAND	15	65-67	S	NK
			med.-coarse, and gravel, wet				
70	SP		Lt. gray (7.5 yr 4/0) SAND	16	70-72	S	NK

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 6 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N* VALUE
			med-coarse, and gravel, wet				
75	SP		Lt. gray (7.5 yr 4/0) SAND	17	75-77	S	NK
			med.-coarse, and gravel, wet				
80	SP		Lt. gray (7.5 yr 4/0) SAND	18	80-82	S	NK
			med.-coarse, wet				
85							
90	SP		Lt. gray (7.5 yr 4/0) SAND	19	90-92	S	NK

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 6 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N VALUE
			med.-coarse, lit. gravel, wet				
95							
100	SP		Lt. gray (7.5 yr 4/0) SAND	20	100-102	S	NK
			med.-coarse, lit. gravel, wet				
105	SP						
110	SP		Lt. gray (7.5 yr 4/0) SAND	21	110-112	S	NK

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 6 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

WESTON

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N * VALUE
			med, lit. gravel, wet				
115							
	SP		Lt. gray (7.5 yr 4/0-5/0)	22	118-120	S	NK
			SAND, fn-med, lit.gravel,wet				
120			TOTAL DEPTH = 120.6 feet				
			* N value is unreported as				
			ASTM procedure was not				
			followed. Hammer wt. was				
			> 140 pounds.				

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 6 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

WELL B

WELL COMPLETION RECORD

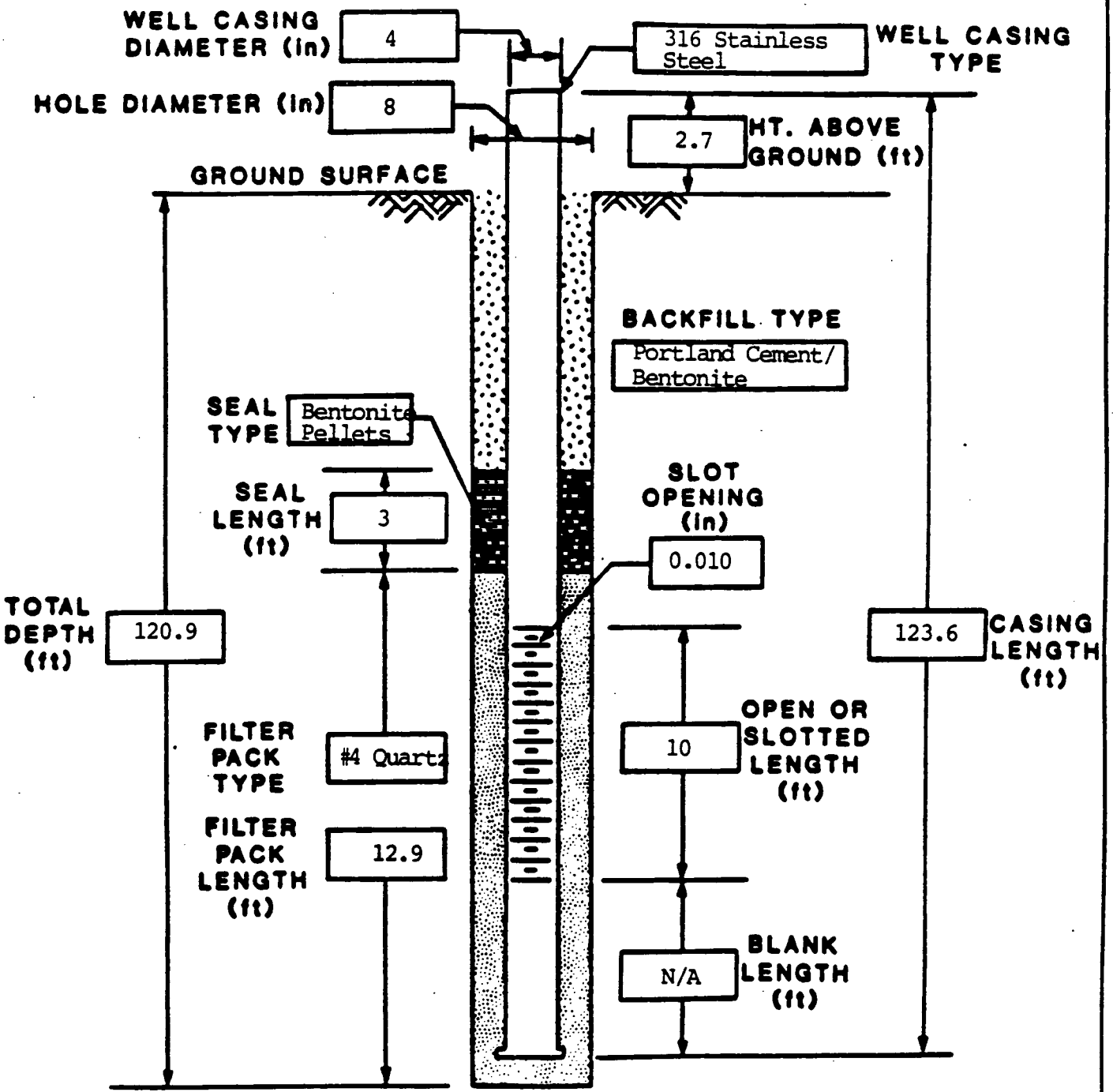
SITE ID: FMPC LOCATION ID: Well B DATE INSTALLED: 21 May 87

APPROX. SITE COORDINATES: (FT.) S 26 + 08.5 E 50 + 18.2

OPEN AREA PER LINEAL FT. ($IN^2/FT.$) N/A

FORMATION OF COMPLETION: Glacial Outwash

FIELD REP.: James Spratt DRILLER: S.C. Patterson



COMMENTS: HT above ground does not represent surveyed elevations.

WESTON

BOREHOLE/WELL CONSTRUCTION LOG

SITE ID: FMPC LOCATION ID: Well B FIELD REP: J. Spratt

APPROX. SITE COORDINATES (FT.): S 26 + 08.5 E 50 + 18.2

GROUND ELEVATION (FT. MSL): N/A COMPLETION DATE: 21 May 1987

BOREHOLE SUMMARY

DRILLER: S.C. Patterson

RIG TYPE: Cable Tool Bucyrus Erie 22W

BIT TYPE	HOLE DIA. (in.)	END DEPTH ● (ft.)	FLUID TYPE
able Tool	8	120.9	Potable Water

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END DEPTH ● (ft.)
P	Steel	10	4
B	316 Stainless Steel	4	113.6
S	Stainless, 0.010 Slot	4	123.6

* P-Protective S-Screen B-Blank O-Open N-None

● Depth from Top of Casing

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING	05/18 05/19 05/20	1445 0815 0810	1740 1810 1345
CASING	05/20	1345	1430
FILTER PACK	05/20	1430	1530
SEAL	05/21	0810	0825
BACKFILL	05/21	0825	1430
DEVELOPMENT	05/27	1010	1250
OTHER	N/A		

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END ● DEPTH (ft.)
B	Portland Cement/Bentonite	105
S	Bentonite Pellets	108
F	No. 4 Quartz Sand	120.9

* B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

WELL DEVELOPMENT

Surged (4" block) w/2' drop, 45 min.

Overpumped (red jacket CN1100, 1.5 hp, rated 22 gpm) at 20 gpm for 50 min, 1000 gal. removed.

Sand pump used for coarser sediments.
Well depth: before: 120.9
after : 120.9

COMMENTS: Static water level, 05/27, 58.15 feet below top of casing .

WESTON

BOREHOLE AND TEST PIT SUMMARY

SITE ID: FMPC
LOCATION ID: Well B
LOCATION COORDINATES:
S 26 + 08.5
E 50 + 18.2
GROUND ELEVATION (FT. MSL):

BH-BOREHOLE/TP-TEST PIT: BH
DRILLER/EXCAVATOR: Bowser Morner
COMPLETION DATE: 21 May 1987
BOREHOLE DIAMETER (IN): 8
TOTAL DEPTH (FT.): 122

WELL SUMMARY

WELL OWNER:
INSTALLER: Weston
INSTALLATION DATE: 21 May 1987
CASING ELEV. (FT. MSL): NK
CASING LENGTH (FT.): 123.6
CASING DIA. (IN.): 4
SEAL (END) DEPTH (FT.): 108

FILTER PACK LENGTH (FT.): 12.9
FORMATION OF COMPLETION: Glacial Outwash
STRATIGRAPHIC ORDER: N/A
OPEN/SCREEN DEPTH (FT.): 112.7
OPEN/SCREEN LENGTH (FT.): 10
OPEN/SCREEN AREA (IN.^{2}/FT.): NK
*FLOW RELATIONSHIP: NK

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT.)	UNIFIED SOIL/ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT.)	SAMPLE METHOD	N* VALUE
1							
2			No Recovery	01	2-4	S	NK
3							
4	MH		Lt. brn. (7.5 yr 6/4) SILT,	02	4-6	S	NK
5			clayey, tr. sand, tr. gravel,	moist			
6	MH		Lt. brn (7.5 yr 6/4) SILT,	03	6-8	S	NK
7			clayey, lit. sand, tr. gravel, moist.				
8	MH		Lt brn (7.5 yr 6/4) SILT,	04	8-10	S	NK
9			clayey, lit. sand, tr. gravel, moist.				
10	ML		Bl-gray (7.5 yr 5/0) SILT,	05	10-12	S	NK
			clayey, trace gravel, dry.				

FLOW RELATIONSHIP:
U-Upgradient
D-Downgradient
C-Cross Gradient
O-On Site
N-Not Known

SAMPLE METHODS:
A-Auger Cuttings
S-2" O.D. 1.38" I.D. drive sample
U-3" O.D. 2.42" I.D. tube sample
T-3" O.D. thin-walled Shelby tube
H-6 1/2 Hollow Stem Auger
C-4 1/2 Continous Flight Auger
GB-Gear Bit
NX-NX Rock Coring
NQ-NQ Wireline Rock Coring
B-Undisturbed Block Sample
D-Disturbed Bulk Sample

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N * VALUE
15	ML		Bl-gray (7.5 yr 5/0) SILT,	06	15-17	S	NK
			clayey, tr. gravel, dry.				
20	ML		Bl-gray (7.5 yr 5/0) SILT,	07	20-22	S	NK
			clayey, tr. gravel, dry.				
25	SP		Lt. brn-gray (5 yr 6/1) SAND	08	25-27	S	NK
			med, some coarse sand, dry.				
30	SP		Lt. brn-gray (5 yr 6/1) SAND,	09	30-32	S	NK
			med-coarse, tr. gravel, dry.				

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE

H - 8 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT

NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N * VALUE
35	SP		Lt. brn-gray (5 yr 6/1) SAND,	10	35-37	S	NK
			med, lit. coarse sand, tr.				
			gravel, dry.				
40	SP		Lt. brn-gray (5 yr 6/1) SAND,	11	40-42	S	NK
			med, tr. gravel, dry.				
45	SP		Lt. brn-gray (5 yr 6/1) SAND,	12	45-47	S	NK
			med-coarse, tr. gravel, dry.				
50	SP		Lt. brn-gray (5 yr 6/1) SAND,	13	50-52	S	NK
			med-coarse, some gravel, dry.				

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 8 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

17

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N * VALUE
55	SP		Lt. brn-gray (5 yr 6/1) SAND,	14	55-57	S	NK
			med-coarse, tr. gravel, dry				
60	SP-GP		Gray (7.5 yr 4/0) SAND and	15	60-62	S	NK
			GRAVEL, med-coarse, wet.				
65	SP		Gray (7.5 yr 4/0) SAND, med.,	16	65-67	S	NK
			trace gravel, wet.				
70	SP		Gray (7.5 yr 4/0) SAND, med.,	17	70-72	S	NK
			wet.				

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 6 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N * VALUE
75	SP		Gray (7.5 yr 4/0) SAND, med-	18	75-77	S	NK
			coarse, lit. gravel, wet.				
80	SP		Gray (7.5 yr 4/0) SAND, med-	19	80-82	S	NK
			coarse, some gravel, wet.				
85	SP		Gray (7.5 yr 4/0) SAND, med-	20	85-87	S	NK
			coarse, wet				
90							

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 6 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N* VALUE
95	SP		Gray (7.5 yr 4/0) SAND, med-	21	95-97	S	NK
			coarse, some gravel, wet.				
100							
105	SP		Gray (7.5 yr 4/0) SAND, med	22	105-107	S	NK
			coarse, some gravel, wet.				
110							

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 6 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N VALUE
115	SP-GP		Gray (7.5 yr 4/0) SAND and	23	115-117	S	NK
			GRAVEL, med-coarse, wet				
120	SP-GP		Gray (7.5 yr 4/0) SAND and	24	120-122	S	NK
			GRAVEL, med, lit. coarse, wet				
			TOTAL DEPTH 122 feet				
			* N value not reported as ASTM procedures were				
			not followed. Hammer weight was > 140 lb.				

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 6 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

WELL C

WELL COMPLETION RECORD

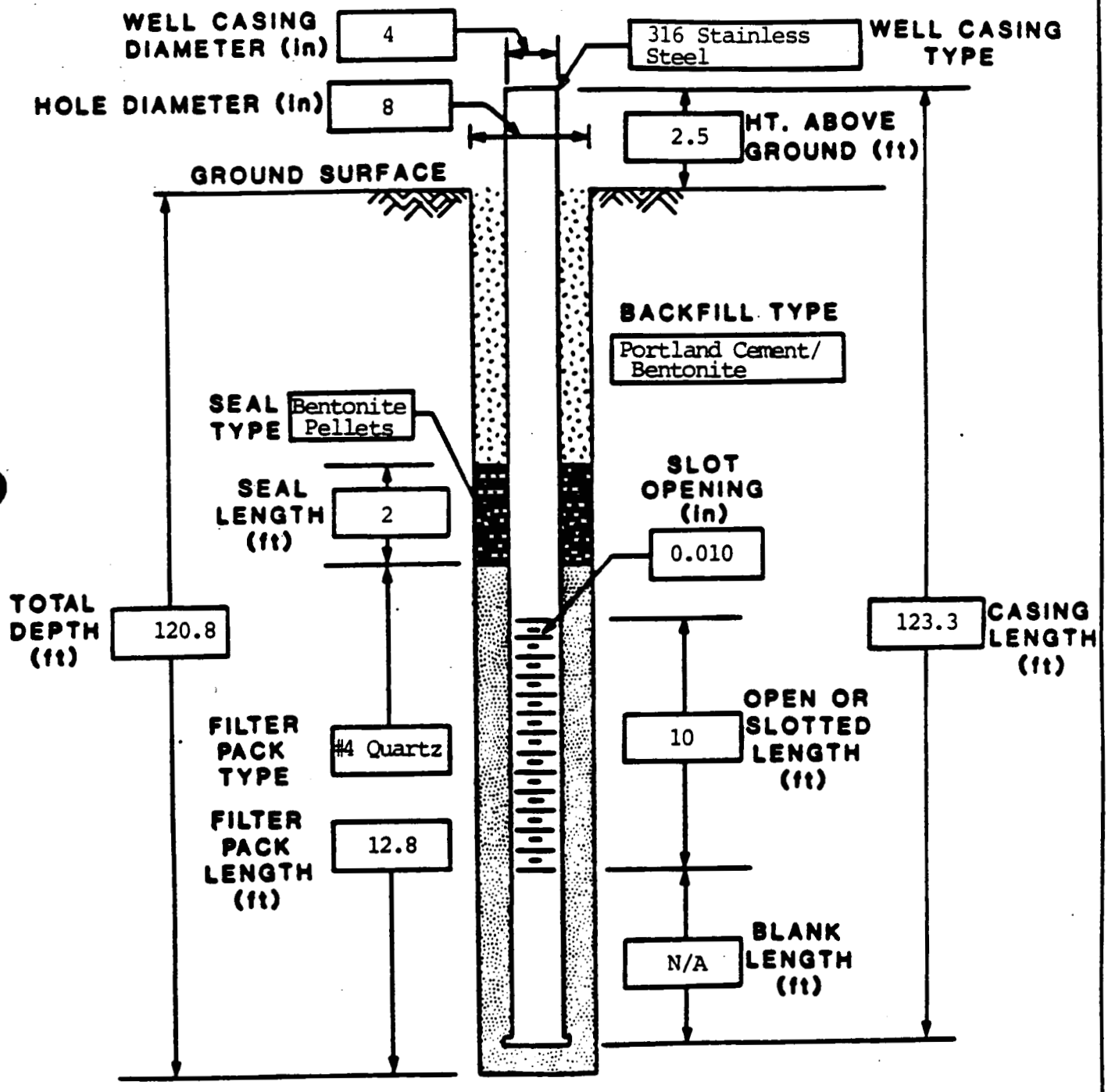
SITE ID: FMPC LOCATION ID: Well C DATE INSTALLED: 14 May 87

APPROX. SITE COORDINATES: (FT.) S 12 + 10 E 41 + 58.5

OPEN AREA PER LINEAL FT. ($IN^2/FT.$) N/A

FORMATION OF COMPLETION: Glacial Outwash

FIELD REP.: James Spratt DRILLER: S.C. Patterson



COMMENTS: HT above ground does not represent surveyed elevations.

WESTON

BOREHOLE/WELL CONSTRUCTION LOG

SITE ID: FMPC LOCATION ID: Well C FIELD REP: J. Spratt

APPROX. SITE COORDINATES (FT.): S 12 + 10 E 41 + 58.5

GROUND ELEVATION (FT. MSL): N/A COMPLETION DATE: 14 May 1987

BOREHOLE SUMMARY

DRILLER: S.C. Patterson

RIG TYPE: Cable Tool Bucyrus Erie 22W

BIT TYPE	HOLE DIA. (in.)	END DEPTH (ft.) ●	FLUID TYPE
able Tool	8	120.8	Potable Water

CASING SUMMARY

CASING TYPE*	DESCRIPTION	DIA. (in.)	END DEPTH (ft.) ●
P	Steel	10	4
B	316 Stainless Steel	4	110.8
S	Stainless Steel 0.010 Slot	4	120.8

* P-Protective S-Screen B-Blank O-Open N-None

● Depth from Top of Casing

WELL CONSTRUCTION

TYPE CODE*	DESCRIPTION	END DEPTH (ft.) ●
B	Portland Cement/Bentonite	106
S	Bentonite Pellets	108
F	No. 4 Quartz Sand	120.8

* B - Backfill S - Seal F - Filter Pack

● Depth from Ground Surface

CONSTRUCTION TIME LOG

ACTIVITY	START DATE	START TIME	END TIME
DRILLING	05/08	1100	1530
	05/11	0810	1530
	05/12	0830	1530
CASING	05/13	0845	0945
FILTER PACK	05/13	0945	1015
SEAL	05/14	0850	0915
BACKFILL	05/14	0915	1630
DEVELOPMENT	05/26	1430	1630
OTHER	N/A		

WELL DEVELOPMENT

Surged (4" block) w/2' drop, 45 min.

Over pumped (red jacket CN1100, 1.5 hp, rated 22 gpm) at 20 gpm for 50 min. 1000 gal removed.

Sand Pump used for coarser sediments.
Well depth: before: 119.9
after : 120.8

COMMENTS:

Static water level, 05/16, 65.5 feet below top of casing.

BOREHOLE AND TEST PIT SUMMARY

SITE ID: FMPC
LOCATION ID: Well C
LOCATION COORDINATES:
S 12 + 10
E 41 + 58.5
GROUND ELEVATION (FT. MSL): NK

BH-BOREHOLE/TP-TEST PIT: BH
DRILLER/EXCAVATOR: Bowser Morner
COMPLETION DATE: 14 May 1987
BOREHOLE DIAMETER (IN): 8
TOTAL DEPTH (FT.): 120.8

WELL SUMMARY

WELL OWNER:
INSTALLER: WESTON
INSTALLATION DATE: 14 May 1987
CASING ELEV. (FT. MSL): NK
CASING LENGTH (FT.): 123.3
CASING DIA. (IN.): 4
SEAL (END) DEPTH (FT.): 108

FILTER PACK LENGTH (FT.): 12.8
FORMATION OF COMPLETION: Glacial Outwash
STRATIGRAPHIC ORDER: N/A
OPEN/SCREEN DEPTH (FT.): 110.8
OPEN/SCREEN LENGTH (FT.): 10
OPEN/SCREEN AREA (IN.^{2}/FT.): NK
*FLOW RELATIONSHIP: NK

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT.)	UNIFIED SOIL/ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT.)	SAMPLE METHOD	N* VALUE
1							
2	ML-SM		Brn.(7.5 yr 4/4) SILT,	01	2-4	S	NK
3			sandy, some clay, dry.				
4	ML-SM		Brn.(7.5 yr 5/6) SILT,	02	4-6	S	NK
5			some clay, some gravel, dry.				
6	ML-SM		Brn-gray (7.5 yr 5/2)	03	6-8	S	NK
7			SILT, sandy, some clay, dry.				
8	ML-SM		Brn.(7.5 yr 4/4) SILT,	04	8-10	S	NK
9			sandy, some clay, dry.				
10							

FLOW RELATIONSHIP:
U-Upgradient
D-Downgradient
C-Cross Gradient
O-On Site
N-Not Known

SAMPLE METHODS:
A-Auger Cuttings
S-2" O.D. 1.38" I.D. drive sample
U-3" O.D. 2.42" I.D. tube sample
T-3" O.D. thin-walled Shelby tube
H-6 1/2 Hollow Stem Auger
C-4 1/2 Continous Flight Auger
GB-Gear Bit
NX-NX Rock Coring
NQ-NQ Wireline Rock Coring
B-Undisturbed Block Sample
D-Disturbed Bulk Sample

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N* VALUE
15	GP-SP		Gray (2.5 yr 4/0) GRAVEL	05	15-17	S	NK
			and SAND (med), wet.				
20	SM-SP		Gray (7.5 yr 5/0) SAND,	06	20-22	S	NK
			med., silty, sl. cohesive				
			wet.				
25	SM-ML		Gray (2.5 yr 5/0) SAND,	07	25-27	S	NK
			med, silty, grade to silt.				
30	ML		Gray (2.5 yr 5/0) SILT,	08	30-32	S	NK
			clayey, cohesive.				

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 6 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N * VALUE
35	ML-SM		Gray (2.5 yr 5/0) SILT	09	35-57	S	NK
			clayey, with brn. yellow				
			(10 yr 6/6) SAND, fine,				
			dry.				
40	SP		Brn.yell.(10 yr 6/6) SAND	10	40-42	S	NK
			fine-med., dry.				
45	SP		Yell. brn.(10 yr 7/6)	11	45-47	S	NK
			SAND, med., dry.				
50	SP		Brn.(10 yr 7/3) SAND, med,	12	50-52	S	NK
			some gravel, dry.				

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 6 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N* VALUE
55	SP		Brn.(10 yr 7/3) SAND,med.	13	55-57	S	NK
			coarse, some gravel, dry.				
60	GP-SP		Brn.(10 yr 7/3) SAND, med	14	60-62	S	NK
			coarse, and GRAVEL, grades				
			into SAND, fine, dry.				
65	SP		Gray (7.5 yr 4/0) SAND,	15	65-67	S	NK
			med., wet.				
70	SP		Gray (7.5 yr 4/0) SAND,	16	70-72	S	NK
			med-coarse, wet.				

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 6 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N* VALUE
75							
80	SP-GP		Gray (7.5 yr 4/0) SAND,	17	80-82	S	NK
			med.-coarse, and GRAVEL,				
			wet.				
85							
90	SP-GP		Gray (7.5 yr 4/0) SAND,	18	90-92	S	NK
			med-coarse, and GRAVEL, wet.				

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 6 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N * VALUE
95							
100	SP		Gray (7.5 yr 4/0) SAND,	19	100-102	S	NK
			med, trace gravel, wet.				
105							
110	GP-SP		Gray (7.5 yr 3/0) SAND,	20	110-112	S	NK
			med-coarse and GRAVEL, gray (10 yr 4/1) sand, f, wet.				

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 6 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

LITHOLOGICAL SUMMARY

SOIL/ROCK PROFILE				STD. PENETRATION TEST			
DEPTH (FT)	UNIFIED SOIL/ ROCK CLASS	STRAT. ORDER	VISUAL DESCRIPTION	SAMPLE ID	DEPTH INTERVAL (FT)	SAMPLE METHOD	N* VALUE
115	GP		Gray (7.5 yr 4/0) SAND,	21	115-117	S	NK
			med-coarse, and GRAVEL				
			wet.				
			Sample taken at 115 ft.				
			depth to attempt to locate				
			"blue clay".				
			TOTAL DEPTH 120.8 ft.				
			* N value is unreported				
			as ASTM procedure was				
			not followed. Hammer				
			wt. was >140 lb.				

SAMPLE METHODS

A - AUGER CUTTINGS
S - 2" O.D. 1.38" I.D. DRIVE SAMPLE
U - 3" O.D. 2.42" I.D. TUBE SAMPLE
T - 3" O.D. THIN-WALLED SHELBY TUBE
H - 6 1/2 HOLLOW STEM AUGER
C - 4 1/2 CONTINUOUS FLIGHT AUGER
GB - GEAR BIT
NX - NX ROCK CORING
NQ - NQ WIRELINE ROCK CORING
B - UNDISTURBED BLOCK SAMPLE
D - DISTURBED BULK SAMPLE

TERRAN

Terran Corporation
Hydrogeologic Consultants
P.O. Box 1410
Fairborn, Ohio 45324

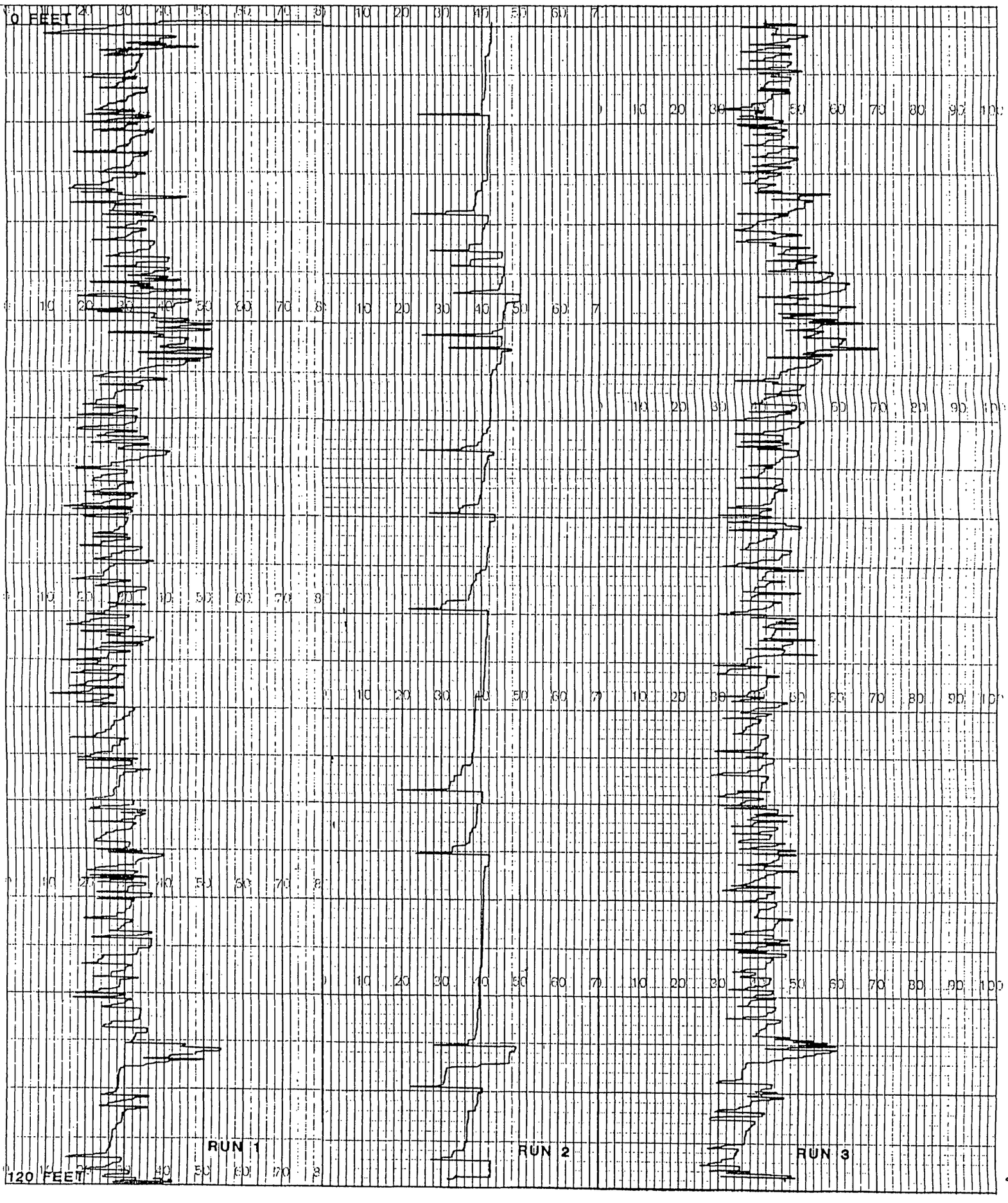
Phone (513) 372-6345

Natural Gamma Log

U.S. DOE Feed Material Production Facility Project				May 29, 1987 Date		1116 Time
Well 'C' Well/Borehole				Schultheis/Huntsman Logged By		Ground Surface Log Measured From
Within Facility Compound Location			Hamilton County	120.5 feet Depth Drilled		120 feet Depth Logged
5&6 Section	Crosby Township	Range	Ohio State	NA Bit Size	4 inch SS Casing	Freshwater Borehole Fluid

	Run 1	Run 2	Run 3
Logging Speed (ft/min)	10	10	10
Time Constant	2	2	2
Gamma Scale (cps)	5	10	5

Comments: Water Level- 68.10 ft (TOC)



TERRAN

Terran Corporation
Hydrogeologic Consultants
P.O. Box 1410
Fairborn, Ohio 45324

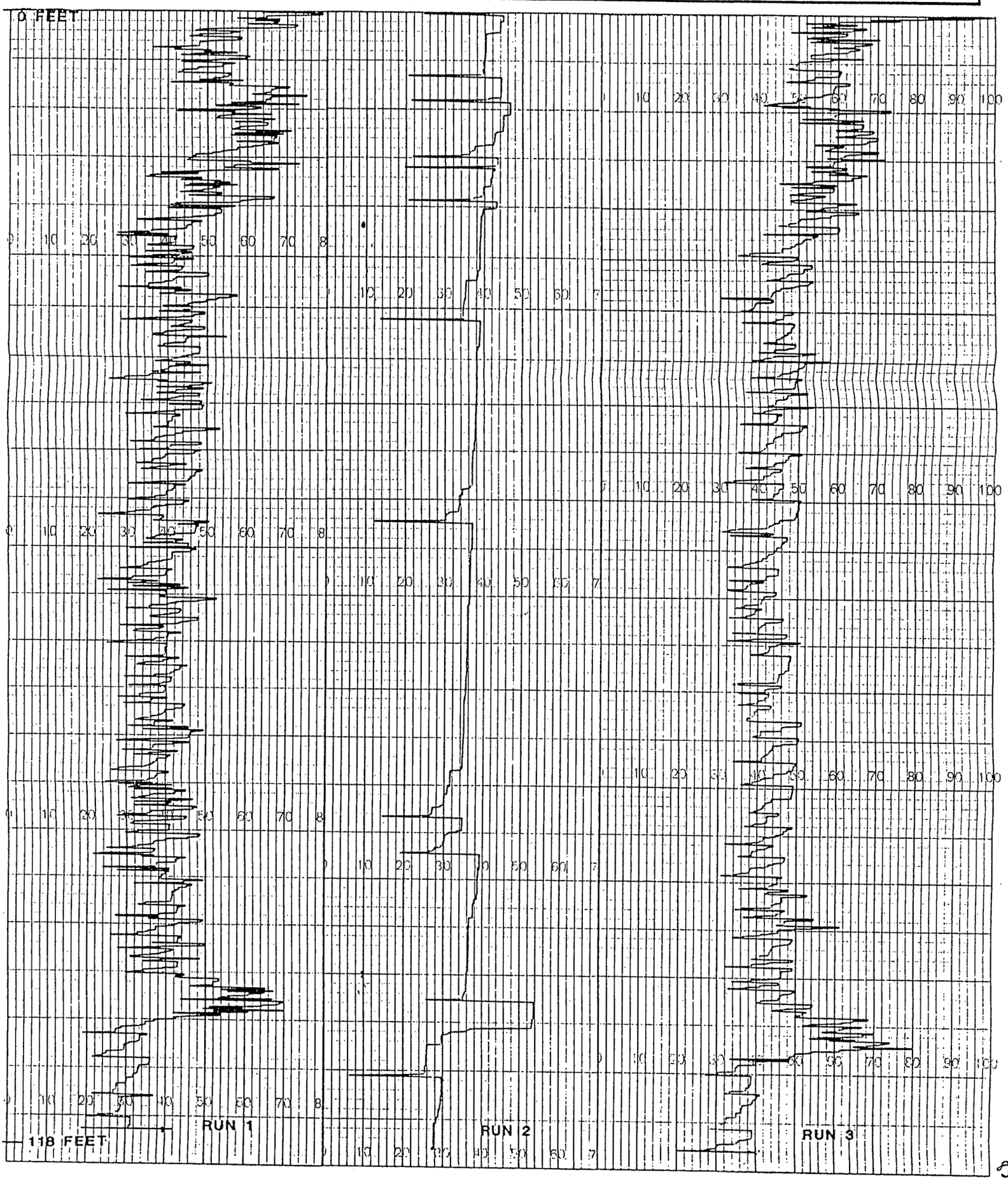
Phone (513) 372-6345

Natural Gamma Log

U.S. DOE Feed Material Production Facility Project				May 29, 1987 Date		0950 Time
Well 'B' Well/Borehole				Schultheis/Huntsman Logged By		Ground Surface Log Measured From
Within Facility Compound Location			Hamilton County	120.5 feet Depth Drilled		118 feet Depth Logged
5&6 Section	Crosby Township	Range	Ohio State	NA Bit Size	4 inch SS Casing	Freshwater Borehole Fluid

	Run 1	Run 2	Run 3
Logging Speed (ft/min)	10	10	10
Time Constant	2	2	2
Gamma Scale (cps)	5	10	5

Comments: Water Level- 61.67 ft (TOC)



TERRAN

Terran Corporation
Hydrogeologic Consultants
P.O. Box 1410
Fairborn, Ohio 45324

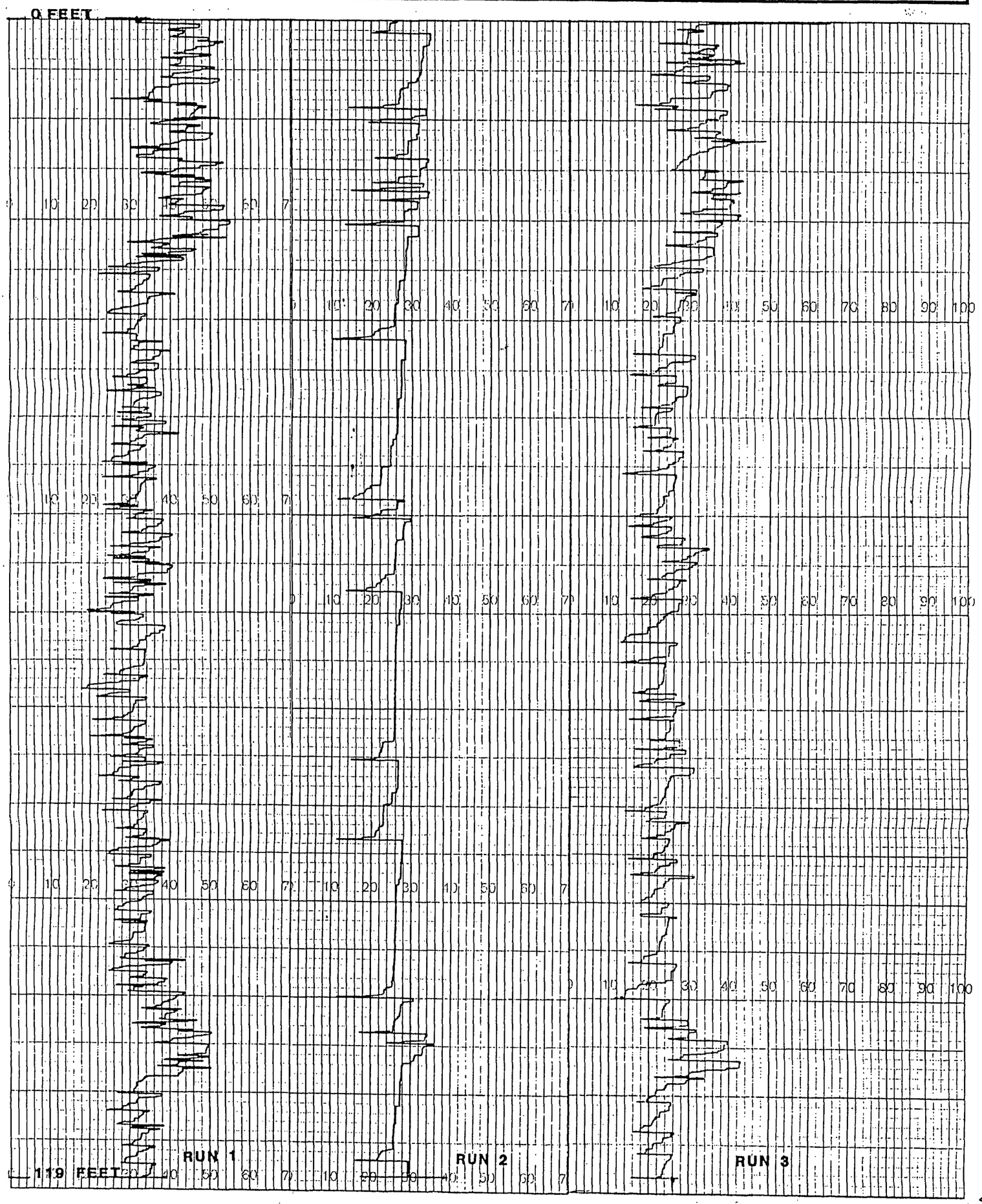
Phone (513) 372-6345

Natural Gamma Log

U. S. DOE Feed Material Production Center Project				May 29, 1987 Date		1239 Time
Well 'A' Well/Borehole				Schultheis/Huntsman Logged By		Ground Surface Log Measured From
Within Facility Compound Location			Hamilton County	120.5 ft Depth Drilled		119 ft. Depth Logged
5&6 Section	Crosby Township	Range	Ohio State	NA Bit Size	4 inch SS Casing	Freshwater Borehole Fluid

	Run 1	Run 2	Run 3
Logging Speed (ft/min)	10	10	10
Time Constant	2	2	2
Gamma Scale (cps)	5	10	5

Comments: Water Level- 60.12 ft (TOC)



34

85