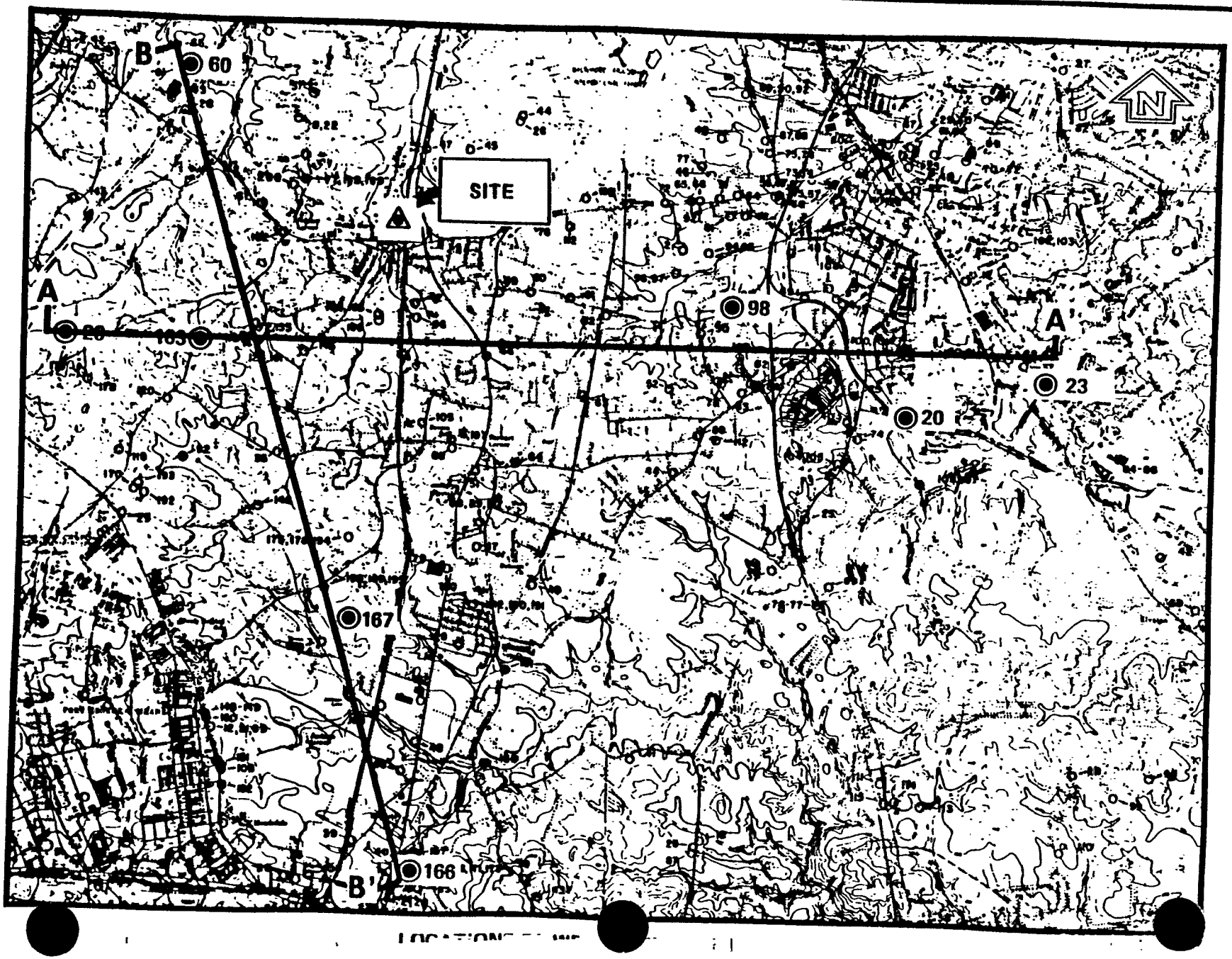
101528

APPENDIX A

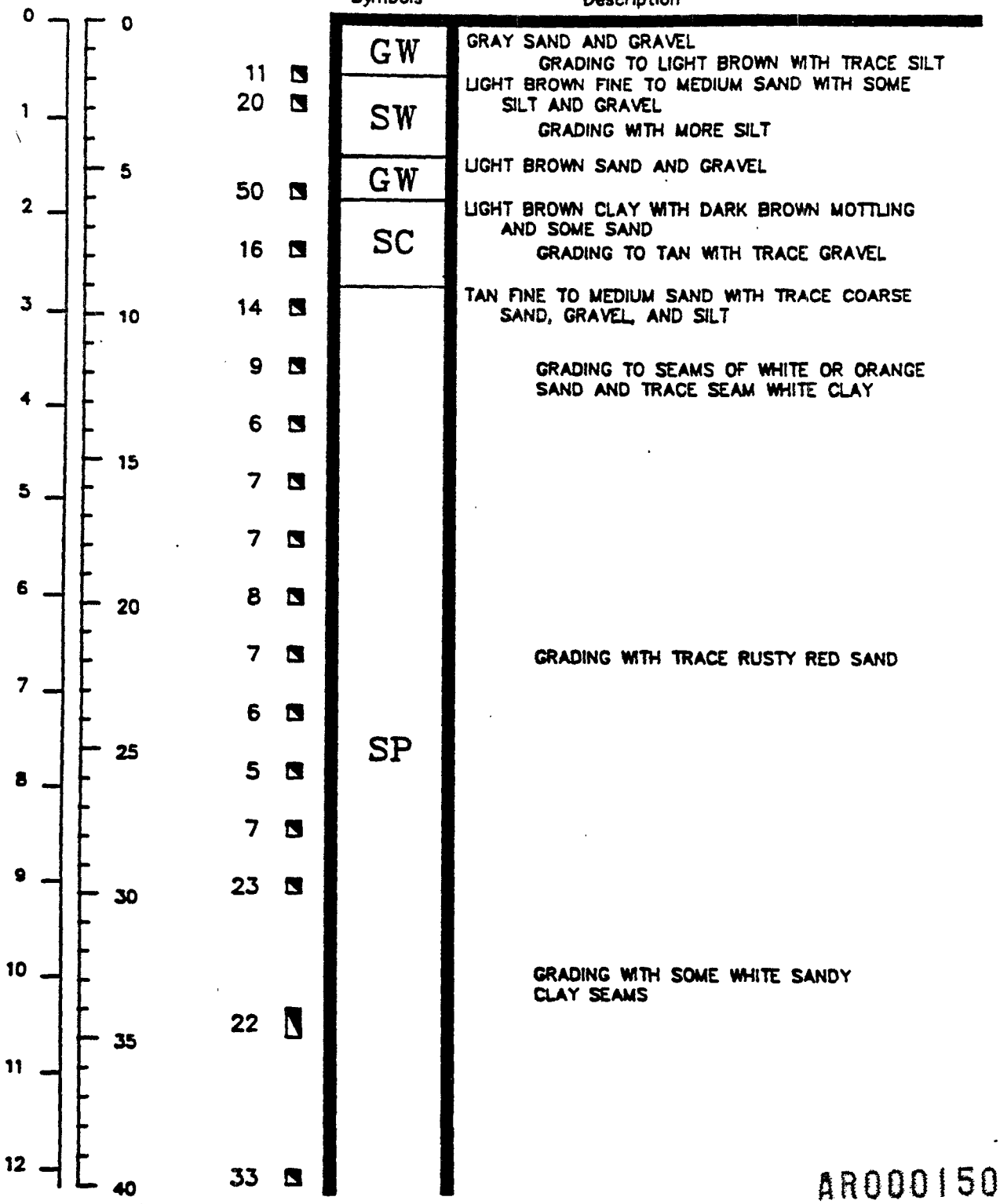
Boring Logs



AR000149

WELL 1

Surface Elevation: 115.4 Feet
Location: Main Yard



AR000150

PLATE
LOG OF BORING

Domes & Moore

WELL 1 (Cont'd.)

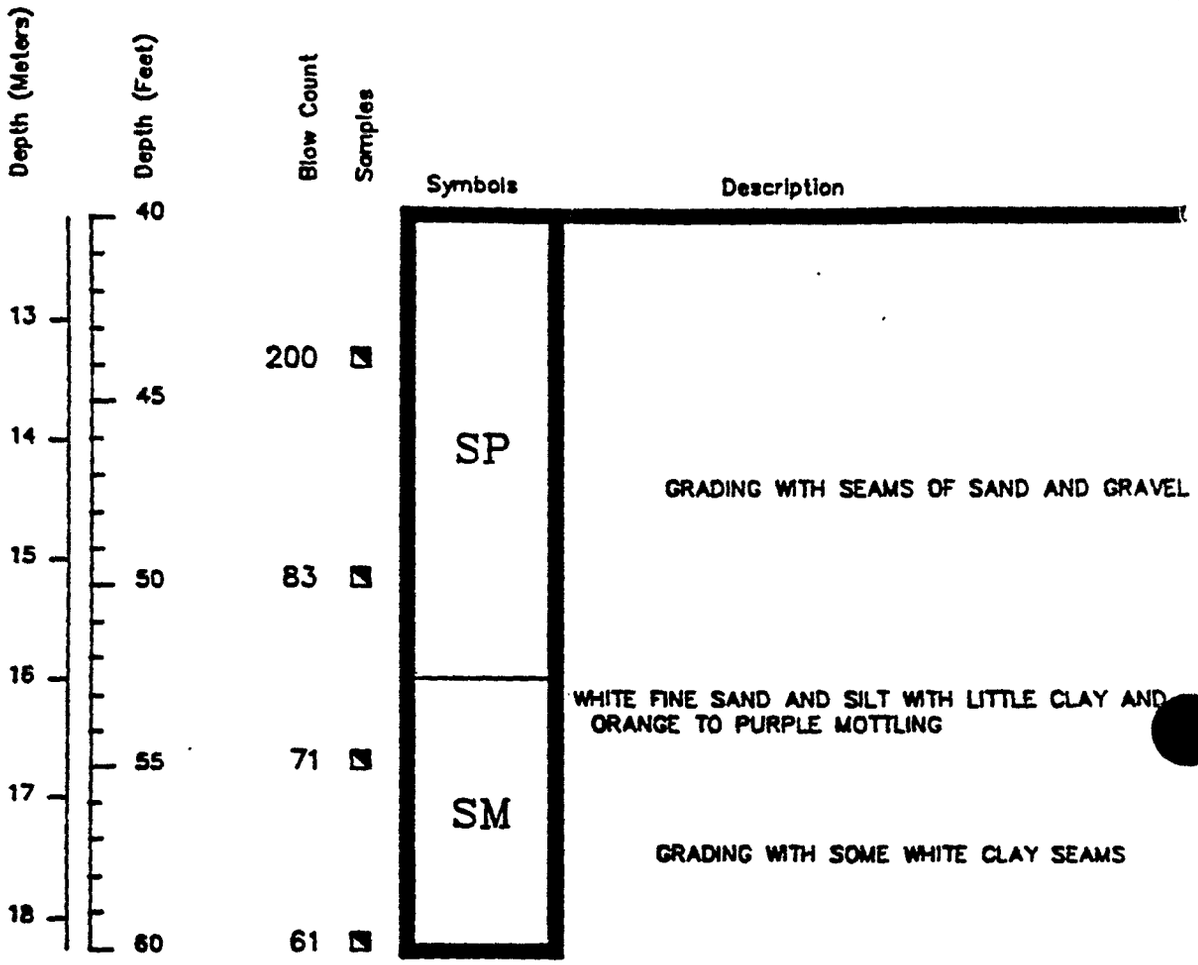


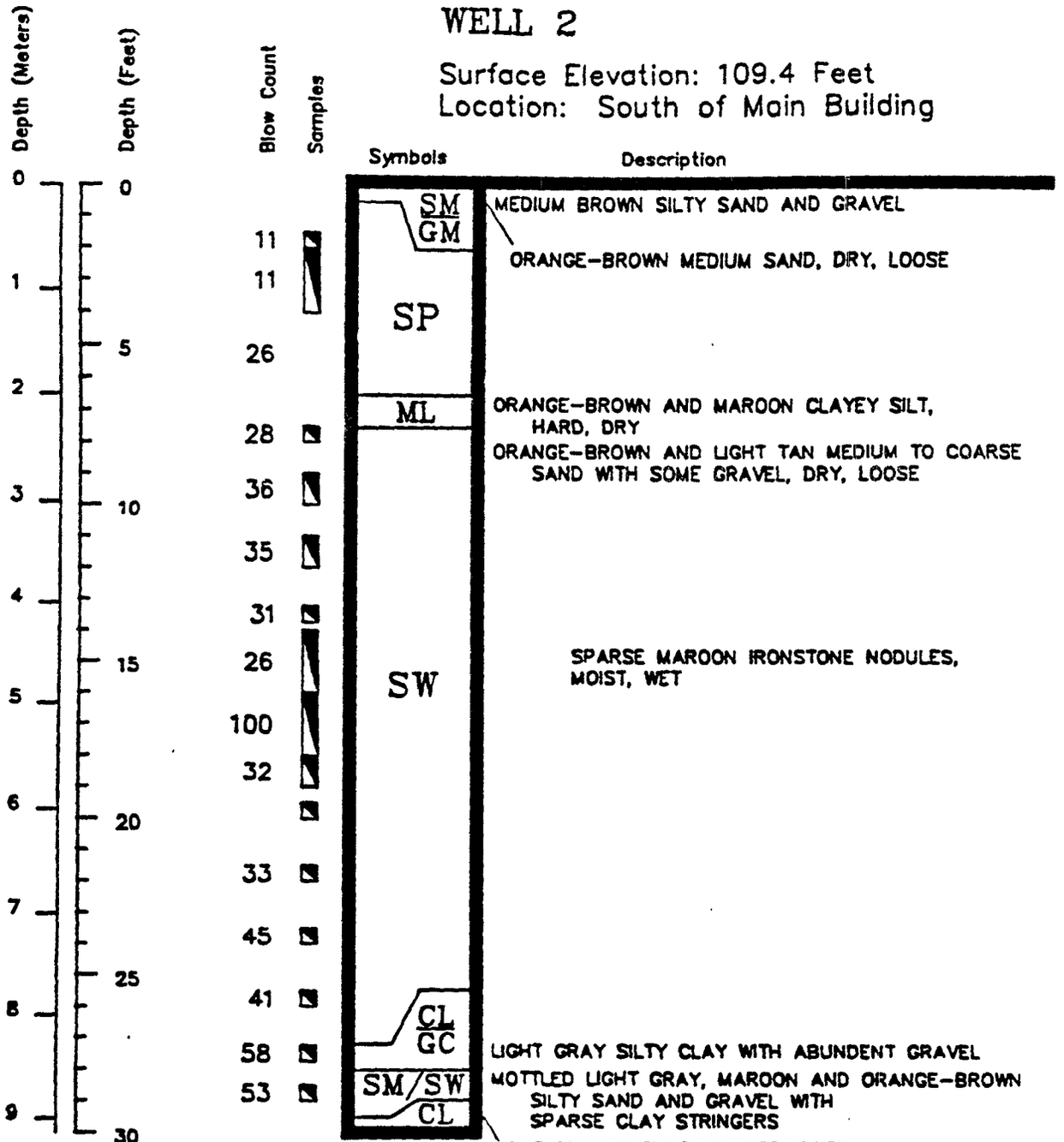
PLATE
LOG OF BORING

AR000151

Dames & Mc

WELL 2

Surface Elevation: 109.4 Feet
Location: South of Main Building



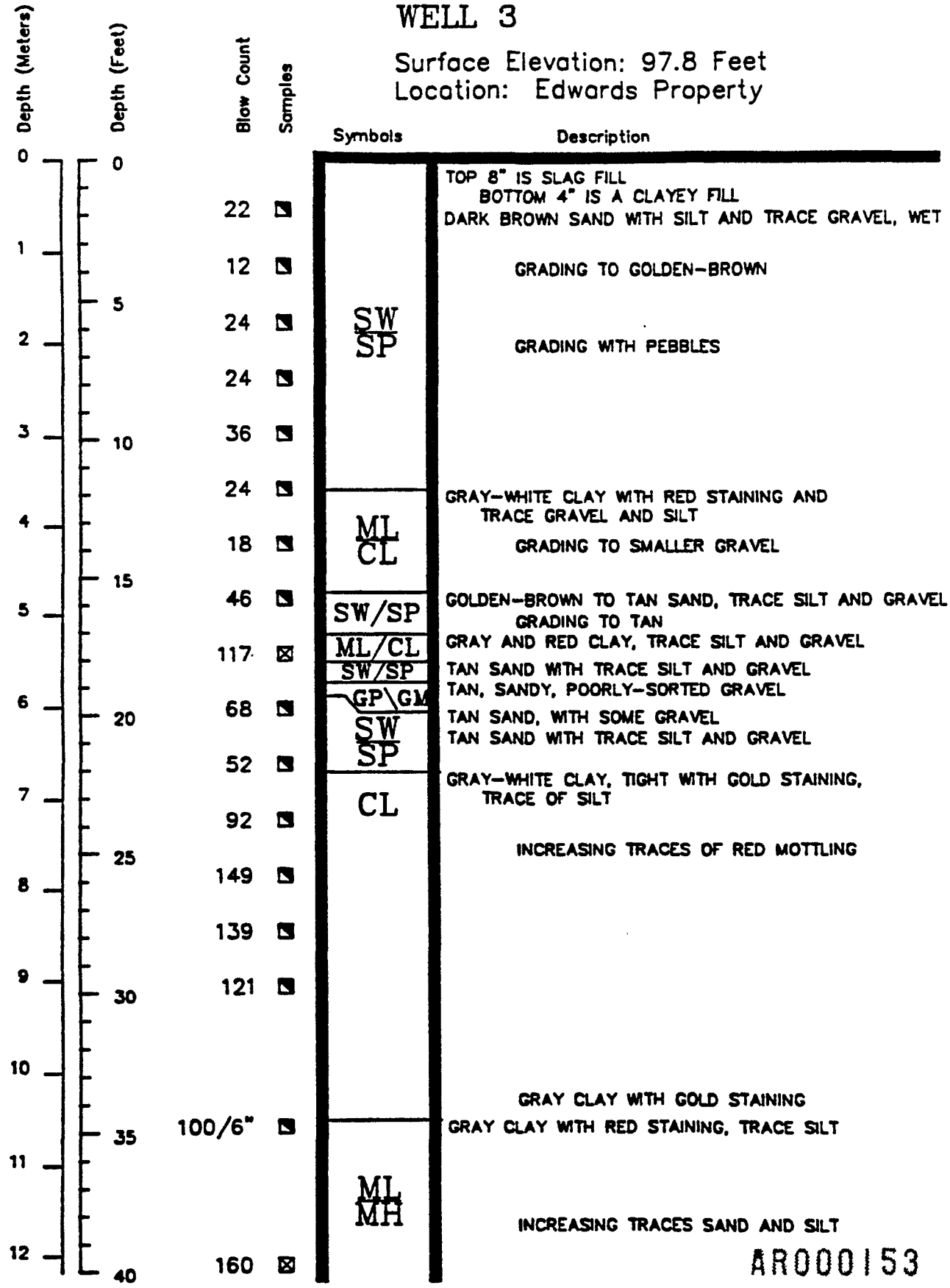
AR000152

PLATE
LOG OF BORING

Dames & Moore

WELL 3

Surface Elevation: 97.8 Feet
Location: Edwards Property



AR000153

PLATE
LOG OF BORING

Domes & Moore

WELL 3 (Cont'd.)

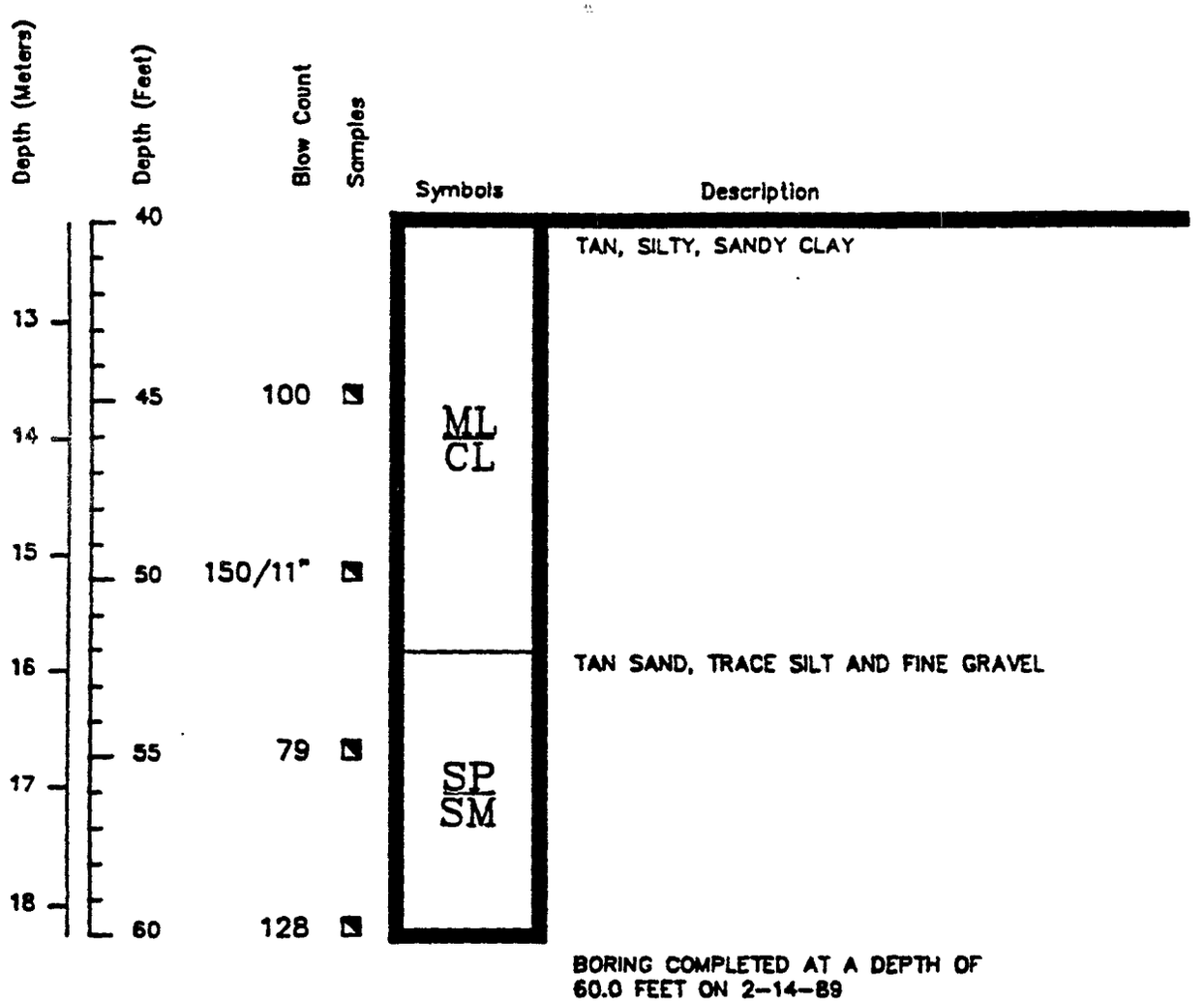


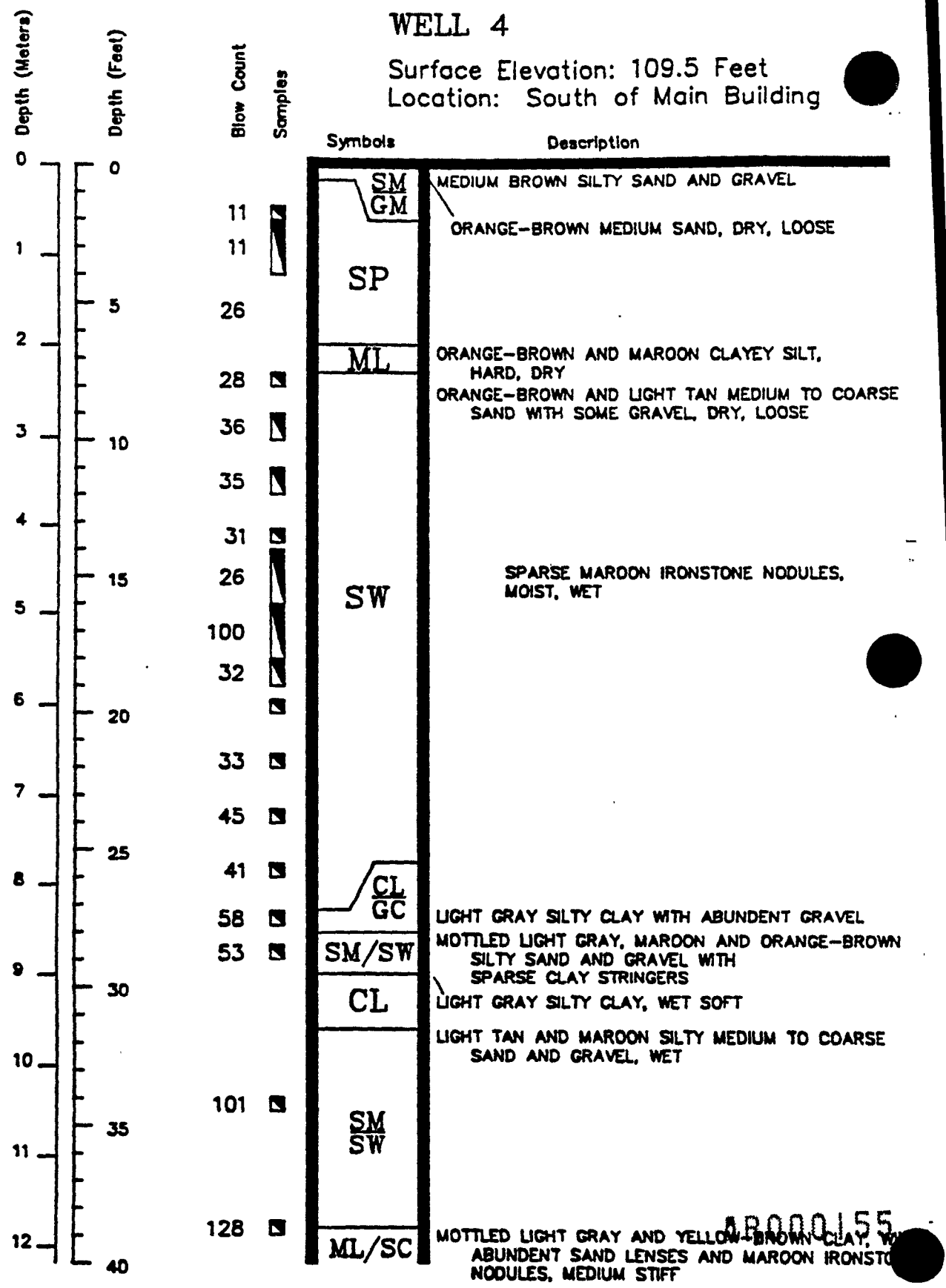
PLATE
LOG OF BORING

AR000154

Dames & Moor

WELL 4

Surface Elevation: 109.5 Feet
Location: South of Main Building



AR000155

PLATE
LOG OF BORING

Domes & M

WELL 4 (Cont'd.)

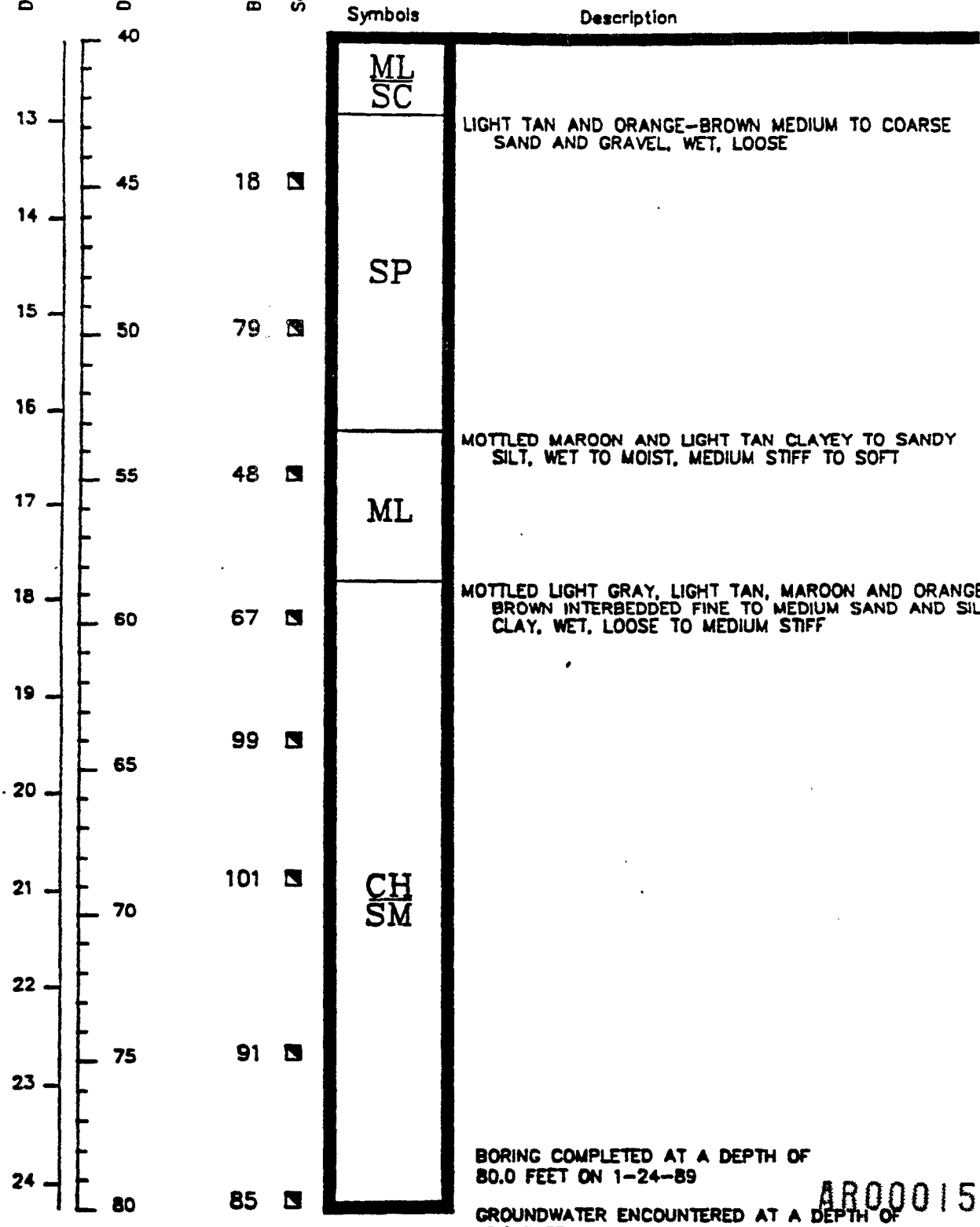
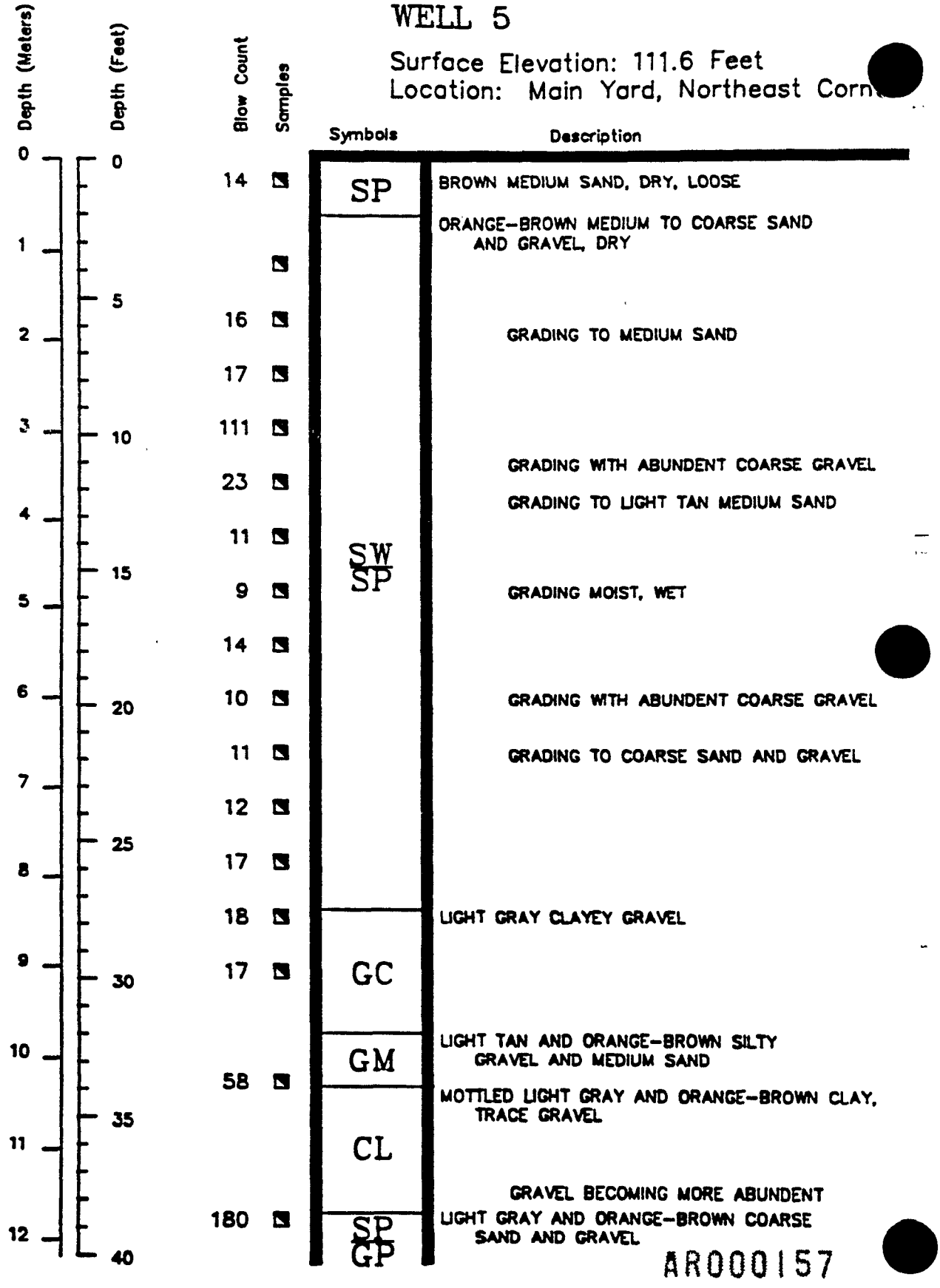


PLATE
LOG OF BORING

Domes & Moore

WELL 5

Surface Elevation: 111.6 Feet
Location: Main Yard, Northeast Corn

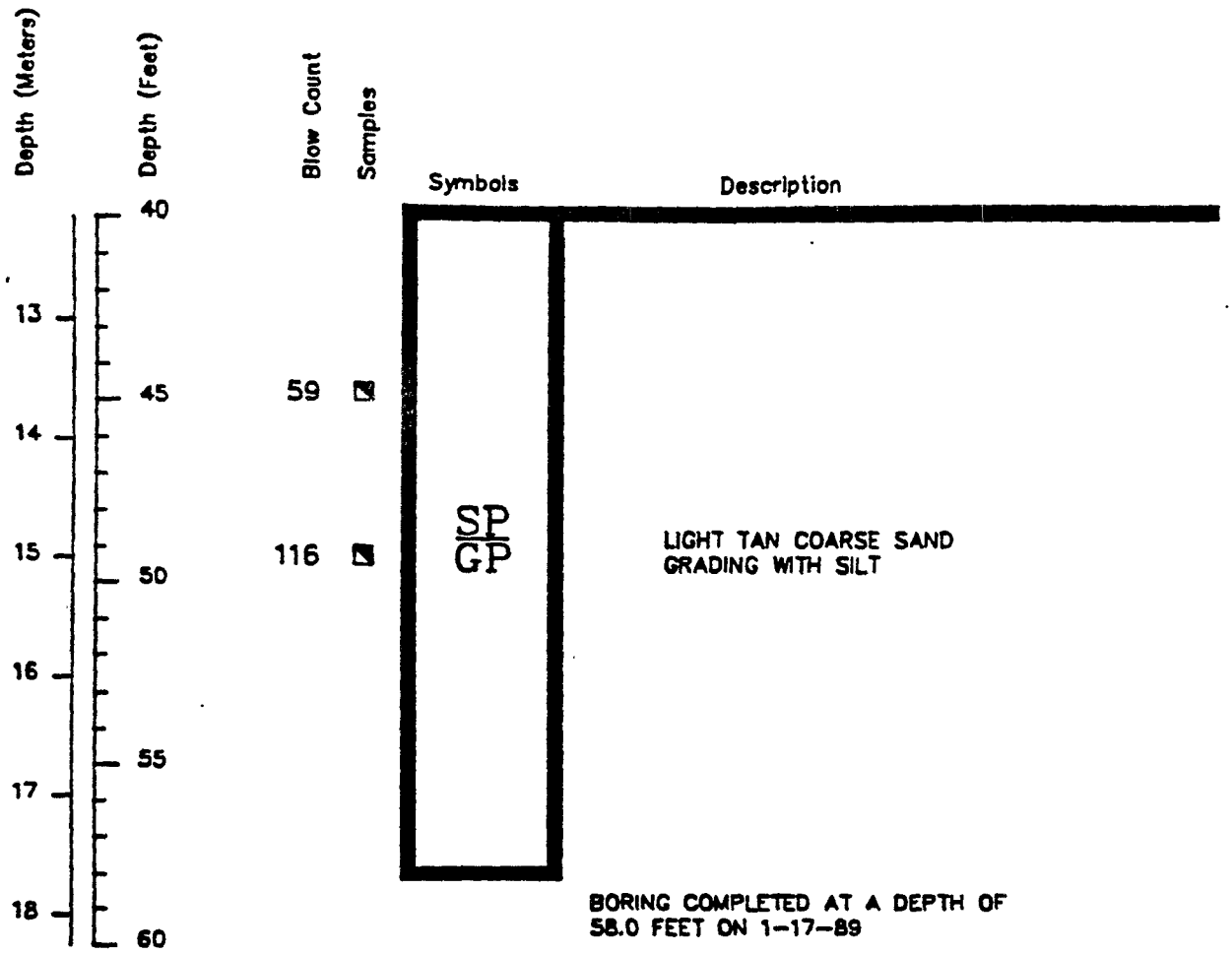


AR000157

PLATE
LOG OF BORING

Domes &

WELL 5 (Cont'd.)

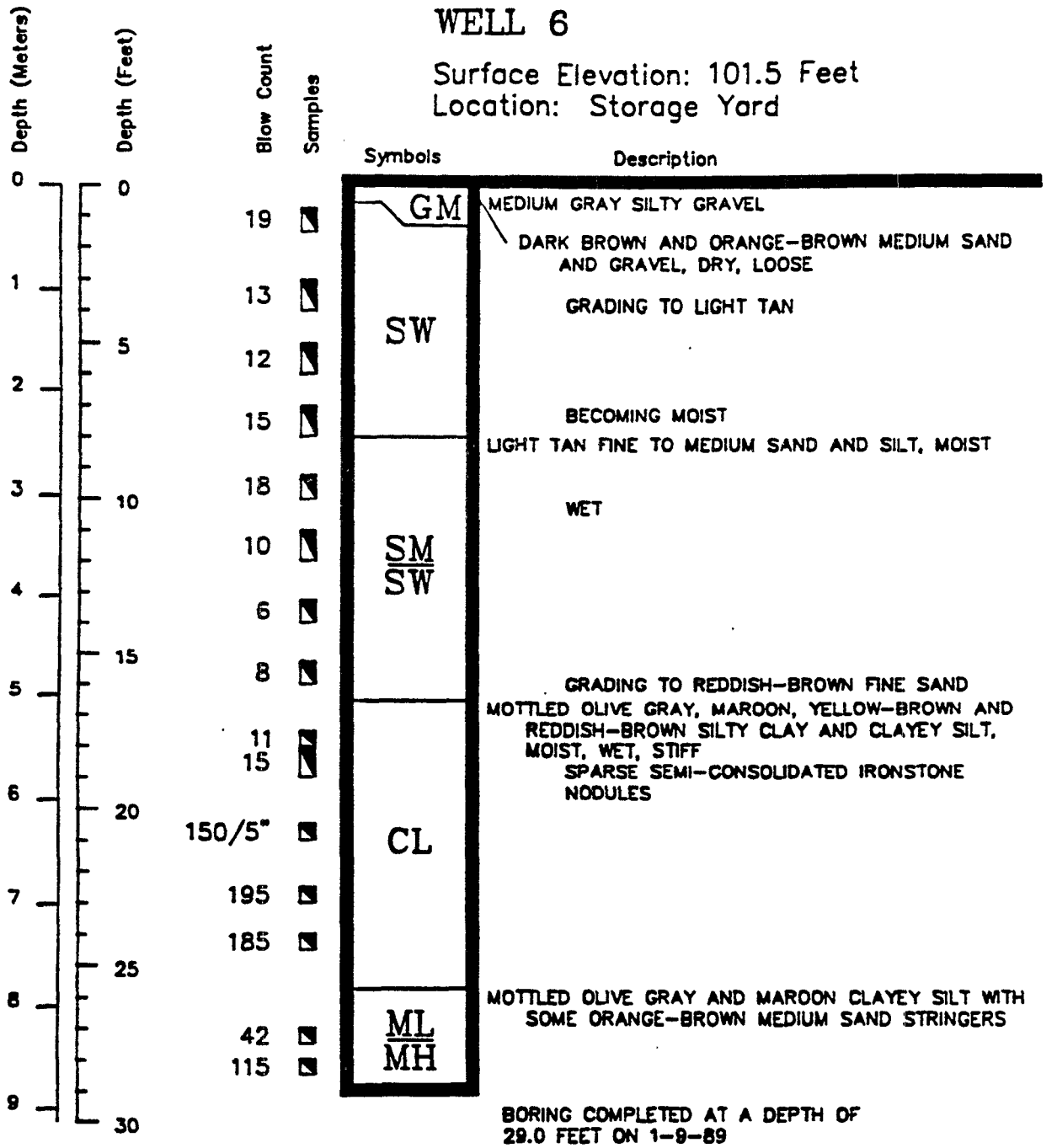


AR000158

PLATE
LOG OF BORING

WELL 6

Surface Elevation: 101.5 Feet
Location: Storage Yard



BORING COMPLETED AT A DEPTH OF 29.0 FEET ON 1-9-89

GROUNDWATER ENCOUNTERED AT A DEPTH OF 10.0 FEET ON 1-5-89

AR000159

PLATE
LOG OF BORING

Domes & Moore

WELL 7

Surface Elevation: 100.9 Feet
Location: McLean Property

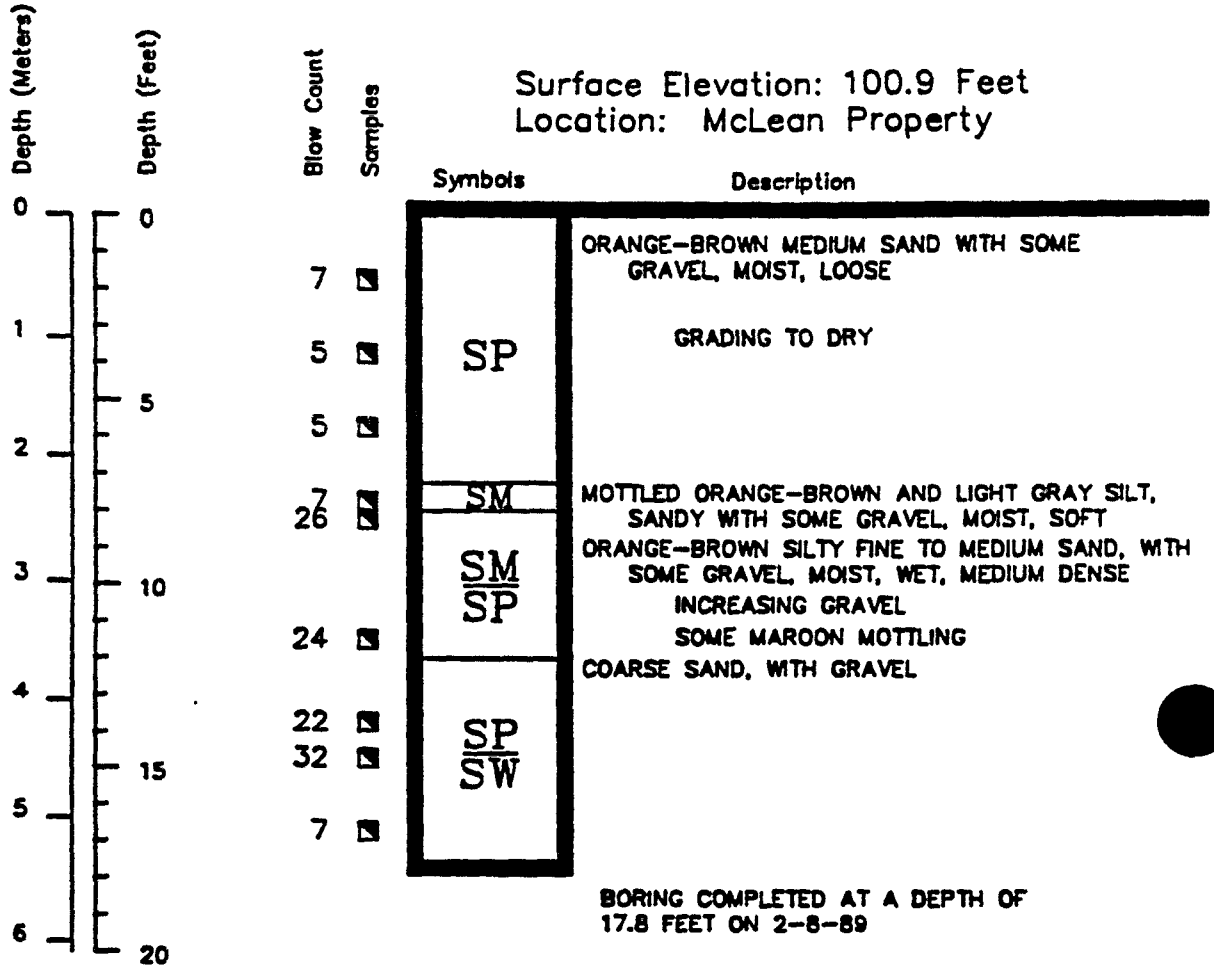


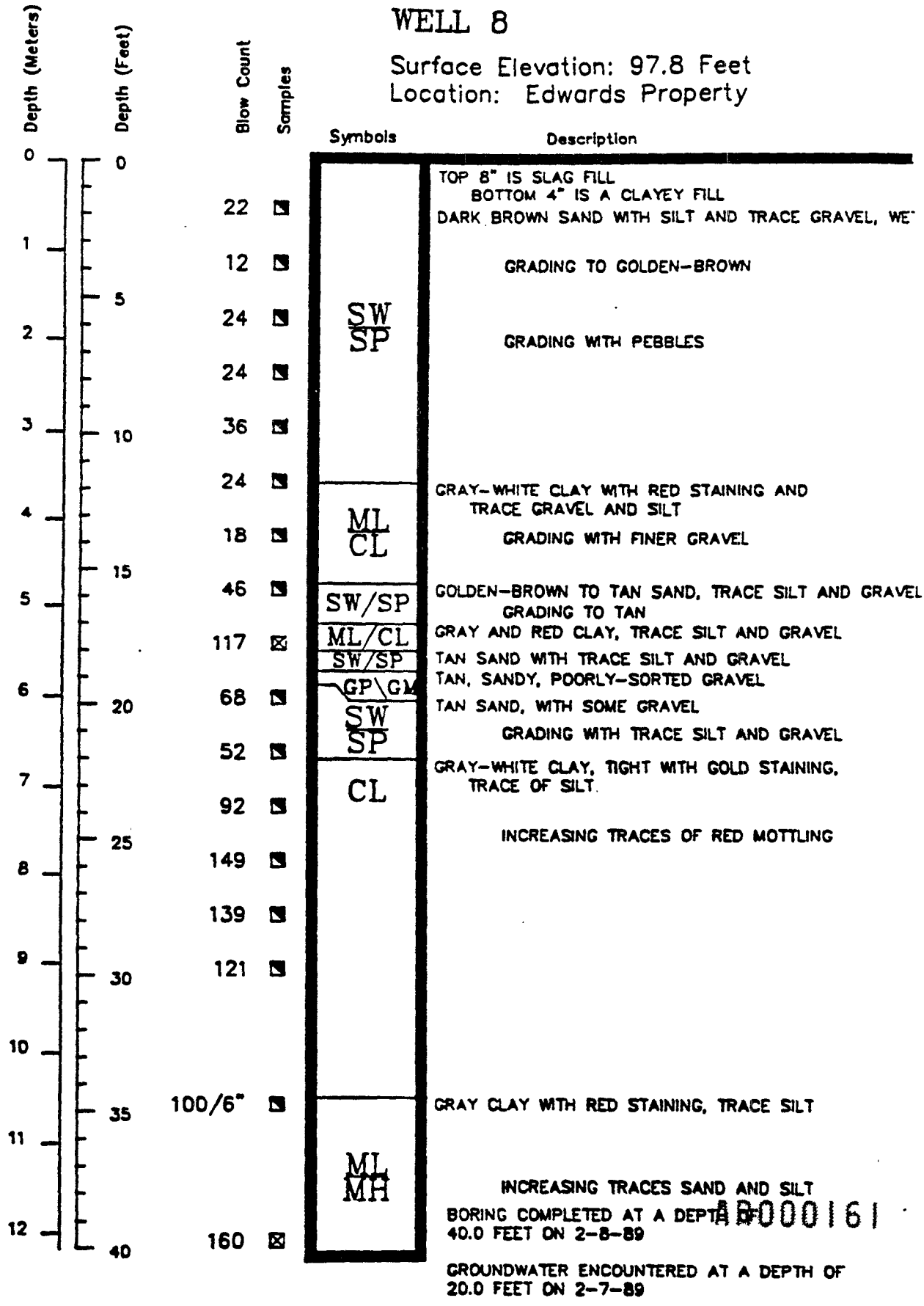
PLATE
LOG OF BORING

AR000160

Dames &

WELL 8

Surface Elevation: 97.8 Feet
Location: Edwards Property



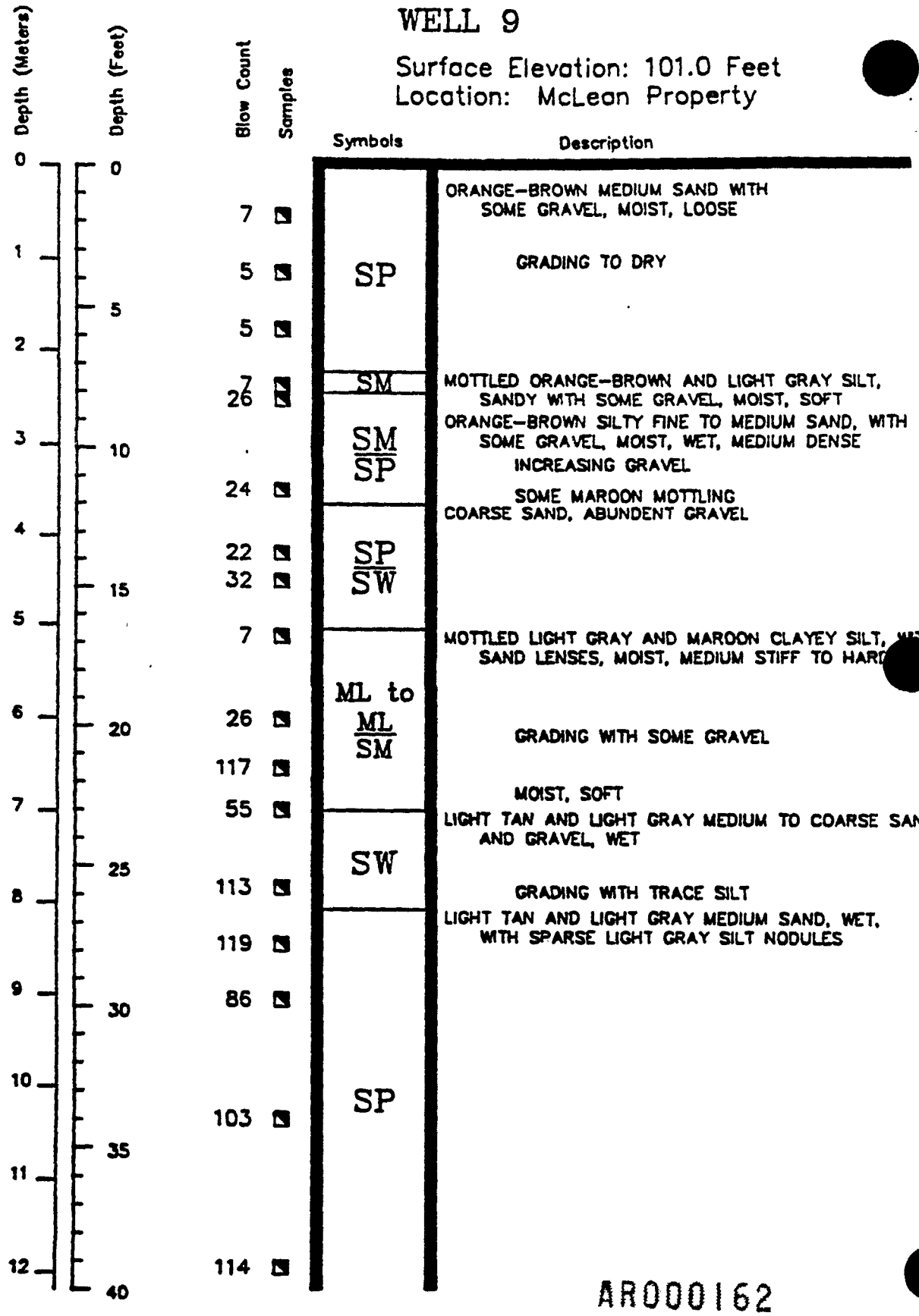
AR000161

PLATE
LOG OF BORING

Domes & Moc

WELL 9

Surface Elevation: 101.0 Feet
Location: McLean Property



AR000162

PLATE
LOG OF BORING

Dames & M

WELL 9 (Cont'd.)

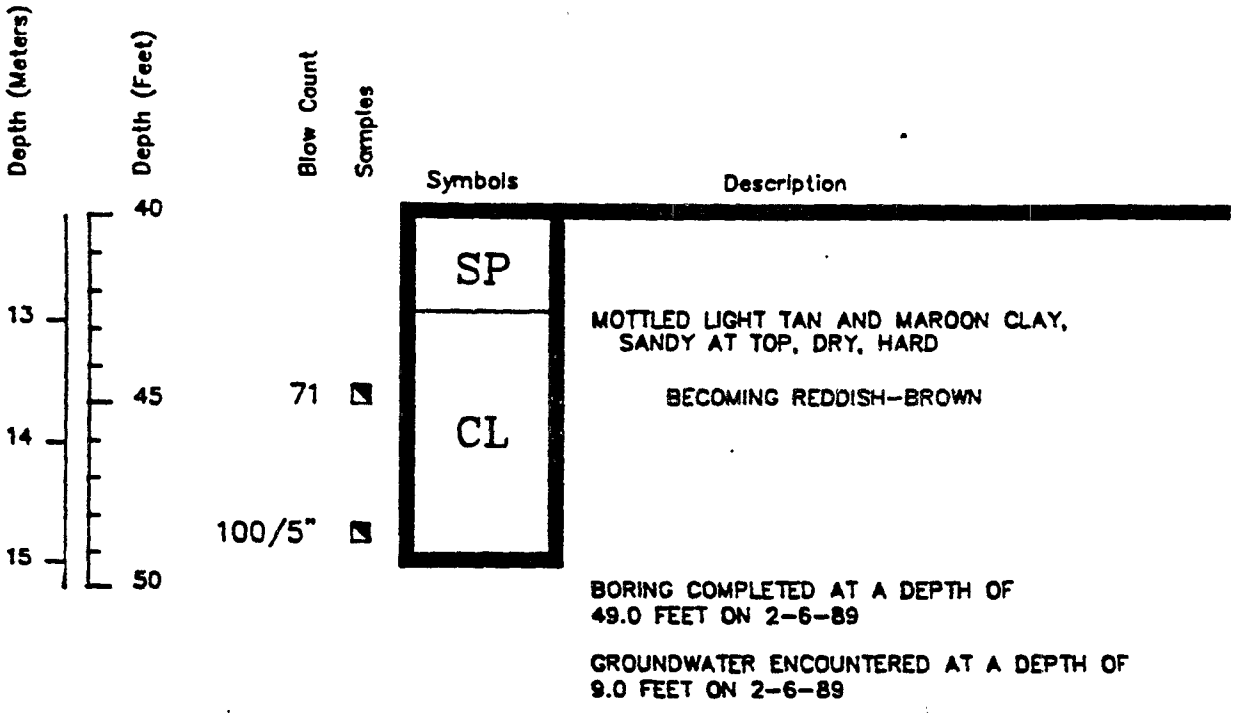


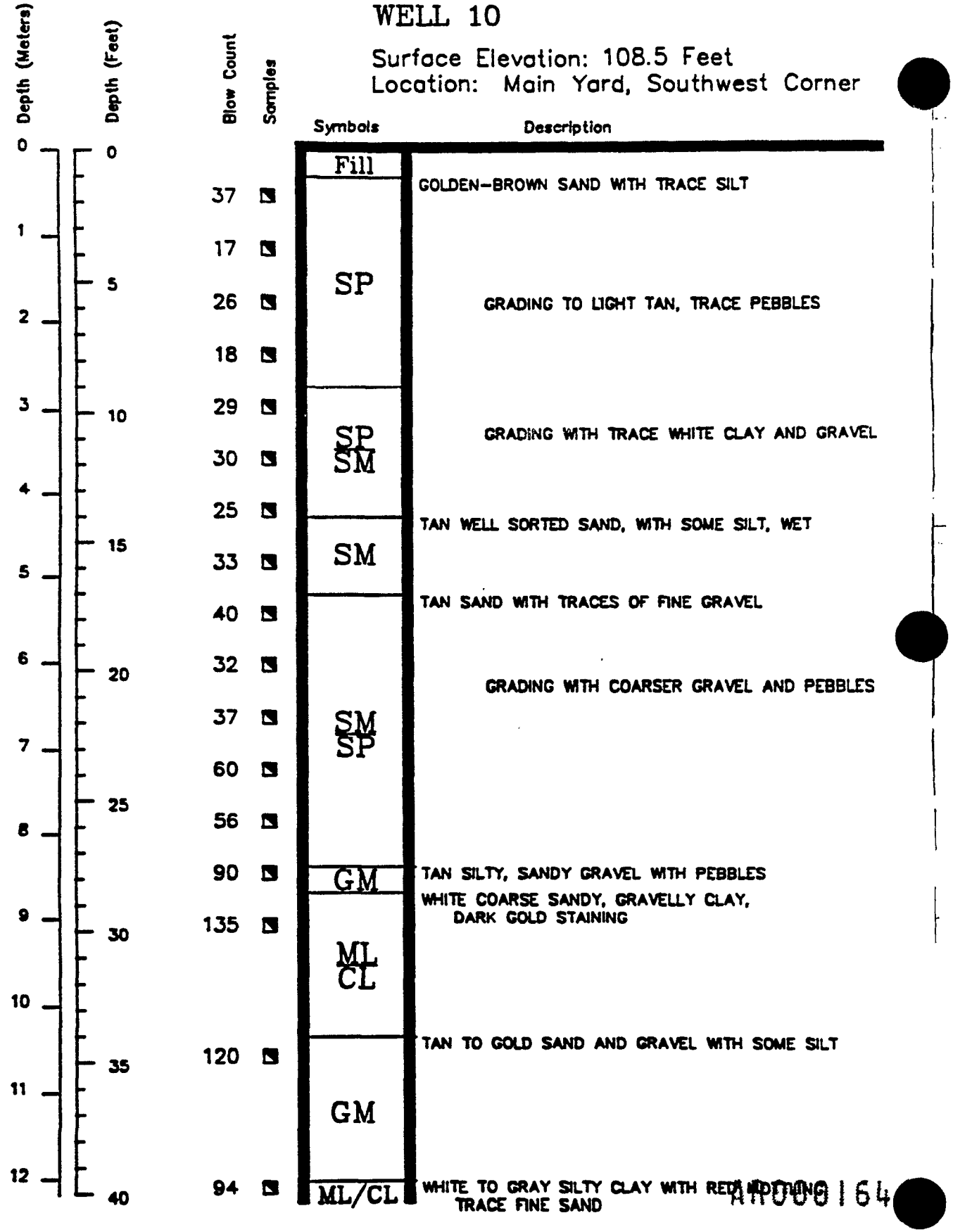
PLATE
LOG OF BORING

AR000163

Domes & Moore

WELL 10

Surface Elevation: 108.5 Feet
Location: Main Yard, Southwest Corner



AR0060164

PLATE
LOG OF BORING

Domes & Moore

WELL 10 (Cont'd.)

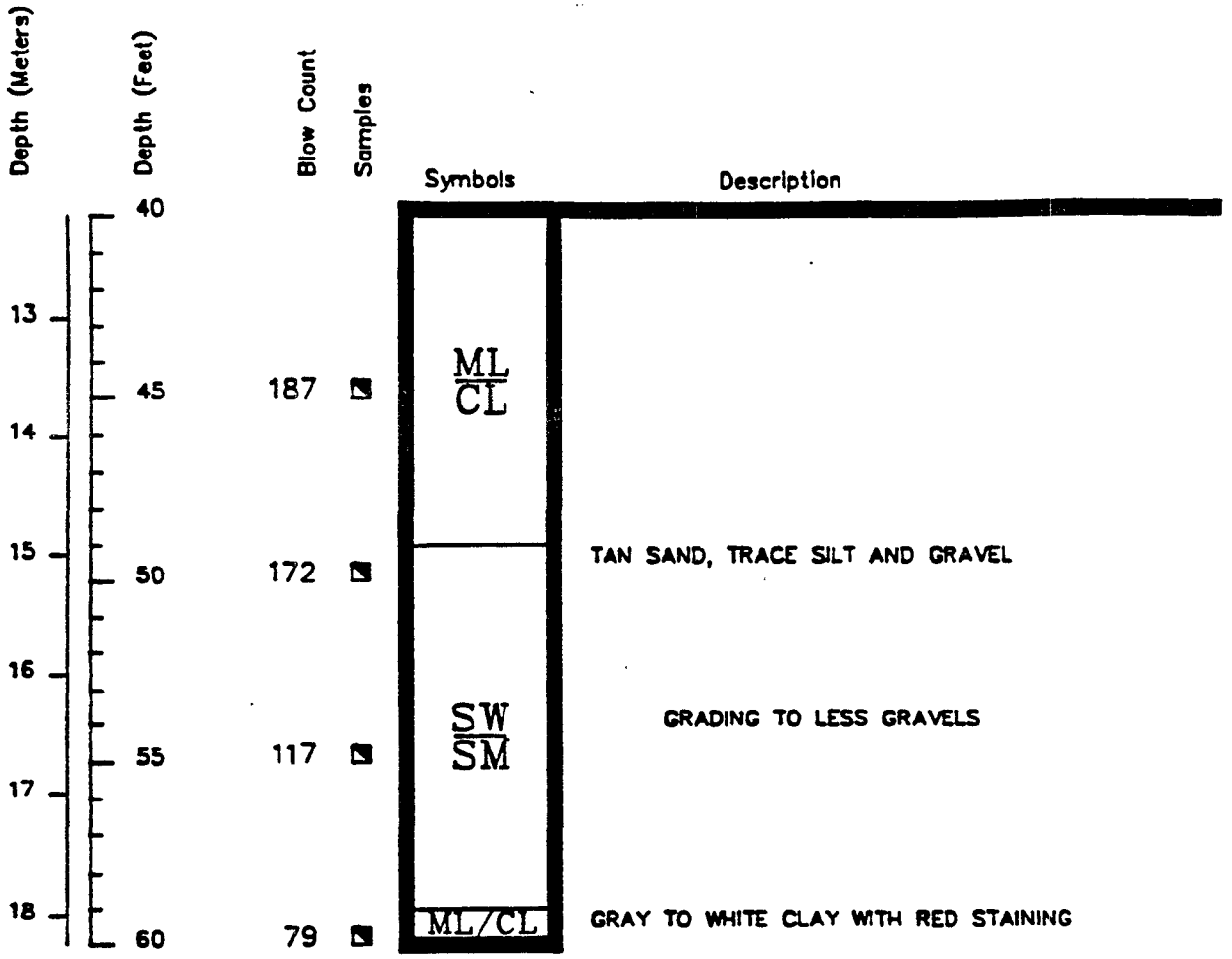


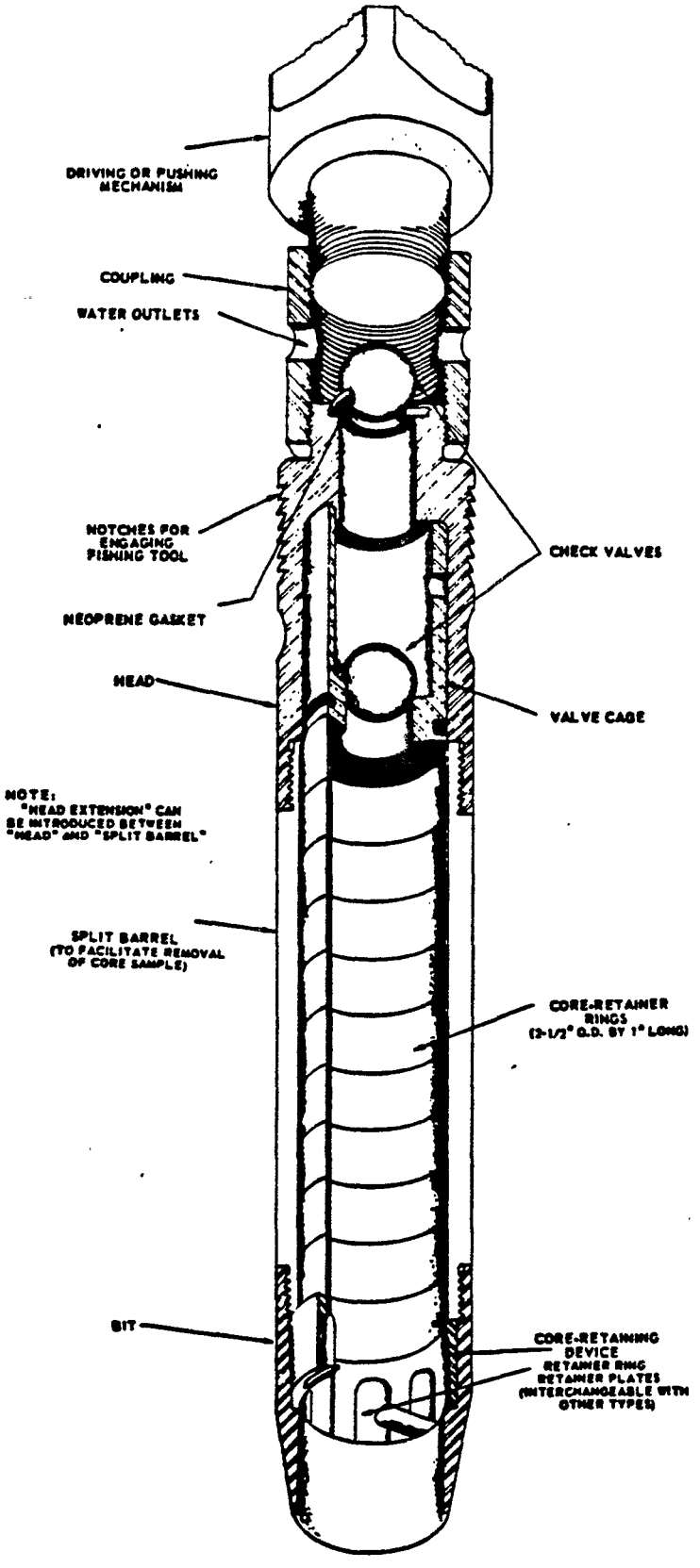
PLATE
LOG OF BORING

AR000165

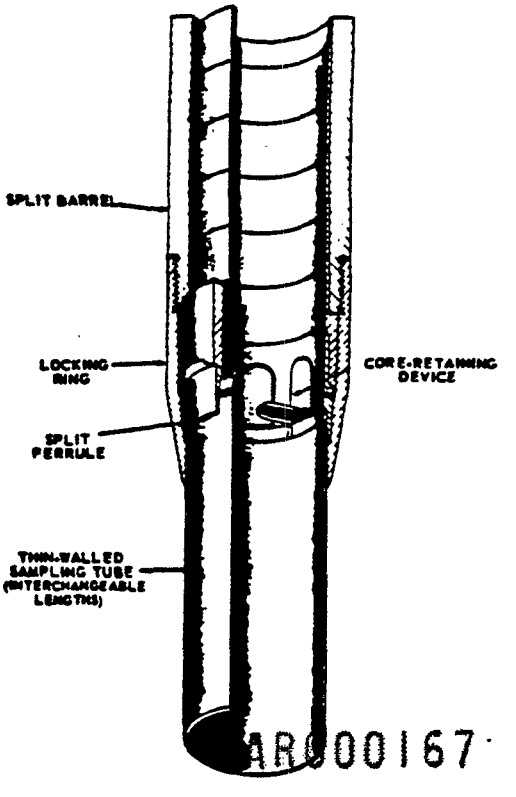
Domes & Moore

APPENDIX B

Geotechnical Data



ALTERNATE ATTACHMENTS



SOIL SAMPLER TYPE U

Dames & Moore

MOISTURE AND DENSITY DETERMINATIONS

Dames & Moore

CLIENT Mid Atlantic Wood Preservers JOB NO. 14519-002-

LOCATION Glen Burnie, MD. PAGE 2 OF 2

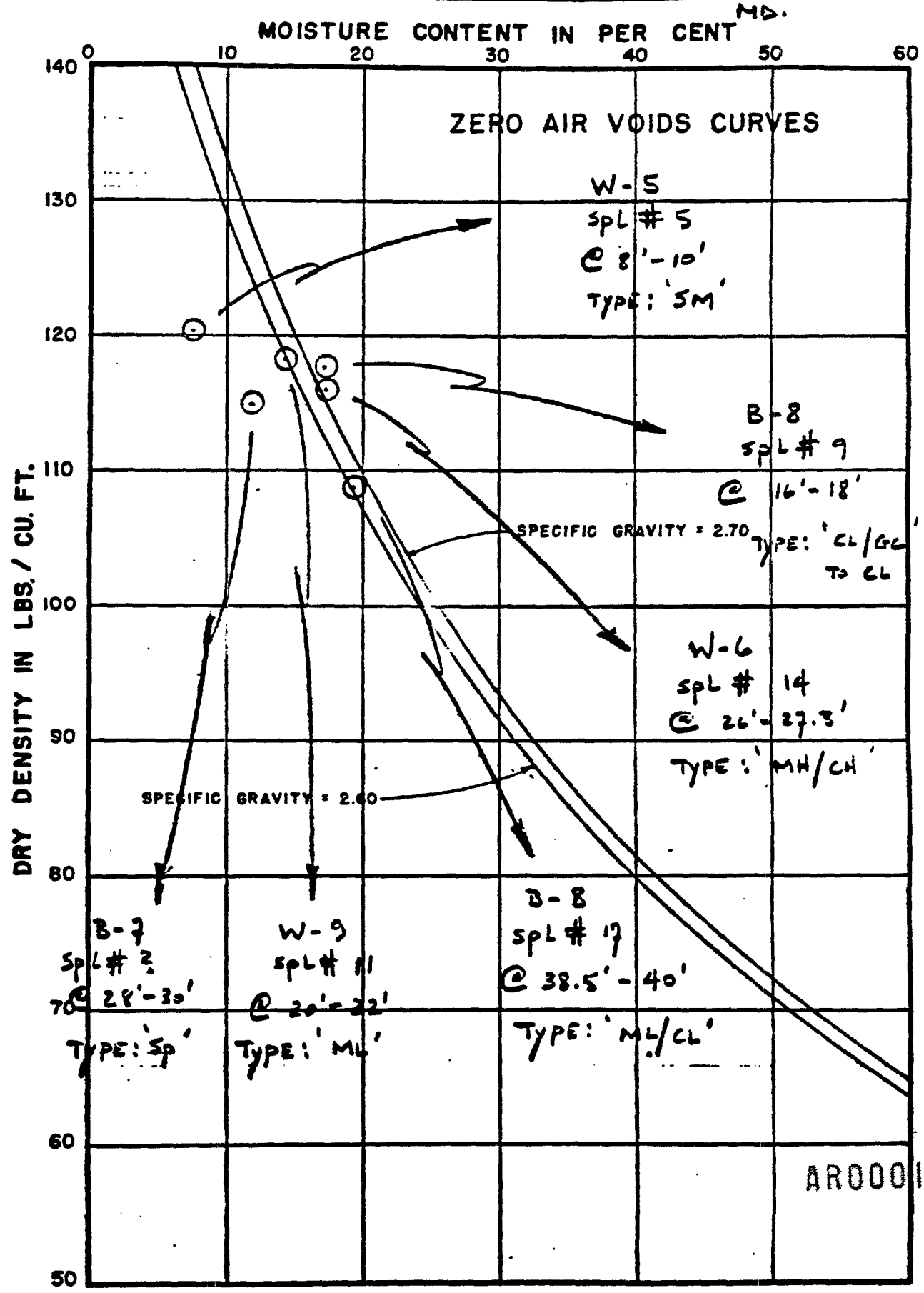
		Pf	Pf	Pf	Pf	Pf	Pf		
SAMPLE & SOIL TYPE	BORING	W-5	W-6	B-7	B-8	B-8	W-9		
	SAMPLE NO.	5	14	2	9	17	11		
	SAMPLE DEPTH	8' to 10'	26'-27.3'	28' to 30'	16'-18'	38.5'-40'	20' to 22'		
	DATE SAMPLED BY	1.17.89 MME	1.05.89 MME	1.27.89 PL	2.07.89 CHK	2.08.89 CHK	2.06.89 MME		
	DATE TESTED BY	2.14.89 HES							
	SOIL TYPE	SM	MH/CH	SM	CL/GC	ML/CL	ML		
	LABORATORY IDENTIFICATION	/	ML/MH	SP		ML/MH	ML to ML/SM		
DENSITY	NO. OF RINGS	5.1	4	5	3	6	6		
	WT. OF WET SOIL & RINGS	1079.2	895.3	1060.8	693.8	1269.8	1307.5		
	WT. OF RINGS	287.5	242.0	287.5	196.5	333.0	333.0		
	WT. OF WET SOIL	791.7	653.3	773.3	497.3	936.8	974.5		
	WET DENSITY (LBS./CU.FT.)	129.2	135.9	128.7	137.9	129.9	135.1		
	DRY DENSITY (LBS./CU.FT.)	120.2	116.0	115.0	117.8	108.9	118.3		
MOISTURE CONTENT	DISH NO.	R18	X1	912	A70	P7	A65		
	WT. OF WET SOIL & DISH	799.8	545.2	625.8	347.3	651.1	685.3		
	WT. OF DRY SOIL & DISH	758.8	487.4	581.4	326.7	571.6	625.9		
	WT. LOSS OF MOISTURE	41.0	57.8	44.4	20.6	79.5	59.4		
	WT. OF DISH	209.2	151.9	207.1	206.1	160.1	207.6		
	WT. OF DRY SOIL	549.6	335.5	374.3	120.6	411.5	418.3		
	MOISTURE CONTENT (% DRY WT.)	7.5	17.2	11.9	17.1	19.3	14.2		

FILE 14519.002.7071.027

SUBJECT: MOISTURE - DENSITY DATA

M.A.W.P. - GLEN BURNIE MD. SHEET 1 OF 2

REVISIONS
BY DATE TO EO
BY DATE TO EO



CHECKED BY HRS DATE 2/17/89

COPY TO EO

AR000169

SPECIFIC GRAVITY OF SOIL SOLIDS (G_s)

Project MID ATLANTIC WOOD PRESERVERS Job No. 14519-002-7071-02

Location of Project GLEN BURNIE, MD. Boring No. W-5 Sample No. 5

Description of Soil 'SM' Depth of Sample 8' TO 10'

Tested By HRS Date of Testing 2.21.89

Test no.	1 (12)	2 (11)	3 (88)	4 (5)
Vol. of flask at 20°C	500 MLS			
Method of air removal[a]	ASPIRATOR			
Wt. flask + water + soil = W_{bws}	691.61	691.58	684.45	694.41
Temperature, °C	22.9			
Wt. flask + water[b] = W_{bw}	668.22	668.82	660.48	669.98
Evap. dish no.				
Wt. evap. dish + dry soil				
Wt. of evap. dish				
Wt. of dry soil = W_s	36.98	35.99	37.83	38.79
$W_w = W_s + W_{bw} - W_{bws}$	13.59	13.23	13.86	14.36
$G_s = \alpha W_s / W_w$	2.721	2.720	2.729	2.701

[a]Indicate vacuum or aspirator for air removal.
[b]W_{bw} is the weight of the flask filled with water with the same quantity of dispersing agent as added to the soil–water mixture and at the same temperature.

Remarks USED NO DEFLOCCULANT IN TEST SAMPLES, ALSO, PYCHNOMETERS CALIBRATED WITHOUT DEFLOCCULANT

Average specific gravity of soil solids (G_s) = 2.718 ± 0.010

TAN TO LT. YELLOW F. TO M. SAND W/ SOME CLAY 70

'SM'

* porosity (value) n = (.2862) 28.6 %

SPECIFIC GRAVITY OF SOIL SOLIDS (G_s)

Project MID ATLANTIC WOOD PRESERVERS Job No. 14519-002-7071-027

Location of Project GLEN BURNIE, MD. Boring No. W-6 Sample No. 14

Description of Soil ML/MH Depth of Sample 26' TO 27.3'

Tested By HRS Date of Testing 2.21.89

Test no.	1 (1)	2 (78)	3 (3)	4 (8)
Vol. of flask at 20°C	500 MLS	—	—	—
Method of air removal[a]	ASPIRATOR	—	—	—
Wt. flask + water + soil = W_{bws}	700.89	658.43	691.31	691.79
Temperature, °C	22.8			
Wt. flask + water[b] = W_{bw}	670.88	654.98	670.28	670.12
Evap. dish no.	—	—	—	—
Wt. evap. dish + dry soil	—	—	—	—
Wt. of evap. dish	—	—	—	—
Wt. of dry soil = W_s	46.60	36.36	32.71	33.68
$W_w = W_s + W_{bw} - W_{bws}$	16.59	12.91	11.62	12.01
$G_s = aW_s/W_w$	2.809	2.816	2.801	2.804

[a]Indicate vacuum or aspirator for air removal.
[b]W_{bw} is the weight of the flask filled with water with the same quantity of dispersing agent as added to the soil–water mixture and at the same temperature.

Remarks USED NO DEFLOCCULANT IN TEST SAMPLES, ALSO, PYCHNOMETERS CALIBRATED WITHOUT DEFLOCCULANT

Average specific gravity of soil solids (G_s) = 2.808 ± 0.005

ORANGE-RED CLAYEY SILT w/ A TRACE F. SAND INTERBEDDED

AR000171

POROSITY (WATER) — $\eta = (.3696) \rightarrow 37.0\%$

SPECIFIC GRAVITY OF SOIL SOLIDS (G_s)

Project MID ATLANTIC WOOD PRESERVERS Job No. 14519-002-7071-027.

Location of Project GLEN BURNIE, MD. Boring No. B-7 Sample No. 2

Description of Soil 'SP' Depth of Sample 28' TO 30'

Tested By HRS Date of Testing 2.20.89

Test no.	1 (78)	2 (12)	3 (5)	4 (1)
Vol. of flask at 20°C	500 MLS			
Method of air removal[a]	ASPIRATOR			
Wt. flask + water + soil = W_{bws}	670.41	697.81	698.59	700.48
Temperature, °C	22.4°			
Wt. flask + water[b] = W_{bw}	635.10	668.34	670.10	671.0-
Evap. dish no.				
Wt. evap. dish + dry soil				
Wt. of evap. dish				
Wt. of dry soil = W_s	56.50	47.29	45.95	47.54
$W_w = W_s + W_{bw} - W_{bws}$	21.19	17.8-	17.46	12.06
$G_s = \alpha W_s / W_w$	2.666	2.654	2.632	2.632

[a]Indicate vacuum or aspirator for air removal.
[b]W_{bw} is the weight of the flask filled with water with the same quantity of dispersing agent as added to the soil–water mixture and at the same temperature.

Remarks USED NO DEFLOCCULANT IN TEST SAMPLE(S), ALSO, PYCHNOMETERS CALIBRATED WITHOUT DEFLOCCULANT

Average specific gravity of soil solids (G_s) = 2.646 ± 0.013

$$a = 1.65(G_s) / (G_s - 1)2.65 \rightarrow a = 1.0009$$

→ WHITE TO LT. TAN F. TO M. SAND w/ A LITTLE GRAVEL (ROUNDED/QUARTZITIC) w/ A TRACE CLAYEY SILT.

+ POROSITY (value) $n = 35.0\%$

SPECIFIC GRAVITY OF SOIL SOLIDS (G_s)

Project MID ATLANTIC WOOD PRESERVERS Job No. 14519-002-7071-027

Location of Project GLEN BURNIE, MD. Boring No. B-8 Sample No. 17

Description of Soil ML Depth of Sample 38.5' TO 40'

Tested By HRS Date of Testing 2. 20 .89

Test no.	1 (88)	2 (3)	3 (8)	4 (11)
Vol. of flask at 20°C	500 ML	—	—	—
Method of air removal[a]	ASPIRATOR	—	—	—
Wt. flask + water + soil = W_{bws}	686.29	698.01	699.17	698.62
Temperature, °C	22.9			
Wt. flask + water[b] = W_{bw}	660.48	670.28	670.18	668.82
Evap. dish no.	—	—	—	—
Wt. evap. dish + dry soil	—	—	—	—
Wt. of evap. dish	—	—	—	—
Wt. of dry soil = W_s	41.12	44.31	46.66	47.83
$W_w = W_s + W_{bw} - W_{bws}$	15.31	16.58	17.61	18.03
$G_s = \alpha W_s / W_w$	2.686	2.672	2.650	2.653

[a]Indicate vacuum or aspirator for air removal.
[b]W_{bw} is the weight of the flask filled with water with the same quantity of dispersing agent as added to the soil–water mixture and at the same temperature.

Remarks USED NO DEFLOCCULANT IN TEST SAMPLE(S), ALSO, PYCHNOMETERS CALIBRATED WITHOUT DEFLOCCULANT

Average specific gravity of soil solids (G_s) = 2.665 ± 0.014

$$\alpha = 1.65(G_s) / (G_s - 1)2.65 \rightarrow \alpha = 0.9966$$

WHITE TO LT. PINK CLAYEY SILT W/ FREQUENT (SOME) LENSING OF F. SAND

★ POROSITY (VALUE) $n = (.3596)$ 36.0%

SPECIFIC GRAVITY OF SOIL SOLIDS (G_s)

Project MID ATLANTIC WOOD PRESERVERS Job No. 14519 - 002 - 7071 - C

Location of Project GLEN BURNIE MD. Boring No. W-9 Sample No. 11

Description of Soil 'ML' 'ML' TO ML/SM Depth of Sample 20' TO 22'

Tested By HRS Date of Testing 2.20.89

Test no.	1 (7)	2 (2)	3 (4)	4 (08)
Vol. of flask at 20°C	500 ML			
Method of air removal[a]	ASPIRATOR			
Wt. flask + water + soil = W_{bws}	701.63	703.24	697.63	693.68
Temperature, °C	22.1°			
Wt. flask + water[b] = W_{bw}	670.24	670.30	668.20	664.10
Evap. dish no.				
Wt. evap. dish + dry soil				
Wt. of evap. dish				
Wt. of dry soil = W_s	50.59	53.18	~ 47.35	47.47
$W_w = W_s + W_{bw} - W_{bws}$	19.20	20.24	17.92	17.89
$G_s = \alpha W_s / W_w$	2.635	2.627	2.642	2.653

[a]Indicate vacuum or aspirator for air removal.
[b]W_{bw} is the weight of the flask filled with water with the same quantity of dispersing agent as added to the soil–water mixture and at the same temperature.

Remarks USED NO DEFLOCCULANT IN TEST SAMPLE(S), ALSO, ~~PYNOC~~ PYCHNOMETERS CALIBRATED WITHOUT DEFLOCCULANT

Average specific gravity of soil solids (G_s) = 2.639 ± 0.01

$$\alpha = 1.65(G_s) / (G_s - 1)2.65 \rightarrow \alpha = 1.0025$$

LT. PINK CLAYEY SILT AND F. SAND → AR0000174

* POROSITY (value) $n = (.2833)$ 28.3%

$\pi r^2 = A$

porosity → $n = V_v / V_{Tot}$ $\pi D^2 H/4 = V$

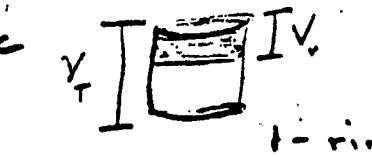
$H_s = W_s / A * G_s * \gamma_w$ $H_s - H_{total} = H_v$

γ_w = 62.4 pcf or 1 g/cc

G_s = specific gravity

A = area of specimen

W_s = wt. of dry soil



1 - ring diameter
= 2.4172"
= 6.1397 cm
= 0.20143'

Vol. of ring = 4.58897 cu ins

B-7 @ 28'-30' → (W_{wet}) (1.0296" - .0123") H_T = 1.0173"
150.1 or 0.3309705 lbs

W-5 @ 8'-10' → (158.4 or 0.3492721bs) 1.0183" → H_{TOT} = 1.0060"

W-6 @ 26'-27.3' → 159.7 or 0.3521385 1.0074 - .0123" = .9951"

B-8 @ 16'-18' → (157.1 or 0.3464061bs) 1.0064 → H_{TOT} = .9941"

W-8 @ 38.5'-40' → (158.9 or 0.3503745lbs) 1.0134" = H_{TOT} = 1.0011'

W-9 @ 20'-22' → (164.5 or 0.3627225lbs W_{TOT})
1.0062" - .0123" H_{TOT} = .9940"

		G_s	
G_s (W-5)	7.5%	2.718	.2862 = 28.6%
G_s (W-6)	17.2%	2.808	.3696 = 37.0%
G_s (B-7)	11.9%	2.646	.3503 = 35.0%
G_s (B-8 #5)	17.1%	.665 (assumed)	.3452 = 34.5%
G_s (B-8 #7)	19.3%	2.665	.3596 = 36.0%
G_s (W-9)	14.2%	[illegible]	.2833 = 28.3%

M.A.W.P. 14519-002-7071-027

	W_{TOT}	A	$W_{s(dry)}$ [lbs]	★ V_{tot}	H_s	V_{solids}	★
W-5 #5	lbs .349272	sq. Ft .0318342	.3230766	cu Ft. .0026687	.059838		.00076
W-6 #14	.3521305	↑	.2915707	.0026398	.0522719	.001664	.00097
B-7 @ 28'	.5309705		.2915850	.0026987	.05507597	.0017533	.000
B-8 #9	lbs .346406		.2871706	cu. Ft. .0026371	Ft .0542455	cu. Ft. .0017268	.0009
B-8 #17	lbs .3503745	↓	.2828132	cu Ft .0026557	Ft .053423	cu Ft .0017006	.0009
W-9 #11	lbs .3627225	sq Ft. .0318342	.3112211	cu Ft .0026369	Ft .0593678		.0007

		porosity (%)
W-5 #5	.2862	28.6
W6 #14	.3696	37.0
B-7 @ 28'	.3503	35.0
B-8 #9	.3452	34.5
B-8 #17	.3596	36.0
W-9 #11	.2833	28.3

B-8; #17 158.93 gm * .193 = 30.67 ⇒ 128.26

= 0.2828133 lbs

A = .7871270 sq ins

= .005465809 sq Ft

Ht. = 0.5' → sq. ins to sq Ft = .006944

$H_s = W_s / A * G_s$

0.311147

W_s = .2822133 lbs

A = .005465809 sq Ft

2.66

H_{TOT} = .083425'

AR000176

pan + ring(s) + paper → 67.1

specimen + ring(s) + pan + paper (before test.) → 225.5

" + " + " + " (after test.) → 232.3

" + " + " + " (dried condition) → 214.4

wt. of dry soil → 147.3

Moisture loss (before satur.) → 11.

Moisture loss (after satur.) → 17.8

#14

WA · II

FALLING-HEAD PERMEABILITY TEST WITH CONSOLIDOMETER

DATE 2.15.89

PROJECT MID ATLANTIC WOOD PRESERVERS INC.

BORING NO W-5 ; Spl #5 ; @ 8.0' to 10.0' 14519-002-707 1-027

LT. ORANGE F. TO M. SAND w/ A LITTLE CLAYEY SILT

SAMPLE OR SPECIMEN NO.

TARE PLUS DRY SOIL			DIAMETER OF SPECIMEN, cm	D	
TARE			AREA OF SPECIMEN, sq cm	a	
DRY SOIL	W_s		INITIAL HEIGHT OF SPECIMEN, cm	L	2.5865
SPECIFIC GRAVITY	G_s	2.718	INITIAL VOL OF SPEC. cc or cu	v	
VOL OF SOLIDS, cc or cu	V_s		INITIAL VOID RATIO	e	
AREA OF STANDPIPE, sq cm	a		CONSTANT	c	.039
CAPILLARY RISE, cm	h_c	11.2	INITIAL DIAL READING, in.	D_0	.5273"
HEIGHT OF TAILWATER, cm	h_t	11.2	CORRECTED TAILWATER, cm	ΔL	0

TEST NO.		1		2		3	
LOAD INCREMENT, T/sq ft	σ						
DIAL READING AT START, in.	D_1						
CHANGE IN HT OF SPEC. in.	ΔD						
HT OF SPEC. cm	L	L on 2/21 → 2.5446 cm					
VOID RATIO	e						
		m	m	m	m	m	m
INITIAL TIME	t_0	172724	180542	184813	192842	201204	205156
FINAL TIME	t_f	180443	184658	192626	201007	203949	213149
ELAPSED TIME, sec	t	2236	2476	2293	2487	1647	2393
INITIAL HEIGHT, cm	h_1	46.00	46.00	46.00	46.00	46.00	46.00
FINAL HEIGHT, cm	h_2	37.50	37.50	37.50	37.00	37.50	36.80
WATER TEMPERATURE, °C	T	22.7	22.6	22.6	22.5	22.5	22.6
VISCOSITY CORRECTION FACTOR[1]	n_T	.938	.940	.940	.942	.942	.940
COEFFICIENT OF PERMEABILITY,[1] cm/sec	k_{20}	$3.69E^{-6}$	$3.34E^{-6}$	$3.61E^{-6}$	$3.55E^{-6}$	$4.98E^{-6}$	$3.78E^{-6}$
	AVG	3.59 x 10^{-6} cm/sec					

[1] CORRECTION FACTOR FOR VISCOSITY OF WATER AT 20°C OBTAINED FROM TABLE VI-6.

[2] $k_{20} = 2.303 \frac{a}{a_t}\left(\log\frac{h_1-\Delta L}{h_2-\Delta L}\right)_{n_T} = n_T \frac{a}{a_t}\left(\log\frac{h_1-\Delta L}{h_2-\Delta L}\right)_{n_0}$

REMARKS

TECHNICIAN HRS COMPUTED BY RS CHECKED BY

110 # 10' = 1100 psf

SURCHARGE USED 1200psf

1.0183"

2/15	2207	.511
2/16	1336	.511
2/17	2213	.511
2/18	1735	.5113
2/20	1904	.510
2/21	1550	.511
2/21	2055	.510

DEGREE SATURATION BEFORE TEST PREPARATION & H_2O INUNDATION = 64.0%

AFTER TESTING TRIALS WERE ATTEMPTED = 86.2%

$S = w G_s \gamma_d / G_s \gamma_w - \gamma_d$

$S = (\gamma_0)$

ACTUAL γ_{dry} = 120.1 pcf (before testing); γ_{wet} = 131.8 pcf

ACTUAL γ_{dry} = 122.5 pcf (after testing); γ_{wet} = 137.4 pcf

MOISTURE CONTENT PRIOR TO SATURATION → 9.7 %

MOISTURE CONTENT AFTER TEST COMPLETION → 12.2 %

pan + ring(s) + paper → 64.1 g

specimen + ring(s) + pan + paper (before test.) → 226.8

" + " + " + " (after test.) → 230.1

" + " + " + " (dried condition) → 202

wt. of dry soil → 135.5

Moisture loss (before satur.) →

Moisture loss (after satur.) → 27

#10

Degree of saturation before test prep. + samples inundation = 90.6%

After test trials while under saturation conditioning = 102.8%

WA · II

FALLING-HEAD PERMEABILITY TEST WITH CONSOLIDOMETER

DATE 2.21.89

PROJECT MID ATLANTIC WOOD PRESERVERS / GLEN BURNIE, MD.

BORING NO. W-6 ; Spl # 14 ; @ 26' to 27.3' 14519-002-7071-027

DK. RED CLAYEY SILT - SILTY CLAY w/ A TRACE F. SAND

SAMPLE OR SPECIMEN NO. MOIST TO DRY

TARE FOR DRY SOIL			DIAMETER OF SPECIMEN, cm	d	6.137
TARE			AREA OF SPECIMEN, sq cm	a	29.77
DRY SOIL	W_s		INITIAL HEIGHT OF SPECIMEN, cm	L	2.5588 → 1.0074"
SPECIFIC GRAVITY	G_s	2.808	INITIAL VOL OF SPEC. cc = aL	V	
VOL OF SOLIDS, cc = $W_s \div G_s$	V_s		INITIAL VOID RATIO = $e = V_v \div V_s$	e	
AREA OF STANDPIPE, sq cm	a		CONSTANT = a/1,000 = a/a	c	.039
CAPILLARY RISE, cm	h_c	11.1	INITIAL DIAL READING, in.	D_o	.5222"
HEIGHT OF TAILWATER, cm	h_t	11.1	CORRECTED TAILWATER, cm $h_t + h_c$	Δh	

TEST NO.		1	2	3
LOAD INCREMENT, T/SQ FT	p	2200 psf		
DIAL READING AT START, in.	D_o			
CHANGE IN HT OF SPEC. in. = $D_o - D_1$	ΔD	L = 2.5179 on 2/27/89		
HT OF SPEC. cm = L − 2.54 ΔD	L			
VOID RATIO = $e = V_v \div V_s$	e			

		3/3 10	15	30	3/3 45	3/6 00	15
INITIAL TIME	t_o	150254	134540	94116	215858	185551	144941
FINAL TIME	t_1	162215	193451	215721	232809	201629	164133
ELAPSED TIME, SEC $t_1 - t_o$	t	4765	6551	8165	5351	4828	7132
INITIAL HEIGHT, cm	h_o	45.30	46.10	46.00	46.00	46.00	46.20
FINAL HEIGHT, cm	h_1	44.40	44.60	44.50	45.10	45.00	44.55
WATER TEMPERATURE, °C	T	23.4	22.6	22.2	22.1	23.7	25.0
VISCOSITY CORRECTION FACTOR[1]	a_T	.701	.940	.949	.951	.916	.889
COEFFICIENT OF PERMEABILITY,[2] CM/SEC	k_{20}	$1.61E^{-7}$	$2.02E^{-7}$	$1.64E^{-7}$	$1.49E^{-7}$	$1.77E^{-7}$	$1.93E^{-7}$
	avg	1.74 × 10⁻⁷ CM/SEC					

[1] CORRECTION FACTOR FOR VISCOSITY OF WATER AT 20°C OBTAINED FROM TABLE VI-4.

[2] $k_{20} = 0.288 \frac{a}{t} \left| \log \frac{h_o - \Delta h}{h_1 - \Delta h} \right| a_T = \frac{aL}{t} \left| \log \frac{h_o - \Delta h}{h_1 - \Delta h} \right| a_T$

REMARKS Allowed +30 min of capillary head to pass into (and through) before trials began.

TECHNICIAN HRS COMPUTED BY RS CHECKED BY

SURCHARGE = 2400 psf

2/21 2219 − .50

2/22 1957 .50

2/27 2052 .50

3/1 1822 .50

3/3 1420 .50

3/6 1845 .50

H_2O @ ~10'

110# 10' = 1100 psf

64# 17.3' = 1107 psf

1100 + 1107 = 2210 psf

Actual γ_{dry} = 112.7 pcf (before testing); γ_{wet} = 132.9 pcf

Actual γ_{dry} = 112.7 pcf (after testing); γ_{wet} = 135.

AR0000178

Moisture Content Prior to Saturation → 17.9 %

Moisture Content After Test Completion → 20.3 %

pan + ring(s) + paper → 61.3

specimen + ring(s) + pan + paper (before test.) → 218.6

" + " + " + " (after test.) → 232.3

" + " + " + " (dried condition) → 192.5

wt. of dry soil → 124.0

Moisture loss (before satur.) → 26.

Moisture loss (after satur.) → 39.

G92

WA-1

FALLING-HEAD PERMEABILITY TEST WITH CONSOLIDOMETER

DATE 3.3.89

PROJECT MID ATLANTIC WOOD PRESERVERS / GLEN BURNIE, MD.

BORING B-7 ; SPL# ; @ 28'-30' 14519-002-7071-07

LT. TAN TO TAN F. TO M. SAND w/ A TRACE CLAYEY SILT

SOURCE OF SPECIMEN MOIST TO WET ('SP')

BY WEIGHT						
	TARE PLUS DRY SOIL			DIAMETER OF SPECIMEN, cm	D	6.137
	TARE			AREA OF SPECIMEN, SQ CM	A	29.77
	DRY SOIL	W_s		INITIAL HEIGHT OF SPECIMEN, CM	L	2.6152
SPECIFIC GRAVITY		G_s	2.646	INITIAL VOL OF SPEC. CC OR CU	V	
VOL OF SOLIDS, CC $= W_s \div G_s$		V_s		INITIAL VOID RATIO $= V_v \div V_s$	e	
AREA OF STANDPIPE, SQ CM		a		CONSTANT $= 0.238 \times a \div A$	c	.142
CAPILLARY RISE, CM		h_c	7.9	INITIAL DIAL READING, IN.	D_0	.4834"
HEIGHT OF TAILWATER, CM		h_t	7.9	CORRECTED TAILWATER, CM $h_t - h_c$	Δh	0

TEST NO.		1		2		3	
LOAD INCREMENT, T/SQ FT	P	3000					
DIAL READING AT START, IN.	D_0						
CHANGE IN HT OF SPEC. IN. $= D_0 - D_1$	ΔD						
HT OF SPEC. CM $0.1 - 2.54\,\Delta D$	L	L = 2.5248 cm on 3/4/89					
VOID RATIO $= V_v \div V_s$	e						
		AM	PM	AM	PM	AM	PM
INITIAL TIME	t_0	180250	212339	181519	181810	182111	183214
FINAL TIME	t_1	180942	181337	181609	181901	182201	183905
ELAPSED TIME, SEC $= t_1 - t_0$	t	50	53	50	51	50	51
INITIAL HEIGHT, CM	h_0	55.00	55.00	55.00	55.00	55.00	55.00
FINAL HEIGHT, CM	h_1	35.00	35.00	35.00	35.00	35.00	35.00
WATER TEMPERATURE, °C	T	24.0	24.0	24.0	23.9	23.9	23.7
VISCOSITY CORRECTION FACTOR[1]	α_T	.910	.910	.910	.912	.912	.916
COEFFICIENT OF PERMEABILITY,[2] CM/SEC	k_{20}	$1.28E^{-3}$	$1.21E^{-3}$	$1.28E^{-3}$	$1.26E^{-3}$	$1.28E^{-3}$	$1.20E^{-3}$
	AVG	1.26 x 10^{-3} cm/sec					

[1] CORRECTION FACTOR FOR VISCOSITY OF WATER AT 20°C OBTAINED FROM TABLE VII-6.

[2] $k_{20} = 2.303 \frac{a}{A} \frac{L}{t} \left(\log \frac{h_1 - \Delta h}{h_0 - \Delta h}\right) \alpha_T = 2.303 \frac{a}{A} \frac{L}{t} \left(\log \frac{h_1 - \Delta h}{h_0 - \Delta h}\right) \alpha_T$

REMARKS before begining test trials ~ 150 ml of tailwater was produced

TECHNICIAN HRS COMPUTED BY RS CHECKED BY

SURCHARGE = 3000 PSF → 1.0296"

3/3 1847 - .4471

3/3 1957 - .4478

3/6 1215 - .4478

3/6 1830 - .4479

H_2O @ 20'

110 # 2.0 = 2200 psf

64 # 10 = 640 psf

2840 psf

DEGREE OF SATURATION BEFORE TEST PREPARATION = $W_s \gamma_d / G_s \gamma_w - \gamma_d$ = 92.6%

" " AFTER TESTING TRIALS WERE ATTEMPTED = " = 141.6%

ACTUAL γ_{dry} = 103.2 pcf (before testing); γ_{wet} = 124.9 pcf

ACTUAL γ_{dry} = 103.2 pcf (after testing); γ_{wet} = 136.3 pcf

MOISTURE CONTENT PRIOR TO SATURATION → 21.0 %

MOISTURE CONTENT AFTER TEST COMPLETION → 32.1 %

pan + ring(s) + paper → 68.1 #
specimen + ring(s) + pan + paper (before test.) → 225.2 D3
" + " + " + " (after test.) → 228.9
" + " + " + " (dried condition) → 199
wt. of dry soil → 131.7 Moisture loss (before satur.) →
Moisture loss (after satur.) → 29

WA-1

FALLING-HEAD PERMEABILITY TEST WITH CONSOLIDOMETER

DATE 2.15.89

PROJECT Mid Atlantic Wood Preservers Inc.

BORING NO. B-8 ; spl #9 ; @ 16.0' to 18.0' 14519-002-7071-027

Motiled white to red to violet silty clay w/ a trace of interbedded m. to c. sand size particles (i.e. ironstone)

WT IN GRAMS	TARE PLUS DRY SOIL			DIAMETER OF SPECIMEN, CM	D	
	TARE			AREA OF SPECIMEN, SQ CM	A	
	DRY SOIL	W_s		INITIAL HEIGHT OF SPECIMEN, CM	L	2.5563
SPECIFIC GRAVITY		G_s	2.665	INITIAL VOL OF SPEC, CC = AL	V	
VOL OF SOLIDS, CC = W_s ÷ G_s		V_s	(Assumed)	INITIAL VOID RATIO = (V − V_s) ÷ V_s	e	
AREA OF STANDPIPE, SQ CM		a		CONSTANT = aL ÷ A	C	.039
CAPILLARY RISE, CM		h_c	7.9	INITIAL DIAL READING, IN.	D_0	.4514"
HEIGHT OF TAILWATER, CM		h_t	7.9	CORRECTED TAILWATER, CM, h_c + h_t	Δh	—

1.0064"

Surcharge @ 1800 psf

2/15 2207 .42
2/16 1335 .42
2/17 2215 .42
2/18 1736 .42
2/20 1905 .42
2/27 2050 .42
3/1 1824 .41
3/2 1820 .40

TEST NO.		1		2		3	
LOAD INCREMENT, T/SQ FT	p						
DIAL READING AT START, IN.	D_1						
CHANGE IN HT OF SPEC, IN. = D_0 − D_1	ΔD	L = 2.4745 cm		on 3/1/89			
HT OF SPEC, CM = L − 2.54 ΔD	L	L = 2.4745 cm		on 3/2/89			
VOID RATIO = (AL − V_s) ÷ V_s	e						
		3/1			3/2		
INITIAL TIME	t_0	181612	193753	210658	155257	170932	191442
FINAL TIME	t_1	193213	210211	222147	170021	184933	203019
ELAPSED TIME, SEC = t_1 − t_0	t	4561	5058	4489	4051	6001	4537
INITIAL HEIGHT, CM	h_0	53.00	53.00	53.00	53.00	52.70	51.90
FINAL HEIGHT, CM	h_1	47.30	46.70	47.30	47.90	45.40	46.30
WATER TEMPERATURE, °C	T	22.9	23.4	23.7	23.7	23.9	23.9
VISCOSITY CORRECTION FACTOR(1)	R_T	.933	.923	.916	.916	.912	.912
COEFFICIENT OF PERMEABILITY,(2) CM/SEC	k_{20}	9.75E-7	9.67E-7	9.73E-7	9.58E-7	9.49E-7	9.61E-7
	AVG	9.64 x 10^-7 cm/sec					

(1) CORRECTION FACTOR FOR VISCOSITY OF WATER AT 20 C OBTAINED FROM TABLE VIII-1.

(2) $k_{20} = 2.303 \frac{a}{A}\frac{L}{t}\left(\log \frac{h_0 - \Delta h}{h_1 - \Delta h}\right) R_T = \frac{CL}{t}\left(\log \frac{h_0 - \Delta h}{h_1 - \Delta h}\right) R_T$

REMARKS Allowed ~45 mls of capillary head to pass before attempting to run test trials

TECHNICIAN HLS COMPUTED BY RS CHECKED BY

ENG FORM 2090

110 # 10' = 1100 psf
hit H_2O @ 10'
64 # 8' = 512
1100 + 510 = 1610 psf

Degree of saturation before test preparation & H_2O inundation = 99.4 %

After testing trials were attempted = 113.9 %

$S = w G_s \gamma_d / (G_s \gamma_w - \gamma_d)$

Actual γ_{dry} = 109.6 pcf (before testing); γ_{wet} = 130.7 pcf

Actual γ_{dry} = 109.6 pcf (after testing); γ_{wet} = 133.8 pcf

Moisture content prior to saturation → 19.3 %

Moisture content after test completion → 22.1 %

pan + paper — 60.7

specimen + ring(s) + pan + paper (before test.) → 227.6

" + " + " + " (after test.) → 236.9

" + " + " + " (dried condition) → 204.4

wt. of dry soil → 135.7

Moisture loss (before satur.) → 23.2

Moisture loss (after satur.) → 32.5

(11)

WA-IV

FALLING-HEAD PERMEABILITY TEST WITH CONSOLIDOMETER

DATE 2.15.89

PROJECT Mid Atlantic Wood Preservers Inc.

BORING NO. B-8 ; Spl #17 ; @ 38.5' to 40' 14519-002-7071-087

SAMPLE OR SPECIMEN NO. White to Lt. Tan clayey silt (MH) interbedded w/ some lenses = stringers of F. to M. sand w/ a little intermittent nodules of silty clay

Tare plus dry soil			Diameter of specimen, cm		d	
Tare			Area of specimen, sq cm		a	
Dry soil	w_s		Initial height of specimen, cm		L_i	2.5740 → 1.0134"
Specific gravity	G_s	2.665	Initial vol. of spec. cc = aL		v	
Vol. of solids, cc = $v_s = w_s/G_s\gamma_w$	v_s		Initial void ratio = $e = v_v/v_s$		e	
Area of standpipe, sq cm	a		Constant = $c = a/A$		c	.039
Capillary rise, cm	h_c	11.4	Initial dial reading, in.		D_i	.6088
Height of tailwater, cm	h_t	11.4	Corrected tailwater, cm $h_t + \Delta_i$		Δ_i	—

Test no.		1		2		3	
Load increment, T/sq ft	p						
Dial reading at start, in.	D_i						
Change in ht of spec., in. $= D_i - D_f$	Δ_D	L = 2.5133 cm on 3/1/89					
Ht of spec., cm $= L - 2.54\Delta_D$	L	L = 2.5131 cm on 3/2/89					
Void ratio = $e = v_v/v_s$	e						
		a	b	a	b	a	b
Initial time	t_i	171720	181547	193931	210614	155434	170822
Final time	t_f	180714	193151	210113	222111	170051	184840
Elapsed time, sec $= t_f - t_i$	t	2994	4564	4908	4497	3977	6018
Initial height, cm	h_i	52.00	52.00	52.00	53.00	53.00	53.00
Final height, cm	h_f	48.00	46.10	47.20	46.90	47.50	45.00
Water temperature, °C	T	22.3	22.5	23.4	23.7	23.7	23.9
Viscosity correction factor[1]	α_T	.947	.933	.923	.916	.916	.912
Coefficient of permeability,[2] cm/sec	k_{20}	$1.08E^{-6}$	$1.05E^{-6}$	$1.02E^{-6}$	$1.06E^{-6}$	$1.07E^{-6}$	$1.06E^{-6}$
	ave	1.06 x 10-6 cm/sec					

[1] Correction factor for viscosity of water at T°C obtained from table VI-6.

[2] $k_{20} = 2.303 \frac{a}{A} \frac{L}{t} \left(\log \frac{h_i - \Delta_i}{h_f - \Delta_i}\right)_a = \frac{cL}{t} \left(\log \frac{h_i - \Delta_i}{h_f - \Delta_i}\right)_a$

Remarks: passed w 50 mls of capillary head prior to running test trials

Technician: Hes Computed by: RS Checked by:

Surcharge used = 3200 psf

2/15	2206	.5871"
2/16	1337	.5863"
2/17	2213	.5859"
2/18	1736	.5860"
2/20	1904	.5856"
2/27	2052	.5851"
3/1	1816	.5849"
3/2	2030	.5848"

H_2O @ 10'

110 # 10' = 1100

64 # 30' = 1920

= 3020 psf

Degree of Saturation Before Test Preparation & H_2O Inundation = 97.5%

" " " After Testing Trials were Attempted = +136%

$S = w G_s \gamma_w / G_s \gamma_w - \gamma_d$

Actual γ_{dry} = 112.9 pcf (before testing); γ_{wet} = 132.2 pcf

Actual γ_{dry} = 112.9 pcf (after testing); γ_{wet} = 139.9 pcf

AR000181

Moisture Content Prior to Saturation → 17.1 %

Moisture Content After Test Completion → 23.9 %

pan + paper → 100.7

specimen + ring(s) + pan + paper (before test.) → 233.2

" + " + " + " (after test.) → 235.7

" + " + " + " (dried condition) → 21[illegible]

wt. of dry soil → 143.8

Moisture Loss (before satur.)

Moisture Loss (after satur.) → 2

WA-III

FALLING-HEAD PERMEABILITY TEST WITH CONSOLIDOMETER

DATE 2.15.89

PROJECT MID ATLANTIC WOOD PRESERVERS

BORING NO. W-9 ; spl #11 ; DEPTH @ 20' TO 22' 14519-012-7071-027

TOP OF SAMPLE → MOTTLED VIOLET TO WHITE TO PURPLE CLAYEY SILT W/ A LITTLE SILTY CLAY STRINGERS W/ SOME F. SAND STRINGERS IN TOP PORTION

SAMPLE OF SPECIFIED

AT TO BEGIN	TARE PLUS DRY SOIL		DIAMETER OF SPECIMEN, CM	D	
	TARE		AREA OF SPECIMEN, SQ CM	A	
	DRY SOIL	w_s	INITIAL HEIGHT OF SPECIMEN, CM	L_o	2.5560
SPECIFIC GRAVITY		G_s 2.639	INITIAL VOL OF SPEC, CC = AL	V	
VOL OF SOLIDS, CC = $v_s = \frac{w_s}{G_s}$		v_s	INITIAL VOID RATIO = $e = V_v / V_s$	e	
AREA OF STANDPIPE, SQ CM		a	CONSTANT = $\frac{a}{A} \cdot \frac{L}{t}$	c	.039
CAPILLARY RISE, CM		h_k 11.2	INITIAL DIAL READING, IN.	D_o	.4778"
HEIGHT OF TAILWATER, CM		h_t 11.2	CORRECTED TAILWATER, CM $h_t + h_k$	Δh	0

TEST NO.		1	2	3	
LOAD INCREMENT, T/SQ FT	σ				
DIAL READING AT START, IN.	D_1				
CHANGE IN HT OF SPEC, IN. = $D_2 - D_1$	ΔD				
HT OF SPEC, CM $L = L_o - 2.54\,\Delta D$	L	L = 2.5080 CM ON		3/2/89	
VOID RATIO = CAL = V_v / V_s	e				

		2/24	3/3	3/3	3/3	3/—	3/—
INITIAL TIME	t_1	191516	140324	162111	180929	155347	170806
FINAL TIME	t_2	203121	154937	180439	194041	170129	184729
ELAPSED TIME, SEC = $t_2 - t_1$	t	4565	6373	9808	5472	4062	5963
INITIAL HEIGHT, CM	h_1	52.00	52.30	52.40	47.80	52.00	51.30
FINAL HEIGHT, CM	h_2	48.50	47.80	48.00	44.30	48.70	47.30
WATER TEMPERATURE, °C	T	23.9	23.2	23.1	22.5	23.7	23.9
VISCOSITY CORRECTION FACTOR[1]	α_T	.912	.927	.929	.942	.916	.912
COEFFICIENT OF PERMEABILITY,[2] CM/SEC	k_{20}	$5.91E^{-7}$	5.552^{-7}	3.528^{-7}	$5.56E^{-7}$	$6.28E^{-7}$	$6.02E^{-7}$
	AVG	5.47 X 10 $^{-7}$ CM/SEC					

[1] CORRECTION FACTOR FOR VISCOSITY OF WATER AT 20°C OBTAINED FROM TABLE VIII-6.

[2] $k_{20} = 2.303 \frac{a}{A} \frac{L}{t} \left[\log \frac{h_1 - \Delta h}{h_2 - \Delta h}\right] \alpha_T = \frac{2.3}{t} \left[\log \frac{h_1 - \Delta h}{h_2 - \Delta h}\right] \alpha_T$

REMARKS ALLOWED ~ 60 MLS OF CAPILLARY HEAD TO PENETRATED SAMPLE BEFORE BEGINING TEST TRIALS

TECHNICIAN HRS COMPUTED BY RJS CHECKED BY

SURCHARGE = 2000 p

→ 1.0063 "

2/15	2206	.41
2/16	1338	. "
2/17	1751	. "
2/18	1734	. "
2/20	1902	. "
2/27	2053	. "
3/1	1820	. "
3/2	2040	. "
3/3	1854	. "

H_2O @ ~ 10'

110 # 10' = 1100 psf

64 # 18' = 770 p-f

770 + 1100 = 187=

DEGREE OF SATURATION BEFORE TEST PREPARATIONS WERE ATTEMPTED = 100.9 %

" " AFTER TESTING TRIALS HAS BEEN ATTEMPTED = 112.7 %

" " = " "

$S = w G_s \gamma_d / G_s \gamma_w - \gamma_d$

ACTUAL γ_{dry} = 119.7 pcf (before testing); γ_{wet} = 136.9 p

ACTUAL γ_{dry} = 119.6 pcf (after testing); γ_{RATIO} 182

MOISTURE CONTENT PRIOR TO SATURATION → 14.4 %

MOISTURE CONTENT AFTER TEST COMPLETION → 16.1

KAPPE ASSOCIATES, INC.
SCIENTIFIC RESEARCH DIVISION

P.O. BOX 1036 • 14211 TRAVILAH ROAD, ROCKVILLE, MD. 20850 • (301) 762-7797 • FAX: (301) 762-6487

February 27, 1989

Mr. Randy Sparks
Dames & Moore
7101 Wisconsin Ave.
Suite 700
Bethesda, MD 20814

Subject: Report of Analysis
Soil Samples - PO# WA 1686

Dear Mr. Sparks:

The results of the analyses performed on the six (6) soil samples received from you on February 21, 1989 are given below.

Sample I.D.	%Fixed Solids	%Volatile Solids
W-5; #5; @ 8' to 10'	97.9	2.1
W-6; #14; @ 26' to 27.3'	94.6	5.4
W-9; #11; @ 20' to 22'	97.1	2.9
B-7; #?; @ 28' to 30'	99.7	0.3
B-8; #9; @ 16' to 18'	96.8	3.2
B-8; #17; @ 38.5' to 40'	96.9	3.1

Thank you for this opportunity to serve you. Should you have any questions concerning this report, please do not hesitate to call.

Very truly yours,

KAPPE ASSOCIATES, INC.
Scientific Research Division

Julia M. Patel

Julia M. Patel
Laboratory Manager

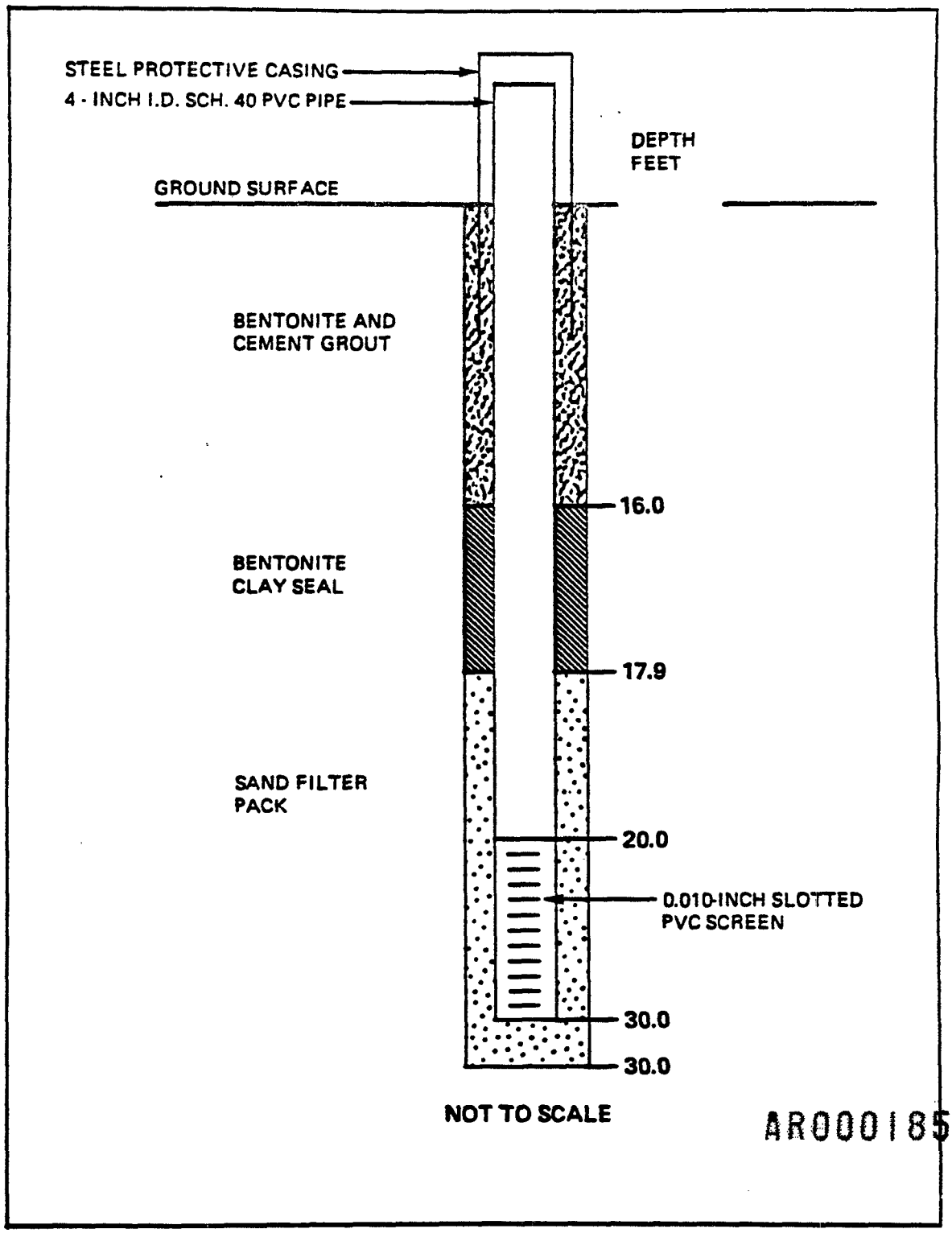
JMP/pm

APPENDIX C

Well Construction Diagrams

WELL INSTALLATION DIAGRAM
FOR
REMEDIAL INVESTIGATION
MID-ATLANTIC WOOD PRESERVERS
HARMANS, MARYLAND

Location: WELL 1
Installation Date: 1-31-89
Ground Elevation: 115. 4
Top of PVC Elevation: 118.03

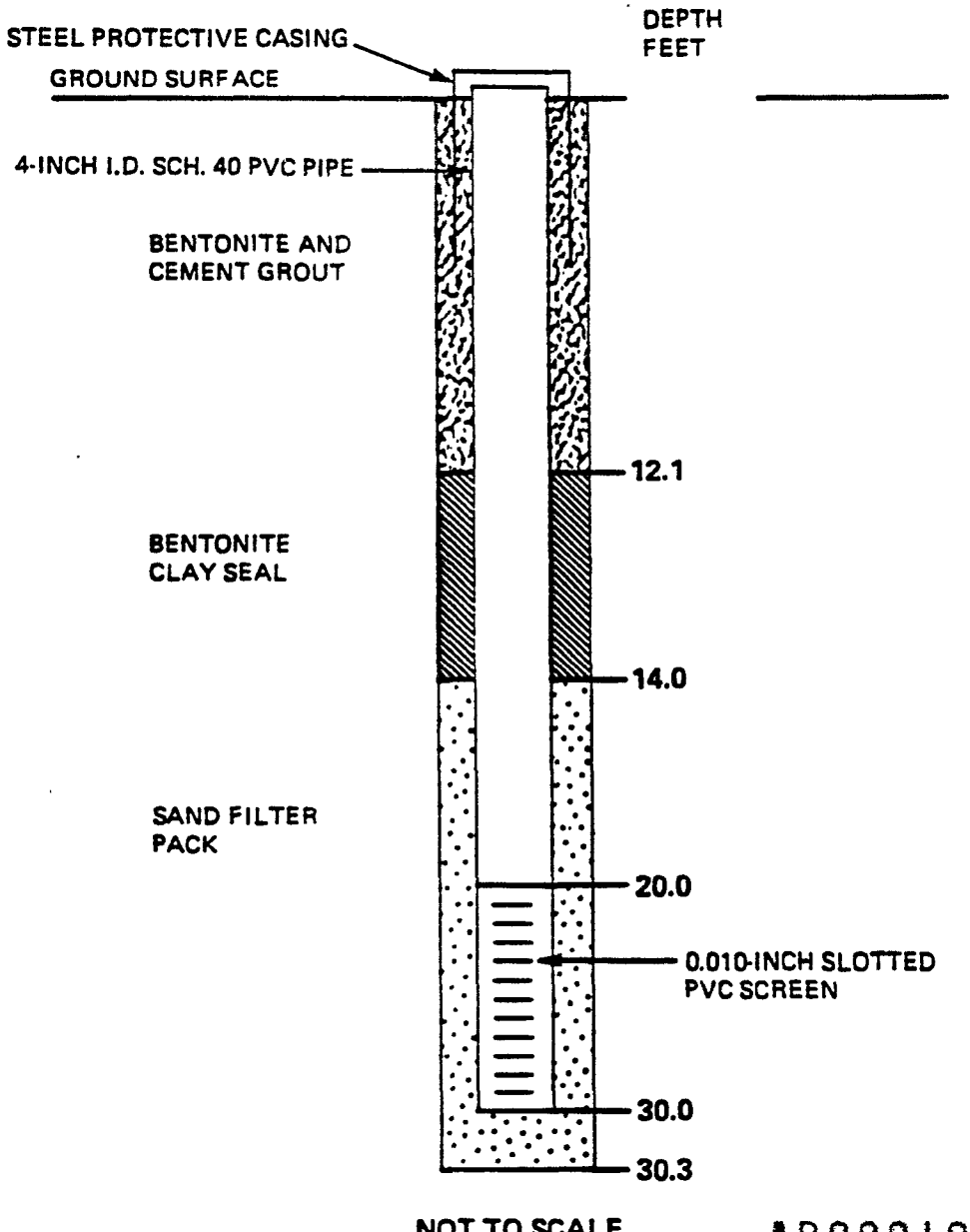


AR000185

Dames & Moore

WELL INSTALLATION DIAGRAM
FOR
REMEDIAL INVESTIGATION
MID-ATLANTIC WOOD PRESERVERS
HARMANS, MARYLAND

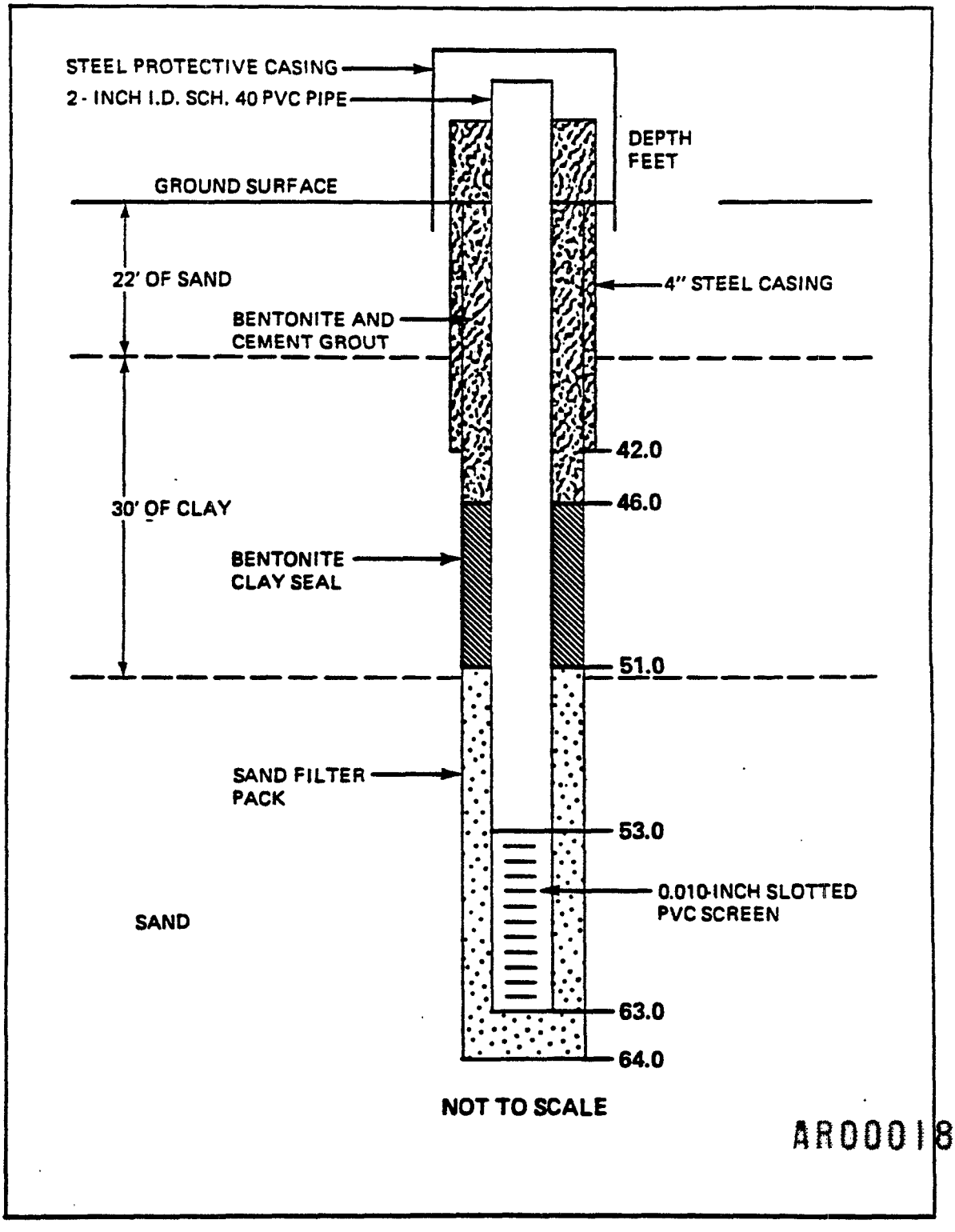
Location: WELL 2
Installation Date: 1-31-89
Ground Elevation: 109.4
Top of PVC Elevation: 109.33



AR000186

WELL INSTALLATION DIAGRAM
FOR
REMEDIAL INVESTIGATION
MID-ATLANTIC WOOD PRESERVERS
HARMANS, MARYLAND

Location: WELL 3
Installation Date: 2-14-89
Ground Elevation: 97.8
Top of PVC Elevation: 100.05

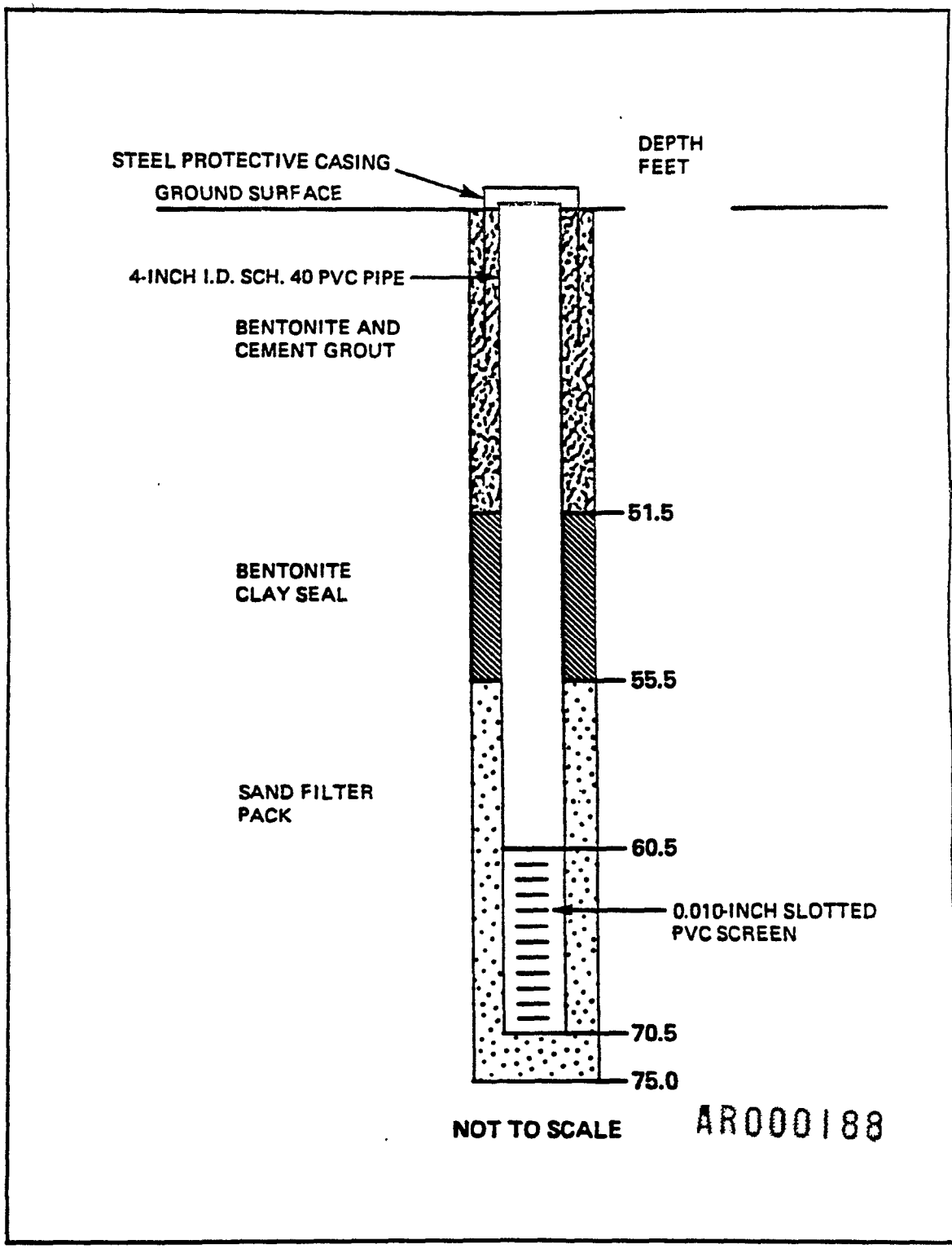


AR000187

Dames & Moore

WELL INSTALLATION DIAGRAM
FOR
REMEDIAL INVESTIGATION
MID-ATLANTIC WOOD PRESERVERS
HARMANS, MARYLAND

Location: WELL 4
Installation Date: 2-2-89
Ground Elevation: 109.5
Top of PVC Elevation: 109.

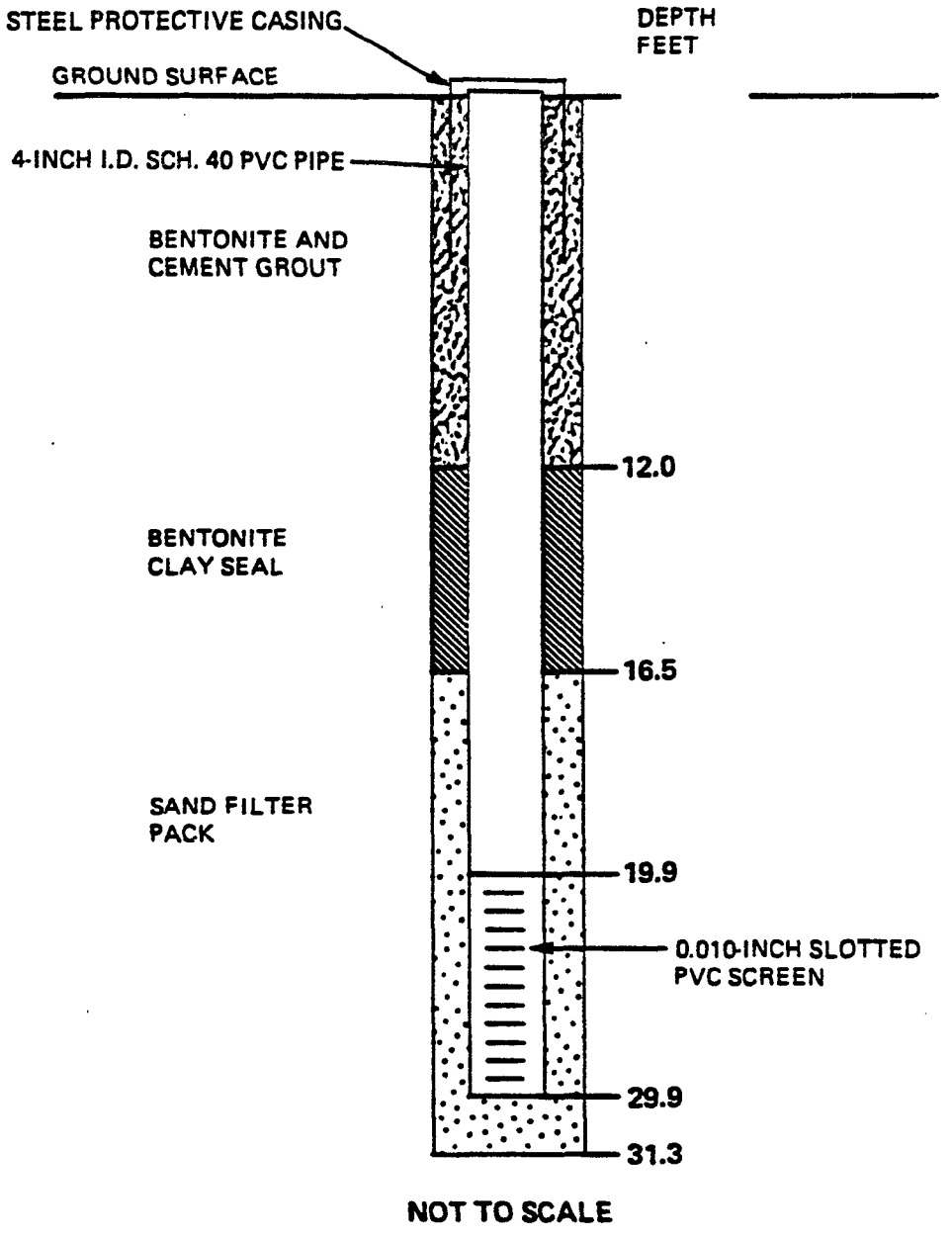


AR000188

Dames & Moo

WELL INSTALLATION DIAGRAM
FOR
REMEDIAL INVESTIGATION
MID-ATLANTIC WOOD PRESERVERS
HARMANS, MARYLAND

Location: WELL 5
Installation Date: 1-18-89
Ground Elevation: 111.6
Top of PVC Elevation: 111.36

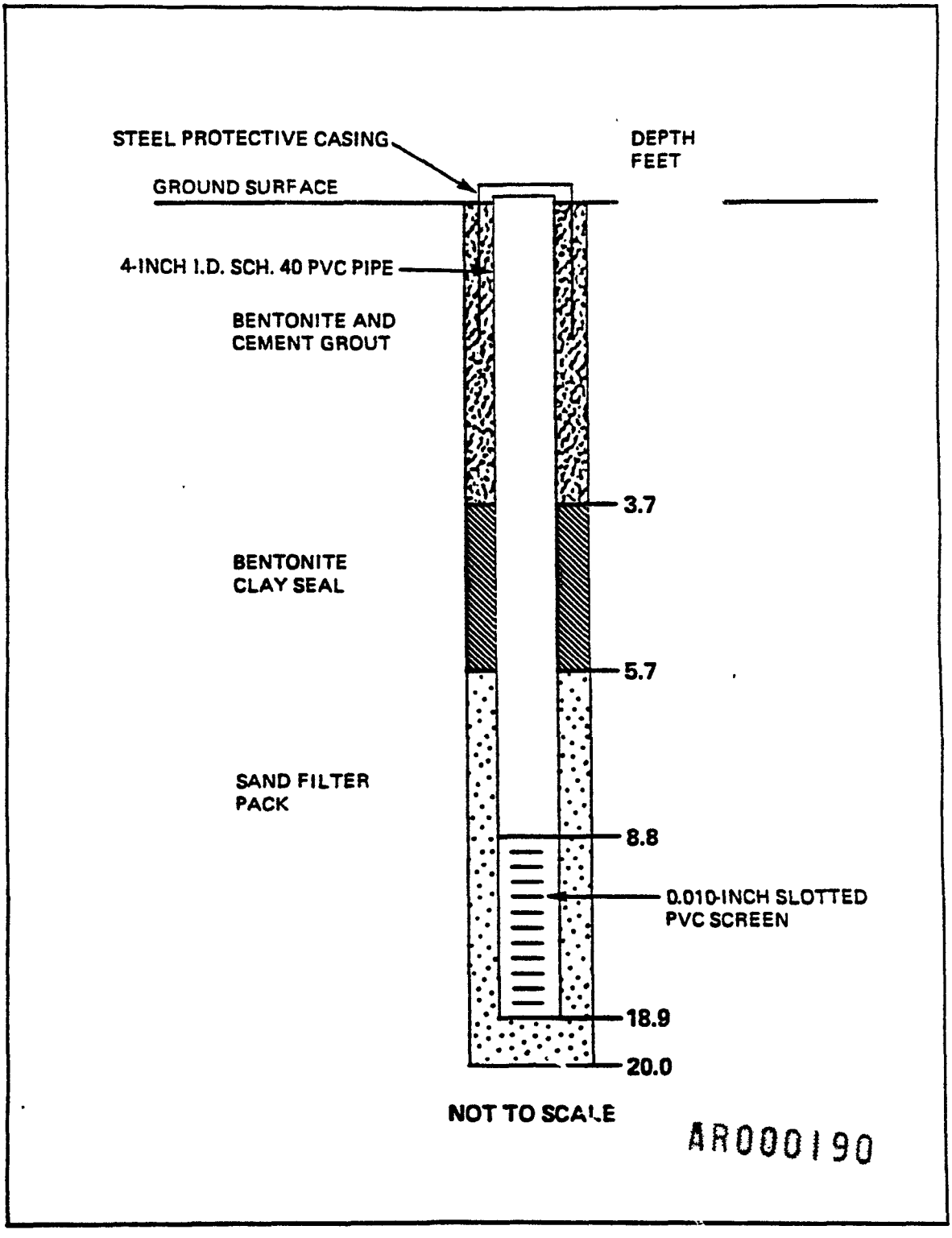


AR000189

Dames & Moore

WELL INSTALLATION DIAGRAM
FOR
REMEDIAL INVESTIGATION
MID-ATLANTIC WOOD PRESERVERS
HARMANS, MARYLAND

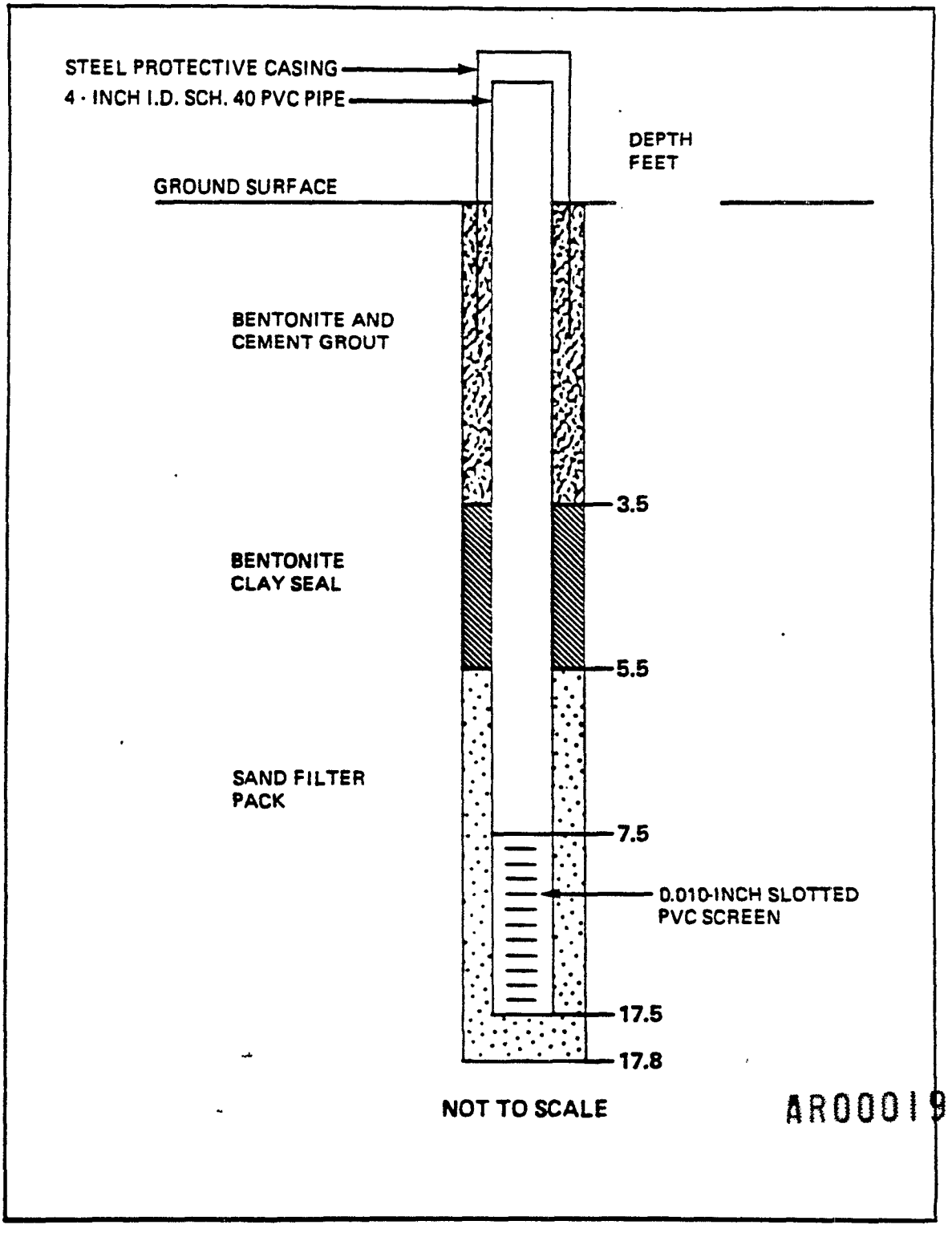
Location: WELL 6
Installation Date: 1-10-89
Ground Elevation: 101.5
Top of PVC Elevation: 100.64



AR000190

WELL INSTALLATION DIAGRAM
FOR
REMEDIAL INVESTIGATION
MID-ATLANTIC WOOD PRESERVERS
HARMANS, MARYLAND

Location: WELL 7
Installation Date: 2-8-89
Ground Elevation: 100.9
Top of PVC Elevation: 103.61

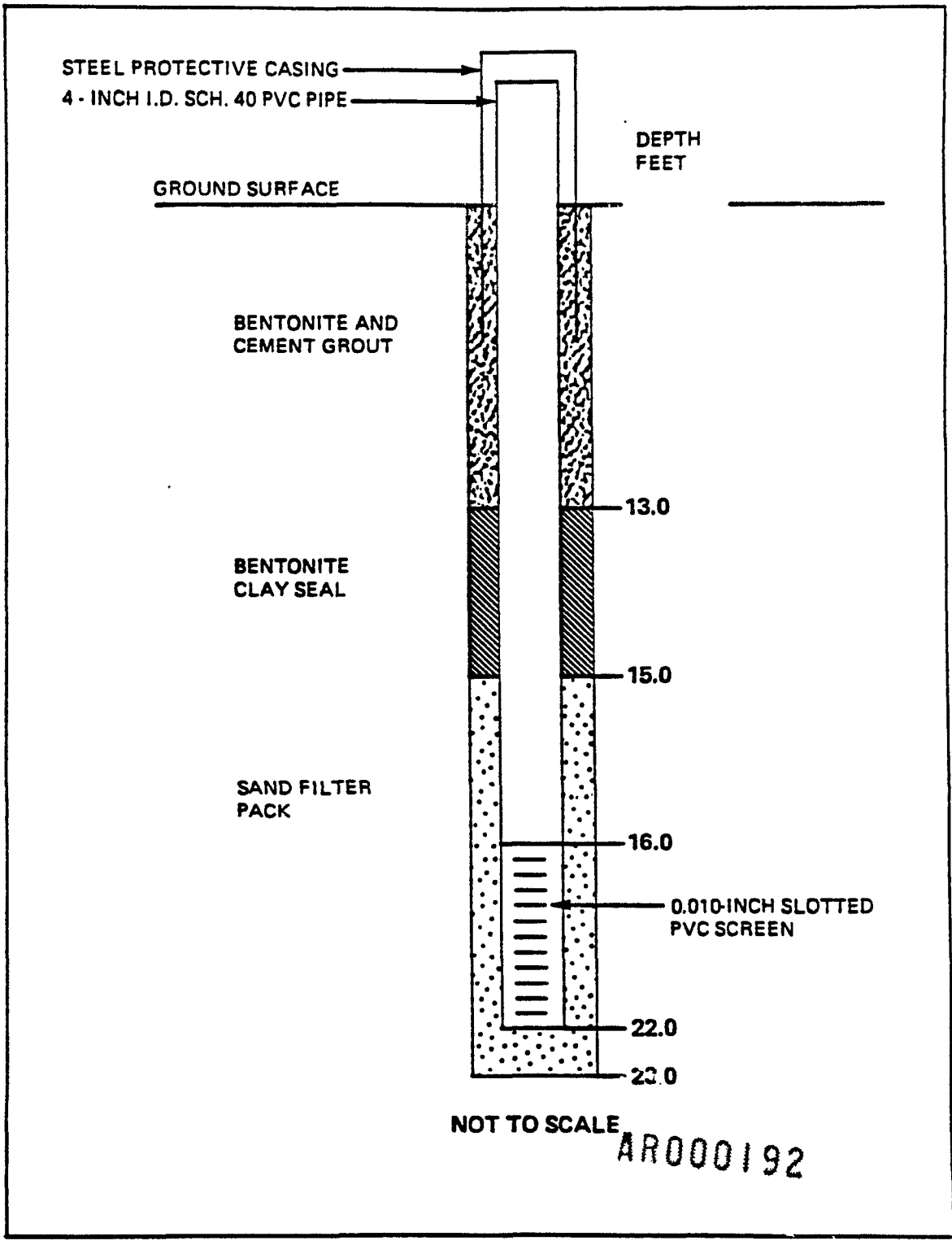


AR000191

Dames & Moore

WELL INSTALLATION DIAGRAM
FOR
REMEDIAL INVESTIGATION
MID-ATLANTIC WOOD PRESERVERS
HARMANS, MARYLAND

Location: WELL 8
Installation Date: 2-7-89
Ground Elevation: 97.8
Top of PVC Elevation: 100.2

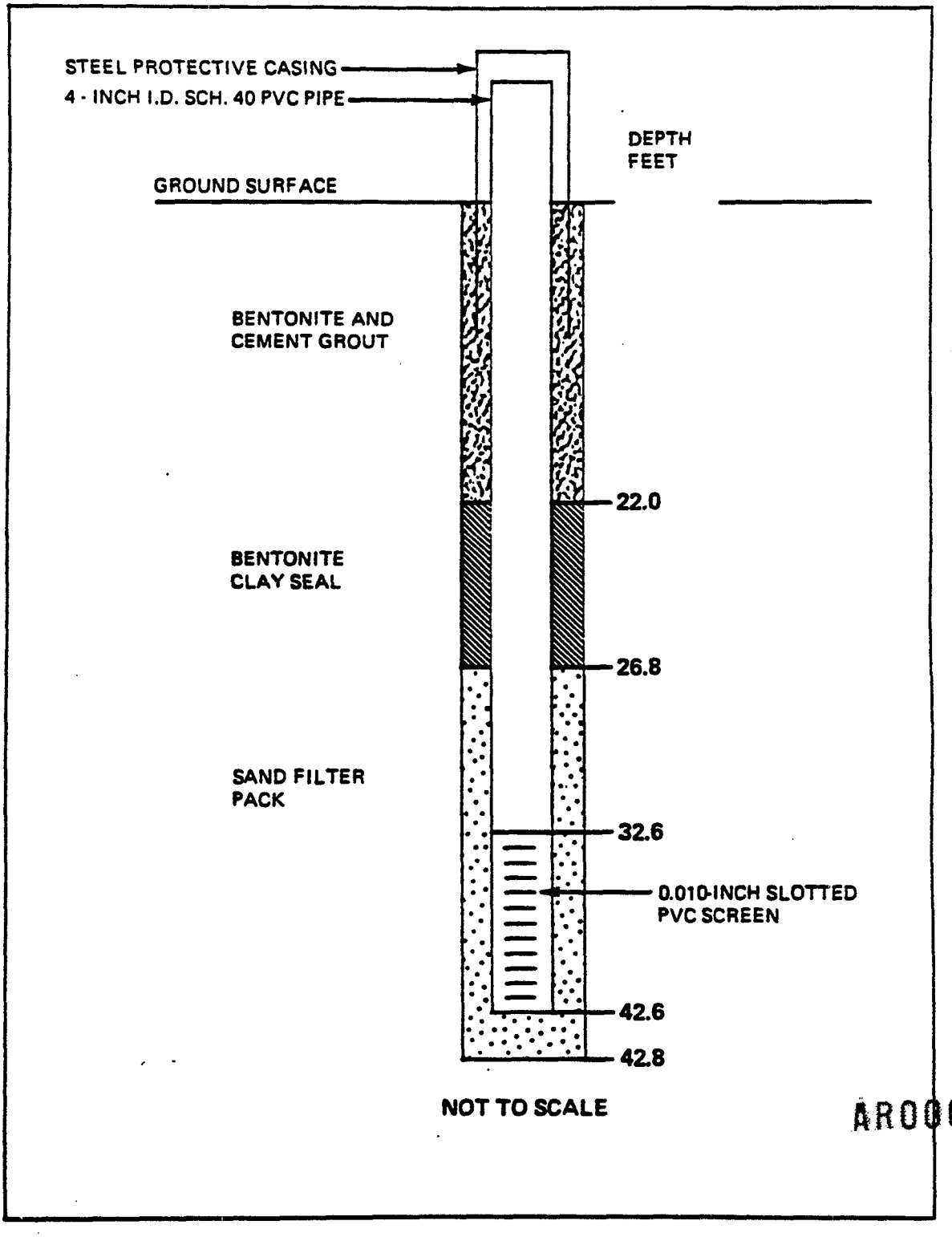


AR000192

Dames & Moor

WELL INSTALLATION DIAGRAM
FOR
REMEDIAL INVESTIGATION
MID-ATLANTIC WOOD PRESERVERS
HARMANS, MARYLAND

Location: WELL 9
Installation Date: 2-8-89
Ground Elevation: 101.0
Top of PVC Elevation: 103.83

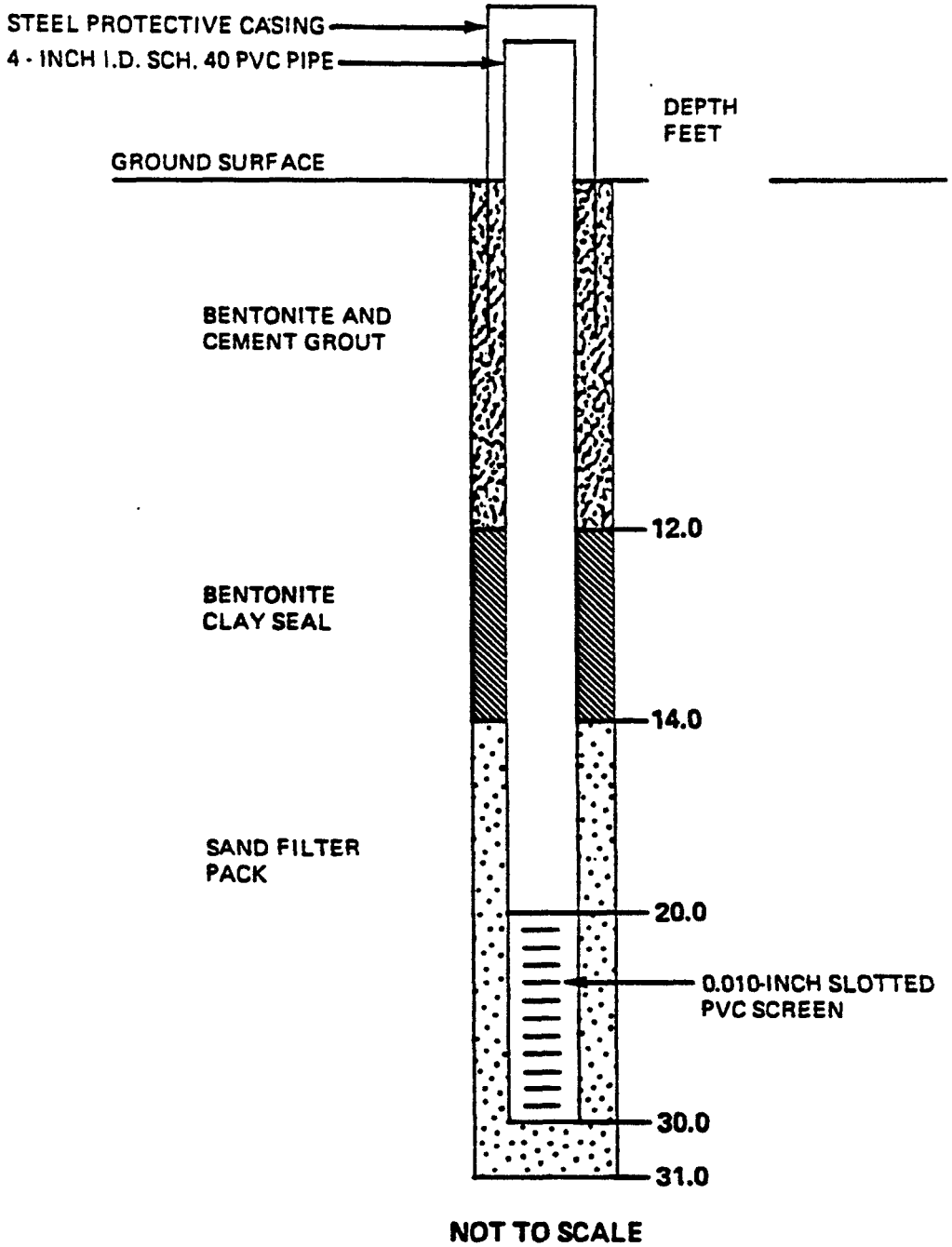


AR000193

Dames & Moore

WELL INSTALLATION DIAGRAM
FOR
REMEDIAL INVESTIGATION
MID-ATLANTIC WOOD PRESERVERS
HARMANS, MARYLAND

Location: WELL 10
Installation Date: 2-6-89
Ground Elevation: 108.5
Top of PVC Elevation: 110.84



NOT TO SCALE

AR000194

APPENDIX D

Survey Data

KIDDE CONSULTANTS, INC.

1020 Cromwell Bridge Road
Towson, Maryland 21204

Main Telephone Number: (301) 321-5500

Telefax Number: (301) 321-5504

TELEFAX TRANSMITTAL

DATE: 4/3/89

TIME: 9:00 AM

NUMBER OF PAGES INCLUDING THIS PAGE: 3

JOB NUMBER: 01-99909

TO:

COMPANY: Dames & Moore

PERSON: Paul Lagace

TELEPHONE NUMBER: (301) ~~565~~ 656-8059

FROM: Kidde Consultants Inc.

PERSON: R. Eastwood

TELEPHONE NUMBER: 583-1767

MESSAGE:

AR000196

KIDDE CONSULTANTS INC.
PROJECT NAME: SHIPLEY AVENUE
PROJECT NO.: 81-8904656
WORK ORDER NO.: 51759

SITE #	DESCRIPTION	MARYLAND STATE PLANE CO-ORDINATES NORTH	EAST	ELEVATION ABOVE MEAN SEA LEVEL NATURAL GROUND	TOP OF COVER	OUTER METAL CASING	INNER METAL CASING	TOP OF PVC CASING	TOP OF PIPE
1	WELL	483744.4	885633.5	115.4	118.51		117.98	118.03	
2	WELL	483651.2	885490.5	109.4	109.51			109.33	
3	WELL	484084.7	885126.4	97.8	100.49	99.97	100.04	100.05	
4	WELL	483864.7	885483.6	109.8	109.76			109.56	
5	WELL	483938.6	885655.0	111.6	111.73			111.36	
6	WELL	483743.5	885139.4	101.5	101.51			100.64	
7	WELL	484242.2	885345.5	100.9	104.21		103.70	103.61	
8	WELL	484052.8	885119.4	97.8	100.81		100.29	100.29	
9	WELL	484232.8	885346.7	101.8	104.47		103.97	103.83	
10	WELL	483778.1	885428.5	108.5	111.64		111.16	110.84	
11	BLDG CORNER	483866.3	885487.6						89.33
12	FLOWLINE CREEK	483791.2	884485.4						87.96
13	FLOWLINE CREEK	484144.0	884719.1						

NOTES:
1. Co-ordinate values are based on Maryland State Grid from field run data using Anne Arundel County Monument # 52-C.
2. Vertical data determined from field run data based on Anne Arundel County Monument 052-C.

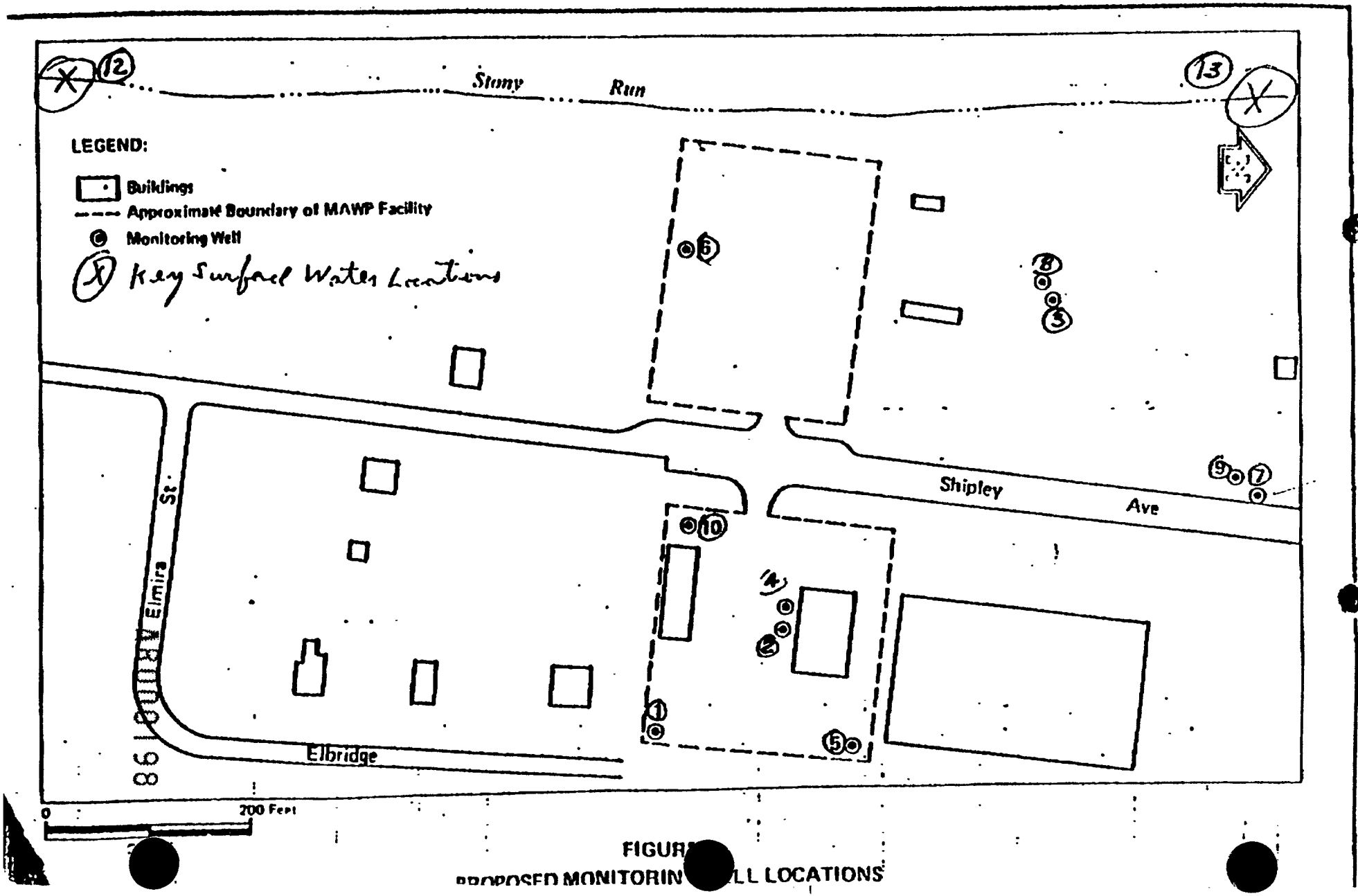


FIGURE
PROPOSED MONITORING WELL LOCATIONS

APPENDIX E

Slug and Pump Test Data

Seq. # ____

FIELD PERMEABILITY TEST DATA SHEET
(For Use with Data Loggers)

Project Name: M.A.W.P. Project No.: 14519-002-
Location: Harmans, MD Client: M.A.W.P.
Engineer/Technician: C.H. Kupfer Contractor: ____
Data Logger ID: 2-2729 Date: 3-23-89
Pressure Transducer ID: —
Transducer Pressure Rating: 15 psi Cal. Pt. 1 — Cal. Pt. 2 —
Well Number: MW-1 Date: 3-23-89

Test Method (describe): Falling head - Water matrix slug Test

Volume Water (Added)/Removed: 15 gallons

Discharge Rate: N/A

Initial Water Level (ft): 21.82'

Pressure Transducer Submergence: Initial (ft): 7.719'
Final (ft): —

Time: Start 1600 End: 1630

Data Logger Variables:

Tag #: N/A Input/Units: feet of sub /Range ____

Length: 2 hr (time interval)

Observed Changes in Adjacent Wells: N/A

Results Recorded on Diskette #: 1

Diskette File Name: MW-1e

Engineer/Technician Signature: C.H. Kupfer

Date: 3-23-89

AR000200

Rev: 1
2/10/88

Seq. # ____

FIELD PERMEABILITY TEST DATA SHEET
(For Use with Data Loggers)

Project Name: M.A.W.P. Project No.: 14519-002-
Location: Harmans, MD Client: M.A.W.P.
Engineer/Technician: CH Kupfer Contractor: ____
Data Logger ID: 2-2729 Date: 3-23-89
Pressure Transducer ID: -
Transducer Pressure Rating: 15 psi Cal. Pt. 1 - Cal. Pt. 2 -
Well Number: MW-2 Date: 3-23-89

Test Method (describe): Falling head - Water matrix slug Test

Volume Water Added/Removed: unknown - used a hose

Discharge Rate: N/A

Initial Water Level (ft): 13.86'

Pressure Transducer Submergence: Initial (ft): 11.331'
Final (ft): -

Time: Start 900 End: 930

Data Logger Variables:

Tag #: N/A Input/Units: feet of sub. /Range ____

Length: 15 min (time interval)

Observed Changes in Adjacent Wells: N/A

Results Recorded on Diskette #: 1

Diskette File Name: MW-2

Engineer/Technician Signature: CHK

Date: 3-23-89

AR000201

Rev: 1
2/10/88

Barnes & Moore

Seq. # ____

FIELD PERMEABILITY TEST DATA SHEET
(For Use with Data Loggers)

Project Name: M.A.W.P. Project No.: 14519-002-
Location: Harmans, MD Client: M.A.W.P.
Engineer/Technician: CH Kupfer Contractor: ____
Data Logger ID: 2-2729 Date: 3.23.89
Pressure Transducer ID: ____
Transducer Pressure Rating: 15 psi Cal. Pt. 1 ____ Cal. Pt. 2 ____
Well Number: MW-3 Date: 3.23.89

Test Method (describe): Falling head - Water matrix slug Test

Volume Water (Added)/Removed: 15 gallons

Discharge Rate: N/A

Initial Water Level (ft): 9.26'

Pressure Transducer Submergence: Initial (ft): 8.532'
Final (ft): ____

Time: Start 1200 End: 1230

Data Logger Variables:

Tag #: N/A Input/Units: feet of sub. /Range ____

Length: 15 min (time interval)

Observed Changes in Adjacent Wells: NA

Results Recorded on Diskette #: 1

Diskette File Name: MW-3

Engineer/Technician Signature: CHK

Date: 3.23.89

AR000202

Rev: 1
2/10/88

Seq. # ____

FIELD PERMEABILITY TEST DATA SHEET
(For Use with Data Loggers)

Project Name: M.A.W.P. Project No.: 14519-002-
Location: Harmans, MD Client: M.A.W.P.
Engineer/Technician: C.H. Kupfer Contractor: ____
Data Logger ID: 2-2729 Date: 3-23-89
Pressure Transducer ID: -
Transducer Pressure Rating: 15 psi Cal. Pt. 1 — Cal. Pt. 2 —
Well Number: MW-4 Date: 3.23.89

Test Method (describe): Falling head - Water matrix slug Test

Volume Water (Added)/Removed: unknown - used a hose

Discharge Rate: N/A

Initial Water Level (ft): 17.02'

Pressure Transducer Submergence: Initial (ft): 17.372'
Final (ft): —

Time: Start 8:00 End: 8:30

Data Logger Variables:

Tag #: N/A Input/Units: feet of sub. /Range ____

Length: 15 min (time interval)

Observed Changes in Adjacent Wells: N/A

Results Recorded on Diskette #: 1

Diskette File Name: MW-4

Engineer/Technician Signature: C.H. Kupfer

Date: 3.23.89

AR000203

Rev: 1
2/10/88

Roger P. Moore

Seq. # ____

FIELD PERMEABILITY TEST DATA SHEET
(For Use with Data Loggers)

Project Name: M.A.W.P. | Project No.: 14519-002-
Location: Harmans, MD | Client: M.A.W.P.
Engineer/Technician: CH Kupfer | Contractor: ____
Data Logger ID: 2-2729 | Date: 3-23-89
Pressure Transducer ID: ____
Transducer Pressure Rating: 15 psi Cal. Pt. 1 — Cal. Pt. 2 —
Well Number: MW-5 | Date: 3-23-89

Test Method (describe): Falling head - Water matrix slug Test

Volume Water ~~Added~~/Removed: 15 gal.

Discharge Rate: N/A

Initial Water Level (ft): 15.18'

Pressure Transducer Submergence: Initial (ft): 5.708'
Final (ft): —

Time: Start 700 End: 730

Data Logger Variables:

Tag #: N/A Input/Units: feet & sec. /Range ____

Length: 10 min (time interval)

Observed Changes in Adjacent Wells: N/A

Results Recorded on Diskette #: 1

Diskette File Name: MW-5

Engineer/Technician Signature: CHK

Date: 3-23-89

AR000204

Rev: 1
2/10/88

Seq. # ____

FIELD PERMEABILITY TEST DATA SHEET
(For Use with Data Loggers)

Project Name: M.A.W.P. Project No.: 14519-002-
Location: Harmans, MD Client: M.A.W.P.
Engineer/Technician: CH Kupfer Contractor: ____
Data Logger ID: 2-2729 Date: 3.23.89
Pressure Transducer ID: -
Transducer Pressure Rating: 15 psi Cal. Pt. 1 - Cal. Pt. 2 -
Well Number: MW-6 Date: 3.23.89

Test Method (describe): Falling head - Water matrix slug Test

Volume Water Added/Removed: 10 gallons

Discharge Rate: N/A

Initial Water Level (ft): 6.20'

Pressure Transducer Submergence: Initial (ft): 8.148'
Final (ft): -

Time: Start 1100 End: 1130

Data Logger Variables:

Tag #: N/A Input/Units: feet of sub. /Range ____

Length: 10 min (time interval)

Observed Changes in Adjacent Wells: N/A

Results Recorded on Diskette #: 1

Diskette File Name: MW-6

Engineer/Technician Signature: CHK

Date: 3.23.89

AR000205

Rev: 1
2/10/88

Seq. # ____

FIELD PERMEABILITY TEST DATA SHEET
(For Use with Data Loggers)

Project Name: M.A.W.P. Project No.: 14519-002-
Location: Harmans, MD Client: M.A.W.P.
Engineer/Technician: CH Kupfer Contractor: ____
Data Logger ID: 2-2729 Date: 3.23.89
Pressure Transducer ID: ____
Transducer Pressure Rating: 15 psi Cal. Pt. 1 — Cal. Pt. 2 —
Well Number: MW-7 Date: 3.23.89

Test Method (describe): Falling head - Water matrix slug Test

Volume Water (Added)/Removed: 17 gallons

Discharge Rate: N/A

Initial Water Level (ft): 10.28'

Pressure Transducer Submergence: Initial (ft): 8.348'
Final (ft): —

Time: Start 1500 End: 1530

Data Logger Variables:

Tag #: N/A Input/Units: feet of sub. /Range —

Length: 20 min (time interval)

Observed Changes in Adjacent Wells: N/A

Results Recorded on Diskette #: 1

Diskette File Name: MW-7

Engineer/Technician Signature: CHK

Date: 3.23.89

AR000206

Rev: 1
2/10/88

Seq. # ____

FIELD PERMEABILITY TEST DATA SHEET
(For Use with Data Loggers)

Project Name: M.A.W.P. Project No.: 14519-002-
Location: Harmans, MD Client: M.A.W.P.
Engineer/Technician: CH Kupfer Contractor: ____
Data Logger ID: 2-2729 Date: 3·23·89
Pressure Transducer ID: —
Transducer Pressure Rating: 15 psi Cal. Pt. 1 ____ Cal. Pt. 2 ____
Well Number: MW-8 Date: ____

Test Method (describe): Falling head - Water matrix slug Test

Volume Water (Added)/Removed: 10 gallons

Discharge Rate: N/A

Initial Water Level (ft): 8.44'

Pressure Transducer Submergence: Initial (ft): 7.508
Final (ft): —

Time: Start 1300 End: 1330

Data Logger Variables:

Tag #: N/A Input/Units: feet of sub. /Range ____

Length: 10 min (time interval)

Observed Changes in Adjacent Wells: N/A

Results Recorded on Diskette #: 1

Diskette File Name: MW-8

Engineer/Technician Signature: CHK

Date: 3·23·89

AR000207

Rev: 1
2/10/88

Barnes & Moore

Seq. # ____

FIELD PERMEABILITY TEST DATA SHEET
(For Use with Data Loggers)

Project Name: M.A.W.P. Project No.: 1419-002-
Location: Harmans, MD Client: M.A.W.P.
Engineer/Technician: CH Kupfer Contractor: ____
Data Logger ID: 2-2729 Date: 3-23-89
Pressure Transducer ID: -
Transducer Pressure Rating: 15 psi Cal. Pt. 1 - Cal. Pt. 2 -
Well Number: MW-9 Date: 3-23-89

Test Method (describe): Falling head - Water matrix slug Test

Volume Water (Added/Removed): 20 gallons

Discharge Rate: N/A

Initial Water Level (ft): 12.87'

Pressure Transducer Submergence: Initial (ft): 6.383'
Final (ft): -

Time: Start 1400 End: 1430

Data Logger Variables:

Tag #: N/A Input/Units: feet of sub. /Range -

Length: 20 min. (time interval)

Observed Changes in Adjacent Wells: N/A

Results Recorded on Diskette #: 1

Diskette File Name: MW-9

Engineer/Technician Signature: CHK

Date: 3-23-89

AR000208

Rev: 1
2/10/88

Seq. # ____

FIELD PERMEABILITY TEST DATA SHEET
(For Use with Data Loggers)

Project Name: M.A.W.P. Project No.: 14519-002-
Location: Harmans, MD Client: M.A.W.P.
Engineer/Technician: CH Kupfer Contractor: ____
Data Logger ID: 2-2779 Date: 3-23-89
Pressure Transducer ID: -
Transducer Pressure Rating: 15 psi Cal. Pt. 1 - Cal. Pt. 2 -
Well Number: MW-10 Date: 3 23 89

Test Method (describe): Falling head - Water matrix slug Test

Volume Water ~~Added~~/Removed: 15 gallons

Discharge Rate: N/A

Initial Water Level (ft): 15.40'

Pressure Transducer Submergence: Initial (ft): 6.805'
Final (ft): -

Time: Start 1000 End: 1030

Data Logger Variables:

Tag #: N/A Input/Units: feet of sub. /Range ____

Length: 15 min (time interval)

Observed Changes in Adjacent Wells: N/A

Results Recorded on Diskette #: 1

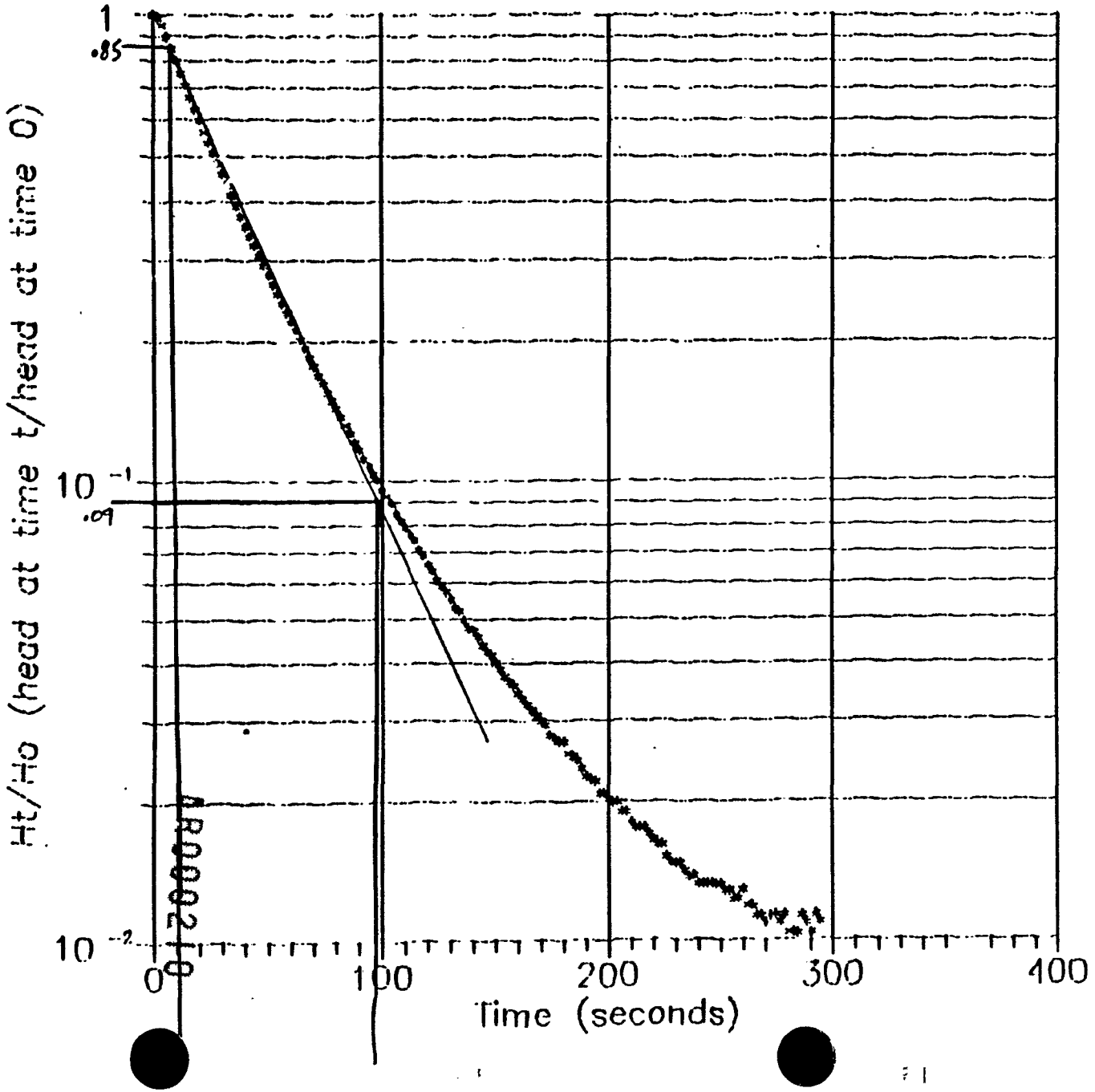
Diskette File Name: MW-10

Engineer/Technician Signature: CHK

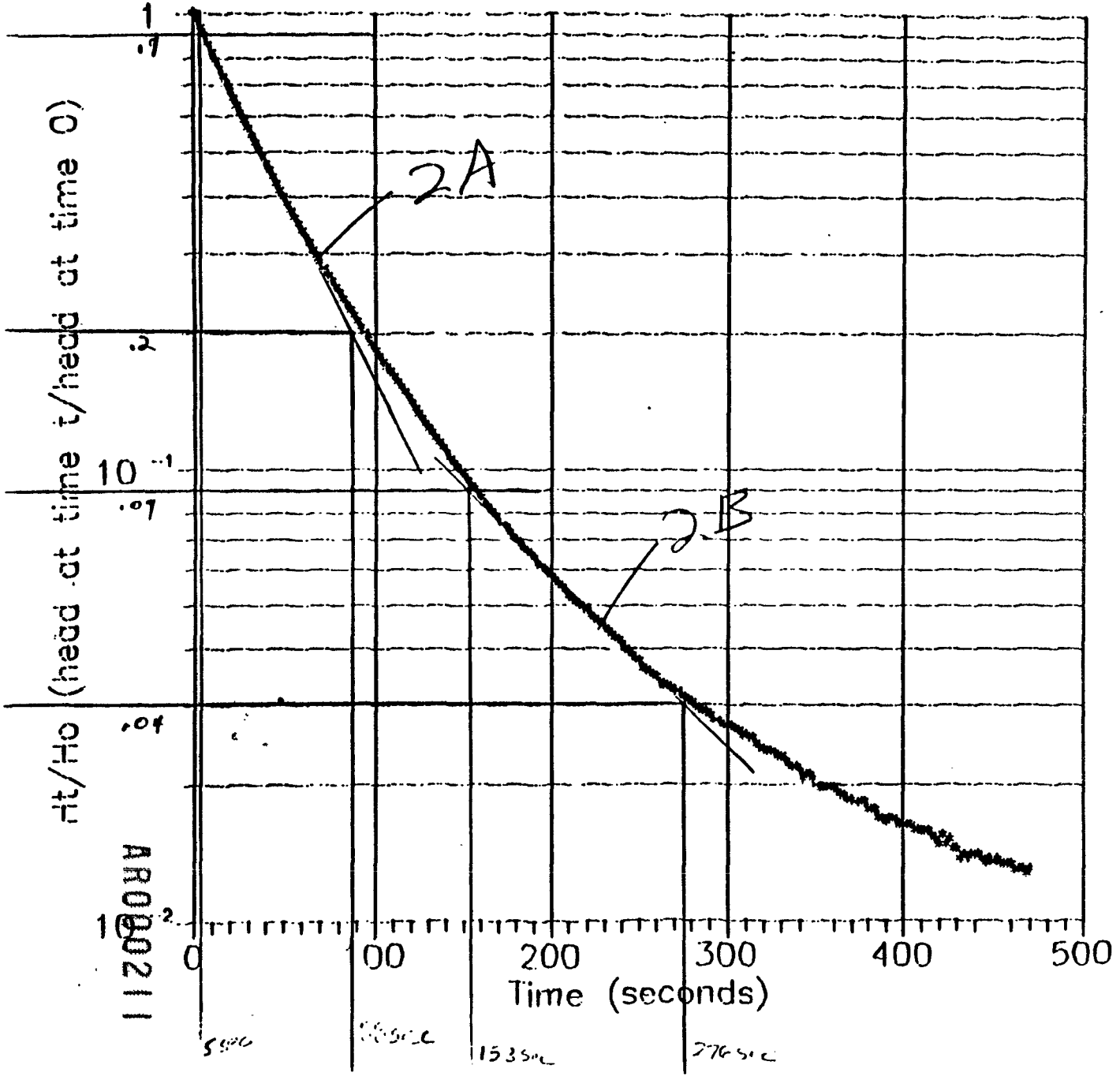
Date: 3-23-89

AR000209

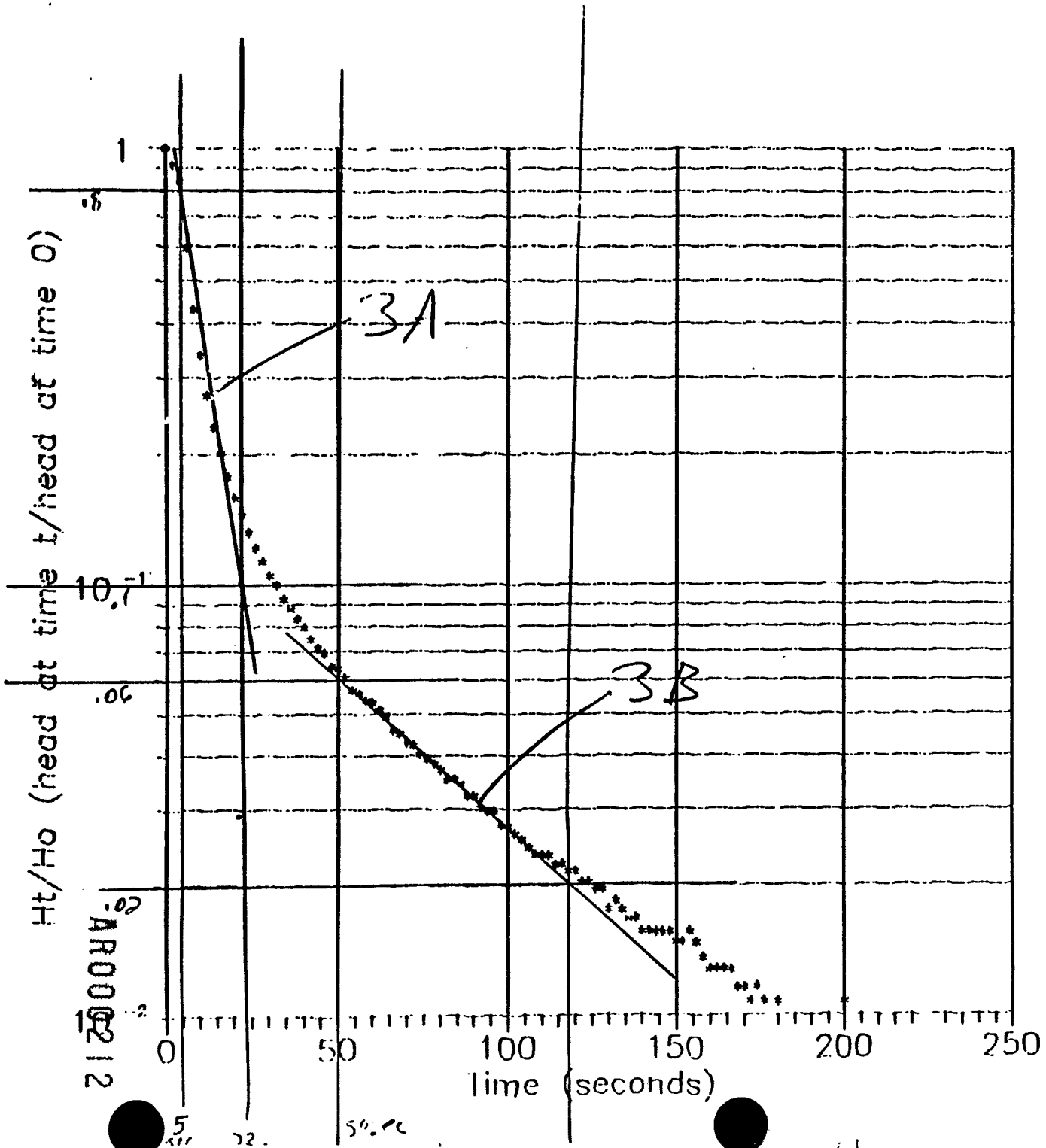
Rev: 1
2/10/88



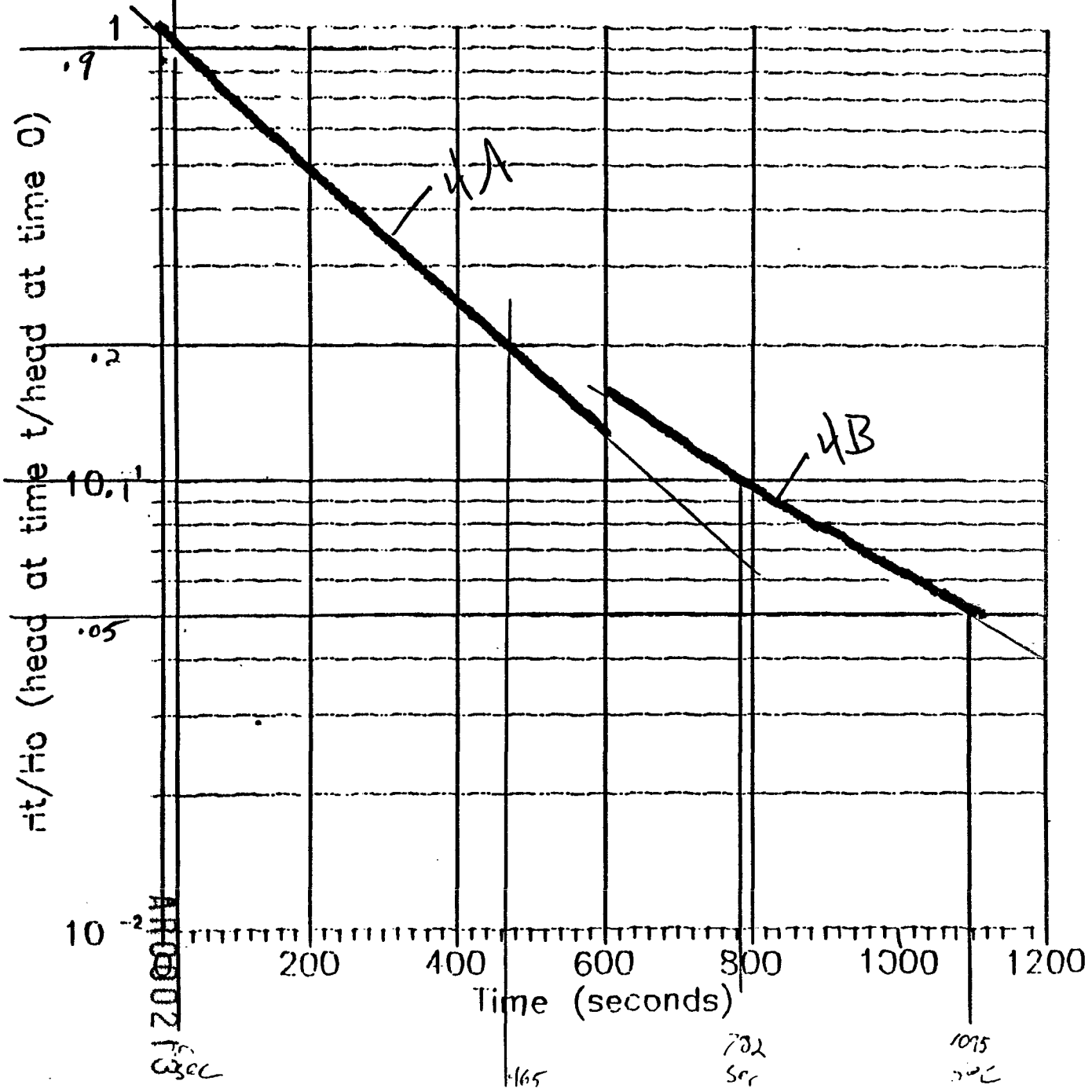
MAWP
Well MW 1
Mar. 23, 1989
Falling Head Test



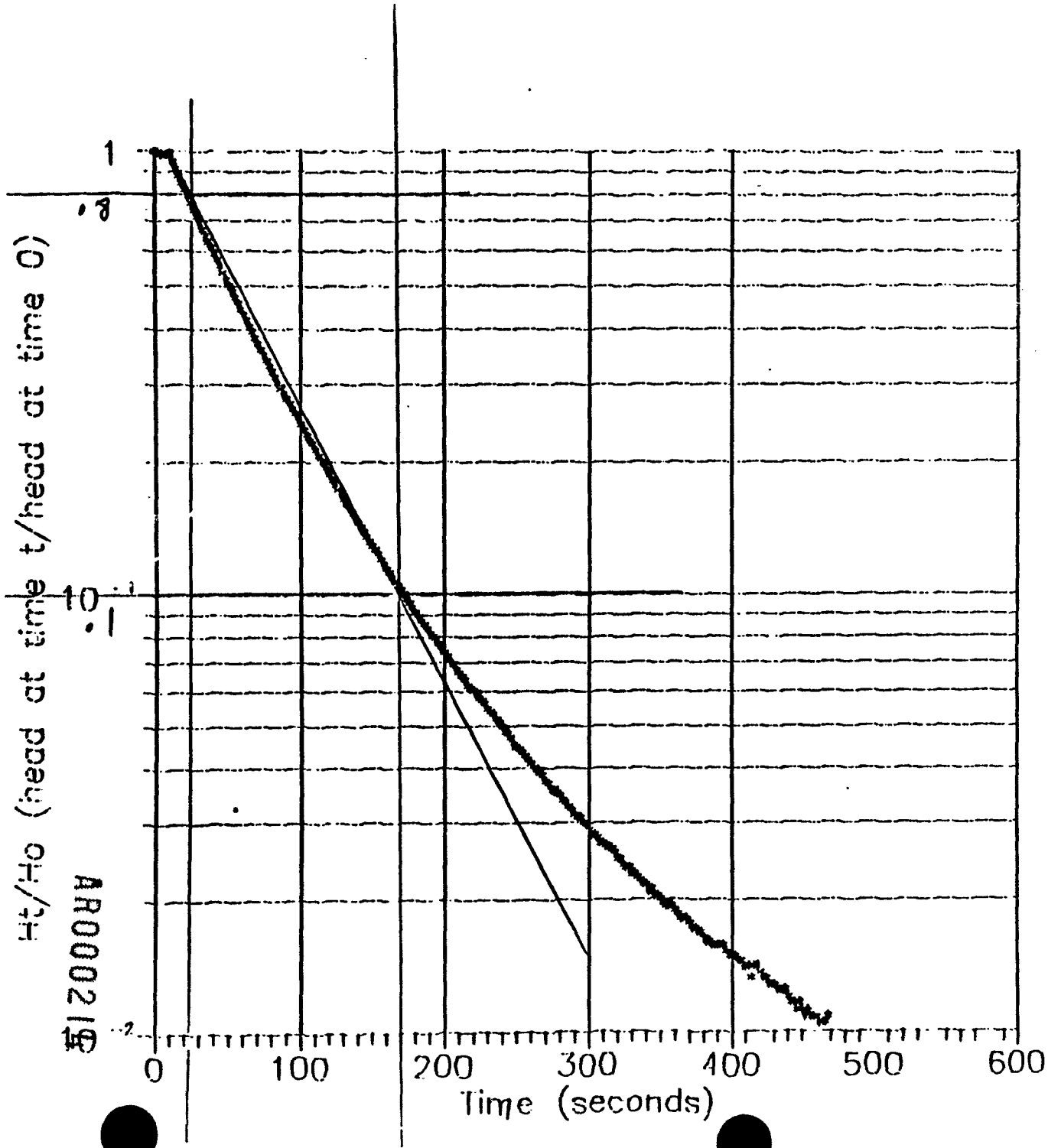
MAWP
Well MW-2
Mar. 23, 1989
Falling Head Test



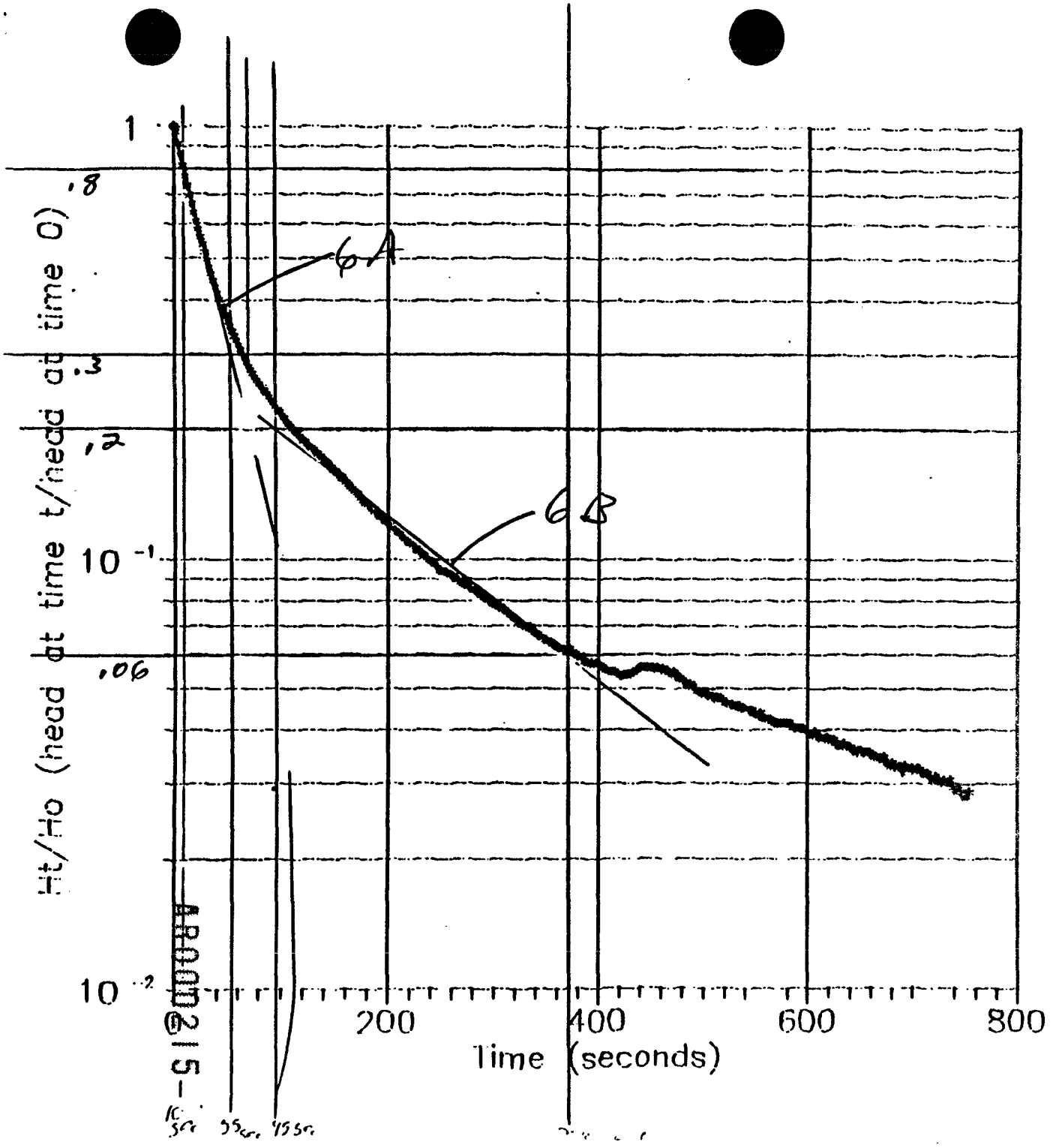
MAWP
Well MW-3
Mar. 23, 1989
Falling Head Test



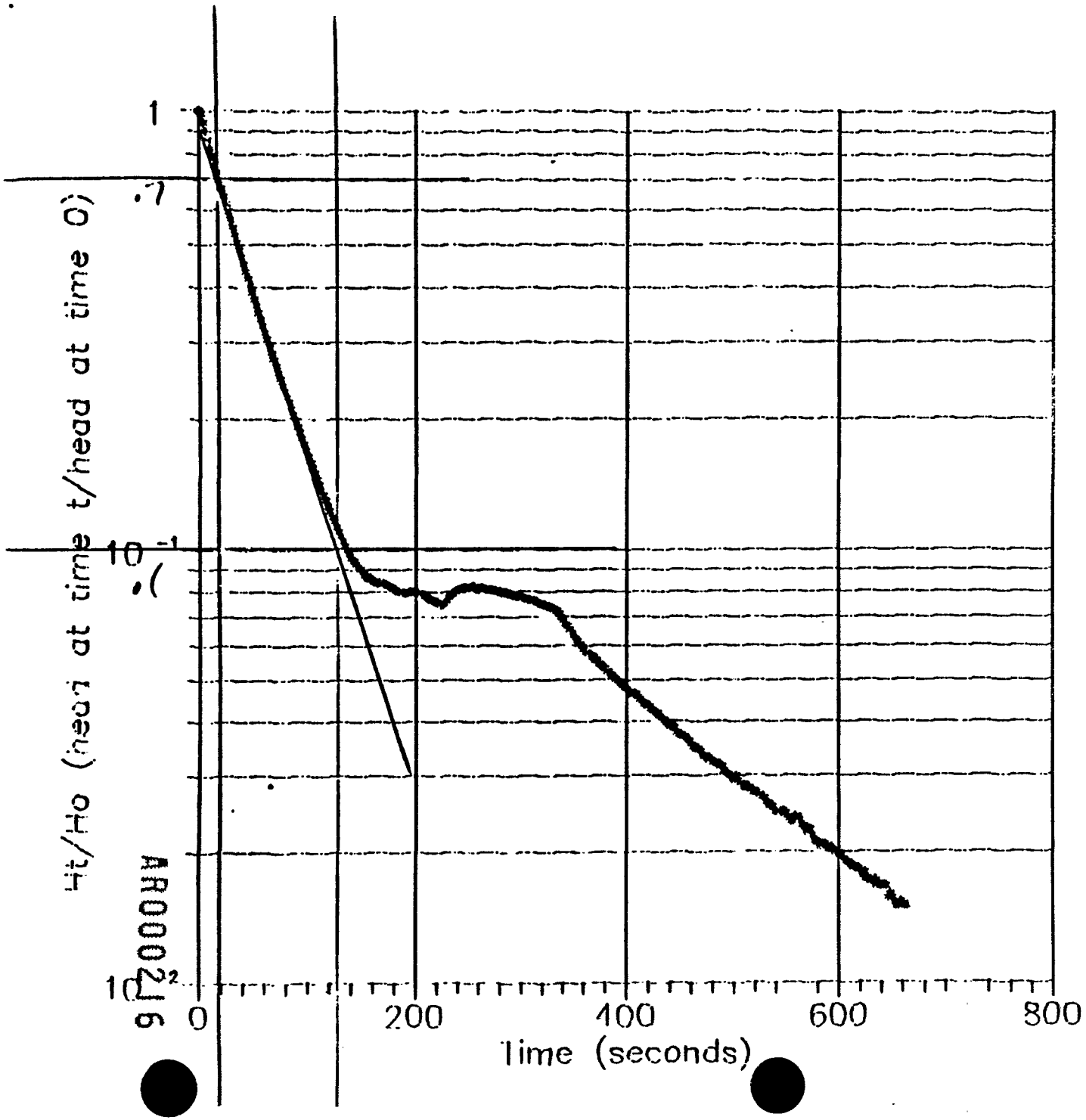
MAWP
Well MW--4
Mar. 23, 1989
Falling Head Test



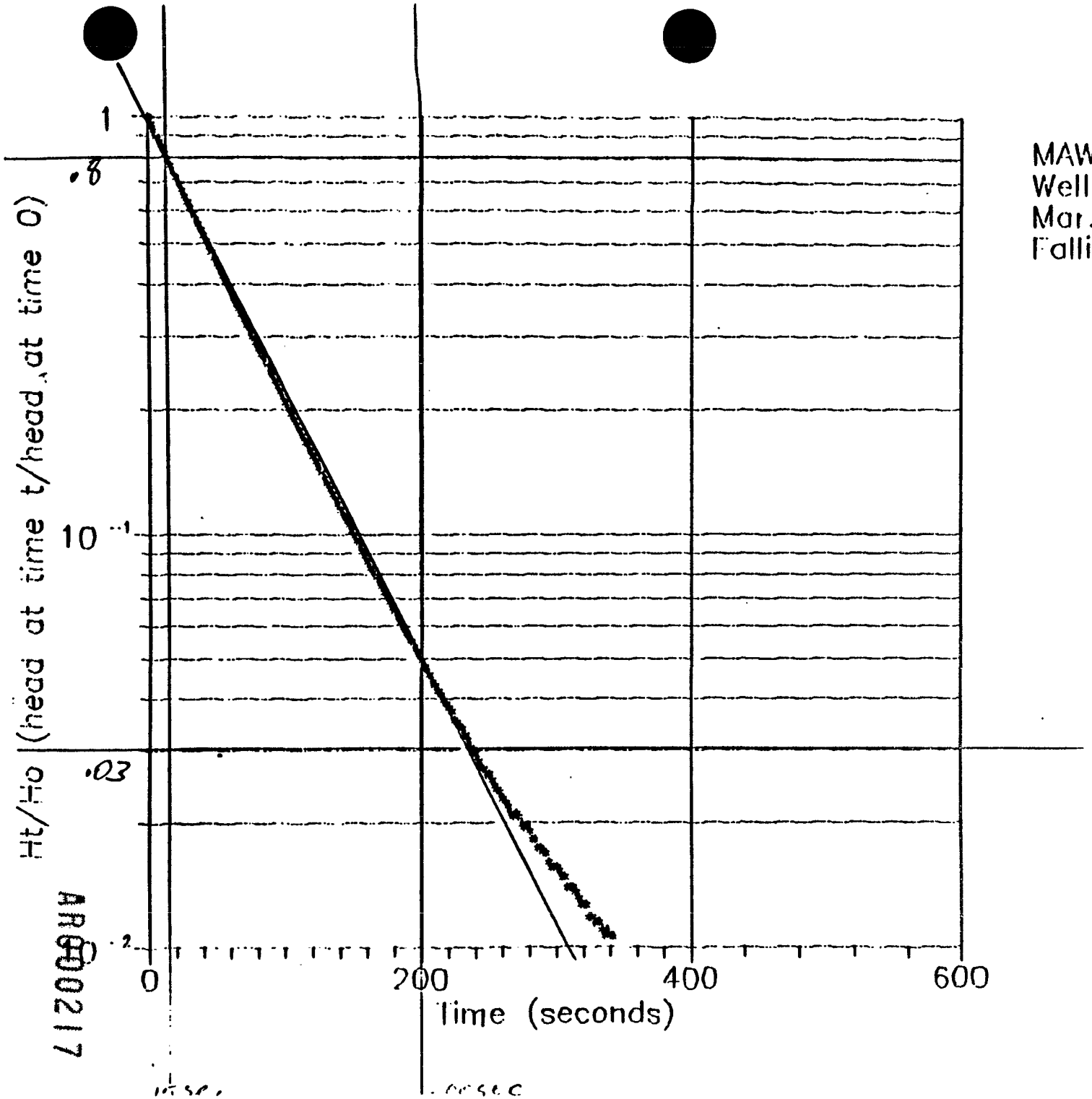
MAWP
Well MW-5
Mar. 23, 1989
Falling Head Test



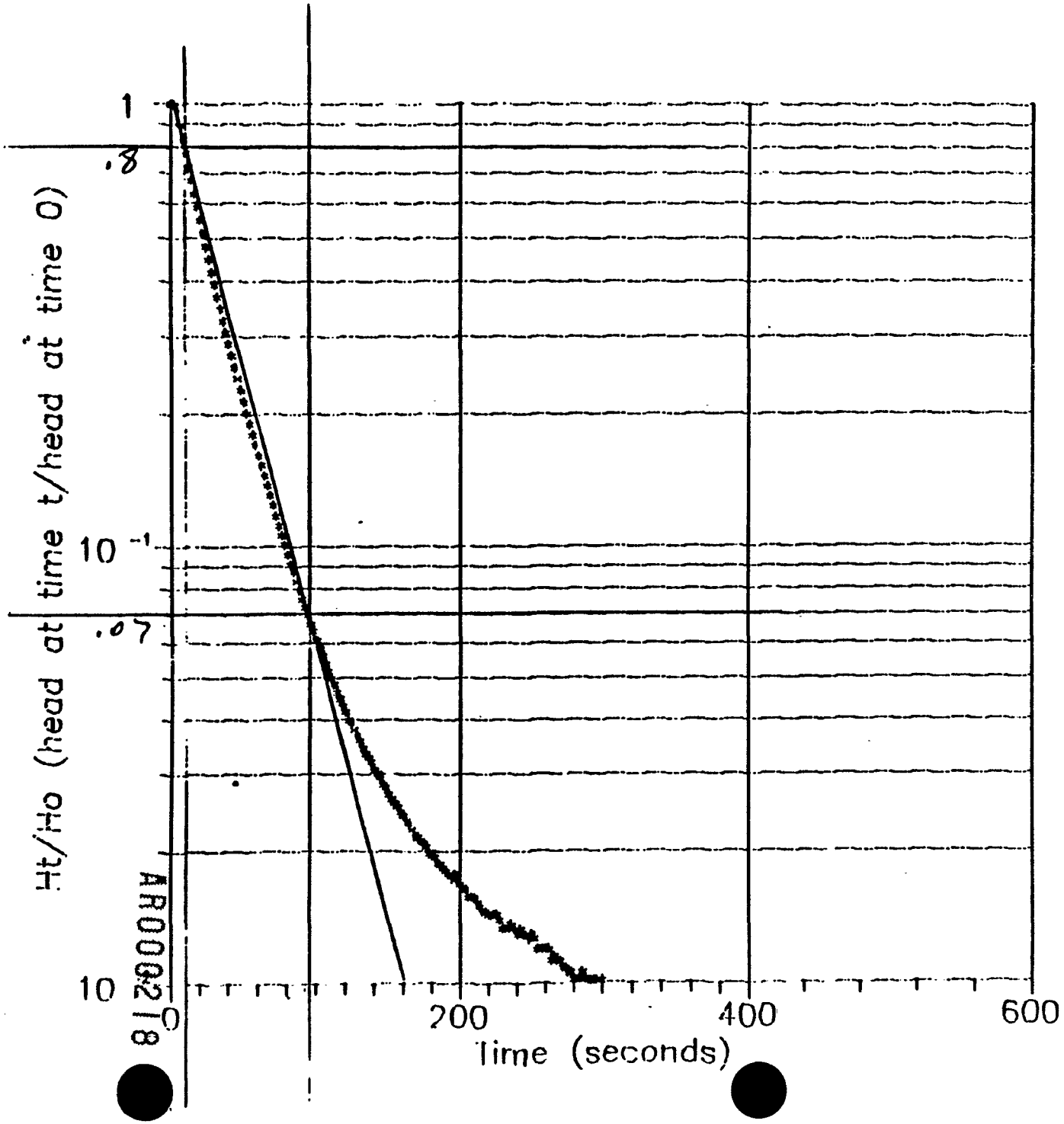
MAWP
Well MW-6
Mar. 23, 1989
Falling Head Test



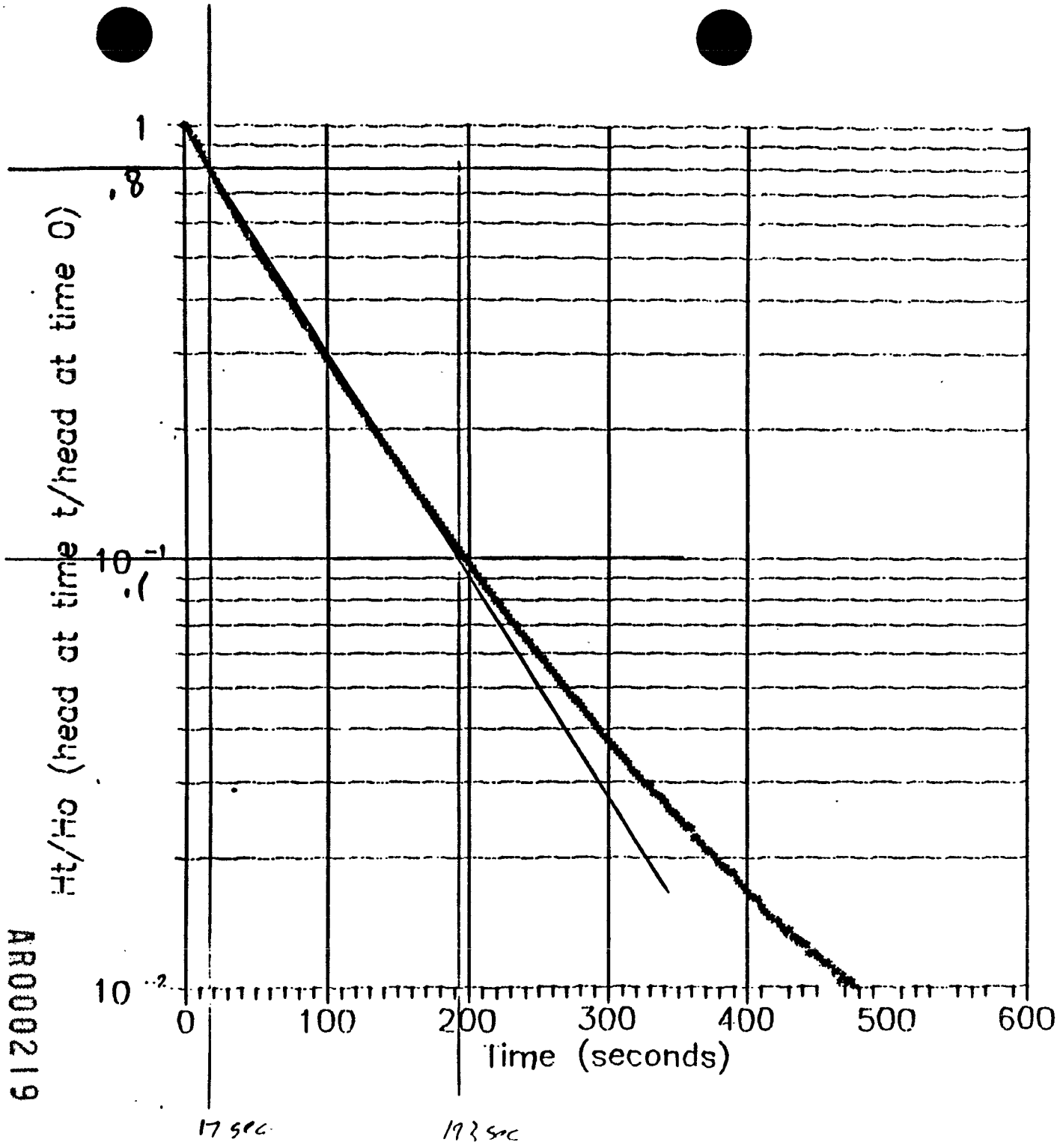
MAWP
Well MW--7
Mar. 23, 1989
Falling Head Test



MAWP
Well MW-8
Mar. 23, 1989
Falling Head Test



MAWP
Well MW-9
Mar. 23, 1989
Falling Head Test



MAWP
Well MW-10
Mar. 23, 1989
Falling Head Test

AR0002119

MAWP WELL MW-4 PUMP TEST

APRIL 19, 1989

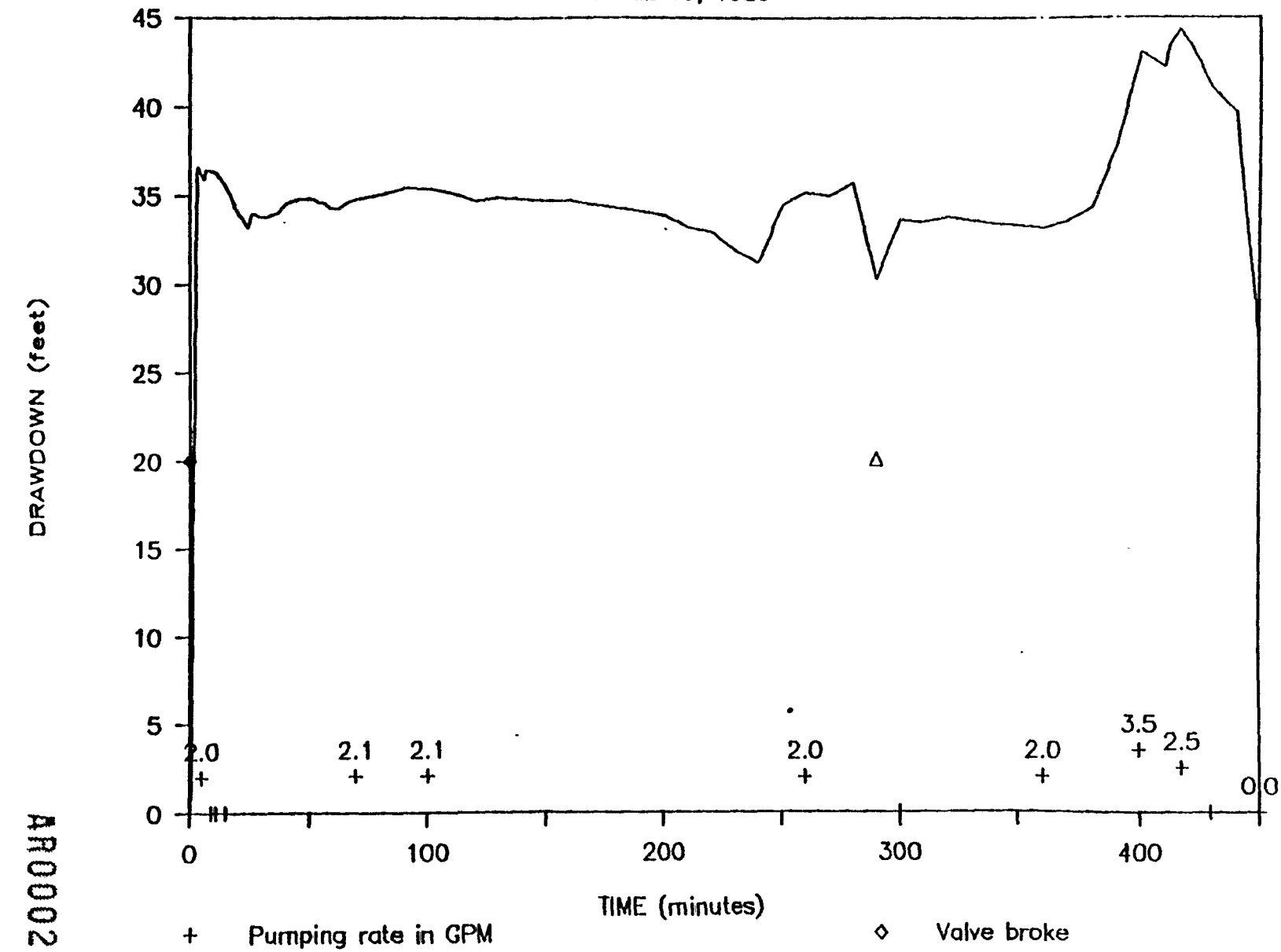


TABLE E-1

Mid-Atlantic Wood Preservers
Pump Test Data for Manually Recorded Drawdowns

Time[a]	Well	Depth to Water (ft from T.O.C.)
10:44	1	21.31
17:11	1	21.31
18:58	1	21.30
11:10	2[b]	13.49
10:21	3	8.87
14:08	3	8.93
16:54	3	8.94
18:37	3	8.93
11:07	4[b]	16.57
10:50	5	14.68
17:14	5	14.64
19:02	5	14.64
10:16	6	5.92
14:00	6	5.86
16:50	6	5.86
18:26	6	5.86
10:30	7	9.65
14:20	7	9.62
17:02	7	9.62
18:41	7	9.60
10:23	8	7.99
14:08	8	8.03
16:56	8	8.06
18:36	8	8.07
10:32	9	12.37
14:15	9	12.42
17:00	9	12.43
18:43	9	12.46
12:23	10[b]	14.95

[a]See graphs for additional drawdowns in wells 2, 4, and 10.

[b]Pumping started at 11:17; see graph of well 4 for pumping rates.

Groundwater Level Data for Pumping Test, OW-02, Mid-Atlantic Wood Preservers
April 19, 1989

Date	Time	Submergence of Transducer TOC (a) (ft)	Depth to Water TOC (ft)	Water Elevation TOC (ft)	Drawdown (ft)	Comments
04/19/89	11:10:00	15.746	13.49 (b)	95.84	0.00	Pre-pumping (c)
04/19/89	12:15:00	15.756	13.38 (b)	95.95	-0.11	(c)
04/19/89	12:19:38	15.756	13.38	95.95	-0.11	
04/19/89	12:21:38	15.756	13.38	95.95	-0.11	
04/19/89	12:23:38	15.760	13.38	95.95	-0.11	
04/19/89	12:25:38	15.763	13.37	95.96	-0.12	
04/19/89	12:27:38	15.763	13.37	95.96	-0.12	
04/19/89	12:29:38	15.763	13.37	95.96	-0.12	
04/19/89	12:31:38	15.763	13.37	95.96	-0.12	
04/19/89	12:33:37	15.763	13.37	95.96	-0.12	
04/19/89	12:35:37	15.763	13.37	95.96	-0.12	
04/19/89	12:37:37	15.763	13.37	95.96	-0.12	
04/19/89	12:39:37	15.767	13.37	95.96	-0.12	
04/19/89	12:41:37	15.756	13.38	95.95	-0.11	
04/19/89	12:43:37	15.756	13.38	95.95	-0.11	
04/19/89	12:45:37	15.760	13.38	95.95	-0.11	
04/19/89	12:47:37	15.763	13.37	95.96	-0.12	
04/19/89	12:49:37	15.763	13.37	95.96	-0.12	
04/19/89	12:51:37	15.767	13.37	95.96	-0.12	
04/19/89	12:53:37	15.763	13.37	95.96	-0.12	
04/19/89	12:55:37	15.756	13.38	95.95	-0.11	
04/19/89	12:57:37	15.756	13.38	95.95	-0.11	
04/19/89	12:59:36	15.756	13.38	95.95	-0.11	
04/19/89	13:01:36	15.763	13.37	95.96	-0.12	
04/19/89	13:03:36	15.767	13.37	95.96	-0.12	
04/19/89	13:05:36	15.770	13.37	95.96	-0.12	
04/19/89	13:07:36	15.770	13.37	95.96	-0.12	
04/19/89	13:09:36	15.763	13.37	95.96	-0.12	
04/19/89	13:11:36	15.760	13.38	95.95	-0.11	
04/19/89	13:13:36	15.763	13.37	95.96	-0.12	
04/19/89	13:15:36	15.767	13.37	95.96	-0.12	
04/19/89	13:17:36	15.767	13.37	95.96	-0.12	
04/19/89	13:19:36	15.767	13.37	95.96	-0.12	
04/19/89	13:21:36	15.770	13.37	95.96	-0.12	
04/19/89	13:23:36	15.770	13.37	95.96	-0.12	
04/19/89	13:25:35	15.770	13.37	95.96	-0.12	
04/19/89	13:27:35	15.770	13.37	95.96	-0.12	
04/19/89	13:29:35	15.770	13.37	95.96	-0.12	
04/19/89	13:31:35	15.770	13.37	95.96	-0.12	
04/19/89	13:33:35	15.773	13.36	95.97	-0.13	
04/19/89	13:35:35	15.773	13.36	95.97	-0.13	
04/19/89	13:37:35	15.777	13.36	95.97	-0.13	
04/19/89	13:39:35	15.780	13.36	95.97	-0.13	
04/19/89	13:41:35	15.777	13.36	95.97	-0.13	
04/19/89	13:43:35	15.777	13.36	95.97	-0.13	
04/19/89	13:45:35	15.777	13.36	95.97	-0.13	
04/19/89	13:47:35	15.777	13.36	95.97	-0.13	
04/19/89	13:49:35	15.777	13.36	95.97	-0.13	
04/19/89	13:51:34	15.773	13.36	95.97	-0.13	
04/19/89	13:53:34	15.773	13.36	95.97	-0.13	
04/19/89	13:55:34	15.770	13.37	95.96	-0.12	
04/19/89	13:57:34	15.770	13.37	95.96	-0.12	
04/19/89	13:59:34	15.777	13.36	95.97	-0.13	
04/19/89	14:01:34	15.773	13.36	95.97	-0.13	
04/19/89	14:03:34	15.780	13.36	95.97	-0.13	
04/19/89	14:05:34	15.760	13.38	95.95	-0.11	
04/19/89	14:07:34	15.763	13.37	95.96	-0.12	
04/19/89	14:09:34	15.767	13.37	95.96	-0.12	
04/19/89	14:11:34	15.773	13.36	95.97	-0.13	
04/19/89	14:13:34	15.770	13.37	95.96	-0.12	
04/19/89	14:15:34	15.767	13.37	95.96	-0.12	
04/19/89	14:17:33	15.773	13.36	95.97	-0.13	
04/19/89	14:19:33	15.767	13.37	95.96	-0.12	
04/19/89	14:21:33	15.770	13.37	95.96	-0.12	
04/19/89	14:23:33	15.770	13.37	95.96	-0.12	
04/19/89	14:25:33	15.770	13.37	95.96	-0.12	
04/19/89	14:27:33	15.770	13.37	95.96	-0.12	

Date	Time	Submergence of Transducer TOC (a) (ft)	Depth to Water TOC (ft)	Water Elevation TOC (ft)	Drawdown (ft)	Comments
04/19/89	14:29:33	15.773	13.36	95.97	-0.13	
04/19/89	14:31:33	15.773	13.36	95.97	-0.13	
04/19/89	14:33:33	15.777	13.36	95.97	-0.13	
04/19/89	14:35:33	15.773	13.36	95.97	-0.13	
04/19/89	14:37:33	15.777	13.36	95.97	-0.13	
04/19/89	14:39:33	15.770	13.37	95.96	-0.12	
04/19/89	14:41:33	15.767	13.37	95.96	-0.12	
04/19/89	14:43:32	15.770	13.37	95.96	-0.12	
04/19/89	14:45:32	15.787	13.35	95.98	-0.14	
04/19/89	14:47:32	15.780	13.36	95.97	-0.13	
04/19/89	14:49:32	15.780	13.36	95.97	-0.13	
04/19/89	14:51:32	15.770	13.37	95.96	-0.12	
04/19/89	14:53:32	15.773	13.36	95.97	-0.13	
04/19/89	14:55:32	15.773	13.36	95.97	-0.13	
04/19/89	14:57:32	15.777	13.36	95.97	-0.13	
04/19/89	14:59:32	15.780	13.36	95.97	-0.13	
04/19/89	15:01:32	15.780	13.36	95.97	-0.13	
04/19/89	15:03:32	15.780	13.36	95.97	-0.13	
04/19/89	15:05:32	15.777	13.36	95.97	-0.13	
04/19/89	15:07:32	15.780	13.36	95.97	-0.13	
04/19/89	15:09:31	15.784	13.35	95.98	-0.14	
04/19/89	15:11:31	15.780	13.36	95.97	-0.13	
04/19/89	15:13:31	15.784	13.35	95.98	-0.14	
04/19/89	15:15:31	15.784	13.35	95.98	-0.14	
04/19/89	15:17:31	15.784	13.35	95.98	-0.14	
04/19/89	15:19:31	15.784	13.35	95.98	-0.14	
04/19/89	15:21:31	15.780	13.36	95.97	-0.13	
04/19/89	15:23:31	15.777	13.36	95.97	-0.13	
04/19/89	15:25:31	15.777	13.36	95.97	-0.13	
04/19/89	15:27:31	15.780	13.36	95.97	-0.13	
04/19/89	15:29:31	15.784	13.35	95.98	-0.14	
04/19/89	15:31:31	15.784	13.35	95.98	-0.14	
04/19/89	15:33:31	15.780	13.36	95.97	-0.13	
04/19/89	15:35:30	15.780	13.36	95.97	-0.13	
04/19/89	15:37:30	15.777	13.36	95.97	-0.13	
04/19/89	15:39:30	15.787	13.35	95.98	-0.14	
04/19/89	15:41:30	15.784	13.35	95.98	-0.14	
04/19/89	15:43:30	15.787	13.35	95.98	-0.14	
04/19/89	15:45:30	15.787	13.35	95.98	-0.14	
04/19/89	15:47:30	15.787	13.35	95.98	-0.14	
04/19/89	15:49:30	15.787	13.35	95.98	-0.14	
04/19/89	15:51:30	15.787	13.35	95.98	-0.14	
04/19/89	15:53:30	15.787	13.35	95.98	-0.14	
04/19/89	15:55:30	15.787	13.35	95.98	-0.14	
04/19/89	15:57:30	15.787	13.35	95.98	-0.14	
04/19/89	15:59:30	15.798	13.34	95.99	-0.15	
04/19/89	16:01:29	15.777	13.36	95.97	-0.13	
04/19/89	16:03:29	15.784	13.35	95.98	-0.14	
04/19/89	16:05:29	15.784	13.35	95.98	-0.14	
04/19/89	16:07:29	15.787	13.35	95.98	-0.14	
04/19/89	16:09:29	15.791	13.35	95.99	-0.14	
04/19/89	16:11:29	15.780	13.36	95.97	-0.13	
04/19/89	16:13:29	15.777	13.36	95.97	-0.13	
04/19/89	16:15:29	15.773	13.36	95.97	-0.13	
04/19/89	16:17:29	15.773	13.36	95.97	-0.13	
04/19/89	16:19:29	15.780	13.36	95.97	-0.13	
04/19/89	16:21:29	15.784	13.35	95.98	-0.14	
04/19/89	16:23:29	15.784	13.35	95.98	-0.14	
04/19/89	16:25:29	15.780	13.36	95.97	-0.13	
04/19/89	16:27:28	15.784	13.35	95.98	-0.14	
04/19/89	16:29:28	15.784	13.35	95.98	-0.14	
04/19/89	16:31:28	15.787	13.35	95.98	-0.14	
04/19/89	16:33:28	15.787	13.35	95.98	-0.14	
04/19/89	16:35:28	15.784	13.35	95.98	-0.14	
04/19/89	16:37:28	15.784	13.35	95.98	-0.14	
04/19/89	16:39:28	15.773	13.36	95.97	-0.13	
04/19/89	16:41:28	15.773	13.36	95.97	-0.13	
04/19/89	16:43:28	15.777	13.36	95.97	-0.13	
04/19/89	16:45:28	15.777	13.36	95.97	-0.13	
04/19/89	16:47:28	15.773	13.36	95.97	-0.13	
04/19/89	16:49:28	15.780	13.36	95.97	-0.13	
04/19/89	16:51:28	15.784	13.35	95.98	-0.14	

Date	Time	Submergence of Transducer TOC (a) (ft)	Depth to Water TOC (ft)	Water Elevation TOC (ft)	Drawdown (ft)	Comments
04/19/89	16:53:27	15.784	13.35	95.98	-0.14	
04/19/89	16:55:27	15.784	13.35	95.98	-0.14	
04/19/89	16:57:27	15.784	13.35	95.98	-0.14	
04/19/89	16:59:27	15.784	13.35	95.98	-0.14	
04/19/89	17:01:27	15.784	13.35	95.98	-0.14	
04/19/89	17:03:27	15.780	13.36	95.97	-0.13	
04/19/89	17:05:27	15.773	13.36	95.97	-0.13	
04/19/89	17:07:27	15.773	13.36	95.97	-0.13	
04/19/89	17:09:27	15.780	13.36	95.97	-0.13	
04/19/89	17:11:27	15.780	13.36	95.97	-0.13	
04/19/89	17:13:27	15.780	13.36	95.97	-0.13	
04/19/89	17:15:27	15.784	13.35	95.98	-0.14	
04/19/89	17:17:27	15.780	13.36	95.97	-0.13	
04/19/89	17:19:26	15.780	13.36	95.97	-0.13	
04/19/89	17:21:26	15.780	13.36	95.97	-0.13	
04/19/89	17:23:26	15.784	13.35	95.98	-0.14	
04/19/89	17:25:26	15.784	13.35	95.98	-0.14	
04/19/89	17:27:26	15.784	13.35	95.98	-0.14	
04/19/89	17:29:26	15.784	13.35	95.98	-0.14	
04/19/89	17:31:26	15.784	13.35	95.98	-0.14	
04/19/89	17:33:26	15.780	13.36	95.97	-0.13	
04/19/89	17:35:26	15.780	13.36	95.97	-0.13	
04/19/89	17:37:26	15.780	13.36	95.97	-0.13	
04/19/89	17:39:26	15.777	13.36	95.97	-0.13	
04/19/89	17:41:26	15.773	13.36	95.97	-0.13	
04/19/89	17:43:26	15.784	13.35	95.98	-0.14	
04/19/89	17:45:25	15.784	13.35	95.98	-0.14	
04/19/89	17:47:25	15.784	13.35	95.98	-0.14	
04/19/89	17:49:25	15.784	13.35	95.98	-0.14	
04/19/89	17:51:25	15.784	13.35	95.98	-0.14	
04/19/89	17:53:25	15.780	13.36	95.97	-0.13	
04/19/89	17:55:25	15.777	13.36	95.97	-0.13	
04/19/89	17:57:25	15.777	13.36	95.97	-0.13	
04/19/89	17:59:25	15.770	13.37	95.96	-0.12	
04/19/89	18:01:25	15.770	13.37	95.96	-0.12	
04/19/89	18:03:25	15.773	13.36	95.97	-0.13	
04/19/89	18:05:25	15.777	13.36	95.97	-0.13	
04/19/89	18:07:25	15.777	13.36	95.97	-0.13	
04/19/89	18:09:25	15.777	13.36	95.97	-0.13	
04/19/89	18:11:24	15.777	13.36	95.97	-0.13	
04/19/89	18:13:24	15.777	13.36	95.97	-0.13	
04/19/89	18:15:24	15.773	13.36	95.97	-0.13	
04/19/89	18:17:24	15.770	13.37	95.96	-0.12	
04/19/89	18:19:24	15.770	13.37	95.96	-0.12	
04/19/89	18:21:24	15.777	13.36	95.97	-0.13	
04/19/89	18:23:24	15.777	13.36	95.97	-0.13	
04/19/89	18:25:24	15.777	13.36	95.97	-0.13	
04/19/89	18:27:24	15.777	13.36	95.97	-0.13	
04/19/89	18:29:24	15.777	13.36	95.97	-0.13	
04/19/89	18:31:24	15.780	13.36	95.97	-0.13	
04/19/89	18:33:24	15.780	13.36	95.97	-0.13	
04/19/89	18:35:24	15.777	13.36	95.97	-0.13	
04/19/89	18:37:23	15.777	13.36	95.97	-0.13	
04/19/89	18:39:23	15.784	13.35	95.98	-0.14	
04/19/89	18:41:23	15.780	13.36	95.97	-0.13	
04/19/89	18:43:23	15.780	13.36	95.97	-0.13	
04/19/89	18:45:23	15.784	13.35	95.98	-0.14	
04/19/89	18:47:23	15.784	13.35	95.98	-0.14	
04/19/89	18:49:23	15.784	13.35	95.98	-0.14	
04/19/89	18:51:23	15.784	13.35	95.98	-0.14	
04/19/89	18:53:23	15.784	13.35	95.98	-0.14	
04/19/89	18:55:23	15.780	13.36	95.97	-0.13	
04/19/89	18:57:23	15.784	13.35	95.98	-0.14	
04/19/89	19:00:00	--				Test Ended

Notes:

(a) TOC is Top of Casing (PVC).

(b) Measurements taken by hand (manual calibration)

(c) Water level data were logged digitally at 2 second intervals and measured periodically by hand from 11:05 through 12:15. Since there was no appreciable change in the water levels during this interval, this logger data were erased. Values represent data obtained by hand.

Groundwater Level Data for Pumping Test, GW-10, Mid-Atlantic Wood Preservers
April 19, 1989

Date	Time	Submergence of Transducer TOC (a) (ft)	Depth to Water TOC (ft)	Water Elevation TOC (ft)	Drawdown (ft)	Comments
04/19/89	11:10:00	15.730	14.93 (b)	95.91	0.00	Pre-pumping (c)
04/19/89	12:23:00	15.719	14.95 (b)	95.89	0.02	(c)
04/19/89	12:39:58	15.719	14.95	95.89	0.02	
04/19/89	12:49:58	15.722	14.95	95.89	0.02	
04/19/89	12:59:58	15.726	14.94	95.90	0.01	
04/19/89	13:09:58	15.722	14.95	95.89	0.02	
04/19/89	13:19:58	15.726	14.94	95.90	0.01	
04/19/89	13:29:58	15.729	14.94	95.90	0.01	
04/19/89	13:39:58	15.729	14.94	95.90	0.01	
04/19/89	13:49:58	15.733	14.94	95.90	0.01	
04/19/89	13:59:58	15.729	14.94	95.90	0.01	
04/19/89	14:09:58	15.729	14.94	95.90	0.01	
04/19/89	14:19:58	15.729	14.94	95.90	0.01	
04/19/89	14:29:58	15.733	14.94	95.90	0.01	
04/19/89	14:39:58	15.733	14.94	95.90	0.01	
04/19/89	14:49:58	15.733	14.94	95.90	0.01	
04/19/89	14:59:57	15.740	14.93	95.91	0.00	
04/19/89	15:09:57	15.740	14.93	95.91	0.00	
04/19/89	15:19:57	15.740	14.93	95.91	0.00	
04/19/89	15:29:57	15.740	14.93	95.91	0.00	
04/19/89	15:39:57	15.743	14.93	95.91	0.00	
04/19/89	15:49:57	15.743	14.93	95.91	0.00	
04/19/89	15:59:57	15.743	14.93	95.91	0.00	
04/19/89	16:09:57	15.740	14.93	95.91	0.00	
04/19/89	16:19:57	15.740	14.93	95.91	0.00	
04/19/89	16:29:57	15.743	14.93	95.91	0.00	
04/19/89	16:39:57	15.740	14.93	95.91	0.00	
04/19/89	16:49:57	15.740	14.93	95.91	0.00	
04/19/89	16:59:57	15.740	14.93	95.91	0.00	
04/19/89	17:09:57	15.740	14.93	95.91	0.00	
04/19/89	17:19:57	15.740	14.93	95.91	0.00	
04/19/89	17:29:57	15.740	14.93	95.91	0.00	
04/19/89	17:39:57	15.743	14.93	95.91	0.00	
04/19/89	17:49:57	15.740	14.93	95.91	0.00	
04/19/89	17:59:57	15.740	14.93	95.91	0.00	
04/19/89	18:09:57	15.740	14.93	95.91	0.00	
04/19/89	18:19:57	15.740	14.93	95.91	0.00	
04/19/89	18:29:57	15.740	14.93	95.91	0.00	
04/19/89	18:39:57	15.740	14.93	95.91	0.00	
04/19/89	18:48:00	--	14.93	95.91	0.00	(b)
04/19/89	19:00:00	--	--	--	--	Pumping Stopped

Notes:

(a) TOC is Top of Casing (PVC).

(b) Measurement taken by hand (manual calibration point).

(c) Water level data were logged digitally at 2 second intervals and measured periodically by hand from 11:10 through 12:23. Since there was no appreciable change in the water levels during this interval, this logger data were erased. Values represent data obtained by hand.

APPENDIX F

Stream Gauging Data

BY MG DATE 3/3/89

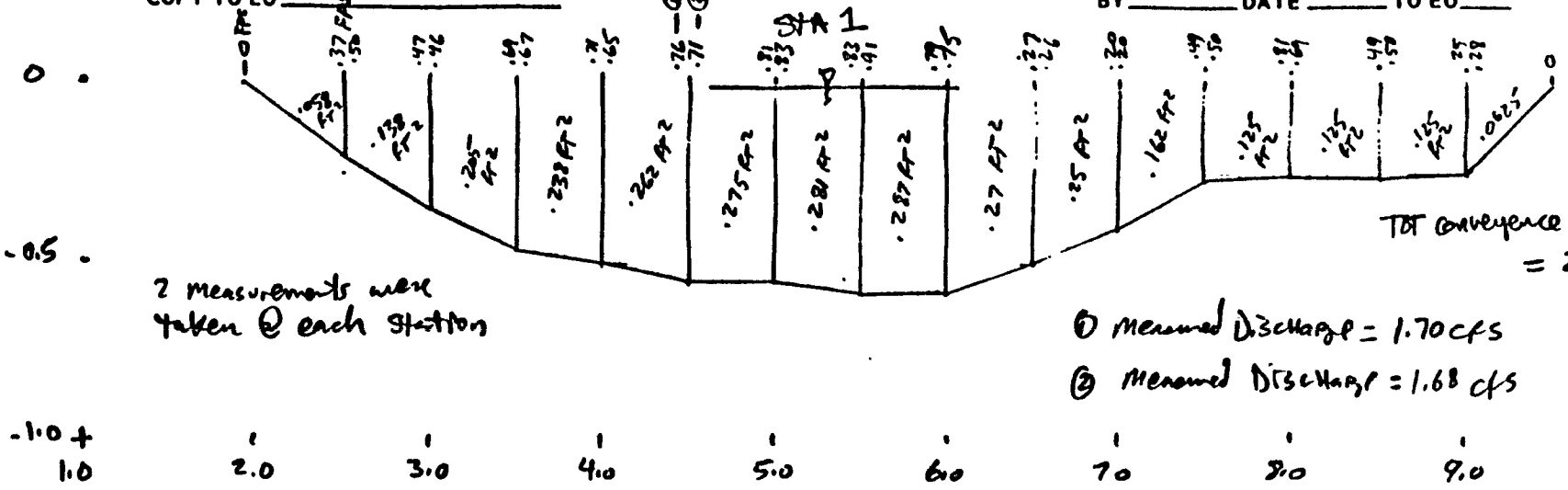
CHECKED BY

COPY TO EO

REVISIONS

BY DATE TO EO

BY DATE TO EO



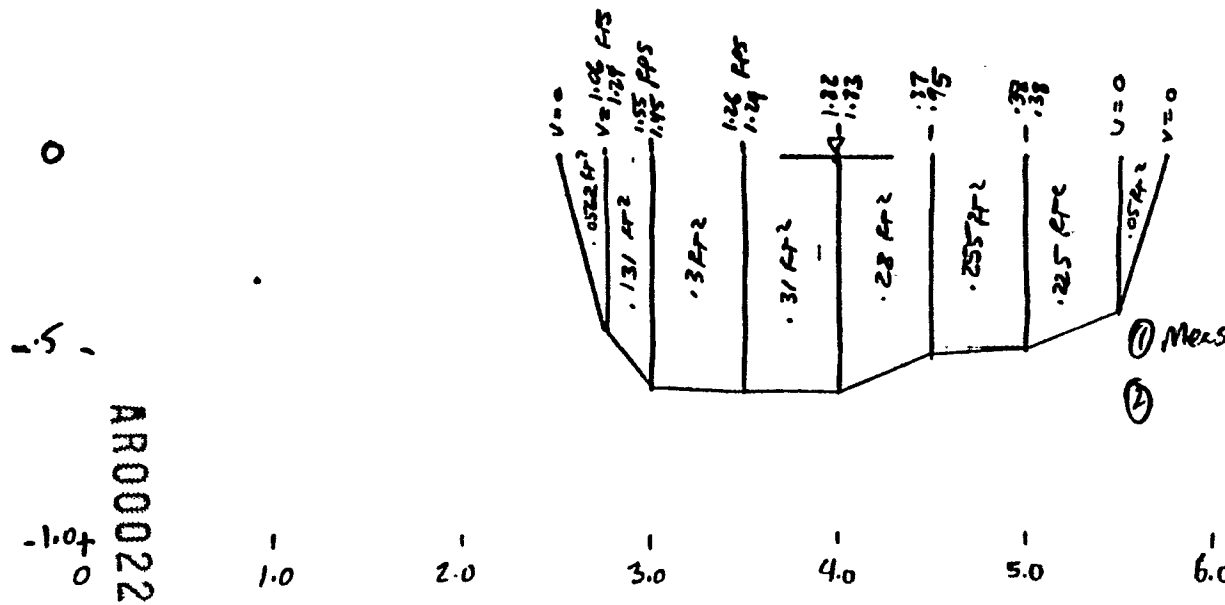
2 measurements were taken @ each station

Tot conveyance Area = 2.86 ft²

① Measured Discharge = 1.70 cfs

② Measured Discharge = 1.68 cfs

Distance bet STA 1 & 2 = 2500'



① Measured Discharge = 1.68 cfs

② " = 1.74 cfs

FILE Mid-Atlantic Wood Preserves

SUBJECT

SHEET 1 OF

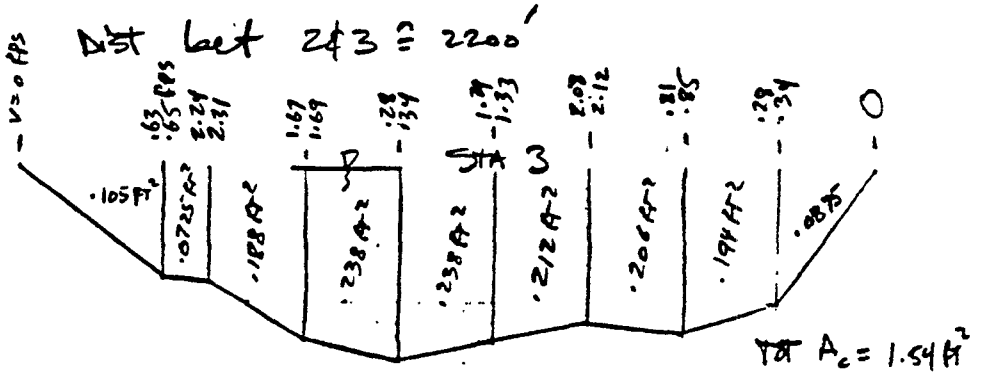
AR000227

Dames & Moore

FILE Mid. Atlantic Wood Preserves

SUBJECT

SHEET 2 OF 6



① Measured Discharge = 1.70 cfs

② " = 1.76 cfs

SUMMARY

Location	Distance (ft)	Measured Discharge ①	Measured Discharge ②
STA 1	2500	1.70	1.68
STA 2	2100	1.68	1.74
STA 3		1.70	1.76

Conclusion: No difference in flow was measured between the 3 stations selected. If there is a decrease in flow as you proceed upstream, given the low magnitude of baseflow, the decrease could easily fall within the measuring error in determining the Geometric cross section and the velocity readings with such a low flow, a reliable difference would be better measured by the use of an artificial control such as a broad crested weir or flume.

AR000228

BY ____ DATE ____ TO EO ____

BY ____ DATE ____ TO EO ____

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COPY TO EO ____

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Date 3/3, 19 87 DISCHARGE MEASUREMENT NOTES

STONY RUN River at STA 1 (END of Shirley Ave)

Angle coefficient	Dist. from initial point	Width	Depth (ft)	Observation depth	Revolutions	Time in seconds	VELOCITY: At point	VELOCITY: Mean in vertical	Adjusted for hor. angle or	Area	Discharge
	1.92	Bank	0		0	40		0		0	0
	2.5		.2		14	40		.37		.135	.04
	3.0		.35		18	40		.47		.175	.082
	3.5		.47		27			.69		.2	.162
	4.0		.5		28			.71		.25	.178
	4.5		.55		30			.76		.275	.209
	5.0		.55		32			.81		.275	.223
	5.5		.58		33			.83		.290	.241
	6.0		.58		31			.79		.290	.229
⊙	6.5		.50		10			.27		.250	.068
	7.0		.40		7			.20		.20	.04
	7.5		.27		19			.49		.135	.066
	8.0		.25		32			.81		.125	.010
	8.5		.26		19			.49		.130	.064
	9.0		.25		9			.23		.125	.031
	9.5	Bank	0		0			0		0	0
										Total	1.64 cfs

ARR0022

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UNITED STATES
DEPARTMENT OF THE INTERIOR
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WATER RESOURCES DIVISION

Date 3/3, 19 87 DISCHARGE MEASUREMENT NOTES

STONY RUN River at STA. 1

Angle coefficient	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	VELOCITY: At point	VELOCITY: Mean in vertical	Adjusted for hor. angle or	Area	Discharge
			0		0	50		0		0	0
			.2		24			.50		.108	.054
			.37		22			.46		.185	.085
			.45		33			.67		.225	.151
			.5		32			.65		.25	.162
			.55		35			.71		.275	.195
			.57		41			.83		.285	.237
			.57		45			.91		.285	.259
			.58		37			.75		.29	.218
⊙			.58		12			.26		.29	.075
			.41		9	Log V's		.20		.205	.041
			.28		24			.50		.140	.070
			.27		34			.69		.135	.093
			.3		24			.50		.150	.075
			.25		13			.28		.125	.035
			0		0			0		0	0
										Total	1.75 cfs

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Ave of 2 readings 1.70 cfs

Date 3/3/ 19[redacted] DISCHARGE MEASUREMENT NOTES

STONY RUN River at STA 2

Angle coefficient	Dist. from initial point (Ft)	Width	Depth (Ft)	Observation depth	Revolutions	Time in seconds	VELOCITY: At point	VELOCITY: Mean in vertical	Adjusted for hor. angle or	Area	Discharge
	2.5	vertical Bank			0	50		0		0	0
	2.75		.45		53			1.06		.112	.119
	3.0		.60		78			1.55		.225	.349
	3.5		.62		63			1.26		.310	.391
	4.0		.62		92			1.82		.310	.564
	4.5		.52		43			.87		.260	.226
	5.0		.50		18			.38		.250	.095
	5.5		.40		0			0		.150	0
	5.75	veil. Bank			0			0		0	0
⊙										TOTAL	1.74 cfs

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0.0 .10 .20 .30 .40 .50 .60 .70 .75

[redacted]0230

Date 3/3 19[redacted] DISCHARGE MEASUREMENT NOTES

STONY RUN River at STA 2 (JUST D/S OF [redacted] DORSEY)

Angle coefficient	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	VELOCITY: At point	VELOCITY: Mean in vertical	Adjusted for hor. angle or	Area	Discharge
			.4		0	50		0		0	0
			.5		62			1.29		.125	.155
			.6		73			1.85		.225	.276
			.65		62			1.29		.325	.403
			.62		92			1.83		.310	.567
			.52		47			.95		.260	.247
			.5		18			.38		.250	.095
			.4		0			0		.150	0
			0		0			0		0	0
⊙										TOTAL	1.79

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DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Date 3/3, 19 89 DISCHARGE MEASUREMENT NOTES

STONY RUN River at STA 3

Azimuth	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	VELOCITY: At point	VELOCITY: Mean in vertical	Adjusted for hor. angle or	Area	Discharge
	2.0	Bank			0	50		0	0	0	0
	2.75		.28		31			.63	.63	.14	.088
9	3.0		.3		126			2.49	2.24	.112	.251
87	3.5		.45		97			1.92	1.67	.225	.376
	4.0		.5		13			.28	.28	.25	.070
12	4.5		.45		70			1.40	1.29	.225	.290
	5.0		.4		105			2.08	2.08	.200	.416
	5.5		.43		40			.81	.81	.215	.174
	6.0		.35		13			.28	.28	.175	.049
⊙	6.6	Bank				↓		0	0	0	0
										TOTAL	1.69 cfs

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GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Date 3/3, 19 89 DISCHARGE MEASUREMENT NOTES

STONY RUN River at STA 3 D/S of unnamed trib

Azimuth	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	VELOCITY: At point	VELOCITY: Mean in vertical	Adjusted for hor. angle or	Area	Discharge
					0	50		0	0	0	0
					32			.65	.65	.14	.091
					130			2.57	2.31	.112	.259
					98			1.94	1.69	.225	.380
					16			.34	.34	.25	.085
Bank					73			1.45	1.33	.225	.300
	Sand				107			2.12	2.12	.200	.424
					42			.85	.85	.215	.183
					16			.34	.34	.175	.059
⊙					0	↓		0	0	0	0
										TOTAL	1.78 cfs

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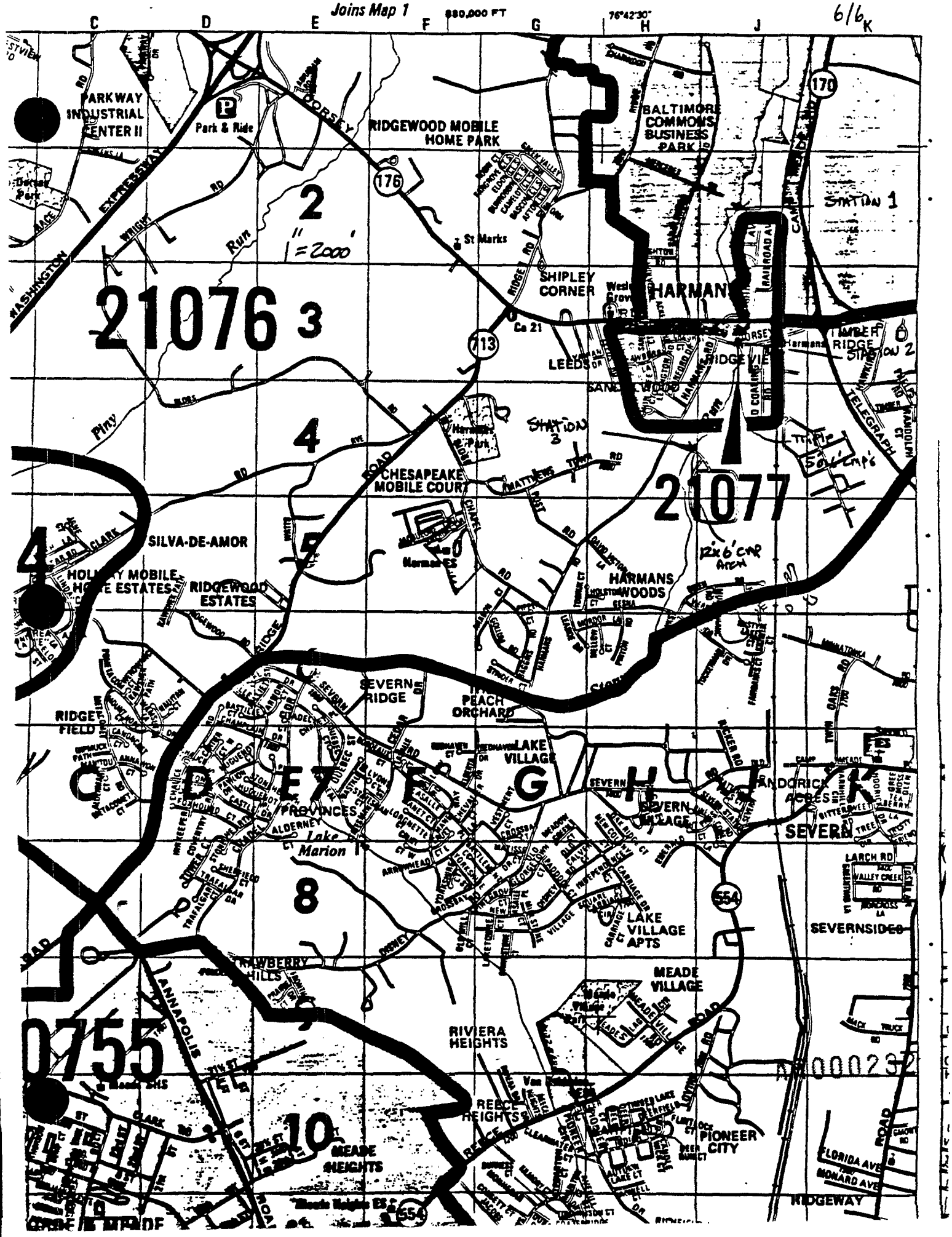
Joins Map 1
880,000 FT
76°42'30"
6/6
C
D
E
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G
H
J
K
PARKWAY INDUSTRIAL CENTER II
Park & Ride
DORSEY
RIDGEWOOD MOBILE HOME PARK
BALTIMORE COMMONS BUSINESS PARK
170
176
EXPRESSWAY
WASHINGTON
WRIGHT
Run
2
1"=2000'
St Marks
SHIPLEY CORNER
HARMANS
STATION 1
21076
3
713
Co 21
LEEDS
RIDGEVIEW
TIMBER RIDGE
STATION 2
TELEGRAPH
Play
4
STATION 3
Harmans Park
CHESAPEAKE MOBILE COURT
MATTHEWS TOWN
21077
SILVA-DE-AMOR
HOLIDAY MOBILE HOME ESTATES
RIDGEWOOD ESTATES
HARMANS WOODS
12x6' CMP ARCH
SEVERN RIDGE
PEACH ORCHARD
RIDGE FIELD
LAKE VILLAGE
PROVINCES
Lake Marion
SEVERN VILLAGE
SANDRICK ACRES
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Model - 1205 Mini Meter

Rinse Current Meter in clear water as soon as possible after use, and dry using a soft cloth. Never place a wet Current Meter in its case. Lubricate, using lubricant supplied after approximately each 8 hours of use, or at least once a week if used infrequently.

To avoid damage to Pivot & Pivot Bearing, be sure to replace Pivot with brass Shipping Pivot supplied with Current Meter when Current Meter is not in use.

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RATING TABLE FOR MINI CURRENT METER

Actual Rating Limits: 0.25 to 3.0 feet per second EQUATION V = 0.977 R + 0.020 Mini Standard Rating

Seconds	VELOCITY IN FEET PER SECOND — Revolutions														
	3	5	7	10	15	20	25	30	40	50	60	80	100	150	200
40	101	150	199	.272	.384	.516	.639	.761	1.00	1.25	1.49	1.98	2.47	3.68	4.91
41	.099	.147	.195	.266	.385	.505	.624	.743	.981	1.22	1.46	1.93	2.41	3.60	4.79
42	.096	.144	.191	.261	.377	.493	.610	.726	.958	1.19	1.42	1.88	2.35	3.52	4.68
43	.094	.142	.187	.255	.369	.482	.596	.710	.937	1.16	1.39	1.85	2.30	3.44	4.57
44	.095	.139	.183	.250	.361	.472	.583	.694	.916	1.14	1.36	1.80	2.25	3.36	4.47
45	.093	.137	.180	.245	.354	.462	.571	.679	.896	1.11	1.33	1.76	2.20	3.29	4.37
46	.092	.134	.177	.240	.347	.453	.559	.665	.878	1.09	1.30	1.73	2.15	3.21	4.26
47	.090	.132	.174	.236	.340	.444	.548	.652	.859	1.07	1.28	1.69	2.11	3.15	4.19
48	.089	.130	.170	.232	.333	.435	.537	.639	.842	1.05	1.25	1.66	2.06	3.08	4.10
49	.088	.128	.168	.227	.327	.427	.526	.626	.826	1.02	1.22	1.62	2.02	3.02	4.02
50	.087	.126	.165	.223	.321	.419	.516	.614	.810	1.00	1.20	1.59	1.98	2.96	3.94
51	.085	.124	.162	.220	.315	.411	.507	.603	.794	.986	1.18	1.56	1.94	2.90	3.85
52	.084	.122	.160	.216	.310	.404	.498	.592	.780	.967	1.16	1.53	1.91	2.85	3.79
53	.083	.120	.157	.212	.305	.397	.489	.581	.765	.950	1.13	1.50	1.87	2.79	3.71
54	.082	.118	.155	.208	.299	.390	.480	.571	.752	.933	1.11	1.48	1.84	2.74	3.65
55	.081	.117	.152	.206	.294	.383	.472	.561	.739	.916	1.09	1.45	1.80	2.69	3.58
56	.080	.115	.150	.202	.290	.377	.464	.551	.726	.900	1.07	1.42	1.77	2.64	3.52
57	.079	.114	.148	.199	.285	.371	.457	.542	.714	.885	1.06	1.40	1.74	2.60	3.45
58	.079	.112	.146	.196	.281	.365	.449	.533	.702	.870	1.04	1.38	1.71	2.55	3.40
59	.078	.111	.144	.194	.276	.360	.442	.525	.690	.856	1.02	1.35	1.68	2.51	3.34
60	.077	.109	.142	.191	.272	.354	.436	.516	.679	.842	1.00	1.33	1.65	2.47	3.28
61	.076	.108	.140	.188	.268	.348	.428	.508	.669	.829	.989	1.31	1.63	2.43	3.23
62	.075	.107	.138	.185	.264	.343	.422	.501	.658	.816	.973	1.29	1.60	2.38	3.16
63	.075	.106	.137	.183	.261	.338	.416	.493	.648	.803	.958	1.27	1.58	2.35	3.13
64	.074	.104	.135	.181	.257	.333	.410	.486	.638	.791	.944	1.25	1.55	2.32	3.08
65	.073	.103	.133	.178	.253	.328	.404	.479	.629	.780	.930	1.23	1.53	2.28	3.03
66	.072	.102	.132	.176	.250	.324	.398	.472	.620	.768	.916	1.21	1.51	2.25	2.99
67	.072	.101	.130	.174	.247	.320	.393	.466	.611	.757	.903	1.19	1.48	2.22	2.94
68	.071	.100	.129	.172	.244	.315	.387	.459	.603	.746	.890	1.18	1.46	2.18	2.90
69	.070	.099	.127	.170	.240	.311	.382	.453	.594	.736	.878	1.16	1.44	2.15	2.85
70	.070	.098	.126	.168	.237	.307	.377	.447	.586	.726	.865	1.14	1.42	2.12	2.82
	3	5	7	10	15	20	25	30	40	50	60	80	100	150	200

Rev 1988

1205-26

Techniques of Water-Resources Investigations
of the United States Geological Survey

Chapter A8

DISCHARGE MEASUREMENTS AT GAGING STATIONS

By Thomas J. Buchanan and William P. Somers

Book 3

APPLICATIONS OF HYDRAULICS

DISCHARGE MEASUREMENTS AT GAGING STATIONS

By Thomas J. Buchanan and William P. Somers

Abstract

The techniques used in making discharge measurements at gaging stations are described in this report. Most of the report deals with the current-meter method of measuring discharge, because this is the principal method used in gaging streams. The use of portable weirs and flumes, floats, and volumetric tanks in measuring discharge are briefly described.

Introduction

The U.S. Geological Survey makes thousands of streamflow measurements each year. Discharges measured range from a trickle in a ditch to a flood on the Amazon. Several methods are used, but the Geological Survey makes most streamflow measurements by current meter. The purpose of this report is to describe in detail the procedures used by the Geological Survey for making current-meter measurements and to describe briefly several of the other methods of measuring streamflow.

Streamflow, or discharge, is defined as the volume rate of flow of the water including any sediment or other solids that may be dissolved or mixed with it. Dimensions are usually expressed in cubic feet per second. Other common units are million gallons per day and acre-feet per day.

Current-Meter Measurements

A current-meter measurement is the summation of the products of the partial areas of the stream cross section and their respective average velocities. The formula

$$Q=\Sigma(a\,v) \qquad (1)$$

represents the computation where Q is total discharge, a is an individual partial cross-section area, and v is the corresponding mean velocity of the flow normal to the partial area.

In the midsection method of making a current-meter measurement it is assumed that the velocity sample at each location represents the mean velocity in a partial rectangular area. The area extends laterally from half the distance from the preceding meter location to half the distance to the next and vertically, from the water surface to the sounded depth. (See fig. 1.)

The cross section is defined by depths at locations 1, 2, 3, 4, . . . n. At each location the velocities are sampled by current meter to obtain the mean of the vertical distribution of velocity. The partial discharge is now computed for any partial section at location x as

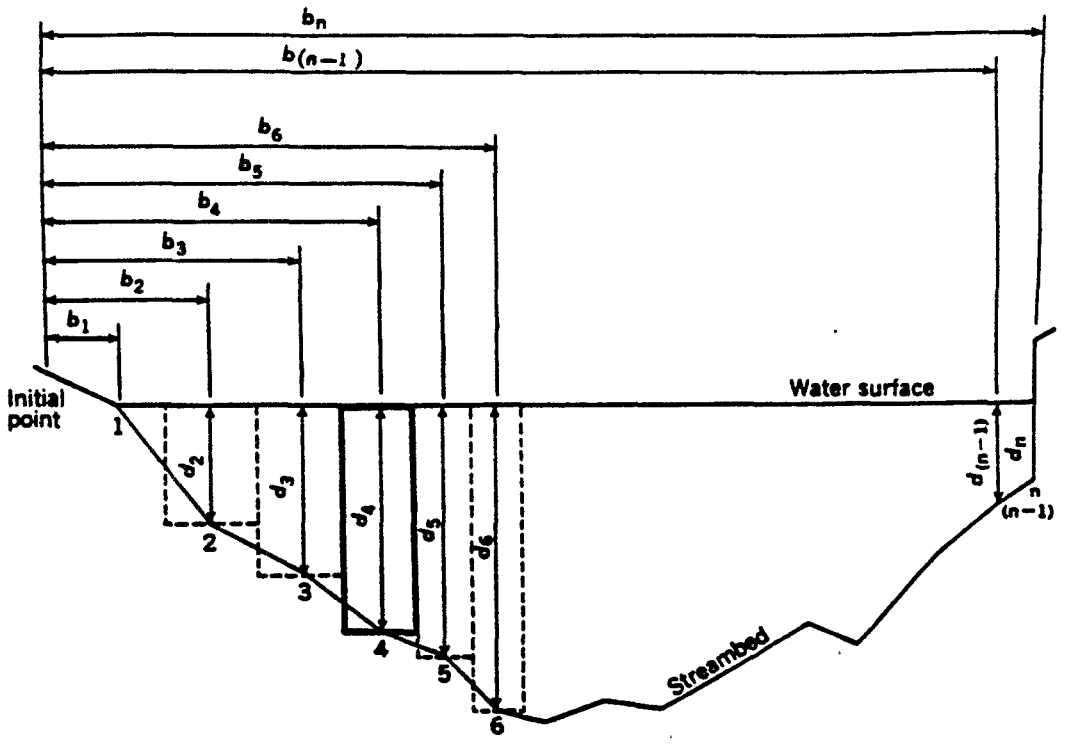
$$q_x=v_x\left[\frac{(b_x-b_{(x-1)})}{2}+\frac{(b_{(x+1)}-b_x)}{2}\right]d_x$$

$$=v_x\left[\frac{b_{(x+1)}-b_{(x-1)}}{2}\right]d_x, \qquad (2)$$

where

q_x = discharge through partial section x,
v_x = mean velocity at location x,
b_x = distance from initial point to location x,
$b_{(x-1)}$ = distance from initial point to preceding location,
$b_{(x+1)}$ = distance from initial point to next location,
d_x = depth of water at location x.

335-253 O—62——2



EXPLANATION

1, 2, 3,.....n	Observation points
$b_1, b_2, b_3, \ldots\ldots b_n$	Distance, in feet, from the initial point to the observation point
$d_1, d_2, d_3, \ldots\ldots d_n$	Depth of water, in feet, at the observation point
Dashed lines	Boundary of partial sections; one heavily outlined discussed in text

Figure 1.—Definition sketch of midsection method of computing cross-section area for discharge measurements.

Thus, for example, the discharge through partial section 4 (heavily outlined in fig. 1) is

$$q_4 = v_4\left[\frac{b_5 - b_3}{2}\right]d_4.$$

The procedure is similar when x is at an end section. The "preceding location" at the beginning of the cross section is considered coincident with location 1; the "next location" at the end of the cross section is considered coincident with location n. Thus,

$$q_1 = v_1\left[\frac{b_2 - b_1}{2}\right]d_1, \text{ and}$$

$$q_n = v_n\left[\frac{b_n - b_{(n-1)}}{2}\right]d_n.$$

For the example shown in figure 1, q_1 is zero because the depth at observation point 1 is zero. However, when the cross-section boundary is a vertical line at the edge of the water as at location n, the depth is not zero and velocity at the end section may or may not be zero. The formula for q_1 or q_n is used whenever there is water only on one side of an observation point such as at piers, abutments, and islands. It usually is necessary to estimate the velocity at an end section as some percentage of the adjacent section because it normally is impossible to measure the velocity accurately with the current meter close to a boundary. There also

is the possibility of damage to the equipment if the flow is turbulent.

The summation of the discharges for all the partial sections is the total discharge of the stream. An example of the measurement notes is shown in figure 2.

The mean-section method used by the Survey prior to 1950 differs from the midsection method in computation procedure. Partial discharges are computed for partial sections between successive locations. The velocities and depths at successive locations are each averaged, and

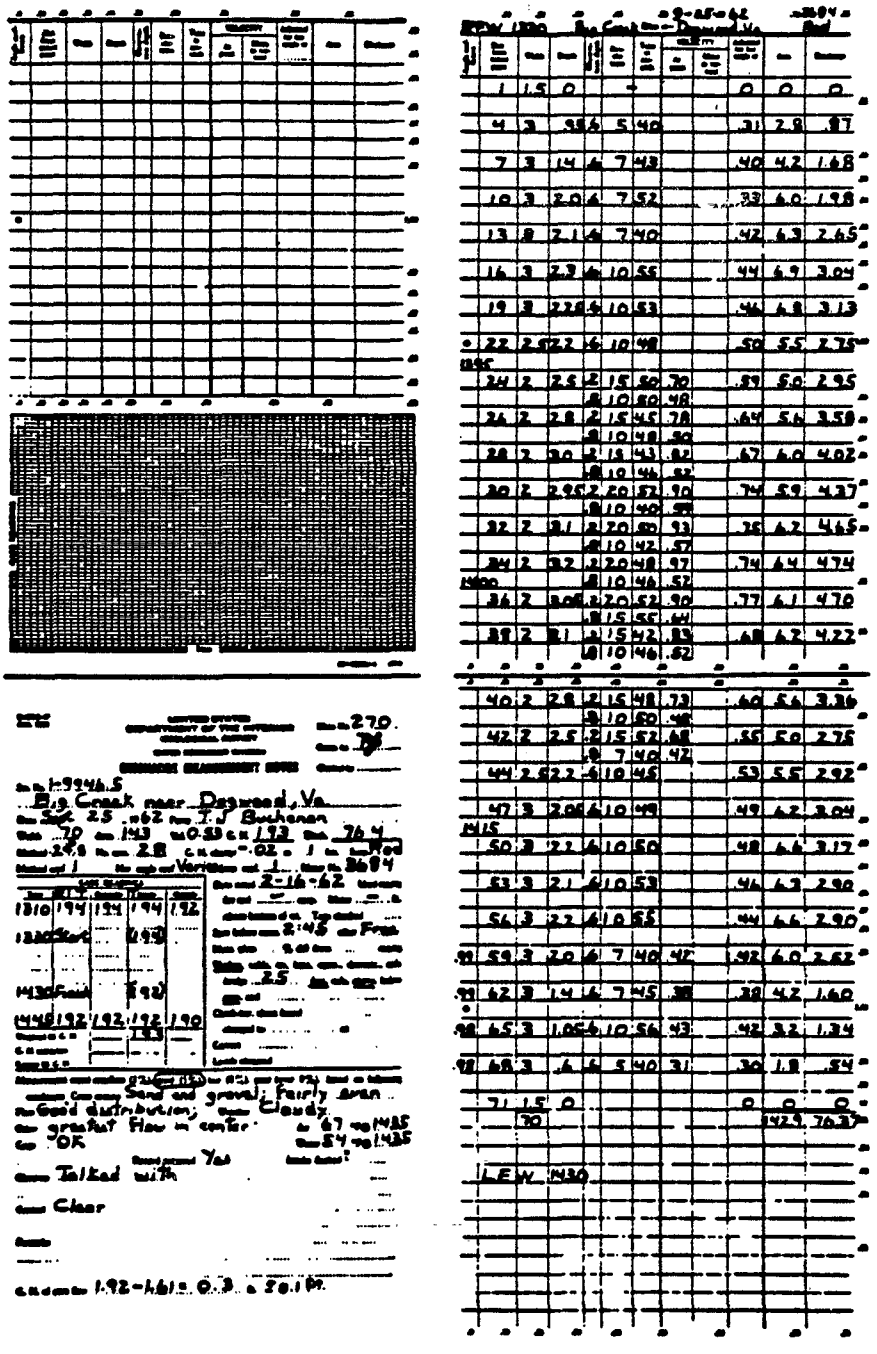


Figure 2.—Computation notes of a current-meter measurement by the midsection method.

the section extends laterally from one observation point to the next. Discharge is the product of the average of two mean velocities, the average of two depths, and the distance between locations. A study by Young (1950) concluded that the midsection method is simpler to compute and is a slightly more accurate procedure than the mean-section method.

Current-meter measurements usually are classified in terms of the means used to cross the stream during the measurement, such as wading, cableway, bridge, boat, or ice.

Instruments and equipment

Current meters, timers, and counting equipment are used when making conventional types of measurements. Additional equipment used depends on the type of measurements being made. Instruments and equipment used in making current-meter measurements are described in this section under the following categories: current meters, sounding equipment, width-measuring equipment, equipment assemblies, and miscellaneous equipment.

Current meters

A current meter is an instrument used to measure the velocity of flowing water. The principle of operation is based on the proportionality between the velocity of the water and the resulting angular velocity of the meter rotor. By placing a current meter at a point in a stream and counting the number of revolutions of the rotor during a measured interval of time, the velocity of water at that point is determined.

The number of revolutions of the rotor is obtained by an electrical circuit through the contact chamber. Contact points in the chamber are designed to complete an electrical circuit at selected frequencies of revolution. Contact chambers can be selected having contact points that will complete the circuit twice per revolution, once per revolution, or once per five revolutions. The electrical impulse produces an audible click in a headphone or registers a unit on a counting device.

The counting intervals are measured by a stopwatch.

Current meters generally can be classified into two main types, those meters having vertical-axis rotors and those having horizontal-axis rotors. The comparative characteristics of these two types are summarized below:

1. Vertical-axis rotor with cups or vanes.
   a. Operates in lower velocities than do horizontal-axis meters.
   b. Bearings are well-protected from silty water.
   c. Rotor is repairable in the field without adversely affecting the rating.
   d. Single rotor serves for the entire range of velocities.
2. Horizontal-axis rotor with vanes.
   a. Rotor disturbs flow less than do vertical-axis rotors because of axial symmetry with flow direction.
   b. Rotor is less likely to be entangled by debris than are vertical-axis rotors.
   c. Bearing friction is less than for vertical-axis rotors because bending moments on the rotor are eliminated.

Vertical-axis current meters

The most common type of vertical-axis current meter is the Price meter, type AA. (See fig. 3.) This meter is used extensively by the Geological Survey. The standard Price meter has a rotor 5 inches in diameter and 2 inches high with six cone-shaped cups mounted on a stainless-steel shaft. A pivot bearing supports the rotor shaft. The contact chamber houses the upper part of the shaft and an an eccentric contact that wipes a bead of solder on a slender bronze wire (cat's whisker) attached to the binding post. A separate reduction gear (pentagear), wire, and binding post provide a contact each time the rotor makes five revolutions. A tailpiece keeps the meter pointing into the current.

In addition to the standard type AA meter for general use there is a type AA meter for low velocities. No pentagear is provided. This modification reduces friction. The shaft usually has two eccentrics making two contacts per revolution. The low-velocity meter normally is rated from 0.2 to 2.5 fps (feet per second) and is recommended when the mean velocity at a cross section is less than 1 fps.

In addition to the type AA meters, the Geological Survey uses a Price pygmy meter

APPENDIX G

Quality Assurance Program

TABLE OF CONTENTS

APPENDIX G

QUALITY ASSURANCE AND
QUALITY CONTROL PROGRAM

APPENDIX G
QUALITY ASSURANCE AND QUALITY CONTROL

This section summarizes the findings of QA/QC activities carried out for the RI for the MAWP site, Harmans, Maryland. The QA/QC activities reported in this section include field sampling procedures and custody, laboratory analysis, chemical data quality assurance review, and data management. Audits conducted during the RI included an office systems audit and a performance audit during groundwater sampling. A copy of each of these audit reports is presented as Attachments G-1 and G-2. Review findings for each activity during groundwater sampling and analysis are discussed below.

G.1 SAMPLING PROCEDURES AND CUSTODY

Special sampling procedures were observed to minimize the chances of sample contamination and cross contamination and to maintain integrity as specified in the project QA Plan. These procedures included the following techniques:

- Use of dedicated sampling equipment at each well. Dedicated bailers were used to sample each well. The bailers were new, still wrapped in plastic and in their shipping carton. The decontamination procedure for the new bailer was to pour distilled water over it prior to use. During well purging prior to groundwater sampling, dedicated piping was used/inserted into the well. The screen at the bottom of the piping, however, was the same for all wells. The decontamination procedure for that screen consisted of pouring distilled water over it prior to attaching it to the pipe to be inserted into the well.
- Use of decontaminated sampling equipment at sediment and soil sampling locations. Stainless steel sampling equipment was decontaminated between each sample using a detergent wash, a tap water rinse, and a final distilled water rinse. Augers and drilling equipment were decontaminated between holes by steam cleaning.
- Prior to use, the sampling equipment was wrapped in aluminum foil to preserve decontamination measures.

- Use of sample containers prepared by the Contractor laboratory, Versar, Inc., that were accompanied by chain-of-custody forms. Chain-of-custody procedures followed each container through sampling and then back to the laboratory.
- Use of overnight delivery service for shipment of samples to the analytical laboratory.
- Use of "trip blank" samples to monitor potential contamination of the samples from and en route to the laboratory.
- Use of "field blank" (rinse blank) samples to monitor any contamination that was introduced by ambient conditions.

A field audit by the Dames & Moore Quality Assurance Officer (QAO) was conducted on February 28, 1989, during groundwater sampling to ensure compliance of procedures stated in the project QA plan (Audit Report is presented as Attachment G-2). Items that required clarification and/or corrective action were minor, did not compromise data quality, and were resolved by the project team in a timely manner. Oversight during groundwater sampling was conducted by EPA contractor representative Freda Griffis of Lee Wan & Associates, Inc., Atlanta, Georgia, and split samples of groundwater were obtained for four onsite wells (well nos. 1, 2, 3, and 10) and one offsite well. Oversight during much of the drilling and soil sampling phase of the RI was conducted by Thomas Sherrod, also of Lee Wan & Associates, Inc.

G.2 LABORATORY ANALYSIS

Versar, Inc., Springfield, Virginia, provided analytical services for the RI. Versar, Inc., is a participant in the EPA's Contract Laboratory Program (CLP). As such, it is subject to laboratory evaluations by EPA on a regular basis. The most recent performance evaluation reports (Organic Report, November 8, 1988, and Inorganic Report, January 24, 1989) indicated the performance level as acceptable.

Versar, Inc., utilized the October 1986 CLP Statement of Work (SOW) for the organic analyses and the July 1985 SOW for the inorganic analyses. Both of these SOWs involve QA/QC procedures to ensure data quality. These procedures include frequent instrument calibration and tuning, the use of method blank samples to monitor for laboratory contaminants, and the use of matrix spike samples to monitor matrix interference effects.

G.3 CHEMICAL DATA QUALITY ASSURANCE REVIEW

A review of the laboratory data reporting deliverable(s) from Versar, Inc., was conducted to evaluate data quality. The laboratory QA/QC procedures for the evaluation and documentation of analytical methodologies were performed according to EPA CLP protocols for samples collected and analyzed from December 1988 to February 1989. A certain number of samples were duplicates and blanks to serve the quality control needs. A summary of the sampling and analysis program for the RI is presented in Table 2-1 of the RI report.

G.3.1 Review Elements

The QA review and findings from laboratory reported data are summarized in this section. The data package of results from each sample or group of samples was checked for completeness of reporting, completion of analysis within appropriate holding times for each parameter, analysis and comparison of duplicate samples, the presence of laboratory contaminants, and completion of internal laboratory QA/QC checks per CLP protocols. The internal laboratory QA/QC procedures included matrix spike recoveries, surrogate compound recoveries, initial and continuing instrument calibration, and reagent and sample blank analyses.

G.3.2 Review Findings

A review of case narratives, as well as required data sheets, of each sample resulted in findings that are summarized below:

1. All of the samples were extracted and analyzed for the required analytes within the appropriate holding times.

2. Results of analysis of volatile and semivolatile organic compounds detected in field and laboratory blanks are summarized in Table G-1. The volatile organic compounds (VOC) detected in field blanks associated with soils analyses were toluene and methylene chloride in RB-3 and RB-4, and toluene in RB-2. Bis(2-ethylhexyl) phthalate was detected in semivolatile laboratory blanks SBLK 28, SBLK 55, and SBLK 50. Other unknown compounds and unknown hydrocarbons were detected in laboratory blanks SBLK 28, SBLK 52, and SBLK 20. Therefore, it is likely that these compounds were present as laboratory or field contaminants. No detectable levels of pesticides were detected in either field or laboratory blanks associated with soils analyses.

TABLE G-1

SUMMARY RESULTS OF LABORATORY AND FIELD BLANKS FOR
VOLATILE, SEMI-VOLATILE AND TENTATIVELY IDENTIFIED ORGANIC COMPOUNDS

SAMPLE	ANALYSIS DATE	UNITS	VOLATILES	VOLATILES-TICS	SEMI-VOLATILES	SEMI-VOLATILES-TICS
ILS ANALYSES:						
Trip Blank	01/17/89	ug/kg	ND (a)	ND	NA (b)	NA
ABLK 28	01/13/89	ug/kg	ND	ND	NA	NA
VBLK 52	01/17/89	ug/kg	ND	ND	NA	NA
SBLK 28	01/31/89	ug/kg	NA	NA	100 (Bis (2-Ethylhexyl Phthalate)	1,937-J, Un AND UHC (c
Trip Blank	01/25/89	ug/kg	ND	ND	NA	NA
RB-2	01/25/89	ug/l	4-J (Toulene) (c)	ND	NA	NA
Trip Blank	01/25/89	ug/l	ND	ND	NA	NA
RB-3	01/25/89	ug/l	7 (Methylene Chloride)	ND	ND	ND
			6 (Toluene)	ND	ND	ND
RB-4	01/25/89	ug/l	7 (Methylene Chloride)	ND	ND	ND
			6 (Toluene)	ND	ND	ND
VBLK 25	01/24/89	ug/kg	ND	ND	NA	NA
VBLK 34	01/25/89	ug/l	ND	ND	NA	NA
ABLK 47	01/26/89	ug/l	ND	ND	NA	NA
BBLK 55	02/07/89	ug/l	NA	NA	6-J (Bis (2-Ethylhexyl Phthalate)	ND
BBLK 50	02/06/89	ug/kg	NA	NA	250-J (Bis (2-Ethylhexyl Phthalate)	ND
SBLK 52	02/15/89	ug/kg	NA	NA	ND	1,665-J, Un and UHC
SBLK 20	02/14/89	ug/kg	NA	NA	ND	4,200-J, Un and UHC

(a) ND = Not detected.
") NA = Not analyzed.
) J = Indicates presence of compound but at a level less than specified detection limit.
For TIC, it indicates an estimated value, Un = Unknown, UHC = Unknown hydrocarbon.
(d) B = Detected in blank.

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TABLE G-1 (Continued)

SUMMARY RESULTS OF LABORATORY AND FIELD BLANKS FOR
VOLATILE, SEMI-VOLATILE AND TENTATIVELY IDENTIFIED ORGANIC COMPOUNDS

SAMPLE	ANALYSIS DATE	UNITS	VOLATILES	VOLATILES-TICS	SEMI-VOLATILES	SEMI-VOLATILES-TICS
GROUNDWATER ANALYSES:						
B-9	03/08/89	ug/l	19 (Methylene Chloride) 88 (Acetone) (d) 6 (Toluene)	ND	ND	ND
-ip Blank	03/08/89	ug/l	ND	ND	NA	NA
BLK 12	03/13/89	ug/l	NA	NA	ND	1J-Un
BLK 38	03/08/89	ug/l	12 (Acetone)	ND	NA	NA
-1	02/13/89	ug/l	44 (Chloroform) 6 (Bromodichloromethane) 5 (Dibromochloromethane) 8 (Toluene)	ND	ND	13J,B
-2	02/13/89	ug/l	33 (Chloroform) 9 (Bromodichloromethane) 7 (Dibromochloromethane)	ND	ND	10J

) ND = Not detected.
) NA = Not analyzed.
) J = Indicates presence of compound but at a level less than specified detection limit.
For TIC, it indicates an estimated value, Un = Unknown, UHC = Unknown hydrocarbon.
) B = Detected in blank.

AR000246

VOCs detected in a field blank (RB-9) generated during groundwater sampling included methylene chloride, acetone, and toluene. Acetone was detected in a laboratory volatile blank (V BLK-38) associated with analyses of groundwater samples. As such, acetone does not appear to be a site contaminant, but appears to be a laboratory artifact.

An unknown semivolatile organic compound was detected in a laboratory blank (SBLK-12) whose origin cannot be traced.

Samples TW-1 and TW-2 represent the tap water used for drilling all wells except nos. 5 and 6, after that water had been run through decontaminated drill rigs A and B, respectively. The analysis detected several trihalomethanes that would be expected in tap water. These chemicals were not detected in groundwater samples.

Field rinse blanks showed the presence of low concentrations of nickel, zinc, and copper, in excess of CRDLs. The source of these metals is unknown but may be associated with the deionized water used to generate field blanks. However, the detected levels are low and do not invalidate data of the associated soil samples.

3. Blind duplicate samples were submitted for analysis during the soil analysis program to verify the consistency of sampling and analytical methods. The concentrations of analytes detected in each sample and its duplicate are summarized in Table G-2. Data reproducibility appears adequate for duplicate soil samples, indicating consistent sampling procedures and laboratory analytical methods. Variations that exist in some duplicate soil samples may be the result of heterogeneity of the soil matrix.

   Two identical pairs (or duplicates) of groundwater samples (GW-1 and GW-14) and (GW-4 and GW-15) were submitted for analysis during the groundwater sampling program to verify the consistency of sampling and analytical methods. The measured values of pH and detected concentrations of cyanide, metals, VOCs, and semivolatile organic compounds, as well as TICs, are summarized in Table G-2. Data reproducibility appears adequate for duplicate samples, with the exception of chromium and copper for sample pairs GW-4 and GW-15.

TABLE G-2

SUMMARY RESULTS OF DUPLICATE SAMPLES - REMEDIAL INVESTIGATION
MID-ATLANTIC WOOD PRESERVERS SITE
HARWINS, MARYLAND

	SOILS						SURFACE WATER		SEDIMENT		GROUNDWATER			
	SAMPLE	DUPLICATE	SAMPLE	DUPLICATE	SAMPLE	DUPLICATE	SAMPLE	DUPLICATE	SAMPLE	DUPLICATE	SAMPLE	DUPLICATE	SAMPLE	DUPLICATE
Sample #	SC-3B	SC-3C	SC-6B	SC-6D	SC-11A	SC-11D	SW-1	SW-4	SE-1	SE-4	GW-1	GW-14	GW-4	GW-15
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/l	ug/l	mg/kg	mg/kg	ug/l	ug/l	ug/l	ug/l
% Solid	96.9	85.6	91.2	90.7	92.8	96.0			60.1	42.4	ND	ND	ND	ND
pH	5.39	5.38	7.57	7.46			6.20	6.26			6.07	6.13	6.34	6.37
CN					<.69	<.43					<10.0	<10.0	<10.0	<10.0
As	2.1 u	2.3 u	14	16	251	380	10 u	10 u	3.3 u	4.7 u	10 u	10 u	10 u	10 u
Cr	3.6	4.6	28	22	277	302	[4.3]	4.0	9.5	16	62	19	16	21
Cu	[1.2]	[2.7]	23	15	216	235	4.0 u	[6.7]	10	18	76	39	[23]	[24]
Al					4,980	5,190							1,150	822
Sb					6.2 u	6.0 u							16 u	16 u
Ba					[16]	[20]							[45]	[45]
Be					[.26]	[.43]							3.0 u	3.0 u
Cd					0.86 u	0.83 u							4.0 u	4.0 u
Ca					98,000	94,200							22,600	22,600
Co					[2.6]	[3.0]							4.0 u	4.0 u
Fe					5,420	5,740							1,580	1,560
Pb					7.4	8.1							15	15
Mg					31,600	31,100							[4,340]	[4,320]
Mn					135	122							45	46
Hg					0.11 u	0.10 u							0.2 u	0.2 u
Ni					13	18							20 u	20 u
K					4,120	3,950							6,070	6,610
Se					1.1 u	1.0 u							5.0 u	5.0 u
Ag					0.86 u	0.83 u							2.0 u	2.0 u
Na					208	[261]							30,200	29,200
Tl					2.2 u	2.1 u							10 u	10 u
V					9.8	9.4							4.0 u	[4.5]
Zn					23	24							35	37
Acetone					ND	ND							9 B	ND
Bis (2-Ethylhexyl) Phthalate					610 B	1,100 B							6 J	ND
Caprolactam					ND	ND							70 J	68 J
Semi-Volatile TICs					8,143 J	7,585 J							24 J	23 J
VOCs					ND	ND							ND	ND
Trichlorofluoromethane													7 J	ND

Qualifiers:

Blank space indicates that the constituent is not analyzed.
u - Indicates element was analyzed for, but not detected and detection limit is given.
[ ] - Indicates value is greater than or equal to the instrument detection limit, but less than the contract required detection limit.
ND - Not detected.
B - Present in blank.
J - Estimated value, based upon nearest standard.

However, the samples were reanalyzed for these two metals, and the disparity was found to be minimal. The lower values in sample GW-14 were interpreted to be the result of precipitate formation identified during reanalysis.

4. Laboratory reported information on each soil and water sample analysis was reviewed to check the matrix spike recoveries and spike duplicate recoveries, surrogate compound recoveries, instrument calibration, and use of appropriate CLP flags for identification of specific QC problems. These checks verified that no QC problems exist in the data to question their validity. Several matrix spike and spike duplicate recoveries were outside of the control limits. Some of these may be related to interferences and may not necessarily invalidate data usage. The only sample that necessitated concern is soil sample SC-2A. Chromium analysis of this sample produced poor recoveries for both the matrix spike and the spike duplicate. The cause of the poor recoveries may be attributable to the heterogeneity of the soil sample. The data for this sample and others within the same analytical batch were properly flagged to indicate that the spike recoveries were outside control limits but are not considered invalid.

In summary, a review of the laboratory data reporting deliverables and checks on the most important portions of each data set were performed. Specific items that were checked included holding times, matrix spike recoveries, surrogate compound recoveries, initial and continuing instrument calibration, and duplicate sample recoveries. The proper use of CLP flags that specify estimated concentrations, quality control problems, and the presence of contaminants introduced in the laboratory process were also spot-checked.

A review of case narratives, as well as required data sheets of each sample, indicated that all samples were analyzed within the CLP specified holding times, results of duplicate samples were within acceptable agreement with their corresponding original samples, and appropriate laboratory QA/QC procedures were followed. Findings also revealed the presence of analytes in field blanks and QC duplicates. Some of these may be related to interferences and may not necessarily invalidate data usage. The presence of low detections of toluene, methylene chloride, and bis(2-ethylhexyl) phthalate in QA/QC soil samples was attributable to

either laboratory and/or field sources of contamination. Acetone in groundwater appears to be a laboratory artifact because of its detection in a laboratory blank.

In conclusion, findings suggest that the chemical analysis of the samples collected by Dames & Moore at the MAWP site are considered to be appropriately conducted and that the results represent conditions at the site.

G.3.3 Data Management

The data generated during the RI were reduced by Dames & Moore through a process of review and interpretation by professional geologists, environmental scientists, and engineers. The laboratory data were compiled from the original laboratory sheets into a Dames & Moore computer system to summarize the results. The data entry sheets were reviewed for any transcriptions errors, and corrections were made as necessary.

ATTACHMENT G-1

Systems Audit Report

System Audit Checklist
Project Office

Project No.:	14519-002	Date:	February 10, 1989
Project Name & Location:	Mid-Atlantic Wood Preservers Site Harmans, MD	QAO:	S. Surya Prasad
Team Members:	Paul Lagace, Proj. Mgr.		

Yes X No ____ 1) Have a Program Manager, Project Officer, and QA Officer been appointed?
Comments: Project Director - Aaron Woloshin; Project Manager - Paul Lagace; Quality Assurance Officer - Surya Prasad.

Yes X No ____ 2) Were project plans and QA/QC plans prepared?
Comments: Approval from EPA--Letter April 4, 1988.

Yes X No ____ 3) Was a briefing held for project participants?
Comments: Meetings were held with project participants on an as-needed basis. Margie English and Chris Kupfer are Field Geologists.

Yes X No ____ 4) Were additional instructions given to the project participants?
Comments: On an as-needed basis.

Yes X No ____ 5) Has a document control system been established and adhered to?
Comments:
- Three-ring binder (MAWP-1989) for EPA and client correspondence.
- File folders in cabinets for others.

Yes X No ____ 6) Have the individual files been assembled (field, sampling, laboratory, QA/QC)?
Comments:
- Files for well logs, subcontractors, and Federal Express correspondence are already assembled.
- Other files are in preparation.

Yes ___ No X 7) Is there a list of accountable field documents?
Comments: List is being compiled.

AR000252

Yes X No ____ 8) Are SOPs and other documentation of established procedures available?
Comments: _____

Yes X No ____ 9) Has coordination been established with contractors and the laboratory?
Comments:
- Paul Lagace provides overall coordination.
- Laboratory QA/QC issues to be held by Surya Prasad.
- Versar, Inc., coordinator Christal Ackerman (703) 642-6910; Alternate: Mark R. Hammersla (703) 642-6807.

Yes ___ No X 10) Have data review responsibilities been assigned?
Comments: In process of personnel assignment.

Yes X No ____ 11) Have reporting requirements been reviewed?
Comments: Project participants report day-to-day activities to Paul Lagace, who, in turn, reports to Aaron Woloshin. Issues related to QA/QC will be brought to Project Manager's attention, who will try resolving issues of concern. Corrective actions based on need and nature of issue to be corrected on or in about 5 working days.

Yes ___ No X 12) Has a data base been established?
Comments: In process of personnel assignment.

ATTACHMENT G-2

Performance Audit Report - Groundwater Sampling

Performance Audit Checklist
Field Operations During Groundwater Sampling

Project No.:	14519-002	Date of Audit:	February 28, 1989
Project Name & Location:	Mid-Atlantic Wood Preservers Site Harmans, MD	QAO:	S. Surya Prasad
		Field Team Leader:	Chris Kupfer
Team Members:	Chris Kupfer & Neal Wood		

Yes X No ____ 1) Is there a set of accountable field documents checked out to the Site Manager?
Comments: Chris Kupfer maintains Vol. II of III, project operations plan for surface water, soil, groundwater investigations. These were obtained from oversite personnel.

Yes X No ____ 2) Is the transfer of field operations from the Site Manager to field participants documented in a logbook?
Comments: Chris Kupfer maintains a field logbook to record notes during groundwater sampling.

Yes X No ____ 3) Is there a written list of sampling locations and descriptions?
Comments: Project Manager provided a written list to Chris Kupfer, which was in his possession. Wells sampled on 2/27/80 recorded in log were: 1, 5, 6, 9, 7. Sample from well no. 7 was requested for analysis of arsenic, copper, chromium, and pH.

Yes X No ____ 4) Are samples collected as stated in the project plan or as directed by the Site Manager?
Comments:
- o A centrifugal pump is being used for/during purging.
- o Dedicated bailers are used for sampling.

Yes X No ____ 5) Are samples collected in the type of containers specified in the project plan or as directed by the Site Manager?
Comments: _____

Yes X No ____ 6) Are samples preserved as specified in the project plan or as directed by the Site Manager?
Comments: Sample containers are prepared and provided to D&M by contractor lab, Versar, Inc., with required preservatives.

Yes X No ____ 7) Are the number, frequency, and type of samples collected as specified in the project plan or as directed by the Site Manager?
Comments: _____

Yes X No ____ 8) Are the number, frequency, and type of measurements taken as specified in the project plan or as directed by the Site Manager?
Comments: Instruments used:

1) pH meter
Cole-parmer model 5985-80
Digi-sense pH meter
Accuracy: 0.01 units

pH buffers used: 4, 7, and 10 for standardization/calibration

2) Conductivity meter
Cole-parmer model 1484-10
Standard solution used: identified as 1K solution.

Yes X No ____ 9) Are samples identified with sample labels?
Comments: _____

Yes X No ____ 10) Are blank and duplicate samples properly identified?
Comments: One travel blank with shipment containing samples for volatile organic analysis. Field blank or rinse blank identified as RB.

Yes X No ____ 11) Are sample and serial numbers for samples split with other organizations recorded in a logbook or on a chain-of-custody record?
Comments: EPA split samples of groundwater from well nos. 1, 2, and 3, and offsite well 11 (84 Lumber) were made by EPA Contractor Rep. Freda Griffis, Lee Wan & Associates, Inc., Atlanta, Georgia, on 2/27/89 for VOA. Business card of contractor representative in file.

AR000256

Yes X No ____ 12) Are samples listed on a chain-of-custody record?
Comments: _____

Yes X No ____ 13) Is chain-of-custody documented and maintained?
Comments: Courier through Federal Express.

Yes X No ____ 14) Are quality assurance checks performed as directed?
Comments: _____

Yes ___ No ____ 15) Are photographs documented in logbooks as required?
Comments: NA

Yes X No ____ 16) Are all documents accounted for?
Comments: _____

Yes ___ No X 17) Have any documents been voided?
Comments: _____

Yes ___ No X 18) Have any documents been destroyed?
Comments: _____

Groundwater sampling procedures are in compliance with SOPs stated in Volume II of III--modifications are noted in comments.

APPENDIX H

Groundwater Purge/Sample Record

Seq. # ____

GROUNDWATER PURGE/SAMPLE RECORD

Project Name: M.A.W.P. Project No.: 14519-002
Location: Harmans, MD Client: M.A.W.P.
Sample No.: Sampler: CHK / NW
Date: 2.27.89 Time: Start 812 End 1350

Sampling Location Designation: GW-1

Sampling Method: teflon bailer

Sample Parameters: As, Cu, Cr, pH

Water Level Observations:
Reference Point: TOC
Casing Stick-Up: feet above/below ground surface
Well Diameter 4" Depth to Water 22.37' Depth to Bottom 32.76'

Meter Calibration:
Conductivity Meter - Make and Model #: Cole/Parmer 1484-10
Date: 2.27.89 Time: 800 Solution: 10K
Reading: 10K Temperature: 16.3 °C
pH Meter - Make and Model #: Cole/Parmer 5985-80
Date: 2.27.89 Time: 815 Solutions: 7.00/10.00
Reading: 7.00/10.00 Temperature: 16.5° °C

Sample Readings:
Date: 2.27.89 Time: 1350
Conductivity: 660 us
pH: 5.91
Temperature: 13.2 °C

Purge Notes and Observations:

- 20 gal. purged for 3 volumes w/ cent. pump
- light Brown, a little cloudy
- purge from 812 to 824

Sampler's Signature: CHK Date: 2.27.89

AR000259

Rev: 1
2/10/88

Seq. # ____

GROUNDWATER PURGE/SAMPLE RECORD

Project Name: M.A.W.P. Project No.: 14519-002
Location: Harmans MD Client: M.A.W.P.
Sample No.: ____ Sampler: CHE / N W
Date: 2-28-89 Time: Start 1430 End 1600

Sampling Location Designation: GW-2

Sampling Method: teflon bailer

Sample Parameters: VOA, TCL metals, Cn, BNA, pest, pH

Water Level Observations:
Reference Point: TOC
Casing Stick-Up: ____ feet above/below ground surface
Well Diameter 4" Depth to Water 14.14' Depth to Bottom 30.61'

Meter Calibration:
Conductivity Meter - Make and Model #: ____
Date: ____ Time: ____ Solution: ____
N/A Reading: ____ Temperature: ____ °C
pH Meter - Make and Model #: ____
Date: ____ Time: ____ Solutions: ____
Reading: ____ Temperature: ____ °C

Sample Readings:
Date: 2-28-89 Time: 1600
Conductivity: 520 45
pH: 4.58
Temperature: 12.0 °C

Purge Notes and Observations: ____

- sample is slightly cloudy
- 31.6 gal purged for 3 volumes w/ cent. pump.
- purged from 1430-1500

Sampler's Signature: CH Kupf Date: 2-28-89

AR000260

Rev: 1
2/10/88

Seq. # ____

GROUNDWATER PURGE/SAMPLE RECORD

Project Name: M.A.W.P. Project No.: 1459-002
Location: Harmons MO Client: M.A.W.P.
Sample No.: ____ Sampler: CHK/NW
Date: 2.28.89 Time: Start 1634 End 1720

Sampling Location Designation: GW-3

Sampling Method: teflon bailer

Sample Parameters: VOA, TCL metals, Cn, BNA, pesty, pH

Water Level Observations:
Reference Point: TOC
Casing Stick-Up: ____ feet above/below ground surface
Well Diameter 2" Depth to Water 9.34' Depth to Bottom 65.30'

Meter Calibration:
Conductivity Meter - Make and Model #: ____
Date: ____ Time: ____ Solution: ____
N/A Reading: ____ Temperature: ____ °C
pH Meter - Make and Model #: ____
Date: ____ Time: ____ Solutions: ____
Reading: ____ Temperature: ____ °C

Sample Readings:
Date: 2.28.89 Time: 1700
Conductivity: 145 45
pH: 6.08
Temperature: 11.9 °C

Purge Notes and Observations: ____

- Sample is clear
- 27.4 gal. purged for 3 volumes w/ cent. pump
- purged from 1634 - 1646

Sampler's Signature: CHKupf Date: 2.28.89

AR000261

Rev: 2
2/16/88

Seq. # ____

GROUNDWATER PURGE/SAMPLE RECORD

Project Name: M.A.W.P. **Project No.:** 14519-002
Location: Harmans MD **Client:** M.A.W.P
Sample No.: ____ **Sampler:** CHK \ N W
Date: 2·28·89 **Time: Start** 900 **End** 1200

Sampling Location Designation: GW-4

Sampling Method: teflon bailer

Sample Parameters: VOA, TCL metals, Cn^-, BNA, Pest, pH

Water Level Observations:
Reference Point: TOC
Casing Stick-Up: ____ feet above/below ground surface
Well Diameter 4" **Depth to Water** 17.35' **Depth to Bottom** 70.03'

Meter Calibration:
Conductivity Meter - Make and Model #: Cole Parmer 1484-10.
Date: 2·28·89 **Time:** 900 **Solution:** 10K
Reading: 10K **Temperature:** 17.4 °C
pH Meter - Make and Model #: Cole Parmer 5985-80
Date: 2·28·89 **Time:** 915 **Solutions:** 7.00/10.00
Reading: 7.00/10.00 **Temperature:** 17.5 °C

Sample Readings:
Date: 2·28·89 **Time:** 1200
Conductivity: 630 µS
pH: 6.24
Temperature: 13.1 °C

Purge **Notes and Observations:** ____

- Sample is quite clear
- 101 gal. purged for 3 volumes w/ 1½ h.p. sub. pump.
- purged from 10^{24}-10^{28}, 10^{35}-10^{38}, 10^{49}-10^{51}, 11^{04}-11^{06}, 11^{15}-11^{17}, 11^{25}-11^{27}, 11^{30}-11^{32}
- (this is also site of full scan d.p. site plus Rinse Blank Sample)

Sampler's Signature: CH Kupka **Date:** 2·28·89

AR000262

Rev: 1
2/10/88

Dames & Moore

Seq. # ____

GROUNDWATER PURGE/SAMPLE RECORD

Project Name: M.A.W.P. Project No.: 14519-002
Location: Harmans MD Client: MAWP
Sample No.: ____ Sampler: CHK / NW
Date: 2.27.89 Time: Start 845 End 1600

Sampling Location Designation: GW-5

Sampling Method: teflon bailer

Sample Parameters: As, Cu, Cr, pH

Water Level Observations:
Reference Point: TOC
Casing Stick-Up: ____ feet above/below ground surface
Well Diameter 4" Depth to Water 15.24' Depth to Bottom 30.27'

Meter Calibration:
Conductivity Meter - Make and Model #: ____
Date: ____ Time: ____ Solution: ____
Reading: ____ Temperature: ____ °C
pH Meter - Make and Model #: ____
Date: ____ Time: ____ Solutions: ____
Reading: ____ Temperature: ____ °C

N/A

Sample Readings:
Date: 2.27.89 Time: 1600
Conductivity: 510 µs
pH: 5.45
Temperature: 11.9 °C

Purge Notes and Observations:

- light brown, partly cloudy
- 78.9 gal purged for 3 volumes w/ cent. pump
- purge from 845 - 855

Sampler's Signature: C.H. Kuhl Date: 2.27.89

AR000263

Rev: 1
2/10/88

Seq. # ____

GROUNDWATER PURGE/SAMPLE RECORD

Project Name: M.A.W.P. Project No.: 14519-002
Location: Harmans MD Client: MAWP
Sample No.: Sampler: CHK/NW
Date: 2.27.89 Time: Start 925 End 1630

Sampling Location Designation: GW-6

Sampling Method: teflon bailer

Sample Parameters: As, Cu, Cr, pH

Water Level Observations:
Reference Point: TOC
Casing Stick-Up: ____ feet above/below ground surface
Well Diameter 4" Depth to Water 6.57' Depth to Bottom 17.77'

Meter Calibration:
Conductivity Meter - Make and Model #: ____
Date: ____ Time: ____ Solution: ____
N/A Reading: ____ Temperature: ____ °C
pH Meter - Make and Model #: ____
Date: ____ Time: ____ Solutions: ____
Reading: ____ Temperature: ____ °C

Sample Readings:
Date: 2.27.89 Time: 1630
Conductivity: 6404S
pH: 4.91
Temperature: 8.5 °C

Purge Notes and Observations:

- light reddish-brown color, slightly cloudy
- 21.5 gal purged for 3 volumes w/ cent. pump.
purge from: g25-g27, g34-g39, g45-g46

Sampler's Signature: CHKuf Date: 2.27.89

AR000264

Rev: 1
2/10/88

Dames & Moore

Seq. # ____

GROUNDWATER PURGE/SAMPLE RECORD

Project Name: M.A.W.P. Project No.: 14519-002
Location: Harmans MD Client: MAWP
Sample No.: ____ Sampler: CHK / N W
Date: 2-27-89 Time: Start 1013 End 1700

Sampling Location Designation: GW-7

Sampling Method: teflon bailer

Sample Parameters: As, Cu, Cr, pH

Water Level Observations:
Reference Point: TOC
Casing Stick-Up: ____ feet above/below ground surface
Well Diameter 4" Depth to Water 9.72' Depth to Bottom 20.27'

Meter Calibration:
Conductivity Meter - Make and Model #: ____
Date: ____ Time: ____ Solution: ____
N/A Reading: ____ Temperature: ____ °C
pH Meter - Make and Model #: ____
Date: ____ Time: ____ Solutions: ____
Reading: ____ Temperature: ____ °C

Sample Readings:
Date: 2-27-89 Time: 1700
Conductivity: 45545
pH: 5.39
Temperature: 10.6 °C

Purge Notes and Observations: ____

- fairly clear sample
- 20.25 gal purged for 3 volumes w/ cent. pump.
- purge from 10^{13}. 10^{16}

Sampler's Signature: CHK Date: 2-27-89

AR000265

Rev: 1
2/10/88

Seq. # ____

GROUNDWATER PURGE/SAMPLE RECORD

Project Name: M.A.W.P. Project No.: 14519-002
Location: Harmons MD Client: MAWP
Sample No.: Sampler: CHK / N W
Date: 2-28-89 Time: Start 1730 End 1830

Sampling Location Designation: GW-8

Sampling Method: teflon bailer

Sample Parameters: VOA, TCL metals, Cn, BNA, pest,

Water Level Observations:
Reference Point: TOC
Casing Stick-Up: _____ feet above/below ground surface
Well Diameter 4" Depth to Water 9.54' Depth to Bottom 25.84'

Meter Calibration:
Conductivity Meter - Make and Model #: _____
Date: _____ Time: _____ Solution: _____
N/A Reading: _____ Temperature: _____ °C
pH Meter - Make and Model #: _____
Date: _____ Time: _____ Solutions: _____
Reading: _____ Temperature: _____ °C

Sample Readings:
Date: 2-28-89 Time: 1830
Conductivity: 780 us
pH: 5.03
Temperature: 10.5°c °C

Purge Notes and Observations: _____

- Sample is quite clear
- 31.3 gal. purged for 3 volumes w/ cent. pump.
- purged from 1740 - 1744

Sampler's Signature: C H Kupf Date: 2-28-89

AR000266

Rev: 1
2/10/88

Seq. # ____

GROUNDWATER PURGE/SAMPLE RECORD

Project Name: M.A.W.P Project No.: 14519-002
Location: Harmans MD Client: M.A.W.P.
Sample No.: ____ Sampler: ____
Date: 2-27-89 Time: Start 1125 End 1730

Sampling Location Designation: GW-9

Sampling Method: teflon bailer

Sample Parameters: As, Cu, Cr, pH

Water Level Observations:
Reference Point: TOC
Casing Stick-Up: ____ feet above/below ground surface
Well Diameter 4" Depth to Water 12.97' Depth to Bottom 45.32'

Meter Calibration:
Conductivity Meter - Make and Model #: ____
Date: ____ Time: ____ Solution: ____
N/A Reading: ____ Temperature: ____ °C
pH Meter - Make and Model #: ____
Date: ____ Time: ____ Solutions: ____
Reading: ____ Temperature: ____ °C

Sample Readings:
Date: 2-27-89 Time: 1730
Conductivity: 860 uS
pH: 5.14
Temperature: 12.8 °C

Purge Notes and Observations: ____

- fairly clear sample
- 62 gal. purged for 3 volumes w/ cent. pump.
- purge from 1125-1140

Sampler's Signature: CH2K Date: 2-27-89

AR000267

Rev: 1
2/10/88

Seq. # ____

GROUNDWATER PURGE/SAMPLE RECORD

Project Name: M.A.W.P. Project No.: 14519-002
Location: Hermann, MO Client: MAWP
Sample No.: ____ Sampler: CHK | N W
Date: 3.1.89 Time: Start 910 End 1000

Sampling Location Designation: GW-10

Sampling Method: Teflon bailer

Sample Parameters: As, Cr, Cu, pH

Water Level Observations:
Reference Point: TOC
Casing Stick-Up: ____ feet above/below ground surface
Well Diameter 4" Depth to Water 15.74' Depth to Bottom 32.41'

Meter Calibration:
Conductivity Meter - Make and Model #: Cole-Parmer 1484-10
Date: 3.1.89 Time: 845 Solution: 10K
Reading: 10K Temperature: 16.2 °C
pH Meter - Make and Model #: Cole Parmer 5985-80
Date: 3.1.89 Time: 855 Solutions: 7.00/10.00
Reading: 7.00/10.00 Temperature: 16.1 °C

Sample Readings:
Date: 3.1.89 Time: 1000
Conductivity: 1500 µS
pH: 4.41
Temperature: 10.7 °C

Purge Notes and Observations:

- purge sample is a little cloudy
- 32 gal purged for 3 volumes w/ cent. pump
- purged from 910 - 921
(Rinse Blank (RB-8) site for limited Scan analysis

Sampler's Signature: CH Kupa Date: 3.1.89

AR000268

Rev: 1
2/10/88

Dames & Moore

Seq. # ____

GROUNDWATER PURGE/SAMPLE RECORD

Project Name: M.A.W.P Project No.: 1V519-002
Location: Harmans MD Client: MAWP
Sample No.: ____ Sampler: CHK | N W
Date: 3.1.89 Time: Start 1100 End 1120

Sampling Location Designation: GW-11

Sampling Method: Grab

Sample Parameters: Cr, Cu, As, pH

Water Level Observations:
Reference Point: ____
N/A Casing Stick-Up: ____ feet above/below ground surface
Well Diameter ____ Depth to Water ____ Depth to Bottom ____

Meter Calibration:
Conductivity Meter - Make and Model #: ____
N/A Date: ____ Time: ____ Solution: ____
Reading: ____ Temperature: ____ °C
pH Meter - Make and Model #: ____
Date: ____ Time: ____ Solutions: ____
Reading: ____ Temperature: ____ °C

Sample Readings:
Date: 3.1.89 Time: 1110
Conductivity: 490 45
* pH: 4.98
* Temperature: 9.3 °C

Purge Notes and Observations: ____

* - Reading may be bogus due to defective meter
- this sample (GW-11) is 1 of 2 "home owners" samples taken
- this site # is 84 Lumber

Sampler's Signature: CHK Date: 3.1.89

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Rev: 1
2/10/88

Seq. # ____

GROUNDWATER PURGE/SAMPLE RECORD

Project Name: M.A.W.P. Project No.: 14519-002
Location: Harmans MD Client: MAWP
Sample No.: Sampler: CHE / N W
Date: 3.1.89 Time: Start 1315 End 1335

Sampling Location Designation: GW-12

Sampling Method: Grab

Sample Parameters: Cr, Cu, As, pH

Water Level Observations:
Reference Point: ____
N/A Casing Stick-Up: ____ feet above/below ground surface
Well Diameter ____ Depth to Water ____ Depth to Bottom ____

Meter Calibration:
Conductivity Meter - Make and Model #: ____
Date: ____ Time: ____ Solution: ____
N/A Reading: ____ Temperature: ____ °C
pH Meter - Make and Model #: ____
Date: ____ Time: ____ Solutions: ____
Reading: ____ Temperature: ____ °C

Sample Readings:
Date: 3.1.89 Time: 1335
Conductivity: 65 45
* pH: 4.65
* Temperature: 9.4 °C

Purge Notes and Observations: ____

* Reading may be bogus due to defective meter

- this sample (GW-12) is 2 of 2 "home owners" samples taken

- This site is Tidewater Lumber

Sampler's Signature: CHRK Date: 3.1.89

AR000270

Rev: 1
2/10/88

Dames & Moore

Seq. # ____

GROUNDWATER PURGE/SAMPLE RECORD

Project Name: M.A.W.P. Project No.: 14519-002
Location: Harmans, MD Client: M.A.W.P.
Sample No.: ____ Sampler: CHK/NW
Date: 2.27.89 Time: Start 812 End 1350

Sampling Location Designation: GW-14 (DUP of GW-1)

Sampling Method: teflon bailer

Sample Parameters: As, Cu, Cr, pH

Water Level Observations:
Reference Point: TOC
Casing Stick-Up: ____ feet above/below ground surface
Well Diameter 4" Depth to Water 32.32' Depth to Bottom 32.76'

Meter Calibration:
Conductivity Meter - Make and Model #: ____
Date: ____ Time: ____ Solution: ____
Reading: ____ Temperature: ____ °C
N/A
pH Meter - Make and Model #: ____
Date: ____ Time: ____ Solutions: ____
Reading: ____ Temperature: ____ °C

Sample Readings:
Date: 2.27.89 Time: 1350
Conductivity: 660 45
pH: 5.91
Temperature: 13.2 °C

Purge Notes and Observations: ____

- duplicate site for limited scan of GW-1
- refer to GW-1 for purge details

Sampler's Signature: CH Kupa Date: 2.27.89

AR000271

Rev: 1
2/10/88

Dames & Moore

Seq. # ____

GROUNDWATER PURGE/SAMPLE RECORD

Project Name: M.A.W.P. Project No.: 14519-002
Location: Harmans MD Client: M.A.W.P.
Sample No.: ____ Sampler: CHK / N W
Date: 2.28.89 Time: Start 900 End 1200

Sampling Location Designation: GW-15 (DUP of GW-4)

Sampling Method: teflon bailer

Sample Parameters: VOA, TCL metals, Cn^-, BNA, pest., pH

Water Level Observations:
Reference Point: TOC
Casing Stick-Up: ____ feet above/below ground surface
Well Diameter 4" Depth to Water 17.35' Depth to Bottom 70.03'

Meter Calibration:
Conductivity Meter - Make and Model #: ____
Date: ____ Time: ____ Solution: ____
N/A Reading: ____ Temperature: ____ °C
pH Meter - Make and Model #: ____
Date: ____ Time: ____ Solutions: ____
Reading: ____ Temperature: ____ °C

Sample Readings:
Date: 2.28.89 Time: 1200
Conductivity: 630 uS
pH: 6.24
Temperature: 13.1 °C

Purge Notes and Observations: ____

- sample is quite clear
- Duplicate site of GW-4
- refer to GW-4 for purge details

Sampler's Signature: CH Kuyk Date: 2.28.89

AR000272

Rev: 1
2/10/88

Dames & Moore

Seq. # ____

GROUNDWATER PURGE/SAMPLE RECORD

Project Name: M.A.W.P. Project No.: 14519-002
Location: Harmans MD Client: MAWP
Sample No.: Sampler: CHK | NW
Date: 3.1.89 Time: Start 1010 End 1030

Sampling Location Designation: RB-8

Sampling Method: teflon bailer

Sample Parameters: Cr, Cu, As, pH

Water Level Observations:
Reference Point:
N/A Casing Stick-Up: feet above/below ground surface
Well Diameter Depth to Water Depth to Bottom

Meter Calibration:
Conductivity Meter - Make and Model #:
N/A Date: Time: Solution:
Reading: Temperature: °C
pH Meter - Make and Model #:
Date: Time: Solutions:
Reading: Temperature: °C

Sample Readings:
Date: 3.1.89 Time: 1030
N/A Conductivity:
pH:
Temperature: °C

Purge Notes and Observations:

- This rinse blank sample was taken after sampling GW-10 and this represents the rinse blank sample for limited scan analysis

Sampler's Signature: CHK Date: 3.1.89

AR000273

Rev: 1
2/10/88

Dames & Moore

Seq. # ____

GROUNDWATER PURGE/SAMPLE RECORD

Project Name: M.A.W.P. Project No.: 14519-002
Location: Harmans MD Client: m.A.W.P
Sample No.: ____ Sampler: CHK / N W
Date: 2.28.84 Time: Start 900 End 1230

Sampling Location Designation: RB-9

Sampling Method: teflon bailer

Sample Parameters: VOA, TCL metals, Cn, BNA, pest, PH

Water Level Observations:
Reference Point: ____
N/A Casing Stick-Up: ____ feet above/below ground surface
Well Diameter ____ Depth to Water ____ Depth to Bottom ____

Meter Calibration:
Conductivity Meter - Make and Model #: ____
N/A Date: ____ Time: ____ Solution: ____
Reading: ____ Temperature: ____ °C
pH Meter - Make and Model #: ____
Date: ____ Time: ____ Solutions: ____
Reading: ____ Temperature: ____ °C

Sample Readings:
Date: ____ Time: ____
N/A Conductivity: ____
pH: ____
Temperature: ____ °C

Purge Notes and Observations: ____

- This is rinse blank sample taken for full scan after GW4 & GW-15 (DUP)

Sampler's Signature: CHK Date: 2.28.84

AR000271

Rev: 1
2/10/88

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APPENDIX I

Materials Safety Data Sheets

Osmose® wood products — MATERIAL SAFETY DATA SHEET

("essentially similar" to OSHA - 20)

Notice: The information herein is given in good faith but no warranty, express or implied, is made.

SECTION I — PRODUCT IDENTIFICATION

MANUFACTURER'S NAME: OSMOSE WOOD PRESERVING CO. OF AMERICA, INC.	EMERGENCY TELEPHONE NO.: (404) 228-8434 (716) 882-5905
ADDRESS: 1016 Everee Inn Road, Griffin, GA 30224 980 Ellicott Street, Buffalo, NY 14209	DATE FORM WRITTEN: 7/1/84
TRADE NAME: Osmose® Brand Pressure Treated Wood	SYNONYMS: K-33®-C Brand CCA-C

SECTION II — HAZARDOUS INGREDIENTS

MATERIAL & COMPONENT	CAS NO.	0.25 pcf	0.4 pcf	0.6 pcf	1.0 pcf	2.5 pcf	TLV
		COMPONENT %*					
ARSENIC PENTOXIDE	1303-28-2	0.3	0.4	0.6	1.0	2.6	0.2 mg/m^3 ** as As
COPPER OXIDE	1317-39-1	0.15	0.2	0.3	0.6	1.3	1.0 mg/m^3 as Cu
TRIVALENT CHROMIUM	1308-38-9	0.4	0.6	0.9	1.4	3.3	0.5 mg/m^3 as Cr

*Based on the applicable retention and a wood density of 32 pcf. These values may vary due to variability of treatment and the natural variability of wood.

**Not subject to OSHA arsenic standard 29 CFR 1910.1018.

SECTION III — PHYSICAL DATA

BOILING POINT, 760 MM HG	N.A.	MELTING POINT: N.A.	
SPECIFIC GRAVITY (H_2O = 1)	ESSENTIALLY THAT OF WOOD.	VAPOR PRESSURE: N.A.	
VAPOR DENSITY (AIR = 1)	N.A.	SOLUBILITY IN H_2O % BY WT: HIGHLY INSOLUBLE	
% VOLATILES BY VOL.	N.A.	EVAPORATION RATE (BUYLY ACETATE = 1): N.A.	
APPEARANCE AND ODOR	GREEN-YELLOW WOOD.	Ph (AS IS) N.A.	Ph (1% SOLN.) N.A.

SECTION IV — FIRE AND EXPLOSION DATA

FLASH POINT (TEST METHOD)	N.A.	AUTOIGNITION TEMPERATURE	> 265°C

FLAMMABLE LIMITS IN AIR, % BY VOL.	LOWER		UPPER	

EXTINGUISHING MEDIA	☒ WATER FOG	☐ ALCOHOL FOAM	☒ DRY CHEMICAL
	☒ FOAM	☒ CO_2	☐ OTHER

SPECIAL FIRE FIGHTING PROCEDURES	TOXIC VAPORS FROM WOOD AND PRESERVATIVE MAY BE GIVEN OFF IN A FIRE.
	WEAR FULL PROTECTIVE EQUIPMENT AND SELF-CONTAINED AIR UNIT.
	AR000276
UNUSUAL FIRE AND EXPLOSION HAZARD	

OSMOSE

MATERIAL SAFETY DATA SHEET

HEALTH	1
FLAMMABILITY	1
REACTIVITY	
PERSONAL PROTECTION	B

H.M.I.S. N.P.C.A.

Notice: The information herein is given in good faith but no warranty, express or implied, is made.

SECTION I — PRODUCT IDENTIFICATION

MANUFACTURER'S NAME: OSMOSE WOOD PRESERVING, INC.	EMERGENCY TELEPHONE NO.: (716) 882-5905
ADDRESS: 980 ELLICOTT ST., BUFFALO, NY 14209	DATE FORM WRITTEN: 7/1/86
TRADE NAME SUNWOOD® ADDITIVE	SYNONYMS

SECTION II — HAZARDOUS INGREDIENTS*

MATERIAL AND COMPONENT	CAS NO.	%	TLV (UNITS)	RQ
NONE TO THE BEST OF OUR KNOWLEDGE				
BASED ON REVIEW OF SUPPLIER MATERIAL				
SAFETY DATA SHEETS.				

CARCINOGEN?: NONE LISTED

D.O.T. CLASSIFICATION: COLOR ADDITIVE (COMMON DYE) D.O.T. LABEL: NONE

SECTION III — PHYSICAL DATA

BOILING POINT 760MM HG N/A	MELTING POINT N/A
SPECIFIC GRAVITY (H_2O = 1) ~ 0.5	VAPOR PRESSURE N/A
VAPOR DENSITY (AIR = 1) N/A	SOLUBILITY IN H_2O % BY WT. SOLUBLE
% VOLATILES BY VOL. N/A	EVAPORATION RATE (BUYLY ACETATE = 1) N/A
APPEARANCE AND ODOR POWDER-MILD ODOR	Ph (AS IS) N/A Ph (1% SOLN.) N/A

SECTION IV — FIRE AND EXPLOSION DATA

FLASH POINT (TEST METHOD) N/A	AUTOIGNITION TEMPERATURE N/A	
FLAMMABLE LIMITS IN AIR % BY VOL.	LOWER N/A	UPPER N/A
EXTINGUISHING MEDIA	☒ WATER FOG ☐ ALCOHOL FOAM ☒ DRY CHEMICAL ☐ FOAM ☒ CO_2 ☐ OTHER	
SPECIAL FIRE FIGHTING PROCEDURES	FIREFIGHTERS SHOULD WEAR FULL PROTECTIVE CLOTHING INCLUDING SELF-CONTAINED BREATHING APPARATUS.	
UNUSUAL FIRE AND EXPLOSION HAZARD	DURING A FIRE, IRRITATING AND/OR TOXIC GASES FROM THE DECOMPOSITION/ COMBUSTION OF PRODUCTS MAY BE PRESENT.	

Information on this form is furnished solely for the purpose of compliance with the Occupational Safety and Health Act of 1970 and shall not be used for any other purpose. Use or dissemination of all or any part of this information for any other purpose may result in a violation of law or constitute grounds for legal action.

OSMOSE

MATERIAL SAFETY DATA SHEET

("essentially similar" to OSHA - 20)

Notice: The information herein is given in good faith but no warranty, express or implied, is made.

SECTION I – PRODUCT IDENTIFICATION

MANUFACTURER'S NAME	OSMOSE WOOD PRESERVING CO. OF AMERICA, INC.	EMERGENCY TELEPHONE NO.	(404) 228-8434
ADDRESS	1016 Everee Inn Road, Griffin, Georgia 30223	DATE FORM WRITTEN	July 13, 1982
TRADE NAME	FLAMEPROOF IHC CONCENTRATE	SYNONYMS	

SECTION II – HAZARDOUS INGREDIENTS[2]

MATERIAL AND COMPONENT	%	TLV
Ammoniated inorganic phosphates, expressed as % ammonia	<5	25 ppm as NH_3

SECTION III – PHYSICAL DATA

BOILING POINT, 760 MM HG	N.A.	MELTING POINT	N.A.
SPECIFIC GRAVITY (H_2O = 1)	1.23	VAPOR PRESSURE	N.A.
VAPOR DENSITY (AIR = 1)	N.A.	SOLUBILITY IN H_2O % BY WT	Soluble
% VOLATILES BY VOL.	>50% as water	EVAPORATION RATE (BUYLY ACETATE = 1)	N.A.
APPEARANCE AND ODOR	Greenish, ammonia	Ph (AS IS) 7.8 - 8.2	Ph (1% SOLN.) N.A.

SECTION IV – FIRE AND EXPLOSION DATA

FLASH POINT (TEST METHOD)	Aqueous Solution	AUTOIGNITION TEMPERATURE	
FLAMMABLE LIMITS IN AIR, % BY VOL.	N.A.	LOWER	UPPER

EXTINGUISHING MEDIA: ☐ WATER FOG ☐ FOAM ☐ ALCOHOL FOAM ☐ CO_2 ☐ DRY CHEMICAL ☐ OTHER

N.A.

SPECIAL FIRE FIGHTING PROCEDURES: Aqueous fire retardant solution, will not burn.

UNUSUAL FIRE AND EXPLOSION HAZARD: Thermal degradation caused by an independent fuel source may cause this product to release ammonia vapors.

FLAME PROOF LHC

MATERIAL SAFETY DATA SHEET

("essentially similar" to OSHA - 20)

Notice: The information herein is given in good faith but no warranty, express or implied, is made.

SECTION I — PRODUCT IDENTIFICATION

MANUFACTURER'S NAME OSMOSE WOOD PRESERVING, INC.	EMERGENCY TELEPHONE NO. (404) 228-8434 (716) 882-5905
ADDRESS 1016 Everee Inn Road, Griffin, GA 30224 980 Ellicott Street, Buffalo, NY 14209	DATE FORM WRITTEN 3-2-89
TRADE NAME FLAMEPROOF LHC Wood	SYNONYMS

SECTION II — HAZARDOUS INGREDIENTS*

MATERIAL AND COMPONENT	%	TLV
Reacted ammoniated inorganic phosphates (no C.A.S number)	2-6*	25 ppm as NH_3
*Expressed as P_2O_5 and a wood density of 32 pcf.		
This value may vary by specie and the natural variability of wood.		
NOTE: This product is free of sulfates, chlorides and other halogens within the		
technical limits of the raw materials used.		

SECTION III — PHYSICAL DATA

BOILING POINT, 760 MM HG	N.A.	MELTING POINT	N.A.
SPECIFIC GRAVITY (H_2O = 1)	Approx. 0.6	VAPOR PRESSURE	N.A.
VAPOR DENSITY (AIR = 1)	N.A.	SOLUBILITY IN H_2O % BY WT	chemicals in wood are soluble
% VOLATILES BY VOL.	minor	EVAPORATION RATE (BUYLY ACETATE = 1)	
APPEARANCE AND ODOR	same as wood	Ph (AS IS) N.A.	Ph (1% SOLN.) N.A.

SECTION IV — FIRE AND EXPLOSION DATA

FLASH POINT (TEST METHOD)	Fire retardant wood - N.A.	AUTOIGNITION TEMPERATURE	Fire retardant wood - N.A.
FLAMMABLE LIMITS IN AIR, % BY VOL.	LOWER		UPPER
EXTINGUISHING MEDIA	X WATER FOG ☐ ALCOHOL FOAM X DRY CHEMICAL X FOAM X CO_2 ☐ OTHER		
SPECIAL FIGHTING PROCEDURED	This product is treated with a fire retardant designed to retard flame spread. It does not contribute fuel to a fire, however, fire fueled by an independent source may generate enough heat to cause thermal decomposition and the potential release of ammonia fumes.		
UNUSUAL FIRE AND EXPLOSION HAZARD			

AR000279

SECTION V — HEALTH HAZARD DATA

[redacted]OLD LIMIT VALUE	See Section II
FFECTS OF OVEREXPOSURE	Dry FLAMEPROOF LHC has a very low order of toxicity, similar to untreated wood. Extremely sensitive individuals may experience skin irritation due to wood extractives and salts in the sawdust. WET WOOD (freshly treated) may release ammonia fumes and may be a greater skin irritant than dry wood.
MERGENCY AND FIRST D PROCEDURES	Flush skin with water, then wash with a mild soap and apply skin moisturizing cream. If irritation persists, see a physician. For ammonia fumes released from wet wood, remove the individual to an area of fresh air. Note to physician: Treat the same as exposure to ammoniated phosphate fertilizer.

SECTION VI — REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID Hygroscopic and corrosive properties similiar to untreated wood in exposures
	STABLE	X	up to 90% Rh. ASK FOR TEST DATA.

NCOMPATABILITY (Materials to avoid) Avoid direct water contact.

AZARDOUS DECOMPOSITION PRODUCTS Thermal: Ammonia fumes From wood: Thermal: CO, CO_2

[redacted]OUS RIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII — SPILL OR LEAK PROCEDURES

TEPS TO BE TAKEN IN CASE OF MATERIAL IS RELEASED OR SPILLED Maintain a clean work area: Clean up scrap lumber from job site.

ASTE DISPOSAL METHOD: Dispose in accordance with all Federal, State and Local laws. Sanitary landfill.

SECTION VIII — SPECIAL PROTECTION INFORMATION

ESPIRATORY PROTECTION (Specify type) Normally not necessary. When machining, use a dust mask.

VOID USE OF WET WOOD.

NTILATION	LOCAL EXHAUST Normally sufficient		SPECIAL
	MECHANICAL (General) When machining		OTHER

ROTECTIVE GLOVES To avoid splinters	EYE PROTECTION When machining - safety goggles

THER PROTECTIVE EQUIPMENT Use carbide tipped saw blades.

SECTION IX — SPECIAL PRECAUTIONS OR OTHER PRECAUTIONS

[redacted]TIONS TO BE TAKEN IN HANDLING AND STORING SEE PRODUCT LITERATURE. Ask for test data on hygroscopicity

orrosion testing. Direct water exposure may leach salts from the wood, reducing fire retardant properties. Do not store on ound or in open weather. AVOID USE OF WET WOOD.

ARI000280

Information on this form is furnished solely for the purpose of compliance with the Occupational Safety and Health Act of 1970 and shall not be used for any other purpose. Use or dissemination of all or any part of this information for any other purpose may result in a violation of law or constitute grounds for legal action

APPENDIX J

Chemical Data From Previous Investigations

Vroblesky, 1979a

CHEMICAL ANALYSIS

Table A

Mid Atlantic Wood Preservers, Inc.

SURVEY NAME: Harmans, MD

RESULTS IN mg/l EXCEPT AS INDICATED

sample #	date of collection mo/day/yr	*** water level (feet)	temp. (°C)	p.H.	specific conductance (μmhos)	arsenic (As)	hexavalent chromium (Cr^{+6})	total chromium (Cr)	remarks
AA534	8/15/78			4.7			7.7		Morehead Well
E 24	9/25/78			4.5				19.5	
AA870	10/30/78						0.01	5.2	
4-01	1/8/79		11	5.7	400	0.006	5.0	8.4	
MA-1	11/1/78	10	13	5.2	150	0.013	<0.02	0.05	Well 1: Between Plant and Morehead
55-01	1/8/79	9.8	14	6.1	120	0.016	<0.02	0.05	Well 1
MA-2	11/1/78	12.1	15	5.7	170	0.013	<0.02	<0.05	Well 2: North of Plant
162-11	1/8/79	13.1	12	6.7	180	0.046	<0.02	0.09	Well 2
MA-3	11/1/78	8.8	14	5.9	80	0.158	<0.04	2.25	Well 3: Rear of Plant

* AA-Analyzed by Dept. of Health & Mental Hygiene State Lab (all others analyzed by WRA State lab)

** Soil Depth

*** Depth below ground surface

CHEMICAL ANALYSIS

Table A (continued)

SURVEY NAME: Mid Atlantic Wood Preservers, Inc
Harmans, MD

RESULTS IN mg/l EXCEPT AS INDICATED

sample #	date of collection mo/day/yr	*** water level (feet)	temp. (°C)	p.H.	specific conductance (µmhos)	arsenic (As)	hexavalent chromium (Cr^{+6})	total chromium (Cr)	remarks
32-01	1/8/79	14.0	9	6.7	140	0.135		0.27	Well 3
26-01	1/8/79	9.5	11	7.2	60	.048		0.15	Well 4
MA-7	1/8/79	0.9	11	6.5	120	0.006	<0.02	<0.05	Dug Well 1
171-11	1/8/79		15	6.1	180	0.014	<0.02	<0.05	Dug Well 2
SD-1	10/23/78				900	1.90	<0.02	0.49	Storm Drain 1
SO-1	11/1/78	2.5-3 **				250mg/kg	0.08mg/kg	5.5mg/kg	Hand Auger1: Near rear of Plant
SO-2A	11/1/78	.5-1 **				400mg/kg	<0.50mg/kg	525.0mg/kg	Hand Auger2:At overflow pipe
SO-2B	11/1/78	2.0-2.5 **				2950mg/kg	1.75mg/kg	1520mg/kg	Hand Auger 2
SO-2C	11/1/78	2.5-3.0 **				5660mg/kg	4.0mg/kg	3110mg/kg	Hand Auger 2

CHEMICAL ANALYSIS

Table A (continued)

SURVEY NAME: Mid Atlantic Wood Preservers, Inc. Harmans, MD

RESULTS IN mg/l EXCEPT AS INDICATED

sample #	date of collection mo/day/yr	water level*** (feet)	temp. (°C)	p.H.	specific conductance (μmhos)	arsenic (As)	hexavalent chromium (Cr^{+6})	total chromium (Cr)	remarks
SD-3	11/1/78	2.5-3.0**				2.44mg/kg	<0.08mg/kg	4.5mg/kg	At Drying Hand Auger 3: Room Door
AA 725	10/2/78					0.002	<0.01		House South of Morehead
AA 768	10/2/78					<0.001	<0.01		House North of Morehead
AA 723	10/2/78					0.002	<0.01		Stream West of Morehead

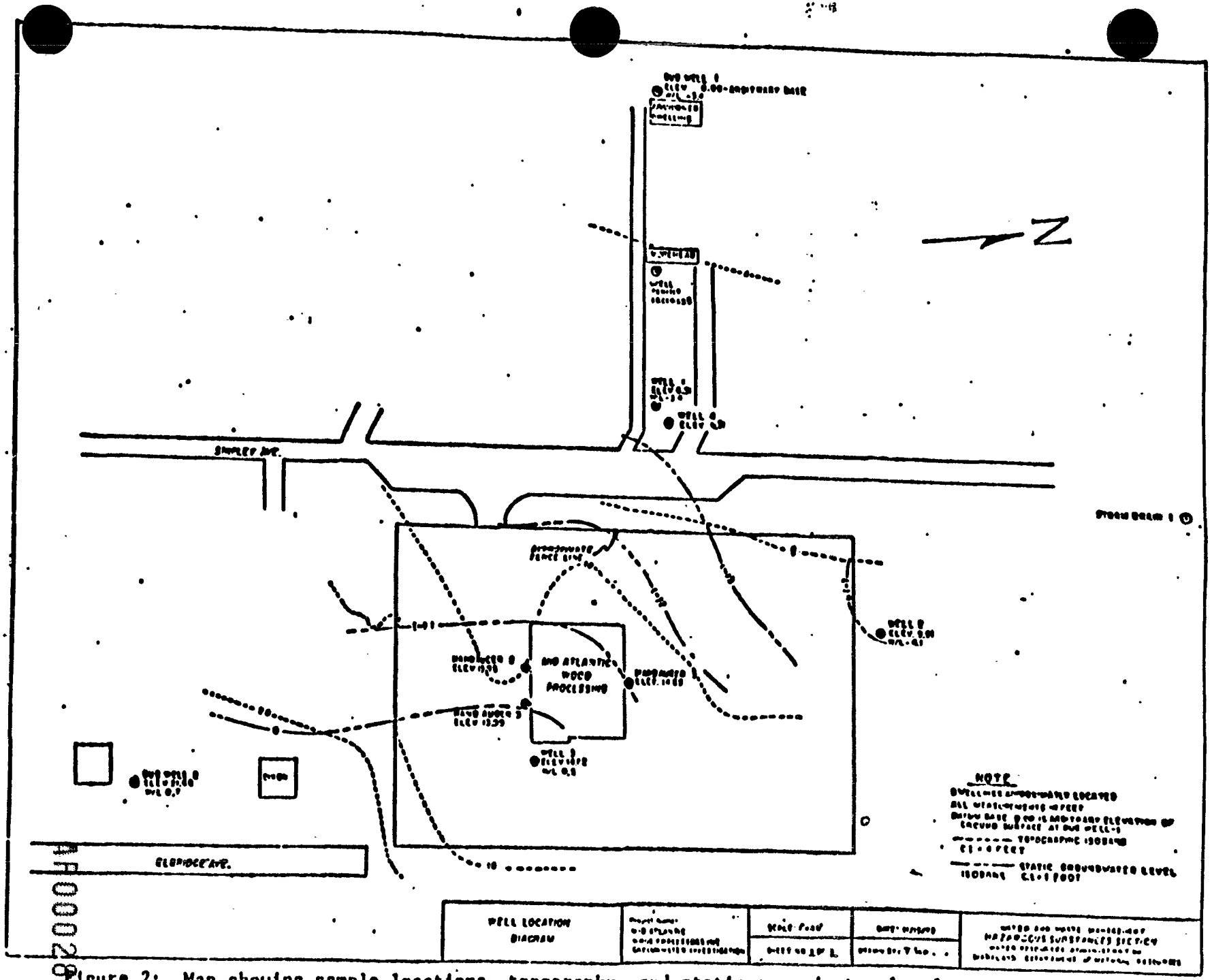


Figure 2: Map showing sample locations, topography, and static groundwater levels.

Vroblesky, 1979b

THOMAS C ANDREWS
DIRECTOR

STATE OF MARYLAND
DEPARTMENT OF NATURAL RESOURCES
WATER RESOURCES ADMINISTRATION
TAWES STATE OFFICE BUILDING
ANNAPOLIS, MARYLAND 21401
(301) 269-3821

3623
24

January 3, 1979

Cary Carlson
Mid Atlantic Wood Preservers, Inc.
P. O. Box 58
Harmons, Maryland 21077

Dear Mr. Carlson:

Enclosed are the water sample analyses from June - August 1979. The chromium was measured by Standard Atomic Assorption and the arsenic was analyzed by Boro-hydride generation.

Sincerely,

Don Vroblesky, Geologist
Hazardous Substances Mgt. Division

DV:jgf

Enclosures

AR000288

CHEMICAL ANALYSES

Sample Point	Depth of Screen (Feet)	Field pH			Cr VI (mg/L)			Total Cr (mg/L)			Arsenic (mg/L)		
		6/79	7/79	8/79	6/79	7/79	8/79	6/79	7/79	8/79	6/79	7/79	8/79
Well 1	21 - 26	5.0	5.8	5.3	<0.02	<0.02	<0.02	0.11	0.10	0.03	0.006	0.011	0.027
Well 2	32 - 37	5.0	5.7	5.5	<0.02	<0.02	<0.02	<0.05	0.11	<0.05	0.003	0.027	<0.025
Well 4	53 - 59	5.7	6.6	5.5	<0.02	<0.02	<0.02	0.08	0.13	0.16	0.005	0.022	0.025
Well 5	0 - 47	4.7	4.8	4.4	9.00	9.10	8.30	10.75	11.70	10.00	<0.002	0.015	0.009
Well 6	19 - 24	4.7	5.8	5.4	24.00	8.10	3.01	33.00	10.60	3.01	20.40	6.720	3.350
Well 7	14.5 - 19 - 5	4.8	5.1	5.0	<0.02	<0.02	<0.02	0.10	0.15	0.10	0.019	0.031	0.027
Well 8	23.5 - 28 - 5	6.3	5.5	5.5	<0.02	<0.02	<0.02	0.12	0.45	<0.05	0.019	0.066	<0.002
Well 9	24 - 29	5.8	6.1	5.2	<0.02	<0.02	<0.02	0.07	0.20	0.07	0.002	0.016	0.004
Dug Well 1	none	6.1	6.2	6.2	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.002	<0.002	<0.002
Morehead Well	Bottom at 25 ft.	4.3	5.9	4.5	7.80	7.00	11.00	8.50	8.70	11.00	<0.002	<0.002	<0.002
Dixon Well	none	-	-	5.5	-	-	<0.02	-	-	<0.05	-	-	<0.002
Boring 1	10 - 15	6.2	-		6.00	-		11.50	-	-	0.48	-	-
Stream	-	6.1	6.5	Dry	<0.02	<0.02	Dry	<0.05	<0.05	Dry	<0.002	<0.002	Dry

Hittman

February 19, 1980

Mid-Atlantic
Wood Preservers Inc.

March 5, 1980

Mr. John Bryan
American Recovary Systems
1901 Birch Street
Saltimore, Md. 21226

Dear Mr. Bryan:

As we have discussed on the telephone, Mid-Atlantic is seeking assistance in disposing of approximately 26 cubic yards of contaminated soil at our premisis.

Enclosed are copies of laboratory data from Hittman Assoc. and the State of Maryland concerning heavy metals content in the area to be excavated. In this data, Hittman sample 1 is the same location as the State of Maryland Hand Auger #2 and Well 6. This location is the center of the area to be removed. The other two sample analysis from Hittman are from areas near the edges of the proposed excavation. All samples given to Hittman Associates were from approximately 18 inches below the surface level of the soil.

Please provide to me, at your earliest opportunity, a proposal for removal and disposal of this soil and the price for this service. The area to be removed is approximately 15' in diameter and 4' deep. We are currently under instruction from the State Water Resources Commission, Enforcement Division, to remove and dispose of this material in an authorized dump by 3/31/80.

Your consideration is greatly appreciated. Any questions about this job can be addressed to me or to Ray Riggin at Enforcement Division, State of Maryland Water Resources Commission.

Sincerely,

Cary Carlson

Cary P. Carlson
General Manager

CPC:ak
CC: Bernie Liedman
Richard Block
Ray Riggin
Dave Lewis
Gerry Daugherty
Enclosure

AR000291

WOOD TREATMENT SPECIALISTS

HITTMAN
9151 RUMSEY ROAD
COLUMBIA, MD. 21045
(301) 730-7800

Confirmation of
Telephone Message

CERTIFICATE OF ANALYSIS

ANALYSIS NO. 4358, 4359, & 4360 DATE 2/27/80

SAMPLE OF Soil

MARKED 1, 2, & 3

RECEIVED FROM Mr. Carey Carlson, Mid Atlantic Wood Preserves
P.O. Box 58, Harman, MD 21077

TESTED FOR: FOUND:

mple No.	Iron	Zinc	Aluminum	Nickel	Lead
1	3658 ppm	15 ppm	4040 ppm	3.7 ppm	14 ppm
2	3661 ppm	9.0 ppm	2446 ppm	3.5 ppm	6.8 ppm
3	2528 ppm	5.9 ppm	1708	2.9 ppm	6.8 ppm

Frederic L. Hyslop
HITTMAN ASSOCIATES, INC

CONFIRMATION
OF
TELEPHONE MESSAGE

HITTMAN
9151 RUMSEY ROAD
COLUMBIA, MD. 21045
(301) 730-7800

CERTIFICATE OF ANALYSIS

ANALYSIS NO. 4358, 4359, & 4360 DATE 2/19/80

SAMPLE OF Soil

MARKED 1, 2, & 3

RECEIVED FROM Mr. Cary Carlson
Mid Atlantic Wood Preservers
P.O. Box 58, Harman, MD 21077

TESTED FOR: FOUND:

Sample No.	Arsenic	Copper	Chromium
1	11.3 ppm	8470.5 ppm	1908.3 ppm
2	2.1 ppm	355.4 ppm	173.0 ppm
3	3.4 ppm	183.8 ppm	113.1 ppm

Frederick L. Hayden
HITTMAN ASSOCIATES, INC

NUS

January 5, 1983

SAMPLE DATA SUMMARY
TARGET COMPOUNDS

CDN Number F3-8112-50
EPA Number MD-70

M Organic I Inorganic

Site Name Mid-Atlantic Coal Preserves
Date of Sample January 5, 1983

Solid sample results reported as wet weight.

Sample Number	Sample Description and Location	Phase	Units	bis(2-ethylhexyl)phthalate	di-n-octylphthalate	methylene chloride	fluorotrichloromethane	toluene	acetone	Remarks
				Compounds Detected						
2643	Bore Hole #1	Solid	µg/kg	89,000		8.1			2000	
2644	Bore Hole #2	Solid	µg/kg		<400			<5000		
2645	Stony Run, upstream	Aq.	µg/L							
2646	Stony Run, downstream	Aq.	µg/L			5.0				
2647	Stony Run, downstream	Solid	µg/kg			110.	<2.5		<50	
2648	Stony Run, upstream	Solid	µg/kg	15,000		120				
2649	Blank	Aq.	µg/L	470,000	18,000	<5				
2650	Blank	Solid	µg/kg			33	2.6		<50	
2651	Maryland Monitoring Well	Aq.	µg/L							
2652	Tidewater Lumber Well	Aq.	µg/L							

NOTE: For a review of this data and non-target, tentatively identified compounds, please see the Technical Quality Assurance section of this report.

TDD Number [redacted]3-8212-50
EPA Number [redacted]2-70

SAMPLE DATA SUMMARY
TARGET COMPOUNDS
☐ Organic ☒ Inorganic

Site Name Mid-Atlantic Naval Research
Date of Sample January 5, 1983

Sample Number	Sample Description and Location	Phase	Units	Compounds Detected: aluminum	chromium	barium	cadmium	cobalt	copper	iron	lead	nickel	manganese	zinc	boron	arsenic	Remarks
MC0350	Bore Hole #1	Solid	mg/kg	190	0.55					1050 Q	12		43 Q	11 Q		0.6	
MC0351	Bore Hole #2	Solid	mg/kg	1750	4.7	95			5.5	2950	1.5 Q		18 Q	3.7 Q	Q 99		
MC0352	Stony Run, upstream	Aq.	µg/L	Q 530						300 Q			20 Q	72 Q	Q 300		
MC0353	Stony Run, downstream	Aq.	µg/L	Q 510					120	220 Q			23 Q	41 Q	Q 695		
MC0354	Stony Run, downstream	Solid	mg/kg	180	1.2				4.3	460 Q			4.2 Q	1.4 Q	Q 55		
MC0355	Stony Run, upstream	Solid	mg/kg	900	7.0	8.5		3.9	19	5500	4.35	4.6	40 Q	27 Q	Q 70		
MC0356	Blank	Aq.	µg/L	390			1.6				0.27			1.2	1100		
MC0357	Blank	Solid	mg/kg	21											60		
MC0358	Maryland Monitoring Well	Aq.	µg/L	36,000	1580		1.5 Q		97	47,000	11 Q		170 Q	104 Q	Q 5860	2250	
MC0359	Tidewater Lumber Well	Aq.	µg/L	Q 595			1.5 Q		99	800 Q				98 Q	Q 1800		

NOTE: For a review of this data and non-target, tentatively identified compounds, please see the Analytical Quality Assurance section of this report.

Q Denotes results of questionable qualitative significance based upon quality assurance review of data.

SAMPLE DATA SUMMARY
TARGET COMPOUNDS

☐ Organic ☒ Inorganic

) Number F3-8212-50
Number MP-70

Site Name Mid-Atlantic Wood Preserver

Date of Sample January 5, 1983

mple mber	Sample Description and Location	Phase	Units	Compounds Detected: thallium	mercury	silver											Remarks
0350	Bore Hole #1	Solid	mg/kg	1.25													
0351	Bore Hole #2	Solid	mg/kg			0.9◊											
0352	Stony Run, upstream	Aq.	µg/L														
0353	Stony Run, downstream	Aq.	µg/L			11◊											
0354	Stony Run, downstream	Solid	mg/kg			15◊											
0355	Stony Run, upstream	Solid	mg/kg			0.85◊											
0356	Blank	Aq.	µg/L			52											
0357	Blank	Solid	mg/kg			3.3											
0358	Maryland Monitoring Well	Aq.	µg/L		0.53												
0359	Tidewater Lumber Well	Aq.	µg/L														

4.2 Quality Assurance Review

4.2.1 Organic Data: Lab Case 1473

4.2.1.1 Introduction

The findings offered in this report are based upon a general review of sample data generated by a contract analytical laboratory. Blank analysis results, surrogate and matrix spike recoveries, duplicate analysis results, and tentatively identified compounds were examined in detail.

4.2.1.2 Qualifiers

It is recommended that this data package be utilized only with the following qualifier statements:

- All positive results for bis(2-ethylhexyl)phthalate, di-n-octylphthalate, methylene chloride, fluorotrichloromethane, and toluene may be questionable, as well as results for acetone in sample C-2647.

- The results for p-chloro-m-cresol, 2-chlorophenol, and phenol in sample C-2644 are incorrect; these compounds were actually not present in this sample.

- Detection limits for some of the acid fraction compounds in samples C-2646 and C-2652 may be significantly higher than those reported.

- Detection limits for TCDD in sample C-2649 may be significantly higher than reported.

- All tentatively identified compounds detected were either suspected artifacts or of deficient matching quality.

4.2.1.3 Findings

- Blank analyses revealed the presence of bis(2-ethylhexyl)phthalate, di-n-octylphthalate, methylene chloride, fluorotrichloromethane, toluene, and acetone at levels sufficient to question the aforementioned sample results for these parameters.

- The reporting error for phenols in sample C-2644 was due to the accidental combination of an unspiked base/neutral extract of sample C-2644 with the spiked acid extract of the same sample. A laboratory QC notice admits this error, and examination of data from the spiked base/neutral extract plus the unspiked acid extract confirms that these compounds were not present in sample C-2644.

- Zero recoveries were reported for 1,2,3,4-TCDD in sample C-2649, and also for one of the two acid fraction surrogate compounds in samples C-2646 and C-2652.

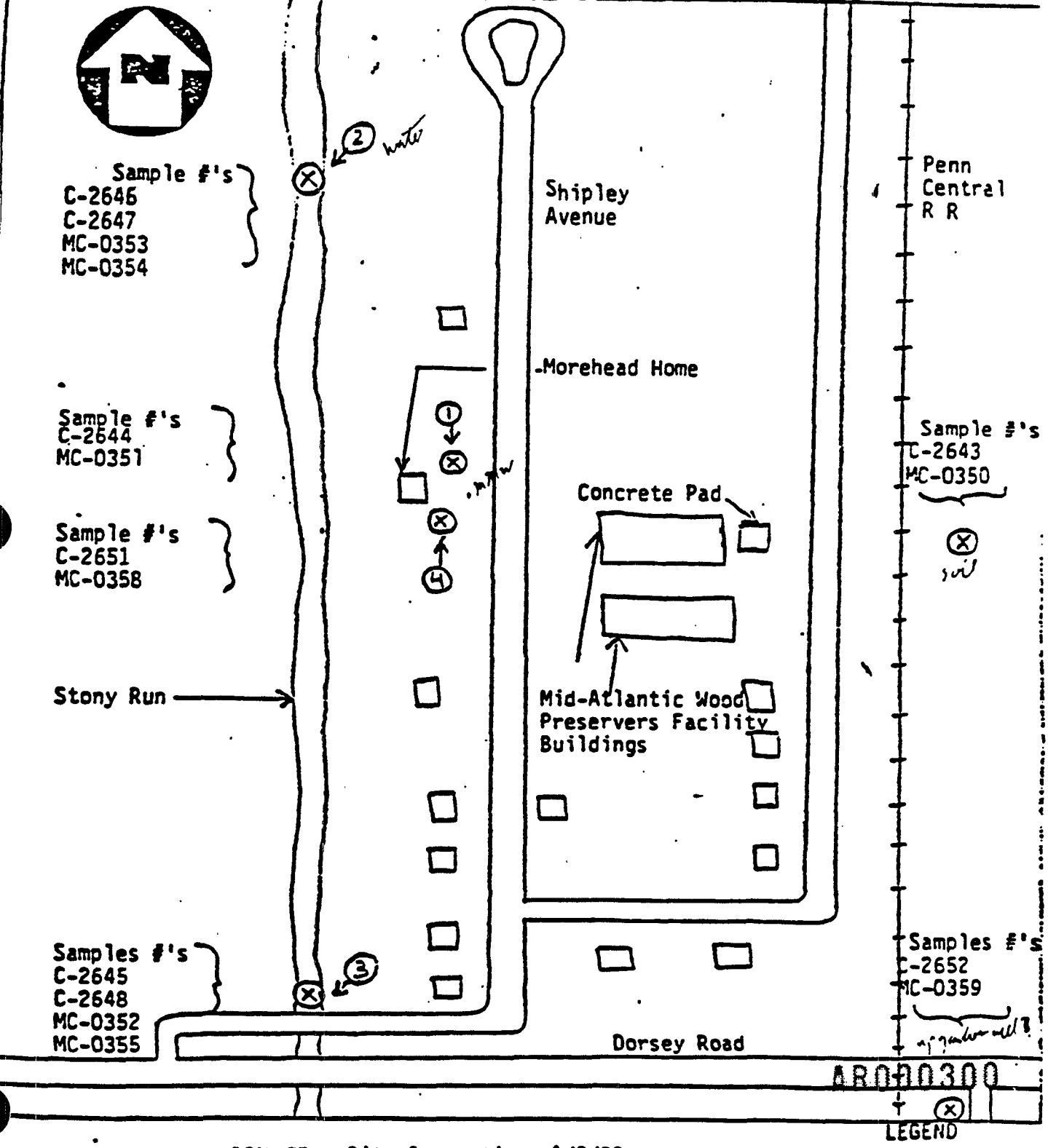
4.2.1.4 Summary

The attached Quality Assurance Review has revealed several areas of concern; blank contamination, surrogate recoveries, tentatively identified compounds, and a reporting error. Please see the accompanying support documentation appendix to this report for specifics on this Quality Assurance Review.

Report prepared by Russell J. Sloboda  Date: June 3, 1983

AR000299

SITE NAME: Mid-Atlantic Wood Preservers
TDD NO.: F3-8212-50
EPA NO.: MD-70
TITLE: Sample and Photograph Location Sketch
FIGURE NO. 2



SOURCE: Site Inspection, 1/5/83

SCALE: None

NUS CORPORATION

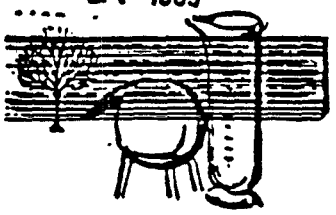
OSMOSE

February 9, 1983

from the

RESEARCH DIVISION

OSMOSE 980 ELLICOTT STREET/BUFFALO, N. Y. 14209/716-883-5905



22-829

subject: ASSAY OF EIGHT WATER SAMPLES FROM MID-ATLANTIC WOOD PRESERVERS, INC.

date: February 14, 1983
PROJ. 648-83
REF. 101-51

Eight water samples, taken by Cary Carson of Mid-Atlantic Wood Preservers, Inc., were received February 9, 1983. The samples were labeled as follows:

1. Downstream (HNO_3)
2. MD MW (HNO_3)
3. Tidewater well (HNO_3)
4. Upstream (HNO_3)
5. Downstream (NaOH)
6. MD MW (NaOH)
7. Tidewater well (NaOH)
8. Upstream (NaOH)

All eight water samples were analyzed for chromium, copper and arsenic by Atomic Absorption Spectroscopy.

RESULTS

Sample	ppm Cr	ppm Cu	ppm As
1	0.01	0.01	0.01
2	1.73	0.03	1.07
3	0.01	0.06	0.03
4	0.01	0.02	0.02
5	0.01	0.04	0.01
6	1.86	0.04	1.74
7	0.01	0.02	0.01
8	0.01	0.02	0.01

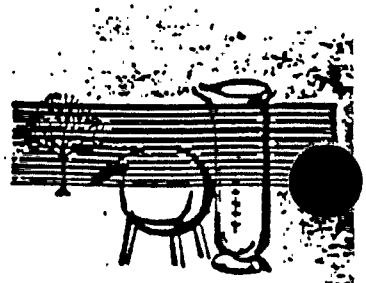
Ronald G. Kiekbusch
Analyst
Research Division

AR000302

RGK:mab

from the

RESEARCH DIVISION



OSMOSE 980 ELLICOTT STREET/BUFFALO, N.Y. 14209/716-882-5905

22-836

subject: ASSAY OF FOUR SOIL SAMPLES FROM MID-ATLANTIC WOOD PRESERVERS, INC.

date: March 3, 1983
PROJ. 648-83
REF. 101-52

Four soil samples taken by Cary Carson at Mid-Atlantic Wood Preservers, Inc. were received February 9, 1983. The samples were labeled

A. Story run upstream
B. Story run downstream
C. Bore hole #1
D. Bore hole #2

The leachable material was extracted from each sample according to the EP Toxicity procedure and analyzed for chromium, copper and arsenic by Atomic Absorption Spectroscopy.

RESULTS

Sample	ppm Cr	ppm Cu	ppm As
A	0.04	0.03	<0.01
B	0.03	0.01	<0.01
C	0.04	0.02	<0.01
D	0.05	0.07	<0.01

Ronald G. Kiekbusch
Analyst
Research Division

RGK:mab

OSMOSE

February 17, 1984

APR 2 1984

OSMOSE
980 ELLICOTT STREET · BUFFALO, N.Y. 14209
(716) 882-5905 Telex 91328 Osmosewood Buf

March 30, 1984

Mr. Randy Gamiel
Mid-Atlantic Wood Preservers, Inc.
P. O. Box 58
Harmans, Maryland 21077

Dear Randy:

Enclosed are two sets of the results from the soil samples taken on Feb. 17, 1984 by yourself. The first sheet of the results are the EPA Toxicity Test. The Federal EPA Standards are .05 ppm for potable water and 5.0 ppm for run-off, standing water and soil. As you can see, these results are below the Federal limit for soil.

The second sheet of results are a total analysis. This shows the total amount of the tested elements in the soil. The typical totals in the earth's crust from the "Principals of Geochemistry" by Brian Mason is 200 ppm for Cr, 70 ppm for Cu and 5 ppm for As. As you can see, there are several samples that are higher than normal. This is probably due to contamination by the treating chemical, especially in the treating plant area. At this time the chemicals are part of the soil and will not leach beyond the EPA toxicity results.

I do recommend that further precautions be observed so that additional contamination does not result.

Respectfully yours,

Dave Schmid

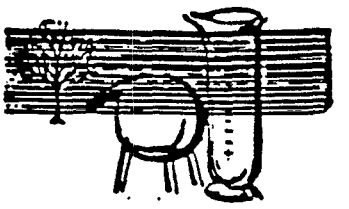
Dave Schmid
Project Engineer

DS/rjt

Enclosure

APR 2 1984

from the
RESEARCH DIVISION



OSMOSE 980 ELLICOTT STREET/BUFFALO, N.Y. 14209/716-882-5905

22-1113

subject: ASSAY OF SIXTEEN SOIL SAMPLES FROM MID-ATLANTIC WOOD PRESERVERS, INC.

date: March 29, 1984
REF. 115-52

Sixteen soil samples taken by Randy Gamiel on February 17, 1984 at Mid-Atlantic Wood Preservers, Inc. were received February 24, 1984.

The leachable material was extracted from each sample according to the EP Toxicity procedure and analyzed for chromium, copper and arsenic by Atomic Absorption Spectroscopy.

Results

Sample	ppm Cr	ppm Cu	ppm As
#1 storage yard	0.04	0.05	0.10
#2 storage yard	<0.01	0.05	0.07
#3 storage yard	<0.01	0.05	0.04
#4 storage yard	0.07	0.04	0.33
#5 storage yard	<0.01	<0.01	0.13
#1 treating plant	<0.01	<0.01	0.06
#2 treating plant	0.01	0.04	0.72
#3 treating plant	0.05	0.07	0.32
#4 treating plant	0.03	0.04	<0.01
#5 treating plant	<0.01	0.02	0.11
#6 treating plant	<0.01	0.02	0.17
#7 treating plant	<0.01	<0.01	<0.01
#8 treating plant	<0.01	<0.01	<0.01
#9 treating plant	0.03	<0.01	0.06
#10 treating plant	0.01	<0.01	0.10
#11 treating plant	<0.01	<0.01	<0.01

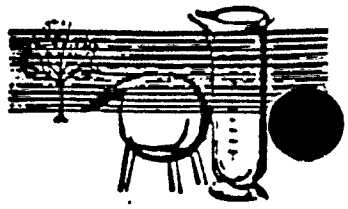
Ronald G. Kiekbusch
Analyst
Research Division

RGK:mab

AR000306

from the

RESEARCH DIVISION



OSMOSE 980 ELLICOTT STREET/BUFFALO, N. Y. 14209/716-882-5905

22-1112

subject: ASSAY OF SIXTEEN SOIL SAMPLES FROM MID-ATLANTIC WOOD PRESERVERS, INC.

date: March 29, 1984
REF. 115-52

Sixteen soil samples taken by Randy Gamiel on February 17, 1984 at Mid-Atlantic Wood Preservers, Inc. were received February 24, 1984.

The samples were oven-dried, acid-digested and analyzed for chromium, copper and arsenic by Atomic Absorption Spectroscopy.

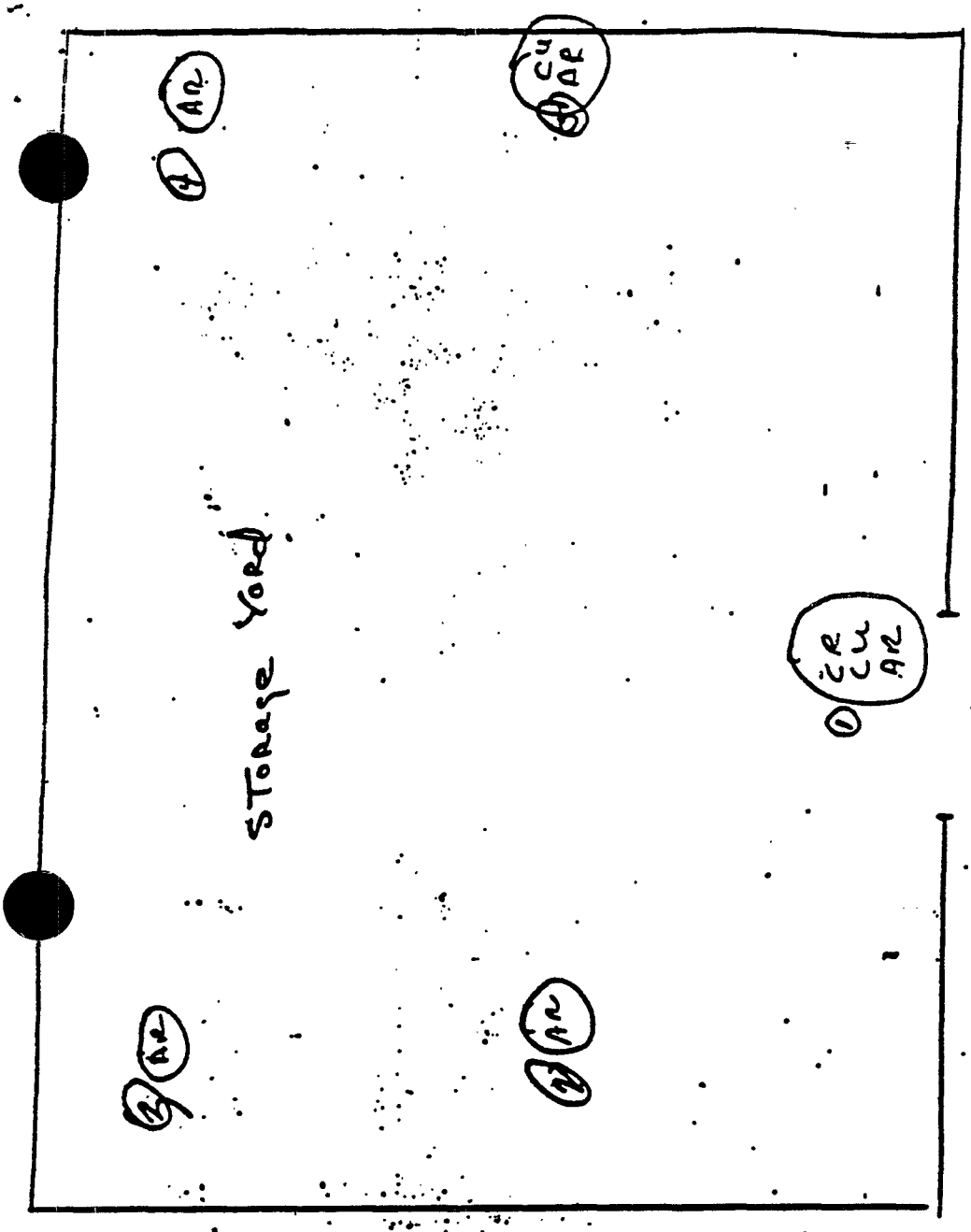
Results

Sample	ppm Cr	ppm Cu	ppm As
#1 storage yard	319.31	246.42	151.54
#2 storage yard	78.02	51.87	26.52
#3 storage yard	31.38	37.39	7.86
#4 storage yard	26.19	35.99	50.43
#5 storage yard	107.56	127.26	95.53
#1 treating plant	26.24	11.80	0.98
#2 treating plant	585.91	703.34	531.53
#3 treating plant	299.53	357.19	212.14
#4 treating plant	6.88	13.30	0.56
#5 treating plant	8.20	12.77	2.72
#6 treating plant	220.04	177.99	69.31
#7 treating plant	41.51	12.03	0.78
#8 treating plant	485.82	26.01	3.37
#9 treating plant	263.56	16.66	3.87
#10 treating plant	417.30	88.15	19.47
#11 treating plant	19.60	18.12	0.72

Ronald G. Kiekbusch
Analyst
Research Division

RGK:mab

AR000307



1 Center 10' from End of Asphalt

2 Center out from Fence 20 feet

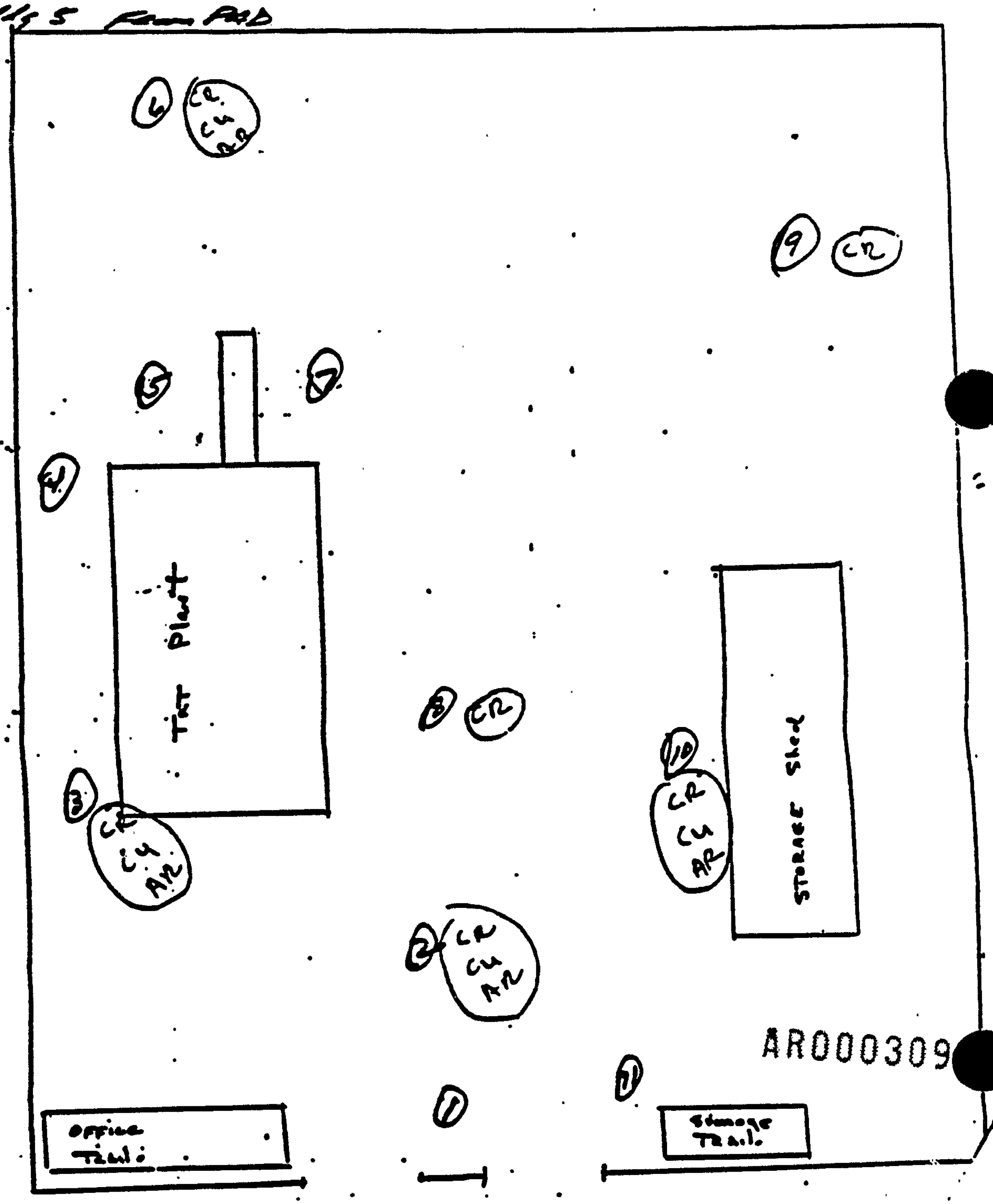
3 Center

4 Corner

5 Center out from Fence 20 feet.

#1. END OF Curb. inside yd.
#2 3' From Asphalt
#3 10' Corner Bldg
#4 — — —
#5 20' From Bldg 5' From PAD
#6 8' From Corner
#7 20' From Bldg 5 From PAD

#8 10 Ft From foundation between 7
#9 Corner
#10 10' Middle Post
#11 From Post



MWRA

August 13, 1984
August 30, 1984

State of Maryland
Department of Health and Mental Hygiene
Office of Environmental Programs
201 West Preston Street, Baltimore, Maryland 21201

Report of Observations

Type of Inspection/Observations: **Date** 10 / [illegible] / [illegible]

Facility Name: MID ATLANTIC WOOD PRESERVERS

Remarks:

THIS WRITER DISCUSSED THE SAMPLE RESULTS OF RAINWATER AND WELL WATER IN THE AREA OF THIS FACILITY WITH BERNARD LIEDMAN AND RANDY [illegible] OF MID-ATLANTIC WOOD PRESERVERS INC.

COPIES OF THE RESULTS WERE REQUESTED [illegible] BY MR LIEDMAN.

THERE IS NO PROBLEM WITH THE WELL SAMPLE [illegible] THE RANGE AND HOSKINS WELLS.

I EXPLAINED THAT THE DISCHARGE OF ARSENIC [illegible] AND CHROMIUM ARE NOT ALLOWED BY REGULATION 10.53.01.05B(2)(d). WE TOURED THE SITE AND [illegible] AREAS OF POSSIBLE CONTAMINATION THAT MAY BE THE SOURCE OF THE DISCHARGE.

ONE AREA AT THE BASE OF THE [illegible] CEDAR DRIP PAD HAD CONTAMINATION PRESENT CLOSEST TO THE BUILDING. I INSTRUCTED THE CLEAN UP OF THESE AREAS TO DECREASE THE DISCHARGE [illegible]

A SAMPLE OF THE [illegible] MATERIAL [illegible] FOR ANALYSIS OF EP TOXIC AND TOTAL METALS.

AR000311

Observer: [signature] REGIONAL INSPECTOR   **Person Interviewed:** [signature]

DHMH 3679

[redacted] Department of Health and Mental Hygiene
Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

Program:
RCRA ____
NPDES ✓

Lab. No. 840448

Hazardous Waste Laboratory
Metals Analysis Report Form

SPECIFY ____ Priority ____

Collector Jett 1400 8/13/84 Sample Source Cutler-Shipley Ave Harmans Md
Name/time/date

Sample ID No. MGWT #1 Preservative Used HNO

Sample Alert ____

Chain of Custody sample possession

From ____ to ____
Name/time/date Name/time/date

From ____ to ____
Name/time/date Name/time/date

EP Toxicity Metals in PPm

☐	Arsenic ____	☐	Lead ____
☐	Barium ____	☐	Mercury ____
☐	Cadmium ____	☐	Selenium ____
☐	Chromium Cr^{+6} ____	☐	Silver ____

Total Metal Analysis in PPm

☒ Solid ☐ Liquid

RECEIVED
SEP 10 1984
ENFORCEMENT FILE
COPY ONLY

☐	Aluminum ____	☐	Lead ____
☐	Antimony ____	☐	Magnesium ____
✓	Arsenic 57.6	☐	Manganese ____
☐	Barium ____	☐	Molybdenum ____
✓	Cadmium 0.66	☐	Nickel ____
☐	Calcium ____	☐	Potassium ____
✓	Chromium total 155	☐	Selenium ____
☐	Chromium: Cr^{+6} ____	☐	Silver ____
☐	Cobalt ____	☐	Thallium ____
☐	Copper ____	☐	Titanium ____
☐	Iron ____	☐	Zinc ____
☐	Iron: Ferrous ____	☐	Mercury ____

AR000312

Authorized By: ____

Supervisor DS Date: 9-11-84 Verified By: MDT

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE
Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

Hazardous Waste Laboratory
Metals Analysis Report Form

Program:
RCRA ✓
PDES _____
PECIFY _____

Lab. No. 840520

Priority _____

Collector GOTSCH 1020 HRS 8/30/84 Sample Source RAYNOR WELL
Name/time/date

Sample ID No. WLG083084001 Preservative Used _____

Sample Alert POSSIBLE CCA CONTAMINATION

Chain of Custody sample possession
From [illegible] to _____
Name/time/date Name/time/date

From _____ to _____
Name/time/date Name/time/date

EP Toxicity Metals in PPm

☐	Arsenic _____	☐	Lead _____
☐	Barium _____	☐	Mercury _____
☐	Cadmium _____	☐	Selenium _____
☐	Chromium Cr^{+6} _____	☐	Silver _____

Total Metal Analysis in PPm

☐ Solid ☒ Liquid

Aluminum	_____	☒	Lead < 0.5
Antimony	_____	☐	Magnesium _____
Arsenic	< 0.001	☐	Manganese _____
Barium	_____	☐	Molybdenum _____
Cadmium	< 0.05	☐	Nickel _____
Calcium	_____	☐	Potassium _____
Chromium total	< 0.5	☒	Selenium < 0.001
Chromium: Cr^{+6}	_____	☐	Silver _____
Cobalt	_____	☐	Thallium _____
Copper	0.50	☐	Titanium _____
Iron	_____	☐	Zinc _____
Iron: Ferrous	_____	☐	Mercury _____

AR000313

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE
Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

Hazardous Waste Laboratory
Metals Analysis Report Form

Lab. No. 840524

ES _____

CIFY _____ Priority _____

ollector GABCH 1135HRS 9/30/84 Sample Source HOSKINS WELL
Name/time/date

ample ID No. WLG093084002 Preservative Used _____

ample Alert POSSIBLE CCA CONTAMINATION

hain of Custody sample possession

rom [illegible] to _____
Name/time/date Name/time/date

rom _____ to _____
Name/time/date Name/time/date

OCT 10 1984

ENFORCEMENT FILE
FILE COPY ONLY

EP Toxicity Metals in PPm

- ☐ Arsenic _____
- ☐ Barium _____
- ☐ Cadmium _____
- ☐ Chromium Cr^{+6} _____
- ☐ Lead _____
- ☐ Mercury _____
- ☐ Selenium _____
- ☐ Silver _____

Total Metal Analysis in PPm

☐ Solid

- uminum _____
- timony _____
- senic < .001
- rium _____
- dmium < 0.05
- lcium _____
- romium total < 0.5
- romium: Cr^{+6} _____
- balt _____
- pper 0.12
- on _____
- on: Ferrous _____

☒ Liquid

- ☒ Lead < 0.5
- ☐ Magnesium _____
- ☐ Manganese _____
- ☐ Molybdenum _____
- ☐ Nickel _____
- ☐ Potassium _____
- ☒ Selenium < .001
- ☐ Silver _____
- ☐ Thallium _____
- ☐ Titanium _____
- ☐ Zinc _____
- ☐ Mercury _____

AR000314

Authorized By: _____

Analyte

October 11, 1984

ANALYTE

LABORATORIES, INC.

301-747-3844

OFFICES:
[redacted] BALTIMORE NAT'L PIKE
[redacted]TE 40 WEST
BALTIMORE, MD. 21228

MAIL:
P.O. BOX 21043
BALTIMORE, MD.
21228-0543

ANALYTICAL REPORT

for

C.O.A. 841012-02

OCT 23 1984

Mid-Atlantic Wood Preservers, Inc.

October 17, 1984

On 10-11-84 surface soil samples were taken from various locations in the main yard. Analytical data from the chemical analysis yielded the following information:

1. Analysis for total metals using a rigorous nitric acid digestion revealed the detectable presence of arsenic, cadmium, chromium and copper in all samples.

2. Although there are different levels of metals in each sample, there is no evidence at this time to suggest gross contamination. This initial finding is based on comparisons made between areas where wood is stored in quantity versus where it is not. Metals present may be typically present in the type of crushed stone used on the yard.

3. Results of the comparison between total metals versus EP Toxicity analysis performed on sample 1 indicated that mobility of the metals present is minimal. There is additional indication that the alkaline nature of the crushed stone helps provide for neutralization and subsequent retainment of chemicals deposited on the soil in small amounts.

The above conclusions are based on an initial investigation performed and are subject to change in the event that core samples or monitoring wells provide an indication that a problem exists.

Theodore J. Stocklas Jr

ANALYTE

LABORATORIES, INC.

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6630 BALTIMORE NAT'L. PIKE
ROUTE 40 WEST
BALTIMORE, MD. 21228

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MAIL:
P.O. BOX 21043
BALTIMORE, MD.
21228-0543

October 17, 1984

Mr. B. Liedman
Mid-Atlantic Wood Preservers, Inc.
7457 Shipley Ave.
Harmans, Md. 21077

Dear Mr. Liedman,

Enclosed are the analytical reports for the soil samples taken from various areas of your plant. To make a comparison, I have included information reqarding the metal concentrations found in some standard materials distributed by the NBS and EPA. I hope this information is helpful.

In the event that you have any questions reqarding methodology used please let me know as this may help when dealing with the EPA.

Sincerely,

T. J. Stockus

Theodore J. Stockus, Jr.
Laboratory Director

TJS/ss
enclosure

AR000317

ANALYTE

LABORATORIES, INC.

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MAIL:
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BALTIMORE, MD.
21228-0543

CERTIFICATE OF ANALYSIS
No. 841012-02 A

Mid-Atlantic Wood Preservers, Inc.

October 17, 1984

Analysis of: Soil sample 1, Front of shed (split)

Arsenic, Total	31 mg/kg (ppm)
Cadmium, Total	1.4 mg/kg (ppm)
Chromium, Total	51 mg/kg (ppm)
Copper, Total	33 mg/kg (ppm)

The above sample was analyzed according to procedures set forth in the following methods:

Digestion: EPA 600/4-79-020 March 1984, Page 6
Arsenic: EPA 206.2 (Atomic Absorption, Furnace Technique)
Cadmium: EPA 213.1 (Atomic Absorption, Direct Aspiration)
Chromium: EPA 218.1 (Atomic Absorption, Direct Aspiration)
Copper: EPA 220.1 (Atomic Absorption, Direct Aspiration)

Reviewed by: T. J. Stockum
Chemist

ANALYTE

LABORATORIES, INC.

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BALTIMORE, MD. 21228

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BALTIMORE, MD.
21228-0543

CERTIFICATE OF ANALYSIS
No. 841012-02 B

Mid-Atlantic Wood Preservers, Inc.

October 17, 1984

Analysis of: Soil sample 1, Front of shed (split)

EP TOXICITY

	Result Obtained	Maximum Concentration
Arsenic	0.97 mg/l	5.0 mg/l
Cadmium	below 0.01 mg/l	1.0 mg/l
Chromium	below 0.02 mg/l	5.0 mg/l
Copper	0.02 mg/l	N/A

The above sample was subjected to the leaching procedure for EP Toxicity as described in 40 CFR Part 261 and EPA 1310. Results expressed are mg/l in the final volume leachate.

AR000319

Reviewed by: T. J. Stockus
Chemist

ANALYTE

LABORATORIES, INC.

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BALTIMORE, MD
21228-0543

CERTIFICATE OF ANALYSIS
No. 841012-02 C

Mid-Atlantic Wood Preservers, Inc.

October 17, 1984

Analysis of: Soil sample 2, SW Corner

Arsenic, Total	90 mg/kg (ppm)
Cadmium, Total	1.5 mg/kg (ppm)
Chromium, Total	129 mg/kg (ppm)
Copper, Total	96 mg/kg (ppm)

The above sample was analyzed according to procedures set forth in the following methods:

Digestion: EPA 600/4-79-020 March 1984, Page 6
Arsenic: EPA 206.2 (Atomic Absorption, Furnace Technique)
Cadmium: EPA 213.1 (Atomic Absorption, Direct Aspiration)
Chromium: EPA 218.1 (Atomic Absorption, Direct Aspiration)
Copper: EPA 220.1 (Atomic Absorption, Direct Aspiration)

Reviewed by: T. J. Stocum
Chemist

ANALYTE

LABORATORIES, INC.

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21228-0543

CERTIFICATE OF ANALYSIS
No. 841012-02 D

Mid-Atlantic Wood Preservers, Inc.

October 17, 1984

Analysis of: Soil sample 3, Under shed, front of compressor

Arsenic, Total	27 mg/kg (ppm)
Cadmium, Total	2.0 mg/kg (ppm)
Chromium, Total	90 mg/kg (ppm)
Copper, Total	65 mg/kg (ppm)

The above sample was analyzed according to procedures set forth in the following methods:

Digestion: EPA 600/4-79-020 March 1984, Page 6
Arsenic: EPA 206.2 (Atomic Absorption, Furnace Technique)
Cadmium: EPA 213.1 (Atomic Absorption, Direct Aspiration)
Chromium: EPA 218.1 (Atomic Absorption, Direct Aspiration)
Copper: EPA 220.1 (Atomic Absorption, Direct Aspiration)

Reviewed by: T. J. Stockum
Chemist

ANALYTE

LABORATORIES, INC.

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[redacted] E 40 WEST
BALTIMORE, MD. 21228

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P.O. BOX 21043
BALTIMORE, MD.
21228-0543

CERTIFICATE OF ANALYSIS
No. 841012-02 E

Mid-Atlantic Wood Preservers, Inc.

October 17, 1984

Analysis of: Soil sample 4, Under shed, south of compressor

Arsenic, Total	37 mg/kg (ppm)
Cadmium, Total	2.0 mg/kg (ppm)
Chromium, Total	45 mg/kg (ppm)
Copper, Total	37 mg/kg (ppm)

The above sample was analyzed according to procedures set forth in the following methods:

Digestion: EPA 600/4-79-020 March 1984, Page 6
Arsenic: EPA 206.2 (Atomic Absorption, Furnace Technique)
Cadmium: EPA 213.1 (Atomic Absorption, Direct Aspiration)
Chromium: EPA 218.1 (Atomic Absorption, Direct Aspiration)
Copper: EPA 220.1 (Atomic Absorption, Direct Aspiration)

Reviewed by: T. J. Hockus
Chemist

ANALYTE

LABORATORIES, INC.

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BALTIMORE, MD.
21228-0543

CERTIFICATE OF ANALYSIS
No. 841012-02 F

Mid-Atlantic Wood Preservers, Inc.

October 17, 1984

Analysis of: Soil sample 5, 50 feet from SE corner

Arsenic, Total	120 mg/kg (ppm)
Cadmium, Total	1.5 mg/kg (ppm)
Chromium, Total	188 mg/kg (ppm)
Copper, Total	161 mg/kg (ppm)

The above sample was analyzed according to procedures set forth in the following methods:

Digestion: EPA 600/4-79-020 March 1984, Page 6
Arsenic: EPA 206.2 (Atomic Absorption, Furnace Technique)
Cadmium: EPA 213.1 (Atomic Absorption, Direct Aspiration)
Chromium: EPA 218.1 (Atomic Absorption, Direct Aspiration)
Copper: EPA 220.1 (Atomic Absorption, Direct Aspiration)

Reviewed by: T. J. Stocking
Chemist

ANALYTE

LABORATORIES, INC.

301-747-3844

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[redacted] E 40 WEST
BALTIMORE, MD. 21228

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P.O. BOX 21043
BALTIMORE, MD.
21228-0543

CERTIFICATE OF ANALYSIS
No 841012-02 G

Mid-Atlantic Wood Preservers, Inc.

October 17, 1984

Analysis of: Soil sample 6, SE corner

Arsenic, Total	17 mg/kg (ppm)
Cadmium, Total	0.5 mg/kg (ppm)
Chromium, Total	18 mg/kg (ppm)
Copper, Total	21 mg/kg (ppm)

The above sample was analyzed according to procedures set forth in the following methods:

Digestion: EPA 600/4-79-020 March 1984, Page 6
Arsenic: EPA 206.2 (Atomic Absorption, Furnace Technique)
Cadmium: EPA 213.1 (Atomic Absorption, Direct Aspiration)
Chromium: EPA 218.1 (Atomic Absorption, Direct Aspiration)
Copper: EPA 220.1 (Atomic Absorption, Direct Aspiration)

Reviewed by: T. D. Stevens
Chemist

TYPICAL STANDARD MATERIALS

NBS 1645

River Sediment

Arsenic	0.066	mg/kg
Cadmium	10.2	mg/kg
Chromium	29,600	mg/kg
Copper	109	mg/kg

NBS 1648

Urban Particulate

Arsenic	115	mg/kg
Cadmium	75	mg/kg
Chromium	403	mg/kg
Copper	609	mg/kg

EPA QC SAMPLE

Municipal Digested Sludge

Arsenic	17.0	mg/kg
Cadmium	19	mg/kg
Chromium	193	mg/kg
Copper	1080	mg/kg

Reviewed by: T. Julian AR000825
Chemist

CHAIN OF CUSTODY RECORD

STUDY: MAWP : SITE: DATE: 10-12-84

COLLECTOR: T. STOCKUS SIGNATURE: T. Stockus

COLLECTOR: SIGNATURE:

LOCATION	DATE	TIME	DESCRIPTION OF SAMPLES
① FRONT OF BLDG.	10-12-84	0840.	
② SW CORNER LOT			
③ SAED FRONT OF COMP.			
④ SAED R OF COMT			
⑤ 50 ft SE CORN			
⑥ SE CORN.	—	0900	
OBSERVERS NAMES:			SIGNATURES OF OBSERVERS:

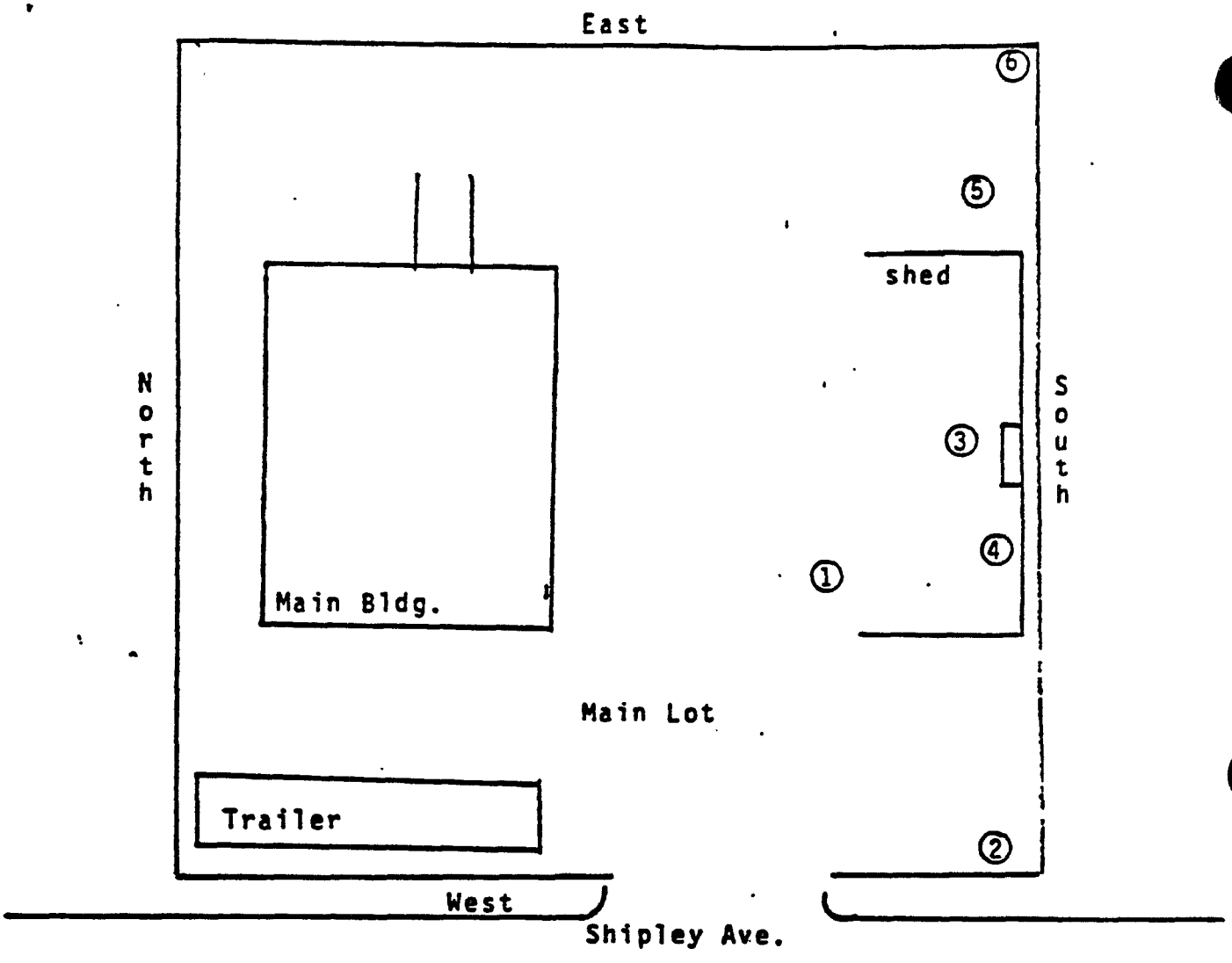
RELINQUISHED BY: (SIGNATURE)	RECEIVED BY: (SIGNATURE)	DATE	TIME

LABORATORY IDENTIFICATION:

1- MICRO XAM. CURRENT

AR000326

Mid-Atlantic Wood Preservers, Inc.



1. Front of shed(split)
2. SW corner
3. Under shed, front of compressor
4. Under shed, south of compressor
5. 50 feet from SE corner
6. SE corner

Analyte

October 23, 1984
October 25, 1984

ANALYTE

LABORATORIES, INC.

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6630 BALTIMORE NAT'L PIKE
ROUTE 40 WEST
BALTIMORE, MD. 21228

301-747-3844

MAIL:
P.O. BOX 21043
BALTIMORE, MD.
21228-0543

NOV 21 1984

CERTIFICATE OF ANALYSIS
No. 841025-02 A

Mid-Atlantic Wood Preservers, Inc.

November 19, 1984

Analysis of: Soil sample, EPA Split, Station 01, SE Corner of building

Chromium, Total	2700 mg/kg (ppm)
Copper, Total	2750 mg/kg (ppm)
Zinc, Total	180 mg/kg (ppm)

The above sample was analyzed according to procedures set forth in the following methods:

Preparation: EPA 3050 (Acid Digestion of Sludges)

Chromium: EPA 7190 (Atomic Absorption, Direct Aspiration Method)
Copper: EPA 7210 (Atomic Absorption, Direct Aspiration Method)
Zinc: EPA 7950 (Atomic Absorption, Direct Aspiration Method)

Reviewed by: _____
Chemist

AR000329

ANALYTE

LABORATORIES, INC.

301-747-3844

OFFICES:
[redacted] BALTIMORE NAT'L. PIKE
[redacted]E 40 WEST
[redacted]LTIMORE, MD. 21228

MAIL:
P.O. BOX 21043
BALTIMORE, MD.
21228-0543

CERTIFICATE OF ANALYSIS
No. 841025-02 B

Mid-Atlantic Wood Preservers, Inc.

November 19, 1984

Analysis of: Water sample, EPA Split, Station 03, Flame proof shed

Chromium, Hexavalent	0.00 mg/l (ppm)
Chromium, Total	2.07 mg/l (ppm)
Copper, Total	0.53 mg/l (ppm)
Zinc, Total	0.66 mg/l (ppm)

Preparation: EPA 3010 (Acid Digestion Procedure for Flame Atomic Absorption Spectroscopy)

Chromium: EPA 7190 (Atomic Absorption, Direct Aspiration Method)
Chromium: EPA 7196 (Hexavalent Chromium: Clorimetric Method)
Copper: EPA 7210 (Atomic Absorption, Direct Aspiration Method)
Zinc: EPA 7950 (Atomic Absorption, Direct Absorption Method)

Reviewed by: T. J. Stockus Jr.
Chemist

ANALYTE

LABORATORIES, INC.

OFFICES:
6630 BALTIMORE NAT'L PIKE
ROUTE 40 WEST
BALTIMORE, MD. 21228

301-747-3844

MAIL:
P.O. BOX 21043
BALTIMORE, MD.
21228-0543

NOV 21 1984

CERTIFICATE OF ANALYSIS
No. 841025-02 C

Mid-Atlantic Wood Preservers, Inc.

November 19, 1984

Analysis of: Water sample, EPA Split, Station 06, Stoney Creek Run Downstream

Chromium, Hexavalent	0.00 mg/l (ppm)
Chromium, Total	0.22 mg/l (ppm)
Copper, Total	0.04 mg/l (ppm)
Zinc, Total	0.17 mg/l (ppm)

Preparation: EPA 3010 (Acid Digestion Procedure for Flame Atomic Absorption Spectroscopy)

Chromium: EPA 7190 (Atomic Absorption, Direct Aspiration Method)
Chromium: 7196 (Hexavalent Chromium: Colorimetric Method)
Copper: EPA 7210 (Atomic Absorption, Direct Aspiration Method)
Zinc: EPA 7950 (Atomic Absorption, Direct Absorption Method)

Reviewed by: T. J. Stachura
Chemist

MARTEL

Certificate of Laboratory Analysis

(4)

ur[illegible]boratory Services, Inc. 1025 Cromwell Bridge Road Baltimore, Maryland 21204 (301) 825-779

oice Number 14956 Page ____ of ____ page(s

nple W-65825 Six soil samples and one blank, 3 water samples and one blank, and two "wood preservatives"; all identified as "Mid-Atlantic Wood Preservatives" received on October 25, 1984.

Roy F. Weston
5090 Central Highway
Pennsauken, New Jersey 08109
Attn: Mr. Tim Travers

November 12, 1984

Soil samples:

Station Number		01	02	03	04
Antimony, Total	EPA 204.1	<10	<10	<10	<10
Arsenic, Total	EPA 206.2	2100	57	75	41
Beryllium, Total	EPA 210.1	<1	<1	<1	<1
Cadmium, Total	EPA 213.1	<1	<1	<1	<1
Chromium, Total	EPA 218.1	1640	64	109	58
Copper, Total	EPA 220.1	2740	66	88	59
Lead, Total	EPA 239.1	66	60	43	39
[illegible]ury, Total	EPA 245.1	<0.1	<0.1	<0.1	<0.1
[illegible]el, Total	EPA 249.1	64	51	50	27
Selenium, Total	EPA 270.2	<1	<1	<1	<1
Silver, Total	EPA 272.1	<1	<1	<1	<1
Thallium, Total	EPA 279.1	<5	<5	<5	<5
Zinc, Total	EPA 289.1	139	54	77	389
Chromium, Hexavalent	EPA 218.4	<0.1	<0.1	<0.1	<0.1
Solids, Total, %	EPA 160.3	86.8	88.0	63.6	92.0

Station Number		07 Storm Drain	08 Backyard	00 Blank
Antimony, Total	EPA 204.1	<10	<10	<0.1
Arsenic, Total	EPA 206.2	5	3	<0.01
Beryllium, Total	EPA 210.1	<1	<1	<0.01
Cadmium, Total	EPA 213.1	<1	<1	<0.01
Chromium, Total	EPA 218.1	18	4	<0.01
Copper, Total	EPA 220.1	7	5	<0.01
Lead, Total	EPA 239.1	14	13	<0.01
Mercury, Total	EPA 245.1	<0.1	<0.1	<0.001
Nickel, Total	EPA 249.1	149	4	<0.01
Selenium, Total	EPA 270.2	<1	<1	<0.01
Silver, Total	EPA 272.1	<1	<1	<0.01
Thallium, Total	EPA 279.1	<5	<5	<0.05
Zinc, Total	EPA 289.1	46	15	0.01
Chromium, Hexavalent	EPA 218.4	<0.1	<0.1	<0.01
[illegible]s, Total, %	EPA 160.3	90.9	89.8	----

AR000332

bove results report as ug/kg on a dry basis except where otherwise ted.

MARTEL

Martel Laboratory Services, Inc. 1025 Cromwell Bridge Road Baltimore, Maryland 21204 (301) 825-7

Quality Assurance

Replicate Analysis		Rep A	Rep B	I Factor
Antimony, Total	EPA 204.1	<10	<10	0.00
Arsenic, Total	EPA 206.2	52	61	0.07
Beryllium, Total	EPA 210.1	<1	<1	0.00
Cadmium, Total	EPA 213.1	<1	<1	0.00
Chromium, Total	EPA 218.1	62	61	0.01
Copper, Total	EPA 220.1	7	9	0.12
Lead, Total	EPA 239.1	17	17	0.00
Mercury, Total	EPA 245.1	<0.1	<0.1	0.00
Nickel, Total	EPA 249.1	10	10	0.00
Selenium, Total	EPA 270.2	<1	<1	0.00
Silver, Total	EPA 272.1	<1	<1	0.00
Thallium, Total	EPA 279.1	<5	<5	0.00
Zinc, Total	EPA 289.1	15	16	0.03
Chromium, Hexavalent	EPA 218.4	<0.1	<0.1	0.00

I Factor = (Rep A - Rep B) / (Rep A + Rep B)

Spike Analysis		Sample	Spike	Recovery, %
Antimony, Total	EPA 204.1	<10	40	100
Arsenic, Total	EPA 206.2	5	10	100
Beryllium, Total	EPA 210.1	<1	39	97.5
Cadmium, Total	EPA 213.1	<1	39	97.5
Chromium, Total	EPA 218.1	64	100	90.0
Copper, Total	EPA 220.1	66	103	92.5
Lead, Total	EPA 239.1	60	96	90.0
Mercury, Total	EPA 245.1	<0.1	1.9	95.0
Nickel, Total	EPA 249.1	51	89	95.0
Selenium, Total	EPA 270.2	<1	5	100.0
Silver, Total	EPA 272.1	<1	10	100.0
Thallium, Total	EPA 279.1	<5	40	100.0
Zinc, Total	EPA 289.1	54	100	115.0
Chromium, Hexavalent	EPA 218.4	<0.1	5.0	100.0

Water Samples

Station Number		03	05 (S. Creek)	06 (St. Creek)	00 (Bl)
Antimony, Total	EPA 204.1	<0.1	<0.1	<0.1	<0.1
Arsenic, Total	EPA 206.2	1.3	<0.01	<0.01	<0.01
Beryllium, Total	EPA 210.1	<0.01	<0.01	<0.01	<0.01
Cadmium, Total	EPA 213.1	0.020	<0.005	<0.005	<0.005
Chromium, Total	EPA 218.1	1.45	<0.01	<0.01	<0.01
Copper, Total	EPA 220.1	0.44	<0.01	<0.01	<0.01
Lead, Total	EPA 239.1	0.03	<0.01	<0.01	<0.01
Mercury, Total	EPA 245.1	<0.001	<0.001	<0.001	<0.001
Nickel, Total	EPA 249.1	0.08	<0.01	<0.01	<0.01
Selenium, Total	EPA 270.2	<0.01	<0.01	<0.01	<0.01
Silver, Total	EPA 272.1	0.02	<0.01	<0.01	<0.01
Thallium, Total	EPA 279.1	<0.05	<0.05	<0.05	<0.05
Zinc, Total	EPA 289.1	0.55	0.04	0.02	<0.01
Chromium, Hexavalent	EPA 218.4	<0.01	<0.01	<0.01	<0.01

Above results reported as mg/l unless otherwise noted.

lity Assurance

Spike Analysis		Sample	Spike	Recovery, %
Antimony, Total	EPA 204.1	<0.1	0.4	100
Arsenic, Total	EPA 206.2	<0.01	0.10	100
Beryllium, Total	EPA 210.1	<0.01	0.38	95.0
Cadmium, Total	EPA 213.1	<0.005	0.400	100.0
Chromium, Total	EPA 218.1	<0.01	0.39	97.5
Copper, Total	EPA 220.1	<0.01	0.38	95.0
Lead, Total	EPA 239.1	<0.01	0.37	92.5
Mercury, Total	EPA 245.1	<0.001	0.019	95.0
Nickel, Total	EPA 249.1	<0.01	0.39	97.5
Selenium, Total	EPA 270.2	<0.01	0.09	90.0
Silver, Total	EPA 272.1	<0.01	0.36	90.0
Thallium, Total	EPA 279.1	<0.05	0.40	100
Zinc, Total	EPA 289.1	0.04	0.48	110
Chromium, Hexavalent	EPA 218.4	<0.01	0.50	100

MARTEL

Product Analysis

Station Number		A (Plywood product)	B (CCA product)	I
Antimony, Total	EPA 204.1	<10	<10	
Arsenic, Total	EPA 206.2	0.2	>15 %	
Beryllium, Total	EPA 210.1	0.3	<0.1	
Cadmium, Total	EPA 213.1	1.0	<0.1	
Chromium, Total	EPA 218.1	47.4	4430	
Copper, Total	EPA 220.1	49.1	3020	
Lead, Total	EPA 239.1	1.7	0.8	
Mercury, Total	EPA 245.1	<0.01	<0.01	
Nickel, Total	EPA 249.1	2.2	1.5	
Selenium, Total	EPA 270.2	<0.1	<0.1	
Silver, Total	EPA 272.1	<0.1	<0.1	
Thallium, Total	EPA 279.1	<1	<1	
Zinc, Total	EPA 289.1	28.2	610	

Above results reported as mg/kg unless otherwise noted.

Robert G. Edwards, Ph. D.
Vice President

WOOD PRESERVERS

SAMPLERS: (Signature) [signature] / [signature]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	8 oz Glass	1 liter plastic	3 oz plastic				REMARKS
00	10-25-84	1130			Station 00 - Blank	1	1	1					Analysis: · Total PP metal · E.P. Toxicity · Hexachrom
01	10-25-84	1015	X		Station 01 - SE Corner of Bldg (soil)	1	1						
02	10-25-84	1040	X		Station 02 - Flame Proof Shed (soil)	1	1						
03	10-25-84	1045	X		Station 03 - Flame Proof Shed (soil/water)	2	1	1					
04	10-25-84	1110	X		Station 04 - SE Corner of Site (soil)	1	1						
05	10-25-84	1205		X	Station 05 - Stony Creek (liquid)	1		1					
06	10-25-84	1235		X	Station 06 - Stony [illegible] (liq.)	1		1					
07	10-25-84	1245	X		Station 07 - Spill Area [illegible] (soil)	1	1						
A	10-25-84	1300		X	Station A - Flameproof Product (like acid)	1			1				
B	10-25-84	1300		X	Station B - CCA Product (brown color)	1			1				
08	10-25-84	1345	X		Station 08 - Background upgradient (Soil)	1	1						

REMARKS: Composite Samples [illegible] — [illegible] → EPA — [illegible]

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	10-25-84 / 1050	[signature]			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

AR000336

MARTEL

Certificate of Laboratory Analysis

artel Laboratory Services, Inc. 1025 Cromwell Bridge Road Baltimore, Maryland 21204 (301) 825-7

voice Number 14956 Page ____ of ____ page(s.

Sample W-6582S Six soil samples and one blank, 2 water samples and one blank, and two "wood preservatives"; all identified as "Mid-Atlantic Wood Preservatives" received on October 25, 1984.

Roy F. Weston
5090 Central Highway
Pennsauken, New Jersey 08109
Attn: Mr. Bhupe Khona

November 29, 1984

Quality Control Addendum

In response to the inquiry after completing and reporting the analysis of Martel report W-6582S the following information is now provided.

Soil samples were quartered to obtain representative portions, were then dried at 104 C to obtain the total solids content. The oven-dried sample was then pulverized by mortar and pestle and sieved through a U. S. Standard No. 40 sieve. The sieved material was then acid digested with HNO_3, filtered, and diluted to an appropriate volume. This filtered solution was then analyzed according to the U. S. EPA methods already listed. This sampling scheme is in accordance with U. S. EPA Test Methods for Evaluating Solid Waste, July 1982.

All replicate analysis was performed on two separate aliquots of the dry, sieved soil. All spikes were produced by adding known analyte concentrations to a sieved soil portion prior to digestion. Different samples were spiked with different analytes in accordance with Martel's own quality assurance program. Report values are based on actual solution values multiplied by a dilution factor.

Martel reports an Industrial Statistic which when multiplied by 200 will produce the relative recovery value desired.

Replicate Analysis		Rep A	Rep B	I Factor
Antimony, Total	EPA 204.1	<10	<10	0.00
Arsenic, Total	EPA 206.2	52	61	0.07
Beryllium, Total	EPA 210.1	<1	<1	0.00
Cadmium, Total	EPA 213.1	<1	<1	0.00
Chromium, Total	EPA 218.1	62	61	0.01
Copper, Total	EPA 220.1	7	9	0.12
Lead, Total	EPA 239.1	17	17	0.00
Mercury, Total	EPA 245.1	<0.1	<0.1	0.00
Nickel, Total	EPA 249.1	10	10	0.00
Selenium, Total	EPA 270.2	<1	<1	0.00

VARTEL

[redacted] F. Weston, W-65825
Quality Control Addendum
Page 2

Silver, Total	EPA 272.1	<1	<1	0.00
Thallium, Total	EPA 279.1	<5	<5	0.00
Zinc, Total	EPA 289.1	15	16	0.03
Chromium, Hexavalent	EPA 218.4	<0.1	<0.1	0.00

I Factor = (Rep A - Rep B) / (Rep A + Rep B)

Spike Analysis		Sample	Spike	Recovery, %	mg/l Added
Antimony, Total	EPA 204.1	<0.1	0.4	100	0.4
Arsenic, Total	EPA 206.2	0.05	0.10	100	0.05
Beryllium, Total	EPA 210.1	<0.01	0.39	97.5	0.40
Cadmium, Total	EPA 213.1	<0.01	0.39	97.5	0.40
Chromium, Total	EPA 218.1	0.64	1.00	90.0	0.40
Copper, Total	EPA 220.1	0.66	1.03	92.5	0.40
Lead, Total	EPA 239.1	0.60	0.96	90.0	0.40
Mercury, Total	EPA 245.1	<0.001	0.019	95.0	0.020
Nickel, Total	EPA 249.1	0.51	0.89	95.0	0.40
Selenium, Total	EPA 270.2	<0.01	0.05	100.0	0.05
[redacted]ver, Total	EPA 272.1	<0.01	0.10	100.0	0.10
[redacted]llium, Total	EPA 279.1	<0.05	0.40	100.0	0.40
Zinc, Total	EPA 289.1	0.54	1.00	115.0	0.40
Chromium, Hexavalent	EPA 218.4	<0.1	5.0	100.0	5.0

Spike Analysis		Sample	Spike	Recovery, %	mg/l Added
Antimony, Total	EPA 204.1	<0.1	0.4	100	0.4
Arsenic, Total	EPA 206.2	<0.01	0.10	100	0.10
Beryllium, Total	EPA 210.1	<0.01	0.38	95.0	0.40
Cadmium, Total	EPA 213.1	<0.005	0.400	100.0	0.400
Chromium, Total	EPA 218.1	<0.01	0.39	97.5	0.40
Copper, Total	EPA 220.1	<0.01	0.38	95.0	0.40
Lead, Total	EPA 239.1	<0.01	0.37	92.5	0.40
Mercury, Total	EPA 245.1	<0.001	0.019	95.0	0.020
Nickel, Total	EPA 249.1	<0.01	0.39	97.5	0.40
Selenium, Total	EPA 270.2	<0.01	0.09	90.0	0.10
Silver, Total	EPA 272.1	<0.01	0.36	90.0	0.40
Thallium, Total	EPA 279.1	<0.05	0.40	100	0.40
Zinc, Total	EPA 289.1	0.04	0.48	110	0.40
Chromium, Hexavalent	EPA 218.4	<0.01	0.50	100	0.50

AR000338

Robert G. Edwards, Ph. D.
Vice President

MWRA

October 26, 1984

DEC 6 1984

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE
Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

Hazardous Waste Laboratory
Metals Analysis Report Form

Lab. No. 840675

ram:

IF

Priority ______

ollector ______ Name/time/date

Sample Source ______

mple ID No. ______ SOIL

Preservative Used NONE

mple Alert ______

ain of Custody sample possession

om ______ Name/time/date to ______ 10-26-84 Name/time/date

om ______ Name/time/date to ______ Name/time/date

EP Toxicity Metals in PPm

✓	Arsenic 0.19		☐	Lead
☐	Barium		☐	Mercury
✓	Cadmium <0.05		☐	Selenium
✓	Chromium Cr^{+6} <0.05		☐	Silver

Total Metal Analysis in PPm

☒ Solid

uminum	
timony	
senic	50.65
rium	
dmium	0.73
lcium	
romium total	52
romium: Cr^{+6}	
balt	
n: Ferrous	

☐ Liquid

Lead	
Magnesium	
Manganese	
Molybdenum	
Nickel	
Potassium	
Selenium	
Silver	
Thallium	
Titanium	
Zinc	
Mercury	

NOV

AR000340

Authorized By: ______

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE

DEC 1984

Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

Hazardous Waste Laboratory
Metals Analysis Report Form

gram: RA ✓ DES ____ CITY ____

Lab. No. 84067

Priority ____

Collector [illegible] Name/time/date

Sample Source [illegible]

Sample ID No. [illegible] Preservative Used [illegible]

Sample Alert ____

Chain of Custody/sample possession

From [illegible] Name/time/date to [illegible] Name/time/date

From ____ Name/time/date to ____ Name/time/date

EP Toxicity Metals in PPm

✓	Arsenic	0.001	☐	Lead	
☐	Barium		☐	Mercury	
✓	Cadmium	< 0.01	☐	Selenium	
✓	Chromium Cr^{+6}	< 0.01	☐	Silver	

Total Metal Analysis in PPm

☐ Solid

Aluminum		Lead	
Antimony		Magnesium	
✓ Arsenic	3.79	Manganese	
Barium		Molybdenum	
✓ Cadmium	0.46	Nickel	
Calcium		Potassium	
✓ Chromium total	7.4	Selenium	
Chromium: Cr^{+6}		Silver	
Cobalt		Thallium	
Copper		Titanium	
Iron		Zinc	
Iron: Ferrous		Mercury	

☐ Liquid

AR000341

DEC 6 1984

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE
Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

Hazardous Waste Laboratory
Metals Analysis Report Form

Lab. No. 840675

am: [redacted]

S

EX

Priority

llector [illegible] Sample Source MAIN ATTENUATOR AREA SHIPLEY AVE STORM DRAIN

mple ID No 07102584134345 Soil Preservative Used NONE

mple Alert

ain of Custody sample possession

[illegible] to Hua Lee 1130 10-26-84
Name/time/date Name/time/date

om to
Name/time/date Name/time/date

EP Toxicity Metals in PPm

✓	Arsenic	0.002	☐	Lead	
☐	Barium		☐	Mercury	
✓	Cadmium	< 0.05	☐	Selenium	
✓	Chromium Cr^{+6}	< 0.05	☐	Silver	

Total Metal Analysis in PPm

☒ Solid ☐ Liquid

minum		☐	Lead		
timony		☐	Magnesium		
senic	4.39	☐	Manganese		
ium		☐	Molybdenum		
mium	0.58	☐	Nickel		
cium		☐	Potassium		
omium total	18	☐	Selenium		
omium: Cr^{+6}		☐	Silver		
alt		☐	Thallium		
		☐	Titanium		
n		☐	Zinc		
n: Ferrous		☐	Mercury		

AR000342

Authorized By:

DEC 6 1984

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE
Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

Hazardous Waste Laboratory
Metals Analysis Report Form

Lab. No. 840675

Program: RA ✓ DES ____ CIFY ____

DRAFT

Priority ____

Collector GRAB SAMPLE 1235 HRS 10/25/84 Sample Source MID-ATLANTIC (CTH) STONEY RUN CREEK
Name/time/date

Sample ID No. 05 10/25/84 1235 LMX10 Preservative Used NONE

Sample Alert ____

Chain of custody sample possession

From [illegible] to Alice Lee 1100 10-26-84
Name/time/date Name/time/date

From ____ to ____
Name/time/date Name/time/date

EP Toxicity Metals in PPm

✓	Arsenic	< 0.001	☐	Lead	
☐	Barium		☐	Mercury	
✓	Cadmium	< 0.05	☐	Selenium	
✓	Chromium Cr^{+6}	< 0.05	☐	Silver	

Total Metal Analysis in PPm

☐ Solid ☒ Liquid

Aluminum			☐	Lead	
Antimony			☐	Magnesium	
Arsenic	< 0.001		☐	Manganese	
Barium			☐	Molybdenum	
Cadmium	< 0.05		☐	Nickel	
Calcium			☐	Potassium	
Chromium total	< 0.5		☐	Selenium	
Chromium: Cr^{+6}			☐	Silver	
Cobalt			☐	Thallium	
Copper			☐	Titanium	
Iron			☐	Zinc	
Iron: Ferrous			☐	Mercury	

AR000343

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE
Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

DEC 6 1984

8400675

Lab. No.

Hazardous Waste Laboratory
Metals Analysis Report Form

Priority ______

Collector [illegible] 10/26/84 Name/time/date

Sample Source MID-ATLANTIC WOOD, STONEY RUN CREEK

Sample ID No. 05/10/25/84 1035 Liquid

Preservative Used NONE

Sample Alert ______

Chain of Custody: sample possession

[illegible] 10/26/84 Name/time/date to [illegible] 11:00 10-26-84 Name/time/date

______ Name/time/date to ______ Name/time/date

EP Toxicity Metals in PPm

✓	Arsenic	< 0.001	☐	Lead	
☐	Barium		☐	Mercury	
✓	Cadmium	< 0.003	☐	Selenium	
✓	Chromium Cr^{+6}	< 0.05	☐	Silver	

Total Metal Analysis in PPm

☐ Solid ☒ Liquid

inum		Lead	
mony		Magnesium	
nic	< 0.002	Manganese	
um		Molybdenum	
ium	< 0.05	Nickel	
ium		Potassium	
mium total	< 0.5	Selenium	
mium: Cr^{+6}		Silver	
t		Thallium	
		Titanium	
		Zinc	
Ferrous		Mercury	

AR000344

Authorized By:

DEC 6 1984

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE
Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

Hazardous Waste Laboratory
Metals Analysis Report Form

gram: RA ✓ DE ☐ CIFY ☐

Lab. No. 840675

Priority ☐

Collector AMY WELSH 1110 HRS 10/25/84 Sample Source MID ATLANTIC ROAD
Name/time/date

Sample ID No. 84/10/25-1/1110 SOIL Preservative Used NONE

Sample Alert ☐

Chain of Custody/sample possession
From AMY WELSH 1110 HRS 10/25/84 to Alice Lau 11:00 10-26-84
Name/time/date Name/time/date

From ☐ to ☐
Name/time/date Name/time/date

EP Toxicity Metals in PPm

✓	Arsenic	<0.001	☐	Lead	
☐	Barium		☐	Mercury	
✓	Cadmium	0.06	☐	Selenium	
✓	Chromium Cr^{+6}	<0.05	☐	Silver	

Total Metal Analysis in PPm

☒ Solid ☐ Liquid

luminum		☐	Lead		
ntimony		☐	Magnesium		
rsenic	42.55	☐	Manganese		
arium		☐	Molybdenum		
admium	0.88	☐	Nickel		
alcium		☐	Potassium		
hromium total	50	☐	Selenium		
hromium: Cr^{+6}		☐	Silver		
obalt		☐	Thallium		
opper		☐	Titanium		
on		☐	Zinc		
on: Ferrous		☐	Mercury		

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DEC 6 1984

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE
Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

ram: Lab. No. 840875

Hazardous Waste Laboratory
Metals Analysis Report Form

S

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ollector: [illegible] Sample Source [illegible]
Name/time/date

ample ID No. 0310258410145 Soil Preservative Used [illegible]

ample Alert

hain of Custody sample possession

[illegible] to Alice Lew 11:00 10-26-84
Name/time/date Name/time/date

rom to
Name/time/date Name/time/date

EP Toxicity Metals in PPm

☑ Arsenic	0.12	☐ Lead	
☐ Barium		☐ Mercury	
☑ Cadmium	0.06	☐ Selenium	
☑ Chromium Cr^{+6}	<0.05	☐ Silver	

Total Metal Analysis in PPm

☒ Solid

uminum	
itimony	
senic	41.37
rium	
dmium	0.78
lcium	
romium total	58
romium: Cr^{+6}	
balt	
on	
on: Ferrous	

☐ Liquid

☐ Lead	
☐ Magnesium	
☐ Manganese	
☐ Molybdenum	
☐ Nickel	
☐ Potassium	
☐ Selenium	
☐ Silver	
☐ Thallium	
☐ Titanium	
☐ Zinc	
☐ Mercury	

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Laboratories Administration
Howard and Biddle Streets
P.O. Box 2755, Baltimore, Maryland 21203

Hazardous Waste Laboratory
Metals Analysis Report Form

Lab. No. 840675

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Priority

Collector [illegible] 10/25/84 Sample Source MID-ATLANTIC ROAD
Name/time/date

Sample ID No. 03102584/1015 LIQUID Preservative Used NONE

Sample Alert

Chain of custody: sample possession

From [illegible] to Mic Lee 11:00 10-26-84
Name/time/date Name/time/date

From to
Name/time/date Name/time/date

EP Toxicity Metals in PPm

✓	Arsenic	0.07	☐	Lead	
☐	Barium		☐	Mercury	
✓	Cadmium	< 0.05	☐	Selenium	
✓	Chromium Cr^{+6}	< 0.05	☐	Silver	

Total Metal Analysis in PPm

☐ Solid ☒ Liquid

luminum		☐	Lead		
ntimony		☐	Magnesium		
rsenic	1.33	☐	Manganese		
arium		☐	Molybdenum		
admium	< 0.05	☐	Nickel		
alcium		☐	Potassium		
hromium total	1.5	☐	Selenium		
hromium: Cr^{+6}		☐	Silver		
obalt		☐	Thallium		
opper		☐	Titanium		
ron		☐	Zinc		
ron: Ferrous		☐	Mercury		

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Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

Hazardous Waste Laboratory
Metals Analysis Report Form

840675
Lab. No.

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Priority

Collector ______ Name/time/date — Sample Source MIDATLANTIC WOOD

Sample ID No. 01106581110 15 SAL — Preservative Used NONE

Sample Alert

Chain of Custody sample possession
From ______ Name/time/date — to Alice Lee 11:00 10-26-84 Name/time/date

From ______ Name/time/date — to ______ Name/time/date

EP Toxicity Metals in PPm

[✓] Arsenic	0.09	[ ] Lead	
[ ] Barium		[ ] Mercury	
[✓] Cadmium	0.06	[ ] Selenium	
[✓] Chromium Cr^{+6}	<0.05	[ ] Silver	

Total Metal Analysis in PPm

[X] Solid

luminum	
ntimony	
rsenic	2089.6
arium	
admium	1.79
lcium	
romium total	1,474
romium: Cr^{+6}	
balt	
on	
on: Ferrous	

[ ] Liquid

[ ] Lead	
[ ] Magnesium	
[ ] Manganese	
[ ] Molybdenum	
[ ] Nickel	
[ ] Potassium	
[ ] Selenium	
[ ] Silver	
[ ] Thallium	
[ ] Titanium	
[ ] Zinc	
[ ] Mercury	

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Laboratories Administration
Howard and Biddle Streets
P.O. Box 2926, Baltimore, Maryland 21203

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ogram: ✓
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Hazardous Waste Laboratory
Metals Analysis Report Form

Lab. No.

Priority

Collector [illegible] Sample Source [illegible]
Name/time/date

Sample ID No. CO 10/25/84 1130 PLASTIC Preservative Used

Sample Alert

Chain of custody sample possession

From [illegible] to [illegible] 11:00 10-26-84
Name/time/date Name/time/date

From to
Name/time/date Name/time/date

EP Toxicity Metals in PPm

✓	Arsenic	< 0.001	☐	Lead	
☐	Barium		☐	Mercury	
✓	Cadmium	< 0.05	☐	Selenium	
✓	Chromium Cr^{+6}	< 0.05	☐	Silver	

Total Metal Analysis in PPm

BLANK SAMPLE - PLASTIC

☐ Solid ☐ Liquid

Aluminum		☐	Lead
Antimony		☐	Magnesium
Arsenic	< 0.001	☐	Manganese
Barium		☐	Molybdenum
Cadmium	< 0.05	☐	Nickel
Calcium		☐	Potassium
Chromium total	< 0.5	☐	Selenium
Chromium: Cr^{+6}		☐	Silver
Cobalt		☐	Thallium
Copper		☐	Titanium
Iron		☐	Zinc
Iron: Ferrous		☐	Mercury

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Authorized By:

[illegible] Chief: Date: Verified [illegible]

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Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

840675
Lab. No.

Hazardous Waste Laboratory
Metals Analysis Report Form

am: [redacted]

S [redacted]

FY _____ Priority _____

llector WAYNE GATES 1130 10/24/84 Sample Source ATLANTIC OCEAN
Name/time/date

nple ID No. 00 10/24/84 1130 GATES Preservative Used NONE

nple Alert _____

ain of Custody sample possession

[redacted] 1130 10/24/84 to Alice Lee 11:00 10-25-84
Name/time/date Name/time/date

m _____ to _____
Name/time/date Name/time/date

EP Toxicity Metals in PPm

☑	Arsenic <0.001	☐	Lead
☐	Barium	☐	Mercury
☑	Cadmium <0.05	☐	Selenium
☑	Chromium Cr^{+6} <0.05	☐	Silver

Total Metal Analysis in PPm

☐ Solid ; BLANK SAMPLE - GLASS ☐ Liquid

inum		☐	Lead
mony		☐	Magnesium
nic	<0.001	☐	Manganese
um		☐	Molybdenum
ium	<0.05	☐	Nickel
ium		☐	Potassium
ium total	<0.5	☐	Selenium
ium: Cr^{+6}		☐	Silver
lt		☐	Thallium
[redacted]		☐	Titanium
		☐	Zinc
Ferrous		☐	Mercury

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Authorized By:

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

Curtis Bldg., 6th & Walnut Sts
Philadelphia, Pennsylvania 19106

PROJECT NAME: Mid Atlantic Wood Preservers

SAMPLERS (Signature): [signature] / C. T. [signature]

REMARKS: Composite Samples split with: – EPA – Mid Atl. W.P. → (– State of MD)

Analysis:
- Total PP metal
- EP Toxicity
- Herachlore

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	8 oz glass	1 liter plastic
	10-25-84	0830			Station 00 – Blank (Soil)	1	1	1
	10-25-84	1015	X		Station 01 – SE Corner of Bld (Soil)	1	1	
	10-25-84	1040	X		Station 02 – Treated Post Shed (Soil/water)	1	1	
	10-25-84	1045	X		Station 03 – Home Post Shed (Soil)	2	1	1
	10-25-84	1110	X		Station 04 – SE Corner of Site	1	1	
	10-25-84	1205		X	Station 05 – Stony Run Creek (liquid)	1		1
	10-25-84	1235		X	Station 06 – Stony Run Creek (liquid)	1		1
	10-25-84	1245	X		Station 07 – Shipping Area Storm Drain (Soil)	1	1	
	10-25-84	1345	X		Station 08 – Background upgradient Soil	1	1	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	10/25/84 1507	[signature]	[signature]	10/26/84 1100	Aric Lu
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution: ... Shipment ... Coordinator Field Files

AR000351

OSMOSE

January 29, 1986

OSMOSE
WOOD PRESERVING DIVISION
(404) 228-8434
P. O. Drawer O / Griffin, Ga. 30224-0249
Telex 54-2214 Osmose Gn Grif

FEB 10 1986

February 6, 1986

Mr. Bernie Liedman
Mid Atlantic Wood Preservers, Inc.
P. O. Box 58 Shipley Avenue
Harmans, MD 21077

Re: Soil Sample Results

Dear Bernie:

We have just received results of the thirty-six (36) soil samples which you collected at your plant. These soil samples were analyzed via the EPA EP Toxicity procedure for copper, chromium and arsenic. Please note all results are well below the limit of a hazardous waste. As you will recall, this limit is five (5) parts per million for chrome and/or five (5) parts per million for arsenic. There presently is no EP Toxicity limit for copper and these numbers are included for reference only.

If there are any questions or if you need additional help from our Department, please feel free to call.

Regards,

T. A. Marr, P. E.
Manager, Environmental Engineering

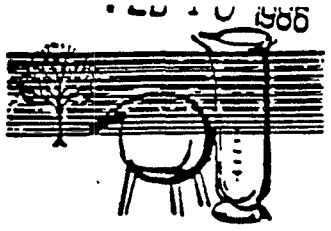
TAM:sh

Enclosures

AR000353

from the

RESEARCH DIVISION



OSMOSE 980 ELLICOTT STREET/BUFFALO, N. Y. 14209/716-882-5905

22-1460

subject: ASSAY OF THIRTY-SIX SOIL SAMPLES FROM MID-ATLANTIC WOOD PRESERVERS, INC.

date: JAN. 29, 19

REF. 130-58

The leachable material from thirty-six soil samples, taken at Mid-Atlantic wood Preservers, Inc., was extracted from each sample according to the EP Toxicity procedure and analyzed for chromium, copper and arsenic by Atomic Absorption Spectroscopy.

RESULTS

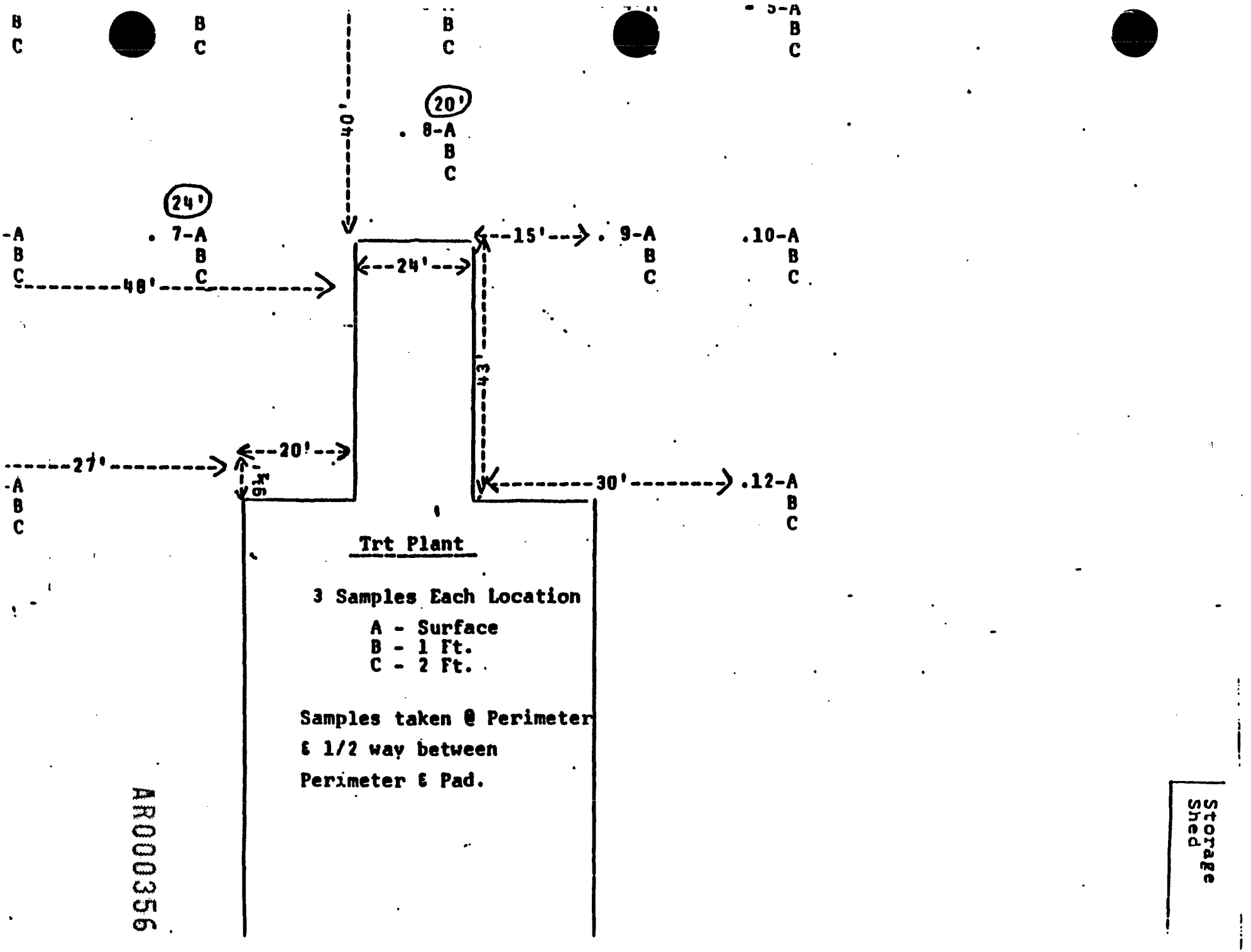
Sample	ppm Cr	ppm Cu	ppm As
1A	0.25	0.02	0.96
1B	<0.01	<0.01	0.30
1C	0.09	0.01	0.11
2A	<0.01	0.05	0.90
2B	0.10	0.01	0.54
2C	0.17	0.02	0.46
3A	<0.01	0.10	0.95
3B	0.09	0.02	0.86
3C	<0.01	0.03	0.72
4A	0.15	0.05	0.80
4B	0.25	<0.01	0.31
4C	<0.01	<0.01	0.30
5A	<0.01	0.02	0.86
5B	<0.01	<0.01	0.04
5C	0.12	<0.01	<0.01
6A	0.06	0.05	0.40
6B	<0.01	0.02	0.37
6C	0.23	0.02	0.18
7A	0.02	0.01	0.94
7B	0.29	<0.01	0.11
7C	<0.01	<0.01	<0.01
8A	0.18	0.01	0.95
8B	0.04	<0.01	0.06
8C	<0.01	<0.01	<0.01

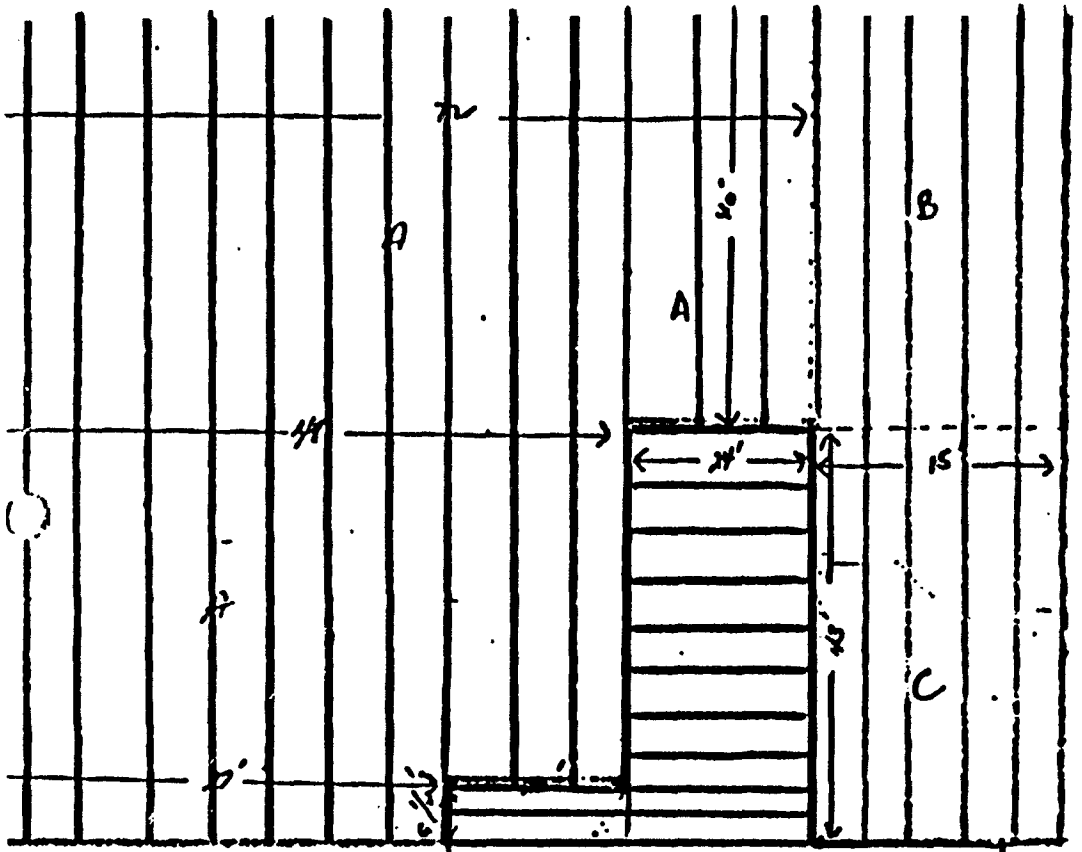
FEB 10 1986

Sample	ppm Cr	ppm Cu	ppm As
9A	<0.01	0.02	0.97
9B	<0.01	<0.01	0.03
9C	0.12	<0.01	0.05
10A	0.39	0.02	0.61
10B	<0.01	<0.01	0.21
10C	0.16	<0.01	<0.01
11A	<0.05	0.04	0.22
11B	<0.01	0.03	0.08
11C	0.09	0.03	<0.01
12A	<0.01	0.05	0.75
12B	<0.01	0.02	0.46
12C	0.07	<0.01	0.03

Ronald G. Kiekbusch
Analyst
Research Division

RGK:mab


B
C
40'
20'
8-A
B
C
24'
7-A
B
C
48'
24'
15'
9-A
B
C
10-A
B
C
43'
27'
20'
16'
30'
12-A
B
C
Trt Plant
3 Samples Each Location
A - Surface
B - 1 Ft.
C - 2 Ft.
Samples taken @ Perimeter
& 1/2 way between
Perimeter & Pad.
Storage
Shed



TRT PLANT

A
81 x 48
40 x 24
= 4848 ft²

B 15 x 40 600 ft²

C 15 x 43 645 ft²

EXISTING PAD

NEW PAD

AR000357

EXHIBIT A

STORAGE YARD

APPENDIX K

Osmose Health and Safety Information

Osmose®
wood products

1016 Everee Inn Rd.
P. O. Drawer O
Griffin, GA 30224-0249

(404)228-8434 Fax (404) 229-5225

* *

TELECOPIER COVER LETTER

DATE: 4/27/89

Please deliver the following page(s) to:

NAME: Paul Legace

COMPANY: _____

CITY: _____

Fax: _____ Phone: _____

FROM: David Grimes

TIME SENT: _____

TOTAL NUMBER OF PAGES: _____ (Includes Cover Page)

COMMENTS: Info on Safety

If you do not receive all the pages, please call back as soon as possible.

* *

UPDATE

CONSUMER AWARENESS PROGRAM

Among the programs initiated by this agreement is the Voluntary Consumer Awareness Program. This program has already been reviewed in great detail in memos from Frank Robertson's office, dated December 5, 1985 and January 8, 1986 (two memos). We have also reviewed this program with many of you by telephone. As additional information, we are enclosing another copy of the Osmose Consumer Information Sheet. The Consumer Awareness Program appears to be operating fairly smoothly. However, please feel free to call if there are any questions or if you need additional help in implementing your program.

PERSONNEL MONITORING

The RPAR Agreement also requires that Personnel Monitoring or a Permissible Exposure Limitation (PEL) Program be implemented to avoid requiring plant personnel to wear respirators. This PEL Program is to be implemented within six (6) months of the date of publication or by July 10, 1986.

Monitoring Requirements

The Program essentially requires an employee from each job description in each work area exposed to inorganic arsenic to be monitored. Monitoring must be in accordance with the RPAR protocol, which includes air sampling at two (2) liters per minute for a minimum of seven (7) hours. Personnel Monitoring gathered within the last two (2) years and meeting the RPAR protocol is acceptable. We would appreciate your contacting our Griffin office to discuss any existing personnel monitoring data so we can review its conformance with the RPAR protocol.

Exposure Limits

Based on the personnel monitoring, employees, in a particular work area, will be required to wear properly fitting, well maintained, high efficiency filter respirators if the initial or any subsequent monitoring shows the inorganic arsenic level to be greater than ten (10) micrograms per cubic meter. If at least two (2) consecutive subsequent personnel monitoring measurements (taken at least seven (7) days apart) show the inorganic arsenic level to be below ten (10) micrograms per cubic meter, the employees in those work areas may discontinue the wearing of respirators.

If the initial (or subsequent) monitoring shows the employee exposure to be above five (5) micrograms per cubic meter and below ten (10) micrograms per cubic meter, the employer shall repeat the monitoring at least every six (6) months until at least two (2) consecutive measurements, taken at least seven (7) days apart are below five (5) micrograms per cubic meter. This is to ensure that arsenic levels are below the permissible exposure limit of ten (10) micrograms per cubic meter.

In the event the initial monitoring (or any two (2) consecutive subsequent monitorings, taken at least seven (7) days apart) shows the employee exposure to be less then five (5) micrograms per cubic meter, no additional monitoring is necessary.

PEL Checklist

However, for plants showing less than five (5) micrograms per cubic meter and not requiring additional monitoring, an annual PEL Checklist (see attached) must be completed and forwarded to EPA. Essentially, this checklist will assess any changes in production, spill controls, material handling procedure, etc., which may be reasonably expected to increase the potential inorganic arsenic exposure. If any items on the PEL Checklist are answered in the affirmative, Personnel Monitoring (PEL) will be required within three (3) months.

Records Keeping and Reporting

Employers are required to maintain the monitoring reports and PEL Checklist reports in their files. Copies of these annual records must be submitted to the U.S. Environmental Protection Agency, Office of Pesticides and Toxic Substances Office of Compliance Monitoring (EN-342), 401 M Street S.W., Washington, D. C. 20460. All records submitted must be certified by the employer as being accurate and in compliance with this program.

PEL Compliance Program

In order to ensure that our Osmose licensees achieve compliance with this Personnel Monitoring, we have prepared a table listing our plants and a tentative Personnel Air Monitoring Schedule. Also, a member of our Engineering Staff has been assigned to each plant to help schedule your monitoring in accordance with the RPAR PEL protocol. Most of you have already been contacted by our Engineering Staff in this regard.

PROTECTIVE CLOTHING

Osmose has for years recommended the use of appropriate protective clothing, such as impervious gloves, boots, aprons, rain gear, face shields, goggles, respirators, etc., to ensure that your employees are protected from unnecessary chemical exposure via splash, dermal contact, and air emissions. As a part of the RPAR Agreement, the use of appropriate protective clothing is required in all situations where there is a potential for dermal contact, i.e., equipment maintenance, manually opening cylinder doors, handling freshly treated wood, etc., Additionally, NIOSH approved respirators should be worn whenever working in a confined space or area with inadequate ventilation when the level of arsenic (or other air pollutants) is unknown, i.e., entering treating cylinders or process tanks contaminated with wood treatment solution, etc.

Another part of this Agreement requires that protective clothing be changed when it shows obvious signs of contamination. Protective clothing is also to be laundered at the plant facility or separately from other household laundry. Worn-out protective clothing is to be disposed of in a manner approved for pesticide disposal and in accordance with state and federal regulations. Also, as a part of this regulation, employees are not to eat, drink or use tobacco products while working in areas of the treating plant process, which may expose them to wood treatment formulations.

PESTICIDE LABELING

Wood preserving chemicals are to be used strictly in conformance with recommendations and precautions listed on the pesticide label. The new label requirements will take effect by November 10, 1986 when wood preservative products, subject to this RPAR Agreement must be relabeled with the agency approved labels contained in this Agreement. These precautions include essentially all items discussed above. It is also important to note that inorganic arsenical processes used to treat wood shall leave no visible surface deposits on the wood, as defined by the AWPA Standards C-1 and AWPB Standards LP2 and LP22). As you know, your use of the Osmose brand Pure Oxide CCA preservative and good operating practices should be of great help in meeting this requirement.

ANTI-POLLUTION FEATURES IN PLANT DESIGN

A. Automatic Batch Mixing Of Osmose K-33, 50% Concentrate
Bulk storage and automatic batching instruments completely eliminate preservative handling by plant personnel.

B. Vacuum Pump Exhaust
Air drawn from the autoclave during initial and final vacuum periods can carry suspended droplets of treating solution. Air that has passed through the vacuum pump and water trap silencer is vented back to the top of the cooling tower. The water trap silencer serves a dual purpose, that of a muffler and a scrubber of air being removed from the autoclave.

C. Vacuum Pump Seal Water
An external water supply is necessary to form a liquid seal for the vacuum pump rotor. The seal water mixes with the air stream from the autoclave. Any droplets of preservative in the air becomes transferred to the seal water supply. A closed water system is created by circulating water from the cooling tower reservoir to the vacuum pump. Periodic flushing of the tower reservoir is necessary to prevent a build-up of solids and preservative. This water is transferred to the main collecting sump for treating solution make-up. Air pollution and water effluent at the vacuum system are completely avoided by using a cooling tower for the vacuum pump seal water.

D. Plant Equipment And Layout
--- All plumbing and electrical work are done under the supervision of the Osmose engineers.

--- Work tanks, pump header and console are all located close to the autoclave for an efficiently operated and maintained unit.

--- The pump header module is located in a pump pit inside the treating room. Any treating solution leakage is recovered in the main collecting sump adjacent to the pump pit.

--- Instrument console with flow diagram and indicator lights for pumps and valves during plant operation. Training of plant personnel in the operating techniques is standardized and not complicated to master.

--- The autoclave, pump header and fill lines from the treating solution work tanks can be gravity drained to the collecting sump. This feature is especially useful when taking freeze precaution and allows complete drainage of the autoclave prior to opening the door for removal of treated charges.

--- Concrete door pit area with sump pump makes it possible for complete recovery of treating solution from the autoclave door, drip pad and outside track area without soil contamination.

--- Retaining wall enclosure around the treating solution work tanks and preservative storage tank eliminates contaminated pollutants from getting away from the contained area.

--- A concrete drip pad and tram car track area for recovery of preservative drippings following removal of pressure treated material from the autoclave.

--- Use of butterfly valves in pump header module, mix and vacuum systems are easily replaced and repaired. Plant shutdown time kept to a minimum.

--- Through use of the water trap silencer and pump module location in the pump pit, the noise level of pumps in operation are well within the OSHA guidelines.

c. Any overfilling of process area containment, tanks, pits, drip pads, etc., should be considered abnormal. The Emergency Spill Procedures, as necessary, should be implemented to properly store the hazardous chemicals and prevent possible overflow spill situations from occurring.

d. Freshly treated wood products should be stored on contained process area drip pads until all drippage has ceased to avoid the abnormal situation of hazardous chemical drippage outside the contained process area.

e. Monitoring instruments - Review RPAR personnel monitoring for permissible exposure limit of arsenic as discussed in the Osmose RPAR Update Newsletter contained in Chapter VII of this Osmose Health and Safety Manual. Review a copy of the RPAR monitoring conducted for our Osmose licensed Wood Preserving Facility to review actual arsenic levels in our work areas and compare them against the safe standard. This information is contained in Chapter VIII of the Osmose Health and Safety Manual entitled Training and Other Key Records.

Learning activity: Discussion

Handouts: Material Safety Data Sheets, labels and Osmose RPAR Update Newsletter contained in Chapters V, VI and VII, respectively, of the Osmose Health and Safety Manual and other handouts when applicable.

11. ENGINEERING CONTROLS

Objective: To describe the engineering controls that are used to control and to contain hazardous chemicals in our wood preserving facility.

Content: To review ventilation, containment systems, drippage collection systems, Emergency Procedures, Process Equipment Controls, etc., used to help protect our employees and the environment from hazardous chemicals. Review the Osmose document entitled "Anti-Pollution Features In Plant Design" in Appendix G and The Emergency Procedures section of this chapter of the Osmose Health and Safety Manual.

Learning activity: Discussion

Handouts: The "Anti-Pollution Features in Plant Design" in Appendix G of the Osmose Health and Safety Manual.

12. PERSONAL PROTECTIVE EQUIPMENT

Objective: To review the types of protective clothing and breathing apparatus used in our facility as well as

7. Be alert to ensure that process equipment is operating properly and that no spills, overflows, or emissions are occurring or about to occur. Inform work area supervisor immediately of any abnormalities. Know how to implement Emergency Procedures if necessary.

8. Be alert to ensure that containers of hazardous chemicals are properly closed, sealed, labeled, etc.

9. Be familiar with precautions contained throughout this training program and how to safely and professionally utilize process equipment and controls, protective equipment, and emergency procedures to safeguard yourself and your work area.

10. Review appropriate sections of the EPA wood preserving industry RPAR agreement contained in Chapter VII of this Osmose Health and Safety Manual for additional precautions for safe working practices.

11. Review the Osmose document entitled "Environmental Responsibilities of the Plant Operator" contained in Appendix G of this manual.

12. Review chemical incompatibilities: CCA in concentrated form (acid medium) is chemically reduced by aluminum and zinc and may produce arsine gas. Do not use aluminum or zinc materials in the process areas.

13. Review precautions against burning CCA (or other inorganic arsenical) wood products: Burning of CCA treated wood products can produce an ash which contains hazardous levels of copper, chrome, and arsenic. Under certain conditions it may also produce hazardous vapors. Do not burn CCA treated wood unless it is done in a boiler or incinerator approved and permitted for that purpose. Review RPAR Agreement contained in Chapter VII of this Osmose Health and Safety Manual.

Learning activity: Discussion, additional slide or video presentations may be available from the Osmose Engineering Department upon request.

Handout: RPAR Agreement, and the "Environmental Responsibilities of the Plant Operator" contained in Chapters VII and Appendix G respectively, of this Osmose Health and Safety Manual.

14. EMERGENCY PROCEDURES

Objective: To define the emergency procedures which are to be employed by workers in the event of a spill, fire or release.

APPENDIX L

Analysis of Drummed Soil Cuttings

24 Hour Service

578-0956

A & A Environmental Services
Division of
A & A Waste Oil Company, Inc.
3635 Woodland Avenue
Baltimore, Maryland 21215

Industrial — Commercial — Marine

Oil Spill Correction
Tank Cleaning
Liquid Waste Removal & Hauling
Environmental Consulting
Audits & Training

Pollution Control
Lead & Gas Freeing
Mobile Vacuum Service
Safety Audits & Training
Including Right To Know

A & A ENVIRONMENTAL SERVICES FACSIMILE COVER SHEET

FAX TELEPHONE NUMBER 656-8059

OFFICE TELEPHONE NUMBER _____

TO:

NAME Paul Ingalls

FIRM Dames + Moore

FROM:

NAME A & A Environmental Services

FAX NUMBER (301) 466-2378

COMMENTS:

TOTAL NUMBER OF PAGES INCLUDING COVER SHEET 3

DATE 3/3/89

AR000368

ANALYTE

LABORATORIES, INC.

OFFICES:
6630 BALTIMORE NAT'L. PIKE
ROUTE 40 WEST
BALTIMORE, MD. 21228

301-747-3844

CERTIFICATE OF ANALYSIS
No. 890221-05
A & A Waste Oil
February 28, 1989

Analysis of: 13311 MDAT

E.P. Toxicity:

Barium	<	1	mg/l
Cadmium	<	0.01	mg/l
Chromium	<	0.02	mg/l
Lead	<	0.2	mg/l
Arsenic	<	0.01	mg/l
Mercury	<	0.01	mg/l
Selenium	<	0.01	mg/l
Silver	<	0.02	mg/l

The above analysis was performed according to procedures described in the following method:

EPA SW-846: Method 1310, E.P. Toxicity

Reviewed by: _____
Chemist

CHAIN OF CUSTODY RECORD

SAMPLER'S Signature: John Hamman

STATION NUMBER	STATION LOCATION	DATE	TIME	SAMPLE TYPE: Water (Comp.)	SAMPLE TYPE: Water (Grab)	SAMPLE TYPE: Air	SEQ. NO.	NO. OF CONTAINERS	ANALYSIS REQUIRED
001	YARD	2-21-89		X				1	EP TOX
002	YARD			X					
003	WELLSITE			X					
004	WELLSITE			X					
005	YARD			X					
006	YARD.			X					

Relinquished by: John Hamman	Received by: John Hamman	Date/Time
Relinquished by:	Relinquished by:	Date/Time
Relinquished by:	Received by:	Date/Time
Received by:	Received by Mobile Laboratory for field analysis:	Date/Time
Dispatched by: John Hamman — Date/Time	Received for Laboratory by: — Date/Time	
Method of Shipment: A&A ENVIRONMENTAL SERVICES		

Distribution: Orig.—Accompany Shipment; 1 Copy—Survey Coordinator Field File