ORIGINAL (Red)

42847

1a

DU PONT - PIGMENTS DEPARTMENT
NEWPORT, DELAWARE

LANDFILL-GROUNDWATER INVESTIGATION

To fulfill State requirements for a groundwater investigation at Du Pont's Newport Pigments Plant landfill, four monitor wells were installed around the fill area in July, 1975. Water level measurements made in these wells at various times, plus groundwater quality data, drillers logs, and information from the Plant on its water wells, comprise the supportive data for this report.

There are three groundwater regimens identified by this report. One is a perched water table which has been developed in monitor well SM-1. Beneath this perched water are Pleistocene Age (probably Columbia) sands, gravels, and silts which are developed in monitor wells SM-2, DM-1, and DM-2. The Upper Potomac aquifer, developed in Plant water wells #11 and #13, is directly overlain by the Pleistocene aquifer. The shallow perched water table, monitored in well SM-1, is very responsive to direct infiltration of rainfall through the landfill. Water levels are seen to rise and fall fast, indicating that infiltrated water is quickly discharged to the Christina River or other surface outlets. There may also be some recharge to this perched water from the underlying Pleistocene aquifer through a leaky aquitard. Some evidence exists for this in the similarity of potentiometric surface of the monitor wells over a long period of time. Contaminants in groundwater from the landfill are mostly discharged to the Christina River or through wet weather springs to the River.

Beneath the shallow surficial aquifer are brown sands, gravels, and silts of Pleistocene Age that along with reworked Potomac sediments have been deposited in alternating, connected, and unconnected lenses. This aquifer offers little potential for development of groundwater due to its heterogenity of sediments and its probable limited areal extent. There does not appear to be any influence from rainfall on monitor wells SM-2, DM-1, and DM-2 as seen in monitor well SM-1. Also, there does not appear to be any influence on the water levels in the monitor wells from pumping plant water wells #11 or #13.

The Upper Potomac aquifer is penetrated in Plant water wells #11 and #13. This aquifer is composed of varigated colored sands, gravels, and silts and has a higher potentiometric surface than either of the overlying aquifers. Because of the nature of the Potomac and Pleistocene sediments, it is not improbable that water from the Upper Potomac aquifer moves upward through a leaky aquitard into the overlying Pleistocene aquifer. Water in the Upper Potomac aquifer does not appear to have been contaminated from the Plant's landfill operations.

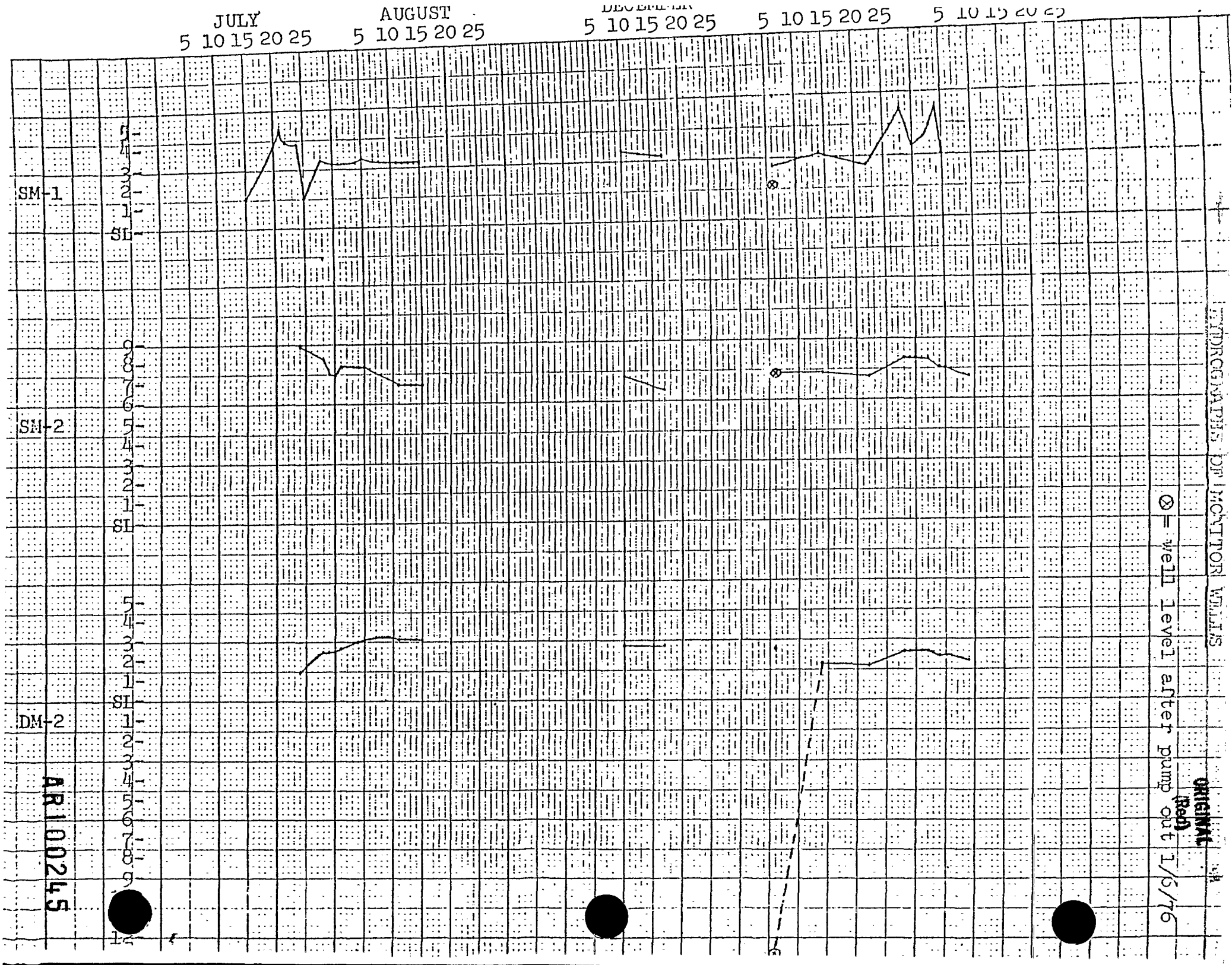
ORIGINAL
(Red)

Continued monitoring of water levels and quality in landfill monitor wells and plant water wells will be continued.

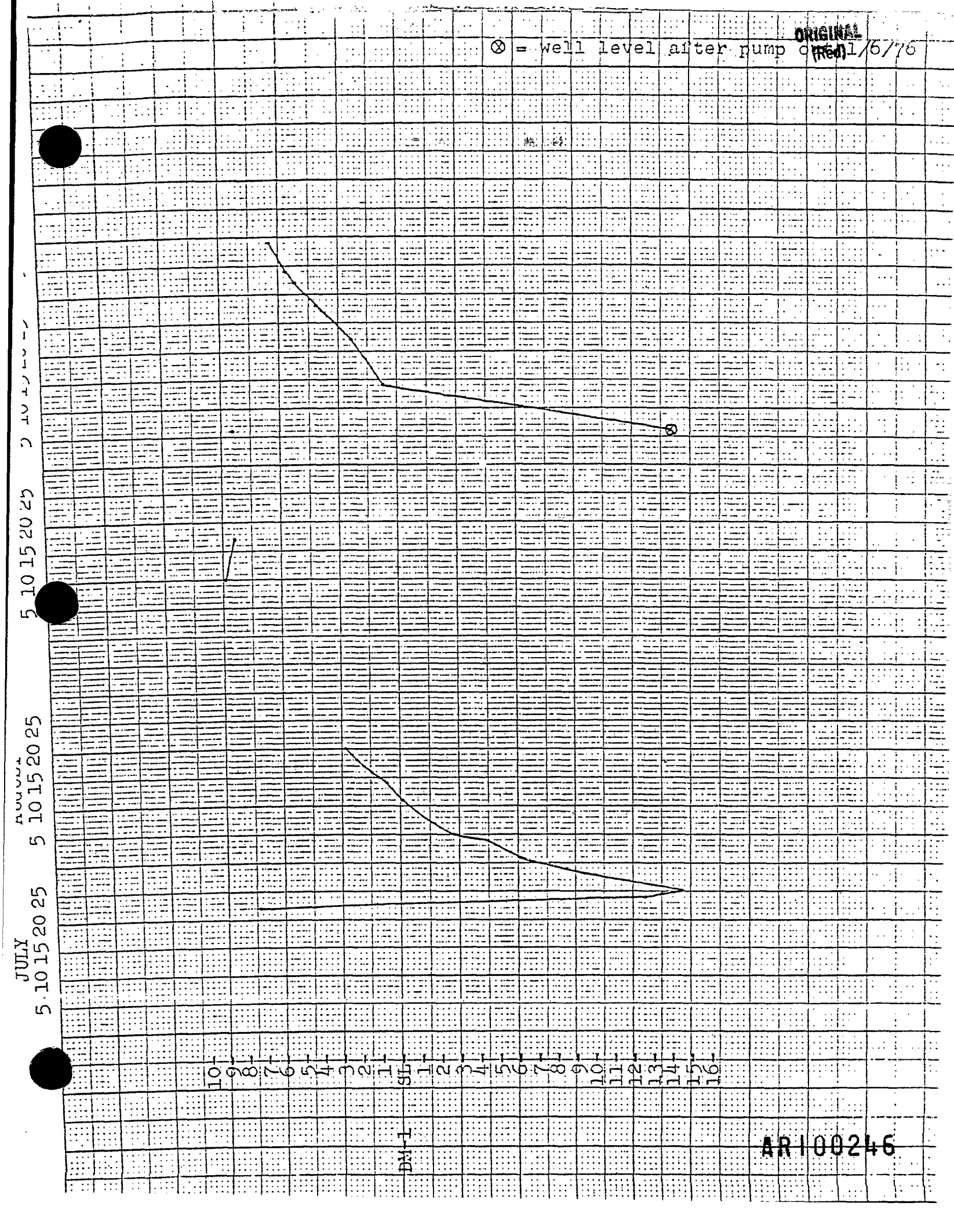
Supportive data attached -

(a) Hydrographs of monitor wells
(b) Groundwater contour maps
(c) Schematic section of monitor wells and water wells
(d) Groundwater levels adjusted to sea level
(e) Driller's logs of monitor wells
(f) Water quality analysis

CRS:rbw
2/13/76


JULY
AUGUST
5 10 15 20 25
5 10 15 20 25
5 10 15 20 25
5 10 15 20 25
SM-1
SM-2
DM-2
SL
⊗ = well level after pump out 1/6/76
HYDROGRAPHS OF MONITOR WELLS
ORIGINAL (Red)

AR100245


⊗ = well level after pump out 1/6/76
ORIGINAL (Red)
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DM-1
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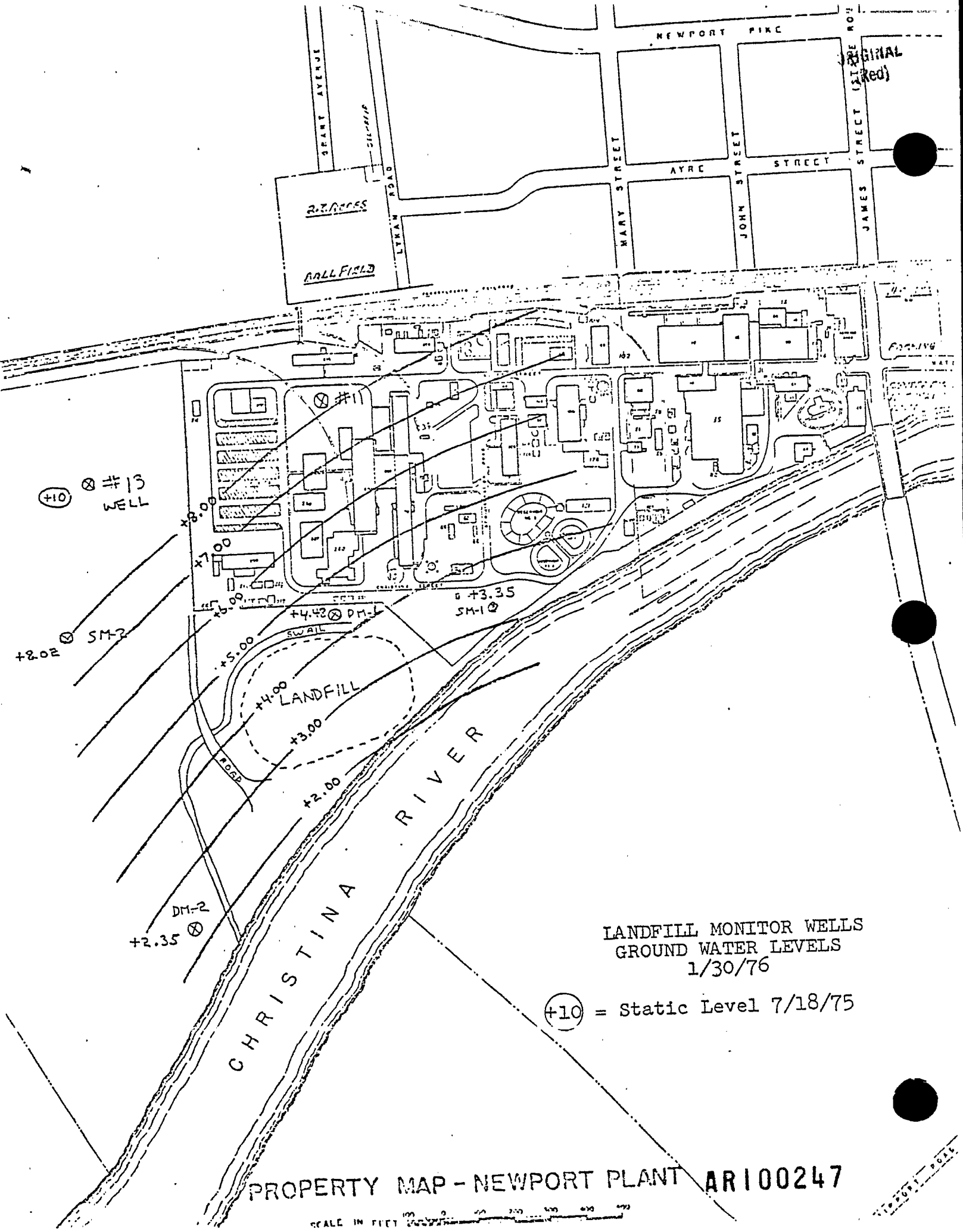
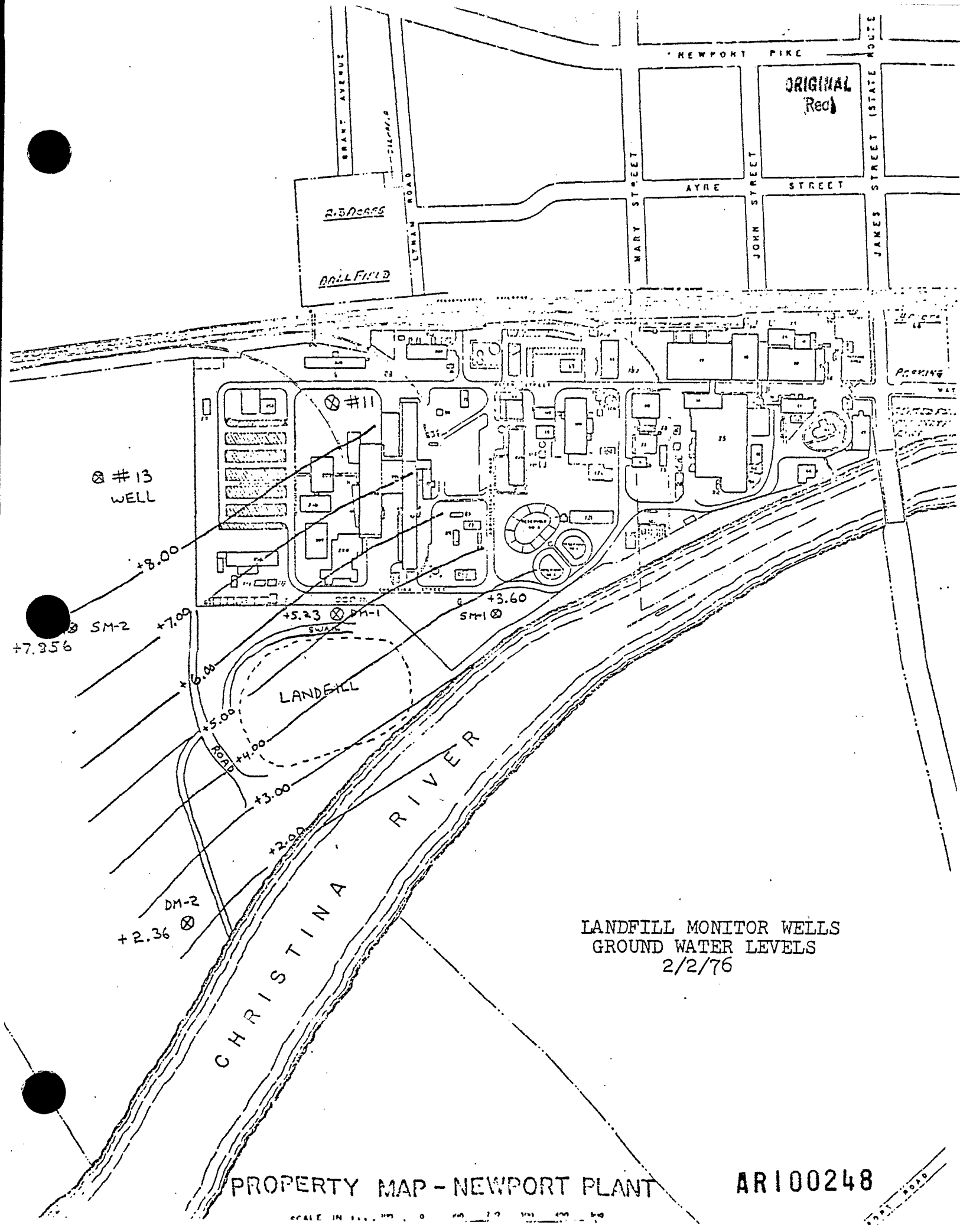


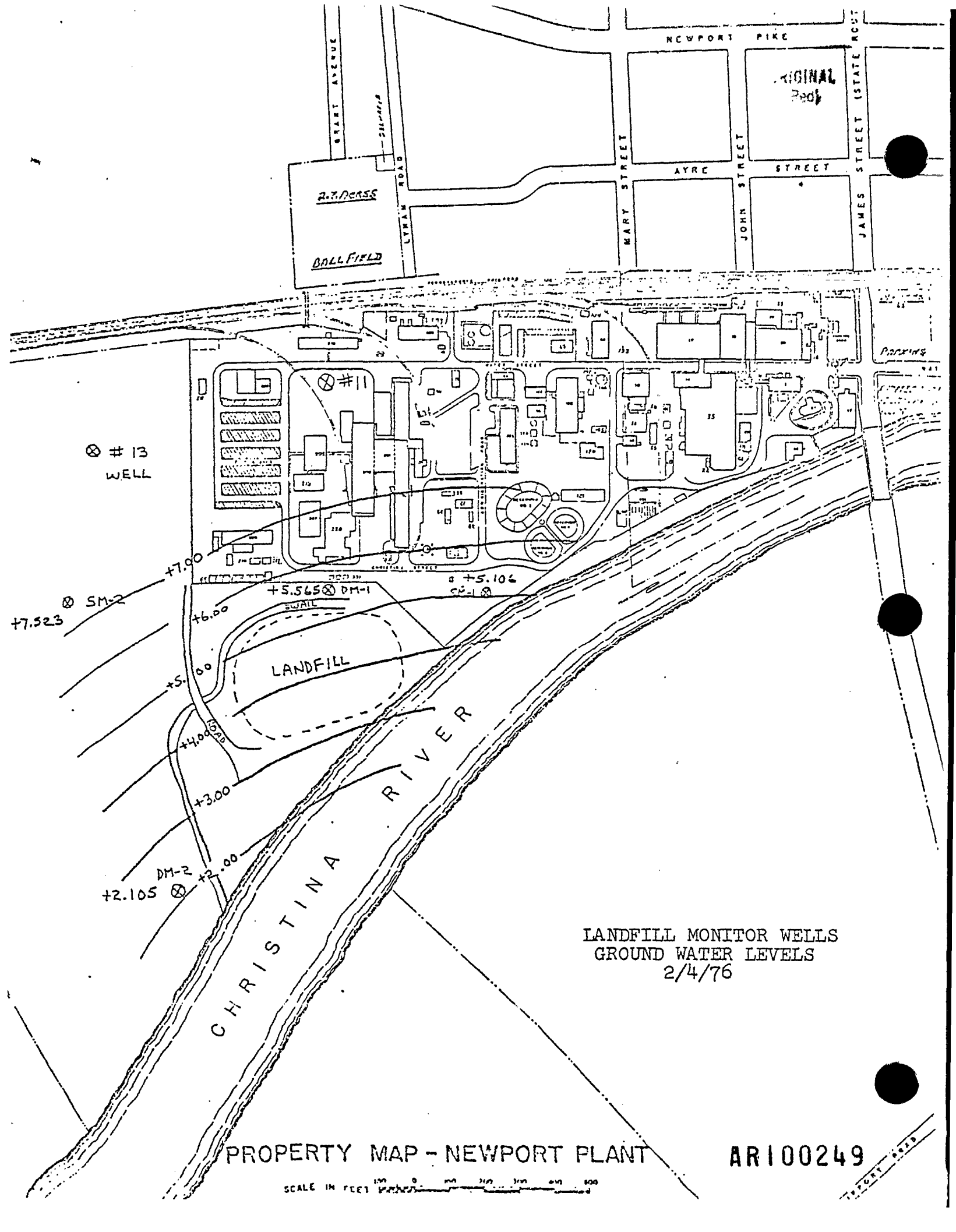
ORIGINAL (Red)

AR100247



LANDFILL MONITOR WELLS
GROUND WATER LEVELS
2/2/76

AR100248



LANDFILL MONITOR WELLS
GROUND WATER LEVELS
2/4/76

NEWPORT GROUND WATER OBSERVATION WELLS
GROUND WATER LEVELS CORRECTED TO SEA LEVEL

ORIGINAL

	SM-1	DM-1	SM-2	DM-2	
	GL+21.350	GL+16.231	GL+13.273	GL+ 1.8559	
	7-15 Drilled	7-17 Drilled	7-21 Drilled	7-23 Drilled	
7-18	+ 1.356	--	--	--	
7-21	+ 4.939	--	--	--	
7-22	+ 4.189	+ 7.398	--	--	
7-24	+ 4.028	-12.602	+ 8.856	+ 1.355	
7-25	+ 1.356	-14.602	--	--	
7-27	Plant wells #11 and #13 turned on				
7-28	+ 3.356	- 9.352	+ 8.106	+ 2.355	
7-29	+ 3.190	- 8.519	+ 7.523	+ 2.355	
7-30	+ 3.106	- 7.602	+ 7.44	+ 2.355	
7-31	+ 3.190	- 6.769	+ 7.523	+ 2.355	
8-1	+ 3.106	- 6.019	+ 7.690	+ 2.605	
8-4	+ 3.190	- 4.269	+ 7.690	+ 3.021	
8-5	+ 3.439	- 2.852	+ 7.690	+ 3.105	
8-6	--	--	--	--	
8-11	+ 3.106	- .035	+ 6.94	+ 3.105	
8-13	+ 3.106	+ .398	+ 6.94	+ 3.105	
8-14	+ 3.106	+ .398	+ 6.94	+ 3.105	
8-15	+ 3.106	+ 1.231	+ 6.94	+ 3.105	
8-18	--	+ 2.231	--	--	
8-19	--	+ 2.481	--	--	
8-20	--	+ 2.814	--	--	
9-8	--	- 5.269	--	--	
12-10	+ 3.356	+ 8.981	+ 7.106	+ 2.689	
12-17	+ 3.106	+ 8.398	+ 6.439	+ 2.689	
1-6-76	+ 2.606	+ 8.398	+ 7.273	+ 2.521	
	Wells pumped out after levels taken 1-6-76				
1-6	+ 1.606	-13.935	+ 7.273	-12.810	after pu out
1-14	+ 3.106	+ .769	+ 7.273	+ 1.772	
1-22	+ 2.606	+ 2.398	+ 6.94	+ 1.605	
1-28	+ 5.106	+ 4.231	+ 8.023	+ 2.355	
1-30	+ 3.356	+ 4.731	+ 8.023	+ 2.355	- 1:00 p.
	Turned on #11 on 1-30 at 2:00 p.m.				
	+ 3.356	+ 4.481	+ 8.023	+ 2.355	- 3:00 p.
2-2	+ 3.606	+ 5.231	+ 7.856	+ 2.355	
2-4	+ 5.106	+ 5.565	+ 7.523	+ 2.105	
2-5	+ 2.939	+ 5.731	+ 7.523	+ 2.105	
2-6	--	--	--	--	
2-9	--	+ 6.397	+ 7.023	+ 1.939	

WALTON CORPORATION
Drilling Contractor
P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

CRITICAL (Red)

BLOWS ON CASING B
0- 1
1- 2
2- 3
3- 4
4- 5
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7- 8
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PROJECT NO. .....

SUPERVISOR .....

NAME DuPont Company
New Port, Delaware

BORING NO. SM-1

DRILLER R. Erickson

DATE 7-15-75

SURFACE ELEVATION

DATUM

WEATHER Cloudy, Hot, Humid

Sample No.	Sample Depth - Feet From	To	Depth Strata Feet From	To	Driller's Description of Materials	*Blows A
			0	1.0	Brn. Silt w/Veg. (Top Soil)	SHELBY
S - 1	0	2.0		1.5	Top Brn. Silt (Rec. 2.0)	
			1.5		Bottom Cinder Fill	SHELBY
S - 2	2.0	4.0		3.4	Top Cinder Fill (Rec. 2.0)	
			3.4		Bottom Brn. Silt, Sand & Gravel	SHELBY
S - 3	4.0	4.6			Same as S-2 Rec. 0.6	SHELBY
S - 4	5.0	5.7			Cinder Fill Rec. 0.7	SHELBY
5	6.0	6.8			Misc. Fill (Cinders, Red Brick) (Rec. 0.8)	
S - 6	8.0	8.7			Same as above Rec. 0.7	SHELBY
1	10.0	12.0			Same (Wet)	
2	12.0	14.0			Misc. Fill (Cinders, Greenish Blue Silty Sand & Gravel) Wet	
3	14.0	16.0			Same	
4	16.0	17.0		16.5	Same	
			16.5		Brn. Med. Sand w/Gravel Tr. Silt	100/1.0
5	18.0	19.3		20.0	Same as above (Wet)	100/1.3
6	20.0	21.5	20.0		Brn. & Grau Med. Sand w/Some Silt & Mica Tr. Gravel	100/1.5
7	22.0	24.0		24.0	Brn. Med. Sand & Gravel (Wet) w/Some Silt	

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

* B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: Drilling water used @ 5.0

Screen: 2"x4' Sch. 80 P.V.C. .010 Slot 17.0-21.0

Gravel Pack: Morie #2 15.0-21.0

Grout: Bentonite Pellets 13.0-15.0

Cement 0 - 13.0

GROUND WATER

16.8	before surging
19.0	after surging
17.2	7-22-75

AR100251

[illegible] CORPORATION

Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

ME DuPont Company ..... PROJECT NO. .....

Newport, Del. ..... SUPERVISOR .....

BEING NO. DM-1	DRILLER R. Erickson	DATE 7-16-75	
WEATHER Cloudy & Hot	SURFACE ELEVATION	DATUM	

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0		Brn. Silt w/Some Sand & Gravel			
S-1	0	2.0		2.0	" " " " " " "	SHELBY		
					(Rec. 1.5)			
(Auger Sample			2.0		Lt. Brn. Silt w/Gravel			
				3.0	Some Brn. Clay Some Fill(Brick)			
			3.0		Brn. & Gray Silt & Gravel w/Some			
		4.0		5.0	Fill & Gray Silty Clay			
2	5.0		5.0		Brn. & Gray Silt w/Tr. Red Brick & Clay	Auger Sample		
[illegible]	6.0			6.5	Same as above	"	"	
4	7.0		6.5		Brn. & Gray Silt	"	"	
5	7.5			8.0	Same as above	"	"	
6	8.0	10.0	8.0	10.0	Variegated Silt w/Some Clay Tr.	Spoon		
					Gravel (Slightly Plastic)			
7	10.0	12.0	10.0		Variegated Clay	Spoon		
S-2	12.0	14.0			Variegated Clay (Rec. 1.8)	SHELBY		
S-3	14.0	16.0		18.5	Brn. & Gray Clay (Rec. 2.0)	SHELBY		
8	19.0	21.0	18.5		Gray Clayey Silt w/Tr. Sand & Organics	Spoon		
	21.0			23.5	Same No Organic	Wash Sample		
	23.0		23.5	24.0	Gray Clayey Silt w/Brn. Sand	"	"	
9	24.0	26.0	24.0	26.5	Brn. Silt, Sand & Gravel Tr. Clay	Spoon		
	26.0		26.5		Brn. Coarse Sand & Gray. Some Silt	Wash Sample		
	28.0			38.0	Brn. Coarse Sand & Gray. Some Silt	"	"	

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

*B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: .....

GROUND WATER

AR 00252

BLOWS ON CASING B
0- 1
1- 2
2- 3
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WALTON CORPORATION
Drilling Contractor
P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

NAME DuPont Comapny ..... PROJECT NO. .....
New Port, Delaware ..... SUPERVISOR .....

BORING NO.	DRILLER	DATE
DM-1 Cont.	P. Dickson	7-17-75
WEATHER	SURFACE ELEVATION	DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
10	39.0	41.0	39.0	42.0	Variegated Fine Silty Sand w/Some Clay Tr. Gravel			
11	44.0	46.0	42.0		Variegated Med. to Coarse Silty Sand w/Tr. Clay (Wet)			
12	49.0	51.0		53.0	Variegated Fine Silty Sand w/Tr. Clay (Wet)			
13	54.0	56.0		56.0	Variegated Coarse Sand w/Gravel Clay (Sticky)			

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

* B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: Screen: 2"x4' Sch. 80 P.V.C. .020 Slot 27.0-31.0
Gravel Pack: Morie #2 25.0-31.0
Grout: Bentonite Pellets 23.0-25.0
Cement: 0 - 23.0

GROUND WATER

AR100253

BLOWS ON CASING B
0- 1
1- 2
2- 3
3- 4
4- 5
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WALTON CORPORATION

Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

ORIGINAL

BORING LOG

DuPont Company ..... PROJECT NO. .....

Newport, Del. ..... SUPERVISOR .....

BORING NO.	DRILLER	DATE
SM-2	S. Williams	7-21-75
WEATHER: Clear, Hot, Humid	SURFACE ELEVATION	DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
			0	7.0	Brn. Silt			
			7.0		Gray Clayey Silt			
S-1	8.0	10.0		9.0	Top: Gray Clayey Silt		SHELBY	
			9.0	10.5	Brn. & Lt. Brn. Micaceous Silt			
S-2	10.0	12.0	10.5	13.0	Brn. & Dk. Brn. M/C Sand w/some			
					Gravel & Micaceous Silt (Wet)			
1	14.0	16.0	13.0	17.5	Brn. & Dk. Brn. M/C Sand &			
					Gravel w/Some Silt			
	19.0	21.0	17.5	22.5	Brn. Micaceous Silt w/Layer of			
					Coarse Sand & Gravel (Wet)			
3	24.0	25.0	22.5	24.5	Brn. M/C Sand & Gravel w/Some			
					Silt (Wet)			
			24.5	25.0	Gray Silt w/Layer of Fine Sand			

BLOWS ON CASING B
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*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

* B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: Wet on Rod @ 11.0

Screen: 2"x4' Sch. 80 P.V.C. .010 Slot 21.0-25.0

Gravel Pack: Morie #2 19.0-25.0

Grout: Bentonite Pellets 17.0-19.0

Cement 0 - 17.0

GROUND WATER

AR100254

WALTON CORPORATION

Drilling Contractor

P. O. BOX 1097, NEWARK, DELAWARE 19711

BORING LOG

NAME ...DuPont Company... PROJECT NO. .....

...New Port, Delaware... SUPERVISOR .....

BORING NO.	DRILLER	DATE
DM-2	T. Erickson	7-23-75
WEATHER: Clear, Hot & Humid	SURFACE ELEVATION	DATUM

Sample No.	Sample Depth - Feet From	Sample Depth - Feet To	Depth Strata Feet From	Depth Strata Feet To	Driller's Description of Materials	*Blows A		
S-1	0	2.0	0		Gray Silty Clay w/Organic	SHELBY		
					Rec. 2.0			
S-2	2.0	4.0			Same as above (Rec. 1.3)	Shelby		
1	4.0	6.0			Same as above Sticky			
2	6.0	11.0		10.5	Same as above			
			10.5		Brn. Peat w/Some Silty Clay			
3	14.0	16.0		15.5	" " " " " "			
			15.5	19.0	Gray Silty Clay (Wet)			
4	19.0	21.0	19.0	22.5	Gray Sandy Silt w/Lies & Some Clay			
					Layer of Coarse White Sand (Wet)			
5	24.0	26.0	22.5	25.0	Lies to Med. Variegated Silty			
					Sand (Wet)			
			25.0	28.0	Red Clay (Stiff)			
6	29.0	31.0	28.0	29.0	Variegated Silty Sand (Wet)			
7	34.0	36.0	29.0	29.5	Variegated Clayey Sand (Wet)			
8	39.0	41.0	29.5	44.0	Variegated Silty Sand w/Some Clay (Wet)			
9	44.0	46.0	44.0	49.0	Pink Silty Clay			
10	49.0	51.0	49.0	50.5	Variegated Silty Sand (Wet)			
			50.5	51.0	Brn. Silt w/Tr. Gravel			

*A Number of blows of 140 lb. hammer dropped 30 in. required to drive 2 in. split-spoon sampler for each of three 6 in. increments.

* B Number of blows of 300 lb. hammer dropped 18 in. required to drive ..... in. casing 12 inches.

REMARKS: Screen: 2"x5' Sch. 80 P.V.C. .010 Slot 20.0-25.0

Gravel Pack: Morie #2 18.0-25.0

Grout: Bentonite Pellets 16.0-18.0

Cement: 0 - 16.0

GROUND WATER

AR100255

BLOWS ON CASING B
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1- 2
2- 3
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4- 5
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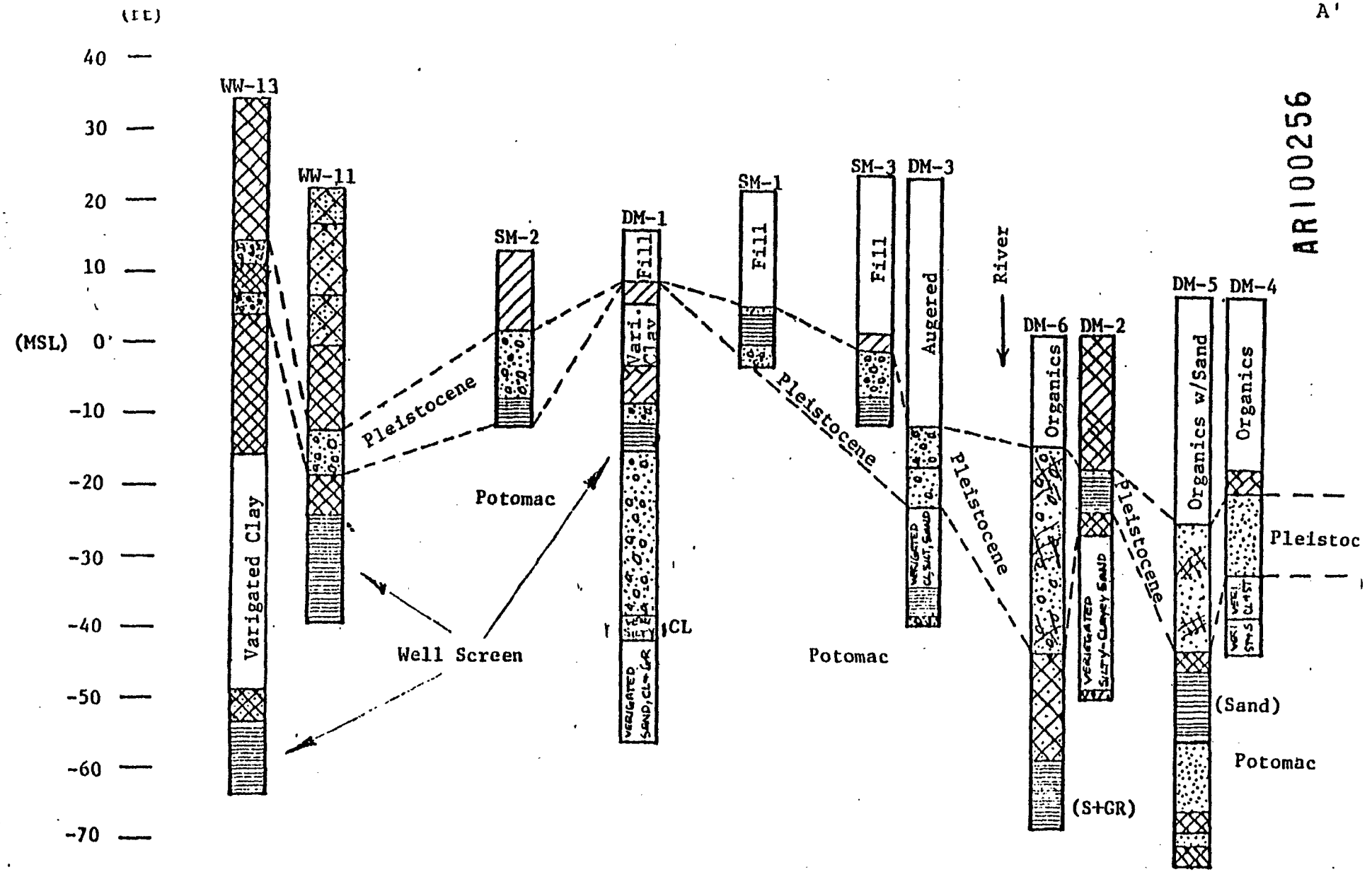
AR100256



Legend *

- clay
- sand + gravel
- silt
- silty clay

NEWPORT PLANT
GEOHYDROLOGIC CROSS SECTION
(no horizontal scale)

Figure 2

* relayed per Al Palmer of DuPont

Rossnazian, EPA.