

Report, 932109, 1984-06-06.
TASK 3 - Round 2

Woodward-Clyde Consultants

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6 June 1984
82C4495-3G

Mr. James B. Marean
New York State Electric
and Gas Corporation
87-89 Chenango Street
Binghamton, NY 13902

RE: Results of Second Round Task 3
Ground-Water Sampling
Lockport Coal Tar Site

Dear Mr. Marean:

Woodward-Clyde Consultants is pleased to present the results of the second quarterly round of Task 3 ground-water sampling at the Lockport Coal Tar Site. Samples were collected on 12-14 March 1984. All 19 existing monitoring wells were sampled except for MW-15, which was obstructed by a bailer which became lodged in the well during the previous sampling event. No canal water samples were collected because the canal had been lowered for the winter months. All samples were analyzed by General Testing Corporation for total phenol and poly-aromatic hydrocarbons. Water levels were measured in all monitoring wells, including MW-15.

Sampling Procedures

Sampling procedures were generally similar to those used during previous sampling events. Prior to collection of samples, a minimum of three volumes of water present in each well were bailed utilizing a PVC bailer. One 1-liter and 1-500 ml sample were collected at each of the 18 sampled wells. To minimize the opportunity for cross contamination, sampling was sequenced from the least potentially contaminated wells to the more highly potentially contaminated wells. An individual bailer was assigned for use at each well, and a minimum of two bailfulls were discarded before a sample was collected. Water levels were measured prior to well evacuation.

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Results

Ground-Water Flow. As discussed in the Task 3 report, ground-water elevations typically dropped after canal lowering began on 21 November, and wells sealed in the Rochester Shale showed a much greater response than other wells. Water levels measured in March 1984 showed little change from previous measurements taken in December 1983. The local ground-water gradient, as determined from March 1984 data (see Figure 1), remains to the northwest, toward the canal. However, a steepened gradient was observed adjacent to the canal, with the zone of steepening extending as far southeast as the western portion of the site. The steepest gradient, immediately adjacent to the canal, was computed to be approximately 0.17 (900 feet per mile). Elsewhere, gradients were found to range from approximately 0.04 to 0.08 (210 to 422 feet per mile).

As in December 1983, water levels in wells sealed in the Rochester Member were found to be lower than water levels in adjacent unsealed wells. This head difference was found to range from approximately 6 feet to 36 feet. The downward ground-water gradient noted from previous data thus appears to be consistent.

Ground-Water Quality. Results of previous sampling events were reviewed and compared with results of first round Task 3 sampling. The first round of Task 3 samples was collected on 28 November to 2 December 1983, with the canal level lowered for the winter months. All available analytical data are summarized in Tables 1, 2, 3, and 4.

Concentration and distribution of total phenol in ground water were similar to that observed following canal drainage in November 1983 (see Figure 2). Most samples showed slight decreases in phenol, and concentrations in wells MW-5, MW-9, MW-13, and MW-14 dropped below detection limits. The eastern boundary of detectable levels of phenol thus appears to be defined. Wells MW-4, MW-6, and MW-12 showed slight increases in phenol concentrations, and well IW-1 showed an order of magnitude increase from 0.017 ppm to 0.145 ppm.

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As in the previous sampling event, maximum phenol levels were observed in wells MW-3, MW-7, and MW-10. Wells MW-3 and MW-7 are located at the western end of the site, and well MW-10 is just north of this area. Phenol concentrations appeared to generally decrease in all directions away from this maximum. A comparison of phenol concentrations in nested deep and shallow or unsealed well pairs (MW-6/IW-2; MW-12/MW-11; and MW-7/MW-3) showed relatively small differences with depth, generally less than one order of magnitude.

Concentrations of poly-aromatic hydrocarbons, including naphthalene, showed some differences from those observed in the previous sampling event. As shown in Tables 3 and 4, wells with relatively high levels of poly-aromatic hydrocarbons in both sampling events, i.e. wells MW-7, MW-11, MW-12, and MW-17, showed significant decreases in concentrations, generally of an order of magnitude or more. Significant increases in concentrations were observed in wells IW-1, MW-2, and MW-16 downgradient of the site and in wells MW-6 and MW-4 crossgradient and upgradient of the site.

The general lateral distribution pattern of total poly-aromatic hydrocarbons in ground water was essentially unchanged from that observed in November 1983 (Figure 3). Highest concentrations were again measured in wells MW-7, MW-3, and MW-10, in the vicinity of the western end of the site. Because well MW-15 could not be sampled, the northeast limit of poly-aromatic hydrocarbons in ground water could not be determined from the available data. The presence of 0.291 ppm total poly-aromatic hydrocarbons in MW-4 and 0.611 ppm in MW-16 suggests that the southeast and southwest limits of poly-aromatic hydrocarbons in ground water may extend beyond these wells.

Within the two pairs of nested deep/shallow wells located north of the site (MW-6/IW-2 and MW-12/MW-11), concentrations of poly-aromatic hydrocarbons were much higher in the two deep wells, by one to two orders of magnitude. This condition was also observed in the November 1983 sampling event. However, as shown in Table 3, the on-site well sealed in the Rochester Member (MW-7) had

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lower levels of poly-aromatic hydrocarbons than the nearby unsealed well also penetrating the Rochester (MW-3). This is the reverse of the trend observed in the November 1983 sampling event.

An oily coating believed to be gasoline was noted in the first evacuation bail during this and previous sampling event in MW-17. This well is located downgradient of the gas station indicating a possible prior leak which has affected the water quality. The presence of gasoline should impact the levels of volatile aromatics (i.e. benzene, toluene and xylene) in the ground water.

Conclusions

The results of the second round of Task 3 sampling suggest the following:

- 1) The steepened ground-water gradient apparently caused by canal lowering may affect the gradient at the western end of the site. The rates of any contaminant transport from the site toward the canal may thus vary seasonally, in accordance with canal level changes.
- 2) The cool for indicator parameters of phenol and poly-aromatic hydrocarbons remain present in ground water in the site vicinity.
- 3) Phenol concentrations generally showed slight decreases from the previous sampling event. The eastern limit of detectable levels of phenols appears to be bounded by wells MW-9, MW-13, and MW-14. The reduction in phenol concentrations may be a seasonal variation. Because the first round of Task 3 samples was collected only one week after canal drainage, the sudden steepening of the gradient at that time may have produced temporarily elevated phenol concentrations.
- 4) Lateral and/or vertical limits of poly-aromatic hydrocarbons in ground water could not be determined from available data. Concentrations of poly-aromatic

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hydrocarbons showed decreases in some wells and increases in other wells, as compared with previous sampling results. There was no obvious correlation between these variations and well location, permeability, or relative concentration of poly-aromatic hydrocarbons.

Recommendations

Based on the data collected to date at Lockport and conclusions deduced from the water quality data, we have the following recommendations for future work to be performed before remedial designs can be assessed. These are:

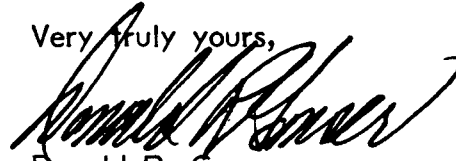
1. Determine the current status of canal water use and modify the canal water sampling plan as appropriate.
2. Collect additional information on existing sewer lines and tunnels/shafts in the vicinity of the site and plot their locations on the base map.
3. Based on information collected under Item 2, install two additional monitoring wells at the approximate preliminary locations shown in Figure 3. These wells would be completed in the Rochester Shale, similar to previously installed wells. Their intended purpose is to bound the northeastern extent of the pollutant plume.
4. Rehabilitate monitoring well MW-15 in order to resume sampling at this location (a bailer is now lodged in the well).
5. Collect a sample of gasoline from the first bailer removed from monitoring well MW-17 and measure the thickness of free floating-hydrocarbons at the time of sampling.

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If you have any questions concerning the recent ground-water sampling results or our recommendations for future work, please do not hesitate to call.

Very truly yours,

A handwritten signature in black ink, appearing to read "Donald R. Ganser", written over the typed name.

Donald R. Ganser
Project Manager

DRG:js
D480/139

Table I

Chemical Parameters Detected in One or More Samples at the
Lockport Coal Tar Site

February 2-3, 1983

May 4, 1983

Parameter	Units ^a	Soil	Sample Location							Sampling Location				
			Seep 1	Seep 2	MW-1	MW-2	MW-3	MW-4	IW-2	MW-1	MW-2	MW-3	MW-4	IW-2
Total Phenol	ppm	8.4 ^b	1.971	0.045	0.028	0.030	0.747	ND	0.016	ND	0.115	0.424	0.022	ND
BOD (5 day)	ppm	NA	420	15.6	11.7	19.2	120	6.3	7.2					
Chromium (total)	ppm	9.5 ^b	1.45	ND	ND	ND	ND	ND	ND					
Chromium (hexavalent)	ppm	NA	0.28	ND	ND	ND	ND	ND	ND					
Copper	ppm	16.5 ^b	1.53	ND	ND	ND	ND	ND	ND					
Zinc	ppm	30 ^b	7.2	0.03	ND	ND	ND	ND	0.08					
Antimony	ppm	26 ^b	0.9	ND	ND	ND	0.3	0.4	ND					
Method 602 (Aromatics)														
Benzene	ppm	ND	0.059	ND	0.066	ND	3.05	ND	0.014	0.014	1.58	4.12	0.003	0.008
Toluene	ppm	0.071 ^b	ND	ND	0.120	ND	2.38	ND	0.003	ND	0.95	3.90	0.003	0.003
Ethyl Benzene	ppm	0.072 ^b	ND	ND	0.033	ND	0.73	ND	ND	0.001	0.43	1.61	ND	0.001
p-Xylene	ppm	ND	0.072	0.002	0.019	ND	0.20	ND	ND	0.010	0.48	0.34	ND	0.001
o-Xylene	ppm	ND	0.120	0.025	0.032	ND	0.39	ND	0.002	0.020	0.57	0.57	ND	0.001
Styrene	ppm	ND	ND	ND	0.004	ND	0.51	ND	ND	ND	ND	0.43	ND	ND
n-Propylbenzene	ppm	ND	ND	ND	0.003	ND	0.03	ND	ND	ND	0.07	ND	ND	ND
Method 604 (phenolics)														
Phenol	ppm	ND	ND	0.03	ND	ND	ND	ND	ND					
4-chloro-3-Methylphenol	ppm	ND	0.60	ND	ND	ND	ND	ND	ND					
Dinitrophenol	ppm	ND	3.5	ND	ND	ND	ND	ND	ND					
Pentachlorophenol	ppm	ND	2.7	ND	ND	ND	ND	ND	ND					
Base Neutrals														
Acenaphthene	ppb	48,000	310	140	ND	NA	190	ND	ND	60	ND	5,700	ND	ND
Acenaphthylene	ppb	16,000	440	110	ND	NA	570	ND	ND					
Anthracene	ppb	15,000	110	27	ND	NA	130	ND	ND					
Benzo (A) Anthracene	ppb	20,000	100	16	ND	NA	81	ND	ND					
Benzo (A) pyrene	ppb	14,000	ND	ND	ND	NA	51	ND	ND					
3,4-Benzofluoranthene	ppb	19,000	13	13	ND	NA	69	ND	ND					
Benzoperylene	ppb	5,600	ND	ND	ND	NA	43	ND	ND					
Benzo (K) fluoranthene	ppb	19,000	13	13	ND	NA	69	ND	ND					
Bis(2-Ethylhexyl)Phthalate	ppb	ND	84	ND	ND	NA	ND	ND	ND					
Chrysene	ppb	14,000	67	10	ND	NA	60	ND	ND					
Fluoranthene	ppb	32,000	240	37	ND	NA	120	ND	ND					
Indeno (1,2,3-CD) Pyrene	ppb	9,600	ND	ND	ND	NA	ND	ND	ND	750	280	28,300	ND	ND
Naphthalene	ppb	220,000	3,100	79	250	NA	5,700	ND	ND	66	180	10,000	ND	ND
Phenanthrene	ppb	96,000	750	120	ND	NA	500	ND	ND					
Pyrene	ppb	52,000	320	44	ND	NA	140	ND	ND					

NOTES:

- a. ppm means mg/l for water samples and mg/kg for soil sample.
ppb means ug/l for water samples and ug/kg for soil sample.

- b. Sample collected November 23, 1982, delivered to laboratory December 6, 1982.

NA means not analyzed

ND means not detected (detection limits may vary)

TABLE 2

CHEMICAL ANALYSES - TASK 3 SOIL, SURFACE WATER AND PRELIMINARY GROUND WATER SAMPLING
 NYSEG COAL TAR SITE

(Chemical Parameters Detected in One or More Samples)

Parameter	Units ^a	19-21 October 1983 Sample Location ^b								7 November 1983 Sample Location			11 November 1983 Sample Location			18 November 1983 Sample Location		
		CSL-1	CSL-2	CSL-3	TT-2/S-1 ^b	TT-5/S-3 ^b	TT-2/S-2 ^b	Alt-4/S-1 ^b	Alt-6/S-1 ^b	MW-8	MW-9	MW-13	CSL-1	CSL-2	CSL-3	CSL-1	CSL-2	CSL-3
Total Phenol	ppm	0.005	0.157	0.010	0.73	3.69	2440	1.06	0.42	0.010	0.047	ND	ND	ND	ND	ND	ND	ND
Method 602 (Aromatics)																		
Benzene	ppm	ND	ND	ND	0.041	0.008	128	6.6	0.09	0.180	0.005	0.004	ND	ND	ND	ND	ND	ND
Toluene	ppm	ND	ND	ND	0.049	0.006	155	26.0	0.05	0.015	0.003	0.004	ND	ND	ND	ND	ND	ND
Ethyl Benzene	ppm	ND	ND	ND	0.006	0.007	10.4	53.1	0.91	0.260	0.011	0.009	ND	ND	ND	ND	ND	ND
p-Xylene	ppm	ND	ND	ND	0.0979	0.002	25.5	1.5	1.619	0.024	0.006	0.012	ND	ND	ND	ND	ND	ND
m-Xylene	ppm	ND	ND	ND		0.008	79.4	60.4		0.018	0.010	0.027	ND	ND	ND	ND	ND	ND
o-Xylene	ppm	ND	ND	ND	0.023	0.004	46.0	11.3	1.05	0.040	0.010	0.019	ND	ND	ND	ND	ND	ND
Styrene	ppm	ND	ND	ND	0.022	0.029	104	14.8	2.19	0.001	0.002	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	ppm	ND	ND	ND	0.006	0.003	4.9	4.8	2.09	0.023	0.002	ND	ND	ND	ND	ND	ND	ND
Method 610 (Poly-Aromatic Hydrocarbons)																		
Acenaphthene	ppm	ND	ND	ND	2.5	3.8	3000	250	6.5	1.28	0.045	0.006	ND	ND	ND	ND	ND	ND
Acenaphthylene	ppm	ND	ND	ND	1.8	3.6	4500	960	0.6	0.15	0.087	0.013	ND	ND	ND	ND	ND	ND
Anthracene ^c	ppm	ND	ND	ND	23	3.5	13,700	4600	14	2.08	0.19	0.020	0.017	0.018	0.006	0.002	0.004	ND
Benzo (A) Anthracene	ppm	ND	ND	ND	22	40	2000	330	12	0.16	0.043	ND	0.013	0.015	ND	ND	ND	ND
Benzo (A) pyrene	ppm	ND	ND	ND	27	52	1500	360	12	0.15	0.051	ND	0.010	ND	ND	ND	0.008	ND
Benzo(a)pyrene	ppm	ND	ND	ND	10	15	300	69	7.6	0.039	ND	ND	ND	ND	ND	ND	ND	ND
Benzo (K) fluoranthene ^d	ppm	ND	ND	ND	24	44	1600	210	11	0.092	0.050	ND	0.005	ND	ND	ND	0.007	ND
Chrysene	ppm	ND	ND	ND	16	33	1300	340	88	0.13	0.039	ND	0.013	0.015	ND	ND	ND	ND
Fluoranthene	ppm	ND	ND	ND	25	118	5300	690	18	0.61	0.034	0.005	0.006	0.009	ND	0.002	0.005	ND
Fluorene	ppm	ND	ND	ND	3.4	4.5	4500	1300	5.7	2.03	0.10	0.028	0.010	ND	ND	ND	ND	ND
Indeno (1,2,3-CD) Pyrene ^e	ppm	ND	ND	ND	26	24	490	80	5.8	0.053	0.020	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ppm	ND	ND	ND	4.1	3.8	29,000	1900	49	0.85	0.075	ND	ND	ND	ND	ND	ND	ND
Pyrene	ppm	ND	ND	ND	24	948	4500	1000	18	2.81	0.064	0.006	0.011	0.006	ND	0.003	0.006	0.003

Notes:

- ppm means mg/l for water samples and ug/g for soil samples.
- Soil samples
- Flutes with Phenanthrene
- Flutes with Benzo (B) Fluoranthene
- Flutes with Indeno (A,H) Anthracene
- Less than 5 ppm
- Flutes with m-Xylene
- CSL means crawl sampling location
- TT means test trench
- Alt means auger boring

NA means not analyzed

ND means not detected (detection limits may vary)

TABLE 3
CHEMICAL ANALYSES - TASK 3 FIRST ROUND SAMPLING
NYSEG COAL TAR SITE
(Chemical Parameters Detected in One or More Samples)

28 November 1983 - 2 December 1983
Sample Location

Parameter	Units ^a	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15 ^f	MW-16	MW-17	1W-1	1W-2
Total Phenol	ppm	0.085	0.081	1.09	0.014	0.005	0.010	6.38	0.014	0.005	9.17	0.057	0.021	0.006	0.007	ND	0.008	0.151	0.017	0.020
Method 602 (Aromatics)																				
Benzene	ppm	0.170	0.520	4.18	0.003	0.005	0.008	3.56	0.052	0.011	6.36	1.06	0.33	ND	0.001	0.012	0.002	2.3	ND	ND
Toluene	ppm	0.230	0.220	3.78	ND	0.001	0.029	3.44	0.005	0.007	4.98	1.46	0.61	ND	0.007	0.027	0.003	11.4	0.005	0.001
Ethyl Benzene	ppm	0.260	0.190	1.96	ND	0.004	0.013	0.99	0.044	0.003	1.01	0.61	1.34	ND	ND	0.057	0.026	4.8	0.004	ND
p-Xylene	ppm	0.041	0.230	0.42	ND	0.002	0.006	0.26	0.012	0.005	0.68	1.06	0.10	ND	ND	0.120	0.007	5.7	0.005	ND
m-Xylene	ppm	0.081	0.110	1.06	ND	ND	0.017	0.67	0.009	ND	1.63	1.22	0.35	ND	ND	0.097	0.007	15.1	0.010	0.001
o-Xylene	ppm	0.062	0.280	0.74	ND	0.002	0.011	0.46	0.014	0.003	1.16	1.47	0.54	ND	ND	0.076	0.015	10.9	0.008	ND
Styrene	ppm	0.005	ND	0.56	ND	ND	ND	0.90	0.001	ND	0.42	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	ppm	0.014	0.083	ND	ND	ND	0.002	0.048	0.007	ND	0.04	0.06	0.09	ND	ND	ND	ND	3.9	0.002	ND
Method 610 (Poly-Aromatic Hydrocarbons)																				
Acenaphthene	ppm	0.14	0.017	1.9	ND	ND	0.003	22	0.12	0.072	1.7	0.30	37	0.007	ND	3.9	ND	4.7	ND	0.008
Acenaphthylene	ppm	0.088	0.013	3.2	ND	0.012	0.003	49	0.049	0.016	2.2	ND	1.8	0.021	ND	7.6	ND	2.4	ND	ND
Anthracene ^b	ppm	0.20	0.054	6.2	0.003	0.007	0.011	99	0.25	0.12	34	0.92	97	0.002	ND	3.1	ND	3.4	ND	0.007
Benzo (A) Anthracene	ppm	ND	0.012	0.88	ND	ND	ND	11	0.022	ND	0.58	0.25	2.5	ND	ND	ND	ND	0.18	ND	ND
Benzo (A) pyrene	ppm	ND	0.014	0.86	ND	ND	ND	11	0.025	0.008	0.55	0.13	2.6	ND	ND	ND	ND	ND	ND	ND
Benzo (ghi) perylene	ppm	ND	ND	0.24	ND	ND	ND	2.9	0.002	ND	ND	ND	0.59	ND	ND	ND	ND	ND	ND	ND
Benzo (K) fluoranthene ^c	ppm	ND	0.008	0.57	ND	ND	ND	7.1	0.015	ND	0.31	0.069	1.5	ND	ND	ND	ND	0.12	ND	0.004
Chrysene	ppm	0.43	0.011	0.77	0.006	0.006	0.036	8.0	0.016	0.011	0.37	0.27	1.8	ND	ND	ND	ND	0.16	ND	0.016
Fluoranthene	ppm	0.23	0.032	1.5	0.002	0.003	0.037	31	0.050	0.014	1.1	0.34	4.4	0.007	0.003	ND	ND	0.46	ND	0.016
Fluorene	ppm	0.095	0.022	2.7	ND	0.005	ND	38	0.13	0.068	1.6	0.40	7.1	0.017	ND	7.3	ND	2.6	ND	0.007
Indeno (1,2,3-CD) Pyrene ^d	ppm	ND	ND	0.27	ND	ND	ND	3.5	0.004	ND	ND	ND	0.66	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ppm	3.0	0.011	22	ND	0.012	0.034	97	0.12	0.077	54	0.42	37	0.002	ND	5.6	ND	47	ND	0.002
Pyrene	ppm	0.33	0.026	1.7	0.003	0.003	0.041	33	0.051	0.017	1.2	0.40	5.5	0.009	0.003	ND	ND	0.37	ND	0.019

Notes:

- ppm means mg/l
- Listed with Fluoranthene
- Listed with Benzo (B) Fluoranthene
- Listed with Dibenzo (A,H) Anthracene
- Less than 1 ppm
- Sampled 21 December 1983

NA means not analyzed
ND means not detected (detection limits may vary)

TABLE 4
CHEMICAL ANALYSES - TASK 3 SECOND ROUND SAMPLING
NYSEG COAL TAR SITE

(Chemical Parameters Detected in One or More Samples)

12 March - 14 March 1984
Sample Location

Parameter	Units ^a	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15 ^f	MW-16	MW-17	IW-1	IW-2
Total Phenol	ppm	0.014	0.033	1.03	0.020	ND	0.062	0.734	0.008	ND	4.33	0.009	0.032	ND	ND	ND	0.007	0.056	0.145	0.010
Methud 610 (Poly-Aromatic																				
Hydrocarbons)																				
Acenaphthene	ppm	0.380	0.110	3.770	0.031	ND	0.120	0.940	0.250	0.074	0.240	ND	0.610	ND	ND	NA	0.120	ND	0.210	ND
Acenaphthylene	ppm	0.130	ND	5.910	0.0036	0.012	0.097	1.470	0.062	0.160	ND ^e	ND	0.120	0.0046	ND	NA	0.110	ND	ND	0.0099
Anthracene ^b	ppm	0.420	0.280	31.800	0.063	0.0051	0.310	1.950	0.450	0.300	2.450	0.046	0.450	0.014	ND	NA	0.100	ND	0.330	0.0078
Benzo (A) Anthracene	ppm	0.460	0.170	1.240	0.050	0.0056	0.290	1.150 ^d	0.038	0.015	ND ^e	0.0083	0.270	0.014	ND	NA	0.0077	ND	0.510	0.017
Benzo (A) pyrene	ppm	ND	0.200	1.740	0.012	ND	ND	0.370	0.074	0.022	ND ^e	0.010	0.120	0.0099	ND	NA	0.012	ND	ND	ND
Benzo (g,h,i) perylene	ppm	ND	ND	1.180	ND	ND	ND	ND ^e	0.044	ND	ND ^e	ND	ND	ND	ND	NA	ND	ND	ND	ND
Benzo (K) fluoranthene ^c	ppm	ND	0.160	0.980	0.0072	ND	ND	0.450	0.058	0.012	ND ^e	0.0055	0.240	0.0077	ND	NA	0.095	ND	0.600	ND
Chrysene	ppm	ND	0.350	1.490	ND	ND	0.210	1	0.051	0.023	0.350	0.0083	ND	ND	ND	NA	0.012	ND	ND	ND
Fluoranthene	ppm	0.130	0.260	3.110	0.037	0.0046	0.200	0.520	0.150	0.092	0.220	0.016	0.088	0.0065	ND	NA	0.025	ND	0.450	ND
Fluorene	ppm	0.350	0.130	5.480	0.028	0.0067	0.140	1.590	0.270	0.130	0.440	0.018	0.520	0.023	ND	NA	0.094	ND	0.150	0.0062
Indeno (1,2,3-CD) Pyrene ^d	ppm	ND	ND	0.300	ND	ND	ND	ND ^e	0.032	0.019	ND ^e	ND	ND	ND	ND	NA	ND	ND	ND	ND
Naphthalene	ppm	1.060	0.190	31.400	0.015	ND	0.640	7.040	0.036	0.110	6.760	0.071	1.110	ND	ND	NA	0.0046	1.090	0.037	0.025
Pyrene	ppm	0.180	0.310	3.900	0.044	0.0045	0.270	0.660	0.170	0.124	0.740	0.024	0.130	0.0091	ND	NA	0.031	ND	0.700	0.0045

Notes:

- a. ppm means mg/l
- b. Elutes with Phenanthrene
- c. Elutes with Benzo (B) Fluoranthene
- d. Elutes with Dibenzo (A,h) Anthracene
- e. Less than 0.1 ppm
- f. Benzo (A) Anthracene and Chrysene eluted together

NA means not analyzed
ND means not detected



EXPLANATION

- MW-1 - MONITORING WELLS/BORINGS
- 75.3 - ELEVATION OF GROUND WATER MEASURED 17 - 20 SEPTEMBER 1984
- CSL - CANAL WATER SAMPLING LOCATION

NOTES

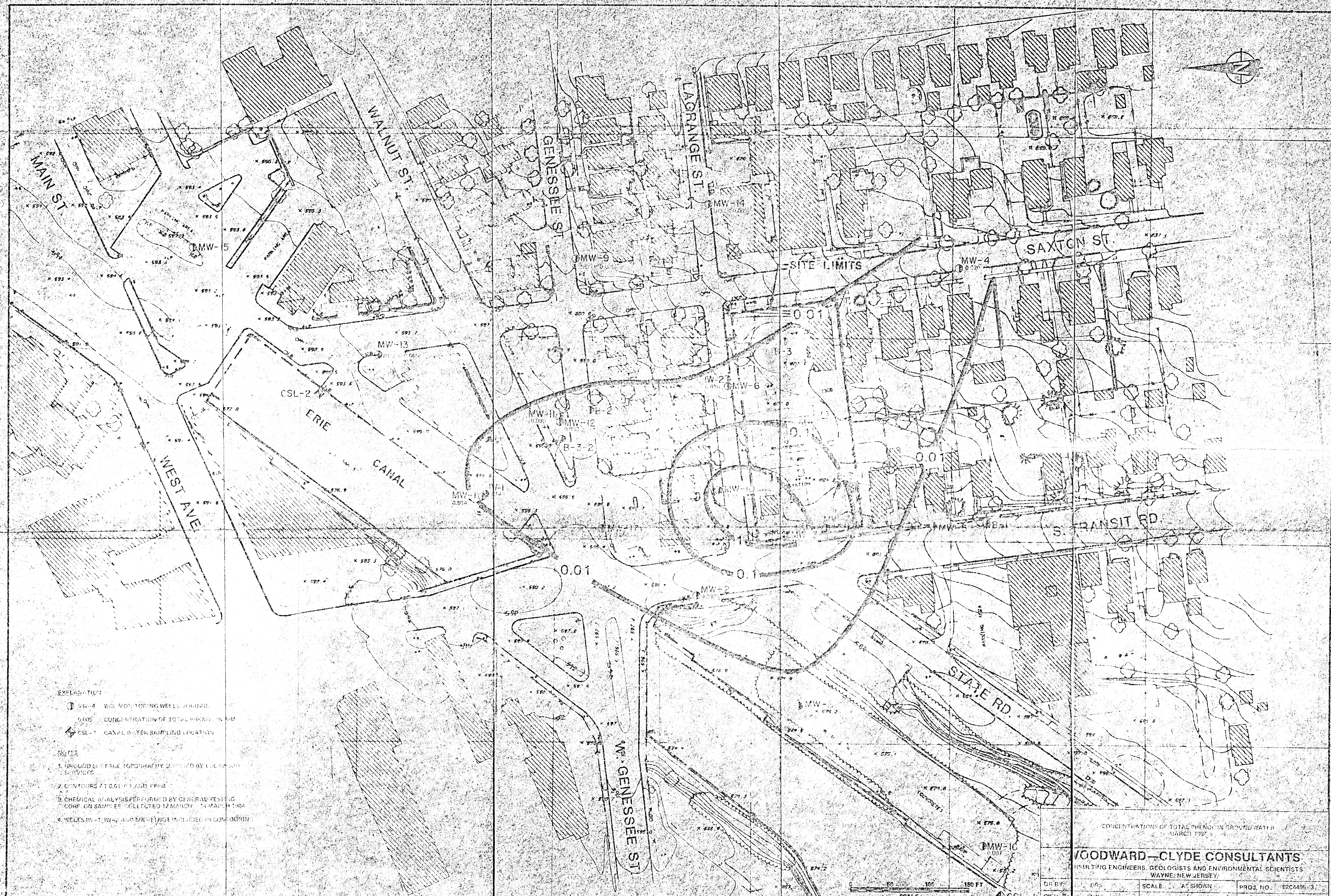
- GROUND SURFACE TOPOGRAPHY SUPPLIED BY LOCKWOOD SERVICES
- SEATED ROCK WELLS (MW-6, MW-7 AND MW-12) WERE NOT INCLUDED IN CONTOURING
- WELL MW-1 WAS NOT INCLUDED IN CONTOURING BECAUSE OF QUESTIONABLE READING
- CONTOURS LOCATED APPROXIMATELY

INFERRED GROUND WATER CONTOUR MAP
SEPTEMBER 1984
LOCKPORT COAL TAIL SITE

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY: DR. SCALE: AS SHOWN PROJ. NO. 826-4485-25
CHECKED BY: DATE: SEPTEMBER 1984 FIG. NO.





EXPLANATION

- MW-4 WIDE MONITORING WELLS BORINGS
- 0.005 CONCENTRATION OF TOTAL PHENOL IN PPM
- ◆ CSL-1 CANAL WATER SAMPLING LOCATION

NOTES

1. GROUND SURFACE TOPOGRAPHY SUPPLIED BY LUCKENBACH SERVICES
2. CONTOURS AT 0.01 PPM AND 0.1 PPM
3. CHEMICAL ANALYSIS PERFORMED BY GENERAL TESTING CORP. ON SAMPLES COLLECTED 12 MARCH - 14 MARCH 1984
4. WELLS MW-1, MW-2 AND MW-11 NOT INCLUDED IN CONTOURING

CONCENTRATIONS OF TOTAL PHENOL IN GROUND WATER
MARCH 1984

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR BY: DRS	SCALE: AS SHOWN	PROJ. NO.: 6204495-3
CKD BY: MRO	DATE: 15 MAY 1984	FIG. NO.: 1