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ENGINEERING INVESTIGATIONS AT INACTIVE HAZARDOUS WASTE SITES

PHASE II INVESTIGATION

Tuxedo Waste Disposal Site Site No. 336035
Tuxedo Orange County

DATE: March 1989

Volume II - Appendices A and B

Prepared for:
**New York State
Department of
Environmental Conservation**

50 Wolf Road, Albany, New York 12233
Thomas C. Jorling, *Commissioner*

Division of Hazardous Waste Remediation
Michael J. O'Toole, Jr. P.E., *Director*

By:
Lawler, Matusky & Skelly Engineers

ENGINEERING INVESTIGATIONS AT INACTIVE HAZARDOUS WASTE SITES IN THE STATE OF NEW YORK
PHASE II INVESTIGATIONS

Tuxedo Waste Disposal Site
Town of Tuxedo, Orange County
NYSDEC I.D. No. 336035

Volume II - Appendices A and B

Prepared for

DIVISION OF HAZARDOUS WASTE REMEDIATION
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 Wolf Road
Albany, New York 12233-0001

Prepared by

LAWLER, MATUSKY & SKELLY ENGINEERS
Environmental Science & Engineering Consultants
One Blue Hill Plaza
Pearl River, New York 10965

March 1989

LMSE-89/0122&576/018

APPENDIX A

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

[1] Soil Gas Field Notes

[2] Trenching and Test Pit Field Notes

[3] Monitoring Well Installation Field Notes

[4] Monitoring Well Development and Sampling Field Notes

[5] Bouwer, H., and Rice, R.C. 1976. A slug test for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells. Water Resources Research, Vol. 12, No. 3, pp. 423-428.

[6] Surface Water/Sediment Sampling Field Notes

[7] Site history information

[8] Flood insurance map

[9] 6 NYCRR Conservation

[10] Wehran Engineering. 1981. Ground-Water Resource Evaluation, Proposed Sand and Gravel Excavation. Prepared for Tuxedo Park Associates, Tuxedo, New York. 10 p.

[11] Freeze, R.A., and Cherry, J.A. 1979. Groundwater. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 604 pp.

[12] Lewis, R.J., Jr., and Sweet, D.V. (eds.). 1984. Registry of toxic effects of chemical substances. 1983 Supplement to the 1981-1982 edition. Washington, DC: National Institute of Occupational Safety and Health, 1655 pp.

[13] Verschueren, K. (ed.). 1983. Handbook of Environmental Data on Organic Chemicals. New York: Van Nostrand Reinhold Company Inc., 1310 pp.

[14] Lapedes, D.N. (ed.). 1978. McGraw-Hill Encyclopedia of the Geological Sciences. New York, McGraw-Hill Inc., 915 p.

[15] Beck, H., Eckart, K., Mathar, W., and Wittkowski, R. 1988. Occurrence of PCDD and PCDF in Different Kinds of Paper, Chemosphere, Vol. 17, No. 1, pp. 51-57.

[16] 14 December 1988 NYSDEC letter to LMS Reviewing Significant Habitats and Endangered Species Lists.

REFERENCE 1

KAW

LAWLER, MATUSKY & SKELLY ENGINEERS
CREW CHIEF REPORT AND INCIDENT SHEET

Crew Chief: KMG | JMG Survey(s): Gas Soil Points Job No. 576-015

Survey Date(s): 7-3-95 Vehicle: Cube Van, Auto Wgn Crew Members: Ralph C., Rich Z.

SURVEY INFORMATION

1. Survey start/end time 0630/1800
2. Equipment prepared for survey/safety equipment present? Yes*
3. Sampling gear working properly? No**
4. Physical/chemical meters functioning properly/ID numbers recorded? Yes
5. Any incidents or mishaps? No
6. Any unusual or important observations/time lost? Yes**
7. Weather observations/marine radiotelephone log/boat and vehicle logs/incident sheet completed? Yes
8. Equipment usage sheet completed and submitted to Warehouse Coordinator? Yes
9. Boat fluids, equipment, etc. checked? —
10. Vehicle fluids, equipment, etc. checked? —
11. Boat(s) Used ______ Engine Hours ______ to ______

Radio Log: Boat ______ From ______ to ______ Location ______

INCIDENT REPORT AND COMMENTS (Include number and explanation): Came in to calib meters + prep. Kevin, Rich + Ralph went to the site while I waited for Olsens to finish machining the 2 [illegible] rods for the Soil Mechanic.* While I was [illegible] at [illegible] Kevin called + said he needed the OVA + personal sampling pump to purge the gas soil points. I picked up the [illegible] @ 1030 and drove to the site. The crew had completed 3 gas soil points before I arrived. I went ahead and purged those 3 soil points with the personal sampling pump for ~10 min. Ralph + Rich worked on another KV point while Kevin and I got out the Soil Mechanic to do a few holes in a few hard areas. We got down ~ 3.5' and it started to go very slow. We continued to 4' and decided to stop since this was the minimum depth for the soil points.** We tried to bump out for ~ 5 [illegible]. We broke the [illegible] twice. Then the bolt on the drive hammer which holds the bump-out plate chain, sheared off. When this happened the guide rod also bent. Steve Kudlmeyer was on site sampling the completed soil gas points. Kevin + I put stakes around the AW rods stuck in the ground. We are going to see if the drillers can retrieve our tools while they are on site. I stayed at the site to assist Steve Kudlmeyer while the rest of the crew went back to the lab. The KV unit had 2 broken threaded nipples during the day due to the adverse conditions of the landfill

(use reverse or additional sheet if necessary)

Lawler, Matusky & Skelly Engineers

KAW

LAWLER, MATUSKY & SKELLY ENGINEERS
CREW CHIEF REPORT AND INCIDENT SHEET

& Slug Tests

Crew Chief: JMGurewich Survey(s): Toredo Soil Pt Sampling Job No. 596-018

Survey Date(s): 9-23-85 Vehicle: Tan Van KM'C Truck Crew Members: Mark C / KM'G KM'C

SURVEY INFORMATION

1. Survey start/end time 0630 / 1900

2. Equipment prepared for survey/safety equipment present? Yes

3. Sampling gear working properly? No

4. Physical/chemical meters functioning properly/ID numbers recorded? Yes

5. Any incidents or mishaps? No

6. Any unusual or important observations/time lost? No

7. Weather observations/marine radiotelephone log/boat and vehicle logs/incident sheet completed? Yes

8. Equipment usage sheet completed and submitted to Warehouse Coordinator? Yes

9. Boat fluids, equipment, etc. checked? —

10. Vehicle fluids, equipment, etc. checked? No

11. Boat(s) Used — Engine Hours ______ to ______

Radio Log: Boat ______ From ______ to ______ Location ______

INCIDENT REPORT AND COMMENTS (Include number and explanation): Survey went OK

We purged the soil points w/ a peristaltic pump. Then we hooked up the MSA 361 + HNU to get readings. The MSA 361 H_2S function appeared to max out at 745 to 760 ppm. The first 8 points all were in this range. When we checked SSP-22 w/ our highest range w/ Drager tubes it went over the 600 ppm max in ~ 1/2 stroke. The % LEL was over 100% at all the soil pts (SSP-27 dropped to 8-10% after sampling). The H_2S func. took a long to drop down to background after being exposed to such high concentrations. The O_2 function read 0.8 to 0.1 % at all the soil points. The HNU did not function properly due to the very low O_2 concentration. When hooked up to the tubing the meter would rise as if go off scale + then quickly drop back to background on most of the soil pts. KM'G + KM'C were doing slug tests on the wells while we were here. After I finished the soil pts I checked the sampling pumps with a rotometer. PAS001 read 100-125 l/min + PAS read 20-30 l/min. After this we helped KM'G + KM'C finish the slug tests. All of the soil pt charcoal tubes were capped and put in VOA vials.

(use reverse or additional sheet if necessary)

Lawler, Matusky & Skelly Engineers

LAWLER, MATUSKY, AND SKELLY ENGINEERS

AIR SAMPLING DATA SHEET

LMS PROJECT #: 576-018

SAMPLE DATE: 8-23-88

LMS ID #	STATION	START/END TIME	PAS #
2437	Background	0833-0933	001
2440	SSP-33	0949-1049	001
2439	SSP-32	1011-1111	002
2445	SSP-24	1100-1200	001
2438	SSP-23	1127-1227	002
2446	SSP-21	1210-1310	001
2442	SSP-20	1230-1330	002
2443	SSP-22	1320-1420	001
2448	SSP-26	1339-1439	002
2449	SSP-25	1433-1533	001
2447	SSP-27	1457-1557	002 * some moisture in tubing (Did not seem to effect sample)

FLOW RATE (mL/min.) 200

SAMPLING TIME (min.) 60 min

CALIBRATION CHECK

		PAS#1	PAS#2
	TIME:	1535	1605
FLOW	RATE	100-125	20-30
	TIME:		
FLOW	RATE		

TEMPERATURE 60-70°F

AUTO TIMER [✓ I] II

COMMENTS: Purge Times   Purge Rate: ~900 ml/min

SSP 33	0936-0946	SSP-20	1213-1223
SSP 32	0953-1003	SSP-22	1256-1306
SSP 24	1040-1050	SSP-26	1323-1333
SSP 23	1103-1113	SSP-25	1411-1421
SSP 21	1150-1200	SSP-27	1434-1444

Job No: 526-018
Site: Tuxedo
Oper: Gas Vent Sampling
Crew: JMG MC

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: DEC # 201439
OVA Meter: —
Explosimeter: DEC MSA 361
Date: 8-23-88

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING		READING	COMMENTS
			% LEL	% O_2	H_2S ppm	
0925	Background	0.2	0 %	20.8	0 ppm	Adj. HNu to 1.0 after bckgrd reading. Readings will be above background
[illegible]	SSP-32	[illegible]	over 100%	0.3	7[illegible]	[illegible]
[illegible]	SSP-32	0.6 above background	over 100%	.6	7[illegible]-7[illegible]5	[illegible]
1055	SSP-24	0.6 above background	over 100%	0.4	763-766	H_2S had dropped to 32 since last sample
1115	SSP-23	~3.2 over bckgd	over 100%	0.4	761-764	H_2S dropped to 50 since last sample HNu deflected to 50 then dropped to 3
1203	SSP-21	* 20 → bckgd	100+	0.4	756-759	* peaked at 20 then to background
1225	SSP-20	* 28 → bckgd	over 100%	0.2	754-757	* peaked @ 28 then dropped quickly to background
1312	SSP-22	* 22 → bckgd	over 100%	0.4	746-750	* peaked @ 22, then quickly dropped to background
1335	SSP-26	* 22 → bckgd	over 100%	0.2	742-745	* see above
1425	SSP-25	* 5 → bckgd	over 100%	0.2	685-690	* peaked @ 5, then quickly dropped to bckgd
1450	SSP-27	2	over 100%	0.8	~20 *	* Meter read steady 20 ppm but may not have had time to drop back down from !
↓	↓	↓	↓	↓	↓	reading. Will Check again after sampling
1600	SSP-27 after sampling	4	8-10%	0.6	8 ppm *	* this is same as bckgrd before hook up to tubing
1612	SSP-33	* 60 → bkgd	over 100%	0.1	710-713	* peaked @ 60 then quickly dropped to background
1636	SSP-27	—	—	—	*	* Drager Tubes: Both ranges read Zero H_2S (0-60 ppm, 0-5 ppm)

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M Guzewich

(Date) 8-23-88

* We called HNU and asked if the lack of O_2 will affect the readings. They mentioned that the PI-101 needs normal O_2 concentration to function properly

9-23-88

Tuxedo C+D

576-018
Soil Gas Sampling

Meter Calibration

	Expected	Observed	Comments
a) H-NU # 801439 DEC 0920	57 ppm @ 9.8	42 ppm	Adj Span until meter reads 57ppm Span adj: 9.8 → 6.6

	Expected	Observed	Zero Adj	Comment:
b) MSA 361 DEC 0925 ↓	H_2S ppm 10 ppm	11 ppm	2 → 0	
	% LEL 50%	50%	4 → 0	
	% O_2 15.0%	15.0%	21.5 → 20.8%	

	Expected	Observed	
HNU # 801439 DEC 1220	57 ppm @ 9.8 span	54 ppm @ 6.6 span* (*see initial calib.)	No Spc Adj.

576-018
9-12-95
JMG, KM'G

Tuxedo Soil H_2S Readings

Time	Soil Gas Points	Drager Tube Reading
0920	SSP-33	over 2000 ppm (~1 stroke)
	SSP-32	over 2000 ppm (~ ½ stroke)
	SSP-24	over 2000 ppm ~ 1 stroke
	SSP-23	over 2000 ppm "
	SSP-21	over 2000 ppm "
	SSP-20	over 2000 ppm "
	SSP-26	over 2000 ppm "
	SSP-22	over 2000 ppm (~ ½ stroke)
	SSP-25	over 2000 ppm (~ ½ stroke)
	SSP-27	too much moisture in tubing, getting drager tube material wet

Crew: JMG KMG
Date: 5-12-88
Job No: 576-018-9001

LAWLER, MATUSKY & SKELLY ENGINEERS
FIELD METER CALIBRATION AND/OR CHECK
DATA SHEET

Site: Tuxedo
Oper: Air Monitoring/Soil Gas
Calib. By: ______

METER No./ PROBE No.	TIME	THERM No./ TEMP. (°C)	EXPECTED VALUE	OBSERVED VALUE	ADJ TO[a]	% ~~DIFF~~[b]	COMMENTS
LMS #601 | OVA 128	0800	|	| 0ppm	| 3.5ppm	| 0ppm		
↓	↓	|	| 95ppm	| 92ppm	| No Adj.	Span ≤ 3.0	
		|	|	|	|		
		|	|	|	|		
DEC | MSA 261	0800	|	| 10ppm H_2S	| 8ppm H_2S	|	No Span Adj.	
		|	| 50% LEL	| 42% LEL	| 50% LEL	Adj Span pot max read	+.1 50%
↓	↓	|	| 15.0% O_2	| 14.9% O_2	|	No Span adj.	
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[a] For dissolved oxygen and pH meter calibrations, record adjustments (include % and ppm readings for dissolved oxygen meter calibration).

[b] Include % Diff. calculation for conductivity calibration checks: % Diff = $\frac{Ex - Ob}{Ex}$ X 100

TO: FILE 576-018 14 September 1988

FROM: K. McGuinness Page 1

SUBJECT: TUXEDO - ADDITIONAL AIR MONITORING/SOIL GAS SAMPLING

Arrived on-site 07:30 on 9/12/88 to investigate an increase in odor from the landfill and continue sampling soil gas with new high range 0-2000 ppm Draeger tubes.

Air monitoring was begun on the northern end of the site, near the antique shop., Not until recently had the trees on this end of the site been observed as sources for landfill venting. This morning, the first eight trees in the line along the RR tracks headed north were venting. All venting gases were analyzed with OVA and MSA 360 (analyzes H_2S or 1% LEL + O_2). No readings of greater than 1 ppm H_2S or 1% LEL were observed. No odor was observed.

Next, area near trench 2a and 2b was checked. Up slope, to the southwest of the trench odor was very strong and MSA registered 1% LEL, 1 ppm H_2S + 20.7% O_2 and OVA readings ranged 10 to 30 ppm with peaks of up to 70 ppm. Very slight breeze to the west seems to push gases against slope where odor is strongest. Several small holes in the cover material were noticed where runoff seemed to be drawing. In first hole investigated, MSA registered no greater than 1 ppm H_2S but LEL read off scale, and the OVA was off scale with and without methane filter. A second hole yielded identical readings. While it was still early it was decided to continue investigating the venting areas before the remaining two trenches. A vent originating from around a tree, upslope from the culvert in the south western corner of the property (Georgia Tech land) yielded an LEL of 1 to 2 % and 0 ppm H_2S while OVA read 40 - 50 ppm with and without filter. The large vent in the middle of slope leading down to the culvert registered 0% LEL, 0 ppm H_2S and no greater than 2 ppm on the OVA with and without the methane filter. Another vent on the landfill surface just above the culvert yielded 0 ppm H_2S, 0% LEL, but 250 ppm with filter, and 220 ppm without filter on the OVA (Note: readings taken directly in vent or hole).

Next a vent originating in the uncapped fill on the eastern side of the Georgia Tech property was analyzed and while 0 ppm H_2S and 0% LEL were found with the MSA, the OVA registered 120 ppm without filter, and 140 ppm with. Monitoring south of the site along the RR tracks yielded no readings above background and no noticeable odor. Readings at the south of the culvert running under the landfill and emptying near MW-4 indicated 0 ppm H_2S, 0% LEL, and 8-10 ppm with filter and 10-15 ppm without on the OVA. The area around the culvert showed no signs of running liquids, no venting, and only a slight odor.

Next, we returned to monitor trenches 1 and 3. The perimeter of trench #1 registered readings above background, there was no visible venting and only slightly noticeable odor. Monitoring in a small break in the cover in valley formed by the covered trench and the original dirt mound, yielded 0 ppm H_2S, but over 100% LEL, and over 1000 ppm on the OVA with and without the filter. A perimeter survey of trench #3 yielded no signs of venting, no odor, and no readings above background, but a small hole in the center of the cover (2 ft south of stake) yielded readings of 761 ppm H_2S, over 100% LEL, and over 1000 ppm with and without filter on the OVA.

Soil Gas Analysis

Based on the portable GC analysis of the soil gas samples, soil probes 33, 32, 24, 23, 21, 20, 26, 22, 25, and 27 were sampled.

During the original sampling, all probes registered over 50 ppm on the Draeger tubes used. On September 13, 1988, newly acquired tubes capable of analysis on the 0-2000 ppm range were used to test the gases at these same locations.

All probes read over 2000 ppm with the exception of SSP 27 from which analysis was made impossible to due to excessive groundwater.

Surface Water Sample #5

During this same site visit, a sample of standing surface water from a depression east of the railroad tracks roughly in the area of MW-6 was taken. Enough sample was retained for analysis for VOA TCL^{+10}, acid base neutrals TCL^{+20}, Phenols, PCBs and Pesticides, metals, as well as a spike matrix.

Note: MSA 360 minimum detection is 1 ppm H_2S.

ROUTE

LAWLER, MATUSKY & SKELLY ENGINEERS **INTEROFFICE MEMO**

TO File
DATE 12-12-88
JOB NO 576-018
FROM JMGuzewich
RE Tuxedo C+D Soil Gas / Test Pits

Hydrogen Sulfide Results

Soil Gas Points

	Soil Point	Dreger Reading	Comments
930	SSP-32	over 2000 ppm	Air Temp less than 10°F
	SSP-33	over 2000 ppm	
	SSP-11	~ 1400 ppm	Some ice in tubing
	SSP-22	over 2000 ppm	
1030	SSP-29	~ 1000 ppm	poss. ice blockage in tubing

*. Soil Points purged w/ peristaltic for 5 to 10 minutes

REFERENCE 2

KAW

LAWLER, MATUSKY & SKELLY ENGINEERS
CREW CHIEF REPORT AND INCIDENT SHEET

Crew Chief: JMGrunwich Survey(s): Tuxedo Trenching Job No. 576-018

Survey Date(s): 8/2,9,10/85 Vehicle: El Truck Cube Van Tux Van/Blue Wgn Crew Members: JMG DJH KMcC KMcG MC KAW/

SURVEY INFORMATION

1.	Survey start/end time	0500 / ~2130 0500 / ~2000 0500 / ~2000
2.	Equipment prepared for survey/safety equipment present?	Yes
3.	Sampling gear working properly?	Yes
4.	Physical/chemical meters functioning properly/ID numbers recorded?	Yes
5.	Any incidents or mishaps?	No
6.	Any unusual or important observations/time lost?	No
7.	Weather observations/marine radiotelephone log/boat and vehicle logs/incident sheet completed?	Yes
8.	Equipment usage sheet completed and submitted to Warehouse Coordinator?	Yes
9.	Boat fluids, equipment, etc. checked?	—
10.	Vehicle fluids, equipment, etc. checked?	Yes

11. Boat(s) Used ______ Engine Hours ______ to ______

Radio Log: Boat ______ From ______ to ______ Location ______

INCIDENT REPORT AND COMMENTS (Include number and explanation): Survey went OK. Weather conditions were not cooperative for polytyvek sampling. On the first day (8-2) Steve Mistonesky was there on site to help out. His first question about the site was "Where are the bathroom facilities?" We began with trench #2. We started out fully suited in polytyvek, but the weather was very hot & humid. Steve had us down grade to the suits tied around the waist so we could ventilate. The material coming out of the trench was black & had sewage, chemical & H_2S odors. A lot of the debris appeared to be C&D & a lot of large timber & RR ties. We took 1 sample from ~15' depth. It was evident that Art Becker's backhoe was not going to go to 20' deep like Mike Komoroske (DEC) wanted. He said he wanted a bigger rig. So Art Becker (EDI) filled in the trench. Then we returned on 8/9 to do trench #1. The OVA was over 1000 ppm & we began to get strong odors from the trench so we decided to go to Level B for the personnel at the trench & the backhoe operator. This made things very deliberate & we had to take quite a few breaks, as the weather was very hot & humid. DJH & I did most of the Level B work. KAW also did some of the Level B work. The rest of the crew was for support (the 3 of us only ones who [illegible]. We were able to complete this trench to 19-20'. The next day (8-10) we began trench #3. Mike Komoroske express concern over the location of this trench but we began to get readings on HNU & OVA which diminished Mike's concern over location of Trench #3. Again it was very hot & humid. We then went back to Trench #2 area to do more trenching here. We began to get high H_2S, OVA & HNU readings just when we were about down to 20'. DJH put on Level B to take measurements, & the last sample was taken. Art Becker did the backfilling with his Level B due to the odors & dusts during the backfilling.
(use reverse or additional sheet if necessary)

Lawler, Matusky & Skelly Engineers

Date: 8-7-88
Crew: JMG KMG KMC DJH
Site: Tuxedo C&D

LAWLER, MATUSKY & SKELLY ENGINEERS
FIELD DATA SHEET FOR SOIL/SEDIMENT SAMPLES
Job No: 576-018

Oper: Trenching
Thermometer NO: —

							SAMPLE BOTTLES				
STA. NO.	TIME	SMPL DPTH	METHOD	TEXT.	CLR.	ODOR	SAMPLE PARAMETERS	BOT. Nos.	SAMPLE PARAMETERS	BOT. Nos.	COMMENTS
Trench #2 Sample A	1625	15'	S/S spoon from bucket of backhoe		Blk		VOAs TCL+10 V1 VOAs TCL+10 V1 TCL	3074 3075 3081			

Date: 8/9-10/88
Crew: JMG KMG KMC DJH KAW MC JAC
Site: Tuxedo C&D

LAWLER, MATUSKY & SKELLY ENGINEERS
FIELD DATA SHEET FOR SOIL/SEDIMENT SAMPLES
Job No: 576-018

Oper: Trenching
Thermometer No: —

STA. NO.	Date TIME	SMPL DPTH	METHOD	TEXT.	CLR.	ODOR	SAMPLE BOTTLES				COMMENTS
							SAMPLE PARAMETERS	BOT. Nos.	SAMPLE PARAMETERS	BOT. Nos.	
Trench #1 Site A	8/9/88 1215	18.5'	S/S Spoon from bucket of backhoe		BlK		VOAs TCL^{+10} V_1 VOAs TCL^{+10} V_2 TCL	3347 0448 3077			
Trench #1 Site B	8/9/88 1550	19'	↓		BlK		VOAs TCL^{+10} V_1 VOAs TCL^{+10} V_2 TCL	3078 3079 3080			
Trench #3 Site A	8/10/88 1020	18-19'	S/S Spoon from bucket of backhoe		BlK		VOAs TCL^{+10} V_1 VOAs TCL^{+10} V_2 TCL	3340 3341 3343			
Trench #3 Site B	8/10/88 1130	18-19'	↓		BlK		VOAs TCL^{+10} V_1 VOAs TCL^{+10} V_2 TCL	4407 4408 4406			
Trench #2 Site B	8/10/88 1510	20'	↓		BLK		VOAs TCL^{+10} V_1 VOAs TCL^{+10} V_2 TCL	4420 4390 4421			

Trench Areas

1 of 2

Job No: C96-015
Site: Tuxedo
Oper: Trenching
Crew: [illegible]

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.NU Meter: HNu Meter 013
OVA Meter: [illegible]
Explosimeter: MSA 361 DEC
Date: 8-2-88

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING %LEL	%O₂	OVA READING	H_2S ppm	COMMENTS
0905	Background	0.2*	0%	20.8	4.4 ppm	0 ppm	* HNu set to 1.0 after background reading; readings will be above bkd
1035	[illegible] Trench #2	1.0	0	...		1 ppm	
1101	#2 1-2'	1.2-1.4		-	2.9 ppm*	0-1	* 2.9 is bkgd.
1106	2-3'	1.4-1.8					
1115	4-6	1.5-2.1	-	-	—	-	
1116	5-7				3.8 ppm		
1209	7-8	0.5-1.0	1%			0	from bucket
1223	9'	2-4					" "
1342	6'	4.2-7.2	—	-	0.4 [illegible]	—	At pile
1348	7	2-2.2	under 1	20.6	0.4	0	from bucket
1358	10'	2.8	under 1	20.7	0.4	0	" "
1400	-	1.4*					bkgd moved up to 1.4
1404	≅10'	6.2	under 1	20.8	0.4	0	from bucket
1413	Excavated Crushed Drum	0.0					
1414	~10'	1-1.5	0	20.6		0	from bucket
1420	"	2-10	0	20.6		0	" "
1416	North end of trench					0.5	@ mouth of trench
1426	10'	0-1	2%	20.4		0	Bucket
1435	North of Trench	2-3					10' north of start
1436	in Trench		|			|	

Trench #2

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M [illegible]

(Date) 8-2-88

2 of 3

Trench Area

Job No: C96-019
Site: Toledo
Oper: Trenching
Crew:

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.NU Meter: Hnu 013
OVA Meter: LMS 001
Explosimeter: MSA 361 Dec
Date: 9-2-88

	TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING % LEL	 % O2	OVA READING	H2S	COMMENTS
Trench #2	1525	10-12'	2.6					
	1535	10-12'	2.8	–	–	–	1 ppm	
	1540	12-13'	3.0	–	–	–	12-13	12-13 [illegible] from edge of trench
	1550	13-14'	2.3				2	@ trench

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M [illegible]

(Date) 9-2-88

Page 1 of 2

Perimeter

Job No: 576-019
Site: [illegible]
Oper: Trenching
Crew: [illegible]

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: —
OVA Meter: —
Explosimeter: Exotox 40 LMS
Date: 8-2-88

Trench #2

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING %LEL / %O_2	OVA READING	H_2S ppm	COMMENTS
0900	Background		0% / 20.8%		0 ppm	
	Prior to Trenching (Removing Soil)					
1040	Downwind-North		0% / 21.3%		0 ppm	North of Trench
1045	Upwind-South		0% / 21.3%		0 ppm	South of trench
1050	West		0% / 21.2%		0 ppm	West of trench - Septic odor
Began Trenching #2 @ 1100 hrs						
1115	Down Wind North		0% / 21.3%		0 ppm	
1117	East		0% / 21.4%		0 ppm	East of trench
1120	Upwind South		0% / 21.4%		0 ppm	
[illegible]	Break for drink - crew perspiring heavily					
1210	Down Wind South		0% / 21.4%		0 ppm	
1212	Upwind North		0% / 21.4%		0 ppm	
1220	West		0% / 21.4%		0 ppm	
1245	Down Wind North		0% / 21.5%		0 ppm	
1248	East		0% / 21.5%		0 ppm	
1250	Down Wind South		0% / 21.4%		0 ppm	1324 - Humidity 59%
1335	West		0% / 21.6%		0 ppm	
1347	South		0% / 21.6%		1 ppm *	* Meter appears to be overreading background ranging from 0-4 ppm
1353	East		0% / 21.6%		—	H_2S not [illegible]
1355	North		0% / 21.6%		—	

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M [illegible]

(Date) 8-2-88

Perimeter

Pg 2 of 2

Job No: 576-015
Site: Tuxedo C-D
Oper: Trenching
Crew: JmG....

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.NU Meter: —
OVA Meter: —
Explosimeter: Exotox 40 units
Date: 8-02-88

Trench #2

%LEL %O2

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING		OVA READING	H_2S ppm	COMMENTS
1407	Trench #2 West		0%	21.6%		0 ppm	
1409	South		0%	21.6%		0 ppm	
1410	East		0%	21.6%		0	
1415	North		0%	21.6%		2 ppm	
1435	North		0%	21.5%		4 ppm	
1440	Just west @ HT		—	—		2 ppm	
1518	West		0%	21.5%		0 ppm	
1519	South (Downwind)		0%	21.5%		0	
1520	East		0%	21.5		1	
1522	North		0%	21.5		1	
1540-42	WEST		0%	21.5		3-21	
1555	NORTH		0 %	21.5		2	
1600	East		0 %	21.4		0	
1602	South		0 %	21.4		0	
1628	North		0 %	21.5		2	
1630	East		0 %	21.4		0	
1631	South		0 %	21.4		0	
1635	West		0 %	21.5		0	

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M Guzewich

(Date) 8-2-88

Trenching

Job No: 576-018
Site: [illegible] DIS
Oper: Trenching
Crew: [illegible] knife
[illegible]

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: LMS 001
OVA Meter: LMS 001
Explosimeter: [illegible] & Exotox
Date: 8-09-88

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING		OVA READING	H_2S ppm	COMMENTS
			%LEL	%O_2			
0813	Background	0.3	0%	20.8%	2.5	0ppm	@ 0800 77°F ~~& 76% Humidity~~
↓	↓	↓	↓	↓	↓	↓	↓
0840	Trench #1 4'	4-15			20-60	1	readings taken from bucket
0900	8-10'	5-10			260 w/ S.H. 260-520 w/o S.H.		from bucket
0910	10-11	3-5			[illegible]	0	from BUCKET
0920	13-15	7	0		600 w/o 100 w/	3	from BUCKET
[illegible]	15-16	5	[illegible]	20.4	300 w/o 100 w/	0	from BUCKET
[illegible]	[illegible]	4.8	.01	[illegible]	300	0	from bucket
	[illegible]	6.8	[illegible]	[illegible]	[illegible]	0	[illegible]
[illegible]	[illegible]	[illegible]	0	20.4	[illegible]	0	[illegible]
[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1204		0.5	0	20.4	1000+	1	
1209	18-19'	3-5			1000+		Gray material near crushed drum
1315	Mouth of Trench (SE)				1000+		
1328	18-19'	3-5	1	20.5	100-300	0	from bucket
1337	~3'	peaked @ 10.5 settled out @ 9.8			40-50		

HNU set – 1.0 [illegible] reading [illegible] bckgd

Level 3

Took Samp.

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) ____________________

(Date) [illegible]

Trenching Area

Job No: 376-[illegible]
Site: [illegible]
Oper: [illegible] Trenching
Crew: [illegible] DJH MC
Kurt Konig

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: LMS 001
OVA Meter: LMS 001
Explosimeter: MSA 361 DEC
Date: 8/5/88

Trench #1

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING %LEL	%O2	OVA READING	H2S PPM	COMMENTS
[illegible]	Bucket	1			[illegible]	0	
1427	Bucket	1	<1	20.5	24	^	
1431	Bucket	1			250	0	
[illegible]	[illegible]				40		
[illegible]	[illegible]				22		[illegible]
[illegible]	[illegible]				300		
[illegible]	[illegible]				110		[illegible]
1441	Bucket	2	<2	[illegible]	500		[illegible]
[illegible]	Bucket	2	<2	[illegible]	80		" "
1450	After bucket dump [illegible]	1.8	003	20.5	1000	0	w/out OVA filter
1458	12-15' In Bucket	7.8	003	20.5	400	0	w/out filter on OVA
1505	In Bucket ~13'	1.9	003	20.5	1200	0	
1509	Bucket ~14'				50		w/o filter
1550	Bucket 19'	1.4	001	20.5	300-700	0	w/o filter / Sample Tak Here
1615	Drums by old Milk Truck	—	—	—	—	—	Checked drums w/ Concrete in them w/ Radiation Detector
↓	↓	—	—	—	—	—	readings 0.00 to 0.07 mr/hr

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M [illegible]

(Date) 8-9-88

Trench #1

Perimeter

Job No: 576-013
Site: [illegible]
Oper: Trenching
Crew: [illegible] KMG MG

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: LMS 001 [illegible]
OVA Meter: LMS 001
Explosimeter: [illegible]
Date: 8-9-88

[illegible] KW'G 0840-0910
KAW LMCC 0910-0940
[illegible] MC 0940-

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING %LEL	EXPLOSIMETER READING %O$_2$	OVA READING	H_2S ppm	COMMENTS
0815	Background 50' Downwind (South)		0%	20.8%	–	0	@ 0800 97°F [illegible] Humidity
↓			0%	21.0%		0	Began trench #1 (TP-1 @ 0840
0850	S end of trench		0%	21.0%		2-3	Wind from NE @ ~2-3 mph
0920	Downwind		0%	21.1%		0	Pictures taken of [illegible] ~10-15' [illegible]
0952	[illegible]		0%	21.1%		-1-0	
1235	[illegible] Downwind		0%	21.1%	30-32	-1-2	[illegible] sampling at [illegible]
1530	[illegible]		0%	21.1		-1-2	" " "
1555	BGND		0%		30-32		40-44 Downwind 50' perimeter

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M [illegible]

(Date) 8-9-88

1 of 3

Trenching Area

Job No: 576-018
Site: Tuxedo
Oper: Trenching
Crew: [illegible]

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: LMS #001
OVA Meter: LMS 001
Explosimeter: MSA 361
Date: 8-10-88

	TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING		OVA READING	H_2S ppm	COMMENTS
				%LEL	%O_2			
	0730	Background	0.1	0%	20.8%	3.2	0 ppm	
	[illegible]	Natural Vent [illegible] trees in	Lamp fogged	1-2%	19.7%	10-80	0 ppm	
	↓	SW corner of fill	↓	↓	↓	↓	↓	
Trench #3	0735	Trench #3 before digging	—	0	20.7	6.4	0	
	[illegible]	7-8'	—	0%	[illegible].6	5 [illegible]	0	[illegible]
		[illegible]		0%	20.6	350		from bucket
				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]			[illegible]		15		[illegible]
	[illegible]				[illegible]	[illegible]		50 ppm [illegible]
	[illegible]	[illegible]			[illegible]	[illegible] w/o filter		[illegible]
						25	After filter	
	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	
	[illegible]			[illegible]		[illegible]	0	[illegible]
					6	[illegible]		[illegible]
						[illegible]		[illegible]
				[illegible]	[illegible]			
				[illegible]	[illegible]			
					6			[illegible]

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M [illegible]

(Date) 8-10-88

601

Trenching

Job No: [illegible]
Site: [illegible]
Oper: [illegible]
Crew: [illegible]

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: [illegible]
OVA Meter: [illegible]
Explosimeter: [illegible]
Date: [illegible]

trench #3

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING		OVA READING	H₂S	COMMENTS
			%LEL	%O₂			
[illegible]		[illegible]	0	[illegible]	[illegible]	0	
	[illegible]				[illegible]		
	↓ 18'	420	1.2	20.6	1000+	0	[illegible]
1045		102.0	0	20.5	50	0	
1055	~14 15'	peaked 5.5 settled @ 2.9	1	20.2	40-60	0	
1057	16-18'	0-1			30-100		from bucket
1110	50' perimeter Downwind	0	0	20.4	24-30	0	
1115	Bucket	30-90	0	20.4	0-240	0-1	
1130	17-18' Bucket	120	2	20.5	0-1000+ settled @ 300-400	0	Sampled @ 1130 from bucket
↓	↓	580 when probe placed in a pocket in material in bucket					Paint thinner type odor coming from bucket

took samp

Temp. of air below 10

Temp of air below 100°

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M [illegible]

(Date) 8-10-88

3 of 3

Trenching Area

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

Job No: 576-019
Site: [illegible] C+D
Oper: Trenching
Crew: [illegible]

H.Nu Meter: LMS #001
OVA Meter: LMS #001
Explosimeter: MSA 361 [illegible]
Date: 8-10-88

Trench # 2

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING %LEL	%O2	OVA READING	H_2S	COMMENTS
1300	Bucket 3-4'	1	0	20.6	Background 11	0	septic type odor
1308	Bucket 4-5'	downwind [illegible]	1	20.7	Background 11	0	Rad meter read Background 0.04
1315	Bucket 5-6'	2	0	20.6	Background 11	0	
1335	~ ~~10~~ 12'	20	0	20.6	50-200	0	Bucket
1400	~ 12' →	Hoe operator encountering large sections of tree trunks nested in bottom of hole					
1410	@ trench 12-13'	3-4 peak 5	0	20.5	100-300 peak 500	rose to 11 & dropped back to 3	
1420	@ trench 13'	3-4	1	20.7	200-300	7	
1425	@ trench [illegible]					20	Down wind - breathing zone
1435	50' Perimeter Downwind					1-2	
1455	Crushed Drum liner from ~16'	12.5			1000		Reading @ bung opening (plastic drum liner)
[illegible]	~18'-19'	45	—	—	700 [illegible]	0	from bucket [illegible]
1500	20'	135	1	20.7	1000+ w/o filter		
1450	South West side of trench				1000+ w/o filter	24	We were taking depth measurement & got these readings & went to [illegible] to get reading. Art Becker will backfill trench w/ level B equip due to dust stirring up the fill

OVA had flamed out

Sample Taken

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) Joel M Dugrid

(Date) 8-10-88

1 of 2

Job No: 596.018
Site: Tuxedo C#2
Oper: Trenching
Crew: DH RG KW/SG KW/C
MC JC

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

PERIMETER = 50' around trench

H.Nu Meter: LMS 001
OVA Meter: LMS 001
Explosimeter: Exotox 40
Date: 8-10-88

Trench #2

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING %LEL	EXPLOSIMETER READING %O2	OVA READING	H_2S	COMMENTS
0730	Background / facility	0.1	0%	20.8	3.2	0	78° F @ 0740 87% humidity
0800	Downwind [illegible]		0	20.5		0	
0830	Trench Dn Wind		1	20.6		0	
0835	@ Van [illegible] of trench, ~70'		1	20.6		0	
0845	50 Downwind [illegible]		1	20.7	8-10	0	
0847	North end of trench		1	20.7	12-15		
0849	50 Upwind		1	20.7	9	0	
0858	Boundary (Rt 17) N of trench		1	20.7	-	0	
0900	North end of trench				16		
0901	50' Downwind [illegible]		1	20.7	10	0	
0905	50' Upwind Sample		1	20.6		0	
0935	50' Dn Wind		0.1	20.8		0	* Also see trench results - crew and monitoring @ Perimeter w/ OVA
1030	50' DnWind		0	20.8		0	
1040	50' Dn Wind	0.2 above background (1.2)			22 bkgd - peak [illegible]		
1042	By Rt 17 ~250' NW of trench	1.0			23-24		
1125	50' perim Downwind	—	0%	20.8	22 *	0 ppm	* Bckgd reading

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M Gaguzis

(Date) 8-10-88

1000

At 10' d.d [illegible] Oregon. Tise check. [illegible] [illegible] [illegible]
[illegible] [illegible], [illegible] [illegible], [illegible] on the [illegible], [illegible]
[illegible] [illegible] [illegible]

Trench #2

2 of 2

Job No: 5?6-015
Site: [illegible]
Oper: Trenching
Crew: DH ?G KM?G KW?G MC ?T

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: —
OVA Meter: —
Explosimeter: Exotox 40
Date: 8-10-88

PERIMETER

Trench #2

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING		OVA READING	H2S	COMMENTS
			%LEL	% O2			
1255	Dnwind [illegible]		1	20.6		0	Trench #2
1257	Upwind of trench		0	[illegible]		0	
1342	Dnwind 50' of trench		0	21.1		1	
1414	Downwind of trench		0	21.1		1-2	
1416	Upwind		0	21.1		0	
[illegible]	[illegible]		0	21.1		5-6	
1510	@ trench [illegible]					20	
1515	Dnwind 50'		0	21.2		1	

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M Grzywinski

(Date) 8-10-88

Facility: Nyack
Date: 8/2, 9, 10/88
Calib. By: JMG
Calib. Gas: methane
Zero Air

LAWLER, MATUSKY & SKELLY ENGINEERS
OVA METER FIELD CALIBRATION
DATA SHEET

Job No: 576-019
Site: [illegible] C&D
Crew: JMG ....
Oper: Trenching

			EXPECTED		OBSERVED			
DATE/TIME	METER No.	BATT. CHECK	ZERO	CALIB. GAS (ppm)	ZERO	CALIB. GAS (ppm)	SPAN ADJ. (from — — to)	COMMENTS
8-2-88 JMG 0845	LMS 001	✓	0	95ppm	6	94ppm	3.0 No Adj	Adj Zero to "0" before calib w/ methane
8-09-88 DJM 0740	LMS 001	✓	0	75ppm	6	90ppm	3.0 No Adj	Adjusted Zero to "0" before calibr w/ methane
8-10-88	LMS 001	✓	0	95ppm	3	100ppm	3.0 No Adj	Adj to Zero before calib w/methane

On-Site Health & Safety Officer and/or Crew Chief:

(Signature): John M [illegible]

(Date): 8-10-88

Facility: Nyack
Date: 8/2,9,10/88
Calib. By: [illegible]
Calib. Gas: Isobutylene

LAWLER, MATUSKY & SKELLY ENGINEERS
H.NU METER FIELD CALIBRATION
DATA SHEET

Job No: 576-015
Site: [illegible]
Crew: [illegible]
Oper: [illegible]

DATE/TIME	METER No.	BATT. CHECK	EXPECTED		OBSERVED		SPAN ADJ. (from — — to)	COMMENTS
			ZERO	CALIB. GAS (ppm)	ZERO	CALIB. GAS (ppm)		
8-2-88 | 0900	Hazco 013	✓	0	58	0	48	9.8 → 8.2	Adj Span until meter read 57 ppm
8-2-88 | 11[illegible]	DEC 801446	✓	0	57	0	50	9.8 → 9.72	Adj Span until meter read 57 ppm
8.9.88 | 0650	DEC #801446	✓	0	57	0	64	9.8	Adj Int pot R48 until meter read 57 @ 9.8
8.9.88 | 07[illegible]	LMS #001	✓	0	57	0	49	9.8 → 9.1	[illegible]
8-[illegible]-88 | 0750	LMS #001	✓	0	57	0	56	9.8 No Adjustment	
8-10-88 | 0710	LMS #001	✓	0	57	0	48	9.8 → 8.05	Adj Span until meter read 57 ppm
8-10-88 | 0730	DEC #801446	✓				*		meter will not settle out on any function

On-Site Health & Safety Officer and/or Crew Chief:

(Signature): John M Guzewich

(Date): 8-10-88

Facility: N.yack
Date: 8/2,9,10/88
Calib. By: J-G
Calib. Gas: H_2S
Methane

LAWLER, MATUSKY & SKELLY ENGINEERS
EXPLOSIMETER FIELD CALIBRATION
DATA SHEET

Job No: 576.018
Site: Tuxedo C+D
Crew: [illegible]
Oper: Trenching

DATE	METER No.	BATT. CHECK	EXPECTED ZERO	EXPECTED CALIB. GAS (ppm)	OBSERVED ZERO	OBSERVED CALIB. GAS (ppm)	Zero ADJ. [redacted].	Zero ADJ. [redacted]	COMMENTS AND/OR MAINTENANCE
8-2-88 -980	Exotox 40 (Lms	✓	0	(H_2S ppm 10 ppm	0	10 ppm	1→0		No Span Adj
↓	↓	↓	–	(% O_2) 15.0%	–	15.5%	21.4% →20.9%		↓
↓	↓	↓	0	% LEL 40	0	44%	1→0		↓
8-2-88	MSA 361 DEC	✓	0	(H_2S ppm) 10 ppm	0	9 ppm	–		↓
↓	↓	↓	–	(% O_2) 15.0%	–	15.3%	21.2% →20.9%		↓
↓	↓	↓	0	% LEL (50%)	0	53%	2→0		↓
8-9-88	MSA 361 DEC	✓	0	(H_2S ppm) 10 ppm	0	8 ppm	2→0		ADJUSTED INTERNAL [illegible] TO READ 10ppm
↓	↓	↓	–	(% O_2) 15.0%	–	15.2	21.1% →20.8%		
↓	↓	↓	0	(% LEL) 50%	0	50	4→0		
8-9-88	Exotox 40 LMS		0	H_2S ppm)	0	10 ppm	0-1		No Adj.
↓	↓	↓	–	(% O_2) 15%	–	15.5%	21.3% →21.8		
↓	↓	↓	0	% LEL 40%	0	45%	0-1		

On-Site Health & Safety Officer and/or Crew Chief

(Signature):

(Date): 8-9-88

Facility: Nyack
Date: 8/10/88
Calib. By: Jmg
Calib. Gas: [illegible]
H2S

LAWLER, MATUSKY & SKELLY ENGINEERS
EXPLOSIMETER FIELD CALIBRATION DATA SHEET

Job No: 576-018
Site: [illegible] C&D
Crew: Jmg DJH KMY KM' DK
Oper: Trenching

			EXPECTED		OBSERVED		Zero ADJ.		
DATE	METER No.	BATT. CHECK	ZERO	CALIB. GAS (ppm)	ZERO	CALIB. GAS (ppm)	COMB.	O2	COMMENTS AND/OR MAINTENANCE
8 10-88	MSA 361 OLC	✓	0	(H2S ppm) 10 ppm	0	11 ppm	1 → 0		No Span Adj.
			–	(% O2) 15.0	–	15.7%			No Span Adj
↓	↓	↓	0	(% LEL) 50%	0	50%	1 → 0		↓
8-10-88	LMS Exotox 40	✓	0	(H2S ppm) 10 ppm	0	10 ppm			No Span Adj
			-	(% O2) 15.0%	–	15.2%			
↓	↓	↓	0	(% LEL) 40%	0	45%			↓

On-Site Health & Safety Officer and/or Crew Chief:

(Signature): John M Guzewich

(Date): 8-10-88

REFERENCE 2. APPENDIX A

Crew: JG, DH,
KC, KG, MC, KW

Trenching Field Notes
Tuxedo Landfill
Trench No. 1

Job No: 576-018-8013
Date: 9 August 1988

Its 0825 on 9 August 1988 at the Tuxedo C & D landfill site. We're on site to do the trenching. Background reading at the area of the trench before trenching was .3 on the HNU, 0% LEL, 20.8% O_2 and 0 ppm H_2S.

At 0835, Art began to remove the fill or the cap from the landfill which appears to be about 1 ft deep. At Trench No. 1, we are beginning to get a decomposition-type order and also other odors mixed in. The HNU reading on material from within the bucket taken from a depth of approximately 4 ft, ranged from 4 to 15 ppm, with a reading of 1 ppm on the H_2S meter. From Trench No. 1 at a depth of 4 to 6 ft the OVA reading was 20 to 60 ppm. The meter is reading 20 ppm or more 10 ft from the hole. At 0845 the radiation detector has a background reading on the piled up fill material.

At Trench No. 1 from a depth of 8 to 10 ft. at 0853, readings of 0 to 1 ppm H_2S and 0% LEL were obtained. Odor seems to be more organic than at trench No. 2 which had more of a garbage and hydrogen sulfide type odor. Trench No. 1 also has a hydrogen sulfide order, but also an odor of organics to it. Standing 10 ft from the trench, the OVA is 9 to 10 ppm with the methane filter on it.

At 0900 from Trench No. 1, at a depth of 8 to 10 ft, the HNU reading from the bucket is 5 to 10 ppm, the OVA read 260 ppm with methane the filter, 580 ppm without the filter.

REFERENCE 2, APPENDIX A

At 0910 from the bucket the H_2S reading is 0 ppm, 3 to 4 ppm on the HNU, about 30 ppm on the OVA and 0.01 or 0.07 mr/hr. on the dosimeter. Background reading on the HNU is about 1.3 ppm with background being about 20 ft from the trench on the south side.

At 0913 the background reading was 13 ppm which increased to 20 ppm after the bucket was dumped.

At 0916 the readings from the bucket were 80 ppm on the OVA, 50 ppm on the OVA with a methane filter, 0% LEL, 0 ppm H_2S, and 2 ppm on the HNU.

At 0920 the OVA reading from the last bucket was around 15 ppm. At 0921 the OVA reading from the bucket was 15 ppm.

At 0922 the reading on the OVA was 30 - 35 ppm standing from about 20 ft. to the northwest of the trench. A reading from the bucket was: 600 ppm on the OVA, 7 ppm on the HNU, 3 ppm H_2S, 0% LEL on the CGI. The bucket contained some railroad ties and had a funky smell but we do not know what is causing the 600 ppm reading on the OVA.

At 0929 from the bucket, the readings were: 50 ppm on the OVA, about 0.5 parts per million above the background on the HNu and 0 on everything else.

At 0931 the background reading taken about 20 ft. from the trench is about 15 ppm on the OVA.

At 0933 the readings from the bucket were: 5 ppm on the HNU, 0 ppm H_2S, 300 ppm on the OVA, 100 ppm on the OVA with the methane filter. Material appears to smell like creosote.

REFERENCE 2, APPENDIX A

At 0945 the HNU reading is 2.8 - 3 ppm, CGI is 0% LEL, HNU toped out at 9 ppm. At the bucket from a depth of approximately 17 to 18 ft, the OVA readings were over a 1000 ppm both with and without the organic filter, the HNU readings were 9 ppm and there were no significant readings on the H_2S or CGI.

At 1005 the HNU reading was approximately 2 ppm and the OVA reading without the methane filter was between 50 and 250 ppm.

At 1039 on 9 August 1988, we have been working on Trench No. 1 on the northern side which has now become the downwind direction due to a shift in the wind direction. We are now getting the readings in the breath zone of 100 to 200 ppm on the OVA, also where the backhoe is located we are getting readings anywheres from 20 to 100 ppm on the OVA. We are going to move the backhoe around to the other side and dig the trench from north to south, in other words, from the upwind side of the trench. Background readings taken from the south side (upwind) are: 20.2 - 100 ppm with a peak of 380 ppm. At 1044 background readings are about 50 ppm on the OVA with a methane filter, 0 - 4 ppm on the HNU, 0% on the H_2S.

At 1200, on 9 August 1988, we have upgraded to Level B, using the airlines to continue working on the trench; John Guzewich and Don Henshaw are now monitoring. The backhoe is now on the southside of the trench, digging from south to north, which is on the upwind side.

At 1213 the OVA reading from a bucket that contained a crushed drum was >1000 ppm, so we are taking the first sample from Trench No. 1. The perimeter monitoring readings were around 24 ppm on the OVA, except for the extreme readings of northside which was in the

REFERENCE 2, APPENDIX A

downward direction where we were getting 30 ppm on the OVA. Sampling is being done under level B protection.

The reading from the sample taken at 1215 are >1000 ppm on the OVA, 3 to 5 ppm on the HNU, background on the dosimeter, and 0 ppm on the H_2S meter.

At 1320 on 9 August 1988, we are going with our second round on level B but first we took a depth measurement at the trench of 18 1/2 ft.
OVA readings to the southeast of the trench pegged at >1000 ppm on the OVA.

1324 started up again on the level B.

REFERENCE 2, APPENDIX A

Crew: JC, DH,
KC, KG, JC, MC

Trenching Field Notes
Tuxedo Landfill
Trench No. 2

Job No: 576-018-8013
Date: 10 August 1988

Today is Wednesday, August 10th 1988. We are beginning to excavate Trench No. 2 at the base of the Mahwah sand slope. We began digging the trench at 1250. We paused briefly to record the cap thickness. The cap seemed to be about 1/2 foot thick which was similar to the half-trench we dug that was right next to it on 2 August 1988. The fill that Art is bringing up includes burned wood, tires, some metal (we can't tell if it's a drum or not), some small tree logs, and some plywood. The metal does not appear to be parts of drums. Perimeter reading is background. The fill coming from about the 3 foot depth looks like maybe one crushed five gallon bucket, some pipe, splintered wood, rags, some plastic, some foam and some sandy material.

1300 - We're down to about 3 to 4 feet, we're monitoring the hole, and we're still getting the same type of fill as we did a little bit higher up. We've got some plastic sheets, some rugs, which look like they are mixed in with the wood and other debris.

1315 - The material coming out of the fill contains wood, splintered wood, rotting foam, black sandy material, pipe, rugs, pieces of scrap metal, plywood, some parts of trees, and small logs.

1320 - Art is digging up more foam, parts of roof, coiled, pipe, possibly copper tubing, smaller sheet metal pieces, smaller tubing, and more wood timbers. I don't see any railroad ties over here so far. The wood also seems to be free of marine organisms or similar features.

1325 - Art's down to about 10 ft or 12 ft, and still bringing up wood scraps, some metal, parts of a roof, metal scraps, and tires. There's also rotting foam that looks like either insulation or parts of a roof or something else.

1330 - Perimeter readings with the HNU are background values. Perimeter readings with the OVA are from 15 to 20 ppm with and without the methane filter.

1335 - Art is trying to widen the hole so he can remove a rather large tree or tree trunk that is giving him a lot of problems. He's getting similar material out of all the upper parts, that is plastic, sheeting, timber, scrap metal, wood and some small logs. There's one crushed five gallon plastic bucket, but we don't know what depth it is from. Art's down to about 10 to 12 feet still trying to work on the log.

1340 p.m. - Art has tracted part of the big tree that's been blocking his path.

1344 p.m. - Art's still down to about 12 feet. He's trying to bring out some railroad ties, more plastic, decomposing foam, some carpet, some wood scraps, and metal scraps, etc.

1350 p.m. - Art is still widening the trench a little bit. There are several more logs that are down there that he is trying to dig up. The fill still consists of the same material as before. There's not as much of an on H_2S smell or odors or vapors downwind as there were in the other couple of trenches, at least at this level.

Shift change at 1350 p.m.

Shift change at 1420. Previous shift reported a peak H_2S reading of 11 ppm and a steady 7 ppm in the breathing zone just downwind from the hole. Art is still around 12 feet below grade. He is still moving large tree trunks, large logs and railroad ties in addition to chain link fence, and roofing material.

1430 p.m. - Art is working at approximately 15 feet instead of 12 ft. He's still getting big trees and logs in there. From the last bucket taken from 15 ft., Art just pulled out some tree stumps, tires, some scrap metal, scrap wood and a small propane tank that's dented in but not in bad condition. Correction, the tank is flattened on one side. We're getting more scrap metal, tire rims, small branches in addition to more railroad ties. Art recovered a plastic drum that's crushed which had a reading of 12.5 ppm on the HNU and >1,000 ppm on the OVA.

1440 - Art's still bringing up some logs. He's also bringing up some railroad ties, several car radiators, tires, scrap metal, stoves, scrap wood, and some short logs, concrete blocks. I didn't see him bringing up any more roofing materials, though. I think Art's about 18 feet down, so we're going to get ready to sample. We just took an OVA reading downwind of the trench and had a reading of >1,000 ppm on the meter. We took a depth measurement at 1800 and the hole was about 19 1/2 feet deep. Art's just brought out the last bucketful and we're going to be taking a sample. The readings on the bucket that we're sampling from are HNU went up to 100 - 150 ppm and the OVA pegged out at >1,000 ppm with and without the methane filter. Downwind in the breathing zone, H_2S is 20 ppm, HNU was steady at 130 ppm with a maximum reaching of 150 ppm. H_2S meter reading at 50 feet downwind reads 1 to 2 ppm. Completed sample collection at 1517.

1520 - Art has begun to fill trench #3 and that's the trench that's closest to 17. He's got his Level B equipment on. We are going to have him use Level B to fill the other trench as well. The trench we

REFERENCE 2, APPENDIX A

just completed had high OVA readings as well as dust in the air. That's why we requested Art to fill everything in at Level B.

REFERENCE 2, APPENDIX A

Crew: JG, DH,
KC, KG, JC, MC

Trenching Field Notes
Tuxedo Landfill
Trench No. 3

Job No: 576-018-8013
Date: 10 August 1988

This is Wednesday, August 10, 1988. We will dig Trench No. 3, which is nearest to Route 17. Trenching from the end at 0800, Art has dug through about 2 ft of Mahwah sand. We are in some material that looks like natural fill, although it could be road base, we're not sure yet. Background OVA reading is 8.2 ppm. The OVA has gone up as high as approximately 50 ppm so far, but then decreased. We're still in the fill which looks to be natural but we're still trying to decide if it is road base or not. The smell is not of a natural material. We've broken through the cover material, which had a total thickness is about 5 to 6 ft. We have about 2 ft of Mahwah sand and about 4 ft of "natural looking fill", which has a lot of stones in it, and is very sandy. Meter readings are: Oxygen normal, 0 ppm hydrogen sulfide, 0% LEL. OVA readings are background, even though a slight smell, almost a septic type smell, is noted.

0825 - Art has moved some of the clean, cover material away and is now digging into the actual fill. The fill coming out of the hole consists of some burnt wood, or sand, and some paper with everything blackened. The OVA went up to 50 ppm briefly but then dropped back down to background as the pile of fill was monitored. As Art dumps the fill on the pile, we have wiffs of hydrogen sulfide. As we monitor the pile, it appears to be warm.

0835 - Art just brought up a bucket of fill. The fill consists of some pieces of metal which don't look like drums, more wood and debris. The OVA just topped out at 110 ppm then went back to background. No abnormal readings on the H_2S meter on all three settings. Art brought up a piece of metal, which doesn't appear to be a drum. The metal is crushed. No positive readings on the dosimeter, all readings are normal, with no indication of any radiation.

Shift change at 0839.

0905 - There are various pieces of metal which may or may not be drums, tree trunks, foam and something that looks like a car seat.

Shift change 0905.

Perimeter OVA readings at 0910 vary between 20 and 45 ppm. Perimeter readings taken from 50 ft downwind after monitoring a bucket taken at 1013 are basically 0 ppm on the HNU, however there is some H_2S smell. The reading from the OVA ranged from 10 to 40 ppm. Approximately 75 ft away from the pit in the downwind direction, readings from the OVA are just background, which are approximately 10 ppm.

0920 - Material or fill coming out of the hole still consists of wood, wood fragments, logs, stones, cushions, pieces of metal that do not appear to be drums, various logs, rubber tire, and pieces of pipe. Depth is approximately 10-12 ft. Some bricks and concrete blocks are removed from the trench.

0925 - The fill coming out of the hole still consists of pipe, wood, some bricks and carpet. None of the wood consists of or appears to have any marine borings such as shells or barnacles on them.

REFERENCE 2, APPENDIX A

0925 - We're going to take a sample but the HNU is acting funny by giving us negative readings which is probably caused by the high humidity.

0930 - The readings at the 50 ft perimeter with the HNU were background readings. Readings at 0930 with the OVA at the 50 ft perimeter were also background.

At 0935 the material from the bucket consists of tires, metal that's not a drum, wood fill, stones, sandy material, bricks, metal, cloth which looks like some foam that's been decomposed and plastic and plastic bottles.

0935 - shift change. We have steam coming out of the last bucket. It could be due to volalitizing water or vapors, but we don't know.

0945 - We are letting Art take a break, so we are going to be measuring some vapors and also using some Drager tubes to find out what the vapors are. We think the vapors are steam that's been generated by methane in the water in the fill. The trench appears to be about 18 ft deep or so. The fill coming out of the trench still consists of wood, metal, one 5 gallon metal can that's crushed, papers, timbers, and we are also getting a lot of plastic sheeting.

1005 - We are still using Drager tubes to determine what the odor is. We took OVA readings directly at the top of the trench down a little bit and then up in the breathing zone. The readings range from 80 to 240 ppm with the meter generally reading about 120 ppm. HNU readings on the sample in the bucket were 5.2 ppm above background. Other HNU readings of materials in the bucket were 420 ppm. At 1010 we are collecting a sample from a bucket of material that has come from 18 ft below grade. We kept getting negative deflection on the HNU meter indicating high moisture content in the material. We ran the material through a Drager test and we got significant readings on the poly test tube. The benzene tube indicated very little if anything maybe a few xylene or toluene-type products. Hydrocarbon tube read basically negative. The HNU is reading about 420 ppm after we let the bucket sit for 15 minutes or so we decided to take a sample at this depth. Art is now continuing to dig the trench.

At 1100, we measured the trench distance. Art is now working on a trench about 32 ft length. The bottom of the trench is between 16 to 18 ft deep for a 10 ft length of the trench.

1106 - Trench No. 3 depth is approximately 15 ft. Readings on the HNU are 22 ppm and over 50 ppm on the OVA. Additional readings on Trench No. 3 are: 240 ppm on the OVA, 2 ppm on the toxicity meter, 2 ppm H_2S, and 9 ppm on the HNU. The trench is now extended 19 ft laterally.

1115 - We are about 16 to 18 ft deep. The same material is coming out of the hole as before, that is wood, soil, etc. Material coming out of the hole still consists of wood, some small logs, plywood that's been broken up, small pieces of metal, there a couple of plastic pails that have been crushed, some rocks and cloth. The wood doesn't appear to have any evidence of marine boring organisms or marine attaching organisms. Trench No. 3 ended at approximately 1130. It was not backfilled. We are beginning to do Trench No. 2.

1 of 2

LAWLER, MATUSKY & SKELLY ENGINEERS
CREW CHIEF REPORT AND INCIDENT SHEET

Crew Chief: JMGurewich Survey(s): Tuxedo Test Pits Job No. 576-018

Survey Date(s): 12/12,13/88 Vehicle: Cube Van Blue Truck Crew Members: SMH KMG SM

12/14/88 Equip on site was Steam-cleaned

SURVEY INFORMATION

1. Survey start/end time ~0600-1830 0609-1900
2. Equipment prepared for survey/safety equipment present? Yes
3. Sampling gear working properly? Yes/No
4. Physical/chemical meters functioning properly/ID numbers recorded? Yes
5. Any incidents or mishaps? No
6. Any unusual or important observations/time lost? No
7. Weather observations/marine radiotelephone log/boat and vehicle logs/incident sheet completed? Yes
8. Equipment usage sheet completed and submitted to Warehouse Coordinator? Yes
9. Boat fluids, equipment, etc. checked? —
10. Vehicle fluids, equipment, etc. checked? No
11. Boat(s) Used — Engine Hours — to

Radio Log: Boat — From ___ to ___ Location —

INCIDENT REPORT AND COMMENTS (Include number and explanation): Survey went OK. The first day (12-12) was very cold (5°F in morning, 13°F in afternoon) We arrived on site to get ready and calib meters. A few of the meters did not seem to respond properly a few times (see H&S sheets) due to the cold conditions. We kept our air cylinders warm in the cube van using space heaters + 6500 w generator in case we had to use the Level-B equip. (We did not have to use it either day). Art Becker of EDI arrived ~ 11:15. He began digging Test Pit #1 near the Trench #3 location. We monitored the material coming out of the pits and the perimeter around the pits with HNU, MSA 361, Exotox 40, Dosimeter Rad Meter + Draeger Tubes. Mike Komoroske + Dan Eaton of the NYSDEC took care of all the bottle labelling, chain of custodies + packaging of all the samples. We used 6 different lab locations for all of the parameters + dup samples: (Compuchem Labs, Research Triangle Park NC; VERSAR, Springfield VA; Enseco - Cal Lab, West Sacramento CA; Enseco / ERCC, Cambridge MA; Enseco - RMAL, Arvada, CO; York Labs, Monroe, Ct. We took 2 sets of samples from each pit. We were able to complete TP # 2 in the afternoon. It was located near the top edge of the hill between Trench #3 + Trench #2. We delivered a couple of coole to Fed X in Mewah NJ on the way back to Nyack. The next day (12-13) we sampled TP # 3, 4 + 5. The weather was more favorable temp. wise (19°F - 23°F) but it flurrie all day. We began at TP # 3 near the Trench #2 location. Art had a lot of

(use reverse or additional sheet if necessary)

2 of 2

ROUTE

LAWLER, MATUSKY & SKELLY ENGINEERS

INTEROFFICE MEMO

TO File

DATE 12/12-13/88

JOB NO 576-018

FROM JMG

RE Tuxedo Test Pits

difficulty getting through the frozen ground (1-2' thick) here. The surface here is hard-packed red-brown fine sand soil w/ cobbles. It took ~2+ hrs to get down to 7-8' to collect #3-A sample. Mike Komoroske wanted to leave this hole and ~~to~~ go back up on the higher lift and dig TP #4 at the edge of the hill above SSP-23. This went much easier. We took sample 4-A @ 8' and 4-B @ 10'. Then we went back to TP #3 and dug down to 9' to take sample 3-B. Mike decided to dig the last sample at the foot of the hill near SSP-23 instead of trying to dig another pit in the frozen red-brown cove near Trench #1 as originally proposed. It was a little frozen here but not as bad as TP #3. We took 5A sample at 7' deep and the TP 5-B sample @ 10' deep. We then packed up the trucks & got ready to leave. Art Becker filled in all the pits & then dumped clean fill on top of all of them. Mike Komoroske said we should get more fill & a dozer to compact the pits & grade them off. Art mentioned that we should let the pits settle a bit first; Dan Eaton agreed with this. We dropped off samples at Fed-X before returning to Nyack. The next day KMG & SM steam-cleaned both rigs on site before they were returned.

1 of 3

ROUTE	

LAWLER, MATUSKY & SKELLY ENGINEERS INTEROFFICE MEMO

TO File DATE 12-12-88 JOB NO 576-018

FROM Crew/JMG KMG [illegible] RE Tuxedo Test Pits

[illegible] Arrived on site Met Mike Komoroske + Don Eaton of DEC
- Temp ~ 5°F w/o wind chill
- Strong H_2S odor on site

0900 - 0940 Let HNUs, MSA & Exotox warm up in Cube Van
- running space heaters in van w/ generator
- calib. went OK except MSA LEL reading very low

0920 - 1030 - Took readings of soil gas points in the area of trenching

[illegible] Art Becker of EDI arrived ([illegible])

1145 Set up - began at test pit #1 (near Trench #3)
[illegible] very difficult [illegible])
[illegible]
[illegible] permeable [illegible] thick
0- [illegible]
1-2' [illegible] brown [illegible]
2' [illegible]
- looks [illegible]
[illegible] graphite [illegible] silt also
3 [illegible] to 7'
4 [illegible] decreased [illegible]
[illegible]
[illegible]

Page 3

LAWLER, MATUSKY & SKELLY ENGINEERS **INTEROFFICE MEMO**

TO File

DATE 12.12 [illegible]

JOB NO [illegible]

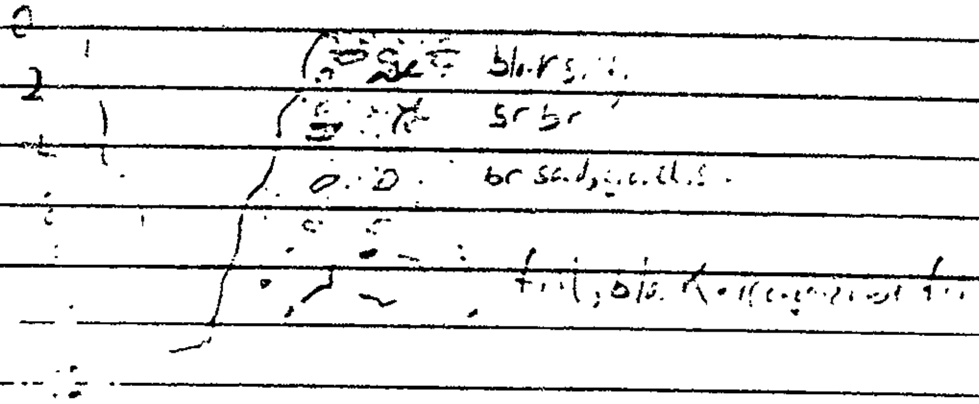
FROM Crew / [illegible]

RE [illegible]

1235 9½' Drill [illegible]

[illegible]

[illegible] Sample [illegible]



0
2
blk r s
sr br
br sand, gravels
fill, blk [illegible]

[illegible] 1st [illegible] 13' [illegible]

Sample # 1-A 11' deep

1330 Sample # 1-B 13' deep

[illegible]

1345 Temp of material from 13' 8.5°C [illegible]

[illegible]

3 of 3

ROUTE

LAWLER, MATUSKY & SKELLY ENGINEERS INTEROFFICE MEMO

TO E.L.		DATE 12-12-88	JOB NO 576-01E
FROM Crew/[illegible]	RE Tuxedo Test Pits		

[illegible] Began Test Pit #2

- top of slope between Trenches #2 + #3

[illegible] easy breaking [illegible]

[illegible]

"#2-A" [illegible]

7.6 [illegible]

[illegible] 13°F [illegible]

#2-B

[illegible] End sampling, finished backfilling @ 1620

630 Left Site

- day was sunny + very cold: 5°F in morning; 13°F when we left

Job No: 576-018
Site: Tuxedo Ct D
Oper: Test Pits
Crew:

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: 801446 / 801439 DEC / DEC
OVA Meter: —
Explosimeter: MSA 361 DEC
Date: 12-12-88

Test Pit #1

TIME	SAMPLE LOCATION	H.NU READING 801446	EXPLOSIMETER READING % LEL	% O2	HNU 801439 READING	MSA 361 H2S ppm	COMMENTS
1130	Bckgd	below zero	1%	20.2%	0.3 *	001	# HNU Adj to 1.0 after bckgd reading
1202	Test Pit #1		1%	20.0%	B.G	000	
1210	" 0-2'	Bckg	"	"		0	
1221	Calibration	"	"	"		8	Allowed H2S calib gas to adjust w/ [illegible] & recalibrated
1225	~4' material	"	—	—		2-3	Head space Readings
1230	7-8'	15	-	-	-	-	-
1335	8'					7	off of pile
1235	8' material	3				3-4	head space
1238	8-9' material	3				5-6	
1247	9.5'	5	-	-	-	3	head space
1250	10.0'	3	-	-	-	7	Out of Bucket (sample).
1310	"	3				1	sample #1A
1320	12'	—	—	—	18	2	headspace reading
1325	13'	~~#~~			1.0	3	sample #1B
	~~Test Pit #2~~						

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M

(Date) 12-12-88

* Took a few readings on material w/ Rad Meter / No Readings

Job No: 576-018
Site: Tuxedo
Oper: Test Pit.
Crew: EMH KM'G SM

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: DEC 801446
OVA Meter: —
Explosimeter: MSA
Date: 12-12-88

MSA

	SAMPLE LOCATION	801446 H.NU READING	EXPLOSIMETER READING % O_2	 ppm H_2S	Hnu 801439 [redacted] READING	COMMENTS
TIME						
T#2 1449	Test Pit #2	0-10	20.8	1		Material from 1-3'
1452	3-4'	20-30	20.8	26		Headspace
1510	6'	—		—		Took sample #2-4
1524	~7	10-15	20.8	1		Headspace MSA & [illegible] do not seem to be responding - cold
V 1632	~9'	20-30	20.8	2-3		Headspace

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M Guzewich

(Date) 12-12-88

Job No: 574-015
Site: Tuxedo C&D
Oper: Test Pits
Crew: JmG Erik Sm KmG

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET
Test Pits

H.Nu Meter: DEC 801446 DEC 801429
OVA Meter: —
Explosimeter: Enmet 40
Date: 12-12-88

801446 Perimeter Readings

	TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING		OVA READING	COMMENTS
				% LEL	H2S ppm		
Test Pit #1	1150	Test Pit #1 Perimeter		03	0		HNU is not functioning properly (temp = 10-12° F)
	1205	"		03	0		
	1213	Rt 17 bound closest to pit	Bckgd	03*	1		* same as backgd HNU working at this time 801446 (we are keeping it in truck when we can)
	1217	50' perim Downwind		03	'		
	1230	"	Bkgd	03	1		
	1320	"	Bckgd	03	0		
Test Pit #2	1445	Test pit #2 perim	Bckgd		1		all around pit
	1455		.2		1		
	1520	Downwind	Bckgd		2-3		

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M Guzewich

(Date) 12-12-88

1 of 3

ROUTE

LAWLER, MATUSKY & SKELLY ENGINEERS **INTEROFFICE MEMO**

TO File	DATE 12-13-88	JOB NO 576-018
FROM Crew	RE Tuxedo C+D Test Pits	

[illegible] Arrived on Site 19° F

[illegible] Mike Komeroske + Dan Eaton arrived

[illegible] Completed calib + set-up

0840 Began at Test Pit #3

[illegible]

[illegible]

[illegible] 8'

[illegible] 10 [illegible] "permafrost" [illegible]

[illegible] 2½ [illegible] 1-5' [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] down ~ 4-5' in [illegible] hole but [illegible] slow time

[illegible] so he can get deeper.

[illegible] Komeroske said [illegible]

[illegible]

[illegible] H-S [illegible] 30' [illegible]. 1-2 ppm H₂S [illegible]

[illegible] fill

[illegible] 3-4 [illegible], 3 HNU

1100 3A Sampling at 4-8' 24.5 °C from [illegible] hole

1115 [illegible] Backhoe [illegible] fill on "permafrost" where he needs to dig in order to go deeper

2 of 3

LAWLER, MATUSKY & SKELLY ENGINEERS INTEROFFICE MEMO

TO [illegible]		DATE 12-13-88	JOB NO 576-015
FROM [illegible] SM KMC	RE [illegible] Test Pits		

[illegible] Moved up to crest of slope above SSP-23 to try [illegible] with other pit "permafrost" warm up

[illegible] Tube reading of gas coming out of Pit # 3 [illegible] need ~ 70 ppm H_2S
Art Becker began digging Pit # 4 above SSP-23

[illegible] perforation

1210 Sampled TP # 4A 8' deep : 32° + C

1235 Sampled TP # 4B 10 deep 28°C
ambient Temp [illegible]°F

1310 Return to TP# 3 - extend Test Pit length - break the 'perma' frost

1400 Took sample # 3-B at 9' depth

1420 Finished sampling, Art Becker closing hole

1420 Mike wants to take sample @ foot of slope below SSP-23

1430 Art began digging TP # 5 @ foot of slope ~ 10-15' north of SSP-23

3 of 3

LAWLER, MATUSKY & SKELLY ENGINEERS **INTEROFFICE MEMO**

TO File
DATE 12-13-88
JOB NO 576-018
FROM SMH KMG SM JMG
RE Tuxedo C&D Test Pits

1450 Still working on breaking through frozen crust for TP #5 near SSP #23

1450-1520 Reporter in white car taking pictures from Rt 17 & observing

1515 - Took sample # 5-A 7' Deep

1535 - Truck found in debris ~7' down

1555 Took sample # 5-B 10' deep
- then began packing up

1700 - One crew took samples to Fed-X for NYSDEC

Job No: 576-018
Site: Tuxedo
Oper: Test Pits
Crew: [illegible] Jng

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

Tuxedo

H.Nu Meter: 801446 DEC / 801439 DEC
OVA Meter: —
Explosimeter: MSA DEC
Date: 12-13-88

	TIME	SAMPLE LOCATION	801446 H.NU READING	%LEL EXPLOSIMETER READING	%O2	H2S READING	801439 HNU	COMMENTS
	0850	Bckgd	0.1	0	20.8	0	0.1	
TP#3	1018	TP# 3	5-7	0	20.8	1	–	3-4'
	102[illegible]	TP# 3	10	0	20.8	[illegible]	–	[illegible]
	1135	TP# 3				100-120		over open hole left meter downwind side. open pit
	↓	↓						* Drager Tube read ~70 ppm
✓	1140	TP# 3	19	–	–	–	–	open pit down wind side
TP#4	[illegible]5[illegible]	TP# 4	9	–	–		–	off pile 3-4' deep
TP#3	[illegible]	TP# 3	~~2-2.5~~				2-2.5	off pile ~8'
	[illegible]	TP# 3					7-8'	off pile ~8-9'
	[illegible]	TP# 3					5-10	[illegible] 8-9
	[illegible]17	TP# 3					12-18	off pile ≥9'
✓ TP#5	1540	TP# 5				4-6	1-10	10 downwind of pit
	[illegible]					23	~~[illegible]~~	"
	[illegible]	"				2-3		~100' downwind on top of slope
	154[illegible]	"				0		along Rt 17
✓	1550	"				32	5-15	10' deep material

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M [illegible]

(Date) 12-13-88

* Took a few readings on material w/ Rad meter / No readings

Job No: 576-017
Site: Tuxedo C+D
Oper: Tuxedo Test Pits
Crew: Jm G, Emil, Sm, KM'G

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

Tuxedo Test Pits
Perimeter Readings

H.Nu Meter: DEC #01446 / DEC #01459
OVA Meter:
Explosimeter: Exotox / DEC #3
Date: 12-13-88

	TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING %LEL / %O2	H2S READING	COMMENTS
#3	0858	Test Pit #3	.1 Background	0 / 20.8	000	0830 - 19°F, Cloudy, NE wind
	0925	"	Bckgnd.	0 / 20.8	000	Flurries.
	0932	"	"	0 / 20.8	0	
	0950	"	"	0 / 20.8	0	
	1012	TP#3 up	"	0 / 20.8	0	
		TP#3 Down	.2	0 / 20.8	1	
	[illegible]	"	3		4	
#4	[illegible]	TP#4	[illegible]	[illegible]	[illegible]	
	[illegible]	TP#4	[illegible]			
	1150	TP#4	1.5	0 / 20.8	3	
	[illegible]	TP#4 up	Bckgnd	0 / 20.8	[illegible]	
	1155	Roadside Rt 17	Bckgd	0 / 20.8		~ downwind of TP#4
	[illegible]	[illegible]	2	0 / 20.8	[illegible]	
	[illegible]	[illegible]	[illegible]	0 / 20.8	0	
#3	335	TP#3 Downwind	.4-.8	0 / 20.8	Exotox MSA 2 0	
	350	[illegible]	1-2.4	0 / 20.8	4 10	
TP#5	1150	[illegible]	Bkgd	0		
	[illegible]			[illegible]	[illegible]	
	[illegible]		1.2-1.8	[illegible]	[illegible] 2	
	[illegible]		[illegible]	[illegible]	[illegible]	7'

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M Gyenicl

(Date) 12-13-88

Crew: JMG EMH DM MHG
Date: 12-12-78 / 12-13 78
Job No: 576-018

LAWLER, MATUSKY & SKELLY ENGINEERS
FIELD METER CALIBRATION AND/OR CHECK
DATA SHEET

Site: Tyrelle C&D
Oper: Test Pits
Calib. By: JMG

	METER NO./ PROBE No.	TIME	THERM No./ TEMP. (°C)	EXPECTED VALUE	OBSERVED VALUE	ADJ TO[a]	% DIFF.[b]	COMMENTS
12-12	DEC 801446 HNU	0945	-5°F	57 ppm Isob	50 ppm	57 ppm*		*Adj. span from 9.8 to 8.66 until meter read 57 ppm
12-13		0805	-18°F	57 ppm Isob.	56 ppm	8.66 span No Adj		
12-12	DEC 801431 HNU	0945	-5°F	57 ppm Isob.	50 ppm	57 ppm	*	*Adj. span from 9.80 to 8.48 until meter read 57 ppm
12-13		0805	-18°F	57 ppm Isob	57 ppm	8.48 span No Adj		
	DEC MSA 361 CGI, O2, H2S	1000	~5°F	50% LEL	11%			
				15.0% O2	15.1%			
				10 ppm H2S	10 ppm			
12-12	LMS Exotox 40 CGI, O2, H2S	1000	-5°F	15.0% O2	15.4%			* No %LEL Gas available
				10 ppm H2S	10 ppm			
12-13		0805	~18°F	15.0% O2	15.4%			
				60 ppm H2S	43 ppm			
12-13	DEC MSA 361	0805	-18°F	50% LEL	12% LEL			
				15.0% O2	15.1% O2			
				60 ppm H2S	43 ppm H2S			

---

[a] For dissolved oxygen and pH meter calibrations, record adjustments (include % and ppm readings for dissolved oxygen meter calibration).

[b] Include % Diff. calculation for conductivity calibration checks: $\% \text{ Diff} = \frac{Ex - Ob}{Ex} \times 100$

REFERENCE 3

KAW

LAWLER, MATUSKY & SKELLY ENGINEERS
CREW CHIEF REPORT AND INCIDENT SHEET

HSO

Crew Chief: Jim Guzewich Survey(s): Tuxedo C&D Well Install Job No. 576-018

Survey Date(s): 7/18-29/98 Vehicle: Cube Van Crew Members: KW'G

SURVEY INFORMATION

1.	Survey start/end time	/
2.	Equipment prepared for survey/safety equipment present?	Yes
3.	Sampling gear working properly?	No *
4.	Physical/chemical meters functioning properly/ID numbers recorded?	Yes *
5.	Any incidents or mishaps?	Yes
6.	Any unusual or important observations/time lost?	No
7.	Weather observations/marine radiotelephone log/boat and vehicle logs/incident sheet completed?	Yes
8.	Equipment usage sheet completed and submitted to Warehouse Coordinator?	Yes
9.	Boat fluids, equipment, etc. checked?	—
10.	Vehicle fluids, equipment, etc. checked?	Yes

11. Boat(s) Used — Engine Hours — ~~to~~

Radio Log: Boat — ~~From~~ to — ~~Location~~

INCIDENT REPORT AND COMMENTS (Include number and explanation): The well installation went a little longer than anticipated. We did not get any significant readings w/ HNU or MSA 361 at any of the wells. MW-5 + MW seemed to yield the highest readings. * The HNU #801446 did not seem to function properly due to the humidity. It showed quite a bit of drift

(use reverse or additional sheet if necessary)

Lawler, Matusky & Skelly Engineers

576-017

Toreda C&D Site

NYSDEC

DAILY HEALTH AND SAFETY REPORT

Date: 7.19.88

Background HNU Reading (Measured at Emergency Staging Area): 0.1

Background H_2S Reading (Measured at Emergency Staging Area): 0 ppm

Background EXP Reading (Measured at Emergency Staging Area): 0% LEL

Background OXY Reading (Measured at Emergency Staging Area): 20.8%

Work Area and Task: —

Level of Protection Required:

Work Area and Task:

Level of Protection Required:

Comments: KMG + I waited for the drillers to show up (were sched. to arrive @ ~1200). Marsden Chen + Burt Pine of DEC showed up around noon. We toured the site and waited until ~1600 before we decided they were not arriving. Only background readings were taken with the air monitoring instruments.

On-Site Health and Safety Officer: John M Guzewich

Note: Readings at work site are recorded on separate table.

576-018

Tuxedo C&D Site

NYSDEC

DAILY HEALTH AND SAFETY REPORT

Date: 7-19-77

Background HNU Reading (Measured at Emergency Staging Area): 0.2

Background OVA Reading (Measured at Emergency Staging Area): —

Background EXP Reading (Measured at Emergency Staging Area): 0% / 0ppm H_2S

Background OXY Reading (Measured at Emergency Staging Area): 20.9%

Work Area and Task: Well Drilling + Installation @ MW-1

Level of Protection Required: Level D

Work Area and Task:

Level of Protection Required: Level D

Comments: Survey went fine. Rain + high humidity rendered the H.Nu useless until the afternoon. During the drilling of MW-1 the standby reading kept drifting back and forth & would not settle down until near the end of the day. The split spoons looked clean + had no odor. The meter showed no readings when it was working properly.

On-Site Health and Safety Officer: John M Guzewich

Note: Readings at work site are recorded on separate table.

1 of 2

Job No: C86-018
Site: Tuxedo C&D
Oper: Will Kastell
Crew: Jim G. King

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: NYSDEC #201446
OVA Meter: —
Explosimeter: MSA 361 NYSE
Date: 7-19-88

% LEL % O_2 ppm H_2S

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING		[redacted] READING	COMMENTS
1705	Background	— *	0%	20.9%	0.	* Too humid for H.Nu
1215	5' From Culvert	—	0%	20.8%	0	
1217	Pitch c Manhole Culvert	—	over 100%	10.1%	100-130 ppm	
1645	Background	0.2	0%	20.8%	0 ppm	

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M Gaziewich

(Date) 7-19-88

2 of 2

Job No: 576-018
Site: Tuxedo Co.D
Oper: Walt Endall
Crew: Inc. KM's

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: DFC 801446
OVA Meter: —
Explosimeter: MSA 261
Date: 7-19-88

%LEL %O_2 H_2S ppm

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING	~~OVA~~ READING	COMMENTS
1304	MW-1, 0-2'	0	—	—	
1314	MW-1 2-4'	0			
1324	MW-1 4-6'	0			
1336	MW-1 over hole	0	0% 20.8%	0 ppm	
1338	MW-1, 6-8'	0			
1345	MW-1, 8-10'	0			
1400	MW-1 10-12'	— *			* Humidity causing H-nu to go off scale ... no reading
1413	MW-1, over hole	—	0% 20.7%	0 ppm	
1417	MW-1 12-14'	0			
1424	MW-1, 14-16'	0			
1437	MW-1, 19-21'	0			

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M Gazewich

(Date) 7-19-88

576-018

Tuxedo C+D Site
NYSDEC

DAILY HEALTH AND SAFETY REPORT

Date: 7-20-88

Background HNU Reading (Measured at Emergency Staging Area): * Meter off scale (Too humid)

Background [redacted] H_2S Reading (Measured at Emergency Staging Area): 0 ppm

Background EXP Reading (Measured at Emergency Staging Area): 0% LEL

Background OXY Reading (Measured at Emergency Staging Area): 20.8

Work Area and Task: MW-1 Well Install

Level of Protection Required: Level D

Work Area and Task: MW-2 Well Drilling

Level of Protection Required: Level D

Comments: Survey went fine. MW-1 was finished (except for outside protective casing) Then MW-2 was started. It was too humid for the HNu all day today

On-Site Health and Safety Officer: John M. Guzewich

Note: Readings at work site are recorded on separate table.

1 of 1

Job No: 596-015
Site: [illegible]
Oper: [illegible]
Crew: [illegible]

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: NYSDEC [illegible]
OVA Meter: —
Explosimeter: [illegible]
Date: 7-20-88

%LEL ' %O2 H2S [illegible]

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING	READING	COMMENTS
1335	MW-2 5-7	—*	0% 20.8%	0ppm	* Too humid, meter off scale
1350	[illegible]	—	2% 19.0%	0ppm	[illegible]
1425	MW-2 6-6.75'	—	0% 20.8%	0ppm	Refusal @ 2' [illegible]

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M Guzewich

(Date) 7-20-88

Tuxedo C+D Site

576-018

NYSDEC

DAILY HEALTH AND SAFETY REPORT

Date: 7-21-88

Background HNU Reading (Measured at Emergency Staging Area): — Too humid

Background [redacted] H_2S Reading (Measured at Emergency Staging Area): 0 ppm

Background EXP Reading (Measured at Emergency Staging Area): 0% LEL

Background OXY Reading (Measured at Emergency Staging Area): 20.8%

Work Area and Task: MW-2 Drilling + Installation

Level of Protection Required:

Work Area and Task:

Level of Protection Required:

Comments: Weather conditions were too humid for HNU

On-Site Health and Safety Officer: John M

Note: Readings at work site are recorded on separate table.

1 of 1

Job No: 276.018
Site: [illegible]
Oper: [illegible]
Crew: [illegible]

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.NU Meter: LLC # 901546, 80
OVA Meter: —
Explosimeter: [illegible] LLC
Date: 7.21.88

TIME	SAMPLE LOCATION	H.NU READING	% LEL % O_2 EXPLOSIMETER READING	H_2S [illegible] READING	COMMENTS
[illegible]	[illegible]	—	0% 20.8%	0	* Too humid for [illegible] HNU:
1020	Background	—	0% 20.8%	0	
1845	Background	—	0% 20.8%	0	

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M Guzewich

(Date) 7-21-88

Toxedo C+D Site 576-018

NYSDEC

DAILY HEALTH AND SAFETY REPORT

Date: 7-22-88

Background HNU Reading (Measured at Emergency Staging Area): 0.1

Background [redacted] H_2S Reading (Measured at Emergency Staging Area): 0 ppm

Background EXP Reading (Measured at Emergency Staging Area): 0% LEL

Background OXY Reading (Measured at Emergency Staging Area): 20.8 % O_2

Work Area and Task: MW-7 Drilling + Installation

Level of Protection Required: Level D

Work Area and Task: --

Level of Protection Required:

Comments: Weather conditions not as humid as the last few days but HNU (#801446) still not working properly Seems to drift up + down all day, readings were taken when the meter seemed somewhat stable. I got no readings over the spoons or over the hole. H.NU problem may not be the humidity; moving the probe + wire around seems to cause drift

On-Site Health and Safety Officer: John M. Guzewich

Note: Readings at work site are recorded on separate table.

Job No: 576-018
Site: Tuxedo C&D
Oper: [illegible]
Crew: JMG KMG

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: HY3DEC # 80446
OVA Meter: —
Explosimeter: MSA 361 NY:t
Date: 7.22.88

% LEL | % O2 H2S ppm

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING	READING	COMMENTS
0920	Background	0.1	0% 20.8%	0 ppm	
1015	MW-7 6-8'	0.0*			
1025	MW-7. 8-10'	—			HNu not working
1028	MW-7 10-12	0.0*	0% 20.8%	0 ppm	
1042	MW-7 12-14	0.0*			
1055	MW-7 14-16	0.0*			
1105	MW-7 16-18	0.0*			
1115	MW-7. 19-20'	0.0*	0% 20.8%	0 ppm	
1127	MW-7. 20-22'	—			HNu not working; moving the probe around caused meter to drift up & down
114[illegible]	MW-7 22-[illegible]	—	0% 20.8%	0 ppm	
1200	MW-7 over auger	—	0% 20.8%	0 ppm	
↓	MW-7 in hole around auger	—	0% 20.8%	0 ppm	

HNU
* Read
are c
backg

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M Guzewich

(Date) 7-22-88

Tuxedo C+D Site 576.019

D/C LEC

DAILY HEALTH AND SAFETY REPORT

Date: 7-23-88

Background HNU Reading (Measured at Emergency Staging Area):	0.0
Background H_2S Reading (Measured at Emergency Staging Area):	0 ppm
Background EXP Reading (Measured at Emergency Staging Area):	0% LEL
Background OXY Reading (Measured at Emergency Staging Area):	20.9%
Work Area and Task:	MW-1 Development
Level of Protection Required:	Level D
Work Area and Task:	
Level of Protection Required:	

Comments: Conrail flagman not available, so no work could be done along the tracks. Only able to develop MW-1, mound grout around the 3 completed wells. Air readings were taken over MW-7 + MW-2 wells & over MW-1 devel. water, we did not get any positive readings. MW-2 was dry

On-Site Health and Safety Officer:

Note: Readings at work site are recorded on separate table.

Job No: [illegible]
Site: [illegible]
Oper: [illegible]
Crew: [illegible]

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.NU Meter: [illegible]
OVA Meter: ——
Explosimeter: [illegible]
Date: 7-23-88

TIME	SAMPLE LOCATION	H.NU READING [illegible]	EXPLOSIMETER READING %LEL / %O2	[illegible] READING H_2S	COMMENTS
1035	background	0.0/0.0	0% 20.9%	0 ppm	
[illegible]	over MW-1 [illegible]	0.0/0.0	0% 20.9%	0 ppm	
[illegible]	MW-7 [illegible]	[illegible] *	0% 20.9%	0 ppm	* [illegible]
1027	MW-7 [illegible]	[illegible]	1% 20.5%	0 ppm	* [illegible]

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M [illegible]

(Date) 7-23-88

Tuxedo C+D Site
NYSDEC

576-018

DAILY HEALTH AND SAFETY REPORT

Date: 7-24-88

Background HNU Reading (Measured at Emergency Staging Area): 0.2-0.3

H_2S
Background [redacted] Reading (Measured at Emergency Staging Area): 0ppm

Background EXP Reading (Measured at Emergency Staging Area): 0% LEL

Background OXY Reading (Measured at Emergency Staging Area): 20.8% O_2

Work Area and Task: MW-6 Drilling + Installation

Level of Protection Required: Level D

Work Area and Task: Devel. of MW-7

Level of Protection Required: Level D

Comments: Survey went fine. Humidity did not seem to effect H-Nu much today. We got a few elevated H-Nu readings right over the hole while going through the fill. H_2S background readings in valley between landfill + RR ranged between 0 + 6 ppm during the drilling + installation. At one point we got H-Nu readings of 2.4 over split spoons + also background but it appears this was due to drift because I took the meter away from the work area + it read the same so I readjusted the zero. (see H_2S Data Sheet)

On-Site Health and Safety Officer: John M Gauzewich

Note: Readings at work site are recorded on separate table.

1 of 1

Job No: 576-015
Site: [illegible]
Oper: Well Drilling
Crew: [illegible]

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: LEC # [illegible]
OVA Meter: —
Explosimeter: MSA [illegible]
Date: 7-24-88

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING		~~OVA~~ READING	COMMENTS
			%LEL	%O2	H_2S ppm	
930	Background	Negative* [illegible]	0%	20.8%	0 ppm	
1045	MW-6 Background	0.1	0%	20.8%	0 ppm	Before Drilling Began Strong H_2S odor in area
1050	MW-6 0-2 ft	Neg [illegible]	0%	20.8%	0 ppm	
1055	MW-6 [illegible]	0.0	0%	20.8%	0 ppm	
1105	MW-6 [illegible]	0.5-1.0	1%	20.8%	2-3 ppm	
↓	MW-6 [illegible]	0.1	0%	20.8%	0 ppm	
1125	MW-6 [illegible]	2.3	–	–	–	augers down ~6'
1132	MW-6 10' [illegible]	0.0	0%	20.8%	3-4 ppm	
1140	MW-6 8-10 spoon	0.2				
1153	MW-6 10-12 spoon	0.2-0.6	0%	20.8%	1 ppm	
1155	MW-6 over hole	0.2	0%	20.8%	0 ppm	
1220	MW-6 12-14 spoon	2.4*				* Same as area background reading (meter may be drifting)
1230	MW-6 14-16 spoon	2.4*	0%	20.6%	2 ppm (background-0)	* same as above (will readjust zero)
1240	MW-6 around auger	0.2	0%	20.5%	3 ppm*	* H_2S ppm same as background
1415	MW-6 Background	0.3	0%	20.8%	1 ppm	
1418	MW-7 Devel. H_2O	0.3	0%	20.8%	0 ppm	
1405	MW-6 over well	0.0	0%	20.8%	0 ppm	
↓	MW-6 19-21 spoon	0.0	0%	20.8%	0 ppm	
1624	MW-6 Background				6 ppm	upwind of hole (flux. between 2-6 ppm)

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M [illegible]

(Date) 7-24-88

Tuxedo C+D 576-018
NYSDEC

DAILY HEALTH AND SAFETY REPORT

Date: 7-25-88

Background HNU Reading (Measured at Emergency Staging Area): 0.3

Background H_2S Reading (Measured at Emergency Staging Area): 0 ppm

Background EXP Reading (Measured at Emergency Staging Area): 0% LEL

Background OXY Reading (Measured at Emergency Staging Area): 20.8 % O_2

Work Area and Task: Drilling + Installation of MW-5 / Drilling MW-3

Level of Protection Required: Level D

Work Area and Task: * see back Geo. Tech Found Trenching Obse

Level of Protection Required: Level D

Comments: Survey went fine. Humidity was down + HNu #801446 appeared to be working well. I got no significant readings on the meters all day

On-Site Health and Safety Officer:

Note: Readings at work site are recorded on separate table.

2-3A

* see back for info on Georgia Tech Foundation property trenching

7-25-85

When Don Graff stopped by he mentioned that a large tree vehicle was getting on to the Geo. Tech Farm Property. I walked up (from MW-5) @ 1100 to meet the crew. I met Wolf Engler + Rich Sheppard of Conestoga-Rovers Assoc. They were beginning to survey in the area. They said they were waiting for the rest of crew and would probably begin trenching later in the day. Wolf said they would be doing air monitoring with an HNU + H_2S meter. Wolf also mentioned that he did not believe they would get any significant readings, but would keep us informed if they did. I told him I would stop back later to observe some of the trenching. Dan Eaton of DEC mentioned that they were a company based out of Canada that built its reputation in the Love Canal area. When I returned @ 1230 Wolf mentioned that their H_2S meter had not arrived + wondered if they could borrow ours. Since the drillers were breaking for lunch + had to grout + steam clean before drilling on t next hole, I told Wolf he could use the meter until we needed it. He mentioned that he had worked with Pocky @ IBM/Poughkeepsie. I stayed to observe the trenching. Rich Gardenier + Rick S. were talking about the source of H odors + Rick S. mentioned that refinery sludges can also produce the same odor
As they began to trench from the edge of the fill towards route 17 the fill got deeper + blacker. Wolf mentioned that he thought it was black because it may have been debris from a roof. A strong pungent "rotting garbage + chemical" odor began to come up from the trenched material. Wolf put on a ½ face respirator + took rea of the material. He got ~4.5 on the HNU but no significant O_2%, % LEL or H_2S on the MSA.
As they got closer to the access road on to property the fill/soil interface came up sharply Rich G. mentioned that he thought the fill would have gone closer to the road. Wolf + Rich located a few spots in the pile of fill to take samples. Rich mentioned he thought that base/neutrals may be picked up. As the Dozer operator filled in the trench the backhoe operator moved over 100' and began a trench parallel to the 1st trench. The 2nd trench appeared brown, rather than black, + did not smell as m
I was not able to observe the 2nd trench much because the drillers were ready to drill @ MW-3

Job No: 576-015
Site: Tuxedo S.D.
Oper: Well Install
Crew: Jim G Kim'G

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: DEC # 201446
OVA Meter: —
Explosimeter: MSA 361 DEC
Date: 7-25-88

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING		~~OVA~~ H2S READING	HNU COMMENTS
			% LEL	% O2		
0943	bkgd.	0.3	0%	20.8%	0ppm	Zero adjusted to one, readings will be from bkgd on HNU.
1001	Background @ MW-5	0.0	0%	20.7%	0 ppm	Upwind of well location before drilling
1005	MW-5 0-2 spoon	0.0	0%	20.7%	1 ppm	
1015	MW-5 2-4' spoon	0.0	0%	20.7%	0ppm	
1019	MW-5 4-6' spoon	0.0	0%	20.7%	0ppm	
1024	MW-5 6-8 spoon	0.0				
1030	MW-5 8-10' spoon	0.0	0%	20.7%	0 ppm	
1038	MW-5 10-12' spoon	0.0				
1043	MW-5 12-14' spoon	0.1				
1055	MW-5 10-14'	0.0				
1105	MW-5 15-21	0.0				
1120	MW-5 over open auger	0.0	1-2%	20.8%	0ppm	
1628	MW-3 0-2' spoon	0.0	0%	20.8%	0ppm	
1645	MW-3 2-4' spoon	0.0	0%	20.8%	0ppm	
1700	MW-3 6-8' spoon	0.0				

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M G[illegible]

(Date) 7-25-88

Tuxedo C+D Site

576-018

NYSDEC

DAILY HEALTH AND SAFETY REPORT

Date: 7-26-88

Background HNU Reading (Measured at Emergency Staging Area): 0.2

H_2S

Background [illegible] Reading (Measured at Emergency Staging Area): 0 ppm

Background EXP Reading (Measured at Emergency Staging Area): 0% LEL

Background OXY Reading (Measured at Emergency Staging Area): 20.8%

Work Area and Task: Drilling MW-3

Level of Protection Required: Level D

Work Area and Task: Devel @ MW-6

Level of Protection Required: Level D*

Comments: Survey went OK. Drillers began to core into bedrock @ MW-3. No significant readings at this hole. Tim, one of the helpers began to develop MW-6. It was coming up very turbid grey & foamy. It began to discolor the boiler & Tim's hands orange. The drillers do not have any latex or nitrile gloves. He washed up his hands which came clean, & then we gave him some nitriles to wear. Trenching on the Geo Tech Prop. finished today

On-Site Health and Safety Officer: John M Guzewich

Note: Readings at work site are recorded on separate table.

Job No: [illegible]
Site: [illegible]
Oper: [illegible]
Crew: [illegible]

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.Nu Meter: DEC # [illegible]
OVA Meter: —
Explosimeter: DEC MSA 361
Date: 7-26-88

%LEL | %O_2 H_2S ppm

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING	OVA READING	COMMENTS
[illegible]	Background	0.2	0% 20.8%	0 ppm	HNu set to 1.0 to zero out background Readings will be above background
[illegible]	Background [illegible] MW-6	0.0	0% 20.8%	0 ppm	
[illegible]	MW-6 [illegible]	0.0	0% 20.8%	0 ppm	
[illegible]	[illegible]	0.2	1% 20.7%	0 ppm	
[illegible]	[illegible]	[illegible]	[illegible]	0 ppm	
0910	MW-3 open hole	0.0	0% 20.8%	0 ppm	hole 8' deep (~2' into bedrock)
[illegible]	MW-6 over open well	0.0	0% 20.6%	0 ppm	
	MW-6 [illegible]		0% 20.8%	5-7 ppm	
↓	MW-6 [illegible]	0.0	0% 20.8%	1-2 ppm	

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M Guzewich

(Date) 7-26-88

[illegible]

576-015

NYSDEC

DAILY HEALTH AND SAFETY REPORT

Date: 7-27-88

Background HNU Reading (Measured at Emergency Staging Area): 0.1

Background ~~TWA~~ H_2S Reading (Measured at Emergency Staging Area): 0 ppm

Background EXP Reading (Measured at Emergency Staging Area): 0% LEL

Background OXY Reading (Measured at Emergency Staging Area): 20.8% O_2

Work Area and Task: Installation of MW-4 Develop. of MW-3, MW-6, MW-5

Level of Protection Required: Level D

Work Area and Task:

Level of Protection Required:

Comments: Survey went fine, readings were taken over open wells & devel. H_2O of wells being developed. We got some readings on devel H_2O from MW-5 & MW-6 when we headspaced the water

On-Site Health and Safety Officer: John M [illegible]

Note: Readings at work site are recorded on separate table.

Job No: [illegible]
Site: [illegible]
Oper: [illegible]
Crew: [illegible]

LAWLER, MATUSKY & SKELLY ENGINEERS
DAILY HEALTH & SAFETY REPORT
DATA SHEET

H.NU Meter: [illegible]
OVA Meter: —
Explosimeter: [illegible]
Date: 7-27-88

TIME	SAMPLE LOCATION	H.NU READING	EXPLOSIMETER READING		[illegible] READING	COMMENTS
			%LEL	%O₂	H₂S ppm	
[illegible]	Background	01	0%	20.8%	0 ppm	HNU was adj. to 1.0 after background readings & [illegible] background [illegible]
[illegible]	[illegible]	0.0	0%	20.7%	0 ppm	
[illegible]	MW-7 [illegible] open well	0.2	1%	20.6%	0 ppm	
[illegible]	MW-6 [illegible]	2.2 ppm	2%	20.5%	0 ppm	
[illegible]	MW-6 [illegible]	0.0	0%	20.8%	1 ppm	
[illegible]	MW-5 [illegible]	0.2	3%	20.6%	0 ppm	
[illegible]	MW-5 [illegible]	0.1	1%	20.9%	1 ppm	
[illegible]	MW-5 [illegible]	0.1	0%	20.8%	0 ppm	
1115	MW-3 over open well	0.0	0%	20.7%	0 ppm	
1145	MW-5 Devel H₂O	0.0	0%	20.7%	0 ppm	Put Devel water in jar to create headspace reading
1417	MW-4 0-2' spoon	0.0	0%			
1420	MW-4 over hole	0.0	0%			
↓	MW-4 Breathing Zone	0.0	0%			
1425	Mouth of Culvert near MW-4	~400	over 100%	4.2%	over 200 ppm	
1520	MW-6 Devel. H₂O	12-14	0%	20.8%	0 ppm	HeadSpace Sample
1535	MW-4 4-6' spoon	2-4	0%	20.8%	0 ppm	
1600	MW-5 Devel H₂O	8-12	0%	20.8%	0 ppm	Headspace Sample
1625	MW-3 Devel H₂O	1-1.4				Head space sample

On-Site Health & Safety Officer and/or Crew Chief:

(Signature) John M D[illegible]

(Date) 7-27-88

Facility: Duck/EHI
Date: 7/19-21/88
Calib. By: Jack
Calib. Gas: H2S
Methane

LAWLER, MATUSKY & SKELLY ENGINEERS
EXPLOSIMETER FIELD CALIBRATION
DATA SHEET

Job No: 576-018
Site: Tuxedo C&D
Crew: Jack KMG
Oper: Well Install.

			EXPECTED		OBSERVED				
DATE/TIME	METER No.	BATT. CHECK	ZERO	CALIB. GAS (ppm)	ZERO	CALIB. GAS (ppm)	ADJ. COMB.	ADJ. O2	COMMENTS AND/OR MAINTENANCE
7-19-88 0930	MSA 361 NYSDEC	✓	0	(H_2S ppm) 10ppm	0	7ppm			Adj internal H_2S span pot until reading @ 10ppm H_2S
↓ ↓	↓	✓	0	(%O_2) 15.0%	0	15.1%			No O_2 Adj
↓ ↓	↓	✓	0	(%LEL) 50%	0	45%			Adj internal LEL span pot until reading @ 50% LEL
7-19-88 1110	MSA 361 NYSDEC	✓	0	(H_2S ppm) 10ppm	0	10ppm			No Adj.
↓ ↓	↓	✓	0	(%O_2) 15.0%	0	15.3%		20.7 → 20.8	No O_2% Span Adj
↓ ↓	↓	✓	0	%LEL) 50%	0	49%	No Adj		No %LEL Span Adj
7-20-88 0840	MSA 361 NYSDEC	✓	0	(H_2S ppm) 10ppm	0	10ppm			No H_2S Span Adj.
↓ ↓	↓	✓	0	(%O_2) 15.0%	0	15.3%		21.0 → 20.8	NO O_2% Span Adj
↓ ↓	↓	✓	0	(%LEL) 50%	0	50%			No %LEL Span Adj.
7-21-88 0955	MSA 361 NYSDEC	✓	0	(H_2S ppm) 10ppm	0	10ppm			No H_2S Span Adj.
↓ ↓	↓	✓	0	(%O_2) 15.0%	0	15.2%		20.0% → 20.8%	No O_2% Span Adj
↓ ↓	↓	✓	0	(%LEL) 50%	0	50%			No %LEL Span Adj.

On-Site Health & Safety Officer and/or Crew Chief:

(Signature): John M Guzewich

(Date): 7-21-88

Facility: Nyack
Date: 7/22-26/88
Calib. By: JMG, KM'G
Calib. Gas: Methane
H_2S

LAWLER, MATUSKY & SKELLY ENGINEERS
EXPLOSIMETER FIELD CALIBRATION
DATA SHEET

Job No: 576015
Site: Tuxedo C&D
Crew: JMG, KM'G
Oper: Well Install

DATE/TIME	METER No.	BATT. CHECK	EXPECTED ZERO	EXPECTED CALIB. GAS (ppm)	OBSERVED ZERO	OBSERVED CALIB. GAS (ppm)	Zero ADJ. [redacted]	Zero ADJ. 02	COMMENTS AND/OR MAINTENANCE
7-22-88 0850	MSA 361 NYSDEC	✓	0	(H_2S ppm) 10ppm	0	10	1→0		No H_2S Span Adj.
↓	↓	↓	—	(% O_2) 15.0%	—	15.2%		20.9 → 20.8	No O_2 Span Adj
↓	↓	↓	0	% LEL (50%)	0	50%	1→0		No % LEL Span Adj
7-22-88 1400	MSA 361 NYSDEC	✓	0	(H_2S ppm) 10ppm	0	11%	—		No H_2S Span Adj.
↓	↓	↓	—	(% O_2) 15.0%	—	15.2%		20.5 → 20.9	No O_2 Span Adj.
↓	↓	↓	0	(% LEL) 50%		51%		-1→0	No LEL Span Adj.
7-24-88 1020	MSA 361 NYSDEC	✓	0	(H_2S ppm) 10ppm	0	10ppm		1→0	No H_2S Span Adj.
↓	↓	↓	—	(% O_2) 15%	—	15.2%		21.0 → 20.8	No O_2 Span Adj
↓	↓	↓	0	(% LEL) 50%	0	50%		1→0	No LEL Span Adj
7-25-88 0930	MSA 361 NYSDEC	✓	0	(H_2S ppm) 10ppm	0	10 ppm		—	No H_2S Span Adj.
↓	↓	↓	-	(% O_2) 15%	-	15.2%		21.2% → 20.8%	No O_2 Span Adj.
↓	↓	↓	0	(% LEL) 50%	0	50%		—	No LEL Span Adj.
7-26-88 0820	MSA 361 NYSDEC	✓	0	(% LEL) 50%	0	50%	1→0		No LEL Span Adj
↓	↓	↓	—	(% O_2) 15.0%	—	15.2	21.2% → 20.8%		No O_2 Span Adj.
↓	↓	↓	0	(H_2S ppm) 10 ppm	0	10ppm	1→0		No H_2S Span Adj.

On-Site Health & Safety Officer and/or Crew Chief:

(Signature): John M

(Date): 7-26-88

Data by KEVIN McGUINNESS

Sheet 1 of 2

SUBSURFACE EXPLORATION - TEST BORING LOG

Boring No. MW-1
Project No. 576-018

Project Name TUXEDO C+D

Date 7/19/88 start 7/19/88 finish

Client NYSDEC

Boring Location Upgradient North side of site

Driller Buffalo Drilling Co

Total Depth 27 FT.

Monitoring Instrument(s) HNu

Depth to Water ~19 FT 7/19/88

SAMPLE HAMMER

Hole Diameter 7 INCHES

Weight 140 lb

Ground Surface Elevation 466.4'

Fall 30 in.

Depth	BLOWS ON SAMPLER 0" to 6"	6" to 12"	12" to 18"	18" to 24"	Retained Sample	Recovery (feet)	Sample No.	Instrument Reading	Moisture Content	Stratigraphic Column	CLASSIFICATION OF MATERIAL f - fine m - medium ~~c - coarse~~ and - 35-50% some - 20-35% little - 10-20% trace - 0-10%	Remarks
0	5										0-0.2' - Gray C-f Silty Sand-organic 0.2-0.5 - Cobble fragments tan Silty Sand.	ROCK IN NOSE OF SPOON
		5										
			17									
				12	X	0.5	4252	—				
2	9										0-0.7 - Tan gray f-C angular mixture 0.7-0.95 - Gray-white f silt And large rounded pebbles and Stones	
		11										
			19									
				23	X	0.95	4255	—				
4	20										0-1.0 - Tan brown Sand, numerous 1-1.5" rounded stones	0 HNu READING OVER ONE-HALF SPOON SPLIT NO SAMPLE TAKEN
		19										
			19									
				17	X	1.0	—	—				
6	11										0-0.95 - Tan, black, white, brown, m-C Sand with numerous rounded and angular stones	
		26							DRY			
			24									
				24	X	0.95	4254	—				
8	17										0-0.85 Tan, black, white, brown, m-C Sand with numerous rounded and angular Stones	
		35										
			29						DRY			
				28	X	0.85	4251	—				
10	37										FIRST INTERVAL IS ROCK, MUST HAVE CLOGGED NOSE OF SPOON 0-0.3 - Tan, black, brown, white, m-C Sand	HNu NOT WORKING DUE TO HUMIDITY
		28										
			9						DRY			
				14	X	0.3	4255					
12	3										0-1.15 - m-C tan brown, black, white Sand	
		7							DRY			
			11									
				14	X	1.15	4256	—				

Sheet 2 of 2

Boringt No. MW-1
Project No. 576-018

Depth	BLOWS ON SAMP' ER 0" to 6"	 6" to 12"	 12" to 18"	 18" to 24"	Retained Sample	Recovery (feet)	Sample No.	Instrument Reading	Moisture Content	Stratigraphic Column	CLASSIFICATION OF MATERIAL f - fine m - medium c - coarse and - 35-50% some - 20-35% little - 10-20% trace - 0-10%	Remarks
14	7										0-1.25 - Tan, black, brown, white m-c Sand.	
		6							DRY			
			5									
16				10	X	1.25	4257	—				
									W.T. ▼		NO SAMPLE TAKEN 16-19'	
19	2								WET		0-2.0 - Tan, black, brown, white, m-c Sand	WATER TABLE AT 18 FT.
		3										
			6									
21				5	X	2.0						
											DOWN TO 25' - SAND HEAVING INTO AUGERS ~8-10'	
25											NO 24-26' SAMPLE DUE TO HEAVING SAND	
27											TOTAL DEPTH 27'	

LAWLER, MATUSKY & SKELLY ENGINEERS

Well No. MW-1
Project No. 536-018

Project Name Tuxedo C+0

Client NYSDEC

MONITORING WELL COMPLETION LOG

Location Tuxedo NY

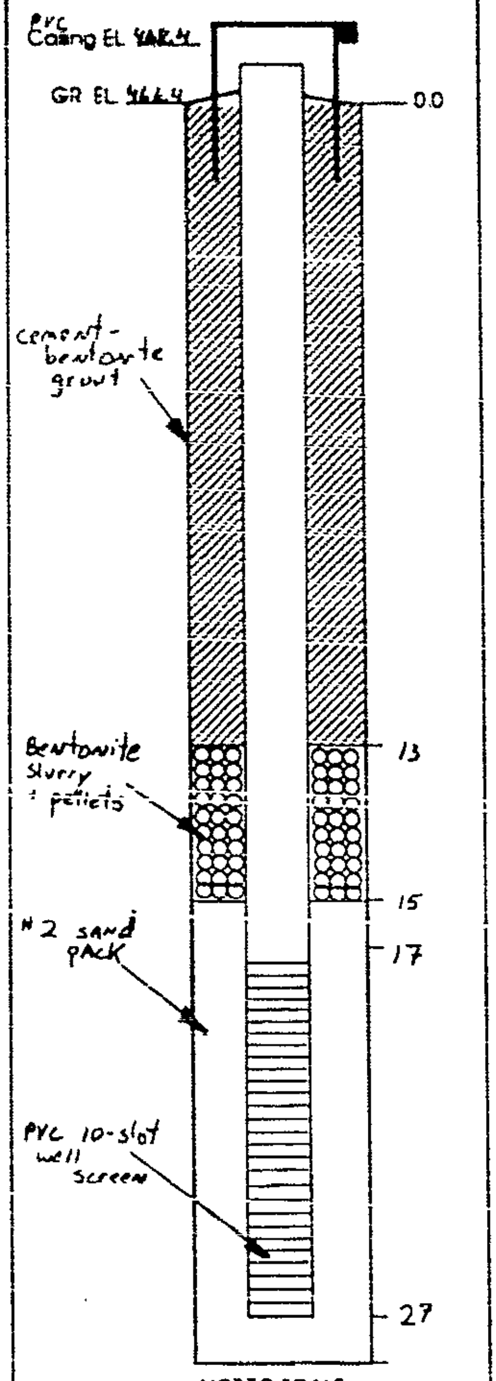
Date Drilled 7-19-88

Date Developed 7-20-88

Developing Method bailer

Well Construction Completed 7-20-88

WELL CONSTRUCTION DETAIL


PVC Casing EL [illegible]
GR EL [illegible]
0.0
cement-bentonite grout
Bentonite slurry + pellets
13
15
17
#2 sand pack
PVC 10-slot well screen
27

NOT TO SCALE

Inspector Kevin McGuinness + John Gurewich
Drilling Contractor Buffalo Drilling Co.

Type of Well overburden
Static Water Level 19.48' Date 7-20-88
Measuring Point (M.P.) Top of casing
Total Depth of Well 27'
Total Depth of boring 27'

Drilling Method
Type Hollow Stem Auger Diameter 7"
Casing

Sampling Method
Type split spoon Diameter 1 3/8"
Weight 140 lb. Fall 30"
Interval

Riser Pipe Left in Place
Material PVC sch. 40 Diameter 2"
Length 20' Joint Type threaded flush

Screen
Material PVC sch 40 Diameter 2"
Slot Size 10 Length 10'
Stratigraphic Unit Screened SAND

Filter Pack
Sand X Gravel Natural
Grade #2
Amount Interval 27-15'

Seal(s)
Type Bentonite slurry Interval 15-13'
Type + pellets Interval
Type Interval

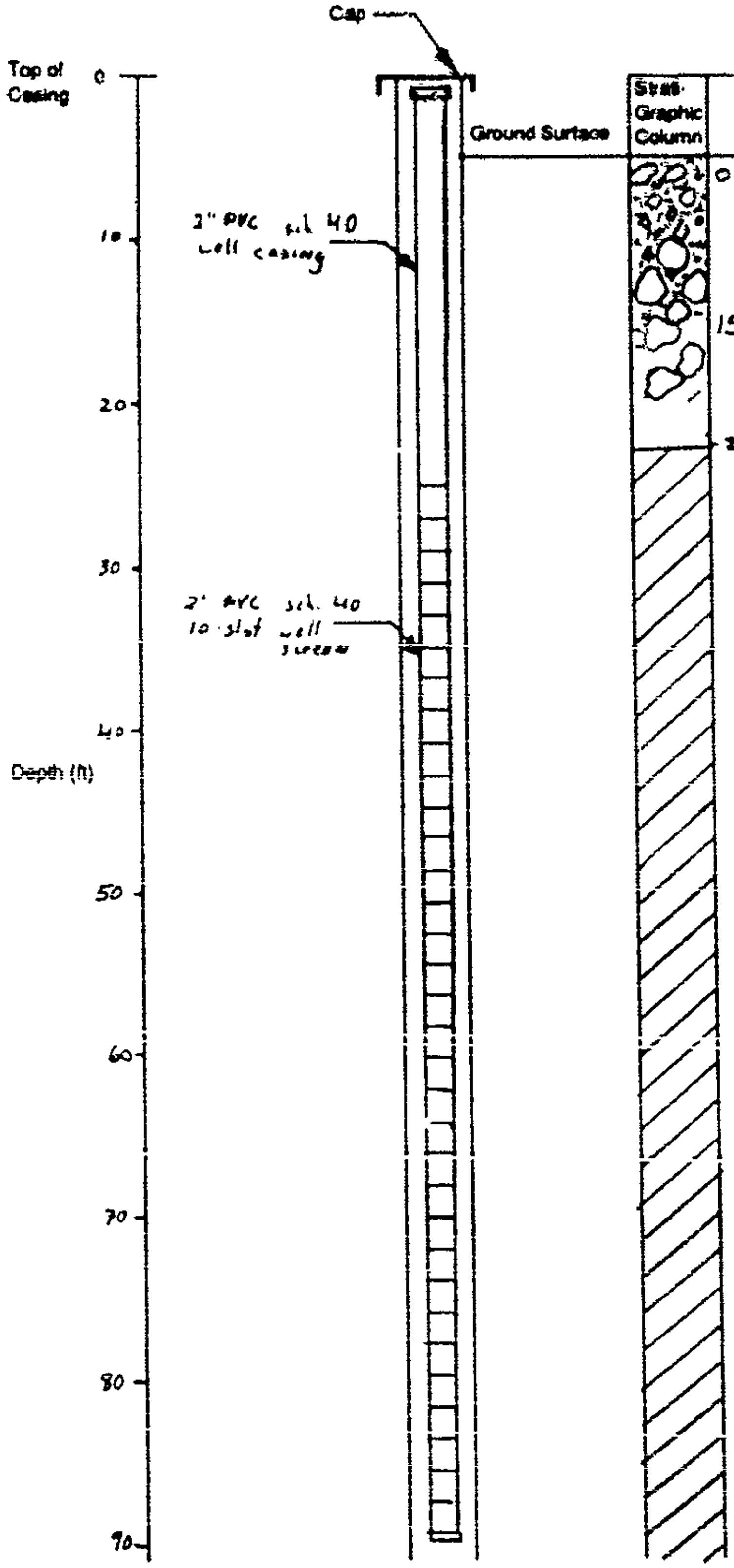
Locking Casing ☒ Yes ☐ No
Notes:

LAWLER, MATUSKY SKELLY ENGINEERS

LMS WELL DRILLING LOG

Client: NYS DEC
Well No.: MW-2
Drilling Completed: 8-29-88
Developing Method/Completed:
Yeild (Date):
Total Depth: 90'
Screened Interval: 90-25
Aquifer: BeDrock
Depth of Casing: -

Project No.: 576-018
Permit No.:
SWL (Date): 24.79' - 9-1-88
Elevation of Ground Surface: 477.69
Elevation of Top of Casing: 480.06
Latitude:
Longitude:
Hole Diameter: 6"
Geologist: Kevin McGuinness


Cap
Top of Casing
0
10
20
30
40
50
60
70
80
90
Depth (ft)
2" PVC sch 40 well casing
2" PVC sch 40 10 slot well screen
Ground Surface
Strati-Graphic Column

Description

0-15' Glacial Till
f-co sand, angular and rounded gravel
many lg cobbles

- clayey more compact matrix closer to 15'

15-24.6 · Cobbles then weathered bedrock

24.6' Into competent bedrock
Hornblende granitic gneiss

Well No. MW-2
Project No. 574-018

Project Name Tuxedo C+D

Client NYSDEC

MONITORING WELL COMPLETION LOG

Location Tuxedo NY

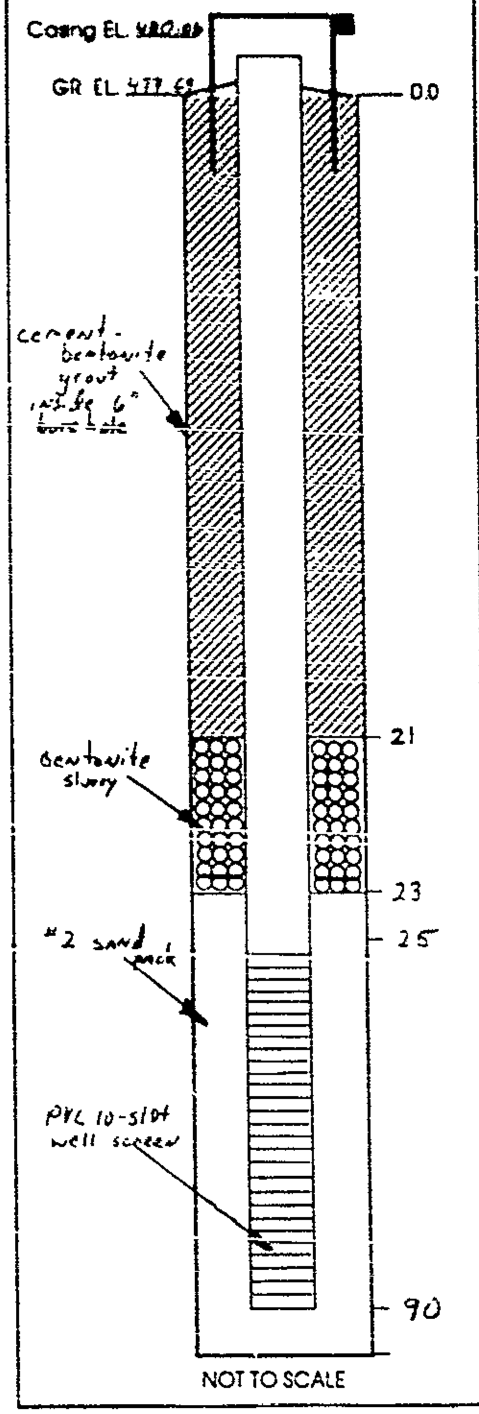
Date Drilled 8-26 thru 8-29-88

Date Developed 9-1-88

Developing Method bailed

Well Construction Completed 8-29-88

WELL CONSTRUCTION DETAIL


Casing EL. [illegible]
GR EL 477.68
0.0
cement-bentonite grout inside 6" bore hole
bentonite slurry
21
23
#2 sand pack
25
PVC 10-slot well screen
90
NOT TO SCALE

Inspector Kevin McGuinness
Drilling Contractor Kendrick Drilling

Type of Well Open hole bedrock
Static Water Level 24.78' Date 9-1-88
Measuring Point (M.P.) Top of PVC
Total Depth of Well 90'
Total Depth of boring 90'

Drilling Method
Type air rotary Diameter 6"
Casing

Sampling Method
Type none Diameter
Weight Fall
Interval

Riser Pipe Left in Place
Material PVC sch. 40 Diameter 2"
Length 25' Joint Type Threaded flush

Screen
Material PVC sch. 40 Diameter 2"
Slot Size 10 Length 65'
Stratigraphic Unit Screened bedrock

Filter Pack
Sand X Gravel Natural
Grade #2
Amount Interval 90-23

Seal(s)
Type Bentonite slurry Interval 23-21
Type Interval
Type Interval

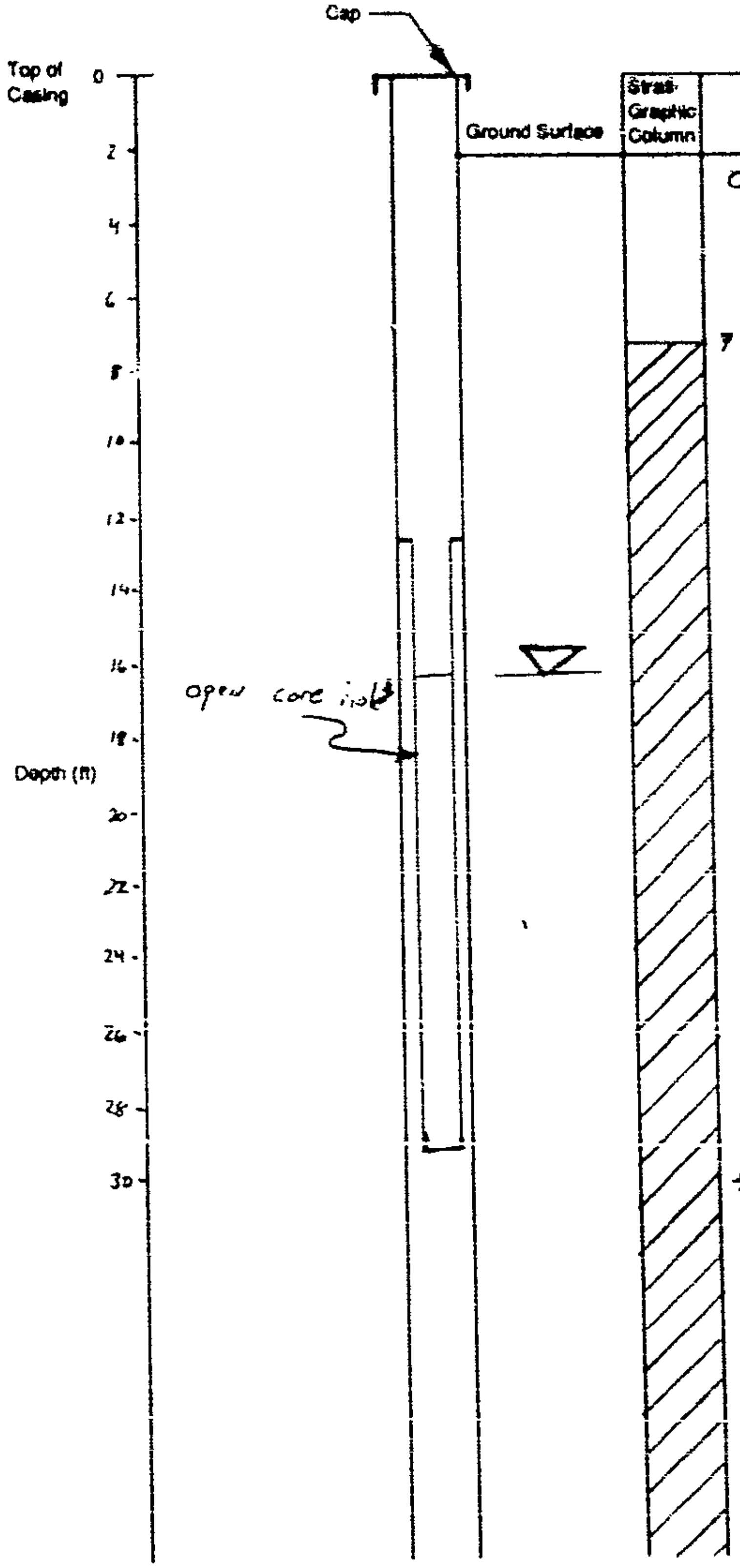
Locking Casing ☑ Yes ☐ No
Notes:

LAWLER, MATUSKY SKELLY ENGINEERS

LMS WELL DRILLING LOG

Client: NYSDEC
Well No.: MW-3
Drilling Completed: 7-27-88
Developing Method/Completed: 7-29-88
Yeild (Date): -
Total Depth: 29
Screened Interval: -
Aquifer: bedrock
Depth of Casing: -

Project No.: 576-018
Permit No.: -
SWL (Date): 16.33' 9-1-88
Elevation of Ground Surface: 457.20
Elevation of Top of Casing: 459.0
Latitude: -
Longitude: -
Hole Diameter: 3"
Geologist: Kevin McGuinness


Cap
Top of Casing
0
2
4
6
8
10
12
14
16
18
Depth (ft)
20
22
24
26
28
30
Ground Surface
Strat-Graphic Column
7
open core hole

Description

0-7' - m-cs tan sand, some gravel and cobbles.

Bedrock
- roller bitted from 7 to 12' to create socket + set casing
- Nx core from 12 to 29'

* MW-2 has no Monitoring Well Completion Log. The monitoring well is an open bedrock well having no riser pipe, bentonite or screen.

Data by Kevin McGuinness

Sheet 1 of 1

SUBSURFACE EXPLORATION - TEST BORING LOG

Boring No. MW-4
Project No. [illegible]

Project Name Tuxedo C+D
Client NYSDEC
Driller Buffalo Drilling Co.
Monitoring Instrument(s) HNu

SAMPLE HAMMER

Weight 140 lb
Fall 30 in.

Date 7/27/88 start 7/27/88 finish
Boring Location Along RR tracks
Total Depth 24.5 FT
Depth to Water 16.72 FT
Hole Diameter 7 INCHES
Ground Surface Elevation 457.90

Depth	BLOWS ON SAMPLER 0" to 6"	6" to 12"	12" to 18"	18" to 24"	Retained Sample	Recovery (foot)	Sample No.	Instrument Reading	Moisture Content	Stratigraphic Column	CLASSIFICATION OF MATERIAL f - fine m - medium c - coarse and - 35-50% some - 20-35% little - 10-20% trace - 0-10%	Remarks
0	2										0-0.3- Brown-Gray Loose f Sandy SILT	
		3									w/organic DEBRIS	
			5								0.3-0.97- BLACK f CINDERS MIXED WITH	
2				7	x	0.97	4298				BROWN GRAY SANDY SILT	
4	50											
		54									0-0.2 TAN-GRAY VERY c PEBBLY SAND	
			50								0.2-0.45 - GRAY ROCK AND f SILT	
				64	x	0.45	4299	4 HNU				6–24.5 FT. ROLLER BITTED AND DROVE CASING THROUGH
6												
											6-26.0 – COBBLES AND SAND	
											MAY HAVE HIT BEDROCK IN LAST	
											~2 FT.	
											VERY CONSISTANTLY HARD	
											NO SOFT POCKETS	
											GRAY WASH	
24.5												

LAWLER, MATUSKY & SKELLY ENGINEERS

Well No. MW-4
Project No. 536-018

Project Name Tuxedo C&O

Client NYSDEC

MONITORING WELL COMPLETION LOG

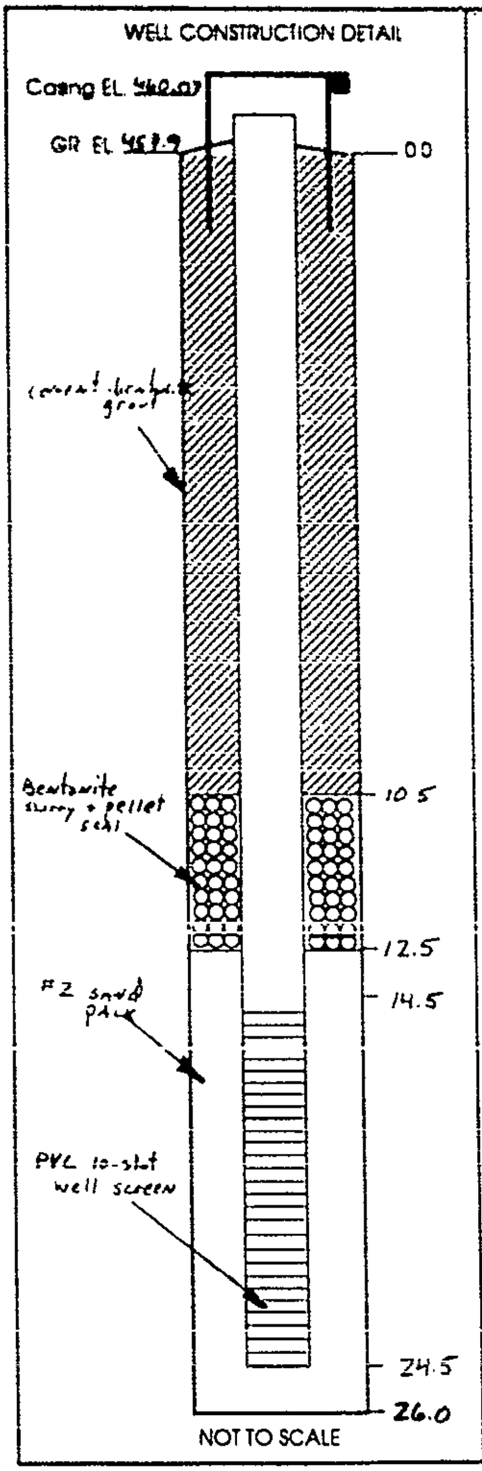
Location Tuxedo NY

Date Drilled 7-27-88

Date Developed 7-28-88

Developing Method bailer

Well Construction Completed 7-27-88


WELL CONSTRUCTION DETAIL
Casing EL. 460.07
GR EL 457.9
0.0
cement bentonite grout
10.5
Bentonite slurry + pellet seal
12.5
14.5
#2 sand pack
PVC 10-slot well screen
24.5
26.0
NOT TO SCALE

Inspector Kevin McGuinness + John Gurzenich
Drilling Contractor Buffalo Drilling Co.

Type of Well overburden
Static Water Level 16.72' Date 9-1-88
Measuring Point (M.P.) Top of PVC
Total Depth of Well 24.5'
Total Depth of boring 26.0'

Drilling Method
Type Hollow-stem auger + roller bit Diameter 7"
Casing spun casing

Sampling Method
Type split spoon Diameter 1 3/8"
Weight 140 lbs Fall 30"
Interval continuous

Riser Pipe Left In Place
Material PVC sch. 40 Diameter 2"
Length 14.5' Joint Type flush threaded

Screen
Material PVC sch. 40 Diameter 2"
Slot Size 10 Length 10
Stratigraphic Unit Screened Till

Filter Pack
Sand X Gravel ______ Natural ______
Grade #2
Amount ______ Interval ______

Seal(s)
Type bentonite slurry Interval ______
Type + pellets Interval ______
Type ______ Interval ______

Locking Casing ☒ Yes ☐ No
Notes:

LAWLER, MATUSKY SKELLY ENGINEERS

Data by Kevin McGuinness

Sheet 1 of 2

SUBSURFACE EXPLORATION - TEST BORING LOG

Boring No MW-5
Project No. 576-012

Project Name Tuxedo C+D

Client NYSDEC

Driller Buffalo Drilling Co

Monitoring Instrument(s) HNU

SAMPLE HAMMER

Weight 140 lb

Fall 30 in.

Date 7-25-88 (start) 7-25-88 (finish)

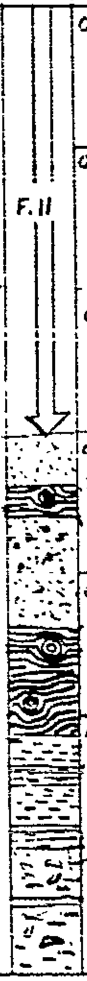
Boring Location Along RR tracks

Total Depth 21'

Depth to Water 9.24'

Hole Diameter 7"

Ground Surface Elevation 447.06

Depth	BLOWS ON SAMPLER 0" to 6"	6" to 12"	12" to 18"	18" to 24"	Retained Sample	Recovery (feet)	Sample No.	Instrument Reading	Moisture Content	Stratigraphic Column	CLASSIFICATION OF MATERIAL f - fine m - medium c - coarse and - 35-50% some - 20-35% little - 10-20% trace - 0-10%	Remarks
0	2										0-.25 · Blk·brown silty misc. FILL, wood plastic etc	
		3										
			6									
				6	✓	.25	4286	0	damp			
2	4										0-.52 Blk damp cs SANDY misc FILL	
		4										
			4									
				4	✓	.52	4287	0	damp			
4	3										0-.47 - same	
		2										
			2									
				3	✓	.47	4288	0	damp			
6	0										0-.2 - cs blk SAND .2-.8 - WOOD, saturated .8-.94 - very cs sandy GRAVEL	
		0										
			1									
				6	✓	.94	4284	0	wet			
8	2										0-.20 - blk cs SAND .2-1.09 - wood, saturated	
		4										
			7									
				7	✓	1.09	4285	0	wet			
10	6										0-.22 - wood saturated .22-.54 - gray·blk clayey SILT	loose soil
		1										
			1									
				6	✓	.54		0				
12	8										0-.84 - gray very fine very compact silty SAND; some clay, some rx frag.s	
		18										
			20									
				31	✓	.84	4292	0				

LAWLER, MATUSKY & SKELLY ENGINEERS

Sheet 2 of 2

Boringt No. MW-5
Project No. 576-018

Depth	BLOWS ON SAMPLER 0" to 6"	6" to 12"	12" to 18"	18" to 24"	Retained Sample	Recovery (feet)	Sample No.	Instrument Reading	Moisture Content	Stratigraphic Column	CLASSIFICATION OF MATERIAL f - fine m - medium c - coarse and - 35-50% some - 20-35% little - 10-20% trace - 0-10%	Remarks
14	5										0-.76 - gray very cs SAND, some lg gravel, rx in nose	
		6										
			20									
				16	✓	.76	4293	0				
16											Augered through	
18												
	7										0-.6 - gray tlk SAND, grading from fine to cs	
		12									.6-.85 - gray tan very cs SAND many angular cobbles, some gravel	
20			10									
				11	✓	.85	4294	0				
22												

LAWLER, MATUSKY & SKELLY ENGINEE

Well No. MW-5
Project No. 674-018

Project Name Tuxedo C+D

Client NYSDEC

MONITORING WELL COMPLETION LOG

Location Along RR tracks

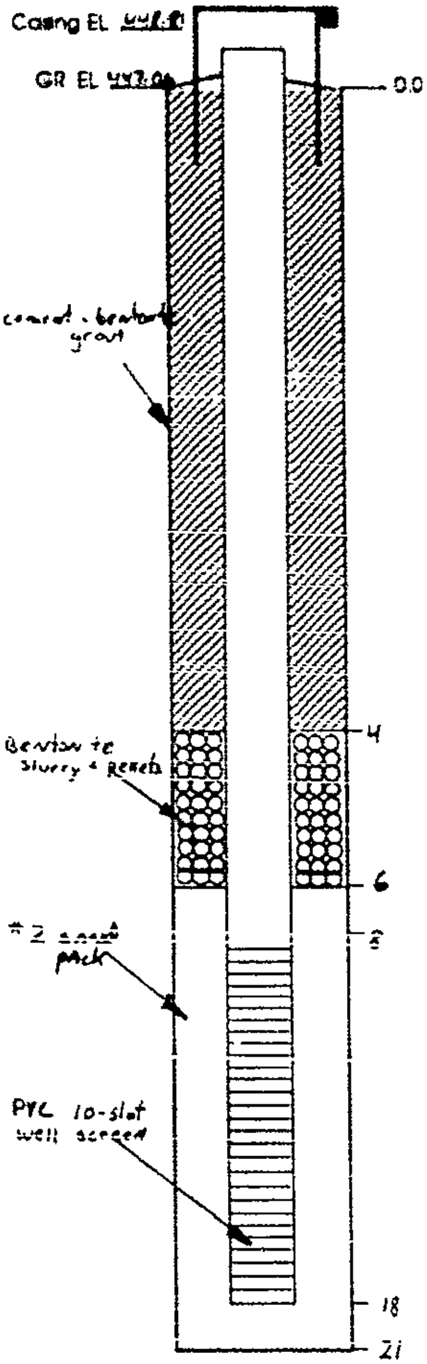
Date Drilled 7-25-88

Date Developed 7-26-88

Developing Method bailed

Well Construction Completed 7-25-88

WELL CONSTRUCTION DETAIL


Casing EL 446.0
GR EL 443.0
0.0
cement + bentonite grout
Bentonite slurry + pellets
4
6
8
#2 sand pack
PVC 10-slot well screen
18
21

NOT TO SCALE

Inspector Kevin McGuinness + John Gurevich
Drilling Contractor Buffalo Drilling Co

Type of Well overburden
Static Water Level 9.24 Date 9-1-88
Measuring Point (M.P.) Top of PVC
Total Depth of Well 18'
Total Depth of boring 21'

Drilling Method
Type Hollow stem auger Diameter 7"
Casing

Sampling Method
Type split spoon Diameter 1 3/8"
Weight 140 lb Fall 30"
Interval Continuous

Riser Pipe Left in Place
Material PVC sch. 40 Diameter 2"
Length 8' Joint Type Flush threaded

Screen
Material PVC sch. 40 Diameter 2"
Slot Size 10 Length 10'
Stratigraphic Unit Screened sand + gravel

Filter Pack
Sand X Gravel Natural
Grade #2
Amount Interval 27-15

Seal(s)
Type Bentonite slurry Interval 15-13'
Type + pellets Interval
Type Interval

Locking Casing ☒ Yes ☐ No
Notes:

LAWLER, MATUSKY SKELLY ENGINEERS

Data by Kevin McGuinness

sheet 1 of 2

SUBSURFACE EXPLORATION - TEST BORING LOG

Boring No. MW-6
Project No. 576-018

Project Name Tuxedo C+D
Client NYSDEC
Driller Buffalo Drilling Co.
Monitoring Instrument(s) HNu, CGI (H2S)

SAMPLE HAMMER

Weight 140 lb
Fall 30 in.

Date 7/24/88 (start) 7/24/88 (finish)
Boring Location MW-6
Total Depth 21 FT
Depth to Water 7.79 FT
Hole Diameter 7"
Ground Surface Elevation 454.80

Depth	BLOWS ON SAMPLER				Retained Sample	Recovery (feet)	Sample No.	Instrument Reading	Moisture Content	Stratigraphic Column	CLASSIFICATION OF MATERIAL f - fine, m - medium, c - coarse and - 35-50%, some - 20-35%, little - 10-20%, trace - 0-10%	Remarks
	0" to 6"	6" to 12"	12" to 18"	18" to 24"								
0	12								MOIST		BLACK-BROWN SILTY SANDY FILL STONES, WOOD FRAGMENTS, LOTS OF DEBRIS IN AUGERS - CABLES, WIRES, ROPE, FOAM, TIRES, PLASTIC CONTAINERS ETC.	
		4										
			10									
2				11	X	0.54	4278					
4	4								DAMP		BLACK C-F MISC. FILL - WOOD & CINDERS SM. STONES	
		3										
			3									
6				4	X	0.44	4279	1 HNu				
	3								WET		BLACK (SOOT WASH) TAN Sandy SILT FEW SM. STONES ROCK IN NOSE OF SPOON	
		3										
			3									
8				50/.1	X	0.24	4280	1 H_2S				
	7								WET		0-0.7 - TAN C-SILTY SAND, ROCK FRAGMENTS BLACK SOOT WASH 0.7-1.2 F GRAY Silty SAND, FEW SM STONES	
		16										
			13									
10				5	X	1.2	4281					
	0										0-0.6 GRAY-BLACK & clayey SILT - UNIFORM - COHESIVE, SOME ROOT FIBERS 0.6-1.1 - GRAY CLAY	
		1										
			2									
12				3	X	1.10	4282					
	1								DRY		0-.2 - GRAY CLAY - DRY 0.2-0.9 - GRAY-BROWN Clayey SILTY PEAT MANY ROOT HAIRS - DRY 0.9-1.1 GRAY UNIFORM F Sandy SILT - DRY 1.1-1.9 GRAY Clayey SILTY PEAT, LG. ROOT FRAGS. - DRY 1.9-2.0 SM STONES AND ROCK FRAGS - WET	
		2										
			2									
14				11	X	2.0	4283					
	11								WET		0-0.5 - GRAY-GREEN F-C SILTY SAND WITH C-ROCK FRAGMENTS	
		11										
			10						WET			
16				15	X	1.3	4284				0.5-1.3 - BROWN-TAN AND GRAY MOTTLED Silty SAND WITH MANY SMALL STONES	

Sheet 2 of 2

Boringt No. MW-6
Project No. 576-018

Depth	BLOWS ON SAMPLER				Retained Sample	Recovery (feet)	Sample No.	Instrument Reading	Moisture Content	Stratigraphic Column	CLASSIFICATION OF MATERIAL f - fine m - medium c - coarse and - 35-50% some - 20-35% little - 10-20% trace - 0-10%	Remarks
	0" to 6"	6" to 12"	12" to 18"	18" to 24"								
19	9										0-0.7 GRADES FROM -TAN M-C SAND TO SMALL PEBBLES	
		8							WET		0.7-0.95- UNIFORM GRAY-TAN M SAND	
			26									
21				34	×	1.3	4285				0.95-1.3-C TAN SAND SOME ROUND STONES, MIXED GRAY SILT.	

Well No. MW-6
Project No. 876-918

Project Name Tuxedo C+D

Client NYSDEC

MONITORING WELL COMPLETION LOG

Location Tuxedo NY

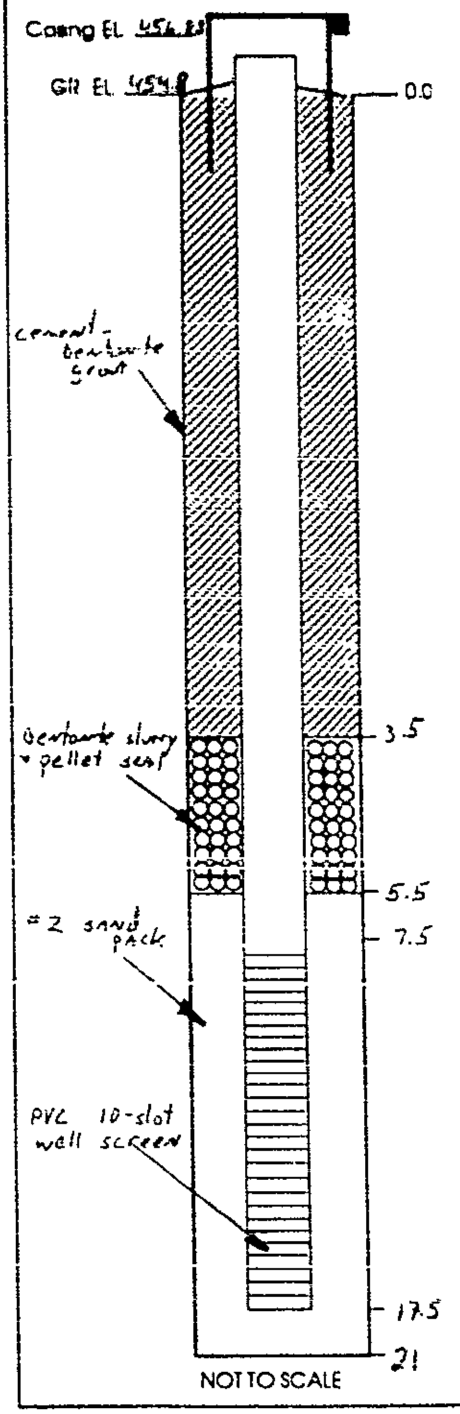
Date Drilled 7-24-88

Date Developed 7-25-88

Developing Method bailer

Well Construction Completed 7-24-88

WELL CONSTRUCTION DETAIL


Casing EL 456.83
GR EL 454.8
0.0
cement-bentonite grout
3.5
bentonite slurry + pellet seal
5.5
7.5
#2 sand pack
PVC 10-slot well screen
17.5
21
NOT TO SCALE

Inspector Kevin McGuinness - John Gutewich
Drilling Contractor Buffalo Drilling Co.

Type of Well overburden
Static Water Level 9.82 Date 9-1-88
Measuring Point (M.P.) Top of PVC
Total Depth of Well 17.5'
Total Depth of boring 21'

Drilling Method
Type Hollow-stem Auger Diameter 7"
Casing

Sampling Method
Type split spoon Diameter 1 3/8"
Weight 140 lbs Fall 30"
Interval continuous

Riser Pipe Left in Place
Material PVC sch. 40 Diameter 2"
Length 7.5' Joint Type flush-threaded

Screen
Material PVC sch. 40 Diameter 2"
Slot Size 10 Length 10'
Stratigraphic Unit Screened silty sand

Filter Pack
Sand x Gravel Natural
Grade #2
Amount -- Interval 17.5 - 5.5

Seal(s)
Type Bentonite slurry Interval
Type + pellets Interval 5.5 - 3.5
Type Interval

Locking Casing ☒ Yes ☐ No
Notes:

LAWLER, MATUSKY SKELLY ENGINEERS

Data by Kevin McGuinness

Sheet 1 of 2

SUBSURFACE EXPLORATION - TEST BORING LOG

Boring No. MW-7
Project No. 526-018

Project Name Tuxedo C+D
Client NYSDEC
Driller Buffalo Drilling Co.
Monitoring Instrument(s) HNU, Mautek 361

SAMPLE HAMMER

Weight 140 lb
Fall 30 in.

Date 7-22-88 (start) 7-22-88 (finish)
Boring Location Downgradient-northernmost
Total Depth 27'
Depth to Water 18.36'
Hole Diameter 7"
Ground Surface Elevation 464.9

Depth	BLOWS ON SAMPLER 0" to 6"	6" to 12"	12" to 18"	18" to 24"	Retained Sample	Recovery (feet)	Sample No.	Instrument Reading	Moisture Content	Stratigraphic Column	CLASSIFICATION OF MATERIAL f - fine m - medium c - coarse and - 35-50% some - 20-35% little - 10-20% trace - 0-10%	Remarks
0											Red-brown sandy SILT, small small rounded gravel, cohesive Land fill cap.	
2												
4												
6	29										0-.38 TAN-brown silty SAND, damp, slightly cohesive some small rounded gravel	Stone may have blocked nose
		26										
			20									damp
				20	✓	.38		0			0-0.8 Orange-tan fine sandy SILT, tr angular rx. frag-s, cohesive, compact damp	
8	9											damp
		7									0.8-1.52 - Brown-tan fine sandy SILT, tr organic debris, tr peat, tr rx frag-s cohesive, compact	damp
			8									
				11	✓	.25		0			0-.6 Orange tan SILT tr. fine SAND	cohesive, compact
10	7										.6-1.0- Orange-tan fine SILT, lg rounded rx frag-s, some cs white-blk angular rx frag-s.	
		5										
			12									
				10	✓	1.52		0			1.0-1.2 - Tan blk very cs angular SAND and gravel.	
12	19											
		13									1.2-1.6 - Tan-brown uniform SAND	
			11									
				7	✓	1.60		0				

Sheet 2 of 2

Boringt No. MW-7
Project No. 576-018

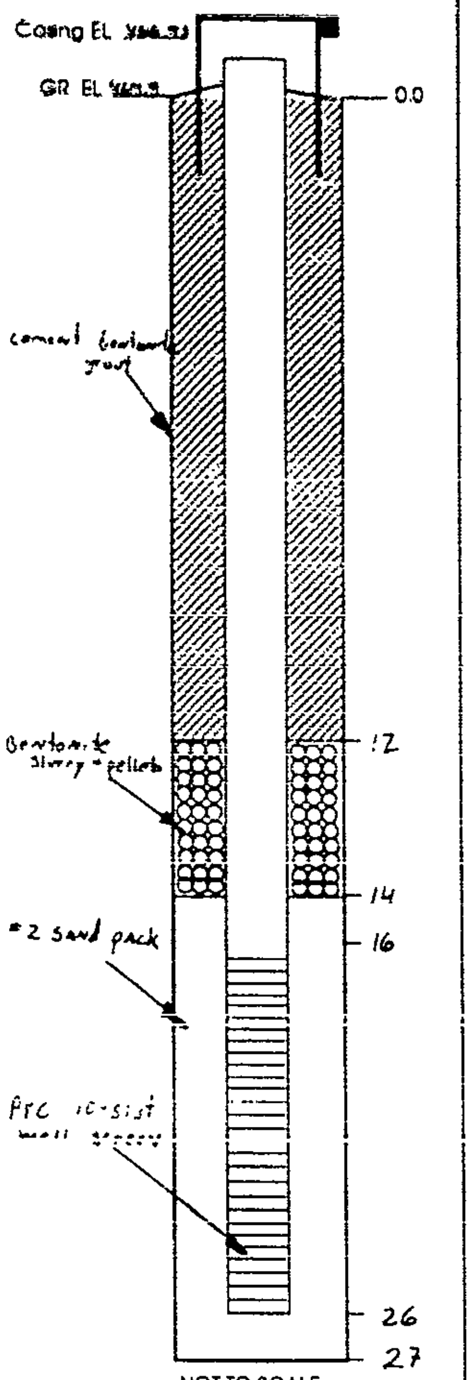
Depth	BLOWS ON SAMPLER 0" to 6"	6" to 12"	12" to 18"	18" to 24"	Retained Sample	Recovery (feet)	Sample No.	Instrument Reading	Moisture Content	Stratigraphic Column	CLASSIFICATION OF MATERIAL f - fine m - medium c - coarse and - 35-50% some - 20-35% little - 10-20% trace - 0-10%	Remarks
14	5										0-.2 Tan-br fine uniform SAND .2-.6 - Lt tan-orange fine silty SAND .6-.65 Cs red-br. (FeO_2 stained) angular SAND .65-1.12 - Gray brown. cs SAND, some silt, many lg rx. frags.	mottled
		6										
			22									
				22	✓	1.12	4272	not working				
16	11										0-1.2 - Tan-brown uniform m-cs SAND	
		4										
			7									
				9	✓	1.20	4273	0	▽			
18	8										0-.15 - SAME .15-.90 - F-cs mixture of angular and rounded silt sand, and rx frags.	
		16										
			20									
				30	✓	0.9	4274	0				
20	19										0-.95 - SAME	
		19										
			19									
				11	✓	0.95	4275	0				
22											Augered through	
24												
	8										0-.2 - cs SAND .2-.7 - cs Gravel, some cs SAND .7-.9 - cs GRAVEL, tr. cobbles, tr sand .9-1.15 - cs GRAVEL, tr. cobbles.	
		7										
26			18									
				23	✓	1.15	4277	0				

Well No. MW-7
Project No. 536-018
Project Name Tuxedo C+D
Client NYSDEC

MONITORING WELL COMPLETION LOG

Location Tuxedo NY
Date Drilled 7-22-88
Date Developed 7-23-88
Developing Method bailer
Well Construction Completed 7-22-88

WELL CONSTRUCTION DETAIL



NOT TO SCALE

Inspector Kevin McGuinness + John Gurewich
Drilling Contractor Buffalo Drilling Co.

Type of Well overburden
Static Water Level 12.36 Date 9-1-88
Measuring Point (M.P.) Top of Casing
Total Depth of Well 26'
Total Depth of boring 27'

Drilling Method
Type Hollow stem Auger Diameter 7"
Casing

Sampling Method
Type Split spoon Diameter 1 1/2"
Weight 140 lb. Fall 30"
Interval Every 5' to water then continuous

Riser Pipe Left in Place
Material PVC sch. 40 Diameter 2"
Length 16' Joint Type threaded flush

Screen
Material PVC sch. 40 Diameter 2"
Slot Size 10 Length 10'
Stratigraphic Unit Screened sand.

Filter Pack
Sand X Gravel Natural
Grade #2
Amount Interval 27-15'

Seal(s)
Type Bentonite slurry Interval 15-13'
Type + pellets Interval
Type Interval

Locking Casing ☒ Yes ☐ No
Notes:

LAWLER, MATUSKY SKELLY ENGINEERS

LAWLER, MATUSKY & SKELLY ENGINEERS
ENVIRONMENTAL SCIENCE & ENGINEERING CONSULTANTS
ONE BLUE HILL PLAZA
POST OFFICE BOX 1509
PEARL RIVER, NEW YORK 10965

BY ______ DATE ______
CHKD BY ______ DATE ______
SHEET NO ______ OF ______
JOB NO ______
SUBJECT ______

Tuxedo Slug Tests

0800 = Arrive on site - Bert Pines + John are here from OEC.

0830 - Set up on MW-1 - DTW - 20.79' from TOC. (
- well - total depth - 30.6' (metal casing)
- height of casing above grade - 2.67'

0900 - Start MW-1 Slug test

-1 - 20.74
-2 - 20.77

- noticeably depress ≈ 1' but equilibrates ~ ≈ 10 sec

1315 - Return to MW-1 to try + get rough time for K formulae

SWL 20.78
-1- 20.6 - time 3.06 secs
-2- - 2.77

-1	7.65 secs
-2	6.24
-3	6.35
-4	6.65
.5	4.24
-6	5.81

Time - from
20.78
to 20.60
[illegible]
0.18

Final Static W.L. - 20.78'

LAWLER, MATUSKY & SKELLY ENGINEERS
ENVIRONMENTAL SCIENCE & ENGINEERING CONSULTANTS
ONE BLUE HILL PLAZA
POST OFFICE BOX 1509
PEARL RIVER NEW YORK 10965

BY ______ DATE ______ SHEET NO ______ OF ______
CHKD. BY ______ DATE ______ JOB NO ______

SUBJECT Tunds Slug Test
8.23.88

13:51 time
MW-7 - 18.73 ft initial water level

Probe set @ 18.60'

- 18.60 feet

1 - 1.42 secs .13 feet
2 - .57 secs
3 - .49 secs

MW-6 14:33 hrs

~~EP~~ initial water level 10.32'

Set water level indicator @ 10.20'

DNC
1 21.60 sec. } meter
2 100.95 sec } malfunction
3 ~~at 15 second intervals~~

~~15~~ -
~~30~~ -
~~45~~ -
~~60~~ -
~~75~~ -
~~90~~ -

↓ at these times

Start again
1) 10.45
2) 8.30
3) 6.52

Adjusted sensitivity on machine

1. 2.11
2. 3.03
3. 3.71
4. 3.91
5. 4.05
} sec

LAWLER, MATUSKY & SKELLY ENGINEERS

ENVIRONMENTAL SCIENCE & ENGINEERING CONSULTANTS

ONE BLUE HILL PLAZA
POST OFFICE BOX 1509
PEARL RIVER NEW YORK 10965

BY ______ DATE ______ SHEET NO ______ OF ______

CHKD BY ______ DATE ______ JOB NO ______

SUBJECT ______

MW-5 - 1554

S.W.L - 11.5'

PROBE SET AT 11.35'

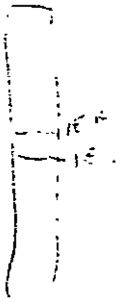
1. 5.05 sec.
2. 4.87 sec
3. 5.26 sec
4. 5.13 sec
5. 4.24 sec.
6. 4.30 sec.

MW-4 16.17 HRS

S.W.L 19.35 from PVC

PROBE SET AT 19.25

1. 6.75 sec.
2. 5.94 sec.
3. 6.62 sec.
4. 4.45 sec.
5. 6.61 sec.
6. 5.8[illegible] sec.



MW-3 16:57 hr.

SWL 18.27 from PVC

NOT APPLICABLE NEEDS [illegible] WITH Probe set At 18.10

~~MEAS/[illegible] 15 SEC. INTERVALS~~

	~~Time~~	
1	16.85	- 25 secs
2		- 35
3	17.22	
4	17.50	- 1.01 MINS
5	17.65	- 1.17
6	17.75	- 1.26
7	17.84	- 1.37
8	17.89	- 1.50
9	18.00	- 2.09
10	18.05	- 2.30
→ 11	18.15	- 3.00

~~MEASURED TO 18.15'~~

CHANGED TO DROP SLUG IN FIRST

		Time
12	18.19	330
13	18.21	400
14	18.23	430
15	18.25	500
16	18.25	530
17	18.25	600
18	18.26	630
19	18.265	700
20	18.27	730

BY ______ DATE ______

CHKD BY ______ DATE ______

LAWLER, MATUSKY & SKELLY ENGINEERS

ENVIRONMENTAL SCIENCE & ENGINEERING CONSULTANTS

ONE BLUE HILL PLAZA
POST OFFICE BOX 1509
PEARL RIVER, NEW YORK 10965

SHEET NO. ______ OF ______

JOB NO ______

SUBJECT ______

πr^2 – 2" well = 75.36 in³/2 ft. displ.

πr^2 — 1.5" slug = 1.767 sq" area

x12 = 21.21 in³ per foot

21.21 (x) = 75.36

x = 42.65 inches

= 3.55' long slug to

displace 2' water in 2" well

7.07 sq" x 24 = 169.65 in³ in 2' of 3" w

πr^2 – 3" well = 84.82 in³/ft. of plug

~~(2) 1.767 (x)~~ = ~~84.82~~

= ~~48~~ 4'

÷

(12½ feet @ 1½" diameter)

2½" slug: $(1.25)^2 \pi$ = 4.91 sq"

4.91 x = 169.65

34.55" @ 2½"Ø = 2' wate

= 2.879

BY KMS DATE 8-17-88

LAWLER, MATUSKY & SKELLY ENGINEERS

ENVIRONMENTAL SCIENCE & ENGINEERING CONSULTANTS

ONE BLUE HILL PLAZA
POST OFFICE BOX 1509
PEARL RIVER, NEW YORK 10965

SHEET NO ______ OF ______

CHKD. BY ____ DATE ______

JOB NO ______

SUBJECT Calc. of slug dimensions to displace 2' of water in 2 + 3" wel

#1 πr^2 for 2" well = 75.36 in² / 2 ft. displacement

πr^2 for 1.5' slug = 1.767 sq. IN.

$1.767 (x) = 75.36$

$x = 42.65$ inches

= 3.55' long slug to displace 2' water

#2 πr^2 for 3' well = 169.65 in³ / 2 ft displacement

πr^2 for 2.5' slug = 4.91 in²

$4.91 x = 169.65$

$x = 34.55$ inches long @ 2.5" D, to displace 2' water

REFERENCE 4

KAW

LAWLER, MATUSKY & SKELLY ENGINEERS
CREW CHIEF REPORT AND INCIDENT SHEET

Crew Chief: JM Gurzwich Survey(s): Tuxedo Well Sampling Job No. 576-018

Survey Date(s): 9/1-2/88 Vehicle: Cube Van Crew Members: KMG / KM'C RC

SURVEY INFORMATION

1.	Survey start/end time	0500 - 2000 0530/ 1930
2.	Equipment prepared for survey/safety equipment present?	Yes
3.	Sampling gear working properly?	Yes
4	Physical/chemical meters functioning properly/ID numbers recorded?	Yes
5.	Any incidents or mishaps?	No
6.	Any unusual or important observations/time lost?	Yes
7.	Weather observations/marine radiotelephone log/boat and vehicle logs/incident sheet completed?	Yes
8.	Equipment usage sheet completed and submitted to Warehouse Coordinator?	Yes
9.	Boat fluids, equipment, etc. checked?	—
10.	Vehicle fluids, equipment, etc. checked?	✓

11. Boat(s) Used ______ Engine Hours ______ to ______

Radio Log: Boat ______ From ______ to ______ Location ______

INCIDENT REPORT AND COMMENTS (Include number and explanation): Survey went fine.

1-88 On the first day KMG + I purged and sampled MW-1, MW-7, MW-6, MW-5 + MW-4. We purged with the Homelite centrif pump. All these wells had a good yield and we were able to sample them 20 to 40 min. after purging. We purged from the bottom at first to pull up any silt at the bottom of the well, then we pulled purge water from mid depth and then we purged from the surface. We did a field blank on the MW-7 bailer before sampling MW-7. We did a Blind Duplicate of MW-6 and called it "MW-8" and said we sampled it at 0730 on the Chain of Custody + Labels. The next day (9-2-88) KM'C, RC + I purged + sampled MW-3 + MW-2. We had to hand bail MW-2 because of the depth. We set KM'C up w/ the tripod + PVC bailer to purge this well. It purged to the bottom a few times so he had to let it recover a few times before purging the required volume. RC + I went on to purge MW-3 w/ the centri. pump. It keep purging to dryness after ~5 gal. (Once the water level got below ~28' (57) the pump would not pull anymore). The turbidity was not below 50 NTU after purging the required volume. Margaret O'Brien of DEC asked if we could purge some more with a bailer. I told her the turbidity would increase if we used a bailer. Yesterday when we purged the 5 wells with the centri. pump the turbiditys were low when we ended (0-45). Most of the wells turbidity increased as we pulled bailers up to sample. I don't believe Margaret noticed this yesterday. She had us purge another 50 gal with a bailer + the turbidity was ~100 NTU. Margaret then had us purge another 16 gal with the pump. (Turbidity still @ ~100 NTU). We pulled out ~17 bore hole volumes of water. As we sampled the turbidity decreased at this well (MW-3). We did our matrix spike + matrix spike dup at this well (MW-3-MS

(use reverse or additional sheet if necessary)

+ MW-3-MSD). We let MW-2 recover for 3 hr 15 min before sampling. (70.4% recovery) The turbidity at this well increased from 1 to 150 NTU's as we sampled. All the samples were FedX'ed to RECRA labs.

Lawler, Matusky & Skelly Engineers

Date: 9-1-88
Crew: JMG KMG
Job No: 496-018

Turb. Meter: DEC Monitek L-33 EV
pH Meter: DEC Orion 4??
Therm. No: 999
Cond. No: DEC TLC-2000

WELL SAMPLING LOG

WELL NO: MW-1
LOCATION: Tuxedo C+D
WELL TYPE: PVC
WELL DIAMETER: 2" (7" Borehole)
WELL DEPTH: 29.59'
SCREENED INTERVAL: Bottom 10'
CASING HT.: —
DEPTH TO WATER: (Static Water Level) 19.63'
REFERENCE POINT: Top of PVC Casing
DATE/TIME PURGED: 9-1-88/0817-0907
PURGING METHOD: Cent. Pump w/ Dedicated Tubing
PURGING DEPTH(S): Surf, Mid, Bottom
PURGE RATES (gpm): 2 gpm
PURGED VOLUME: 100 gal
DTW AFTER PURGING: 19.65'
EST. YIELD RATE: —
SEAL NO: —
CHAIN OF CUSTODY NO: —
4 Bore Volumes: 80 gal.

TYPE OF SCREENING CASING: PVC
WATER BEARING FORMATION(S): Overburden
SAMPLE DATE/TIME: 9-01-88/0930-0950
SAMPLING METHOD: Teflon Bailer
DTW BEFORE SAMPLING: 19.64'
SAMPLING DEPTH(S): Mid Water Column
WELL CONDITION: Good
SAMPLE OBSERVATIONS:
Rather clear, no noticeable

WET CHEMISTRIES
SAMPLE TEMPERATURE: 11.2° C
SAMPLE pH: 6.4
SAMPLE SP. COND: 286

PURGE CHEMISTRIES

TIME/VOLUME	TEMP.	pH	SP. CONDUCTIVITY	Turb. NTU.
40 gal	12.6° C	6.3/6.4	266	
60 gal	12.7° C	6.3	265	
80 gal	12.6° C	6.4	276	0.15
100 gal	12.6° C	6.3	279	0.15

SAMPLE ANALYSIS (List Sample Jar Parameters) INVENT. #

2 VOCs: TCL +10 V_1 V_2
1 l Amber TCL +10 A, B/N's
1 l Amber TCL Pest./PCBs
1 l Amber 4°C
1 l Amber Phenols
½ l Plastic TCL Tot. Metals
½ l Plastic Cyanides

COMMENTS:
29.59 - 19.63 = 9.96' x 2 = 19.92 gal x 4 = 80 gal.
Purge water slightly turbid at first, then cleared up very well

Crew Chief Signature: John M

Date: 9-1-88

Lawler, Matusky & Skelly Engineer

Date: 9-2-88
Crew: JMG RC Kim'l
Job No: 576-018

Turb. Meter: DEC Monitek # L-8318 ✓
pH Meter: DEC Orion # 4996
Therm. No: 999
Cond. No: DEC TIC-3000

WELL SAMPLING LOG

WELL NO: MW-2
LOCATION: Tuxedo C.L.
WELL TYPE: PVC
WELL DIAMETER: 2" (6" Borehole
WELL DEPTH: 89.80'
SCREENED INTERVAL: Bottom 65'
CASING HT.: —
DEPTH TO WATER: (Static Water Level) 24.76'
REFERENCE POINT: Top of PVC
DATE/TIME PURGED: 9-2-88/0808-1450
PURGING METHOD: PVC Bailer
PURGING DEPTH(s): Surf → Bottom
PURGE RATES (gpm): —
PURGED VOLUME: 125 GAL.
DTW AFTER PURGING: 86.00'
EST. YIELD RATE: —
SEAL NO: —
CHAIN OF CUSTODY NO: —
4 Bore Volumes: 166 gal / 3 Bore Vol.: 125 gal.

TYPE OF SCREENING CASING: PVC
WATER BEARING FORMATION(s): Bedrock
SAMPLE DATE/TIME: 9-2-88/1705-1730
SAMPLING METHOD: Teflon Bailer
DTW BEFORE SAMPLING: 44.02'
SAMPLING DEPTH(s): Top of Water C
WELL CONDITION: Good
SAMPLE OBSERVATIONS:
Clear at first, but got more turbid as we sampled

WET CHEMISTRIES
SAMPLE TEMPERATURE: 13.0°C
SAMPLE pH: 8.0
SAMPLE SP. COND: 183

Sample Turbidity (NTU's)	Before	After
	1.0	150

PURGE CHEMISTRIES

TIME/VOLUME	TEMP.	pH	SP. CONDUCTIVITY	Turb. NTU
25 gal.	10.0°	7.4	266	
60 gal	10.8°	7.7	202	
75 gal.	10.7°	7.8	190	225
95 gal	10.8°	8.1	195	1.5
125 gal	11.0°	8.1	196	8.5

SAMPLE ANALYSIS (List Sample Jar Parameters) INVENT. #

2 VOCs TCL+10 V1 V2
1l Amber TCL+10 A,B/N
1l Amber TCL Pest/PCB
1l Amber 4°C
1l Amber Phenols
½l Plastic TCL Total M
½l Plastic TCL Cyani

COMMENTS: 89.80'-24.75' = 65.02' x .64 = 41.6 gal x 4 = 166 gal.
(4" well) x 3 = 125 gal.

Purge water turbid, tan at first
cleared up as we purged
purged to ~ dryness a few times, had to let well
recover a few times & then purge again
Well recovered 70.4% between purging & sampling

Crew Chief Signature: John M Guzewicz

Date: 9-2-88

Lawler, Matusky & Skelly Engineers

Date: 9-2-88
Crew: JMG PC KM'G
Job No: 576-018

Turb. Meter: DEC Montek # 6-333
pH Meter: DEC Orion # 4336 /C
Therm. No: 989
Cond. No: DEC TLC-2000

WELL SAMPLING LOG

WELL NO: MW-3 * (also MW-3-MS + MW-3-MSD) Matrix Spike + Matrix Spike Dupl.
LOCATION: Turecki C+D
WELL TYPE: Open Hole
WELL DIAMETER: 3'
WELL DEPTH: 30.42'
SCREENED INTERVAL: —
CASING HT.: —
DEPTH TO WATER: (Static Water Level) 18.13'
REFERENCE POINT: Top of PVC Casing
DATE/TIME PURGED: 9-2-88/0947-0950, 1008-1011, 1035-1037, 1110-1124, 1200-1500
PURGING METHOD: Centri. Pump w/ Dedicated Tubing
PURGING DEPTH(S): Bott, Mid, Surf.
PURGE RATES (gpm): ~2 gpm
PURGED VOLUME: 103 gal.
DTW AFTER PURGING: Dryness (27.80') * w/ pump @ 1130
EST. YIELD RATE: —
SEAL NO: —
CHAIN OF CUSTODY NO: —
4 Bore Volumes: 18.2 gal.

TYPE OF SCREENING CASING: —
WATER BEARING FORMATION(S): Bedrock
SAMPLE DATE/TIME: 9-2-88/1550-1640
SAMPLING METHOD: Teflon Bailer
DTW BEFORE SAMPLING: 18.11'
SAMPLING DEPTH(S): Mid Water Column
WELL CONDITION: Good
SAMPLE OBSERVATIONS:
Sl. turbid, no noticeable odo
sample cleared up a little as we s

WET CHEMISTRIES

SAMPLE TEMPERATURE: 12.6/17.6°C
SAMPLE pH: 6.0
SAMPLE SP. COND: 1855
Sample Turbidity (NTUs): Before 99 After 46

* We did our Matrix Spike + Matr Spike Duplicate at this well (MW-3 MS, MW-3-MSD)

PURGE CHEMISTRIES

	TIME/VOLUME	TEMP.	pH	SP. CONDUCTIVITY	Turb. NTUs
	5 gal.	17.1	6.4	1429	
	10 gal.	19.3	6.0	1675	
	15 gal.	16.2	6.0	1750	
End Pump	27 gal	15.0°	6.0/6.0	1821	57
Hand Bail ↓	32 gal	11.7°	6.0	1851	275
	42 gal	12.6°	6.1	1872	84

SAMPLE ANALYSIS (List Sample Jar Parameters) INVENT. #

2 VOCs TCL+10 V_1 V_2
↓
1 l Amber TCL+20 A,B/Ns
1 l Amber TCL Pest/PCBs
1 l Amber Phenols
1 l Amber 4°C
½ l Plastic TCL Cyanide
½ l Plastic TCL Total Metals

COMMENTS: 30.42 - 18.13' = 12.29' x .37 = 4.5 gal x 4 = 18.2 gal

Purge water slightly turbid, tan at first. Purged to dryness at 5 gal, let well recover + purged to dryness again (5 more gal.). Again (5 more gal.) and again. We began hand-bailing @ 1200 because pump not able to draw when the water was at ~28'. We hand bailed 60 gal but turbidity increase, as I told Margaret O'Brien (DEC) it would, so then we pumped it dry again.

Crew Chief Signature: Date: 9-2-88

Purge Chems

	Volume	Temp	ph	sp. Cond	NTUs
Hand Bail	68 gal	12.7°	6.1	1854	120
	77 gal.	13.2°	6.1	1834	150
↓	87 gal.	12.5	6.1	1847	100
Pump	103 gal	[illegible]	6.1	[illegible]	[illegible]

Quit Bailing, returned to pump

Lawler, Matusky & Skelly Engineer

Date: 9-01-88
Crew: JMG KM'G
Job No: 576-01B

Turb. Meter: DEC Monitek # L-88.
pH Meter: DEC Orion # 4086
Therm. No: 988
Cond. No: DEC TLC-3000

WELL SAMPLING LOG

WELL No: MW-4
LOCATION: Tuxedo C+D
WELL TYPE: PVC
WELL DIAMETER: 2" (7" Borehole)
WELL DEPTH: 26.30'
SCREENED INTERVAL: Bottom 10'
CASING HT.: —
DEPTH TO WATER: (Static Water Level) 16.72'
REFERENCE POINT: Top of PVC
DATE/TIME PURGED: 9-01-88/1720-1750
PURGING METHOD: Cent. Pump w/ Dedicated Tubing
PURGING DEPTH(s): Bott., Mid, Surf.
PURGE RATES (gpm): 5gpm
PURGED VOLUME: 100gal
DTW AFTER PURGING: 16.97'
EST. YIELD RATE: —
SEAL No: —
CHAIN OF CUSTODY No: —
4 Bore Volumes: 77 gal.

TYPE OF SCREENING CASING: PVC
WATER BEARING FORMATION(s): Overburden
SAMPLE DATE/TIME: 9-1-88/1815-1835
SAMPLING METHOD: Teflon Bailer
DTW BEFORE SAMPLING: 16.79'
SAMPLING DEPTH(s): Mid Water Colum
WELL CONDITION: Good
SAMPLE OBSERVATIONS: Clear at first, then got more turbid and tan-brown as we sampled

WET CHEMISTRIES
SAMPLE TEMPERATURE: 17.4°C
SAMPLE pH: 5.7
SAMPLE SP. COND: 521

PURGE CHEMISTRIES

TIME/VOLUME	TEMP.	pH	SP. CONDUCTIVITY	Turb. NTU
1744 40gals	11.7°	5.8	808	
60gal.	17.6°	5.9	920	
80gal	17.5°	5.9	970	3.0
100gal.	17.4°	5.9	999	2.5

SAMPLE ANALYSIS (List Sample Jar Parameters) INVENT. #
2 VOCs TCL+10 V_1 V_2
1l Amber TCL+20 A, B/Ns
1l Amber TCL Pest./PCBs
1l Amber 4°C
1l Amber Phenols
½l Plastic TCL Total Metal
½l Plastic TCL Cyanide

COMMENTS: 26.30' - 16.72' = 9.58' x 2 = 19 gal x 4 = 77 gal.

Purge water turbid + tan at first then cleared up quickly as we purged. We got no readings over the purge water. At the culvert we got 240ppm H_2S, ~2% O_2

Crew Chief Signature: John M Guzewich
Date: 9-1-88

Lawler, Matusky & Skelly Engine

Date: 9-1-88
Crew: JMG KM'G
Job No: 576-018

Turb. Meter: DEC Monitek L-3334
pH Meter: DEC Orion # 4996 / CF # 62
Therm. No: 989
Cond. No: DEC TLC-2000

WELL SAMPLING LOG

WELL No: MW-5
LOCATION: Tuxedo
WELL TYPE: PVC
WELL DIAMETER: 2" (7" Borehole)
WELL DEPTH: 19.42'
SCREENED INTERVAL: Bottom 10'
CASING HT.: —
DEPTH TO WATER: (Static Water Level) 10.99'
REFERENCE POINT: Top of PVC Casing
DATE/TIME PURGED: 9-1-88/1529-1551
PURGING METHOD: Centri. Pump w/ Dedicated Tubing
PURGING DEPTH(s): Bottom, Mid, Surf
PURGE RATES (gpm): 5 gpm
PURGED VOLUME: 100 gal
DTW AFTER PURGING: 11.28'
EST. YIELD RATE: —
SEAL No: —
CHAIN OF CUSTODY No: —
4 Bore Volumes: 67 gal

TYPE OF SCREENING CASING: PVC
WATER BEARING FORMATION(s): Overburden
SAMPLE DATE/TIME: 9-1-88 / 1615-1625
SAMPLING METHOD: Teflon Bailer
DTW BEFORE SAMPLING: 10.99
SAMPLING DEPTH(s): Mid Water Column
WELL CONDITION: Good
SAMPLE OBSERVATIONS: Somewhat clear at first, then turned cloudy as we sampled no noticeable odor

WET CHEMISTRIES

SAMPLE TEMPERATURE: 21.7°/21.7°C
SAMPLE pH: 5.9
SAMPLE SP. COND: 2750

PURGE CHEMISTRIES

TIME/VOLUME	TEMP.	pH	SP. CONDUCTIVITY	Turb.
40 gal	22.0°C	5.9	2790	
60 gal	22.1°	5.9	2710	
90 gal	22.0°	5.9	2650	5.0
100 gal	21.9°	5.9/5.9	2530	10.0

SAMPLE ANALYSIS (List Sample Jar Parameters)

Sample Jar Parameters	INVENT. #
2 VOC's TCL+10	V1
↓	V2
1 l Amber TCL+20 A,B/Ns	
1 l Amber TCL Pest./PCB's	
1 l Amber 4°C	
1 l Amber Phenols	
½ l Plastic TCL Total Metals	
½ l Plastic TCL Cyanides	

COMMENTS: 19.42-10.99' = 8.42 × 2 = 16.8 × 4 = 67 gal.
LEL was 40-35% when we first opened well
H_2S read 0 ppm
Purge water turbid + gray at first, then cleared up as we purged. We got 1-2 ppm H_2S over purge water

Crew Chief Signature: John M Guzewich
Date: 9-1-88

Lawler, Matusky & Skelly Engineers

Date: 9-1-88
Crew: JMG KM'G
Job No: 576-018

Turb. Meter: See MW-6 Log
pH Meter:
Therm. No:
Cond. No:

WELL SAMPLING LOG

WELL No: "MW-8" (Blind Dup of MW-6)
LOCATION: Toredo C+D
WELL TYPE: See MW-6 Log
WELL DIAMETER:
WELL DEPTH:
SCREENED INTERVAL:
CASING HT.:
DEPTH TO WATER: (Static Water Level)
REFERENCE POINT:
DATE/TIME PURGED:
PURGING METHOD:
PURGING DEPTH(s):
PURGE RATES (gpm):
PURGED VOLUME:
DTW AFTER PURGING:
EST. YIELD RATE:
SEAL No:
CHAIN OF CUSTODY No:
4 Bore Volumes:

TYPE OF SCREENING CASING:
WATER BEARING FORMATION(s):
SAMPLE DATE/TIME: "9-1-88/0730"
SAMPLING METHOD: Teflon Bailer
DTW BEFORE SAMPLING: See MW-6
SAMPLING DEPTH(s): Log
WELL CONDITION:
SAMPLE OBSERVATIONS:

WET CHEMISTRIES

SAMPLE TEMPERATURE:
SAMPLE pH:
SAMPLE SP. COND:

PURGE CHEMISTRIES

TIME/VOLUME	TEMP.	pH	SP. CONDUCTIVITY	Turb. NTU.
See	MW-6	Log		

SAMPLE ANALYSIS (List Sample Jar Parameters) INVENT. #

2 VOCs TCL^{+10} V_1 V_2
1l Amber TCL^{+20} ABNs
1l Amber TCL Pest/PCBs
1l Amber 4°C
1l Amber Phenols
½l Plastic TCL Total Metals
½l Plastic TCL Cyanides

COMMENTS:

"Blind Duplicate of MW-6"

" " = fictious info put on CofC and labels

Crew Chief Signature: John M

Date: 9-1-88

Lawler, Matusky & Skelly Engineer

Date: 9-1-88
Crew: JMG KM'G
Job No: 576-018

Turb. Meter: DEC Monitek L-2324
pH Meter: DEC Orion 4996
Therm. No: 989
Cond. No: DEC TLC-2000

WELL SAMPLING LOG

WELL NO: MW-6
LOCATION: Tuxedo C+D
WELL TYPE: PVC
WELL DIAMETER: 2" (7" Borehole)
WELL DEPTH: 18.44'
SCREENED INTERVAL: Bottom 10'
CASING HT.: —
DEPTH TO WATER: (Static Water Level) 9.82'
REFERENCE POINT: Top of PVC Casing
DATE/TIME PURGED: 9-1-88/ 1212-1230
PURGING METHOD: Cent Pump w/ Dedicated Tubing
PURGING DEPTH(s): Bott, Mid, Surf.
PURGE RATES (gpm): 6gpm
PURGED VOLUME: 100gal
DTW AFTER PURGING: 9.97'
EST. YIELD RATE: —
SEAL NO: —
CHAIN OF CUSTODY NO: —
4 Bore Volumes: 70 gal.

TYPE OF SCREENING CASING: PVC
WATER BEARING FORMATION(s): Overburden
SAMPLE DATE/TIME: 9-1-88/1300-1340
SAMPLING METHOD: Teflon Bailer
DTW BEFORE SAMPLING: 9.84'
SAMPLING DEPTH(s): Mid Water Column
WELL CONDITION: Good
SAMPLE OBSERVATIONS: Rather clear with yellow coloration w/ broken up sheen on surface

WET CHEMISTRIES

SAMPLE TEMPERATURE: 24.8°C
SAMPLE pH: 6.6
SAMPLE SP. COND: 3440

PURGE CHEMISTRIES

TIME/VOLUME	TEMP.	pH	SP. CONDUCTIVITY	Turb. NTU
40gal	26.4°C	6.5	3610	
60gal	26.3°	6.5	3620	
80gal	26.3°	6.5	3670	47
100gal	26.2°	6.5	3550	45

SAMPLE ANALYSIS (List Sample Jar Parameters) INVENT.

2 VOCs TCL+10	V_1 V_2
1 l Amber TCL+20 A,B/Ns	
1 l Amber TCL Pest/PCBs	
1 l Amber 4°C	
1 l Amber Phenols	
½ l Plastic TCL Metals	
½ l Plastic TCL Cyanide	

COMMENTS: 18.44-9.82' = 8.62 x 2 = 17.2 x 4 = 70gal.
When we opened the well the LEL was over 100%, H_2S was zero ppm, HNU read same as background (0.3) Purge water was turbid + gray-yellow at first, then cleared up somewhat but had a yellow tint + was also rather foamy. HNU + MSA 361 showed no readings over a bucket of purge water.

Crew Chief Signature: John M [illegible]

Date: 9-1-88

Lawler, Matusky & Skelly Engineers

Date: 9-01-88
Crew: JMG KMG
Job No: 576-01E

Turb. Make: DEC Monitek # L22
pH Meter: DEC Orion # 4996 /C1
Therm. No: 999 / C68
Cond. No: DEC TLC-2000

WELL SAMPLING LOG

WELL No: MW-7
LOCATION: Tuxedo C&D
WELL TYPE: PVC
WELL DIAMETER: 2" (2' Borehole)
WELL DEPTH: 28.02'
SCREENED INTERVAL: Bottom 10'
CASING HT.: —
DEPTH TO WATER: (Static Water Level) 18.36'
REFERENCE POINT: Top of PVC
DATE/TIME PURGED: 9-01-88/1013-1024
PURGING METHOD: Grundfos Pump w/ Dedicated Tubing
PURGING DEPTH(s): Surf, Mid, Bottom
PURGE RATES (gpm): 10 gpm
PURGED VOLUME: 115 gal
DTW AFTER PURGING: 18.37'
EST. YIELD RATE: —
SEAL No: —
CHAIN OF CUSTODY No: —
4 Bore Volumes: 77 gal.

TYPE OF SCREENING CASING: PVC
WATER BEARING FORMATION(s): Overburden
SAMPLE DATE/TIME: 9-1-88/1110-1130
SAMPLING METHOD: Teflon Bailer
DTW BEFORE SAMPLING: 18.37'
SAMPLING DEPTH(s): Mid Water Column
WELL CONDITION: Good
SAMPLE OBSERVATIONS:
Rather clear at first, then became more turbid & tan as we samp
no noticeable odor

WET CHEMISTRIES

SAMPLE TEMPERATURE: 15.7°/15.7°C
SAMPLE pH: 6.1/6.0
SAMPLE SP. COND: 575

PURGE CHEMISTRIES

TIME/VOLUME	TEMP.	pH	SP. CONDUCTIVITY	Turb. NTU
40 gal	14.6°C	6.1	575	
60 gal.	14.6°C	6.1	564	
80 gal	14.5°	6.1	557	
100 gal	14.4°	6.0	555	4.5

SAMPLE ANALYSIS (List Sample Jar Parameters) INVENT. #

2 VOC's TCL+10 V_1
V_2
1 l Amber TCL+20 A,B/N's
1 l Amber TCL Pest./PCB's
1 l Amber 4°C
½ l Plastic TCL Tot. Metals
½ l Plastic TCL Cyanides
1 l Amber Phenols

COMMENTS: 28.02' - 18.36' = 9.66' x 2 = 19.3 gal x 4 = 77 gal

Purge water turbid & orange at first but quickly cleared up

We got no HNU, H_2S or LEL readings over the purge water

Crew Chief Signature: John M [illegible]

Date: 9-1-88

Date: 9·1·77
Crew: JMG KMcG
Job No: 576-018

Turb. Meter : —
pH Meter:
Therm. No: —
Cond. No: —

WELL SAMPLING LOG

WELL No: Field Blank
LOCATION: Turcdo C+D
WELL TYPE: —
WELL DIAMETER: —
WELL DEPTH: —
SCREENED INTERVAL:
CASING HT.: —
DEPTH TO WATER: (Static Water Level) —
REFERENCE POINT: —
DATE/TIME PURGED: —
PURGING METHOD: —
PURGING DEPTH(s): —
PURGE RATES (gpm):
PURGED VOLUME: —
DTW AFTER PURGING: —
EST. YIELD RATE: —
SEAL No: —
CHAIN OF CUSTODY No: —
4 Bore Volumes : —

TYPE OF SCREENING CASING: —
WATER BEARING FORMATION(s): —
SAMPLE DATE/TIME: 9-1-88 / 1055
SAMPLING METHOD: Teflon Bailer
DTW BEFORE SAMPLING: —
SAMPLING DEPTH(s): —
WELL CONDITION: —
SAMPLE OBSERVATIONS:

WET CHEMISTRIES

SAMPLE TEMPERATURE: —
SAMPLE pH: —
SAMPLE SP. COND: —

PURGE CHEMISTRIES

TIME/VOLUME	TEMP.	pH	SP. CONDUCTIVITY	TURB. NTUs

SAMPLE ANALYSIS (List Sample Jar Parameters) INVENT. #

2 VOC's TCL+10 V_1 V_2
1 l Amber TCL+20 A,B/Ns
1 l Amber TCL Pest/PCB's
1 l Amber Phenols
½ l Plastic TCL Total Metals
½ l Plastic TCL Cyanides

COMMENTS:

RECRA supplied Field Blank water was poured through MW-7 bailer. Bailer was then used to sample MW-7

Crew Chief Signature: John M Garzynski

Date: 9-1-88

Lawler, Matusky & Skelly Engineer

Crew: JMG, KMG
Date: 9-1-88
Job No: 576-016

LAWLER, MATUSKY & SKELLY ENGINEERS
FIELD METER CALIBRATION AND/OR CHECK
DATA SHEET

Site: Tuxedo
Oper: Well Sampling
Calib. By: JMG KMG

METER No./	PROBE No.	TIME	THERM No./	TEMP. (°C)	EXPECTED VALUE		OBSERVED VALUE		ADJ TO[a]		% DIFF.[b]	COMMENTS
DEC#	4776	0710		16.2°	7.00	—	6.91	—	7.01	—		
pH		↓		↓	4.01	10.01	3.89	9.95	4.00	—		
		1845		22.9°	7.00	—	7.11	—	7.00	—		
↓		↓		↓	4.01	10.01	3.61	9.88	4.00	—		
CP*	62	0710		16.2°	7.0	—	7.0	—	—			
pH		↓		↓	4.0	10.0	4.1					
		1845		23.9°	7.0	—	6.9		7.0			
↓		↓		↓	4.0	10.0	4.0					
MSA 261	DEC	0715			10 ppm H_2S		9 ppm	H_2S	No Span Adj.			
CGI, H_2S, O_2					50% LEL		32%	LEL	Adj Span to		50% LEL	
↓					15.0 O_2 %		15.4%	O_2	No Span Adj.			
HNU	DEC # 90147	0720			57 ppm		58 ppm		Span @ 9.5 - No Adj.			
DEC	L-3324	0805				40		45		40		
Turbidity		↓				60		59		No Adj.		
		1400				40		40		—		
↓		1850				40		37		40		

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[a] For dissolved oxygen and pH meter calibrations, record adjustments (include % and ppm readings for dissolved oxygen meter calibration).

[b] Include % Diff. calculation for conductivity calibration checks: $\% \text{ Diff} = \frac{Ex - Ob}{Ex} \times 100$

Crew: Tim G RC Km'c
Date: 9-2-88
Job No: 530-013

LAWLER, MATUSKY & SKELLY ENGINEERS
FIELD METER CALIBRATION AND/OR CHECK DATA SHEET

Site: Tuxedo C+D
Oper: Well Sampling
Calib. By: Tim G

	METER No./ PROBE No.	TIME	THERM No./ TEMP. (°C)	EXPECTED VALUE	OBSERVED VALUE	ADJ TO[a]	% DIFF.[b]	COMMENTS
pH	DEC #4776	0830	19.1°	7.00 —	6.99 —	7.00 —		
	↓	↓	↓	4.01 10.01	4.01 9.95	4.00 —		
		1730		7.00 —	7.02 —	7.00		
		↓		4.01 10.01	4.02	4.01		
	↓							
pH	CP#624	0830	19.1°	7.0 -	7.0			
		↓	↓	4.0 10.0	4.1 9.9			
		1730		7.0 —	6.9 —	7.0		
		↓		4.0 10.0	4.0 9.9			
	↓							
CGI H_2S, O_2	MSA 361 DEC	0820		10ppm H_2S	8ppm	No Span Adj.		
				50% LEL	74%	Adj. span to 50%		
		↓		15% O_2	15.1%	No Span Adj.		
	HNU DEC #801439	0830		57ppm	57 ppm	Span [illegible] No adj.		
Turbidity	DEC L-3324	0900		40	39	40		
		↓		60	59	—		
		1730		40	45	40		
		↓		60	59	—		
	↓	↓				—		

[a] For dissolved oxygen and pH meter calibrations, record adjustments (include % and ppm readings for dissolved oxygen meter calibration).

[b] Include % Diff. calculation for conductivity calibration checks: $\% \text{ Diff} = \frac{\text{Ex} - \text{Ob}}{\text{Ex}} \times 100$

LAWLER, MATUSKY & SKELLY ENGINEERS
CREW CHIEF REPORT AND INCIDENT SHEET

ew Chief: JM Gurewich / EM Hastings Survey(s): Tuxedo C+D 2nd Well Sampling Job No. 576-018

Survey Date(s): 11-8-88 Vehicle: Cube Van ~~Blu P'up~~ Crew Members: KmC CSS

SURVEY INFORMATION

1.	Survey start/end time	0530/2000
2.	Equipment prepared for survey/safety equipment present?	Yes
3.	Sampling gear working properly?	Yes
4.	Physical/chemical meters functioning properly/ID numbers recorded?	Yes
5.	Any incidents or mishaps?	No
6.	Any unusual or important observations/time lost?	No
7.	Weather observations/marine radiotelephone log/boat and vehicle logs/incident sheet completed?	Yes
8.	Equipment usage sheet completed and submitted to Warehouse Coordinator?	Yes
9.	Boat fluids, equipment, etc. checked?	—
10.	Vehicle fluids, equipment, etc. checked?	—

11. Boat(s) Used ______ Engine Hours ______ to ______

Radio Log: Boat ______ From ______ to ______ Location ______

INCIDENT REPORT AND COMMENTS (Include number and explanation): Survey went fine. We met Mike Komoroske at the Tuxedo C+D site. The NYSDEC took care of all the bottle + analysis arrangements (They used Compu-Chem). Mike took care of all the C of C's + bottle labelling while we sampled. First we set up the purge bladder pump on GW-2. Then we set up in teams + purged and sampled GW-3 + GW-4 at the same time. To save time Mike had us only monitor purge chems at the beginning and the end. Then we purged + sampled GW-5 + GW-6. The blind dup (GW-8) was taken @ GW-6 while Caroline + I were sampling GW-6. Edward + Kevin moved over to GW-7 + GW-1 to purge. The Field Blank was done on the GW-7 bailer before sampling GW-7. LMS supplied the FB water + the preservatives for metals + Cyanide samples. GW-1 was sampled before GW-7; the pump @ GW-7 was not running very well. In all the shuffle the GW-1 data sheet was misplaced. I have made up another one with the "approximate info on it. While GW-7 was being sampled I went to GW-2 to pull the purge pump + let it recover. We sampled GW-2 last, packed up the shuttles + dropped them off @ Fed X.

(use reverse or additional sheet if necessary)

Lawler, Matusky & Skelly Engineers

Date: 11.8.88
Crew: EMH, KPW
Job #: 596-018

pH Meter:
Therm. #:
SCT #:
ReDox #:
D.O. #:

WELL SAMPLING LOG

TUXEDO CTD
2nd Sampling

WELL #: [illegible]
LOCATION: NEXT TO [illegible] SHOP ABOVE B17
WELL TYPE: OVERBURDEN
WELL DIAMETER: 2" I.D. PVC
WELL DEPTH: - 30.24
SCREENED INTERVAL:
CASING HT.: Top of St casing 2.83
DEPTH TO WATER: (Static Water Level) 18.61
REFERENCE POINT: TOP of PVC
DATE/TIME PURGED: 11.8.88 1427 - 15:57
PURGING METHOD: [illegible] Pump w/ Dedicated Polypropylene Tubing
PURGING DEPTH(s):
PURGE RATES (gpm): 3 GPM
PURGED VOLUME: 70 GALS.
DTW AFTER PURGING: 19.63'
EST. YIELD RATE: + 4 GPM

TYPE OF SCREENING CASING: [illegible]
WATER BEARING FORMATION(s): [illegible]
SAMPLE DATE/TIME: 11.8.88 / 1543-1552
SAMPLING METHOD: Teflon Bailer
DTW BEFORE SAMPLING: 18.61'
SAMPLING DEPTH(s): Top of Water Column [illegible]
~~DTW AFTER SAMPLING~~:
SAMPLE OBSERVATIONS:
SAMPLE OBSERVATIONS:
Clear, no odor

WET CHEMISTRIES

SAMPLE TEMPERATURE: 10.7°C
SAMPLE pH: 6.9
SAMPLE CONDUCTIVITY: 293
~~SAMPLE SULFITE~~:
~~SAMPLE REDOX: Rel. mV: mV~~
Before Turbidity (2[illegible] After [illegible] 18

PURGE CHEMISTRIES

TIME/VOLUME	TEMP.	pH	CONDUCTIVITY	TBu
20 GAL	12.6	6.7	295	45
50	[illegible]	[illegible]	[illegible]	15
50	12.4	6.8	296	1.5

SAMPLE ANALYSIS (List Sample Jar Parameters)	INVENT. #

COMMENTS:
11.63' Column of
Water = 17 GALS in
1 Well Vol of 5"
x 4 = 68 GALS
After Surging well water became
[illegible] Turbid But cleared up
quickly During pumping well
was drawn down to 19.3'

Crew Chief Signature:

Date:

Lawler, Matusky & Skelly Engineers

Date: 11.8.88
Crew: JMG/EH/LS/KPM
Job No: 376-018

Turb. Meter: LMS 63241
pH Meter: DEC 4979
Therm. No: 640
Cond. No: #560 DEC TEC

TUXEDO C+D 2nd SAMPLING
WELL SAMPLING LOG

WELL NO: GW-2
LOCATION: Georgia Teck Prop off rt 17 Tuxedo C+D site
WELL TYPE: Bedrock
WELL DIAMETER: 2" Casing; 6" Borehole
WELL DEPTH: 89 93'
SCREENED INTERVAL: Bottom 65'
CASING HT.: 2.59' from Ground TST SLEEVE; PVC 2.37'
DEPTH TO WATER: (Static Water Level) 20.11'
REFERENCE POINT: TOP of PVC CASING
DATE/TIME PURGED: 11.8.88/0900-1525
PURGING METHOD: WELL WIZARD TEFLON BLADDER w/ DECONED ELC HOSE (AUTO)
PURGING DEPTH(S): Bott, Mid, Surf
PURGE RATES (gpm): .75
PURGED VOLUME: 250 gal
DTW AFTER PURGING: 69.72'
EST. YIELD RATE: —
SEAL No: —
CHAIN OF CUSTODY No: 013873, 013880
4 Bore Volumes: 335 GALS

TYPE OF SCREENING CASING: PVC
WATER BEARING FORMATION(s): Overburden
SAMPLE DATE/TIME: 11-8-88/1655
SAMPLING METHOD: Teflon Bailer
DTW BEFORE SAMPLING: 24.95'
SAMPLING DEPTH(s): Top of Water Column
WELL CONDITION: Good
SAMPLE OBSERVATIONS: Clear, No Odor

WET CHEMISTRIES

SAMPLE TEMPERATURE: 10.2°C
SAMPLE pH: 6.6
SAMPLE SP. COND: 165
Sample Turb: Before 7des filter: 200 NTU

PURGE CHEMISTRIES

TIME/VOLUME	TEMP. °C	pH	SP. CONDUCTIVITY	Turb. NTU
Initial	9.4°C	7.6	253	510
250 gal	9.4°	7.3	195	35

SAMPLE ANALYSIS (List Sample Jar Parameters) INVENT. #

HSL + 30
Organics, Metals
Pest/PCB's + Cyanides

COMMENTS: 83.75 GALS in 69.82 FT WATER COLUMN
Vol 5" BOREHOLE = 335 GALS
- Mike K Aloud for Begining and end Chemistries only

Crew Chief Signature: John M

Date: 11-8-88

Lawler, Matusky & Skelly Engineers

Turb. meter: LMS L-3257
pH Meter: DEG 9779
Therm. No: 690
Cond. No: # 560 DEC TLC

Date: 11-8-88
Crew: JMG CS EMH KAC
Job No: 576-018

Tuxedo C+D 2nd Sampling
WELL SAMPLING LOG

WELL NO: GW-3
LOCATION: Tuxedo C+D (along RR tracks, SE corner of site)
WELL TYPE: Open Hole (Bedrock)
WELL DIAMETER: 2" (~5" Borehole)
WELL DEPTH: 30.46'
SCREENED INTERVAL: ——
CASING HT.: STEEL: 2.31' PVC: 2.08' above ground surface
DEPTH TO WATER: (Static Water Level) 16.42'
REFERENCE POINT: Top of PVC
DATE/TIME PURGED: 11-8-88/0959 - 1046
PURGING METHOD: Centrifugal Pump
PURGING DEPTH(s): Bott, Mid, Surf
PURGE RATES (gpm): ~1.5 gpm
PURGED VOLUME: 70 gal
DTW AFTER PURGING: 21.0'
EST. YIELD RATE: –
SEAL NO: –
CHAIN OF CUSTODY NO: 013877, 013871
4 Bore Volumes ;

TYPE OF SCREENING CASING: PVC
WATER BEARING FORMATION(s): Bedrock
SAMPLE DATE/TIME: 11-8-88 /1100-1125
SAMPLING METHOD: Teflon Bailer
DTW BEFORE SAMPLING: 16.48'
SAMPLING DEPTH(s): Top of water column
WELL CONDITION: Good
SAMPLE OBSERVATIONS:
-basically clear, no noticeable odor

WET CHEMISTRIES

SAMPLE TEMPERATURE: 12.9°C
SAMPLE pH: 6.1
SAMPLE SP. COND: 1717
Turbidity (NTUs) Before <10
After 10

PURGE CHEMISTRIES

TIME/VOLUME	TEMP. °C	pH	SP. CONDUCTIVITY	Turb. NTUs
Initial (42 gal)	16.6°C	6.2	1967	19
54 gal	17.8°C	6.2	1665	47
70 gal	—	—	—	19

SAMPLE ANALYSIS (List Sample Jar Parameters) INVENT. #
HSL + 30
Organics, Metals
Pest/PCBs + Cyanides

COMMENTS: Water column = 14.04
14.04 x 3 = 42.12 gal = 3 borehole volumes of 5" hole

Purge water slightly turbid at first, cleared up as we purged. Mike Komoroske had us only take wet chems at start + end of the purge

Crew Chief Signature: John M Guzewich
Date: 11-8-88

Lawler, Matusky & Skelly Engineers

Turb. Meter : LMS L-3257
pH Meter: DEC Orion 4779
Therm. No: 640
Cond. No: DEC TLC # 660

Date: 11-8-88
Crew: JMG, CS, EMH, KMC
Job No: 576-018

Turedo C+D 2nd Sampling

WELL SAMPLING LOG

WELL NO: GW-4
LOCATION: Turedo C+D (along RR track, near culvert running under landfill)
WELL TYPE: PVC
WELL DIAMETER: 2" (7' Borehole)
WELL DEPTH: 26.30'
SCREENED INTERVAL: Bottom 10'
CASING HT.: - ST. STEEL 2.32 PVC 2.16'
DEPTH TO WATER: (Static Water Level) 10.67'
REFERENCE POINT: Top of PVC
DATE/TIME PURGED: 11-8-88/0950 - 11:35
PURGING METHOD: Cent. Pump / Dedicated Tubing
PURGING DEPTH(S): Bott; Mid; Surf
PURGE RATES (gpm): 3GPM
PURGED VOLUME: ~210 gal.
DTW AFTER PURGING: 10.72
EST. YIELD RATE: —
SEAL NO: —
CHAIN OF CUSTODY NO: 013862, 013978
4 Bore Volumes: 64 GAL

TYPE OF SCREENING CASING: PVC
WATER BEARING FORMATION(S): Overburden
SAMPLE DATE/TIME: 11-8-88/1045-1100
SAMPLING METHOD: Teflon Bailer
DTW BEFORE SAMPLING: 10.67'
SAMPLING DEPTH(S): Surf. (Top of water Column
WELL CONDITION: Good
SAMPLE OBSERVATIONS: Rather clear, no noticeable odor

WET CHEMISTRIES

SAMPLE TEMPERATURE: 15.4°C
SAMPLE pH: 6.0
SAMPLE SP. COND: 1038

Turbidity (NTU's)	
Before	After
24	9.5

PURGE CHEMISTRIES

TIME/VOLUME	TEMP.°C	pH	SP. CONDUCTIVITY	Turb. GAL.
30 gal.	18.7°	5.9	1062	91
180 gal.	17.1°	6.0	1067	07

SAMPLE ANALYSIS (List Sample Jar Parameters) INVENT. #

HSL - 30
Organics, Metals, Pest/PCBs + Cyanide

COMMENTS: 15.7 Column of WATER x 1 GPF = 16 GALS in 1 Bore Hole x 4 = 64 GALS
21 MINS OF PURGING AT 1.5 RATE
WELL WAS CONTINUALLY SURGED & TURBIDITY DRAMATICALLY DECREASED AFTERWARD. INCREASED PUMPING RATE TO 4.5 GPM AFTER 22 MINS AND SURGED/PUMPED TO 23 min @ 6 GPM TOTAL PURGED ~210 gal

Crew Chief Signature: John M Gumenick

Date: 11-8-88

Lawler, Matusky & Skelly Engineers

Date: 11.8.88
Crew: JMG, CS, PH, KAM
Job No: 576.018

Turb. Meter: LMS L-3257
pH Meter: DEC Orion 4779
Therm. No: 690
Cond. No: DEC TLC # 560

Tuxedo C&D 2nd Sampling

WELL SAMPLING LOG

WELL No: GW-5
LOCATION: Tuxedo C&D (Along RR tracks [illegible])
WELL TYPE: PVC
WELL DIAMETER: 2" , .75' Bore Hole
WELL DEPTH: 19.60'
SCREENED INTERVAL: Bottom 10'
CASING HT.: Top of sleeve 2.16 Top PVC 1.98
DEPTH TO WATER: (Static Water Level) 8.86'
REFERENCE POINT: Top of PVC
DATE/TIME PURGED: 11 8 88 / 12 06 12 51 ~3 mins
PURGING METHOD: centrifugal pump / DEDICATED polyethylene tubing
PURGING DEPTH(s): Bottom, Mid, Surface
PURGE RATES (gpm): 4.5 GPM
PURGED VOLUME: ~ 100 gal
DTW AFTER PURGING: 10.95 [illegible]
EST. YIELD RATE: 5 GPM possibly [illegible]
SEAL No: ——
CHAIN OF CUSTODY No: 013866, 013865
4 Bore Volumes: 43 GALS

TYPE OF SCREENING CASING: PVC
WATER BEARING FORMATION(s): overburden
SAMPLE DATE/TIME: 11-8-88/1300
SAMPLING METHOD: Teflon Bailer
DTW BEFORE SAMPLING: 10.95'
SAMPLING DEPTH(s): Top of Water Column
WELL CONDITION: Good
SAMPLE OBSERVATIONS: Rather Clear, no noticeable odor

WET CHEMISTRIES

SAMPLE TEMPERATURE: 18.2°C
SAMPLE pH: 6.0
SAMPLE SP. COND: 2290
Sample Turb (NTUs): 3.5 NTUs / 6.0 NTUs After Sampling

PURGE CHEMISTRIES

TIME/VOLUME	TEMP.	pH	SP. CONDUCTIVITY	Turb. NTUs
20 gal	21.6°C	6.0	2370	10 NTU
80 gal	22.1°C	6.1	2290	2.5 NTU

SAMPLE ANALYSIS (List Sample Jar Parameters) INVENT. #

HSL + 30
Organics, Metals, Pest/PCB's + Cyanide

COMMENTS:
1 Gal per ft 5" Bore Hole (open)
10.5 Gals x 4
water is foamy, slightly silty
Pumped w/ 4.5 GPM for 21.5 mins

Crew Chief Signature: John M Gurzewich

Date: 11-8-88

Lawler, Matusky & Skelly Engineers

Date: 11·8·88
Crew: JMG · GS · KPA · EH
Job No: 576-018

Turb. Meter: LMS L-3257
pH Meter: DEC 4776
Therm. No: 690
Cond. No: DEC 716 #560

Toredo C+D 2nd Sampling

WELL SAMPLING LOG

WELL NO: GW-6
LOCATION: Toredo C+D (along RR tracks)
WELL TYPE: PVC
WELL DIAMETER: 2" (~7" Borehole)
WELL DEPTH: 18.67'
SCREENED INTERVAL: Bottom 10'
CASING HT.: Steel 2.13' PVC 1.99'
DEPTH TO WATER: (Static Water Level) 8.19'
REFERENCE POINT: Top of PVC
DATE/TIME PURGED: 11-8-88/1215-1236
PURGING METHOD: Centrifugal Pump
PURGING DEPTH(s): Bottom, Mid, Surf
PURGE RATES (gpm): 5 gpm
PURGED VOLUME: ~20 gal
DTW AFTER PURGING: 8.25'
EST. YIELD RATE: —
SEAL No: —
CHAIN OF CUSTODY No: 013858, 002011
4 Bore Volumes:

TYPE OF SCREENING CASING: PVC
WATER BEARING FORMATION(s): Overburden
SAMPLE DATE/TIME: 11-8-88/1250-1335
SAMPLING METHOD: Teflon Bailer
DTW BEFORE SAMPLING: 8.19'
SAMPLING DEPTH(s): Top of water column
WELL CONDITION: Good
SAMPLE OBSERVATIONS:
Rather clear, yellow tint

WET CHEMISTRIES

SAMPLE TEMPERATURE: 20.3°C
SAMPLE pH: 6.6
SAMPLE SP. COND: 2150
Turbidity (NTUs): Before 45
After 44

PURGE CHEMISTRIES

TIME/VOLUME	TEMP.	pH	SP. CONDUCTIVITY	Turb. NTUs.	SAMPLE ANALYSIS (List Sample Jar Parameters)	INVENT. #
10 gal	22.6°C	6.7	1858	6.5	HSL+30 Organics, Metals Pest/PCBs, Cyanide	
15 gal	22.7°C	6.5	2000	1.5		

COMMENTS: 18.67 − 8.19 = 10.48 x 1.03 = 10.8 gal in 5" Borehole
10.8 gal x 3 = 32.4 gal.
Purge water foamy w/ yellow-tan tint

✗ Blind Dup taken at this well, called GW-8, time 1400
(C of C #'s: 013861, 013881)

Crew Chief Signature: John M Guzewich
Date: 11-8-88

Lawler, Matusky & Skelly Engineers

Date: 11 8 88
Crew: EJH KPM JMG CS
Job No: 546.018

Turb. Meter: LMS L-3257
pH Meter: DEC Orion 4776
Therm. No: #690
Cond. No: DEC TLC #560

Tuxedo C+D
WELL SAMPLING LOG
2nd Sampling

WELL NO: GW-7
LOCATION: Tuxedo C+D (near RR tracks in northeast section of site)
WELL TYPE: PVC
WELL DIAMETER: 2" [illegible] ID (~7" Borehole)
WELL DEPTH: 25.16'
SCREENED INTERVAL:
CASING HT.: Stainless 1.2[illegible]' PVC 1.19'
DEPTH TO WATER: (Static Water Level) [illegible] 17.65'
REFERENCE POINT: Top of PVC Casing
DATE/TIME PURGED: 11 8 88 / 1344 - 1550
PURGING METHOD: Centrifugal pump w/ dedicated polypropylene tubing
PURGING DEPTH(S): Top to bottom of water
PURGE RATES (gpm): ~1gpm
PURGED VOLUME: 100 gal
DTW AFTER PURGING: 17.69'
EST. YIELD RATE: —
SEAL No: —
CHAIN OF CUSTODY No: 002010, 013872
4 Bore Volumes: 63 GALS.

TYPE OF SCREENING CASING: PVC
WATER BEARING FORMATION(S): Overburden
SAMPLE DATE/TIME: 11-8-88 / 1620-1655
SAMPLING METHOD: Teflon Bailer
DTW BEFORE SAMPLING: 17.65'
SAMPLING DEPTH(S): Top of Water Column
WELL CONDITION: Good
SAMPLE OBSERVATIONS:
Ver. Slight, turbid, no noticeable odor

WET CHEMISTRIES

SAMPLE TEMPERATURE: 14.8 °C
SAMPLE pH: 5.7
SAMPLE SP. COND: 535
Turbidity (NTU's)
Before 55 After 40

PURGE CHEMISTRIES

TIME/VOLUME	TEMP.	pH	SP. CONDUCTIVITY	Turb. NTUs
0 GAL	18.3	5.9	1530	250
65 gal	17.9	5.7	1265	200
100 gal	12.6°C	5.9	1070	2 ntus

SAMPLE ANALYSIS (List Sample Jar Parameters) **INVENT. #**

HSL +30
Organics, Metals
Pest/PCB's, Cyanides

* The Field Blank is to be analyzed for the same parameters

COMMENTS:
10.5' WATER COLUMN
15.7 GALS in 5" CASING HOLE
x 4 BORE HOLES = 65 GALS

Fieldblank done at this well on the bailer before it was used to sample GW-7
(C of C #'s 013875 + Blank)

Crew Chief Signature: John M Guzewich **Date:** 11-8-88

Lawler, Matusky & Skelly Engineers

Crew: JMG CS EMH KMC
Date: 11-2-88
Job No: 576-018

LAWLER, MATUSKY & SKELLY ENGINEERS
FIELD METER CALIBRATION AND/OR CHECK
DATA SHEET

Site: Tuxedo S+D
Oper: Well Resampling
Calib. By: JMG CS

METER NO./	PROBE NO.	TIME	THERM NO./	TEMP. (°C)	EXPECTED VALUE		OBSERVED VALUE		ADJ TO[a]		% DIFF.[b]	COMMENTS
EMS Monitek		0820	—	—	40	60	40	55	—	—		
Turbidity		1429			40	60	20	55	40	-		
		1725	—	-	40	60	20	75	40	[illegible]		
DEC	801446	0830				55ppm	53ppm					No Adj.
HNu												
DEC	MSA	0830	—	—	10ppm	H_2S	8ppm					LEL % Zero Adj. from -3 to 0 H_2S ppm Zero Adj. from 2 to 0 O_2% Ambient Adj. from 20.1% to 20.8%
CGI		↓	—	—	50%	LEL	47%					
			—	—	15%	O_2%	15.3%					
DEC Orion	4776	0835			7.00	-	6.72	-	7.00	—		
					4.00	10.00	4.07	10.13	4.00	—		
		1417	thermometer	11.8°C	7.00	-	7.27	-	7.00	—		
					4.00	10.00	3.95	9.72	4.00	—		
		1506			7.00 4.00	— 10.00	6.90 4.16	— 10.28	7.00 4.00	— —		New battery
		1705	Thermometer	9.9°C	7.0	-	7.16	-	7.00	-		
					4.0	10.0	3.99	10.12				

[a] For dissolved oxygen and pH meter calibrations, record adjustments (include % and ppm readings for dissolved oxygen meter calibration).

[b] Include % Diff. calculation for conductivity calibration checks: $\% \text{ Diff} = \frac{Ex - Ob}{Ex} \times 100$

WELL PURGING & SAMPLING

MW-1	9.1.88	11.8.88
STATIC WATER LEVEL (TOP OF PVC)	19.63'	18.61
HEIGHT OF PVC (ABOVE GRADE)	± 2.4'	± 24'
BOTTOM WATER LEVEL	29.59'	30.24'
PURGED VOLUME (gals)	100	90
PURGE RATE (gpm)	2.0	3.0
DEPTH TO WATER AFTER PURGE	19.65'	18.63'

PURGE CHEMISTRY

AMOUNT PURGED GALS.	TEMP °C 9.1	TEMP °C 11.8	pH 9.1	pH 11.8	SPEC. COND. 9.1	SPEC. COND. 11.8	TURBIDITY 9.1	TURBIDITY 11.8	SAMPLING DATES
20	/	12.6°	/	6.7	/	295	/	45	
40	12.6°	/	6.34	/	266	/	/	/	
50	/	12.3°	/	6.8	/	286	/	15	
60	12.7°	/	6.3	/	265	/	/	/	
80	12.6°	12.4°	6.4	6.8	276	296	0.15	1.5	
100	12.6°	/	6.3	/	279	/	0.15	/	
SAMPLE CHEM	11.2°	10.7°	6.4	6.9	286	293	/	20	

/ NO MEASUREMENT TAKEN AT THAT VOLUME

INSERT

SAMPLING DA

MW-2	9.2.88	11.8.88
STATIC WATER LEVEL (TOP OF PVC)	24.78	20.11
HEIGHT OF PVC (Above Ground)	2.31'	2.37'
BOTTOM WATER LEVEL	89.80	89.95
PURGED VOLUME (gal)	125	250
PURGE RATE (gpm)	.3	.75
DEPTH TO WATER AFTER PURGE	860'	69.12'

PURGE CHEMISTRY

AMOUNT PURGED (GALS)	Temp °C		pH		SPEC COND		TURBIDITY		
	9.2	11.8	9.2	11.8	9.2	11.8	9.2	11.8	SAMPLING DATES
12	⧄	9.4	⧄	7.6	⧄	253	⧄	510	
25	10.0	⧄	7.4	⧄	266	⧄	⧄	⧄	
60	10.8°	⧄	7.7	⧄	202	⧄	⧄	⧄	
75	10.7°	⧄	7.8	⧄	190	⧄	2.25	⧄	
95	10.8°	⧄	8.1	⧄	195	⧄	1.5	⧄	
125	11.0°	⧄	8.1	⧄	196	⧄	8.5	⧄	
250	⧄	9.4°	⧄	7.3	⧄	185	⧄	3.5	
SAMPLE CHEM	130°	10.2	8.0	6.6	183	165	1.0	7	

⧄ NO MEASUREMENT TAKEN AT THAT VOLUME

SAMPLING DATES

MW-3	9.2.88	11.8.88
STATIC WATER LEVEL (TOP OF PVC)	18.13	16.42
HEIGHT OF PVC (FROM GRADE)	2.08	2.08
BOTTOM WATER LEVEL	30.42	30.46
PURGED VOLUME (gal)	103	70
PURGE RATE (gpm)	±2	±1.5
DEPTH TO WATER AFTER PURGE	27.80	21.0

PURGE CHEMISTRY

AMOUNT PURGED (GALS)	TEMP °C		pH		SPEC. COND.		TURBIDITY	
	9.2	11.8	9.2	11.8	9.2	11.8	9.2	11.8
5	17.1	16.6	6.4	6.2	1429	1967		19
10	19.3		6.0		1675			
15	16.2		6.0		1750			
27	15.0		6.0		1821		51	
32	11.7		6.0		1851		275	
42	12.6		6.1		1872		84	
54		17.8		6.2		1665		47
68	12.7		6.1		1854		120	
70								19
77	13.2		6.1		1834		150	
87	12.5		6.1		1847		100	
103	12.7		6.1		1840		100	
SAMPLE CHCK	12.6	12.9	6.0	6.1	1855	1717	99	<10

SAMPLING DATES

MW-4	9.1.88	11.8.88
STATIC WATER LEVEL (TOP OF PVC)	16.72	10.67
HEIGHT OF PVC (ABOVE GRADE)	2.16	2.16'
BOTTOM WATER LEVEL	26.30	26.30
PURGED VOLUME (GAL)	100	180
PURGED RATE (GPM)	5.0	34.5
DEPTH TO WATER AFTER PURGE	16.97	10.72

PURGE CHEMISTRY

VOLUME PURGED (GAL)	TEMP °C		pH		SPEC. COND.		TURBIDITY		SAMPLE DATES
	9.1	11.8	9.1	11.8	9.1	11.8	9.1	11.8	
30	⧄	18.7	⧄	5.9	⧄	1062	⧄	91	
40	17.7	⧄	5.8	⧄	808	⧄	⧄	⧄	
60	17.6	⧄	5.9	⧄	920	⧄	⧄	⧄	
80	17.3	⧄	5.9	⧄	970	⧄	3.0	⧄	
100	17.4	⧄	5.9	⧄	999	⧄	2.5	⧄	
180	⧄	17.1	⧄	6.0	⧄	1067	⧄	7	
SAMPLE	17.4	15.4	5.7	6.0	521	1038	⧄	24	

⧄ NO MEASUREMENT AT THAT VOLUME

SAMPLING DATE

MW-5	9.1.88	11.8.88
STATIC WATER LEVEL (TOP OF PVC)	10.99	8.86
HEIGHT of PVC (FROM GRADE)	1.98	1.98
BOTTOM WATER LEVEL	19.42	19.60
PURGED VOLUME (gal)	100	96
PURGE RATES (GPM)	5.0	4.5
DEPTH TO WATER AFTER PURGING	11.28	10.95

PURGE CHEMISTRY

VOLUME PURGED	TEMP °C		pH		SPEC. COND.		TURBIDITY		
(gals)	9.1	11.8	9.1	11.8	9.1	11.8	9.1	11.8	SAMPLE DATES
20	⧄	21.6	⧄	6.0	⧄	2370	⧄	10	
40	22.0	⧄	5.9	⧄	2790	⧄		⧄	
60	22.1	⧄	5.9	⧄	2710	⧄		⧄	
80	22.0	20.1	5.9	6.1	2650	2290	5.0	2.5	
100	21.8	⧄	5.9	⧄	2530	⧄	10.0	⧄	
SAMPLE CHEM.	21.7	18.2	5.9	6.0	2750	2290	⧄	3.5	

⧄ NO MEASUREMENT TAKEN AT THIS VOLUME

SAMPLING DATES

MW-6	9.1.88	11.8.88
STATIC WATER LEVEL (TOP OF PVC)	9.82	8.19
HEIGHT OF PVC (FROM GRADE)	1.99	1.99
BOTTOM WATER LEVEL	18.44	18.67
PURGED VOLUME (gal)	100	120
PURGE RATES (gpm)	6.0	5.0
DEPTH TO WATER AFTER PURGING	9.97	8.25

PURGE CHEMISTRY

VOLUME PURGED (gals)	TEMP °C		pH		SPEC. COND.		TURBIDITY		
	9.1	11.8	9.1	11.8	9.1	11.8	9.1	11.8	SAMPLE DATES
10		22.6		6.7		1858		6.5	
40	26.4		6.5		3610				
60	26.3		6.5		3620				
80	26.3		6.5		3610		47		
85		22.7		6.5		2000		1.5	
100	26.2		6.5		3550		45		
SAMPLE CHECK	24.8	20.3	6.6	6.6	3440	2180		4.5	

MW-7	SAMPLING DATE 9.1.88	11.8.88
STATIC WATER LEVEL (from PVC)	18.36	17.65
HEIGHT of PVC (from Grade)	1.19	1.19
BOTTOM WATER LEVEL	28.02	28.16
PURGED VOLUME (gal)	115	100
PURGE RATE (gpm)	10	BAILER 1.0
DEPTH TO WATER AFTER PURGING	18.37	17.68

PURGE CHEMISTRY

VOLUME PURGED (gals)	TEMP °C		PH		SPEC. COND.		TURBIDITY		SAMPLING DATES
	9.1	11.8	9.1	11.8	9.1	11.8	9.1	11.8	
2		18.3		5.8		1830		250	
40	14.6		6.1		575				
60	14.6		6.1		564				
65		17.9		5.7		1065		200	
80	14.5		6.1		557				
100	14.4	17.6	6.0	5.9	555	1070	4.5	2.0	
SAMPLE CHEM	15.7	14.8	6.1	5.7	575	1535		55	

9·1·88

WELL NAME OR SAMPLE POINT	DEPTH TO H_2O FROM TOP OF ~~ST. SLEEVE~~ PVC RISER	DEPTH TO H_2O FROM TOP OF ST. SLEEVE CORRECTED *	HEIGHT OF ~~ST.~~ PVC ~~SLEEVE~~ RISER DETERMINED IN ELEV. SURVEY	DEPTH TO H_2O BELOW GROUND SURFACE	ELEVATION OF GROUND SURFACE	ELEVATION OF GROUND WATER SURFACE
MW-1	19.63		2.0	17.63	466.40	448.77
MW-2	24.78		2.37'	22.41	500.10	477.69
MW-3	18.13		1.80	16.33	457.20	440.87
MW-4	16.72		2.17	14.55	457.90	443.35
MW-5	10.99		1.75	9.24	456.30	447.06
MW-6	9.82		2.03	7.79	454.80	447.01
MW-7	18.36		2.03	16.33	464.90	448.57

* MUST ADD .16FT. FOR LENGTH OF PLOPPER WHEN APPLICABLE

WELL NAME OR SAMPLE POINT	DEPTH TO BOTTOM OF WELL FROM TOP OF STEEL SLEEVE *	VOLUME OF WATER IN CASING	VOLUME OF WATER EVACUATED	TIME SAMPLED	NUMBER OF SAMPLES	TEMPERATURE	pH	SPECIFIC CONDUCTANCE

*CORRECTED FOR PLOPPER WHEN APPLICABLE

NOTES: HEIGHT of PVC AT MW-2 IS TAKEN from MEASUREMENTS of FIELD DATA - NOT SURVEY

11.8.88

WELL NAME OR SAMPLE POINT	DEPTH TO H_2O FROM TOP OF ST. SLEEVE	DEPTH TO H_2O FROM TOP OF ST. SLEEVE CORRECTED *	HEIGHT OF ST. SLEEVE DETERMINED IN ELEV. SURVEY	DEPTH TO H_2O BELOW GROUND SURFACE	ELEVATION OF GROUND SURFACE	ELEVATION OF GROUND WATER SURFACE
MW-1	18.61		2.0	16.61	466.40	449.79
MW-2	20.11		2.37	17.74	500.10	482.36
MW-3	16.42		1.80	14.62	457.20	442.58
MW-4	10.67		217	8.50	457.90	449.40
MW-5	8.86		1.15	7.11	456.30	449.19
MW-6	8.19		203	6.16	454.80	448.64
MW-7	17.65		203	15.62	464.90	449.26

* MUST ADD .16FT. FOR LENGTH OF PLOPPER WHEN APPLICABLE

WELL NAME OR SAMPLE POINT	DEPTH TO BOTTOM OF WELL FROM TOP OF STEEL SLEEVE *	VOLUME OF WATER IN CASING	VOLUME OF WATER EVACUATED	TIME SAMPLED	NUMBER OF SAMPLES	TEMPERATURE	pH	SPECIFIC CONDUCTANCE

*CORRECTED FOR PLOPPER WHEN APPLICABLE

NOTES:

RANKING OF STATIC WATER LEVELS

ELEVATION OF GROUND SURFACE AT WELLS LISTED BELOW(feet)	STATIC WATER LEVELS RANKED							
	9-1-88		11-8-88					
	(A)	(B)	(A)	(B)	(A)	(B)	(A)	(B)
MW-1	448.77	2	449.79	2				
MW-2	477.69	1	482.36	1				
MW-3	440.87	7	442.58	7				
MW-4	443.35	6	449.40	3				
MW-5	447.06	4	449.19	5				
MW-6	447.01	5	448.64	6				
MW-7	448.57	3	449.28	4				

A= Elevation of static water level (in feet)
B= Ranking of static water levels (highest elevation =1)

BY KPM DATE 3.6.89

CHKD. BY ____ DATE ____

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PEARL RIVER, NEW YORK 10965

SHEET NO 1 OF ____

JOB NO 576-01B

SUBJECT Tuxedo C&D Permeability Calculations
NYSDEC I.D. No. 336085 MW-1

$$K = \frac{r_c^2 \ln(R_e/r_w)}{2L} \; \frac{1}{t} \; \ln\frac{y_0}{y_t}$$

$$\ln R_e/r_w = \left[\frac{1.1}{\ln(H/r_w)} + \frac{A + B \ln[(D-H)/r_w]}{L/r_w}\right]^{-1}$$

$$r_c^2 = (2.54\,cm)^2 + (.42)\left[(10.1\,cm)^2 - (2.54\,cm)^2\right]$$

$$102.01\,cm^2 - 6.45\,cm^2$$

$$(2.54\,cm)^2 + (.42 \quad 95.56\,cm^2)$$

$$6.45\,cm^2 + 40.13\,cm^2 = 46.55\,cm^2$$

$$(46.55\,cm^2) = 4.655\,cm^2 = .0501\,ft^2$$

$$\ln R_e/r_w = \left[\frac{1.1}{\ln(6.21)/.4\,ft} + \frac{2 + .3 \ln[(100\,ft^{*} - 6.21\,ft)/.4\,ft]}{6.21/.4\,ft}\right]^{-1}$$

$$\left[\frac{1.1}{2.74\,ft} + \frac{2 + .3 \ln 234.5}{6.21\,ft/.4\,ft}\right]^{-1}$$

$$\left[.4 + \frac{4.72}{15.52\,ft}\right]^{-1}$$

$$[.4 + .304]^{-1} = .704^{-1} = .0704^{*}$$

*100 ft USED FOR MAXIMUM DEPTH TO CONSOLIDATED ZONE

BY KPM DATE 3.6.89

CHKD. BY ____ DATE ____

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SHEET NO ____ OF ____

JOB NO 376-018

SUBJECT Tuxedo C+D Permeability (MW-1)

$$K = \frac{.0501\,ft^2(.0704)}{2(6.21\,ft)} \cdot \frac{1}{3.06\,sec} \cdot \ln \frac{2.0\,ft}{.15\,ft}$$

$$\frac{.00353\,ft^2}{12.42\,ft} \cdot .33\,sec \cdot 2.5903$$

$$(.000284\,ft)(33\,sec)\cdot(2.5903) = .0002 = 2\times10^{-4}\,ft/sec$$

$$\frac{meters}{day} = \frac{2.0\times10^{-4}\,ft}{sec} \cdot \frac{60\,sec}{1\,min} \cdot \frac{60\,min}{1\,hr} \cdot \frac{24\,hr}{1\,day} \cdot \frac{1\,m}{3.3\,ft} = 5.236\,m/day$$

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BY ______ DATE ______ SHEET NO. 1 OF 1

CHKD BY ______ DATE ______ JOB NO. ______

SUBJECT Tuxedo Permeability Calculations
MW-2

$$\ln R_e/r_w = \left[\frac{1.1}{\ln(65.02/.19ft)} + \frac{7 + 1.6\ \ln[(200-65.02)/.19]}{65.02/.19}\right]^{-1}$$

$$\frac{1.1}{5.8354} \qquad + \frac{7 + 1.6\ \ln[(134.98/.19)]}{342.21}$$

$$.1885 \quad + \quad \frac{7+10.50}{342.21}$$

$$.1885 \quad + \quad .0511 = [.2396]^{-1} = .02396$$

2.3×10^{-2}

$$K = \frac{.0833^2\,(.02397)}{2(65.02)}$$

$$\frac{.0020}{130.04} \quad \frac{1}{8000sec} \quad \ln\left(\frac{89.0}{45.51}\right)$$

$$1.53\times10^{-5} \cdot .0001cu \cdot .6707 = 1.0262\times10^{-9}$$

$$1.0262\times10^{-9}\,\frac{ft}{sec} = 2.68\times10^{-5}\ m/day$$

BY CPU DATE

CHKD. BY DATE

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SHEET NO ____ OF ____

JOB NO 576-018

SUBJECT Tweedie C+D Permeability Calculations
MW-3

$$\ln R_e/r_w = \left[\frac{1.1}{\ln(10.73\,ft/.125)} + \frac{3.9 + .8\ln[(200\,ft - 10.73\,ft)/.125]}{10.73\,ft/.125\,ft}\right]^{-1}$$

$$\frac{1.1}{4.45} + \frac{9.76}{85.84}$$

$$.247 + .1156 = .361$$

$$K = \frac{(.125\,in)^2(.0361)}{2(10.73\,ft)} \cdot \frac{1}{180\,sec} \cdot \ln\frac{2.0}{.15}$$

$$.0056 \qquad 2.59$$

$$(.00002635)(.0056)(2.59) = 3.81 \times 10^{-7}\ ft/sec$$

$$\text{meters/day} = \frac{3.81\times10^{-7}\,ft}{sec}\ \frac{60\,sec}{1\,min}\ \frac{60\,min}{1\,hr}\ \frac{24\,hr}{1\,day}\ \frac{1\,m}{3.3\,ft} = .01\ m/day$$

1×10^{-2} m/day

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BY ______ DATE ______ SHEET NO ______ OF ______

CHKD BY ______ DATE ______ JOB NO 576-018

SUBJECT Tuxedo Permeability
MW-4

$$\ln R_e/r_w \left[\frac{1.1}{\ln(5.15\,ft/.4\,ft)} + \frac{2 + .5\ln[(75\,ft - 5.15\,ft)/.4]}{5.15\,ft/.4\,ft}\right]^{-1}$$

$$\frac{1.1}{12.875} + \frac{2 + .5(5.16\,ft)}{12.875\,ft}$$

$$.4305 + .3556 = .7863$$

$$.07863$$

$$K = \frac{(.125\,ft^2)(.07863)}{2(5.15\,ft)} \cdot \frac{1}{5.93\,sec} \cdot \ln\frac{2.0}{.15}$$

$$\frac{.0039}{10.3} \cdot .168\,sec \cdot 2.59$$

$$.000378 \cdot .168\,sec \cdot 2.59 = .0002 = 2\times10^{-4}\,ft/sec$$

$$\frac{2\times10^{-4}\,ft}{sec} \cdot \frac{60\,sec}{1\,min} \cdot \frac{60\,min}{1\,hr} \cdot \frac{24\,hr}{1\,day} \cdot \frac{1\,m}{3.3\,ft} = 4.3\,m/day$$

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BY ______ DATE ______
CHKD BY ______ DATE ______
SHEET NO. ______ OF ______
JOB NO. 576-018

SUBJECT Tuxedo Permeability
MW-5

$$\ln R_e/r_w = \left[\frac{1.1}{\ln(6.5\,ft/.4\,ft)} + \frac{2 + .5\ln[(79\,ft - 6.5\,ft)/.4\,ft]}{6.5\,ft/.4\,ft}\right]^{-1}$$

$$\frac{1.1}{2.788} + \frac{2 + .5(5.143)}{16.25}$$

$$.394 + \frac{4.57}{16.25}$$

$$.394 + .281 = .675^{-1} = .0675$$

$$K = \frac{.0001\,ft\,(.0675)}{2(6.5\,ft)} \cdot \frac{1}{4.603} \cdot \ln\frac{2.0}{.15}$$

$$\frac{.00338\,ft}{13\,ft} \cdot .208 \cdot 2.59 =$$

$$(.00026)\;(.208)\;(2.59) = .0001 = 1 \times 10^{-4}\ ft/sec$$

$$m/day = \frac{1 \times 10^{-4}\,ft}{sec}\;\frac{60\,sec}{1\,min}\;\frac{60\,min}{1\,hr}\;\frac{24\,hr}{1\,day}\;\frac{1\,m}{3.3\,ft} = 3.66\ m/day$$

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BY ______ DATE ______ SHEET NO ______ OF ______

CHKD BY ______ DATE ______ JOB NO 576-018

SUBJECT Tuxedo Permeability Calculations

MW-6

$$\ln R_e/r_w = \left[\frac{1.1}{\ln(6.18\text{ft}/.4\text{ft})} + \frac{2 + .5\ln[(75\text{ft} - 6.18\text{ft})/.4\text{ft}]}{6.18\text{ft}/.4\text{ft}}\right]$$

$$\frac{1.1}{\ln 15.45} + \frac{2 + .5(5.14)}{15.45}$$

$$\frac{1.1}{2.73} +$$

$$.4 + .295 = .697^{-1} = .0697$$

$$K = \frac{.0501\text{ft}^2(.0697)}{2(6.18\text{ft})} \cdot \frac{1}{3.36\text{ sec}} \cdot \ln\frac{2.0}{.15}$$

$$\frac{.00349}{12.36} \cdot .297 \cdot 2.59$$

$$.00028 \cdot (.297)(2.59) = .0002 = 2\times10^{-4}\text{ ft/sec}$$

$$\frac{2\times10^{-4}\text{ ft}}{\text{sec}} \cdot \frac{60\text{ sec}}{1\text{ min}} \cdot \frac{60\text{ min}}{1\text{ hr}} \cdot \frac{24\text{ hr}}{1\text{ day}} \cdot \frac{1\text{ m}}{3.3\text{ ft}} = 5.64\text{ m/day}$$

1

BY ______ DATE ______

CHKD. BY ______ DATE ______

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SHEET NO. ______ OF ______

JOB NO. 376-018

SUBJECT Tuxedo Permeability
MW-7

$$\ln R_e/r_w \left[\frac{1.1}{\ln(7.27\text{ft}/.4\text{ft})} + \frac{2. + .3 \ln[(75-7.27\text{ft})/.4\text{ft}]}{7.27/.4\text{ft}}\right]^{-1}$$

$$\frac{1.1}{2.9} \quad +$$

$$.379 \quad + \quad \frac{2 + 2.566}{18.175}$$

$$.379 \qquad .2512 = .6302^{-1}$$

$$K = \frac{.0801\text{ in }(.06302)}{2(7.27\text{ ft})} \cdot \frac{1}{.826\text{ sec}} \cdot \ln \frac{2.0}{.15}$$

$$\frac{.00315}{14.54} \cdot \quad 1.21\text{ sec} \qquad 2.59$$

$$.000216 \quad \cdot 1.21 \qquad 2.59 \quad = \quad .0007 = 7 \times 10^{-4}$$

$$\text{m/day} = \frac{7\times10^{-4}\text{ ft}}{\text{sec}} \quad \frac{60\text{ sec}}{1\text{ min}} \quad \frac{60\text{ min}}{1\text{ hr}} \quad \frac{24\text{ hr}}{\text{day}} \quad \frac{1\text{ m}}{3.3\text{ ft}} = 17.7\text{ m/day}$$

REFERENCE 5

VOL. 12, NO. 3 WATER RESOURCES RESEARCH JUNE 1976

A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells

HERMAN BOUWER AND R. C. RICE

U.S. Water Conservation Laboratory, Agricultural Research Service, U.S. Department of Agriculture, Phoenix, Arizona 85040

A procedure is presented for calculating the hydraulic conductivity of an aquifer near a well from the rate of rise of the water level in the well after a certain volume of water is suddenly removed. The calculation is based on the Thiem equation of steady state flow to a well. The effective radius R_e over which the head difference between the equilibrium water table in the aquifer and the water level in the well is dissipated was evaluated with a resistance network analog for a wide range of system geometries. An empirical equation relating R_e to the geometry of the well and aquifer was derived. The technique is applicable to completely or partially penetrating wells in unconfined aquifers. It can also be used for confined aquifers that receive water from the upper confining layer. The method's results are compatible with those obtained by other techniques for overlapping geometries.

With the slug test the hydraulic conductivity or transmissibility of an aquifer is determined from the rate of rise of the water level in a well after a certain volume or 'slug' of water is suddenly removed from the well. The slug test is simpler and quicker than the Theis pumping test because observation wells and pumping the well are not needed. With the slug test the portion of the aquifer 'sampled' for hydraulic conductivity is smaller than that for the pumping test even though with the latter, most of the head loss also occurs within a relatively small distance of the pumped well and the resulting transmissibility primarily reflects the aquifer conditions near the pumped well.

Essentially instantaneous lowering of the water level in a well can be achieved by quickly removing water with a bailer or by partially or completely submerging an object in the water, letting the water level reach equilibrium, and then quickly removing the object. If the aquifer is very permeable, the water level in the well may rise very rapidly. Such rapid rises can be measured with sensitive pressure transducers and fast-response strip chart recorders or x-y plotters. Also it may be possible to isolate portions of the perforated or screened section of the well with special packers for the slug test. This not only reduces the inflow and hence the rate of rise of the water level in the well, but it also makes it possible to determine the vertical distribution of the hydraulic conductivity. Special packer techniques may have to be developed to obtain a good seal, especially for rough casings or perforations. Effective sealing may be achieved with relatively long sections of inflatable stoppers or tubing. The use of long sections of these materials would also reduce leakage flow from the rest of the well to the isolated section between packers. This flow can occur through gravel envelopes or other permeable zones surrounding the casing. Sections of inflatable tubing may have to be long enough to block off the entire part of the well not used for the slug test. High inflation pressures should be used to minimize volume changes in the tubing due to changing water pressures in the isolated section when the head is lowered.

So far, solutions for the slug test have been developed only for completely penetrating wells in confined aquifers. *Cooper et al.* [1967] derived an equation for the rise or fall of the water level in a well after sudden lowering or raising, respectively. Their equation was based on nonsteady flow to a pumped, completely penetrating well, and the solution was expressed as a series of 'type curves' against which observed rates of water level rises were matched. Values for the transmissibility and storage coefficient were then evaluated from the curve parameter and horizontal-scale position of the type curve showing the best fit with the experimental data. *Skibitzke* [1958] developed an equation for calculating transmissibility from the recovery of the water level in a well that was repeatedly bailed. The technique is limited to wells in confined aquifers with sufficiently shallow water levels to permit short time intervals between bailing cycles [*Lohman*, 1972].

To use the slug test for partially penetrating or partially perforated wells in confined or unconfined aquifers, some solutions developed for the auger hole and piezometer techniques to measure soil hydraulic conductivity [*Bouwer and Jackson*, 1974] may be employed. However, the geometry of most groundwater wells is outside the range in geometry covered by the existing equations or tables for the auger hole or piezometer methods. For this reason, theory and equations are presented in this paper for slug tests on partially or completely penetrating wells in unconfined aquifers for a wide range of geometry conditions. The wells may be partially or completely perforated, screened, or otherwise open along their periphery. While the solutions are developed for unconfined aquifers, they may also be used for slug tests on wells in confined aquifers if water enters the aquifer from the upper confining layer through compression or leakage.

THEORY

Geometry and symbols of a well in an unconfined aquifer are shown in Figure 1. For the slug test the water level in the well is suddenly lowered, and the rate of rise of the water level is measured. The flow into the well at a particular value of y can be calculated by modifying the Thiem equation to

$$Q = 2\pi K L \frac{y}{\ln (R_e/r_w)} \qquad (1)$$

where Q is the flow into the well (length^3/time), K is the hydraulic conductivity of the aquifer (length/time), L is the height of the portion of well through which water enters (height of screen or perforated zone or of uncased portion of well), y is the vertical distance between water level in well and equilibrium water table in aquifer, R_e is the effective radius over which y is dissipated, and r_w is the horizontal distance

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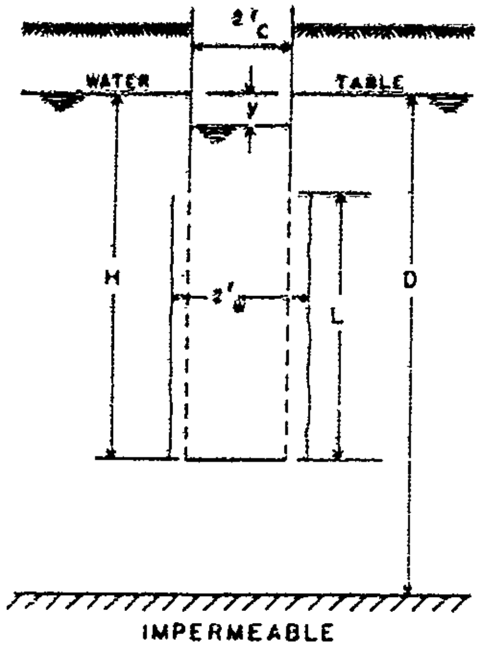

Fig. 1. Geometry and symbols of a partially penetrating, partially perforated well in unconfined aquifer with gravel pack or developed zone around perforated section.

from well center to original aquifer (well radius or radius of casing plus thickness of gravel envelope or developed zone).

The terms L, y, R_e, and r_w are all expressed in units of length. The effective radius R_e is the equivalent radial distance over which the head loss y is dissipated in the flow system. The value of R_e depends on the geometry of the flow system, and it was determined for different values of H, L, D, and r_w (Figure 1) with a resistance network analog, as will be discussed in the next section. Equation (1) is based on the assumptions that (1) drawdown of the water table around the well is negligible, (2) flow above the water table (in the capillary fringe) can be ignored, (3) head losses as water enters the well (well losses) are negligible, and (4) the aquifer is homogeneous and isotropic. These are the usual assumptions in the development of equations for pumped hole techniques [*Bouwer and Jackson*, 1974, and references therein].

The value of r_w in (1) represents the radial distance between the undisturbed aquifer and the well center. Thus r_w should include gravel envelopes or 'developed' zones if they are much more permeable than the aquifer itself (Figure 1).

The rate of rise, dy/dt, of the water level in the well after suddenly removing a slug of water can be related to the inflow Q by the equation

$$dy/dt = -Q/\pi r_c^2 \tag{2}$$

where πr_c^2 is the cross-sectional area of the well where the water level is rising. The minus sign in (2) is introduced because y decreases as t increases.

The term r_c is the inside radius of the casing if the water level is above the perforated or otherwise open portion of the well. If the water level is rising in the perforated section of the well, allowance should be made for the porosity outside the well casing if the hydraulic conductivity of the gravel envelope or developed zone is much higher than that of the aquifer. In that case the (open) porosity in the permeable zone must be included in the cross-sectional area of the well. For example, if the radius of the perforated casing is 20 cm and the casing is surrounded by a 10-cm permeable gravel envelope with a porosity of 30%, r_c should be taken as $[20^2 + 0.30(30^2 - 20^2)]^{1/2} = 23.5$ cm to obtain the cross-sectional area of the well that relates Q to dy/dt. The value of r_w for this well section is 30 cm.

Combining (1) and (2) yields

$$\frac{1}{y}\,dy = -\frac{2KL}{r_c^2 \ln (R_e/r_w)}\,dt \tag{3}$$

which can be integrated to

$$\ln y = -\frac{2KLt}{r_c^2 \ln (R_e/r_w)} + \text{constant} \tag{4}$$

Applying this equation between limits y_0 at $t = 0$ and y_t at t and solving for K yield

$$K = \frac{r_c^2 \ln (R_e/r_w)}{2L}\,\frac{1}{t}\,\ln \frac{y_0}{y_t} \tag{5}$$

This equation enables K to be calculated from the rise of the water level in the well after suddenly removing a slug of water from the well. Since K, r_c, r_w, R_e, and L in (5) are constants, $(1/t) \ln y_0/y_t$ must also be constant. Thus field data should yield a straight line when they are plotted as $\ln y_t$ versus t. The term $(1/t) \ln y_0/y_t$ in (5) is then obtained from the best-fitting straight line in a plot of $\ln y$ versus t (see the example). The value of $\ln R_e/r_w$ is dependent on H, D, L, and r_w and can be evaluated from the analog results presented in the next section. The transmissibility T of the aquifer is calculated by multiplying (5) by the thickness D of the aquifer or

$$T = \frac{Dr_c^2 \ln (R_e/r_w)}{2L}\,\frac{1}{t}\,\ln \frac{y_0}{y_t} \tag{6}$$

This equation is based on the assumption that the aquifer is uniform with depth.

Equations (5) and (6) are dimensionally correct. Thus K and T are expressed in the same units as the length and time parameters in the equations.

EVALUATION OF R_e

Values of R_e, expressed as $\ln R_e/r_w$, were determined with an electrical resistance network analog for different values of r_w, L, H, and D (Figure 1), using the same assumptions as those for (1). An axisymmetric sector of 1 rad was simulated by a network of electrical resistors. The vertical distance between the nodes was constant, but the radial distance between nodes increased with increasing distance from the center line (Figure 2). This yielded a network with the highest node density near the well, where the head loss was greatest, and a decreasing node density toward the outer reaches of the system. For a more detailed discussion of graded networks for representing axisymmetric flow systems, see *Liebmann* [1950] and *Bouwer* [1960].

The radial extent of the medium represented on the analog was more than 60,000 times the largest r_w value used in the analyses. Thus the radial extent of the analog system was essentially infinite, as evidenced by the fact that a reduction in radial extent by several nodes did not have a measurable effect on the observed value of R_e.

The value of R_e for an infinitely deep aquifer ($D = \infty$) was determined by simulating an impermeable and then an infinitely permeable layer at a certain value of D. If this value of D is taken to be sufficiently large, the flow in the system when the layer at D is taken as being impermeable is only slightly

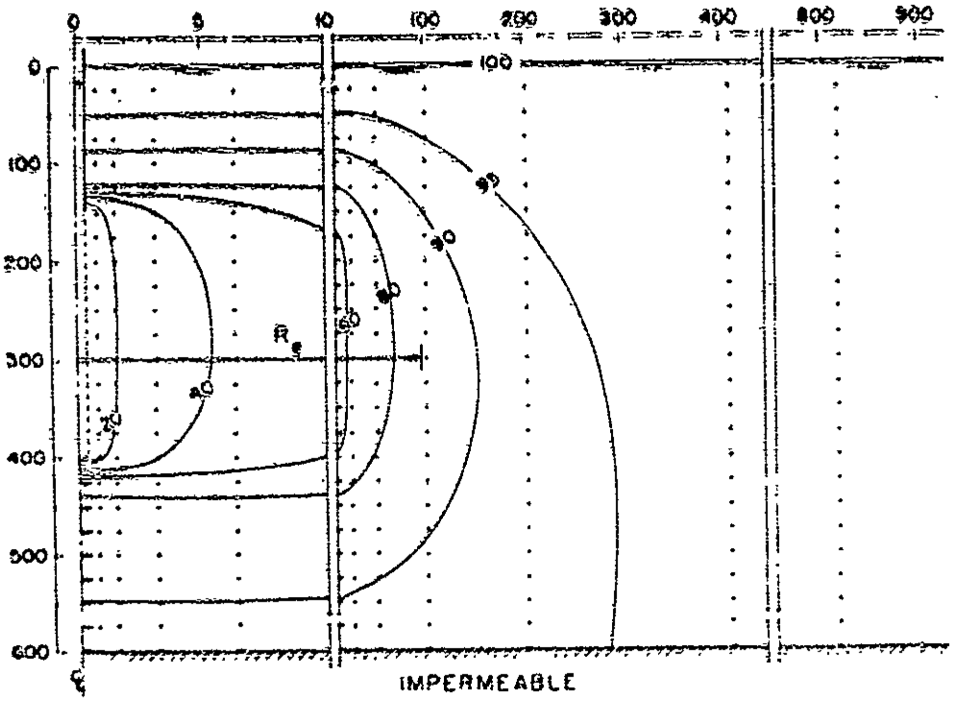

Fig. 2. Node arrangement (dots) for resistance network analog and potential distribution (indicated as percentages on equipotentials) for system with $L/r_w = 625$, $H/r_w = 1000$, and $D/r_w = 1500$. The numbers on the left and at the top of the figure are arbitrary length units (note breaks in horizontal scale).

less than the flow when the layer is taken as being infinitely permeable. The average of the two flows can then be taken as a good estimate of the flow that would occur if the aquifer were represented on the analog as being uniform to infinite depth [*Bouwer*, 1967]. This average flow was used to calculate R_e for $D = \infty$.

The analog analyses were performed by simulating a system with certain values of r_w, H, and D. The electrical current entering the "well" was then measured for different values of L, ranging from near H to near 0. This was repeated for other values of r_w, H, and D. The condition where $L = H$ could not be simulated on the analog because it would mean a short between the water table as the source and the well as the sink. The electrical current flow in the analog was converted to volume per day, and ln R_e/r_w was evaluated with (1) for each combination of r_w, H, L, and D used in the analog.

For a given geometry described by r_w, H, and D, the current flow Q_t into the simulated well varied essentially linearly with L and could be described by the equation

$$Q_t = mL + n \qquad (7)$$

Because of the linearity between Q_t and L the results of the analyses could be extrapolated to the condition $L = H$. The values of m in (7) appeared to vary inversely with ln H/r_w. The values of n varied approximately linearly with ln $[(D - H)/r_w]$, the slope A and intercept B in these relations being a function of L/r_w. This enabled the derivation of the following empirical equation relating ln R_e/r_w to the geometry of the system:

$$\ln \frac{R_e}{r_w} = \left[\frac{1.1}{\ln (H/r_w)} + \frac{A + B \ln [(D - H)/r_w]}{L/r_w}\right]^{-1} \qquad (8)$$

In this equation, A and B are dimensionless coefficients that are functions of L/r_w, as shown in Figure 3. If $D >> H$, an increase in D has no measurable effect on ln R_e/r_w. The analog results indicated that the effective upper limit of ln $[(D - H)/r_w]$ is 6. Thus if D is considered infinity or $(D - H)/r_w$ is so large that ln $[(D - H)/r_w]$ is greater than 6, a value of 6 should still be used for the term ln $[(D - H)/r_w]$ in (8).

If $D = H$, the term ln $[(D - H)/r_w]$ in (8) cannot be used. The analog results indicated that for this condition, which is the case of a fully penetrating well, (8) should be modified to

$$\ln R_e/r_w = \left(\frac{1.1}{\ln (H/r_w)} + \frac{C}{L/r_w}\right)^{-1} \qquad (9)$$

where C is a dimensionless parameter that is a function of L/r_w as shown in Figure 3.

Equations (8) and (9) yield values of ln R_e/r_w that are within 10% of the actual value as evaluated by analog if $L > 0.4H$ and within 25% if $L << H$ (for example, $L = 0.1H$).

The analog analyses were performed for wells that were closed at the bottom. Occasionally, however, wells with open bottoms were also simulated. The flow through the bottom appeared to be negligible for all values of r_w and L used in the analyses. If L is not much greater than r_w (for example, $L/r_w << 4$), the system geometry approaches that of a piezometer cavity [*Bouwer and Jackson*, 1974], in which case the bottom flow can be significant. Equations (8) and (9) can also be used to evaluate ln R_e/r_w if a portion of the perforated or otherwise open part of the well is isolated with packers for the slug test.

Equipotentials for the flow system around a partially penetrating, partially perforated well in an unconfined aquifer after lowering the water level in the well are shown in Figure 2. The numbers along the symmetry axis and the water table represent arbitrary length units. The numbers on the equipotentials indicate the potential as a percentage of the total head difference between the water table (100%) and the open portion of the well (0%) shown as a dashed line.

The value of R_e for the case in Figure 2 is 96.7 length units. As shown in the figure, this corresponds approximately to the

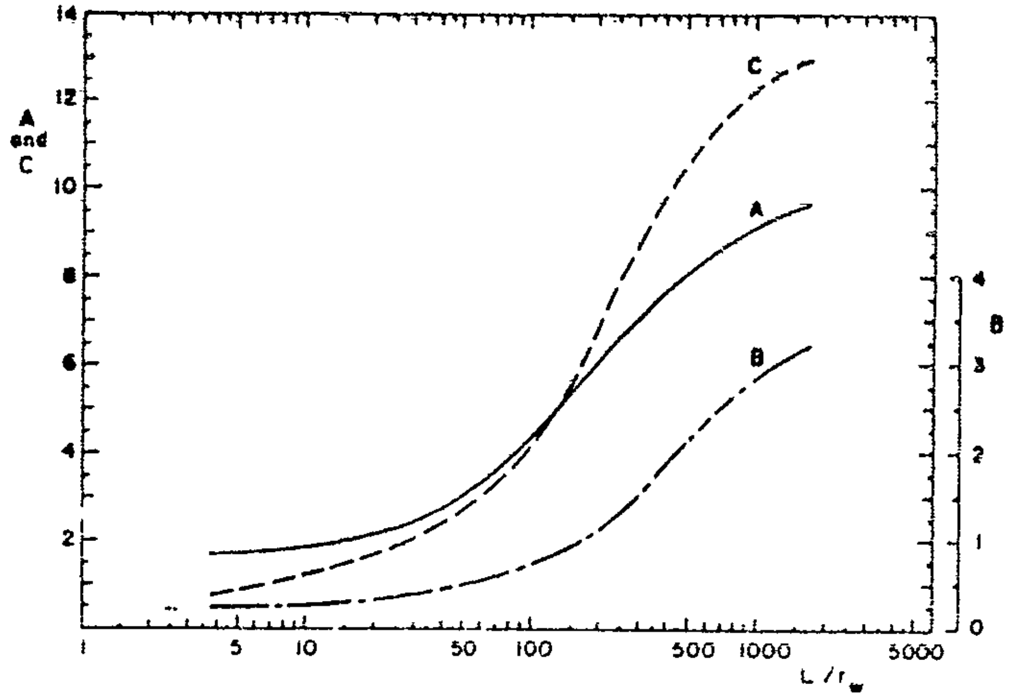

Fig. 3. Curves relating coefficients A, B, and C to L/r_w.

85% equipotential when R_e is laterally extended from the center of the open portion of the well. Thus most of the head loss in the flow system occurs in a cylinder with radius R_e, which is indicative of the horizontal extent of the portion of the aquifer sampled for K or T. The vertical extent is somewhat greater than L, as indicated by, for example, the 80% equipotential in Figure 2.

To estimate the rate of rise of the water level in a well after it is suddenly lowered, (5) can be written as

$$t = \frac{r_c^2}{2KL} \ln \frac{R_e}{r_w} \ln \frac{y_0}{y_t} \tag{10}$$

By taking $y_t = 0.9y_0$, (10) reduces to

$$t_{90\%} = 0.0527 \frac{r_c^2}{KL} \ln \frac{R_e}{r_w} \tag{11}$$

where $t_{90\%}$ is the time that it takes for the water level to rise 90% of the distance to the equilibrium level. By assuming a permeable aquifer with $K = 30$ m/day, a well with $r_c = 0.2$ m and $L = 10$ m, and $\ln (R_e/r_w) = 3$, (11) yields $t_{90\%} = 1.82$ s. Thus if y_0 is taken as 30 cm, it takes 1.8 s for the water level to rise 27 cm, another 1.8 s for the next 2.7 cm (90% of the remaining 3 cm), and another 1.8 s for the next 0.27 cm, or a total of 5.4 s for a rise of 29.97 cm. Measurement of this fast rise requires a sensitive and accurate transducer and a fast-response recorder. The rate of rise can be reduced by allowing groundwater to enter through only a portion of the open section of the well, as can be accomplished with packers.

For a moderately permeable aquifer with, for example, $K = 1$ m/day, a well with $r_c = 0.1$ m and $L = 20$ m, and $\ln (R_e/r_w) = 5$, (11) yields $t = 11.4$ s. In this case, it would take the water level 22.8 s to rise from 30 cm to 0.3 cm below static level.

EXAMPLE

A slug test was performed on a cased well in the alluvial deposits of the Salt River bed west of Phoenix, Arizona. The well, known as the east well, is located about 20 m east of six rapid infiltration basins for groundwater recharge with sewage effluent [*Bouwer*, 1970]. The static water table was at a depth of 3 m, $D = 80$ m, $H = 5.5$ m, $L = 4.56$ m, $r_c = 0.076$ m, and r_w was taken as 0.12 m to allow for development of the aquifer around the perforated portion of the casing. A Statham PA131TC pressure transducer was suspended about 1 m below the static water level in the well (when trade names and company names are included, they are for the convenience of the reader and do not imply preferential endorsement of a particular product or company over others by the U.S. Department of Agriculture). A solid cylinder with a volume equivalent to a 0.32-m change in water level in the well was also placed below the water level. When the water level had returned to equilibrium, the cylinder was quickly removed. The transducer output, recorded on a Sargent millivolt recorder, yielded the y-t relationship shown in Figure 4 with y plotted on a logarithmic scale. The straight-line portion is the valid part of the readings. The actual y_0 value of 0.29 m indicated by the straight line is close to the theoretical value of 0.32 m calculated from the displacement of the submerged cylinder.

Extending the straight line in Figure 4 shows that for the arbitrarily selected t value of 20 s, $y = 0.0025$ m. Thus $(1/t) \ln y_0/y_t = 0.238$ s^{-1}. The value of $L/r_w = 38$, for which Figure 3 yields $A = 2.6$ and $B = 0.42$. Substituting these values into (8) and using the maximum value of 6 for $\ln [(D - H)/r_w]$ (since $\ln [(D - H)/r_w]$ for the well exceeds 6) yield $\ln (R_e/r_w) = 2.37$. Equation (5) then gives $K = 0.00036$ m/s = 31 m/day. This value agrees with K values of 10 and 53 m/day obtained previously with the tube method on two nearby observation wells [*Bouwer*, 1970]. These K values were essentially point measurements on the aquifer immediately around the well bottoms, which were at depths of 9.1 and 6.1 m, respectively.

COMPARISONS

Piezometer method. The geometry to which (8) and (9) and the coefficients in Figure 3 apply overlaps the geometry of the piezometer method at the lower values of L/r_w. With the piezometer method a cavity is augered out in the soil below a piezometer tube. The water level in the tube is abruptly lowered, and K of the soil around the cavity is calculated from the rate of rise of the water level in the tube [*Bouwer and Jackson*, 1974]. The equation for K is

$$K = \frac{\pi r_w^2}{A_t} \frac{1}{t} \ln \frac{y_0}{y_t} \tag{12}$$

where A_t is a geometry factor with dimension of length. Values of A_t were evaluated with an electrolytic tank analog by *Youngs* [1968], whose results were expressed in tabular form as A_t/r_w for different values of L/r_w (ranging between 0 and 8), $(H - L)/r_w$, and $(D - H)/r_w$.

Taking a hypothetical case where $L/r_w = 8$, $H/r_w = 12$, and $D/r_w = 36$, K calculated with (5) is 18% below K calculated with (12). This is more than the 10% error normally expected with (8) and (9) for the L/H value of 0.67 in this case. The larger discrepancy may be due to the difference in methodology, or to the fact that the L/r_w value is close to the lower limit of the range covered on the resistance network analog.

An approximate equation for calculating K with the piezometer method was presented by *Hvorslev* [1951]. The equation, which is based on the assumptions of an ellipsoidal cavity or well screen and infinite vertical extent (upward and downward) of the flow system, contains a term $[1 + (L/2r_w)^2]^{1/2}$. For most well-slug-test geometries, $L/2r_w$ will be sufficiently large to permit replacement of this term by $L/2r_w$. In that case, however, Hvorslev's equation for Q yields $R_e = L$, which is not true. In reality, R_e is considerably less than L. For example, if $L = 40$ m, $r_w = 0.4$ m, $H = 80$ m, and $D = \infty$, (8) shows that $R_e = 11.9$ m, which is much less than the value of 40 m indicated by Hvorslev's equation. However, since the calculation of K is based on $\ln(R_e/r_w)$ as shown by (5), the error in K is less than the error in R_e (i.e., 36 and 236%, respectively, in this case).

If, for the above example, the top of the well screen or cavity had been taken at the same level as the water table ($H = 40$ m), R_e would have been 8.6 m and Hvorslev's equation would have yielded a K value that is 50% higher than K given by (5). The larger error is probably due to Hvorslev's assumption of infinite vertical (upward) extent of the flow system, which is not met when the cavity is immediately below the water table. Using Hvorslev's equation for cavities immediately below a confining layer would increase the error to 73%, but this, of course, is due to the fact that a water table is not a solid boundary. Hvorslev's equation for the confining layer case can be shown to yield $R_e = 2L$.

Auger hole method. The analog analyses for (8) and (9) and Figure 3 were performed for $L < H$, because short circuiting between the water table and the well prevented simulation of the case where $L = H$. If the analog results are extrapolated to $L = H$, however, the geometry of the system in Figure 1 becomes similar to that of the auger hole technique, for which a number of equations and graphs have been developed to calculate K from the rise of the water level in the well [*Bouwer and Jackson*, 1974]. *Boast and Kirkham* [1971], for example, developed the equation

$$K = C_{BK} \frac{\Delta y}{\Delta t} \tag{13}$$

where C_{BK} was determined mathematically and expressed in tabular form for various values of L/r_w, $(D - H)/r_w$, and r_w/H. Since the rate of rise of the water level in the hole after the removal of a slug of water decreases with decreasing y, $\Delta y/\Delta t$ is not a constant and the value of K obtained with this procedure depends on the magnitude of Δy used in the field measurements. The general rule is that Δy should be relatively small.

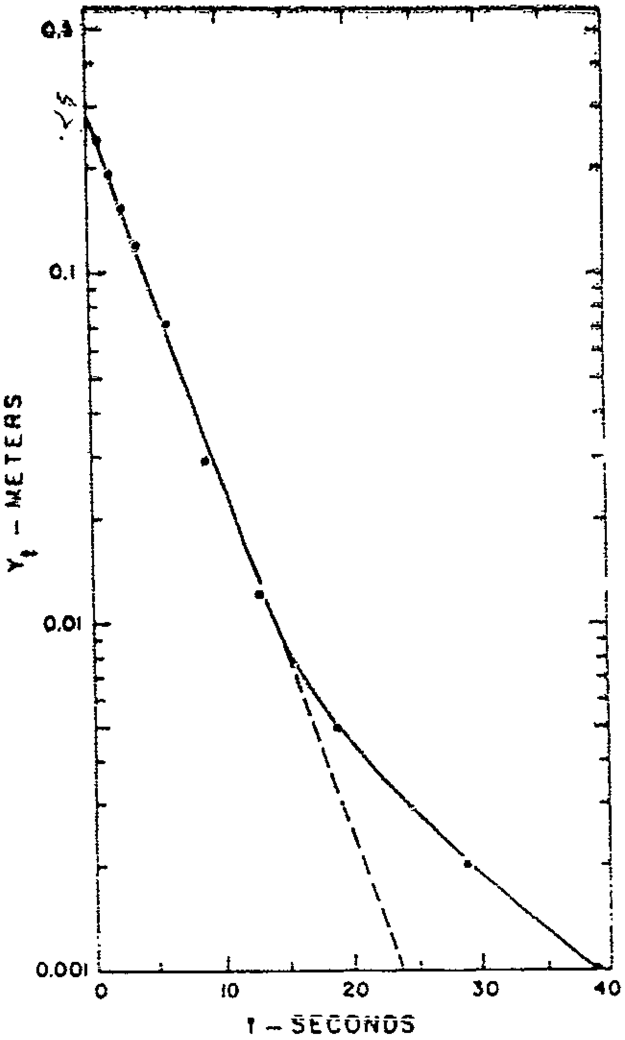

Fig. 4. Plot of y versus t for slug test on east well.

Taking a hypothetical case where $y_0 = 2.5$ m, $y_t = 2.4$ m, $\Delta t = 10$ s, $L = H = 5$ m, $D = 6$ m, and $r_w = 0.1$ m, (5) yields a K value that is 36% lower than K calculated with (13). However, if y_t is taken as 0.5 m, which should give $\Delta t = 394$ s according to the theory that $(1/t) \ln y_0/y_t$ is constant, the K value yielded by (5) is 26% higher than K obtained with (13). If y_t is taken as 0.9 m, (5) and (13) give identical results.

Slug test on wells in confined aquifers. The confined aquifer for which the slug test by *Cooper et al.* [1967] was developed is an aquifer with an internal water source, for example, recharge through aquitards or compression of confining layers or other material. This situation is similar to that of the unconfined aquifer presented in this paper because the water table is considered horizontal, like the upper boundary of a confined aquifer, and the water table is a plane source. Thus K or T calculated with (5) or (6) should be of the same order as K calculated with the procedure of *Cooper et al.* [1967], which involves plotting the rise of the water level in the well and finding the best fit on a family of type curves. *Cooper et al.* [1967] presented an example of the calculation of T for a well with $r_c = r_w = 0.076$ m and $L = 98$ m. The resulting value of T was 45.8 m^2/day. Values of D and H for this well were not given. However, since the well was 122 m deep and completely penetrating (at least theoretically), D and H must have been between 98 and 122 m. Assuming that both D and H were 100 m, (6) yields $T = 62.8$ m^2/day, which is compatible with T obtained by Cooper et al.

CONCLUSIONS

The hydraulic conductivity of an aquifer near a well can be calculated from the rise of the water level in the well after a slug of water is suddenly removed. The calculation is based on the Thiem equation, using an effective radius R_e for the distance over which the head difference between the equilibrium water table in the aquifer and the water level in the well is dissipated. Values of R_e were evaluated by electrical resistance network analog. An empirical equation was then developed to relate R_e to the geometry of the system. This equation is accurate to within 10–25%, depending on how much of the well below the water table is perforated or otherwise open. The technique is applicable to partially or completely penetrating wells in unconfined aquifers. It can also be used to estimate the hydraulic conductivity of confined aquifers that receive water from the upper confining layer through recharge or compression.

The vertical distance between the rising water level in the well and the equilibrium water table in the aquifer must yield a straight line when it is plotted on a logarithmic scale against time. This can be used to check the validity of field measurements and to obtain the best-fitting line for calculating the hydraulic conductivity. Permeable aquifers produce rapidly rising water levels that can be measured with fast-response pressure transducers and strip chart recorders or x-y plotters. The portion of the aquifer sampled for hydraulic conductivity with the slug test is approximately a cylinder with radius R_e and a height somewhat larger than the perforated or otherwise open section of the well.

Hydraulic conductivity values obtained with the proposed slug test are compatible with those yielded by the auger hole and piezometer techniques where the geometries of the systems overlap, and by a slug test for completely penetrating wells in confined aquifers.

REFERENCES

Boast, C. W., and D. Kirkham, Auger hole seepage theory, *Soil Sci. Soc. Amer. Proc.*, 35(3), 365–374, 1971.

Bouwer, H., A study of final infiltration rates from ring infiltrometers and irrigation furrows with a resistance network analog, in *7th International Congress of Soil Science*, vol. 1, pp. 448–456, International Society of Soil Science, Madison, Wis., 1960.

Bouwer, H., Analyzing subsurface flow systems with electric analogs, *Water Resour. Res.*, 3(3), 897–907, 1967.

Bouwer, H., Ground water recharge design for renovating waste water, *J. Sanit. Eng. Div. Amer. Soc. Civil Eng.*, 96(SA1), 59–74, 1970.

Bouwer, H., and R. D. Jackson, Determining soil properties, in *Drainage for Agriculture*, *ASA Monogr. 17*, chap. 23, sect. 10, edited by J. van Schilfgaarde, pp. 611–672, American Society of Agronomy, Madison, Wis., 1974.

Cooper, H. H., Jr., J. D. Bredehoeft, and I. S. Papadopulos, Response of a finite diameter well to an instantaneous charge of water, *Water Resour. Res.*, 3, 263–269, 1967.

Hvorslev, J. M., Time lag and soil permeability in ground-water observations, *Bull. 36*, 50 pp., U.S. Corps of Eng., Waterways Exp. Sta., Vicksburg, Miss., 1951.

Liebmann, G., Solution of partial differential equations with a resistance network analogue, *Brit. J. Appl. Phys.*, 1, 92–103, 1950.

Lohman, S. W., Groundwater hydraulics, *U.S. Geol. Surv. Prof. Pap. 708*, 70 pp., 1972.

Skibitzke, H. E., An equation for potential distribution about a well being bailed, open file report, U.S. Geol. Surv., Washington, D. C., 1958.

Youngs, E. G., Shape factors for Kirkham's piezometer method for determining the hydraulic conductivity of soil *in situ* for soils overlying an impermeable floor or infinitely permeable stratum, *Soil Sci.*, 106(3), 235–237, 1968.

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revised January 19, 1976;
accepted January 23, 1976.)

REFERENCE 6

KAW

LAWLER, MATUSKY & SKELLY ENGINEERS
CREW CHIEF REPORT AND INCIDENT SHEET

Crew Chief: Jim Gorewich Survey(s): Tuxedo Surf. H₂O / Sediment Job No. 576-018

Survey Date(s): 8-4-85 Vehicle: T Van Crew Members: DK

SURVEY INFORMATION

1.	Survey start/end time	/
2.	Equipment prepared for survey/safety equipment present?	Yes
3.	Sampling gear working properly?	Yes
4.	Physical/chemical meters functioning properly/ID numbers recorded?	Yes
5.	Any incidents or mishaps?	No
6.	Any unusual or important observations/time lost?	No
7.	Weather observations/marine radiotelephone log/boat and vehicle logs/incident sheet completed?	Yes
8.	Equipment usage sheet completed and submitted to Warehouse Coordinator?	Yes
9.	Boat fluids, equipment, etc. checked?	—
10.	Vehicle fluids, equipment, etc. checked?	—

11. Boat(s) Used ______ Engine Hours ______ to ______

Radio Log: Boat ______ From ______ to ______ Location ______

INCIDENT REPORT AND COMMENTS (Include number and explanation):

Survey went fine. We took the samples where Mike Komoroske of DEC wanted them taken. While we were sampling Mike found an area of standing water on the east side of the RR tracks, he said he would like us to sample this location. We did not have the bottles or preservative I told him we would sample it at another time. When we checked it a week later it was dry

(use reverse or additional sheet if necessary)

Lawler, Matusky & Skelly Engineers

Date: 8-4-88
Crew: JGG DAK
Site: Tuxedo C+D

LAWLER, MATUSKY & SKELLY ENGINEERS
FIELD DATA SHEET FOR SOIL/SEDIMENT SAMPLES
Job No: 576-018

Oper: Surf H$_2$O + Sediments
Thermometer No: —

							SAMPLE BOTTLES				
STA. NO.	TIME	SMPL DPTH	METHOD	TEXT.	CLR.	ODOR	SAMPLE PARAMETERS	BOT. Nos.	SAMPLE PARAMETERS	BOT. Nos.	COMMENTS
RS-1	1055	0-6"	S/S spoon	fine to coarse sand some silt	Brn	None	VOA TCL^{+10} VOA TCL^{+10} 1 l Glass TCL	4351 4343 4352			Mid River (Ramapo)
↓	↓	↓	↓	+ small stones	↓	↓					West side of River (by lily pad area)
RS-2	1210	0-6"	S/S Spoon	fine org material "fluff" w/ fine sand & silt	Brn	Swamp odor	VOA TCL^{+10} V$_1$ VOA TCL^{+10} V$_2$ 1 l Glass TCL	4369 4370 4368			
SWS*-3	—	—	—	—	—	—					* Not taken as per Mike Komoroske of DEC
RS-4	1415	0-6"	S/S Spoon	Same as RS-1	Brn	None	VOA TCL^{+10} V$_1$ VOA TCL^{+10} V$_2$ 1 l Glass TCL	4380 4381 3346			Mid River (East of SW-3)
SWS**-3	1505	0-6"	S/S Spoon	"fluffy" w/ fine sand & silt & org material	Blk	Swamp Odor	VOA TCL^{+10} V$_1$ VOA TCL^{+10} V$_2$ 1 l Glass TCL	4418 3076 4417			** Mike decided that we should take this sample (Sediment from standing water along RR tracks north of MW-7

Date: 9-4-98
Crew: JMG DK
Site: Toxcdo (Ramapo R)
Oper: Surf Waters

LAWLER, MATUSKY & SKELLY ENGINEERS
FIELD DATA SHEET FOR SURFACE WATER
Job No: 576-018

pH No: DEC #4336 / CP # 38
Thermometer No: 989 / 433
SCT No: DEC TC-3000 / TSC #9
Velocity Meter No: ——

STA. NO.	SAMPLE DEPTH (ft/in)	TIME (HHMM)	TEMP. (°C)	pH	SP COND. (µmhos/cm)	FLOW MEAS.	CRK. DPTH ft INT. (Rt-Lft) (ft/in)	CRK. WDTH (ft)	SAMPLE BOTTLES SAMPLE PARAMETERS	BOT. NOS.	SAMPLE PARAMETERS	BOT. NOS.	COMMENTS
SW-1	Mid (Water Depth 1.2')	1040	24.4°	7.98 / 8.0	495	—	—	—	VOA V, TCL HO VOA V, TCL HO AB/N TCL Metals TCL	4350 4342 4345 4346	Phenols Cyanides Pest/PCBs TCL	4348 4349 4347	Mid River (Ramapo)
SW-2	Surf. (Water Depth: 0.5')	1200	28.4°	7.30	515	—	—	—	VOA V, TCL VOA V, TCL AB/N TCL Metals TCL	4366 4367 4365 4371	Phenols Cyanides Pest/PCBs TCL	4363 4362 4364	West side of River (by lily pad area)
SW-3	Near Bottom (Water Depth: 1.4')	1310	23.4°	6.97 / 7.0	487				VOA V, TCL VOA V, TCL A,B/N TCL Metals TCL	4377 4378 4375 4376	Phenols Cyanides Pest/PCBs	4373 4374 4372	Standing water along RR Tracks, between 1st & 2nd High Voltage wire Poles north of MW-7
SW-4	Mid (Water Depth: 1.6')	1400	24.8° / 24.9°	8.22 / 8.2	521 / 519	—	—	—	VOA V, TCL VOA V, TCL A,B/N TCL Metals TCL	4387 4388 4385 4382	Phenols Cyanides Pest/PCBs TCL	4384 4383 4386	Mid River, East of SW-3

Crew: JMG DK
Date: 8.4.98
Job No: 576.019

LAWLER, MATUSKY & SKELLY ENGINEERS
FIELD METER CALIBRATION AND/OR CHECK
DATA SHEET

Site: Tuxedo C&D
Oper: Surf H2O & Sediment.
Calib. By: DK JMG

pH

METER NO./ PROBE NO.	TIME	THERM NO./ TEMP. (°C)		EXPECTED VALUE		OBSERVED VALUE		ADJ TO[a]	% DIFF.[b]	COMMENTS
DEC # 4326	0940	989	28.6°	7.00	–	6.97	–	7.00		
↓	↓	↓	↓	10.00	4.00	9.91	3.97	10.00		
	1520	↓	30+	7.0		6.98	–	7.00		
	↓	↓	↓	4.0	10.0	9.97		10.00		
Cl #	0940	989	28.6°	7.0	–	7.0	–	–		
↓	↓	↓	↓	10.0	4.0	10.0	4.1			
	1515	↓	30+	7.0		7.1		7.0		
	↓	↓	↓	10.0	4.0	10.0	4.1			

[a] For dissolved oxygen and pH meter calibrations, record adjustments (include % and ppm readings for dissolved oxygen meter calibration).

[b] Include % Diff. calculation for conductivity calibration checks: % Diff = $\frac{Ex - Ob}{Ex} \times 100$

LAWLER, MATUSKY & SKELLY ENGINEERS
CREW CHIEF REPORT AND INCIDENT SHEET

Add'l + Vent Sampling + Soil Gas pH Sampl

Crew Chief: JMGinevich Survey(s): Tuxedo Surf H_2O Sample Job No. 576-018

Survey Date(s): 9-12-88 Vehicle: B1 Truck Crew Members: KM'G

SURVEY INFORMATION

1.	Survey start/end time	0600 / 1600
2.	Equipment prepared for survey/safety equipment present?	Yes
3.	Sampling gear working properly?	Yes
4.	Physical/chemical meters functioning properly/ID numbers recorded?	Yes
5.	Any incidents or mishaps?	No
6.	Any unusual or important observations/time lost?	No
7.	Weather observations/marine radiotelephone log/boat and vehicle logs/incident sheet completed?	Yes
8.	Equipment usage sheet completed and submitted to Warehouse Coordinator?	Yes
9.	Boat fluids, equipment, etc. checked?	—
10.	Vehicle fluids, equipment, etc. checked?	—

11. Boat(s) Used ______ Engine Hours ______ to ______

Radio Log: Boat ______ From ______ to ______ Location ______

INCIDENT REPORT AND COMMENTS (Include number and explanation): KM'G + I prepped up and went to the Tuxedo C+D site to check readings around the trenches and also from any noticeable venting areas. We checked venting from the trees trenches + some spots on the Georgia Tech property. We also purged the 10 selected soil sample points (SSP-33, 32, 24, 23, 21, 20 26, 22, 25 + 27) all of which (except SSP-27... too much moisture in tubing) read over 2000 ppm H_2S on the 0-2000 ppm Drager Tubes. We sampled the SW-5 location. This is the area just east of the RR track bed that looks like it may be leachate seeping from the landfill (orange staining + floc in area

(use reverse or additional sheet if necessary)

+ some sheening on the water surface. We did a matrix spike + matrix spike dup. here

Lawler, Matusky & Skelly Engineers

Date: 9-12-88
Crew: JMG KM'G
Site: Tuxedo C&D
Oper: Surf H₂O Samples

LAWLER, MATUSKY & SKELLY ENGINEERS
FIELD DATA SHEET FOR SURFACE WATER
Job No: 576-018

pH No: Orion DLC # 4776
Thermometer No: 703
SCT No: DEC TIC ·2000
Velocity Meter No: —

STA. NO.	SAMPLE DEPTH (ft/in)	TIME (HHMM)	TEMP. (°C)	pH	COND. (µmhos/cm)	FLOW MEAS.	CRK. DPTH ft INT. (Rt-Lft) (ft/in)	CRK. WDTH (ft)	SAMPLE BOTTLES				COMMENTS
									SAMPLE PARAMETERS	BOT. Nos.	SAMPLE PARAMETERS	BOT. Nos.	
SW-5	Surf	1200	21.4°	6.5	1755	—	—	—	2 VOCs TCL	2-40 ml	[illegible] TCL [illegible]	½ l Plast.	
									A,B/N, TCL	1 l Amber	TCL Cyanides	½ l Plast.	
									TCL Pest/PCBs	1 l Amber			
									Phenols	1 l Amber			
SW-5-MS	↓	↓	↓	↓	↓	–	–	–	Same as above				
SW-5-MSD	↓	↓	↓	↓	↓	–	–	–	Same as above				

LAWLER, MATUSKY & SKELLY ENGINEERS
CREW CHIEF REPORT AND INCIDENT SHEET

Crew Chief: JM Gurewich Survey(s): Tuxedo Surf H$_2$O / Sediment Resampling Job No. 576-018

Survey Date(s): 11-7-88 Vehicle: Cube Van Crew Members: KMC

SURVEY INFORMATION

1.	Survey start/end time	0700 / 2000
2.	Equipment prepared for survey/safety equipment present?	Yes
3.	Sampling gear working properly?	Yes
4.	Physical/chemical meters functioning properly/ID numbers recorded?	Yes
5.	Any incidents or mishaps?	No
6.	Any unusual or important observations/time lost?	Yes
7.	Weather observations/marine radiotelephone log/boat and vehicle logs/incident sheet completed?	Yes
8.	Equipment usage sheet completed and submitted to Warehouse Coordinator?	Yes
9.	Boat fluids, equipment, etc. checked?	—
10.	Vehicle fluids, equipment, etc. checked?	—

11. Boat(s) Used ____ Engine Hours ____ to ____

Radio Log: Boat ____ From ____ to ____ Location ____

INCIDENT REPORT AND COMMENTS (Include number and explanation): Survey went OK. We met Mike Komoroske @ the site. The Ramapo River was ~3-4' higher than the last time we sampled. We had to move SW-1/RS-1 ~70' downstream and closer to the bank due to the water depth. SW-2/RS-2 was done in the original location. SW-3/SWS-3 was also in the original location. SW-4/RS-4 had to be moved
1. Hle closer to shore due to the water depth. We checked the SW-5 location but the Ramapo River was up to this point so the seep was not visible and there was no sheen or orange floc in the area. Mike K decided not to resample this location. The samples were sent to Compuchem by Fed X that same night

(use reverse or additional sheet if necessary)

Lawler, Matusky & Skelly Engineers

Date: 11-7-88
Crew: JMG KMS
Site: Tuxedo Grd
Oper: Surf H2O Samples

LAWLER, MATUSKY & SKELLY ENGINEERS
FIELD DATA SHEET FOR SURFACE WATER
Job No: E36-013

pH No: DEC Sargn 7776
Thermometer No: 542
SCT No: DEC TLC #560
Velocity Meter No: ——

STA. NO.	SAMPLE DEPTH (ft/in)	TIME (HHMM)	TEMP. (°C)	pH	SP. COND. (µmhos/cm)	FLOW MEAS.	CRK. DPTH ft INT. (Rt-Lft) (ft/in)	CRK. WDTH (ft)	SAMPLE BOTTLES SAMPLE PARAMETERS	BOT. Nos.	SAMPLE PARAMETERS	BOT. Nos.	COMMENTS
SW-1	Surf	1300	9.5°	6.7	266	—	—	—	HSL^{+30} Organics, Metals Pest/PCBs Cyanides				Sample taken ~ 8' off west bank in ~3' of water ~65-70' downstream of original site
SW-2	"	1410	9.5°	6.8	263	—	—		HSL^{+30} Organics Metals Pest./PCBs Cyanides				Sample taken @ original site. water depth is ~2' deep
SW-3	Surf	1510	10.0°	6.9	382	—	—	—	HSL^{+30} Organics, Metals Pest./PCBs Cyanides				Sample taken @ original site. Water depth is ~2' deep
SW-4	Surf	1610	9.4°	6.9	263				HSL^{+30} Organics, Metals Cyanides Pest./PCBs				Sample taken @ original site. Water Depth is ~3' deep

Date: 11-9-88
Crew: Jms, Km'c
Site: [illegible] C+D

LAWLER, MATUSKY & SKELLY ENGINEERS
FIELD DATA SHEET FOR SOIL/SEDIMENT SAMPLES
Job No: 576.018

Oper: Sediment Sampling
Thermometer No: —

								SAMPLE BOTTLES				
	STA. NO.	TIME	SMPL DPTH	METHOD	TEXT.	CLR.	ODOR	SAMPLE PARAMETERS	BOT. Nos.	CofC #'s ~~SAMPLE PARAMETERS~~	BOT. Nos.	COMMENTS
02	RS-1	1310	0-4"	S/S Spoon		Blk + Brn	None	HSL Organics + Metals				* Sample taken off bank in ~3' water ~65 to 70' downstream of original site
04	RS-2	1415	"	"		Brn	Slight Sulfur	HSL Organics + Metals				Sample taken @ original site
06	SWS-3	1520	"	"		Blk + Brn	Slight Swamp Odor	HSL Organics + Metals		013867		Sample taken @ original site
08	RS-4	1620	0-4"	"			None	HSL Organics + Metals				Sample taken closer to shore than orig. site

Crew: JMG KMC
Date: 11-7-88
Job No: 576-018

LAWLER, MATUSKY & SKELLY ENGINEERS
FIELD METER CALIBRATION AND/OR CHECK
DATA SHEET

Site: Tyndo C+D
Oper: Surf H2O
Calib. By: JMG

METER No./ PROBE No.	TIME	THERM No./ TEMP. (°C)	EXPECTED VALUE		OBSERVED VALUE		ADJ TO[a]		% DIFF.[b]	COMMENTS
DEC / 4976 [illegible] pH	1220	Thermistor / 10.9°	7.00	–	6.95	–	7.00	–		
↓	↓	↓	10.00	4.00	10.09	4.03	10.00	–		
	1650		7.00	–	7.25	–	7.00	–		
	↓	↓	10.00	4.00	10.19	4.05	10.00	–		

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[a] For dissolved oxygen and pH meter calibrations, record adjustments (include % and ppm readings for dissolved oxygen meter calibration).

[b] Include % Diff. calculation for conductivity calibration checks: $\% \text{ Diff} = \frac{Ex - Ob}{Ex} \times 100$

REFERENCE 7

SACCO/BARONE LANDFILL

On March 17, 1987 at about 1:30 p.m. while patrolling Rt. 17, Town of Tuxedo, I observed what appeared to be a landfill on East of Rt. 17, about 300 yards south of Duck Cedar Inn. I observed trucks coming, filled with material, dumping the material on the property and leaving what appeared to be empty. I took two Polaroids, A,B, from the road and contacted Solid Waste in New Paltz. I spoke to Sandy White, checking for permit to operate and to make an appointment to inspect the site.

On March 18, 1987, I returned to the site with Sandy White, EnCon Assistant Sanitary Engineer. I observed trucks, dumping C&D and non C&D wastes including plastics, tires, clothing, rugs, cardboard, paper, foam rubber and metal "white goods" (pix C-I). Sandy and I spoke to Frank Sacco, who was on the site, and who identified himself as manager of the site and representative of Material Transport Services. We advised him on the violation of his so-called "C&D" exemption; and that was non "C&D" and lift height greater than 10 feet.

The site was ordered closed and a summons (UAT 98375) was issued. Mr. Sacco said he would comply. I determined through tax maps at the Town Hall that Reynard Barone was one of two owners. Mr. Barone was then, the town justice. I attempted to stop to see him; he was not in, and I left message that I stopped by.

On March 23, 1987, I had occasion to return to Tuxedo to speak to Mr. Barone. Upon passing the site of Landfill, I observed dumping continuing. At that time, there appeared to be less non C&D material but there was still paper products and tires. At that time, I did not see Mr. Sacco. I went down to meet with Mr. Barone. I advised him of the violations, of the continuing dumping after ordering to halt. I also advised him of an offer to settle by Civil Compromise and a Schedule "A". I "gave" him 24 hours to contact Sacco and discontinue operation. While I was in his office he "called" Frank Sacco and told him (Sacco) not to dump anything. I contacted Sandy White to advise about continued operation and to prepare a Schedule A for me. We agreed on a Compromise of $800. Mr. Barrone contacted me again and asked for a meeting the next day, the 24th, to settle and become legal.

March 24, 1987 while enroute to meeting in Mr. Barone's office, I observed more dumping of C&D and non C&D material (plastics, tires, paper, cloth). I took pictures of operations (J-K-L). At about 2:00 p.m., I met with Sandy White, Mike Hill from Central Office, Mr. Cassidy, a consultant for Sacco (MTS), Mr. Barone and Leon Greenspan, Mr. Sacco's attorney.

The meeting started with Mr. Barone stating he didn't want to violate the law and agreed in concept with our Compromise and Schedule "A". Mr. Greenspan then took over and from a discussion of violations and loss of C&D exemptions it went downhill to, we had no right to regulate this site, this was United States of America, not Nazi Germany and we will see him in court. I advised all four that the site is in violation and Summons will be issued for every day it operates.

I observed operations on March 25 and 26. On March 27th, I observed truck with Registration NY 16621-TN dump a load heavy with plastics and paper products. On March 31, I observed NY 2184-TZ (Update) dump a load heavy in paper products, plastics and at least one (1) tire. I also observed a transferred station 2 drop containers; 1 full of metal goods and cloth products and the other appeared empty, observed from on site.

On April 1, 1987 at about 8:00 a.m., I observed NY TT 2854 dump a load of debris which appeared to be almost total paper products. I took pictures "M-N". This was observed from State Rd. Rt. 17. The only person I observed around was a workman identified as Jerry Dally, operating suspended Reg. AN 2951, and operating a bulldozer.

On April 2, 1987, I went on site, took photographs "O-U". The 2 transfer stations were on site, paper, cloth, plastics and tires were in the face or being covered up. Material to cover the debris was coming from on-site, a possible Mined Land violation if continued. I issued Summons 146250, 146251, 146252, to Frank Sacco and Reynard Barone. I also advised them of the containers violation, Mined Lands violation and continuing C&D exemptions violations. I also, at this time, issued "Stop Work" order from Regional Attorney Judith Ferry (Attachment "I") to R. Barone.

On Friday, April 3, 1987, Environmental Conservation Officer Scott ✓I Steingart went to the site to serve Stop Work Order. Served it on person who stated represented MTS (Serve notice given to J. Ferry). Site still had large amounts non C&D paper, plastics, white goods. Pictures taken V-W. Also on site was the owenr of the heavy equipment, Mr. Alfred Ratteni, DOB 1/29/45. He was driving a 1987 Lincoln, NY Reg. VPA-696. The equipment owned by Mr. Ratteni was a large shovel, 1 or 2 bulldozers. He was advised of violations and he stated he would remove his equipment.

On April 6th, I observed continuing operation, could not observe contents being dumped. The excavation going on on-site (60'x45'x20' give or take) and in conjunction with the initial excavation on the north end of property indicated a Mined Lands Violation. I ordered cessation of such operation and issued written warnings to Sacco and Barone and at same time issued summons 146621 and 146622 for operating landfill without a permit.

April 7, observed landfill from Road, did not observe non C&D material. I did do an initial investigation to another alleged Sacco landfill in Ramapo by 202, 59 & 17 Junction.

April 13, 1987, Summons 146628, 146626, 146629 issued for transfer station and the landfill. Was 146625, 146627 and 146630. Upon inspection, I again found large amounts of paper some of which was computer-type material. Collected physical evidence.

April 14, 1987, observed about 12 tires, half buried in face and 3 to 4 tires from previous loads - NY 2466 TT and NJ YA 70203.

On April 15, I observed approximately 15 tires spread around base of face with some partially buried. A truck bearing lettering of "GARRAN" was observed dumping a "dirty" load, paper, plastics, cloth-like material; this was observed from Rt. 17.

On April 16 with an onsite inspection I observed 2-3 load piles heavy with cardboard and at least 2-3 bags of household garbage not buried.

On April 21, I observed operation from roadside (Rt. 17), did not see much non C&D; did observe violation of solid waste in surface water. (Pictures A & B).

On Sunday, April 26, observing from roadside (Rt. 17) did not see much non C&D; just mostly tires. Did observe further mining violation directly in front of trailer (north) est. 30'x50'x15', large pile of tires on edge of pit.

On Wednesday, April 29, inspected on site -- tires and pit gone. Paper, plastics and fabric spread throughout face of landfill.

On May 7, 1987, I met with Sandy White to serve Frank Sacco with a subpoena Duces Tecum. Mr. Sacco stated he no longer represented his wife's company, MTS. At this time, Mr. Donald F. Disilvestro DOB 12/29/51, identified himself as a representative of MTS (Materials Transport Service).

S. White and myself inspected the site, observed plastics, cloth fabric, paper. Also observed debris infringing and entering surface water to the north and west. Pictures C1 to G1 were taken. At this time, the local police arrived stating they had a complaint (Disilvestro) of trespass against us (Ms. White and myself). I reminded them of an ongoing investigation of a violation of DEC Rules and Regulations. The Chief of Police asked if we had enough information. I said yes for today, but we would probably return tomorrow or next day. He asked us to leave, to which we complied.

The next time I made an onsite inspection was not until August 25, 1987; I was in area and decided to inspect. I observed large amounts of paper, cardboard, some household garbage. I also found hospital refuse, EKG strips, Techs. orders from Lawrence Hospital. I also observed syringes or the catheters to the syringes and oxygen tubing, but by the time I got back to the location with the appropriate gloves, those items were buried. The paper products were picked up for physical evidence.

During the course of this investigation by this officer, the lift height always exceeded the 10 foot level. Mr. Sacco nor Mr. Barone did not tell me I could not go onto the property and on several occasions, both invited me to inspect the site.

The final inspection and summons on Sacco/Barone site came on October 19, 1987 when I received a complaint from ECO S. Steingart as to a Mined Land violation.

The pit measured, by pacing, 100'x50'x15'. A summons was issued to a Mr. McCann of Montvale, NJ. Case was settled by AG's office in Tuxedo Court. I have no knowledge of the Georgia-Tech incident since it was handled by Environmental Conservation Officers.

R. Conklin
Region 3
6/22/88

File No. 576-018

TUXEDO WASTE DISPOSAL SITE
INTERVIEW WITH ROBERT CONKLIN
11 October 1988

To determine location and extent of pits in former landfill surface.

Interviewers: E. Maikish/M. Creager

Weather: Sunny, light breeze, approximately 60°F

Part I - Pit Identification near excavation trench 3

Part II - Waste characterization and lift description near excavation trench 2.

Conklin: In August, I found some paper waste from a hospital, EKG machine, strips, requisitions. I saw a couple of syringes. I went back to my vehicle to get some gloves and by the time I got back the syringes were gone; a lot of clothing, a lot of railroad ties, a lot of plastic.

Creager: But no real excavation pits?

Conklin: No, no. They still had plenty of room yet to fill in and that was about the time I stopped coming, August.

Maikish: As far as you know the excavation pits were only dug for fill, not necessarily to hid anything.

Conklin: Apparently, yes. Except for the one by the concrete bunker. It appeared to be there and be gone too quickly. Everything else seemed to be taking its time to be dug out and filled in.

Creager: We had one trench over there near the woods where the pile of dirt is. Again, there was no excavation over there. They were just filling it in?

Maikish: It's just right near the block out front?

Conklin: Right. That area in there they had plenty of fill. You could see all they had to do was take the bulldozer and scrape off the edge to cover it over. There is a large block out practice, over in there.

Maikish: So that area, itself, that's about the right height.

Creager: About 20-30 ft.

Conklin: Yes, there all the way down through across the route flagging that was the second phase. That was the last time I was here. That was in August.

Maikish: This is the second level.

Conklin: This would appear to be the second level. Yes.

Maikish: So they continued all the way down here for the second level and that would be the third level.

Conklin: Right. Except it was below the river, below the railroad track. That was 4 ft below the railroad track bed.

Creager: On top of the water?

Conklin: Yeah, on top of the water. So you have some idea how much stuff there is in here. I'd say it had a funny tint to it, like kerosene or gasoline.

Creager: Sort of a sheen on the water?

Conklin: Yeah, yeah, it was a real heavy sheen.

Conklin: In fact I think I got a couple of pictures.

Creager: Was there any iron-type staining, any brown or dark, in the bottom sediment, at all?

Conklin: No, not that I remember seeing.

Maikish: They did not do anything to drain the pond? They just filled it in?

Conklin: I was told both by Sacco and Sendy White that they dug a ditch, drained the pond and filled it in with gravel, crushed gravel, to 1 inch, and then filled right in over the top of it. And that was acceptable.

Creager: However, if the pond was 4 ft below the railroad tracks...

Conklin: Well, yeah, the grade does run that way and it is conceivable that it could be drained out that way.

Maikish: But you didn't see them doing any of this?

Conklin: Absolutely not. I just came here one day and found the pond filled over.

Conklin: That was May 7th, that they got up to the edge of the pond.

Creager: So this area was still had the trees in there, then?

Conklin: Yes. This area still had the trees. This picture here, was taken approximately where the flagging was. As I was walking along the edge I saw the material.

Maikish: The reports said that they installed a drainage ditch, did you see any of that?

Conklin: Supposedly. It was a stream, well not a stream but a drainage stream an intermittent... I would have considered it a an intermittent stream. It was running enough....

Maikish: Well, the pictures here, that's a stream.

Conklin: That didn't look like just a runoff and that was in April. That's the stream. The stream is down here.

Maikish: And it ran this way?

Conklin: Right.

Maikish: And it ran through to the pond and it ended at the pond?

Conklin: Right. And when I took these pictures, there was some culvert pipe laying over there; 12 inch culvert pipe and I was told that it was used for the stream all the way over.

Maikish: But they....

Conklin: The culvert pipe was buried in the fill, but I couldn't trace it all the way back that way.

Maikish: But there's no outlet to it? I mean, they should take that all the way through, all the way out here. To our knowledge unless there is an outlet right here. There is a culvert way down there.

Conklin: Well, they said they put two culverts in. One's down there, and one's down through here, which I couldn't quit understand.

Maikish: But from our records, we could not see the culvert flow.

Maikish: As far as we can figure, no flow is coming out, here.

Conklin: The 'Y' they put in would have had to been over in here some place. Because that culvert pipe bends up here.

Conklin: There was a long period of time when I was coming here, every day and I could watch what they were doing. And then it got to the point where fires were occurring and other things were happening so that I couldn't come every day. When I did come things were changed but the things were changed couldn't have changed that fast. I mean, I know how long it would take some body to lay a culvert, especially that size, and especially going through 20 ft of fill.

Maikish: They were not laying it while they were ....

Conklin: No. Except for may be this one, that ran along 17, laying it while they were filling in. But that one, running across, they had to dig it up and then lay it.

Maikish: Because you're saying this was an intermittent stream.

Conklin: As far as I was concerned, yes, it was an intermittent stream. During the heat of the summer, I saw it flowing but, about 8 months out of the rest of the year, I wouldn't.

Maikish: Maybe that is the reason we are getting so much hydrogen sulfide because that I don't see any water going or any culvert leading to water from here so the water must be building up.

Maikish: Therefore, there is no reason to believe that the water is downgradient. The other culvert is not working. I mean it is not working in the sense that it is not draining.

Conklin: All I remember is that there was a big culvert or a little culvert. I'd be curious to find out far it goes in.

Conklin: I wouldn't put it pass them to put more lengths in and bury it. That's to say it was there.

Maikish: It's definitely does not drain. We don't see any drainage and the water has to go somewhere.

Maikish: That means it has got to building up in the landfill.

Conklin: Those pictures were taken April/May when everything else was drying out. The normal streams were still flowing at that time.

Maikish: How deep was the original pond? What about the swampy area?

Conklin: Well, it was swampy where I was taking the pictures and then the pond was maybe only a foot deep or something like that. You could see the bottom. It was just a regular boggy, turtle bog. It's pretty much the first lift. There was a bank, that bank right there kinda came straight over the foot so standing here shouldn't be able to see the top of a, the antique place. It's this bank right here. All right, it's this ledge right in here where even a point up further the fill should just gradually come across so you'd only be touching the very top of the antique.

Creager: So they took out quite a bit of material in the truck turning area.

Conklin: They took out quite a bit of material right in here. The prints show a turning area that extended further.

Maikish: How much of the fill was over here. How deep is this?

Conklin: This was at 92 ft, so they ....

Conklin: So they took 10 ft - 20 ft. I really couldn't tell you because, again this was when, I wasn't here. The last time I saw the first lift was right in here and then the second lift was back in here, so I really couldn't tell you how it was progressing.

Maikish: How big was the pit......Let's say it was 15-20 ft deep. How wide was it, the blade of the bulldozer?

Conklin: Two blades of a bulldozer, 12 ft. 12 by maybe 20.

REFERENCE 8

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

TOWN OF
TUXEDO,
NEW YORK
ORANGE COUNTY

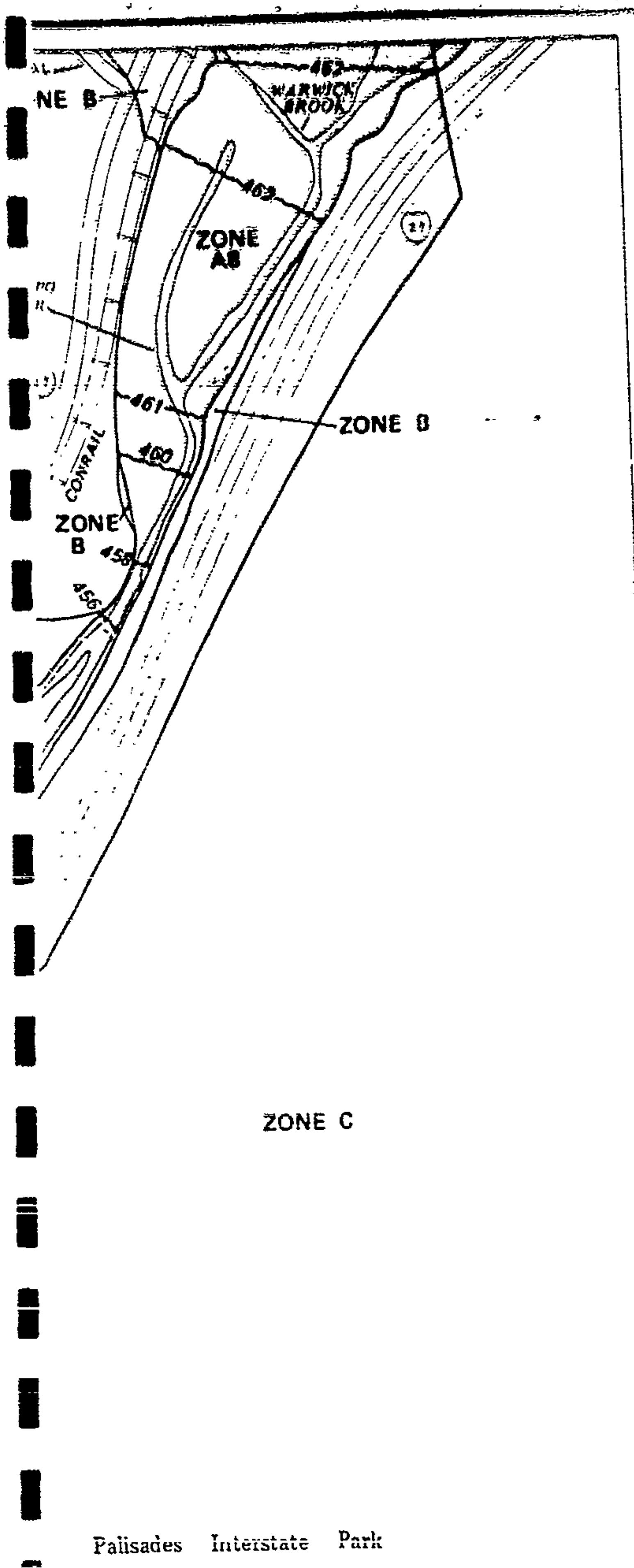
PANEL 8 OF 10
(SEE MAP INDEX FOR PANELS NOT PRINTED)

[illegible]
APR 1 [illegible]

COMMUNITY-PANEL NUMBER
360631 0008 B

EFFECTIVE DATE:
APRIL 15, 1982

Federal Emergency Management Agency



KEY TO MAP

500-Year Flood Boundary	ZONE B
100-Year Flood Boundary	
Zone Designations*	ZONE A1 / ZONE A8
100-Year Flood Boundary	ZONE B
500-Year Flood Boundary	
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7×
Zone D Boundary	
River Mile	•M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile, or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

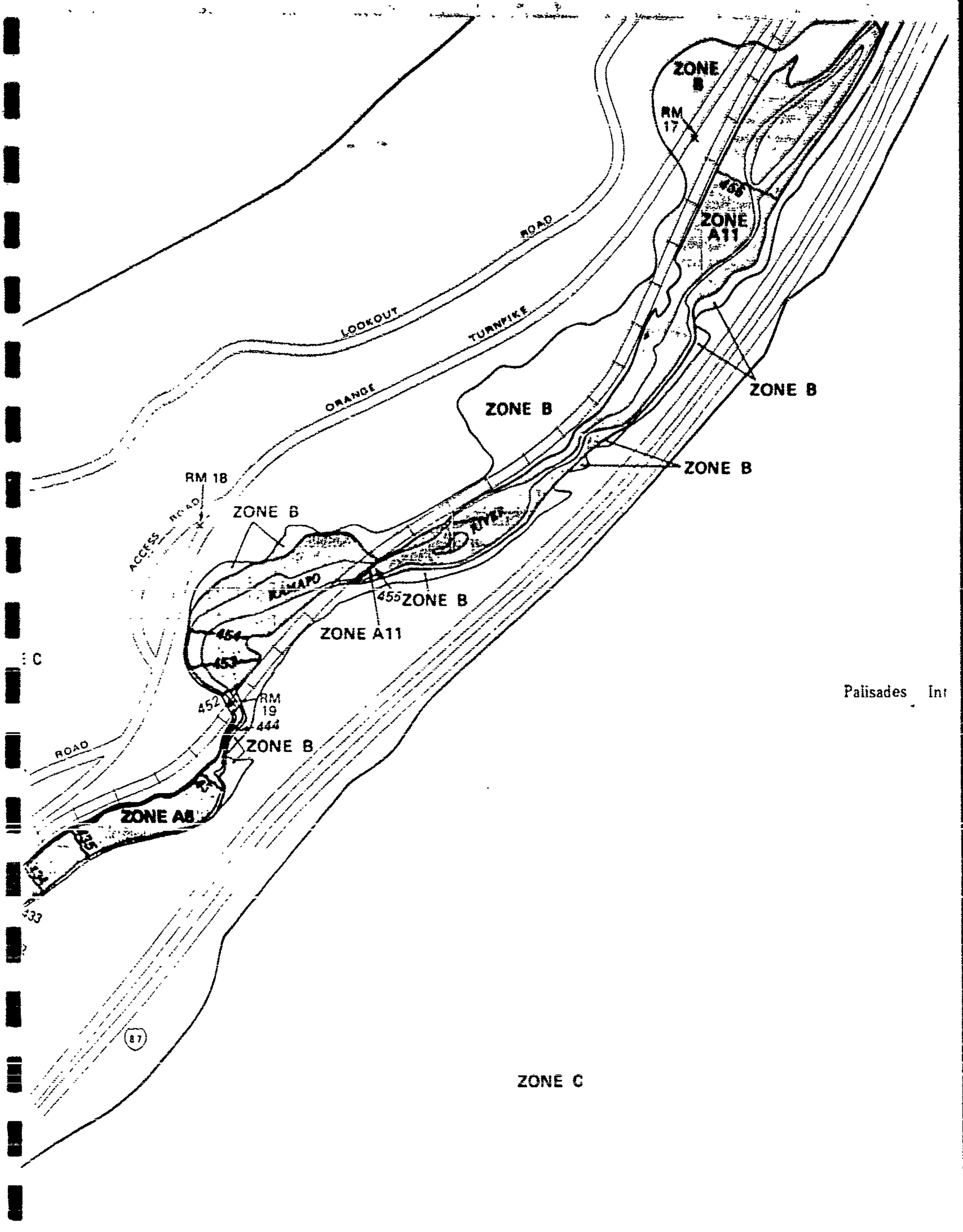
This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION:

APRIL 12, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS:


ZONE B
RM 17
455
ZONE A11
ROAD
LOOKOUT
TURNPIKE
ORANGE
ZONE B
ZONE B
ZONE B
RM 18
ROAD
ACCESS
ZONE B
RIVER
RAMAPO
455
ZONE B
ZONE A11
454
453
C
452
RM 19
444
ZONE B
ROAD
ZONE A8
435
434
433
87
ZONE C
Palisades Int

REFERENCE 9

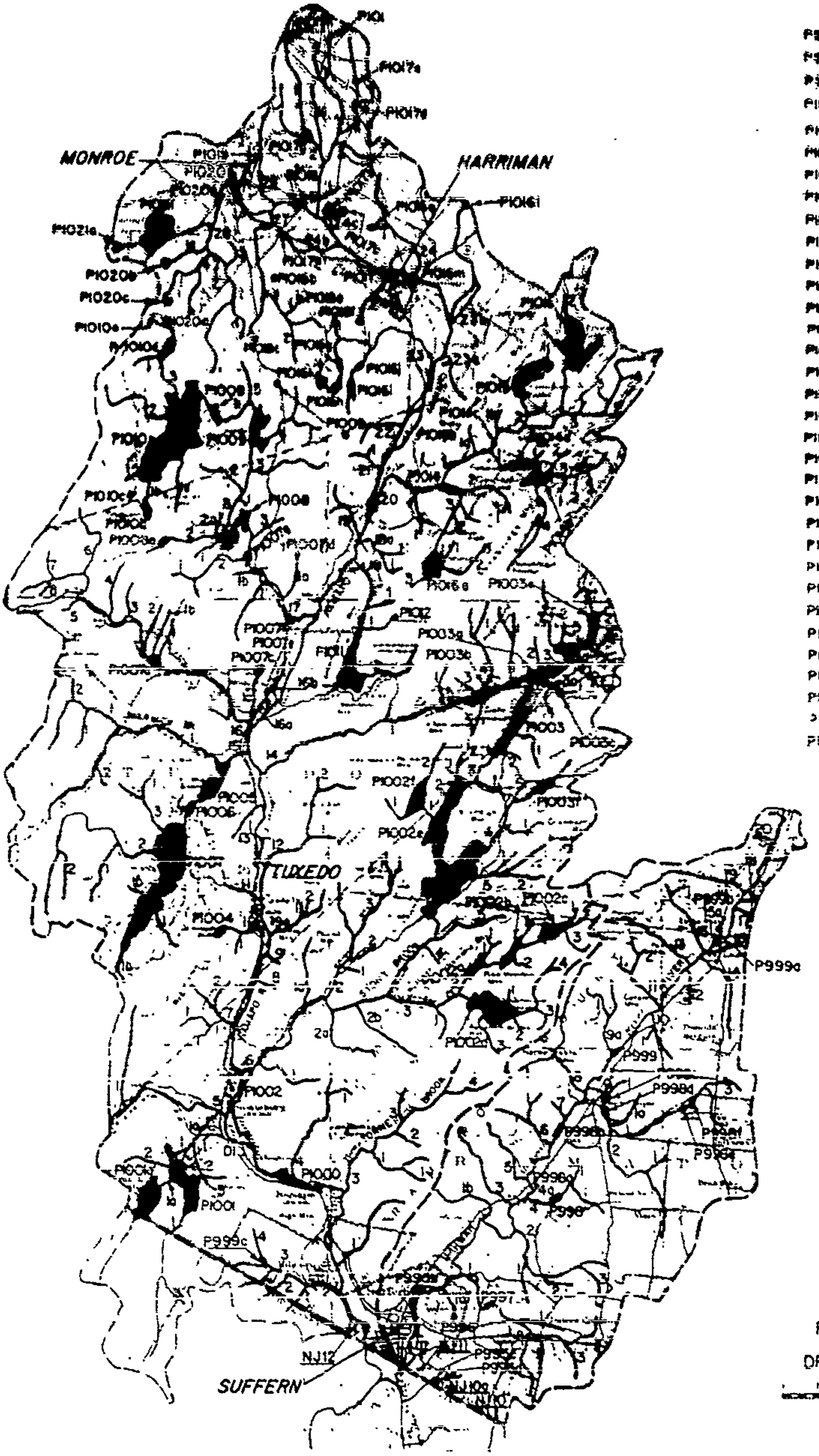
CN 11-15-66

Item No.	Waters Index Number	Name	Description	Map Ref. No.	Class	Standard
6	NJ 11-1b	Trib. of Mahwah River	Enters Mahwah River from northeast approximately 2 miles northeast of Suffern.	Q-23	B	B
7	NJ 11-2	Trib. of Mahwah River	Enters Mahwah River from southeast approximately 2.1 miles northeast of Suffern.	Q-23	C	C(T)
8	NJ 11-2-1,2,3	Tribs. of trib. of Mahwah River	Enter trib. 2 from south and southeast approximately 0.5, 1.0 and 1.5 miles above mouth.	Q-23	D	D
9	NJ 11-3	Trib. of Mahwah River	Enters Mahwah River from northwest approximately 2.2 miles northeast of Suffern.	Q-23	B	B
10	NJ 11-4 and trib. including P 998	Trib. of Mahwah River	Enters Mahwah River from east approximately 2.0 miles west of Viola.	Q-23	C	C(T)
11	NJ 11-4a including P 998a	Trib. of Mahwah River	Enters Mahwah River from northeast approximately 2.4 miles northeast of Suffern.	Q-23	D	D
12	NJ 11-5,6 and trib.,7,8 and trib.	Tribs. of Mahwah River	Enter Mahwah River from northwest approximately 1.5, 1.0, 0.7, miles southwest and 0.2 mile northwest respectively of Wesley Chapel.	Q-23	B	B

TABLE I (contd.)

Item No.	Waters Index Number	Name	Description	Map Ref. No.	Class	Standards
13	NJ 11-9 and tribs. excluding P 998c,P 998d, P 998e and P 998f	Sunny Brook	Enters Mahwah River from east 0.3 mile northwest of Wesley Chapel.	Q-23	C	C(T)
14	NJ 11-9-P 998c, P 998d,P 998e and P 998f	Ponds	Located on trib. 9 approximately 0.1 and 1.3 miles east of Wesley Chapel.	Q-23	B	B(T)
15	NJ 11-9a and trib.,10 and trib.,11 and tribs.,12,13, 14,15 and trib., 15a including P 999b,16,17, 18,20	Tribs. of Mahwah River	Tribs. entering Mahwah River above a point approximately 1.0 mile northeast of Wesley Chapel.	Q-23	B	B
16	NJ 11-19	Trib. of Mahwah River	Enters Mahwah River from northwest approximately 1.0 mile north of Lade.	Q-23	C	C(T)
17	NJ 12 portion as described including P 1000,P 1002	Ramapo River	Enters New Jersey from north just west of Suffern. State line to P 1000 which is approximately 1.5 miles southeast of Sloatsburg.	Q-23	A	A
18	NJ 12 portion as described	Ramapo River	From P 1000 to trib. 23 which is approximately 1.5 miles southeast of Harriman.	Q-23 P-23	A	A(T)

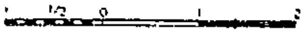
2283 CN 11-15-66


P1017a
P1017b
MONROE
HARRIMAN
P1019
P1020
P1016i
P1021a
P1020b
P1020c
P1010a
P1010
P1009
P1008
P1016a
P1003e
P1012
P1003a
P1003b
P1011
P1003
P1003c
P1002f
P1003f
P1005
P1006
P1002e
TUXEDO
P1002b
P1002c
P1004
P999a
P1002d
P999
P1002
P998d
P998b
P998f
P998e
P1000
P1001
P998c
P999c
P995b
P998
NJ12
SUFFERN
NJ10a
NJ10

P995b	LAKE ANTRIM
P998f	BOCKAR LAKE
P999c	HILLBURN RESERVOIR
P1001	CRANBERRY POND
P1001a	POTAKE POND
P1002d	PINE MEADOW LAKE
P1002e	SEBAGO LAKE
P1002f	LAKE SKENONTO
P1003	LOWER LAKE KANAWAUKI
P1003a	MIDDLE LAKE KANAWAUKI
P1003b	UPPER LAKE KANAWAUKI
P1003c	SPRING POND
P1003d	LAKE SKANNATATI
P1003e	LAKE ASKOTI
P1004	MOUNTAIN LAKE
P1005	WE-WAH LAKE
P1006	LITTLE WE-WAH LAKE
P1007	TUXEDO LAKE
P1007c	SPRUCE POND
P1008	LITTLE DAM LAKE
P1009b	LAKE WINAPE
P1010	MOMBASHA LAKE
P1011	LAKE STAHAHE
P1014	ECHO LAKE
P1014a	LOWER LAKE COHASSET
P1014b	UPPER LAKE COHASSE
P1015	CRANBERRY LAKE
P1016	FOREST LAKE
P1016a	ISLAND POND
P1016i	LAKE SAPPHIRE
P1019	MONROE POND
P1020c	SMITH'S POND
P1021	HOUND LAKE

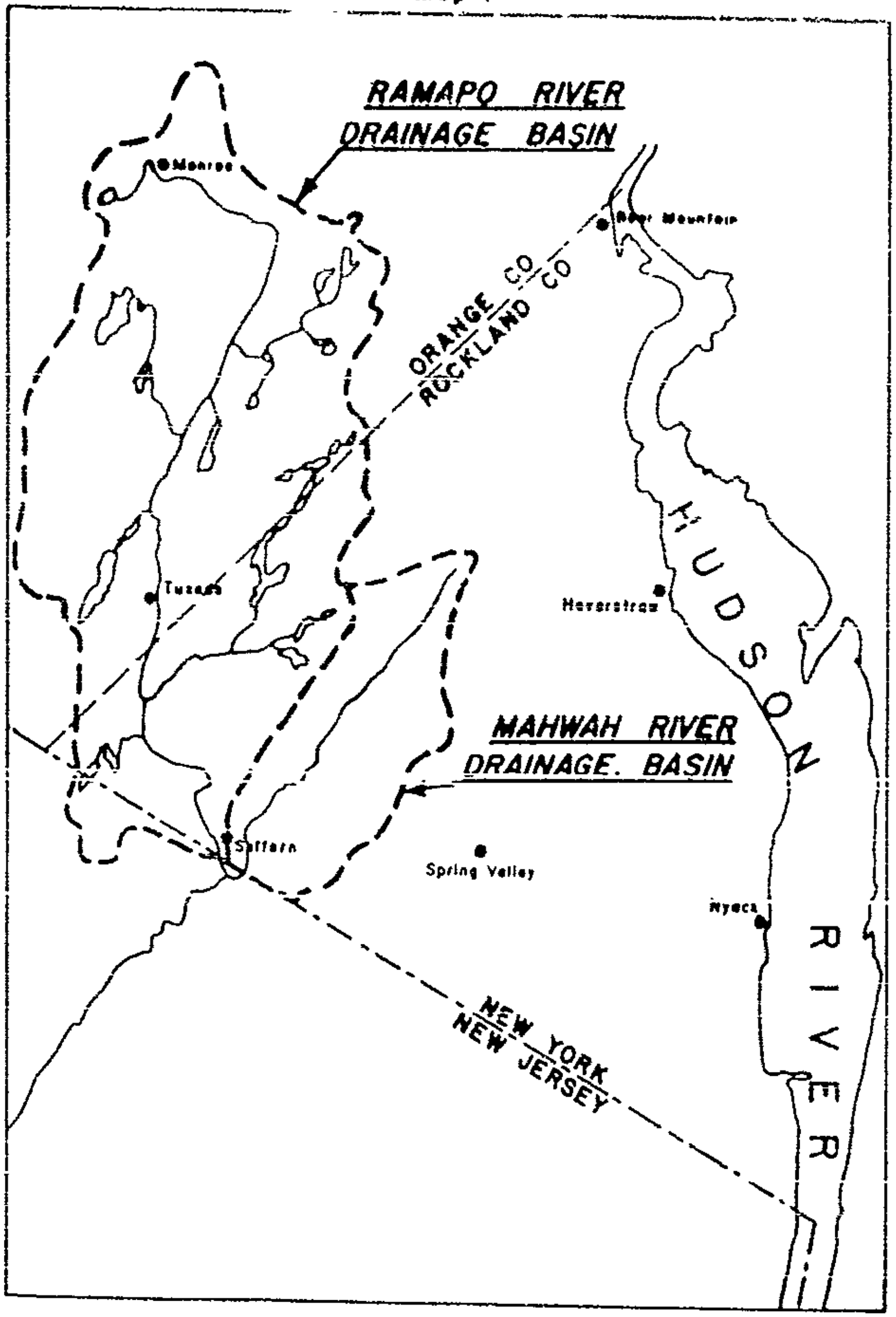
MAP 2

RAMAPO RIVER DRAINAGE BASIN


1/2
0
1
2
SCALE IN MILES

860.5 Map 1.

Map 1


RAMAPO RIVER
DRAINAGE BASIN
Monroe
Bear Mountain
ORANGE CO
ROCKLAND CO
Tuxedo
Haverstraw
HUDSON RIVER
MAHWAH RIVER
DRAINAGE BASIN
Suffern
Spring Valley
Nyack
NEW YORK
NEW JERSEY

3. Total dissolved solids.	Shall be kept as low as practicable to maintain the best usage of waters, but in no case shall it exceed 500 milligrams per liter.
4. Dissolved oxygen	For cold waters suitable for trout spawning, the DO concentration shall not be less than 7.0 mg/l from other than natural conditions. For trout waters, the minimum daily average shall not be less than 6.0 mg/l. At no time shall the DO concentration be less than 5.0 mg/l. For non-trout waters, the minimum daily average shall not be less than 5.0 mg/l. At no time shall the DO concentration be less than 4.0 mg/l

CLASS "A"

Best usage of waters. Source of water supply for drinking, culinary or food processing purposes and any other usages.

Conditions related to best usage of waters. The waters, if subjected to approved treatment equal to coagulation, sedimentation, filtration and disinfection, with additional treatment if necessary to reduce naturally present impurities, will meet New York State Department of Health drinking water standards and will be considered safe and satisfactory for drinking water purposes.

Quality Standards for Class "A" Waters

Items	*Specifications*
1. Coliform	The monthly median coliform value for 100 ml of sample shall not exceed 5,000 from a minimum of five examinations, and provided that not more than 20 percent of the samples shall exceed a coliform value of 20,000 for 100 ml of sample and the monthly geometric mean fecal coliform value for 100 ml of sample shall not exceed 200 from a minimum of five examinations.
2. pH	Shall be between 6.5 and 8.5.
3. Total dissolved solids.	Shall be kept as low as practicable to maintain the best usage of waters, but in no case shall it exceed 500 milligrams per liter.
4. Dissolved oxygen.	For cold waters suitable for trout spawning, the DO concentration shall not be less than 7.0 mg/l from other than natural conditions. For trout waters, the minimum daily average shall not be less than 6.0 mg/l. At no time shall the DO concentration be less than 5.0 mg/l. For non-trout waters, the minimum daily average shall not be less than 5.0 mg/l. At no time shall the DO concentration be less than 4.0 mg/l.

items among the following which the commissioner determines to be necessary:

a. The description of the sites included in the latest report by the department to the governor and legislature;

b. Address and site boundaries;

c. Time period of use for disposal of hazardous waste;

d. Name of the current owner and operator and names of any past and reported owners and operators during the time period of use for disposal of hazardous waste;

e. Names of persons responsible for the generation and transportation of hazardous waste disposed of;

f. Type and quantity of hazardous waste disposed of;

g. Manner of disposal of hazardous waste;

h. Nature of soils at the site;

i. Depth of water table at the site;

j. Location, nature and size of aquifers at the site;

k. Direction of present and historic groundwater flows at the site;

l. Location, nature and size of all surface waters at and near the site;

m. Levels of contaminants, if any, in groundwater, surface water, air and soils at and near the site resulting from hazardous wastes disposed of at the site or from any other cause and areas known to be directly affected or contaminated by wastes from the site;

n. As determined by the department of health, current quality of all drinking water drawn from or distributed through the area in which the site is located when the department of health determines that water quality may have been affected by the site in question and any known change in the quality of such drinking water over time; and

o. Proximity of the site to private residences, public buildings or property, school facilities, places of work or other areas where individuals may be present.

4. a. The department shall conduct investigations of the sites listed in the registry and shall investigate areas or sites which it has reason to believe should be included in the registry. The purpose of these investigations shall be to develop the information required by subdivisions two and three of this section to be included in the annual report by the department.

b. The department shall, as part of the registry, assess by January first, nineteen hundred eighty-four and each year thereafter, and based upon new information received, reassess, in cooperation with the department of health, the relative priority of the need for action at each site to remedy environmental and health problems resulting from the presence of hazardous wastes at such sites. In making its assessments of relative priority, the department shall place every site in one of the following classifications:

(1) Causing or presenting an imminent danger of causing irreversible or irreparable damage to the public health or environment—immediate action required;

(2) Significant threat to the public health or environment—action required;

(3) Does not present a significant threat to the public health or environment—action may be deferred;

(4) Site properly closed—requires continued management;

(5) Site properly closed, no evidence of present or potential adverse impact—no further action required.

c. (1) Any owner or operator of a site listed pursuant to this section may petition the commissioner for deletion of such site, modification of the site classification, or modification of any information re-

garding such site by sub
commissioner may requir
(2) Within ninety da
missioner may convene
particular site should b
site classification or wh
be modified. In any e
petitioner. No less th
sioner shall cause a not
ble environmental notic
tion in the county in w
also notify in writing
thirty days prior to th
ing the cost of any pu
pense.
(3) No later than t
ord as that term is d
or following the decis
provide the owner or
nied by reason therefo
of the site classificati
such site. Any decisi
able under article seve
(4) The department
able resources all pu
tions or deletions to s
such deletions or mod
tion of the registry.
(5) The departmen
fy the local governme
the registry pursuant
d. (1) Within sev
sion the department
any part of each site
of the site or area b
known address. The
ed to the registry, t
mail the owner of al
of such site or area b
last known address.
(2) Notice pursua
but not be limited t
posed by section 27-
hundred eighty-nine-
(3) Non-receipt o
subdivision shall in
ties imposed on any
health law.
5. The departme
than January first,
writing a "state ina
ferred to as "the pl
board shall then ap
empowered to do p
mit the approved pl
ture on or before M
ing, preparing and c
a. Conduct or ca
ority sites listed in
for the purpose of
maximum extent p

REFERENCE 10

GROUND-WATER RESOURCE EVALUATION

PROPOSED SAND AND GRAVEL EXCAVATION

TUXEDO PARK ASSOCIATES

TUXEDO , NEW YORK

mr. Cheney

NOVEMBER 1981

WEHRAN ENGINEERING
Consulting Engineers

WE WEHRAN
ENGINEERING
Consulting Engineers

October 26, 1981

Mr. George Boynton
Tuxedo Park Associates
P.O. Box 727
Tuxedo Park, New York 10987

RE: Ground-Water Resource Evaluation
Proposed Sand and Gravel Mining
Tuxedo Park, New York
(WE Project No. 01231105)

Dear Mr. Boynton:

Wehran Engineering is pleased to submit this report in accordance with our agreement of September 22, 1981. As is indicated in the report, we feel the proposed excavation and impoundment, if properly designed and constructed, would have little detrimental impact upon existing or potential use of the ground-water resource.

Should you have any questions concerning our evaluation, please do not hesitate to contact us. As always, it is a pleasure to be of service.

Very truly yours,

WEHRAN ENGINEERING, P. C.

Michael R. Brother

Michael R. Brother
Senior Geologist

MRB/vld
Enclosure

200 Route 17 South
Mahwah, NJ 07430
(201) 529-5400

Crystal Run Rd Middletown [illegible] 342-~~[illegible]~~ 4573
666 E. Main St " 343-0660 —
[illegible] #

INTRODUCTION

This report presents the results of our ground-water resource evaluation performed for the Tuxedo Park Associates for their proposed sand and gravel excavation at Tuxedo Park, New York. Our evaluation consisted of examining the available regional and site-specific data concerning the geology and hydrogeology of the site and surrounding area. The data examined included a number of soils and geologic maps, aerial photographs, and logs of borings and test pits previously performed on-site. In addition, an experienced geologist from Wehran Engineering conducted a walk-over survey of the site to determine the occurrence of bedrock outcrops in the area and to derive an understanding of the interrelationships between the bedrock and surficial geology and the occurrence of ground and surface waters.

The limited nature of the site-specific hydrogeologic data became apparent during our evaluation. However, a general understanding of ground-water occurrence is sufficient at this time to evaluate the potential impact of the project on the ground-water regime. As the project proceeds, further work in this area would be necessary. We have briefly considered this possibility in the recommendations at the end of this report.

SITE LOCATION

The proposed site for sand and gravel excavation is located within the Town of Tuxedo, Orange County, New York (Figure 1) and appears on the Sloatsburg, New York-New Jersey USGS 7.5' quadrangle. The area of concern is located at approximately 41° 13' north, 74° 11' west and is bounded on the north by the confluence of Warwick Creek and the Ramapo River, on the east by the New York State Thruway right-of-way, on the south by Augusta Falls on the Ramapo, and on the west by the Erie-Lackawana and Orange and Rockland rights-of-way (Figure 2).

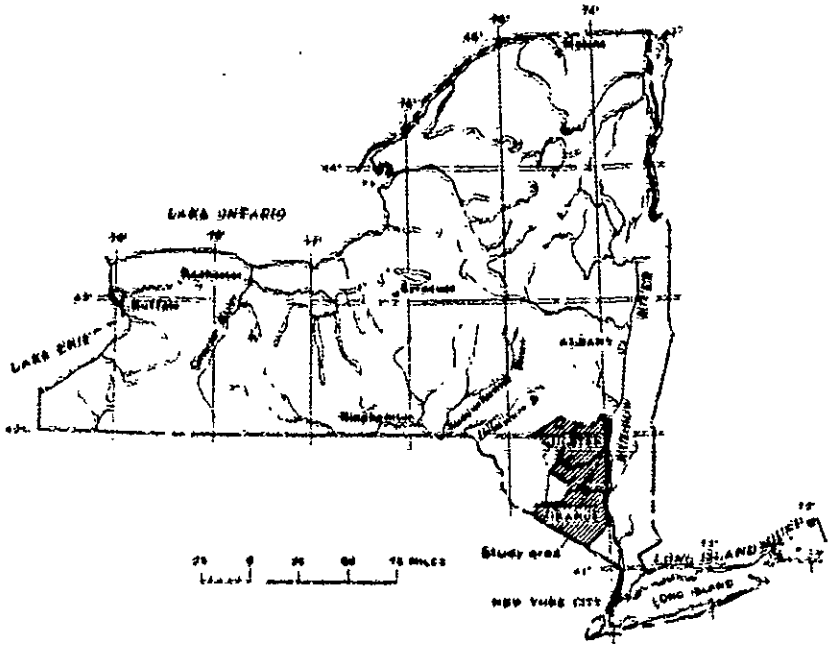

LAKE ONTARIO
LAKE ERIE
Buffalo
ALBANY
Study area
NEW YORK CITY
LONG ISLAND
25 0 25 50 75 MILES

FIGURE 1

LOCATION OF THE STUDY AREA

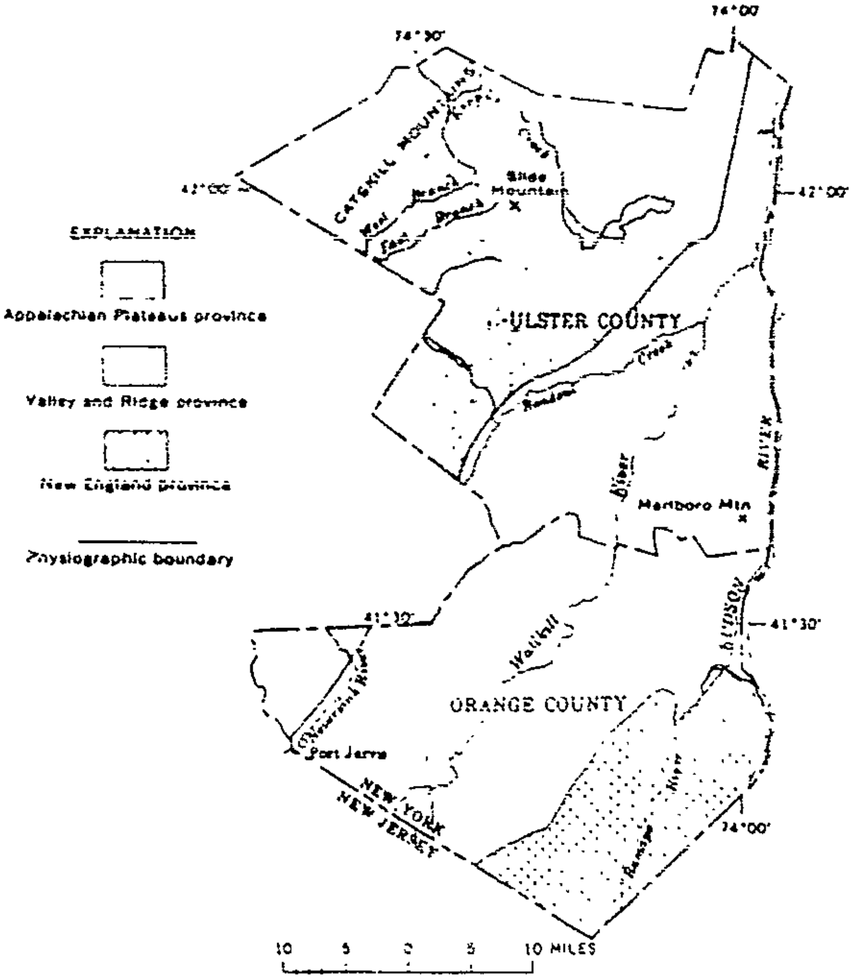
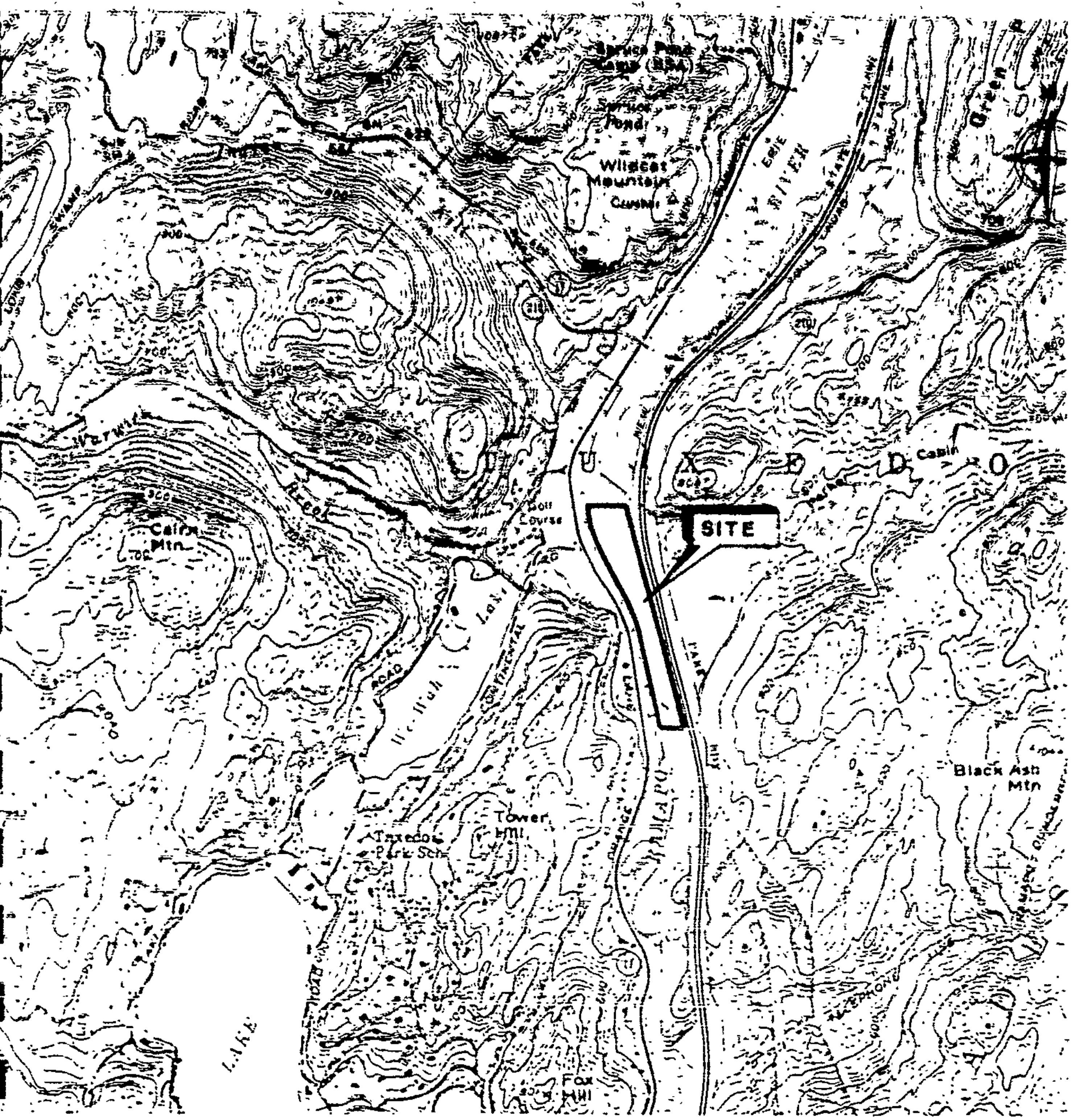

74°30'
74°00'
42°00'
41°30'
CATSKILL MOUNTAINS
Slide Mountain
West Branch
East Branch
ULSTER COUNTY
Rondout Creek
RIVER
HUDSON
Marlboro Mtn
Wallkill
ORANGE COUNTY
Port Jervis
NEW YORK
NEW JERSEY
Ramapo River
EXPLANATION
Appalachian Plateaus province
Valley and Ridge province
New England province
Physiographic boundary
10 5 0 5 10 MILES

FIGURE 3

PHYSIOGRAPHIC PROVINCES

AFTER FRIMPTER (


SITE
Spruce Pond
Wildcat Mountain
Cairn Mtn
Golf Course
Black Ash Mtn
Tower Hill
Tuxedo Park Sch
Fox Hill
TUXEDO
RIVER
LAKE
Cabin

NOTE TOPOGRAPHY TAKEN FROM SLOATS. N.Y. (1969) U.S.G.S. QUADRANGLE

FIGURE 2

LOCATION MAP

PROPOSED SAND AND GRAVEL EXCAVATION

TUXEDO PARK ASSOCIATES

TUXEDO, NEW YORK

SCALE: 1" = 2000' CONTOUR INTERVAL = 20'

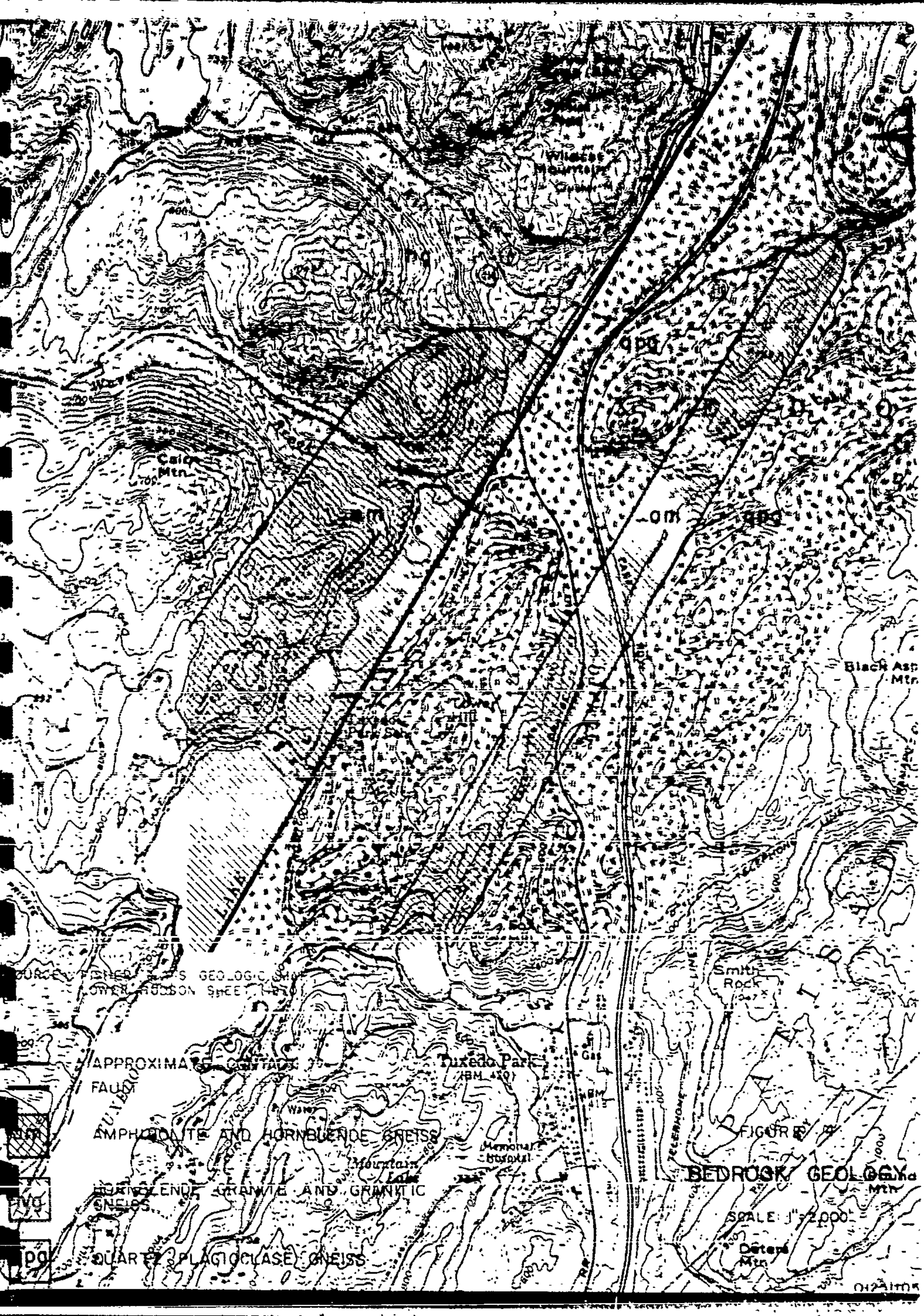
GEOLOGY

The site is situated within the Hudson Highlands extension of the New England Upland Physiographic Province (Figure 3) in the valley of the Ramapo River. Crystalline bedrock of Pre-Cambrian age rises steeply from beneath the valley floor to form the walls of the valley. Within the area of concern bedrock is comprised of a complex sequence of faulted metamorphic rock, consisting primarily of amphibolite and quartz-plagioclase gneiss (Figure 4). In the area of the proposed excavation bedrock occurs at depths in excess of 40 feet below the existing ground surface. In the vicinity of Augusta Falls, however, the bedrock outcrops within the center of the valley to form the ledge over which the falls occur. Analysis of soils and topographic maps and aerial photos, and a brief walk-over survey, suggest that this bedrock obstruction is continuous across the valley floor; as such, it appears to act as an effective boundary separating the overlying unconsolidated deposits upstream from similar sediments found downstream.

The unconsolidated deposits consist of a thick sequence of stratified sand and gravel overlain by a relatively thin topsoil horizon. In lowlying areas along the banks of the Ramapo River, the upper several feet of soil would likely consist of silt deposited during periodic river flooding. The approximate limits of the unconsolidated materials, based on USDA Soil Conservation Service mapping and aerial photographic interpretation, are depicted on Figure 5.

The logs of borings and test pits previously performed on site indicate that the sequence of sandy materials exists to depths on the order of 40 feet in the central portion of the site. These deposits would be expected to thin rapidly away from the longitudinal axis of the valley. These relationships are depicted schematically on Figure 6. The sands were presumably deposited as glacial outwash during the retreat of the ice margin during the Late Pleistocene.

With the exception of the floodplain silts described above, the site soils have been rated "good" with respect to their potential for development as a sand and gravel resource by the Soil Conservation Service (1972).


Whitney Mountain
Cald Mtn
qpg
om
qpg
Black Ash Mtn
Tower Hill
Tuxedo Park
Smith Rock
Tuxedo Park
BM 420
Memorial Hospital
Mountain Lake
Deters Mtn
APPROXIMATE CONTACT
FAULT
am AMPHIBOLITE AND HORNBLENDE GNEISS
hg HORNBLENDE GRANITE AND GRANITIC GNEISS
qpg QUARTZ PLAGIOCLASE GNEISS

SOURCE: FISHER ET AL'S GEOLOGIC MAP, LOWER HUDSON SHEET, 1970

FIGURE 8

BEDROCK GEOLOGY

SCALE: 1"=2,000'

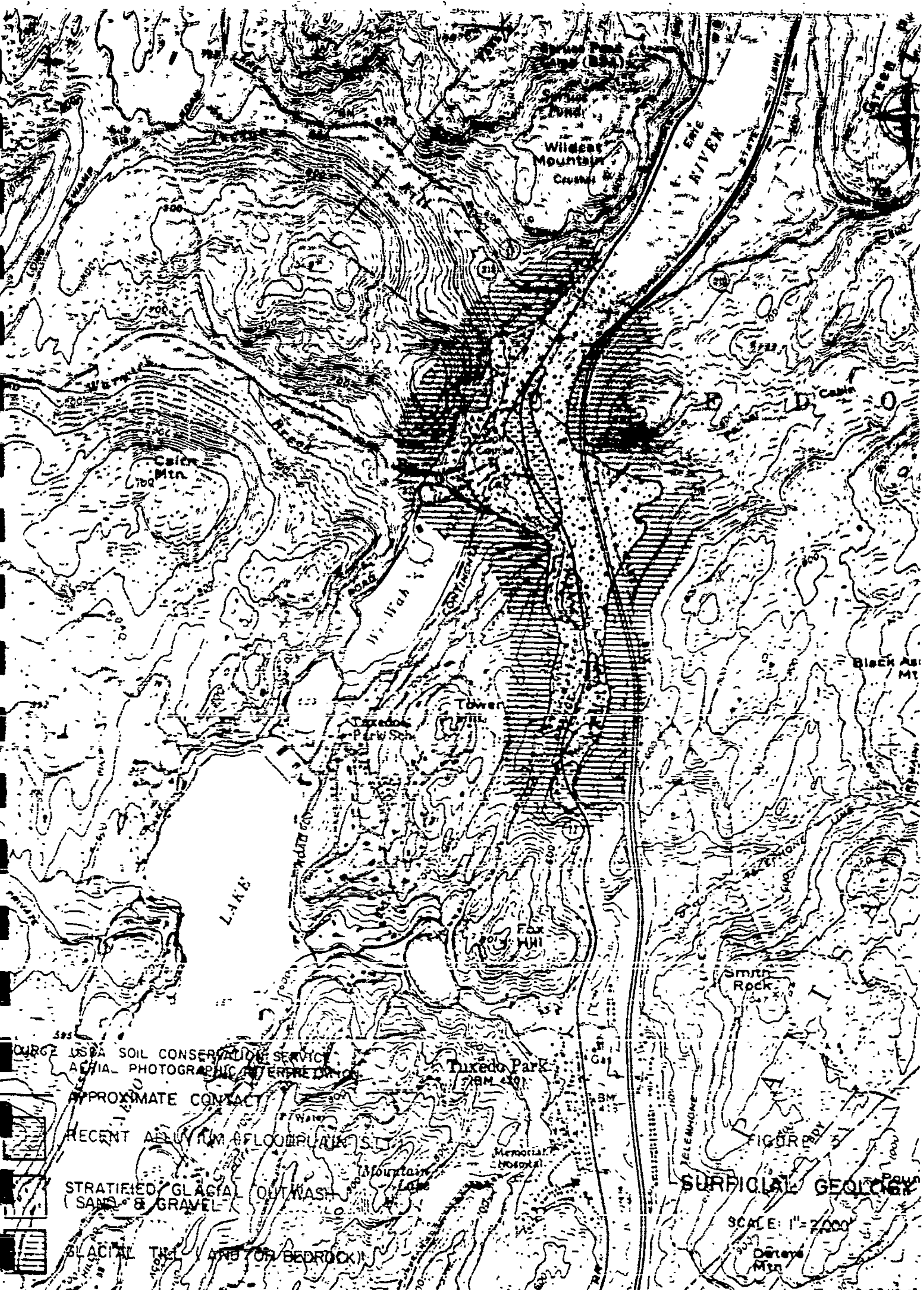

Spruce Pond
Wildcat Mountain
RIVER
Erie
Green
Warwick
Brook
Cairn Mtn.
Tower
Tuxedo Park Sch
LAKE
Fox Hill
Smith Rock
Black Ash Mt
Tuxedo Park
Mountain Lake
Memorial Hospital
Dater Mtn
SOURCE USDA SOIL CONSERVATION SERVICE
AERIAL PHOTOGRAPHIC INTERPRETATION
APPROXIMATE CONTACT
RECENT ALLUVIUM (FLOODPLAIN SILT)
STRATIFIED GLACIAL OUTWASH
(SAND & GRAVEL)
GLACIAL TILL (AND/OR BEDROCK)

FIGURE 5

SURFICIAL GEOLOGY

SCALE: 1"=2000'

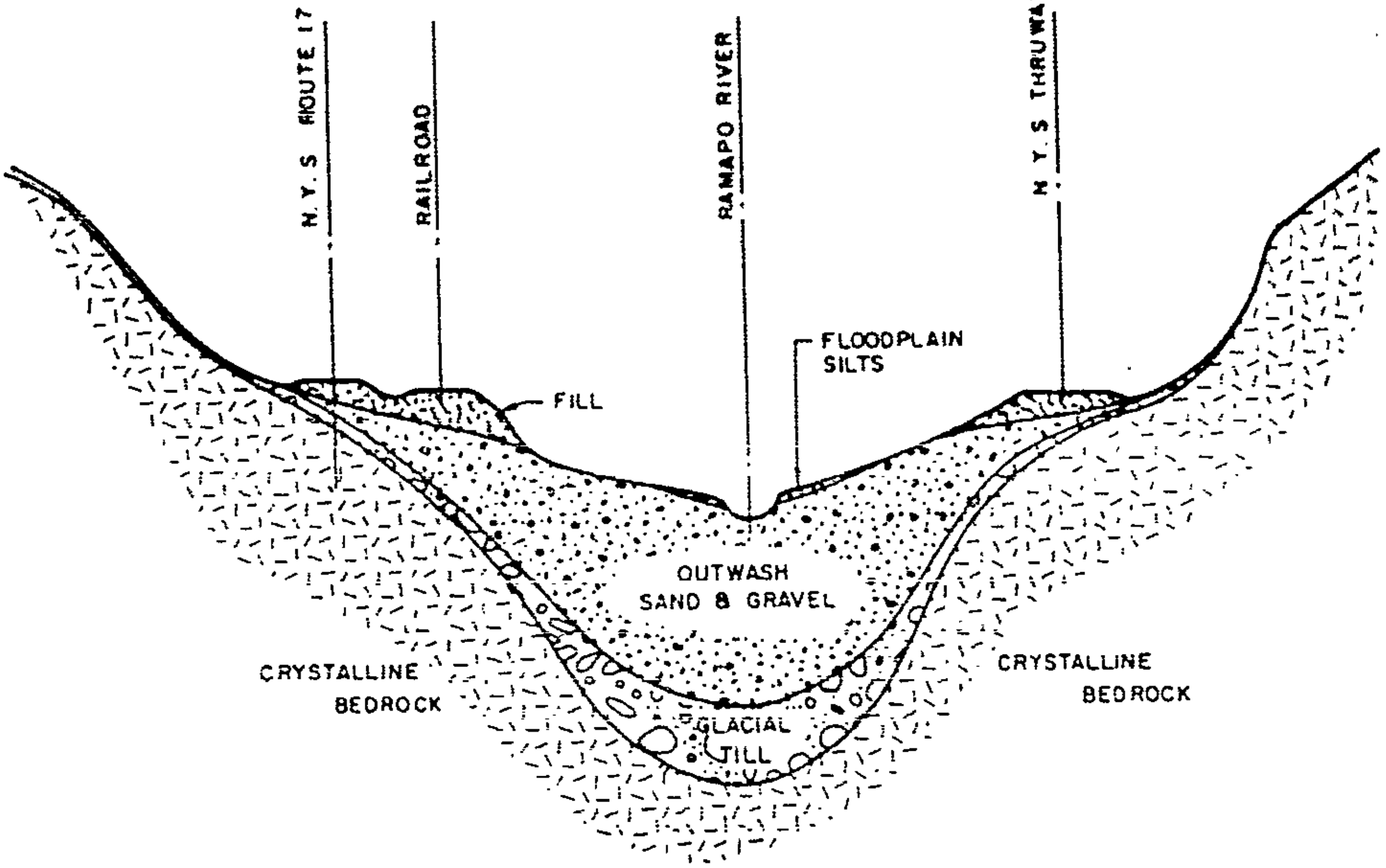

N. Y. S ROUTE 17
RAILROAD
RAMAPO RIVER
N. Y. S THRUWAY
FLOODPLAIN SILTS
FILL
OUTWASH SAND & GRAVEL
CRYSTALLINE BEDROCK
CRYSTALLINE BEDROCK
GLACIAL TILL

FIGURE 6

SCHEMATIC TRANSVERSE CROSS-SECTION

GROUND-WATER OCCURRENCE

Ground water has been observed to occur under unconfined water table conditions at depths ranging from 4 to 10 feet beneath the site. The water table configuration would likely be a subdued replica of the ground surface; ground-water discharge occurs directly to the Ramapo River. The aquifer appears to be isolated from similar downstream aquifers by the bedrock obstruction at Augusta Falls on the Ramapo. This obstruction effectively limits the impact of the proposed excavation to the upstream unconfined aquifer. Therefore, similar aquifers located downstream from Augusta Falls would not be adversely affected by the proposed project. The approximate spatial distribution of the unconfined aquifer is depicted on Figure 7.

EXISTING GROUND-WATER USE

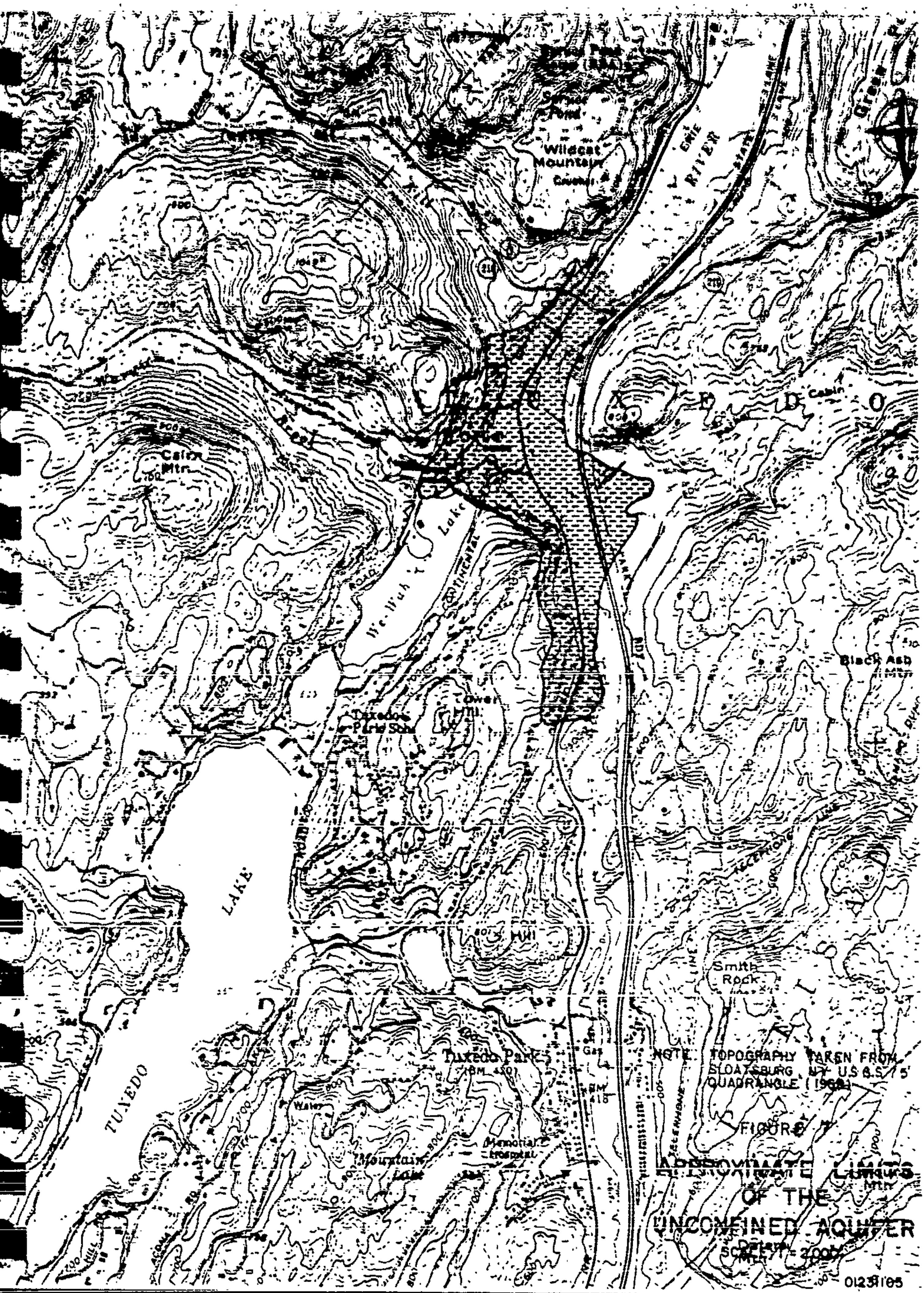
The area surrounding the site is served by a public water supply system, and to our knowledge there are no active users of ground water in the immediate vicinity of the site. Therefore, the potential impact of excavation on existing ground-water use is negligible.

POTENTIAL GROUND-WATER USE

The area proposed for sand and gravel excavation exhibits several characteristics favorable to development as a ground-water resource. These characteristics would include:

1. saturated sand and gravel of relatively high permeability and significant thickness, and
2. proximity to the Ramapo River as a source of induced recharge to the ground-water under pumping conditions.

However, the shallow depth to the water table and the close proximity to roadways and the railroad suggest a potential for existing or future degradation of water quality. Similarly, induced recharge from surface water sources is generally of lesser quality than true ground-water. These water-quality considerations could impose limitations on the potential development of the aquifer as a water source.


Wildcat Mountain
Spruce Pond
Cabin Mtn
Erie
River
Wee Wah Lake
Tuxedo Park Schl
Tower Hill
Black Ash Mtn
Hill
Smith Rock
Tuxedo Lake
Tuxedo Park
BM 430
Memorial Hospital
Mountain Lake
T U X E D O
Tuxedo

NOTE: TOPOGRAPHY TAKEN FROM SLOATSBURG, NY U.S.G.S. 7.5' QUADRANGLE (1968)

FIGURE 7

APPROXIMATE LIMITS OF THE UNCONFINED AQUIFER

SCALE 1" = 2000'

Potential Effects of the Proposed Project

The potential effects of the proposed excavation on the ground-water system can only be generally described with the existing data base. For example, detailed knowledge of ground-water elevations, methods of excavation, and final impoundment design would be required to quantify the anticipated effects. However, we believe that with proper engineering design the excavation could be performed with only minor impact upon the ground-water resource, both in terms of ground-water quantity, and quality.

The anticipated impact would consist of two opposing conditions which could occur simultaneously along different portions of the impoundment. First, if the water level within the impoundment remains at or below the present river level, the ground-water table would decrease in elevation as discharge to the excavation increases. On the other hand, if water levels within the impoundment are allowed to rise above the existing ground-water elevations, backflow from the river into the aquifer would occur until equilibrium conditions were again established. This process would result in elevated ground-water levels in the immediate vicinity of the site. From the standpoint of potential adverse impact, altered ground-water levels could conceivably have detrimental effects on slope stability in the adjacent affected area. However, proper engineering design would, we feel, enable the proposed project to proceed without significant detrimental impact upon the ground-water regime, or upon the stability of adjacent slopes. Such design measures would include maintenance of an adequate buffer zone between the excavation and the adjacent highway and railroad embankments, excavation and maintenance of proper slopes, control of the rate at which dewatering occurs, and immediate stabilization of all slopes upon completion of the excavation.

The final impoundment design would provide increased flood storage capacity for the Ramapo River. During periods of increased river flow, water elevations within the impoundment would rise, thus inducing a potential for recharge from the river to the aquifer. This recharge would largely be in the form of bank storage, with water being gradually returned to the river as high water levels recede. This process effectively enhances the flood control benefits of the proposed project. The primary benefit of short-term impoundment and adjacent bank storage would be to reduce peak flood flows downsteam; an additional advantage, however, would be the increased potential for recharge of downstream aquifers as the stored waters are gradually released to the Ramapo.

CONCLUSIONS

1. In general, the geologic materials in the area of concern consist of a glacial outwash sequence of stratified sand and gravel, underlain by glacial till, and bedrock of Pre-Cambrian age. The outwash attains a maximum thickness on the order of 40 feet, but would be expected to thin rapidly away from the valley axis.

2. Ground water occurs under unconfined water table conditions at shallow depths beneath the site. The unconfined aquifer is of rather limited areal extent and is separated from similar downstream aquifers by the bedrock obstruction at Augusta Falls on the Ramapo River.

3. To our knowledge there are no active users of the ground-water resource in the immediate vicinity of the site at this time. Thus, the potential impact of the proposed excavation on existing aquifer use is negligible.

4. The area of investigation exhibits several favorable characteristics with regard to potential development of the site as a ground-water source. These characteristics include: 1) the existence of sand and gravel of relatively high permeability and significant thickness, and 2) the proximity of the site to the Ramapo River as a potential source of induced recharge. However, water quality considerations could impose limitations on the development of the aquifer as a water source.

5. The potential impact of the proposed excavation on the ground-water system is dependent upon the eventual design of the excavation and impoundment, and on the manner in which the excavation is performed. However, two opposing conditions could occur: a) if impounded water levels remain at or below the existing level of the river, lowered water table elevations would occur; and/or, b) if impounded water levels are above the existing river level, the adjacent water table would rise. Altered water levels are potentially of concern, due to potential

detrimental effects on slope stability. Detailed analysis of existing and anticipated conditions would be necessary to quantify the potential impact. However, proper engineering design and supervision would serve to mitigate the effects.

The proposed project would, upon completion, serve to reduce downstream peak flood flows through the mechanism of impoundment and bank storage. An additional benefit would be the potential for increased recharge of downstream aquifers as stored flood waters are gradually returned to the Ramapo River.

RECOMMENDATIONS

Should the decision be made to proceed with this project, further field work would be necessary. To specifically address the concern of potential impact on ground water would require the installation of a number of small diameter piezometers. These piezometers would enable determination of the elevation of the ground-water surface and ground-water flow directions. In addition, the piezometers could be utilized as in situ permeameters to determine the permeability of the saturated materials. This information would, in turn, enable calculation of anticipated flow volumes under existing conditions, during excavation, and upon completion of the project. Should you desire, Wehran Engineering would be pleased to prepare a proposal for your review detailing a scope of services, and attendant costs, for the above concerns.

BIBLIOGRAPHY

Fisher, et al, 1970. *Geologic Map of New York - Lower Hudson Street.* University of the State of New York, the State Education Department.

Frimpter, M. H., 1970. *Ground-Water Basic Data Orange and Ulster Counties, New York.* State of New York, Conservation Department, Water Resources Commission, Bulletin 65, 93 pp.

________________, 1972. *Ground-Water Resources of Orange and Ulster Counties, New York.* U. S. Geologic Survey Water-Supply Paper 1985, 80 pp.

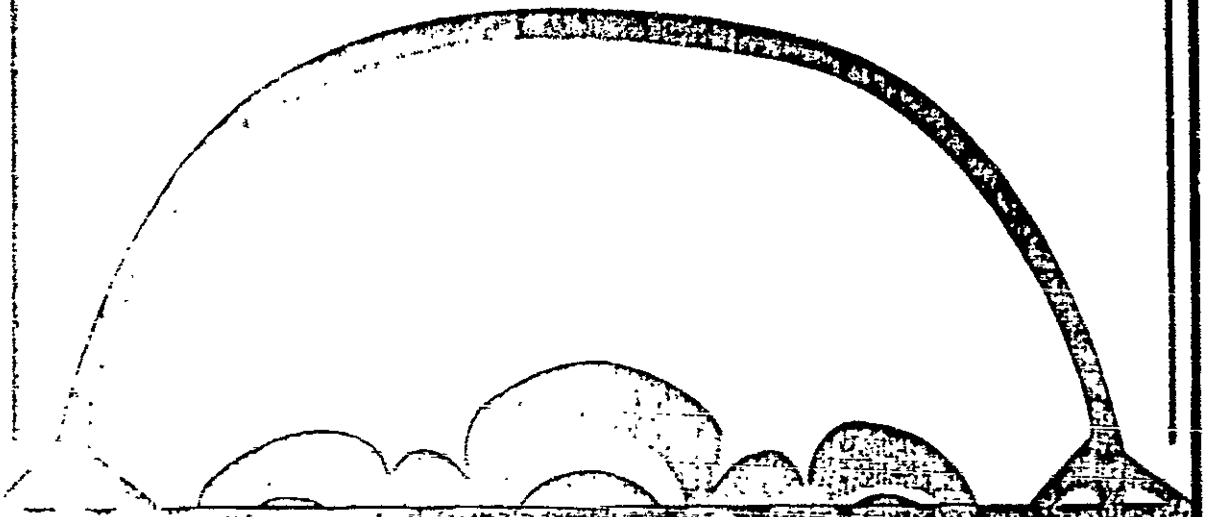
Raimondi Associates, P. E., 1976. *Ramapo River Drainage Study, Orange County, New York.* Prepared for the Orange County Department of Public Works, 97 pp.

Saquinsin, J. H. S., et al, 1981. *The Northeast Regional Environmental Impact Study: Description of the Existing Northeast Regional Geohydrology.* Prepared for the U. S. Department of Energy, 79 pp.

U. S. Army Corps of Engineers, 1972. *Passaic River Basin, New Jersey and New York. Survey Report for Water Resources, Volume II, Appendix C - Geological and Soils Investigations*, p. C-1 to C-21.

REFERENCE 11

GROUNDWATER



R. Allan Freeze / John A. Cherry

If a temperature gradient can cause fluid flow as well as heat flow in a porous medium, it should come as no surprise to find that a hydraulic gradient can cause heat flow as well as fluid flow. This mutual interdependency is a reflection of the well-known thermodynamic concept of *coupled flow*. If we set $dh/dl = i_1$ and $dT/dl = i_2$, we can write a pair of equations patterned after Eq. (2.22):

$$v_1 = -L_{11}i_1 - L_{12}i_2 \tag{2.23}$$

$$v_2 = -L_{21}i_1 - L_{22}i_2 \tag{2.24}$$

where v_1 is the specific discharge of *fluid* through the medium and v_2 is the specific discharge of *heat* through the medium. The L's are known as *phenomenological coefficients*. If $L_{12} = 0$ in Eq. (2.23), we are left with Darcy's law of groundwater flow and L_{11} is the hydraulic conductivity. If $L_{21} = 0$ in Eq. (2.24), we are left with Fourier's law of heat flow and L_{22} is the thermal conductivity.

It is possible to write a complete set of coupled equations. The set of equations would have the form of Eq. (2.23) but would involve all the gradients of Eq. (2.21) and perhaps others. The development of the theory of coupled flows in porous media was pioneered by Taylor and Cary (1964). Olsen (1969) has carried out significant experimental research. Bear (1972) provides a more detailed development of the concepts than can be attempted here. The thermodynamic description of the physics of porous media flow is conceptually powerful, but in practice there are very few data on the nature of the off-diagonal coefficients in the matrix of phenomenological coefficients L_{ij}. In this text we will assume that groundwater flow is fully described by Darcy's law [Eq. (2.3)]; that the hydraulic head [Eq. (2.18)], with its elevation and pressure components, is a suitable representation of the total head, and that the hydraulic conductivity is the only important phenomenological coefficient in Eq. (2.21).

2.3 Hydraulic Conductivity and Permeability

As Hubbert (1956) has pointed out, the constant of proportionality in Darcy's law, which has been christened the hydraulic conductivity, is a function not only of the porous medium but also of the fluid. Consider once again the experimental apparatus of Figure 2.1. If Δh and Δl are held constant for two runs using the same sand, but water is the fluid in the first run and molasses in the second, it would come as no surprise to find the specific discharge v much lower in the second run than in the first. In light of such an observation, it would be instructive to search for a parameter that can describe the conductive properties of a porous medium independently from the fluid flowing through it.

To this end experiments have been carried out with ideal porous media consisting of uniform glass beads of diameter d. When various fluids of density ρ and dynamic viscosity μ are run through the apparatus under a constant hydraulic gradient dh/dl, the following proportionality relationships are observed:

$$v \propto d^2$$

$$v \propto \rho g$$

$$v \propto \frac{1}{\mu}$$

Together with Darcy's original observation that $v \propto -dh/dl$, these three relationships lead to a new version of Darcy's law:

$$v = -\frac{Cd^2\rho g}{\mu}\frac{dh}{dl} \tag{2.25}$$

The parameter C is yet another constant of proportionality. For real soils it must include the influence of other media properties that affect flow, apart from the mean grain diameter: for example, the distribution of grain sizes, the sphericity and roundness of the grains, and the nature of their packing.

Comparison of Eq. (2.25) with the original Darcy equation [Eq. (2.3)] shows that

$$K = \frac{Cd^2\rho g}{\mu} \tag{2.26}$$

In this equation, ρ and μ are functions of the fluid alone and Cd^2 is a function of the medium alone. If we define

$$k = Cd^2 \tag{2.27}$$

then

$$K = \frac{k\rho g}{\mu} \tag{2.28}$$

The parameter k is known as the *specific* or *intrinsic permeability*. If K is always called hydraulic conductivity, it is safe to drop the adjectives and refer to k as simply the permeability. That is the convention that will be followed in this text, but it can lead to some confusion, especially when dealing with older texts and reports where the hydraulic conductivity K is sometimes called the *coefficient of permeability*.

Hubbert (1940) developed Eqs. (2.25) through (2.28) from fundamental principles by considering the relationships between driving and resisting forces on a microscopic scale during flow through porous media. The dimensional considerations inherent in his analysis provided us with the foresight to include the constant g in the proportionality relationship leading to Eq. (2.25). In this way C emerges as a dimensionless constant.

The permeability k is a function only of the medium and has dimensions $[L^2]$. The term is widely used in the petroleum industry, where the existence of gas, oil, and water in multiphase flow systems makes the use of a fluid-free conductance parameter attractive. When measured in m² or cm², k is very small, so petroleum engineers have defined the *darcy* as a unit of permeability. If Eq. (2.28) is substituted in Eq. (2.3), Darcy's law becomes

$$v = \frac{-k\rho g}{\mu}\frac{dh}{dl} \tag{2.29}$$

Referring to this equation, 1 darcy is defined as the permeability that will lead to a specific discharge of 1 cm/s for a fluid with a viscosity of 1 cp under a hydraulic gradient that makes the term $\rho g\, dh/dl$ equal to 1 atm/cm. One darcy is approximately equal to 10^{-8} cm².

In the water well industry, the unit gal/day/ft² is widely used for hydraulic conductivity. Its relevance is clearest when Darcy's law is couched in terms of Eq. (2.4):

$$Q = -K\frac{dh}{dl}A$$

The early definitions provided by the U.S. Geological Survey with regard to this unit differentiate between a laboratory coefficient and a field coefficient. However, a recent updating of these definitions (Lohman, 1972) has discarded this formal differentiation. It is sufficient to note that differences in the temperature of measurement between the field environment and the laboratory environment can influence hydraulic conductivity values through the viscosity term in Eq. (2.28). The effect is usually small, so correction factors are seldom introduced. It still makes good sense to report whether hydraulic conductivity measurements have been carried out in the laboratory or in the field, because the methods of measurement are very different and the interpretations placed on the values may be dependent on the type of measurement. However, this information is of practical rather than conceptual importance.

Table 2.2 indicates the range of values of hydraulic conductivity and permeability in five different systems of units for a wide range of geological materials. The table is based in part on the data summarized in Davis' (1969) review. The primary conclusion that can be drawn from the data is that hydraulic conductivity varies over a very wide range. There are very few physical parameters that take on values over 13 orders of magnitude. In practical terms, this property implies that an order-of-magnitude knowledge of hydraulic conductivity can be very useful. Conversely, the third decimal place in a reported conductivity value probably has little significance.

Table 2.3 provides a set of conversion factors for the various common units of k and K. As an example of its use, note that a k value in cm² can be converted to one in ft² by multiplying by 1.08×10^{-3}. For the reverse conversion from ft² to cm², multiply by 9.29×10^{2}.

Table 2.2 Range of Values of Hydraulic Conductivity and Permeability

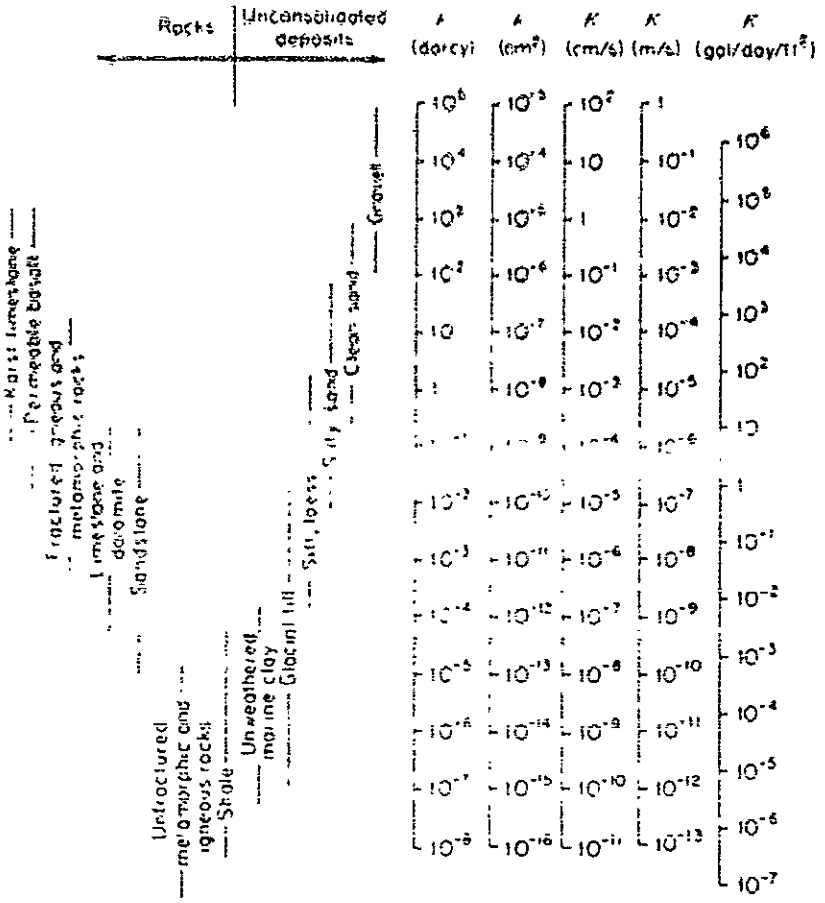


Table 2.3 Conversion Factors for Permeability and Hydraulic Conductivity Units

	Permeability, k*			Hydraulic conductivity, K		
	cm²	ft²	darcy	m/s	ft/s	gal/day/ft²
cm²	1	1.08×10^{-3}	1.01×10^{8}	9.80×10^{2}	3.22×10^{3}	1.85×10^{9}
ft²	9.29×10^{2}	1	9.42×10^{10}	9.11×10^{5}	2.99×10^{6}	1.71×10^{12}
darcy	9.87×10^{-9}	1.06×10^{-11}	1	9.66×10^{-6}	3.17×10^{-5}	1.82×10^{1}
m/s	1.02×10^{-3}	1.10×10^{-6}	1.04×10^{5}	1	3.28	2.12×10^{6}
ft/s	3.11×10^{-4}	3.35×10^{-7}	3.15×10^{4}	3.05×10^{-1}	1	5.74×10^{5}
gal/day/ft²	5.42×10^{-10}	5.83×10^{-13}	5.49×10^{-2}	4.72×10^{-7}	1.74×10^{-6}	1

*To obtain k in ft², multiply k in cm² by 1.08×10^{-3}.

The various approaches to the measurement of hydraulic conductivity in the laboratory and in the field are described in Sections 8.4 through 8.6.

2.4 Heterogeneity and Anisotropy of Hydraulic Conductivity

Hydraulic conductivity values usually show variations through space within a geologic formation. They may also show variations with the direction of measurement at any given point in a geologic formation. The first property is termed *heterogeneity* and the second *anisotropy*. The evidence that these properties are commonplace is to be found in the spread of measurements that arises in most field sampling programs. The geological reasoning that accounts for their prevalence lies in an understanding of the geologic processes that produce the various geological environments.

Homogeneity and Heterogeneity

If the hydraulic conductivity K is *independent* of position within a geologic formation, the formation is *homogeneous*. If the hydraulic conductivity K is *dependent* on position within a geologic formation, the formation is *heterogeneous*. If we set up an xyz coordinate system in a homogeneous formation, $K(x, y, z) = C$, C being a constant; whereas in a heterogeneous formation, $K(x, y, z) \neq C$.

There are probably as many types of heterogeneous configurations as there are geological environments, but it may be instructive to draw attention to three broad classes. Figure 2.7(a) is a vertical cross section that shows an example of *layered heterogeneity*, common in sedimentary rocks and unconsolidated lacustrine and marine deposits. Here, the individual beds making up the formation each have a homogeneous conductivity value $K_1, K_2, \ldots$, but the entire system can be thought of as heterogeneous. Layered heterogeneity can result in K contrasts of almost the full 13-order range (Table 2.2), as, for example, in interlayered deposits of clay and sand. Equally large contrasts can arise in cases of *discontinuous heterogeneity* caused by the presence of faults or large-scale stratigraphic features. Perhaps the most ubiquitous discontinuous feature is the overburden-bedrock contact. Figure 2.7(b) is a map that shows a case of *trending heterogeneity*. Trends are possible in any type of geological formation, but they are particularly common in response to the sedimentation processes that create deltas, alluvial fans, and glacial outwash plains. The A, B, and C soil horizons often show vertical trends in hydraulic conductivity, as do rock types whose conductivity is primarily dependent on joint and fracture concentration. Trending heterogeneity in large consolidated or unconsolidated sedimentary formations can attain gradients of 2–3 orders of magnitude in a few miles.

Many hydrogeologists and petroleum geologists have used statistical distributions to provide a quantitative description of the degree of heterogeneity in a geological formation. There is now a large body of direct evidence to support the

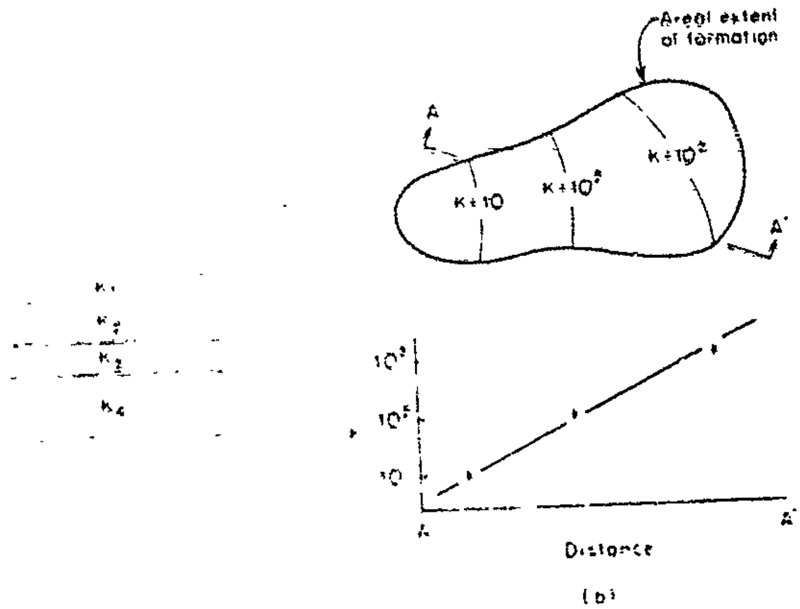


Figure 2.7 Layered heterogeneity and trending heterogeneity.

statement that the probability density function for hydraulic conductivity is log-normal. Warren and Price (1961) and Bennion and Griffiths (1966) found this to be the case in oilfield reservoir rocks, and Willardson and Hurst (1965) and Davis (1969) support the conclusion for unconsolidated water-bearing formations. A log-normal distribution for K is one for which a parameter Y, defined as $Y = \log K$, shows a normal distribution. Freeze (1975) provides a table, based on the references above, that shows the standard deviation on Y (which is independent of the units of measurement) is usually in the range 0.5–1.5. This means that K values in most geological formations show internal heterogeneous variations of 1–2 orders of magnitude. Trending heterogeneity within a geological formation can be thought of as a trend in the *mean value* of the probability distribution. The same standard deviation may be evident in measurements at different positions in the formation, but the trending means lead to an increase in the overall observed range for the formation.

Greenkorn and Kessler (1969) have provided a set of definitions of heterogeneity that are consistent with the statistical observations. In effect, they argue that if all geologic formations display spatial variations in K, then under the classical definitions, there is no such thing as a homogeneous formation. They redefine a homogeneous formation as one in which the probability density function of hydraulic conductivity is monomodal. That is, it shows variations in K, but maintains a constant mean K through space. A heterogeneous formation is defined as one in which the probability density function is multimodal. To describe a porous medium that satisfies the classical definition of homogeneity (K constant everywhere, such as in experimental glass beads of diameter d) they use the term *uniform*. If we wish to adapt the classical definitions given at the start of this section to this more rational set of concepts, we can do so by adding the adjective "mean" and couching the original definitions in terms of *mean hydraulic conductivity*.

Isotropy and Anisotropy

If the hydraulic conductivity K is *independent* of the direction of measurement at a point in a geologic formation, the formation is *isotropic* at that point. If the hydraulic conductivity K *varies* with the direction of measurement at a point in a geologic formation, the formation is *anisotropic* at that point.

Consider a two-dimensional vertical section through an anisotropic formation. If we let θ be the angle between the horizontal and the direction of measurement of a K value at some point in the formation, then $K = K(\theta)$. The directions in space corresponding to the θ angle at which K attains its maximum and minimum values are known as the *principal directions of anisotropy*. They are always perpendicular to one another. In three dimensions, if a plane is taken perpendicular to one of the principal directions, the other two principal directions are the directions of maximum and minimum K in that plane.

If an xyz coordinate system is set up in such a way that the coordinate directions coincide with the principal directions of anisotropy, the hydraulic conductivity values in the principal directions can be specified as K_x, K_y, and K_z. At any point (x, y, z), an isotropic formation will have $K_x = K_y = K_z$, whereas an anisotropic formation will have $K_x \neq K_y \neq K_z$. If $K_x = K_y \neq K_z$, as is common in horizontally bedded sedimentary deposits, the formation is said to be *transversely isotropic*.

To fully describe the nature of the hydraulic conductivity in a geologic formation, it is necessary to use two adjectives, one dealing with heterogeneity and one with anisotropy. For example, for a homogeneous, isotropic system in two dimensions: $K_x(x, z) = K_z(x, z) = C$ for all (x, z), where C is a constant. For a homogeneous, anisotropic system, $K_x(x, z) = C_1$ for all (x, z) and $K_z(x, z) = C_2$ for all (x, z) but $C_1 \neq C_2$. Figure 2.8 attempts to further clarify the four possible combinations. The length of the arrow vectors is proportional to the K_x and K_z values at the two points (x_1, z_1) and (x_2, z_2).

The primary cause of anisotropy on a small scale is the orientation of clay minerals in sedimentary rocks and unconsolidated sediments. Core samples of clays and shales seldom show horizontal to vertical anisotropy greater than 10:1, and it is usually less than 3:1.

On a larger scale, it can be shown (Maasland, 1957; Marcus and Evenson, 1961) that there is a relation between layered heterogeneity and anisotropy. Consider the layered formation shown in Figure 2.9. Each layer is homogeneous and isotropic with hydraulic conductivity values $K_1, K_2, \ldots, K_n$. We will show that the system as a whole acts like a single homogeneous, anistropic layer. First, consider flow perpendicular to the layering. The specific discharge v must be the

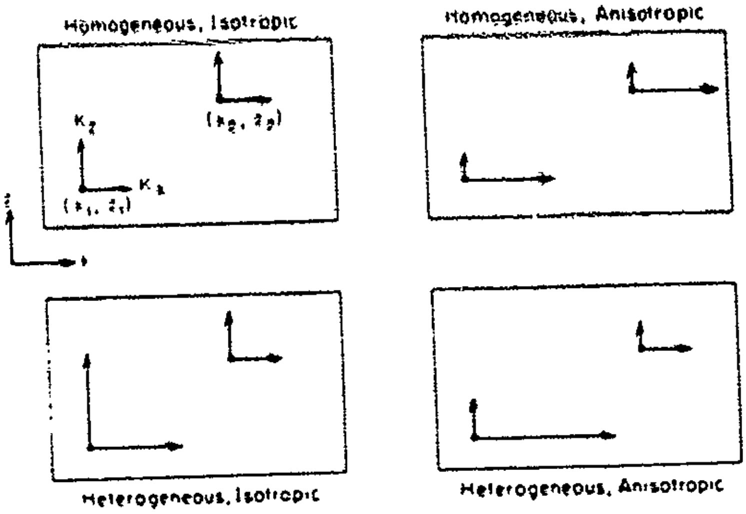

Homogeneous, Isotropic
Homogeneous, Anisotropic
K_z
K_x
(x_1, z_1)
(x_2, z_2)
z
x
Heterogeneous, Isotropic
Heterogeneous, Anisotropic

Figure 2.8 Four possible combinations of heterogeneity and anisotropy.

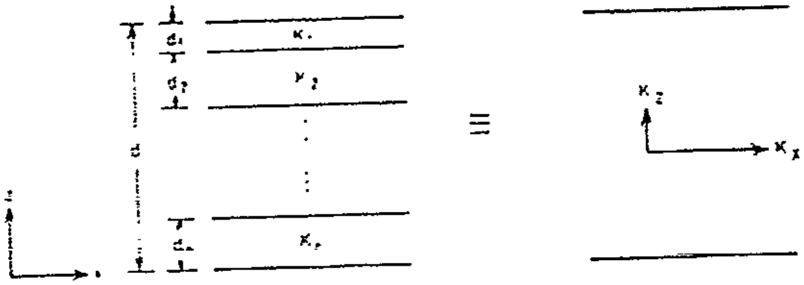

d_1
d_2
d_n
d
K_1
K_2
K_n
≡
K_z
K_x
z
x

Figure 2.9 Relation between layered heterogeneity and anisotropy.

same entering the system as it is leaving; in fact, it must be constant throughout the system. Let Δh_1 be the head loss across the first layer, Δh_2 across the second layer, and so on. The total head loss is then $\Delta h = \Delta h_1 + \Delta h_2 + \ldots + \Delta h_n$, and from Darcy's law,

$$v = \frac{K_1\,\Delta h_1}{d_1} = \frac{K_2\,\Delta h_2}{d_2} = \ldots = \frac{K_n\,\Delta h_n}{d_n} = \frac{K_z\,\Delta h}{d} \tag{2.30}$$

where K_z is an equivalent vertical hydraulic conductivity for the system of layers. Solving the outside relationship of Eq. (2.30) for K_z and using the inside relationships for $\Delta h_1, \Delta h_2, \ldots$, we obtain

$$K_z = \frac{vd}{\Delta h} = \frac{vd}{\Delta h_1 + \Delta h_2 + \ldots + \Delta h_n}$$

$$= \frac{vd}{vd_1/K_1 + vd_2/K_2 + \ldots + vd_n/K_n}$$

which leads to

$$K_z = \frac{d}{\sum_{i=1}^{n} d_i/K_i} \qquad (2.31)$$

Now consider flow parallel to the layering. Let Δh be the head loss over a horizontal distance l. The discharge Q through a unit thickness of the system is the sum of the discharges through the layers. The specific discharge $v = Q/d$ is therefore given by

$$v = \sum_{i=1}^{n} \frac{K_i d_i}{d} \frac{\Delta h}{l} = K_x \frac{\Delta h}{l}$$

where K_x is an equivalent horizontal hydraulic conductivity. Simplification yields

$$K_x = \sum_{i=1}^{n} \frac{K_i d_i}{d} \qquad (2.32)$$

Equations (2.31) and (2.32) provide the K_x and K_z values for a single homogeneous but anisotropic formation that is hydraulically equivalent to the layered system of homogeneous, isotropic geologic formations of Figure 2.9. With some algebraic manipulation of these two equations it is possible to show that $K_x > K_z$ for all possible sets of values of $K_1, K_2, \ldots, K_n$. In fact, if we consider a set of cyclic couplets $K_1, K_2, K_1, K_2, \ldots$ with $K_1 = 10^4$ and $K_2 = 10^2$, then $K_x/K_z = 25$. For $K_1 = 10^4$ and $K_2 = 1$, $K_x/K_z = 2500$. In the field, it is not uncommon for layered heterogeneity to lead to regional anisotropy values on the order of 100:1 or even larger.

Snow (1969) showed that fractured rocks also behave anisotropically because of the directional variations in joint aperture and spacing. In this case, it is quite common for $K_z > K_x$.

Darcy's Law in Three Dimensions

For three-dimensional flow, in a medium that may be anisotropic, it is necessary to generalize the one-dimensional form of Darcy's law [Eq. (2.3)] presented earlier. In three dimensions the velocity v is a vector with components v_x, v_y, and v_z, and the simplest generalization would be

$$\begin{aligned} v_x &= -K_x \frac{\partial h}{\partial x} \\ v_y &= -K_y \frac{\partial h}{\partial y} \qquad (2.33) \\ v_z &= -K_z \frac{\partial h}{\partial z} \end{aligned}$$

where K_x, K_y, and K_z are the hydraulic conductivity values in the x, y, and z directions. Since h is now a function of x, y, and z, the derivatives must be partial.

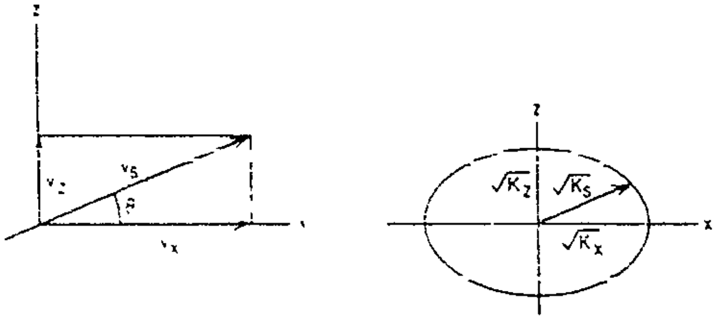
In this text we will assume this simple generalization to be an adequate description of three-dimensional flow, but it is worth noting that a more generalized set of equations could be written in the form

$$
\begin{aligned}
v_x &= -K_{xx}\frac{\partial h}{\partial x} - K_{xy}\frac{\partial h}{\partial y} - K_{xz}\frac{\partial h}{\partial z} \\
v_y &= -K_{yx}\frac{\partial h}{\partial x} - K_{yy}\frac{\partial h}{\partial y} - K_{yz}\frac{\partial h}{\partial z} \qquad (2.34) \\
v_z &= -K_{zx}\frac{\partial h}{\partial x} - K_{zy}\frac{\partial h}{\partial y} - K_{zz}\frac{\partial h}{\partial z}
\end{aligned}
$$

This set of equations exposes the fact that there are actually nine components of hydraulic conductivity in the most general case. If these components are put in matrix form, they form a second-rank symmetric tensor known as the *hydraulic conductivity tensor* (Bear, 1972). For the special case $K_{xy} = K_{xz} = K_{yx} = K_{yz} = K_{zx} = K_{zy} = 0$, the nine components reduce to three and Eq. (2.33) is a suitable generalization of Darcy's law. The necessary and sufficient condition that allows use of Eq. (2.33) rather than Eq. (2.34) is that the principal directions of anisotropy coincide with the x, y, and z coordinate axes. In most cases it is possible to choose a coordinate system that satisfies this requirement, but one can conceive of heterogeneous anisotropic systems in which the principal directions of anisotropy vary from one formation to another, and in such systems the choice of suitable axes would be impossible.

Hydraulic Conductivity Ellipsoid

Consider an arbitrary flowline in the xz plane in a homogeneous, anisotropic medium with principal hydraulic conductivities K_x and K_z [Figure 2.10(a)]. Along



(a) (b)

Figure 2.10 (a) Specific discharge v_s in an arbitrary direction of flow. (b) Hydraulic conductivity ellipse.

the flowline

$$v_s = -K_s \frac{\partial h}{\partial s} \tag{2.35}$$

where K_s is unknown, although it presumably lies in the range $K_x - K_z$. We can separate v_s into its components v_x and v_z, where

$$\begin{aligned} v_x &= -K_x \frac{\partial h}{\partial x} = v_s \cos\theta \\ v_z &= -K_z \frac{\partial h}{\partial z} = v_s \sin\theta \end{aligned} \tag{2.36}$$

Now, since $h = h(x, z)$,

$$\frac{\partial h}{\partial s} = \frac{\partial h}{\partial x} \cdot \frac{\partial x}{\partial s} + \frac{\partial h}{\partial z} \cdot \frac{\partial z}{\partial s} \tag{2.37}$$

Geometrically, $\partial x/\partial s = \cos\theta$ and $\partial z/\partial s = \sin\theta$. Substituting these relationships together with Eqs. (2.35) and (2.36) in Eq. (2.37) and simplifying yields

$$\frac{1}{K_s} = \frac{\cos^2\theta}{K_x} + \frac{\sin^2\theta}{K_z} \tag{2.38}$$

This equation relates the principal conductivity components K_x and K_z to the resultant K_s in any angular direction θ. If we put Eq. (2.38) into rectangular coordinates by setting $x = r\cos\theta$ and $z = r\sin\theta$, we get

$$\frac{r^2}{K_s} = \frac{x^2}{K_x} + \frac{z^2}{K_z} \tag{2.39}$$

which is the equation of an ellipse with major axes $\sqrt{K_x}$ and $\sqrt{K_z}$ [Figure 2.10(b)]. In three dimensions, it becomes an ellipsoid with major axes $\sqrt{K_x}$, $\sqrt{K_y}$, and $\sqrt{K_z}$, and it is known as the *hydraulic conductivity ellipsoid*. In Figure 2.10(b), the conductivity value K_s for any direction of flow in an anisotropic medium can be determined graphically if K_x and K_z are known.

In Section 5.1, the construction of flow nets in anisotropic media will be discussed, and it will be shown there that, in contrast to isotropic media, flowlines are not perpendicular to equipotential lines in anisotropic media.

2.5 Porosity and Void Ratio

If the total unit volume V_T of a soil or rock is divided into the volume of the solid portion V_s and the volume of the voids V_v, the *porosity* n is defined as $n = V_v/V_T$. It is usually reported as a decimal fraction or a percent.

Figure 2.11 shows the relation between various rock and soil textures and porosity. It is worth distinguishing between *primary porosity*, which is due to the *consolidation*, c_v, which is defined as

$$c_v = \frac{K}{\rho g \alpha} \tag{8.30}$$

At each loading level in a consolidation test, the sample undergoes a transient drainage process (fast for sands, slow for clays) that controls the rate of consolidation of the sample. If the rate of decline in sample thickness is recorded for each loading increment, such measurements can be used in the manner described by Lambe (1951) to determine the coefficient of consolidation, c_v, and the hydraulic conductivity, K, of the soil.

In Section 8.12, we will further examine the mechanism of one-dimensional consolidation in connection with the analysis of land subsidence.

Unsaturated Characteristic Curves

The characteristic curves, $K(\psi)$ and $\theta(\psi)$, that relate the moisture content, θ, and the hydraulic conductivity, K, to the pressure head, ψ, in unsaturated soils were described in Section 2.6. Figure 2.13 provided a visual example of the hysteretic relationships that are commonly observed. The methods used for the laboratory determination of these curves have been developed exclusively by soil scientists. It is not within the scope of this text to outline the wide variety of sophisticated laboratory instrumentation that is available. Rather, the reader is directed to the soil science literature, in particular to the review articles by L. A. Richards (1965), Klute (1965b), Klute (1965c), and Bouwer and Jackson (1974).

8.5 Measurement of Parameters: Piezometer Tests

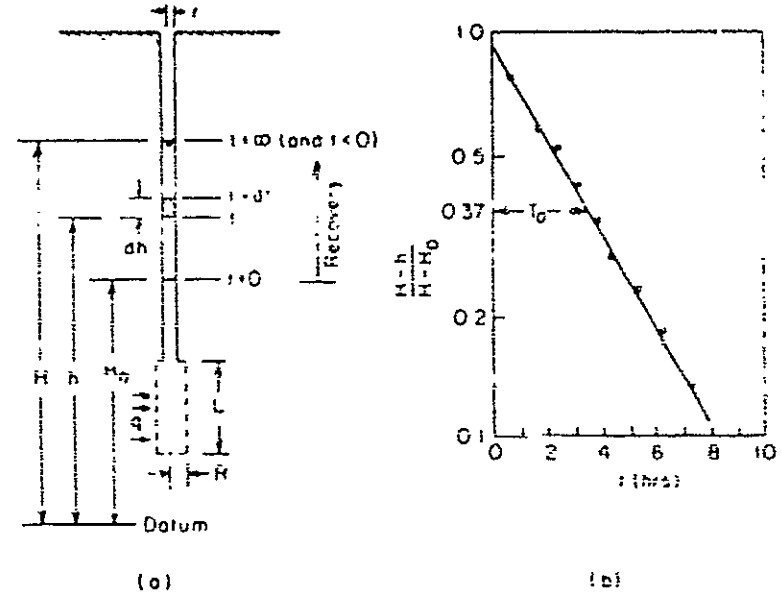
It is possible to determine *in situ* hydraulic conductivity values by means of tests carried out in a single piezometer. We will look at two such tests, one suitable for point piezometers that are open only over a short interval at their base, and one suitable for screened or slotted piezometers that are open over the entire thickness of a confined aquifer. Both tests are initiated by causing an instantaneous change in the water level in a piezometer through a sudden introduction or removal of a known volume of water. The recovery of the water level with time is then observed. When water is removed, the tests are often called *bail tests*; when it is added, they are known as *slug tests*. It is also possible to create the same effect by suddenly introducing or removing a solid cylinder of known volume.

The method of interpreting the water level versus time data that arise from bail tests or slug tests depends on which of the two test configurations is felt to be most representative. The method of Hvorslev (1951) is for a point piezometer, while that of Cooper et al. (1967) is for a confined aquifer. We will now describe each in turn.

The simplest interpretation of piezometer-recovery data is that of Hvorslev (1951). His initial analysis assumed a homogeneous, isotropic, infinite medium in which both soil and water are incompressible. With reference to the bail test of Figure 8.20(a), Hvorslev reasoned that the rate of inflow, q, at the piezometer tip at any time t is proportional to the hydraulic conductivity, K, of the soil and to the unrecovered head difference, $H - h$, so that

$$q(t) = \pi r^2 \frac{dh}{dt} = FK(H - h) \tag{8.31}$$

where F is a factor that depends on the shape and dimensions of the piezometer intake. If $q = q_0$ at $t = 0$, it is clear that $q(t)$ will decrease asymptotically toward zero as time goes on.



(a) (b)

Figure 8.20 Hvorslev piezometer test. (a) Geometry; (b) method of analysis.

Hvorslev defined the *basic time lag*, T_0, as

$$T_0 = \frac{\pi r^2}{FK} \tag{8.32}$$

When this parameter is substituted in Eq. (8.31), the solution to the resulting ordinary differential equation, with the initial condition, $h = H_0$ at $t = 0$, is

$$\frac{H - h}{H - H_0} = e^{-t/T_0} \tag{8.33}$$

A plot of field recovery data, $H - h$ versus t, should therefore show an exponential decline in recovery rate with time. If, as shown on Figure 8.20(b), the recovery is normalized to $H - H_0$ and plotted on a logarithmic scale, a straight-line plot results. Note that for $H - h/H - H_0 = 0.37$, $\ln(H - h/H - H_0) = -1$, and from Eq. (8.33), $T_0 = t$. The basic time lag, T_0, can be defined by this relation; or if a more physical definition is desired, it can be seen, by multiplying both top and bottom of Eq. (8.32) by $H - H_0$, that T_0 is the time that would be required for the complete equalization of the head difference if the original rate of inflow were maintained. That is, $T_0 = V/q_0$, where V is the volume of water removed or added.

To interpret a set of field recovery data, the data are plotted in the form of Figure 8.20(b). The value of T_0 is measured graphically, and K is determined from Eq. (8.32). For a piezometer intake of length L and radius R [Figure 8.20(a)], with $L/R > 8$, Hvorslev (1951) has evaluated the shape factor, F. The resulting expression for K is

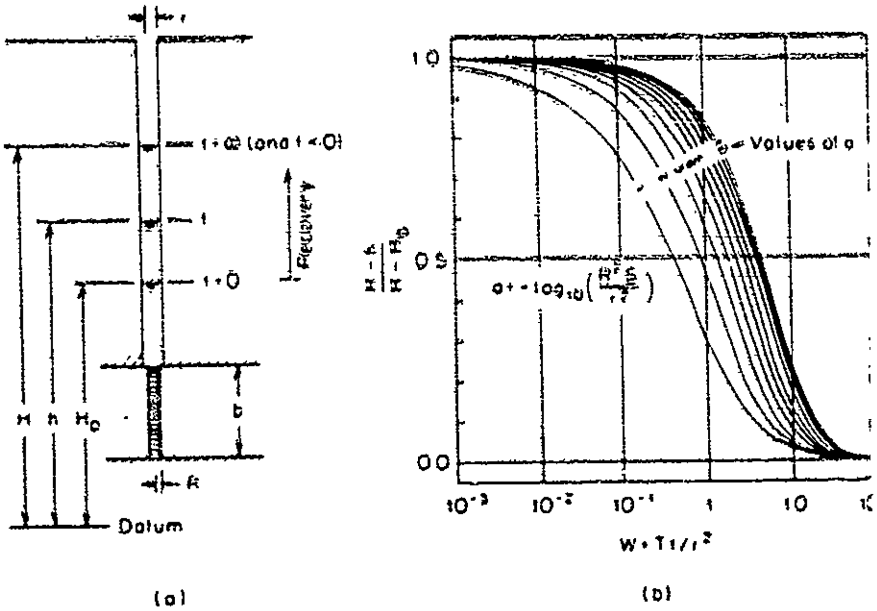
$$K = \frac{r^2 \ln(L/R)}{2LT_0} \qquad (8.34)$$

Hvorslev also presents formulas for anisotropic conditions and for a wide variety of shape factors that treat such cases as a piezometer open only at its basal cross section and a piezometer that just encounters a permeable formation underlying an impermeable one. Cedergren (1967) also lists these formulas.

In the field of agricultural hydrology, several *in situ* techniques, similar in principle to the Hvorslev method but differing in detail, have been developed for the measurement of saturated hydraulic conductivity. Boersma (1965) and Bouwer and Jackson (1974) review those methods that involve auger holes and piezometers.

For bail tests of slug tests run in piezometers that are open over the entire thickness of a confined aquifer, Cooper et al. (1967) and Papadopoulos et al. (1973) have evolved a test-interpretation procedure. Their analysis is subject to the same assumptions as the Theis solution for pumpage from a confined aquifer. Contrary to the Hvorslev method of analysis, it includes consideration of both formation and water compressibilities. It utilizes a curve-matching procedure to determine the aquifer coefficients T and S. The hydraulic conductivity K can then be determined on the basis of the relation, $K = T/b$. Like the Theis solution, the method is based on the solution to a boundary-value problem that involves the transient equation of groundwater flow, Eq. (2.77). The mathematics will not be described here.

For the bail-test geometry shown in Figure 8.21(a), the method involves the preparation of a plot of recovery data in the form $H - h/H - H_0$ versus t. The plot is prepared on semilogarithmic paper with the reverse format to that of the Hvorslev test; the $H - h/H - H_0$ scale is linear, while the t scale is logarithmic. The field curve is then superimposed on the type curves shown in Figure 8.21(b). With the axes coincident, the data plot is translated horizontally into a position where the data best fit one of the type curves. A matchpoint is chosen (or rather, a vertical axis is matched) and values of t and W are read off the horizontal scales



(a) (b)

Figure 8.21 Piezometer test in a confined aquifer. (a) Geometry; (b) type curves (after Papadopoulos et al., 1973).

at the matched axis of the field plot and the type plot, respectively. For ease calculation it is common to choose a matched axis at $W' = 1.0$. The transmissi T is then given by

$$T = \frac{Wr^2}{t} \qquad (8.$$

where the parameters are expressed in any consistent set of units.

In principle, the storativity, S, can be determined from the α value of t matched curve and the expression shown on Figure 8.21(b). In practice, since t slopes of the various α lines are very similar, the determination of S by this meth is unreliable.

The main limitation on slug tests and bail tests is that they are heavily dep dent on a high-quality piezometer intake. If the wellpoint or screen is corro or clogged, measured values may be highly inaccurate. On the other hand, i piezometer is developed by surging or backwashing prior to testing, the measu values may reflect the increased conductivities in the artificially induced gra pack around the intake.

It is also possible to determine hydraulic conductivity in a piezomete single well by the introduction of a tracer into the well bore. The tracer concentr tion decreases with time under the influence of the natural hydraulic gradient t exists in the vicinity of the well. This approach is known as the *borehole dil* *method*, and it is described more fully in Section 9.4.

REFERENCE 12

REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES

1983 SUPPLEMENT

TO

THE 1981-82 EDITION

VOLUME 2
H-Z

[illegible]
MAY 22 1985
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REFERENCE

Ref
RA
1231
.R3
1983
v.2

Edited by
Richard J. Lewis, Sr.
and
Doris V. Sweet

For Reference

Not to be taken from this room

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control
National Institute for Occupational Safety and Health
Cincinnati, Ohio 45226

October 1984

For sale by the Superintendent of Documents, U.S. Government
Printing Office, Washington, D.C. 20402

OE2980000 LANNEA COROMANDELICA (Houtt) Merr., leaf and stem bark extract
DEF: Indian plant belonging to the family ANACARDIACEAE (IJEBA6 9,91,71)
UPDT:8001
SYN: [illegible] LEAF AND STEM BARK EXTRACT (Indian) * [illegible] STEM BARK and LEAF EXTRACT (Indian)
TOXICITY DATA AND REFERENCES:
[illegible] ipr-mus LD50:800 mg/kg IJEBA6 9,91,71
LANOL see [illegible]
LANOPHYLLIN see [illegible]
LANOXIN see [illegible]
LANRAY see [illegible]
LANSTAN see [illegible]

OE4375000 LANTHANUM CHLORIDE
UPDT:8403 CAS: [illegible] MW: 245.26 MOLFM: Cl3-La
TOXICITY DATA AND REFERENCES:
orl-rat LD50:4200 mg/kg AIHOAX 1,637,50
ipr-rat LD50:106 mg/kg AMIHAB 16,475,57
ivn-rat LDLo:4 mg/kg AMIHAB 16,475,57
ipr-mus LD50:121 mg/kg COREAF 256,1043,63
scu-mus LD50:3494 mg/kg EQSSDX 1,1,75
ivn-mus LD50:18 mg/kg JNCIAM 15,839,55
[illegible] ipr-gpg LD50:130 mg/kg AMIHAB 15,9,57
ipr-frg LD50:[illegible] mg/kg EQSSDX 1,1,75
REVIEW AND REFERENCES:
TOXICOLOGY REVIEW: JPMSAE 56,665,66
STATUS:
REPORTED IN EPA TSCA INVENTORY, 1983
★ EPA GENETIC TOXICOLOGY PROGRAM, JANUARY 1984
LANVAFLIN see UO7452000
LA [illegible] see OJ6600010
LA [illegible] see OJ6600000
LA [illegible] see OJ6650010
LA [illegible] see OJ6650000
LA [illegible] see OJ6600010
LA [illegible] see OJ6600000
LAPACHIC ACID see OL8730000
LAPACHOL see OL8730000
LAPACHOL W9070 see OL8730000
LAPAQUIN see VS7260000
LAPEMIS HARDWICKII (MALAYA) VENOM see YX4185000
LAPLANA EXTRACT (Indian) see HL7795000
LAPLIN see EV9730000

OE5784050 LAPORTEA CRENULATA Gaud., extract excluding roots
DEF: Indian plant belonging to the family URTICACEAE (IJEBA6 12,312,74)
UPDT:8303
SYN: [illegible] EXTRACT (Indian)
TOXICITY DATA AND REFERENCES:
[illegible] ipr-mus LD50:750 mg/kg IJEBA6 12,312,74

OE5784360 LAPROL 702
UPDT:8303 CAS: [illegible] MOLFM: [illegible]
SYN: POLY(OXY(METHYL-1,2-ETHANEDIYL)), alpha-HYDRO-omega-HYDROXY- [illegible]
TOXICITY DATA AND REFERENCES:
1A11 unk-rat LD50:3730 mg/kg GISAAA 46(4),73,81
1A11 unk-mus LD50:4220 mg/kg GISAAA 46(4),73,81
1A11 unk-gpg LD50:1200 mg/kg GISAAA 46(4),73,81
STATUS:
REPORTED IN EPA TSCA INVENTORY, 1983
LAPSANG SOUCHONG TEA LEAF EXTRACT see WT6482990
LAPTRAN see TS2250000
LARABOPA see AT5600000

OE5800000 LARANA
DEF: Aqueous extract from the dried leaves of the plant (JNCIAM 46,1131,71)
UPDT:8401
SYN: CITRUS AURANTIUM
TUMORIGENIC DATA AND REFERENCES:
ZYOZY10 scu-rat TDLo:45 gm/kg/1Y-I JNCIAM 46,1131,71
STATUS:
MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE
LARD FACTOR see VH6730000
LARGACTIL see SN8925000
LARGACTIL MONOHYDROCHLORIDE see SO1750000
LARGACTILOTHIAZINE see SN8925000
LARGACTYL see SN8925000
LARGACTYL see SO1750000

OE5970000 LARGOMYCIN
DEF: An antitumor antibiotic produced by the strain STREPTOMYCES PLURICOLORESCENS (JJBBEAT? [illegible])
UPDT:8315
TOXICITY DATA AND REFERENCES:
1V30 ipr-mus LD50:35500 ug/kg BSERAY 2,1351,78

OE6000000 LARGOMYCIN F II
DEF: Isolated from STREPTOMYCES PLURICOLORESCENS (85ODA2 4(2),276,80)
UPDT:8309
SYN: ANTIBIOTIC TA-1867-F-II * TA-1867-F-II
MUTATION DATA AND REFERENCES:
pic-esc 30 mg/plate CNREA8 43,2819,83
TOXICITY DATA AND REFERENCES:
★ ipr-mus LD50:34 mg/kg 85ODA2 4(2),276,80
LARIXIC ACID see UQ1050000
LARIXIN see [illegible]
LARIXINIC ACID see UQ1050000
LAROCAINE see UB1575000
LARODOPA see AY5600000
LAROSCORBINE see CI7650000
LAROXIN see HO9275000
LAROXYL see HO9275000
LARTEN see TZ0175000
LARVACIDE see PB6300000
LAS see DB4370000
LASALOCID A see OF4000000
LASAN see CB1225000
LASEX see CB2625000
LASILIX see CB2625000

OE7875000 LASIOCARPINE
UPDT:8401 CAS: 303-34-4 MW: 411.55 MOLFM: C21-H33-N-O7
SYN: HELIOTRIDINE ESTER with LASIOCARPUM and ANGELIC ACID * NCI-C01478
MUTATION DATA AND REFERENCES:
mmo-sat 200 ug/plate MUREAV 68,211,79
dnd-hmg-pal 20 umol/L ZEVBAS 91,74,80
mma-dsn 20 mmol/L/6H NATUAS 210,593,66
~~[illegible] 40 umol/L [illegible] 4,304,82~~
dni-rat-par 80 mg/kg NATUAS 223,1269,69
TUMORIGENIC DATA AND REFERENCES:
3V831L0061 orl-rat TDLo:255 mg/kg/31W-C NCITR* NCI-CG-TR-39,78
3V831L0060 ipr-rat TDLo:70 mg/kg/56W-I CNREA8 38,908,73
3V831L0061 orl-rat TD:[illegible] mg/kg/31W-C NCITR* NCI-CG-TR-39,78
3V831L0061 orl-rat TD:1510 mg/kg/31W-C NCITR* NCI-CG-TR-39,78
3V831L0060 orl-rat TD:[illegible] mg/kg/48W-C BJCAAI 37,289,78
TOXICITY DATA AND REFERENCES:
orl-rat [illegible] mg/kg TXAPA9 17,[illegible],70
ipr-rat LD50:72 mg/kg CNREA8 33,908,73
ivn-rat LDLo:60 mg/kg APTOA6 [illegible]
par-rat LD50:[illegible] mg/kg NATUAS 223,1269,69
unk-rat LD50:77 mg/kg PARKAD 22,459,70
ivn-hmn? LDLo:[illegible] mg/kg APTOA6 [illegible]
REVIEW AND REFERENCES:
TOXICOLOGY REVIEW: CTOXBQ? 46,1171,76
★ CARCINOGENIC REVIEW:ANIMAL POSITIVE IARC** 10,281,76
STATUS:
★ NCI CARCINOGENESIS BIOASSAY COMPLETED;RESULTS POSITIVE:RAT (NCITR* NCI-CG-TR-39,78)
★ EPA GENETIC TOXICOLOGY PROGRAM, JANUARY 1984
MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE

OE7900000 LASIOCARPINE N-OXIDE
UPDT:[illegible] CAS: 127-30-8 MW: 427.55 MOLFM: C21-H33-N-O8
TOXICITY DATA AND REFERENCES:
orl-rat LDLo:40 mg/kg JPBAA7 78,471,59
ipr-rat LD50:600 mg/kg JPBAA7 89,153,65
STATUS:
★ EPA GENETIC TOXICOLOGY PROGRAM, JANUARY 1984

OE7940000 LASIOSIPHON KRAUSSIANUS, root extract
UPDT:8006
TOXICITY DATA AND REFERENCES:
3YC3J36K30 orl-mus LD50:37 gm/kg PLMEAA 41,367,81
3YE3J36K17 ipr-mus LD50:320 mg/kg PLMEAA 41,367,81
LASIX see CB2625000
LAS-Na see DB4350000
LASONIT see [illegible]

OE8350000 LASSIA ACULEATA Lour., rhizome extract
DEF: Indian plant belonging to the family ARACEAE (IJEBA6 12,312,74)
UPDT:8003
SYN: [illegible] RHIZOME EXTRACT (Indian)
TOXICITY DATA AND REFERENCES:
★ ipr-mus LD50:130 mg/kg IJEBA6 12,312,74
LASTO see AS2275000
LAS, SODIUM SALT see DB4350000
LASTRAC see A1697000C
LASUNI EXTRACT (Indian) see [illegible]
LATA EXTRACT (Indian) see EW7699000
LATAMOXEF SODIUM see BH4824000
LATAPALAS EXTRACT (Indian) see EH3435100
LATEX see TQ2600000
LATEXOL RED J see QL5436000
LATEXOL SCARLET E see DB5300000
LATEXOL SCARLET E SOLUPOWDER see DB5300000
LATEX SVD see EV9730000
LATEX XD 7151 see OM0000000
~~[illegible] see [illegible]~~
LATIBON see SO4200000
LATICAUDA see YZ4175000
LATICAUDA SEMIFASCIATA VENOM see YZ4175000
LATJIRA STEM BARK EXTRACT (Indian) see AQ2999000
LATTICHBOUQUET OIL (German) see TX5300000
LATUMCIDIN see QY8430000
LAUDOCAINE see DO4725000
LAURAN (N-n-BUTYLCIMICITY (Czech) see WH7000000
LAUGHING GAS see QX1350000
LAURAMIDE DEA see JR1925000
LAUREL CAMPHOR see EX1225000

OE9500000 LAUREL LEAF OIL
UPDT:8303 CAS: 8006-78-8
SYN: OIL of LAUREL LEAF
IRRITATION DATA AND REFERENCES:
skn-rbt 500 mg/24H MOD FCTXAV 14,337,76
TOXICITY DATA AND REFERENCES:
★ orl-rat LD50:3950 mg/kg FCTXAV 14,337,76
STATUS:
REPORTED IN EPA TSCA INVENTORY, 1983
LAURETH see MD0875000
LAURETH 9 see MD0875020
LAURETH 23 see MD0875000

OE9800000 LAURIC ACID
UPDT:8306 CAS: 143-07-7 MW: 200.36 MOLFM: C12-H24-O2
SYN: C 1297 * DODECANOIC ACID * DUODECYLIC ACID * HYDROFOL ACID 1255 * HYDROFOL ACID 1295 * LAUROSTEARIC ACID * NEO-FAT 12 * NEO-FAT 12-43 * NINOL AA62 EXTRA * 1-UNDECANECARBOXYLIC ACID * WECOLINE 1295
MUTATION DATA AND REFERENCES:
cyt-smc 10 mg/L NATUAS 294,263,81
TUMORIGENIC DATA AND REFERENCES:
TV07Y30 skn-mus TDLo:108 gm/kg/15W-I APMIAL 46,51,59
TOXICITY DATA AND REFERENCES:
1F12 ivn-mus LD50:131 mg/kg APTOA6 18,141,61
orl-rat LD50:12 gm/kg FDRLI* 123,-,76
REVIEW AND REFERENCES:
TOXICOLOGY REVIEW: AMIHAB 21,100,80
STATUS:
REPORTED IN EPA TSCA INVENTORY, 1983
MEETS CRITERIA FOR PROPOSED OSHA MEDICAL RECORDS RULE

OE9805000 LAURIC ACID, BARIUM CADMIUM SALT
UPDT 8303
SYN: BARIUM CADMIUM LAURATE
TOXICITY DATA AND REFERENCES:
★ orl-rat LD50:1696 mg/kg GTPZAB 18(3),50,74
★ orl-mus LD50:316 mg/kg GISAAA 46(4),18,81
REVIEW AND REFERENCES:
★ TLV-TWA 0.5 mg(Ba)/m3 DTLVS* 4,35,80
★ TLV-TWA 50 ug(Cd)/m3;STEL 200 ug(Cd)/m3 DTLVS* 4,59,80
STANDARDS & REGULATIONS:
★ OSHA STANDARD-air:TWA 200 ug(Cd)/m3;CL 600 ug(Cd)/m3 (dust) (SCP-W) FEREAC 39,23540,74
★ OSHA STANDARD-air:TWA 0.5 mg(Ba)/m3 (SCP-X) FEREAC 39,23540,74

REFERENCE 13

HANDBOOK OF ENVIRONMENTAL DATA ON ORGANIC CHEMICALS

SECOND EDITION

Karel Verschueren

Environmental Advisor
Heidemij/Adviesbureau
and
Department of Public Health and Tropical Hygiene
Agricultural University of Wageningen
Netherlands

VNR VAN NOSTRAND REINHOLD COMPANY
NEW YORK CINCINNATI TORONTO LONDON MELBOURNE

lactonitrile (2-hydroxypropanenitrile, acetaldehydecyanohydrin, ethylidenecyanohydrin)

$CH_3CHOHCN$

A PROPERTIES colorless or strawcolored liquid, m w 71 08, m p -40°C, b p 183°C slightly decomposes, v p 10 mm at 74°C, v d 2 45, sp gr 0 992

C WATER POLLUTION FACTORS

- Waste water treatment

methods	temp °C	days observed	feed mg/l	days acclim	% theor oxidation	% removed
RW, CO_2, CAN	20	8	10	17	60	100
RW, CO_2, CAN	20	13	50	30+	60	100
RW, CO_2, CAN	5	35	50	30+ at 20°C	60	100
ASC, CAN	22-25	28	55	28	75+	95+

(93)

D BIOLOGICAL EFFECTS

- Fish pinperch TLm (24 hr) 0 215 mg/l, in sea water (245)
  fathead minnow, TLm (96 hr) 0 9 mg/l (41)
  bluegill: TLm (24-96 hr) 4 0-0 90 mg/l (41)
  guppies TLm (96 hr) 1 37 mg/l (41)
- Mammalia rat acute oral LD_{50} 21 mg/kg (211)

landrin

D BIOLOGICAL EFFECTS

- Insects
  fourth instar larval *Chironomus riparius* 24 hr LC_{50} 51 4 ppb (1853)

LAS *see* linear alkyl sulfonates

lauraldehyde *see* dodecanal

lauric acid (dodecanoic acid)

$CH_3(CH_2)_{10}COOH$

A fatty acid occurring in many vegetable fats as the glyceride, especially in coconut oil and laurel oil

Use: alkyd resins, wetting agents, soaps; detergents, cosmetics, insecticides, food additives

A. PROPERTIES: colorless solid, m.w. 200 31, m p 44°C, b p. 225°C at 100 mm, v p 1 mm at 121°C, sp gr. 0.871 at 50°C; log P_{oct} 4.20

B. AIR POLLUTION FACTORS:

- Odor: characteristic: quality: like oil of bay
  T.O.C. = 0.028 mg/cu m = 3.4 ppb (307)
  detection: 0.1 mg/cu m (778, 779)
  recognition: 0 004-0.005 mg/cu m (610)

- Ambient air quality
  glc's Detroit freeway interchange Nov 1963 13 7 µg/1,000 cu m
  New York high-traffic city location 39 4 µg/1,000 cu m (100)
  organic fraction of suspended matter
  Bolivia at 5200 m altitude (Sept -Dec 1975) 1 4-1 7 µg/1,000 cu m
  residential area, 10 km south of Antwerp, Belgium (Jan -April 1976) 4 5-8 4 µg/1,000 cu m (428)
  glc's in residential area (Belgium) oct 1976
  in particulate phase 0 01 ng/cu m
  in gas phase 30 3 ng/cu m (1289)

C WATER POLLUTION FACTORS

Waste water treatment

A S after 6 hr 4 1% of ThOD
12 hr 4 3% of ThOD
24 hr 6 1% of ThOD (89)

D BIOLOGICAL EFFECTS

Mammals rat oral ingestion no effect: 35% in diet for 2 years (211)

laurylalcohol *see* 1-dodecanol

laurylguanidineacetate *see* n-dodecylguanidineacetate

laurylsulfate, sodium (dodecylsulfate, sodium)

$CH_3(CH_2)_{11}OSO_3Na$

Use wetting agent in textiles, detergent in toothpaste, food additive and surfactant

A PROPERTIES small white or yellow crystals, m w 288 38; m p 204-207°C, log P_{oct} 1.60

C. WATER POLLUTION FACTORS

- Biodegradation
  at 17 mg/l (inoculum sew) no degradation after 30 days, (no salt mentioned) (488)

D. BIOLOGICAL EFFECTS:

- Toxicity threshold (cell multiplication inhibition test).

bacteria (*Pseudomonas putida*):	290 mg/l	(1900)
green algae (*Scenedesmus quadricauda*):	0 02 mg/l	(1900)
protozoa (*Entosiphon sulcatum*).	40 mg/l	(1900)
protozoa (*Uronema parduczi Chatton-Lwoff*):	0 75 mg/l	(1901)

- Fish.

	LC_{50} (FT) 48 hr	96 hr	10 d
trout	5.95 mg/l	4.62 mg/l	2.85 mg/l at 15°C
zebrafish (*Brachydanio rerio*)	8.81 mg/l	7.97 mg/l	7.97 mg/l at 25°C
flagfish (*Jordanella floridae*)	10.0 mg/l	8.10 mg/l	6 90 mg/l at 25°C

(479)

REFERENCE 14

McGraw-Hill Encyclopedia of the Geological Sciences

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Daniel N. Lapedes

Editor in Chief

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Table 2. Average percentages of the major and some micro elements in subsurface soil clays and crustal rocks

Soil order:	Alfisol	Inceptisol	Mollisol	Oxisol	Spodosol	Ultisol	Crustal rocks
Si	19.20	24.69	23.01	12.43	5.79	16.02	27.72
Al	12.38	19.63	10.29	19.33	15.86	17.49	8.13
Fe	8.04	3.81	6.83	10.83	3.29	11.96	5.00
Ca	.69	.00	3.39	.10	.29	.15	3.63
Mg	1.20	.40	1.62	.46	.15	.08	2.09
Na	.18	2.52	.04	.00	.27	.00	2.83
K	3.62	n.d.	1.20	.07	.40	.22	2.59
Ti	.40	.28	.44	1.32	.16	.50	.44
Mn	.06	n.d.	.06	.08	.06	.05	.10
P	.14	n.d.	.14	.27	.17	.12	.11

characteristics and clay content of the soil.) All other soils are termed organic. Carbon, oxygen, hydrogen, nitrogen, phosphorus, and sulfur are the most important constituents of organic soils and of soil organic matter in general. Carbon, oxygen, and hydrogen are most abundant; the content of nitrogen is often about one-tenth that of carbon, while the content of phosphorus or sulfur is usually less than one-fifth that of nitrogen (Table 1). The number of organic compounds into which these elements are incorporated in soil is very large, and the elucidation of the chemistry of soil organic matter remains a challenging problem. *See* HUMUS, GEOCHEMISTRY OF.

Besides oxygen, the most abundant elements found in mineral soils are silicon, aluminum, and iron (Table 2). The distribution of chemical elements will vary considerably from soil to soil and, in general, will be different in a specific soil from the distribution of elements in the crustal rocks of the Earth. Often this difference may be understood in terms of pedogenic weathering processes and the chemical reactions that accompany them. Some examples are the illuvial accumulation of aluminum and iron oxides in the B horizon of a Spodosol and of $CaCO_3$ in the calcic horizon of a Mollisol. The most important micro or trace elements in soil are boron, copper, manganese, molybdenum, and zinc, since these elements are essential in the nutrition of green plants. Also important are cobalt, which is essential in animal nutrition, and selenium, cadmium, and nickel, which may accumulate to toxic levels in soil. The average distribution of trace elements in soil is not greatly different from that in crustal rocks (Table 3). This indicates that the total content of a trace element in soil usually reflects the content of that element in the soil parent material and, generally, that the trace element content of soil often is not affected substantially by pedochemical processes.

The elemental composition of soil varies with depth below the surface because of pedochemical weathering. The principal processes of this type that result in the removal of chemical elements from a given soil horizon are: (1) soluviation (ordinary dissolution in water), (2) cheluviation (complexation by organic or inorganic ligands), (3) reduction, and (4) suspension. Soluviation, cheluviation, and reduction include leaching by water into lower horizons; suspension involves removal by erosion or by translocation downward along soil pores. The principal effect of these four processes is the appearance of illuvial horizons in which compounds such as aluminum and iron oxides, aluminosilicates, or calcium carbonate have been precipitated from solution or deposited from suspension. *See* WEATHERING PROCESSES.

Minerals. The minerals in soils are the products of physical, geochemical, and pedochemical weathering. Soil minerals may be either amorphous or crystalline. They may be classified further, approximately, as primary or secondary minerals, depending on whether they are inherited from parent rock or are produced by chemical weathering, respectively.

Primary minerals in soil. The bulk of the primary minerals that occur in soil are found in the silicate minerals, such as the olivines, garnets, pyroxenes, amphiboles, micas, feldspars, and quartz. The feldspars, micas, amphiboles, and pyroxenes commonly are hosts for trace elements that may be released slowly into the soil solution as weathering of these minerals continues. Chemical weathering of the silicate minerals is responsible for producing the most important secondary minerals in soil. The general scheme of the weathering sequence is shown in Fig. 1. *See* SILICATE MINERALS.

Secondary minerals in soil. The important secondary minerals that occur in soil are found in the clay fraction. These include aluminum and iron hydrous oxides (usually in the form of coatings on other minerals), carbonates, and aluminosilicates. The term "allophane" is applied to the x-ray amorphous, hydrous aluminosilicates that are

Table 3. Average amounts of trace elements commonly found in soils and crustal rocks

Trace element	Soil, ppm*	Crustal rocks, ppm
As	6	1.8
B	10	10
Cd	.06	.2
Co	8	25
Cr	100	100
Cu	20	55
Mo	2	1.5
Ni	40	75
Pb	10	13
Se	.2	.05
V	100	135
Zn	50	70

*ppm = parts per million.

REFERENCE 15

Chemosphere, Vol.17, No.1, pp 51-57, 1988
Printed in Great Britain

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R7757

OCCURRENCE OF PCDD AND PCDF IN DIFFERENT KINDS OF PAPER

H. Beck, K. Eckart, W. Mathar and R. Wittkowski

Max von Pettenkofer-Institut, Bundesgesundheitsamt,
Postfach 330013, D-1000 Berlin 33, F.R.G.

Abstract

PCDD and PCDF were determined in 5 samples of paper with amounts mainly in the ppt range. About a fifth of the isomers belongs to the toxic tetra, penta and hexa 2,3,7,8-substituted compounds. 2,3,7,8-TCDF has been analyzed in relatively high amounts, whereas hepta and octa congeners were comparatively low.

Introduction

It is well known that PCDD and PCDF may result from condensation of chlorophenols formed by chlorination of natural occuring phenolic compounds such as lignin (25 % in wood) and other plant constituents (1,2). This also includes the reaction of chlorine with water containing humic and fulvic acids originating from the soil. Onodera et al (3) succeeded in finding some chlorinated phenoxyphenols (predioxins) arising from the treatment of water contaminated with phenolic compounds with chlorine. These potential precursors for dioxins may also be formed during industrial production of chlorophenolic compounds, particularly chlorobleeching of wood pulp in paper industry (4,5,6,7). Investigations of wastewater effluents from a paper mill in regard to chlorinated reaction products yielded amounts for chlorinated phenols and guaiacols in the µg/l range (7).

Recent findings of high levels of PCDF and TCDD in a sedimentation lagoon near a Swedish paper mill (8), in fish (9,10) and crabs in particular (11) of the Baltic Sea support the assumption that pulp bleeching might be a potential source of PCDF/PCDD.

Within the scope of our analyses of different foodstuffs (12,13) we got indications of two additional nontoxic TCDD isomers in the blanks. In addition to that a remarkable irregularity of the isomeric pattern was observed when using laboratory filter paper for sample preparation. Through these findings and the data from the literature cited above we come to the conviction that investigations of different kinds of paper would be a useful contribution to the discussion about dioxins spreading in the environment.

Table 2: TCDD equivalent concentrations (ppt) calculated using the TCDD Equivalent Factors (TEF) (16) *

congener	TEF	newsprint	laboratory-filter	coffee filter	cosmetic tissue	recycled wr. paper
2,3,7,8-TCDF	0.1	-	0.4	0.57	1.3	1.3
Σ TCDF	0.01	0.026	0.08	0.043	0.26	0.13
2,3,7,8-TCDD	1.0	-	0.3	1.0	1.1	0.6
Σ TCDD	0.01	-	0.017	-	0.052	0.082
1,2,3,7,8-PeCDF	0.1	-	-	-	0.04	-
2,3,4,7,8-PeCDF	0.1	-	-	-	0.04	-
Σ PeCDF	0.01	-	0.095	0.037	0.087	0.028
1,2,3,7,8-PeCDD	0.1	-	0.02	-	0.06	0.09
Σ PeCDD	0.01	0.016	0.158	0.021	0.324	0.471
2,3,4,6,7,8-HxCDF	0.1	-	0.01	0.02	-	0.02
Σ HxCDF	0.01	0.008	0.019	0.01	0.029	0.03
1,2,3,6,7,8-HxCDD	0.1	0.12	0.32	-	1.2	4.8
1,2,3,7,8,9-HxCDD	0.1	-	0.15	-	0.42	1.9
Σ HxCDD	0.01	0.065	0.183	0.021	0.678	2.68
Σ HpCDF	0.001	0.0018	0.0011	0.0003	0.0029	0.0015
Σ HpCDD	0.001	0.0043	0.0042	0.001	0.015	0.037
OCDF	0.001	0.0019	0.0003	-	0.0024	0.0015
OCDD	0.001	0.037	0.0064	0.0019	0.056	0.058
total		0.3	1.8	1.7	5.6	12.2

* The sum values include no toxic congeners

Table 1: Concentrations of PCDF and PCDD in paper (ppt) *

congener	newsprint	laboratory-filter	coffee-filter	cosmetic tissue	recycled scr. paper
2,3,7,8-TCDF	-	4.0	5.7	13	13
Σ TCDF	2.6	12	10	39	26
2,3,7,8-TCDD	-	0.3	1.0	1.1	0.6
Σ TCDD	< 0.4	2.0	1.0	6.3	8.8
1,2,3,7,8-PeCDF	-	-	-	0.4	-
2,3,4,7,8-PeCDF	-	-	-	0.4	-
Σ PeCDF	< 0.4	9.5	5.7	9.5	2.8
1,2,3,7,8-PeCDD	-	0.2	-	0.6	0.9
Σ PeCDD	1.6	16	2.1	33	49
2,3,4,6,7,8-HxCDF	-	0.1	0.2	-	0.2
Σ HxCDF	0.8	2.0	1.2	2.9	3.2
1,2,3,6,7,8-HxCDD	1.2	3.2	-	12	48
1,2,3,7,8,9-HxCDD	-	1.5	-	4.2	19
Σ HxCDD	7.7	23	2.1	79	335
Σ HpCDF	1.8	1.1	0.3	2.9	1.5
Σ HpCDD	4.3	4.2	1.0	15	37
OCDF	1.9	0.3	-	2.4	1.5
OCDD	37	6.4	1.9	56	58

* The sum values include the toxic congeners

REFERENCE 16

New York State Department of Environmental Conservation
21 South Putt Corners Road, New Paltz, New York 12561
914-255-5453

Thomas C. Jorling
Commissioner

December 14, 1988

Mr. Edward Maikish
Lawler Matusky & Skelly
One Blue Hill Plaza
P. O. Box 1509
Pearl River, NY 10886

RE: File No. 518018
Tuxedo C & D

Dear Mr. Maikish:

I have reviewed both our Significant Habitat and Endangered Species files.

I found no records of either located within the above referenced project area.

I have identified the following concerns:

1. A threatened timber rattlesnake snake den located within 1 mile
2. A threatened lake chubsucker location within 2 miles
3. Freshwater Wetlands SL-4, SL-5, SL-10, SL-14, SL-15, SL-16, SL-21, SL-22, SL-24. All within 2 miles.

Sincerely,

Joel L. Hermes
Senior Wildlife Biologist
Region 3

JLH:sw

APPENDIX B

APPENDIX B

7 APRIL 1988 NUS-PREPARED EPA PRELIMINARY ASSESSMENT (Form 2070-12)

MK/DE 3 copies

02-8804-01-PA
Rev. No. 0

PRELIMINARY ASSESSMENT
TUXEDO PARK CONSTRUCTION AND DEMOLITION
TUXEDO, NEW YORK

PREPARED UNDER

TECHNICAL DIRECTIVE DOCUMENT NO. 02-8804-01
CONTRACT NO. 68-01-7346

FOR THE

ENVIRONMENTAL SERVICES DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

APRIL 7, 1988

NUS CORPORATION
SUPERFUND DIVISION

SUBMITTED BY:

STEPHEN E. MAYBURY
SITE MANAGER

REVIEWED/APPROVED BY:

Ronald M Naman
RONALD M. NAMAN
FIT OFFICE MANAGER

NUS
CORPORATION

Mr. DE
EPA has received
3 Congressional request
to do something at
site
Copy to LMS MC
5/10/88

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT

02-8804-01-PA
Rev. No. 0

Tuxedo Park Construction and Demolition **Site Name**	New Site **EPA Site ID Number**
Route 17 Tuxedo, Orange County, New York **Address**	02-8804-01 **TDD Number**

Date of Site Visit: Off-Site Reconnaissance, Conducted April 4, 1987

SITE DESCRIPTION

The Tuxedo Park Construction and Demolition Site is a 10- to 12-acre landfill located in the town of Tuxedo, Orange County, New York. The landfill is also identified by the name of the Barone Demolition Landfill. The privately owned landfill is located in a rural area adjacent to Route 17 and within 200 feet of the Ramapo River. The site is a construction and demolition debris landfill that began operation in February 1987 and is suspected of receiving hazardous waste. The landfill is also known to be the source of significant odor problems that have resulted in citizen complaints. In March 1987 New York State Department of Environmental Conservation (NYSDEC) inspections of the site found improper landfill practices including disposal of materials not of a construction and demolition nature. It is also believed that landfill materials were disposed of on an adjacent property owned by the Georgia Tech Foundation. In October 1987 the landfill received a court-ordered temporary restraining order prohibiting further disposal on site. The landfill is currently being graded and covered.

Analytical results of samples collected by the NYSDEC indicate that materials brought onto the site, from a Mahwah, New Jersey location, for landfill cover are contaminated with low levels of polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs). The contaminated cover material was spread over areas of the site. Additional samples collected by the NYSDEC of waste materials and landfill soil gas indicate the presence of over 20 volatile organic and semivolatile organic Target Compound List pollutants.

PRIORITY FOR FURTHER ACTION: High __ Medium __ NFRAP X — ONLY BECAUSE DEC IS DOING A PHII

RECOMMENDATIONS

No further action is recommended at this time as the NYSDEC has been leading the investigation and enforcement activities regarding the landfill. NYSDEC representatives indicate that a Phase 2 study will be conducted at the site starting in the early summer of 1988. A Phase 1 study will not be completed due to the nature of the site and the information currently available. It is recommended that a followup of the site's regulatory status be conducted in the future.

Prepared by: Stephen E. Maybury
of NUS Corporation

Date: April 7, 1988

PRELIMINARY ASSESSMENT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

01 STATE 02 SITE NUMBER
NY New Site

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)
Tuxedo Park Construction and Demolition

02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
Route 17, 2.8 miles north of the Orange & Rockland County Lines

03 CITY
Tuxedo Park

04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST.
NY	10987	Orange	087	NY22

09 COORDINATES

LATITUDE	LONGITUDE
4 1° 1 2' 3 6". N	0 7 4° 1 1' 0 2". W

10 DIRECTIONS TO SITE (Starting from nearest public road)

Travel north on Route 17 from the Town of Tuxedo Park. The landfill is on the right side of Route 17 approximately 1 mi from the town.

III. RESPONSIBLE PARTIES

01 OWNER (If known)
Renard Barone (See Attachment A)

02 STREET (Business, mailing, residential)
P.O. Box 656

03 CITY
Tuxedo

04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
NY	10987	(914) 351-5453

07 OPERATOR (If known and different from owner)
Frank and Lillian Sacco (See Attachment A)

08 STREET (Business, mailing, residential)
4 Echo Road

09 CITY
Montvale

10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
NJ	07645	

13 TYPE OF OWNERSHIP (Check one)

X A. PRIVATE ___ B. FEDERAL: ________ (Agency name) ___ C. STATE ___ D. COUNTY ___ E. MUNICIPAL

___ F. OTHER: ________ (Specify) ___ G. UNKNOWN

14. OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)

___ A. RCRA 3001 DATE RECEIVED: __/__/__ ___ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: __/__/__

X C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION

X YES DATE: 11 / 19 / 87

___ NO

BY (Check all that apply)

___ A. EPA ___ B. EPA CONTRACTOR X C. STATE ___ D. OTHER CONTRACTOR

___ E. LOCAL HEALTH OFFICIAL ___ F. OTHER: ________ (Specify)

CONTRACTOR NAME(S): ________

02 SITE STATUS (Check one)

X A. ACTIVE ___ B. INACTIVE ___ C. UNKNOWN

03 YEARS OF OPERATION

2/87 / 10/87 ___ UNKNOWN
BEGINNING ENDING

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

The site is a construction and demolition landfill suspected of receiving hazardous waste. Analytical results of soil samples collected from the material used to cover the landfill indicate the presence of low levels of PCBs and PAHS. Additional waste and soil-gas samples collected indicate the presence of volatile organic and semivolatile organic Targe Compound List pollutants on site.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

Contaminants on site pose a threat to the surrounding population via potential contamination of air, groundwater drinking supplies, and direct contact. The nearest drinking water well is located approximately 100 feet from the landfill. The landfill is located within 200 feet of the Ramapo River, a major recreational river in the area. The site also lies in the Ramapo River Basin, a primary New York State aquifer (Ramapo River - Mahwah River Aquifer) providing water for over 81,00 people.

IV. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)

___ A. HIGH (Inspection required promptly) ___ B. MEDIUM (Inspection required) X NFRAP (No further Remedial Action Planned)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NUMBER
Amy Brochu	U.S. EPA, Edison, NJ	(201) 906-6802

04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
Stephen E. Maybury	U.S. EPA	NUS Corp.	(201) 225-6160	04 / 07 / 88

EPA FORM 2070-12 (7-81)

III. RESPONSIBLE PARTIES CONTINUED

01 OWNER (If known) Sarkis Khouroagian	02 STREET (Business, mailing, residential) Address Unknown		
03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
07 OPERATOR (If known and different from owner) Material Transport Service	08 STREET (Business, mailing, residential) 1025 Sawmill River Road		
09 CITY Yonkers	10 STATE NY	11 ZIP CODE	12 TELEPHONE NUMBER

02-8804-01-PA
Rev. No. 0

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION
01 STATE 02 SITE NUMBER
NY New Site

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

X A. SOLID
X B. POWDER, FINES
X C. SLUDGE
_ D. OTHER: ____ (Specify)
_ E. SLURRY
_ F. LIQUID
_ G. GAS

02 WASTE QUANTITY AT SITE

(Measures of waste quantities must be independent)

TONS Unknown
CUBIC YARDS Unknown
NO. OF DRUMS Unknown

03 WASTE CHARACTERISTICS (Check all that apply)

X A. TOXIC
_ B. CORROSIVE
_ C. RADIOACTIVE
X D. PERSISTENT
X E. SOLUBLE
_ F. INFECTIOUS
_ G. FLAMMABLE
_ H. IGNITABLE
_ I. HIGHLY VOLATILE
_ J. EXPLOSIVE
_ K. REACTIVE
_ L. INCOMPATIBLE
_ M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE	Unknown		It is suspected that contaminated materials may have been disposed of with construction and demolition materials. In addition, an unknown quantity of PCB- and PAH-contaminated material was spread on the site as cover material.
OLW	OILY WASTE	Unknown		
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS	Unknown		
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
OCC	Aroclor - 1221	11104-28-2	Landfill	1.04	ug/g
OCC	Aroclor - 1016/1242	999	Landfill	0.36	ug/g
OCC	Aroclor - 1254	1109769-2	Landfill	0.16	ug/g
OCC	Acenaphthene	83-32-9	Landfill	34,000	ug/kg
OCC	Dibenzofuran	132-64-9	Landfill	16,000	ug/kg
OCC	Fluorene	86-73-7	Landfill	22,000	ug/kg
OCC	Phenanthrene	85-01-8	Landfill	67,000	ug/kg
OCC	Anthracene	120-12-7	Landfill	20,000	ug/kg
OCC	Fluoranthene	206-44-0	Landfill	92,000	ug/kg
OCC	Pyrene	129-00-0	Landfill	74,000	ug/kg
OCC	Butylbenzyl phthalate	85-68-7	Landfill	52,000	ug/kg
OCC	Benzo(a)anthracene	56-55-7	Landfill	45,000	ug/kg
OCC	Chrysene	218-01-9	Landfill	45,000	ug/kg
OCC	Benzo(k)fluoranthene	207-08-9	Landfill	70,000	ug/kg
OCC	Benzo(a)pyrene	50-32-8	Landfill	40,000	ug/kg
OCC	Ideno(1,2,3 cd) pyrene	193-39-5	Landfill	24,000	ug/kg
OCC	Benzo(g,h,i)perylene	191-24-2	Landfill	21,000	ug/kg
OCC	2-Methylnaphthalene	91-507	Landfill	25,000	ug/kg
OCC	Tetrachloroethene	127-18-4	Landfill	680	ug/kg
OCC	Toluene	108-88-3	Landfill	760	ug/kg
OCC	Ethylbenzene	100-41-4	Landfill	630	ug/kg
OCC	Total xylenes	999	Landfill	4,700	ug/kg
OCC	Phenol	108-45-2	Landfill	7,000	ug/kg
OCC	Acetone	67-64-1	Landfill	2,400	ug/kg
OCC	Benzene	71-43-2	Landfill	750	ug/kg
OCC	Toluene	108-88-3	Landfill	16,000	ug/Cu. M.
OCC	Ethylbenzene	100-41-4	Landfill	8,800	ug/Cu. M.
OCC	Tetrachloroethene	127-18-4	Landfill	5,700	ug/Cu. M.
OCC	trans-1,2-Dichloroethene	156-60-5	Landfill	1,300	ug/Cu. M.
OCC	1,1-Dichloroethane	75-34-3	Landfill	270	ug/Cu. M.
OCC	Trichloroethene	79-01-6	Landfill	2,700	ug/Cu. M.

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS	Not Applicable		FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (See specific references, e.g., state files, sample analysis, reports)

Analytical results of soil samples collected by NYSDEC on 11/19/87, analysis by Cambridge Analytical Associates.
Analytical result of soil-gas samples collected by NYSDEC 11/17-19/87, analysis by NY State Dept. of Health.
Analytical results of samples collected by NYSDEC on 10/16/87, analysis by NY State Dept. of Health.

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE 02 SITE NUMBER
NY New Site

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 X A. GROUNDWATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: 700
02 OBSERVED (DATE:)
04 NARRATIVE DESCRIPTION
X POTENTIAL _ ALLEGED

Contaminants in the landfill may readily leach into groundwater as the site is believed to be located in an area of permeable overburden deposits consisting of sand and gravel. The landfill is situated in what is believed to be an old sand and gravel pit. Bedrock is believed to be between 5 and 10 feet below the land surface and outcrops in an area on site. Although background information is limited, wells in the area primarily use a crystallic bedrock as the aquifer. Potential also exists for usage of permeable overburden materials as a source of water for private wells in the area.

01 X B. SURFACE WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: unknown
02 OBSERVED (DATE:)
04 NARRATIVE DESCRIPTION
X POTENTIAL _ ALLEGED

The Ramapo River is located within 200 feet downgradient of the landfill. It is believed that a raised railroad grade located between the landfill and the river may prevent surface runoff from directly reaching the Ramapo River. The slope between the landfill and the railroad tracks was noted as very steep during the FIT 2 off-site reconnaissance. Potential exists for contaminants on site to reach the Ramapo River via groundwater discharge. The Ramapo River is used for recreational fishing.

01 X C. CONTAMINATION OF AIR
03 POPULATION POTENTIALLY AFFECTED: 3,096
02 OBSERVED (DATE:)
04 NARRATIVE DESCRIPTION
X POTENTIAL _ ALLEGED

The landfill has a history of odor problems and complaints. NYSDEC sampling results indicate the presence of several volatile organic compounds in soil- gas, air vent, and waste samples collected on the landfill that may pose a threat. Ambient air samples collected for volatile organic analysis in sorbent tubes did not detect any contaminants. Airborne particulates may also pose a threat of contamination as the site is open and not vegetated. An odor was noted during the Region 2 FIT off-site reconnaissance. The population of the town of Tuxedo is approximately 3,096.

01 X D. FIRE/EXPLOSIVE CONDITIONS
03 POPULATION POTENTIALLY AFFECTED: 3,096
02 OBSERVED (DATE:)
04 NARRATIVE DESCRIPTION
X POTENTIAL _ ALLEGED

The exact volume and constituents in waste disposed of on site are unknown. NYSDEC sampling results indicate the presence of volatile compounds on site that may pose a fire and/or explosion threat.

01 X E. DIRECT CONTACT
03 POPULATION POTENTIALLY AFFECTED: 650
02 OBSERVED (DATE:)
04 NARRATIVE DESCRIPTION
X POTENTIAL _ ALLEGED

The site is accessible to the public as there are no fences or other barriers preventing access. The site lies immediately adjacent to Route 17, a public roadway. The site is not capped and contaminated materials may not be covered. Cover material brought to the site is known to be contaminated with PCBs and PAHs. Based on a USGS topographic map house count, there are approximately 650 people within 1 mile.

01 X F. CONTAMINATION OF SOIL
03 AREA POTENTIALLY AFFECTED: 10-12 (ACRES)
02 X OBSERVED (DATE: 11/19/87)
04 NARRATIVE DESCRIPTION
_ POTENTIAL _ ALLEGED

Soil, waste, and soil-gas samples collected on site indicate contamination of soil with volatile organic, semivolatile organic, and PCB compounds.

01 X G. DRINKING WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: 700
02 OBSERVED (DATE:)
04 NARRATIVE DESCRIPTION
X POTENTIAL _ ALLEGED

Contaminants on site may leach into groundwater, a source for two noncommunity wells (serving 320 people) and an unknown number of private residential wells (estimated serving 380 people) within 3 miles of the site. The closest well is a private well located in a commercial establishment and residence less then 100 feet north of the site. The site lies in the Ramapo River Basin, the location of the Ramapo - Mahwah River Valley Aquifer. This aquifer is designated a primary aquifer in New York as it serves over 81,000 people in Rockland County. The Ramapo River is not a public drinking water source within 3-miles.

01 X H. WORKER EXPOSURE/INJURY
03 WORKERS POTENTIALLY AFFECTED: Unknown
02 OBSERVED (DATE:)
04 NARRATIVE DESCRIPTION
X POTENTIAL _ ALLEGED

Workers at the landfill may be exposed to contaminants by direct contact and air contamination on site. Fire and explosion may also pose a threat if contaminants are present in sufficient quantity and concentration. Workers on site are currently in the process of grading and covering the landfill.

01 I. POPULATION EXPOSURE/INJURY
03 POPULATION POTENTIALLY AFFECTED: 3,096
02 OBSERVED (DATE:)
04 NARRATIVE DESCRIPTION
X POTENTIAL _ ALLEGED

Population exposure may occur via contamination of air, local drinking water wells, and direct contact with contaminants on the site. Fire and explosion on site may also pose a threat due to the unknown nature and quantity of all wastes on site.

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE 02 SITE NUMBER
NY New Site

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 X J. DAMAGE TO FLORA
04 NARRATIVE DESCRIPTION
02 _ OBSERVED (DATE: ________) X POTENTIAL _ ALLEGED

Migration of contaminants on site via surface runoff or groundwater discharge to the Ramapo River may damage aquatic flora. The Ramapo River is located less then 200 feet downslope of the landfill.

01 X K. DAMAGE TO FAUNA
04 NARRATIVE DESCRIPTION (include name(s) of species)
02 _ OBSERVED (DATE: ________) X POTENTIAL _ ALLEGED

Migration of contaminants on site to the Ramapo River may damage fish. The Ramapo River is used extensively for recreational fishing and is stocked with trout by the NYSDEC.

01 X L. CONTAMINATION OF FOOD CHAIN
04 NARRATIVE DESCRIPTION
02 _ OBSERVED (DATE: ________) X POTENTIAL _ ALLEGED

Potential exists for contamination of trout and other fish caught in the Ramapo River. These fish are potentially eaten by humans.

01 X M. UNSTABLE CONTAINMENT OF WASTES
(Spills/runoff/standing liquids/leaking drums)
02 _ OBSERVED (DATE: ________) X POTENTIAL _ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 850
04 NARRATIVE DESCRIPTION

Waste on site is not properly contained as there are no liners, berms, or engineered cover materials preventing off-site migration of contaminants. An unknown quantity of contaminated cover material was spread over portions of the landfill.

01 X N. DAMAGE TO OFFSITE PROPERTY
04 NARRATIVE DESCRIPTION
02 _ OBSERVED (DATE: ________) X POTENTIAL _ ALLEGED

Potential exists for off-site migration of contaminants to the drainage channel along the adjacent railroad. Off-site migration of contaminants via groundwater flow may also damage off-site property. Windblown particulates may also carry contaminants to off-site properties. It is believed that landfill material was dumped on an adjacent property owned by the Georgia Tech Foundation.

01 X O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs
04 NARRATIVE DESCRIPTION
02 _ OBSERVED (DATE: ________) X POTENTIAL _ ALLEGED

Potential exists for damage to the drainage channel along the adjacent railroad. A corrugated metal storm drainage pipe currently channels water from upslope properties under the landfill to the railroad drainage channel.

01 X P. ILLEGAL/UNAUTHORIZED DUMPING
04 NARRATIVE DESCRIPTION
02 X OBSERVED (DATE: 3/18/87) _ POTENTIAL _ ALLEGED

The landfill was exempt from NYSDEC Solid Waste permit requirements as a construction and demolition landfill. Inspection of the site by the NYSDEC has documented the presence of waste materials other than construction and demolition debris. It is suspected that hazardous waste may have been dumped on site.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

While conducting a site inspection, NYSDEC representative Richard Gardineer noted rusted and crushed drums. There is no information regarding the contents of the drums.

III. TOTAL POPULATION POTENTIALLY AFFECTED: 3,096

IV. COMMENTS

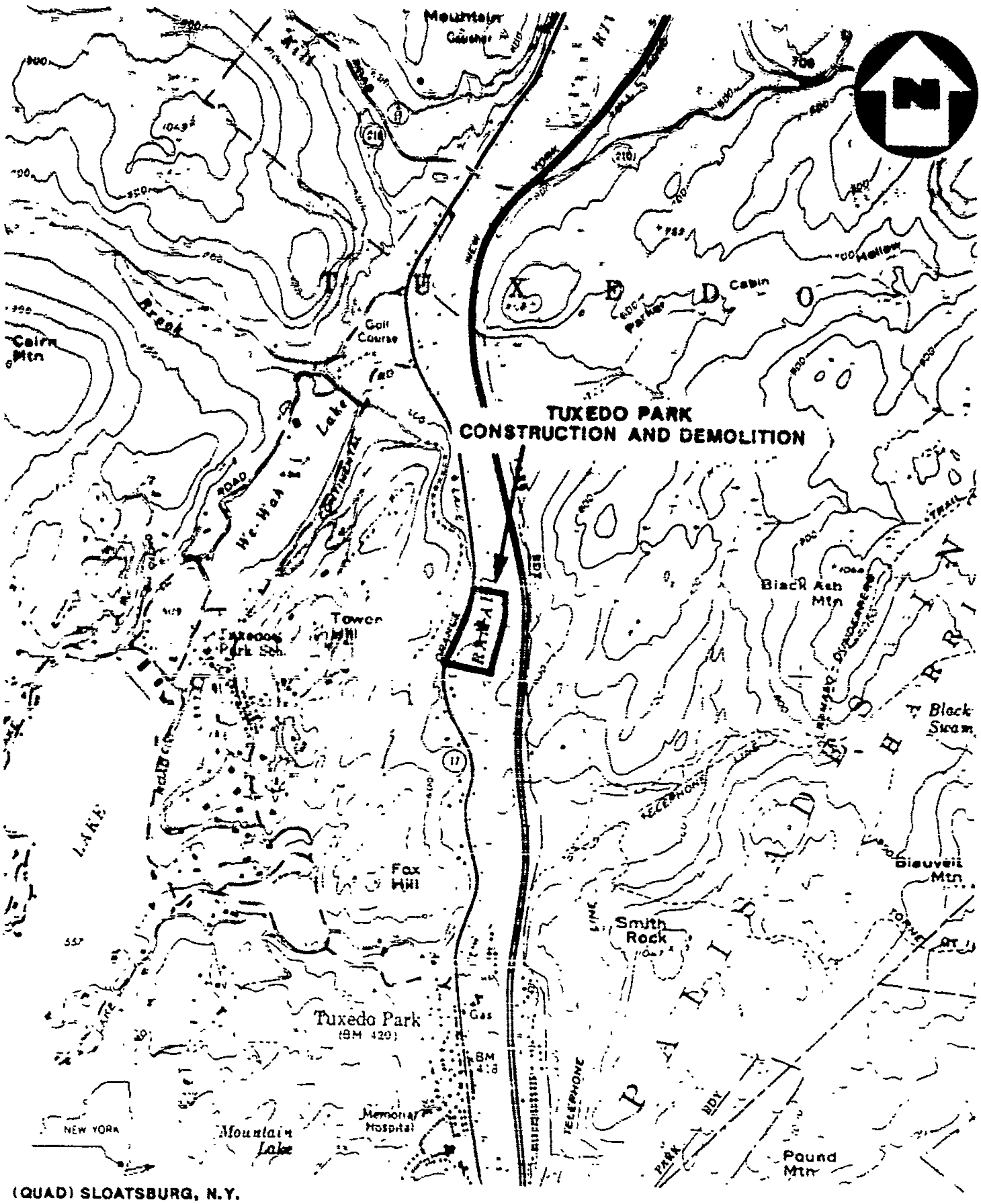
The site was originally a construction and demolition landfill and therefore exempt from New York State permit requirements. However, NYSDEC inspections of the site noted nonconstruction materials present and violations of standard solid waste facility permit requirements. Violations of standard permit requirements included no access control, solid waste not effectively controlled, lift height greater than 10 feet, and odor problems.
Contaminated cover material is believed to have originated from the Abex Corporation of Mahwah, New Jersey.

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Affidavit in opposition to motion to vacate, Index No. 7427/87, by Richard Gardineer of the NYSDEC, 10/30/87.
Affidavit in support, by Richard Gardineer of the NYSDEC, 9/30/87.
Personal interview of G. Angell, Geologist, NYSDEC, by S. Maybury of NUS on 4/4/88. Re: Geology and drainage.
Personal interview of R. Gardineer, NYSDEC, by S. Maybury of NUS Corp. 4/6/88. Re: Site information.
New York State Atlas of Community Water System sources, 1982.
Telecon Note: Conversation between S. Barba of the Tuxedo Water Dept. and S. Maybury of NUS Corp., 4/6/88, Re: Water source for Tuxedo and area.
Telecon Note: Conversation between V. Marsh, Tuxedo Town Clerk, and S. Maybury of NUS Corp., 4/6/88, 4/7/88. Re: Wells and population of Tuxedo.
NUS Corporation, Region 2 FIT off-site reconnaissance conducted 4/4/88, TDD No. 02-8804-01.
U.S. Department of the Interior, Geologic Survey Topographic Map, 7.5 minute series, Sloatsburg N.Y. - N.J., 1955.

APPENDIX A

MAPS AND PHOTOS


N
Mountain
TUXEDO
Golf Course
Cairn Mtn
Brook
We-Wah Lake
ROAD
TUXEDO PARK CONSTRUCTION AND DEMOLITION
Parker Cabin
Hollow
Tower Hill
Tuxedo Park Sch.
Black Ash Mtn
Black Swamp
TELEPHONE LINE
Fox Hill
Smith Rock
Blauvelt Mtn.
Tuxedo Park (BM 420)
Gas
BM 418
Memorial Hospital
Mountain Lake
NEW YORK
PALISADES INTERSTATE PARK
PARK BDY
Pound Mtn
17
210
NEW YORK THRUWAY
TRAIL

(QUAD) SLOATSBURG, N.Y.

SITE LOCATION MAP

TUXEDO PARK CONSTRUCTION AND DEMOLITION

TUXEDO, N.Y.

SCALE: 1" = 2000'

FIGURE 1

NUS CORPORATION

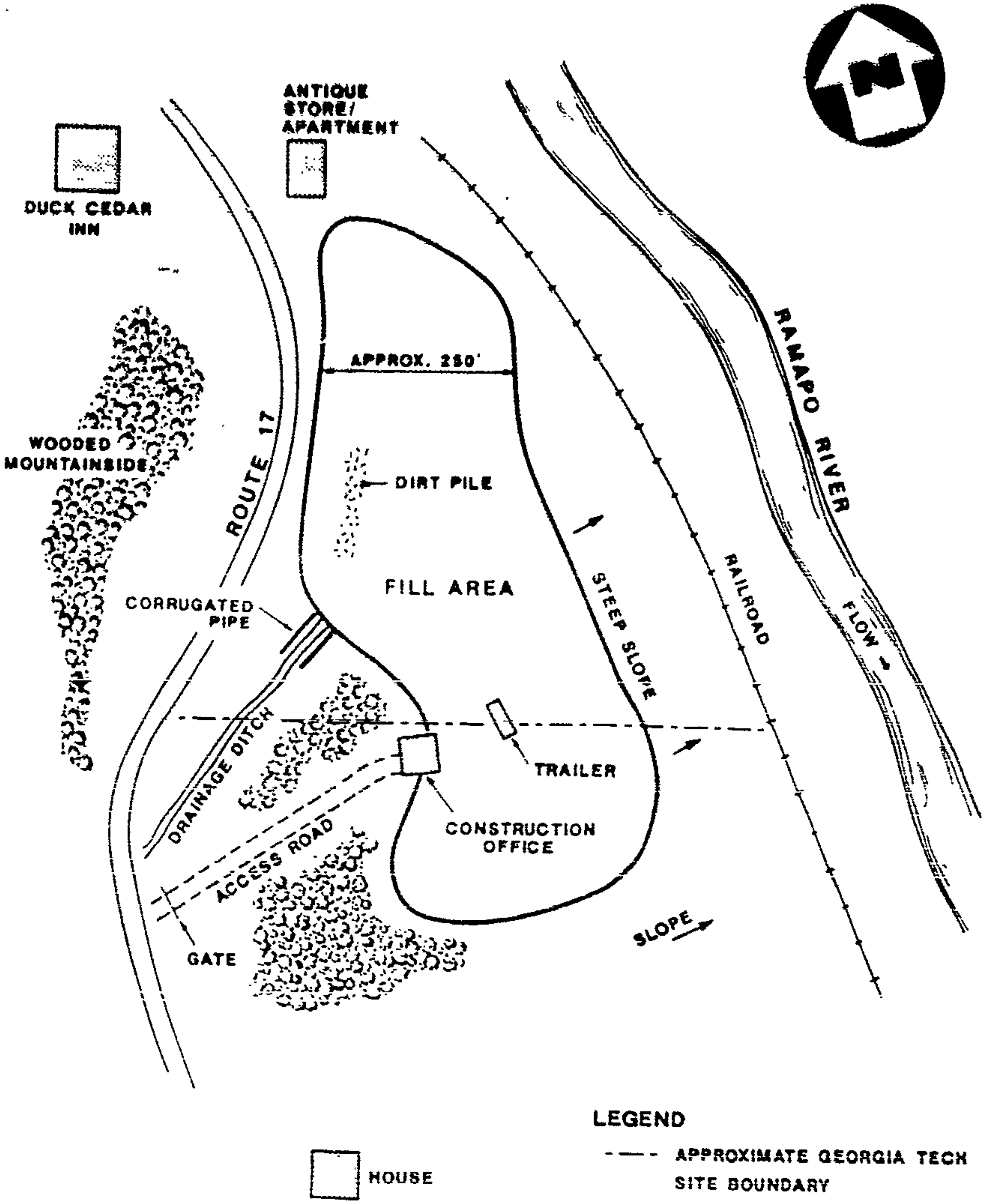

N
ANTIQUE STORE/ APARTMENT
DUCK CEDAR INN
WOODED MOUNTAINSIDE
ROUTE 17
APPROX. 250'
DIRT PILE
FILL AREA
CORRUGATED PIPE
DRAINAGE DITCH
ACCESS ROAD
GATE
TRAILER
CONSTRUCTION OFFICE
STEEP SLOPE
SLOPE
RAILROAD
RAMAPO RIVER
FLOW
LEGEND
HOUSE
APPROXIMATE GEORGIA TECH SITE BOUNDARY

FIGURE 2

SITE MAP

TUXEDO PARK CONSTRUCTION AND DEMOLITION

TUXEDO, N.Y.

(NOT TO SCALE)

NUS CORPORATION

PHOTOGRAPH LOG
TUXEDO PARK CONSTRUCTION AND DEMOLITION
TUXEDO, NEW YORK

Off-Site Reconnaissance: April 4, 1988

TUXEDO PARK CONSTRUCTION AND DEMOLITION
TUXEDO, NEW YORK
APRIL 4, 1988

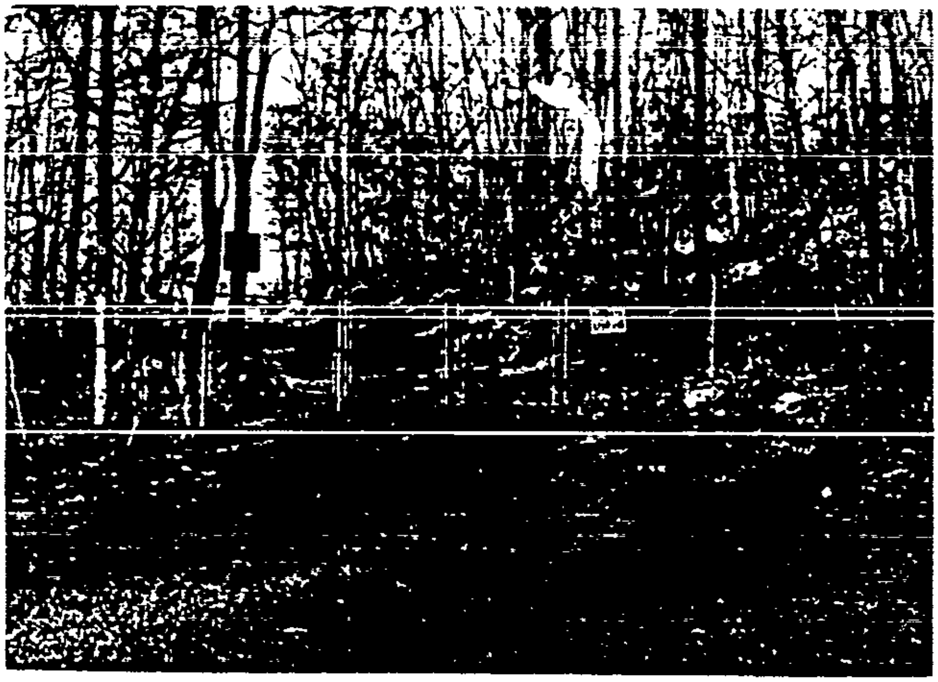
PHOTOGRAPH INDEX

Photo Number	Description	Time
1P-1	Looking southeast from the antique store parking lot at the fill area.	1738
1P-2	Looking northwest from Route 17 at the site access road.	1740
1P-3	The corrugated steel drainage pipe going under the landfill.	1745
1P-4	Looking southeast from Route 17 at the construction trailer and construction office near the landfill. The construction office is on the Georgia Tech property.	1747
1P-5	The landfill area with the Ramapo River in the background.	1750

~~Photograph 1P-1 taken by Stephen Maybury.~~
Photographs 1P-2 through 1P-5 taken by M. Vogel.

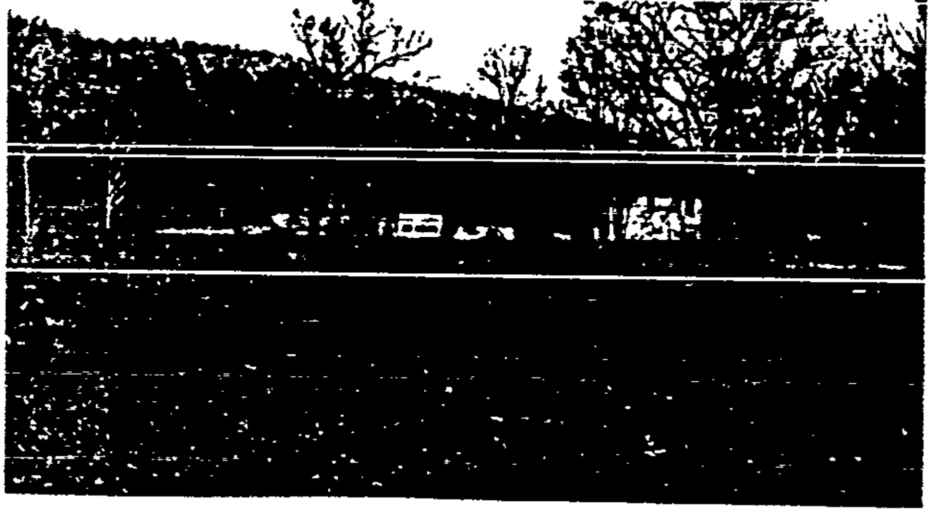
TUXEDO PARK CONSTRUCTION AND DEMOLITION, TUXEDO, NEW YORK

1P-1 April 4, 1988 1738
Looking southeast from the antique store parking lot at the fill area.



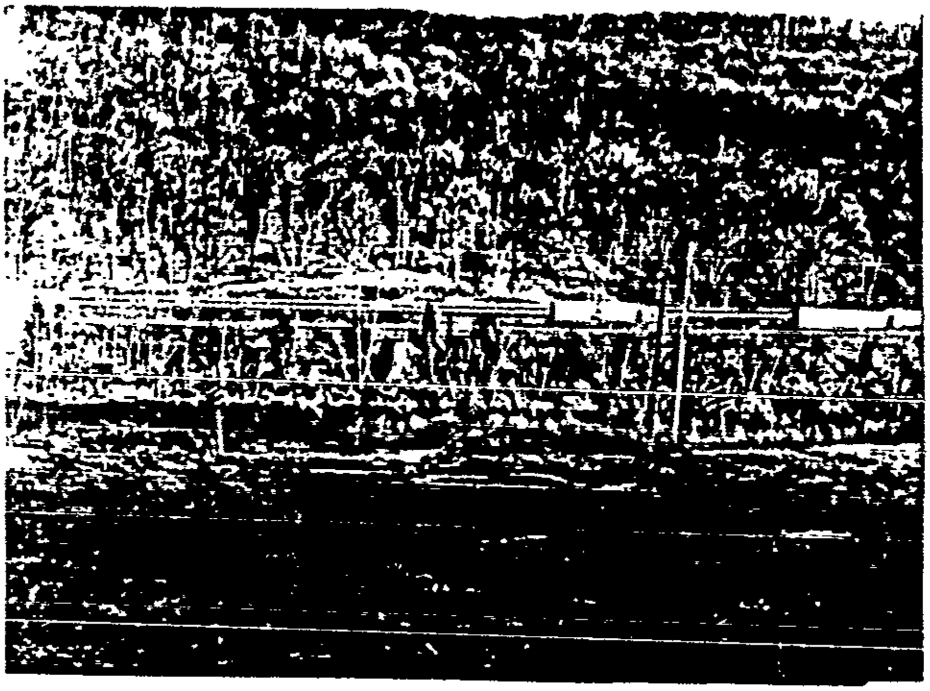
1P-2 April 4, 1988 1740
Looking northwest from Route 17 at the site access road.

1P-3 April 4, 1988 1745
The corrugated steel drainage pipe going under the landfill.



1P-4 April 4, 1988 1747
Looking southeast from Route 17 at the construction trailer and construction office near the landfill. The construction office is on the Georgia Tech property.

TUXEDO PARK CONSTRUCTION AND DEMOLITION, TUXEDO, NEW YORK



1P-5 April 4, 1988 1750
The landfill area with the Ramapo River in the background.

APPENDIX B

BACKGROUND INFORMATION

(POOR FILE COPY, SOME PAGES MAY BE HARD TO READ.)

OSRIRF 10/12/87
Page 1 of 5

PRELIMINARY ASSESSMENT
OFF SITE RECONNAISSANCE
INFORMATION REPORTING FORM

Date: 4/4/88

Site Name: Tuxedo C+D TDD: 02-8804-01

Site Address: Rt 17, 2.5 miles north of Orange/Rockland County line
Street, Box, etc.

Tuxedo
Town

Orange
County

New York
State

NUS Personnel:

Name	Discipline
Stephen E Maybury	Environmental Scientist
Margaret Vogel	Chemist

Weather Conditions (clear, cloudy, rain, snow, etc.):
Warm, Clear skies, sunny

Estimated wind direction and wind speed: no appreciable wind

Estimated temperature: 60°-65°F

Signature: Steve E May Date: 4/4/88

Countersigned: Margaret Vogel Date: 4/7/88

PRELIMINARY ASSESSMENT

INFORMATION REPORTING FORM

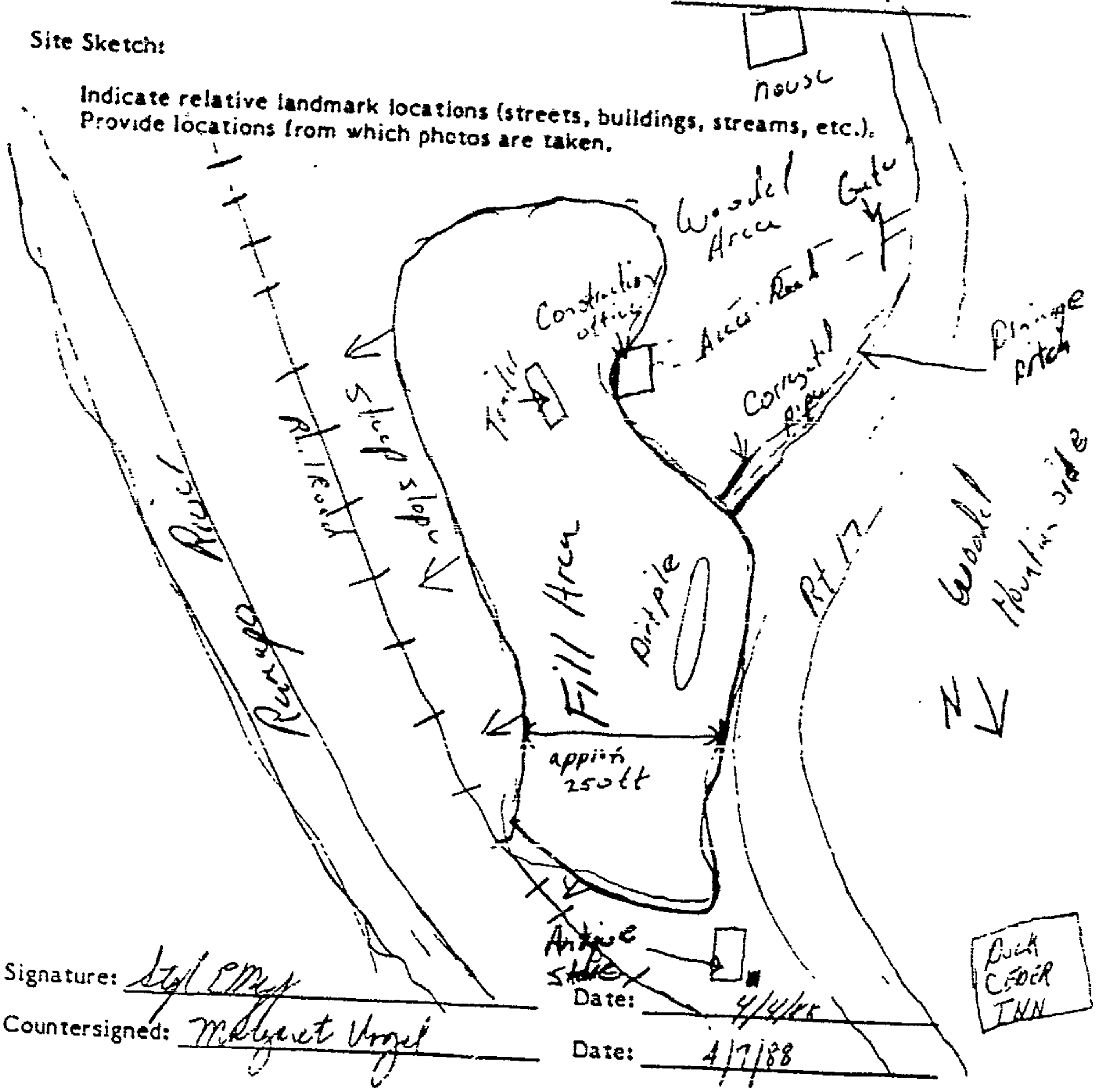
Date: 4/4/88

Site Name: Tuxedo Park C&D

TDD: 02-8804-01

Site Sketch:

Indicate relative landmark locations (streets, buildings, streams, etc.). Provide locations from which photos are taken.


house
Wooded Area
Gate
Construction office
Access Road
Corrugated pipe
Drainage ditch
Trailer
Steep slope
RR. Road
Ramapo River
Fill Area
Dirt pile
approx. 250 ft
Rt. 17
Wooded Mountain side
N
Antique Shop
Duck Cedar Inn

Signature: Date: 4/4/88

Countersigned: Margaret Vogel Date: 4/7/88

OSRIRF 10/12/87
Page 3 of 5

PRELIMINARY ASSESSMENT

INFORMATION REPORTING FORM

Date: 4/4/88

Site Name: Tuxedo Park C&D TDD: 02-8804-01

Notes (Periodically indicate time of entries in military time):

1725 Arrive at the site location. We park in the adjacent antique store parking lot. The site is immediately adjacent to Rt 17. There are no traces of barriers preventing access to the fill area.

1730 Drive down Rt 17 along site to get a better view of site. The site is adjacent to Rt 17 and at one point appears to be up to the roadway. Along the SE side of the fill there is some in obvious fill materials. Some areas have been freshly disturbed by bulldozer.

1745 At the south side of the fill there is a access road with a gate leading to a construction office. The office was apparently a house at one time

Signature: Date: 4/4/88
Countersignature: Date: 4/7/88

PRELIMINARY ASSESSMENT

INFORMATION REPORTING FORM

Date: 4/4/88

Site Name: Tuxedo Park LF TDD: 02-8804-01

Notes (Cont'd):

The landfill has been graded for the most part with only a few piles of dirt along Rt 17. The fill area is hilly sloping toward the railroad ~~to the~~ and the Ramapo River to the SE. The site slopes very steeply just prior to reaching the railroad tracks.

1250 At the Southwest side of the fill there is a corrugated pipe that apparently goes under the landfill. This is a drainage pipe ~~from~~ that receives water from a ditch originating at Rt 17.

An odor is evident along the fill area. It seems to be a sulfur/landfill odor.

Attach additional sheets if necessary. Provide site name, TDD number, signature, and countersignature on each.

Signature: Date: 4/4/88

Countersignature: Margaret Vogel Date: 4/7/88

OSRIRF 10/12/87
Page 4 of 5

PRELIMINARY ASSESSMENT

INFORMATION REPORTING FORM

Date: 4/4/88

Site Name: Tuxedo Park C+D TDD: 02-8804-01

Notes (Cont'd):

The site area is relatively rural. NW of the site there are steeply sloping wooded mountainsides. To the Southeast is the railroad tracks, Ramapo River Rt 87 and Harriman State Park beyond that. There is a house along Rt 17 South of the site approx ¼ mile. The Commercial establishments of the Dark Cedar Inn and ~~the~~ an antique store lie within a few hundred feet of the site to the NW.

Leaving the Site @ 1805

Attach additional sheets if necessary. Provide site name, TDD number, signature, and countersignature on each.

Signature: Date: 4/4/88

Countersignature: Margaret Vogel Date: 4/7/88

OSRIRF 08/22/86
Page 5 of 5

PRELIMINARY ASSESSMENT

INFORMATION REPORTING FORM

Date: 4/4/88

Site Name: Tuxedo Park C+D TDD: 02-8804-01

Photolog:

Frame/Photo Number	Date	Time	Photographer	Description
1P1, 151	4/4/88	1735	S. Mayhew	– Look SE from Antique Store at fill area
1P2, 153 (152 void)	4/4/88	1740	M. Vogel	– Looking NE from Rt 17 at the site access Road.
1P3, 154	4/4/88	1745	M. Vogel	– Corrugated pipe going under Fill area
1P4, 155	4/4/88	1747	M. Vogel	Construction trailer and house. Look SE from Rt 17.
1P5, 156	4/4/88	1750	M. Vogel	Fill area with River and Thruway in the background.

Attach additional sheets if necessary. Provide site name, TDD number, signature, and countersignature on each.

Signature: Steph E Mayhew Date: 4/4/88

Countersignature: Margaret Vogel Date: 4/7/88

NUS CORPORATION

TELECON NO

CONTROL NO:	DATE: 7/6/84	TIME: 1:30 pm

DISTRIBUTION:
Tuxedo Park CID

BETWEEN: Warren Reiss	OF: NYDEC - Enforcement	PHONE: (518) 457-43

AND: Steph. [illegible] (NU

DISCUSSION:

Re: Site Information

I confirmed with Mr Reiss that the sampling information ie core samples, waste samples and soil gas samples are all the samples collected on site. Ed Perkins of NYDEC ~~[illegible]~~ same phone # as above is a chemist that took the samples

Mr Reiss said that responsible parties
~~[illegible]~~ owners - Barone, Sarkis Khourasjian
operators - Sacco, Material Transport.

Mr Reiss ~~[illegible]~~ said that it is believed that landfill materials were placed on an adjacent property owned by Georgia Tech. In addition He did not know the exact locations of materials

ACTION ITEMS:
placed on this property

Mr Reiss said that DEC is currently deciding if a Phase 2 study should be done. In all likelihood there will be a excellent Phase 2 done due to ~~[illegible]~~ pesticide presence on the site. The DEC will probably do the study this winter-sometime later

NUS 067 REVISED 0581

NUS CORPORATION

TELECON NOTE

CONTROL NO:	DATE: 4/7/88	TIME: 1545
DISTRIBUTION:		
BETWEEN: Ed Atkins	OF: NYDEC Enforcement Chemist	PHONE: (914)457-4346
AND: [illegible] (NUS)		

DISCUSSION:

Re: Samples collected on site

Re: Air sampling - Sampling was conducted upwind and downwind at the site with sorbent tubes and air pumps. results showed negative downwind with Methylene chloride detected in one upwind sample this may be [illegible] the Georgia Tech site.
Ambient readings were obtained on the OVA of 25-50 ppm ~~no dow~~ No readings on the HNu.

Mr Reiss explained the location of "the Georgia Tech site in the House is on the Georgia Tech property

ACTION ITEMS: Mr Reiss also explained that BNA's detected on site may be from asphalt type materials.

The sample described as sludge was not a wet sample but a wet chalky type sample.

NUS 067 REVISED 0681

NUS CORPORATION

TELECON NOTE

CONTROL NO:	DATE: 4/7/88	TIME: 1055

DISTRIBUTION: Tuxedo Pa. K C+D

BETWEEN: Virginia Marsh	OF: Tuxedo Town Clerk	PHONE: (914) 351-4411

AND: Steph E Murph (NUS)

DISCUSSION:

The population of the entire town of Tuxedo - (including the village) is 3069 from 1980 census.

ACTION ITEMS:

NUS 087 REVISED 0681

NUS CORPORATION

TELECON NOTE

CONTROL NO:	DATE: 4/6/88	TIME: 0945

DISTRIBUTION:

Tuxedo Park CHD

BETWEEN: Virginia Marsh	OF: Town Clerk, Town of Tuxedo	PHONE: (914) 351-4411

AND: Steph E Murphy (NUS)

DISCUSSION:

Re: Private wells in the area

Ms. Marsh said there are areas of the town that are not served public water and also isolated homes that have private wells. The area along Route 17 up to the Duck Cedar Inn is served with public water, however, there may be homes along the road which have wells.

The Village of Tuxedo Water Dept serves the village and most of the town. Sterling Forest Water Company serves part of the town ie Laurel Ridge, Maple Brook and Clinton Brook Roads, Southfields is all private wells. Arden is all private wells. The Closest private well to the site is the antique store and apartment above.

~~ACTION ITEMS:~~

Ms Marsh estimated that 100 homes in the town are on private wells.

NUS 087 REVISED 0681

NUS CORPORATION

TELECON NOTE

CONTROL NO:

DATE: 4/17/89

TIME: 1:45

DISTRIBUTION:

Tuxedo Park C+D

BETWEEN: Cathy Quinn

OF: Rockland County Health Dept

PHONE: Ext [illegible] (914) 354-0200

AND: Steph. E. [illegible] (NUS)

DISCUSSION:

- Water use of Ramapo River

She said she is not aware of any intakes in the Ramapo River. However the river directly recharges the sand and gravel aquifer around the River which is used by Spring Valley water company and Suffern wells.

The village of Sloatsburg receives water from the potake water company which draws the water from a lake near N.J. border.

ACTION ITEMS:

NUS 087 REVISED 0981

NUS CORPORATION

TELECON NO

CONTROL NO:

DATE: 4/6/89

TIME: 1535

DISTRIBUTION:

Re. Tuxedo Park C+D

BETWEEN: Laura Kinney

OF: Fisheries Technician

PHONE: (914) 255-5445

AND: Steph E Murphy

(NU

DISCUSSION:

Re Trout Stocked -

The Ramapo River in Orange County, Town of Tuxedo is a trout stocked stream.

ACTION ITEMS:

NUS 087 REVISED 0881

CONTROL NO:

DATE: 4/6/88

TIME: 0930

DISTRIBUTION:

Tuxedo Park CTD

BETWEEN: Steve Barber

OF: Village of Tuxedo Water Company

PHONE: (914) 351-4745

AND: Steph E Muff

NUS

DISCUSSION:

Water sources in area

Tuxedo Lake serves the village and town of Tuxedo. Most of the town is served by public water although there may be a few private wells.

I asked if along Rt 17 up to the Red Cedar Inn was served by public water. He said that it was.

I asked if he had information on other water supplies in the area

1. Sloatsburg - receives water from the Potake Water Company from Cranberry Lake.

ACTION ITEMS:

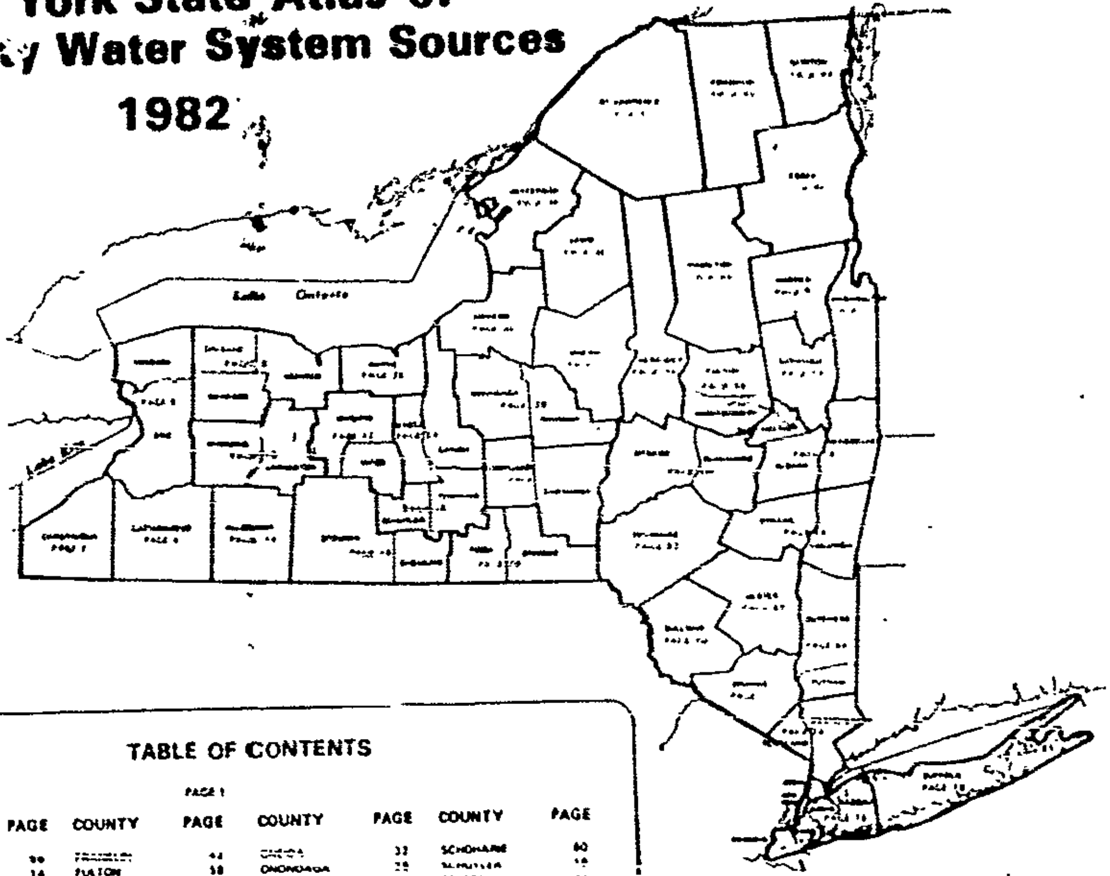
2. Southfields - he did not know

He Referred me to the Town of Tuxedo for more info about wells in the town.

New York State Atlas of Community Water System Sources

1982

NEW YORK STATE
DEPARTMENT OF HEALTH



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COUNTY	PAGE	COUNTY	PAGE	COUNTY	PAGE	COUNTY	PAGE
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BRONX	78	GENESEE	8	ONTARIO	12	SENECA	24
BROOME	20	GREENE	64	ORANGE	72	STEUBEN	16
CATTARAUGUS	4	HAMILTON	48	ORLEANS	6	SUFFOLK	78
CAYUGA	24	HERKIMER	34	OSWEGO	30	SULLIVAN	70
CHAUTAUQUA	2	JEFFERSON	38	OTSEGO	40	TIOGA	20
CHEMUNG	16	KINGS	78	PUTNAM	68	TOMPKINS	18
CHENANGO	32	LEWIS	[illegible]	QUEENS	78	ULSTER	66
CLINTON	44	LIVINGSTON	10	RENSSELAER	56	WARREN	[illegible]
COLUMBIA	64	MADISON	28	RICHMOND	78	WASHINGTON	52
CORTLAND	22	MONROE	8	ROCKLAND	74	WAYNE	26
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ERIE	6	NEW YORK	78	SCHENECTADY	56	YATES	12
ESSEX	48	NIAGARA	6				

LEGEND

BOUNDARIES AND PLACES

International
State
County
Town
Indian Reservation
City
Village
Unincorporated Place
Federal Reservation
Built up Area (Over 25 000 population including and contiguous city or village)

CLASSIFICATION OF POPULATED PLACES

100 000 or more	YONKERS
50 000 to 100 000	Levittown
12 500 to 50 000	Poughkeepsie
2 500 to 12 500	[illegible]
250 to 2 500	[illegible]
250 or less	[illegible]

TRANSPORTATION

Highways
Divided Highways
Full Control of Access
Partial or No Control of Access
Undivided Highways
Interchange
Touring Route (State, U.S., Interstate) or State Parkway
Touring Route Markers
State U.S. Interstate

Railroads
Operating Line
Service Discontinued
Operator
Owner (If Other than Operator)
Company Having Trackage Rights

Airports (Open to the Public, Military)
Runway under 4000
Runway over 4000'

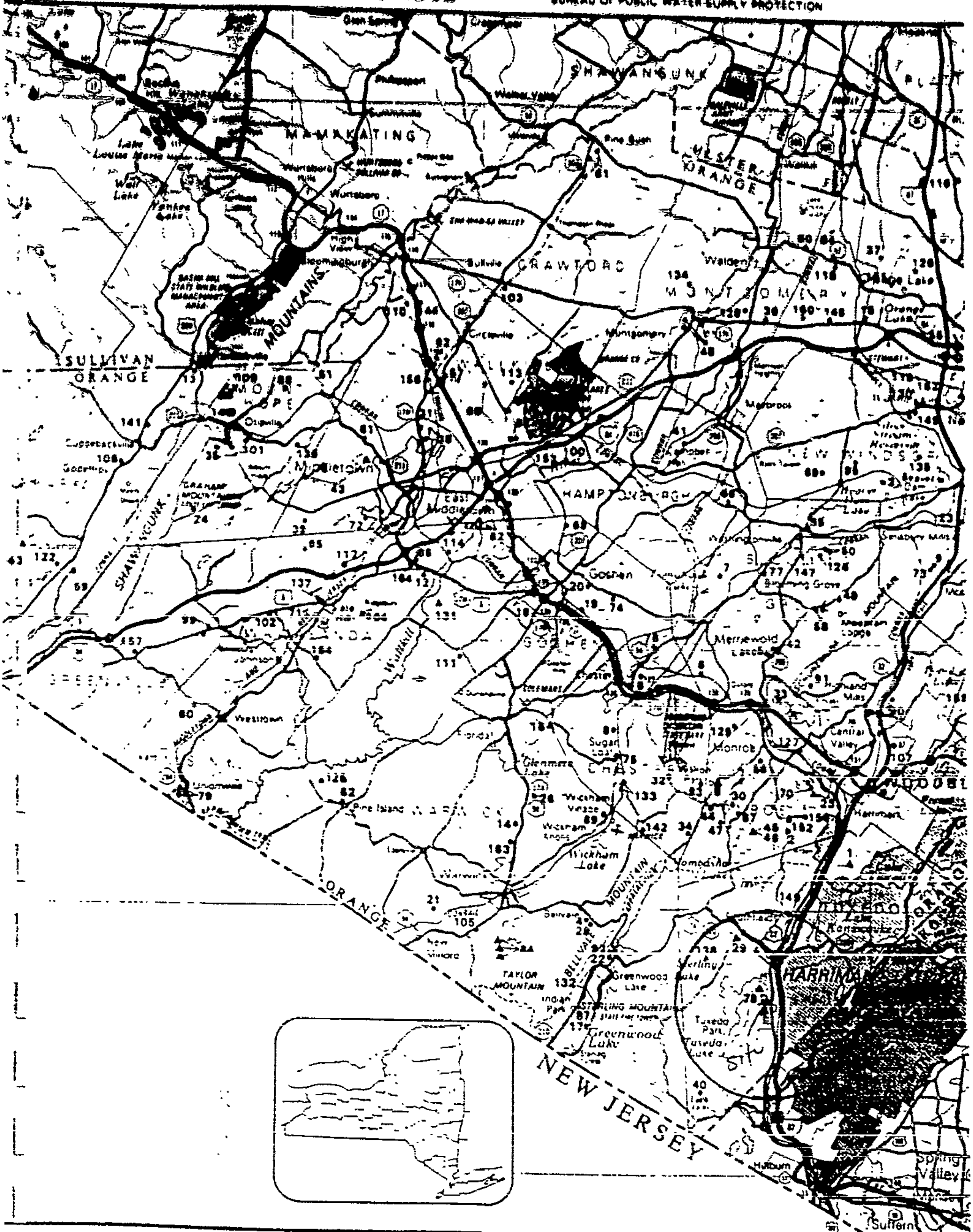
Rest Areas
Food, Gas, Rest Rooms
Gas, Rest Rooms
Rest Rooms
Parking Only

RECREATION FACILITIES

State or National Recreation Area
State Campground
State Boat Launching Site
State Canal Park
State Fish Hatchery
Other State Recreation Site

MUNITY WATER SYSTEM SOURCES-1982

BUREAU OF PUBLIC WATER SUPPLY PROTECTION


MAMAKATING
SHAWANGUNK
ULSTER
ORANGE
CRAWFORD
MONTGOMERY
SULLIVAN
ORANGE
MOUNT HOPE
WALLKILL
NEW WINDSOR
HAMPTONBURGH
GREENVILLE
MINISINK
WAWAYANDA
GOSHEN
CHESTER
BLOOMING GROVE
WARWICK
MONROE
TUXEDO
SHAWANGUNK MOUNTAINS
Middletown
Goshen
Walden
Montgomery
Monroe
Warwick
Greenwood Lake
Tuxedo Park
Sugar Loaf
Florida
Pine Island
Westtown
Unionville
Otisville
Bloomingburg
Wurtsboro
Pine Bush
Maybrook
Washingtonville
Chester
Harriman
Central Valley
Salisbury Mills
Merriewold Lake
Round Lake
Walton Lake
Wickham Lake
Glenmere Lake
Sterling Lake
Suffern
Spring Valley
HARRIMAN STATE PARK
TAYLOR MOUNTAIN
BELLVALE MOUNTAIN
STERLING MOUNTAIN
ORANGE
NEW JERSEY

[illegible] THE NEW YORK STATE DEPARTMENT OF TRANSPORTATION

SCALE 1 250,000

5 MILES

ORANGE COUNTY

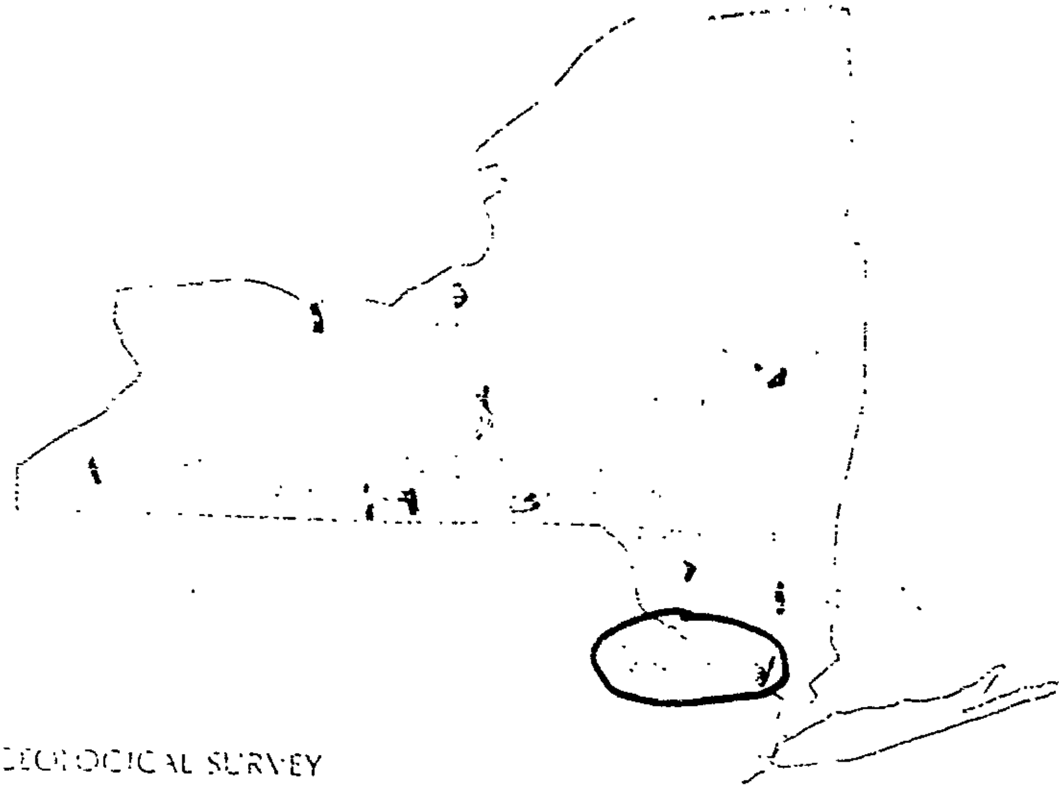
ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE
Municipal Community			
1	Arden Farms Dairy Company	60	Echo Lake
2	Arrow Park, Inc.	NA	Wells
3	Beaver Dam Lake Development	400	Wells
4	Bellvale Park Water District	100	Wells
5	Blooming Grove Water District #1	2000	Wells
6	Blooming Grove Water District #2 Oxford Heights	80	Wells
7	Blooming Grove Water District #3	200	Wells
8	Chester Village	1910	Walton Lake, Wells
9	Cornwall-on-Hudson, Main Line	3166	Alec Meadow Reservoir, Arthurs, Tamarac, & Sphagnum Ponds
10	Cornwall-on-Hudson, Mt Line	300	Upper Reservoir
11	Deer Park Manor	400	Wells
12	[illegible]ton Hills	130	Wells
13	[illegible] Road Association	50	Wells
14	[illegible] Heights	200	Wells
15	[illegible]wood Manor - Holiday Park	225	Wells
16	Florida Water Works	2000	Glenmere Lake
17	Forest Acres	400	Wells
18	Goshen Village	5000	Goshen Reservoir
19	Goshen Water District #2 (Arcadia Hills)	[illegible]	Wells
20	Goshen Water District #1	500	Wells
21	[illegible]ter Display & Wild Farming	75	Wells
22	[illegible]wood Lake Village	3150	Wells
23	[illegible]man Village	1050	Wells
24	Hidden Valley Estates	200	Wells
25	Highland Falls Village	5500	Bog Meadow Pond
26	Hill Lake Estates	50	Wells
27	Hillcrest Heights	25	Wells
28	Hillside Acres	80	Wells
29	Indian Hill	2000	Indian Hill
30	J Ludlam Water Supply	15	Wells
31	Keystone Park	150	Wells
32	King Tract	200	Wells
33	Kiryas Joel	2500	Wells
34	Lake Hill Farms Water District	360	Wells
35	Lake Linda	30	Wells
36	Lake Vue Park Water District	160	Wells
37	Lakewood Homes	60	Wells
38	Lincoln Park	32	Wells
39	Lorelei Lake	150	Wells
40	Maple Brook	160	Wells
41	Maybrook Village	2500	Wells
42	Merriwold Water Company	1600	Wells
43	Middletown City	21454	Monhagen, Highland & Shawangunk Lakes
44	Monroe Hills Estates	120	Wells
45	Monroe Village	6000	Lake Mombasha
~~46~~	~~Monroe Water District #1 (High Ridge)~~	~~NA~~	~~Lake Mombasha~~
47	Monroe Water District #2 (Sterling Manor)	90	Wells
48	Montgomery Village	2120	Wells
49	Mountain Lodge Park Development	1600	Wells
50	Mountain View Estates	250	Wells
51	New Vernon Estates	150	Wells
52	New Windsor Consolidated Water District	19000	[illegible]
53	Newburgh City	23488	Lake Washington
54	Newburgh Consolidated Water District	9000	Chadwick Lake
55	Orange Lake Development Company	20	Wells
56	Orchard Hill	174	Wells
57	Orchard Hill Water District	80	Wells
58	Orchard Lake Park	250	Wells
59	Painted Apron Village	16	Wells
60	Pheasant Hill	150	Wells
61	Pine Bush Water District	1500	Wells
62	Pine Island Water Company	50	Wells
63	Port Jervis City	8500	Reservoirs
64	Ridgebury Lake Acres	60	Wells
65	Robin Meadows	126	Wells
66	Rural Ridge Water District	300	Wells
67	Scheller Water Supply	25	Wells
68	Scotchtown Park	180	Wells

ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE
Municipal Community			
71	Slate Hill (Green)	65	Wells
72	[illegible] Hills	70	Wells
73	Star Industries	NA	Wells
74	Stone Hedge Water Company	160	Wells
75	Sugar Loaf Hills	125	Wells
76	Surrey Meadow Water District	900	Wells
77	Tappan Homes	136	Wells
78	Tuxedo Park Village	1600	We-Wah Lake
79	Unionville Village	576	Wells
80	Walden Village	5500	Wells
81	Wallkill Heights	49	Wells
82	Wallkill Water District #1	[illegible]	Wells
83	Walton Lake Estates	500	Wells
84	Warwick Village	4125	Warwick Reservoir
85	Washingtonville Village	NA	Wells
86	Wawayanda Development Corporation	125	Wells
87	West Side Greenwood Lake Water District	1600	Wells
88	Whitlock Farms	120	Wells
89	Wickham Village	1100	Wells
90	~~Woodbury Water District #1~~	4500	Wells
91	Woodbury Water District #6 (Amjor Park)	160	Wells
92	Woodfield Acres	100	Wells
Non Municipal Community			
93	~~Bear Mountain~~ State Park (Rockland Co, Page 74)		Turkey Lake, Queensboro Lake
94	Bel-Air Trailer Park	59	Wells
95	Brittany Terrace	150	Wells
96	Butler Mobile Homes	200	Wells
97	Campbell Water Supply	35	Wells
98	Candlestick Mobile Park	325	Wells
99	Castle High Trailer Park	130	Wells
100	Crystal Run Village Inc.	100	Wells
101	Dirbar's ~~Bungalow Colony~~	30	Wells
102	Dombal Trailer Park	70	Wells
103	Donovan's Place	20	Wells
104	Doodletown Water System (Rockland Co, Page 74)		Queensboro Lake
105	Fair Mead Farm	15	Wells
106	Fairlawn Mobile Village	60	Wells
107	Falkirk Hospital	65	Wells
108	Fancher Trailer Court	55	Wells
109	Federal Correctional Institute	500	Wells
110	Gillen Trailer Park	14	Wells
111	Goshen Center for Boys	250	Wells
112	Greenwood Mobile Home Court	125	Wells
113	H A Harris, Inc.	25	Wells
114	Hampton Realty Trailer Park	23	Wells
115	Hill and Dale Mobile Home Park	55	Wells
116	Hilltop Haven Trailer Park	NA	Wells
117	Hogencamps Trailer Court	6	Wells
118	Holiday Mobile Park Inc	225	Wells
119	Hudson Valley Trailer Park	[illegible]	Wells
120	Hudson View Terrace (Lower Section)	120	Wells
121	Hudson View Terrace (Upper Section)	150	Wells
122	Huguenot Estates East	125	Wells
123	K & M Mobile Home Park	46	Wells
124	Kaylake Lodge	30	Wells
125	Kimball Farms	83	Wells
126	Lage Country Homes	NA	Wells
127	Lamplight Village	260	Wells
128	M G U Realty	NA	Wells
129	Mary Crest Convent	40	Wells
130	Mason's Trailer Park & Apartments	60	Wells
131	Mid-Hudson Psychiatric Center	400	Reservoir
132	Mid-Lake Park	15	Wells
133	Mid-Orange Correctional [illegible]	[illegible]	[illegible]

ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE
Non Municipal Community			
136	Mt Hope Foundation-Residence	35	Wells
137	Mt Orange Trailer Park	49	Wells
138	NYU Housing Sterling Forest	170	Wells
139	Old S-W Realty Corp	30	Wells
140	Otisville Rehabilitation Center	NA	Bear Swamp Reservoir
141	Pine Grove Trailer Park	250	Wells
142	Pine Hill School	95	Wells
143	Park Terrace Trailer Park	110	Wells
144	Schertick Trailer Park	36	Wells
145	Silver Stream Trailer Court	105	Wells
146	Sleepy Hollow Mobile Park	670	Wells
147	[illegible] Water Supply	25	Wells
148	South Maple Estates	50	Wells
149	Southfields Heights Apartments	200	Wells
150	Spruce Lodge	350	Wells
151	St Patrick's Villa Group	42	Wells
152	St Patrick's Semi-Military Academy	122	Wells
153	Stoney Ford Trailer Park	30	Wells
~~154~~	~~[illegible]~~	NA	Wells
155	Sunset Trailer Court	36	Wells
156	Thompsons Trailer Court	35	Wells
157	Tri-State Trailer Park	35	Wells
158	U S M A - Stony Lonesome System	12000	Long Pond, Stillwell Lake
159	US Military Academy Lusk System	NA	Popolopen Lake, Queensboro Lake
160	Valley View Park	150	Wells
161	Walden Mobile Home Association	36	Wells
162	Walters Trailer Village	225	Wells
163	Warwick Garden Apartments	33	Wells
164	Wawayanda Trailer Park	35	Wells

RAMAPO RIVER - MAHWAH RIVER
AQUIFER (ROCKLAND
COUNTY)

Atlas of Eleven Selected
Aquifers in New York



U.S. GEOLOGICAL SURVEY
Water-Resources Investigations
Open-File Report 82-553

Prepared in cooperation with
NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Public Water Supply Protection

4 RAMAPO RIVER – MAHWAH RIVER AREA
B. Population and ground water use

This aquifer provides water to over 81,000 people

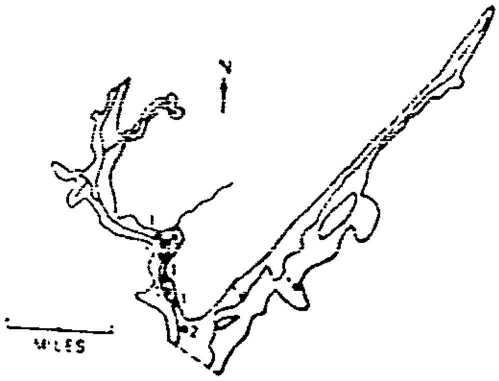
More than 81,000 people use water from this valley-fill aquifer. An estimated 9.5 million gallons per day is withdrawn.

Ground-water use in the Ramapo and Mahwah River area is unique in that a private water company serves most of the area (fig. 4B). The Village of Suffern has its own ground-water supply, and some homes and industries or commercial enterprises have private supplies. More than 81,000 people use a total of 16 Mgal/d from this aquifer.

The table opposite lists 1980 pumpage by the various water suppliers. Locations of municipal systems are shown on the map below and in figure 4A.

LOCATION OF MUNICIPAL COMMUNITY WATER-SYSTEM WELL FIELDS

Numbers correspond to well fields listed opposite



4 RAMAPO RIVER – MAHWAH RIVER AREA

A. Location and major geographic features

Much of this aquifer system underlies a heavily urbanized area

This aquifer system occupies the valleys of the Ramapo and Mahwah Rivers, which are tributary to the Passaic River in New Jersey. The area contains three physiographic sections — the Ramapo Mountains in the central and west part, a low, hilly terrain in the east, and the flat Y-shaped valley. Industry and urbanization are heaviest near the confluence of the two rivers, near Suffern.

This aquifer system underlies the valley floor of the Ramapo and Mahwah River valleys. It lies mostly in Rockland County but extends into Orange County to the northwest and into Bergen County, N.J., to the south (fig. 4A). Within Rockland County, the aquifer system occupies 6 square miles. The Ramapo River flows from Orange County southward through Rockland County into New Jersey; the Mahwah River, which originates approximately ½ mile northeast of the aquifer, flows southwestward and enters the Ramapo 1 mile south of the New Jersey border. The Ramapo River is tributary to the Passaic River, which discharges into the ocean from northern New Jersey.

The valley floor has a gently sloping surface ranging in altitude from 270 to 530 feet above sea level. The drainage area (fig. 4A) to the aquifer occupies 115 square miles. The narrow valley floor of the Ramapo River is a corridor for the New York State Thruway and a railroad. Heavy urbanization and industry have developed at the confluence of the two valleys.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF HAZARDOUS WASTE REMEDIATION
INACTIVE HAZARDOUS WASTE DISPOSAL REPORT

ASSIFICATION CODE: 2a REGION: 3 SITE CODE: 336035
EPA ID:

NAME OF SITE : Tuxedo Park C&D Site
STREET ADDRESS: E of Rte 17 and 2.5 mi. N of Rockland Cnty Line

TOWN/CITY:	COUNTY:	ZIP:
Tuxedo Park	Orange	10987

SITE TYPE: Open Dump-X Structure- Lagoon- Landfill- Treatment Pond-
ESTIMATED SIZE: Acres

SITE OWNER/OPERATOR INFORMATION:
CURRENT OWNER NAME....: Renald Barone
CURRENT OWNER ADDRESS.: PO Box 656, Tuxedo Park, NY
OWNER(S) DURING USE...: Renald Barone
OPERATOR DURING USE...: Material Transport Service
OPERATOR ADDRESS......: 1025 Saw Mill River Road, Yonkers, NY
PERIOD ASSOCIATED WITH HAZARDOUS WASTE: From 2/87 To 10/87

SITE DESCRIPTION:
This is a Construction and Demolition debris site that was in operation for a period of 8 months beginning in February, 1987. It was ordered to be closed following violations of Part 360 regulations and suspicions of hazardous waste disposal.

HAZARDOUS WASTE DISPOSED: Confirmed- Suspected-X

TYPE	QUANTITY (units)
PCB's	Unknown
Polynuclear Aromatic Hydrocarbons	Unknown

New York State Department of Environmental Conservation
21 South Putt Corners Road
New Paltz, New York 12561-1696
(914) 255-5453

Thomas C. Jorling
Commissioner

August 31, 1987

Alexandra York
Environmental Protection Bureau
Office of the Attorney General
26th Floor - Room 128
120 Broadway
New York, NY 10271

Re: Sacco C & D Site
Tuxedo Park, Orange Co.

Dear Ms. York:

Pursuant to our telephone conversation, enclosed please find an inspection of the subject construction and demolition debris disposal site. This inspection reveals that the site is in non-compliance with:

Subparts 360.8(a)(6) - no access control,
360.8(a)(8) - odors,
360.8(a)(16) - solid waste is not effectively controlled
360.8(b)(1)(vii)(b) - lift height is greater than 10 feet.

Due to these violations, the site cannot be considered exempt under Section 360.1(f)(x). The site is therefore operating without a valid Part 360 Permit and should be closed as required in Section 360.2(b)!

In addition, waste has been placed on Route 17 R.O.W. and the drainage system on Route 17 may be effected, resulting in possible flooding and freezing conditions (icy pavement in the winter). Please contact Eugene Pinto of the NYS DOT (914-343-4638) concerning these problems.

Very truly yours,

Richard Gardineer
Regional Solid Waste Engineer
Region 3

RG/mbh
Enc.

AIM
ADVANCED
IMAGE
MANAGEMENT

MINOLTA

The Following Documents are Photocopies Condition Can't Be Improved -

not 2 documents on top of each other, and / or information cut off on bottom or sides or top, and / or print blurred, and / or black smudged, and/or print too light..

Table 1.--Records of selected wells and springs (Continued)

Well number	Owner's name	Reported yield (gallons per minute)	Use	Method of construction; completion	Depth of well (feet)	Diameter (inches)	Length of casing (feet)	Aquifer	Water level: Below land surface (feet)	Water level: Date	Topographic situation	Altitude above sea level (feet)	Remarks
113-426-1	Emily Hall	3	D	-- --	r75	6	70	Carbonate	Flows	1959	Hs	690	Iron
113-417-1	Michael Mauser	--	D	Du, P	8	37	8	Sand	4.7	11/20/63	Vf	630	
-2	Village of Greenwood Lake	100	P	Dr, S	r83	10	77	Sand and gravel	.5	9/27/63	Vf	640	Yield has decreased since construction of well
-3	do.	--	P	Dr; S	r83	10	77	do.	r6.1	10/ 9/63	Vf	640	Abandoned, yield originally sufficient to pump 100 gpm
-4	do.	35	I	Dr, P	r41	6	36	do.	r3.2	10/ 2/63	Vf	640	dd 15 ft after pumping 4 hours at 47 gpm. Iron
-5	do.	129	I	Dr, P	r41	6	--	do.	r3.1	10/ 2/63	Vf	640	dd 19 ft after pumping 10 1/2 hours. Iron
-6	do.	--	D, T	Dr, J, S	r30	1	28	do.	r9.6	3/11/65	Vf	640	Iron. Test water at 30 ft
-7	do.	0	I	Dr; P	r41	6	36	do.	--	--	Vf	640	Iron. Originally yield was 35 gpm but well clogged with silt during pumping test
-8	do.	60	I	-- --	r36	6	31	do.	r1.8	10/26/63	Vf	640	dd 19 ft after pumping 3 hours. Iron. Backfilled to 31
-9	do.	152	I	-- --	r55	6	48	do.	r2.5	5/ 7/64	Vf	630	dd 11 ft after pumping 75 hours. Iron
-10	do.	160	I	-- --	r46	5	42	do.	r2.0	5/20/64	Vf	630	dd 12 ft after pumping 2 1/4 hours. Iron
113-416-1	John Bauer	--	D	Dr, --	r52	6	45	?	--	--	Vf	645	Overburden is sand and gravel
-2	do.	--	D	Dr; OE	r38	6	38	Sand and gravel	r15	11/26/63	Vf	645	
112-420-1	Velma Lovato	10	D	Dr; OH	r90	6	10	Sandstone	--	--	Vf	940	
112-419-1	Louis Gutman	4	C, D	-- --	r162	6	20	do.	--	--	Hs	940	
111-418-1	Knolls Water Co., Inc.	25	P	-- --	r135	6	--	Crystalline	--	--	Hs	[illegible]	Manganese.
-2	do.	5	P	-- --	r350	6	20	do.	--	--	Hs	790	Do.
-3	do.	5	P	-- --	r350	6	18	do.	28.2	12/ 9/64	Hs	795	
-4	do.	25	P	-- --	r300	8	--	do.	--	--	Hs	550	Manganese
111-411-1	Joseph S. [illegible]	8	D	-- --	r120	6	7	do.	--	--	Hs	585	
-2	William Dowle	4	D	-- --	r101	6	--	do.	--	--	Hs	[illegible]	
-3	Harry Layton	--	D	-- --	r90	6	--	do	--	--	Vf	405	Rock is at land surface.
-4	James Mathews	6	D	-- --	r237	6	5	do.	--	--	Hs	510	
110-413-1	Tuxedo Park Assoc.	--	C	-- --	r67	6	--	do.	--	--	Vf	525	Yield reported to be greater than 20 gpm
-2	do.	21	C	Dr; OE	r107	6	107	Gravel	r12	--	Vf	510	May be in a fault zone rather than water-deposited gravel.
110-411-1	Ralph Hatton	5	C	Dr; OH	r252	7	11	Crystalline	r10	--	Hs	435	1.5 gpm at 150 ft.
109-414-1	Tuxedo Park Assoc.	--	D	-- --	r93	6	40	do.	--	--	Vf	490	
109-413-1	Mrs. Morgan Hamilton	--	A, P	Du; OE	7	78	7	Sand	.0	11/21/63	Hs	580	
-2	do.	--	A, P	Du, OE	6	168	6	do.	4.5	11/21/63	Hs	580	

Table 1.--Records of selected wells and springs (Continued)

Well number	Owner's name	Reported yield (gallons per minute)	Use	Method of construction; completion	Depth of well (feet)	Diameter (inches)	Length of casing (feet)	Aquifer	Water level: Below land surface (feet)	Water level: Date	Topographic situation	Altitude above sea level (feet)	Remarks
115-413-1	Milton J. Moore	9	D	-- --	r136	6	56	Shale	r16	5/ 6/64	VF	705	Dd 18, log
115-410-1Sp	Sterling Forest Corp.	2	U	-- --	--	--	--	Regolith	Flow	11/22/63	Hs	740	Temp 9 C 10/8/63; 9 C 11/22/63
-2	Guy A. Lamble	--	D	Dug; P	r20	30	20	Till	r12	11/ 2/63	Hs	510	
116-429-1	Roy Drew	--	D	Dr; OH	r180	6	--	Carbonate	r6	5/ 6/64	VF	460	
-2	Donald Drew	5	C, D	-- --	r200	6	5	do.	--	--	VF	470	
116-425-1	Kenneth Ashley	12	D	-- --	r95	6	61	do	--	--	Ter	435	
-2	Harold Stickle	20	A	-- --	r60	6	40	do	r6	5/15/64	Hs	460	
116-430-1	Wilton Lord	12	D	-- --	105	6	20	do	12.6	5/ 6/64	VF	470	Log
-2	Art Hall	15	D	-- --	r118	6	65	do	r50	5/ 6/64	HT	500	Iron
-3	William Lewis	4	D	Dr, S	r31	1	-	Sand and gravel	--	--	VF	465	
-4	Charles Fowler	18	D	Dr, OH	r130	6	40	Carbonate	r2.3	5/ 6/64	VF	460	
-5	Mrs. Emily Hall	--	P	-- --	r144	6	--	do.	r20	5/25/64	HT	540	
116-423-1	John LaCove	--	U	Dug; P	22	18	--	Sand	11.2	5/13/64	VF	540	Reportedly used by Continental Army during Revolution
-2	Allied Park	50	A	-- --	1	72	3	do.	Flows	5/25/64	VF	540	Temp 8 C 5/25/64; flow 50 gpm 5/25/64
-3	Stanley Ferguson	--	A, P	-- --	1	64	3	do	6	5/25/64	Hs	570	
-4	Allied Park	--	S	Dr, S	r135	6	130	do.	20	5/25/64	Hs	540	Pump sometimes draws sand; sand heaved 30 ft up casing when drilled to 90 ft
116-422-1	Thomas Lawrence	--	D	Dr; --	90	6	--	Unknown	35.2	5/ 5/64	HT	560	
-2	[illegible] Shopping Center	50	C	Dr; OH	r280	--	180	Carbonate	4.4	--	VF	555	Gravel at 100 ft
116-428-1	Harold Camelio, Jr.	200	E	-- --	r300	6	102	Crystalline	Flows	5/22/64	Hs	605	Flows, log, temp 13 C 5/22/64, flow 15 gpm 5/22/64
116-417-1	Mrs. Cornelia Conti	36	C, P	-- --	r195	6	--	Red shale	--	--	Hs	560	Partial anal.
116-416-1	James and Florence Ryerson	25	D	-- --	r100	6	12	Carbonate	r13	--	Hs	695	
-2	John Welchman	12	D	-- --	r203	6	120	Shale	r30	12/ /64	Hs	730	Iron, temp 10 C 5/4/64
-3	H. B. Wallace	9	D	-- --	157	6	100	Carbonate	21.5	5/ 4/64	Hs	500	Caving formation, sand and water up in casing 5/4/64.
[illegible]	George Newman	13	C, D	--	r155	6	60	Crystalline	--	--	Hs	515	Iron.
-2	John McDonnell	15	D	-- --	r96	6	30	do.	r30	--	VF	485	Iron, log
-3	Peter F. Hall	20	D	-- --	r64	5	42	do.	r12	1932	VF	485	Do.
-4	Estate of Edward Lehman	16	C, D	-- --	r198	6	21	do.	r2	--	VF	490	
-5	William Osborne	5	C		r155	6	44	do.	--	--	Hs	525	
-6	Red Apple Rest, Inc.	60	C	-- --	r130	8	80	do.	r23	--	VF	585	
113-426-1	Stanley Ferguson	2	D	-- --	r240	6	85	Carbonate, Crystalline	--	--	Hs	575	
-2	Emily Hall	5	D	-- --	r38	6	20	Carbonate	r30	--	Hs	490	

SAMPLING TRIP REPORT
DIVISION OF ENVIRONMENTAL ENFORCEMENT

SITE NAME: Tuxedo Park, NY 10987, Landfill East Side Rt. 17.

ENFORCEMENT CATEGORY: Inactive

SAMPLING DATE: 10/16/87 (11:30 am - 4:45 pm)

SAMPLING KEY

DEC'S ID#	PRP'S ID#	TYPE	COMMENT
P-387-C23-(01,02,03,04,06,07)	None	Soil	See attached map for exact location.
P-387-C23-05	None	Leachate	
P-387-D20-(01,02,03,04,06,07,09)	None	Soil	

SAMPLING PERSONNEL

NAME	ORGANIZATION	DUTIES ON SITE
E. Perkins	NYSDEC DEE	Sampling
W. Wurster	" "	"
D. Ashline	" "	
R. Gardineer	NYSDEC Reg. 3	Site survey prior to sampling.

SAFETY REQUIREMENTS:

Wet Wear, Tyrex Suit
Boots
Gloves
Decontamination: Solution of IPA/Alconox - Scrub and Rinse

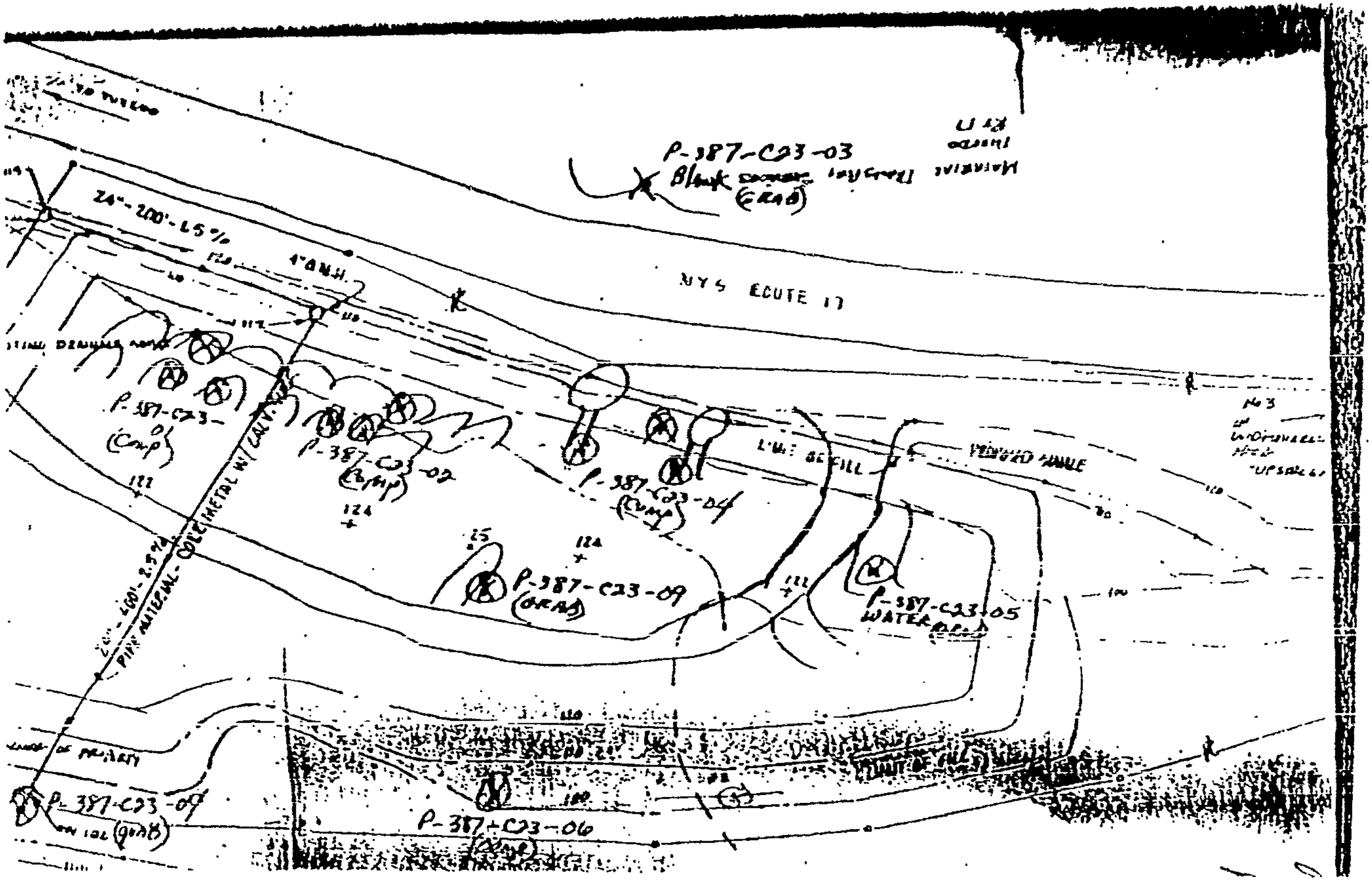
WEATHER CONDITIONS: Clear, sunny, temp. 65-70°F.

Comments and Observations

1) Fill was being brought to site.
2) Fill was being withdrawn from site.
3) Strong odor permeated site.
4) HNU reading taken at sampling location, results negative.

Report Prepared by: W. Wurster
Date: 10/22/87

cc: J. Periconi
W. Reiss
V. Bryant
E. Perkins
D. Ashline



24"-200'-1.5%
4" G.M.H.
NYS ROUTE 17
P-387-C23-03
Blank
(GRAB)
P-387-C23-01
(Comp)
P-387-C23-02
(Comp)
P-387-C23-04
(Comp)
P-387-C23-09
(GRAB)
P-387-C23-05
WATER (GRAB)
P-387-C23-06
(Comp)
P-387-C23-07
(GRAB)
PIPE MATERIAL - CORR. METAL W/ GALV.
LINE OF PROPERTY
LIMIT OF FILL
122
124
124
125
110
100

TTCI

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PAGE 1
RESULTS OF EXAMINATION
PENDING APPROVAL

SAMPLE ID: 874731
SAMPLE RECEIVED:87/10/19/
CHARGE: 16.50
PROGRAM: SUBDIVISION OF ENVIRONMENTAL ENFORCEMENT * DEC
SOURCE ID:
DRAINAGE BASIN:
GAZETTEER CODE:3563
POLITICAL SUBDIVISION:TUXEDO
COUNTY:ORANGE
LATITUDE: .
LONGITUDE: .
Z DIRECTION:
LOCATION: TUXEDO PARK RT 17 LANDFILL
DESCRIPTION:P-387-D20-01
REPORTING LAB: TOXILAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: PCBS:PCB'S IN SOLIDS - STEAM DISTILLED
SAMPLE TYPE: 500:SOIL, SAND
REASONS FOR SUBMISSION: TASTE/ODOR
DATE OF FINAL:87/10/22
TIME OF SAMPLING: 87/10/16 13:50

ANALYSIS: PCBS PCB'S IN SOLIDS-STEAM DISTILLED (DES 312-2)
DATE COMPLETED: 87/10/21
PENDING APPROVAL

------------PARAMETER------------	-----------RESULT----------
T39803 PCB,AROCLOR 1221	< 0.01 MCG/G
T38003 PCB,AROCLOR 1016/1242	0.36 MCG/G
T52203 PCB,AROCLOR 1248	< 0.01 MCG/G
T38103 PCB,AROCLOR 1254	0.11 MCG/G
T41603 PCB,AROCLOR 1260	< 0.01 MCG/G

FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

ANALYSIS: 6108 POLYNUCLEAR AROMATIC HYDROCARBONS - SOIL/SEDIMENT
DATE COMPLETED: 87/10/21
PENDING APPROVAL

------------PARAMETER------------	-----------RESULT----------
T65603 NAPHTHALENE	0.10 MCG/G [PL]
T63103 ACENAPHTHYLENE	0.10 MCG/G [PL]
T63003 ACENAPHTHENE	0.10 MCG/G [PL]
T63203 FLUORENE	0.10 MCG/G [PL]
T66103 PHENANTHRENE	0.90 MCG/G
T63203 ANTHRACENE	0.15 MCG/G
T48003 FLUORANTHENE	0.90 MCG/G
T66203 PYRENE	1.0 MCG/G
T63303 BENZO(A)ANTHRACENE	0.15 MCG/G
T64203 CHRYSENE	0.22 MCG/G
T63403 BENZO(B)FLUORANTHENE	< 0.10 MCG/G
T63503 BENZO(K)FLUORANTHENE	< 0.10 MCG/G
T63603 BENZO(A)PYRENE	< 0.10 MCG/G
T64303 DIBENZO(A,H)ANTHRACENE	< 0.10 MCG/G
T63703 BENZO(GHI)PERYLENE	< 0.10 MCG/G
T63403 INDENO(1,2,3-CD)PYRENE	< 0.10 MCG/G

**** END OF REPORT ****

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PAGE 1                     RESULTS OF EXAMINATION             PENDING APPROVAL

SAMPLE ID:     874732      SAMPLE RECEIVED:87/10/19/          CHARGE:    16.50
PROGRAM:       5600:DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
SOURCE ID:                 DRAINAGE BASIN:               GAZETTEER CODE:3565
POLITICAL SUBDIVISION:TUXEDO                             COUNTY:ORANGE
LATITUDE:         .        LONGITUDE:         .          Z DIRECTION:
LOCATION:   TUXEDO PARK AT 17 LANDFILL
DESCRIPTION:P-387-020-(03).02
REPORTING LAB:         TOXLAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN:          PCBS:PCB'S IN SOLIDS - STEAM DISTILLED
SAMPLE TYPE:           6001:SOIL, SAND
REASONS FOR SUBMISSION: TASTE/ODOR
TIME OF SAMPLING: 87/10/16 14:20                         DATE OF FINAL:87/10/22

ANALYSIS:       PC55    PCB'S IN SOLIDS-STEAM DISTILLED (DES 312-2)
                        DATE COMPLETED: 87/10/21            PENDING APPROVAL

   ------------PARAMETER-----------          -----------RESULT----------
      T39803 PCB,AROCLOR 1221                < 0.002 MCG/G
      T38003 PCB,AROCLOR 1016/1242             0.03 MCG/G [SU]
      T52203 PCB,AROCLOR 1248                < 0.002 MCG/G
      T39103 PCB,AROCLOR 1254                < 0.002 MCG/G
      T41603 PCB,AROCLOR 1260                < 0.002 MCG/G

           FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

ANALYSIS:       [illegible]    POLYNUCLEAR AROMATIC HYDROCARBONS - SOIL/SEDIMENT
                        DATE COMPLETED: 87/10/21            PENDING APPROVAL

   ------------PARAMETER-----------          -----------RESULT----------
      T65603 NAPHTHALENE                       0.10 MCG/G [PL]
      T63103 ACENAPHTHYLENE                  < 0.10 MCG/G
      T63003 ACENAPHTHENE                      0.10 MCG/G [PL]
      T65203 FLUORENE                          0.10 MCG/G [PL]
      T66103 PHENANTHRENE                      0.56 MCG/G
      T63203 ANTHRACENE                        0.12 MCG/G
      T68003 FLUORANTHENE                      0.90 MCG/G
      T66203 PYRENE                             1.1 MCG/G
      T63303 BENZO(A)ANTHRACENE                0.18 MCG/G
      T64203 CHRYSENE                          0.30 MCG/G
      T63403 BENZO(B)FLUORANTHENE              0.15 MCG/G
      T63503 BENZO(K)FLUORANTHENE             < 0.1 MCG/G
      T63603 BENZO(A)PYRENE                  < 0.10 MCG/G
      T64303 DIBENZO(A,H)ANTHRACENE          < 0.10 MCG/G
      T63703 BENZO(GHI)PERYLENE              < 0.10 MCG/G
      T65403 INDENO(1,2,3-CD)PYRENE          < 0.10 MCG/G
                           **** END OF REPORT ****

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        *                                      *      SUBMITTED [illegible]
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               WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 1                    RESULTS OF EXAMINATION                 PENDING APPROVAL

SAMPLE ID:      074733        SAMPLE RECEIVED:87/10/19/          CHARGE:   16.50
PROGRAM:        5600:DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
SOURCE ID:                    DRAINAGE BASIN:              GAZETTEER CODE:3565
POLITICAL SUBDIVISION:TUXEDO                               COUNTY:ORANGE
LATITUDE:          .          LONGITUDE:          .        Z DIRECTION:
LOCATION:    TUXEDO PARK RT 17 LANDFILL
DESCRIPTION:P-387-020-03
REPORTING LAB:          TOXILAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN:           PCBS:PCB'S IN SOLIDS - STEAM DISTILLED
SAMPLE TYPE:            600:SOIL, SAND
REASONS FOR SUBMISSION: TASTE/ODOR
TIME OF SAMPLING: 87/10/16 14:20                          DATE OF FINAL:87/10/22

ANALYSIS:        PCBS     PCB'S IN SOLIDS-STEAM DISTILLED (DES 312-2)
                          DATE COMPLETED: 87/10/21               PENDING APPROVAL

  ------------PARAMETER------------              -----------RESULT-----------
      T39803 PCB,AROCLOR 1221                     < 0.001 MCG/G
      T38003 PCB,AROCLOR 1016/1242                < 0.001 MCG/G
      T32203 PCB,AROCLOR 1248                     < 0.001 MCG/G
      T38103 PCB,AROCLOR 1254                     < 0.001 MCG/G
      T41803 PCB,AROCLOR 1260                     < 0.001 MCG/G

          FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

ANALYSIS:        [illegible]     POLYNUCLEAR AROMATIC HYDROCARBONS - SOIL/SEDIMENT
                          DATE COMPLETED: 87/10/21               PENDING APPROVAL

  ------------PARAMETER------------              -----------RESULT-----------
      T63803 NAPHTHALENE                          < 0.10 MCG/G
      T63103 ACENAPHTHYLENE                       < 0.10 MCG/G
      T63003 ACENAPHTHENE                         < 0.10 MCG/G
      T65203 FLUORENE                             < 0.10 MCG/G
      T66103 PHENANTHRENE                           0.10 MCG/G [PL]
      T63203 ANTHRACENE                             0.10 MCG/G [PL]
      T68003 FLUORANTHENE                           0.10 MCG/G [PL]
      T66203 PYRENE                                 0.10 MCG/G [PL]
      T63303 BENZO(A)ANTHRACENE                   < 0.10 MCG/G
      T64203 CHRYSENE                             < 0.10 MCG/G
      T63403 BENZO(B)FLUORANTHENE                 < 0.10 MCG/G
      T63503 BENZO(K)FLUORANTHENE                 < 0.10 MCG/G
      T63603 BENZO(A)PYRENE                       < 0.10 MCG/G
      T64303 DIBENZO(A,H)ANTHRACENE               < 0.10 MCG/G
      T63703 BENZO(GHI)PERYLENE                   < 0.10 MCG/G
      T65403 INDENO(1,2,3-CD)PYRENE               < 0.10 MCG/G
                               **** END OF REPORT ****

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          *                                     *        SUBMITTED BY:PERKINS
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PAGE 1 RESULTS OF EXAMINATION PENDING APPROVAL

SAMPLE ID: 874734 SAMPLE RECEIVED: 87/10/19/ CHARGE: 16.50
PROGRAM: [illegible]DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
SOURCE ID: DRAINAGE BASIN: GAZETTEER CODE: 3565
POLITICAL SUBDIVISION: TUXEDO COUNTY: ORANGE
LATITUDE: . LONGITUDE: . Z DIRECTION:
LOCATION: TUXEDO PARK RT 17 LANDFILL
DESCRIPTION: P-387-020-04
REPORTING LAB: TOXICAS FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN: PCBS: PCB'S IN SOLIDS - STEAM DISTILLED
SAMPLE TYPE: [illegible]SOIL, SAND
REASONS FOR SUBMISSION: TASTE/ODOR
TIME OF SAMPLING: 87/10/16 14:30 DATE OF FINAL: 87/10/22

ANALYSIS: PCBS PCB'S IN SOLIDS-STEAM DISTILLED (DES 312-2)
DATE COMPLETED: 87/10/21 PENDING APPROVAL

PARAMETER	RESULT
T39803 PCB,AROCLOR 1221	1.04 MCG/G
T38003 PCB,AROCLOR 1016/1242	< 0.02 MCG/G
T52203 PCB,AROCLOR 1248	< 0.02 MCG/G
T38103 PCB,AROCLOR 1254	0.16 MCG/G
T41603 PCB,AROCLOR 1260	< 0.02 MCG/G

FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

ANALYSIS: 6105 POLYNUCLEAR AROMATIC HYDROCARBONS - SOIL/SEDIMENT
DATE COMPLETED: 87/10/21 PENDING APPROVAL

PARAMETER	RESULT
T63603 NAPHTHALENE	0.10 MCG/G (PL)
T63103 ACENAPHTHYLENE	0.10 MCG/G (PL)
T63003 ACENAPHTHENE	0.13 MCG/G
T65203 FLUORENE	0.13 MCG/G
T66103 PHENANTHRENE	1.3 MCG/G
T63203 ANTHRACENE	0.22 MCG/G
T68003 FLUORANTHENE	1.2 MCG/G
T66203 PYRENE	1.5 MCG/G
T63303 BENZO(A)ANTHRACENE	0.20 MCG/G
T64203 CHRYSENE	0.31 MCG/G
T63403 BENZO(B)FLUORANTHENE	0.11 MCG/G
T63503 BENZO(K)FLUORANTHENE	< 0.10 MCG/G
T63803 BENZO(A)PYRENE	< 0.10 MCG/G
T64303 DIBENZO(A,H)ANTHRACENE	< 0.10 MCG/G
T63703 BENZO(GHI)PERYLENE	< 0.10 MCG/G
T65403 INDENO(1,2,3-CD)PYRENE	< 0.10 MCG/G

**** END OF REPORT ****

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SUBMITTED [illegible]

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                          RESULTS OF EXAMINATION            PENDING APPROVAL
PAGE 1

SAMPLE ID:     874735       SAMPLE RECEIVED:87/10/19/           CHARGE:    16.50
PROGRAM:       36000 DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
SOURCE ID:                  DRAINAGE BASIN:              GAZETTEER CODE:3565
POLITICAL SUBDIVISION:TUXEDO                             COUNTY:ORANGE
LATITUDE:     .             LONGITUDE:       .           Z DIRECTION:
LOCATION:    TUXEDO PARK RT 17 LANDFILL
DESCRIPTION:P-387-020-6
REPORTING LAB:          TOXLAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN:           PCBS:PCB'S IN SOLIDS - STEAM DISTILLED
SAMPLE TYPE:            600:SOIL, SAND
REASONS_FOR SUBMISSION: TASTE/ODOR
TIME OF SAMPLING: 87/10/16 131                       DATE OF FINAL:87/10/22

ANALYSIS:        PCBS    PCB'S IN SOLIDS-STEAM DISTILLED (DES 312-2)
                         DATE COMPLETED: 87/10/21           PENDING APPROVAL

   -----------PARAMETER-----------             -----------RESULT----------
      T39803 PCB,AROCLOR 1221                  < 0.005 MCG/G
      T38003 PCB,AROCLOR 1016/1242               0.05 MCG/G [SU]
      T52203 PCB,AROCLOR 1248                  < 0.005 MCG/G
      T39103 PCB,AROCLOR 1254                  < 0.005 MCG/G
      T41603 PCB,AROCLOR 1260                  < 0.005 MCG/G

          FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

ANALYSIS:        6103    POLYNUCLEAR AROMATIC HYDROCARBONS - SOIL/SEDIMENT
                         DATE COMPLETED: 87/10/21           PENDING APPROVAL

   -----------PARAMETER-----------             -----------RESULT----------
      T55603 NAPHTHALENE                       0.10 PL MCG/G [MS]
      T63103 ACENAPHTHYLENE                    0.10 PL MCG/G [MS]
      T63003 ACENAPHTHENE                          0.11 MCG/G [MS]
      T65203 FLUORENE                              0.24 MCG/G [MS]
      T66103 PHENANTHRENE                          1.4 MCG/G [MS]
      T63203 ANTHRACENE                            0.33 MCG/G [MS]
      T66003 FLUORANTHENE                          1.4 MCG/G [MS]
      T66203 PYRENE                                2.0 MCG/G [MS]
      T63303 BENZO(A)ANTHRACENE                    0.19 MCG/G [MS]
      T64203 CHRYSENE                              0.30 MCG/G [MS]
      T63403 BENZO(B)FLUORANTHENE              0.10 PL MCG/G [MS]
      T63503 BENZO(K)FLUORANTHENE              < 0.10 MCG/G
      T63603 BENZO(A)PYRENE                    0.10 PL MCG/G [MS]
      T64303 DIBENZO(A,H)ANTHRACENE            < 0.10 MCG/G
      T63703 BENZO(GHI)PERYLENE                < 0.10 MCG/G
      T65403 INDENO(1,2,3-CD)PYRENE            < 0.10 MCG/G
                          **** END OF REPORT ****

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PAGE 1                   RESULTS OF EXAMINATION              PENDING APPROVAL

SAMPLE ID:    874736     SAMPLE RECEIVED:87/10/19/         CHARGE:    16.80
PROGRAM:      SUBDIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
SOURCE ID:               DRAINAGE BASIN:             GAZETTEER CODE:3565
POLITICAL SUBDIVISION:TUXEDO                          COUNTY:ORANGE
LATITUDE:        .       LONGITUDE:           .      Z DIRECTION:
LOCATION:   TUXEDO PARK RT 17 LANDFILL
DESCRIPTION:P-387-020-07
REPORTING LAB:        TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN:        PCBS:PCB'S IN SOLIDS - STEAM DISTILLED
SAMPLE TYPE:          600:SOIL, SAND
REASONS FOR SUBMISSION: TASTE/ODOR
TIME OF SAMPLING: 87/10/16 15:45                    DATE OF FINAL:87/10/22

ANALYSIS:       PCBS   PCB'S IN SOLIDS-STEAM DISTILLED (DES 3.2-2)
                       DATE COMPLETED: 87/10/21               PENDING APPROVAL

 ------------PARAMETER------------           -----------RESULT-----------
    T39803 PCB,AROCLOR 1221                      0.19 MCG/G [SU]
    T38003 PCB,AROCLOR 1016/1242               < 0.001 MCG/G
    T32203 PCB,AROCLOR 1248                    < 0.001 MCG/G
    T38103 PCB,AROCLOR 1254                    < 0.001 MCG/G
    T41603 PCB,AROCLOR 1260                    < 0.001 MCG/G

           FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

ANALYSIS:       6205   POLYNUCLEAR AROMATIC HYDROCARBONS - SOIL/SEDIMENT
                       DATE COMPLETED: 87/10/21               PENDING APPROVAL

 ------------PARAMETER------------           -----------RESULT-----------
    T65603 NAPHTHALENE                             0.10 MCG/G [PL]
    T63103 ACENAPHTHYLENE                          0.10 MCG/G [PL]
    T63003 ACENAPHTHENE                            0.10 MCG/G [PL]
    T63203 FLUORENE                                0.10 MCG/G [PL]
    T66103 PHENANTHRENE                            0.28 MCG/G
    T63203 ANTHRACENE                              0.10 MCG/G [PL]
    T68003 FLUORANTHENE                            0.21 MCG/G
    T66203 PYRENE                                  0.20 MCG/G
    T63303 BENZO(A)ANTHRACENE                    < 0.10 MCG/G
    T64203 CHRYSENE                              < 0.10 MCG/G
    T63403 BENZO(B)FLUORANTHENE                  < 0.10 MCG/G
    T63503 BENZO(K)FLUORANTHENE                  < 0.10 MCG/G
    T63603 BENZO(A)PYRENE                        < 0.10 MCG/G
    T64303 DIBENZO(A,H)ANTHRACENE                < 0.10 MCG/G
    T63703 BENZO(GHI)PERYLENE                    < 0.10 MCG/G
    T65403 INDENO(1,2,3-CD)PYRENE                < 0.10 MCG/G
                        **** END OF REPORT ****

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PAGE 1                  RESULTS OF EXAMINATION              PENDING APPROVAL

SAMPLE ID:    874737       SAMPLE RECEIVED:87/10/19/        CHARGE:    16.50
PROGRAM:      SUBDIVISION OF ENVIRONMENTAL ENFORCEMENT * DEC
SOURCE ID:                 DRAINAGE BASIN:               GAZETTEER CODE:3565
POLITICAL SUBDIVIS/UNIT:TUXEDO                           COUNTY:ORANGE
LATITUDE:       .          LONGITUDE:         .          Z DIRECTION:
LOCATION:   TUXEDO PARK AT 17 LANDFILL
DESCRIPTION:P-387-020-09
REPORTING LAB:        TOXILAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN:         PCB8:PCB'S IN SOLIDS - STEAM DISTILLED
SAMPLE TYPE:          600:SOIL, SAND
REASONS FOR SUBMISSION: TASTE/ODOR
TIME OF SAMPLING: 87/10/16 14:45                     DATE OF FINAL:87/10/22

ANALYSIS:       PCB8    PCB'S IN SOLIDS-STEAM DISTILLED (DES 3.2*2)
                        DATE COMPLETED: 87/10/21              PENDING APPROVAL

  -----------PARAMETER-----------              ----------RESULT----------
     T35803 PCB,AROCLOR 1221                    < 0.01 MCG/G
     T36003 PCB,AROCLOR 1016/1242                 0.04 MCG/G [BU]
     T52203 PCB,AROCLOR 1248                    < 0.01 MCG/G
     T38103 PCB,AROCLOR 1254                    < 0.01 MCG/G
     T41603 PCB,AROCLOR 1260                    < 0.01 MCG/G

          FOLLOWING PARAMETERS NOT PART OF TEST PATTERN

ANALYSIS:       6105    POLYNUCLEAR AROMATIC HYDROCARBONS - SOIL/SEDIMENT
                        DATE COMPLETED: 87/10/21              PENDING APPROVAL

  -----------PARAMETER-----------              ----------RESULT----------
     T65603 NAPHTHALENE                           0.10 MCG/G [PL]
     T63103 ACENAPHTHYLENE                        0.10 MCG/G [PL]
     T63003 ACENAPHTHENE                          0.10 MCG/G [PL]
     T65203 FLUORENE                              0.10 MCG/G [PL]
     T66103 PHENANTHRENE                          0.42 MCG/G
     T63203 ANTHRACENE                            0.10 MCG/G [PL]
     T66003 FLUORANTHENE                          0.73 MCG/G
     T66203 PYRENE                                 1.0 MCG/G
     T63303 BENZO(A)ANTHRACENE                    0.16 MCG/G
     T64203 CHRYSENE                              0.27 MCG/G
     T63403 BENZO(B)FLUORANTHENE                < 0.10 MCG/G
     T63503 BENZO(K)FLUORANTHENE                < 0.10 MCG/G
     T63603 BENZO(A)PYRENE                      < 0.10 MCG/G
     T64303 DIBENZO(A,H)ANTHRACENE              < 0.10 MCG/G
     T63703 BENZO(GHI)PERYLENE                  < 0.10 MCG/G
     T65403 INDENO(1,2,3-CD)PYRENE              < 0.10 MCG/G
                            **** END OF REPORT ****

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        *                                   *
        *                                   *        SUBMITTED BY: [illegible]
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Analytical results are listed by parameter descriptions which include units of measurement. At times, numerical results include a two digit notation to supplement, explain or qualify the quantity reported. A notation, if present, follows the units of measurement. The following is a list of "official" notations and their interpretation.

BG	Heavy bacterial growth
BM	Spreading growth
CC	Calculated result
EE	Estimated result
FB	Value in doubt because field blank indicated collection procedure out of control
II	Insufficient information provided by collector
LA	Laboratory accident
MI	Mat growth, test for coliform organisms inconclusive
MP	Mat growth, test for coliform organisms positive
NA	Not analyzed
NC	Not confirmed (analyte may or may not be present)
ND	Not detectable and no minimum number available
NR*	Not required* (or Not Requested for analysis)
PL	Present but less than the usual minimum reportable value
PR	Present
RC	Result confirmed (generally by Mass Spectrometry or 2nd column GC or other analytical techniques)
CR	Confirmed Result by 2nd column gas chromatography
MS	Confirmed Result by Mass Spectrometry
SC	Aliquot was not provided
SD	Not analyzed: sample deteriorated in transit due to improper preservation
SG	Sample over maximum holding time (with a result)

$I	Not analyzed: insufficient quantity
$L	Not analyzed: sample lost or leaked in transit
$N	Not analyzed: sample over maximum holding time
R or $U	Suspicious result
UI	Unknown interference **

The NR notation is suppressed on data sheets distributed outside the laboratory. (Lab file copies will include this notation.)

In addition to this notation, there are cases where analytical results are qualified due to interferences and abbreviations are entered in the result field.
Examples are as follows: INT or INTER or INTERF

Analytical results may include a symbol preceeding the number which qualifies the result reported. There are four possible symbols which are depicted and described below. Previous computer-generated data (some 1983 and before) required that the four symbols were presented as a two digit notation (following the number). For reference, the previously used data notations are also listed below in parentheses.

>	Greater than	(GT)
>=	Greater than or equal to	(GE)
<	Less than	(LT)
<=	Less than or equal to	(LE)

Page 1
Received: 11/24/87

REPORT
12/28/87 11:35:51

Work Order # 87-11-235

REPORT TO NYSDEC
Room 317
50 Wolf Road
Albany, New York 12233-0001
ATTEN Mr. Jack Ryan

PREPARED BY Cambridge Analytical Assoc.
Environmental Division
1106 Commonwealth Avenue
Boston, MA 02215
ATTEN
PHONE 617-232-2207

Edward A. Lawler
CERTIFIED BY

CONTACT LAWLER

CLIENT NYSDEC
SAMPLES 3
COMPANY NYSDEC
FACILITY Bur. of Tech. Services & Res.

This report is approved for release by the following staff:
Laboratory Director:
Inorganic Laboratory:
Organic Laboratory:

WORK ID P-387-C07-20,-21,-22
TAKEN by E.Perkins & B.Wurster
TRANS by Federal Ex #1394778884
TYPE Environmental
P.O. # C001299
INVOICE under separate cover

This report summarizes the results of any inorganic or conventional sample analyses. Results for metals or organic analyses are reported in separate EPA CLP format reports where applicable. These CLP reports are attached.

SAMPLE IDENTIFICATION

01	P-387-C07-20
02	P-387-C07-21
02	P-387-C07-21 DUPLICATE
02	P-387-C07-21 LCS
02	P-387-C07-21 MS
02	P-387-C07-21 MSD
02	P-387-C07-21 SPIKE
03	P-387-C07-22

TEST CODES and NAMES used on this report

CNT_S	Total cyanide-EPA 335.3
ECLPPE	Pest/PCB ext-aq-CLP
EXCL_S	A/B/N extraction-soil-CLP
MSCLPS	Semi-volatiles-CLP
SLFD_S	Sulfide-soil-EPA 376.1

age 1
eceived: 11/24/87

REPORT
Results by Sample

Work Order # 87-11-235

SAMPLE ID P-387-C07-20 SAMPLE # 01 FRACTIONS: A,B,C,D
Date & Time Collected 11/19/87 Category SOIL

CNT_S 1.9 ug/g (dry wt)
ECLPPE 12/02/87 extraction date
EXCL_S 12/02/87 extraction date
SLFD_S 11 ug/g (dry wt)

SAMPLE ID P-387-C07-21 SAMPLE # 02 FRACTIONS: A,D,G,J
Date & Time Collected 11/19/87 Category SOIL

CNT_S 0.64 ug/g (dry wt)
ECLPPE 12/02/87 extraction date
EXCL_S 12/02/87 extraction date
SLFD_S <5.4 ug/g (dry wt)

SAMPLE ID P-387-C07-21 DUPLICATE SAMPLE # 02 FRACTIONS: L
Date & Time Collected 11/19/87 Category SOIL

CNT_S <0.64 ug/g (dry wt)
SLFD_S <5.4 ug/g (dry wt)

SAMPLE ID P-387-C07-21 LCS SAMPLE # 02 FRACTIONS: M
Date & Time Collected 11/19/87 Category SOIL

CNT_S 110% % Recovery
SLFD_S N/A % Recovery

SAMPLE ID P-387-C07-21 MS SAMPLE # 02 FRACTIONS: B,E,H
Date & Time Collected 11/19/87 Category SOIL

ECLPPE 12/02/87 extraction date
EXCL_S 12/02/87 extraction date

SAMPLE ID P-387-C07-21 MSD SAMPLE # 02 FRACTIONS: C,F,I
Date & Time Collected 11/19/87 Category SOIL

ECLPPE 12/02/87 extraction date
EXCL_S 12/02/87 extraction date

Tuxedo Park C&D Site
Sample Key

DEC I.D.	DOH Accession No.	Sampling Point
P-387-D24-01	875404	Downwind 1 ambient air
P-387-D24-02	875405	Upwind 1 ambient air
P-387-D24-03	875406	Downwind 2 ambient air
P-387-D24-04	875407	Upwind 2 ambient air
P-387-D25-05	875408	Site air ambient air
P-387-D24-06	875409	Blank
P-387-D24-07	875410	SSI Vent
P-387-D24-08	875411	CL-1 Culvert
P-387-D24-09	875412	SS-4 Vent
P-387-D24-10	875413	SS-5 Vent
P-387-D24-11	875414	A-2 Boring
P-387-D24-12	875415	CL-2 Culvert
P-387-D24-13	875416	D-4 Boring
P-387-D24-14	875417	C-2 Boring
P-387-D24-15	875418	C-7 Boring
P-387-D24-16	875419	D-6 Boring
P-387-D24-17	875420	B-4 Boring
P-387-D24-18	875421	A-7 Boring
P-387-D24-19	875422	A-9 Boring
P-387-C07-20		Debris Pile
P-387-C07-21		Soil Pit
P-387-C07-22		Sludge

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233

Thomas C. Jorling
Commissioner

Rin
File

RECEIVED

MAR 0 2 1988

ADMINISTRATIVE UNIT
REGION #3

February 29, 1988

Mrs. Susan Wiand
c/o Mrs. Helen Partridge
193 Straw Town Road
West Nyack, NY 10994

RE: Tuxedo Park C & D Site Analytical Results

Dear Mrs. Wiand:

In accordance with your request of February 26, 1988, enclosed herewith please find analytical results for samples obtained by DEC personnel on October 16 and November 17-19, 1987.

The samples obtained on October 16 consisted of soil and surface water (not leachate). These samples were obtained in duplicate and sent to the New York State Department of Health laboratory and Cambridge Analytical Associates laboratory. The Health Department lab analyzed the samples for PCBs and Polynuclear Aaromatic Hydrocarbons (PAHs or PNAs). Cambridge analyzed the samples for semivolatiles, pesticides, petroleum hydrocarbons (PHCs) and metals. The map which accompanies the sampling trip report for Ocober 16th indicates the sampling location and the type of sample obtained. Unless otherwise indicated, the media sampled was soil. For your information, the sampling type, for example, "grab" or "composite" indicates whether a single sample or group of samples were collected and mixed together, that is composited. The term "blank" for sample location P-387-C23-03 should have been a background sample. The symbols u/G and u/Kg on the lab report sheets mean micrograms per gram and micrograms per kilogram respectively. These, in turn, are equivalent to parts per million (ppm) and parts per billion (ppb) respectively. One part per million equals one thousand parts per billion such that a figure of 3300ug/kg or 3300 ppb is equavalent to 3.3ppm.

The samples obtained on November 17-19th, were analyzed by either the Health Department or Cambridge Laboratories as follows: air samples by DOH; soil and fill samples by Cambridge. The air sampling results have previously been provided to you. The enclosed air results are final and the detection limits have been entered.

In response to your other questions:

1. Methane and other volatile gases were qualitatively screened for by using two instruments, an organic vapor analyzer (OVA), which detects methane and an HNU photoionization detector (PID) which does not detect methane. By comparing readings on the two instruments, the presence or absence of methane and other gases can be determined. It was the samplers' opinion that methane and/or other gases were present.

2. The "borings" were actually shallow soil probes conducted by hand such that the air sampling tubes could be placed into the fill material to obtain samples of the vapors being emitted from the various layers such as the cover material and the underlying C & D fill. The depth of these probes ranged from one (1) to three (3) feet.

3. Symbols such as MS (matrix spike), MSD (matrix spike duplicate), MB (method blank) are references to quality assurance and quality control (QA/QC) procedures which are routinely performed to check the methodology and accuracy of the analytical process.

I trust that this data and explanations are responsive to your request and questions. If you have any further questions, please do not hesitate to contact me at (518) 457-4346.

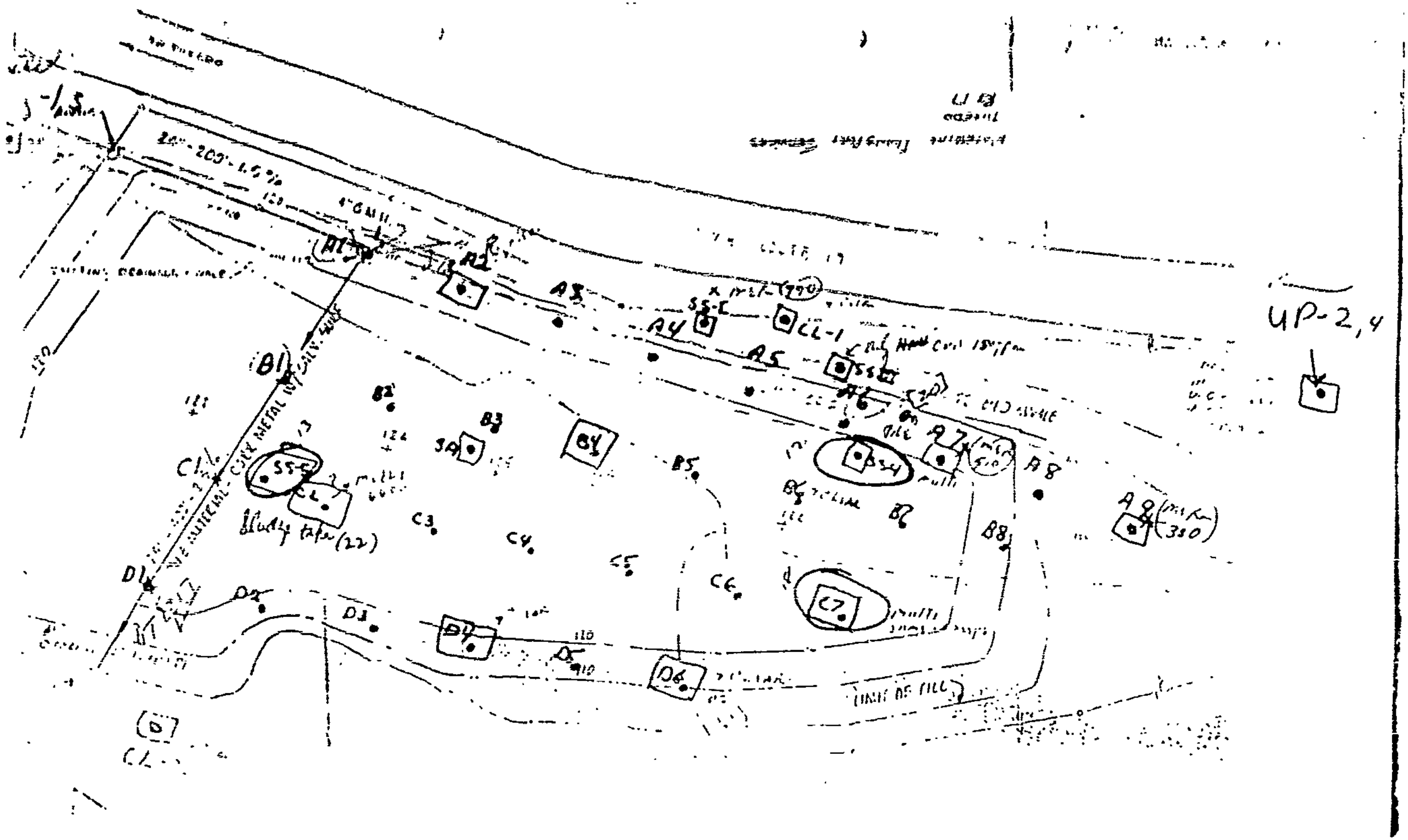
Sincerely yours,

Vance Bryant

Vance Bryant
Chief, Bureau of Technical Svc.
Division of Environmental
Enforcement

Enclosures

cc: D. Markell (w/o enc.)
W. Reiss " "
P. Keller " "


20"-200'-1.5%
A1
A2
A3
A4
A5
A6
A7
A8
A9 (mike) (330)
SS-E
CL-1
x mil (990)
B1
B2
B3
3A
B4
B5
B6
B7
B8
SS-5
CL
C1
C3
C4
C5
C6
C7
Sludgy talin (22)
D1
D2
D3
D4
D5
D6
D
CL
UP-2,4
LIMIT OF FILL

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                    NE  O.  STATE DEPARTMENT OF HEALTH
          WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE .                  RESULTS OF EXAMINATION              INTERIM REPORT

LAB FILE ID:    .5404     SAMPLE RECEIVED:87 11/23          CHARGE:      0.00
[illegible]                   ENVIRONMENTAL ENFORCEMENT - DEC
                          DRAINAGE BASIN:                   GAZETTEER CODE:3565
[illegible]                                                 COUNTY:ORANGE
LATITUDE:        .        LONGITUDE:          .             Z DIRECTION:
[illegible]                                   LANDFILL
DESCRIPT   [illegible]-AIR,111487,SAMPLING POINT LF-1,P-387-024-01
[illegible]                                          CHEMISTS
TEST PATTERN:      VOLATILE COMPOUNDS IN AIR
[illegible]
[illegible] OF SUBMISSION : [illegible] CODE
[illegible]                                     LAST ACTION DATE:[illegible]

[illegible]
                      DATA INCOMPLETE                        INTERIM REPORT

         -----PARAMETER-------------          ----------RESULT----------
         [illegible] CHLOROMETHANE                       [NE]
         [illegible] CHLORIDE                            [NE]
         [illegible]                                     [NE]
         [illegible] METHYLENE CHLORIDE (DICHLOROMETHANE) [illegible] CU.M.
         [illegible]                                     [NE]
         [illegible] ETHANE                              [NE]
         [illegible]                                     [NE]
         [illegible] DICHLOROETHANE                      [NE]
         [illegible]                                     [NE]
         [illegible] CHLOROFORM                          [NE]
         [illegible]                                     [NE]
         [illegible] TRICHLOROFLUOROMETHANE (FREON-11)   [NE]
         [illegible] CARBON TETRACHLORIDE                [NE]
         [illegible] BROMODICHLOROMETHANE                [NE]
         [illegible] BENZENE                             [NE]
         [illegible] TOLUENE                             [NE]
         [illegible] ETHYLBENZENE                        [NE]
         [illegible] TRANS-1,3-DICHLOROPROPENE           [NE]
         [illegible] CIS-1,3-DICHLOROPROPENE             [NE]
         [illegible] 1,2-DICHLOROPROPANE                 [NE]
         [illegible]                                     [NE]
         [illegible] TRICHLOROETHENE                     [NE]
         [illegible] TRICHLOROETHANE                     [NE]
         [illegible] TETRACHLOROETHENE                   [NE]
         [illegible] TETRACHLOROETHANE                   [NE]
         [illegible] DIBROMOCHLOROMETHANE                [NE]
         [illegible] BROMOFORM                           [NE]
         T06300 AIR VOLUME                          0.0180 CU.M.
                         ***** END OF REPORT *****
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AIM
ADVANCED
IMAGE
MANAGEMENT

MINOLTA

The Following Documents are Photocopies Condition Can't Be Improved -

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7010 Fly Road • E. Syracuse, NY 13057 • (315) 432-0591 • FAX (315) 432-0593
1717 Central Avenue • Suite 104 • Albany, NY 12205 • (518) 456-0532 • FAX (518) 456-0533
140A Metro Park • Rochester, NY 14623 • (716) 427-2460 • FAX (716) 427-8231
204 Court Street • Binghamton, NY 13902 • (607) 724-8368

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                NEW YORK STATE DEPARTMENT OF HEALTH
           WADSWORTH CENTER FOR LABORATORIES AND RESEARCH
PAGE 1                   RESULTS OF EXAMINATION                 INTERIM REPORT
SAMPLE ID:    875415       SAMPLE RECEIVED:87 11/23          CHARGE:     0.00
[illegible]            DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
[illegible]                [illegible]                       GAZETTEER CODE:[illegible]
[illegible]                                                  COUNTY: [illegible]
LATITUDE:      .           LONGITUDE:       .               Z DIRECTION:
[illegible]
DESCRIPTION:[illegible] SAMPLING POINT DW-1,P-187-024-02
[illegible]                                   [illegible] CHEMISTRY
TEST PATTERN:          [illegible] VOLATILE COMPOUNDS IN AIR
[illegible]
[illegible]
[illegible]
[illegible]                  VOLATILE [illegible] IN AIR [illegible]
                       DATA INCOMPLETE                          INTERIM REPORT

     --------------[illegible]--------------        ----------RESULT----------
[illegible]                                                  [NE]
     [illegible]                                             [NE]
     [illegible]                                             [NE]
     [illegible]                   [illegible]ETHANE         [NE]
     [illegible]                                             [NE]
       [illegible] BROMOMETHANE                              [NE]
     [illegible]                                             [NE]
     [illegible]                   [illegible]ETHANE         [NE]
     [illegible]                                             [NE]
     [illegible] CHLOROFORM                                  [NE]
     [illegible]                                             [NE]
     [illegible] TRICHLOROFLUOROMETHANE (FREON-11)           [NE]
     [illegible]                                             [NE]
     [illegible] BROMODICHLOROMETHANE                        [NE]
     [illegible]                                             [NE]
     [illegible] TOLUENE                                     [NE]
     [illegible]                                             [NE]
     [illegible] [illegible]-1,3-DICHLOROPROPENE             [NE]
     [illegible]                                             [NE]
     [illegible] 1,2-DICHLOROPROPANE                         [NE]
     [illegible]                                             [NE]
     [illegible] TRICHLOROETHENE                             [NE]
     [illegible]                                             [NE]
     [illegible] TETRACHLOROETHENE                           [NE]
     [illegible]                                             [NE]
     [illegible] DIBROMOCHLOROMETHANE                        [NE]
     [illegible]                                             [NE]
     [illegible] AIR VOLUME                       0.0139 CU.M.
                        **** END OF REPORT ****

[illegible]                                          SAMPLE [illegible]
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                    [illegible] STATE DEPARTMENT OF HEALTH
             WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 1                 RESULTS OF EXAMINATION                    INTERIM REPORT

SAMPLE ID:      875406     SAMPLE RECEIVED:87 11 23/           CHARGE:      0.[illegible]
[illegible]                [illegible]DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
SOURCE ID:                 DRAINAGE BASIN:                 GAZETTEER CODE:3765
[illegible]                                                COUNTY:ORANGE
LATITUDE:       .          LONGITUDE:          .           Z DIRECTION:
[illegible] LANDFILL
DESCRIPTION:#111479A,#111480B.SAMPLING POINT LP-2,P-367-024-02
[illegible]                                                [illegible]CHEMISTRY.
REP. PATTERN:       024-IP:VOLATILE COMPOUNDS IN AIR
[illegible]
REASON FOR SUBMISSION: TASTE ODOR
[illegible]

[illegible]               VOLATILE COMPOUNDS [illegible]
                           DATA INCOMPLETE                        INTERIM REPORT

  ------------PARAMETER-------------              ---------RESULT---------
  [illegible]                                             [NE]
  [illegible] VINYL CHLORIDE                              [NE]
  [illegible] CHLOROETHANE                                [NE]
  [illegible] METHYLENE CHLORIDE (DICHLOROMETHANE)        [NE]
  [illegible]                                             [NE]
  [illegible] BROMOMETHANE                                [NE]
  [illegible] TRANS-1,2-DICHLOROETHENE                    [NE]
  [illegible] 1,1-DICHLOROETHANE                          [NE]
  [illegible] 1,2-DICHLOROETHANE                          [NE]
  [illegible] CHLOROFORM                                  [NE]
  [illegible] 1,1,1-TRICHLOROETHANE                       [NE]
  [illegible] TRICHLOROFLUOROMETHANE (FREON-11)           [NE]
  [illegible] CARBON TETRACHLORIDE                        [NE]
  [illegible] BROMODICHLOROMETHANE                        [NE]
  [illegible] BENZENE                                     [NE]
  [illegible] TOLUENE                                     [NE]
  [illegible] ETHYLBENZENE                                [NE]
  [illegible] TRANS-1,3-DICHLOROPROPENE                   [NE]
  [illegible] CIS-1,3-DICHLOROPROPENE                     [NE]
  [illegible] 1,2-DICHLOROPROPANE                         [NE]
  [illegible] CHLOROBENZENE                               [NE]
  T41102 TRICHLOROETHENE                                  [NE]
  [illegible] 1,1,2-TRICHLOROETHANE                       [NE]
  T41202 TETRACHLOROETHENE                                [NE]
  [illegible] 1,1,2,2-TETRACHLOROETHANE                   [NE]
  [illegible] DIBROMOCHLOROMETHANE                        [NE]
  [illegible] BROMOFORM                                   [NE]
  [illegible] AIR VOLUME                            0.0207 CU.M.
                      **** END OF REPORT ****

COPIES SENT TO: [illegible]     LPHE     FED     [illegible]
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                WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

 PAGE 1                    RESULTS OF EXAMINATION                    INTERIM REPORT

 SAMPLE ID:    [illegible]        SAMPLE RECEIVED: 07/11/88          CHARGE:     0.00
 [illegible] DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
 SOURCE ID:                 DRAINAGE BASIN:                 GAZETTEER CODE: 3505
 [illegible] COUNTY: [illegible]
 LATITUDE:                  LONGITUDE:                      Z DIRECTION:
 [illegible]
 DESCRIPTION: [illegible] SAMPLING POINT 04-2,F-287-024-04
 [illegible] CHEMISTS
 [illegible]           [illegible] VOLATILE COMPOUNDS IN AIR
 [illegible] SAMPLES
 [illegible]
 [illegible] EXTRACTION [illegible]

 [illegible] VOLATILE COMPOUNDS IN AIR BY GC/MS
                     DATA INCOMPLETE                               INTERIM REPORT

 ------------------PARAMETER-------------------           ---------RESULT-----------
 [illegible]                                                      [NE]
      [illegible] VINYL CHLORIDE                                  [NE]
 [illegible]                                                      [NE]
      [illegible] METHYLENE CHLORIDE (DICHLOROMETHANE)            [NE]
 [illegible] 1,1-DICHLOROETHENE                                   [NE]
      [illegible] BROMOMETHANE                                    [NE]
 [illegible] TRANS-1,2-DICHLOROETHENE                             [NE]
      [illegible] 1,1-DICHLOROETHANE                              [NE]
 [illegible]                                                      [NE]
      [illegible] CHLOROFORM                                      [NE]
 [illegible] 1,1,1-TRICHLOROETHANE                                [NE]
      [illegible] TRICHLOROFLUOROMETHANE (FREON-11)               [NE]
 [illegible]                                                      [NE]
      [illegible] BROMODICHLOROMETHANE                            [NE]
 [illegible] BENZENE                                              [NE]
      [illegible] TOLUENE                                         [NE]
 [illegible] ETHYLBENZENE                                         [NE]
      [illegible] TRANS-1,3-DICHLOROPROPENE                       [NE]
 [illegible]                                                      [NE]
      T81302 1,2-DICHLOROPROPANE                                  [NE]
 [illegible] CHLOROBENZENE                                        [NE]
      T41102 TRICHLOROETHENE                                      [NE]
 [illegible] 1,1,2-TRICHLOROETHANE                                [NE]
      T41202 TETRACHLOROETHENE                                    [NE]
 [illegible] 1,1,2,2-TETRACHLOROETHANE                            [NE]
      [illegible] DIBROMOCHLOROMETHANE                            [NE]
 [illegible]                                                      [NE]
      [illegible] VOLUME                                   0.0222 [illegible]
 [illegible] *** END OF REPORT ***


 COPIES SENT TO: CO-2 , RO    , LPHI    , FED   , INFO-R(  , INFO-L( :
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[illegible] STATE DEPARTMENT OF HEALTH
          WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 1                     RESULTS OF EXAMINATION                    INTERIM REPORT

SAMPLE ID:      87[illegible]       SAMPLE RECEIVED:87/11/2[illegible]        CHARGE:      0.[illegible]
[illegible]
SOURCE ID:                 DRAINAGE BASIN:                  GAZETTEER CODE:[illegible]
[illegible]
LATITUDE:          .       LONGITUDE:          .            Z DIRECTION:
[illegible]
DESCRIPTION:#111409-,111406E,SAMPLING POINT [illegible]
[illegible]
TEST PATTERN:      C24AIR:VOLATILE COMPOUNDS IN AIR
[illegible]
REASONS FOR SUBMISSION: TASTE/ODOR
[illegible]

[illegible]
                      DATA INCOMPLETE                                INTERIM REPORT

    -------------PARAMETER-------------              -----------RESULT----------
      [illegible]                                               (NE)
      [illegible] CHLORIDE                                      (NE)
      [illegible]                                               (NE)
        [illegible] CHLORIDE [illegible]                        (NE)
      [illegible]                                               (NE)
      T[illegible] BROMOMETHANE                                 (NE)
      [illegible]                                               (NE)
      T[illegible] 1,1-DICHLOROETHANE                           (NE)
      [illegible]                                               (NE)
      T[illegible] CHLOROFORM                                   (NE)
      [illegible]                                               (NE)
      T[illegible] TRICHLOROFLUOROMETHANE (FREON-11)            (NE)
      [illegible]                                               (NE)
      T[illegible] BROMODICHLOROMETHANE                         (NE)
      [illegible]                                               (NE)
      T[illegible] TOLUENE                                      (NE)
      [illegible]                                               (NE)
      T[illegible] TRANS-1,3-DICHLOROPROPENE                    (NE)
      [illegible]                                               (NE)
      T[illegible] 1,2-DICHLOROPROPANE                          (NE)
      [illegible]                                               (NE)
      T[illegible] TRICHLOROETHENE                              (NE)
      [illegible]                                               (NE)
      T[illegible] TETRACHLOROETHENE                            (NE)
      [illegible]                                               (NE)
      T[illegible] DIBROMOCHLOROMETHANE                         (NE)
      [illegible]                                               (NE)
      T00300 AIR VOLUME                                  0.0210 CU.M.
                           ***** END OF REPORT *****
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                    NEW YORK STATE DEPARTMENT OF HEALTH
              WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

 PAGE 1              RESULTS OF EXAMINATION                  INTERIM REPORT

              [illegible]       SAMPLE RECEIVED: [illegible]        CHARGE:    0.00
 [illegible]       DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
 [illegible]                    DRAINAGE BASIN:               GAZETTEER CODE: [illegible]
 [illegible]                                                  COUNTY: [illegible]
 [illegible]                    LONGITUDE:                    Z DIRECTION:
 [illegible]
 [illegible]                    SAMPLING POINT: [illegible]
 [illegible]             ANALYTICAL CHEMISTRY
 [illegible]          VOLATILE COMPOUNDS IN AIR
 [illegible]
 [illegible] SUBMISSION: WASTE ODOR
 [illegible]                                          LAST ACTION DATE: [illegible]

 [illegible]  VOLATILE COMPOUNDS IN AIR [illegible]
                      DATA INCOMPLETE                        INTERIM REPORT

 ------------PARAMETER--------------            ----------RESULT----------
 [illegible]                                                 [NE]
 [illegible] CHLORIDE                                        [NE]
 [illegible]                                                 [NE]
 [illegible] METHYLENE CHLORIDE (DICHLOROMETHANE)            [NE]
 [illegible]                                                 [NE]
 [illegible] BROMOMETHANE                                    [NE]
 [illegible]                                                 [NE]
 [illegible] 1,1-DICHLOROETHANE                              [NE]
 [illegible]                                                 [NE]
 [illegible] CHLOROFORM                                      [NE]
 [illegible]                                                 [NE]
 [illegible] TRICHLOROFLUOROMETHANE (FREON-11)               [NE]
 [illegible]                                                 [NE]
 [illegible] BROMODICHLOROMETHANE                            [NE]
 [illegible] BENZENE                                         [NE]
 [illegible] TOLUENE                                         [NE]
 [illegible] ETHYLBENZENE                                    [NE]
 [illegible] TRANS-1,3-DICHLOROPROPENE                       [NE]
 [illegible] CIS-1,3-DICHLOROPROPENE                         [NE]
 T01302 1,2-DICHLOROPROPANE                                  [NE]
 [illegible] CHLOROBENZENE                                   [NE]
 [illegible] TRICHLOROETHENE                                 [NE]
 [illegible]                                                 [NE]
 [illegible] TETRACHLOROETHENE                               [NE]
 [illegible] 1,1,2,2-TETRACHLOROETHANE                       [NE]
 [illegible] DIBROMOCHLOROMETHANE                            [NE]
 [illegible] BROMOFORM                                       [NE]
 [illegible] AIR VOLUME                                 NONE
                          ***** END OF REPORT *****
```

[redacted]

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        [illegible] CENTER FOR [illegible] AND RESEARCH
PAGE 1                  RESULTS OF EXAMINATION                        INTERIM REPORT
SAMPLE ID:   875410     SAMPLE RECEIVED: 87 11/23               CHARGE:      0.00
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[illegible] ID:         DRAINAGE BASIN:                   GAZETTEER CODE:3565
[illegible]
LATITUDE:     .         LONGITUDE:        .               DIRECTION:
[illegible]
DESCRIPTION:#111488,111488B,SAMPLING POINT SS-1,R-187-024-07
[illegible]
TEST PATTERN:      53-AIR VOLATILE COMPOUNDS IN AIR
[illegible]
REASONS FOR SUBMISSION: TASTE ODOR
[illegible]

[illegible]

[illegible]
                         DATA COMPLETE                               INTERIM REPORT
---------------PARAMETER---------------            ----------UNITS----------
[illegible]                                                [NE]
T[illegible] VINYL CHLORIDE                                [NE]
[illegible]                                                [NE]
T[illegible] METHYLENE CHLORIDE (DICHLOROMETHANE)          [NE]
[illegible]                                                [NE]
T[illegible] BROMOMETHANE                                  [NE]
[illegible]                                                [NE]
T[illegible] 1,1-DICHLOROETHANE                            [NE]
[illegible]                                                [NE]
T[illegible] CHLOROFORM                                    [NE]
[illegible]                                                [NE]
T[illegible] TRICHLOROFLUOROMETHANE (FREON-11)             [NE]
[illegible]                                                [NE]
T[illegible] BROMODICHLOROMETHANE                          [NE]
[illegible]                                                [NE]
T18202 TOLUENE                                             [NE]
[illegible]                                                [NE]
T61502 TRANS-1,3-DICHLOROPROPENE                           [NE]
[illegible]                                                [NE]
T21302 1,2-DICHLOROPROPANE                                 [NE]
[illegible]                                                [NE]
T41102 TRICHLOROETHENE                                     [NE]
[illegible]                                                [NE]
T41202 TETRACHLOROETHENE                                   [NE]
[illegible]                                                [NE]
T44302 DIBROMOCHLOROMETHANE                                [NE]
[illegible]                                                [NE]
                  ***** CONTINUED ON NEXT PAGE *****

COPIES SENT TO: [illegible]                    [illegible]     [illegible]
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                  NEW YORK STATE DEPARTMENT OF HEALTH
             WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 2                   RESULTS OF EXAMINATION                 INTERIM REPORT

SAMPLE ID:   875410      SAMPLE RECEIVED: [illegible] 11 23[illegible]      CHARGE:    0.00
[illegible] SUBMISSION [illegible]                          COUNTY: ORANGE
[illegible] 200 [illegible] AT [illegible]
[illegible] 11 18 09 [illegible] 11 18 10 [illegible] LAST ACTION DATE: [illegible]

             PARAMETER                          RESULT
      [illegible] AIR VOLUME                         0.0128 CU.M.
                         **** END OF REPORT ****
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                        NEW YORK STATE DEPARTMENT OF HEALTH
                  WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 1                   RESULTS OF EXAMINATION                       INTERIM REPORT

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SOURCE ID:                 DRAINAGE BASIN:                   GAZETTEER CODE:3565
[illegible]                                                  COUNTY: OSWEGO
LATITUDE:        .         LONGITUDE:         .              Z DIRECTION:
[illegible]
DESCRIPTION:#111[illegible],111C48,SAMPLING POINT CL-1,P-337-[illegible]-08
[illegible]                                  ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN:          VOAAIR: VOLATILE COMPOUNDS IN AIR
[illegible]                        OTHER AIR RELATED SAMPLES
REASONS FOR SUBMISSION: TASTE/ODOR
TIME OF SAMPLING: [illegible] 10:45 TO 87-11-19 11:30 LAST ACTION DATE:88/01/12

[illegible]                 VOLATILE COMPOUNDS IN AIR - GC MS
                           DATA INCOMPLETE                           INTERIM REPORT

   ------------PARAMETER------------               -----------RESULT----------
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        [illegible]                                         [NE]
        [illegible] METHYLENE CHLORIDE (DICHLOROMETHANE)    [NE]
        [illegible]                                         [NE]
        [illegible] BROMOMETHANE                            [NE]
        [illegible]                                         [NE]
        [illegible] 1,1-DICHLOROETHANE                      [NE]
        [illegible]                                         [NE]
        [illegible] CHLOROFORM                              [NE]
        [illegible]                                         [NE]
        [illegible] TRICHLOROFLUOROMETHANE (FREON-11)       [NE]
        [illegible]                                         [NE]
        [illegible] BROMODICHLOROMETHANE                    [NE]
        [illegible]                                         [NE]
        [illegible] TOLUENE                                 [NE]
        [illegible]                                         [NE]
        [illegible] TRANS-1,3-DICHLOROPROPENE               [NE]
        [illegible]                                         [NE]
        T61302 1,2-DICHLOROPROPANE                          [NE]
        [illegible]                                         [NE]
        T41102 TRICHLOROETHENE                              [NE]
        [illegible]                                         [NE]
        [illegible] TETRACHLOROETHENE                       [NE]
        [illegible]                                         [NE]
        [illegible] DIBROMOCHLOROMETHANE                    [NE]
        [illegible]                                         [NE]
        T00300 AIR VOLUME                            0.0151 CU.M.
                              **** END OF REPORT ****
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                    NEW YORK STATE DEPARTMENT OF HEALTH
                  WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

[illegible]              RESULTS OF EXAMINATION                    INTERIM REPORT

SAMPLE ID:  [illegible]        SAMPLE RECEIVED: [illegible] 11 [illegible]     CHARGE:     0.00
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[illegible]                     DRAINAGE BASIN:            GAZETTEER CODE: [illegible]
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LATITUDE:                       LONGITUDE:                 DIRECTION:
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[illegible] FOR ANALYTICAL CHEMISTRY
[illegible]
[illegible] TYPE [illegible]

      [illegible]

      [illegible]

[illegible]                                                            INTERIM REPORT

                                                          RESULT
     [illegible] CHLORO ETHANE                           (NE)
     [illegible]                                         (NE)
     [illegible] CHLORIETHANE                            (NE)
     [illegible]                                         (NE)
     [illegible] 1,1-DICHLOROETHENE                      (NE)
     [illegible]                                         (NE)
     [illegible] TRANS-1,2-DICHLOROETHENE                (NE)
     [illegible]                                         (NE)
     [illegible] 1,2-DICHLOROETHANE                      (NE)
     [illegible]                                         (NE)
     [illegible] 1,1,1-TRICHLOROETHANE                   (NE)
     [illegible]                                         (NE)
     [illegible] CARBON TETRACHLORIDE                    (NE)
     [illegible]                                         (NE)
     [illegible] BENZENE                                 (NE)
     [illegible] TOLUENE                     13,000. MCG CU.M.
     [illegible] ETHYLBENZENE                  2200. MCG CU.M.
     [illegible]                                         (NE)
     [illegible] CIS-1,3-DICHLOROPROPENE                 (NE)
     [illegible]                                         (NE)
     [illegible] CHLOROBENZENE                           (NE)
     [illegible]                                         (NE)
     [illegible] 1,1,2-TRICHLOROETHANE                   (NE)
     [illegible] TETRACHLOROETHENE            [illegible] MCG CU.M.
                **** CONTINUED ON NEXT PAGE ****
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[illegible] STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 2 RESULTS OF EXAMINATION INTERIM REPORT

SAMPLE ID: [illegible]75412 SAMPLE RECEIVED: 87/11/2[illegible] CHARGE: 0.00
[illegible] COUNTY: [illegible]
LOCATION: [illegible] FARM RT 17 LANDFILL
[illegible] LAST ACTION DATE: 88/01/[illegible]

ANALYSES RESULT
79345 1,1,2,2-TETRACHLOROETHANE [NE]
[illegible] [NE]
75252 BROMOFORM [NE]
[illegible]

**** END OF REPORT ****

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                     NEW YORK STATE DEPARTMENT OF HEALTH
             WADSWORTH CENTER FOR LABORATORIES AND RESEARCH
[illegible]                  RESULTS OF EXAMINATION                        INTERIM REPORT
[illegible]        [illegible]       SAMPLE RECEIVED:87 11 23              CHARGE:
[illegible]        5600:DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
[illegible]                         DRAINAGE BASIN:                  GAZETTEER CODE:3500
[illegible] SUBDIVISION:TU EDO                                       COUNTY :ORANGE
[illegible]                         LONGITUDE:                       DIRECTION:
[illegible]          [illegible]
[illegible]  [illegible] SAMPLING POINT [illegible]
[illegible]                 TO LAB FOR ORGANIC ANALYTICAL CHEMISTRY
[illegible]                 624AIR:VOLATILE COMPOUNDS IN AIR
[illegible]                 [illegible]:OTHER AIR-RELATED SAMPLES
[illegible] FOR SUBMISSION: [illegible]
[illegible] SAMPLING [illegible] 87 11 23 11:1[illegible] TO 87 11 23 12:0[illegible] LAST ACTION DATE:88 [illegible]

             METHYL ISOBUTYL KETONE = 4,000. MCG. CU.M.
             METHYL BUTYL KETONE = [illegible] MCG. CU.M.
             TOTAL XYLENES = [illegible] MCG. CU.M.

[illegible]         624AIR      VOLATILE COMPOUNDS IN AIR - GC/MS
                                DATA INCOMPLETE                        INTERIM REPORT

     ------------PARAMETER-----------               ------------RESULT----------
       [illegible] CHLOROMETHANE                                [NE]
       [illegible] VINYL CHLORIDE                               [NE]
       [illegible] CHLOROETHANE                                 [NE]
       [illegible] METHYLENE CHLORIDE (DICHLOROMETHANE)         [NE]
       [illegible] 1,1-DICHLOROETHENE                           [NE]
       [illegible] BROMOMETHANE                                 [NE]
       [illegible] TRANS-1,2-DICHLOROETHENE                     [NE]
       [illegible] 1,1-DICHLOROETHANE                           [NE]
       [illegible] 1,2-DICHLOROETHANE                           [NE]
       [illegible] CHLOROFORM                                   [NE]
       [illegible] 1,1,1-TRICHLOROETHANE                        [NE]
       [illegible] TRICHLOROFLUOROMETHANE (FREON-11)            [NE]
       [illegible] CARBON TETRACHLORIDE                         [NE]
       [illegible] BROMODICHLOROMETHANE                         [NE]
       [illegible] BENZENE                                      [NE]
       [illegible] TOLUENE                               11,000. MCG/CU.M.
       [illegible] ETHYLBENZENE                           9,900. MCG/CU.M.
       T61502 TRANS-1,3-DICHLOROPROPENE                         [NE]
       T61402 CIS-1,3-DICHLOROPROPENE                           [NE]
       T61302 1,2-DICHLOROPROPANE                               [NE]
       [illegible] CHLOROBENZENE                                [NE]
       [illegible] TRICHLOROETHENE                              [NE]
       [illegible] 1,1,2-TRICHLOROETHANE                        [NE]
       [illegible] TETRACHLOROETHENE                     [illegible] MCG/CU.M.
       [illegible] 1,1,2,2-TETRACHLOROETHANE                    [NE]
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 COPIES SENT TO: [illegible]
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[illegible] [illegible]
                                                              COUNTY: ORANGE
LOCATION: [illegible]       LANDFILL
[illegible]                  TO [illegible] 11 18 12:03 [illegible] COLLECTION DATE: [illegible]

-------------PARAMETER-------------                  ----------RESULT----------
   [illegible]                                                  [illegible]
   [illegible]                                                  [illegible]
   [illegible]                                         0.0100 [illegible]
                           **** END OF REPORT ****
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              [illegible] CENTER FOR LABORATORIES AND RESEARCH
PAGE                          RESULTS OF EXAMINATION                        [illegible]
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PROGRAM:       5300:DIVISION OF ENVIRONMENTAL ENFORCEMENT - SEC
SOURCE ID:                   DRAINAGE BASIN:                        [illegible]
POLITICAL SUBDIVISION:TUXEDO                                        COUNTY:ORANGE
LATITUDE:                    LONGITUDE:                             [illegible]
LOCATION:     TUXEDO PARK RT 17 LANDFILL
DESCRIPTION:#[illegible].114688.SAMPLING POINT [illegible]
REPORTING LAB:          TOXILAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN:         [illegible]:VOLATILE COMPOUNDS IN AIR
[illegible]                   [illegible]:OTHER AIR-RELATED SAMPLES
[illegible] FOR SUBMISSION: WASTE ODOR
[illegible]

[illegible]        [illegible]    VOLATILE COMPOUNDS IN AIR - GC MS
                              DATA INCOMPLETE                             [illegible]

------------PARAMETER------------                       ------------RESULT------------
   [illegible] CHLOROMETHANE                                      [NE]
   [illegible] VINYL CHLORIDE                                     [NE]
   [illegible] CHLOROETHANE                                       [NE]
   [illegible] METHYLENE CHLORIDE (DICHLOROMETHANE)               [NE]
   [illegible] 1,1-DICHLOROETHENE                                 [NE]
   [illegible] BROMOMETHANE                                       [NE]
   [illegible] TRANS-1,2-DICHLOROETHENE                           [NE]
   [illegible] 1,1-DICHLOROETHANE                                 [NE]
   [illegible] 1,2-DICHLOROETHANE                                 [NE]
   [illegible] CHLOROFORM                                         [NE]
   [illegible] 1,1,1-TRICHLOROETHANE                              [NE]
   T61702 TRICHLOROFLUOROMETHANE (FREON-11)                       [NE]
   [illegible] CARBON TETRACHLORIDE                               [NE]
   [illegible] BROMODICHLOROMETHANE                               [NE]
   [illegible] BENZENE                                            [NE]
   [illegible] TOLUENE                                            [NE]
   [illegible] ETHYLBENZENE                                       [NE]
   T61502 TRANS-1,3-DICHLOROPROPENE                               [NE]
   [illegible] CIS-1,3-DICHLOROPROPENE                            [NE]
   T61302 1,2-DICHLOROPROPANE                                     [NE]
   [illegible] CHLOROBENZENE                                      [NE]
   T41102 TRICHLOROETHENE                                         [NE]
   [illegible] 1,1,2-TRICHLOROETHANE                              [NE]
   T41202 TETRACHLOROETHENE                                       [NE]
   [illegible] 1,1,2,2-TETRACHLOROETHANE                          [NE]
   T44302 DIBROMOCHLOROMETHANE                                    [NE]
   [illegible] BROMOFORM                                          [NE]
   [illegible] AIR VOLUME                               [illegible] [illegible]
                          ***** END OF REPORT *****

COPIES SENT TO: CO(2), RO [illegible], LPHE [illegible], FED [illegible], INFO-A [illegible], [illegible]
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[illegible]
                                   DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
                                   [illegible]                        GAZETTEER [illegible]
              [illegible] DEC                                          COUNTY :ORANGE
                                   [illegible]                         DIRECTION:
              [illegible] LANDFILL
              [illegible]
                           [illegible] FOR ORGANIC ANALYTICAL CHEMISTRY
                           [illegible] VOLATILE COMPOUNDS IN AIR
                           [illegible] OTHER [illegible] SAMPLES
              [illegible] WASTE [illegible]
              [illegible] LAST ACTION DATE: [illegible]

              [illegible]   VOLATILE COMPOUNDS IN AIR - GC [illegible]
                            DATA [illegible]                           INTERIM REPORT

     [illegible] PARAMETER [illegible]                      [illegible]
       [illegible] [illegible]ROMOMETHANE                   (NE)
       [illegible] [illegible] CHLORIDE                     (NE)
       [illegible] CHLOROETHANE                             (NE)
       [illegible] METHYLENE CHLORIDE (DICHLOROMETHANE)     (NE)
       [illegible] [illegible]DICHLOROETHENE                (NE)
       [illegible] [illegible]ETHANE                        (NE)
       [illegible] [illegible]                              (NE)
       [illegible] 1,1-DICHLOROETHANE                       (NE)
       [illegible] 1,2-DICHLOROETHANE                       (NE)
       [illegible] CHLOROFORM                               (NE)
       [illegible] 1,1,1-TRICHLOROETHANE                    (NE)
       [illegible] TRICHLOROFLUOROMETHANE (FREON-11)        (NE)
       [illegible] CARBON TETRACHLORIDE                     (NE)
       [illegible] BROMODICHLOROMETHANE                     (NE)
       [illegible] BENZENE                                  (NE)
       [illegible] TOLUENE                                  (NE)
       [illegible] ETHYLBENZENE                             (NE)
       [illegible] TRANS-1,3-DICHLOROPROPENE                (NE)
       [illegible] CIS-1,3-DICHLOROPROPENE                  (NE)
       [illegible] 1,2-DICHLOROPROPANE                      (NE)
       [illegible] CHLOROBENZENE                            (NE)
       [illegible] TRICHLOROETHENE                          (NE)
       [illegible] 1,1,2-TRICHLOROETHANE                    (NE)
       [illegible] TETRACHLOROETHENE                        (NE)
       [illegible] 1,1,2,2-TETRACHLOROETHANE                (NE)
       [illegible] DIBROMOCHLOROMETHANE                     (NE)
       [illegible] BROMOFORM                                (NE)
          [illegible]                               [illegible]
                             [illegible] END OF REPORT [illegible]

   COPIES SENT TO: [illegible] , BC[illegible] , [illegible] , [illegible] , INFO-[illegible] , [illegible]
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                    WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 1                      RESULTS OF EXAMINATION                    INTERIM REPORT

SAMPLE ID:     875416        SAMPLE RECEIVED:87/11/23              CHARGE:
PROGRAM:       5000:DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
STATE ID:                    DRAINAGE BASIN:                  GAZETTEER CODE:3566
POLITICAL SUBDIVISION:[illegible]                             COUNTY:ORANGE
LATITUDE:                    LONGITUDE:                       Z DIRECTION:
LOCATION:      [illegible] FARM RT 17 LANDFILL
DESCRIPTION:#111487[illegible],111498B,SAMPLING POINT [illegible]-13
REPORTING LAB:          TOX LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN:      02AAIR:VOLATILE COMPOUNDS IN AIR
SAMPLE TYPE:            990:OTHER AIR-RELATED SAMPLES
REASON FOR SUBMISSION: [illegible]
TIME OF SAMPLING:[illegible]

LAB ID:        02AAIR     VOLATILE COMPOUNDS IN AIR - GC/MS
                          DATA INCOMPLETE                             INTERIM REPORT

  ------------PARAMETER------------                   -----------RESULT----------
    [illegible] CHLOROMETHANE                                  (NE)
    T4[illegible] VINYL CHLORIDE                               (NE)
    [illegible] CHLOROETHANE                                   (NE)
    T[illegible] METHYLENE CHLORIDE  DICHLOROMETHANE           (NE)
    [illegible]                                                (NE)
    T[illegible] BROMOMETHANE                                  (NE)
    [illegible] TRANS-1,2-DICHLOROETHENE                       (NE)
    T51202 1,1-DICHLOROETHANE                                  (NE)
    T5[illegible] 1,2-DICHLOROETHANE                           (NE)
    T[illegible] CHLOROFORM                                    (NE)
    T[illegible] 1,1,1-TRICHLOROETHANE                         (NE)
    T[illegible] TRICHLOROFLUOROMETHANE  FREON-11              (NE)
    [illegible] CARBON TETRACHLORIDE                           (NE)
    T[illegible] BROMODICHLOROMETHANE                          (NE)
    [illegible] BENZENE                                        (NE)
    [illegible] TOLUENE                                        (NE)
    [illegible] ETHYLBENZENE                                   (NE)
    T81502 TRANS-1,3-DICHLOROPROPENE                           (NE)
    T81402 CIS-1,3-DICHLOROPROPENE                             (NE)
    T81302 1,2-DICHLOROPROPANE                                 (NE)
    T49902 CHLOROBENZENE                                       (NE)
    T41102 TRICHLOROETHENE                                     (NE)
    T51702 1,1,2-TRICHLOROETHANE                               (NE)
    T41202 TETRACHLOROETHENE                                   (NE)
    T5[illegible] 1,1,2,2-TETRACHLOROETHANE                    (NE)
    T44302 DIBROMOCHLOROMETHANE                                (NE)
    T43102 BROMOFORM                                           (NE)
    T[illegible] AIR VOLUME                             0.0033 CU.M.
                              ***** END OF REPORT *****

COPIES SENT TO: CO(2), RO( ), LPHE( ), FED( ), INFO-FY( ), INFO-L( )
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[illegible] CENTER FOR LABORATORIES AND RESEARCH

[illegible]            RESULTS OF EXAMINATION                    INTERIM REPORT

[illegible]            SAMPLE RECEIVED:87 11 23                  CHARGE:
[illegible]  5000:DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
[illegible]            DRAINAGE BASIN:                           GAZETTEER CODE:[illegible]
[illegible]:TV ECO                                               COUNTY:ORANGE
[illegible]            LONGITUDE:                                DIRECTION:
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[illegible] :8.11435A,111436E,SAMPLING POINT C#2,P-87-024-14
[illegible]            TO LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN:   [illegible] VOLATILE COMPOUNDS IN AIR
[illegible]            [illegible] AIR-RELATED SAMPLES
REASON FOR SUBMISSION: [illegible]
[illegible] 12 13:49 TO 87 11 12 13:59 LAST ACTION DATE:88 01 13

[illegible]   VOLATILE COMPOUNDS IN AIR - GC/MS
              DATA INCOMPLETE                                    INTERIM REPORT

   ------------PARAMETER------------                  ----------RESULT---------
       [illegible] CHLOROMETHANE                                (NE)
       [illegible] CHLORIDE                                     (NE)
       [illegible]OROETHANE                                     (NE)
       [illegible] METHYLENE CHLORIDE (DICHLOROMETHA 2,200. [illegible]
       [illegible]DICHLOROETHENE                                (NE)
       [illegible] BROMOMETHANE                                 (NE)
       [illegible]                                              (NE)
       [illegible] 1,1-DICHLOROETHANE                           (NE)
       [illegible] 1,2-DICHLOROETHANE                           (NE)
       [illegible] CHLOROFORM                                   (NE)
       [illegible] 1,1,1-TRICHLOROETHANE                        (NE)
       [illegible] TRICHLOROFLUOROMETHANE (FREON-11)            (NE)
       [illegible] CARBON TETRACHLORIDE                         (NE)
       [illegible] BROMODICHLOROMETHANE                         (NE)
       [illegible] BENZENE                                      (NE)
       [illegible] TOLUENE                                      (NE)
       [illegible] ETHYLBENZENE                                 (NE)
       T21502 TRANS-1,3-DICHLOROPROPENE                         (NE)
       [illegible] CIS-1,3-DICHLOROPROPENE                      (NE)
       T21202 1,2-DICHLOROPROPANE                               (NE)
       [illegible] CHLOROBENZENE                                (NE)
       T41102 TRICHLOROETHENE                                   (NE)
       [illegible] 1,1,2-TRICHLOROETHANE                        (NE)
       T41202 TETRACHLOROETHENE                                 (NE)
       [illegible] 1,1,2,2-TETRACHLOROETHANE                    (NE)
       [illegible] DIBROMOCHLOROMETHANE                         (NE)
       [illegible]                                              (NE)
       [illegible] AIR VOLUME                          [illegible] CU.M.
                        ***** END OF REPORT *****

[illegible]
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                      NEW YORK STATE DEPARTMENT OF HEALTH
              WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 1                   RESULTS OF EXAMINATION                     INTERIM REPORT

SAMPLE ID:     875416        SAMPLE RECEIVED:87 11 23           CHARGE:      0.00
PROGRAM:       9600:DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
SOURCE ID:                   DRAINAGE BASIN:                 GAZETTEER CODE:3565
POLITICAL SUBDIVISION:TUXEDO                                  COUNTY:ORANGE
LATITUDE:        .           LONGITUDE:         .            Z DIRECTION:
LOCATION:   TUXEDO PARK RT 17 LANDFILL
DESCRIPTION:#111411A,111412B,SAMPLING POINT C-[illegible],P-[illegible]-15
REPORTING LAB:         TO LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN:       304A15:VOLATILE COMPOUNDS IN AIR
SAMPLE TYPE:            990:OTHER AIR-RELATED SAMPLES
REASON FOR SUBMISSION: TASTE ODOR
TIME OF SAMPLING:87 11 19 14:20 TO 87 11 19 15:10 LAST ACTION DATE:88 01 12

         METHYL ISOBUTYL KETONE = 390. MCG./CU.M.
         METHYL BUTYL KETONE = 340. MCG./CU.M.
         TOTAL XYLENES = 2,400. MCG./CU.M.

ANALYSIS:      304A15    VOLATILE COMPOUNDS IN AIR - GC MS
                         DATA INCOMPLETE                          INTERIM REPORT

   -----------PARAMETER-----------              -----------RESULT----------
       [illegible] CHLOROMETHANE                            [NE]
       [illegible] VINYL CHLORIDE                           [NE]
       [illegible] CHLOROETHANE                             [NE]
       T23802 METHYLENE CHLORIDE (DICHLOROMETHANE)          [NE]
       [illegible] 1,1-DICHLOROETHENE                       [NE]
       [illegible] BROMOMETHANE                             [NE]
       [illegible] TRANS-1,2-DICHLOROETHENE          1,390. MCG/CU.M.
       T51902 1,1-DICHLOROETHANE                       270. MCG/CU.M.
       [illegible] 1,2-DICHLOROETHANE                       [NE]
       T39202 CHLOROFORM                                    [NE]
       [illegible] 1,1,1-TRICHLOROETHANE                    [NE]
       T61702 TRICHLOROFLUOROMETHANE (FREON-11)             [NE]
       [illegible] CARBON TETRACHLORIDE                     [NE]
       T32902 BROMODICHLOROMETHANE                          [NE]
       [illegible] BENZENE                             750. MCG/CU.M.
       T39202 TOLUENE                                4,100. MCG/CU.M.
       T51002 ETHYLBENZENE                             750. MCG/CU.M.
       T61502 TRANS-1,3-DICHLOROPROPENE                     [NE]
       T61402 CIS-1,3-DICHLOROPROPENE                       [NE]
       T61302 1,2-DICHLOROPROPANE                           [NE]
       T41902 CHLOROBENZENE                                 [NE]
       T41102 TRICHLOROETHENE                        2,700. MCG/CU.M.
       [illegible] 1,1,2-TRICHLOROETHANE                    [NE]
       [illegible] TETRACHLOROETHENE                   550. MCG/CU.M.
       [illegible] 1,1,2,2-TETRACHLOROETHANE                [NE]
                    **** CONTINUED ON NEXT PAGE ****

COPIES SENT TO: CO( ), RO( ), LPHE( ), FED( ), INFO-FY( ), OTHER( )
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                    WADSWORTH CENTER FOR LABORATORIES AND RESEARCH
PAGE 2                          RESULTS OF EXAMINATION                  [illegible]
SAMPLE ID:    875418         SAMPLE RECEIVED:87 11 13                  CHARGE:
POLITICAL SUBDIVISION:TUXEDO                                  COUNTY:ORANGE
LOCATION:    TUXEDO PARK RT 17 LANDFILL
TIME OF SAMPLING:87 11 12 14:20 TO 87 11 12 15:10 LAST ACTION DATE:88 01 12
    ------------PARAMETER------------                   ----------RESULT----------
         T44302 DIBROMOCHLOROMETHANE                              [NE]
         T43104 BROMOFORM                                         [NE]
         T10300 AIR VOLUME                                  0.0320 CU.M.
                              **** END OF REPORT ****
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0017                NEW YORK STATE DEPARTMENT OF HEALTH
                WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 1                        RESULTS OF EXAMINATION                    INTERIM REPORT

SAMPLE ID:      875413       SAMPLE RECEIVED:87 11 23              CHARGE:      0.00
PROGRAM:          5600:DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
SOURCE ID:                    DRAINAGE BASIN:                  GAZETTEER CODE:3565
POLITICAL SUBDIVISION:TUXEDO                                   COUNTY:ORANGE
LATITUDE:          .          LONGITUDE:           .           Z DIRECTION:
LOCATION:     TUXEDO PARK RT 17 LANDFILL
DESCRIPTION:#111453A,111454B,SAMPLING POINT G-6,P-387-024-16
REPORTING LAB:          TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN:        624AIR:VOLATILE COMPOUNDS IN AIR
SAMPLE TYPE:               390:OTHER AIR-RELATED SAMPLES
REASON FOR SUBMISSION: TASTE/ODOR
TIME OF SAMPLING:87 11 19 14:42 TO 87 11 19 15:25 LAST ACTION DATE:88 01 12

ANALYSIS:       624AIR      VOLATILE COMPOUNDS IN AIR - GC/MS
                            DATA INCOMPLETE                             INTERIM REPORT

   ------------PARAMETER------------                ------------RESULT----------
      T52002 CHLOROMETHANE                                   [NE]
      T41002 VINYL CHLORIDE                                  [NE]
      T31902 CHLOROETHANE                                    [NE]
      T23802 METHYLENE CHLORIDE (DICHLOROMETHANE)            [NE]
      T50902 1,1-DICHLOROETHENE                              [NE]
      T61302 BROMOMETHANE                                    [NE]
      T21102 TRANS-1,2-DICHLOROETHENE                        [NE]
      T51902 1,1-DICHLOROETHANE                              [NE]
      T50802 1,2-DICHLOROETHANE                              [NE]
      T39002 CHLOROFORM                                      [NE]
      T33202 1,1,1-TRICHLOROETHANE                           [NE]
      T31702 TRICHLOROFLUOROMETHANE (FREON-11)               [NE]
      T37802 CARBON TETRACHLORIDE                            [NE]
      T33902 BROMODICHLOROMETHANE                            [NE]
      T31402 BENZENE                                         [NE]
      T39202 TOLUENE                                         [NE]
      T51002 ETHYLBENZENE                                    [NE]
      T61502 TRANS-1,3-DICHLOROPROPENE                       [NE]
      T61402 CIS-1,3-DICHLOROPROPENE                         [NE]
      T61202 1,2-DICHLOROPROPANE                             [NE]
      T40902 CHLOROBENZENE                                   [NE]
      T41102 TRICHLOROETHENE                                 [NE]
      T51702 1,1,2-TRICHLOROETHANE                           [NE]
      T41202 TETRACHLOROETHENE                               [NE]
      T51302 1,1,2,2-TETRACHLOROETHANE                       [NE]
      T43002 DIBROMOCHLOROMETHANE                            [NE]
      T43102 BROMOFORM                                       [NE]
      T00300 AIR VOLUME                                .0288 CU.M.
                              **** END OF REPORT ****
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PAGE 1                       RESULTS OF EXAMINATION                         INTERIM REPORT

SAMPLE NO:       [illegible]          SAMPLE RECEIVED: 11 22                [illegible]
PROGRAM:         5300:DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
SOURCE ID:                            DRAINAGE BASIN:                    GAZETTEER CODE:[illegible]
POLITICAL SUBDIVISION:TU EDO                                             COUNTY:ORANGE
LATITUDE:                .            LONGITUDE:           .             DIRECTION:
LOCATION:        TU EDO PARK RT 17 LANDFILL
DESCRIPTION:#111499A,111500B.SAMPLING POINT E-4,F-32,-[illegible]-17
REPORTING LAB:            [illegible] LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN:           [illegible]:VOLATILE COMPOUNDS IN AIR
SAMPLE TYPE:             [illegible]:OTHER AIR-RELATED SAMPLES
REASON FOR SUBMISSION: WASTE, DOCR
[illegible]

[illegible]              [illegible]    VOLATILE COMPOUNDS IN AIR - GC [illegible]
                               DATA INCOMPLETE                             INTERIM REPORT

----------------PARAMETER-----------------                    ---------RESULT---------
    [illegible] CHLOROMETHANE                                 (NE)
    [illegible] VINYL CHLORIDE                                (NE)
    [illegible] CHLOROETHANE                                  (NE)
    [illegible] METHYLENE CHLORIDE (DICHLOROMETHANE)          (NE)
    [illegible] 1,1-DICHLOROETHENE                            (NE)
    [illegible] BROMOMETHANE                                  (NE)
    [illegible] TRANS-1,2-DICHLOROETHENE                      (NE)
    [illegible] 1,1-DICHLOROETHANE                            (NE)
    [illegible] 1,2-DICHLOROETHANE                            (NE)
    [illegible] CHLOROFORM                                    (NE)
    [illegible] 1,1,1-TRICHLOROETHANE                         (NE)
    [illegible] TRICHLOROFLUOROMETHANE (FREON-11)             (NE)
    [illegible] CARBON TETRACHLORIDE                          (NE)
    [illegible] BROMODICHLOROMETHANE                          (NE)
    [illegible] BENZENE                                       (NE)
    [illegible] TOLUENE                                       (NE)
    [illegible] ETHYLBENZENE                                  (NE)
    [illegible] TRANS-1,3-DICHLOROPROPENE                     (NE)
    [illegible] CIS-1,3-DICHLOROPROPENE                       (NE)
    [illegible] 1,2-DICHLOROPROPANE                           (NE)
    [illegible] CHLOROBENZENE                                 (NE)
    [illegible] TRICHLOROETHENE                               (NE)
    [illegible] 1,1,2-TRICHLOROETHANE                         (NE)
    [illegible] TETRACHLOROETHENE                             (NE)
    [illegible] 1,1,2,2-TETRACHLOROETHANE                     (NE)
    T44802 DIBROMOCHLOROMETHANE                               (NE)
    [illegible] BROMOFORM                                     (NE)
    [illegible] AIR VOLUME                               [illegible].028 CU.M.
                            ***** END OF REPORT *****

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[redacted]

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PAGE  1                      RESULTS OF EXAMINATION                      INTERIM REPORT

SAMPLE ID:     873421        SAMPLE RECEIVED:87 11 23/          CHARGE:       5.00
PROGRAM:          3800:DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
SOURCE ID:                   DRAINAGE BASIN:                    GAZETTEER CODE:3565
POLITICAL SUBDIVISION:TUXEDO                                    COUNTY:ORANGE
LATITUDE:         .          LONGITUDE:          .              Z DIRECTION:
LOCATION:   TUXEDO PARK RT 17 LANDFILL
DESCRIPTION:#111413A,111416B,SAMPLING POINT ..T.P-387-024-15
REPORTING LAB:          TOX:LAB FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN:       624AIR:VOLATILE COMPOUNDS IN AIR
SAMPLE TYPE:            901:OTHER AIR-RELATED SAMPLES
REASON FOR SUBMISSION: TASTE ODOR
TIME OF SAMPLING:87 11 19 15:20 TO 87 11 19 16:04 LAST ACTION DATE:88 01 12

ANALYSIS:      624AIR    VOLATILE COMPOUNDS IN AIR - GC/MS
                         DATA INCOMPLETE                              INTERIM REPORT

 ------PARAMETER-----------                    -----------RESULT----------
 .1002 CHLOROMETHANE                                      [NE]
 .1012 VINYL CHLORIDE                                     [NE]
 1202 CHLOROETHANE                                        [NE]
 .3802 METHYLENE CHLORIDE (DICHLOROMETHANE)               [NE]
 .0202 1,1-DICHLOROETHENE                                 [NE]
 .1802 BROMOMETHANE                                       [NE]
 .1202 TRANS-1,2-DICHLOROETHENE                           [NE]
 .1802 1,1-DICHLOROETHANE                                 [NE]
 .0802 1,2-DICHLOROETHANE                                 [NE]
 .3002 CHLOROFORM                                         [NE]
 .2602 1,1,1-TRICHLOROETHANE                              [NE]
 .1702 TRICHLOROFLUOROMETHANE (FRECN-11)                  [NE]
 .2602 CARBON TETRACHLORIDE                               [NE]
 .3302 BROMODICHLOROMETHANE                               [NE]
 .3402 BENZENE                                            [NE]
 .2202 TOLUENE                                            [NE]
 .51002 ETHYLBENZENE                                      [NE]
 .21502 TRANS-1,3-DICHLOROPROPENE                         [NE]
 .21402 CIS-1,3-DICHLOROPROPENE                           [NE]
 .61302 1,2-DICHLOROPROPANE                               [NE]
 .42012 CHLOROBENZENE                                     [NE]
 .41102 TRICHLOROETHENE                                   [NE]
 .51702 1,1,2-TRICHLOROETHANE                             [NE]
 .41202 TETRACHLOROETHENE                                 [NE]
 .51902 1,1,2,2-TETRACHLOROETHANE                         [NE]
 .44202 DIBROMOCHLOROMETHANE                              [NE]
 .2102 BROMOFORM                                          [NE]
 .0201 AIR VOLUME                                 0.0277 CU.M.
                     **** END OF REPORT ****

 [illegible] SENT TO: [illegible], SO [illegible], LPHE [illegible], FED [illegible], INFO-R [illegible], INFO-L [illegible]

                                                        SUBMITTED BASED TERM [illegible]
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               WADSWORTH CENTER FOR LABORATORIES AND RESEARCH

PAGE 1                      RESULTS OF EXAMINATION                 [illegible]

SAMPLE ID:   [illegible]       SAMPLE RECEIVED: [illegible]
SOURCE ID:       5200:DIVISION OF ENVIRONMENTAL ENFORCEMENT - DEC
SOURCE ID:                  DRAINAGE BASIN:                GAZETTEER CODE:3500
POLITICAL SUBDIVISION:[illegible]                          COUNTY:ONONDAGA
LATITUDE:                   LONGITUDE:                     DIRECTION:
LOCATION:   TU[illegible] PARK RT 11 LANDFILL
DESCRIPTION:#13141[illegible],SAMPLING POINT [illegible]
RECEIVING LAB:          TRAILER FOR ORGANIC ANALYTICAL CHEMISTRY
TEST PATTERN:       624AIR:VOLATILE COMPOUNDS IN AIR
SAMPLE TYPE:            990:OTHER AIR-RELATED SAMPLES
REASONS FOR SUBMISSION: [illegible]
[illegible]

            [illegible]

[illegible]       624AIR       VOLATILE COMPOUNDS IN AIR - GC/MS
                               TEST COMPLETE                        [illegible]

------------PARAMETER-------------                      ---------RESULT---------
    [illegible] [illegible]METHANE                                   (NE)
    [illegible] [illegible] CHLORIDE                                 (NE)
    [illegible] [illegible]ETHANE                                    (NE)
    [illegible] METHYLENE CHLORIDE (DICHLOROMETHANE)                 (NE)
    [illegible] [illegible]CHLOROETHANE                              (NE)
    [illegible] BROMOMETHANE                                         (NE)
    [illegible] TRANS-1,2-DICHLOROETHENE                             (NE)
    [illegible] 1,2-DICHLOROETHANE                                   (NE)
    [illegible] 1,1-DICHLOROETHANE                                   (NE)
    [illegible] CHLOROFORM                                           (NE)
    [illegible] 1,1,1-TRICHLOROETHANE                                (NE)
    [illegible] TRICHLOROFLUOROMETHANE (FREON 11)                    (NE)
    [illegible] CARBON TETRACHLORIDE                                 (NE)
    [illegible] BROMODICHLOROMETHANE                                 (NE)
    [illegible] BENZENE                                              (NE)
    [illegible] TOLUENE                                              (NE)
    [illegible] ETHYLBENZENE                                         (NE)
    [illegible] TRANS-1,3-DICHLOROPROPENE                            (NE)
    [illegible] CIS-1,3-DICHLOROPROPENE                              (NE)
    [illegible] 1,2-DICHLOROPROPANE                                  (NE)
    [illegible] CHLOROBENZENE                                        (NE)
    [illegible] TRICHLOROETHENE                                      (NE)
    [illegible] 1,1,2-TRICHLOROETHANE                                (NE)
    [illegible] TETRACHLOROETHENE                                    (NE)
    [illegible] 1,1,2,2-TETRACHLOROETHANE                            (NE)
    [illegible] DIBROMOCHLOROMETHANE                                 (NE)
    [illegible] BROMOFORM                                            (NE)
                  **** CONTINUED ON NEXT PAGE ****

COPIES SENT TO: [illegible], [illegible], [illegible], [illegible], [illegible]

                  [illegible]
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PAGE [illegible]            RESULTS OF EXAMINATION                              [illegible]
SAMPLE ID: [illegible]        SAMPLE RECEIVED: [illegible] 11/[illegible]              [illegible]
POLITICAL SUBDIV: [illegible]                                 COUNTY: ORANGE
LOCATION:   TU [illegible] 17 LANDFILL
TIME OF SAMPLING: 87 11 19 15:35 TO 87/11/19 16:25 LAST ACTION DATE: 88/01 1[illegible]
   -------------PARAMETER-------------                ------------RESULT----------
      [illegible]00 AIR [illegible]                               0.0324 CU.M.
                                  **** END OF REPORT ****
```

REPORT TO

NYSDEC
Room 317
50 Wolf Road
Albany, New York 12233-0001
Attn: Mr. Jack Ryan

Work ID: P-387-C07-20,-21,-22
P.O. No.: C001299
Work Order: 87-11-235

Cambridge Analytical Associates
Environmental Division
1106 Commonwealth Avenue
Boston MA 02215

ceived: 11/24/87

REPORT
Results by Sample

Work Order # 87-11-235

SAMPLE ID P-187-C07-21 SPIKE   SAMPLE # 02   FRACTIONS: K
Date & Time Collected 11/19/87   Category SOIL

NT_S 114% % Recovery   SLFD_S N/A % Recovery

SAMPLE ID P-187-C07-22   SAMPLE # 03   FRACTIONS: A,B,C,D
Date & Time Collected 11/19/87   Category SOIL

NT_S 0.69 ug/g (dry wt)   ECLPPE 12/02/87 extraction date   EXCL_S 12/02/87 extraction date   SLFD_S <7.0 ug/g (dry wt)

TEST CODE CNT_S NAME Total cyanide-EPA 335.3

lethod Reference: EPA. 1979. Methods for Chemical Analysis of Water and lastes. EPA-600/4-79-020 (Revised March 1983). EPA/EMSL, Cincinnati, Ohio. lethod 335.2-Cyanide, total (spectrophotometric). Method 335.3-cyanide, total colorimetric, automated UV).

Additional References:EPA. 1982. Test Methods for Evaluating Solid Waste-Physical/Chemical Methods. SW-846 (second edition). EPA/Office of Solid Waste and Emergency Response, Washington, DC. 9010.

APHA. 1985. Standard Methods for the Examination of Water and Wastewater. 16th edition. American Public Health Association, Washington, DC. Method 412.

ethod Description: Cyanide as hydrocyanic acid (HCN) is released from cyanide omplexes by means of a reflux-distillation operation and absorbed in a scrubber ontaining sodium hydroxide solution. Cyanide ion in the absorbing solution is etermined colorimetrically. Cyanide is converted to cyanogen chloride by eaction with chloramine-T at a pH less than 8 without hydrolyzing to cyanate. fter the reaction is complete, color is formed by addition of yridine-barbituric acid reagent. Absorbance is read at 578 nm. Colorimetric eterminations are made using a Technicon AutoAnalyzer II.

C Procedures: The spectrophotometer is calibrated using a blank and four orking standards. Accuracy of the working standards is verified by analysis of n independent check standard. A procedural blank is run with each batch of amples, and duplicates and matrix spikes are run at a frequency of 10 %.

EST CODE SLFD_S NAME Sulfide-soil-EPA 376.1

ethod Reference: EPA. 1979. Methods for Chemical Analysis of Water and Wastes. PA-600/4-79-020 (revised March 1983). EPA/EMSL, Cincinnati, Ohio. ethod 376.1-sulfide, titrimetric, iodine.

Additional references: EPA. 1982. Test Methods for Evaluating Solid Waste-Physical/Chemical Methods. SW-846 (second edition). EPA/Office of Solid Waste and Emergency Response, Washington, DC. Method 9030.

APHA. 1985. Standard Methods for Examination of the Examination of Water and Wastewater. 16th edition. American Public Health Association, EST CODE SLFD_S NAME Sulfide-soil-EPA 376.1

Washington, DC. Method 427.

EPA/COE. 1981. Procedures for Handling and Chemical Analysis of Sediment and Water Samples. EPA/COE Technical Committee on Criteria for Dredged and Fill Material, EPA/COE, U.S. Army Engineers Waterways Experiment Station, Vicksburg, MI.

thod Description: A sample of soil or sediment is placed in a
stillation flask and oxygen is purged from the sample using a stream
nitrogen. After addition of hydrochloric acid, the sample is
stilled into an impinger containing zinc acetate solution. Sulfide
determined titrimetrically or colorimetrically on the zinc acetate
pinger solution.

Page 1
Received: 11/24/87

REPORT
12/28/87 11:35:51

Work Order # 87-11-235

REPORT NYSDEC
TO Room 317
50 Wolf Road
Albany, New York 12233-0001
ATTEN Mr. Jack Ryan

CLIENT NYSDEC
SAMPLES 3
COMPANY NYSDEC
FACILITY Bur. of Tech. Services & Res.

WORK ID P-387-C07-20,-21,-22
TAKEN by E.Perkins & B.Wurster
TRANS by Federal Ex #1394778884
TYPE Environmental
P.O. # C001299
INVOICE under separate cover

PREPARED BY Cambridge Analytical Assoc.
Environmental Division
1106 Commonwealth Avenue
Boston, MA 02215
ATTEN
PHONE 617-232-2207

CERTIFIED BY

CONTACT LAWLER

This report is approved for release by the following staff:
Laboratory Director:
Inorganic Laboratory:
Organic Laboratory:

This report summarizes the results of any inorganic or conventional sample analyses. Results for metals or organic analyses are reported in separate EPA CLP format reports where applicable. These CLP reports are attached.

SAMPLE IDENTIFICATION

01	P-387-C07-20
02	P-387-C07-21
02	P-387-C07-21 DUPLICATE
02	P-387-C07-21 LCS
02	P-387-C07-21 MS
02	P-387-C07-21 MSD
02	P-387-C07-21 SPIKE
03	P-387-C07-22

TEST CODES and NAMES used on this report

CNT_S	Total cyanide-EPA 335.3
ECLPPE	Pest/PCB ext-aq-CLP
EXCL_S	A/B/N extraction-soil-CLP
MSCLPS	Semi-volatiles-CLP
SLFD_S	Sulfide-soil-EPA 376.1

Sample Number
[illegible]12C

Organics Analysis Data Sheet
(Page 1)

Laboratory Name Cambridge Analytical
Lab Sample ID No 871235-01
Sample Matrix Soil
Data Release Authorized By S Rawler

Case No P-387-C07
QC Report No
Contract No ~~[illegible]~~ C001299
Date Sample Received 11/24/87

Volatile Compounds

Concentration: [✓ Low] Medium (Circle One)
Date Extracted/Prepared 12/1/87
Date Analyzed 12/1/87
Conc/Dil Factor: 1.5 pH N/A
Percent Moisture (Not Decanted) 34

CAS Number		ug/l or [✓ ug/Kg] (Circle One)
74-87-3	Chloromethane	50U
74-83-9	Bromomethane	50U
75-01-4	Vinyl Chloride	50U
75-00-3	Chloroethane	50U
75-09-2	Methylene Chloride	~~[illegible]~~ 210 B
67-64-1	Acetone	50U
75-15-0	Carbon Disulfide	25U
75-35-4	1, 1-Dichloroethene	25U
75-34-3	1, 1-Dichloroethane	25U
156-60-5	Trans-1, 2-Dichloroethene	25U
67-66-3	Chloroform	25U
107-06-2	1, 2-Dichloroethane	25U
78-93-3	2-Butanone	50U
71-55-6	1, 1, 1-Trichloroethane	25U
56-23-5	Carbon Tetrachloride	25U
108-05-4	Vinyl Acetate	50U
75-27-4	Bromodichloromethane	25U

CAS Number		ug/l or [✓ ug/Kg] (Circle One)
78-87-5	1, 2-Dichloropropane	25U
10061-02-6	Trans-1, 3-Dichloropropene	25U
79-01-6	Trichloroethene	25U
124-48-1	Dibromochloromethane	25U
79-00-5	1, 1, 2-Trichloroethane	25U
71-43-2	Benzene	25U
10061-01-5	cis-1, 3-Dichloropropene	25U
110-75-8	2-Chloroethylvinylether	50U
75-25-2	Bromoform	25U
591-78-6	4-Methyl-2-Pentanone	50U
108-10-1	2-Hexanone	50U
127-18-4	Tetrachloroethene	25U
79-34-5	1, 1, 2, 2-Tetrachloroethane	25U
108-88-3	Toluene	25U
108-90-7	Chlorobenzene	25U
100-41-4	Ethylbenzene	25U
100-42-5	Styrene	25U
	Total Xylenes	25U

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

Value If the result is a value greater than or equal to the detection limit, report the value.

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration/dilution action. (This is not necessarily the instrument detection limit.) The footnote should read: U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicated the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J). If limit of detection is 10 µg/l and a concentration of 3 µg/l is calculated, report as 3J.

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides ≥10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

Laboratory Name [illegible]

Case No [illegible]

Sample Number
PC

Organics Analysis Data Sheet
(Page 2)

Semivolatile Compounds

Concentration [✓ Low] Medium (Circle One)

Date Extracted/Prepared 12/02/87

Date Analyzed 12/14/87

Conc/Dil Factor 50

Percent Moisture (Decanted) 34

GPC Cleanup ☐Yes ☒No

Separatory Funnel Extraction ☐Yes

Continuous Liquid - Liquid Extraction ☐Yes

CAS Number		ug/l or [✓ ug/Kg] (Circle One)
108-95-2	Phenol	16500 U
111-44-4	bis(2-Chloroethyl)Ether	16500 U
95-57-8	2-Chlorophenol	[illegible]
541-73-1	1,3-Dichlorobenzene	16500 U
106-46-7	1,4-Dichlorobenzene	16500 U
100-51-6	Benzyl Alcohol	[illegible]
95-50-1	1,2-Dichlorobenzene	16500 U
95-48-7	2-Methylphenol	[illegible]
39638-32-9	bis(2-chloroisopropyl)Ether	16500 U
106-44-5	4-Methylphenol	[illegible]
621-64-7	N-Nitroso-Di-n-Propylamine	16500 U
67-72-1	Hexachloroethane	16500 U
98-95-3	Nitrobenzene	16500 U
78-59-1	Isophorone	16500 U
88-75-5	2-Nitrophenol	16500 U
105-67-9	2,4-Dimethylphenol	16500 U
65-85-0	Benzoic Acid	[illegible]
111-91-1	bis(2-Chloroethoxy)Methane	16500 U
120-83-2	2,4-Dichlorophenol	16500 U
120-82-1	1,2,4-Trichlorobenzene	16500 U
91-20-3	Naphthalene 17900	[illegible]
106-47-8	4-Chloroaniline	16500 U
87-68-3	Hexachlorobutadiene	16500 U
59-50-7	4-Chloro-3-Methylphenol	16500 U
91-57-6	2-Methylnaphthalene [illegible]	[illegible]
77-47-4	Hexachlorocyclopentadiene	16500 U
88-06-2	2,4,6-Trichlorophenol	16500 U
95-95-4	2,4,5-Trichlorophenol	80000 U
91-58-7	2-Chloronaphthalene	16500 U
88-74-4	2-Nitroaniline	16500 U
131-11-3	Dimethyl Phthalate	16500 U
208-96-8	Acenaphthylene	16500 U
99-09-2	3-Nitroaniline	[illegible]

CAS Number		ug/l or ug/ (Circ
83-32-9	Acenaphthene 13000 J	~~16500 U~~
51-28-5	2,4-Dinitrophenol	80000 U
100-02-7	4-Nitrophenol	80000 U
132-64-9	Dibenzofuran 7000	~~16500 U~~
121-14-2	2,4-Dinitrotoluene	16500 U
606-20-2	2,6-Dinitrotoluene	16500 U
84-66-2	Diethylphthalate 15000 JB	~~16500 U~~
7005-72-3	4-Chlorophenyl-phenylether	16500 U
86-73-7	Fluorene 12000 J	~~16500 U~~ sec
100-01-6	4-Nitroaniline	80000 U
534-52-1	4,6-Dinitro-2-Methylphenol	80000 U
86-30-6	N-Nitrosodiphenylamine (1)	16500 U
101-55-3	4-Bromophenyl-phenylether	16500 U
118-74-1	Hexachlorobenzene	16500 U
87-86-5	Pentachlorophenol	80000 U
85-01-8	Phenanthrene 67000	~~16500 U~~ sec
120-12-7	Anthracene 20000	~~16500 U~~
84-74-2	Di-n-Butylphthalate	16500 U
206-44-0	Fluoranthene 92000	~~16500 U~~ sec
129-00-0	Pyrene 74000	~~16500 U~~ sec
85-68-7	[illegible]	[illegible]
91-94-1	3,3'-Dichlorobenzidine	33000 U
56-55-3	Benzo(a)Anthracene 45000	~~16500 U~~ sec
117-81-7	bis(2-Ethylhexyl)Phthalate	16500 U
218-01-9	Chrysene 45000	~~16500 U~~ sec
117-84-0	Di-n-Octyl Phthalate	16500 U
205-99-2	Benzo(b)Fluoranthene	16500 U *
207-08-9	Benzo(k)Fluoranthene 70000	16500 U
50-32-8	Benzo(a)Pyrene 40000	~~16500 U~~ sec
193-39-5	Indeno(1,2,3-cd)Pyrene sec	~~16500 U~~ 24
53-70-3	Dibenz(a,h)Anthracene	16500 U
191-24-2	Benzo(g,h,i)Perylene sec	~~16500 U~~ 21

* unresolved benzo fluoranthenes

(1)-Cannot be separated from diphenylamine

Laboratory Name Cambridge Analytical Associates

Case No ______

Sample Numb
20

Organics Analysis Data Sheet
(Page 3)

Pesticide/PCBs

Concentration [✓ Low] Medium (Circle One)

Date Extracted/Prepared 12/2/67

Date Analyzed 12/10/67

Conc/Dil Factor 50

Percent Moisture (decanted) 34

GPC Cleanup ☐Yes ☒No

Separatory Funnel Extraction ☐Yes

Continuous Liquid - Liquid Extraction ☐Yes

CAS Number		ug/l or [✓ ug/Kg] (Circle One)
319-84-6	Alpha BHC	400u
319-85-7	Beta-BHC	400u
319-86-8	Delta BHC	400u
58-89-9	Gamma-BHC (Lindane)	400u
76-44-8	Heptachlor	400u
309-00-2	Aldrin	400u
1024-57-3	Heptachlor Epoxide	400u
959-98-8	Endosulfan I	400u
60-57-1	Dieldrin	800u
72-55-9	4,4'-DDE	800u
72-20-8	Endrin	800u
33213-65-9	Endosulfan II	800u
72-54-8	4,4'-DDD	800u
1031-07-8	Endosulfan Sulfate	800u
50-29-3	4,4'-DDT	800u
72-43-5	Methoxychlor	800u
53494-70-5	Endrin Ketone	800u
57-74-9	Chlordane	4000u
8001-35-2	Toxaphene	8000u
12574-11-2	Aroclor-1016	4000u
11104-28-2	Aroclor-1221	4000u
11141-16-5	Aroclor-1232	4000u
53469-21-9	Aroclor-1242	4000u
12572-29-6	Aroclor-1248	4000u
11097-69-1	Aroclor-1254	8000u
11096-82-5	Aroclor-1260	8000u

V_i = Volume of extract injected (ul)

V_s = Volume of water extracted (ml)

W_s = Weight of sample extracted (g)

V_t = Volume of total extract (ul)

V_s ______ or W_s 31.0 V_t 10 000ul V_i 3ul

ory Name Cambridge Analytical Associates
No ~~[illegible]~~ P8607C07

Sample Number
20

Organics Analysis Data Sheet
(Page 4)

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/kg)
	none found	VOA	—	—
	unknown	BN	22.15	9800 J
	hexadecanoic acid		22.48	24000 J
	unknown		22.96	32000 J
	unknown		23.19	15000 J
	octadecanoic acid		24.45	12000 J
	11 H-Benzo (a) fluorene		25.11	12000 J
	benzo phenanthrene isomer		27.57	9800 J
	unknown benzenedicarboxylic acid		27.82	19000 J
	eicosane		28.18	12000 J
	docosane		29.76	22000 J
	benzo pyrene isomer		2996	39000 J
	unknown		30.64	54000 J
	tritetracontane		31.66	19000 J
	dotriacontane		32.85	27000 J

Sample Number
S1

Organics Analysis Data Sheet
(Page 1)

Laboratory Name Cambridge Analytical
Lab Sample ID No 8711235-02
Sample Matrix Soil
Data Release Authorized By J Fowler

Case No P-387-CC7
QC Report No
Contract No [illegible] CCC1299
Date Sample Received 11/24/87

Volatile Compounds

Concentration [✓ Low] Medium (Circle One)
Date Extracted/Prepared 12/1/87
Date Analyzed 12/1/87
Conc/Dil Factor 1.5 pH N/A
Percent Moisture (Not Decanted) 34

CAS Number		ug/l or [✓ ug/Kg] (Circle One)
74-87-3	Chloromethane	50U
74-83-9	Bromomethane	50U
75-01-4	Vinyl Chloride	50U
75-00-3	Chloroethane	50U
75-09-2	Methylene Chloride	~~25U~~ 21JB
67-64-1	Acetone	50U
75-15-0	Carbon Disulfide	25U
75-35-4	1, 1-Dichloroethene	25U
75-34-3	1, 1-Dichloroethane	25U
156-60-5	Trans-1, 2-Dichloroethene	25U
67-66-3	Chloroform	25U
107-06-2	1, 2-Dichloroethane	25U
78-93-3	2-Butanone	50U
71-55-6	1, 1, 1-Trichloroethane	25U
56-23-5	Carbon Tetrachloride	25U
108-05-4	Vinyl Acetate	50U
75-27-4	Bromodichloromethane	25U

CAS Number		ug/l or [✓ ug/Kg] (Circle One)
78-87-5	1, 2-Dichloropropane	25U
10061-02-6	Trans-1, 3-Dichloropropene	25U
79-01-6	Trichloroethene	25U
124-48-1	Dibromochloromethane	25U
79-00-5	1, 1, 2-Trichloroethane	25U
71-43-2	Benzene	25U
10061-01-5	cis-1, 3-Dichloropropene	25U
110-75-8	2-Chloroethylvinylether	50U
75-25-2	Bromoform	25U
591-78-6	4-Methyl-2-Pentanone	50U
591-78-6	2-Hexanone	50U
127-18-4	[redacted]	[redacted]
79-34-5	1, 1, 2, 2-Tetrachloroethane	25U
108-88-3	Toluene [illegible]	[illegible]
108-90-7	Chlorobenzene	25U
100-41-4	Ethylbenzene	25U
100-42-5	Styrene	25U
	Total Xylenes	25U

Data Reporting Qualifiers

~~For reporting results to EPA, the following~~ results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

Value If the result is a value greater than or equal to the detection limit, report the value

U Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g. 10U) based on necessary concentration/dilution action. (This is not necessarily the instrument detection limit.) The footnote should read: U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

J Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicated the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g. 10J). If limit of detection is 10 ug/l and a concentration of 3 ug/l is calculated, report as 3J.

C This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides ≥10 ng/ul in the final extract should be confirmed by GC/MS.

B This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

Other Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

Laboratory Name Cambridge Analytical Associates
Case No 6287 C07

Sample Number
B-1

Organics Analysis Data Sheet
(Page 2)

Semivolatile Compounds

Concentration [✓ Low] Medium (Circle One)
Date Extracted/Prepared 12/02/87
Date Analyzed 12/14/87
Conc/Dil Factor 15
Percent Moisture (Decanted) 3

GPC Cleanup ☐ Yes ☒ No
Separatory Funnel Extraction ☐ Yes
Continuous Liquid - Liquid Extraction ☐ Yes

BN only

CAS Number		ug/l or [✓ ug/Kg] (Circle One)
108-95-2	Phenol	4950 U
111-44-4	bis(2-Chloroethyl)Ether	4950 U
95-57-8	2-Chlorophenol	4950 U
541-73-1	1,3-Dichlorobenzene	4950 U
106-46-7	1,4-Dichlorobenzene	4950 U
100-51-6	Benzyl Alcohol	4950 U
95-50-1	1,2-Dichlorobenzene	4950 U
95-48-7	2-Methylphenol	4950 U
39638-32-9	bis(2-chloroisopropyl)Ether	4950 U
106-44-5	4-Methylphenol	4950 U
621-64-7	N-Nitroso-Di-n-Propylamine	4950 U
67-72-1	Hexachloroethane	4950 U
98-95-3	Nitrobenzene	4950 U
78-59-1	Isophorone	4950 U
88-75-5	2-Nitrophenol	4950 U
105-67-9	2,4-Dimethylphenol	4950 U
65-85-0	Benzoic Acid	24000 U
111-91-1	bis(2-Chloroethoxy)Methane	4950 U
120-83-2	2,4-Dichlorophenol	4950 U
120-82-1	1,2,4-Trichlorobenzene	4950 U
91-20-3	Naphthalene	4950 U
106-47-8	4-Chloroaniline	4950 U
87-68-3	Hexachlorobutadiene	4950 U
59-50-7	4-Chloro-3-Methylphenol	4950 U
91-57-6	2-Methylnaphthalene	4950 U
77-47-4	Hexachlorocyclopentadiene	4950 U
88-06-2	2,4,6-Trichlorophenol	[illegible]
95-95-4	2,4,5-Trichlorophenol	24000 U
91-58-7	2-Chloronaphthalene	4950 U
88-74-4	2-Nitroaniline	4950 U
131-11-3	Dimethyl Phthalate	4950 U
208-96-8	Acenaphthylene	4950 U
99-09-2	3-Nitroaniline	24000 U

CAS Number		ug/l or ug/Kg (Circle One)
83-32-9	Acenaphthene	4950 U
51-28-5	2,4-Dinitrophenol	24000 U
100-02-7	4-Nitrophenol	24000 U
132-64-9	Dibenzofuran	4950 U
121-14-2	2,4-Dinitrotoluene	4950 U
606-20-2	2,6-Dinitrotoluene	4950 U
84-66-2	Diethylphthalate 3400 JB	~~4950 U~~
7005-72-3	4-Chlorophenyl-phenylether	4950 U
86-73-7	Fluorene	4950 U
100-01-6	4-Nitroaniline	4950 U
534-52-1	4,6-Dinitro-2-Methylphenol	[illegible]
86-30-6	N-Nitrosodiphenylamine (1)	4950 U
101-55-3	4-Bromophenyl-phenylether	4950 U
118-74-1	Hexachlorobenzene	4950 U
87-86-5	Pentachlorophenol	24000 U
85-01-8	Phenanthrene 4500 J	~~4950 U~~
120-12-7	Anthracene 4400 J	~~4950 U~~
84-74-2	Di-n-Butylphthalate	4950 U
206-44-0	Fluoranthene 4600	~~4950 U~~ SK
129-00-0	Pyrene 8000	~~4950 U~~ SK
85-68-7	Butylbenzylphthalate 52000	~~4950 U~~ SK
91-94-1	3,3'-Dichlorobenzidine	9900 U
56-55-3	Benzo(a)Anthracene 4400	~~4950 U~~ SK
117-81-7	bis(2-Ethylhexyl)Phthalate 3	~~4950 U~~ 520
218-01-9	Chrysene 5000	~~4950 U~~
117-84-0	Di-n-Octyl Phthalate	4950 U
205-99-2	Benzo(b)Fluoranthene 9300*	~~4950 U~~
207-08-9	Benzo(k)Fluoranthene	~~4950 U~~
50-32-8	Benzo(a)Pyrene 5200	~~4950 U~~ SK
193-39-5	Indeno(1,2,3-cd)Pyrene 3	~~4950 U~~
53-70-3	Dibenz(a,h)Anthracene	4950 U
191-24-2	Benzo(g,h,i)Perylene	4950 U

* Unresolved benzo(b,k)fluoranthenes

(1)-Cannot be separated from diphenylamine

Laboratory Name Cambridge Analytical Associates

Case No ______

Sample Number
21

Organics Analysis Data Sheet
(Page 3)

Pesticide/PCBs

Concentration [✓ Low] Medium (Circle One)

GPC Cleanup ☐Yes ☒No

Date Extracted/Prepared 12/2/87

Separatory Funnel Extraction ☐Yes

Date Analyzed 12/10/87

Continuous Liquid - Liquid Extraction ☐Yes

Conc/Dil Factor 50

Percent Moisture (decanted) 3

CAS Number		ug/l or [✓ ug/Kg] (Circle One)
319 84-6	Alpha BHC	400u
319 85 7	Beta BHC	400u
319 86 8	Delta BHC	400u
58 89 9	Gamma BHC (Lindane)	400u
76 44-8	Heptachlor	400u
309 00 2	Aldrin	400u
1024 57-3	Heptachlor Epoxide	400u
959 98-8	Endosulfan I	400u
60-57-1	Dieldrin	800u
72-55-9	4 4 -DDE	800u
72-20-8	Endrin	800u
33213 65-9	Endosulfan II	800u
72-54-8	4 4 -DDD	800u
1031-07-8	Endosulfan Sulfate	800u
50 29-3	4 4 -DDT	800u
72-43-5	Methoxychlor	4000u
53494-70-5	Endrin Ketone	800u
57-74-9	Chlordane	4000u
8001-35 2	Toxaphene	8000u
12674-11-2	Aroclor-1016	4000u
11104-28-2	Aroclor-1221	4000u
11141-16-5	Aroclor-1232	4000u
53469 21-9	Aroclor-1242	4000u
12672-29-6	Aroclor-1248	4000u
11097-69-1	Aroclor-1254	8000u
11096-82-5	Aroclor-1260	8000u

V_i = Volume of extract injected (ul)

V_s = Volume of water extracted (ml)

W_s = Weight of sample extracted (g)

V_t = Volume of total extract (ul)

V_s ——— or W_s 30.4 V_t 10,000 ul V_i 3 ul

Lab Name Cambridge Analytical Associates
Case No. 2267CC7

Sample Number
3

Organics Analysis Data Sheet
(Page 4)

Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/kg)
	none found	VOA	—	—
	unknown (indene)	BN	19.88	3000 J
	unknown (indene)		28.18	9700 J
	unknown		28.58	3600 J
	docosane		29.76	4100 J
	unknown		30.17	3000 J
	docosane		30.64	12 000 J
	unknown		31.64	4100 J
	unknown		32.85	6600 J
	unknown		33.96	2500 J
	unknown		34.26	3000 J
	~~benzene, isocyanato~~ unknown		35.98	3000 J
	benzene, isocyanato-		38.49	1600 J
	unknown		40.57	3600 J

Sample Number
[illegible]

Organics Analysis Data Sheet
(Page 1)

Laboratory Name Cambridge Analytical Assoc.
Case No [illegible]
Lab Sample ID No 8711236-15
QC Report No
Sample Matrix ~~Water~~ Soil
Contract No ~~68-01-7218~~ [illegible] COL 2[illegible]
Data Release Authorized By L. Fowler
Date Sample Received 11/24/87

Volatile Compounds

Concentration: [✓ Low] Medium (Circle One)
Date Extracted/Prepared 12/01/87
Date Analyzed 12/01/87
Conc/Dil Factor: 1/100 pH
Percent Moisture. (Not Decanted) ~~NA~~ 28

µL

CAS Number		~~ug/l~~ or [✓ ug/Kg] (Circle One)	
74-87-3	Chloromethane	1000 U	
74-83-9	Bromomethane	1000 U	
75-01-4	Vinyl Chloride	1000 U	
75-00-3	Chloroethane	1000 U	
75-09-2	Methylene Chloride 7 JB	~~500 U~~	
67-64-1	Acetone 2400	~~1000 U~~	✓
75-15-0	Carbon Disulfide 230 J	500 [illegible]	
75-35-4	1, 1-Dichloroethene	500 U	
75-34-3	1, 1-Dichloroethane	500 U	
156-60-5	Trans 1, 2-Dichloroethene	500 U	
67-66-3	Chloroform	500 U	
107-06-2	1, 2-Dichloroethane	500 U	
78-93-3	2-Butanone	1000 U	
71-55-6	1, 1, 1-Trichloroethane	500 U	
56-23-5	Carbon Tetrachloride	500 U	
108-05-4	Vinyl Acetate	1000 U	
75-27-4	Bromodichloromethane	500 U	

µL

CAS Number		~~ug/l~~ or [✓ ug/Kg] (Circle One)	
78-87-5	1, 2-Dichloropropane	500 U	
10061-02-6	Trans-1, 3-Dichloropropene	500 U	
79-01-6	Trichloroethene	500 U	
124-48-1	Dibromochloromethane	500 U	
79-00-5	1, 1, 2-Trichloroethane	500 U	
71-43-2	Benzene	500 U	
10061-01-5	cis-1, 3-Dichloropropene	500 U	
110-75-8	2-Chloroethylvinylether	1000 U	
75-25-2	Bromoform	500 U	
108-10-1	4-Methyl-2-Pentanone	1000 U	
591-78-6	2-Hexanone	1000 U	
127-18-4	Tetrachloroethene 660	~~500 U~~	✓
79-34-5	1, 1, 2, 2-Tetrachloroethane	500 U	
108-88-3	Toluene 760	~~500 U~~	✓
108-90-7	Chlorobenzene	500 U	
100-41-4	Ethylbenzene 630	~~500 U~~	
100-42-5	Styrene	500 U	
	Total Xylenes 4700	~~500 U~~	

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used. Additional flags or footnotes explaining results are encouraged. However, the definition of each flag must be explicit.

Value	If the result is a value greater than or equal to the detection limit, report the value.
U	Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g., 10U) based on necessary concentration/dilution action. (This is not necessarily the instrument detection limit.) The footnote should read: U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.
J	Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g., 10J). If limit of detection is 10 µg/l and a
C	This flag applies to pesticide parameters where the identification has been confirmed by GC-MS. Single component pesticides ≥10 ng/ul in the final extract should be confirmed by GC/MS.
B	This flag is used when the analyte is found in the blank as well as a sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.
Other	Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report.

Laboratory Name [illegible]

Case No. [illegible]

Sample Number [illegible]

Organics Analysis Data Sheet
(Page 2)

Semivolatile Compounds

Concentration [✓ Low] Medium (Circle One)

Date Extracted/Prepared 12/2/87

Date Analyzed 12/14/87

Conc/Dil Factor 15

Percent Moisture (Decanted) 28

GPC Cleanup ☐ Yes ☒ No

Separatory Funnel Extraction ☐ Yes

Continuous Liquid - Liquid Extraction ☐ Yes

~~BN only~~

CAS Number		ug/l or [✓ ug/Kg] (Circle One)
108-95-2	Phenol 7000	~~4450~~
111-44-4	bis(-2-Chloroethyl)Ether	4450 u
95-57-8	2-Chlorophenol	4450 u
541-73-1	1,3-Dichlorobenzene	4450 u
106-46-7	1,4-Dichlorobenzene	4450 u
100-51-6	Benzyl Alcohol	[illegible]
95-50-1	1,2-Dichlorobenzene	4450 u
95-48-7	2-Methylphenol	[illegible]
39638-32-9	bis(2-chloroisopropyl)Ether	4450 u
106-44-5	4-Methylphenol 4200 J	~~4450~~
621-64-7	N-Nitroso-Di-n-Propylamine	4450 u
67-72-1	Hexachloroethane	4450 u
98-95-3	Nitrobenzene	4450 u
78-59-1	Isophorone	4450 u
88-75-5	2-Nitrophenol	[illegible]
105-67-9	2,4-Dimethylphenol	[illegible]
65-85-0	Benzoic Acid	[illegible]
111-91-1	bis(-2-Chloroethoxy)Methane	4450 u
120-83-2	2,4-Dichlorophenol	[illegible]
120-82-1	1,2,4-Trichlorobenzene	4450 u
91-20-3	Naphthalene 69000	~~4450~~
106-47-8	4-Chloroaniline	4450 u
87-68-3	Hexachlorobutadiene	4450 u
59-50-7	4-Chloro-3-Methylphenol	[illegible]
91-57-6	2-Methylnaphthalene 25000	~~4450 u~~
77-47-4	Hexachlorocyclopentadiene	4450 u
88-06-2	2,4,6-Trichlorophenol	[illegible]
95-95-4	2,4,5-Trichlorophenol	22000 u
91-58-7	2-Chloronaphthalene	4450 U
88-74-4	2-Nitroaniline	4450 U
131-11-3	Dimethyl Phthalate	4450 U
208-96-8	~~Acenaphthylene [illegible]~~	~~[illegible]~~
99-09-2	3-Nitroaniline	24000 u

CAS Number		ug/l or [✓ ug/Kg] (Circle One)
83-32-9	Acenaphthene 34000	~~4450~~
51-28-5	2,4-Dinitrophenol	[illegible]
100-02-7	4-Nitrophenol	[illegible]
132-64-9	Dibenzofuran 16000	~~4450~~
121-14-2	2,4-Dinitrotoluene	4450 u
606-20-2	2,6-Dinitrotoluene	4450 u
84-66-2	Diethylphthalate 3700 JB	~~4450~~
7005-72-3	4-Chlorophenyl-phenylether	4450 u
86-73-7	Fluorene 22000	~~4450~~
100-01-6	4-Nitroaniline	[illegible]
534-52-1	4,6-Dinitro-2-Methylphenol	[illegible]
86-30-6	N-Nitrosodiphenylamine (1)	4450 u
101-55-3	4-Bromophenyl-phenylether	4450 u
118-74-1	Hexachlorobenzene	4450 u
87-86-5	Pentachlorophenol	[illegible]
85-01-8	Phenanthrene 46000	~~4450~~
120-12-7	Anthracene 11000	~~4450~~
84-74-2	Di-n-Butylphthalate 9900	~~4450~~
206-44-0	Fluoranthene 27000	~~4450~~
129-00-0	Pyrene 26000	~~4450~~
85-68-7	~~Butylbenzylphthalate~~ 4600	~~4450 u~~
91-94-1	3,3'-Dichlorobenzidine	9900 u
56-55-3	Benzo(a)Anthracene 13,000	~~4450~~
117-81-7	bis(2-Ethylhexyl)Phthalate	~~4450~~ 120
218-01-9	Chrysene	~~4450~~ 1400
117-84-0	Di-n-Octyl Phthalate	4450 u
205-99-2	Benzo(b)Fluoranthene *	~~4450~~ 23,
207-08-9	Benzo(k)Fluoranthene	~~4450~~
50-32-8	Benzo(a)Pyrene	~~4450~~ 120
193-39-5	Indeno(1,2,3-cd)Pyrene	~~4450~~ 230
53-70-3	Dibenz(a,h)Anthracene	4450 u
191-24-2	Benzo(g,h,i)Perylene	4450 u

* Unresolved benzo(bk)fluoranthenes

(1)-Cannot be separated from diphenylamine

Laboratory Name Cambridge Analytical Associates
Case No

Sample Numbe
23

Organics Analysis Data Sheet
(Page 3)

Pesticide/PCBs

Concentration [✓ Low] Medium (Circle One)
Date Extracted/Prepared 12/02/87
Date Analyzed 12/10/87
Conc/Dil Factor 50
Percent Moisture (decanted) 28

GPC Cleanup ☐Yes ☒No
Separatory Funnel Extraction ☐Yes
Continuous Liquid - Liquid Extraction ☐Yes

CAS Number		ug/l or [✓ ug/Kg] (Circle One)
319-84-6	Alpha-BHC	400u
319-85-7	Beta-BHC	400u
319-86-8	Delta-BHC	400u
58-89-9	Gamma-BHC (Lindane)	400u
76-44-8	Heptachlor	400u
309-00-2	Aldrin	400u
1024-57-3	Heptachlor Epoxide	400u
959-98-8	Endosulfan I	400u
60-57-1	Dieldrin	800u
72-55-9	4,4'-DDE	800u
72-20-8	Endrin	800u
33213-65-9	Endosulfan II	800u
72-54-8	4,4'-DDD	800u
1031-07-8	Endosulfan Sulfate	800u
50-29-3	4,4'-DDT	800u
72-43-5	Methoxychlor	800u
53494-70-5	Endrin Ketone	800u
57-74-9	Chlordane	4000u
8001-35-2	Toxaphene	8000u
12674-11-2	Aroclor-1016	4000u
11104-28-2	Aroclor-1221	4000u
11141-16-5	Aroclor-1232	4000u
53469-21-9	Aroclor-1242	4000u
12672-29-6	Aroclor-1248	4000u
11097-69-1	Aroclor-1254	8000u
11096-82-5	Aroclor-1260	8000u

V_i = Volume of extract injected (ul)

V_s = Volume of water extracted (ml)

W_s = Weight of sample extracted (g)

V_t = Volume of total extract (ul)

V_s ——— or W_s 31.4 V_t 15 ~~15~~ 000 ul 50c V_i 3ul

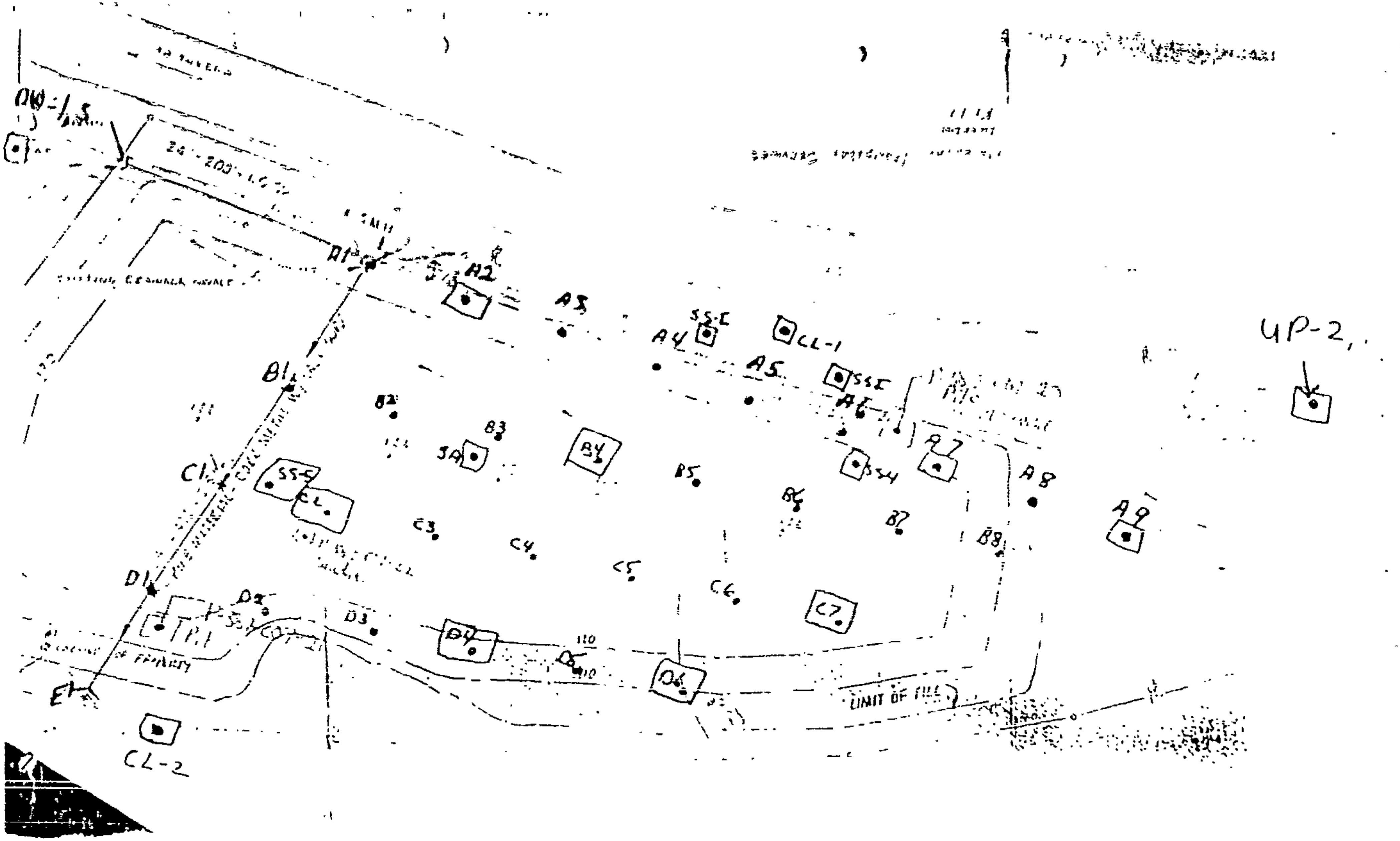
Laboratory Name [illegible]
Case No 6 337, C07

Sample Number
23

Organics Analysis Data Sheet
(Page 4)

Tentatively Identified Compounds

	CAS Number	Compound Name	Fraction	RT or Scan Number	Estimated Concentration (ug/l or ug/kg)
1		unknown	VOA	24.41	3200 J
2		trimethyl benzene isomer		27.70	4100 J
3		Bicycle [3.1.1] hept-2-ene, 177 trimethyl		27.29	23,000 J
4		1-ethyl-4-methyl benzene		24.67	4800 J
5	probably	dimethyl, 136-Octatriene		26.25	10,000 J
6	same	Bicycle [3.1.1] hept-2-ene trimethyl isomer		22.17	15,000 J
7	peak!	Bicyclo [3.1.1] hept-2-ene, trimethyl	BN	7.69	15,000 J
8		Benzene, methyl (methyl ethyl) isomer		9.63	9300 J
9		Bicyclo hept-2-ene trimethyl isomer		9.72	24000 J
10		Tetramethyl hexane isomer		10.21	10,000 J
11		unknown alkane		10.40	7300 J
12		undecane		11.05	4600 J
13		unknown		11.84	2600 J
14		Cyclohexene-1-methanol isomer		12.65	6600 J
15		~~decane~~		~~12.74~~	
16		1-methyl naphthalene	BN	14.51	4600 J
17		1,1' biphenyl		15.48	9300 J
18		tetradecane		15.71	9300 J
19		dimethyl Naphthalene isomer		15.86	8600 J
20		"		16.07	12000 J
21		(1,1'-biphenyl) 4-carboxaldehyde		18.89	9300 J
22		octacosane		23.83	18000 J
23		pentadecane		25.68	13000 J
24		~~unknown~~		~~26.55~~	~~11,000 J~~
25		eicosane		28.97	5300 J
26		dimethyl hexadecane isomer		30.66	32000 J
27					
28					
29					
30					


DW-1S
24" RCP
EXISTING DRAINAGE SWALE
A1
A2
A3
SS-I
A4
CL-1
A5
SS-I
A6
A7
UP-2
A8
A9
B1
B2
B3
3A
B4
B5
B6
SS-4
B7
B8
C1
SS-5
CL
C3
C4
C5
C6
C7
D1
D2
TP-1
SS-3
D3
D4
D5
D6
E1
BOUNDARY OF PROPERTY
LIMIT OF FILL
CL-2

SUPREME COURT OF THE STATE OF
NEW YORK - COUNTY OF ORANGE

STATE OF NEW YORK and THOMAS C. JORLING,
Commissioner of the New York State
Department of Environmental Conservation,

Index No.

Plaintiffs,

AFFIDAVIT IN SUPPOR

- against -

RENARD BARONE, FRANK SACCO, LILLIAN SACCO,
MATERIAL TRANSPORT SERVICE, SARKIS KHOURDAGIAN,

Defendants.

STATE OF NEW YORK)
) ss.:
COUNTY OF ULSTER)

RICHARD A. GARDINEER, being duly sworn, deposes and states

1. I am an Associate Sanitary Engineer for the New York State Department of Environmental Conservation ("the Department"), in the Region III (New Paltz) office, and have held this position for five years. I am a Professional Engineer, licensed to practice professional engineering in the State of New York. I possess a Bachelor of Engineering degree in Civil Engineering, and a Master of Science degree in Civil Engineering, both from New York University. I am currently the Program Manager for the Solid Waste Section. In this position, my duties include the supervision of regulatory activities for solid waste management facilities, including facilities that dispose of construction and demolition debris. These duties include monitoring compliance of solid waste permits and determining exemptions pursuant to 6 NYCRR Part 360.1(f)(1)....

2. In the course of my duties I have become familiar wit the defendants' landfill located on Route 17 in Tuxedo, New

York. My knowledge is based upon personal site visits, my staff's inspection reports and citizen complaints.

3. Solid waste facilities in New York State are requ to obtain a permit from DEC prior to operation. An exception this permit requirement is a construction and demolition ("C& debris site that is in operation for less than one year and meets other requirements listed in 6 NYCRR Part 360.1(f)(1

4. An exempt C&D site must be used exclusively for non-hazardous, non-putrescible construction debris material a must be in compliance with certain 6 NYCRR Part 360.8 regulations. C&D debris is defined as waste "resulting from construction, remodeling, repair and demolition of structures road building and land clearing" in 6 NYCRR Part 360.1(d)(11). I have personally visited defendants' site located at Route 1 in Tuxedo, New York. This site is adjacent to the Ramapo Rive a Class A trout stream, and designated recreational river. I addition, I have reviewed reports from my staff concerning the landfill's operation.

5. The site owned and operated by the defendants is not an exempt site because it does not meet the applicable 6 NYCR Part 360.1(f)(1)(x)(a) and 360.8 regulations. (See August 1 1987 report annexed as Exhibit A.)

6. I believe that the closure of this site and the undertaking of drainage work is necessary to prevent serious possibly irreversible damage to the environment. These conclusions are based upon the following: potential groundwa contamination; the generation of significant odors effecting nearby property owners; the potential for flooding and icy

conditions on Route 17 due to drainage conditions caused by sit construction; and the dischaige of drainage directly at the Conrail railroad which may undermine the track.

A. SITE HISTORY OF CONSTRUCTION AND DEMOLITION DEBRIS DISPOSAL

7. On March 17, 1987, Robert Conklin, a Forest Ranger employed in Region 3 of the Department observed a waste disposa operation at a site located along Route 17 in Tuxedo. (See Conklin affidavit annexed).

8. On March 18, 1987, Forest Ranger Conklin returned to the site with Sandra White, an Assistant Sanitary Engineer, working under my supervision. Ms. White observed that amounts of wastes were disposed that were not construction and demolition debris. These items, which included tires, clothing rugs, cardboard and paper are not construction and demolition debris as defined in 6 NYCRR Part 360.1. (See White and Conkli affidavits annexed.)

9. On or about July 21, 1987, I inspected the site, whic encompasses approximately twelve acres. It is situated east o Route 17 and is adjacent to the Conrail railroad. Approximatel 50 feet east of the railroad is the Ramapo River. This river and its underlying aquifer supply water to the Spring Valley Water Company, to the Village of Suffern, and to Mahwah, New Jersey.

10. During my inspection, I noticed approximately twenty tires, material which is not construction and demolition debris

11. I also observed a twenty-four inch diameter corrugate metal pipe along the bottom of the fill. This pipe pointed

towards the railroad track and is located approximately 6½ feet from the track. Discharge from the pipe will flow towards the track and possibly undermine the track. This is a violation of 6 NYCRR Part 360.8(a)(20).

12. I also observed strong odors emanating from the site. (See also White, Cantu, Briggs, Wiand and Petrosky affidavits annexed.)

13. On August 18, 1987, I inspected the site along Route 17. The site had been significantly enlarged and expanded to touch the shoulder along Route 17. (See Exhibit A annexed.)

14. During this inspection I found that the site does not meet the height restrictions contained in 6 NYCRR Part 360.8(b)(1)(vii)(b) because the height is approximately 30 feet -- 20 feet above the allowable height. Also, the working face was almost vertical. This grade could result in a slope failu causing the bulldozers or hauling vehicles to slide down the slope.

15. During this inspection, there were significant odors coming from this site. These odors were in violation of 6 NYCR Part 360.8(a)(8).

16. On August 31, 1987, I again inspected the site. The same site conditions existed. The height of the fill was 30 feet and significant odors were detected. The site was again i violation of 6 NYCRR Parts 360.8(b)(1)(vii)(b) and 360.8(a)(8). (See Exhibit B annexed.)

17. On September 1, 1987, I inspected the site with Defendant Frank Sacco, Ms. White and Mr. Lawrence Gallagher of my staff. My particular interest was to inspect the site for

possible upstream and downstream drainage problems. I observed a twenty-four inch corrugated metal pipe entering the landfill at the southern portion of the site. The pipe exits on the eastern side of the landfill exiting towards the railroad. Nea the northern portion of the landfill I observed a cross-drain, which flows under Route 17 and empties directly onto the landfill. This pipe was partially filled with debris. During this inspection, I also noticed tires along the eastern bottom-of-slope. (See Exhibit C annexed.)

B. Adverse Environmental Impacts

18. The odors detected at this site as evidenced in my inspections (Exhibits A, B and C), in the affidavit of Engineer White, and in the affidavits of Ms. Heidi Cantu, Ms. Susan Wiand, Mr. Mark Briggs and Ms. Diane Petrosky are a violation of 6 NYCRR Parts 360.8(a)(8).

19. The allowance of surface water onto the waste disposa area from the cross-drain under Route 17 is a violation of 6 NYCRR Part 360.8(a)(1). This will result in the generation of leachate. Leachate as defined in 6 NYCRR Part 360.1(d)(41) as liquid which has been in contact with or passed through a solid waste. The leachate will flow beneath the site and off the sit along the railroad track, polluting the groundwater and the Ramapo River.

20. The placement of waste along the embankment of Route 17 will result in an additional violation of Section 360.8(a)(1 because it will allow groundwater normally flowing under Route 17 to enter directly into the fill. This will result in the

additional generation of leachate, which will ultimately pollute the aquifer and the Ramapo River.

21. On September 1, 1987, during my site visit, Mr. Sacc informed me that he planned to connect a pipe located in the southwest corner of the fill (which flows under the landfill) an existing cross-drain located under Route 17 south of the landfill. This may result in possible flooding and icing conditions on Route 17 and thus is a violation of 6 NYCRR Part 360.8(a)(20) as state in paragraph 12.

22. The outflow pipe along the eastern bottom-of-fill ma ultimately result in the undermining of the railroad track. This could result in a violation of 6 NYCRR Part 360.8(a)(20).

23. The placement of non-construction and demolition debris on an unlined site may result in a violation of 6 NYCRR Part 360.8(a)(3) and 6 NYCRR Part 703.5 of the Groundwater Quality Standards because leachate will form and discharge int surface water and groundwater.

24. The aforementioned adverse environmental effects and violations of 6 NYCRR Part 360.8 are such that this site canno be considered exempt under 6 NYCRR Part 360.1(f)(1). Therefor the defendants are operating this landfill in violation of Environmental Conservation Law ("ECL") § 27-0701 and 6 NYCRR Part 360.2(b).

C. SITE REMEDY

25. Based upon all of the reasons set forth above, the defendants must be ordered to immediately cease receiving wast and to undertake a program to close the landfill in an

environmentally sound manner consistent with all requirements the Environmental Conservation Law.

26. The placement of final cover, grading and seeding, consistent with 6 NYCRR Parts 360.8(b)(1)(vii), (ix), and (x) will minimize the amount of water percolating through the waste and reduce the amount of pollutants flowing into the groundwate and the Ramapo River, and significantly reduce the odors generated by the site.

27. Groundwater monitoring wells consistent with 6 NYCRR Part 360.8(b)(1)(iii) and a groundwater monitoring program consistent with 6 NYCRR Part 360.8(b)(1)(iv) are needed to protect the Ramapo River and the underlying aquifer.

28. A plan should be prepared to divert flow from the northern cross-drain along Route 17 as required in 6 NYCRR Part 360.8(a)(1).

29. No connection of the southern cross-drain under Route 17 to the landfill pipe should be made due to the potential of flooding and/or icy conditions on Route 17.

30. In order for the Department to determine the precise nature of the remediation necessary at the site, the Department should be given access to the site.

31. A study should be undertaken to determine the effect of the discharge pipe on the railroad track to alleviate any possible undermining of the tracks.

32. I made this affidavit in support of a motion for a court order enjoining the defendants to cease receiving all waste, to allow the Department access to the site for inspections, to close the site located on Route 17 in Tuxedo in

an environmentally sound manner consistent with 6 NYCRR Part 360.8 and to undertake measures to prevent flooding on State Highway Route 17 and along the Conrail railroad tracks.

Dated: New Paltz, New York
September 30, 1987

Richard Gardineer, P.E.

Richard Gardineer, P.E.

Sworn to before
me this 30th day of
September, 1987

Ruth D. Bean

Notary Public

RUTH D. BEAN
Notary Public, State of New York
No. 4651229
Qualified in Ulster County
Term Expires ~~[illegible]~~, 19 89
May 31

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