WATER QUALITY INVESTIGATION
AT THE
VAN DE MARK CHEMICAL CO., INC.
SOLID WASTE DISPOSAL SITE,
LOCKPORT, NEW YORK

FOR

W.W.W. Consulting Engineers
50 West Genesee Street
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BY

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August 1978

INTRODUCTION

The purpose of this investigation was two (2)-fold: (a) provide a pre-test baseline for Eighteenmile Creek in a reach adjacent to a proposed industrial waste disposal site for solid materials from the Van De Mark Chemical Co., Inc.; and (b) to ascertain if contaminants from the disposal site were adversely impacting the ground and surface waters. The latter was done because the site did contain solid wastes from Van De Mark as well as other industries in the Lockport region. Major consideration was given to general chemical water quality indicators as well as those heavy metals and nutrients that possibly could be released directly or indirectly from the material that is proposed to be placed in the landfill. The latter is located on a bluff above Eighteenmile Creek and is between Mill Street (south), West Jackson Street (north), and Gooding Street (west) in Lockport, Niagara County, New York.

METHODS

Three (Stations 1, 3, and 5) of the six transects that were established on Eighteenmile Creek in June 1977 were sampled (Figure 1). These collection areas were so located that regions above, within, and downstream from the area most apt to be impacted by surface runoff and groundwater from the site would be sampled. Three sampling points were located on each transect. Sites designated "A" were one-quarter (1/4) the distance from the right bank when facing downstream. The "B" sites were located in mid-stream; while the "C" sites were one-quarter (1/4) the distance from the left bank when facing downstream.

Each of the nine sites were sampled on 8 August. On the same date, three replicate samples also were gathered from each of the four test borings within or adjacent to the disposal area.

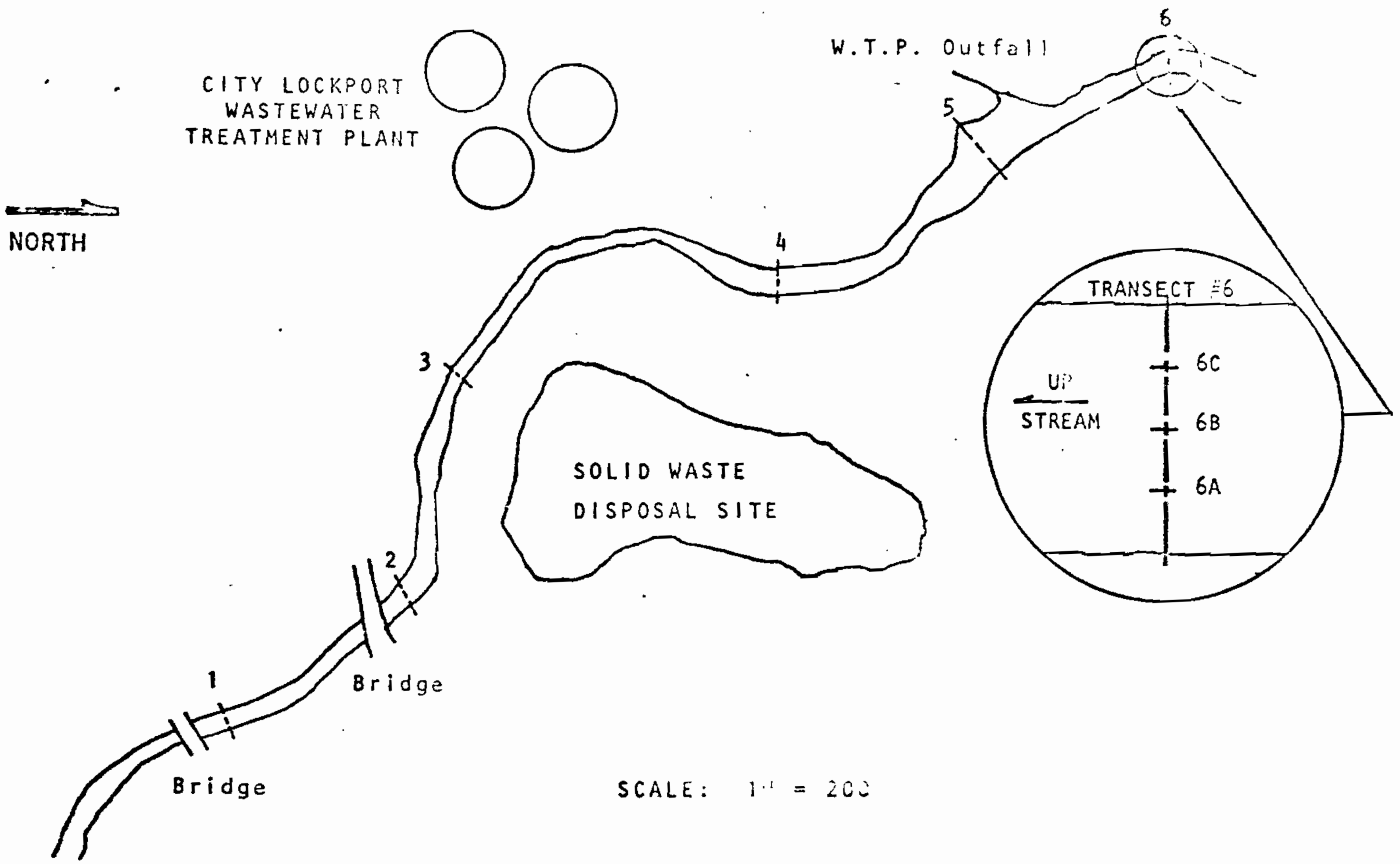


FIGURE 1. Sampling Sites - Eighteen Mile Creek

The well locations are shown on Figure 2. Water also was taken from the drainage ditch to the east of the disposal area.

Water from the Creek was collected at mid-depth with a 5.2 L PVC Van Dorn Water Bottle (horizontal). Well samples as well as the surface water from the ditch were gathered with a weighted PVC 300 ml test-tube that was lowered into the well on a nylon line. Samples were taken from the mid-depth of the standing water in each well. The collection depths for Wells 1, 2, 3, and 4 were 5.5, 4, 13, and 14.5 m, respectively.

All samples were preserved and analyzed according to procedures previously approved by the U.S. Environmental Protection Agency (EPA), the U.S. Army Corps of Engineers, and the New York State Department of Environmental Conservation. All laboratory analysis were initiated on the same day that each set of samples were collected in the field. The same quality control program, including spikes and blanks, that had been approved by EPA for the Erie-Niagara Counties 208 Study also was employed.

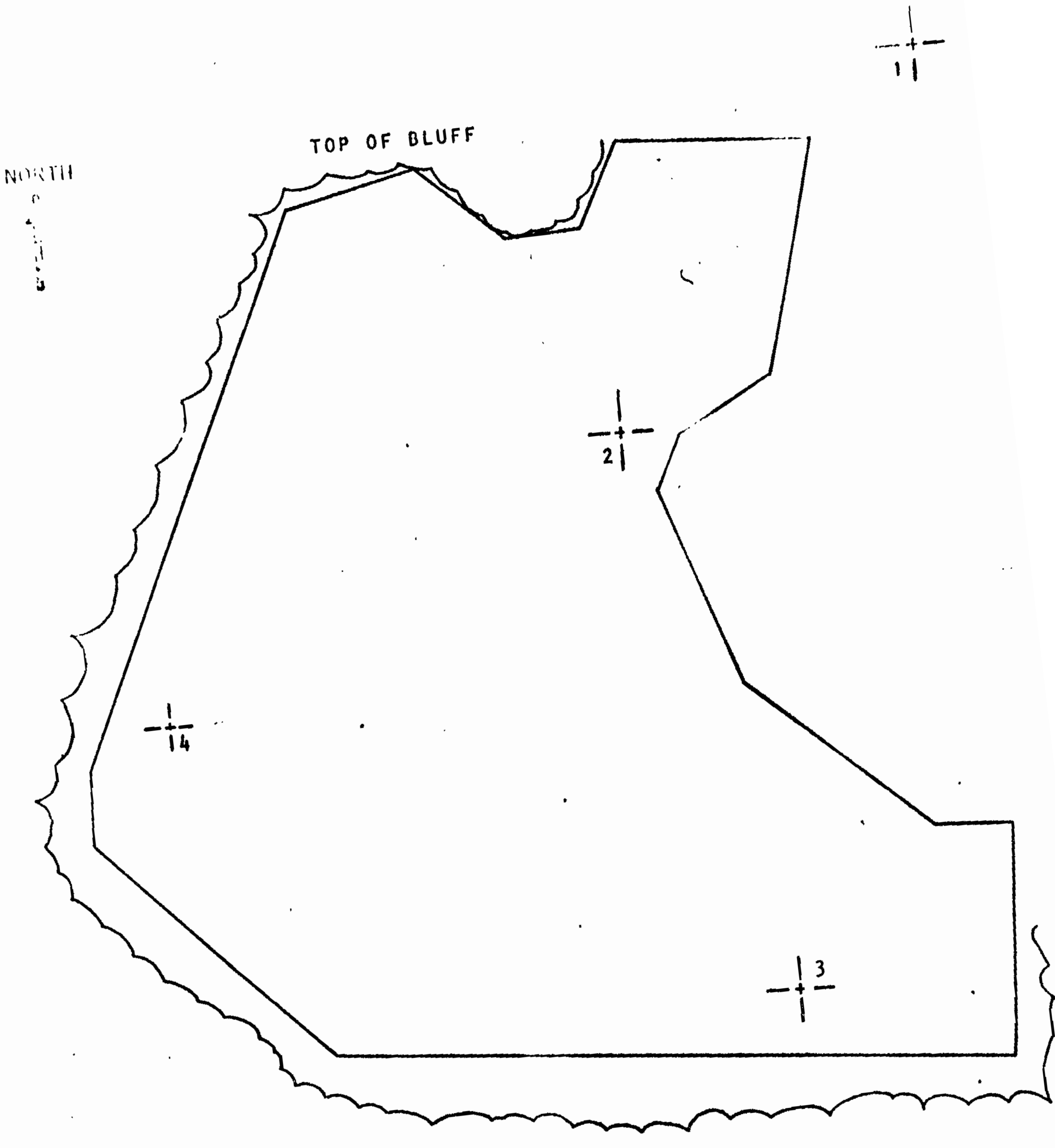
Dissolved oxygen and temperature was measured in the field utilizing a YSI Dissolved Oxygen-Temperature Meter. The latter was air-calibrated for oxygen with a standardized thermometer. The pH also was determined immediately after each collection was made using a Leeds and Northrup pH Meter. The latter was checked for accuracy against pH 7.00 and 8.00 buffers.

A detailed description of each lab and field procedure will be furnished upon request.

The field phase of the project was supervised by the Great Lakes Laboratory's Biological Coordinator, Dr. V. Ray Frederick; the laboratory analyses were directed by the GLL's Chemical Coordinator, Dr. Russell H. Plumb. The GLL Director, Dr. Robert A. Sweeney, oversaw the entire project.

RESULTS-DISCUSSION

The results from the analyses of the water samples from Eighteenmile Creek collected on 7 August 1978 are shown on



SCALE: 1" = 50' 2' cont.

FIGURE 2. Sampling Sites - Ground Water

Table I. The data from the testing of the drainage ditch and well samples also were gathered on 7 August and are given on Table II.

It should be noted that Transect 5 was impacted by discharges from the Lockport Wastewater Treatment Plant, whose effluent entered Eighteenmile Creek from the west (left bank), just downstream from Transect 5. Within the latter, the collection from Site 5A was less affected by the release from the wastewater treatment facility than those from Sites 5B and 5C. Samples from Transect 1 appeared to be impacted by effluents from upstream industry. There was an outfall from a metals recovery plant above Site 1C. The stream discharge was reduced between Transects 1 and 3, which we believe resulted in a settling out of suspended and a reduction of dissolved material.

There were chemical and physical differences across each transect that could be explained by the point source discharges to the stream. There was no evidence that the samples from the collection sites along the right (east) bank, which were more apt to be impacted from surface runoff and groundwater from the industrial solid waste disposal site, were lower in quality than the mid-stream or left-bank samples. To the contrary, water quality generally was higher at the "A" sites in each transect.

Most nutrients, chloride, calcium, magnesium, and potassium levels measured in August 1978 were lower than those quantified at the same sites in April and May 1977. Similar drops between the spring and summer seasons have been observed in other Western New York tributaries.

Elevated zinc, total Kjeldahl nitrogen (TKN), iron, and chloride levels at Site 1C were attributed to the discharge from the metals reprocessing plant. However, quantities returned to ambient by Transect 3.

The results from Test Wells 1 and 2, which were shallower and outside of the region where known solid industrial wastes had been placed previously, were similar only with respect to

TABLE I

WATER QUALITY - EIGHTEENMILE CREEK

7 August 1978

PARAMETERS	TRANSECT 1 1A	 1B	 1C	TRANSECT 3 3A	 3B	 3C	TRANSECT 5 5A	 5B	 5C
Conductivity (μmhos)	360.	350.	1450.	360.	372.	362.	372.	372.	378.
Dissolved Oxygen (mg/1)	6.5	6.2	6.3	6.4	6.2	6.6	9.8	6.7	6.5
Temperature (°C)	23.8	23.9	24.1	23.9	24.2	23.6	23.8	23.8	24.0
Percent Saturation (100%)	74.5	71.0	75.0	75.0	72.5	77.0	120.0	80.0	77.0
pH	7.99	7.52	4.58	8.26	7.72	7.63	8.01	6.77	8.01
Silica Dioxide (mg/1)	1.21	1.08	2.71	0.90	0.80	0.85	1.20	0.90	0.82
Chlorides (mg/1)	32.82	26.60	782.	31.41	33.02	33.93	31.41	36.46	31.41
Total Organic Carbon (mg/1)	7.0	6.6	13.9	5.3	8.1	6.1	6.1	8.0	4.4
Total Inorganic Carbon (mg/1)	16.9	21.3	<0.4	18.6	17.5	18.3	19.0	15.0	20.8
Alkalinity (mg/1 as $CaCO_3$)	97.27	98.29	0.00	96.25	98.29	95.22	99.32	99.32	99.22
Calcium (mg/1)	36.8	34.8	6.8	36.0	35.6	35.8	35.8	36.0	35.0
Magnesium (mg/1)	10.0	10.1	15.0	0.9	10.0	10.0	10.0	10.0	10.0
Potassium (mg/1)	2.2	1.3	3.6	2.2	2.0	2.2	2.2	2.6	2.2
Sodium (mg/1)	14.9	14.7	15.0	15.6	15.8	16.4	15.7	15.7	16.1
Iron (mg/1)	0.38	0.28	15.0	0.56	0.43	0.37	0.36	0.17	0.24
Zinc (mg/1)	0.032	0.034	2.43	0.054	0.040	0.040	0.046	0.010	0.016
Total Phosphorus (mg P/1)	0.735	0.360	0.278	0.360	0.360	0.360	0.247	0.398	1.64
Orthophosphorus (mg P/1)	0.088	0.083	0.080	0.018	0.028	0.030	0.052	0.050	0.055
Ammonia (mg N/1)	0.182	0.220	0.274	0.228	0.208	0.220	0.197	0.169	0.157
Total Kjeldahl Nitrogen (mg N/1)	0.540	0.528	2.30	0.782	0.351	1.36	0.935	0.570	1.470
Nitrite-Nitrate (mg N/1)	0.46	0.58	0.40	0.46	0.48	0.65	0.45	0.48	0.34

TABLE II

WATER QUALITY - WELLS AND DRAINAGE DITCH

7 August 1978

PARAMETERS	WELL 1	WELL 2	WELL 3	WELL 4	EAST DRAINAGE DITCH
Conductivity (μmhos)	392.	850.	793.0	338.	1242.
Dissolved Oxygen (mg/1)	5.2	6.6	5.2	7.8	3.7
Temperature (°C)	27.0	28.0	26.0	20.5	23.3
Percent Saturation (100%)	64.5	83.0	63.0	86.0	43.0
pH	7.68	9.1	7.3	7.68	4.2
Silica Dioxide (mg/1)	8.83	29.7	8.83	124	2.57
Chlorides (mg/1)	18.57	425.6	316.2	138.94	797.
Total Organic Carbon (mg/1)	785.	259.6	286.0	290	786.
Total Inorganic Carbon (mg/1)	37.0	21.4	31.4	42.0	12.6
Alkalinity (mg/1 as $CaCO_3$)	957.	172.0	112.0	145.0	0.00
Calcium (mg/1)	86.4	87.9	89.1	69.2	6.2
Magnesium (mg/1)	36.4	20.5	36.4	19.6	14.6
Potassium (mg/1)	18.8	37.6	8.4	8.5	13.7
Sodium (mg/1)	42.2	195.0	43.3	30.5	15.0
Iron (mg/1)	81.0	10.7	8.0	8.0	12.0
Zinc (mg/1)	3.19	4.2	4.01	3.09	0.034
Total Phosphorus (mg P/1)	0.647	2.42	2.47	2.79	0.278
Orthophosphorus (mg P/1)	0.040	0.032	0.013	0.025	0.032
Ammonia (mg N/1)	0.235	1.31	0.917	0.877	0.81
Total Kjeldahl Nitrogen (mg N/1)	4.34	8.41	9.08	4.50	2.41
Nitrite-Nitrate (mg N/1)	0.39	0.600	0.91	0.45	0.42

conductivity, pH, zinc, nitrite-nitrate, and TKN. If Test Wells 2 and 3 were influenced by the solid wastes, which were known to release HCl, it only was evident in the elevated chloride levels. There was no evidence of acidity problems. The range of values observed in all the wells were within the ranges noted in groundwater in limestone-sandstone regions not known to be influenced by industrial discharges.

However, there is evidence that the east drainage ditch is being impacted by acidic material which, from the high chloride levels, possibly may contain HCl. Increased solubility together with accelerated decay of organic matter in the acidic solution probably accounted for the high conductivity.

CONCLUSIONS

There is no evidence from the August 1978 sampling that water from the Van De Mark disposal site was impacting the stream. This is similar to the observations in April-May 1977.

The quality of the groundwater in the vicinity of the disposal area was not homogeneous, which also concurs with the April-May 1977 measurements. There was no evidence that the groundwater was adversely impacted by the material within the Van De Mark disposal zone.

The ditch to the east of the disposal site is being influenced by what is believed to be an acidic waste. The source of the latter should be identified and neutralized.