ENGINEERING INVESTIGATIONS AT INACTIVE HAZARDOUS WASTE SITES

PHASE II INVESTIGATION

Norton Lab
Site No. 932029
Town of Lockport, Niagara County

Final – April 1988

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BUREAU OF HAZARDOUS SITE CONTROL
DIVISION OF HAZARDOUS WASTE REMEDIATION

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., Acting Director

Prepared by:

EA SCIENCE AND TECHNOLOGY
A Division of EA Engineering, Science, and Technology, Inc.

EA Report DEC52C

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

PHASE II INVESTIGATIONS
NORTON LAB
CITY OF LOCKPORT, NIAGARA COUNTY
NEW YORK ID NO. 932029

Prepared for

Division of Hazardous Waste Remediation
New York State Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-0001

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A Division of EA Engineering, Science, and Technology, Inc.

April 1988

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1. EXECUTIVE SUMMARY

The Norton Lab site (New York ID No. 932029, EPA ID No. NYD030212799) is an inactive landfill located immediately south of 520 Mill Street in Lockport, Niagara County, New York. Norton Lab is no longer in business. The site was closed in 1976 after approximately 12 years of operation. The site, 2-3 acres in size, is currently owned by James J. Hoden of Lockport, New York. Access to the site is from the north along Mill Street, via an entrance gate for Twin Lake Chemical Company.

During operation of the Norton Lab Landfill, it is reported that over 2,000 tons of solid polyester and phenolic based waste plastics, and at least 3,000 gal of lubricating and hydraulic waste oils were disposed. Asphalt, insulating material, and roofing materials were observed on the south section of the site during EA's field operations.

Somerset Railroad Corporation installed 22 monitoring wells along the railroad right-of-way in the region of the Norton Lab site, including two shallow wells screened in the fill. Several of these wells were sampled in 1981 revealing only some possible oil and grease contamination within the fill area. PCBs were not detected in any of the monitoring wells sampled. A second round of sampling and analysis was completed by Somerset Railroad in June 1984. Only iron concentrations were found to exceed New York State Ground Water Quality Standards. Ammonia was the only parameter to exceed New York State Water Quality Standards for Class D waters in any of the surface water samples.

The Phase II investigation conducted by EA consisted of: A record search to obtain information on site history; a site inspection and interviews to update and document current site conditions; field activities, including geophysical survey consisting of EM grid, resistivity sounding, and grid proton magnetometer survey; monitoring well installation (2 deep and 3 shallow wells); surveying of well casings; pump tests; and sampling of ground water for analysis of the Hazardous Substance List of inorganic parameters and organic compounds.

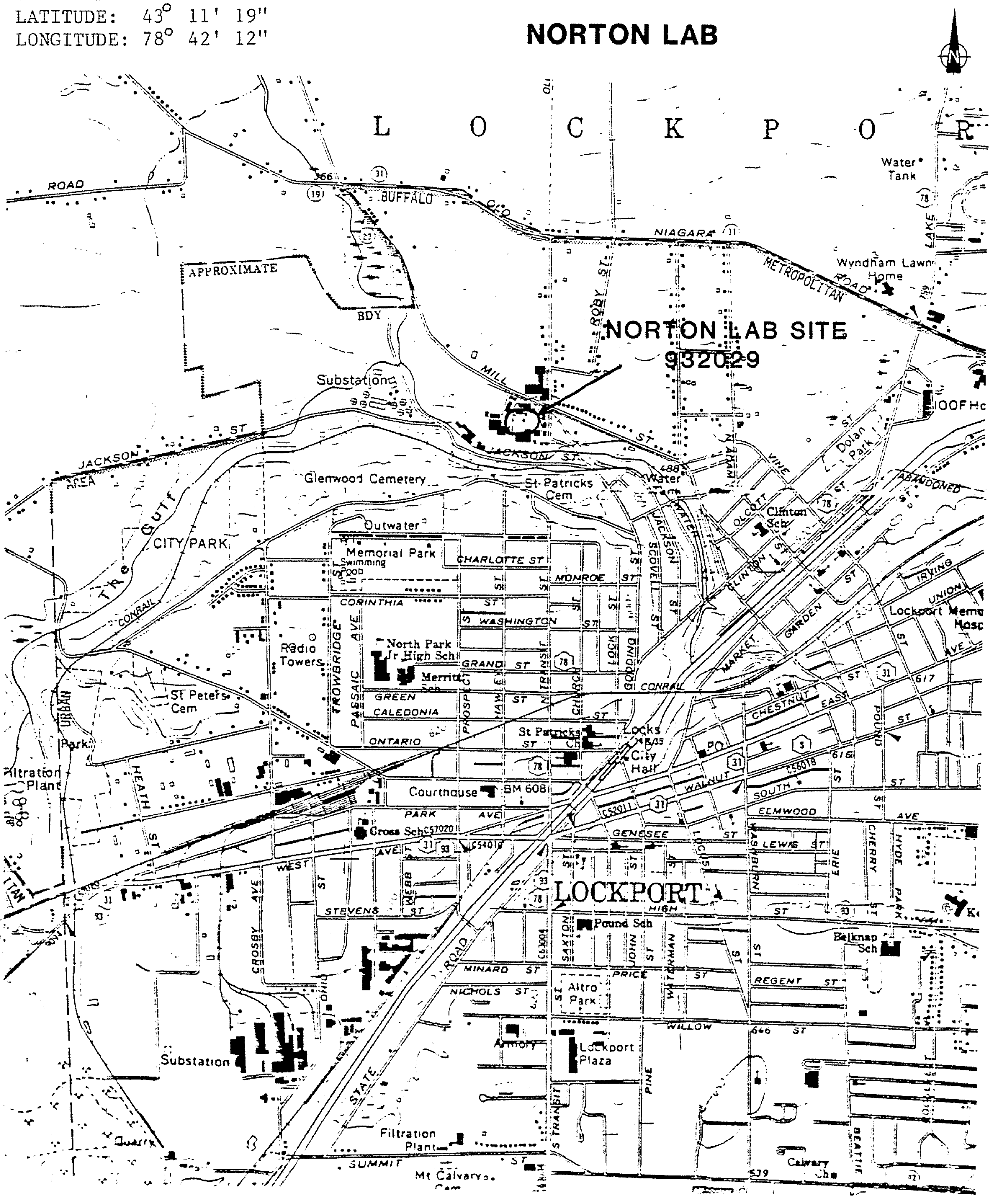
Analytical results of samples collected from the five Phase II monitoring wells indicate that the landfill is releasing iron, copper, and sodium to the ground water in the vicinity of the site.

The final HRS score for the site is as follows: Migration Score (S_M) = 5.64 [Ground-Water Route (S_{GW}) = 4.47, Surface Water Route (S_{SW}) = 8.68, and Air Route (S_A) = 0]; Direct Contact Score (S_{DC}) = 50.00; and Fire and Explosion Score (S_{FE}) = NA.

A preliminary evaluation of potential site remedial alternatives is presented in Chapter 6.

COORDINATES
LATITUDE: 43° 11' 19"
LONGITUDE: 78° 42' 12"

NORTON LAB



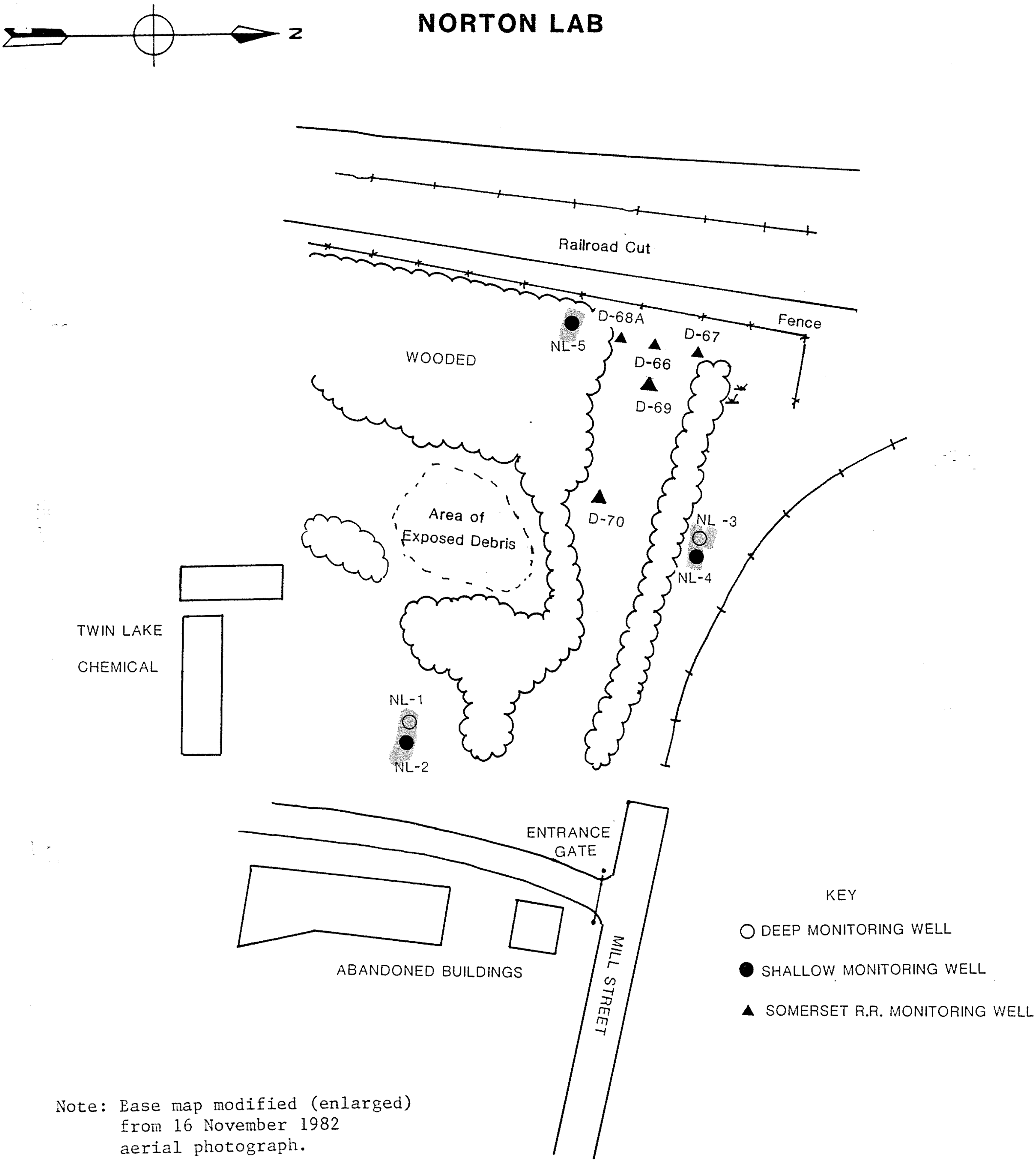
LOCKPORT QUAD
7.5 Minute Series
1976 Edition

0 2000 Feet

SCALE: 1 in = 2000 ft

Figure 1-1

NORTON LAB

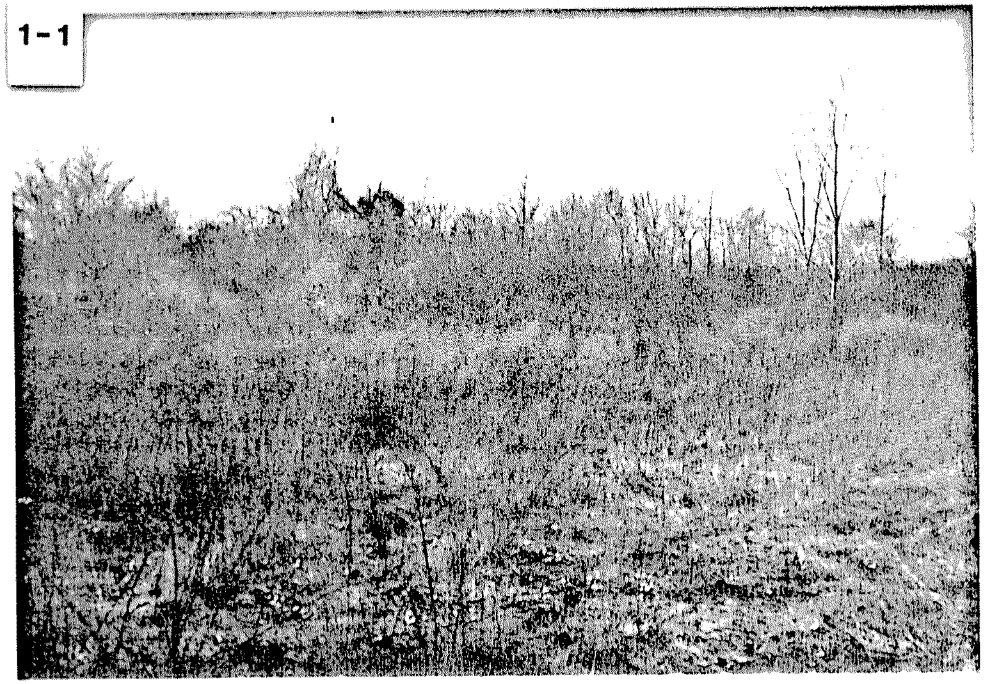


Note: Ease map modified (enlarged)
from 16 November 1982
aerial photograph.

Approximate Scale 1 in.= 150 ft

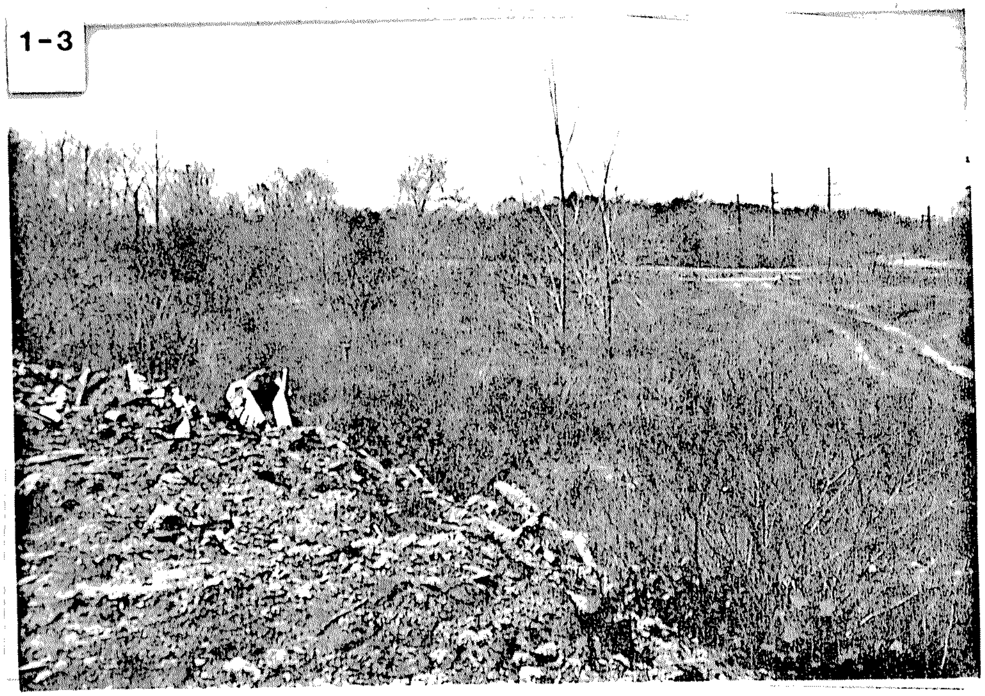
FIGURE 1-2

1-1



1-2

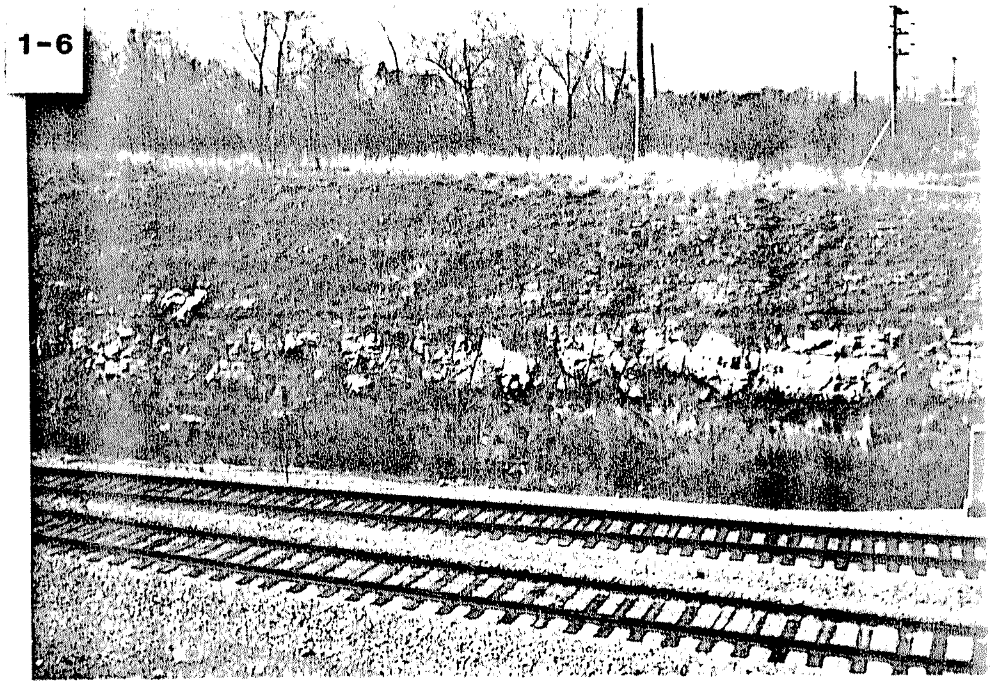
1-3



1-4

1-5

1-6



1-7

1-8

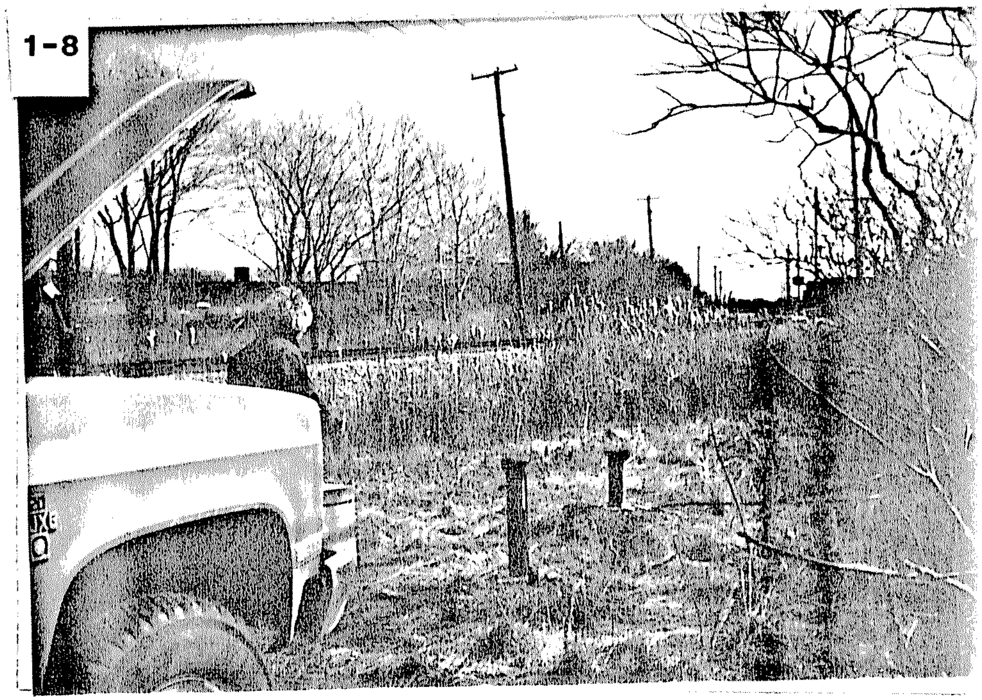


PHOTO LOG - NORTON LABS

Photo	Description
1-1, 1-2	Panoramic view west across northern portion of site. This portion of site is flat, grass-covered, and partially covered with trees.
1-3	View northwest across site from mound of exposed debris in central portion of site. (Phase I photo, 12 May 1983).
1-4	View west across top of mound, exposed debris (brick, asphalt, and sand). Small trees in background cover western portion of mound.
1-5	View south along western edge of site. Railroad cut under construction located right side of photo (Phase I photo, 12 May 1983).
1-6	Railroad cut west of site, bedrock exposed on rock cut face. Off-white rock in center is lower Grimsby formation.
1-7	Monitoring Wells Nl-1 and NL-2 in eastern portion of site. Buildings in background are no longer used.
1-8	Monitoring Wells NL-3 and NL-4 on northern edge of site.

2

2. PURPOSE

The objectives of the Phase II investigation of the Norton Lab site were to: (1) obtain available records on the site history from state, federal, county, and local agencies to update the previous Phase I report; (2) obtain additional information since the Phase I report on site topography, geology, local surface- and ground-water use, contamination assessments, and local demographics; (3) interview site owners, operators, and other groups or individuals knowledgeable of site operations; (4) conduct a site inspection to observe current conditions; (5) perform geophysical surveys at and around the site to evaluate the potential for and existence of ground-water contaminant plumes and stratigraphic information; (6) install test borings/monitoring wells and perform environmental sampling; and (7) prepare a Phase II report. The Phase II report includes a final Hazard Ranking System Score (HRS), an assessment of the available information, and recommendation for remedial work.

3

3. SCOPE OF WORK

3.1 RECORD SEARCH/DATA COMPILATION

A record search/data compilation and interviews were conducted as part of the Phase II investigation of the Norton Lab site. Appendix 1.3.1-1 contains a list of agencies and individuals contacted.

3.2 FIELD ACTIVITIES

3.2.1 Site Reconnaissance

EA Science and Technology conducted a site reconnaissance on 17 April 1985 to familiarize key project personnel with the site. During the site reconnaissance, visible waste and/or filled areas were located, tentative locations for test borings/observation wells and sampling were selected, accessibility was evaluated, and HNu measurements (upgradient and site-wide) were obtained to help the Safety Officer develop specific health and safety requirements for the field activities. No organic vapors were detected above background by the HNu at the site during the site reconnaissance. Photographs of the site were taken and significant features were noted on an aerial photograph (Scale: 1 in. = 200 ft), dated 16 November 1982 of the site.

3.2.2 Geophysical Survey

Geophysical surveys of the site were conducted by a 2-person EA field team on 31 May and 1 June 1985, and by Delta Geophysical, Inc. on 25 June 1985, under EA's supervision.

The purpose of the geophysical investigation was to non-destructively, accurately, and cost-effectively evaluate subsurface conditions at the site, including stratigraphy, depth to water, presence of buried drums, and potential contaminant plumes.

The existing site data (geology, area size, hydrogeology, etc.) were reviewed. Upon completion of the geophysical surveys, interpretation of the geophysical data was made prior to leaving the site. Monitoring wells were then located in accordance with anomalous zones and general hydrogeologic information.

The geophysical technique used first at the site was a gridded terrain conductivity (electromagnetic or EM) survey, using an EM-34 with 20-meter cable and effective depth of penetration of 45 and 90 ft below grade. The data gathered from this type of survey indicated zones of anomalous conductivity, potential subsurface contamination (plumes). The second technique used was resistivity. This method measures vertical changes in subsurface resistivities, providing for evaluation of depth to ground water, depth to rock, and general stratigraphy. Finally, a proton magnetometer was used to evaluate subsurface conditions for large concentrations of buried ferrous materials (Appendix 1.3.2-1, specific geophysical techniques, locations, and resultant interpreted anomalous zones).

3.2.3 Monitoring Well Installation

For the purpose of establishing ground-water flow direction and to document a release of contaminants to ground water at the site, five test borings/ monitoring wells were installed at the Norton Lab site on 8-14 August 1985 (Figure 3-1). Based on previous investigations, ground water was found in several zones beneath the site. To study the upper two ground water zones, three shallow wells (NL-2, NL-4, and NL-5) and two deeper bedrock wells (NL-1 and NL-3) were installed with a CME-75 truck-mounted drill rig. Drilling was performed by Drill & Test of Orchard Park, New York, under the supervision of an EA geologist.

Based on the previous investigations and the location of the railroad cut, ground-water flow direction was anticipated to be towards the northwest. Wells NL-1 and NL-2 (deep and shallow, respectively) were located approximately 8 ft adjacent to each other in a cluster fashion at an upgradient location, southeast of the filled area. Wells NL-3 and NL-4 (deep and shallow, respectively) were also located in a cluster fashion at a downgradient location, and within an anomalous zone as indicated by geophysical data. A single overburden well was located in the southwest corner of the site to establish ground-water flow direction and to monitor ground-water quality along the edge of the railroad cut.

The three shallow borings/monitoring wells were drilled using the hollow-stem auger (6-3/4 in. ID) drilling method in the unconsolidated material and air rotary drilling (4-1/2 in. OD steel drill bit) into rock. The two deep wells were drilled using hollow-stem auger (6-1/4 in. ID) drilling method in the unconsolidated material, air rotary drilling (4-1/2 in. OD steel drill bit), 5 ft into competent bedrock of the lower Grimsby Formation, to set 3-in. steel casing. A 2-15/16 in. open hole was then drilled through the casing to its final depth.

The boring logs and well schematics of the test borings/monitoring wells are shown in Figures 3-2 through 3-6. Grain-size analysis was performed on a representative soil sample collected from Well NL-5 during drilling. The grain-size curve is presented in Figure 3-7.

Development of the shallow wells was accomplished on 12-14 August 1985 using a centrifugal pump. All three overburden wells were pumped dry 2-3 times. The water discharged was maroon-colored and cloudy, but cleared up somewhat with the second or third pumping.

The deep wells were developed with an air compressor. Both rock wells were blown dry, and the surging was repeated several times. The water discharged was slightly grey and cloudy but cleared up after repeated surging/pumping with compressed air.

EA surveyed the newly installed wells at the Norton Lab site on 7 October 1985 using a Kern Swiss GKOA surveying instrument and surveying rod. The upgradient Well NL-1 was arbitrarily designated as having a top-of-steel elevation of 100 ft. On 7 March 1986, relative elevations for three of Somerset Railroad's onsite monitoring wells were surveyed to the Phase II investigation datum established at well NL-1 and water level measurements were taken (Table 3-1).

In-well pumping tests were conducted at the Norton Lab site on 6 and 7 October 1985. Based on the pump test data, drawdown and recovery for each well were plotted on a graph (Figures 3-8 through 3-17). A detailed description of monitoring well installation and testing procedures is presented in Appendix 1.3.2-2.

3.2.4 Sampling

Sampling of ground water was performed in four of the five newly installed wells (NL-1, NL-2, NL-4, and NL-5) at the Norton Lab site on 12 and 13 November 1985. Prior to purging and sampling of wells, static water levels were measured and recorded. Water was purged from each well using a cleaned Keck (Model SP-84) submersible pump. All wells pumped dry before four borehole volumes were purged. Each well was allowed to recharge 15 minutes and pumped dry a second time except NL-3 which has a very slow recharge rate. Purge volumes of the wells were as follows: NL-1 - 7 gals, NL-2 - 3 gals, NL-3 - 1.5 gals, NL-4 - 5 gals, and NL-5 - 10 gals. Wells were allowed to recharge overnight. Ground-water samples were then collected using an individual clean 1-1/2-in. diameter Teflon bailer for each well. Sample containers were filled, labeled, and kept on ice in coolers. Field measurements for pH and conductivity were performed on all ground-water samples. Coolers containing sample bottles were shipped with a chain-of-custody form via overnight express delivery to EA's chemistry laboratory in Baltimore, Maryland.

A ground-water sample was not obtained from Well NL-3 (downgradient) on 13 November 1985. Due to slow recharge at this well (>48 hours) a sufficient sample quantity could not be obtained.

Wells NL-1 and NL-3 were purged again on 25 February 1986 and after allowing NL-3 to recharge for 48 hours, there was not a sufficient volume of water to fill all of the sample bottles. The water level in NL-3 was measured again on 5 March 1986 and it was determined that the well had still not recharged enough to fill the full array of sample bottles. On 2 April 1986, Well NL-1 was purged again and ground-water samples were obtained from Wells NL-1 and NL-3.

Due to missed holding times, the wells were resampled and analyzed for pesticides and PCB of the Hazardous Substances List. The wells were purged on 10 March 1987, Wells NL-1, NL-2, NL-3, and NL-5 pumped dry before four borehole volumes were purged. Greater than four borehole volumes (24 gals) were purged from Well NL-4. Due to the slow recharge rate of NL-3, samples could not be collected the following day. On 31 March 1987, Wells NL-1, NL-2, NL-4, and NL-5 were repurged. All of the wells were then sampled.

A detailed description of sampling procedures is provided in Appendix 1.3.2-3. EA's field records of well purging and sampling are presented as Figures 3-18 through 3-31.

TABLE 3-1 SUMMARY OF PHASE II MONITORING WELL DATA

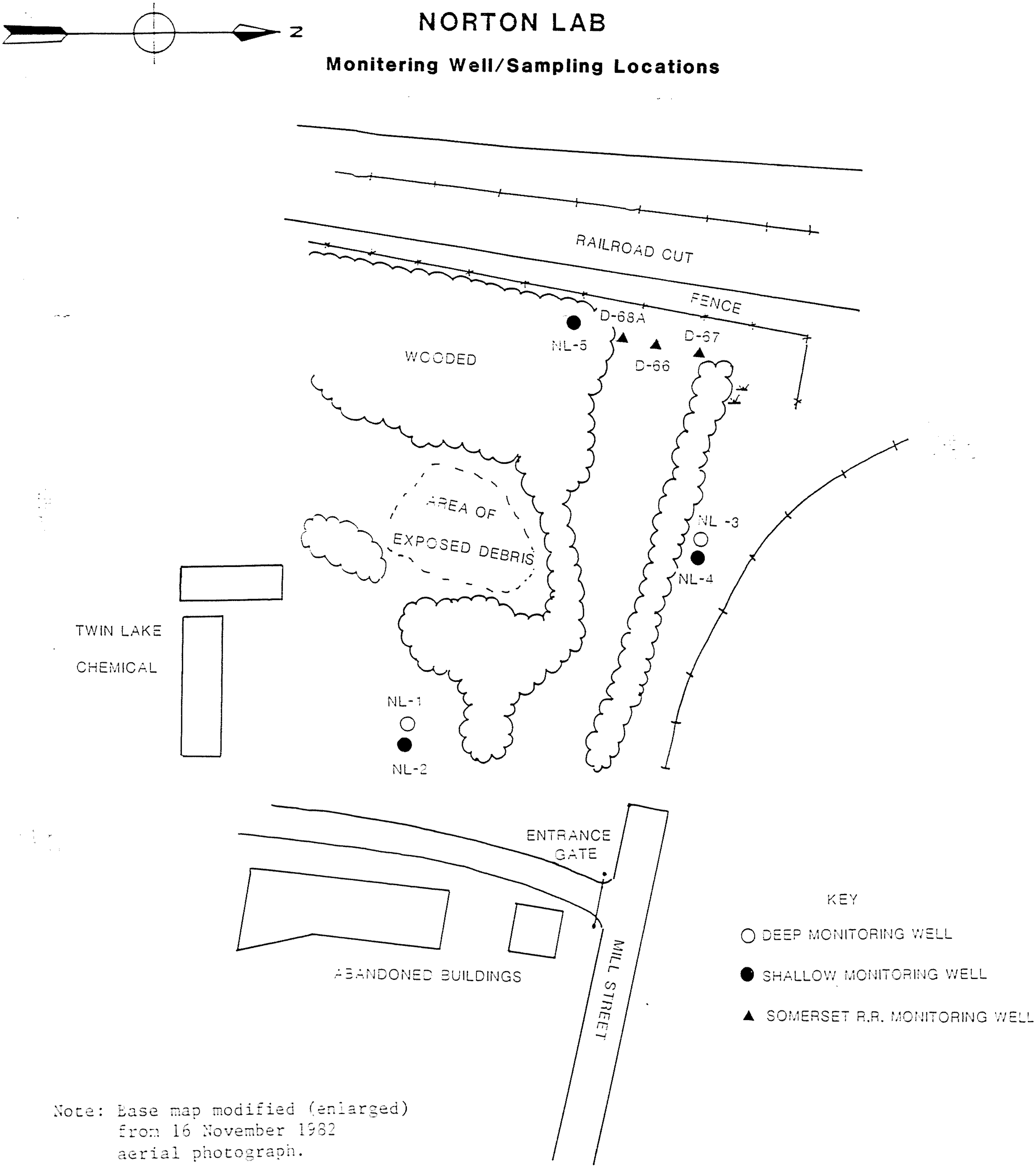
Well No.	Stick-Up (Feet Above Ground Surface)	Tot. Well Depth (Feet Below Ground Surface)	Elevation of MP**	Date	Ground Water: Depth Below MP (feet)	Ground Water: Elevation (feet)**
NL-1	1.87	52.87	100.00	11/12/85	34.22	65.78
NL-1	1.87	52.87	100.00	03/10/87	35.76	64.24
NL-2	1.85	16.85	100.15	11/12/85	10.29	89.86
NL-2	1.85	16.85	100.15	03/10/87	6.76	93.39
NL-3	1.51	48.51	89.71	11/12/85	44.07	45.64
NL-3	1.51	48.51	89.71	3/10/87	45.20	44.51
NL-4	1.76	15.76	90.04	11/12/85	7.70	82.34
NL-4	1.76	15.76	90.04	3/10/87	6.40	83.64
NL-5	1.98	24.98	93.85	11/12/85	17.40	76.45
NL-5	1.98	24.98	93.85	3/10/87	16.75	77.10
D-66	2.20	40.20	91.97	03/07/86	34.40	57.57
D-67	1.70	101.70	91.59	03/07/86	53.98	37.61
D-68A	1.65	59.65	93.31	03/07/86	54.49	38.82

* MP = measuring point (top of steel).

** Feet above or below an assumed datum of 100 feet, established at NL-1 (measured at top of steel in NL-1, NL-3, D-67, and D-68A and top of PVC in NL-2, NL-4, and NL-5).

NORTON LAB

Monitering Well/Sampling Locations

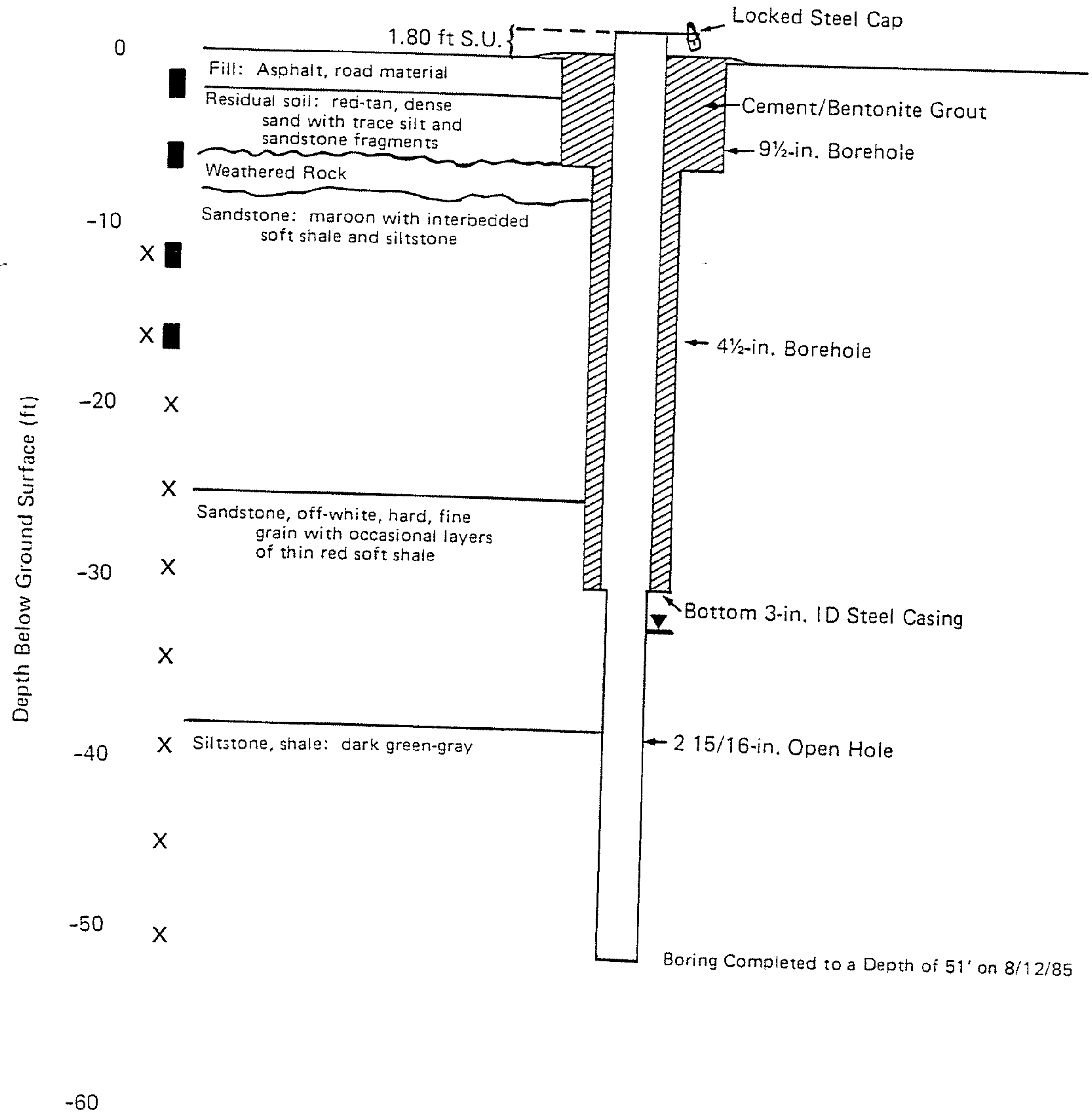


Note: Base map modified (enlarged)
from 16 November 1982
aerial photograph.

Approximate Scale 1 in.= 150 ft

Figure 3-1

WELL NL-1



KEY

■ Soil Interval Sampled by Standard Split Spoon

▼ Static Water Level Measurement on 11/12/85 and 3/10/87

X Cuttings Sample Collected

Figure 3-2.

WELL NL-2

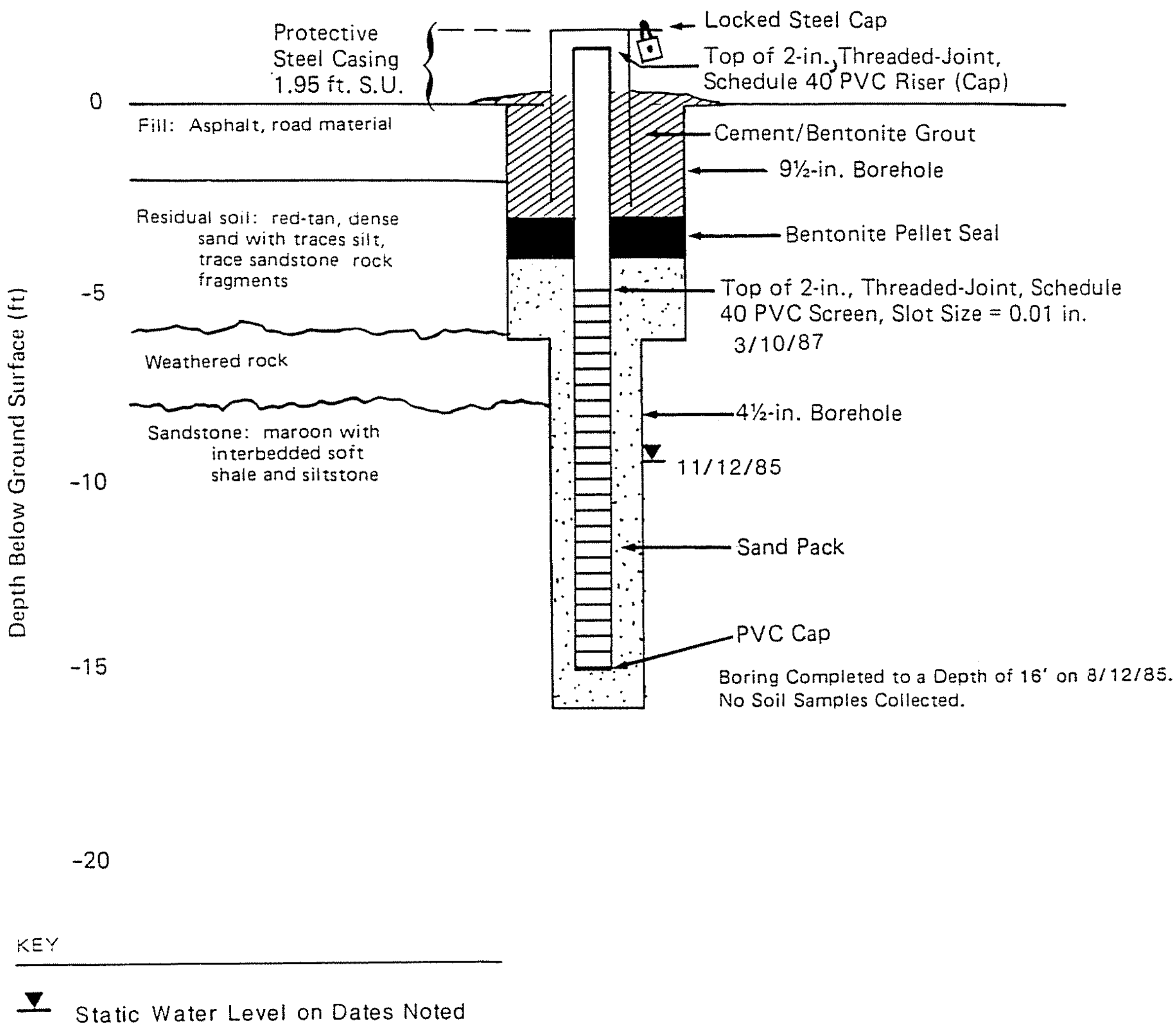


Figure 3-3.

WELL NL-3

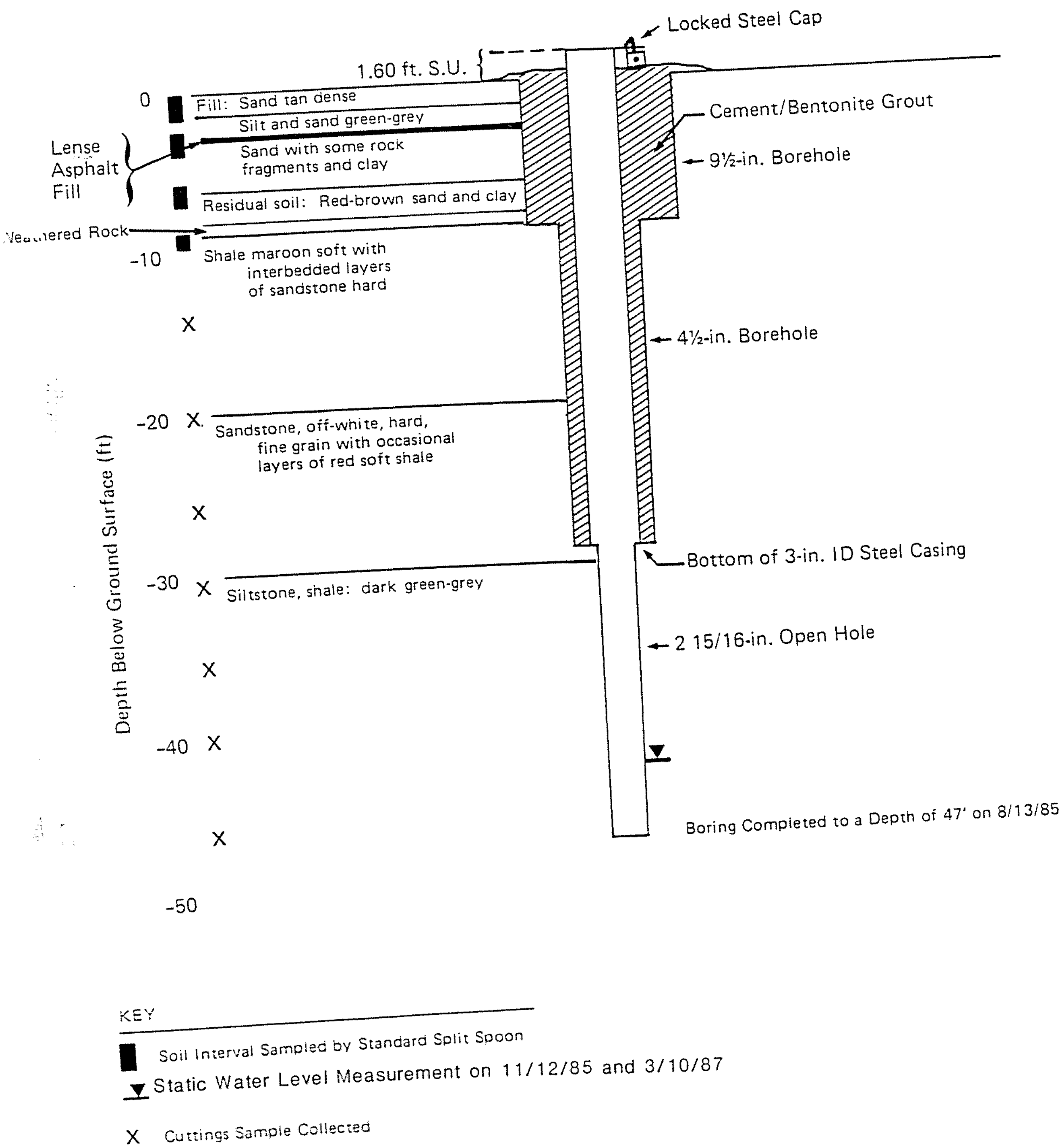
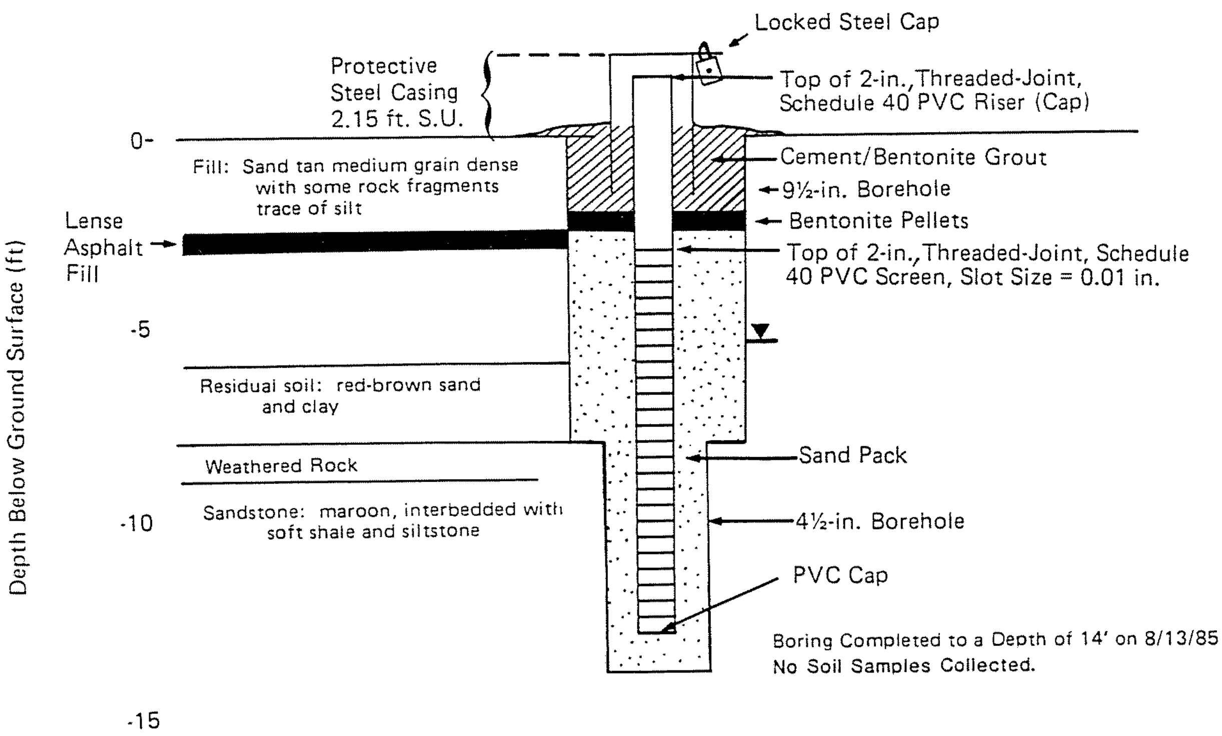


Figure 3-4.

WELL NL-4

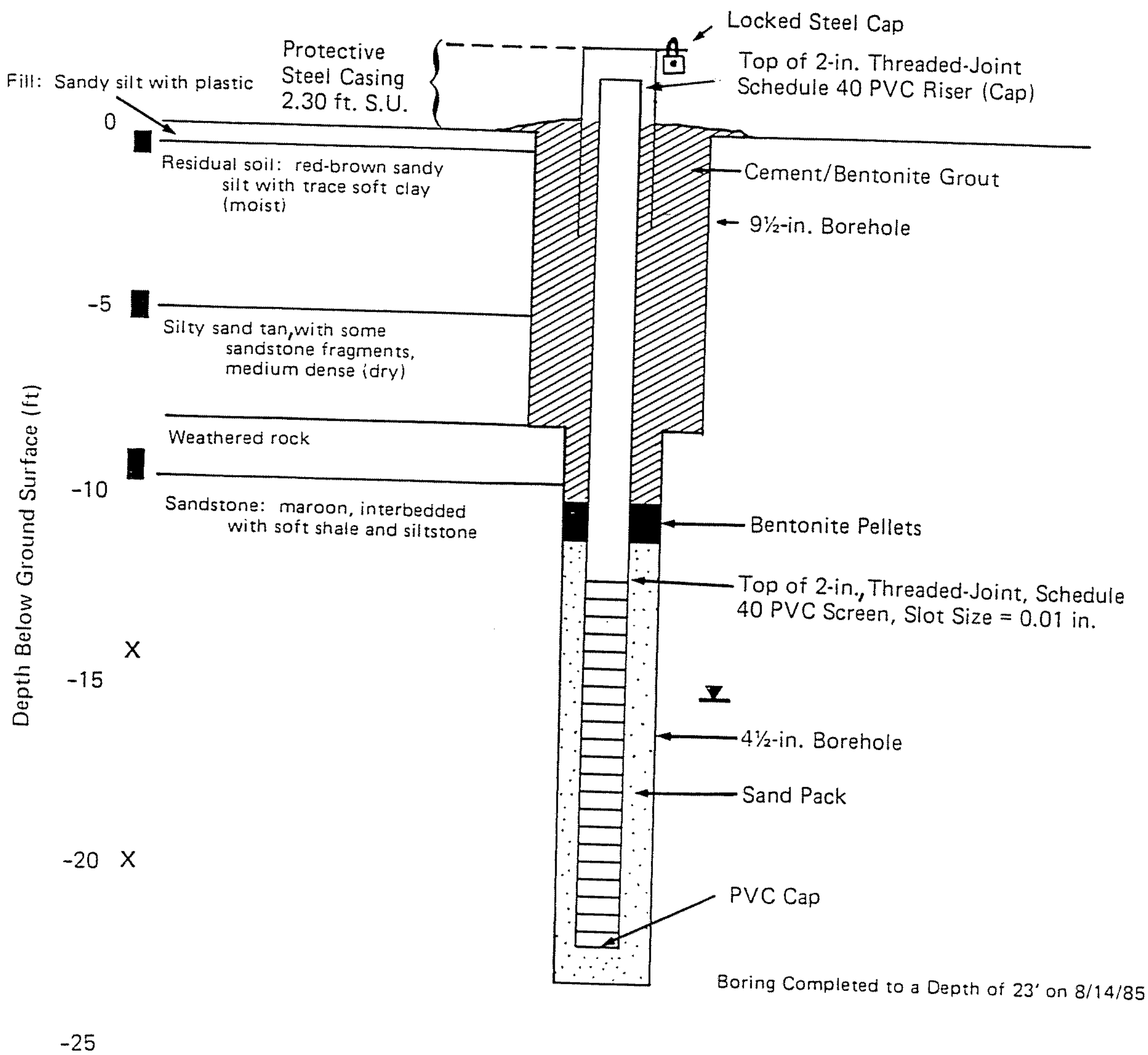


KEY

▼ Static Water Level Measurement on11/12/85 and 3/10/87

Figure 3-5.

WELL NL-5



KEY

■ Soil Interval Sampled by Standard Split Spoon

▼ Static Water Level Measurement on 11/12/85 and 3/10/87

X Cuttings Sample Collected

Figure 3-6.

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

GRAIN SIZE DISTRIBUTION CURVE

Project NORTON LAB

Boring No. NL-5 Sample No. 1

Depth ______ Elevation ______

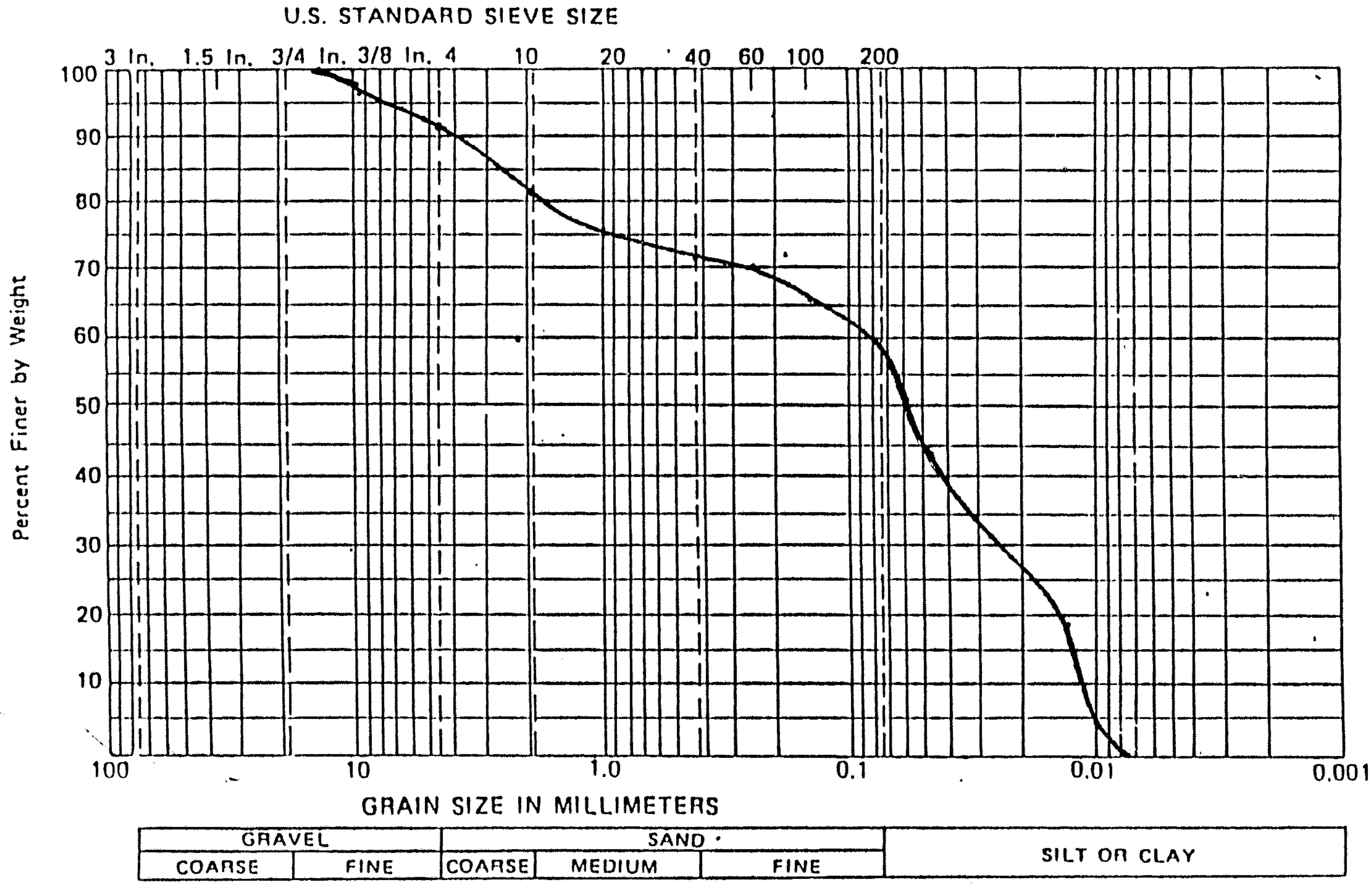


FIGURE 3-7

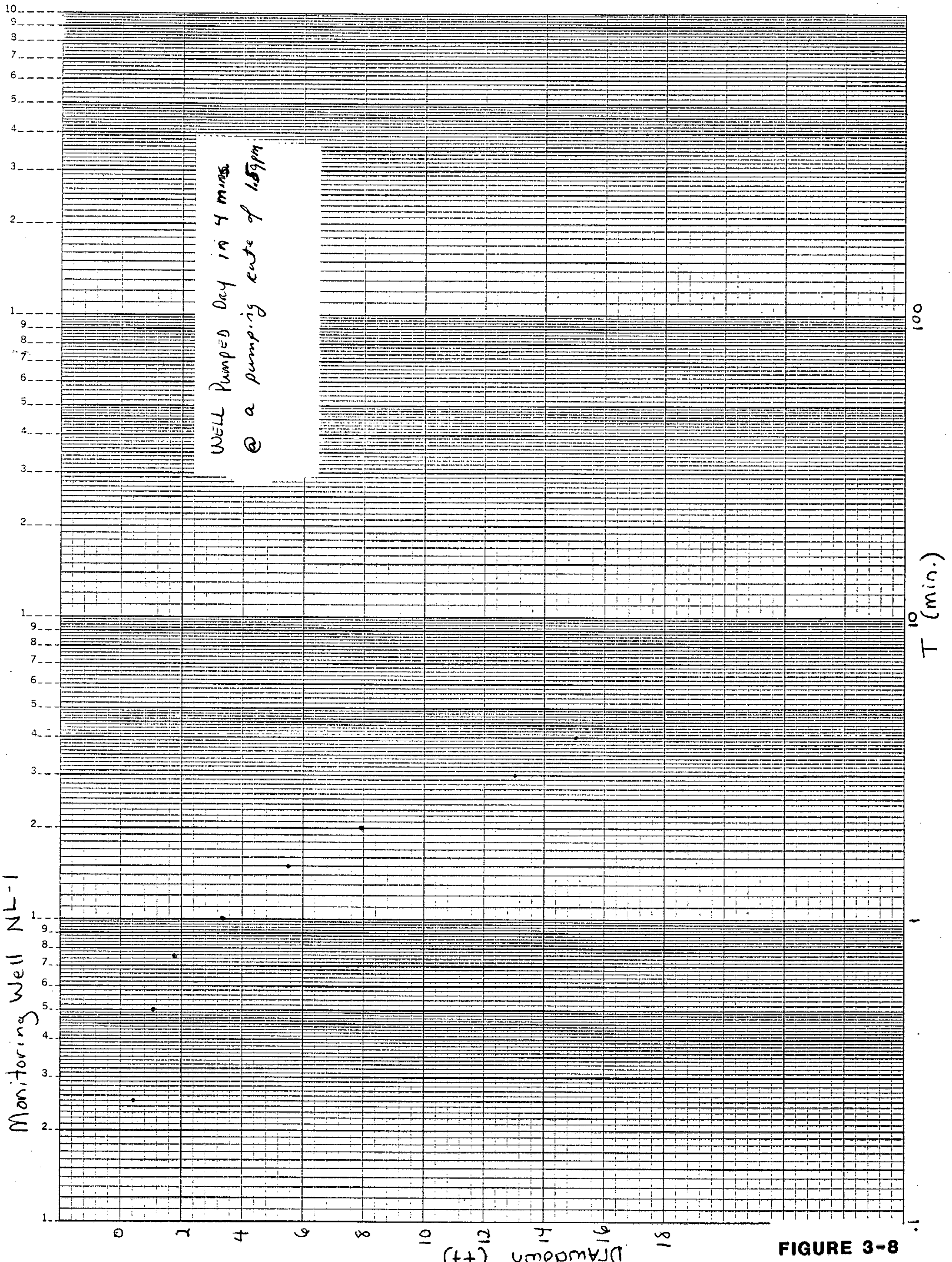

Monitoring Well NL-1
WELL Pumped Dry in 4 mins
@ a pumping rate of 1.5gpm
T (min.)
100
10
1
Drawdown (ft)
0
2
4
6
8
10
12
14
16
18

FIGURE 3-8

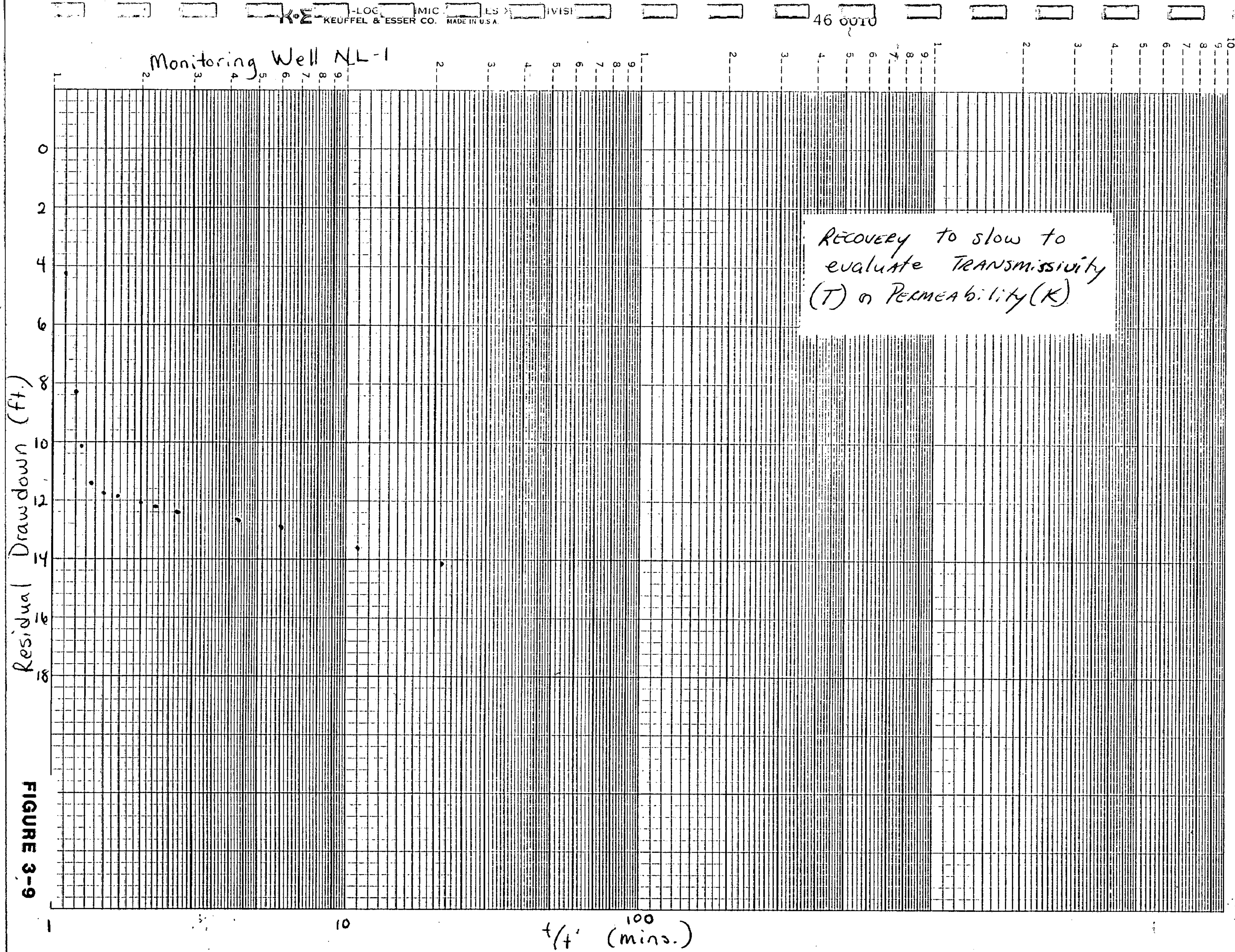

Monitoring Well NL-1
RECOVERY to slow to evaluate TRANSMISSIVITY (T) or PERMEABILITY (K)
Residual Drawdown (ft.)
0
2
4
6
8
10
12
14
16
18
1
10
100
t/t' (mins.)
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 6010

FIGURE 3-9

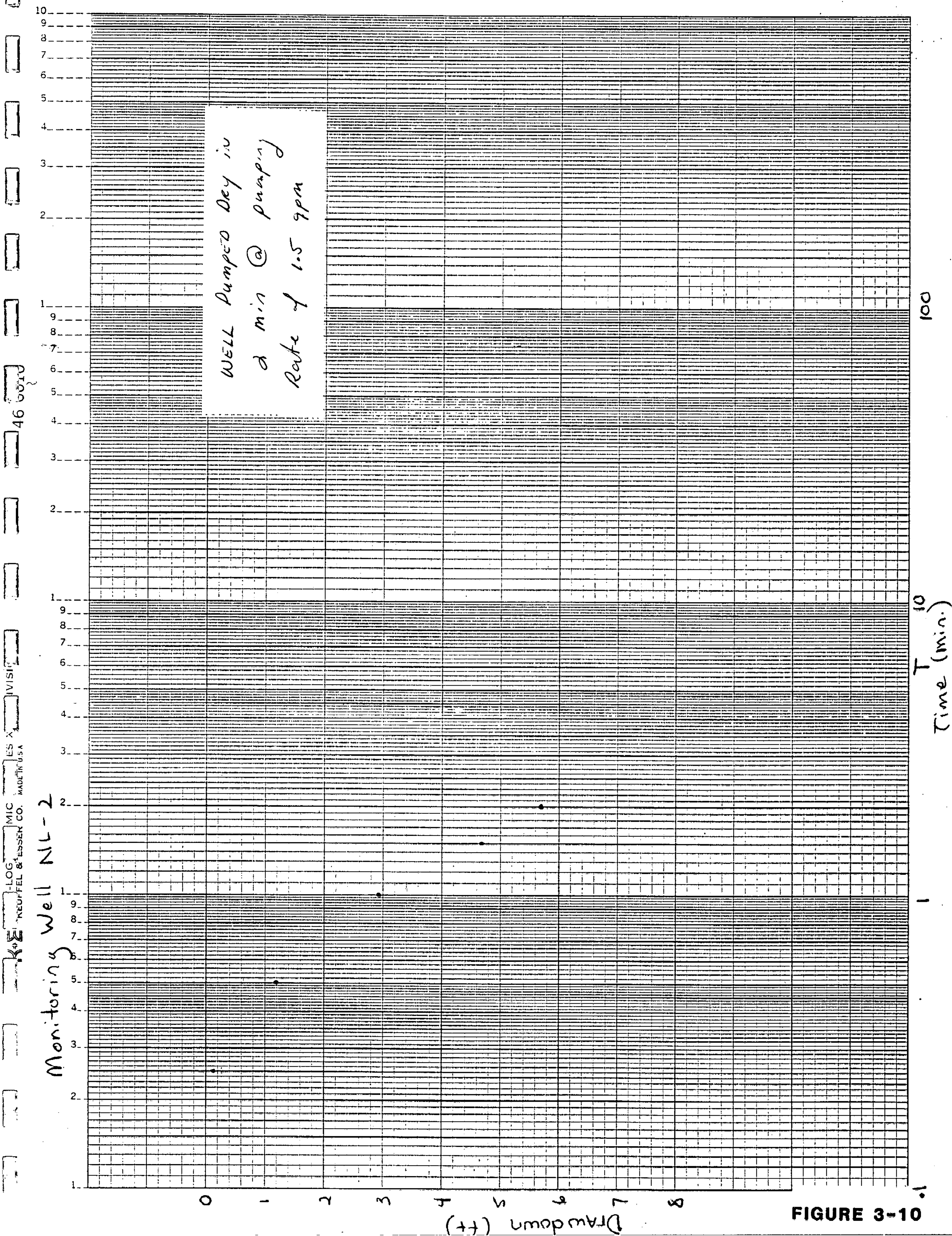

Monitoring Well NL-2
WELL Pumped Dry in
2 min @ pumping
Rate of 1.5 gpm
Time (min.)
1
10
100
Drawdown (ft)
0
1
2
3
4
5
6
7
8

FIGURE 3-10

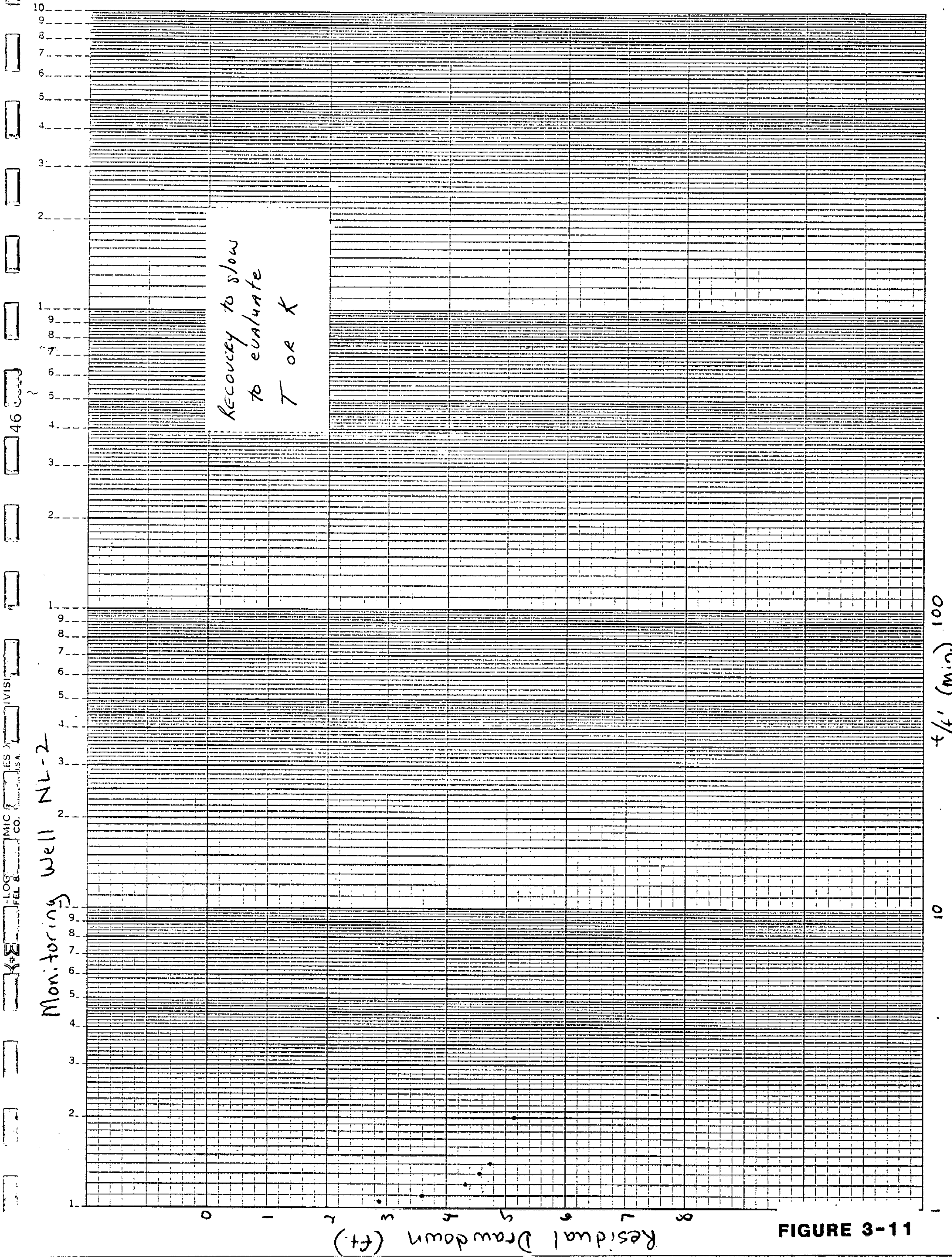

Monitoring Well NL-2
Recovery to slow to evaluate T or K
t/t' (min)
10
100
Residual Drawdown (ft.)
0
1
2
3
4
5
6
7
8

FIGURE 3-11

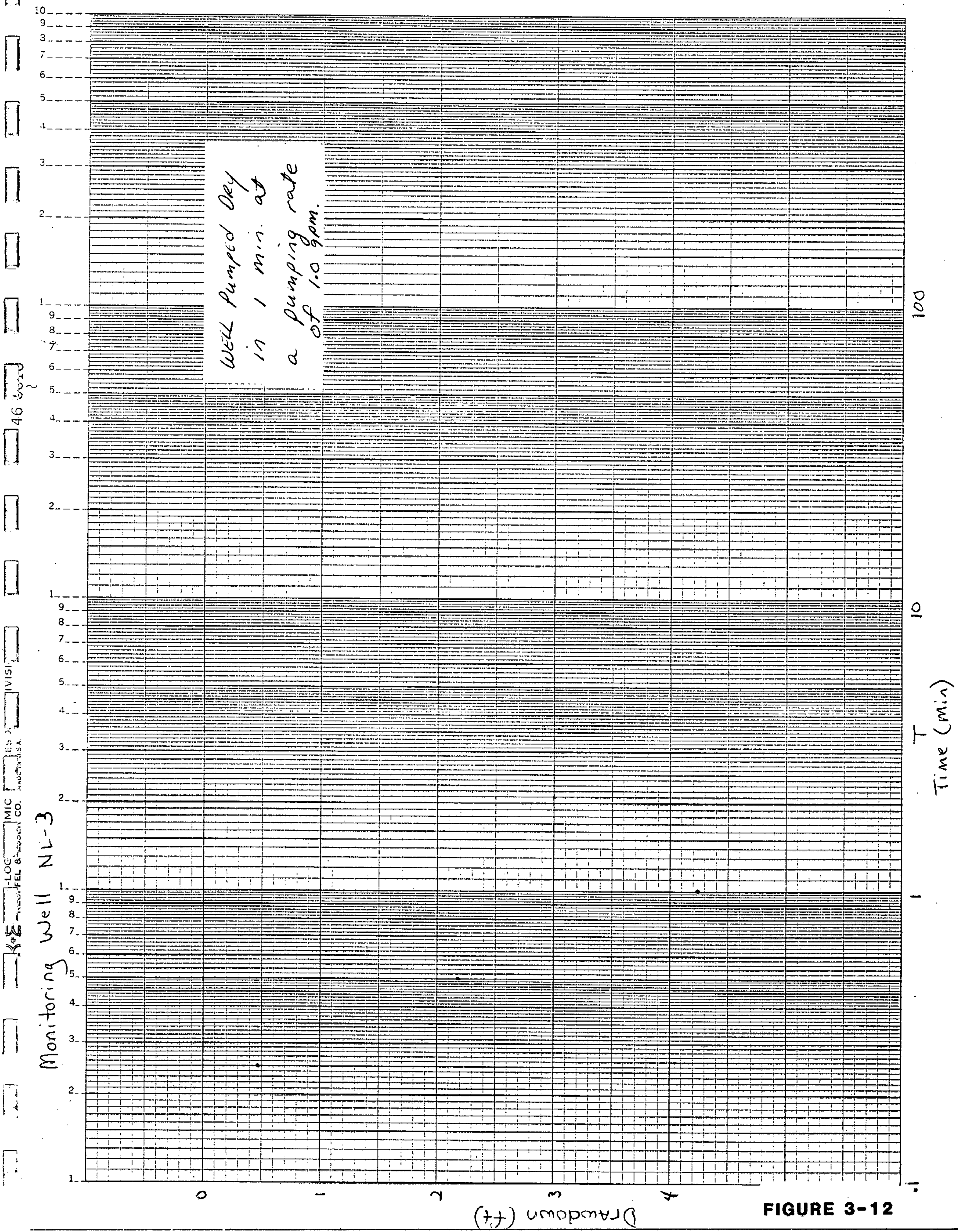
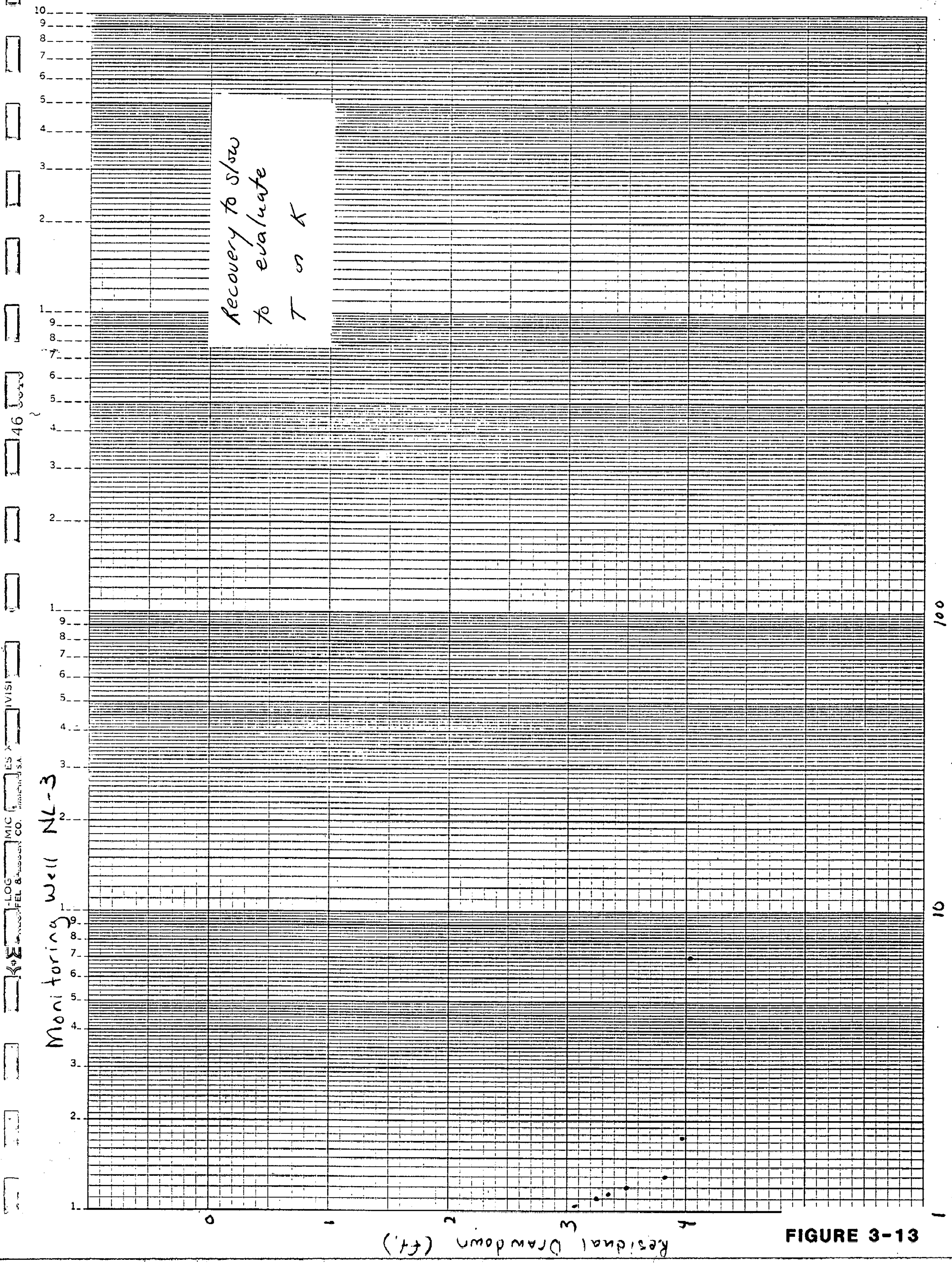

Monitoring Well NL-3
Well Pumped Dry in 1 min. at a pumping rate of 1.0 gpm.
T
Time (min)
100
10
1
Drawdown (ft)
0
1
2
3
4

FIGURE 3-12



Monitoring Well NL-3
Recovery to s/sw to evaluate T & K
t/t' (min.)
Residual Drawdown (ft.)

FIGURE 3-13

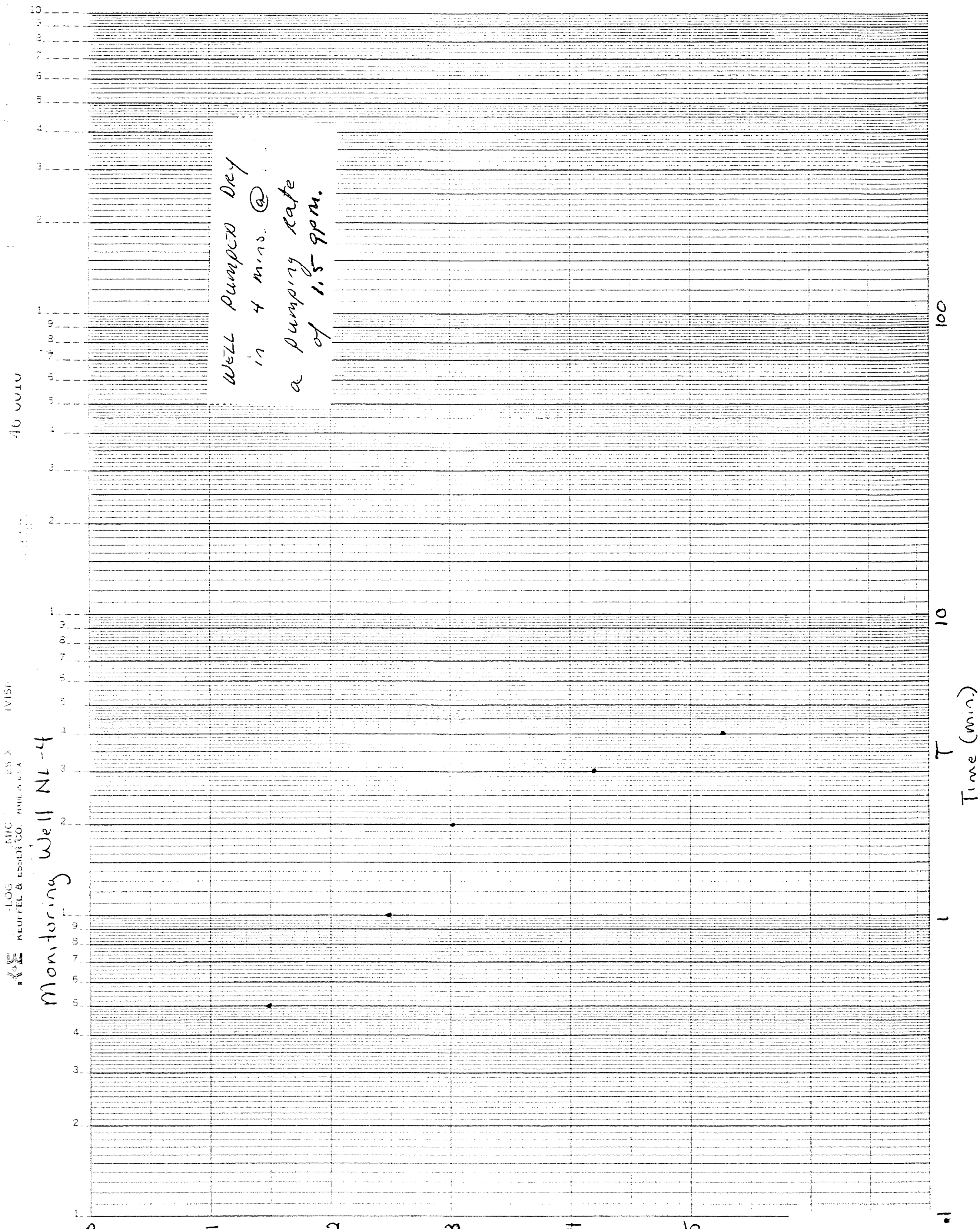

Monitoring Well NL-4
WELL PUMPED DRY in 4 mins. @ a pumping rate of 1.5 gpm.
Time (min)
DRAWDOWN (Ft)
0
1
2
3
4
5
.1
1
10
100
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 6010

FIGURE 3-14

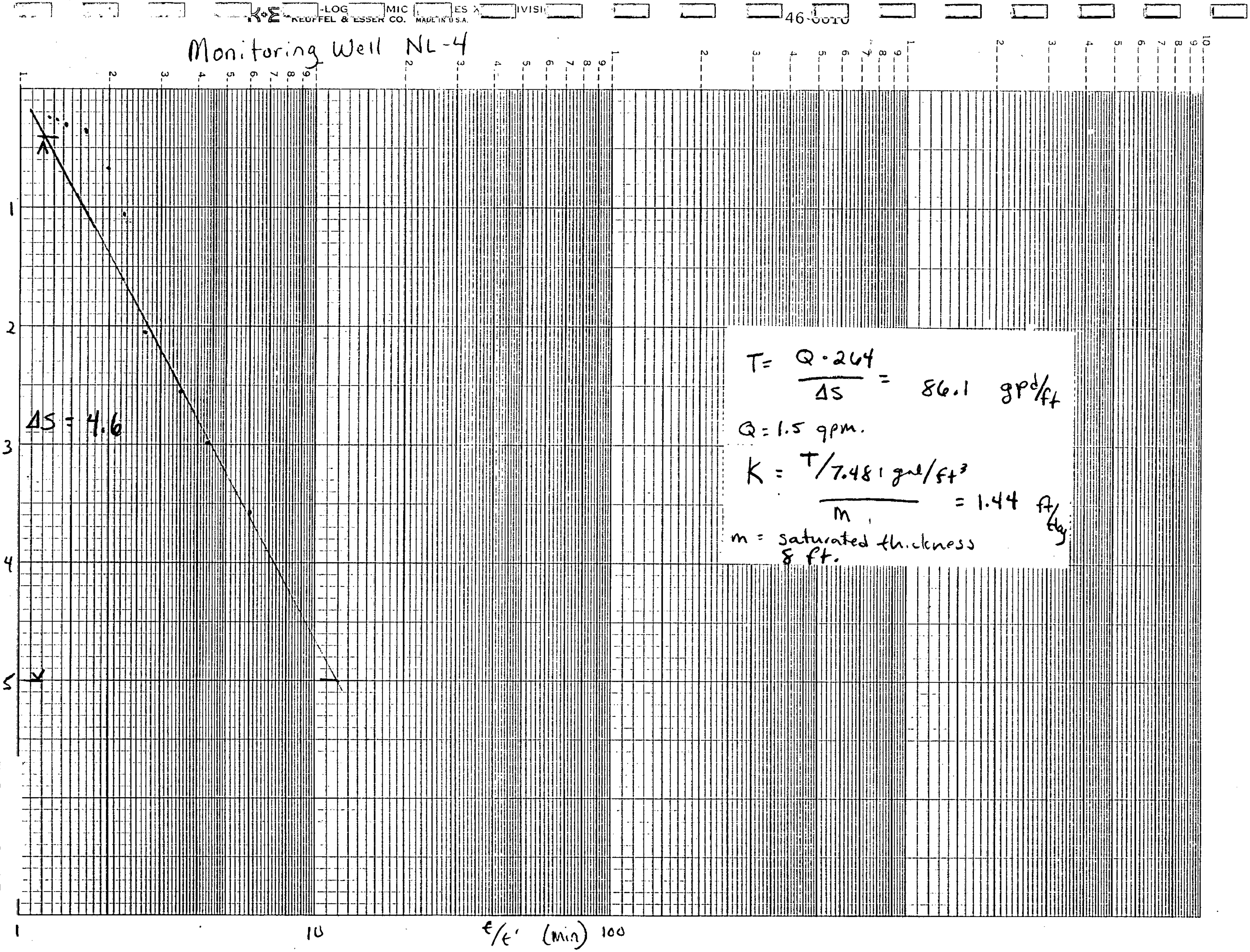

Monitoring Well NL-4
Residual Drawdown (ft)
t/t' (min)
ΔS = 4.6
T = Q·264 / ΔS = 86.1 gpd/ft
Q = 1.5 gpm.
K = (T / 7.481 gal/ft³) / m = 1.44 ft/day
m = saturated thickness 8 ft.
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 6010

FIGURE 3-15

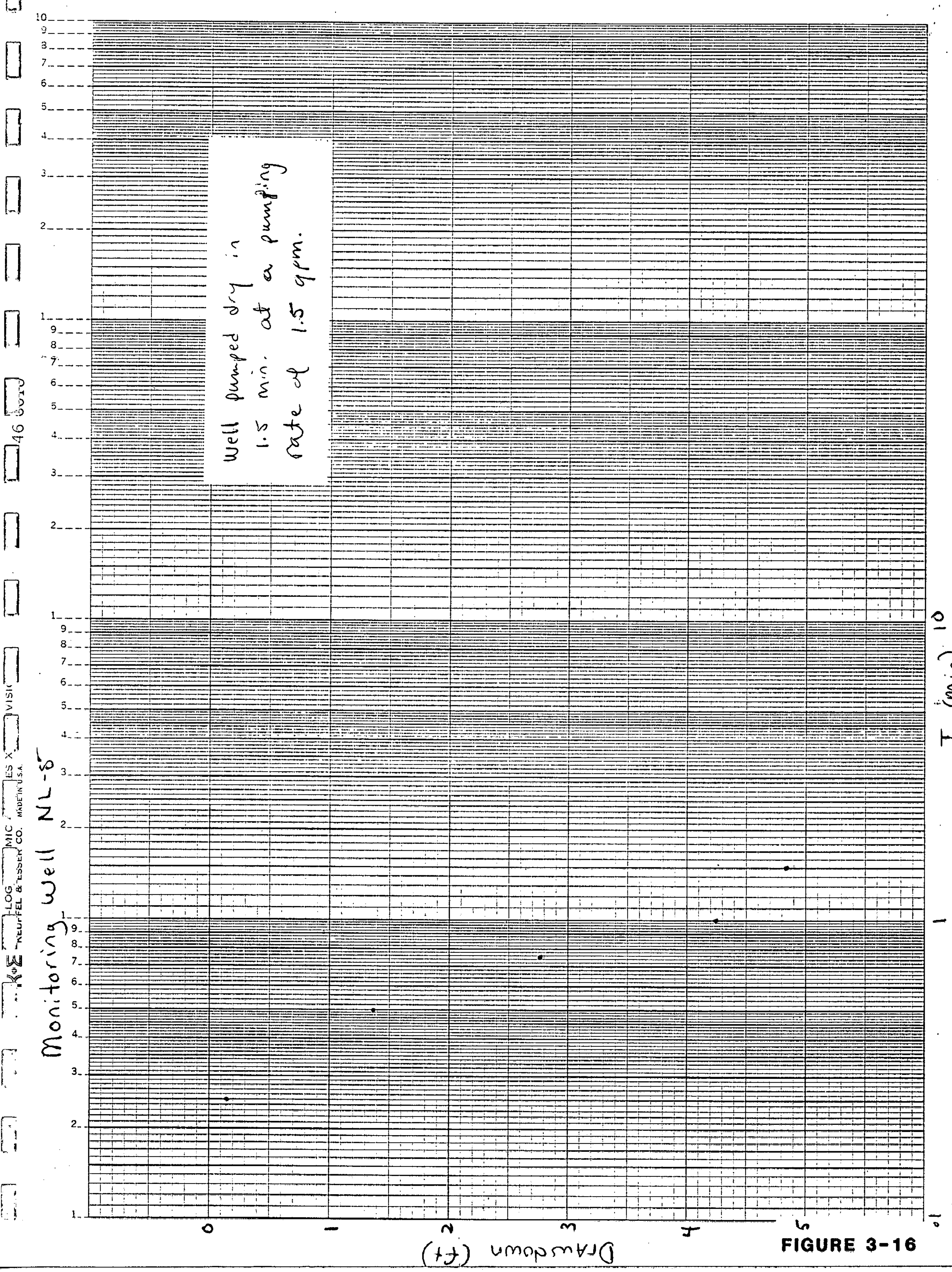

Monitoring Well NL-5
Well pumped dry in 1.5 min. at a pumping rate of 1.5 gpm.
T (min)
Drawdown (ft)
0
1
2
3
4
5
10
1
.1

FIGURE 3-16

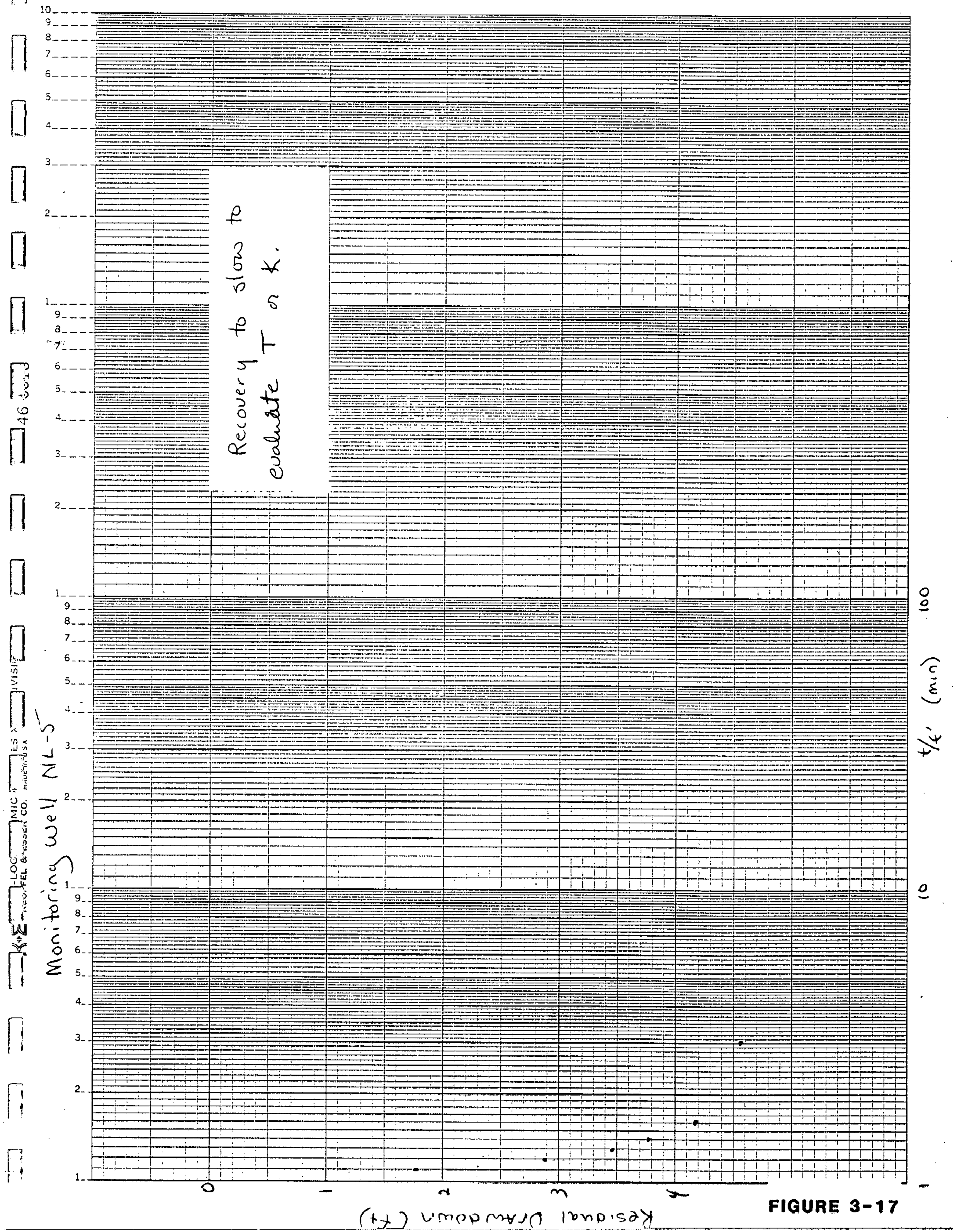

Monitoring Well NL-5
Recovery to slow to evaluate T or K.
t/t' (min)
10
100
Residual Drawdown (ft)
0
1
2
3
4

FIGURE 3-17

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Norton Labs

Well No: NL-1 Gauge Date: 11-12-85 Time: 1000

Weather: Cloudy, Drizzle ~40°F

Well Condition:

Well Diameter (inches): 2 15/16" dia. open hole

Odor (describe): None

Sounding Method: water level indicator Measurement Reference: Top of Steel

Stick up/down (ft): 1.87'

(1) Well Depth (ft): 52.91' Purge Date: 11-12-85 Time: 1010

(2) Depth to Liquid (ft): — Purge Method: 2" Submersible pump

(3) Depth to Water (ft): 34.22' Purge Rate (gpm): ~1 gpm

(4) Liquid Depth [(1)-(2)]: 18.69 Purge Time (min): 7

1 Borehole

(5) Liquid Volume [(4)xF] (gal): 6.58 Purge Volume (gal): 7 gals.

x4 = 26.3

Did Well Pump Dry? Describe: Well pumped dry, After 15 min. well pumped dry Again

Samplers: JWK & CRG

Sampling Date: 11-13-85 Time: 0830 hrs.

Sample Type: Groundwater (GRAB) Split? No With Whom:

Comments and Observations: pH 5.47 Spec. Cond. 750

FIGURE 3-18

* Conversion factor (F) = .3522 gal/ft.

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Norton Labs

Well No: ~~[illegible]~~ NL-2 Gauge Date: 11-12-85 Time: ______

Weather: Cloudy, Drizzle ~40°F

Well Condition: ______

Well Diameter (inches): 2" dia PVC well in 6 3/4" dia borehole

Odor (describe): ______

Sounding Method: water level indicator Measurement Reference: Top of PVC

Stick up/down (ft): 1.96 / .11' PVC stickup 1.85'

(1) Well Depth (ft): 17.85' Purge Date: 11-12-85 Time: 1045

(2) Depth to Liquid (ft): 10.29' Purge Method: 2" submersible pump

(3) Depth to Water (ft): – Purge Rate (gpm): 1.5 gpm

(4) Liquid Depth [(1)-(2)]: 7.56 Purge Time (min): ______

* (5) / borehole Liquid Volume [(4)xF] (gal): 4.54 Purge Volume (gal): 3

x 4 = 18.2

Did Well Pump Dry? Describe: Yes, well pumped dry quickly, after 15 min. pumped dry again.

Samplers: JWK & CRG

Sampling Date: 11-13-85 Time: 0900 hrs

Sample Type: Ground-water GRAB Split? No With Whom: ______

Comments and Observations: pH 6.41 Specific cond. 500

* Conversion factor (F): (.1632 gal/ft x ___ ft) + (.4385 gal/ft x ___ ft) **FIGURE 3-19**

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Norton LAB

Well No: NL-3 Gauge Date: 11-12-85 Time: ______

Weather: Cloudy, drizzle ~ 40°F

Well Condition: ______

Well Diameter (inches): 2 15/16" dia. open hole

Odor (describe): ______

Sounding Method: water level indicator Measurement Reference: Top of Steel

Stick up/down (ft): 1.51'

(1) Well Depth (ft): 48.51' Purge Date: 11-12-85 Time: 1300 hrs.

(2) Depth to Liquid (ft): – Purge Method: 2" Submersible pump

(3) Depth to Water (ft): 44.07 Purge Rate (gpm): 1 gpm

(4) Liquid Depth [(1)-(2)]: 4.44 Purge Time (min): ______

1 Borehole
* (5) ✓ Liquid Volume [(4)xF] (gal): 1.56 Purge Volume (gal): 1.5 gal.
x4 = 6.25

Did Well Pump Dry? Describe: Yes well pumped dry quickly not a good recharge rate. Could not pump twice.

Samplers: ______

Sampling Date: ______ Time: ______

Sample Type: ______ Split? ______ With Whom: ______

Comments and Observations: Unable to collect sample 11-12-85 well did not yield enough to fill bottles

* Conversion Factor (F) = .3522 gal/ft.

FIGURE 3-20

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Norton LAB

Well No: NL-4 Gauge Date: 11-12-85 Time:

Weather: Cloudy, drizzle ~40°F

Well Condition:

Well Diameter (inches): 2" PVC well in 6 3/4" dia. borehole

Odor (describe):

Sounding Method: Water level indicator Measurement Reference: Top of PVC

Stick up/down (ft): 1.76'

(1) Well Depth (ft): 15.76' Purge Date: 11-12-85 Time: 1340

(2) Depth to Liquid (ft): - Purge Method: 2" submersible pump

(3) Depth to Water (ft): 7.70' Purge Rate (gpm): 1.5 ~~gal~~ gpm

(4) Liquid Depth [(1)-(2)]: 8.06' Purge Time (min):

*(5) Borehole Liquid Volume [(4)xF] (gal): 4.84 x 4 = 19.4 Purge Volume (gal): 5 gal

Did Well Pump Dry? Describe: Yes, well pumped dry quickly, Allow 15 min for recovery and pumped again.

Samplers: JWK & CRG

Sampling Date: 11-13-85 Time: 1100 hrs.

Sample Type: Groundwater Split? No. With Whom:

Comments and Observations: pH 6.54 spec. cond. 345

FIGURE 3-21

* Conversion factor (F): (.1632 gal/ft x __ ft) + (.4385 gal/ft x __ ft)

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Norton Lab

Well No: NL-5 Gauge Date: 11-12-85 Time: ______

Weather: Cloudy, drizzle ~40°F

Well Condition: ______

Well Diameter (inches): 2" PVC well in 6¾" borehole

Odor (describe): ______

Sounding Method: water level indicator Measurement Reference: Top of PVC

Stick up/down (ft): 1.98'

(1) Well Depth (ft): 24.98' Purge Date: 11-12-85 Time: 1430

(2) Depth to Liquid (ft): - Purge Method: 2" submersible pump

(3) Depth to Water (ft): 17.40' Purge Rate (gpm): 1.5 gpm

(4) Liquid Depth [(1)-(2)]: 7.58 Purge Time (min): ______

*(5) / borehole Liquid Volume [(4)xF] (gal): 4.56 x4 = 18.2 Purge Volume (gal): 10 gal.

Did Well Pump Dry? Describe: Well was pumped dry twice.

Samplers: JWK & CRG

Sampling Date: 11-13-85 Time: 1150 hrs.

Sample Type: Groundwater Grab Split? ______ With Whom: ______

Comments and Observations: pH 6.32 Spec. Cond. 625

* Conversion factor(F): (.1632 gal/ft x — ft) + (.4385 gal/ft x — ft)

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Norton LABS

Well No: NL-1 Gauge Date: 2-25-86 Time: ______

Weather: Sunny, clear, 20°F

Well Condition: Good, locked no signs of tampering

Well Diameter (inches): 3 15/16" dia. open hole

Odor (describe): None

Sounding Method: Water Level indicator Measurement Reference: Top of Steel

Stick up/down (ft): 1.87'

(1) Well Depth (ft): 52.91' Purge Date: 2/25/86 Time: 1440 hrs.

(2) Depth to Liquid (ft): – Purge Method: Bailer (Teflon)

(3) Depth to Water (ft): 35.53 Purge Rate (gpm): ______

(4) Liquid Depth [(1)-(2)]: 17.38 Purge Time (min): 45 min.

(5) borehole Liquid Volume [(4)xF] (gal): 6.12 x 4 = 24.5 Purge Volume (gal): 8.5 gal.

Did Well Pump Dry? Describe: Yes. Well was bailed dry twice allowing 15 min. to recharge.

Samplers: ______

Sampling Date: ______ Time: ______

Sample Type: ______ Split? ______ With Whom: ______

Comments and Observations: Did not sample NL-1 because NL-3 could not be sampled.

* Conversion factor (F) = .3522 gal./ft

FIGURE 3-23

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Norton LAB

Well No: NL-1 Gauge Date: 4-2-86 Time: ______

Weather: Sunny, Clear 55°F light breeze

Well Condition: Lock, No sign of tampering

Well Diameter (inches): 2 15/16" open hole

Odor (describe): None

Sounding Method: Steel tape / water level indicator Measurement Reference: Top of Steel

Stick up/down (ft): 1.87'

(1) Well Depth (ft): 52.91 Purge Date: 4-2-86 Time: 0745 hrs.

(2) Depth to Liquid (ft): – Purge Method: teflon bailer

(3) Depth to Water (ft): 35.49' Purge Rate (gpm): ______

(4) Liquid Depth [(1)-(2)]: 17.42' Purge Time (min): 22 min.

(5) 1 Borehole Liquid Volume [(4)xF] (gal): 6.13 x 4 = 24.5 Purge Volume (gal): 12.98 gal.

Did Well Pump Dry? Describe: Yes, well purged dry and was Allowed to recharge for 15 min. then purged dry Again

Samplers: CRG / GWB

Sampling Date: 4-2-86 Time: 1115 hrs.

Sample Type: Groundwater (Grab) Split? No With Whom: ______

Comments and Observations: ph : 7.10 Conductivity : 810

* Conversion Factor (F) = .3522 gal / Ft.

FIGURE 3-24

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Norton LAB

Well No: NL-3 Gauge Date: 2-25-86 Time:

Weather: Sunny, Clear, 20°F

Well Condition: Good, locked no signs of tampering

Well Diameter (inches): 2 15/16" dia. open bore hole

Odor (describe): None

Sounding Method: Water level indicator Measurement Reference: Top of Steel

Stick up/down (ft): ~~[illegible]~~ 1.51'

(1) Well Depth (ft): 48.51' Purge Date: 2/25/86 Time:

(2) Depth to Liquid (ft): - Purge Method: Teflon bailer

(3) Depth to Water (ft): 43.95 Purge Rate (gpm):

(4) Liquid Depth [(1)-(2)]: 4.56 Purge Time (min):

(5) bore hole Liquid Volume [(4)xF] (gal): ~~[illegible]~~ 1.60 x4 = 6.4 Purge Volume (gal): ~ 1.5 gal

Did Well Pump Dry? Describe: Yes, well is very slow recharger unable to bail twice.

Samplers:

Sampling Date: Time:

Sample Type: Split? With Whom:

Comments and Observations: Attempted to sample well on 2/26/86 and 2/27/87. Not enough water in well to fill sample containers. On 3-7-86 sample collection was attempted however, well went dry before all sample containers could be filled.

FIGURE 3-25

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Norton Lab

Well No: NL-3 Gauge Date: 4-2-86 Time: ___

Weather: Sunny, clear 60°F light breeze

Well Condition: Locked no sign of tampering

Well Diameter (inches): 2 15/16" dia. open hole

Odor (describe): None

Sounding Method: water level indicator Measurement Reference: Top of steel

Stick up/down (ft): 1.51'

(1) Well Depth (ft): ~~48.51~~ 48.51 Purge Date: ___ Time: ___

(2) Depth to Liquid (ft): ___ Purge Method: ___

(3) Depth to Water (ft): ___ Purge Rate (gpm): ___

(4) Liquid Depth [(1)-(2)]: ___ Purge Time (min): ___

(5) Liquid Volume [(4)xF] (gal): ___ Purge Volume (gal): ___

Did Well Pump Dry? Describe: ___

Samplers: CRG/GWB

Sampling Date: 4-2-86 Time: 12:00 hrs.

Sample Type: Groundwater (Grab) Split? ___ With Whom: ___

Comments and Observations: ph 7.61 Conductivity 950

FIGURE 3-26

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Norton LAB

Well No: NL-1 Gauge Date: 3-10-87 Time: 0830 hrs.

Weather: Cold ~10°F, windy overcast

Well Condition: Steel cap broken, well not secure. No evidence ~~of~~ of forced breakage.

Well Diameter (inches): 2 15/16" dia.. open hole

Odor (describe): None

Sounding Method: QED water level indicator Measurement Reference: Top of steel

Stick up/down (ft): 1.87'

(1) Well Depth (ft): 52.91' Purge Date: 3-10-87 Time: 0935

(2) Depth to Liquid (ft): - Purge Method: 2" Submersible pump.

(3) Depth to Water (ft): 35.76 Purge Rate (gpm): 1.5 gpm

(4) Liquid Depth [(1)-(2)]: 17.15 Purge Time (min):

(5) borehole Liquid Volume [(4)xF] (gal): 6.04 x 4 = 24.1 Purge Volume (gal): ~ 6 gal.

Did Well Pump Dry? Describe: Yes, initial discharge cloudy black, cleared after 3 gal. Allowed well to recharge for 15 min. pumped again.

Samplers: Lori Roger / Tom Porter

Sampling Date: 3-31-87 Time: 1420 hrs.

Sample Type: Grab Split? No With Whom:

Comments and Observations: Spec. Cond. 800

Well purged again on 3-31-87 prior to sampling

FIGURE 3-27

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Norton LAB

Well No: NL-2 Gauge Date: 3-10-87 Time: ~~1030~~ 0835 hrs

Weather: Cold ~15° F windy partly cloudy

Well Condition: Locked, sound.

Well Diameter (inches): 2" D.A. well in 6 3/4" bore hole

Odor (describe): None

Sounding Method: QED WATER level indicator Measurement Reference: Top of PVC

Stick up/down (ft): 1.85'

(1) Well Depth (ft): 17.85 Purge Date: 3-10-87 Time: 1030 hrs.

(2) Depth to Liquid (ft): – Purge Method: submersible pump

(3) Depth to Water (ft): 6.76' Purge Rate (gpm): 1 gpm

(4) Liquid Depth [(1)-(2)]: 11.09 Purge Time (min):

(5) Liquid Volume [(4)xF] (gal): 6.67 ×4=26.7 (1 bore hole) Purge Volume (gal): ~2.5 gal

Did Well Pump Dry? Describe: Well pumped dry quickly.
Discharge initially cloudy brn turn translucent after 1 gal.
Allowed to recharge 15 min. pumped dry again.

Samplers: Lori Rogers / Tom Porter

Sampling Date: 3-31-87 Time: 1425 hrs.

Sample Type: Grab Split? NO. With Whom:

Comments and Observations: Spec Cond. 2400
Well purged again on 3-31-87 prior to sampling

FIGURE 3-28

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Norton LAB

Well No: NL-3 Gauge Date: 3-10-87 Time: 1100 hrs.

Weather: Cold 15°F windy

Well Condition: ~~At~~ Locked secure

Well Diameter (inches): 2 15/16" dia. open hole.

Odor (describe): None

Sounding Method: QED water level indicator Measurement Reference: Top of Steel

Stick up/down (ft): 1.51'

(1) Well Depth (ft): 48.51 Purge Date: 3-10-87 Time: 1150 hrs.

(2) Depth to Liquid (ft): – Purge Method: Teflon bailer

(3) Depth to Water (ft): 45.20' Purge Rate (gpm):

(4) Liquid Depth [(1)-(2)]: 3.31' Purge Time (min):

(5) 1 borehole Liquid Volume [(4)xF] (gal): 1.16 x4 = 4.66 Purge Volume (gal): ~1.0 gal.

Did Well Pump Dry? Describe: Yes, well bailed dry very slow recharge rate could not bail twice

Samplers: Lori Rogers / Tom Porter

Sampling Date: 3-31-87 Time: 1450 hrs.

Sample Type: Grab Split? NO. With Whom:

Comments and Observations: Spec. Cond. 1800

FIGURE 3-29

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Norton LAB

Well No: NL-4 Gauge Date: 3-10-87 Time: 1100 hrs.

Weather: Cold 15°F Windy

Well Condition: Locked secure.

Well Diameter (inches): 2" PVC well in 6 3/4" bore hole

Odor (describe): None

Sounding Method: QED WATER level indicator Measurement Reference: Top of PVC

Stick up/down (ft): 1.76'

(1) Well Depth (ft): 15.76 Purge Date: 3-10-87 Time: 1200 hrs.

(2) Depth to Liquid (ft): — Purge Method: centrifugal pump

(3) Depth to Water (ft): 6.40' Purge Rate (gpm): 2.5 gpm

(4) Liquid Depth [(1)-(2)]: 9.36' Purge Time (min): ~~24 gal~~ ~10 min.

(5) 1 bore hole Liquid Volume [(4)xF] (gal): 5.63 X4 = 22.53 Purge Volume (gal): 24 gal.

Did Well Pump Dry? Describe: No. initial discharge cloudy brn cleared after 3 gal.

Samplers: Lori Rogers / Tom Porter

Sampling Date: 3-31-87 Time: 1455 hrs.

Sample Type: Grab Split? No With Whom:

Comments and Observations: Spec Cond. 400 Well purged again prior to sampling on 3-31-87

FIGURE 3-30

FIELD RECORD OF WELL GAUGING, PURGING AND SAMPLING

Site: Norton LAB

Well No: NL-5 Gauge Date: 3-10-87 Time: 1220 hrs.

Weather: Cold 15°F windy

Well Condition: Locked, secure

Well Diameter (inches): 2" PVC well. in 6 3/4" borehole

Odor (describe): None

Sounding Method: QED water level indicator Measurement Reference: Top of PVC

Stick up/down (ft): 1.98'

(1) Well Depth (ft): 24.98 Purge Date: 3-10-87 Time: 1240 hrs.

(2) Depth to Liquid (ft): – Purge Method: Teflon bailer

(3) Depth to Water (ft): 16.71' Purge Rate (gpm): ____

(4) Liquid Depth [(1)-(2)]: 8.27' Purge Time (min): ____

(5) Liquid Volume [(4)xF] (gal): 4.97 Purge Volume (gal): 5 gal.

Did Well Pump Dry? Describe: Yes, well bailed dry, discharge cloudy

Samplers: Lori Rogers / Tom Porter

Sampling Date: 3-31-87 Time: 1505 hrs.

Sample Type: Grab Split? No. With Whom: ____

Comments and Observations: Well purged again on 3-31-87 prior to sampling Spec. Cond. 700

FIGURE 3-31

4

4. SITE ASSESSMENT

4.1 SITE HISTORY

The Norton Lab site is an inactive landfill located on the south side of Mill Street and about 20 ft east of the top of the slope of the Somerset Railroad Corporation cut in the Town of Lockport, Niagara County, New York. While operational, the site was owned by Mr. Arthur Hilgar, Sr., owner of McGonigle-Hilgar Roofing, Lockport, New York (Appendixes 1.4.1-1 through 1.4.1-3). Mr. Hilgar sold the site in 1984 to Mr. James Hoden, Sr., the owner/president of Twin Lake Chemical at 520 Mill Street, Lockport, New York (Appendixes 1.4.1-1 and 1.4.1-2). The NYSDEC Phase I report incorrectly identified the Somerset Railroad Corporation as the Norton Lab site owner. The site was ordered closed in 1976 by the NYSDEC after having been in operation since at least 1965. A 1977 estimate of waste generation for Norton Lab was 1,000 lbs/day. The primary wastes were solid waste plastics and defective plastic parts, of which 80-90 percent were associated with polyester-based plastics and the remainder with phenolic-based plastics. The landfill was operated until the mid-1970s. After that time, most of the wastes were recycled or hauled offsite for disposal (Appendix 1.4.1-3). Originally, the Norton Lab plant was located in the eastern portion of the site in the abandoned buildings (Figure 1-2). In 1975, it moved to the present Twin Lake chemical building locatation (Appendix 1.4.1-4).

According to a NYSDEC Industrial Waste Survey, 250 gal/year of waste lubricating and hydraulic oils were placed in the landfill as well (Appendix 1.4.1-5).

The Norton Lab Landfill covers an area of approximately 2-3 acres. The areal extent of the landfill to the east is unknown. A portion of the Norton Lab Landfill (approximately 0.4 acres) at the east-southeast end, is overlain by another landfill referred to as the McGonigle-Hilgar Landfill (Figure 4-1), which is assumed to be the "Area of Exposed Debris" shown on Figures 1-2 and 3-1. The McGonigle-Hilgar Landfill was used by the McGonigle & Hilgar Roofing Company from 1978 to 1982 for the disposal of roofing (asphalt, insulating material, tar paper) and general construction debris resulting from structural demolition. Reportedly, McGonigle & Hilgar Roofing Company deposited these waste materials on the ground surface and periodically spread the wastes out over the ground surface. The depth of the McGonigle-Hilgar Landfill overlaying the Norton Lab Landfill is 6-8 ft (Appendix 1.4.1-6). Eventually, some of the McGonigle-Hilgar Landfill was covered over with soil and is presently vegetated with some areas of exposed debris.

In 1981, Somerset Railroad Corporation conducted a hydrogeologic investigation to evaluate ground-water flow direction relative to a proposed railroad cut to be constructed on the west perimeter of the Norton Lab site (Appendix 1.4.1-6). The investigation included installation of 22 monitoring wells of which five were placed at the Norton Lab Landfill (Figure 4-1). Ground-water samples were collected for determination of several chemical parameters with only iron exceeding the New York State Ground Water Quality Standards for Class GA Waters (a more detailed description of the analytical results is presented in Section 4.4).

In August 1982, the Somerset Railroad Corporation conducted excavation operations on the western border of the site, during which one buried drum was punctured (Appendix 1.4.1-3). According to an employee of Somerset Railroad Corporation, these drums were located approximately 20-25 ft from the theoretical center of Mill Street in an area outside the perimeter of the Norton Lab Landfill (Appendix 1.4.1-7). According to a Niagara County Health Department (NCHD) employee who observed the open excavation of the Somerset Railroad Construction in 1982 when the wastes were encountered, there were several 55-gal drums, along with scrap plastic, and he believed the drums were within the boundaries of the Norton Lab landfill (Appendix 1.4.1-4). Therefore, a question whether contamination resulting from the puncturing of the drums is associated with the Norton Lab Landfill. In 1983, after the railroad cut had been completed, seeps were discovered eminating from the cut adjacent to the site. Reportedly the seeps showed signs of contamination (i.e., discoloration and an oil sheen) (Appendix 1.4.1-4). No samples were collected directly from the seeps; only the drainage ditch below the seeps were sampled and analyzed (Appendix 1.4.1-8).

In 1983, the Somerset Railroad Corporation conducted a second hydrogeologic assessment to determine the extent that construction of the railroad cut had modified surface or ground-water movement, and to identify the probable effects on water quality in the vicinity of the Norton Lab site (Appendix 1.4.1-9). The investigation included conducting ground-water and surface-water samplings, obtaining monthly water level measurements in the existing observation wells, and weekly observations of the extent of seepage from the rock cut. The parameters monitored included arsenic, barium, beryllium, cadmium, chromium, copper, iron, lead, nickel, mercury, zinc, conductivity, ammonia, phenols, oil and grease, pH, total halogenated organics (TOX), and total organic carbon (TOC). Ground-water studies indicated that it is unlikely that any seepage from the site will affect offsite ground-water users. During the Phase II investigation, no seeps were observed at the railroad cut.

4.2 SITE TOPOGRAPHY

The Norton Lab site is an inactive landfill located on Mill Street in the Town of Lockport at an elevation of approximately 475 ft above mean sea level. The site has an average slope of 3 percent to the northwest. The nearest surface water downgradient of the site is the Eighteenmile Creek which is located approximately 1,000 ft south of the site. The prevailing slope from the site to Eighteenmile Creek is approximately 9 percent (EA Site Inspection, Appendix 1.4.2-1).

The site is not fenced except for one section of fence located along the western end of the site. The western end of the site meets the Somerset Railroad cut. Immediately south of the site is the Twin Lake Chemical Company and it's adjacent lot. Several hundred feet farther south is an embankment which drops off steeply down a road cut to Eighteenmile Creek. (The geology of the area can be readily observed in this road cut and also in the Somerset Railroad cut.) To the east are several old industrial buildings (Appendix 1.4.2-1, EA Site Inspection).

The distance to the nearest residence is approximately 400 ft to the east, and there are commercial/industrial buildings immediately adjacent to the site (Appendix 1.4.2-1, EA Site Inspection). There are no ground-water wells within a 3-mi radius of the site (Appendixes 1.4.2-2 through 1.4.2-4).

4.3 HYDROGEOLOGY

The Norton Lab site is located within the Erie-Niagara Basin of the Erie-Ontario Lowlands Physiographic Province. The site is located on a bluff near the base of the Niagara escarpment, an east-west trending topographic feature which rises abruptly 200 ft above the Ontario plain. Bedrock in the area of the site is relatively flat lying (horizontal) and covered by a thin layer of weathered rock and glacial deposits (Appendix 1.4.3-1). Rock formations exposed in the railroad cut directly west of the site and road cuts to the south of the site, include from oldest to youngest, the Queenston shale (Ordovician Age), and Silurian Age units comprised of the Whirlpool sandstone, Power Glen shale, and Grimsby sandstone. The Grimsby sandstone is further divided into an upper and lower unit.

The site is directly underlain by glacial till deposits consisting of unsorted coarse to fine sand with some silt and a trace of clay and fine gravel. The material is dense and stiff. The glacial deposits are underlain by 1-2 ft of weathered bedrock which in turn is underlain by competent bedrock of the Grimsby Formation. Competent bedrock is generally between 6 and 13 ft below ground surface. The Upper Grimsby (approximately 17 ft thick) is a maroon colored sandstone interbedded with soft shale and siltstone. The upper unit is very fractured. The lower unit of the Grimsby Formation (approximately 10 ft thick) is an off-white, hard, fine-grained sandstone. Below the Grimsby is the Power Glen Formation, composed of dark green-gray shale and siltstone which has some fractures (Appendix 1.4.1-9 and Figures 3-2 and 3-6).

Ground water at the site occurs in two zones separated from each other by relatively nonwater-bearing zones. The two water-bearing zones at the Norton Labs site are the fill material/Upper Grimsby and Power Glen Formations, which have been previously designated as Zone 1 and Zone 2, respectively. Depth to first ground water is generally about 5 ft in the overburden. Ground-water flow in Zones 1 and 2 is generally to the west. The transmissibility and permeability of Zone 1 is somewhat higher than that of Zone 2.

Cluster wells were installed at the site. The installation of the shallow (Zone 1) wells and the deep (Zone 2) rock wells indicate that the shallow water-bearing zone extends from roughly 8 to 25 ft below grade, within the overburden and upper Grimsby sandstone. This zone overlies the lower Grimsby Formation (nonwater-bearing zone). Because the lower Grimsby here was found to be a hard, fine-grained, relatively sound sandstone, there is probably a low degree of vertical movement of ground water between Zone 1 and Zone 2 through the lower Grimsby. The Zone 2 water-bearing zone was found to begin at the contact between the lower Grimsby and the Power Glen shale and extend downward through the Power Glen. Boring logs are provided in Figures 3-2 through 3-6.

The static water level in Zone 1 (NL-4 and NL-5) was observed to drop slightly through the summer and fall; while static levels remained relatively stable in the deeper Zone 2 in well NL-3, but rose slightly in deep well NL-1 (located further from the railroad cut) (Figure 4-2). Based on pumping test data, both Zones 1 and 2 are very slow recharging aquifers. Transmissivity and effective permeabilities values could not be calculated for any of the wells in Zones 1 or 2, except for well NL-4. Transmissivity and permeability values for well NL-4 were calculated using the Jacob's modification of the Theis equation

(Appendix 1.4.3-2). Transmissivity was found to be 86.1 gpd/ft and permeability was found to be 1.44 ft/day. The drawdown data for the other wells is directly related to the evaluation of borehole and/or well casing. The recovery of the wells were too slow to calculate transmissivity and permeability (Figures 3-8 to 3-17). Ground water is above the weather rock only in well NL-4 (Figures 3-2 to 3-6).

Analysis of relative ground-water elevations (Table 3-1) indicates that both Zone 1 and Zone 2 ground water flows to the northwest (Figure 4-3). Zone 1 ground water was calculated to have a hydraulic gradient across the site of 2.5 percent while the Zone 2 gradient was approximately 7 percent. A summary of monitoring well data and water level data is provided in Table 3-1.

Residences within a 3-mi radius of the Norton Lab site are served by surface water supplied by the Niagara River (Appendixes 1.4.2-2 through 1.4.2-4 and 1.4.3-1). Therefore, there is no currently used ground water (aquifer of concern) underlying the site.

4.4 SITE CONTAMINATION

Waste Types and Quantities

The Norton Lab Landfill, which operated from at least 1965 to 1976, received approximately 1,000 lbs/day of phenolic and polyester based solid waste plastics and 250 gal/year of hydraulic and lubrication waste oils. The waste oils were reportedly spilled out onto the ground (Appendixes 1.4.1-3 and 1.4.1-5).

Ground Water

Somerset Railroad Corporation conducted a hydrogeologic investigation in the vicinity of the Norton Lab Landfill in 1981 which included the installation of 22 monitoring wells (Figure 4-2). Two wells (D-69 and D-70) were screened in the fill material and three wells were screened beneath the fill material (D-66 in Zone 2, D-68A in Zone 3, and D-67 in Zone 4). An upgradient well screened in the fill material to evaluate ambient water quality conditions was not installed. Three other wells were installed southwest and outside of the perimeter of the Norton Lab Landfill (D-63A in Zone 4, D-64 in Zone 2, and D-65 in Zone 3). Duplicate ground-water samples were obtained from each well on 3 November 1981 for determination of pH, specific conductance, total organic carbon (TOC), total filterable residue, chloride, total iron, and oil and grease. Analytical results are presented in Appendix 1.4.4-1. Only iron concentrations exceeded the New York State Ground-Water Quality Standards for Class GA waters.

Wells D-66, D-69, and D-70 were resampled on 13-18 November 1981 for analysis by RECRA Research, Inc. for the same parameters (with the exception of iron) in addition to fluoride, total cyanide, zinc, and antimony. Results (Appendix 1.4.4-1) did not show the contravention of any New York State Ground-Water Quality Standards for Class GA Waters.

In November 1981, Woodward & Clyde Consultants conducted sampling of Wells D-66, D-68A, C-69, and D-70 for determination of metals and volatile organic compounds. The analyses were performed by Advanced Environmental Systems, Inc. The only parameters to exceed NYS Ground-Water Quality Standards for Class GA

Waters were arsenic in Well D-68A (68 ppb) and barium in Well D-66 (1,800 ppb) (Appendix 1.4.4-2). The only volatile organic compound detected was methylene chloride which was also present at a high concentration in the trip blank. An upgradient sample was not collected for comparison with ambient conditions.

Woodward & Clyde Consultants conducted sampling of the same wells again in May 1982 for determination of arsenic, barium, cadmium, chromium, lead, zinc, total halogenated organics, total PCB, methylene chloride, and oil and grease (Appendix 1.4.4-3). The only parameter to exceed New York State Ground-Water Quality Standards for Class GA Waters was lead in Well D-68A (66ppb). Again, an upgradient sample was not collected for comparison with ambient ground-water quality conditions.

In 1983, Somerset Railroad Corporation conducted a second hydrogeologic investigation in the vicinity of the Norton Lab Landfill which included four rounds of sampling at Wells D-66, D-69, and D-70. Determinations for TOC, total halogenated organics, phenols, ammonia, oil and grease, and metals were conducted (Appendix 1.4.4-4). The NYS Ground-Water Quality Standards for phenols were exceeded in all three samples, and standards for iron were exceeded in Well D-70. An upgradient sample was not collected for comparison with ambient conditions, and sample collection and handling methods are unknown.

During the Phase II investigation, five ground-water samples were collected (one from each Phase II monitoring well) and analyzed for the organic and inorganic parameters of the Hazardous Substances List. There was no significant increase in the concentration of any parameter, with the exception of acetone, iron, copper, and sodium. Iron and copper were detected at concentrations 10 times greater in shallow well NL-4 than in upgradient shallow well NL-2. Sodium was detected 10 times greater in deep well NL-3 than in upgradient deep well NL-1. Copper concentrations were below drinking water quality standards in both the upgradient and downgradient samples. For NL-1 and NL-3, Cr and Zn were detected, however, contamination in the trip blank was greater than required levels, therefore, was not used. Acetone was detected in Wells NL-1, NL-3, and NL-5 at significant concentrations, however, acetone was required for cleaning of purging and sampling equipment used in the wells and may have been introduced during sampling. Lower levels were also found in the trip blank. Magnesium also was detected at elevated levels in all of the wells (Table 4-1). Due to missed holding times, the five Phase II monitoring wells were resampled and analyzed for pesticides and PCB of the Hazardous Substance List. No PCB or pesticides were detected above the contract required detection limits in any of the wells (Appendix 3)

In order to confirm a release of contaminants from the site for the purpose of HRS, there must be a significant increase in the concentration of a chemical parameter between the upgradient and downgradient sampling points at the site. EPA considers a significant increase to be at least a 10-fold increase when the same parameters are detected in the upgradient sample, or three times the detection limit for parameters not detected in upgradient sample. Therefore, an observed release to ground water is indicated based on the detection of increased concentrations (ten times) of iron, copper, and sodium in downgradient wells. The NCHD indicated that the parameters found in the wells (magnesium, iron, and sodium) are found higher than drinking water standards in many wells in the area and felt that the results reflect background levels (Appendix 1.4.1-4). However, for the purpose of HRS, the values constitute an observed release.

Surface Water

Somerset Railroad Corporation collected surface water samples on 8 September 1983 at two locations in the vicinity of the Norton Lab Landfill. One water sample was collected from the drainage ditch paralleling Mill Street (designated "Mill Street Sampling Location"), and a second sample was collected from the Rock Cut Sampling Location which handles the combined drainage from two ditches paralleling Mill Street. Samples were analyzed for the same parameters determined on ground-water samples and results are summarized in Appendix 1.4.4-5. The only parameter which exceeded Class D Water Quality Standards was ammonia (in the Mill Street water sample).

No surface water samples were collected during the Phase II investigation. A sample of seepage from the Somerset Railroad cut was to be obtained, however, no seepage was present during the Phase II sampling effort. Additionally, it was determined that the seep located several hundred feet northwest of the site, would not be representative of the site.

Soil

No soil or sediment samples were collected during Somerset Railroad Corporation's hydrogeologic investigations or during the Phase II program.

TABLE 4-1 RESULTS OF DETERMINATIONS CONDUCTED ON GROUND WATER SAMPLES COLLECTED FROM NORTON LAB SITE, LOCKPORT, NEW YORK, 13 NOVEMBER 1985 AND 3 APRIL 1986.

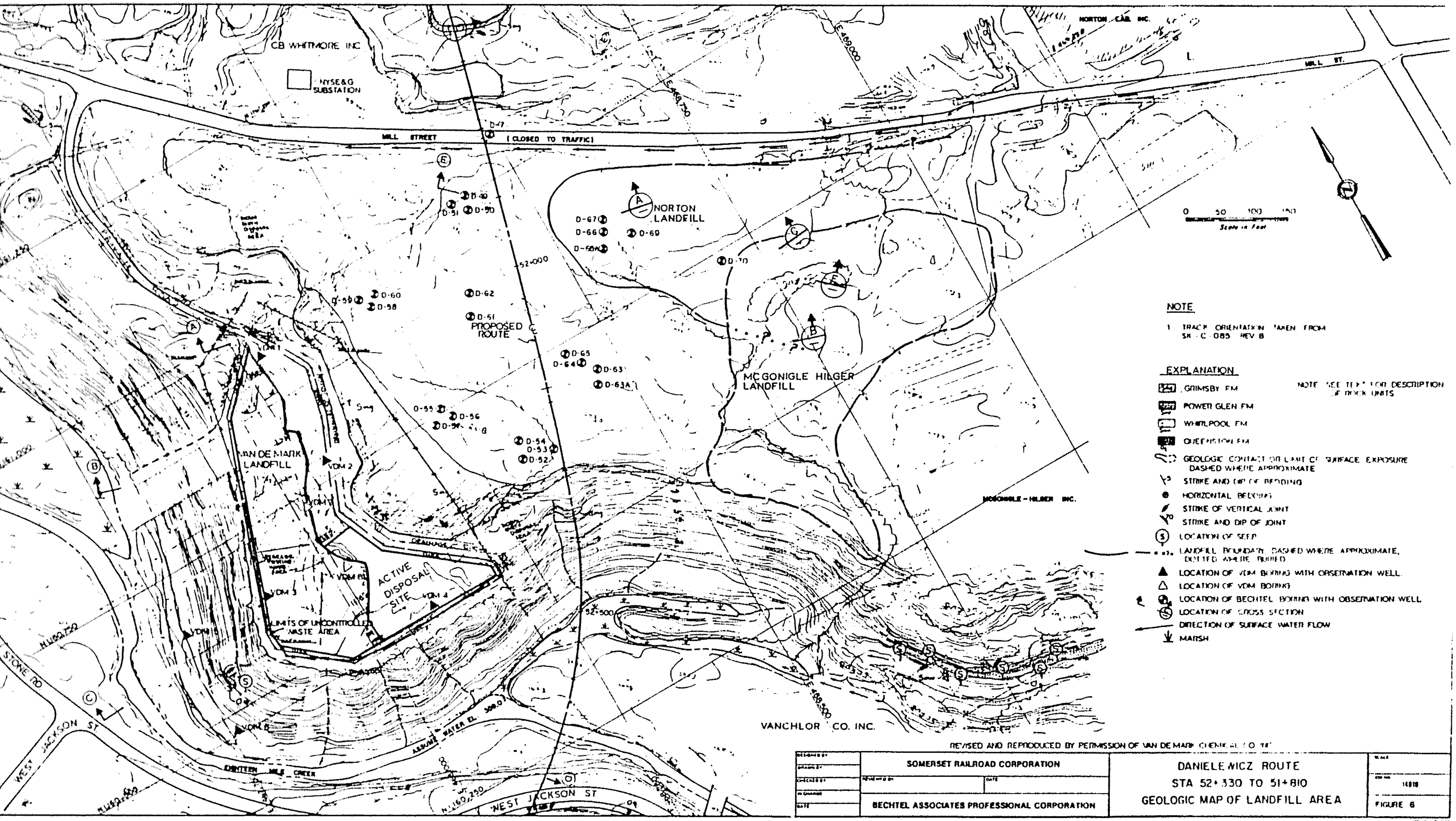
Parameter	Deep Upgradient NL-W1	Deep Upgradient NL-W1[a]	Shallow Upgrad. NL-W2	Deep Downgrad. NL-W3[a]	Shallow Downgradient NL-W4	Shallow Downgradient NL-W5	Trip Blank	Trip[a] Blank	VOA Blank	VOA[a] Blank	BNA Blank	BNA Blank[a]
Volatiles (ug/L)												
Methylene Chloride	BCRDL	BCRDL[b]	BCRDL	BCRDL[b]	BCRDL[b]	BCRDL[b]	BCRDL[b]	9B	BCRDL	BCRDL		
Acetone	140	BCRDL	BCRDL	490	BCRDL	76	21	BCRDL				
2-Butanone	BCRDL	BCRDL		BCRDL	BCRDL	BCRDL	BCRDL					
1,1-Dichloroethene				10[c]								
Trichloroethene				5[c]								
Benzene				BCRDL[c]								
Toluene				BCRDL[c]								
Chlorobenzene				BCRDL[c]								
Chloroform										BCRDL		
Semi-Volatiles (ug/L)												
Dibenzofuran	BCRDL											
Fluorene	BCRDL											
Phenanthrene	BCRDL											
Anthracene	BCRDL											
Fluoranthene	BCRDL											
Pyrene	BCRDL											
Benzo(a)anthracene	BCRDL											
Bis(2-ethylhexyl) phthalate	12b	BCRDL[b]	11B	13B	BCRDL[b]	14B	15B	BCRDL[b]			BCRDL	11
Chrysene	BCRDL											
Benzo(B+K)Fluoranthene[d]	BCRDL											
Benzo(a)pyrene	BCRDL											
Metals (mg/L)												
Aluminum	<0.20	0.46	3.30	0.48	4.10	1.80	<0.20	<0.04				
Antimony	<0.01	<0.005	<0.01	<0.005	<0.016	<0.01	<0.01	<0.005				
Arsenic	<0.002	<0.005	<0.002	<0.005	<0.007	<0.002	<0.002	<0.005				
Barium	0.76	0.80	0.03	0.009	0.13	0.22	<0.02	<0.04				
Beryllium	<0.0005	<0.0005	<0.0005	<0.002	<0.005	<0.005	<0.005	<0.002				
Cadmium	<0.0005	<0.0005	0.0007	<0.0005	0.0021	0.0007	<0.0005	<0.0005				
Calcium	140	110	44.0	20.0	64.0	92.0	<1.00	0.50				
Chromium	0.002	0.045	0.003	0.04	0.010	0.003	<0.001	0.05				
Copper	<0.005	0.04	0.007	0.10	0.20	0.007	<0.005	<0.02				
Iron	6.30	6.00	0.42	0.66	9.80	0.78	<0.05	0.25				
Lead	0.005	0.019	0.007	0.037	0.019	0.007	<0.002	<0.005				
Magnesium	14.0	13.90	16.0	3.41	16.0	50.0	<0.01	<0.01				
Manganese	3.40	2.89	0.22	0.09	0.11	0.25	<0.01	<0.01				
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	0.0013	<0.0002	<0.0002	<0.0002				
Nickel	<0.04	0.04	<0.04	<0.02	0.10	<0.04	<1.00	0.40				
Potassium	3.00	3.90	4.00	12.0	8.00	4.00	<1.00	0.40				

TABLE 4-2 (Cont.)

Parameter	Deep Upgradient NL-W1	Deep Upgradient NL-W1[a]	Shallow Upgrad. NL-W2	Deep Downgrad. NL-W3[a]	Shallow Downgradient NL-W4	Shallow Downgradient NL-W5	Trip Blank	Trip[a] Blank	VOA Blank	VOA[a] Blank	BNA Blank	BNA Blank[a]
Metals (cont.)												
Sodium	40.0	46	38.0	406	28.0	34.0	<1.00	2.5				
Zinc	<0.02	0.043	0.13	0.057	2.60	0.12	<0.02	0.024				
Total Cyanide	<0.01	<0.01	0.04	<0.01	<0.01	0.01	<0.01	<0.01				
Total Phenols	<0.02	<0.05	<0.02	<0.05	<0.02	<0.02	<0.02	<0.05				

NOTE: BCRDL = Below Contract Required Detection Limit.
No pesticides or PCB were detected above the contract required detection limit as the result of the resampling on 17 March 1987.

a = Results of analyses for Samples collected 3 April 1986.
b = Parameter was detected in the method blank.
c = Probable contamination from matrix spike standard.
d = Unable to resolve isomers; results represent total of both isomers.



CB WHITMORE INC
NYSE&G SUBSTATION
MILL STREET
(CLOSED TO TRAFFIC)
MILL ST.
NORTON LANDFILL
MCGONIGLE HILGER LANDFILL
VAN DE MARK LANDFILL
ACTIVE DISPOSAL SITE
LIMITS OF UNCONTROLLED WASTE AREA
PROPOSED ROUTE
VANCHLOR CO. INC.
WEST JACKSON ST
STONE RD
EIGHTEEN MILE CREEK
NOTE
1 TRACK ORIENTATION TAKEN FROM SK-C-085 REV B
EXPLANATION
GRIMSBY FM
POWER GLEN FM
WHIRLPOOL FM
QUEENSTON FM
GEOLOGIC CONTACT OR LIMIT OF SURFACE EXPOSURE DASHED WHERE APPROXIMATE
STRIKE AND DIP OF BEDDING
HORIZONTAL BEDDING
STRIKE OF VERTICAL JOINT
STRIKE AND DIP OF JOINT
LOCATION OF SEEP
LANDFILL BOUNDARY, DASHED WHERE APPROXIMATE, DOTTED WHERE BURIED
LOCATION OF VDM BORING WITH OBSERVATION WELL
LOCATION OF VDM BORING
LOCATION OF BECHTEL BORING WITH OBSERVATION WELL
LOCATION OF CROSS SECTION
DIRECTION OF SURFACE WATER FLOW
MARSH
NOTE: SEE TEXT FOR DESCRIPTION OF ROCK UNITS
0 50 100 150
REVISED AND REPRODUCED BY PERMISSION OF VAN DE MARK CHEMICAL CO. INC.
SOMERSET RAILROAD CORPORATION
BECHTEL ASSOCIATES PROFESSIONAL CORPORATION
DANIELEWICZ ROUTE
STA 52+330 TO 51+810
GEOLOGIC MAP OF LANDFILL AREA
FIGURE 6

FIGURE 4 -1

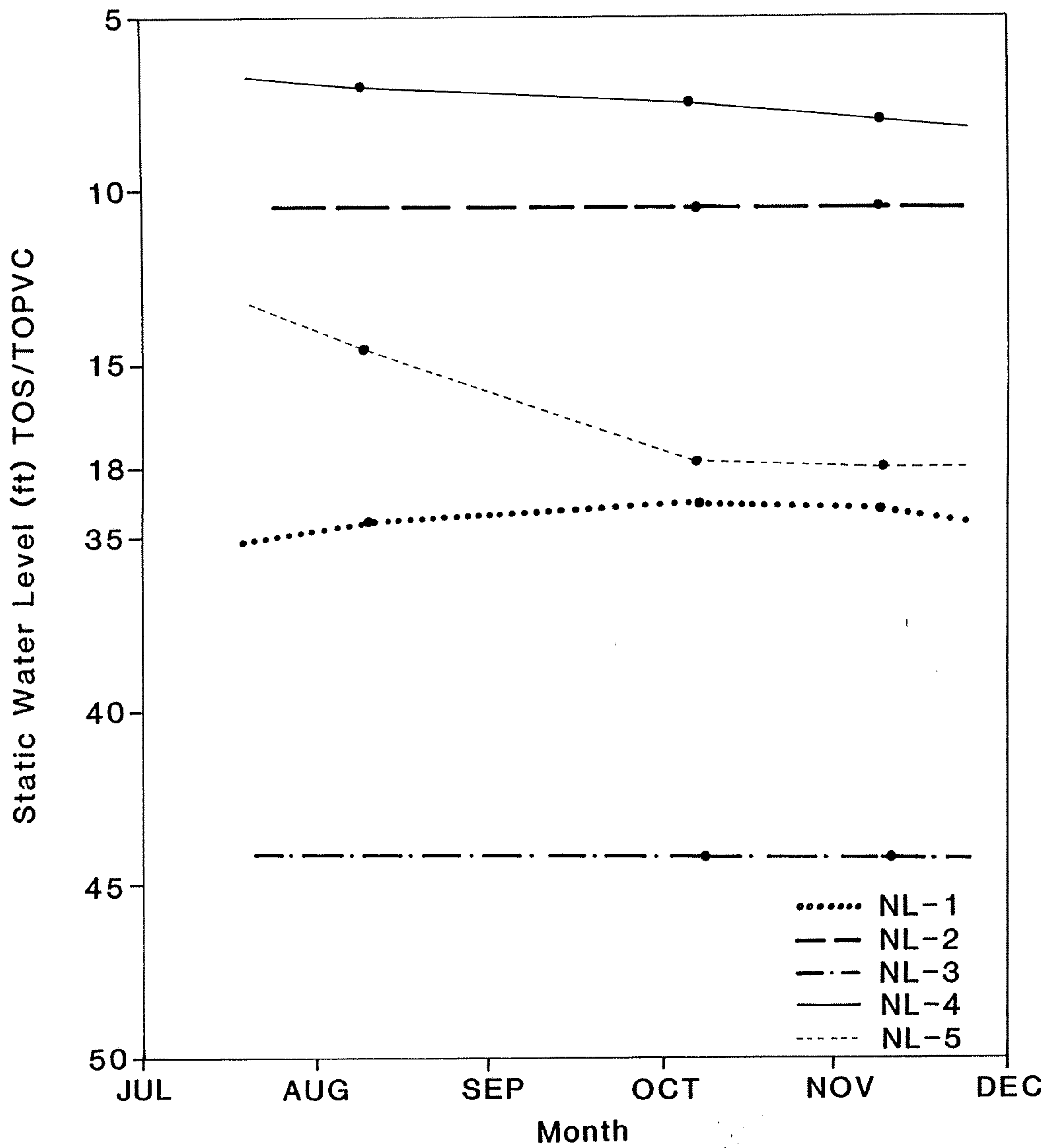
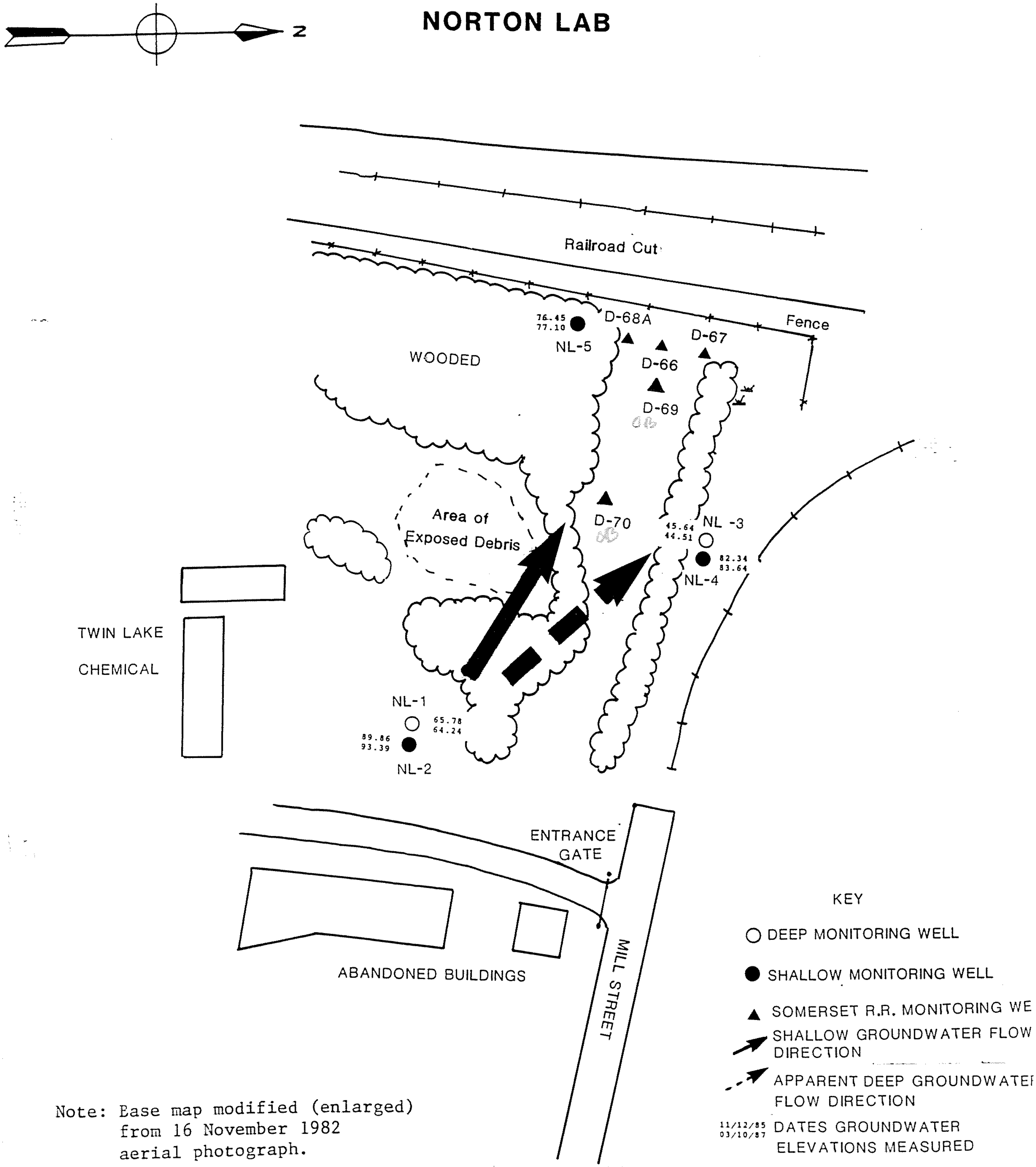


Figure 4-2. Norton Lab static water levels through summer and fall 1985.

NORTON LAB



Note: Base map modified (enlarged)
from 16 November 1982
aerial photograph.

Approximate Scale 1 in.= 150 ft

FIGURE 4-3.

5

5.1

5. NARRATIVE SUMMARY

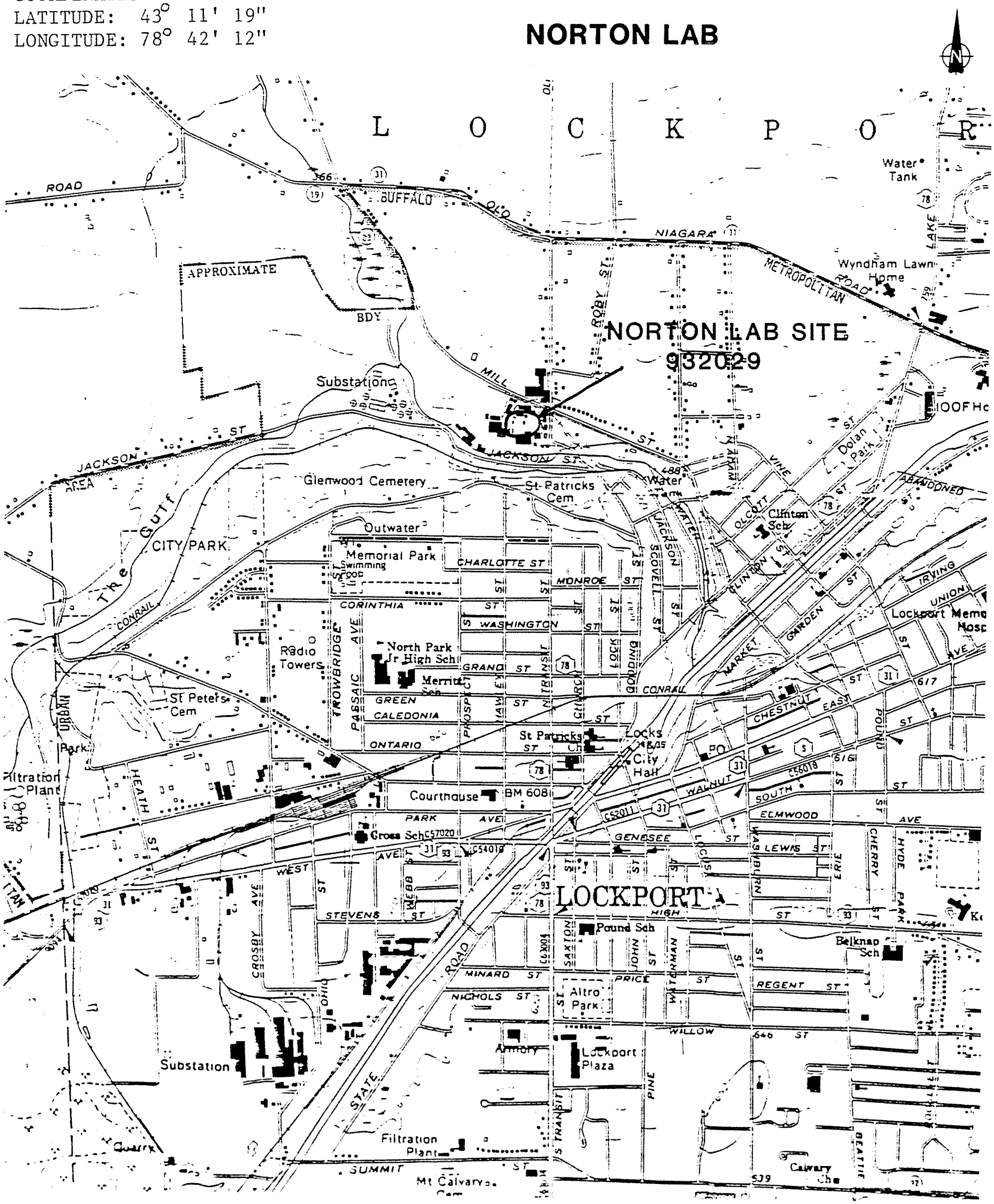
The Norton Lab site is an inactive landfill covering approximately 2-3 acres located in Lockport, Niagara County, New York. The site was owned by Mr. Arthur Hilgar, Sr., of Lockport, New York, until 1984 when it was sold to Mr. James Hoden, Sr., also of Lockport. The site was ordered closed in 1976 by the NYSDEC after having been in operation since at least 1965. Disposal of wastes onsite was estimated in 1977 as 1,000 lb/day of solid waste plastic and defective plastic parts, and 250 gal/year of waste lubricating and hydraulic oil. The oils were reportedly spilled out onto the ground.

The analytical results of determinations conducted on ground-water samples collected from this site (Refer to Section 4.4) indicate a significant increase in the concentration of copper, iron, and sodium between samples collected at upgradient and downgradient monitoring wells. The presence of acetone in the downgradient monitoring well sample is most probably due to introduction of acetone-rinsed (as required by NYSDEC) submersible pump into the well. However, for the purpose of HRS, the metals data do confirm a release of contaminants from the Norton Lab Landfill.

5.2

COORDINATES
LATITUDE: 43° 11' 19"
LONGITUDE: 78° 42' 12"

NORTON LAB



LOCKPORT QUAD
7.5 Minute Series
1976 Edition

0 2000 Feet

SCALE: 1 in = 2000 ft

5.3

Facility name: Norton Lab Landfill

Location: 520 Mill Street, Lockport, Niagara County, New York

EPA Region: II

Person(s) in charge of the facility: James Hoden, Sr.
520 Mill Street
Lockport, New York 14094

Name of Reviewer: Linda K. McConnell Date: 14 July 1986

General description of the facility:
(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

The site is a 2-3 acre inactive landfill located in Lockport, New York and is bordered by the Somerset Railroad cut to the west, by Mill Street to the north, by Eighteen Mile Creek to the south, and is immediately adjacent to industrial buildings. The landfill reportedly received 250 gal/year of waste hydraulic and lubricating oils and 1,000 lbs/day of solid waste plastics and defective plastic parts. The facility operated from at least 1965 to 1976. Analytical results for ground-water samples*

Scores: S_M = 5.64 S_{gw} = 4.47 S_{sw} = 8.68 S_a = 0)

S_{FE} = N/A

S_{DC} = 50.00

FIGURE 1
HRS COVER SHEET

*collected at the site confirm a release of iron, copper, and sodium from the landfill.

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 (45)	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score				15	
3 Containment	0 1 2 3	1		3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 (1) 2 3 4 5 6 7 8	1	1	8	
Total Waste Characteristics Score			19	26	
5 Targets					3.5
Ground Water Use	0 (1) 2 3	3	3	9	
Distance to Nearest Well/Population Served	(0) 4 6 8 10 / 12 16 18 20 / 24 30 32 35 40	1	0	40	
Total Targets Score			3	49	
6 If line 1 is 45, multiply 1 x 4 x 5; If line 1 is 0, multiply 2 x 3 x 4 x 5			2,565	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} =	4.47		

FIGURE 2
GROUND WATER ROUTE WORK SHEET

Surface Water Route Work Sheet					
Rating Factor	**Assigned Value (Circle One)**	**Multi-plier**	**Score**	**Max Score**	**Ref. (Section)**
1 Observed Release	(0) 45	1	0	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 1 (2) 3	1	2	3	
1-yr. 24-hr. Rainfall	0 (1) 2 3	1	1	3	
Distance to Nearest Surface Water	0 1 (2) 3	2	4	6	
Physical State	(0) 1 2 3	1	0	3	
	Total Route Characteristics Score		7	15	
3 Containment	0 1 2 (3)	1	3	3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 (1) 2 3 4 5 6 7 8	1	1	8	
	Total Waste Characteristics Score		19	26	
5 Targets					4.5
Surface Water Use	0 1 (2) 3	3	6	9	
Distance to a Sensitive Environment	(0) 1 2 3	2	0	6	
Population Served/Distance to Water Intake Downstream	0 4 6 (8) 10 12 16 18 20 24 30 32 35 40	1	8	40	
	Total Targets Score		14	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			5,586	64,350	
7 Divide line 6 by 64,350 and multiply by 100			S_{sw} = 8.68		

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

Air Route Work Sheet					
Rating Factor	**Assigned Value (Circle One)**	**Multiplier**	**Score**	**Max. Score**	**Ref. (Section)**
1 Observed Release	(0) 45	1	0	45	5.1
Date and Location:					
Sampling Protocol:					
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2 Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
Total Waste Characteristics Score				20	
3 Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
Total Targets Score				39	
4 Multiply 1 x 2 x 3				35,100	
5 Divide line 4 by 35,100 and multiply by 100	S_a = 0				

FIGURE 9
AIR ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	4.47	19.98
Surface Water Route Score (S_{sw})	8.68	25.35
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		95.32
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		9.76
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		5.64

FIGURE 10
WORKSHEET FOR COMPUTING S_M

Fire and Explosion Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max Score	Ref. (Section)
1 Containment	1 3	1		3	7.1
2 Waste Characteristics					7.2
Direct Evidence	0 3	1		3	
Ignitability	0 1 2 3	1		3	
Reactivity	0 1 2 3	1		3	
Incompatibility	0 1 2 3	1		3	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
3 Targets					7.3
Distance to Nearest Population	0 1 2 3 4 5	1		5	
Distance to Nearest Building	0 1 2 3	1		3	
Distance to Sensitive Environment	0 1 2 3	1		3	
Land Use	0 1 2 3	1		3	
Population Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Buildings Within 2-Mile Radius	0 1 2 3 4 5	1		5	
	Total Targets Score			24	
4 Multiply 1 x 2 x 3				1,440	
5 Divide line 4 by 1,440 and multiply by 100	S_{FE} = NA				

FIGURE 11
FIRE AND EXPLOSION WORK SHEET

Direct Contact Work Sheet					
Rating Factor	**Assigned Value (Circle One)**	**Multi-plier**	**Score**	**Max Score**	**Ref. (Section)**
1 Observed Incident	0 45	1	0	45	8.1
If line 1 is 45, proceed to line 4 If line 1 is 0, proceed to line 2					
2 Accessibility	0 1 2 3	1	3	3	8.2
3 Containment	0 15	1	15	15	8.3
4 Waste Characteristics Toxicity	0 1 2 3	5	15	15	8.4
5 Targets					8.5
Population Within a 1-Mile Radius	0 1 2 3 4 5	4	16	20	
Distance to a Critical Habitat	0 1 2 3	4	0	12	
	Total Targets Score		16	32	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			10,800	21,600	
7 Divide line 6 by 21,600 and multiply by 100	S_{DC} = 50.00				

FIGURE 12
DIRECT CONTACT WORK SHEET

5.4

DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

INSTRUCTIONS: As briefly as possible, summarize the information you used to assign the score for each factor (e.g., "Waste quantity = 4,230 drums plus 800 cubic yards of sludges"). The source of information should be provided for each entry and should be a bibliographic-type reference. Include the location of the document.

FACILITY NAME: Norton Lab Landfill

LOCATION: City of Lockport, Niagara, County, New York

DATE SCORED: 14 July 1986

PERSON SCORING: Linda K. McConnell

PRIMARY SOURCES(S) OF INFORMATION (e.g., EPA region, state, FIT, etc.)

EA Science and Technology, Phase II Field Activities
N.Y. State Dept. of Environmental Conservation Files
Somerset Railroad Corporation Hydrogeologic Studies,
February 1982 and June 1984.

FACTORS NOT SCORED DUE TO INSUFFICIENT INFORMATION:

Air route.

COMMENTS OR QUALIFICATIONS:

GROUND WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected (5 maximum):

Iron, copper, and sodium.

Rationale for attributing the contaminants to the facility:

There was a significant increase in the concentration of each of the three metals detected downgradient of the site as compared with the concentrations detected upgradient. Significance is defined as a three times increase above the detection limit if undetected upgradient, or a 10 times increase if detected upgradient.

References: 1 and 2.

***

2 ROUTE CHARACTERISTICS

Not applicable/observed release.

Depth to Aquifer of Concern

Name/description of aquifer(s) of concern:

Depth(s) from the ground surface to the highest seasonal level of the saturated zone (water table[s]) of the aquifer of concern:

Depth from the ground surface to the lowest point of waste disposal/storage:

Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):

Mean annual lake or seasonal evaporation (list months for seasonal):

Net precipitation (subtract the above figures):

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

Permeability associated with soil type:

Physical State

Physical state of substances at time of disposal (or at present time for generated gases):

***

3 CONTAINMENT

Not applicable/observed release.

Containment

Method(s) of waste or leachate containment evaluated:

Method with highest score:

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

Iron, copper, and sodium.

Reference: 2.

Compound with highest score:

Iron, copper.

Assigned value = 18.

References: 1 and 3.

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

Reportedly, 1,000 lbs/day of plastic wastes went to the landfill, however, the quantity of hazardous wastes is unknown.

Reference: 4.

Basis of estimating and/or computing waste quantity:

Minimum quantity assumed.

Assigned value = 1.

Reference: 1.

***

5 TARGETS

Ground Water Use

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:

Not currently used.

References: 5, 6, and 7.

Assigned value = 1.

Reference: 1.

Distance to Nearest Well

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:

Not applicable.

References: 5, 6, and 7.

Distance to above well or building:

Population Served by Ground Water Wells Within a 3-Mile Radius

Identified water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:

There are no water supply wells within a 3-mi radius of the site.

References: 5, 6, and 7.

Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):

Although there is approximately 300 acres of agricultural land within a 3-mi radius of the site, it is irrigated by surface water from the Niagara River or Eighteenmile Creek.

Reference: 8.

Total population served by ground water within a 3-mile radius:

Zero.

References: 5-8.

Assigned value = 0.

Reference: 1.

SURFACE WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

No surface water samples were collected during the Phase II investigation.

Assigned value = 0.

Reference: 1.

Rationale for attributing the contaminants to the facility:

***

2 ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

3 percent.

References: 9 and 10.

Name/description of nearest downslope surface water:

Eighteenmile Creek.

References: 9 and 10.

Average slope of terrain between facility and above-cited surface water body in percent:

9 percent.

References: 9 and 10.

Assigned value = 2.

Reference: 1.

Is the facility located either totally or partially in surface water?

No.

References: 9 and 10.

Is the facility completely surrounded by areas of higher elevation?

No.

References: 9 and 10.

<u>1-Year, 24-Hour Rainfall in Inches</u>

2 inches.

Reference: 1.

Assigned value = 1.

Reference: 1.

<u>Distance to Nearest Downslope Surface Water</u>

1,000 ft.

References: 9 and 10.

Assigned value = 2.

Reference: 1.

<u>Physical State of Waste</u>

Solid waste plastic and defective plastic parts (stabilized solids).

References: 4 and 11.

Assigned value = 0.

Reference: 1.

***

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

The wastes are not adequately covered with soil. No diversion system.

Reference: 9.

Method with highest score:

Inadequate cover and no diversion system.

Assigned value = 3.

Reference = 1.

***

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated

Iron, copper, and sodium.

Reference: 2.

Compound with highest score:

Iron and copper.

Assigned value = 18.

References: 1 and 3.

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

Reportedly, 1,000 gal/day of plastic wastes went to the landfill, however, the quantity of hazardous substances is unknown.

Reference: 4.

Basis of estimating and/or computing waste quantity:

Minimum quantity assumed.

Assigned value = 1.

Reference: 1.

***

5 TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

Recreational.

Reference: 12.

Assigned value = 2.

Reference: 1.

Is there tidal influence?

No.

References: 9 and 10.

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

Not applicable.

References: 9 and 10.

Distance to 5-acre (minimum) freshwater wetland, if 1 mile or less:

Not applicable.

References: 9 and 10.

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

Not applicable.

Reference: 13.

Assigned value = 0.

Reference: 1.

Population Served by Surface Water

Location(s) of water supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static waterbodies) downstream of the hazardous substance and population served by each intake:

Eighteenmile Creek is located approximately 1,000 ft south of the site. The population within a 3-mi radius of the site is served by the Niagara River which lies outside the 3-mi radius.

References: 5, 6, and 7.

Computation of land area irrigated by above-cited intake(s) and conversion to population (1.5 people per acre).

There are approximately 467 acres of land irrigated by Eighteenmile Creek on a periodic basis (467 X 1.5 people per acre = 701 people). A majority of the reportedly irrigated acres is located between 2 and 3 mi from the site.

Reference: 8.

Total population served:

701.

References: 5, 6, 7, 8, and 1.

Assigned value = 8.

Reference: 1.

Name/description of nearest of above waterbodies:

Distance to above-cited intakes, measured in stream miles.

Basis of estimating and/or computing waste quantity:

***

3 TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined:

0 to 4 mi 0 to 1 mi 0 to 1/2 mi 0 to 1/4 mi

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

Distance to 5-acre (minimum) freshwater wetland, if 1 mile or less:

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Distance to national or state park, forest, or wildlife reserve if 2 miles or less:

Distance to residential area, if 2 miles or less:

Distance to agricultural land in production within past 5 years, if 1 mile or less:

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

FIRE AND EXPLOSION

Not applicable based on information provided. No state or local fire marshal has certified that the site presents a significant fire of explosion threat or whether a threat has been demonstrated based on field observations (e.g., combustible gas indicator readings are not available).

Reference: 14.

1 CONTAINMENT

Hazardous substances present:

Type of containment, if applicable:

***

2 WASTE CHARACTERISTICS

Direct Evidence

Type of instrument and measurements:

Ignitability

Compound used:

Reactivity

Most reactive compound:

Incompatibility

Most incompatible pair of compounds:

***

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility:

Basis of estimating and/or computing waste quantity:

***

3 TARGETS

Distance to Nearest Population

Distance to Nearest Building

Distance to Sensitive Environment

Distance to wetlands:

Distance to critical habitat:

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

Distance to residential area, if 2 miles or less:

Distance to agricultural land in production within past 5 years, if 1 mile or less:

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

Population Within 2-Mile Radius

Buildings Within 2-Mile Radius

DIRECT CONTACT

1 OBSERVED INCIDENT

Date, location, and pertinent details of incident:

None reported.

Reference: Chapter 3.

Assigned value = 0.

Reference: 1.

2 ACCESSIBILITY

Describe type of barrier(s):

Fence does not completed surround the facility.

Reference: 9.

Assigned value = 3.

Reference: 1.

***

3 CONTAINMENT

Type of containment, if applicable:

Wastes are not adequately covered.

Reference: 9.

Assigned value = 15.

Reference: 1.

***

4 WASTE CHARACTERISTICS

<u>Toxicity</u>

Compounds evaluated:

Iron, copper, and sodium.

Reference: 2.

Compound with highest score:

Iron and copper.

Assigned value = 3.

References: 1 and 3.

***

5 TARGETS

Population Within 1-Mile Radius

7,218 (estimated 1/4 of the population from the City of Lockport [24,844] plus 265 houses X 3.8 = 6,211 + 1,007).

References: 10 and 15.

Assigned value = 0.

Reference: 1.

Distance to Critical Habitat (of Endangered Species)

Not applicable.

Reference: 12.

Assigned value = 0.

Reference: 1.

REFERENCES

1. U.S. Environmental Protection Agency. 1984. Uncontrolled Hazardous Waste Site Ranking System. A Users Manual.

2. EA Science and Technology Laboratory (EA). 1986. Analytical Results of Phase II Program (Sections 3.2.4 and 4.4).

3. Sax, N.I. 1979. Dangerous Properties of Industrial Materials. Van Nostrand Reinhold Company, New York.

4. Norton Labs Site History. (Appendix 1.4.1-3.)

5. New York State Department of Health. 1982. New York State Atlas of Community Water System Sources (Appendix 1.4.2-4).

6. Kehoe, S. 1987. Deputy Director, Niagara County Department of Health. Personal Communication. 19 June. (Appendix 1.4.2-3.)

7. Newman, P. 1987. Chief Operator, City of Lockport Water Department. Personel Communication. 19 June. (Appendix 1.4.2-2.)

8. Tillman, D. 1987. District Manager, Niagara County Soil and Water Conservation Service. Letter regarding irrigated land. 28 August. (Appendix 1.5.1-1.)

9. EA Science and Technology. 1985. Site Inspection. 24 April.

10. New York State Department of Transportation (NYSDOT). 1976. Lockport Quadrangle. 7.5 Minute Series.

11. New York State Industrial Waste Survey. 1976. Norton Labs. 22 November. (Appendix 1.4.1-4.)

12. Meridian, S. 1987. Regional Fisheries Manager, NYSDEC Region 9. Personal Communication. 19 June. (Appendix 1.5.1-2.)

13. Ozard, J. 1986. Senior Wildlife Biologist, New York State Department of Environmental Conservation. Personal Communication. 10 April. (Appendix 1.5.1-3.)

14. Darroch, T. 1987. Fire Chief, Lockport Fire Department. Personal Communication. 19 June. (Appendix 1.5.1-4.)

15. NYSDOT. 1983. New York State Map Gazetter.

5.5

United States
Environmental Protection
Agency

Office of Emergency and
Remedial Response
Washington, DC 20460

EPA Form 2070-13
July, 1981

EPA

Potential Hazardous Waste Site

Site Inspection Report

NORTON LAB LANDFILL

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	030212799

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
Norton Lab Landfill	520 Mill Street

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Lockport	NY	14094	Niagara		

09 COORDINATES: LATITUDE 43° 11' 19." LONGITUDE 78° 42' 12."

10 TYPE OF OWNERSHIP (Check one): ☒ A. PRIVATE ☐ B. FEDERAL ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL ☐ F. OTHER ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION	02 SITE STATUS	03 YEARS OF OPERATION
4 / 24 / 85 (MONTH DAY YEAR)	☐ ACTIVE ☒ INACTIVE	< 1965 (BEGINNING YEAR) / 1976 (ENDING YEAR) ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply)

☐ A. EPA ☐ B. EPA CONTRACTOR ________ (Name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR ________ (Name of firm)

☐ E. STATE ☒ F. STATE CONTRACTOR EA Science & Technology (Name of firm) ☐ G. OTHER ________ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
Charles W. Houlik, Jr., Ph.D.	Principal Investigator	EA	(301) 771-4950

09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO.
Linda Rubin	Corporate Health & Safety Officer	EA	(301) 771-4950
John Kosloski	Geologist	EA	(301) 771-4950
			( )
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO.
Arthur Hilgar	Previous Owner	P.O. Drawer G Lockport, N.Y. 14094	(716) 434-1912
Gary Edwards	Works for NYS E&G	4500 Vestal Parkway Binghamton, N.Y. 13902	(716) 795-9501
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☒ PERMISSION ☐ WARRANT	0900	Clear, sunny, 70 degrees

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
James Shultz	EA Science & Technology, Inc.	(914) 692-6706

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
Linda K. McConnell		EA Science & Technology	(301) 771-4950	7 / 14 / 86 (MONTH DAY YEAR)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	030212799

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- X A. SOLID
- ☐ B. POWDER, FINES
- ☐ C. SLUDGE
- X D. OTHER waste oil (Specify)
- ☐ E. SLURRY
- ☐ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

- TONS 1560 Plastics
- CUBIC YARDS
- ~~NO. OF DRUMS~~ gals 3000 waste oils

03 WASTE CHARACTERISTICS (Check all that apply)

- ☐ A. TOXIC
- ☐ B. CORROSIVE
- ☐ C. RADIOACTIVE
- ☐ D. PERSISTENT
- ☐ 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			
(OLW)	OILY WASTE	3000	Gallons	Disposal rate of 250 gal/yr in
SOL	SOLVENTS			1977
PSD	PESTICIDES			
(OCC)	OTHER ORGANIC CHEMICALS	1,000	lb/day	Solid phenolic & polyester
IOC	INORGANIC CHEMICALS			based plastics
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
MES	Iron	7439-89-6	Open Dump	9.80	mg/L
MES	Copper	7440-50-8	Open Dump	0.20	mg/L

V. FEEDSTOCKS (See Appendix for CAS Numbers) NOT APPLICABLE

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NYSDEC Report from DEC Reg 9 File
NYSDEC Albany File - Norton's Response to waste survey
NYSDEC Environmental Reg. File (Eismann)

EPA	POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS	I. IDENTIFICATION 01 STATE: NY 02 SITE NUMBER: 030212799

II. HAZARDOUS CONDITIONS AND INCIDENTS NONE

01 ☒ A. GROUNDWATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED 0
02 ☒ OBSERVED (DATE 11/13/85) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Residences within a 3 mi radius are served by surface water intakes from the Niagara River.

01 ☐ B. SURFACE WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED ______
02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known to exist.

01 ☐ C. CONTAMINATION OF AIR
03 POPULATION POTENTIALLY AFFECTED ______
02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known to exist.

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS
03 POPULATION POTENTIALLY AFFECTED ______
02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known to exist.

01 ☒ E. DIRECT CONTACT
03 POPULATION POTENTIALLY AFFECTED 7,218
02 ☐ OBSERVED (DATE ______) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The landfill is not adequately covered.

01 ☐ F. CONTAMINATION OF SOIL
03 AREA POTENTIALLY AFFECTED ______ (Acres)
02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known.

01 ☐ G. DRINKING WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED ______
02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Ground water is not currently used as drinking water within a 3 mi radius of the site.

01 ☐ H. WORKER EXPOSURE/INJURY
03 WORKERS POTENTIALLY AFFECTED ______
02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known.

01 ☐ I. POPULATION EXPOSURE/INJURY
03 POPULATION POTENTIALLY AFFECTED ______
02 ☐ OBSERVED (DATE ______) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	030212799

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known.

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)

None known.

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known.

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES (Spills Runoff Standing liquids Leaking drums) — 02 ☐ OBSERVED (DATE ________) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED ________ 04 NARRATIVE DESCRIPTION

Landfill has no contaminant.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known.

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known.

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE ________) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: ________

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NYSDEC Environmental Regulatory File (P. Eismann)
NY State Atlas of Community Water Systems, 1982.
Somerset Railroad Hydrogeologic Investigation, June 1984.
EA Site Inspection, 24 April 1985.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	030212799

II. PERMIT INFORMATION NOT APPLICABLE

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☐ A. NPDES				
☐ B. UIC				
☐ C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☐ G. STATE (Specify)				
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
☐ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☐ A. SURFACE IMPOUNDMENT	Plastics-	
☐ B. PILES	1560	tons
☐ C. DRUMS, ABOVE GROUND	Waste oils-	
☐ D. TANK, ABOVE GROUND	3000	gallons
☐ E. TANK, BELOW GROUND		
X F. LANDFILL		
☐ G. LANDFARM		
X H. OPEN DUMP		
☐ I. OTHER ______ (Specify)		

04 TREATMENT (Check all that apply)

- ☐ A. INCENERATION
- ☐ B. UNDERGROUND INJECTION
- ☐ C. CHEMICAL/PHYSICAL
- ☐ D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☐ H. OTHER ______ (Specify)

05 OTHER

X A. BUILDINGS ON SITE

06 AREA OF SITE

2-3 (Acres)

07 COMMENTS

1,000 pounds/day x 290 days/yr x 12 yrs = 1,740 tons of solid plastics

250 gals/yr x 12 yrs = 3000 gallons waste oils

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☐ B. MODERATE ☐ C. INADEQUATE, POOR X D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC

The landfill is not lined. It has not been adequately covered.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE X YES ☐ NO

02 COMMENTS

Site is not entirely fenced.

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

EA Science & Technology, Inc., Site Inspection, 17 April 1985.
NYSDEC Files.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE: NY | 02 SITE NUMBER: 030212799

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)

	SURFACE	WELL
COMMUNITY	A. X	B. ☐
NON-COMMUNITY	C. ☐	D. ☐

02 STATUS

ENDANGERED	AFFECTED	MONITORED
A. ☐	B. ☐	C. ☐
D. ☐	E. ☐	F. ☐

03 DISTANCE TO SITE

A. > 3 (mi)

B. ______ (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING

X B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available)

☐ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available)

☐ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER: Unknown

03 DISTANCE TO NEAREST DRINKING WATER WELL: Unknown (mi)

04 DEPTH TO GROUNDWATER: approx. 7 (ft)

05 DIRECTION OF GROUNDWATER FLOW: N - NW

06 DEPTH TO AQUIFER OF CONCERN: > 35 (ft)

07 POTENTIAL YIELD OF AQUIFER: unknown (gpd)

08 SOLE SOURCE AQUIFER: ☐ YES X NO

09 DESCRIPTION OF WELLS (Including useage, depth, and location relative to population and buildings)

95 percent of Niagara County, N.Y. is served by a public water supply system with the source water being a surface water. No wells within a 3-mile radius of the site have been identified. It is assumed that if any wells do exist, they are screened in the deeper regional aquifer.

10 RECHARGE AREA

☐ YES ☐ NO COMMENTS

11 DISCHARGE AREA

X YES ☐ NO COMMENTS Eighteen Mile Creek located approximately 1,000 ft south of site

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

X A. RESERVOIR, RECREATION DRINKING WATER SOURCE

☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES

☐ C. COMMERCIAL, INDUSTRIAL

☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
Eighteen Mile Creek	☐	± 1,000 ~~(mi)~~
	☐	(mi)
	☐	(mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE	TWO (2) MILES OF SITE	THREE (3) MILES OF SITE
A. 7,218 NO. OF PERSONS	B. 22,500 NO. OF PERSONS	C. 30,164 NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION: adjacent (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE: 5925

04 DISTANCE TO NEAREST OFF-SITE BUILDING: adjacent (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

Site is located within the city limits of Lockport, New York. Setting is best described as a village with industrial buildings located adjacent to site.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	030212799

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. $10^{-6} - 10^{-8}$ cm/sec ☐ B. $10^{-4} - 10^{-6}$ cm/sec ☒ C. $10^{-4} - 10^{-3}$ cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK (Check one)

☐ A. IMPERMEABLE (Less than 10^{-6} cm sec) ☐ B. RELATIVELY IMPERMEABLE ($10^{-4} - 10^{-6}$ cm sec) ☒ C. RELATIVELY PERMEABLE ($10^{-2} - 10^{-4}$ cm sec) ☐ D. VERY PERMEABLE (Greater than 10^{-2} cm sec)

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH
5-10 (ft)	unknown (ft)	unknown

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
6 (in)	2 (in)	3 %	NW	9 %

09 FLOOD POTENTIAL

SITE IS IN ______ YEAR FLOODPLAIN

10 ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE	OTHER
A. ______ (mi)	B. > 3 (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)

N/A (mi)

ENDANGERED SPECIES: ______

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AGRICULTURAL LANDS: AG LAND
A. adjacent (mi)	B. 0.08 (mi)	C. ______ (mi)	D. 0.7 (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

The site is an open, vegetated field that is relatively flat. The site rises to the south, and surrounding areas are more heavily vegetated. On the western perimeter of the site is the Somerset Railroad cut. Industrial buildings located immediately adjacent to the site. Eighteen Mile Creek is located approximately 1,000 ft south of the site.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NYSDEC Files.
EA Site Inspection, 29 April 1985
U.S.G.S. Topographic Maps
U.S. Dept. of Commerce - Climatic Atlas of the United States, 1968

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	030212799

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER	5	EA Science and Technology	
SURFACE WATER			
WASTE			
AIR			
RUNOFF			
SPILL			
SOIL			
VEGETATION			
OTHER			

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS

IV. PHOTOGRAPHS AND MAPS

01 TYPE X GROUND X AERIAL

02 IN CUSTODY OF EA Science and Technology
(Name of organization or individual)

03 MAPS
☐ YES
☐ NO

04 LOCATION OF MAPS

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	030212799

II. CURRENT OWNER(S)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
James Hoden		520 Mill Street		Lockport	NY	14094

PARENT COMPANY (if applicable)

08 NAME	09 D+B NUMBER	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE	12 CITY	13 STATE	14 ZIP CODE

III. PREVIOUS OWNER(S) (List most recent first)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
Arthur E. Hilgar		P. O. Drawer G		Lockport	NY	14094
Arthur H. Hilgar		520 Mill Street		Lockport	NY	14094
Norton Lab, Inc.		520 Mill Street		Lockport	NY	14094

IV. REALTY OWNER(S) (If applicable, list most recent first)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Interview with Arthur Hilgar, Jr.
NYSDEC, Albany, N.Y., Files

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	030212799

II. CURRENT OPERATOR *(Provide if different from owner)*

01 NAME		02 D+B NUMBER
03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE
08 YEARS OF OPERATION	09 NAME OF OWNER	

OPERATOR'S PARENT COMPANY *(If applicable)*

10 NAME		11 D+B NUMBER
12 STREET ADDRESS *(P.O. Box, RFD #, etc.)*		13 SIC CODE
14 CITY	15 STATE	16 ZIP CODE

III. PREVIOUS OPERATOR(S) *(List most recent first; provide only if different from owner)*

01 NAME		02 D+B NUMBER
Norton Lab, Inc.		
03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*		04 SIC CODE
520 Mill Street		
05 CITY	06 STATE	07 ZIP CODE
Lockport	NY	14094
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD	
≥ 12	Arthur Hilgar, Sr.	
01 NAME		02 D+B NUMBER
03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD	
01 NAME		02 D+B NUMBER
03 STREET ADDRESS *(P.O. Box, RFD #, etc.)*		04 SIC CODE
05 CITY	06 STATE	07 ZIP CODE
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD	

PREVIOUS OPERATORS' PARENT COMPANIES *(If applicable)*

10 NAME		11 D+B NUMBER
12 STREET ADDRESS *(P.O. Box, RFD #, etc.)*		13 SIC CODE
14 CITY	15 STATE	16 ZIP CODE
10 NAME		11 D+B NUMBER
12 STREET ADDRESS *(P.O. Box, RFD #, etc.)*		13 SIC CODE
14 CITY	15 STATE	16 ZIP CODE
10 NAME		11 D+B NUMBER
12 STREET ADDRESS *(P.O. Box, RFD #, etc.)*		13 SIC CODE
14 CITY	15 STATE	16 ZIP CODE

IV. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	030212799

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER
Norton Lab, Inc.	

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE
520 Mill Street	

05 CITY	06 STATE	07 ZIP CODE
Lockport	NY	14094

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P O Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

NYSDEC Albany, N.Y. , Files

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	030212799

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ E. CONTAMINATED SOIL REMOVED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ F. WASTE REPACKAGED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ G. WASTE DISPOSED ELSEWHERE — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ H. ON SITE BURIAL — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ L. ENCAPSULATION — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ N. CUTOFF WALLS — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	030212799

II PAST RESPONSE ACTIVITIES *(Continued)*

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☒ S. CAPPING/COVERING — 02 DATE 1976 03 AGENCY NYS DEC
04 DESCRIPTION Site ordered closed. A final soil cover was placed over the Norton Lab Landfill.

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ V. BOTTOM SEALED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ W. GAS CONTROL — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ X. FIRE CONTROL — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ Y. LEACHATE TREATMENT — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ Z. AREA EVACUATED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ 1. ACCESS TO SITE RESTRICTED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ 2. POPULATION RELOCATED — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE ______ 03 AGENCY ______
04 DESCRIPTION

III. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

NYSDEC Files.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NY	030212799

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY/ENFORCEMENT ACTION X YES ☐ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT ACTION

N.Y. State DEC requested that the site be covered and closed in 1976. Landfill received a final cover of soil.

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NYSDEC Files.

6

6. REMEDIAL COST ESTIMATE

Based upon the results of this Phase II investigation, no remedial action is currently recommended. However, it is recommended that a long-term, ground-water monitoring program be implemented to evaluate changes in contaminant concentrations. The total cost for conducting ground-water monitoring at the five Phase II wells, sampling two to four times annually over a 1-year period, ranges from $32,000 to $66,000. This is based on conducting analyses for the full Hazardous Substances List.

It is also recommended that sampling and analysis of eight of the Somerset Railroad Corporation's monitoring wells be conducted. The additional cost for conducting sampling and analysis (two to four times annually for a one year period) of the eight Somerset Railroad Corp. monitoring wells would range from $66,000 to $135,000.

APPENDIX 1

APPENDIX 1.3.1-1

The Phase II investigation of the Norton Labs site involved a site inspection, geophysical surveying, installation and sampling of test borings and observation wells, and an update on record searches and interviews for the Phase I investigation. The following agencies or individuals were contacted:

Contact	Information Received
Mr. Peter Carney New York State Electric & Gas Corp. (Somerset Railroad) 4500 Vestal Parkway Binghamton, New York 13902 (607) 729-2551	Somerset Railroad Hydrogeologic logic Report (1984) Figures from Bechtel Study (1982)
Mr. Arthur Hilgar, Sr. Owner McGonnegale-Hilgar Roofing P.O. Drawer G Lockport, New York 14094 (716) 434-1912	Interview
Mr. James Hoden, Sr. President/Owner Twin Lake Chemical 520 Mill Street Lockport, New York 14094 (716) 433-3824	Interview
Mr. Jack Tygert New York State Department of Environmental Protection 600 Delaware Avenue Buffalo, New York (716) 847-4585	Telephone interview--no additional information available since Phase I report
Mr. Joe Campizzi Staff Environmental Specialist (Geologist) New York State Electric & Gas Corp. (Somerset Railroad) 4500 Vestal Parkway Binghamton, New York 13902 (609) 729-2551 Ext. 4314	Telephone interview

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Contact	Information Received
Ms. Mary Mackintosh G.W. Hydrologist New York State Department of Environmental Conservation 600 Delaware Avenue Buffalo, New York (716) 847-4585	Telephone interview--no additional information available since Phase I report
Mr. Gary P. Edwards New York State Electric & Gas Corp. 4500 Vestal Parkway Binghamton, New York 13902 (716) 795-9501 Ext. 5029	Interview
Mr. Lawrence T. Clare New York State Department of Environmental Conservation 600 Delaware Avenue Buffalo, New York (716) 847-4585	No additional information available since Phase I report
Mr. Jack Kehoe Deputy Director Niagara County Dept. of Health 1010 E. Falls Street Niagara Falls, New York 14302	Water Supply Information
Mr. Mike Hopkins Niagara County Health Department 1010 East Falls Road Niagara Falls, New York 14302 (716) 284-3128	Information of Site History
Mr. Phil Newman Chief Operator City of Lockport Water Dept. 1 Locks Plaza Lockport, New York 14094	Water Supply Information
Mr. Thomas Darroch Fire Chief Lockport Fire Dept. Fire Dept. Headquarters Municipal Building Lockport, New York 14094 (716) 439-6724	Information on Fire and Explosion Threat

Contact	Information Received
Mr. John Ozard Senior Wildlife New York State Department of Environmental Conservation Wildlife Resources Center Delmar, New York 12054	Information on Critical Habitat
Mr. Steve Meridian Regional Fisheries Manager New York State Department of Environmental Conservation Region 9 128 South Street Olean, New York 14760 (716) 372-0645	Surface Water Information
Mr. Dick Tillman District Conservationist Niagara County Soil Conservation Service 4487 Lake Avenue Lockport, New York 14094 (716) 434-4949	Information on Irrigated Land

APPENDIX 1.3.2-1

GEOPHYSICAL FIELD EQUIPMENT AND GENERAL METHODOLOGY

Three geophysical instruments were used at the site to evaluate general subsurface conditions (geology, depth to ground water, and contamination). The following provides a description of the equipment used.

TERRAIN CONDUCTIVITY

EM-34

The Geonics, Ltd., EM-34 terrain conductivity meter is portable and nondestructive. The EM-34 has variable depth capability which allows the user to measure subsurface conductance at more than one depth. This is important when depth to rock or approximate depth of contamination plumes is required. The EM-34 has separate transmitter and receiver coils. The coils are connected by either a 10-, 20-, or 40-meter cable which determines the general depth range being investigated. In addition to being able to change cable lengths, the operator can change the receiver and transmitter orientations (horizontal and vertical dipole modes) to gather more detailed subsurface information.

The transmitter induces very small (primary field) currents into the earth from a magnetic dipole transmitter coil producing a weak secondary magnetic field. The equipment compares the weak secondary field with the primary field using advanced current techniques to produce direct terrain conductivity (mmhos/m) readings. Having the capability of using all three cable lengths, the operator can gather important subsurface information from at least four effective depths (25, 45, 90, and 180 ft).

RESISTIVITY

Resistivity soundings were made using a Bison 2350B earth resistivity meter.

The 2350B earth resistivity meter measures the nature of subsurface materials in ohm-ft. This technique employs four electrodes (two outer and two inner) installed along a straight line (for the Wenner and Schlumberger arrays). The instrument induces a DC current into the ground through the outer electrodes, and the potential difference between the two inner electrodes is measured. This potential difference may be affected by differences in geology, porosity, dissolved ions, soil moisture and/or water quality. As the electrode positions are moved, specific potential differences are recorded. For each potential difference, apparent resistivity can be calculated. When the apparent resistivity values are plotted, the nature of subsurface conditions (location of voids, sand and gravel, water quality, etc.) can be inferred.

PROTON MAGNETOMETER

A Geometrics G-856 proton magnetometer was used to evaluate subsurface conditions for large concentrations of buried ferrous materials. This equipment measures the total intensity of the earth's magnetic field (gammas).

The proton magnetometer utilizes the precession of spinning protons or nuclei of the hydrogen atom to measure the intensity of the earth's magnetic field. The spinning of the protons act as small magnetic dipoles. When an electrical current is generated by the coil, the protons temporarily align themselves with respect to the coil. When the current is removed, the protons spin in the direction of the earth's magnetic field (which is influenced by external interferences such as ferrous material). As the protons spin they generate a small electrical signal. This signal produces a frequency which is proportional to the field intensity, and is converted into gammas by the G-856.

GEOPHYSICAL SURVEYS

Perimeter Conductivity Survey (Performed by EA Science and Technology)

Initially, an Electromagnetic Terrain Conductivity 30 x 30 ft grid survey was conducted using a Geonics LTD. EM-34-3L Terrain Conductivity instrument. A grid survey was performed as opposed to a perimeter survey due to the sites relatively small size and difficulty in conducting a line survey. Gridding the site allowed for a complete, more detailed composite of the site with respect to fill distribution, geology and contaminant plume configurations. Instrument readings were made in both the horizontal and vertical dipole modes with a 20 m intercoil spacing providing effective depths of penetration of 45 and 90 ft, respectively. Data was obtained along each line at 30-ft intervals.

Although cultural interference sources were present along the northeast property boundary (i.e., railroad tracks, overhead power lines) the effect was apparently negligible.

The resultant data for both the horizontal (effective depth 45 ft) and vertical (effective depth 90 ft) dipole modes are presented in Figures A-1 and A-2, respectively. Figures A-1 and A-2 illustrate moderate and high anomalous zones.

Resistivity Survey (Performed by EA Science and Technology)

A vertical resistivity sounding R-1 was performed within the EM anomaly in the north central portion of the site (Figures A-1 and A-2). The sounding was performed utilizing the Lee modification of Wenner electrode configuration.

Data obtained from the R-1 sounding produced a four layer model. The upper layer 0-1.5 meters (0-4.95 ft) is interpreted as unsaturated fill. The second layer which exhibited high resistivity of 2,500 m from approximately 1.5-2.8 meters (4.95-9.24 ft) is interpreted to represent a fill of high resistivity (i.e., plastic, wood, roofing material). The third layer from 2.8 to 37.8 meters (5.24-124.74 ft) is interpreted as a highly to moderately fractured bedrock. The fourth layer below 37.8 meters (124.74 ft) being more resistive, is interpreted to be rock exhibiting lower porosity and/or fraturing. Depth to water is anticipated to be 9 ft.

Magnetometer Grid Survey (Performed by Delta Geophysical Services)

Six magnetometer survey lines were performed over the site using a Geometrics G-856 proton magnetometer. The magnetometer survey utilized the same grid network established for the terrain conductivity survey. Magnetometer data were recorded at 30-ft intervals.

Interpretation and analysis of the data indicate areas beneath the site where subsurface ferrous material may be present. These areas are shown on the map as anomalous zones (Figure A-4). In addition, the magnetometer data indicate that the remaining area surveyed may contain small amounts of scattered ferrous material.

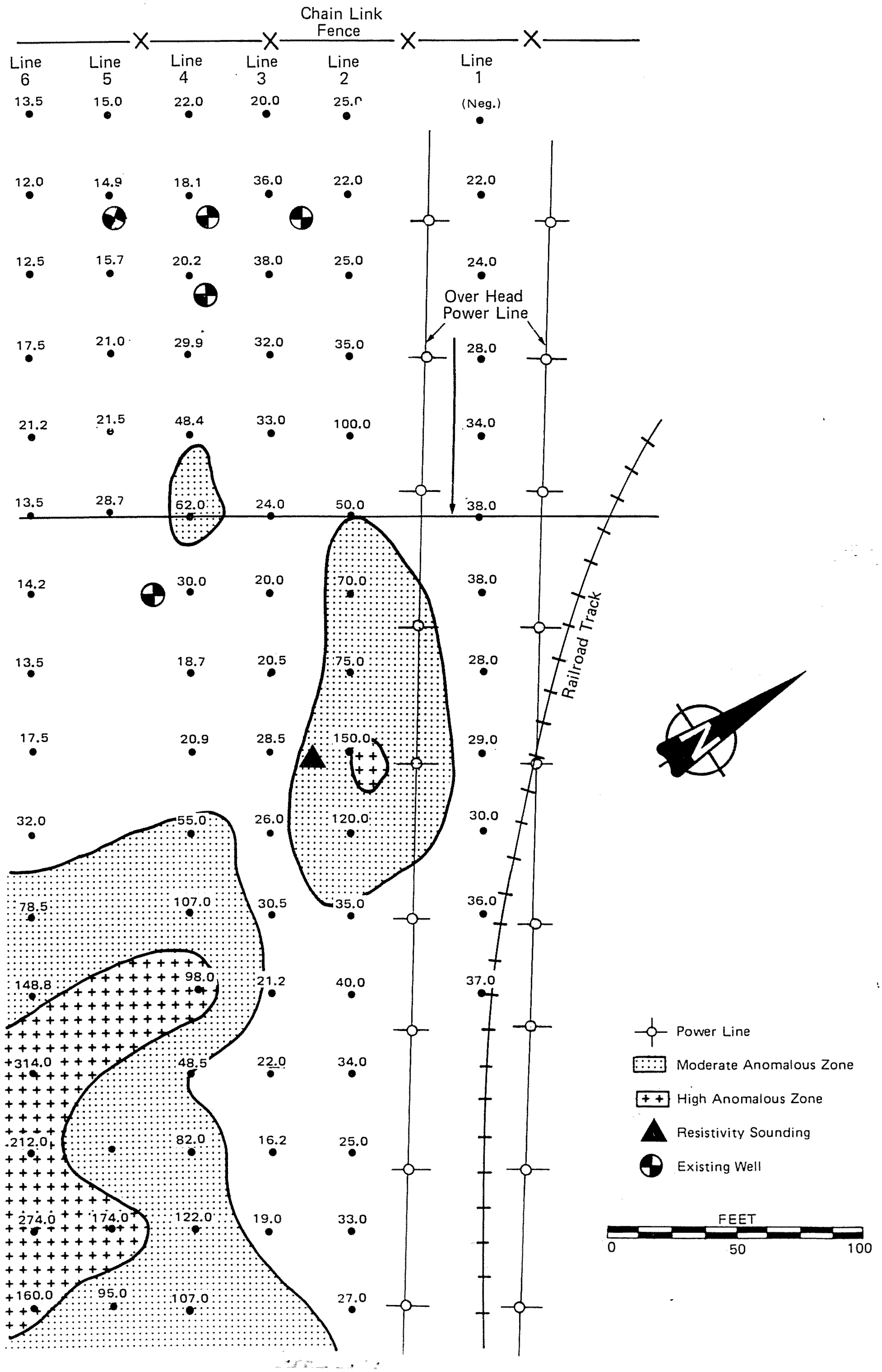


Figure A-1. Norton Labs terrain conductivity grid survey, effective depth: 45 ft.

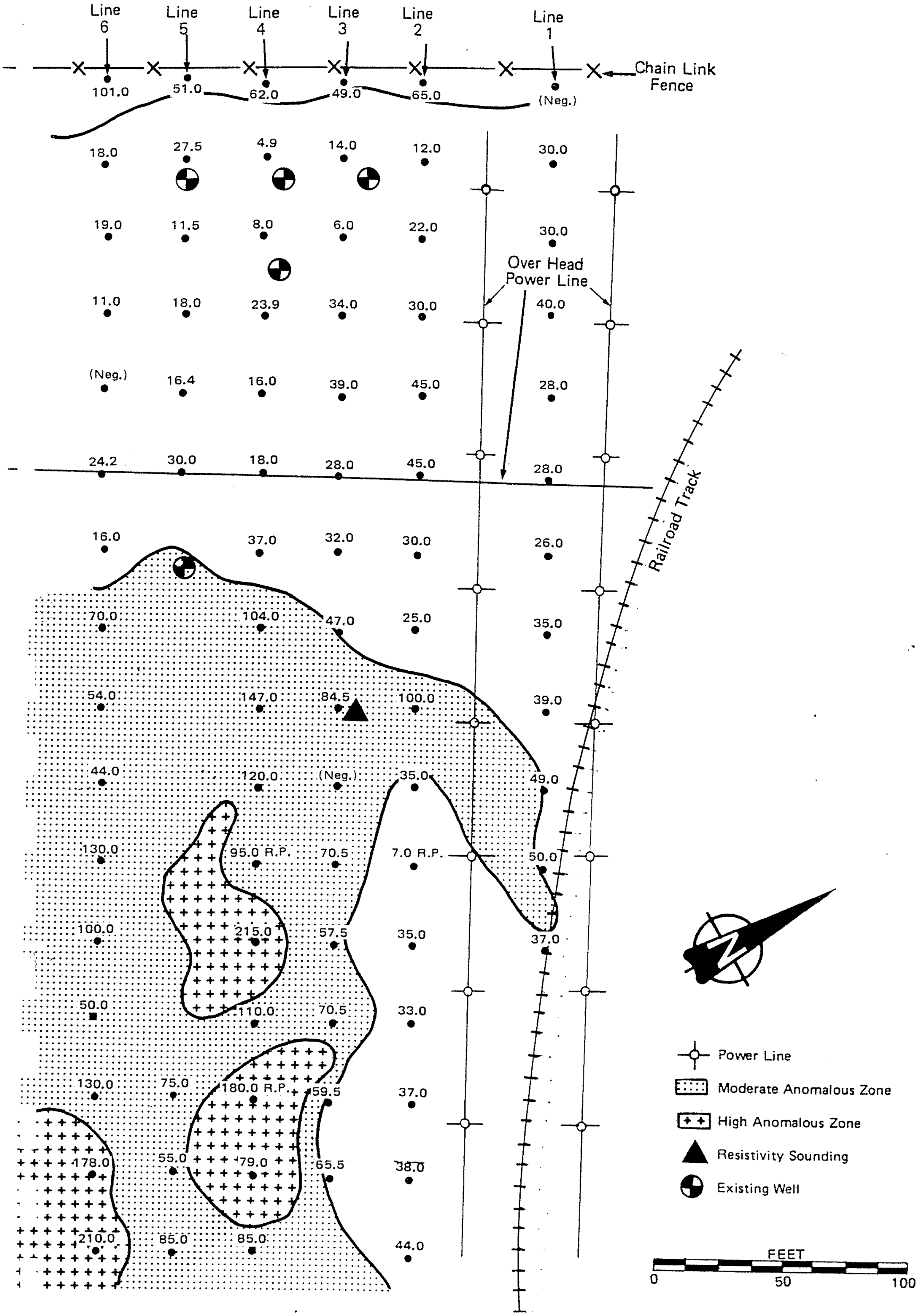
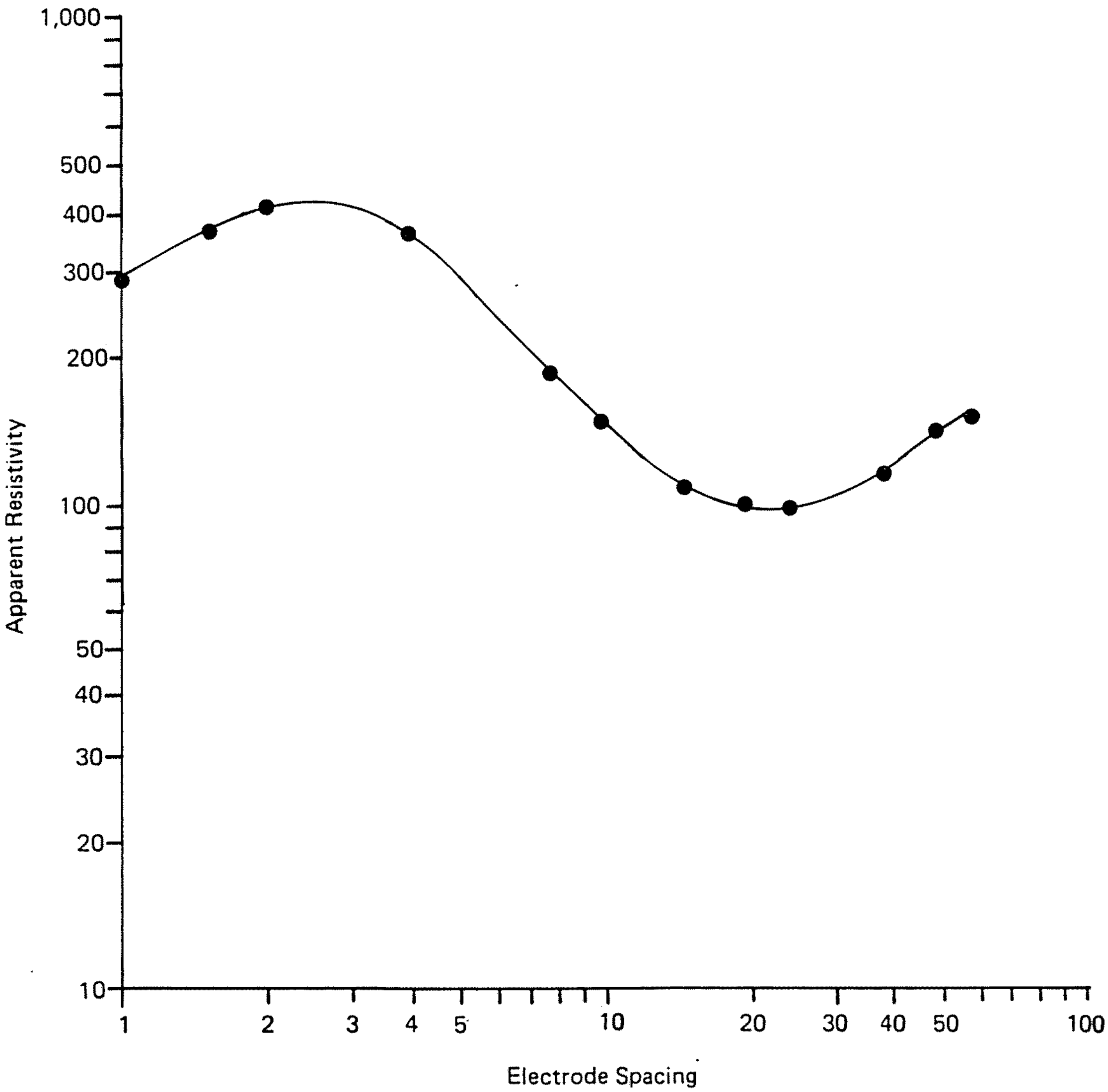


Figure A-2. Norton Labs terrain conductivity grid survey, effective depth: 90 ft.



FigureA-3. Norton Labs resistivity sounding curve, R-1.

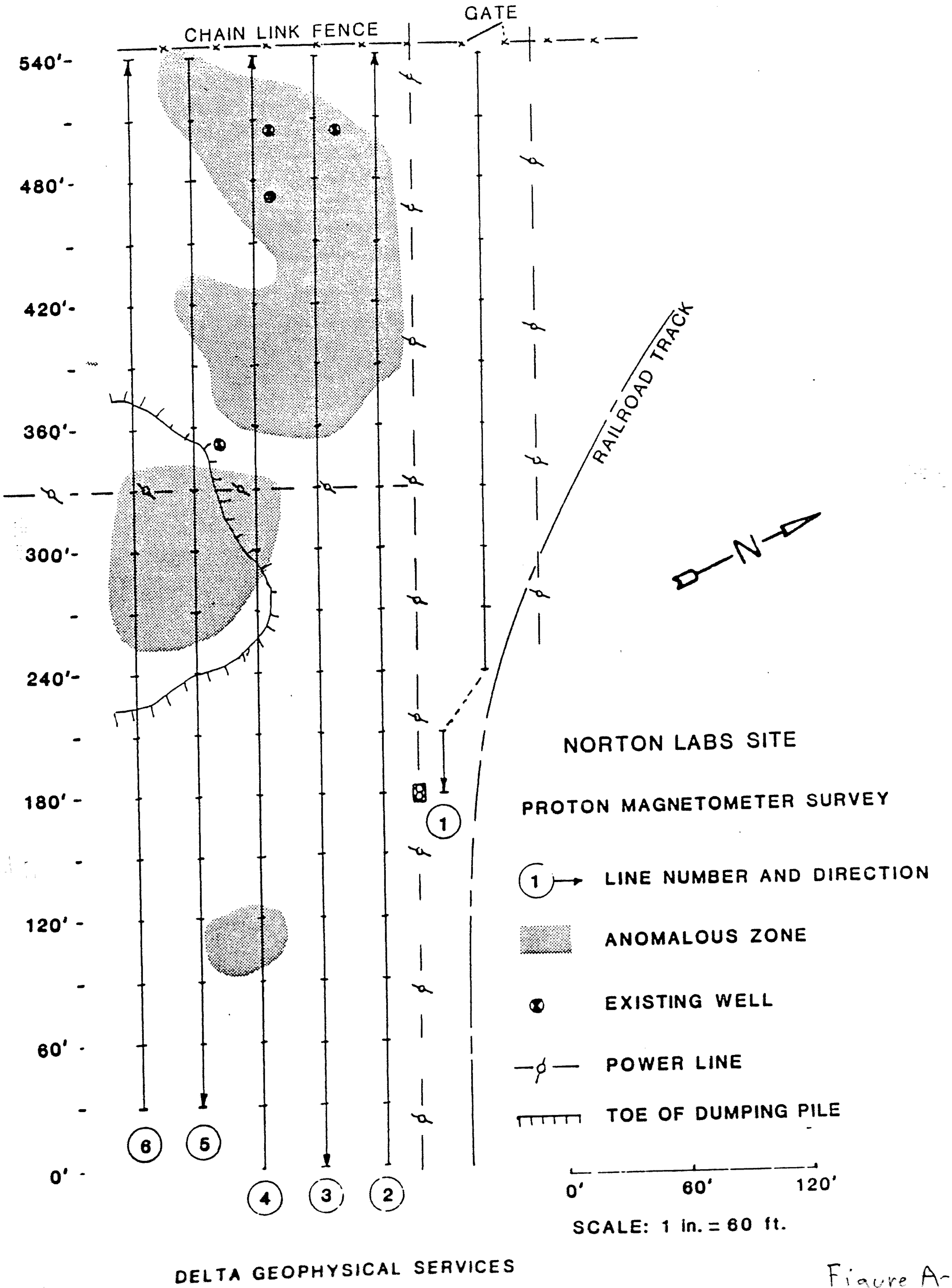

CHAIN LINK FENCE
GATE
540'
480'
420'
360'
300'
240'
180'
120'
60'
0'
RAILROAD TRACK
N
NORTON LABS SITE
PROTON MAGNETOMETER SURVEY
1
LINE NUMBER AND DIRECTION
ANOMALOUS ZONE
EXISTING WELL
POWER LINE
TOE OF DUMPING PILE
6
5
4
3
2
0'
60'
120'
SCALE: 1 in. = 60 ft.
DELTA GEOPHYSICAL SERVICES

Figure A-4

APPENDIX 1.3.2-2

MONITORING WELL INSTALLATION AND TESTING PROCEDURES

MONITORING WELL DRILLING

Well drilling was accomplished using a CME-75 truck-mounted drill rig. A hollow-stem auger drilling method was used in unconsolidated sediment, using a 4-1/2-in. I.D. auger. Bedrock was drilled with a 4-1/2-in. diameter steel drill bit for installation of the 3-in. diameter protective casing. The boring was then completed to depth using a 2-15/16-in. diameter roller bit. Split-spoon (24-in. length, 2-in. O.D.) soil samples were taken every 5 ft in the unconsolidated sediment, and drill cuttings were collected every 5 ft in the bedrock. Soil sampling was performed at each cluster location at the location of the deeper well. This provided adequate soil and water table information to accurately install the shallow wells which were placed 8 ft from the deep well at each cluster. Split-spoon sampling was also performed in overburden well NL-5.

Prior to the drilling of each boring/well, and at the completion of the last boring/well, the drilling equipment which came in contact with subsurface materials was pressure-washed with hot potable water. The split-spoon sampler was pressure-washed with hot potable water before and after each sample. An HNU was used to monitor the potential organic vapors emitted during drilling operations and from each soil sample. Samples of the major soil/unconsolidated sediment types encountered during drilling were collected and grain-size analysis was performed on a selected representative sample. All drill cuttings, fluids, and development/purging water were left on, or discharged to, the ground surface in the immediate area of the activity. An HNU reading of at least 5 ppm above ambient readings was established by NYSDEC as the criteria above which fluids and cuttings were to be collected and drummed for future appropriate disposal by NYSDEC. No such readings were encountered.

Well Construction

Immediately prior to installation, the well pipe and screen were cleaned with a water-pressure washer. The deep well-casings were installed into a 4-1/2 in. rock borehole using a 3-in. steel casing installed to a depth adequate to case off the upper water-bearing zone (Zone 1). The annulus of the borehole (outside the steel casing) was grouted and allowed to cure overnight. A 2-15/16 in. diameter open hole was drilled through the rock to a depth adequate to penetrate into the second aquifer of concern (Zone 2). Overburden wells were installed by augering into overburden with a hollow-stem auger (6-1/4 in. O.D., 4-1/2 in. I.D.). One foot of No. 4 gravel pack was then placed into the borehole bottom, and 2-in. diameter PVC screen and riser of appropriate length was lowered down inside the auger. No. 4 gravel pack was then placed around the screen to about 1 ft above the top of the screen interval. The auger was withdrawn slowly during this process. Once the auger was withdrawn, a 1-ft bentonite pellet seal was placed above the top of gravel pack, followed by cement grout to the surface. A 5-ft length of protective steel casing was placed into the grout around the PVC stickup.

Well Development

The development of the monitoring wells was performed by pumping as soon as practical after well installation. Development of the overburden wells was accomplished using a centrifugal pump. Clean 3/4-in. polyethylene hose was attached to the pump at the surface and lowered down to the bottom of the well. All three overburden wells were pumped dry 2-3 times. The water discharged was maroon-colored and cloudy, and cleared up somewhat with the second or third pumping.

Rock wells were developed with an air compressor. A clean length of 3/4-in. polyethylene hose was connected to the air compressor and the hose lowered into the open hole in rock. The saturated portion of each open borehole was alternately surged and pumped to remove fines. Both rock wells were blown dry, so the procedure was repeated several times. The water discharged was slightly grey and cloudy but cleared up after repeated surging and pumping.

Pump Testing of Monitoring Wells

In-well pumping tests were performed at the Norton Lab site on 6 and 7 October 1985. A clean stainless steel Keck submersible pump (Model SP-84), operating from a 12-V battery, was lowered into the bottom of the well to be tested along with 1/2-in. clean polyethylene discharge hose. An initial static water level was recorded with an electronic sounder. Pumping was begun and changes in static water level (drawdown) were measured and recorded over time. In addition, the pumping rate was measured by filling a calibrated 5-gal bucket from the discharge line during a set time interval.

At the instant pumping was stopped, the time was noted and recovery of the well (recharge) began. Water-level measurements were again recorded over time until 90 percent recovery of original static level was achieved, as possible.

The submersible pump and water-level sounder were both cleaned after use in each well by the following procedure: (1) Alconox and de-ionized water solution wash, (2) de-ionized water rinse, (3) acetone rinse, and finally (4) a hexane rinse and air dry. In addition, polyethylene hose used for one well was discarded and clean discharge hose was used for the next well.

APPENDIX 1.3.2-3

SAMPLING PROCEDURES

All sampling was conducted by experienced personnel under supervision of the project manager. Sampling was accomplished under a rigorous chain- of-custody protocol. All samples were placed in containers of appropriate composition, containing appropriate preservatives as presented in Table 7-1 of the Work/QA Project Plan for the current Amendment to Perform Phase II Work dated 16 January 1985. Refer also to Section 13, Sample Custody Procedures, of the Work QA/Project Plan.

Monitoring Well Ground-Water Sampling

Sample collection was performed at the Norton Lab site on 16 and 17 November 1985. Prior to purging and sampling of wells, static water levels were measured and recorded. The volume of water to be purged from a well before sampling was based on four times the open space of one borehole volume. Each well was purged using a Keck (Model SP-84) submersible pump. A new length of clean 1/2-in. polyethylene discharge hose was used at each well and the pump was cleaned in the following manner after each use: (1) an Alconox and de-ionized water solution wash followed by (2) de-ionized water rinse, (3) acetone rinse, and finally, (4) a hexane rinse and air dry. All wells purged dry before purging of 4 borehole volumes was achieved. The wells were left overnight to recharge.

Sampling of ground water was performed using clean individual 1-1/2 in. diameter Teflon bailers with clean line for each well. The full array of sample containers were filled, labeled, and put on ice in coolers. An additional bailer of water was retrieved from each well to measure pH and conductivity. All coolers were shipped with a chain-of-custody form designating each sample, the date and time samples were taken, the total number of samples, and the signature of field personnel performing the sampling. The coolers were shipped the same day sampling was completed via Federal Express to EA's Baltimore, Maryland, laboratory for chemical analysis.

The field sampling at Norton Lab was performed as planned with the exception that the leachate/seep sample was not obtained from the railroad cut. At the time that sample collection was performed, there was no discharge of leachate from the railroad cut adjacent to the site.

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

COMMUNICATIONS RECORD FORM

Distribution: (X) Norton Labs ______, ( ) ______,
( ) ______, ( ) ______,

(X) Author

716/434-1912

Person Contacted: Arthur Hilgar, Sr. Date: 4/12/85

Title: owner - McGonnegale-Hilgar Roofing; previous owner Norton Labs site

Affiliation: McGonnegale-Hilgar

Type of Contact: Telephone

Address: Mill St. Lockport, NY

Person making Contact: Gloria McCleary

Communications Summary: He no longer owns the site he sold the site last year to Twin Lake Chemical. Twin Lake Chemical leased/rented the property for 9 years before buying it from Hilgar.
Call James Hedan, Sr.
Twin Lake Chemical (716) 433-3824
Hilgar is the only one who knows what has been dumped at the site. He thought it was mostly plastic casings, etc.
He will give us a tour of the site.

Signature: Gloria

EA 0079 3/12/79

DP/C 048

Appendix 1.4.1-2

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

COMMUNICATIONS RECORD FORM

Distribution: (X) Norton Labs, ( ) ____,
( ) ____, ( ) ____,
(X) Author

716/433-3824

Person Contacted James Hodan, Sr. Date 4/12/85

Title President/owner

Affiliation Twin Lake Chemical Type of Contact Telephone

Address 520 Mill Street Person making Contact JDM

Lockport, NY.

Communications Summary He rented/leased the property from Hilgar before buying it. Since there was a major fire on the property, the disposal area is different (in looks) from when the dumping/disposal took place when Norton Labs was in business.

Signature [signature]

EA 0079 3/12/79

DP/C 048

Source: Niagara County Department of Health.

NAME:

NORTON LABS (DEC No. 932029)

LOCATION:

This site is a one acre inactive landfill located in Lockport, NY 100 feet south of Mill Street and 20 feet east of the top of slope of the Somerset Railroad Corporation cut.

A site sketch is attached.

OWNERSHIP:

This property was owned by Norton Labs, Inc. at the time of disposal. The current owner was not determined.

HISTORY:

Norton Labs operated plants in Lockport until bankruptcy forced their closing in 1982. The original plant was located at 520 Mill Street and was later moved to 521 Mill Street. Norton manufactured plastic parts from polyester resin with glass strands and sisal fillers and from phenolic resin with wood flour filler. A 1977 estimate of waste generation was 1000 pounds per day, of which 80 to 90% was associated with the polyester based plastics and the remainder with the phenolic based plastics. The primary wastes were solid waste plastic and defective plastic parts. The Interagency Task Force report states that 250 gallons of waste oil per year were dumped here. The source of this information is not known. See Attachment 6 - 3 Appendix 1.4.1-5

Until the mid 1970's, Norton Labs operated a disposal area south of Mill Street. After that time, most of the wastes were either recycled or hauled off-site for disposal. Some inert plastic material may have been disposed of west of the parking area west of the plant building at 521 Mill St. As the company is now defunct, Norton personnel were not available to confirm this information.

The site south of Mill Street was covered with soil in 1976 at the request of this department. This area was not subsequently used for disposal although an adjacent area was used for dumping of demolition debris by McGonigle and Hilger Roofing of 520 Mill Street from 1978 to 1982.

In August 1982, Lane Construction, Inc. inadvertently uncovered a portion of the landfill during construction of the Somerset Railroad. The railroad cut is adjacent to the landfill. A steel drum was punctured, emitting a solvent -like odor. Also, a thick green liquid seeped to the surface nearby which had an odor similar to a non-solvent degreaser (Lysol). The majority of the fill appeared to be plastic waste and small plastic parts (distributor rotors, door knobs, etc). Fifteen cubic yards of contaminated earth were removed for secure landfill disposal (although analysis found no hazardous characteristics). The Railroad agreed to cover the remaining exposed wastes.

Once completed, the Somerset Railroad plans to monitor any seepage into the railroad cut and the water collected in the associated drainage system.

RESULTS OF PREVIOUS SAMPLING:

Samples were taken by SCA Chemical Services of the waste materials prior to disposal of material uncovered in August 1982. The analysis was unable to identify the components of the wastes. The material was found to exhibit none of the characteristics of a hazardous waste (corrosivity, ignitability, reactivity and EP toxicity) and was considered non-hazardous by the testing firm (Recra Research).

EXAMINATION OF AERIAL PHOTOGRAPHY:

Aerial photography provided no additional information.

SOILS/GEOLOGY:

Soils in this area are characteristically shallow and stony. It is possible that some of the soil may have been removed prior to landfilling.

The U. S. Soil Conservation Service classifies this area as "Rockland - nearly level" in Soil Survey of Niagara County. This classification indicates that 70 to 80% of the surface is covered with stones or rock outcrops. Surrounding areas are designated "Rockland - steep" or "Quarry".

Vegetation is sparce grass and scrub brush. Rock outcrops cause many bald areas.

Bedrock is of the Clinton and Albion groups of various shales and sandstones to over 100 feet in depth. According to Johnston (1964) these units are capable of transmitting groundwater, primary through joints and fractures, but recharge is limited by the nearly impervious Rochester shale unit overlying most of the formation. Wells in these formations generally produce low yields (2 to 3 gpm). Water quality is generally poor because of hardness and salinity.

GROUNDWATER:

Boring records from nearby sites indicate that very little free water is available in the bedrock and that overburden wells are intermittent.

The cuts to be made (up to 26 feet) adjacent to the site for the railroad ROW are likely to collect any groundwater from the site and railroad drainage would discharge this water to Eighteen Mile Creek. Therefore, this cut could act as a conduit for leachate from this site, if leachate is generated.

There are no known drinking water wells in this area and no known users of groundwater.

SURFACE WATER:

Eighteen-Mile Creek is located 600 feet south of the disposal area at an elevation 110 feet below the landfill. A very steep embankment (nearly vertical) over 100 feet high begins at the creek bank. It is obvious that runoff from the landfill area enters the creek.

SURFACE WATER (continued)

It is noted that Eighteen Mile Creek receives discharges from several industries and the Lockport Wastewater Treatment Plant. It would appear that the effect of the Norton site, if any, on water quality would be small by comparison.

Eighteen-Mile Creek enters Lake Ontario twelve miles downstream at Olcott. There are no drinking water intakes downstream.

There are no wetlands near the site and the site is not in a 100-year flood plain.

AIR/FIRE/EXPLOSION:

No problems with air emissions, fire or explosion potential are likely as long as the wastes remain covered. When uncovered in 1982, solvent odors were emitted. The flashpoint of a sample of waste material was greater than 160^{0} F. No methane generation is anticipated.

The site is over 1000 feet from any residence. The area to the south and east is industrial, the area to the west is idle and the area to the north and northwest are vacant industrial (former Norton Plant) within 1000 feet and residential beyond 1000 feet.

DIRECT CONTACT:

The materials buried here are not known to be toxic or irritating. If the wastes remain covered, the potential for direct contact is slight. In addition, public use of this area is minimal.

SUMMARY:

The majority of wastes disposed of at this site are waste plastics, which are essentially inert and non-toxic. Small quantities of other unknown wastes may be present. A potential pathway for migration exists in the adjacent railroad cut.

RECOMMENDATIONS:

The rock cut and side slopes of the railroad cut should be inspected at least annually for visible seepage from the landfill. A follow-up inspection should be made upon the completion of the railroad construction to determine whether or not the landfill is adequately closed. No sampling or further investigation is considered necessary unless seepage or other problems are found. The Somerset Railroad Company will reportedly monitor the drainage water prior to discharge to Eighteen-Mile Creek.

EA SCIENCE AND TECHNOLOGY
A Division of EA Engineering, Science, and Technology, Inc

1.4.1-4
1 of 2

COMMUNICATIONS RECORD FORM

Distribution: ( ) Norton Labs File, ( ) ______
( ) ______, ( ) ______
( ) Author

Person Contacted: Mike Hopkins Date: 4/25/88

Phone Number: (716) 284-3128 Title: ______

Affiliation: Niagara County Health Dept Type of Contact: phone

Address: 1010 E. Falls Rd Person Making Contact: L Rogers
Niagara Falls, NY 14302

Communications Summary: I called Mr Hopkins to discuss his comments regarding the Norton Labs Draft Phase II Report. He briefly discussed the site history with me. The site was still active in the early 1970's. However the plant was located across the street (shown as abandoned bldgs on EA Site Map). In 1975, it moved to present building location. The NCDH does not believe there was any disposal on the old plant property.

In 1982-1983, during construction of the Somerset Railroad, it became obvious what the extent of the landfill was. During the railroad construction a portion of the landfill was uncovered. Several 55-gal steel drums were uncovered, as well as plastic scrap. The drums smelled of volatiles. Two of the drums were located at the surface. Mr Hopkins believes these were removed but there were several underneath these ~~at~~ two which may ~~have been covered over,~~ still be there.

~~The following year seeps~~ In the following year, seeps were discovered emanating from the ~~road~~ rail cut adjacent to the site. They appeared to show signs of ~~dis~~ contamination - ~~there was~~ discoloration & an oily ~~organic~~ sheen were observed. Mr Hopkins indicated that samples collected by Somerset RR personel from a ditch below the seeps indicated the water

(see over for additional space)

Signature: Lon Rogers

was contaminated. However, Mr Hopkins could not provide any data ~~fr~~ collected directly from the seeps. When I explained that EA personnel were unable to find any seeps during site visits, he stated that the ~~st~~ aquifer was probably dewatered. He suggested we call Walt Sevicki of NYSEC to determine if any samples were ever collected from the seeps (see Appendix)

We discussed his comment about an observed release to groundwater. He again stated that these parameters are sometimes higher than drinking water standards in many wells in this area & felt the Norton Lab results reflected background levels only & were not due to the landfill. I explained that I would note his comments in the report.

Regarding his comment about the well locations, I explained that, from the ... EA had gathered the ~~source~~ drum had been removed from the Norton Labs site. Furthermore, it would have been impossible to put wells downgradient of the waste locations because this area is adjacent to the rock cut. He stated he realized this ~~but~~ & feels that only a seep sample would accurately reflect what was in the landfill.

Regarding comment #6, I told him the Appendix was in a DEC file ... no letterhead or other such identifying feature to establish the author.

2 of 2

Initial Contact	11/ /76	by	
Appointment Made	11/5/76	by	J.E.I
... or Phone Visit	11/22/76	by	J.E.I
Follow-up	/ /	by	
Form Completed	11/22/76	by	J.E.I

Comments:
... ... residue
... ...
... ...
dumped out back
... on site

Company Name Norton Laboratories, Inc.
Address 521 Mill St Lockport, N.Y. 14094
County Niagara Phone (716) - 433 - 6751
SIC Codes 1. 3079 3. ____ 2. ____ 4. ____

New York State Industrial Waste Survey
Department of Environmental Conservation
Division of Solid Waste Management
50 Wolf Road, Albany, N.Y. 12233 Telephone: (518) 457-6605

General Information

1. Company Name Norton Laboratories

Mailing Address 521 Mill St., Lockport, N.Y. 14094
Street City State Zip

Plant Location /✓/ Same as above

Street City State Zip

2. If Subsidiary, Name of Parent Company Auburn Plastics INC

3. Individual Responsible for Plant Operations John Fitzsimmons
Name

[illegible] [illegible]
Title Phone

4. Individual Providing Information [illegible]
Name

[illegible]
Title Phone

5. Department of Environmental Conservation Interviewer John E. Iannotti

6. Standard Industrial Classification (SIC) Codes for Principal Products

Group Name	SIC Code (4 Digit)	Approximate % of /✓/ Production / / Value Added
a. [illegible]	[illegible]	
b.		
c.		
d.		

7. Processes Used at Plant
a. mixing & blending
b.
c.
d.
e.

8. Products
a. [illegible]
b. [illegible]
c.
d.
e.

[illegible] tact [illegible] by [illegible]
[illegible]made 11/5/76 by [illegible]

Company Name Norton Laboratories, Inc.
[illegible] Lockport, N.Y.

[Ch]emicals used in manufacturing or produced as products:

a. liquid resin
b. styrene
c. [illegible]
d. carbonates
e. polyester
f. aluminum hydrates
g. sisal (rope fiber)
h. lube & [illegible] oils
i. catalyst system → benzoyl peroxide
j.

a. On Site Waste Water Treatment / /Yes /✓/No

b. On Site Waste Water Treatment by July 1977 / /Yes /✓/No

c. On Site Waste Water Treatment by July 1983 / /Yes /✓/No

d. Industrial Sewer Discharge /✓/Yes / /No Name of Sewage Treatment Plant City of Lockport

e. SPDES No. ______ NPDES No. ______

a. Air Pollution Control Devices /✓/Yes / /No Types cyclone & dust collectors

b. To Be Built / /Yes / /No by __/__/__

c. Air 100 Emission Point Registration Numbers ______

a. Number of manufacturing employees 200 b. Manufacturing Floor Space — sq.ft.

At[t]ach a plat or sketch of the facility showing the location of on-site process waste st[o]rage (if available).

At[t]ach flow diagrams of chemical processes including waste flow outputs (if available).

In-house waste treatment capabilities: No

Is there a currently used or abandoned landfill, dump or lagoon on plant property? / /Yes /✓/No

In[d]ustrial wastes produced or expected to be produced by plant.
1) degreaser waste → to sewer
2) residue from tank cleanups
3) waste oil
4) lab waste
5) cyclone & dust collector waste
6)
7)
8)

Co[m]ments: lube oil just dumped out behind plant tact ... by ... Company Name Norton Laboratories, Inc. Lockport N.Y.

Waste Characterization and Management Practice
(Use separate form for each waste stream)

1. Waste Stream No. 1 (from Form I, Number 17)

2. Description of process producing waste cleaning of molds with raw material styrene

3. Brief characterization of waste slurry

4. Time period for which data are representative current to ____

5. a. Annual waste production 220 [ ] tons/yr. [✓] gal./yr.

   b. Daily waste production — [ ] tons/day [ ] gal./day

   c. Frequency of waste production: [ ] seasonal [✓] occasional [ ] continual

   [ ] other (specify) ____

6. Waste Composition

   a. Average percent solids ____ % b. pH range __ to __

   c. Physical state: [ ] liquid, [✓] slurry, [ ] sludge, [ ] solid,

   [ ] other (specify) ____

   d. Component

Component	Average Concentration	[ ] wet weight / [ ] dry weight
1. styrene		[ ] wt.% [ ] ppm
2. H_2O		[ ] wt.% [ ] ppm
3.		[ ] wt.% [ ] ppm
4.		[ ] wt.% [ ] ppm
5.		[ ] wt.% [ ] ppm
6.		[ ] wt.% [ ] ppm
7.		[ ] wt.% [ ] ppm
8.		[ ] wt.% [ ] ppm
9.		[ ] wt.% [ ] ppm
10.		[ ] wt.% [ ] ppm

tact [illegible] by [illegible] Company Name *Norton Laboratories, Inc.*

e. Analysis of composition is /_/theoretical /_/laboratory /✓/estimate (attach copy of laboratory analysis if available)

f. Projected /_/increase, /_/decrease in volume from base year:_____% by July 1977;

_____% by July 1983.

g. Hazardous properties of waste: /_/flammable /_/toxic /_/reactive /_/explosive

/_/corrosive /_/other (specify)__________

7. On Site Storage

a. Method: /_/drum, /_/roll-off container, /_/tank, /_/lagoon, /_/other(specify)________

b. Typical length of time waste stored______ /_/days, /_/weeks, /_/months

c. Typical volume of waste stored________ /_/tons, /_/gallons

d. Is storage site diked? /_/Yes /_/No

e. Surface drainage collection /_/Yes /_/No

8. Transportation

a. Waste hauled off site by /_/you /_/others

b. Name of waste hauler__________

Address __________

Street City

____

State Zip Code Phone

9. Treatment and Disposal

a. Treatment or disposal: /_/on site /✓/off site

b. Waste is /_/reclaimed /_/treated /_/land disposed /_/incinerated

/✓/other (specify) *discharged to sewer*

c. Off site facility receiving waste

Name of Facility *City of Lockport Treatment Facility*

Facility Operator__________

Facility Location__________

Street City

( )

State Zip Code Phone

Contact [illegible] by [illegible]   Company Name [illegible]

Pg. 5 of 12

Waste Characterization and Management Practice
(Use separate form for each waste stream)

1. Waste Stream No. 2 (from Form I, Number 17)

2. Description of process producing waste cleaning of mixing & blending tanks

3. Brief characterization of waste sludge

4. Time period for which data are representative current to

5. a. Annual waste production 2.6 /✓/tons/yr. / /gal./yr.

b. Daily waste production 20 /✓/ ~~tons/yr.~~ lb/day / /gal./yr.

c. Frequency of waste production: / /seasonal / /occasional /✓/continual

/ /other (specify)

6. Waste Composition

a. Average percent solids ____ % b. pH range __ to __

c. Physical state: / /liquid, / /slurry, /✓/sludge, / /solid,

/ /other (specify)

d. Component	Average Concentration	/ /wet weight / /dry weight
1.		/ /wt.% / /ppm
2.		/ /wt.% / /ppm
3.		/ /wt.% / /ppm
4.		/ /wt.% / /ppm
5.		/ /wt.% / /ppm
6.		/ /wt.% / /ppm
7.		/ /wt.% / /ppm
8.		/ /wt.% / /ppm
9.		/ /wt.% / /ppm
10.		/ /wt.% / /ppm

tact [illegible] by [illegible]

e. Analysis of composition is / /theoretical / /laboratory /✓/estimate
(attach copy of laboratory analysis if available)

f. Projected / /increase, / /decrease in volume from base year: _____% by July 1977;

_____% by July 1983.

g. Hazardous properties of waste: / /flammable / /toxic / /reactive / /explosive

/ /corrosive / /other (specify) __________

8. On Site Storage

a. Method: /✓/drum, / /roll-off container, / /tank, / /lagoon, / /other(specify) ______

b. Typical length of time waste stored 1 / /days, /✓/weeks, / /months

c. Typical volume of waste stored 100 /✓/~~tons~~ 16s, / /gallons

d. Is storage site diked? / /Yes /✓/No

e. Surface drainage collection / /Yes /✓/No

9. Transportation

a. Waste hauled off site by / /you /✓/others

b. Name of waste hauler Modern [illegible]

Address ______________________________
Street City

____
State Zip Code Phone

10. Treatment and Disposal

a. Treatment or disposal: / /on site /✓/off site

b. Waste is / /reclaimed / /treated /✓/land disposed / /incinerated

/ /other (specify) __________

c. Off site facility receiving waste

Name of Facility City of Lockport Landfill

Facility Operator ______________________________

Facility Location ______________________________
Street City

( )
____
State Zip Code Phone

tact ~~[illegible]~~ Company Name Norton Laboratories, Inc.

Pg. 7 of 12

Waste Characterization and Management Practice
(Use separate form for each waste stream)

1. Waste Stream No. 3 (from Form I, Number 17)

2. Description of process producing waste lubrication of machinery

3. Brief characterization of waste lube & hydraulic oil waste

4. Time period for which data are representative current to ______

5. a. Annual waste production 250 / /tons/yr. /✓/gal./yr.

b. Daily waste production — / /tons/yr. / /gal./yr.

c. Frequency of waste production: / /seasonal /✓/occasional / /continual

/ /other (specify) ______

6. Waste Composition

a. Average percent solids ____% b. pH range __ to __

c. Physical state: /✓/liquid, / /slurry, / /sludge, / /solid,

/ /other (specify) ______

d. Component	Average Concentration	/ /wet weight / /dry weight
1.		/ /wt.% / /ppm
2.		/ /wt.% / /ppm
3.		/ /wt.% / /ppm
4.		/ /wt.% / /ppm
5.		/ /wt.% / /ppm
6.		/ /wt.% / /ppm
7.		/ /wt.% / /ppm
8.		/ /wt.% / /ppm
9.		/ /wt.% / /ppm

e. Analysis of composition is / /theoretical / /laboratory / /estimate (attach copy of laboratory analysis if available)

f. Projected / /increase, / /decrease in volume from base year: _____% by July 1977;

_____% by July 1983.

g. Hazardous properties of waste: /✓/flammable / /toxic / /reactive / /explosive

/ /corrosive / /other (specify) ______________

8. On Site Storage

a. Method: / /drum, / /roll-off container, / /tank, / /lagoon, /✓/other (specify) Small Containers

b. Typical length of time waste stored ___—___ / /days, / /weeks, / /months

c. Typical volume of waste stored ___—___ / /tons, / /gallons

d. Is storage site diked? / /Yes / /No

e. Surface drainage collection / /Yes / /No

9. Transportation

a. Waste hauled off site by / /you / /others

b. Name of waste hauler ______________

Address ______________

Street City

( )

State Zip Code Phone

10. Treatment and Disposal

a. Treatment or disposal: /✓/on site / /off site

b. Waste is / /reclaimed / /treated /✓/land disposed / /incinerated

/ /other (specify) just dumped on land out back (no specified dumping area)

c. Off site facility receiving waste

Name of Facility ______________

Facility Operator ______________

Facility Location ______________

Street City

( )

State Zip Code Phone

Waste Characterization and Management Practice
(Use separate form for each waste stream)

1. Waste Stream No. 4 (from Form I, Number 17)

2. Description of process producing waste laboratory analyses

3. Brief characterization of waste miscellaneous lab waste

4. Time period for which data are representative current to ____

5. a. Annual waste production 20 [ ] tons/yr. [x] gal./yr.

b. Daily waste production — [ ] tons/yr. [ ] gal./yr.

c. Frequency of waste production: [ ] seasonal [x] occasional [ ] continual

[ ] other (specify) ____

6. Waste Composition

a. Average percent solids ____ % b. pH range ____ to ____

c. Physical state: [x] liquid, [ ] slurry, [ ] sludge, [x] solid,

[ ] other (specify) ____

d. Component — Average Concentration — [ ] wet weight / [ ] dry weight

1. ____ ____ [ ] wt.% [ ] ppm

2. ____ ____ [ ] wt.% [ ] ppm

3. ____ ____ [ ] wt.% [ ] ppm

4. ____ ____ [ ] wt.% [ ] ppm

5. ____ ____ [ ] wt.% [ ] ppm

6. ____ ____ [ ] wt.% [ ] ppm

7. ____ ____ [ ] wt.% [ ] ppm

8. ____ ____ [ ] wt.% [ ] ppm

9. ____ ____ [ ] wt.% [ ] ppm

e. Analysis of composition is /_/theoretical /_/laboratory /_/estimate (attach copy of laboratory analysis if available)

f. Projected /_/increase, /_/decrease in volume from base year: _____% by July 1977; _____% by July 1983.

g. Hazardous properties of waste: /_/flammable /_/toxic /_/reactive /_/explosive /_/corrosive /_/other (specify) ____________

8. On Site Storage

a. Method: /_/drum, /_/roll-off container, /_/tank, /_/lagoon, /✓/other (specify) small Containe

b. Typical length of time waste stored______ /_/days, /_/weeks, /_/months

c. Typical volume of waste stored_________ /_/tons, /_/gallons

d. Is storage site diked? /_/Yes /_/No

e. Surface drainage collection /_/Yes /_/No

9. Transportation

a. Waste hauled off site by /_/you /✓/others

b. Name of waste hauler ____________

Address ____________
Street City
____
State Zip Code Phone

10. Treatment and Disposal

a. Treatment or disposal: /_/on site /✓/off site

b. Waste is /_/reclaimed /_/treated /✓/land disposed /_/incinerated

/_/other (specify) ____________

c. Off site facility receiving waste

Name of Facility City of [illegible] Landfill

Facility Operator ____________

Facility Location ____________
Street City
____________ ( )
State Zip Code Phone

Waste Characterization and Management Practice
(Use separate form for each waste stream)

1. Waste Stream No. 5 (from Form I, Number 17)

2. Description of process producing waste process cyclones & dust collectors

3. Brief characterization of waste dust in powder-type form

4. Time period for which data are representative current to

5. a. Annual waste production 2.5 /✓/tons/yr. / /gal./yr.

b. Daily waste production 20 /✓/~~tons/yr~~ (lbs/day) / /gal./yr.

c. Frequency of waste production: / /seasonal / /occasional /✓/continual

/ /other (specify)

6. Waste Composition

a. Average percent solids ___% b. pH range ___ to ___

c. Physical state: / /liquid, / /slurry, / /sludge, /✓/solid,

/ /other (specify)

d. Component	Average Concentration	/ /wet weight / /dry weight
1.		/ /wt.% / /ppm
2.		/ /wt.% / /ppm
3.		/ /wt.% / /ppm
4.		/ /wt.% / /ppm
5.		/ /wt.% / /ppm
6.		/ /wt.% / /ppm
7.		/ /wt.% / /ppm
8.		/ /wt.% / /ppm
9.		/ /wt.% / /ppm

e. Analysis of composition is / /theoretical / /laboratory / /estimate (attach copy of laboratory analysis if available)

f. Projected / /increase, / /decrease in volume from base year: _____% by July 1977; _____% by July 1983.

g. Hazardous properties of waste: / /flammable / /toxic / /reactive / /explosive / /corrosive /✓/other (specify) nuisance irritant

8. On Site Storage

a. Method: /✓/drum, / /roll-off container, / /tank, / /lagoon, / /other(specify) _____

b. Typical length of time waste stored 2 / /days, / /weeks, /✓/months

c. Typical volume of waste stored 825 /✓/ ~~tons~~ lbs, / /gallons

d. Is storage site diked? / /Yes / /No

e. Surface drainage collection / /Yes / /No

9. Transportation

a. Waste hauled off site by / /you /✓/others

b. Name of waste hauler [illegible]

Address _____
Street City
_____
State Zip Code Phone

10. Treatment and Disposal

a. Treatment or disposal: / /on site /✓/off site

b. Waste is / /reclaimed / /treated /✓/land disposed / /incinerated / /other (specify) _____

c. Off site facility receiving waste

Name of Facility City of [illegible] Landfill

Facility Operator _____

Facility Location _____
Street City
_____ ( )
State Zip Code Phone

Appendix 1.4.1-6
p 1 of 3

SOMERSET RAILROAD PROJECT

HYDROGEOLOGIC STUDY
DANIELEWICZ ROUTE
STATION 51 + 810 TO 52 + 330

FEBRUARY 1982

BECHTEL ASSOCIATES PROFESSIONAL CORPORATION

According to reports in the files of DEC, the waste material consists of 30 to 70 percent hexachlorodisiloxane, 10 to 50 percent silicon tetrachloride, and 5 to 30 percent carbon and silicon carbide. The hexachlorodisiloxane and silicon tetrachloride decompose into sand (silicon dioxide) and hydrochloric acid. Carbon and silicon carbide remain unchanged. The hydrochloric acid reacts with the limestone forming a neutral chloride salt. The residue is buried in drums; the owner reports that in 4 to 8 months the only visible remains are part of the drum rings used to seal the open head drum tops. According to the Van De Mark Chemical Company's landfill application to DEC, the entire waste mass will eventually become a sand pile with some salt content.

Presently, the active sections of the waste area are located within the southern one-third of the landfill (Figure 2). Prior to 1977, untreated waste was placed on the western portion of the landfill and allowed to decompose without the addition of limestone. DEC has given this landfill a code identification of "E" which indicates a closed controlled landfill in which monitoring is required.

3.2 Norton/McGonigle & Hilger Landfill

The Norton Landfill is situated approximately 400 feet east of the VDM Landfill, as shown on Figure 2. It is overlain in part by the McGonigle & Hilger Landfill. The areal extent of the Norton Landfill is unknown. The composite of these two landfills occupies about 4 to 5 acres. The area of the landfills is bounded on the north by Mill Street and on the south by a cliff leading down to Eighteenmile Creek. The east and southeast boundaries are formed by various manufacturing buildings. The landfill is about 110 feet above Eighteenmile Creek. Access to the landfill is gained from the east along Mill Street. The western boundary of this landfill extends to within approximately 60 feet of the centerline of the proposed railroad cut. The elevation of the landfill is about 473 feet msl. Depending on the final configuration of the cut in this vicinity, the western boundary of the Norton Landfill could extend to within 10 feet of the upper portions of the proposed railroad cut.

The Norton Landfill was used for the storage and recycling of thermoset plastic castings manufactured by Norton Laboratories, Inc., a facility located at the northwest intersection of North Transit Road and Mill Street but which is no longer in operation. Pieces of castings were noted in samples obtained from exploration holes, and during a reconnaissance of the area.

According to the DEC reports, waste lubricating oil in the amount of about 250 gallons/year was also stored there for recycling. Some documented spillage of the waste oil was reported. The period in which this occurred is unknown.

A portion of the site is now used by the McGonigle & Hilger Roofing Company for the disposal of roofing and general construction debris resulting from structural demolition. Asphalt, insulating material, tar paper, and general construction rubble are scattered over the site and a portion of the slope leading down to Eighteenmile Creek. Waste materials from the McGonigle & Hilger operations are deposited on the ground surface and spread periodically, probably by loader or bulldozer. A cover of natural soil material has been placed on top of some of the waste deposits. In the northern part of the area this waste is being spread over the Norton Landfill to a depth of about 6 to 8 feet. The western boundary of the McGonigle & Hilger Landfill is located 200 to 270 feet from the centerline of the proposed railroad cut.

DEC has given the Norton/McGonigle & Hilger Landfill a code identification of "F" which indicates that there is no toxic hazard.

INTERVIEW ACKNOWLEDGEMENT FORM

Site Name: Norton Lab

I.D. Number: 932029

Person Contacted: Gary Edwards

Date: 4 - 17 -85

Title:

Affiliation: NYSEG

Phone No.: (716)795-9501

Address: 4500 Vestal Parkway
Binghamton, New York 13902

Persons Making Contact:
EA Representatives:
Chuck Houlik
John Kosloski
Linda Rubin

Type of Contact: Personal Interview

Interview Summary: Gary Edwards showed EA representatives the well locations and said that the drums punctured by Somerset Railroad were found ~~on a~~ road nearby, but not actually on the disposal site.

Acknowledgement:

I have read the above transcript and I agree that it is an accurate summary of the information verbally conveyed to EA Science and Technology interviewers, or as I have revised below, is an accurate account.

Revisions (please write in corrections to above transcript):

Gary Edwards showed EA representatives the well locations and stated that the drums found by Somerset Railroad were found along Mill St., a paper street, not within the area assumed to be the former dump site. The drums were covered with approx. 8-10" of soil. (The location was approximately 20-25' from theoretical Center line of road.)

Signature: G Edwards

Date: Sept. 9, 1985

It should also be noted the material in the drums found was analyzed and it was determined the contents were nonhazardous.

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1.4.1-8

COMMUNICATIONS RECORD FORM

Distribution: ( ) Norton Labs Site , ( ) ______
( ) ______ , ( ) ______
( ) Author

Person Contacted: Walt Sevicki   Date: 4/25/88

Phone Number: (716) 729-2551   Title: ______

Affiliation: NYSEG Corp   Type of Contact: phone

Address: 4500 Vestal Parkway
Binghamton, NY 13902   Person Making Contact: L. Rogers

Communications Summary: I explained that Mike Hopkins of the Niagara County Health Dept asked me to call regarding NYSEG sampling results obtained during the investigation of seeps emanating from the Norton Labs Site. Mr Sevicki recalled that only the drainage ditch below the seeps were sampled & analyzed but would check the records & call me back.

(see over for additional space)

Signature: Lori Rogers

A HYDROGEOLOGIC ASSESSMENT
OF
POST-CONSTRUCTION CONDITIONS
ALONG THE MILL STREET CUT
(Station 52 + 250 to 51 + 650)

Somerset Railroad Corporation

June, 1984

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3.0 PREVIOUS INVESTIGATIONS

Before evaluating the WQMP results in-depth it is useful to briefly review the conclusions of previous investigations by Bechtel and Woodward-Clyde. Bechtel conducted detailed geologic and hydrogeologic investigations of the area in October and November 1981. The investigations included the installation of 22 observation wells completed in four geologic horizons. At this point it is useful to briefly describe site geology and define the four geologic horizons mentioned.

The bluff on which the study area is situated is near the base of the Niagara escarpment, a major geomorphic feature that extends in an east-west direction across northern Niagara County. The bedrock consists of nearly flat-lying (horizontal) sedimentary beds with a thin cover of unconsolidated glacial deposits, soil, and talus. The glacial deposits consist of unsorted fine to coarse sand with some traces of fine gravel, silt, and clay. The materials are commonly stiff and very compact. The formations underlying the bluff are well-exposed in the road cut along west Jackson Street directly south of the landfills. These formations include, from oldest to youngest, the Queenston Formation of Ordovician age, and the Whirlpool, Power Glen, and Grimsby Formations of Silurian age.

The Queenston Formation, the lowermost formation exposed in the area, consists of reddish-brown shale with thin interbeds of greenish-gray shale and siltstone. The Whirlpool Formation is a gray to white sandstone. This unit is very hard and fine to medium grained with thin bands of gray shale. The Power Glen Formation is a greenish-gray shale and siltstone interbedded with limestone, dolomite, and calcareous sandstone. The Grimsby Formation includes a lower white to pale-green fine-grained sandstone and an upper reddish-brown sandstone with interbedded siltstone and shale.

Jointing in exposures of bedrock is uniform in orientation and character. Observations from rock cores indicate the joints tend to be more open to the east near the bluff. The frequency of jointing ranges from 3 to 6 foot spacing. Three near-vertical joint sets present have orientations of N45W to N70W, N55E to N75E, and N10E to N30E. In addition, horizontal bedding joints are present. The near-vertical joints dip predominantly from 85° to vertically. Joint openings measured at outcrops near the Van De Mark Landfill ranged from closed to as much as 2 inches. (Bechtel, 1982)

From the comprehensive hydrogeologic investigations performed by Bechtel and WCC in the latter part of 1981, it was established that the local ground water gradients are generally from east to west in four distinct zones between the existing ground surface to a depth of about 109 feet, which approximates the elevation of Eighteenmile Creek. The two lower zones found along the contacts between the Power Glen and Whirlpool Formations (Zone 3), and the Whirlpool and Queenston Formations (Zone 4) would not be intercepted in this vicinity by the rock cut. The shallow ground water zone (Zone 1) found only in the area of the Norton Landfill to the east of the railroad cut, and a somewhat deeper zone (Zone 2), which occurs along the contact between the Grimsby and Power Glen Formations, would be intercepted by the cut.

Bechtel's analysis of groundwater level data indicated that flows are generally moving east to west within Zone 2. Due to the direction of groundwater flow and the relative elevations of the Van De Mark landfill and the railroad, Bechtel did not expect the Mill Street Cut to receive groundwater from the Van De Mark landfill. Chemical analyses of groundwater samples for parameters indicative of inputs from the Van De Mark landfill further confirmed this conclusion. Results from Bechtel's 1981 groundwater quality sampling can be found in Appendix A.

Bechtel indicated that the railroad cut would only intercept the upper two water bearing zones (Zones 1 and 2). Since the strata within Zone 2 evidenced low permeability, it was thought that the quantity of Zone 2 groundwater reaching the cut would be limited.

Data from the two shallow wells (D-69 and D-70) which were completed in the Norton Landfill indicated that groundwater in the unconsolidated material of the landfill was perched above the water in the lower part of the Grimsby Formation (Zone 2). Bechtel also indicated that the groundwater found in this perched water table may or may not reach the cut. Groundwater that may move into the railroad cut from the east was expected to have a chemical quality similar to that found in the Zone 1 and 2 wells.

In addition to the detailed hydrogeologic investigations conducted by Bechtel, Woodward-Clyde Consultants (WCC) analyzed Zone 1 and 2 water quality and conducted a terrain conductivity survey in the vicinity of the Mill Street Cut. Appendix B and C provide the results from WCC's 1981 and 1982 water quality sampling efforts. WCC concluded that groundwater occurs in the unconsolidated fill materials of the Norton landfill and in the bedrock below the landfills. Based on the data from the terrain conductivity survey, and the water levels in the landfill materials, groundwater within the Norton landfill appeared to be flowing northward toward Mill Street. Based upon preliminary data provided by the conductivity survey and water levels, WCC indicated that the water in the landfill materials was effectively isolated from groundwater within the bedrock.

WCC expected that some groundwater in the vicinity of the cut, which would act as a linear drain, will flow toward the cut and seep into it. Groundwater at the base of the Grimbsy Formation (Zone 2) was expected to flow westward toward the rock cut. Groundwater flow from the Van De Mark landfill toward the proposed cut was considered improbable.

Because the rock cut would intercept groundwater flow in the Grimbsy formation, groundwater elevations were expected to decline west of the cut after construction. Some seepage of groundwater was expected to enter the cut although based on water quality analyses from the Zone 1 and 2 observation wells, the seepage was not projected to adversely affect surface water quality.

5.0 GROUNDWATER/SURFACE WATER OCCURRENCE - DISCUSSION OF RESULTS

Hydrographs for the observation wells are included in this report as Appendix D. From installation of the monitoring wells in November, 1981 through the establishment of final grade in the Mill Street Cut in April, 1983 water level readings were recorded weekly at the sixteen observation wells by Bechtel environmental staff.

Following establishment of the final grade in the Mill Street Cut, water level readings were updated on a monthly basis through November, 1983 by Bechtel environmental staff. The collection of water level data before, during, and after construction provides a fairly complete picture of the effect that excavating the Mill Street Cut has had on groundwater movement within the four distinct water bearing zones. Figure 2 provides a geologic cross section (A-A') depicting the Mill Street Cut at Station 51 + 910. Groundwater levels for Zones 1, 2, and 3 taken from the relevant observation well hydrographs are indicated as dotted lines on the cross section. In addition to the cross section, Figures 3 through 6 which show groundwater contours have been included to provide further detail on the post-construction groundwater regime in Zones 2 and 3.

To determine the effect that construction has had on the hydrogeologic regime in the vicinity of the Mill Street Cut, it is necessary to examine the results of groundwater level monitoring and weekly rock cut seepage monitoring in detail.

5.1 Zone 1

It is apparent from examination of the hydrographs for observation wells D-69 and D-70 (Appendix D - Well Nest 8) that fluctuations in water level in Zone 1 have occurred during and after excavation of the rock cut. On average, the water level in well D-70 has fallen one to two (1-2) feet since the commencement of construction. The hydrograph for well D-69 has approximately paralleled that of well D-70 with two notable exceptions. During the periods of August through November, 1982 and June through November, 1983 the water level in well D-69 showed a significant departure from that of well D-70. During these two periods the water level in D-69 fell to a minimum elevation of approximately 450 ft. MSL, which was 7-8 feet below the water level in well D-70.

The geologic cross section presented in Figure 2 provides the configuration of the perched water table in November, 1983 following the second deviation in Zone 1 water levels. During the two periods noted above, it appears that the water level in well D-69 dropped to the base of the fill material. Although the water level in well D-69 has dropped significantly during these two periods, the water level in well D-70 has only shown minor fluctuations. It should be noted that well D-69 is located approximately 100 feet from the edge of the cut, while well D-70 is located about 230 feet from the rock cut.

The anomalous water elevations noted at well D-69 suggest that the zone 1 water level may fluctuate fairly significantly over a short period of time in the unconsolidated materials adjacent to the cut. Weekly monitoring of the seepage from the Mill Street Cut was conducted from the end of July, 1983 to mid-November, 1983. During the period August 1, 1983 to October 26, 1983 the Weekly Rock Cut Seepage Monitoring Report indicated that there was "no dripping or ponding of water" on the east side of the cut; corresponding with the lower water levels observed in well D-69 during this period. The last Weekly Rock Cut Seepage Monitoring Report of November 14, 1983, which reported minor dripping and ponding, would similarly correspond to the rise in water elevation at well D-69.

It is not understood what mechanism would cause this periodic fluctuation in water elevations. The data from observation well hydrographs and Weekly Rock Cut Seepage Monitoring Reports suggests that the fill material of the portion of the Norton Landfill located in a 100-200 foot wide strip adjacent to the cut is dewatered on a periodic basis. Periodic dewatering of this 100-200 foot wide strip of fill material may have occurred prior to construction. It is also possible that excavation of the Mill Street Cut may have increased horizontal and vertical permeabilities in the underlying Grimsby Formation contributing to periodic dewatering of the overburden.

Once final grade was reached in the Mill Street Cut during February, 1983, it was evident from visual observation that seepage from Zone 1 was emanating from a level approximately 5-10 feet below the top of the cut face. Below this level the rock was usually wet, and occasionally minor dripping and ponding occurred. There was never a sufficient quantity of water accumulated to begin flowing along the ditch paralleling the cut face. The seepage either evaporated or infiltrated into the surrounding rock or fill material.

During shaping of the rock cut a portion of the Norton landfill was uncovered. To restore this portion of the landfill a clay cap was placed from Station 51 + 840 to Station 51 + 925 from the eastern edge of the right-of-way to the top of the rock cut. Jute mesh was installed from the top of the cut to several feet below the visible outcropping of debris to stabilize the slope. The portion of the landfill that was exposed along the cut face has proven to be one of the major sources of seepage along the cut face. Although this segment of the cut has usually been a fairly continuous source of seepage, there is no direct path for this water to reach any surface water body.

Based on a terrain conductivity survey of the area, WCC indicated that groundwater within Zone 1 should continue to move north and northwest toward Mill Street following construction. Consequently, some Zone 1 groundwater discharge moving northward could be intercepted by the drainage ditch which drains into Headwall No. 1 (referred to as the Rock Cut Sampling Location). Although several field inspections of this drainage ditch did not reveal observable seepage, interception of Zone 1 groundwater by this drainage ditch cannot be ruled out. For details concerning this drainage pattern, see Figure 8. Drainage entering Headwall No. 1 is carried via 48" corrugated metal pipe (CMP) along the cut face and eventually discharges into Eighteenmile Creek. In summary, Zone 1 groundwater appears to be moving northwest toward the rock cut, and may also be moving northward toward the above mentioned interceptor ditch.

5.2 Zone 2

Following completion of the Mill Street Cut (April, 1983), the hydrographs for Zone 2 monitoring wells D-66, D-61, and D-51 (Appendix D, well nests 7, 5 and 1 respectively) showed declines in water level of several feet. All three wells are located within 70 feet of the rock cut. Observation well D-55 (Appendix D, well nest 3) which is located over 110 feet from the cut has not demonstrated any long term changes in water level during the two years of groundwater level monitoring. The fifth Zone 2 observation well, D-58, has been dry during most of this two year period.

The decline in groundwater elevations at wells D-66, D-61, and D-51 since completion of the Mill Street Cut reflects what appears to be a permanent reduction in Zone 2 water levels. The observed post-construction drop in Zone 2 water levels may have resulted from dewatering of this water bearing horizon as excavation of the Mill Street Cut proceeded. Observation well hydrographs for the four functioning Zone 2 wells indicate that the Zone 2 potentiometric surface has fallen since completion of the Mill Street Cut to a level near or below the base of the cut. Zone 2 groundwater contour maps depicting post-construction conditions in April and November, 1983 (see Figures 3 and 4) suggest that groundwater is moving along a southeast to northwest gradient, which is generally in agreement with pre-construction assessments made by Bechtel and WCC.

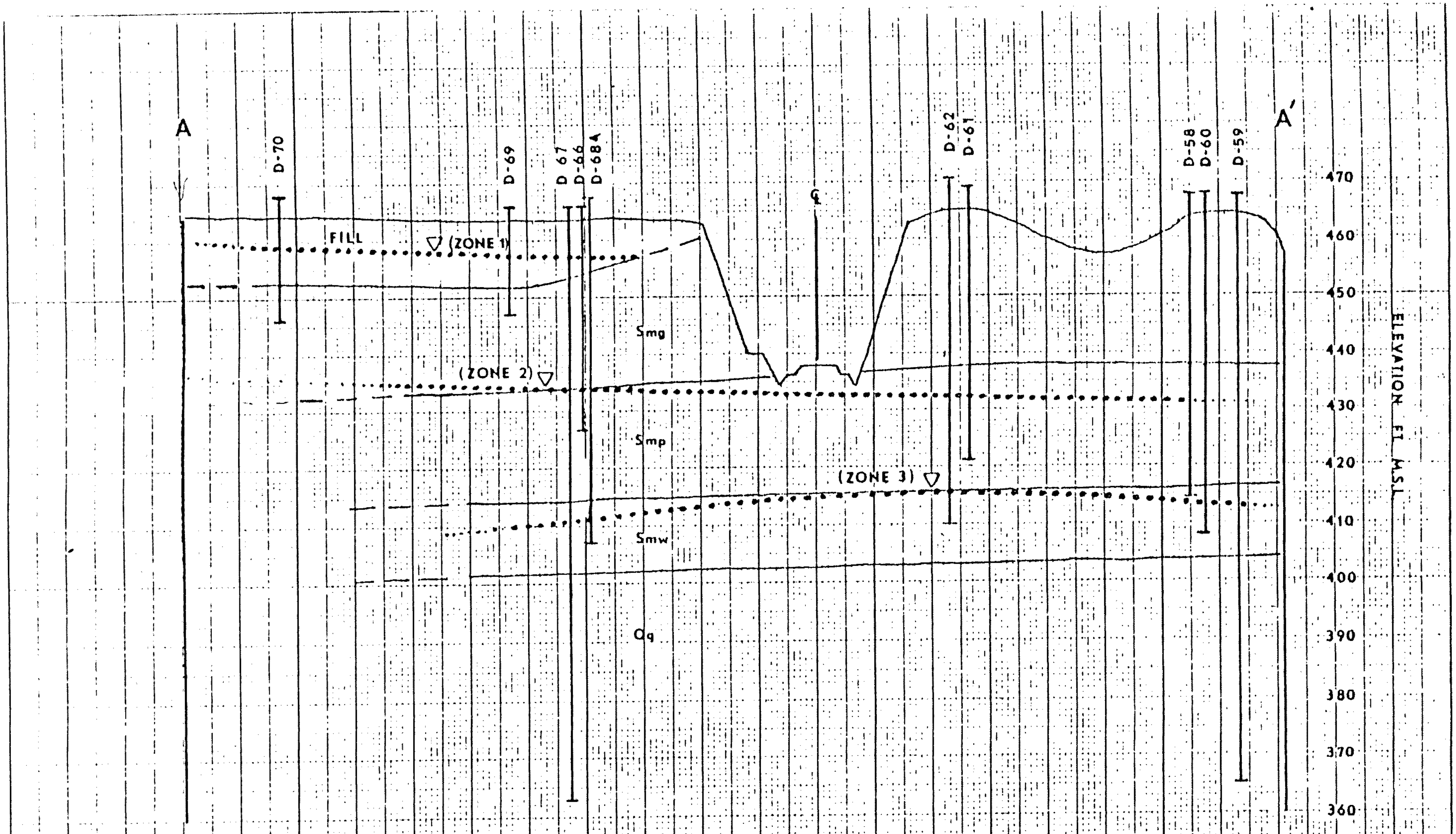
Comparing the elevation of the final grade through the Mill Street Cut from Station 52 + 250 to 51 + 650 (see Figure 8) with estimated Zone 2 groundwater contours it is evident that only a small section of the cut face along the east side has the potential to intercept groundwater moving to the northwest. Weekly observations of rock cut seepage have typically reported that most of the east cut face below the area of Zone 1 seepage is continuously wet. Although the east face has been wet and occasional ponding of water noted, no flow (other than during precipitation events) has been observed in the railroad drainage ditches. These facts indicate that the amount of Zone 2 groundwater being intercepted by the east cut face as seepage is insignificant.

Weekly reporting of rock cut seepage has demonstrated that the west side of the rock cut is usually dry over the entire face, and no ponding or flow of water has been noted in the railroad drainage ditches. This evidence in conjunction with the reported movement of Zone 2 groundwater from southeast to northwest across the cut confirms that easterly migration of contaminants from the Van De Mark Landfill into the cut is improbable.

5.3 Zones 3 and 4

Although Zones 3 and 4 have not been intercepted by the Mill Street Cut in the area investigated, it is useful to examine whether or not construction has affected groundwater movement in these lower hydrogeologic regimes. Hydrographs for the five Zone 3 wells; D-68, D-62, D-60, D-57, D-54 (Appendix D, well nests 7, 5, 4, 3 and 2 respectively) and the four Zone 4 wells; D-67, D-59, D-56, D-52 (Appendix D, well nests 7, 4, 3, and 2 respectively) demonstrate no significant changes in water elevations over the two year period of groundwater level monitoring. Figures 5 and 6, which provide a representation of the groundwater contours for Zone 3 during April and November, 1983, suggest a northeast to southwest groundwater maximum centered just to the west of the Mill Street Cut. This groundwater configuration is very similar to that found in Figure 9 (Water Level Contours Zone 3) of Bechtel's 1982 Report. Before and after construction groundwater within Zones 3 and 4 has been moving along a north-northeast to south-southwest gradient. The similarity between pre-construction and post-construction conditions can also be seen by comparing Bechtel's cross section A with the geologic cross section found at the end of this report (Figure 2).

One can conclude from this data that the occurrence of groundwater and its movement within the lower hydrogeologic regime (including Zones 3 and 4) has not been appreciably affected by construction in this portion of the Mill Street Cut.



NOTES:

1. Water levels based on 11-1-83 observation well hydrographs
2. For location of geologic cross section (A-A) see Fig 1
3. Cross Section based on Bechtel Hydrogeologic Study (Feb 1982)

EXPLANATION

▽ (dotted line)	Water level within zone of interest
Smg	Grimsby Fm.
Smp	Power Glen Fm.
Smw	Whirlpool Fm.
Oq	Queenston Fm.

SCALE

VERT 1" = 25.4'

0 5 15 25

HORIZ 1" = 79.4'

0 40 80

SOMERSET RAILROAD
GEOLOGIC CROSS SECTION
STA. 51 + 910

FIGURE 2

PREPARED BY: J S CAMPISI

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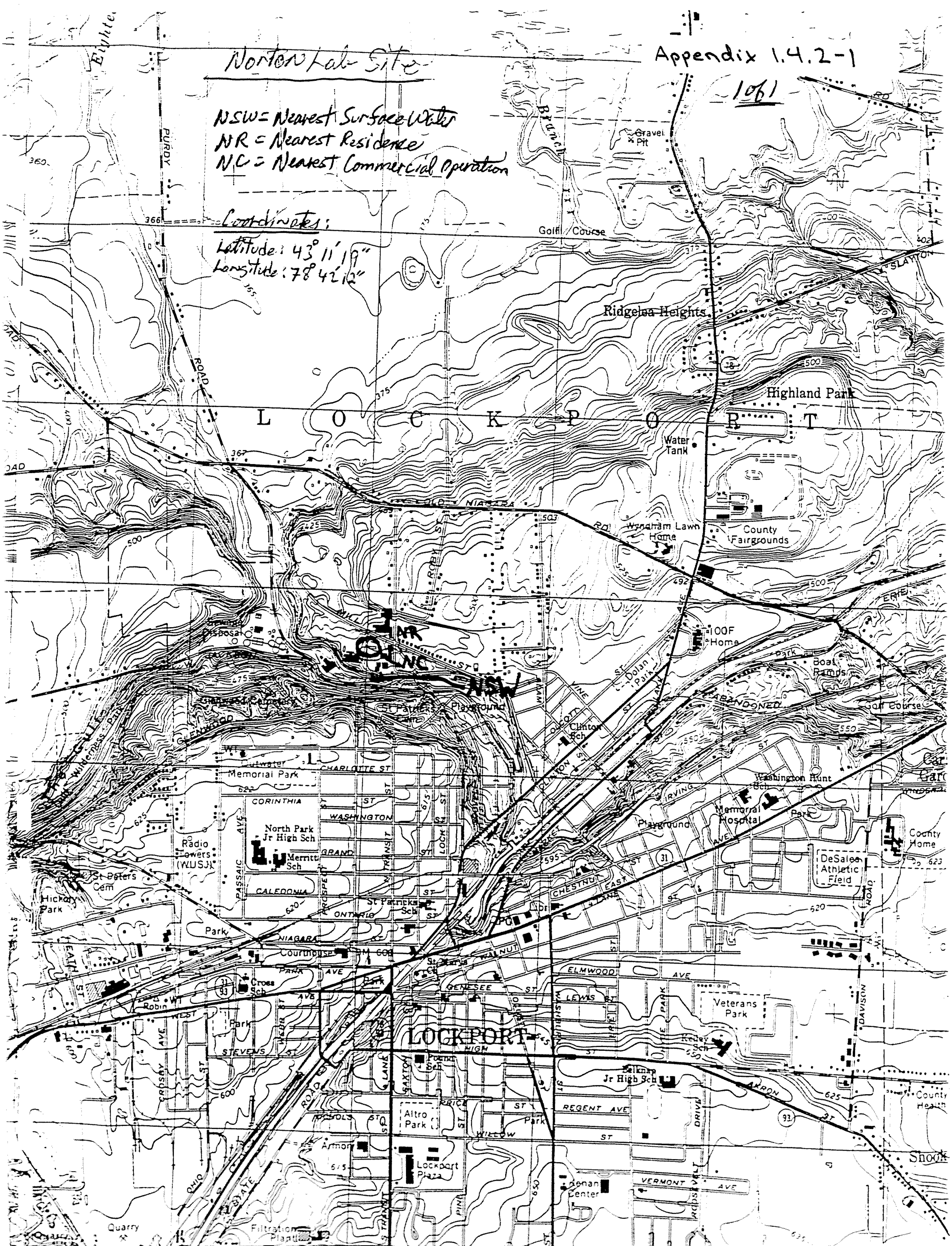

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Appendix 1.4.2-2
1 of 1

COMMUNICATIONS RECORD FORM

Distribution: ( ) Norton Lab, ( ) ______
( ) ______, ( ) ______
( ) Author

Person Contacted: Phil Newman Date: 6/19/87

Phone Number: (716) 439-6678 Title: Chief Operator

Affiliation: City of Lockport Water Dept. Type of Contact: phone

Address: 1 Locks Plaza
Lockport, NY 14094
Person Making Contact: L. Rogers

Communications Summary: City of Lockport is served by surface water from the Niagara River. The boundaries of the water district are the city limits.

(see over for additional space)

Signature: Lou Rogers

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A Division of EA Engineering, Science, and Technology, Inc.

Appendix 1.4.2-3

COMMUNICATIONS RECORD FORM

Distribution: ( ) Norton Lab, ( ) ________
( ) ________, ( ) ________
( ) Author

Person Contacted: Jack Kehoe Date: 6/19/87

Phone Number: (716) 284-3124 Title: Deputy Director

Affiliation: Niagara Co. Dept of Health Type of Contact: phone

Address: 1010 E Falls St
Niagara Falls, NY 14302
Person Making Contact: L. Rogers

Communications Summary: Mr Kehoe stated that there are very few private wells within ~~the~~ Niagara County. Residences outside the city limits of Lockport are served by the Niagara County Water District which is supplied by the Niagara River.

(see over for additional space)

Signature: Lori Rogers

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New York State Atlas of
Community Water System Sources
1982

NEW YORK STATE DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL PROTECTION
BUREAU OF PUBLIC WATER SUPPLY PROTECTION

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ID NO	COMMUNITY WATER SYSTEM	POPULATION	SOURCE
	Municipal Community		
	Akron Village (See No 1 Wyoming Co, Page 10)	3640	
1	Alden Village	3460	Wells
2	Angola Village	8500	Lake Erie
3	Buffalo City Division of Water	357870	Lake Erie
4	Caffee Water Company	210	Wells
5	Collins Water District #3	704	Wells
6	Collins Water Districts #1 and #2	1384	Wells
7	Erie County Water Authority (Sturgeon Point Intake)	375000	Lake Erie
8	Erie County Water Authority (Van DeWater Intake)	NA	Niagara River - East Branch
9	Grand Island Water District #2	9390	Niagara River
10	Holland Water District	1670	Wells
11	Lawtons Water Company	138	Wells
12	Lockport City (Niagara Co)		Niagara River - East Branch
13	Niagara County Water District (Niagara Co)		Niagara River - West Branch
14	Niagara Falls City (Niagara Co)		Niagara River - West Branch
15	North Collins Village	1500	Wells
16	North Tonawanda City (Niagara Co)		Niagara River - West Branch
17	Orchard Park Village	3671	Pipe Creek Reservoir
18	Springville Village	4169	Wells
19	Tonawanda City	18538	Niagara River - East Branch
20	Tonawanda Water District #1	91269	Niagara River
21	Wanakah Water Company	10750	Lake Erie
	Non-Municipal Community		
22	Aurora Mobile Park	125	Wells
23	Bush Gardens Mobile Home Park	270	Wells
24	Circle B Trailer Court	50	Wells
25	Circle Court Mobile Park	125	Wells
26	Creekside Mobile Home Park	120	Wells
27	Donnelly's Mobile Home Court	99	Wells
28	Gowanda State Hospital	NA	Clear Lake
29	Hillside Estates	160	Wells
30	Hunters Creek Mobile Home Park	150	Wells
31	Knox Apartments	NA	Wells
32	Maple Grove Trailer Court	72	Wells
33	Millgrove Mobile Park	100	Wells
34	Perkins Trailer Park	75	Wells
35	Quarry Hill Estates	400	Wells
36	Springville Mobile Park	114	Wells
37	Springwood Mobile Village	132	Wells
38	Taylors Grove Trailer Park	39	Wells
39	Valley View Mobile Court	42	Wells
40	Villager Apartments	NA	Wells

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CIRC. 173

GEOLOGICAL SURVEY CIRCULAR 173

WATER RESOURCES OF THE BUFFALO-NIAGARA FALLS REGION

By Charles W. Reck, and Edward T. Simmons

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UNITED STATES DEPARTMENT OF THE INTERIOR
Oscar L. Chapman, Secretary

GEOLOGICAL SURVEY
W. E. Wrather, Director

GEOLOGICAL SURVEY CIRCULAR 173

WATER RESOURCES OF THE BUFFALO-NIAGARA FALLS REGION

By Charles W. Reck, and Edward T. Simmons

Based on data collected in cooperation with the New York Department of Public Works, New York Department of Conservation, New York Power and Control Commission, and Corps of Engineers

Washington, D. C., 1952

Free on application to the Geological Survey, Washington 25, D. C.

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WATER RESOURCES OF THE BUFFALO-NIAGARA FALLS REGION

INTRODUCTION

An average daily flow of 125,000 million gal is available at the eastern end of Lake Erie where the Niagara River drains the inland waters northward to Lake Ontario. This quantity is sufficient to supply 70 percent of the present estimated daily use of water in the United States for all purposes except water power. The temperature and chemical characteristics of this water are suitable for most purposes. Moderate quantities of water may be obtained also from small streams and wells in the area. With such large quantities of water of good quality near at hand there should be no water shortage for the million or more people in the Buffalo-Niagara Falls area.

The economic growth of an area depends upon a satisfactory supply of water. In order to assure success and economy, the development of water resources should be based on a thorough knowledge of the quantity and quality of the water. As a nation, we can not afford to run the risk of dissipating our resources especially in times of national emergency, by building projects that are not founded on sound engineering knowledge.

The purpose of this report is to summarize and interpret all available water-resources information of the Buffalo-Niagara Falls region. This report will be useful for initial guidance in the location or expansion of water facilities for defense and nondefense industries and the municipalities upon which they are dependent. No attempt has been made to present a complete record of the hydrologic information.

Most of the facts presented herein are based on data obtained for other purposes by the U. S. Geological Survey in cooperation with the New York State Department of Public Works, Department of Conservation, Water Power and Control Commission, and the Corps of Engineers.

Much information regarding conditions in the area was obtained from the Erie County Department of Health, the Buffalo Sewer Authority, the Northwestern New York Water Authority, and the New York State Department of Health.

This report was prepared in the Water Resources Division of the U. S. Geological Survey under the immediate supervision of Arthur W. Harrington, district engineer, and Maurice L. Brashears, Jr., district geologist, and under the general direction of C. G. Paulsen, chief hydraulic engineer.

The Niagara Frontier

The Buffalo-Niagara Falls region, locally called the Niagara Frontier, is defined as that area in Erie and Niagara Counties in New York bounded on the south by Eighteenmile Creek; on the west by Lake Erie and the Niagara River; on the north by Lake Ontario; and on the east by a line just east of the village of East Aurora and the city of Lockport (see pl. 1).

Topography

The topography of the Niagara Frontier is of a relatively simple type. Three plains comprise the region - Erie, Huron, and Ontario - which form steps descending northward to Lake Ontario. The Erie and Huron plains are separated by the Onondaga escarpment, and the Huron and Ontario plains by the Niagara escarpment (see pl. 1). The Niagara escarpment, which lies north of Niagara Falls, rises abruptly 200 ft above the Ontario plain. The Ontario plain drains northward to Lake Ontario and is nearly level in most areas. The Huron plain lies about 600 ft above mean sea level. Although nearly level this plain dips southward to the Onondaga escarpment. In the vicinity of Buffalo, the Onondaga escarpment is less evident than at the eastern boundary of the area where it rises about 70 ft above the Huron plain. The Portage escarpment, the southern boundary of the Erie plain, lies outside of the area under consideration. It is moderately steep in the vicinity of Cattaraugus Creek but to the northeast it becomes ill-defined and broken by deep narrow valleys. The surface of the plains has been made uneven by the irregular deposition of rock material from glacial ice. After the retreat of the glacier, the lowland areas of Erie and Niagara Counties were covered by a lake. Lake bottom deposits of clay now determine the topographic features of the region.

Climate

The Niagara Frontier has a temperate climate and extremes in temperature are moderated by the proximity of Lake Erie and Lake Ontario. Lake Erie to

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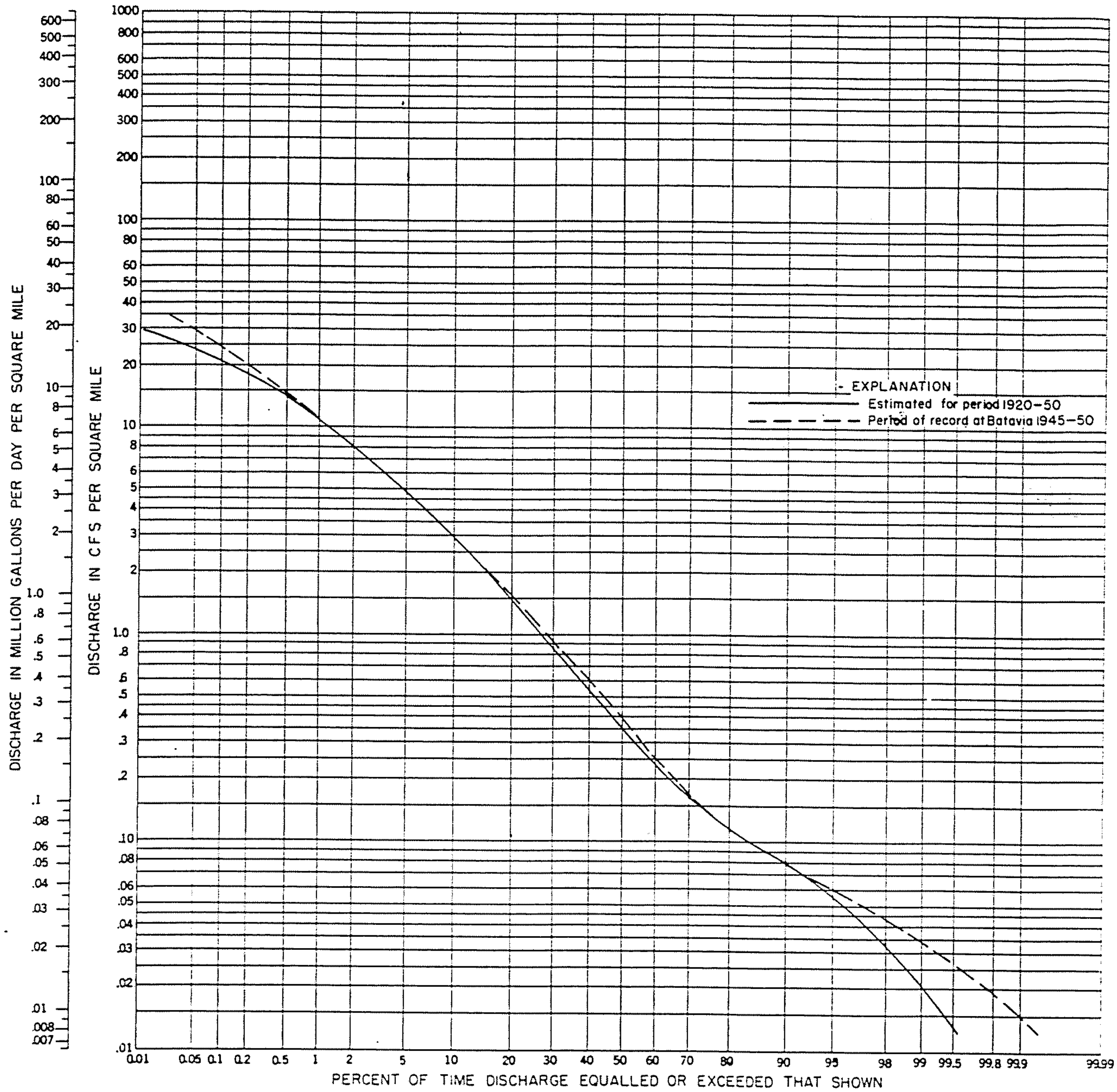

Figure 16. -Flow-duration curve for Tonawanda Creek between Batavia and Millersport.

Niagara Falls and from the Niagara River. Temperature data have not been collected on this stream. A chemical analysis of water from Tonawanda Creek at Millersport is given in table 2.

Other Streams

Drainage areas of seven ungaged streams of significance in the area are shown in table 3.

GROUND WATER

Ground water in the Buffalo-Niagara Falls region occurs both in bedrock and in unconsolidated deposits and is withdrawn in moderately large quantities by industries and municipalities. Climate and geology control the occurrence of ground water in the area. The water contained in rocks is replenished directly from rain and snowfall over the immediate area. The amount of replenishment to the water-bearing formations (called aquifers) is dependent upon several factors. Among these are the absorptive capacity of the soil and underlying rocks, topography, vegetal cover, wind, temperature, humidity, and the form, intensity, and amount of precipitation. In general, conditions in the area are favorable for the replenishment of the aquifers.

Aquifers are similar to surface reservoirs in many respects. Basic differences are the much greater size

Table 3. –Drainage areas of small streams in the Buffalo-Niagara Falls region

Stream	Drainage area (sq mi)	Remarks
Eighteenmile Creek (tributary to Lake Erie)	120	Reported to have no flow at times.
Rush Creek	11.0	Receives sewage effluent from Blasdall and Woodlawn.
Smoke Creek	32.0	Receives sewage effluent from Lackawanna plant.
Ellicott Creek	119	Receives sewage from Williamsville. Estuary to near limit of report area.
Ransom Creek	50.8	
Twelvemile Creek	45	No flow at mouth on August 7, 1951.
East Branch Twelvemile Creek	30	No flow at mouth on August 7, 1951.
Eighteenmile Creek (tributary to Lake Ontario)	82.5	Receives water from New York State Barge Canal and effluent from Lockport sewage plant.

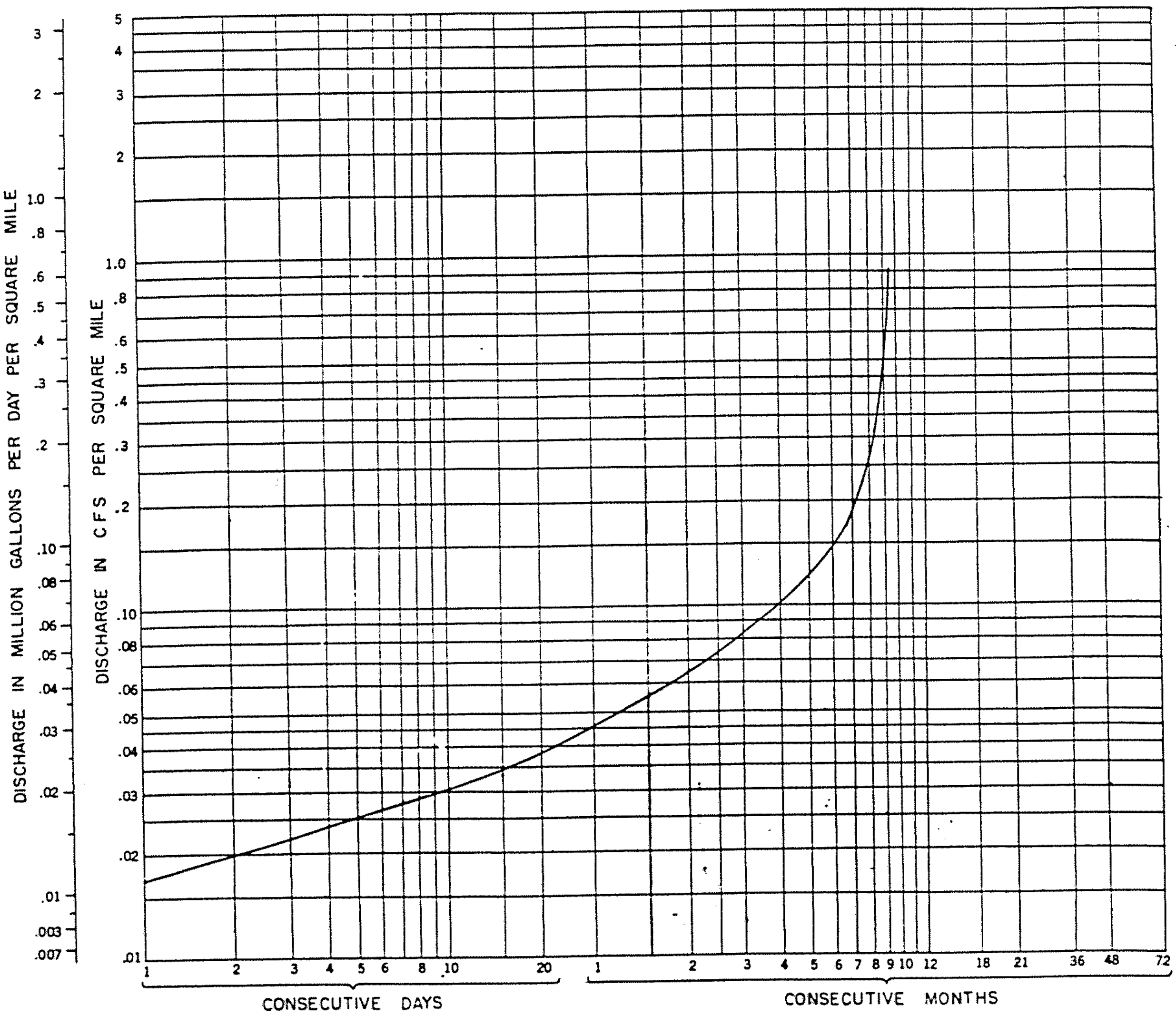

Figure 17. –Maximum period of deficient discharge for Tonawanda Creek between Batavia and Millersport.

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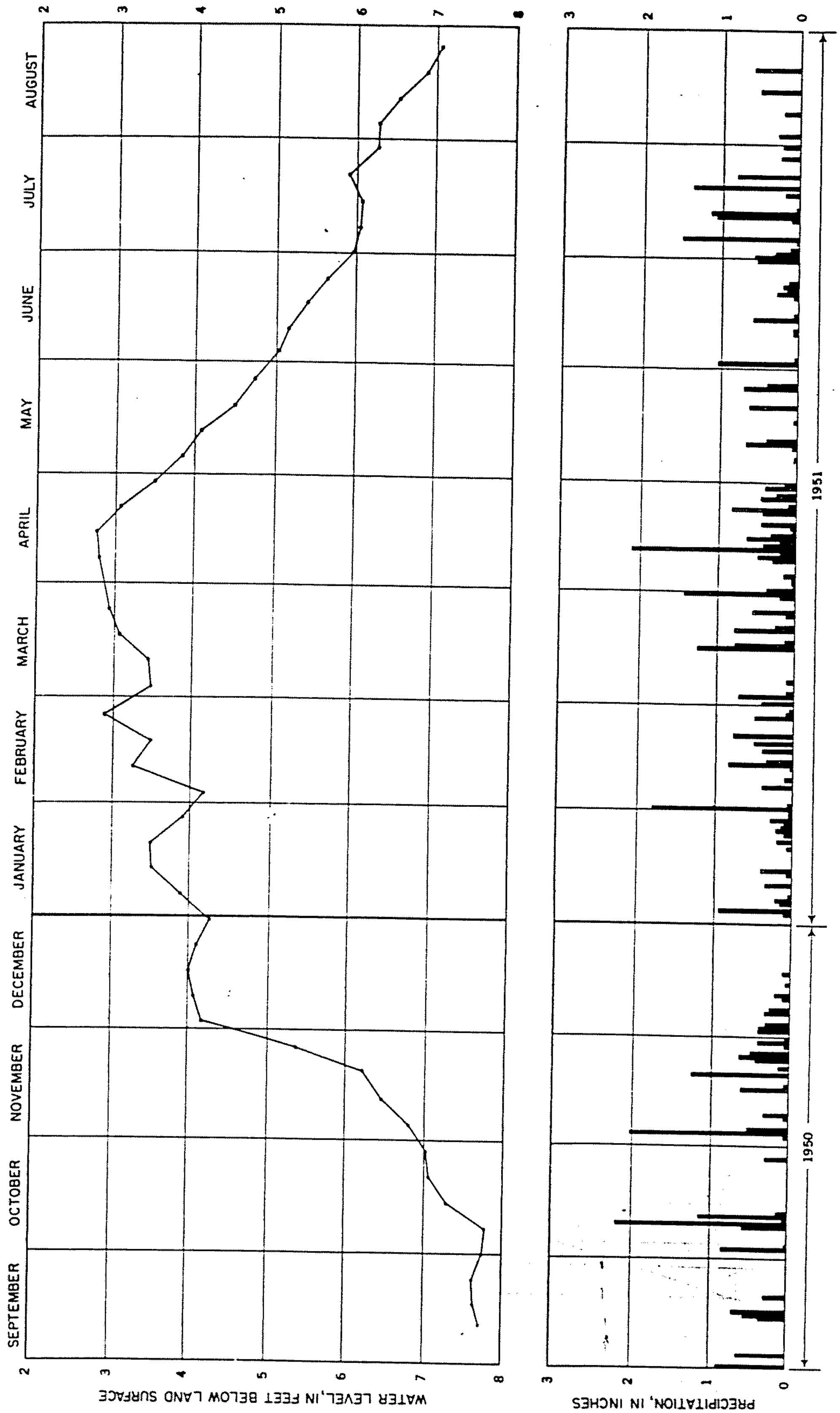

Figure 18.—Water level in observation well Ni 30 near Youngstown and daily precipitation at Lewiston, September 1950 to August 1951.

of most aquifers as compared to artificial reservoirs, and the slower rate of intake and release of the water in underground storage. The water-bearing rocks receive the water percolating down from the soil zone and release it slowly to streams and wells. The water table, or the pressure surface in confined aquifers, fluctuates in response to changes in inflow and outflow. Owing to the great extent of most aquifers and the relatively slow movement of water through them, changes in storage of more than a few feet as represented by water levels in wells generally are measured in months or years (fig. 18). Therefore, the ground acts as a great natural regulator, providing storage for precipitation and sustaining the flow of streams and springs, and the yield of wells in dry periods.

Aquifers differ in the quantity and quality of the water in storage and in their ability to yield water according to the character of the rock. These differences are related directly to the character of the rock; therefore, a knowledge of the geology of the area is essential.

Water-Bearing Formations

The consolidated rock formations (bedrock) of the Buffalo-Niagara region were deposited in shallow seas about 350 million years ago. The strata consist mostly of limestone and dolomite, shale, and sandstone. They extend in almost parallel belts from the Niagara River and Lake Erie eastward across the area. The consolidated rock beds have a slight dip to the south, the slope averaging about 28 ft per mile. The oldest formation, the Queenston shale, crops out along the south shore of Lake Ontario in the northern part of the area. Each formation to the south is younger than the formation bordering it to the north.

Each formation beginning with the Queenston shale to the north, dips beneath these younger formations and lies at progressively greater depths to the south. Thus, each formation can be penetrated by wells not only in its area of outcrop but, owing to the gentle dip, is within reach of wells in a narrow belt within the outcrop area of the next younger rocks to the south. The zones in which the principal bedrock aquifers are tapped by wells are shown on plate 1.

The unconsolidated sediments, consisting of gravel, sand, and clay, were deposited considerably later, within the past million years. These deposits are thin but cover the consolidated formations over an extensive area. Only along the base of the Portage escarpment and in isolated places do the unconsolidated deposits reach a thickness greater than 50 ft. The geologic sequence of the major rock units in the area is shown on plate 1.

Porosity and permeability are important hydrologic characteristics of a rock formation. Porosity is a measure of the volume of water that a rock formation can hold, and is expressed as a percentage by volume of the voids in a rock formation. The voids or pores formed at the time the rock was deposited are classified as primary; the joints and fractures produced by weathering and earth movements are classified as secondary. Permeability is the capacity of a rock to transmit water. Fine clay is porous, but the pores are so small that the water will not drain out. Coarse gravel may have the same porosity as the clay but the large openings permit it to drain readily. The bedrock formations in the area are generally not highly permeable except where many secondary openings occur. These openings have been further enlarged by solution in the limestone and dolomite rocks. Such enlarged openings are well developed in the Buffalo-Niagara region. No method is known for precisely determining at the surface, in advance of drilling, the location of secondary openings in bedrock and the quantity of water available. Information on existing wells, however, gives an indication of the water-bearing properties of a rock formation. A summary of these data collected in the Buffalo-Niagara region is given in plate 1. Some bedrock formations have been omitted because of their small areal extent and others have been grouped together because of similar hydrologic characteristics.

The unconsolidated rocks in the Niagara Frontier differ hydrologically from the underlying consolidated deposits. The unconsolidated deposits contain innumerable small openings or pores between grains making up the sediments. The size, number, and continuity of these openings control the quantity of water that can pass through a given deposit. If the materials consist of fine sand, clay, or silt the movement of water is slow. In coarse sand or gravel, large openings between grains permit a greater rate of flow. No known extensive gravel deposits overlie the bedrock in the Buffalo-Niagara region, although the village of East Aurora obtains ample water supplies from such deposits. The unconsolidated material overlying the bedrock elsewhere in the area consists largely of fine sand and clay and is a poor source of water. The greatest reported thickness of this material is at the southern end of Grand Island where the logs of gas borings show the thickness to be about 70 ft.

Yields of Wells

The consolidated formations in the Buffalo-Niagara region are among the largest yielding rock aquifers in New York State. Wells drilled in the Lockport dolomite, Salina formation, and Onondaga limestone yield unusually large quantities of water from secondary openings. Municipalities that use ground water depend mostly upon supplies derived from the unconsolidated material overlying the bedrock, chiefly because of the better chemical quality of the water.

The Salina formation, consisting of crystalline dolomite and dolomitic shale, is the best aquifer in the area. The average yield of 37 wells is 415 gpm (plate 1). However, this average is of little value in determining the probable yield of new wells because of the wide range in yield from this formation (25 to 3,000 gpm). Figure 19 shows the distribution of yields in this formation. The light gray to bluish Lockport dolomite and Onondaga limestone are aquifers with average yields respectively of 124 gpm and 178 gpm.

High average yields in the Salina formation and the Lockport dolomite are due, in some areas, to the infiltration of water from the Niagara River. Pumping from some wells adjacent to the river lowers the water table to below river level producing a flow of water from the river toward the wells through solution channels and other openings. For example, four wells

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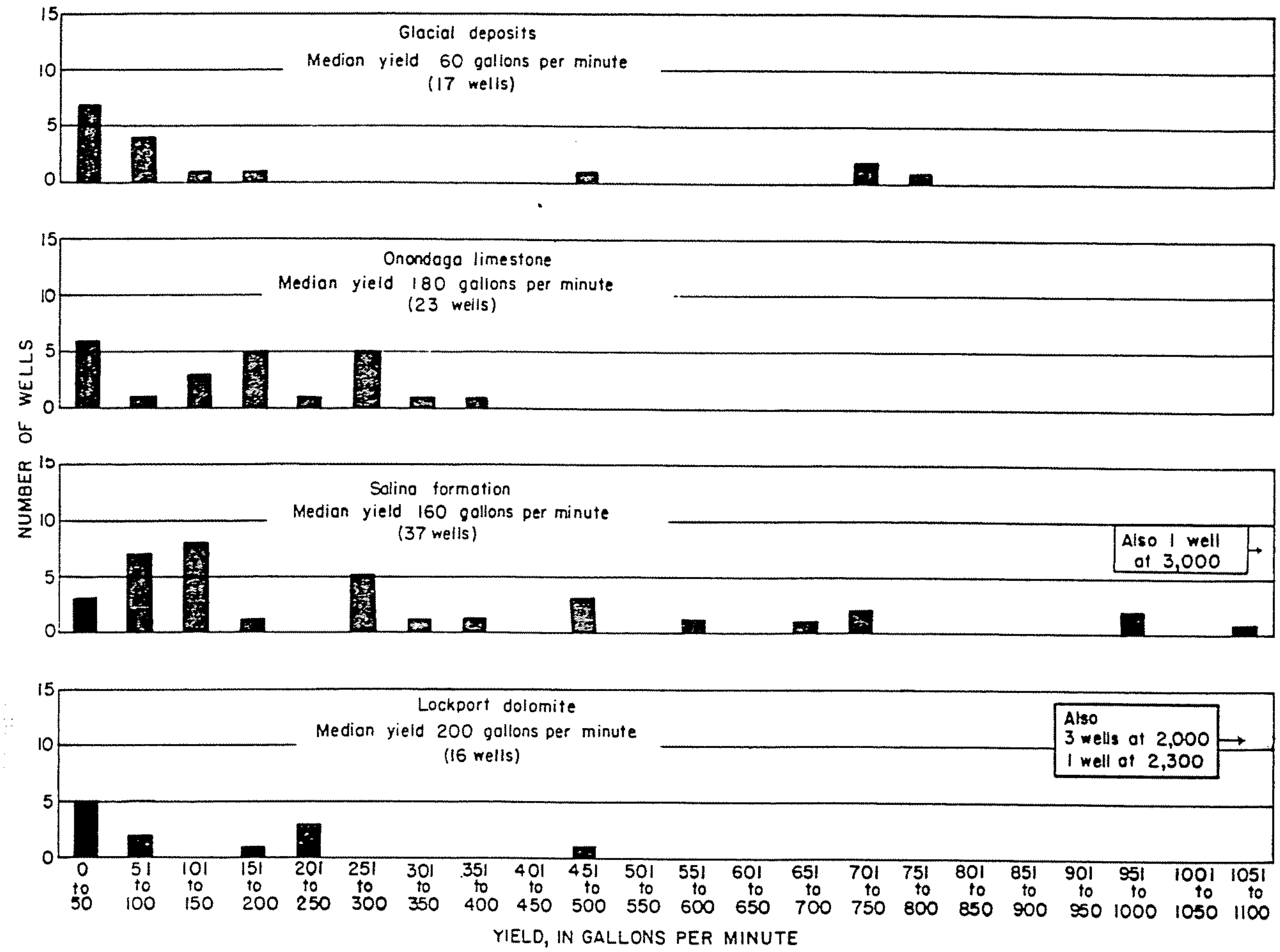

Figure 19. -Yield of wells in the Niagara Frontier.

drilled in the Lockport dolomite adjacent to the Niagara River yield to a total of 8,300 gpm. Because these wells are not considered typical of the formation in general, they have not been included in plate 1. The graph, figure 20 compares the chemical quality of water from the Niagara River and the Lockport dolomite. The quality of water from wells adjacent to the river indicates the occurrence and approximate degree of infiltration. Figure 21 shows the variations in temperature of the Niagara River and the wells at the E. I. du Pont de Nemours plant at the city of Tonawanda. The temperature of ground water when not affected by river recharge varies only a few degrees throughout the year (fig. 21, North well field). The ground-water temperature at the E. I. du Pont de Nemours plant, however, shows a large annual variation due to the infiltration of water from the Niagara River into the aquifer.

The unconsolidated rocks are extensive, but few sand and gravel deposits yield substantial quantities of ground water. Table 4 summarizes available data on wells in the unconsolidated deposits of the region. In the village of East Aurora four wells drilled in the unconsolidated deposits yield from 500 to 800 gpm each. These are the largest yielding wells developed in the unconsolidated deposits. Attempts have been made with very little success to develop ground-water supplies from the fine sand and clay north of the city of Buffalo. One abandoned well 100 ft in depth at the Allegheny Ludlum Steel Co. yielded 37 gpm. On the north side of Grand Island, however, a well capable of yielding 250 gpm has been developed by inducing

Table 4.—Summary of data on wells in the unconsolidated rocks

Number of well records	20
Static water level (feet below land surface):	
Average	14
Range:	
Low	56
High	Flowing
Yield (gallons per minute):	
Average	209
Range:	
Low	30
High	800
Specific capacity (gallons per minute per foot of drawdown):	
Average	4.7
Range:	
Low	.9
High	12

infiltration from the Niagara River through fine sand. Outside the area to the south small areas of gravel are found. They have been developed in the towns of Eden and Collins, the yields of these wells range from 30 to 300 gpm.

Quality of Ground Water

Rain water, which is relatively free from impurities, except dissolved gases, dissolves minerals from the soil and rocks with which it comes into contact. Water percolating through decomposed organic matter, such as decaying vegetation, will absorb carbon dioxide which materially increases the solvent action of water. This solvent action of water upon the very soluble minerals in the rock of this region has resulted in a ground water of high mineral content. The consolidated rock formations contain soluble minerals such as sodium chloride, magnesium sulfate, calcium bicarbonate, magnesium bicarbonate, and calcium sulfate. A summary of the chemical quality of the ground water in the Buffalo-Niagara Falls region is given in table 5. Most of the ground water sampled in the area had over 800 ppm dissolved solids. However, some water bottling plants have succeeded in finding ground water of lower concentrations of dissolved solids by drilling shallow wells. Industries along the Niagara River also obtain ground water of lower mineral content through the induced infiltration of river water into their wells. Municipalities have developed ground-water supplies from the unconsolidated deposits of sand and gravel to obtain water of lower mineral content. Although this water is not as hard as water from the rock formations and contains less iron, it is usually necessary for the municipalities to install softeners and to provide aeration for the oxidation and removal of iron. The chemical quality of water from one well changed substantially over a period of years (see table 6). This well is now abandoned because of the unsuitable chemical quality of the water.

The Salina formation in the Buffalo-Niagara region yields water of high mineral content. Expensive treatment would be necessary to make the water suitable for many industrial processes. Waters from the Lockport dolomite and Onondaga limestone are but slightly lower in mineral content than the water from the Salina formation. The chemical quality of bedrock water in the Buffalo-Niagara area limits its use mainly to cooling and air conditioning. Water from unconsolidated sand and gravel and from the Upper Devonian shale and sandstone usually have a much lower mineral content than water from the bedrock.

Pollution

The ground water along the Niagara Frontier is generally of good sanitary quality. In some areas, especially those underlain by the Onondaga limestone, wells have been drilled by individuals and industries for the discharge of waste material. This has resulted in the pollution of large sections of this aquifer. Many of the

Table 5. –Chemical quality of ground water in the Buffalo-Niagara Falls region

(parts per million)

Formation	Period	Silica (SiO_2)	Iron (Fe)	Sulphate (SO_4)	Chloride (Cl)	Total hardness (as $CaCO_3$)	Dissolved solids
Sand and gravel deposits:	(Pleistocene)						
Number of tests		4	17	10	17	17	5
Average		12	1.0	176	90	321	898
Maximum		13	3.0	471	670	906	1,390
Minimum		10	.14	39	3	14	423
Upper Devonian sandstone: and shale							
Number of tests		1	2	2	2	2	2
Average		17	.19	173	124	602	806
Maximum		-	.33	185	144	628	841
Minimum		-	.05	160	104	576	771
Onondaga limestone:	(Devonian)						
Number of tests		4	5	6	6	7	8
Average		29	1.9	410	411	741	1,670
Maximum		74	5.6	1,160	950	1,470	2,650
Minimum		12	.03	69	32	180	428
Salina formation:	(Silurian)						
Number of tests		4	7	8	10	10	6
Average		5	.69	1,290	478	1,790	4,500
Maximum		12	36	2,780	2,500	3,010	8,450
Minimum		1	.03	116	29	444	1,900
Lockport dolomite:	(Silurian)						
Number of tests		5	5	7	6	7	6
Average		25	3.3	524	606	858	1,490
Maximum		101	16	1,320	1,200	2,180	3,230
Minimum		1.4	.03	87	18	120	299
Queenston shale:	(Ordovician)						
Number of tests		1	1	1	1	1	1
Analysis		3.0	1.0	3,620	2,100	1,570	8,920

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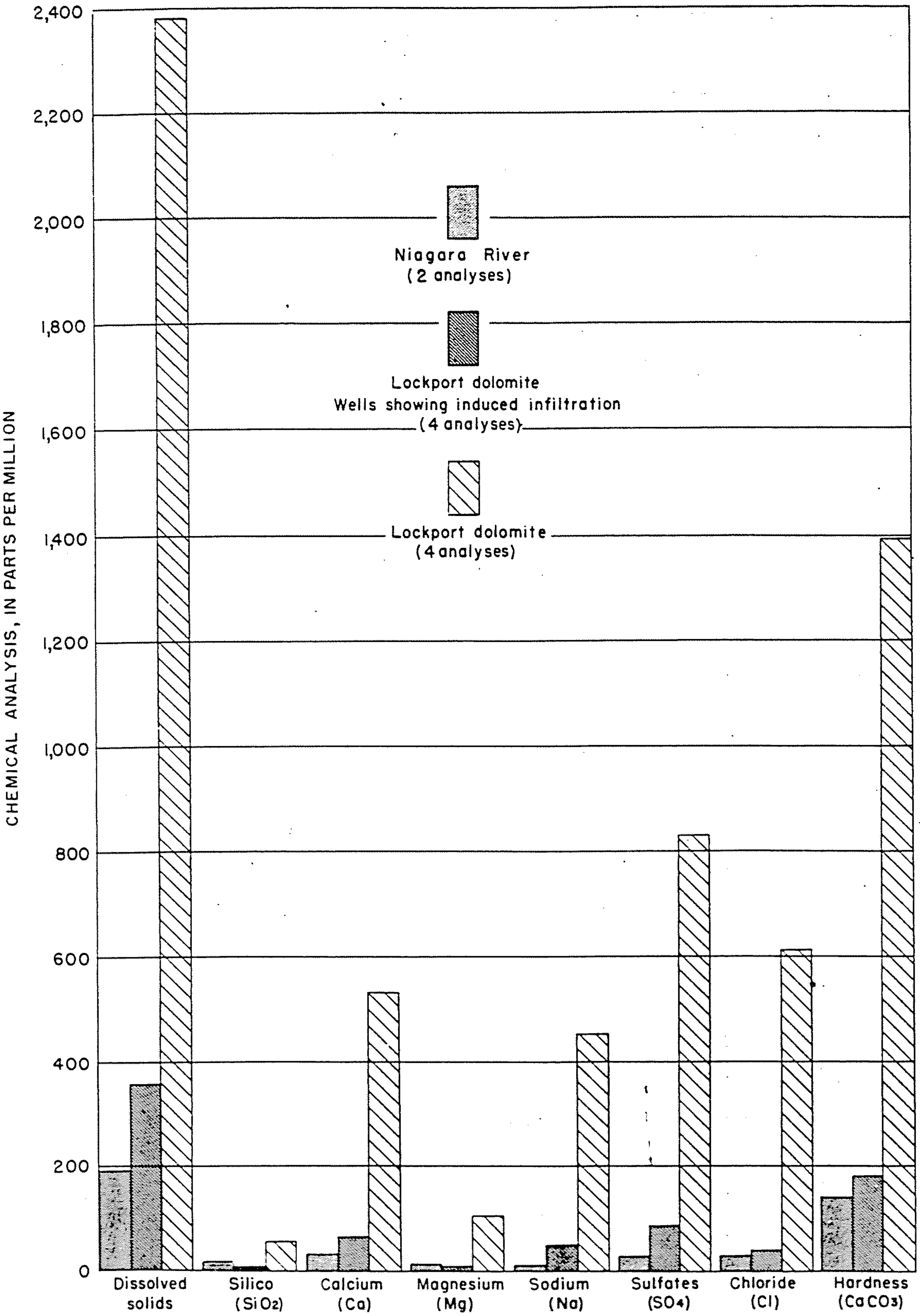

Figure 20. –Effect of induced infiltration on chemical quality of ground water in the Lockport dolomite.

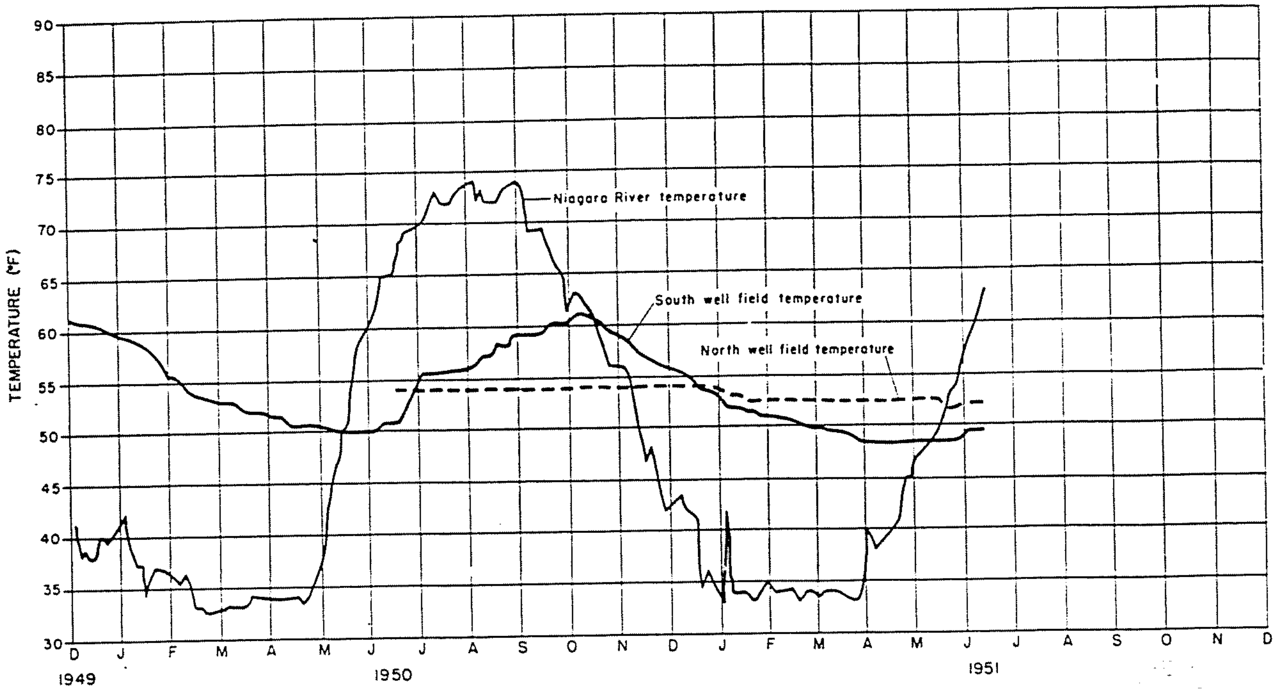

Figure 21.–Effect of induced infiltration on temperature of ground water.

wells soon become clogged losing their efficiency to absorb waste. The practice of drilling drainage wells is now discouraged by health officials.

Temperature

The temperature of water used for air-conditioning and cooling purposes is of prime importance. The temperature of surface water responds more readily to atmospheric conditions and may range from about 32 F to more than 78 F throughout a year. For this reason, ground water with its consistently moderate temperature is preferred to surface water for cooling. Of the 15 million gallons of ground water being pumped in the Buffalo-Niagara region about 80 percent is used for cooling and air conditioning. The temperature of ground water generally remains within a few degrees of the mean annual air temperature of the region, regardless of the season. The mean annual air temperature at Buffalo is 47.1 F. The average ground-water temperature as measured in the summer is 53 F. Only in shallow wells and in wells adjacent to the Niagara River and Lake Erie, where the ground-water gradient has been reversed inducing infiltraion, may the ground-water temperature be expected to vary appreciably during the year (see fig. 21).

Table 6.–Variation of the chemical quality of water from well (E1)

[East Aurora]

Year	Hardness (ppm)	Iron (ppm)	Chloride (ppm)
1931	236	-	4.8
1935	343	0.8	6.0
1938	620	1.7	430
1940	1,070	1.8	870

PUBLIC WATER SUPPLIES

Existing facilities supplying potable water to the public in the area operate at or beyond their rated capacities in most instances. Population served, average daily consumption, and rated capacities of public water-supply systems are shown in table 7.

City of Buffalo

Buffalo has adequate facilities to meet its immediate water needs. Its intake has a maximum capacity of 450 mgd and extends 1.5 miles into the Emerald channel of Lake Erie. An emergency intake obtains water from Niagara River. The Col. Francis G. Ward pumping station has a total capacity of 315 mgd. The Massachusetts Avenue pumping station is a standby unit having a capacity of 180 mgd. The two pumping stations, about one mile apart, are interconnected and with some modernization could be utilized at full capacity. The filtration plant has a rated capacity of 160 mgd with treatment consisting of chlorination, coagulation, and rapid sand filtration. A chemical analysis of the treated water is given in table 2. The distribution system serves the entire population of the city and supplies additional water to neighboring communities. Storage facilities have a total capacity of 27 million gallons.

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Table 7. –Population served, average consumption and rated capacities of public water-supply systems

Public supplies	Source	Population served	Average daily consumption (mgd)	Rated capacity (mgd)
City of Buffalo	Lake Erie	577,400	130	160
City of Niagara Falls	Niagara River, Tonawanda Channel	90,900	43	40
Western New York Water Co.	Lake Erie	175,000	20	16
City of Lockport	Niagara River Tonawanda Channel	25,150	8	8
City of North Tonawanda	- do -	24,750	8	8
City of Tonawanda	- do -	14,600	6	12
Other public supplies	Ground water	-	1	-
	Small streams	-	11	-
Total		-	227	-

City of Niagara Falls

Niagara Falls has two water supply plants. Plant no. 1 obtains water from an intake extending about 1,500 ft into the Tonawanda Channel of the Niagara River. Plant no. 2 obtains water from the power canal.

Plant no. 1 has an intake capacity of about 90 mgd. Its present pumping capacity is 48 mgd, with a filter capacity of 32 mgd. At present this plant is being expanded and the intake will be extended into the Chippewa Channel of the Niagara River. By 1953 the expanded pumping and treatment plant will have a rated capacity of 90 mgd.

Plant no. 2 has a pumping capacity of 12 mgd and a filtration capacity of 8 mgd. Upon completion of the expansion program mentioned above, this plant will be abandoned.

Treatment of water consists of chlorination, coagulation, chlorine dioxide for taste and odor control, and rapid sand filtration.

The city of Niagara Falls supplies water to communities to the north on the Ontario lowland through a gravity supply system. Its storage facilities have a capacity of 750,000 gal.

Western New York Water Co.

The Western New York Water Co. is a private water company which supplies the suburban area of Buffalo with treated water. The present water facilities are overloaded. The pumping station and filtration plant are in Woodlawn, N. Y. (see pl. 1). Twin intakes, with submerged cribs under about 22 ft of water are approximately 4,000 ft offshore in Lake Erie. The pumping facilities have a capacity of 30 mgd. Treatment consists of chlorination, coagulation, activated carbon and rapid sand filtration. The rated capacity of the filtration plant is 16 mgd. Additional water is obtained from the city of Buffalo to meet peak demands beyond the capacity of the company system. This company furnishes treated water to water districts that operate and maintain their own distribution systems. The storage facilities have a capacity of 16 million gal.

City of Lockport

Lockport pumps raw water from the Tonawanda Channel of the Niagara River at North Tonawanda through 13 miles of pipeline to its filter plant in Lockport.

The pumping station in North Tonawanda has a capacity of 21 mgd. The filter plant has a rated capacity of 8 mgd. Water treatment consists of chlorination, coagulation, chlorine dioxide and activated carbon for taste control, and rapid sand filtration.

Storage facilities have a capacity of 500,000 gal.

City of Tonawanda

Tonawanda has two intakes, a 48-in. wooden pipe, a 24-in. cast iron pipe, extending into the Tonawanda Channel of the Niagara River.

The present steam-driven pumping station has a capacity of 17 mgd, but will be converted to electrically driven pumps and enlarged to a capacity of 20 mgd by late 1952. The filtration plant has a rated capacity of 12 mgd. Treatment consists of chlorination, ammoniation, coagulation, chlorine dioxide and activated carbon for taste control, and rapid sand filtration.

The storage facilities have a capacity of 500,000 gal.

City of North Tonawanda

North Tonawanda obtains water through two intakes, one wood the other steel, from the Tonawanda Channel of Niagara River. The pumping station has a total capacity of 30 mgd, of which the standby steam-driven units can pump 12 mgd.

Treatment at the filtration plant having a capacity of 8 mgd is the same as that for the city of Tonawanda. Storage facilities have a capacity of 900,000 gal.

PRESENT WATER USE

About 1,700 mgd are used for public and industrial supplies in the region. Industries are the largest

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Groundwater and Wells

Second Edition

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pumped well to a point where the drawdown is measured	pumped well to a point where the drawdown is measured
S = coefficient of storage (dimensionless)	S = coefficient of storage (dimensionless)
T = coefficient of transmissivity, in gpd/ft	T = coefficient of transmissivity, in m²/day
t = time since pumping started, in days	t = time since pumping started, in days

The well function of u [$W(u)$] originated as a term to represent the heat distribution in a flat plate with a heating element at its center. Theis recognized that this same concept could be applied to the regular distribution of the groundwater head around a pumping well even though water flows toward the point source rather than away from it. The mathematical principles remain the same.

Analysis of pumping test data* using the Theis equation can yield transmissivity and storage coefficients for all nonequilibrium situations. In actual practice, however, the Theis method is often avoided because it requires curve-matching interpretation and is somewhat laborious. In fact, the work of applying the Theis method can be avoided in most cases. For example, if the pumping test is sufficiently long or the distance from the well to where the drawdown is measured is sufficiently small, the $W(u)$ function can be replaced by a simpler mathematical function which makes the analysis easier. The Theis method is developed at the end of this chapter, but at this point the simplified version is examined because it serves well in most cases.

MODIFIED NONEQUILIBRIUM EQUATION

In working with the Theis equation, Cooper and Jacob (1946) point out that when u is sufficiently small, the nonequilibrium equation can be modified to the following form without significant error:

$$s = \frac{264Q}{T}\log\frac{0.3\,Tt}{r^2S} \qquad s = \frac{0.183Q}{T}\log\frac{2.25\,Tt}{r^2S} \qquad (9.6)$$

where the symbols represent the same terms as in Equation 9.5 and 9.5a.

For values of u less than about 0.05, Equation 9.6 gives essentially the same results as Equation 9.5. The value of u becomes smaller as t increases and r decreases. Thus, Equation 9.6 is valid when t is sufficiently large and r is sufficiently small. Equation 9.6 is similar in form to the Theis equation except that the exponential integral function, $W(u)$, has been replaced by a logarithmic term which is easier to work with in practical applications of well hydraulics.

For a particular situation where the pumping rate is held constant, Q, T, and S are all constants. Equation 9.6 shows, therefore, that the drawdown, s, varies with log t/r^2 when u is less than 0.05. From this relationship, two important relationships can be stated:

1. For a particular aquifer at any specific point (where r is constant), the terms s and t are the only variables in Equation 9.6. Thus, s varies as log C_1t, where C_1 represents all the constant terms in the equation.

2. For a particular formation and at a given value of t, the terms s and r are the

*The performance of newly completed wells is often checked by pumping tests. During the test, the drawdown in the pumping well and observation wells is measured at a constant discharge rate. When properly conducted, these tests yield information on transmissivity and storage capability. See Chapter 16 for a detailed analysis of pumping test procedures.

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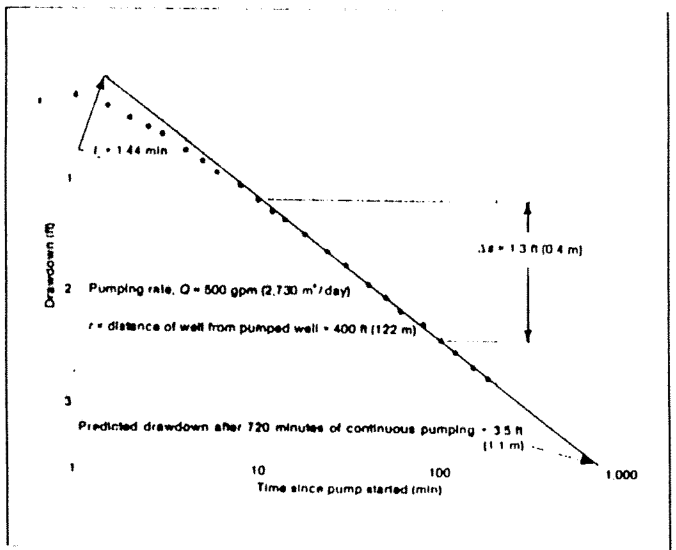

Figure 9.13. When data from Table 9.1 are plotted on semilogarithmic graph paper, most of the plotted points fall on a straight line. The reason for determining Δs and t_0 are explained in the text.

only variables in Equation 9.6. In this case, s varies as log C/r^2, where C represents all the constant terms in the equation, including the specific value of t.

By using these simplified relationships based on Equation 9.6, it is possible to derive information on the hydraulic characteristics of the aquifer by plotting drawdown and time data taken during a pumping test. The data are plotted on semilogarithmic paper* as shown in Figure 9.13. Applying the first of the relationships developed above, time, t, is plotted horizontally on the logarithmic scale; drawdown, s, is plotted vertically on the arithmetic scale. Figure 9.13 shows the data from Table 9.1 plotted as a semilog diagram, where most of the points fall on a straight line.

All the points except those representing measurements made during the first 10 minutes of pumping fit the line. During the first 10 minutes, the value of u is larger than 0.05 and so the modified nonequilibrium equation is not applicable within that phase of the test.

Transmissivity

The coefficient of transmissivity is calculated from the pumping rate and the slope of the time-drawdown graph by using the following relationship developed from Equation 9.6:

*Semilogarithmic graph paper is constructed so that one scale is arithmetic and the other is based on the logarithm of the number being plotted. Thus, a straight-line relationship can be shown to exist between two variables whose relationship is actually changing in time.

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$$T = \frac{264\,Q}{\Delta s}$$

where
T = coefficient of transmissivity, in gpd/ft
Q = pumping rate, in gpm
Δs = (read "delta s") slope of the time-drawdown graph expressed as the change in drawdown between any two times on the log scale whose ratio is 10 (one log cycle)

$$T = \frac{2.3}{4\pi}\frac{Q}{\Delta s} = \frac{0.183\,Q}{\Delta s} \quad (9.7)$$

where
T = coefficient of transmissivity, in m²/day
Q = pumping rate, in m³/day
Δs = (read "delta s") slope of the time-drawdown graph expressed as the change in drawdown between any two times on the log scale whose ratio is 10 (one log cycle)

In the example, Δs is 1.3 ft (0.4 m), which is the change in drawdown between 10 minutes and 100 minutes after the start of the pumping test, and Q equals 500 gpm (2,730 m³/day); so:

$$T = \frac{264 \times 500}{1.3} = 102{,}000 \text{ gpd/ft} \qquad T = \frac{0.183 \times 2{,}730}{0.4} = 1{,}250 \text{ m}^2/\text{day}$$

Table 9.1. Drawdown Measurements in an Observation Well 400 ft (122 m) from Pumped Well

Time since pump started, in min	Drawdown, s ft	Drawdown, s m	Time since pump started, in min	Drawdown, s ft	Drawdown, s m
1	0.16	0.05	24	1.58	0.48
1.5	0.27	0.08	30	1.70	0.52
2	0.38	0.12	40	1.88	0.57
2.5	0.46	0.14	50	2.00	0.61
3	0.53	0.16	60	2.11	0.64
4	0.67	0.20	80	2.24	0.68
5	0.77	0.23	100	2.38	0.73
6	0.87	0.27	120	2.49	0.76
8	0.99	0.30	150	2.62	0.80
10	1.12	0.34	180	2.72	0.83
12	1.21	0.37	210	2.81	0.86
14	1.30	0.40	240	2.88	0.88
18	1.43	0.44			

Coefficient of Storage

The coefficient of storage is also readily calculated from the time-drawdown graph by using the zero-drawdown intercept of the straight line as one of the terms in the equation. The following equation is derived from Equation 9.6:

$$S = \frac{0.3\,T t_0}{r^2}$$

where
S = storage coefficient

$$S = \frac{2.25\,T t_0}{r^2} \quad (9.8)$$

where
S = storage coefficient

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opped and water-level
·c ery period.
se ation well and the
eginning of the pump-
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ar also shown in the

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ov or Jacob's (1946b)
vi hat the time-draw-
on a semilogarithmic
covery plot, where the
·c ery period and the

9.40. The result is sim-
m aquifer test. Theo-

e Observation Well

[illegible]	...n. s. ...ping t	Calculated recovery $(s - s')$	
	m	ft	m
[illegible]	3.23	0.00	0.00
[illegible]	3.23	0.05	0.01
[illegible]	3.23	0.10	0.03
[illegible]	3.23	0.21	0.06
[illegible]	3.23	0.52	0.15
[illegible]	3.24	0.90	0.28
[illegible]	3.24	1.41	0.43
[illegible]	3.24	2.00	0.61
[illegible]	3.25	3.40	1.03
[illegible]	3.26	4.20	1.28
[illegible]	3.27	5.10	1.55
[illegible]	3.29	5.85	1.78
6	3.34	6.95	2.12
5	3.40	8.35	2.55
5	3.46	8.65	2.64
6	3.52	9.50	2.89
6	3.59	9.80	2.99
5	3.64	10.35	3.15

day)

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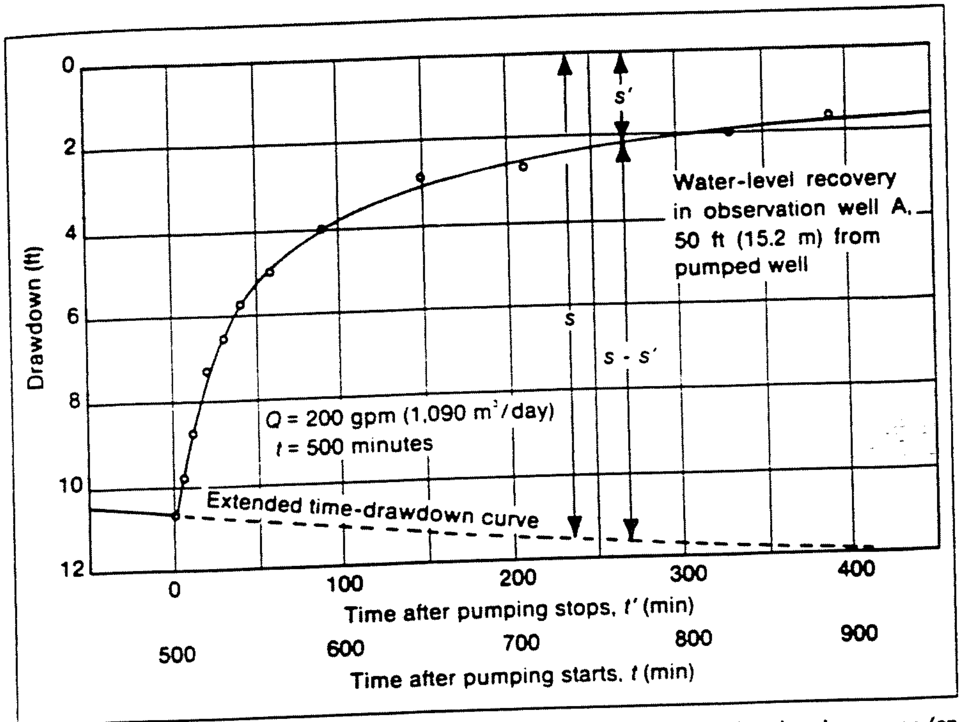

Figure 9.39. Residual-drawdown curve from observation well, with extended time-drawdown curve (on arithmetic scales) showing how calculated recovery is determined at any instant during the recovery period. Producing well pumped 200 gpm (1,090 m³/day) for 500 minutes.

retically, the drawdown and recovery plots should be identical if the aquifer conditions conform to the basic assumptions of the Theis concept.

The time-recovery data from the pumped well can also be plotted by using the method applied to the observation well. The time-recovery plot for the pumped well is more accurate than its time-drawdown plot because the residual-drawdown measurements are more accurate. During the recovery period, water-level measurements can be made without being affected by pump vibrations and momentary variations in the pumping rate.

In analyzing the time-recovery plot, its slope is of primary interest. Two factors determine the slope of the straight line in Figure 9.40. One is the average pumping rate during the preceding pumping period, the other is the aquifer transmissivity.

In Figure 9.40, the slope of the straight line is expressed numerically as the change in the water-level recovery per logarithmic cycle. It is designated by $\Delta(s - s')$. Its value in Figure 9.40 is 5.2 ft (1.6 m), which is the recovery during the period from 10 minutes to 100 minutes after pumping stopped.

The next step is to calculate the transmissivity of the aquifer from the following equation:

$$T = \frac{264\,Q}{\Delta(s - s')} \qquad T = \frac{0.183\,Q}{\Delta(s - s')} \qquad (9.14)$$

Note that this equation is similar to Equation 9.7. Figure 9.40 shows the value of T to

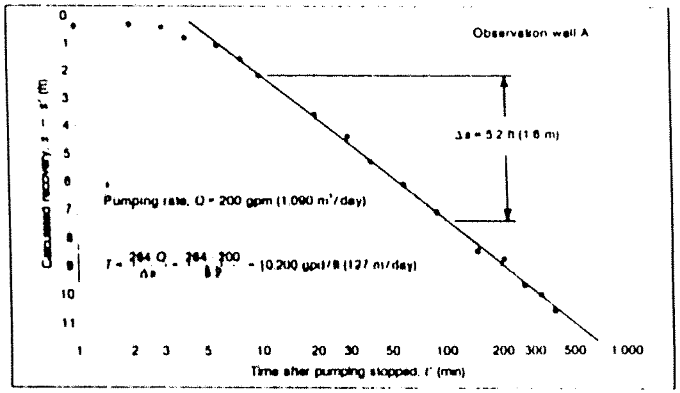

Figure 9.40. Time-recovery plot for observation well becomes a straight line when plotted on a semilog diagram, similar to the time-drawdown diagram for the preceding pumping period.

be about 10,200 gpd/ft (127 m²/day), which may be compared with T as calculated from the time-drawdown data plotted in Figure 9.25. If test conditions meet the required standards and measurements are taken carefully, the two results should agree reasonably well.

A second method of plotting the data permits direct use of the residual drawdown without calculating the recovery from an extension of the time-drawdown plot. It can be shown that the residual drawdown is related to the logarithm of the ratio t/t' as follows:

$$s' = \frac{264\,Q}{T} \log t/t' \qquad s' = \frac{0.183\,Q}{T} \log t/t' \qquad (9.15)$$

Mathematical development of this relationship is given in Appendix 9.D.

This equation shows that when values of s' are plotted against corresponding values of t/t' on semilogarithmic graph paper, a straight line can be drawn through the plotted points. Figure 9.41 shows the data from Table 9.4 plotted on a semilog diagram, with s' indicated on the vertical arithmetic scale and t/t' on the horizontal logarithmic scale. The transmissivity is then calculated from the following equation:

$$T = \frac{264\,Q}{\Delta s'} \qquad T = \frac{0.183\,Q}{\Delta s'} \qquad (9.16)$$

Note from Figure 9.41 that time during the recovery period increases toward the left in this method of plotting, whereas on the time-drawdown and time-recovery plots time increases toward the right.

The residual-drawdown plot as shown in Figure 9.41 is preferred over the recovery plot, Figure 9.40, for calculating transmissivity. The method shown in Figure 9.41 provides a more independent check on the results calculated from the pumping period.

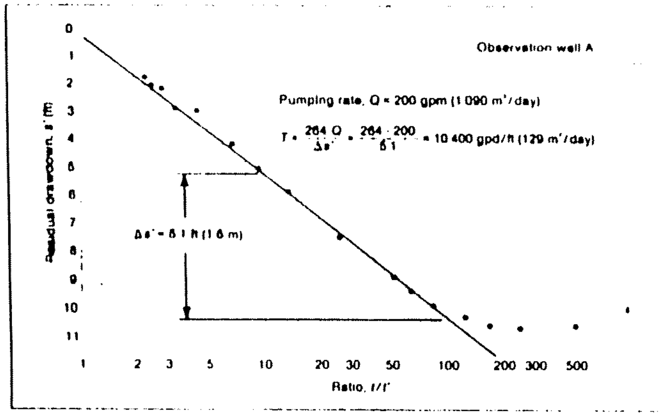

Figure 9.41. Residual drawdown plotted against the ratio t/t' becomes a straight line on semilog graph and permits calculation of transmissivity as shown. Time during recovery period increases toward the left in this diagram.

The method used in Figure 9.40 depends upon extension of the time-drawdown plot through the recovery period; thus, the drawdown plot itself determines the values used in the recovery plot, and any inaccuracies in the drawdown plot are projected into the recovery plot.

If no observation well is available, the recovery data from the pumped well usually provide the best basis for calculating the transmissivity of the aquifer. The residual-drawdown plot, as shown in Figure 9.41, should always be used in such a case.

Determining Storage Coefficient Using Recovery Data

If measurements are made in at least one observation well during the recovery period, the storage coefficient can be calculated from portions of these data. The data must be plotted as shown in Figure 9.40. The residual-drawdown plot cannot be used for determining the storage coefficient, even though that plot is valid for calculating the transmissivity.

Figures 9.42 and 9.43 show the similarity in calculations of the storage coefficient from time-drawdown and time-recovery diagrams. Using Equations 9.7 and 9.8, the time-drawdown data for an observation well, shown in Figure 9.42, give values of T = 13,000 gpd/ft (161 m²/day) and $S = 5.7 \times 10^{-4}$, respectively. Parallel calculations from Figure 9.43 using $\Delta(s - s')$ in place of Δs and t'_o in place of t_o, give values of T = 13,700 gpd/ft (170 m²/day) and $S = 4.4 \times 10^{-4}$, respectively. These two sets of results are considered to be in reasonable agreement.

It is apparent from the residual-drawdown curve in Figure 9.41 that t'_o cannot be obtained from that diagram. The horizontal scale represents a ratio without units. The intercept of this curve at zero drawdown has an entirely different significance on this graph. It is necessary to review the basic assumptions listed on page 218 that were used in developing the equations for both the pumping period and the recovery period

p 5 of 6

A study of residual-drawdown curves from actual aquifer tests reveals that the curve does not always pass through this point, called the origin of the diagram. When the curve fails to pass through the origin, it is concluded that the aquifer conditions do not conform to the assumed idealized conditions.

Three ways in which the conditions differ from the theoretical aquifer may be indicated by the residual-drawdown plot. If the graph indicates zero drawdown at a t/t' value of 2 or more, it is concluded that some recharge water reached the aquifer during the pumping period. The result of the recharge is to bring about full recovery to the original static level during a relatively short recovery period, long before t/t' approaches 1. The upper plot in Figure 9.44 might be obtained for such a situation.

A different condition is indicated when the plot extended to the left shows a residual drawdown of several inches or more as t/t' approaches 1. This situation would occur in an aquifer of limited extent with no recharge, when pumping permanently lowers the static water level. The lowest plot in Figure 9.44 illustrates this type of result.

The third condition that can account for minor displacement of the residual drawdown plot results from a variation in the storage coefficient, S. In theory, the storage coefficient is assumed to be constant during both the pumping period and the recovery period of the test. In practice, however, S probably varies and is apt to be greater during the pumping period than during the subsequent recovery (Jacob, 1963).

The value of S for a confined aquifer depends upon the elastic properties of the formation. If the aquifer is not perfectly elastic, it does not rebound vertically during recovery of water levels (recovery of pressure) at the same rate that it is compressed as a result of the drawdown during the preceding pumping.

During pumping from an unconfined aquifer, air occupies the voids in the sands within the cone of depression, because that part of the formation is actually dewatered. The volume of water drained per cubic foot of the formation is the value of S. When pumping is stopped, the rising water table may trap some of the air as bubbles in the

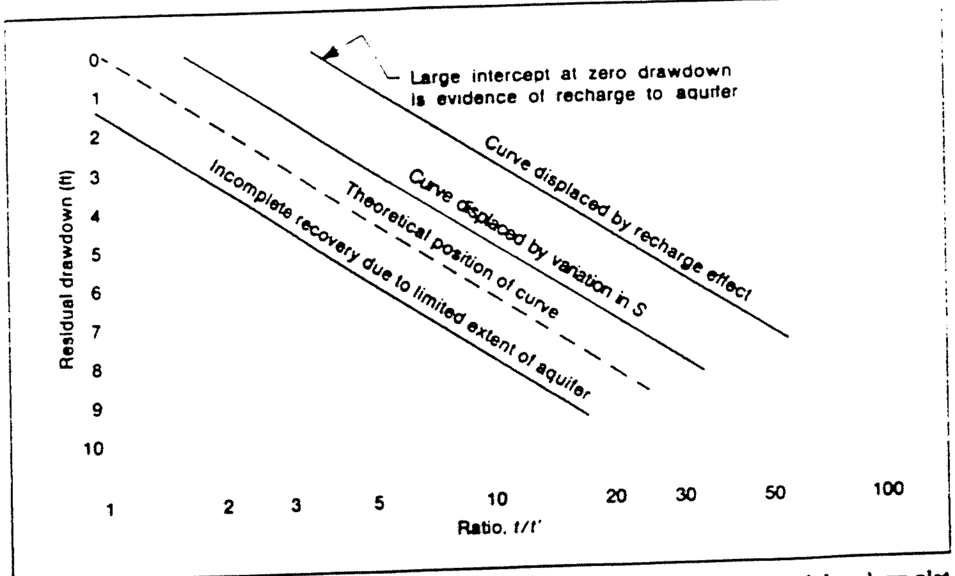

Figure 9.44. When real aquifer conditions differ from theoretical conditions, the residual-drawdown plot may be displaced in any of the three ways shown in this diagram.

SOMERSET RAILROAD PROJECT

HYDROGEOLOGIC STUDY
DANIELEWICZ ROUTE
STATION 51 + 810 TO 52 + 330

FEBRUARY 1982

BECHTEL ASSOCIATES PROFESSIONAL CORPORATION

Water Quality Monitoring Results

Bechtel - November, 1981

Appendix 1.4.4-1
3 of 10

CHEMICAL ANALYSES OF GROUND WATER SAMPLES

DATA SHEETS FROM RECRA RESEARCH, INC.

FIRST ROUND ANALYSES

ANALYTICAL RESULTS

BECHTEL CIVIL & MINERALS, INC.

Report Date: 11/11/81

PARAMETER	UNITS OF MEASURE	SAMPLE IDENTIFICATION (DATE)			
		D-62A (11/3/81)	D-62B (11/3/81)	D-63AA (11/3/81)	D-63AB (11/3/81)
pH (field)	Standard Units	9.95	10.25	9.65	9.80
Specific Conductance (field)	umhos/cm	510	505	255	275
Temperature (field)	°C	10	10	12	11
Total Organic Carbon	mg/l	3.3	1.5	5.6	5.8
Total Filterable Residue (180°C)	mg/l	550	520	270	270
Chloride	mg/l	19	19	23	24
Total Iron	mg/l	17	18	4.7	3.0
Total Recoverable Oil and Grease	mg/l	6	<5	<5	<5

COMMENTS: Refer to pages 1 through 4.

FOR RECRA RESEARCH, INC. Q. V. Finn

DATE 11/11/81

RECRA RESEARCH, INC.
I.D. #81-1000

ANALYTICAL RESULTS

BECHTEL CIVIL & MINERALS, INC.

Report Date: 11/11/81

PARAMETER	UNITS OF MEASURE	SAMPLE IDENTIFICATION (DATE)			
		D-64A (11/2/81)	D-64B (11/2/81)	D-65A (11/2/81)	D-65B (11/2/81)
pH (field)	Standard Units	8.20	8.45	7.85	8.30
Specific Conductance (field)	umhos/cm	244	242	1,290	1,290
Temperature (field)	°C	11.5	13	11.5	11.5
Total Organic Carbon	mg/l	5.7	6.8	4.5	9.5
Total Filterable Residue (180°C)	mg/l	180	170	1,200	1,100
Chloride	mg/l	24	23	37	37
Total Iron	mg/l	1.8	21	4.8	3.3
Total Recoverable Oil and Grease	mg/l	8	<5	<5	<5

COMMENTS: Refer to pages 1 through 4.

FOR RECRA RESEARCH, INC. R. V. Frisin

DATE 11/11/81

RECRA RESEARCH, INC.

I.D. #81-1000

ANALYTICAL RESULTS

BECHTEL CIVIL & MINERALS, INC.

Report Date: 11/11/81

PARAMETER	UNITS OF MEASURE	SAMPLE IDENTIFICATION (DATE)			
		D-66A (11/3/81)	D-66B (11/3/81)	D-67A (11/3/81)	D-67B (11/3/81)
pH (field)	Standard Units	7.50	7.45	10.65	10.75
Specific Conductance (field)	µmhos/cm	1,040	1,000	540	530
Temperature (field)	°C	13	12.5	13	12.5
Total Organic Carbon	mg/l	4.0	4.4	3.2	2.0
Total Filterable Residue (180°C)	mg/l	860	830	410	410
Chloride	mg/l	200	190	33	33
Total Iron	mg/l	8.0	1.6	3.1	3.5
Total Recoverable Oil and Grease	mg/l	<5	<5	<5	15

COMMENTS: Refer to pages 1 through 4.

FOR RECRA RESEARCH, INC. R. V. Finn

DATE 11/11/81

RECRA RESEARCH, INC.

I.D. #81-1000

ANALYTICAL RESULTS

BECHTEL CIVIL & MINERALS, INC.

Report Date: 11/11/81

PARAMETER	UNITS OF MEASURE	SAMPLE IDENTIFICATION (DATE)			
		D-68A (11/3/81)	D-68B (11/3/81)	D-69A (11/3/81)	D-69B (11/3/81)
pH (field)	Standard Units	8.75	8.95	6.70	6.80
Specific Conductance (field)	umhos/cm	255	258	800	780
Temperature (field)	°C	12	12	14	14
Total Organic Carbon	mg/l	1.8	2.5	6.8	8.7
Total Filterable Residue (180°C)	mg/l	230	240	670	730
Chloride	mg/l	19	20	29	29
Total Iron	mg/l	8.4	6.7	7.4	89
Total Recoverable Oil and Grease	mg/l	<5	<5	14	<5

COMMENTS: Refer to pages 1 through 4.

FOR RECRA RESEARCH, INC. R. V. Finn

DATE 11/11/81

RECRA RESEARCH, INC.

I.D. #81-1000

ANALYTICAL RESULTS

BECHTEL CIVIL & MINERALS, INC.

Report Date: 11/11/81

PARAMETER	UNITS OF MEASURE	SAMPLE IDENTIFICATION (DATE)	
		D-70A (11/3/81)	D-70B (11/3/81)
pH (field)	Standard Units	6.85	6.80
Specific Conductance (field)	µmhos/cm	640	540
Temperature (field)	°C	14.5	13
Total Organic Carbon	mg/l	24	33
Total Filterable Residue (180°C)	mg/l	570	590
Chloride	mg/l	31	32
Total Iron	mg/l	120	260
Total Recoverable Oil and Grease	mg/l	73	31

COMMENTS: Refer to pages 1 through 4.

FOR RECRA RESEARCH, INC. R. V. Finn

DATE 11/11/81

RECRA RESEARCH, INC.
I.D. #81-1000

Appendix 1.4.4-1
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CHEMICAL ANALYSES OF GROUND WATER SAMPLES

DATA SHEETS FROM RECRA RESEARCH, INC.

SECOND ROUND ANALYSES

ANALYTICAL RESULTS

BECHTEL CIVIL AND MINERALS, INC.

Report Date: 11/18/81
Date Received: 11/13/81 - 11/17/81

PARAMETER	UNITS OF MEASURE	SAMPLE IDENTIFICATION D-64	D-66	D-69	D-70
pH (field)	Standard Units	6.75	7.30	6.40	6.15
Conductance (25°C)	umhos/cm	670	810	615	490
Chloride	mg/l	84	100	31	36
Fluoride	mg/l	0.33	0.36	0.39	0.26
Total Organic Carbon	mg/l	33	8	7.6	7.6
Total Cyanide	µg/l	<10	<10	<10	<20
Total Zinc	mg/l	0.083	0.235	1.4	3.4
Soluble Zinc	mg/l	0.099	0.125	0.443	0.533
Soluble Antimony	mg/l	<0.3	<0.3	<0.3	<0.3
Total Recoverable Oil and Grease	mg/l	<5	<5	<5	7

COMMENTS: Values reported as "less than" (<) indicate the working detection limit for the particular sample or parameter.

FOR RECRA RESEARCH, INC. R. V. Finn

DATE 11/18/81

RECRA RESEARCH, INC.

I.D. #81-1051

Appendix 1.4.4-2

A HYDROGEOLOGIC ASSESSMENT OF POST-CONSTRUCTION CONDITIONS ALONG THE MILL STREET CUT

(Station 52 + 250 to 51 + 650)

Somerset Railroad Corporation

June, 1984

Appendix 1.4.4-2
2 of 5

Water Quality Monitoring Results

Woodward Clyde Consultants - November, 1981

Advanced Environmental Systems, Inc.

Monitoring and Support Laboratory

RESULTS

Metals Analysis of Eleven Water Samples
(Expressed as micrograms per liter, or ppb)

Metal	Well D-51	Well D-53	Well D-55	Well D-61	Well D-64	Well D-66	Well D-68	Well D-69	Well D-70	STR-1	Trip Blank	Field Blank
Arsenic	<10.	<10.	<10.	<10.	<10.	<10.	68.	<10.	<10.	<10.	<10.	<10.
Barium	<200.	<200.	<200.	<200.	650.	1800.	<200.	<200.	<200.	<200.	<200.	<200.
Cadmium	<25.	<25.	<25.	<25.	<25.	<25.	<25.	<25.	<25.	<25.	<25.	<25.
Chromium	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.
Lead	<250.	<250.	<250.	<250.	<250.	<250.	<250.	<250.	<250.	<250.	<250.	<250.
Nickel	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.	<100.
Zinc	<20.	165.	<20.	38.	35.	<20.	23.	375.	400.	35.	<20.	<20.
Copper	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.
Mercury	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Beryllium	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.	<50.

1 (<) Less than equals the limits of detection.

VOLATILE ORGANICS

(EXPRESSED AS MICROGRAMS PER LITER, OR ppb)

Parameter	Well D-51	Well D-53	Well D-55	Well D-61	Well D-64	Well D-66	Detecti Limit
ACROLEIN	BDL[1]	BDL	BDL	BDL	BDL	BDL	100
ACRYLONITRILE	BDL	BDL	BDL	BDL	BDL	BDL	100
BENZENE	BDL	BDL	BDL	BDL	BDL	BDL	10
BIS (CHLOROMETHYL) ETHER	BDL	BDL	BDL	BDL	BDL	BDL	10
BROMOFORM	BDL	BDL	BDL	BDL	BDL	BDL	10
CARBON TETRACHLORIDE	BDL	BDL	BDL	BDL	BDL	BDL	10
CHLOROBENZENE	BDL	BDL	BDL	BDL	BDL	BDL	10
CHLORODIBROMOMETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
CHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
2-CHLOROETHYLVINYL ETHER	BDL	BDL	BDL	BDL	BDL	BDL	10
CHLOROFORM	BDL	BDL	BDL	BDL	BDL	BDL	10
DICHLOROBROMOMETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
DICHLORODIFLUOROMETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,1-DICHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,2-DICHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,1-DICHLOROETHYLENE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,2-DICHLOROPROPANE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,3-DICHLOROPROPYLENE	BDL	BDL	BDL	BDL	BDL	BDL	10
ETHYLBENZENE	BDL	BDL	BDL	BDL	BDL	BDL	10
METHYL BROMIDE	BDL	BDL	BDL	BDL	BDL	BDL	10
METHYL CHLORIDE	BDL	BDL	BDL	BDL	BDL	BDL	10
METHYLENE CHLORIDE[2]	119.0	880.0	93.0	16.0	120.0	99.0	10
1,1,2,2-TETRACHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
TETRACHLOROETHYLENE	BDL	BDL	BDL	BDL	BDL	BDL	10
TOLUENE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,2-TRANS-DICHLOROETHYLENE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,1,1-TRICHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,1,2-TRICHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
TRICHLOROETHYLENE	BDL	BDL	BDL	BDL	BDL	BDL	10
TRICHLOROFLUOROMETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
VINYL CHLORIDE	BDL	BDL	BDL	BDL	BDL	BDL	10

[1] (BDL) Below Detection Limits
[2] See DISCUSSION

Appendix 1.4.4-2 5 of 5

VOLATILE ORGANICS

(EXPRESSED AS MICROGRAMS PER LITER, OR ppb)

Parameter	Well D-68	Well D-69	Well D-70	STR-1	Trip Blank	Field Blank	Detecti. Limit
ACROLEIN	BDL	BDL	BDL	BDL	BDL	BDL	100
ACRYLONITRILE	BDL	BDL	BDL	BDL	BDL	BDL	100
BENZENE	BDL	BDL	BDL	BDL	BDL	BDL	10
BIS (CHLOROMETHYL) ETHER	BDL	BDL	BDL	BDL	BDL	BDL	10
BROMOFORM	BDL	BDL	BDL	BDL	BDL	BDL	10
CARBON TETRACHLORIDE	BDL	BDL	BDL	BDL	BDL	BDL	10
CHLOROBENZENE	BDL	BDL	BDL	BDL	BDL	BDL	10
CHLORODIBROMOMETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
CHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
2-CHLOROETHYLVINYL ETHER	BDL	BDL	BDL	BDL	BDL	BDL	10
CHLOROFORM	BDL	BDL	BDL	BDL	BDL	BDL	10
DICHLOROBROMOMETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
DICHLORODIFLUOROMETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,1-DICHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,2-DICHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,1-DICHLOROETHYLENE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,2-DICHLOROPROPANE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,3-DICHLOROPROPYLENE	BDL	BDL	BDL	BDL	BDL	BDL	10
ETHYLBENZENE	BDL	BDL	BDL	BDL	BDL	BDL	10
METHYL BROMIDE	BDL	BDL	BDL	BDL	BDL	BDL	10
METHYL CHLORIDE	BDL	BDL	BDL	BDL	BDL	BDL	10
METHYLENE CHLORIDE[1]	210.0	270.0	BDL	BDL	22,000.0	27.0	10
1,1,2,2-TETRACHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
TETRACHLOROETHYLENE	BDL	BDL	BDL	BDL	BDL	BDL	10
TOLUENE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,2-TRANS-DICHLOROETHYLENE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,1,1-TRICHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
1,1,2-TRICHLOROETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
TRICHLOROETHYLENE	BDL	BDL	BDL	BDL	BDL	BDL	10
TRICHLOROFLUOROMETHANE	BDL	BDL	BDL	BDL	BDL	BDL	10
VINYL CHLORIDE	BDL	BDL	BDL	BDL	BDL	BDL	10

[1] See DISCUSSION

1 of 3

A HYDROGEOLOGIC ASSESSMENT

OF

POST-CONSTRUCTION CONDITIONS

ALONG THE MILL STREET CUT

(Station 52 + 250 to 51 + 650)

Somerset Railroad Corporation

June, 1984

Appendix 1.4.4-3
2 of 3

Water Quality Monitoring Results

Woodward Clyde Consultants, Inc. - May, 1982

... Environmental Systems, Inc.

Monitoring and Support Laboratory

Appendix 1.4.4-3
3 of 3

RESULTS

Well #	Arsenic (mg/l)	Barium (mg/l)	Cadmium (mg/l)	Chromium (mg/l)	Lead (mg/l)	Zinc (mg/l)	THO (µg/l)	Tot.PCB (µg/l)	Meth. Cl. (µg/l)	Oil & Grease (mg/l)
D-51	<0.010[1]	<0.200	<0.001	<0.005	<0.010	<0.050	<0.07	<0.50	<0.01	0.35
D-53	<0.010	<0.200	<0.001	<0.005	<0.010	0.130	<0.07	<0.50	<0.01	<0.05
D-55	<0.010	<0.200	<0.001	<0.005	<0.010	0.160	<0.07	<0.50	<0.01	0.93
D-61	0.010	<0.200	<0.001	<0.005	<0.010	<0.050	<0.07	<0.50	<0.01	1.51
D-64	0.010	<0.200	0.004	<0.005	<0.010	0.115	<0.07	<0.50	<0.01	0.37
D-66	0.044	<0.200	<0.001	<0.005	<0.010	<0.050	<0.07	<0.50	<0.01	0.38
D-68A	0.050	<0.200	0.005	0.008	0.066	<0.050	<0.07	<0.50	<0.01	0.75
D-69	0.014	<0.200	0.003	<0.005	<0.010	0.180	<0.07	<0.50	<0.01	0.08
D-70	<0.010	<0.200	<0.001	<0.005	<0.010	0.115	<0.07	<0.50	<0.01	3.17
Trip Blank	<0.010	<0.200	<0.001	<0.005	<0.010	<0.050	**[2]	**[2]	<0.01	0.24
Field Blank	<0.010	<0.200	<0.001	<0.005	0.010	<0.050	<0.07	<0.50	<0.01	0.48

1 (<) Less than equals the limits of detection.

2 No Sample

Appendix 1.4.4-4

A HYDROGEOLOGIC ASSESSMENT
OF
POST-CONSTRUCTION CONDITIONS
ALONG THE MILL STREET CUT
(Station 52 + 250 to 51 + 650)

Somerset Railroad Corporation

June, 1984

Water Quality Monitoring Results

Somerset Railroad Corporation, 1983

Parameter - Abbreviations

Arsenic - (As)	Mercury - (Hg)
Barium - (Ba)	Zinc - (Zn)
Beryllium - (Be)	Conductivity (Cond)
Cadmium - (Cd)	Ammonia (NH_3)
Chromium - (Cr)	Phenols
Copper - (Cu)	Oil & Grease
Iron - (Fe)	pH
Lead - (Pb)	Total Halogenated Organics (TOX)
Nickel - (Ni)	Total Organic Carbon (TOC)

SOMERSET RAILROAD
WATER QUALITY MONITORING PROGRAM

East Side of Mill Street Cut
Summary for Observation Well D-66

--Parameters--

Sampling Date	pH	Cond (umhos @ 25°C)	TOC	TOX (ppb)	Phenols (ppb)	NH_3	Oil & Grease	As	Ba
06/09/83	6.9	1050	15	1500	24.0	2.3	1.0	<0.01	1.30
07/20/83	6.6	900	17	1500	11.0	1.4	1.0	<0.01	1.17
09/08/83	7.2	840	75	1300	<1.0	2.0	1.0	<0.01	0.62
11/17/83	6.9	1500	12	1100	13.0	1.0	1.0	<0.01	1.03

All results in ppm unless otherwise noted.

Metal analyses reported in dissolved state.

Appendix 1.4.4-4

Appendix 1.4.4-4
4 of 8

SOMERSET RAILROAD
WATER QUALITY MONITORING PROGRAM

East Side of Mill Street Cut
Summary for Observation Well D-66

--Parameters--

Sampling Date	Be	Cd	Cu	Cr	Fe	Hg	Ni	Pb	Zn
06/09/83	<0.05	<0.01	<0.03	<0.01	0.05	<0.0002	<0.1	<0.01	0.04
07/20/83	<0.02	<0.01	<0.03	<0.01	<0.05	<0.0002	<0.1	<0.01	0.17
09/08/83	<0.02	0.01	<0.03	<0.01	0.14	<0.0002	<0.1	<0.01	<0.03
11/17/83	<0.05	0.01	<0.03	<0.01	<0.05	<0.0002	<0.1	<0.01	0.03

All results in ppm unless otherwise noted.

Metal analyses reported in dissolved state.

SOMERSET RAILROAD
WATER QUALITY MONITORING PROGRAM

East Side of Mill Street Cut
Summary for Observation Well D-69

--Parameters--

Sampling Date	pH	Cond (umhos @ 25°C)	TOC	TOX (ppb)	Phenols (ppb)	NH_3	Oil & Grease	As	Ba
06/09/83	6.7	780	64	1800	4.1	1.4	1.0	<0.01	0.60
07/20/83	6.4	690	30	1700	<1.0	<0.1	1.0	<0.01	0.58
09/08/83	6.4	740	71	1400	<1.0	0.7	1.0	<0.01	<0.20
11/17/83	6.5	1100	23	2300	<1.0	<0.1	1.1	<0.01	0.20

All results in ppm unless otherwise noted.

Metal analyses reported in dissolved state.

SOMERSET RAILROAD
WATER QUALITY MONITORING PROGRAM

East Side of Mill Street Cut
Summary for Observation Well D-69

--Parameters--

Sampling Date	Be	Cd	Cu	Cr	Fe	Hg	Ni	Pb	Zn
06/09/83	<0.05	<0.01	0.04	0.043	0.08	<0.0002	<0.1	<0.01	0.26
07/20/83	<0.02	<0.01	0.04	<0.01	<0.05	<0.0002	<0.1	<0.01	0.44
09/08/83	<0.02	0.01	0.04	<0.01	<0.05	<0.0002	<0.1	<0.01	0.45
11/17/83	<0.05	0.01	0.06	<0.01	<0.05	<0.0002	<0.1	<0.01	0.37

All results in ppm unless otherwise noted.

Metal analyses reported in dissolved state.

Appendix 1.4.4-4
6 of 8

SOMERSET RAILROAD
WATER QUALITY MONITORING PROGRAM

East Side of Mill Street Cut
Summary for Observation Well D-70

--Parameters--

Sampling Date	pH	Cond (umhos @ 25°C)	TOC	TOX (ppb)	Phenols (ppb)	NH_3	Oil & Grease	As	Ba
06/09/83	6.2	625	50	1000	25.0	0.1	1.3	<0.01	0.60
07/20/83	6.5	560	48	1100	14.0	1.8	1.0	<0.01	0.58
09/08/83	6.4	670	67	1100	<1.0	2.0	*80.9	<0.01	<0.20
11/17/83	6.5	950	21	1400	<1.0	1.0	1.6	<0.01	<0.20

All results in ppm unless otherwise noted.

Metal analyses reported in dissolved state.

* Laboratory analysis indicated high probability of error.

Appendix 1.4.4-4
7 of 8

SOMERSET RAILROAD
WATER QUALITY MONITORING PROGRAM

East Side of Mill Street Cut
Summary for Observation Well D-70

--Parameters--

Sampling Date	Be	Cd.	Cu	Cr	Fe	Hg	Ni	Pb	Zn
06/09/83	<0.05	<0.01	<0.03	0.044	7.00	<0.0002	<0.1	<0.01	0.12
07/20/83	<0.02	<0.01	<0.03	<0.01	11.10	<0.0002	<0.1	<0.01	0.41
09/08/83	<0.02	<0.01	<0.03	<0.01	8.28	<0.0002	<0.1	<0.01	0.14
11/17/83	<0.05	<0.01	<0.01	<0.01	13.00	<0.0002	<0.1	<0.01	0.11

All results in ppm unless otherwise noted.

Metal analyses reported in dissolved state.

Appendix 1.4.4-4
8 of 8

A HYDROGEOLOGIC ASSESSMENT OF POST-CONSTRUCTION CONDITIONS ALONG THE MILL STREET CUT (Station 52 + 250 to 51 + 650)

Somerset Railroad Corporation

June, 1984

SOMERSET RAILROAD
WATER QUALITY MONITORING PROGRAM

East Side of Mill Street Cut
Summary for the Rock Cut Sampling Location

--Parameters--

Sampling Date	pH	Cond (umhos @ 25°C)	TOC	TOX (ppb)	Phenols (ppb)	NH_3	Oil & Grease	As	Ba
06/09/83	6.7	520	10	65	3.6	1.0	1.0	<0.01	<0.5
07/20/83	7.0	405	8.0	81	<1.0	0.26	1.0	<0.01	0.27
09/08/83	7.4	400	13	58	9.0	0.5	1.0	<0.01	<0.2
11/17/83	7.0	980	18	150	3.0	0.1	16.4	<0.01	<0.2

All results in ppm unless otherwise noted.

Metal analyses reported in dissolved state.

SOMERSET RAILROAD
WATER QUALITY MONITORING PROGRAM

East Side of Mill Street Cut
Summary for the Rock Cut Sampling Location

Appendix 1.4.4-5
3 of 5

--Parameters--

Sampling Date	Be	Cd	Cu	Cr	Fe	Hg	Ni	Pb	Zn
06/09/83	<0.05	<0.01	<0.03	<0.01	0.11	<0.0002	<0.1	<0.01	0.07
07/20/83	<0.02	<0.01	<0.03	<0.01	0.07	<0.0002	<0.1	<0.01	0.09
09/08/83	<0.02	<0.01	<0.03	<0.01	<0.05	<0.0002	<0.1	<0.01	0.07
11/17/83	<0.05	<0.01	<0.03	<0.01	0.07	<0.0002	<0.1	<0.01	0.17

All results in ppm unless otherwise noted.

Metal analyses reported in dissolved state.

SOMERSET RAILROAD
WATER QUALITY MONITORING PROGRAM

East Side of Mill Street Cut
Summary for the Mill Street Sampling Location

--Parameters--

Sampling Date	pH	Cond (umhos @ 25°C)	TOC	TOX (ppb)	Phenols (ppb)	NH_3	Oil & Grease	As	Ba
06/09/83	6.7	510	10	63	12.0	0.8	1.0	<0.01	<0.5
07/20/83	6.9	410	5	78	2.0	0.5	1.0	<0.01	0.30
09/08/83	7.2	430	19	80	<1.0	2.5	1.0	<0.01	<0.2
11/17/83	6.8	1000	18	62	7.0	<0.1	5.3	<0.01	1.08

All results in ppm unless otherwise noted.

Metal analyses reported in dissolved state.

SOMERSET RAILROAD
WATER QUALITY MONITORING PROGRAM

East Side of Mill Street Cut
Summary for the Mill Street Sampling Location

--Parameters--

Sampling Date	Be	Cd	Cu	Cr	Fe	Hg	Ni	Pb	Zn
06/09/83	<0.05	<0.01	<0.03	0.011	0.20	<0.0002	<0.1	<0.01	0.04
07/20/83	<0.02	<0.01	<0.03	<0.01	0.13	<0.0002	<0.1	<0.01	0.08
09/08/83	<0.02	<0.01	<0.03	<0.01	0.07	<0.0002	<0.1	<0.01	<0.03
11/17/83	<0.05	<0.01	<0.03	<0.01	0.14	<0.0002	<0.1	<0.01	0.08

All results in ppm unless otherwise noted.

Metal analyses reported in dissolved state.

Appendix 1.5.1-1

1 of 3

EA SCIENCE AND TECHNOLOGY

A Division of EA Engineering, Science, and Technology, Inc

COMMUNICATIONS RECORD FORM

Distribution: ( ) ________, ( ) ________

( ) ________, ( ) ________

( ) Author

Person Contacted: Dick Tillman Date: 8/28/87

Phone Number: (716)434-4949 Title: District Manager

Affiliation: Niagara County Soil & Water Conservation District Type of Contact: phone

Address: 4487 Lake Avenue Person Making Contact: T. Porter

Lockport, NY 14094

Communications Summary: Any bordering farm of Eighteen Mile Creek (& E. Branch of Eighteenmile Creek) use the surface water body on a periodic basis for irrigation purposes

(see over for additional space)

Signature: Tom Porter

RECEIVED JUL 16 1987

NIAGARA COUNTY SOIL AND WATER CONSERVATION DISTRICT

NIAGARA FALLS
LOCKPORT
NORTH TONAWANDA

4487 LAKE AVENUE
LOCKPORT, NEW YORK 14094
TELEPHONE: 434-4949

July 10, 1987

EA Science & Technology
RD #2, Box 91
Goshen Turnpike
Middletown, NY 10940

Dear Lori:

Enclosed are the farms and two golf courses that do some supplemental irrigation within the three mile radus of the Norton Lab site. Depending on what crop is planted, the amount of irrigation will vary.

The irrigation source water varies greatly also. Most is from surface water supplies or public county water systems. I do not know anyone who pumps from a well to irrigate.

Surface water supply water is derived out of Eighteen Mile Creek and the East Branch of Eighteen Mile Creek. Both creeks and their tributaries are augmented by water release from the State Barge Canal, which cuts through this area.

I hope this helps you in your site review. If you need names and addresses of these farm owners contact our office.

More farmers is this area will be using more surface water supplies if the demand on the public water system continues. Also more crops are being irrigated every year in our area.

Yours In Conservation,

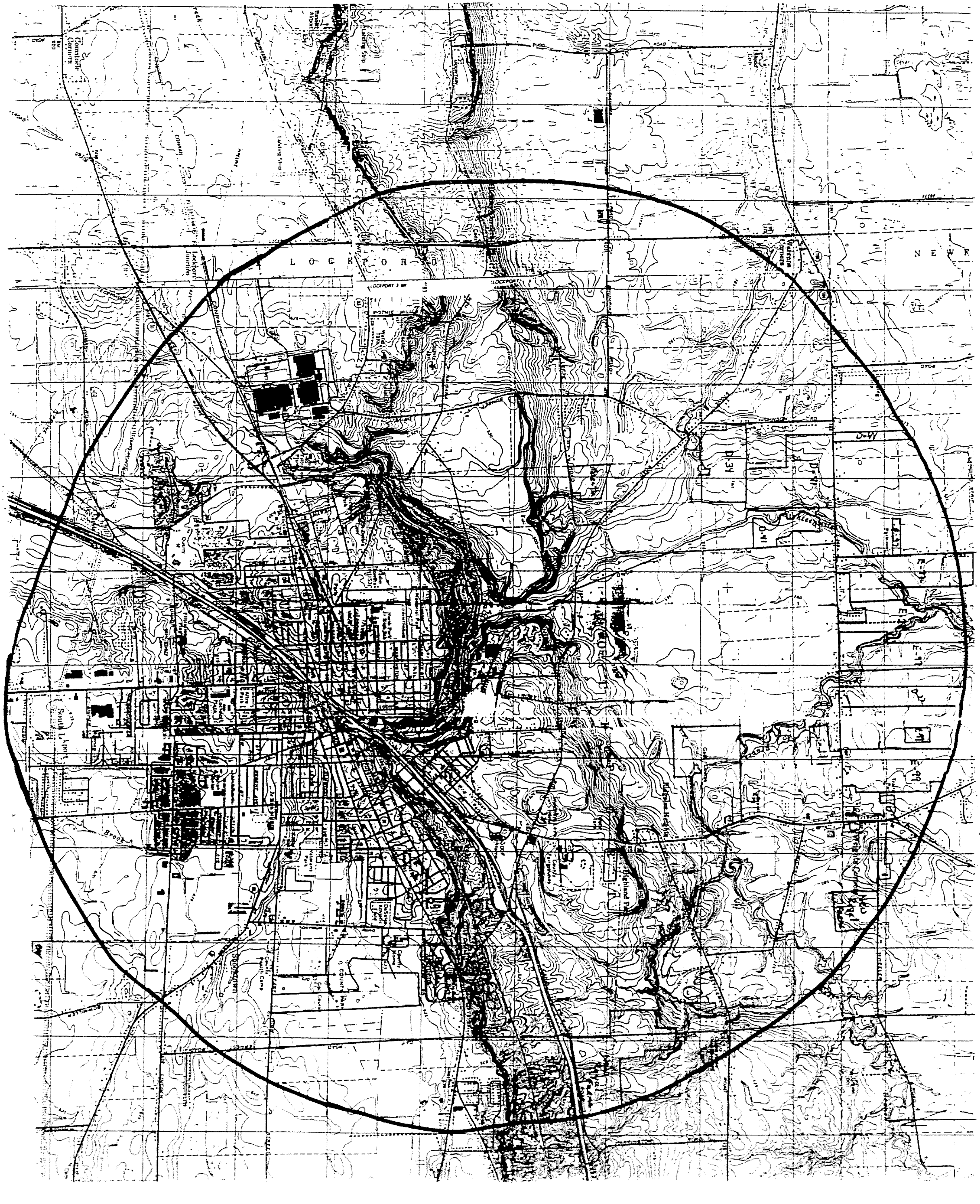
Richard Tillman

Richard Tillman
District Manager

Enclosure

RT:sb

Appendix 1.5.1-1
3 of 3
Scale 1" = 4000'



EA SCIENCE AND TECHNOLOGY
A Division of EA Engineering, Science, and Technology, Inc.

Appendix 1.5.1-2

COMMUNICATIONS RECORD FORM

Distribution: ( ) Norton Lab, ( ) ______
( ) ______, ( ) ______
( ) Author

Person Contacted: Mr Steve Meridian Date: 6/19/87

Phone Number: (716) 372-0645 Title: Regional Fisheries Manager

Affiliation: NYSDEC Region 9 Type of Contact: phone

Address: 128 South St. Person Making Contact: L. Rogers
Olean, NY 14760

Communications Summary: Eighteenmile Creek is a critical recreational resource in Niagara County. It is used heavily for fishing and is also an important migration route for salmon and trout.

(see over for additional space)

Signature: Lou Rogers

Appendix 1.5.1-3

New York State Department of Environmental Conservation
Wildlife Resources Center
Delmar, NY 12054

Henry G. Williams
Commissioner

RECEIVED APR 16 1986

April 10, 1986

Mr. Thomas Porter
EA Science and Technology
RD2 Box 91
Goshen Turnpike
Middletown, NY 10940

Dear Tom:

We have reviewed the hazardous waste sites enclosed with your letter of 21 March 1986 for potential affects on "Federally listed endangered species" and "critical habitats". There were not any Federally listed species identified in the vicinity of the sites; however, several sites are in close proximity to significant habitats, including State listed endangered and threatened species. We have drawn the approximate locations of these habitats on the enclosed maps and described them on the back of each map.

In addition, these sites were reviewed by the New York Natural Heritage Program for proximity to rare plants. Information from their files is also included on the back of each map. Please treat the rare plant information as "confidential" and review the enclosed disclaimer statement. If you have any questions concerning the rare plants please contact Dr. Steve Clemants, Botanist, New York Natural Heritage Program, at this address or (518) 439-7488.

If we can be of further assistance please do not hesitate to contact us.

Sincerely,

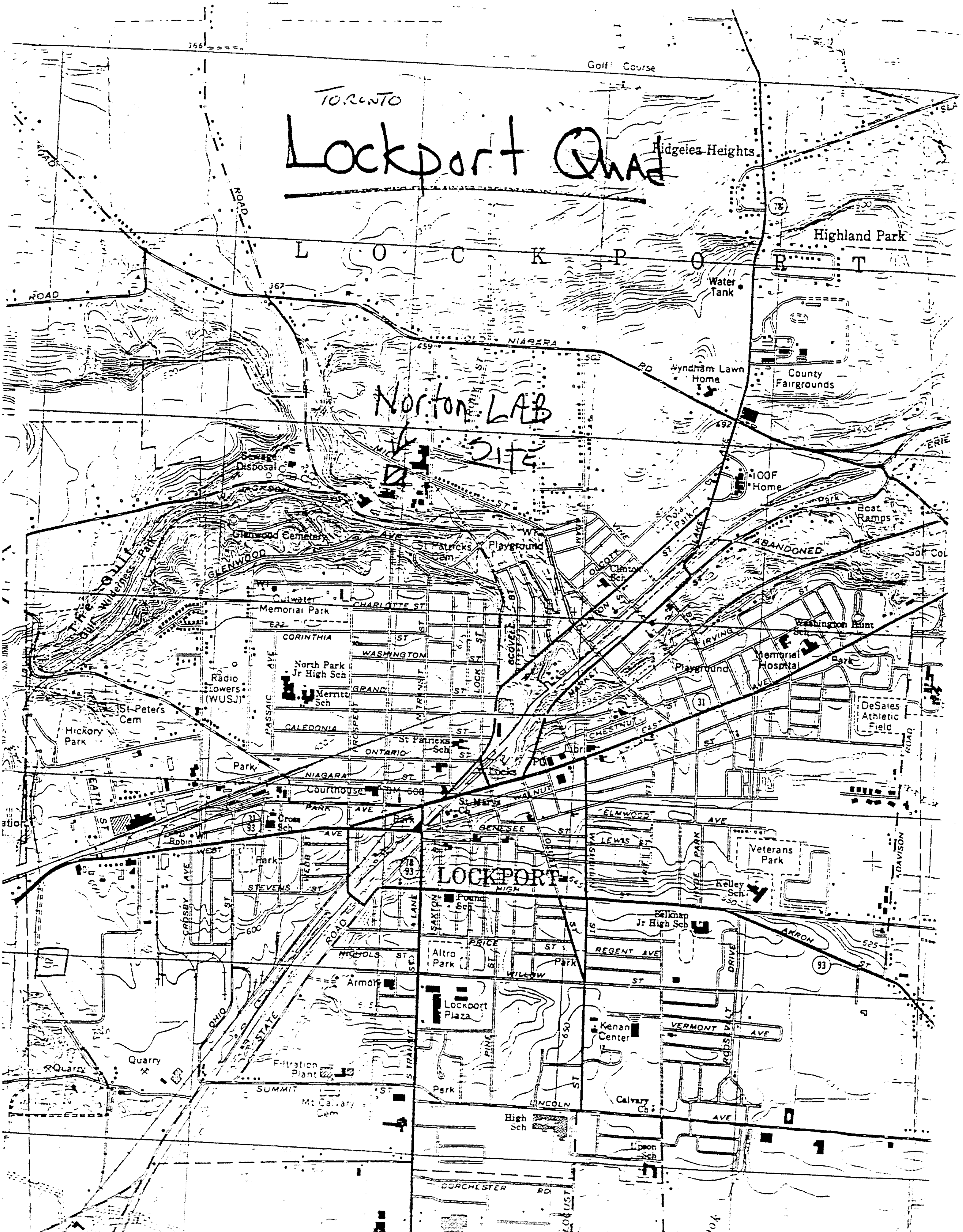
John W. Ozard

John W. Ozard
Senior Wildlife Biologist
Significant Habitat Unit

Enclosures

cc: NYNHP - S. Clemants

JWO:sjs


TORONTO
Lockport Quad
Norton LAB Site
L O C K P O R T
Golf Course
Ridgelea Heights
Highland Park
Water Tank
OLD NIAGARA RD
Wyndham Lawn Home
County Fairgrounds
Sewage Disposal
IOOF Home
Boat Ramps
Glenwood Cemetery
GLENWOOD AVE
St Patricks Cem
Playground
Clinton Sch
ABANDONED
Outwater Memorial Park
CHARLOTTE ST
CORINTHIA ST
WASHINGTON ST
North Park Jr High Sch
Merritt Sch
GRAND ST
CALEDONIA ST
ONTARIO ST
NIAGARA ST
Radio Towers (WUSJ)
St Peters Cem
Hickory Park
Park
St Patricks Sch
Locks
Courthouse
BM 608
St Marys Ch
WALNUT
ELMWOOD AVE
GENESEE ST
LEWIS ST
PARK AVE
Cross Sch
WEST AVE
STEVENS ST
LOCKPORT
HIGH
Veterans Park
Kelley Sch
Washington Hunt Sch
Memorial Hospital
IRVING
Playground
MARKET ST
CHESTNUT
EAST AVE
DeSales Athletic Field
Belknap Jr High Sch
AKRON ST
REGENT AVE
Altro Park
PRICE ST
WILLOW ST
NICHOLS ST
Armory
Lockport Plaza
Kenan Center
VERMONT AVE
ROOSEVELT DRIVE
STATE ROAD
OHIO
Quarry
Filtration Plant
SUMMIT ST
Mt Calvary Cem
LINCOLN AVE
Calvary Ch
High Sch
Upson Sch
DORCHESTER RD
TRANSIT
DAVISON ROAD
The Gulf Wilderness Park
JACKSON ST
MILL ST
CROSBY AVE
PASSAIC AVE
PROSPECT
SAXTON
PINE
LOCUST
ERIE
Golf Course
Park

EA SCIENCE AND TECHNOLOGY
A Division of EA Engineering, Science, and Technology, Inc

Appendix 1.5.1-4

COMMUNICATIONS RECORD FORM

Distribution: ( ) Norton Lab, ( ) ______
( ) ______, ( ) ______
( ) Author

Person Contacted: Thomas Darroch Date: 6/19/87

Phone Number: (716)439-6724 Title: Fire Chief

Affiliation: Lockport Fire Dept Type of Contact: phone

Address: Fire Dept HQ, Municipal Bldg Person Making Contact: L. Rogers
Lockport, NY 14094

Communications Summary: Mr Darroch could not certify that the Norton Lab site constituted a fire or explosion threat.

(see over for additional space)

Signature: Lori Rogers

APPENDIX 2

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DIVISION OF SOLID AND HAZARDOUS WASTE

INACTIVE HAZARDOUS WASTE DISPOSAL SITE REPORT

PRIORITY CODE: ____________ SITE CODE: 932029

NAME OF SITE: Norton Lab Landfill REGION: 9

STREET ADDRESS: 520 Mill Street

TOWN/CITY: Lockport, New York COUNTY: Niagara

NAME OF CURRENT OWNER OF SITE: James Hoden, Sr.

ADDRESS OF CURRENT OWNER OF SITE: 520 Mill Street, Lockport, New York

TYPE OF SITE: OPEN DUMP [ ] STRUCTURE [ ] LAGOON [ ] LANDFILL [XXX] TREATMENT POND [ ]

ESTIMATED SIZE: 4 ACRES

SITE DESCRIPTION: The Norton Lab Site is an inactive landfill on the south side of Mill Street in Lockport, New York. The site was ordered closed in 1976 after having been in operation since at least 1965. Wastes disposed on the site have been listed as 1,000 pounds per day of plastics and 250 gallons per year of waste oils during 1977.

HAZARDOUS WASTE DISPOSED: CONFIRMED [XX] SUSPECTED [ ]

TYPE AND QUANTITY OF HAZARDOUS WASTES DISPOSED:

TYPE	QUANTITY (POUNDS, DRUMS, TONS, GALLONS)

TIME PERIOD SITE WAS USED FOR HAZARDOUS WASTE DISPOSAL:

at least, 19 65 TO ______, 19 76

OWNER(S) DURING PERIOD OF USE: Arthur Hilgar, Sr.

SITE OPERATOR DURING PERIOD OF USE: Norton Lab, Inc.

ADDRESS OF SITE OPERATOR: 520 Mill St., Lockport, NY 14094

ANALYTICAL DATA AVAILABLE: AIR [ ] SURFACE WATER [x] GROUNDWATER [x]
SOIL [ ] SEDIMENT [ ] NONE [ ]

CONTRAVENTION OF STANDARDS: GROUNDWATER [x] DRINKING WATER [ ]
SURFACE WATER [ ] AIR [ ]

SOIL TYPE: Reddish-tan, dense, moist, medium grained snad with some silt

DEPTH TO GROUNDWATER TABLE: Overburden aquifer at about 7 ft below ground surface

LEGAL ACTION: TYPE: Site closure STATE [x] FEDERAL [ ]
STATUS: IN PROGRESS [ ] COMPLETED [x]

REMEDIAL ACTION: PROPOSED [ ] UNDER DESIGN [ ]
IN PROGRESS [ ] COMPLETED [ ]

NATURE OF ACTION: ______

ASSESSMENT OF ENVIRONMENTAL PROBLEMS:

Based on Phase II investigation, there is no documentation of any hazardous waste disposal occurring at this site.

ASSESSMENT OF HEALTH PROBLEMS:

This site is not considered to present any potential health problems based on the Phase II investigation.

PERSON(S) COMPLETING THIS FORM:

For: NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION	NEW YORK STATE DEPARTMENT OF HEALTH
NAME Linda K. McConnell	NAME
TITLE Environmental Engineer	TITLE
NAME EA Engingeering, Science,	NAME
TITLE & Technology, Inc.	TITLE
DATE:	DATE: