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FRED C. HART ASSOCIATES, INC.
155 WASHINGTON STREET
NEWARK, NEW JERSEY 07102
(201) 621-6800

TO
Mr. John Czapor
Room 1000
US EPA
26 Federal Plaza
New York, New York 10278

DATE October 6, 1981

SUBJECT Love Canal Mitre Report

Enclosed is the Mitre report for Love Canal. The total aggregate score is 60.96. If you have any questions please contact me.

Peter M. Cangialosi

202881

Form ML 5-N72 The Drawing Board, Inc., Box 505, Dallas, Texas

FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES

FIT PROJECT

TASK REPORT TO THE ENVIRONMENTAL PROTECTION AGENCY CONTRACT NO. 68-01-6056

MITRE MODEL SCORING

OF

LOVE CANAL

NEW YORK

TDD No. HQ-8109-01

Submitted by: Gary P. Clemons, Ph.D.
Submitted to: Steve Caldwell

23 October 1981

ecology and environment, inc.

International Specialists in the Environmental Sciences

63100

HAZARDOUS WASTE SITE RANKING MODEL SUMMARY SHEET

Site Name: Love Canal Location: Niagara Falls, NY

ROUTE - GROUNDWATER

	Scores Original	FIT	Diff
Measured Level or Evidence of Release		45	
Depth to Aquifer of Concern			
Net Precipitation			
Permeability of Unsaturated Zone			
Containment			
Physical State		3	
Persistence		6	
Toxicity/ Infectiousness		6	
Total Waste Quantity		5	
Ground Water Use		0	
Distance to Nearest Well Downgradient		0	
Population Served by Ground Water within 3 Mile Radius		0	

GROUNDWATER ROUTE SUBTOTAL

	0	

ROUTE - SURFACE WATER

	Scores Original	FIT	Diff
Measured Level or Evidence of Release		45	
Site Slope and Terrain			
1 Year 24 Hour Rainfall			
Distance to Surface Water			
Flood Potential			
Containment			
Surface Water Use		6	
Critical Habitats		4	
Population Served by Surface Water Intake Within 3 Miles Downstream from Site.		30	

SURFACE WATER ROUTE SUBTOTAL

	86.40	

AGGREGATE SITE RANKING

	60.96	

ROUTE - AIR

	Scores Original	FIT	Diff
Evidence of Release		45	
Physical State/ Volatility		3	
Reactivity		0	
Incompatibility		0	
Toxicity/ Infectiousness		6	
Distance to Nearest Population		6	
Population Within 1 Mile Radius		25	
Critical Environments		4	
Land Use		3	

AIR ROUTE SUBTOTAL

	55.44	

REASONS FOR SCORE DIFFERENCES
(Use other side if necessary)

NAME OF REVIEWER: Pete Cangialosi / Mike Rosenberg

APPENDIX E
MODEL WORKSHEETS

Site Name: Love Canal, Niagara Falls, NY

Location: Niagara Falls, NY

EPA Region: Region II

Person(s) in Charge of the Site:

Name of Reviewer: Peter Cangialosi / Michael Rosenberg

Site Overall Score: 60.96

General Description of the Site:

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

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ROUTE - GROUND WATER · Love Canal

Rating Factor	Basis of Information	Site Rating (Circle One)	Multiplier	Site Score	Maximum Possible Score
1 OBSERVED RELEASE (not GW)					
Measured Level or Evidence of Release	much info	0 (45)	1	45	45
If the site score is zero, go to step 2; otherwise, go to step 5					
2 ROUTE CHARACTERISTICS[1] (not GW)					
Depth to Aquifer of Concern		0 1 2 3	2		6
Net Precipitation		0 1 2 3	1		3
Permeability of Unsaturated Zone		0 1 2 3	2		6
			Subtotal		15
3 CONTAINMENT[1,2] (not GW)					
Containment		0 1 2 3	1		3
4 POTENTIAL FOR RELEASE					
Multiply site score from 2 by site score from 3. The product is site rating for this route.			1		45
5 RELEASE					
Enter site score from 1 or 4				45	45
6 WASTE CHARACTERISTICS[1,3] (not GW)					
Physical State	Liquid	0 1 2 (3)	1	3	3
Persistence	PCB, TCDD	0 1 2 (3)	2	6	6
Toxicity/ Infectiousness	PCB, TCDD	0 1 2 (3)	2	6	6
			Subtotal	15	15
7 HAZARDOUS WASTE QUANTITY[1] (not GW)					
Total Waste Quantity	21,800 Tons	0 1 2 3 4 (5)	1	5	5
(by Superfund definition excluding waste that is totally contained)					
8 TARGETS[1] (not GW)					
Ground Water Use	none known	(0) 1 2 3	3	0	9
Distance to Nearest Well/Population Served	only monitoring wells	(0) 1 2 3	3	0	9
Population Served by Ground Water Within 3 Mile Radius	none known	(0) 1 2 3 4 5	6	0	30
			Subtotal	0	48
9 GROUND WATER ROUTE SUBTOTAL					
A. Multiply 5 x 6 x 7 x 8	45 x 15 x 5 x 0 =			0	162,000
B. Multiply [A.] by Normalization Factor of 0.5 and Divide by 1,000			0.5	0 [B] Route Subtotal	97.2

← check industries 1-3 miles

[1] A rating of zero should be entered when data is unavailable to take an additive factor. A rating of 1 should be entered when data is unavailable so that a multiplicative category (both on the waste quantity or containment) is not zeroed out. A total of 5% missing data for the entire site is allowed when using a zero.

[2] If the site has more than one type of containment (e.g., surface impoundment, landfill, containment), consider all areas separately and enter the score from the worst area.

[3] Rate the five most hazardous wastes. Select the one with the highest individual score and enter that score.

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ROUTE - SURFACE WATER *Love Canal*

Rating Factor	Basis of Information	Site Rating (Circle One)	Multiplier	Site Score	Maximum Possible Score
1 OBSERVED RELEASE (ref SW 1)					
Measured level or evidence of release		0 (45)	1	45	45
If the site score is zero, go to step 2. Otherwise, go to step 5					
2 ROUTE CHARACTERISTICS[1] (ref SW 2)					
Site Slope and Terrain		0 1 2 3	1		3
1 Year 24 Hour Rainfall		0 1 2 3	1		3
Distance to Surface Water		0 1 2 3	1		3
Flood Potential		0 1 2 3	2		6
			Subtotal		15
3 CONTAINMENT[1,2] (ref SW 3)					
Containment		0 1 2 3	1		3
4 POTENTIAL FOR RELEASE					
Multiply site score from 2 by site score from 3. The product is site rating for this route.			1		45
5 RELEASE					
Enter site score from 1 or 4				45	45
6 WASTE CHARACTERISTICS[1,3] (ref SW 4)					
Physical State	Liquid	0 1 2 (3)	1	3	3
Toxicity/Infectiousness	PCB, TCDD	0 1 2 (3)	2	6	6
Persistence	PCB, TCDD	0 1 2 (3)	2	6	6
			Subtotal	15	15
7 HAZARDOUS WASTE QUANTITY[1] (ref SW 5)					
Total Waste Quantity	21,800 Tons	0 1 2 3 4 (5)	1	5	5
By Superfund definitions excluding waste that is totally contained					
8 TARGETS[1] (ref SW 6)					
Surface Water Use	Recreation	0 1 (2) 3	3	6	9
Critical Habitats	Wetlands ¼ mile	0 1 (2) 3	2	4	6
Population Served by Surface Water With Water Intake Within 3 Miles Downstream From Site	>77,500	0 1 2 3 4 (5)	6	30	30
			Subtotal	40	45
9 SURFACE WATER ROUTE SUBTOTAL					
A. Multiply 5 x 6 x 7 x 8	45 x 15 x 5 x 40 = 135,000				151,875
B. Multiply [A] by normalization factor of 0.64 and divide by 1,000			0.64	86,440 [B] Route Subtotal	97.2

→ drinking?

check

ROUTE - AIR LOVE CANAL

Rating Factor	Basis of Information	Site Rating (Circle One)	Multiplier	Site Score	Maximum Possible Score
1 OBSERVED RELEASE* (ref. A 1)					
Evidence of Release	RTI REPORT DATA	0 (45)	1	45	45
If the site score is zero, the route subtotal score is zero, otherwise, go to Step 2					
2 RELEASE					
Enter site score from 1				45	45
3 WASTE CHARACTERISTICS[1,3] (ref. A 2)					
Physical State/ Volatility	CHLOROFORM	0 1 2 (3)	1	3	3
Reactivity	"	(0) 1 2 3	1	0	3
Incompatibility	"	(0) 1 2 3	1	0	3
Toxicity/ Infectiousness	"	0 1 2 (3)	2	6	6
			Subtotal	9	15
4 HAZARDOUS WASTE QUANTITY[1] (ref. A 3)					
Total Waste Quantity	TABLE 1 21,500 tons	0 1 2 3 4 (5)	1	5	5
By Superfund definition (excluding waste that is totally contained)					
5 TARGETS[1] (ref. A 4)					
Distance to Nearest Population	< 1/4 MILE	0 1 2 (3)	2	6	6
Population Within 1 Mile Radius	> 10,000	0 1 2 3 4 (5)	5	25	25
Critical Environments	WETLAND < 1/4 MILE	0 1 (2) 3	2	4	6
Land Use	RESIDENTIAL < 1/4 MILE	0 1 2 (3)	1	3	3
			Subtotal	38	40
6 AIR ROUTE SUBTOTAL					
A. Multiply 2 x 3 x 4 x 5	45 x 9 x 5 x 38			76,950	135,000
B. Multiply [A] by normalization factor of 0.72 and divide by 1,000			0.72	55.4 [B.] Route Subtotal	97.2

→ get report

*Only air monitoring data will be considered as evidence of release.

AGGREGATE SITE RATING

Route	Route Subtotal from 6 or 9	Route Subtotal Squared	Maximum Possible Score
Ground Water	0	0	$(97.2)^2 = 9447.84$
Surface Water	86.4	7464.96	$(97.2)^2 = 9447.84$
Air	55.4	3069.16	$(97.2)^2 = 9447.84$
Sum		10,534.12	28,343.52
Square Root of Sum		102.64	168.36
Overall Score* = $\frac{\text{sum} \times 100}{168.36}$		60.96	100

FIRE AND EXPLOSION

Route Subtotal from 8	Maximum Possible Score
	97.2

Adjusted Score = $\frac{\text{Route Subtotal} \times 100}{97.2}$

DIRECT CONTACT

Route Subtotal from 8	Maximum Possible Score
	97.2

Adjusted Score = $\frac{\text{Route Subtotal} \times 100}{97.2}$

*The overall and adjusted scores will be between 0 and 100. The maximum overall score for a site with only one exposure route is 57.7.

WORKSHEET FOR HAZARDOUS WASTE
SITE RANKING MODEL

FIT QUALITY ASSURANCE TEAM

DRAFT

GENERAL

Site name and location: Love Canal, Niagara Falls, NY

Date(s) of site scoring: Oct 5-6, 198

Primary source(s) of information (e.g., EPA region, state, FIT, etc.):
EPA-Region II, NYC
Robert Copiella 201 321-6646
George Zechos 321-6647

Factors not scored (assigned 0 for additive and 1 for multiplicative) due to insufficient information:

Comments or qualifications:

~~Ref 1~~:

Ref 2: Report by O.H. Materials, "Survey of Chemical Contaminants in Love Canal Storm Sewers," June 3, 1980 for EPA-Edison
Table 3, Sec 2

~~Ref 2~~

Ref 3: Report by Calspan Corporation, "Characterization and Abatement of Groundwater Pollution From Love Canal Chemical Landfill, Niagara Falls, N.Y." Aug, 1977. Calspan Report #ND-6097-M-1 Prepared for City of Niagara Falls, N.Y.

Ref 4: Report by RTI, "Quantification of toxic materials in ambient air at "Old Love" Canal, Niagara Falls, N.Y." Final Report, Research Triangle Institute

GROUND WATER PATHWAY

[1] Measured Level or Evidence of Release

Describe substance(s) and nature of release:
TCE, 1,2,4 Trichlorobenzene Ref 1

Describe method of measurement or observation:

[2] Depth to Aquifer of Concern 40-55 ft. silty-sand, perm - 2×10^{-5} cm/

Describe/name aquifer of concern:
silty sand

delete

Why is above aquifer of concern? silty sand

Depth and how determined, including sources: below 7-8 feet is hard clay

Net Precipitation

Net precipitation and how determined, including source(s):

Premeability of Unsaturated Zone

Soil type(s) in unsaturated zone:

Premeability and how determined, including source(s):

3 Containment

Method of waste management (e.g., surface impoundment, landfill, etc) of extreme case:

Describe basis for selecting extreme case:

Describe method(s) of waste or leachate containment for above extreme case:

Cite source(s) of information:

6 Physical State

Physical state of waste and source of information: Liquids, solids (leachates)

Persistence

Most persistent compound subject to transport via ground water:
PCB, Trichlorophenol, hexochlorocyclohexane ref 3; Table 3

Basis for selecting compound, including source(s):
~~[illegible]~~ use PCB, found in sumps

Basis for selecting persistence rating score:
most hazardous score

Toxicity/Infectiousness

Five most toxic materials subject to transport via ground water and Sax or NFPA level for each:

Cite source(s) of information indicating toxics present on site:

Infectious materials present on site and source(s) of information:

Basis for selecting CDC classification of infectious materials:

7 Total Waste Quantity

Total waste quantity present, including unit of measurement (e.g., 21,000 Tons tons, cubic yards, drums): table 1 from

"Chemical Engineering News," Chemicals Disposed by Hooker in Love Canal Landfill August 11, 1980, p. 26

Basis for estimating or computing quantity, including source(s) of information:

8 Ground Water Use

Use(s) of aquifer of concern and source(s) of information: none known

Distance to Nearest Well Downgradient

Distance to nearest well downgradient: there are monitoring wells in and around site, put in for an EPA study (Dr. Deagon EPA-Wash headed study)

How was downgradient direction(s) established, including source(s) of information: Niagara river is $\frac{1}{4}$ - $\frac{1}{2}$ mile south of site

How was distance determined?: map

Is nearest building known to be using ground water? Source of information: no

Bob Mathews - Director of Utilities C. of N.F. 716-278-8138

Is nearest well known to be drawing from aquifer of concern? Source of information:

Population Served by Ground Water Within 3-Mile Radius

Population served with 3-mile radius: none known

How was population counted or computed, including source(s) of information:

Is population known to be served by aquifer of concern? Source of information: no

SURFACE WATER PATHWAY

1 Measured Level or Evidence of Release

Describe substances and nature of release:
many, benzene, Trichlorophenol, dichlorobenzene benzenehexachloride, etc.

Describe method of measurement or observation:
Found in sediment - Black Creek, Ref 2

2 Site Slope and Terrain

Computation of slope and description of points of measurement:

Cite source(s) of information (topo maps, etc.):

1-Year 24-Hour Rainfall

Amount of rainfall and source of information:

Distance to Surface Water

Distance and description of points of measurement:

Cite source(s) of information:

Flood Potential

In what flood plain, if any, is the site located?:

Cite source(s) of information:

3 Containment

Describe basis for selecting extreme waste management case: several conditions presently: min 3 ft. clay cap - originally uncovered, then covered with clay by Hooker, then clay removed in various stages by either school, housing developers (not really known etc)

Describe method(s) of waste or leachate containment for extreme case:

delete

perimeter drain collection system.

leachate collected collected + treated on site then to C. of NF treatment (physical-chemical) plant

Cite source(s) of information:

ref 3

8 Surface Water Use

Use(s) of downstream surface water and sources of information: intake of C of NF is located downstream but in a different channel intake closest to north shore is closed permanently check map on C of NF Utilities Dept. east branch is shipping + recreation. swimming, fishing

Critical Habitats

Location and descritpion of downstream critical habitat, if any: within 100 yr. floodplain, wetlands check with state

Distance and description of points of measurement:

Cite source(s) of information:

Population Served By Surface Water with Water Intake Within 3 Miles Downstream from Site City of Niagara Falls 77,400 people

Population served by water intake(s):

Is surface water within 3 miles in a tidal estuary?:

Description(s) and location(s) of intake(s) and corresponding population served by each:

How was population counted or computed?:

Cite source(s) of water-intake and population information:

DEC contacts: Mike Cutty
Tom Quinn (Albany)
Norm Nosenchuck
→ Joe Slack Albany

originally 500 families in area presently evacuated

AIR PATHWAYS

[1] Evidence of Release

Describe contaminant and monitoring which reveal that background levels have been exceeded?: ref 4

Quantification of toxic materials in ambient air at "Old Love" Canal, Niagra Falls, N.Y. Research Triangle Institute ambient air measurements outside homes (10 locations)

Cite source(s) of information: ref 4

compounds detected include: chloroform, Carbon Tetrachloride, 1,1,1,-Trichloroethane, Trichloroethylene, Tetrachloroethylene, chlorobenzene, dichlorobenzene, and others

[3] Physical State/Volatility

Physical state of waste and source(s) of information: liquid

chloroform volatility -3

Vapor pressure of waste and source(s) of information:

vapor pressure 100 mmHg -3

Reactivity

Reactive substances and source(s) of information:

NFPA level for each and basis of selection:

Incompatability

Incompatible substances which are present and source(s) of information:

Basis for selecting incompatibility score:

5 Distance to Nearest Population

Distance and description of points of measurement:
Presently 2 families at 99th + Colvin Avenue
2 families on 99th street verify with EPA field office at L.C.
< 1/4 mile

Cite source(s) of information:
Bob Copiella

Population Within 1-Mile Radius

Population and how counted or computed:
>10,000

Cite source(s) of information:

Land Use

Location and type of determining land use: residential < 1/4 mile

Distance to determining land use: < 1/4 mile

Cite source(s) of information: Bob Copiella, various maps

Hooker disposed of 21,800 tons of chemicals

Type of waste	Estimated tonnage
Miscellaneous acid chlorides	400
Thionyl chloride	500
Miscellaneous chlorinations	1,000
Dodecyl mercaptans (DDM)	2,400
Trichlorophenol (TCP)	200
Benzoyl chloride	800
Metal chlorides	400
Liquid disulfides (LDS/ MCT)	700
Hexachlorocyclohexane (BHC, Lindane)	6,900
Chlorobenzenes	2,000
Benzyl chlorides	2,400
Sulfides	2,100
Miscellaneous 10% of above	2,000
TOTAL	21,800

Table 1 - Chemicals Disposed by Hooker in Love Canal Landfill (Ref. Chemical Engineering News, August 11, 1980, page 26)

Priority pollutants in Love Canal leachate — **Table II**

Analysis* of composite samples collected from the onsite treatment facility (southern sector) revealed the following 27 compounds on EPA's list of 128 priority pollutants. Influent was analyzed after sedimentation and sand filtration. Note, however, that the mix does not typify leachate composition, which changes randomly and continually.

Compounds	Carbon-adsorber	
	Influent (μg/L)	Effluent (μg/L)
Hexachloro-1,3-butadiene	109	< 20
1,2,4-trichlorobenzene	23	< 20
Hexachlorobenzene	32	< 20
α-benzene hexachloride	184	< 0.01
β-benzene hexachloride	548	< 0.01
γ-benzene hexachloride	392	0.12
Heptachlor (1,4,5,6,7,8, 8a-heptachlorodicyclopentadiene)	573	< 0.01
Phenol	30	69†
2,4-dichlorophenol	10	< 5
Methylene chloride	180	< 10 (2)
1,1-dichloroethylene	28	< 10
Chloroform	540	< 10 (0.2)
Carbon tetrachloride	92	< 10 (0.4)
Trichloroethylene	240	< 10 (0.1)
Dibromochloromethane	21	< 10
1,1,2,2-tetrachloroethylene	270	< 10 (0.4)
Chlorobenzene	1,200	10 (0.2)
Total antimony	2	4‡
Total arsenic	130	38
Total cadmium	11	3
Total chromium	270	24
Total copper	540	< 1
Total lead	29	< 1
Total nickel	240	20
Total selenium	9	2
Total silver	1	< 1
Total zinc	480	2

*Performed by Recra Research Inc. (Tonawanda, N.Y.)

†After the Recra analysis, Calgon tested for phenol, and found that the phenol content of the raw leachate was 4.7 mg/L. After full carbon treatment, effluent content was < 50 μg/L, below the EPA detectable limit.

‡Calgon says it cannot explain the rise in antimony, and suggests that the results may be within the limits of analytical accuracy.

Calgon Corp. emphasizes that the activated-carbon adsorption system is intended to control only dissolved organics, not metals.

Table 2 - Priority Pollutants in Love Canal Leachate, March 12, 1979
(Ref. Chemical Engineering, October 22, 1979, page 91)

Design plan for Love Canal leachate containment and collection system

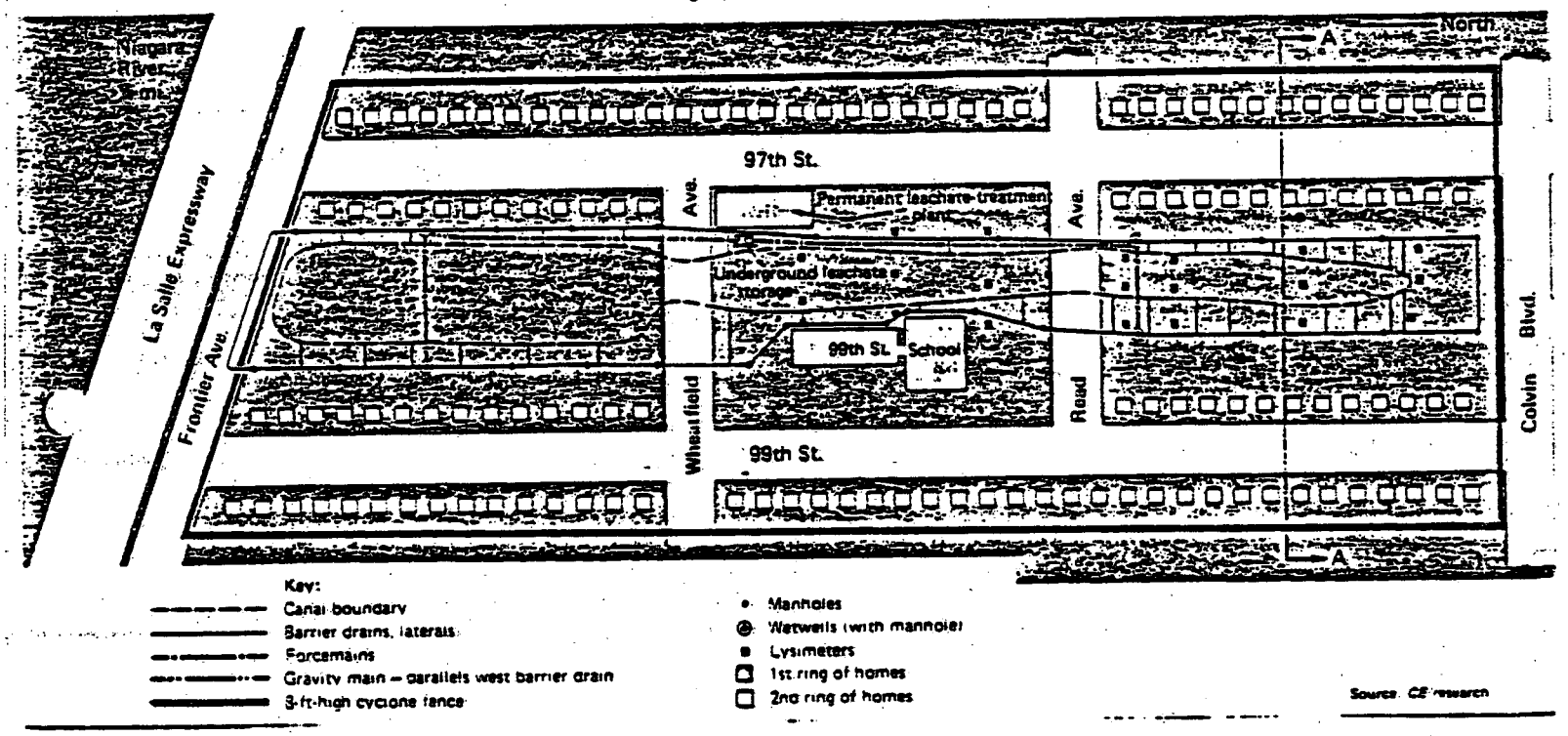


Figure 4 - Love Canal Leachate Containment & Collection System (Ref. Chemical Engineering, October 22, 1979, page 86)

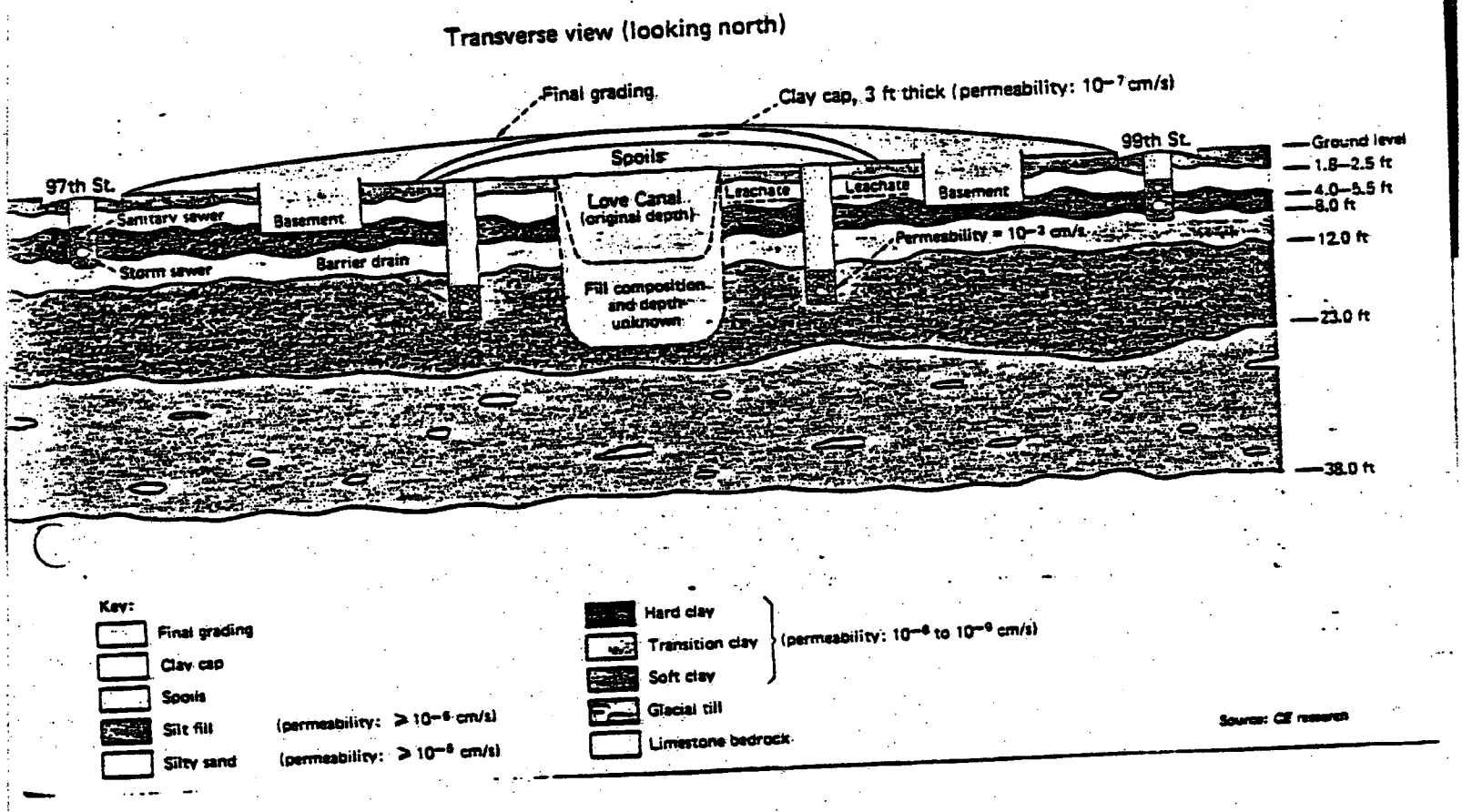
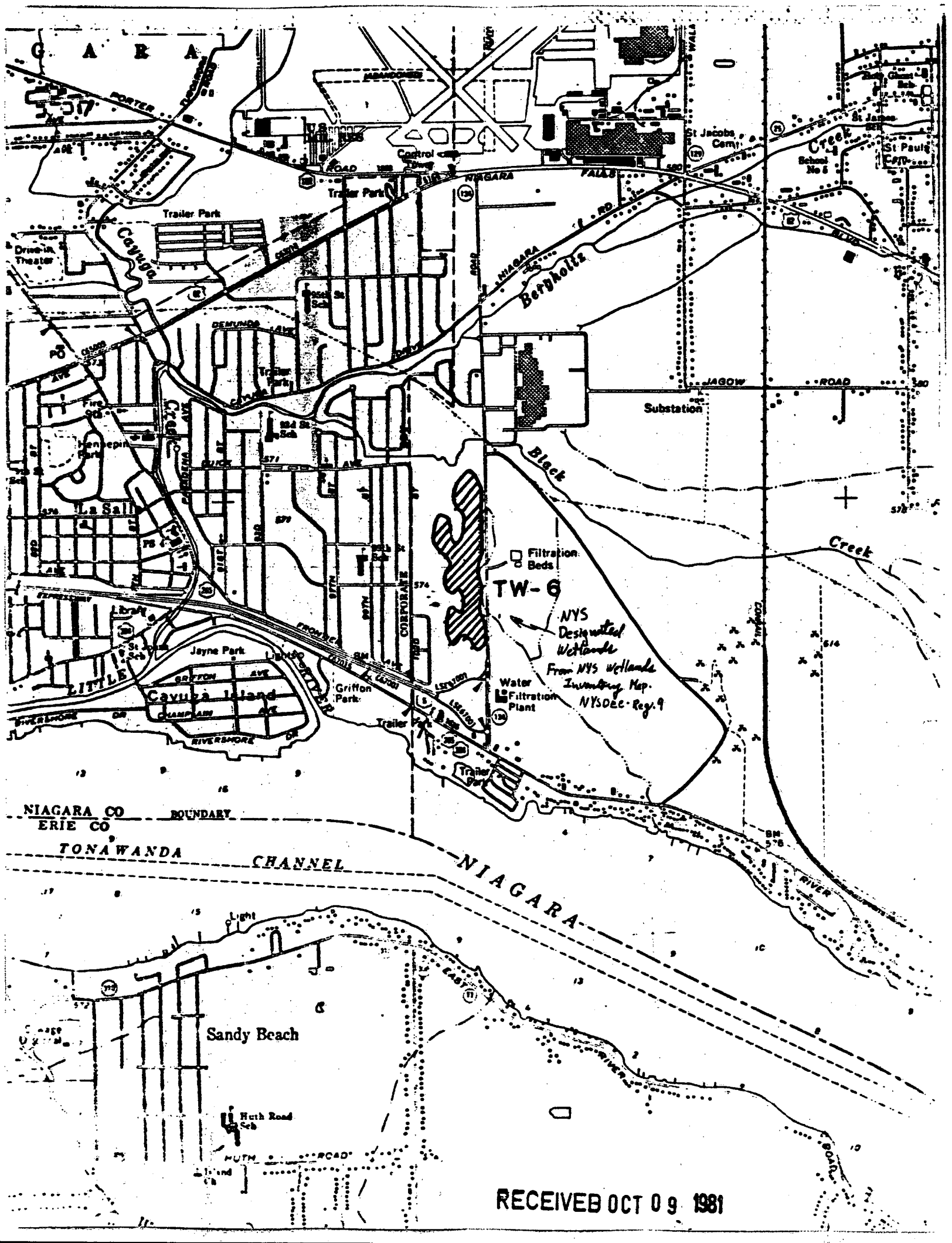


Figure 5 - Cross-sectional View of Love Canal (Ref. Chemical Engineering, October 22, 1979, page 87)



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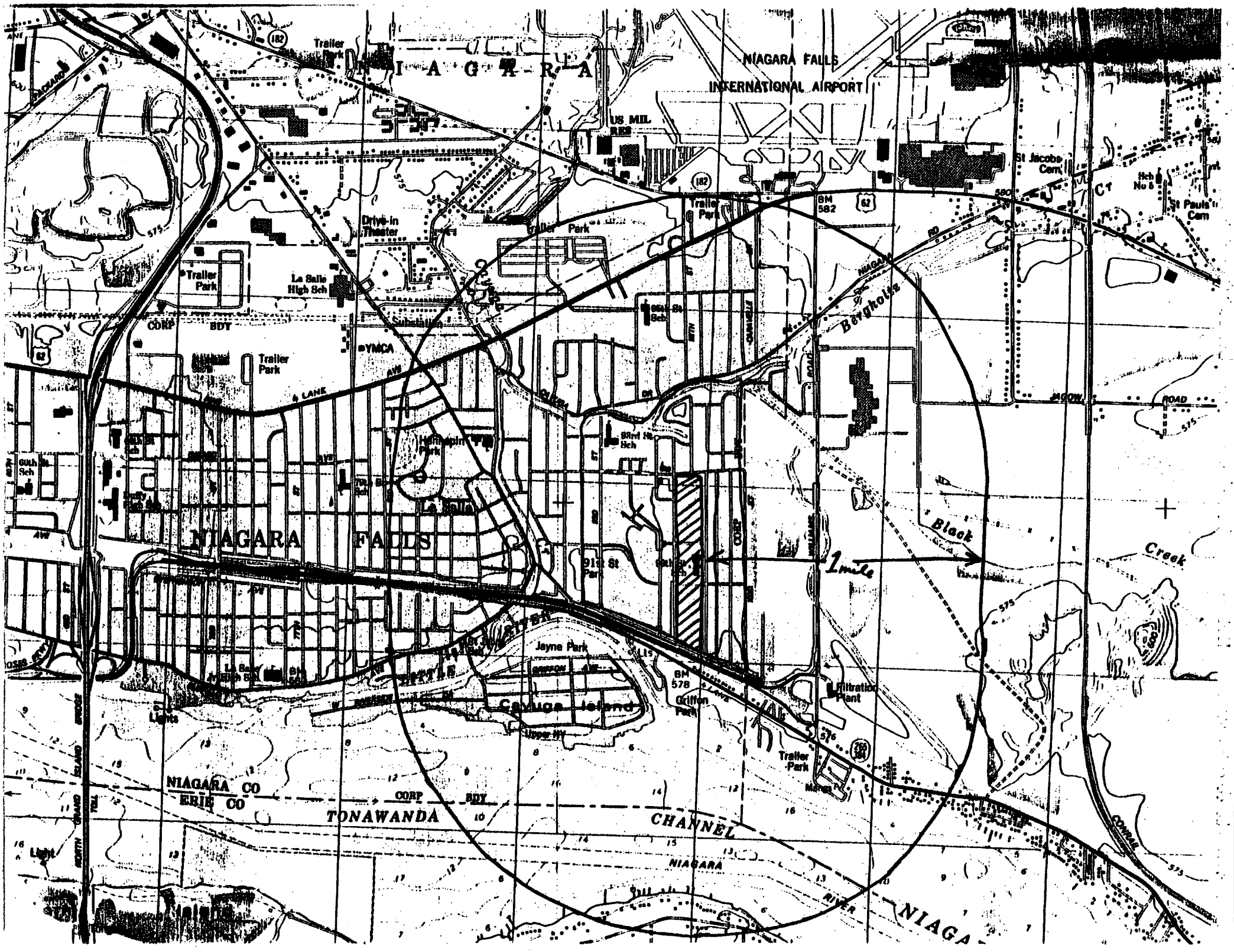
NIAGARA FALLS
INTERNATIONAL AIRPORT
NIAGARA
US MIL RES
Trailer Park
Drive-in Theater
La Salle High Sch
Substation
YMCA
CORP BDY
Hennepin Park
La Salle
NIAGARA FALLS
91st St Park
Jayne Park
Cayuga Island
Upper NY
Griffon Park
Filtration Plant
Lights
NIAGARA CO
ERIE CO
TONAWANDA
CHANNEL
NIAGARA
RIVER
Black
Creek
1 mile
Bergholtz
St Jacobs Cem
St Pauls Cem
BM 582
BM 578
CONRAIL
JAGOW ROAD
NIAGARA RD
NORTH GRAND ISLAND BRIDGE
TOLL

RESEARCH TRIANGLE INSTITUTE

Ref #4

QUANTIFICATION OF TOXIC MATERIALS IN AMBIENT AIR AT "OLD LOVE" CANAL, NIAGARA FALLS, NY

EPA Contract No. 68-01-6161
RTI/1371/17-01F

FINAL REPORT

by

Edo D. Pellizzari, Ph.D.
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Research Triangle Park, NC 27709

Task Manager
Mr. William Librizzi, Director
Office of Toxic Substances
U.S. EPA, Region II
Edison, New Jersey 08817

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF ENFORCEMENT
6th and Walnut Streets
Philadelphia, PA 19106

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1.0 Introduction

Old Love Canal is a 16 acre land field site owned by the city of Niagara Falls and a private individual. The land fill is bordered by single family residences and a playground and school are also located on this land fill. The canal was designed to provide a waterway around Niagara Falls. However, it was used as a disposal area for the Hooker Chemical and Plastics Company (a variety of drummed chemical wastes, including chemical residues, process sludges, fly ash, etc.) and the city of Niagara Falls (municipal solid waste). Records of the contents, locations and quantities of materials dumped were not available at the time this program was executed.

Beginning in about November of 1976, New York state and the city began taking samples in the area in response to citizens complaints. The program identified the presence of PCBs and hexachlorocyclopentadiene in the sumps of several homes. In early 1978 monitoring was increased and a multimedia sampling program was initiated. A survey of the atmosphere in several of the basements of homes indicated the presence of several organic compounds including benzene.

This contract was undertaken with the intention to sample ambient air at the site to determine if a health hazard might exist.

2.0 Experimental Methods

2.1 Ambient Air Sampling

The sampling strategy which was adopted included sampling at 1 upwind and several downwind sampling locations, concurrently. This was to be repeated during a second time period at a new set of locations. The sampling method employed is described in Appendix A. The collection method involved using battery operated personnel sampling systems which

were portable and independent of any power supply allowing the selection of optimum sampling sites near homes on the Old Love Canal. Table 1 presents the sampling protocol for this area. Table 2 presents the meteorology for the two day period of sampling. Figure 1 depicts the sampling locations throughout the Old Love Canal at the upwind and downwind locations respectively for the entire sampling period.

2.2 Analysis Methods

The samples collected on Tenax GC cartridges were analyzed using thermal desorption and glass capillary, gas chromatography/mass spectrometry/computer techniques. These procedures are described also in Appendix A. Prior to the analysis of samples, perfluorotoluene and perfluorobenzene were added as standards to each sampling cartridge in order that quantification could be achieved of the individual organics.

Quantitative analyses of the samples for the following compounds were conducted.

a. Benzene

b. Chloroform

c. Carbon tetrachloride

d. Trichlorethylene

e. 1,3-Hexachlorbutadiene

f. Other halogenated hydrocarbons which were identified in household basements in February of 1978.

2.3 Quality Control and Assurance

For quality control purposes, several cartridges which were transported and stored in a similar manner to the samples which were taken in the field. These blanks were employed to determine the background contribution and possible contamination from the preparation, transportation, and storage of the Tenax GC.

Table 1. AMBIENT AIR MONITORING PROTOCOL FOR "OLD LOVE" CANAL AREA OF NIAGARA FALLS, NY

Location(Address)	Date	Time Period of Monitoring	Volume Air Collected (ℓ)
1. (703 97th St.)	7/6/78	1028-1747[a]	22
2. (703 97th St.)	7/6,7/78	1759-0810[a]	42
3. (783 97th St.)[b,c]	7/6,7/78	2113-0838	34
4. (791 97th St.)	7/6/78	0927-1515	17
5. (915 97th St.)	7/6,7/78	1550-0857	51
6. (746 99th St.)	7/6/78	0857-1720	25
7. (502 99th St.)	7/6/78	1102-1737	17
8. (476 99th St.)[b]	7/6/78	1045-1637	18
9. (474 99th St.)[b]	7/6,7/78	1700-0927	49
10. (99th St. Elementary School)	7/11/78	0910-1510	22
11. (93rd St. Elementary School)	7/12,13/78	0840-1310	19.5

[a]Sampler was placed in nearby yard, a corner lot and upwind of the "canal".

[b]Houses which were previously included in the February 1978 basement air monitoring.

[c]Location of RMI weather station.

Table 2. METEOROLOGY FOR JULY 6 AND 7, 1978 IN THE OLD LOVE CANAL AREA, NIAGARA FALLS, NY

Date	Time	Temp (C°)	Wind Speed/Direction[a] (KM/Hr)		Wind Speed/Direction[b] (KM/Hr)	
7/6/78	1000	25	3	/ S	13	SW
	1200	28	3	/ S	17	SW
	1400	29	3	/ S	20	SSW
	1600	29	2	/ SSW	24	SW
	1800	29	<2	/ SSW	24	SW
	2000	27	<2	/ SSW	18	SW
	2200	23	calm		15	SW
	2400	22	calm		13	SW
7/7/78	0200	20	calm		13	SSW
	0400	20	calm		9	SSW
	0600	19	calm		13	SSW
	0800	23	calm		14	SSW
	1000	27	2	/ S	20	SSW

[a]MRI weather station, 6' above ground level.

[b]Niagara Falls, NY Weather Station.

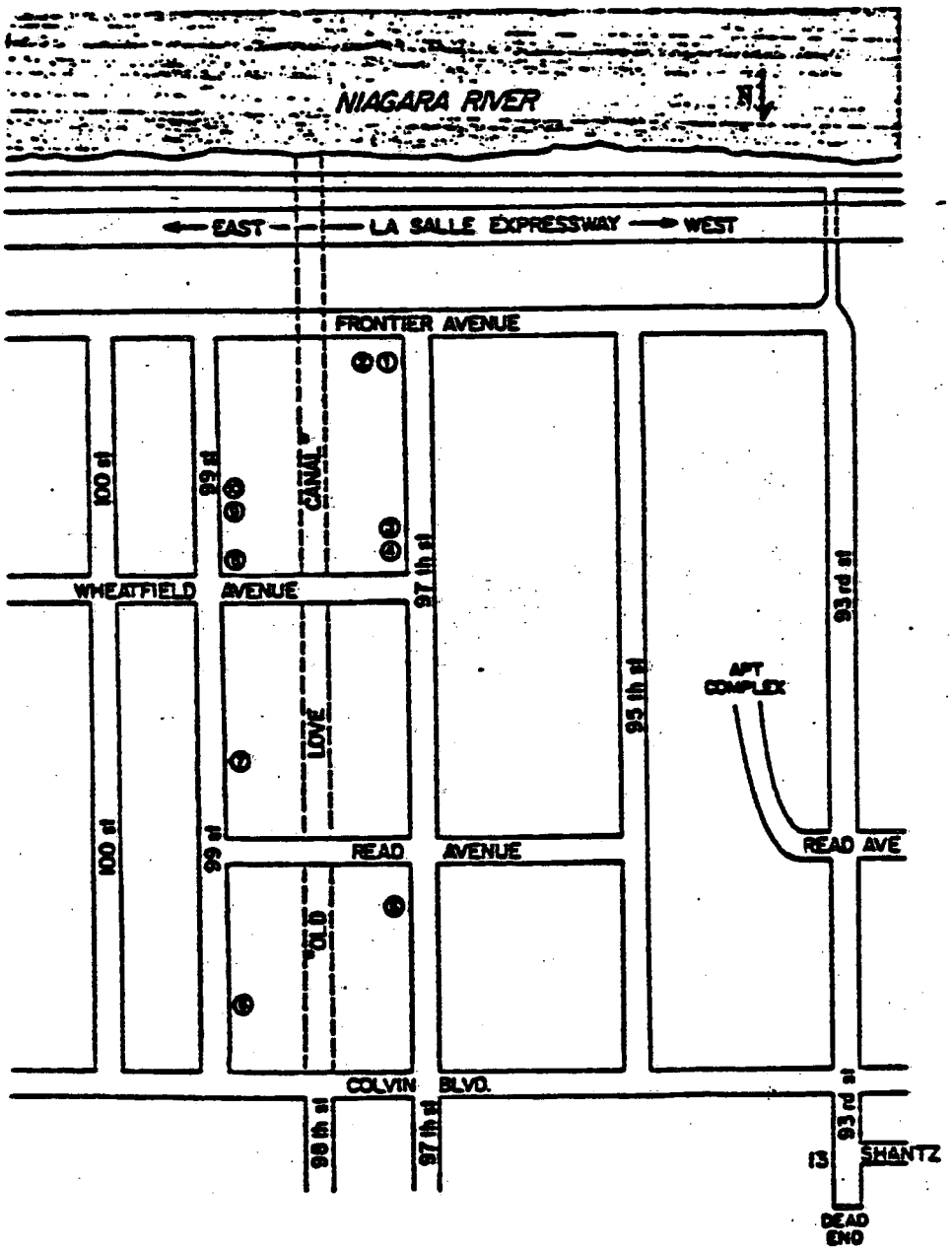

Figure 1. Map of "Old Love Canal" area of Niagara Falls, NY - Sampling locations for ambient air outside of homes.

A chain of custody record was maintained from the time that the sampling cartridges were prepared to the time the data was returned to the Principal Investigator for inclusion into the final report. As the chain of custody changed hands from one investigator to another for each step of the procedure, signatures were required to document this transfer. A copy of a typical chain of custody for a sample is given in Appendix B.

3.0 Results and Discussion

On July 6 and 7 of 1978, RTI personnel took ambient air samples on and near the Old Love Canal area. This sampling trip was also coordinated with another program which was interested in the human body burden for halogenated hydrocarbons (which were identified in the household air basement in February of 1978).

The sampling protocol required RTI to take concurrent upwind downwind samples of 8 to 12 hour duration. Samples at each location were taken in duplicate. During the sampling, winds were primarily out of the south-southwest at approximately 3 kilometers per hour during July 6 and was calm on July 7.

The estimated levels of halogenated compounds in ambient air outside the homes of Old Love Canal and Niagara, New York are given in Table 3. The halogenated compounds which were selected in addition to those required by the scope of work for this contract were substances which were identified in previous air samples taken from the basements of homes from this site. In many cases, each of the compounds which had been identified and detected in samples from the sampling conducted during February of 1978 were also detected in July.

Table 3. ESTIMATED LEVELS OF HALOGENATED COMPOUNDS IN AMBIENT AIR OUTSIDE HOMES OF "OLD LOVE CANAL", NIAGARA, NY[a]

Compound	Location										
	1	2	3	4	5	6	8	9	10	93rd[e]	99th[e]
Chloroform	15,846	105,461	70,308	30,231	1,385	51,692	1,050	19,692	55,923	51,350	1,700
Carbon tetrachloride	2,000	3,692	2,923	1,615	2,231	1,000	1,000	T[b]	-	T	T
1,1-dichloroethane	-	-	-	-	-	-	-	-	-	-	-
1,2-dichloroethane	-	-	-	-	T	-	NQ[d]	T	-	-	-
1,1,1-trichloroethane	2,111	5,444	2,222	1,778	4,222	1,444	2,667	1,667	-	840	975
Trichloroethylene	-	-	-	-	285	-	-	611	-	-	T
Tetrachloroethylene	591	714	735	14,000	647	400	750	2,111	122	320	389
Chlorobenzene	-	119	-	T	T	T	T	-	-	T	T
Dichlorobenzene (2 isomers)	-	190	206	T	353	T	350	444	-	-	T
1,2-dichloropropane	-	-	-	-	-	T	T	-	-	-	-
Chlorotoluene (2 isomers)	T	T	1,235	647	T	-	2,750	T	T	-	-
Chlorobenzaldehyde isomer	-	-	-	-	-	-	-	-	-	-	-
Dichlorotoluene (3 isomers)	T	-	-	648	T	T	500	T	T	-	-
Chloronapthalene isomer	T	-	-	T	-	-	T	T	T	-	-
Bromotoluene isomer	-	-	-	-	-	-	-	-	T	-	-
Dichlorobenzaldehyde isomer	-	-	-	-	-	-	-	-	-	-	-
Trichlorobenzene (3 isomers)	-	T	-	T	T	T	-	T	T	-	-
1,2-Dibromoethane	-	T	-	-	T	T	T	-	-	-	-
Trichlorotoluene (5 isomers)	-	T	-	T	T	T	T	T	T	-	-
Tetrachlorotoluene isomer	T	T	T	T	T	T	-	-	-	-	-
Bromochlorotoluene isomer	-	T	T	-	-	T	-	-	-	-	-
Chlorobenzodichlorofluoride isomer	-	-	-	-	-	T	-	-	-	-	-

(CONTINUED)

G.H. ZACHOS

APRIL 28, 1980

#1

August 18, 1978

ANALYSIS OF A GROUND WATER CONTAMINATION INCIDENT IN NIAGARA FALLS, NEW YORK AND REPORT ON SECOND PHASE OF STUDY

Prepared for:
U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Solid Waste
Contract No. 68-01-3897

Prepared by:
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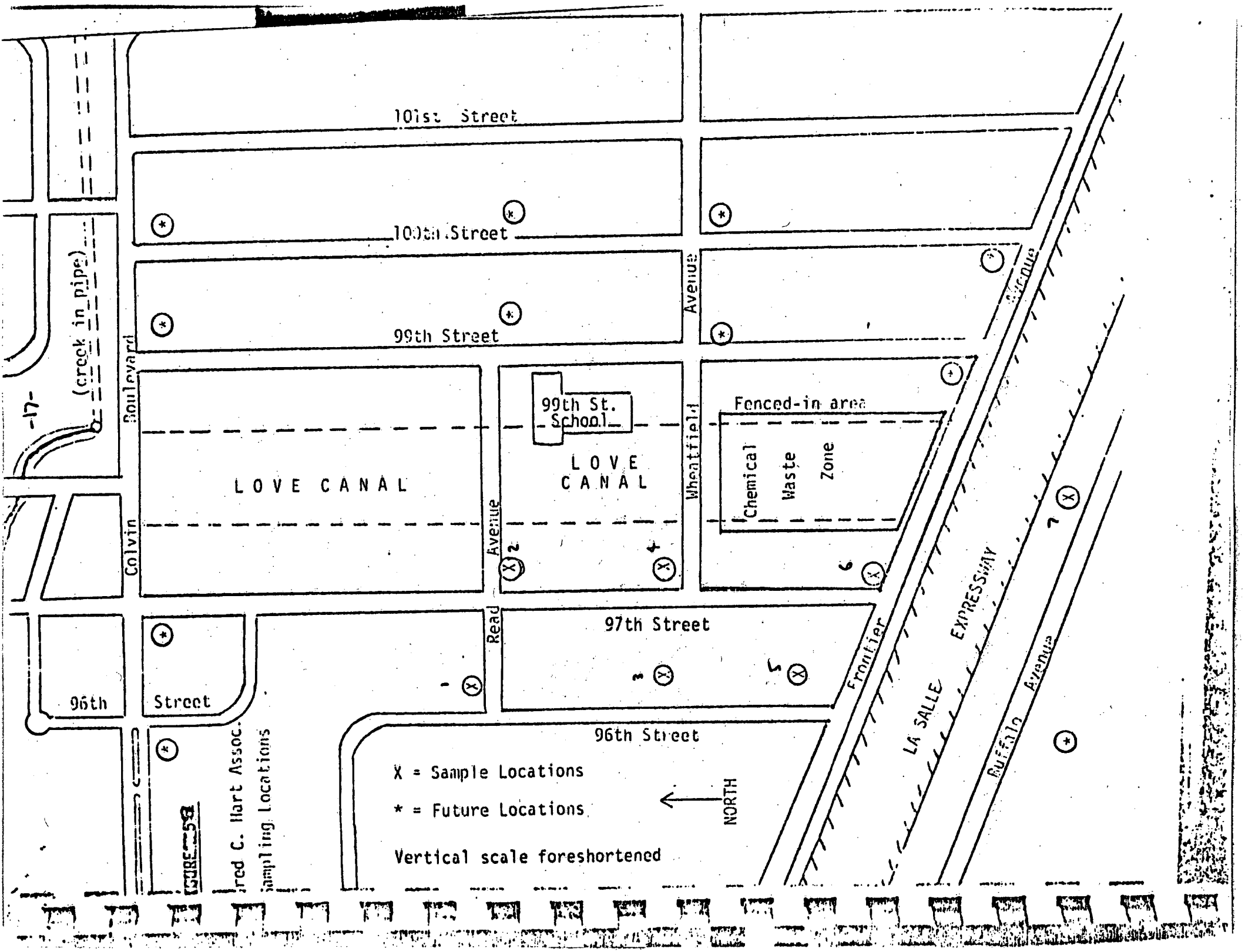
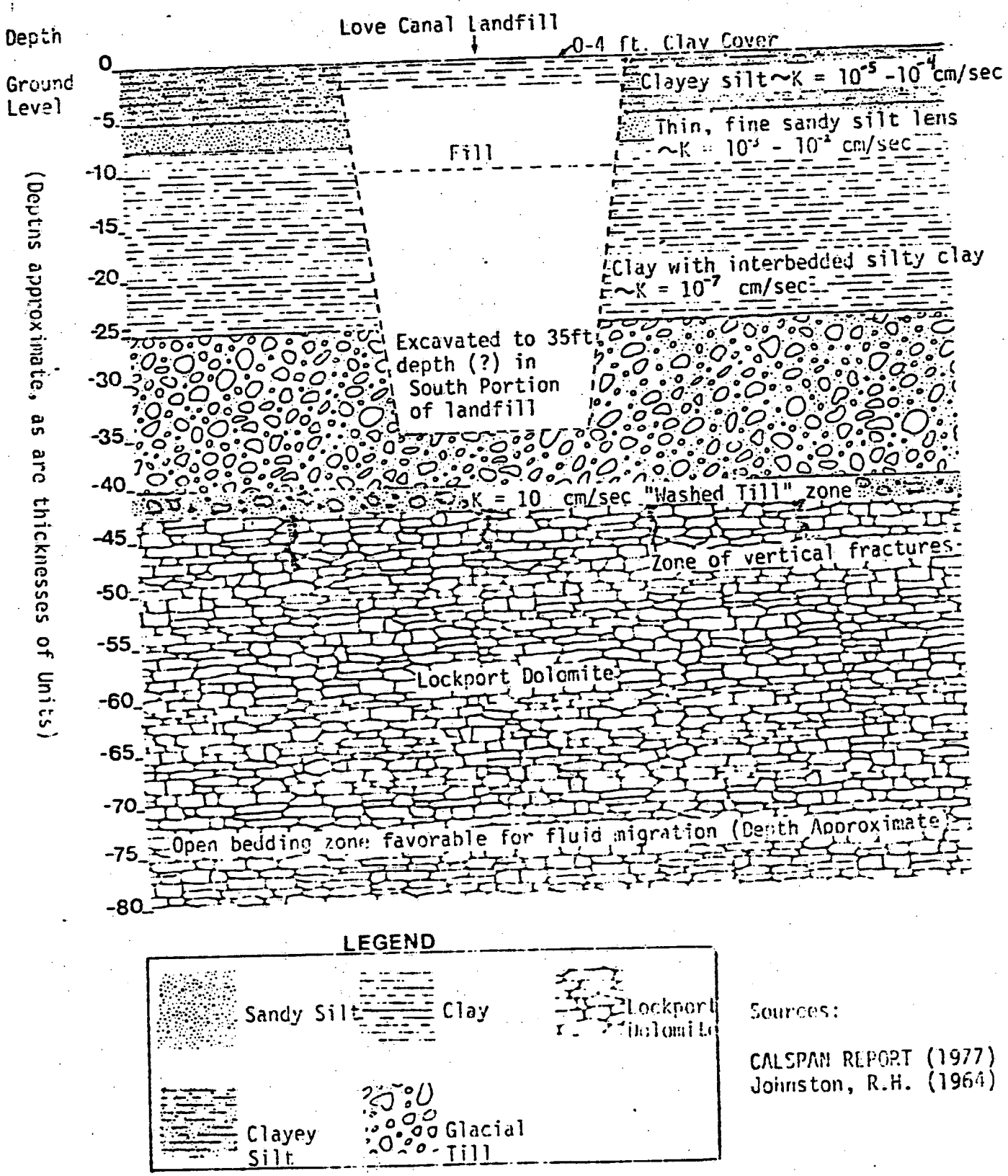
New York, N.Y. 10036



101st Street
100th Street
99th Street
(creek in pipe)
Boulevard
Colvin
LOVE CANAL
99th St. School
LOVE CANAL
Avenue
Wheatfield
Fenced-in area
Chemical Waste Zone
Read
97th Street
96th Street
96th Street
Frontier
LA SALLE EXPRESSWAY
Buffalo Avenue
Avenue
red C. Hart Assoc.
Sampling Locations
X = Sample Locations
* = Future Locations
Vertical scale foreshortened
NORTH

Figure 4: Generalized Site Stratigraphic Section



Sources:

CALSPAN REPORT (1977)
Johnston, R.H. (1964)

Ref #3

Calspan

CHARACTERIZATION AND ABATEMENT OF GROUNDWATER POLLUTION FROM LOVE CANAL CHEMICAL LAND FILL, NIAGARA FALLS, N.Y.

R.P. Leonard, P.H. Werthman, R.C. Ziegler

Calspan Report No. ND-6097-M-1

Prepared For:

CITY OF NIAGARA FALLS, N.Y.

AUGUST 1977

Contract No. CC-315

Calspan Corporation
Buffalo, New York 14221