PHASE I REPORT

ENGINEERING INVESTIGATIONS AND EVALUATIONS AT INACTIVE HAZARDOUS WASTE DISPOSAL SITES

Niagara Sanitation, Nash Road
Niagara County, NY

SUBMITTED TO

New York State Department of Environmental Conservation

SUBMITTED BY

ENGINEERING-SCIENCE, INC.
in association with
DAMES & MOORE

JUNE 1983

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SITE IDENTIFICATION

USEPA # NY D000514380

NYSDEC #932054

SECTION I

EXECUTIVE SUMMARY

Niagara Sanitation, Nash Road

Objective

The purpose of this two phase program is to conduct engineering investigations and evaluations at inactive hazardous waste disposal sites in New York State in order to calculate a Hazard Ranking System (HRS) score for each site and estimate the cost of any recommended remedial action. During the initial portion of this investigation (Phase I) all available data and records combined with information collected from a site inspection were reviewed and evaluated to determine the adequacy of existing information for calculating an HRS score. On the basis of this evaluation, a Phase II Work Plan was prepared for collecting additional HRS data (if necessary), evaluating remedial alternatives and preparing a cost estimate for recommended remedial action. The results of this Phase I study for this site are summarized below and detailed in the body of the report.

Site Background

The Niagara Sanitation Landfill is an inactive landfill located in the Town of Wheatfield, Niagara County, New York. The site is located in a suburban residential area and is partly overgrown with trees and marsh vegetation. The site was operated as a landfill by the Niagara Sanitation Company between 1964 and 1968 and is currently owned by the Town of Wheatfield. Both municipal and industrial wastes including caustics and plating sludge were buried at the site. Approximately 1,600 cubic yards of contaminated soil from Love Canal was reported to have been buried on the site in the mid 1960's. Investigations at the site have determined that heavy metals and phenols are present in the groundwater.

Assessment

Insufficient data is available to complete a final HRS scoring. The preliminary HRS scoring was:

S_M= 6.60 S_A= 0

S_{GW}=5.89 S_{FE}= 0

S_{SW}=9.79 S_{DC}= 37.50

The low scores are largely due to the low groundwater and surface water route target values. In addition there are no available analyses for surface water or air.

Recommendations

The following recommendations are made for the completion of Phase II:

(1) Emergency Evaluation of Surface Water
- five surface water samples analyzed for organic chemical parameters associated with Love Canal (includes benzene, toluene, chloroform, and carbon tetrachloride).

(2) Site Investigation
- geophysical survey to define the boundaries and depth of disposal trench.
- groundwater monitoring system consisting of four monitoring wells.
- surface water monitoring system consisting of three stations.
- air monitoring survey with an OVA meter to determine air quality.
- sample analysis should include the Love Canal indicator parameters for groundwater samples and Pb, Cr, Cd, Hg, Cu, Ni, Zn, and a GC/MS scan for surface water samples.

The estimated manhours required to complete Phase II are 579, while the estimated cost is $39,335.

SECTION II

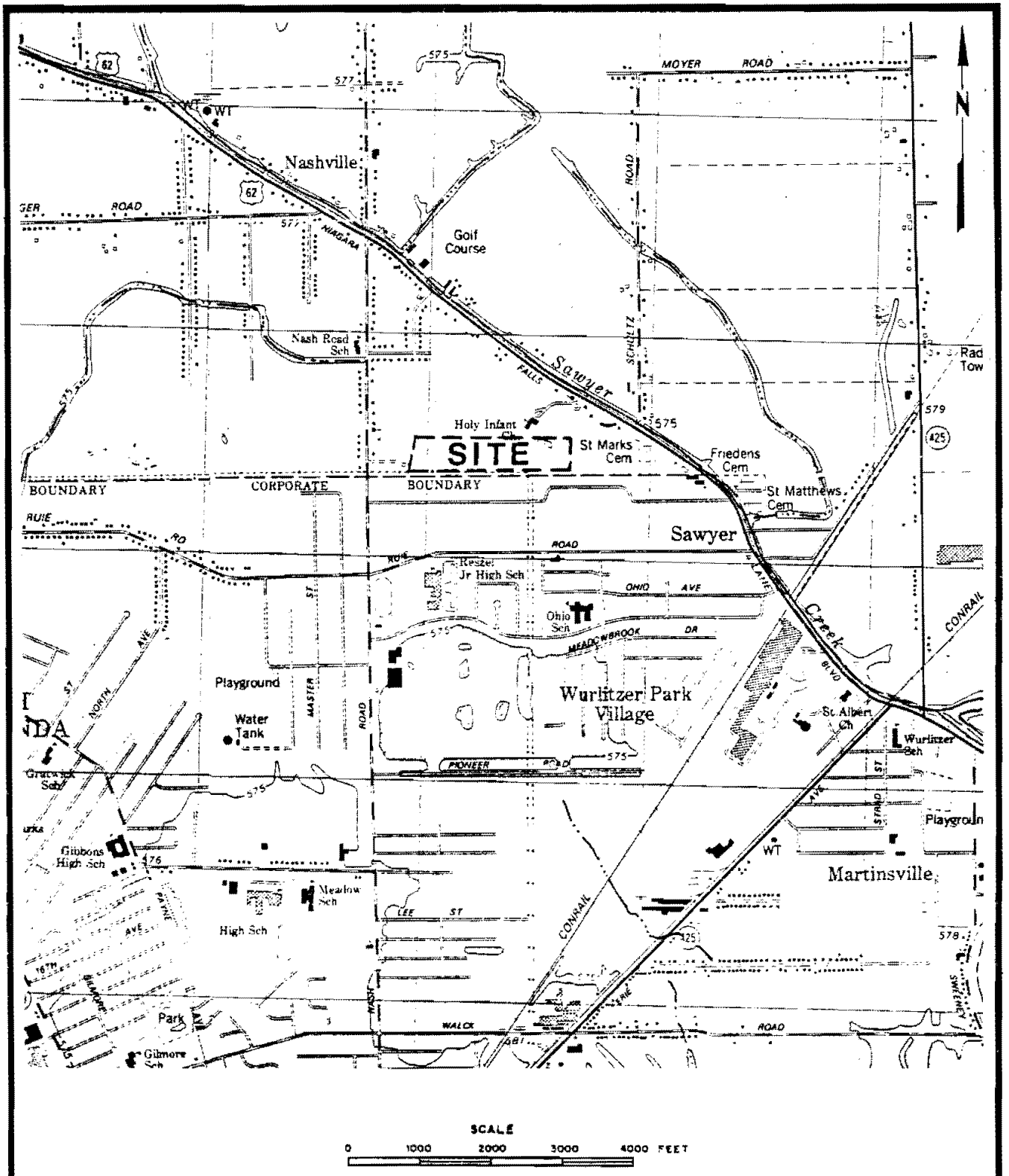
SITE DESCRIPTION

Niagara Sanitation Landfill on Nash Road

The site is an inactive landfill located in the Town of Wheatfield, Niagara County (NYS) adjacent to the North Tonawanda City boundary. The site is rectangular totaling approximately seven acres. The Nash Road site is located in a suburban residential area, and is partly overgrown with trees and marsh vegetation.

The Nash Road site was operated by Niagara Sanitation Company between 1964 and 1968. Both municipal and industrial wastes, including caustic materials and sludges, are disposed at the site. Approximately 1,600 cubic yards of contaminated soil from Love Canal was reported to have been deposited on the site in the mid 1960's.

Although some wastes are covered, protruding refuse is visible from the ground surface. Current concern centers on the possibly unsafe containment of the potentially toxic waste and the migration of these wastes off-site.



REFERENCE: U.S.G.S. 7.5' TOPOGRAPHIC MAP
TONAWANDA EAST, NY (1980) AND
TONAWANDA WEST, NY (1980) QUADRANGLES

SITE LOCATION MAP
NIAGARA SANITATION

SECTION III

HRS SCORING

HRS COVER SHEET

Facility name: Niagara Sanitation - Nash Rd.

Location: Town of Wheatfield

EPA Region: II

Person(s) in charge of the facility: Ed Greinert

Town Supervisor

Town of Wheatfield, NY

Name of Reviewer: John Kubarewicz/Eileen Gillian Date: 5/20/83

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.)

Landfill used by Niagara Sanitation 1964-1968 for both municipal and industrial wastes. Contaminated Love Canal soils was reportedly disposed on the site. Improperly closed, rubbish visible. Phenols, lead and organics found in soil and groundwater samples.

Scores: $S_M = 6.60$ ($S_{gw} = 5.89$ $S_{sw} = 9.79$ $S_a = 0$)

$S_{FE} = 0$

$S_{DC} = 37.50$

GROUND WATER ROUTE WORK SHEET

Ground Water Route Work Sheet						
Rating Factor	Assigned Value (Circle One)	Multi-plier	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	7	8	
Total Waste Characteristics Score			25	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			3375	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} =	5.89		

SURFACE 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	3	3	
1-yr. 24-hr. Rainfall	0 1 (2) 3		1	2	3	
Distance to Nearest Surface Water	0 1 2 (3)		2	6	6	
Physical State	0 1 2 (3)		1	3	3	
Total Route Characteristics Score				14	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	7	8	
Total Waste Characteristics Score				25	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	0	40	
Total Targets Score				6	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				6300	64,350	
7 Divide line 6 by 64,350 and multiply by 100				S_{SW} = 9.79		

AIR 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	

DIRECT CONTACT WORK SHEET

Direct Contact Work Sheet						
Rating Factor	Assigned Value (Circle One)		Multiplier	Score	Max. Score	Ref. (Sectic
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	12	20	
Distance to a Critical Habitat	(0) 1 2 3		4	0	12	
Total Targets Score				12	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				8100	21,600	
7 Divide line 6 by 21,600 and multiply by 100				SOC = 37.50		

Fire and Explosion Work Sheet

	Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1	Containment	1 3	1	0	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			FE = 0		

WORKSHEET FOR COMPUTING S_M

	S	S^2
Groundwater Route Score (S_{gw})	5.89	34.69
Surface Water Route Score (S_{sw})	9.79	95.84
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		130.53
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		11.43
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} \,/\, 1.73 = S_M =$		6.60

June 28, 1982

DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

INSTRUCTIONS: The purpose of these records is to provide a convenient way to prepare an auditable record of the data and documentation used to apply the Hazard Ranking System to a given facility. 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 that will make the document used for a given data point easier to find. Include the location of the document and consider appending a copy of the relevant page(s) for ease in review.

FACILITY NAME: NIAGARA SANITATION ON NASHRD.

LOCATION: TOWN OF WHEATFIELD

GROUND WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected (5 maximum):

LEAD
NICKEL
PHENOL
THO
ARSENIC

Rationale for attributing the contaminants to the facility:

GROUNDWATER SAMPLE FROM USGS STUDY

* * *

2 ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifers(s) of concern:

GROUNDWATER ON SITE

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

~4'

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

UNKNOWN

Net Precipitation

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

40"

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

27"

Net precipitation (subtract the above figures):

13"

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

SILT LOAM

Permeability associated with soil type:

$10^{-4} - 10^{-3}$ cm/sec

Physical State

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

SOLIDS

LIQUIDS IN DRUMS (NOW EMPT!)

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

DRUMS

Method with highest score:

DRUMS

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

PHENOL 3,1
LEAD
NICKEL
ARSENIC
benzene
toluene
Chlorobenzene

Compound with highest score:

LEAD

3, 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):

UNKNOWN BUT BASED UPON DEC MEMO
Approximately 1800 yds³ wastes from Love Canal and other heavy metal containing wastes. ⇒?

Basis of estimating and/or computing waste quantity:

DEC MEMO

* * *

5 TARGETS

Ground Water Use

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

Available for industrial use.

⇒ 1

Distance to Nearest Well

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

UNKNOWN

Distance to above well or building:

N/A

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:

NONE

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):

N/A

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

0

SURFACE WATER ROUTE

1 OBSERVED RELEASE

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

NONE

Rationale for attributing the contaminants to the facility:

N/A

* * *

2 ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

0%

Name/description of nearest downslope surface water:

SAWYER CREEK

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

<1%

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

YES. WASTES IN SWAMPY AREA.

Is the facility completely surrounded by areas of higher elevation?

NO

1-Year 24-Hour Rainfall in Inches

2.1

Distance to Nearest Downslope Surface Water

0.25 MILES

Physical State of Waste

LIQ + SOLID

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

DRUMS

Method with highest score:

DRUMS=3

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated
PHENOL 3.1
LEAD 3,3
IRON
NICKEL
Benzene
Toluene

Compound with highest score:

Lead
3,3 => 18

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):

Approximately 1600 cuyds
Love Canal wastes => 7

Basis of estimating and/or computing waste quantity:

DEC MEMO.
(NYSDEC, 1983)

* * *

5 TARGETS

Surface Water Use

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

RECREATION
TRANSPORTATION

Is there tidal influence?

NO

Distance to a Sensitive Environment

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

N/A

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

N/A

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

N/A

Population Served by Surface Water

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

NONE

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

N/A

Total population served:

0

Name/description of nearest of above water bodies:

N/A

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

N/A

AIR ROUTE

1 OBSERVED RELEASE

Contaminants detected:

N/A

Date and location of detection of contaminants

N/A

Methods used to detect the contaminants:

N/A

Rationale for attributing the contaminants to the site:

N/A

* * *

2 WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

N/A

Most incompatible pair of compounds:

N/A

Toxicity

Most toxic compound:

N/A

Hazardous Waste Quantity

Total quantity of hazardous waste:

N/A

Basis of estimating and/or computing waste quantity:

N/A

* * *

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

N/A

Distance to a Sensitive Environment

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

N/A

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

N/A

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

N/A

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:

0.01 ADJACENT

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?

UNKNOWN

EPA

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

I. IDENTIFICATION
01 STATE | 02 SITE NUMBER
NY D000514380

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER				
NIAGARA SANITATION, NASH RD.	4800 RIVER RD.				
03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
NIAGARA FALLS	NY	14150	NIAGARA	063	36

09 COORDINATES: LATITUDE 43°04'10.0" | LONGITUDE 078°51'23.8"

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 28 83 (MONTH DAY YEAR)	☐ ACTIVE ☒ INACTIVE	1964 (BEGINNING YEAR) : 1968 (ENDING YEAR) ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR ENGINEERING-SCIENCE (Name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR _____ (Name of firm)
☐ E. STATE ☒ F. STATE CONTRACTOR DAMES + MOORE (Name of firm) ☐ G. OTHER _____ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
JOHN KUBAREWICZ	CHEMICAL ENGINEER	ES	(703) 591-7575
09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO.
ART SEANOR	GEOLOGIST	D+M	(315) 638-2572
			( )
			( )
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO.
ED GREINERT	City Supervisor	WHEATFIELD	( )
			( )
			( )
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☐ PERMISSION ☐ WARRANT	15:00	SUNNY

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
JOHN KUBAREWICZ	ES	(703) 591-7575

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
SAME				5 6 83 (MONTH DAY YEAR)

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

I. IDENTIFICATION
01 STATE: NY | 02 SITE NUMBER: 000514380

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)
- [X] A. SOLID
- [ ] B. POWDER, FINES
- [X] C. SLUDGE
- [X] D. OTHER (Specify) _____
- [X] E. SLURRY
- [X] F. LIQUID
- [ ] G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be "reasonable")
- TONS: _____
- CUBIC YARDS: 1600
- NO. OF DRUMS: _____

03 WASTE CHARACTERISTICS (Check all that apply)
- [X] A. TOXIC
- [X] B. CORROSIVE
- [X] C. RADIOACTIVE
- [ ] D. PERSISTENT
- [ ] E. SOLUBLE
- [ ] F. INFECTIOUS
- [X] 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			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS	UNKNOWN		ORGANIC CHEMICALS (CONTAMINATED) SOIL
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS	UNKNOWN	—	LEAD, CHROMIUM, PLATING SLUDGE

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	LEAD	999	LF	67-20,000	ppb
OCC	2,4, DIMETHYL 2 PENTENE	999	LF	192,000	ppb
OCC	2-(1,1 DIMETHYL)-4-	999	LF	183,000	ppb
OCC	METLYI FURAN	—	LF	—	—
OCC	PHENOL	108-95-2	LF	1000	mg/L
MES	MERCURY	7439-97-6	LF	0.5	ppb
SOL	BENZENE	71432	LF		
SOL	TOLUENE	108883	LF	—	—
SOL	METHYLENE CHLORIDE	999	LF	—	—
OCC	DICHLOROBENZENE	25321-226	LF	—	—
OCC	TETRACHLORIDE	999	LF	—	—
OCC	TRICHLOROETHANE	127184	LF		
OCC	TRICHLOROETHENE	999	LF		
OCC	HEXACHLOROBUTADIENE	87683	LF		

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS	MERCURY	7439-97-6	FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

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

"INVESTIGATION OF SELECTED INACTIVE TOXIC LANDFILLS IN CONJUNCTION WITH THE NIAGARA RIVER STUDY," AUG. 1981, (USGS)
NYSDEC, 1983

EPA

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

I. IDENTIFICATION
01 STATE | 02 SITE NUMBER
NY 0000514380

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☑ A. GROUNDWATER CONTAMINATION
02 ☑ OBSERVED (DATE: 7/24/81) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION
WELL SAMPLING SHOWS CONTAMINATION BY LEAD AND ORGANIC CHEMICALS.

01 ☑ B. SURFACE WATER CONTAMINATION
02 ☑ OBSERVED (DATE: 6/11/81) ☐ POTENTIAL ☑ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION
RUST COLORED STAINS IN STANDING WATER AND SOIL.

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

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

01 ☑ E. DIRECT CONTACT
02 ☐ OBSERVED (DATE: _____) ☑ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION
POTENTIAL CONTACT PROBLEM DURING REMEDIAL ACTION

01 ☑ F. CONTAMINATION OF SOIL
02 ☑ OBSERVED (DATE: 7/24/81) ☐ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: _____ (Acres)
04 NARRATIVE DESCRIPTION
SOIL SAMPLES SHOW METAL AND ORGANIC CONTAMINATION.

01 ☐ G. DRINKING WATER CONTAMINATION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION
NO

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

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

EPA

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

I. IDENTIFICATION
01 STATE 02 SITE NUMBER
NY 0000514380

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☒ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) — ☒ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION
DEAD LEAVES FROM TREES HAVE A GREENISH TINT, NO OTHER VISIBLE EFFECTS.

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)
NONE OBSERVED

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

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES (Spills/Runoff/Standing liquids, Leaking drums) — 02 ☒ OBSERVED (DATE: 4/28/83) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION
POOLS OF ORANGE TINTED STANDING WATER OBSERVED, RUBBISH PROTRUDING FROM EARTH.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION
NO

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION
NO

01 ☒ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☒ OBSERVED (DATE: 6/11/81) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION
NIAGARA COUNTY DOH OBSERVED "EVIDENCE OF DUMPING" AFTER SITE CLOSED.

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 analyses, reports)
NIAGARA COUNTY DOH 1981
USGS STUDY 1982/83

EPA FORM 2070-13 (7-81)

EPA

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

I. IDENTIFICATION
01 STATE | 02 SITE NUMBER
NY 000514380

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☐ A. NPDES	N/A			
☐ 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		
☐ B. PILES		
☐ C. DRUMS, ABOVE GROUND		
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
☒ F. LANDFILL	UNKNOWN	
☐ G. LANDFARM		
☐ H. OPEN DUMP		
☐ I. OTHER (Specify)		

04 TREATMENT (Check all that apply)
- ☐ A. INCINERATION
- ☐ B. UNDERGROUND INJECTION
- ☐ C. CHEMICAL/PHYSICAL
- ☐ D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☒ H. OTHER NONE (Specify)

05 OTHER
- ☐ A. BUILDINGS ON SITE

06 AREA OF SITE
17 (Acres)

07 COMMENTS
POORLY CLOSED, TIRES, METAL OTHER RUBBISH VISIBLE

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)
☐ A. ADEQUATE, SECURE ☐ B. MODERATE ☒ C. INADEQUATE, POOR ☐ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.
POORLY CLOSED, TIRES, METAL OTHER RUBBISH VISIBLE

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: ☒ YES ☐ NO
02 COMMENTS
UNFENCED EASY ACCESS

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

SITE INSPECTION

EPA FORM 2070-13 (7-81)

EPA

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

I. IDENTIFICATION
01 STATE: NY | 02 SITE NUMBER: 0000514380

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)	SURFACE	WELL	02 STATUS: ENDANGERED	AFFECTED	MONITORED	03 DISTANCE TO SITE
COMMUNITY	A. ☒	B. ☐	A. ☐	B. ☐	C. ☐	A. _____ (mi)
NON-COMMUNITY	C. ☐	D. ☐	D. ☐	E. ☐	F. ☐	B. _____ (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING ☐ 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: 0 | 03 DISTANCE TO NEAREST DRINKING WATER WELL: _____ (mi)

04 DEPTH TO GROUNDWATER	05 DIRECTION OF GROUNDWATER FLOW	06 DEPTH TO AQUIFER OF CONCERN	07 POTENTIAL YIELD OF AQUIFER	08 SOLE SOURCE AQUIFER
4.0 (ft)	S	~4.0 (ft)	_____ (gpd)	☐ YES ☐ NO

09 DESCRIPTION OF WELLS (Including useage, depth, and location relative to population and buildings)
POSSIBLY 1 SHALLOW MONITORING/SAMPLING WELL ONSITE

10 RECHARGE AREA		11 DISCHARGE AREA	
☒ YES ☐ NO	COMMENTS	☐ YES ☒ NO	COMMENTS

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☒ 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
Small POND ON SITE		
Sawyer Creek	☐	0.25 (mi)
Bull Creek	☐	1.1 (mi)
Tonawanda Creek	☐	2.3 (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	02 DISTANCE TO NEAREST POPULATION
A. 2300 NO. OF PERSONS	B. 6100 NO. OF PERSONS	C. 12,000 NO. OF PERSONS	350' (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE	04 DISTANCE TO NEAREST OFF-SITE BUILDING
1620	350 (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)

EPA

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

I. IDENTIFICATION
01 STATE: NY | 02 SITE NUMBER: 000514380

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	
>11.5' (ft)	(ft)	5.6-7.3	

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
40-27=13 (in)	2.1 (in)	~0 %	E	1.0 %

09 FLOOD POTENTIAL
SITE IS IN 7500 YEAR FLOODPLAIN

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

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE: A. _____ (mi)
OTHER: B. 3.5 (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)

3.5 (mi)
RIVER NEAR CON
ENDANGERED SPECIES: GOLDEN EAGLE

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. _____ (mi)	B. _____ (mi)	C. _____ (mi)	D. _____ (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

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

USGS
DEC SITE DOSSIER

EPA

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

I. IDENTIFICATION

01 STATE: NY | 02 SITE NUMBER: 000514380

II. SAMPLES TAKEN

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

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☑ GROUND ☐ AERIAL

02 IN CUSTODY OF: D+M OFFICE
(Name of organization or individual)

03 MAPS ☑ YES ☐ NO

04 LOCATION OF MAPS: D+M OFFICE

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

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

EPA FORM 2070-13 (7-81)

EPA

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

I. IDENTIFICATION
01 STATE: NY | 02 SITE NUMBER: D000514380

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
TOWN WHEATFIELD		2800 CHURCH RD		N. TONAWANDA	NY	14120

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

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)

NYS Tax Records

EPA FORM 2070-13 (7-81)

EPA

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

I. IDENTIFICATION

01 STATE: NY | 02 SITE NUMBER: D000514380

II. CURRENT OPERATOR (Provide if different from owner)

01 NAME	02 D+B NUMBER
NONE	

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
NIAGARA SANITATION CO.	

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

05 CITY	06 STATE	07 ZIP CODE
N. TONAWANDA	NY	

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD
1964-68	

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

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

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

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

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)

NIAGARA COUNTY DOH A981

EPA

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

I. IDENTIFICATION
01 STATE: NY | 02 SITE NUMBER: D000514380

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER
NONE	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
FRONTIER CHEM		NF AIR FORCE BASE	
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
		NIAGARA FALLS	NY
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
BELL AEROSPACE		CANBORUNDUM	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
		BUFFALO AVE	
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
		NIAGARA FALLS	NY

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
NIAGARA SANITATION Co.			
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
N. TONAWANDA	NY		
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)

Same
Suspected Love Canal Soil disposed at site in mid 1960's.

EPA FORM 2070-13 (7-81)

EPA

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

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NY	0000514380

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

01 ☐ E. CONTAMINATED SOIL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

01 ☐ F. WASTE REPACKAGED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

01 ☐ G. WASTE DISPOSED ELSEWHERE — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

01 ☐ H. ON SITE BURIAL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

01 ☐ L. ENCAPSULATION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

01 ☐ N. CUTOFF WALLS — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
NO

EPA FORM 2070-13 (7-81)

EPA

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

I. IDENTIFICATION
01 STATE 02 SITE NUMBER
NY 0000514380

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
NO

01 ☐ S. CAPPING/COVERING — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
INCOMPLETE COVER OF WASTE (TRASH)

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
NO

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
NO

01 ☐ V. BOTTOM SEALED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
NO

01 ☐ W. GAS CONTROL — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
NO

01 ☐ X. FIRE CONTROL — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
NO

01 ☐ Y. LEACHATE TREATMENT — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
NO

01 ☐ Z. AREA EVACUATED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
NO

01 ☑ 1. ACCESS TO SITE RESTRICTED — 02 DATE 11/16/81 — 03 AGENCY DEC
04 DESCRIPTION
YES - GATE IS LOCKED ACROSS ACCESS ROAD

01 ☐ 2. POPULATION RELOCATED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
NO

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION
NONE

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

EPA FORM 2070-13 (7-81)

EPA

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

I. IDENTIFICATION

01 STATE | 02 SITE NUMBER
NY D000514380

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY/ENFORCEMENT ACTION ☐ YES ☑ NO

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

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

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION
01 STATE: NY | 02 SITE NUMBER: D000514380

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER				
NIAGARA SANITATION	NASH RD.				
03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
NORTH TONAWANDA	NY	14120		63	36
09 COORDINATES LATITUDE: 42°04'10."	LONGITUDE: 078°51'33.8"				

10 DIRECTIONS TO SITE (Starting from nearest public road)
NORTH OF NIAGARA MOHAWK EASEMENT WHICH STRADDLES N. TONAWANDA - WHEATFIELD TOWN LINE.

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)				
TOWN OF WHEATFIELD	2906 CHURCH RD.				
03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER		
N. TONAWANDA	NY	14120	(716) 694-6440		
07 OPERATOR (If known and different from owner)	08 STREET (Business, mailing, residential)				
NIAGARA SANITATION CO.					
09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER		
N. TONAWANDA	NY		(716) 693-5185		

13 TYPE OF OWNERSHIP (Check one)
☐ A. PRIVATE ☐ B. FEDERAL: _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☑ E. MUNICIPAL
☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☐ A. RCRA 3001 DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☐ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☑ YES ☐ NO DATE 4 28 83 (MONTH DAY YEAR)
BY (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR ☑ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)
CONTRACTOR NAME(S): ENGINEERING SCIENCE / DAMES + MOORE

02 SITE STATUS (Check one)
☐ A. ACTIVE ☑ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION: 1964 (BEGINNING YEAR) | 1983 (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED
LOW LEVELS OF ORGANICS, PHENOLS
THO
BENZENE
DICHLORO BENZENE
TOLUENE
-LEAD

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
WELL AND SOIL SAMPLES INDICATE LOW LEVELS OF CONTAMINATION BY LEAD AND ORGANICS, LOVE CANAL SOIL CONTAMINATED WITH ORGANIC CHEMICALS SUSPECTED ON SITE. REQUIRES INVESTIGATION.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☑ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☐ C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)		03 TELEPHONE NUMBER	
JOHN KUBAREWICZ	ES		(703) 591-7575	
04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
SAME			( )	5 18 83 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE: NY | 02 SITE NUMBER: 0000514380

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

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

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

TONS:

CUBIC YARDS: 1600

NO. OF DRUMS:

03 WASTE CHARACTERISTICS (Check all that apply)

- [X] A. TOXIC
- [X] B. CORROSIVE
- [X] C. RADIOACTIVE
- [ ] D. PERSISTENT
- [ ] E. SOLUBLE
- [ ] F. INFECTIOUS
- [X] 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			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS	UNKNOWN		ORGANIC CHEMICALS IN
IOC	INORGANIC CHEMICALS			Soil from LOVE CANAL
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS	UNKNOWN	—	LEAD, CHROMIUM, PLATING SLUDGE

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	LEAD	999	LF	67-20,000	ppb
OCC	2,4,DIMETHYL 2PENTENE	999	LF	182,006	ppb
OCC	2-(1,1 DIMETHYL)-4-		LF	183,000	ppb
OCC	METLY LFURAN	999	LF	—	—
OCC	PHENOL	108-95-2	LF	1000	mg/L
MES	MERCURY	7439-97-6	LF	0.5	ppb
SOL	BENZENE	71432	LF	—	—
SOL	TOLUENE	108 883		—	—
SOL	METHYLENE CHLORIDE	999		—	
OCC	DICHLOROBENZENE	25321-226		—	—
OCC	TETRACHLORIDE	999		—	—
OCC	TRICHLOROETHANE	127184		—	—
OCC	TRICHLORETHLENE	999			
OCC	HEXACHLOROBUTADIENE	87683			

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS	MERCURY	7439-97-6	FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

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

"INVESTIGATION OF SELECTED INACTIVE TOXIC LANDFILLS IN CONJUNCTION WITH THE NIAGARA RIVER STUDY," AUG. 1981, (USGS)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: NY | 02 SITE NUMBER: D000514380

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☑ A. GROUNDWATER CONTAMINATION | 02 ☑ OBSERVED (DATE: 7/24/81) | ☐ POTENTIAL | ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ | 04 NARRATIVE DESCRIPTION
WELL SAMPLING SHOWS CONTAMINATION BY LEAD AND ORGANIC CHEMICALS.

01 ☑ B. SURFACE WATER CONTAMINATION | 02 ☑ OBSERVED (DATE: 9/16/81) | ☐ POTENTIAL | ☑ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ | 04 NARRATIVE DESCRIPTION
RUST COLORED STAIN IN STANDING WATER AND SOIL.

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

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

01 ☑ E. DIRECT CONTACT | 02 ☐ OBSERVED (DATE: _____) | ☑ POTENTIAL | ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ | 04 NARRATIVE DESCRIPTION
POTENTIAL DURING REMEDIAL ACTION

01 ☑ F. CONTAMINATION OF SOIL | 02 ☑ OBSERVED (DATE: 7/24/81) | ☐ POTENTIAL | ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: _____ (Acres) | 04 NARRATIVE DESCRIPTION
SOIL SAMPLES SHOW METAL AND ORGANIC CONTAMINATION

01 ☐ G. DRINKING WATER CONTAMINATION | 02 ☐ OBSERVED (DATE: _____) | ☐ POTENTIAL | ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ | 04 NARRATIVE DESCRIPTION
NO

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

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

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE | 02 SITE NUMBER
NY 000514380

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) — ☑ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION
DEAD LEAVES FROM TREES HAVE A GREENISH TINT, NO OTHER VISIBLE EFFECTS.

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)
NONE OBSERVED

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

01 ☑ M. UNSTABLE CONTAINMENT OF WASTES (Spills/runoff/standing liquids/leaking drums) — 02 ☑ OBSERVED (DATE: 4/28/83) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION
POOLS OF ORANGE TINTED STANDING WATER OBSERVED, RUBBISH PROTRUDING FROM EACH.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION
NO

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION
NO

01 ☑ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☑ OBSERVED (DATE: 6/11/81) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION
NIAGARA COUNTY DOH OBSERVED "EVIDENCE OF DUMPING" AFTER SITE CLOSED.

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 analyses, reports)
NIAGARA COUNTY DOH 1981
USGS STUDY 1982-83

SECTION IV

SITE HISTORY

Niagara Sanitation Landfill on Nash Road

This landfill was used by the Niagara Sanitation Company for waste disposal from 1964 to 1968. The refuse site was used for both industrial and municipal wastes. The site received wastes from Niagara Falls Air Force Base, Bell Aerospace, Carborundum, Frontier Chemical, Graphite Specialties, Continental Can and Grief Bros. Wastes may include caustics, plating tank sludge and municipal wastes (Niagara County DOH, 1981).

Hydrogeological investigation of the site began in 1979 with the installation of two groundwater wells. USGS installed two additional wells in 1982. Chemical analyses of these wells indicate high levels of metals and phenols (USGS, 1981).

Approximately 1,600 cubic yards of contaminated soil from Love Canal were reportedly buried at the site in the mid 1960's. The soil is suspected to contain organic chemicals including benzene, toluene, methylene, chloride, chloroform and trichloroethane (NYS DEC, 1983).

SECTION V

SUMMARY OF AVAILABLE DATA

Niagara Sanitation, Nash Road

Regional Geology and Hydrology

The site is located in the Erie-Ontario lowlands physiographic province. The bedrock of this region is predominantly limestone, dolostone, and shale. Most of the rocks are deep aquifers with regional flow to the south.

In the recent past, most of New York State, including the site, has been repeatedly covered by a series of continental ice sheets. The activity of the glacier widened preexisting valleys and deposited widespread accumulations of till. The melting of ice, ending approximately 12,000 years ago, produced large volumes of meltwater; this water subsequently shaped channels and deposited thick accumulations of stratified, granular sediments.

As glacial ice retreated from the region, meltwater formed lakes in front of the ice margin. This region is covered by lake sediments, the most recent being from Lake Iroquois (a larger predecessor to Lake Ontario) and from Lake Tonawanda (an elongate lake which occupied an east-west valley and drained north into Lake Iroquois). The sediments consist of blanket sands and beach ridges which are occasionally underlain by lacustrine silts and clays (indicating quiet, deeper water deposition).

Granular deposits in this region frequently act as shallow aquifers, whereas lacustrine clays, as well as tills, often inhibit groundwater movement. However, fine-grained, water-lain sediments, such as silts and clays, frequently contain horizontal laminations and sand seams. These internal features facilitate lateral groundwater movement through otherwise low permeability materials.

Site Geology

The site geology is based on boring logs from 4 on-site wells (USGS, 1982), as well as on geological investigations on nearby sites. Bedrock is expected to be Camillus Shale (Salina group) and may be located at depths of approximately 25 feet. Overlying the bedrock is clay, which becomes silty and sandy in the upper soil layers. Waste materials are buried to depths of approximately 5 feet. Some parts of the site are covered with approximately 1 foot of topsoil.

Site Hydrology

Site hydrology is known from well information, which indicates a shallow aquifer at a depth of approximately 4 feet. This depth places the water table within the fill material. No information is available about the deep bedrock (shale) aquifer or about flow directions.

Sampling and Analysis

The Niagara County DOH took both soil and groundwater samples at the Niagara Sanitation site as shown on Figure V-1 (NYSDOH, 1981). The results are summarized below:

Sample	Date	THO* (ppb)	Phenols (ppm)	Lead (ppm)	Nickel (ppm)
Well 9	7/16/81	-	-	0.2	0.12
10	7/16/81	4	-	-	-
28	8/12/81	-	.008	-	-
Soil 19	7/24/81	<10	-	-	-
20	7/24/81	<10	-	-	-

*Total Halogenated Organics

As part of their ongoing study the USGS sampled soil and groundwater at the site (USGS, 1982). Sample locations are shown on Figure V-2, while results are summarized in Table V-1. The single groundwater sample was found to contain low levels (5-74 ppb) of arsenic, cadmium, and lead. A number of organic compounds were

FIGURE V-1

NIAGARA SANITATION SAMPLING LOCATIONS

NIAGARA SANITATION NASH ROAD SITE (DEC # 932054)

Approx. Scale
1: 3600
(All distances estimated)

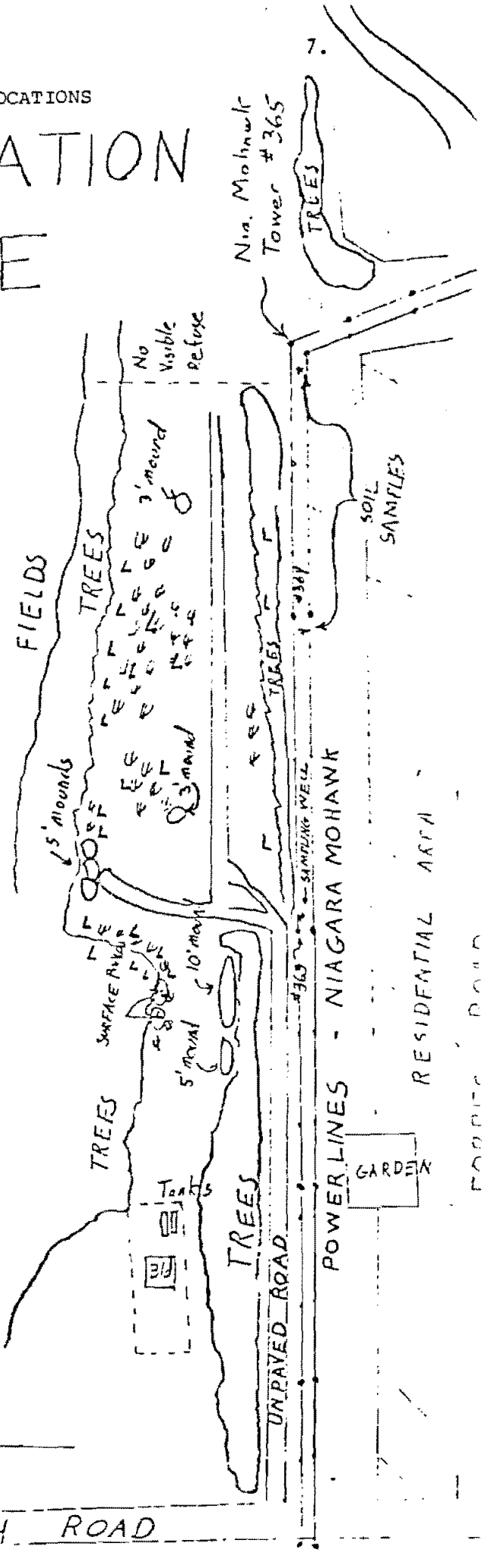
25 50 75 100 yd 0 100 yd 200 yd

ψ - Marsh Area
⟆ - Treeline
⫶ - Powerlines
L - Red-Brown Leachate stains

Slope - downward toward SE (<1%)

Mapped from field observation only by M. Hopkins NCHD

Michael E. Hopkins



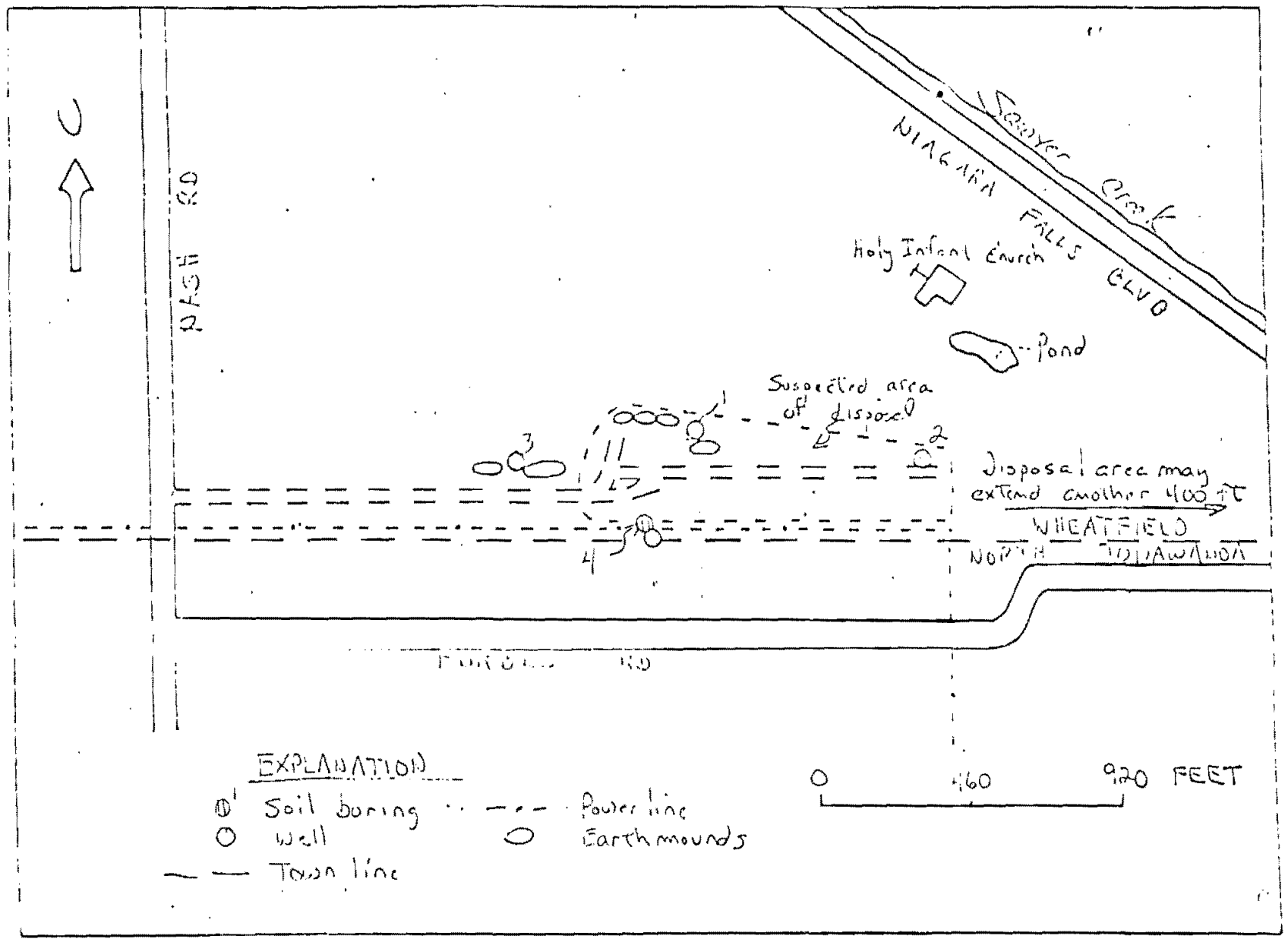


FIGURE V-2 Location of sampling sites on the Nash Road property. (USGS, 1982)

TABLE V-1

Analyses of ground-water and substrate samples from Nash Road, Wheatfield, New York (USGS. 1982-1983)

	Sample number			
	1	2	3	4
Date collected	062432	062432	062432	062432
Depth (ft)	6.0	9.5	7.0	6.5
Sample Type[1]	gw	s	s	s
pH	6.4	-	-	-
Conductivity (uMHOS)	2650	-	-	-
Temperature (°C)	17.0	-	-	-
Inorganic Constituents[2]				
Antimony				
Arsenic	5;5	<1000;<1000	<1000	<1000
Cadmium	1;1	1000;1000	1000	1000
Chromium	<10;<10	2000;4000	2000	2000
Copper	17;21	77000;100000	71000	71000
Iron	90000;90000	2500000;5000000	2100000	2400000
Lead	67;74	20000;20000	13000	20000
Mercury	0.3;0.5	<10;<10	<10	<10
Nickel	34;34	<10000;<10000	<10000	<10000
Selenium				
Zinc				
Flouride				
Sulfide				
Cyanide				
Organic Compounds[2]				
1,2,3-trimethylbenzene[5]	6.2;-[7]	-;-	<300	-
1,2,4-trimethylbenzene[5]	18;-[7]	-;-	<300	-
1,4-dichlorobenzene[5]	7.3;-[7]	-;-	<300	-
(1-methylethyl)benzene[5]	9.3;-[7]	-;-	<300	-
1,3,3-Trimethyl-bicyclo-[2.2.1]heptan-2-one[4]	62;-[7]	-;-	<300	-
1,7,7-Trimethyl-bicyclo-[2.2.1]heptan-2-one[4]	390;17[7]	-;-	<300	-

1 Sample type: gw=ground water, sw=surface water, and s=substrate.

2 Concentrations: ug/L for water and hg/Kg for substrate. Blank spaces indicate that no analyses were performed; dashed indicate that constituents and compounds were not found.

3 Cu(D): analysis done by direct aspiration because of high iron concentration.

4 Identity determined by library match; no standard available. Concentration results are semiquantitative and are based on the response factor of the internal standard.

5 Identity based on less than library match; identification seemed reasonable. As for footnote 4, concentration results are semiquantitative.

6 Volatile found in GC/ms extractions. Concentration results probably less than actual.

7 Low surrogate recoveries.

8 Estimated value less than detection limit.

determined by gas chromatography/mass spectrometry (GC/MS) analysis. The majority of compounds identified were present in low concentrations (2-390 ppb) and included diethyl phthalate, dichlorobenzene, and trimethyl benzene. Soil samples were found to contain relatively high concentrations of heavy metals such as lead, chromium and cadmium (1000-20,000 ppb). A number of organic compounds such as 2,4,-dimethyl-2-pentane and 3-octanol were found at high concentration (182,000 ppb) in the soil sample. The complete analysis is contained in Appendix A.

SECTION VI

ASSESSMENT OF ADEQUACY OF DATA

Site: Niagara Sanitation, Nash Road

HRS Data Requirement	Comments on Data
Observed Release	
Ground Water	Data available, adequate for HRS evaluation.
Surface Water	No available data, field data collection recommended.
Air	No available data, field data collection recommended.
Route Characteristics	
Ground Water	Data available, adequate for HRS evaluation.
Surface Water	Data available, adequate for HRS evaluation.
Air	Data available, adequate for HRS evaluation.
Containment	Information available, adequate for HRS evaluation.
Waste Characteristics	Insufficient information on quantity of waste.
Targets	Information available, adequate for HRS evaluation.
Observed Incident	Information available revealed no report of incident. No further investigation recommended.
Accessibility	Adequate information available.

SECTION VII

PHASE II WORK PLAN

Site: Niagara Sanitaton, Nash Road

Objectives

The objectives of the Phase II activities are:

- To collect additional field data necessary to complete the HRS scoring.
- To perform a conceptual evaluation of remedial alternatives and estimate budgetary costs for the most likely alternative.
- To prepare a site investigation report.

The additional field data required to complete the HRS are defined as follows:

Step 1 - Emergency Evaluation Surface Water

A surface water monitoring program will be implemented to determine: if an eminent hazard exists at the site. Five surface water samples shall be collected around the disposal trench and then analyzed for the following parameters: methylene chloride, chloroform, carbon tetrachloride, benzene, toluene, chlorobenzene, 1,1,2-trichloroethane, tetrachloroethene, 1,1,2,2-tetrachloroethane, trichloroethene, trichlorobenzene (and isomers), dichlorobenzene (and isomers), hexachlorobutadiene, total organic halogens, and pH. These materials represent indicator parameters for Love Canal wastes.

Step 2 - Site Investigation

Geophysical Survey (East End) - A geophysical survey is recommended to define the boundaries and depth of the disposal trench. The standing water must be drained in order to conduct the survey. Electromagnetics (EM) and resistivity will be used to identify the trench boundaries and seismic refraction will be used to determine the depth of the disposal trench.

Gound-Water Monitoring (East End) - A ground-water monitoring program is recommended around the disposal trench. Four 2-inch stainless steel monitoring wells, approximately 30 feet deep, will be installed. The wells will be sampled and analyzed for the indicator parameters listed in Step 1.

Surface Water (West End) - A surface water monitoring system with three monitoring stations is recommended for the collection of samples for the following analyses: Pb, Cr, Cu, Hg, Ni, Zn, and a GC/MS organic priority pollutant scan. Both the water and sediment will be tested.

Air - An air monitoring survey with an OVA meter is recommended to check the air quality above the surface of the site.

Waste Characteristics - Additional search of records is necessary to determine the quantity of waste present (East End).

TASK DESCRIPTION

The proposed Phase II tasks are described in Table VII-1.

COST ESTIMATE

The estimated manhours required for the Phase II project are presented in Table VII-2 and the estimated project costs by tasks are presented in Table VII-3. The cost for performing the Phase II project is $6,492 for Step 1 and $32,843 for Step 2, for a total project cost of $39,335.

TABLE VII-1

PHASE II WORK PLAN - TASK DESCRIPTION

NIAGARA SANITATION, NASH ROAD

Tasks	Description of Task
Step 1 - Emergency Evaluation	
Perform Surface Water Sampling and Analyses	Inspect the site and collect 5 water samples around the disposal trench. Analyze the samples for methylene chloride, chloroform, carbon tetrachloride, benzene, toluene, chlorobenzene, 1,1,2-trichloroethane, tetrachloroethene, 1,1,2,2-tetrachloroethane, trichloroethene, trichlorobenzene (and isomers), dichlorobenzene (and isomers), hexachlorobutadiene, total organic halogens and pH.
Step 2 - Site Investigation	
II-A Update Work Plan	Review the information in the Phase I report, and Step 1 evaluation, and revise the Phase II work plan.
II-B Conduct Geophysical Studies	Conduct EM, resistivity and seismic surveys to define the boundary and depth of the disposal trench.
II-C Conduct Boring/Install Monitoring Wells	Install 4 stainless steel monitoring wells around the disposal trench.
II-D Construct Test Pits/ Auger Holes	No further construction of test auger holes necessary.
II-E Perform Sampling and Analysis	
Soil samples from borings	Samples collected at 5-foot intervals or at changes in subsurface lithology. Perform wet sieve and one Atterberg limit determination on one sample per boring.
Soil samples from surface soils	No further sampling necessary.
Soil samples from test pits and auger holes	No further sampling necessary

TABLE VII-1
(Continued)

Sediment samples from surface water	Collect 3 sediment samples at the west end and analyze samples for Pb, Cr, Cd, Cn, Hg, Ni, Zn, and a GC/MS organic priority pollutant scan.
Ground-water samples	Collect samples from the 4 new monitoring wells and analyse for the parameter listed in Step 1.
Surface water samples	Collect 3 surface water samples at the west end and analyzed samples for Pb, Cr, Cd, Cn, Hg, Ni, Zn, and a GC/MS organic priority pollutant scan.
Air samples	Using the OVA, determine if organic vapors are present.
Waste samples	No further sampling necessary.
II-F Calculate Final HRS	Revise HRS based on the field data collected in Tasks IIB-IIE, complete the HRS form.
II-G Conduct Site Assessment	Prepare final report containing Phase I report, additional field data, final HRS and HRS documentation records, and site assessments. The site assessment will consist of a conceptual evaluation of alternatives and a preliminary cost estimate of the most probable alternative.
II-H Project Management	Project coordination, administration and reporting.

TABLE VII-2
PERSONNEL RESOURCES BY TASK
PHASE II HRS SITE INVESTIGATION (SITE: NIAGARA SANITATION)

TASK DESCRIPTION	TEAM MEMBERS, MANHOURS												TOTAL HOURS	TOTAL $
	PIC	TRB	PM	DPM	PCM	QAM	HSM	FTL	FT	RAAL	RAAF	SS		
STEP 1 EMERGENCY EVALUATION	2		24	1				24	16			8	75	1463
STEP 2 SITE INVESTIGATION														
II-A UPDATE WORK PLAN	1		4	1		1	1	6		6		8	28	497
II-B CONDUCT GEOPHYSICAL STUDIES			2	1				8	80			8	99	1106
II-C CONDUCT BORING/INSTALL MONITORING WELLS			4	1	2	1	2	8	40				58	783
II-D CONSTRUCT TEST PITS/AUGER HOLES													0	0
II-E PERFORM SAMPLING AND ANALYSIS														
Soil Samples from Borings									8			1	9	82
Soil Samples from Surface Soils													0	0
Soil Samples from Test Pits and Auger Holes													0	0
Sediment Samples from Surface Water			1					2	10			2	15	183
Ground-Water Samples			1					2	10				13	167
Surface Water Samples								2	10			2	14	157
Air Samples								1	8			2	11	116
Waste Samples													0	0
II-F CALCULATE FINAL HRS		3	3					3	24			16	49	596
II-G CONDUCT SITE ASSESSMENT	2	2	8	4			4	8	16	16	36	64	160	2102
II-H PROJECT MANAGEMENT	4		12	4		6	6					16	48	884
TOTALS	9	2	59	15	2	8	13	64	222	22	36	127	579	8136

TABLE VII-3
COST ESTIMATE BREADKOWN BY TASK
PHASE II HRS SITE INVESTIGATION (SITE: NIAGARA SANITATION)

TASK DESCRIPTION	DIRECT LABOR HOURS	DIRECT LABOR COST	OTHER DIRECT COSTS (ODC), $ LAB ANALYSIS	TRAVEL AND SUBSISTENCE	SUPPLIES	EQUIP. CHARGES	SUBCON-TRACTORS	MISC.	SUBTOTAL ODC	TOTALS($)
STEP 1 EMERGENCY EVALUATION	75	1463	1500	900	50	50		75	2575	4038
STEP 2 SITE EVALUATION										
II-A UPDATE WORK PLAN	28	497		100	50	50		25	225	722
II-B CONDUCT GEOPHYSICAL STUDIES	99	1106		700	50	250		50	1050	2156
II-C CONDUCT BORING/INSTALL MONITORING WELLS	58	783		550	50		4200	50	4850	5633
II-D CONSTRUCT TEST PITS/AUGER HOLES									4	0
II-E PERFORM SAMPLING AND ANALYSIS										
Soil Samples from Borings	9	82	392						392	474
Soil Samples from Surface Soils									4	0
Soil Samples from Test Pits and Auger Holes									4	0
Sediment Samples from Surface Water	15	183	2745	170	25			15	2955	3138
Ground-Water Samples	13	167	1200	170	25	50		15	1460	1627
Surface Water Samples	14	157	2745		25				2770	2927
Air Samples	11	116		85	25	15		5	130	246
Waste Samples									0	0
II-F CALCUALTE FINAL HRS	49	596			50	50		25	125	721
II-G CONDUCT SITE ASSESSMENT	160	2102			100	200		75	375	2477
II-H PROJECT MANAGEMENT	48	884		150	150	50		50	400	1284
TOTALS	579	8136	8190	2825	600	715	4200	385	17,307	25,443
								OVERHEAD=		11,618
								SUBTOTAL=		37,061
								FEE=		2,274
								TOTAL PROJECT COST=		39,335

APPENDIX A

BIBLIOGRAPHY

APPENDIX A

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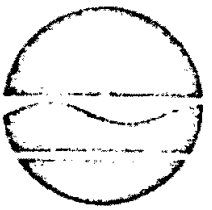
USGS (1982083). An Investigation of Selected Inactive Toxic Landfills in Conjunction with the Niagara River Study. Continuation of Study. 1982-1983.

New York State Department of Environmental Conservation
600 Delaware Avenue, Buffalo, New York 14202-1073



Robert F. Flacke
Commissioner

Niagara Sanitation
1 Regina 9 Niagara

March 18, 1982

Mr. Edward C. Greinert, Supervisor
Town of Wheatfield
2800 Church Road
North Tonawanda, New York 14120

Dear Mr. Greinert:

This letter is in response to your submission of a resolution passed by the Wheatfield Town Board on January 18, 1982 which directed the Town Engineers to undertake certain activities associated with the Nash Road Landfill (DEC Site #932054).

Please be advised that the work elements presented in the resolution are generally in agreement with those items discussed and agreed upon during a meeting held with Wendel Engineers in this office on November 12, 1981. We believe that these work items form the basis of an overall plan to first investigate and then remediate the Nash Road site. However, I would offer the following comments with respect to the work elements to be undertaken by the Town Engineers.

The groundwater monitoring wells proposed will be used not only to determine the direction of groundwater movement but also to determine the extent of contaminant movement from the landfill. The wells should be installed as soon as site access conditions permit. However, before installation begins, it is requested that a location map and construction details of the wells be submitted to this office for review. The results of the sampling and water level monitoring of the wells should be submitted within 3 months of well installation. Although not specifically discussed during the November 12th meeting with Wendel Engineers, it is suggested that, as a minimum, the following chemical parameters be analyzed for in all of the samples extracted from the wells: Heavy metals, including iron, Total halogenated organics (THO), Total organic carbon (TOC), [illegible].

Finally, it was suggested by Wendel Engineers during our November meeting that sampling of private water wells near the Nash Road site would be considered as a means of investigating contaminant migration. This approach is not mentioned in the resolution submitted. Is it still being considered?

The installation of additional monitoring wells and the subsequent development of groundwater flow and quality information is the initial step toward determining the significance of the Nash Road site. We look forward to the commencement of this effort.

Should you have questions on this matter or wish to discuss it further, please feel free to contact me at 847-4590.

Yours truly,

Peter J. Buechi, P.E.
Associate Sanitary Engineer

PJB:cag

cc: P. Hoffman, Wendel Engineers
J. Kehoe, Niagara County Health Department
R. McCarty, NYSDEC/Albany
J. McMahon, NYSDEC/Buffalo
A. Tayyebi, NYSDEC/Buffalo

NEW YORK STATE GEOLOGICAL ASSOCIATION

54th ANNUAL MEETING

October 8-10, 1982

Amherst, New York

GUIDEBOOK FOR FIELD TRIPS IN WESTERN NEW YORK, NORTHERN PENNSYLVANIA AND ADJACENT, SOUTHERN ONTARIO

Edward J. Buehler

and

Parker E. Calkin

Editors

Department of Geological Sciences
State University of New York at Buffalo

Held in Conjunction with
11th Annual Meeting Eastern
Section American Association
of Petroleum Geologists

Published by the New York State Geological Association. Guidebook available from the executive secretary: M.P. Wolf, Geology Department, Gittleson Hall, Hofstra University, Hempstead, New York 11550.

NEW YORK STATE GEOLOGICAL ASSOCIATION

38th Annual Meeting

April 29 - May 1, 1966

GUIDEBOOK

Geology of Western New York

Edward J. Buehler, Editor

Department of Geological Sciences
State University of New York at Buffalo

Additional copies are available from the permanent secretary of the New York State Geological Association: Dr. Kurt E. Lowe, Department of Geology, City College of the City University of New York, 139th St. at Convent Ave., New York, N. Y.

Niagara Co. Department of Health (1981)

SUMMARY OF SAMPLES TAKEN

SAMPLE #	LOCATION	TYPE	PARAMETER	DATE	NEAREST HOUR
1	Gratwick # 13	Well	Metals	7/16/81	11:00
2	Gratwick # 10	Well	Metals	7/16/81	11:00
3	Gratwick # 11	Well	Metals	7/16/81	11:00
4	Gratwick # 12	Well	Metals	7/16/81	11:00
5	Gratwick # 13	Well	THO	7/16/81	11:00
6	Gratwick # 10	Well	THO	7/16/81	11:00
7	Gratwick # 11	Well	THO	7/16/81	11:00
8	Gratwick # 12	Well	THO	7/16/81	11:00
9	Nia. Sanitation	Well	Metals	7/16/81	1:00
10	Nia. Sanitation	Well	THO	7/16/81	1:00
11	Zimmerman	Well	THO	7/16/81	12:00
12	Old Falls	Well	THO	7/16/81	12:00
13	Artpark	Leachate	Metals	7/17/81	12:00
14	Artpark	Leachate	THO	7/17/81	12:00
15	PASNY	Soil	Metals	7/21/81	10:00
16	PASNY	Soil	THO	7/21/81	10:00
17	Nia. Sanitation	Soil	Metals	7/24/81	12:00
18	Nia. Sanitation	Soil	THO	7/24/81	12:00
19	Nia. Sanitation	Soil	Metals	7/24/81	12:00
20	Nia. Sanitation	Soil	THO	7/24/81	12:00
21	Walck Road	Soil	THO	7/24/81	12:00
22	Gratwick # 13	Well	Phenol	8/12/81	10:00
23	Gratwick # 10	Well	Phenol	8/12/81	10:00
24	Gratwick # 11	Well	Phenol	8/12/81	10:00
25	Gratwick # 12	Well	Phenol	8/12/81	10:00
26	Zimmerman	Well	Phenol	8/12/81	11:00
27	Old Falls	Well	Phenol	8/12/81	11:00
28	Nia. Sanitation	Well	Phenol	8/12/81	12:00
29	Olin-Industrial Welding	Soil	THO, TOC Lindane	9/07/81	12:00

GRATWICK - RIVERSIDE PARK (continued)

WELL # 13

Sample # 1	Sampled 11:00			7/16/81
Cadmium, total	L.T.	0.02	MG/L	
Chromium, total	L.T.	0.1	MG/L	
Lead, total		0.1	MG/L	
Mercury, total	L.T.	0.4	MCG/L	
Nickle, total		0.05	MG/L	
Sample # 5	Sampled 11:00			7/16/81
THO		18	MCG/L	
Sample # 22	Sampled 10:00			8/12/81
Phenols		17	MG/L	

RESULTS OF SAMPLES TAKEN AT NIAGARA SANITATION SITE

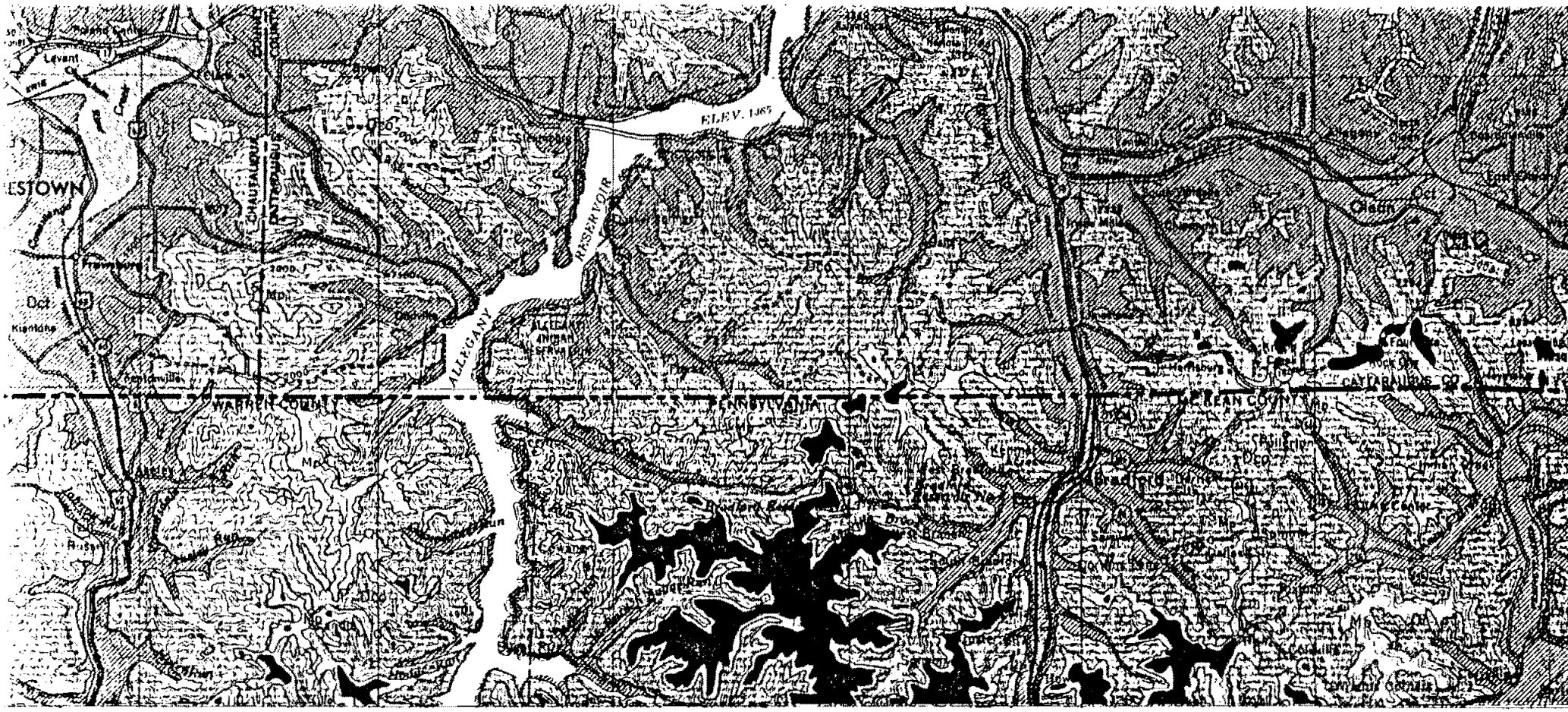
WELL SAMPLES

Sample # 9	Sampled 1:00			7/16/81
Cadmium, total	L.T.	0.02	MG/L	
Chromium, total	L.T.	0.1	MG/L	
Lead, total		0.2	MG/L	
Mercury, total	L.T.	0.4	MCG/L	
Nickle, total		0.12	MG/L	
Sample # 10	Sampled 1:00			7/16/81
THO		4	MCG/L	
Sample # 28	Sampled 12:00			8/12/81
Phenol		0.008	MG/L	

SOIL SAMPLES

Samples # 17,18,19 & 20 all Sampled 10:00 7/24/81
Samples # 17 & 18 Metals - Results not yet available

Sample # 19	L.T. 10 PPB	THO
Sample # 20	L.T. 10 PPB	THO



GEOLOGIC MAP OF NEW YORK

1970

Niagara Sheet

Scale 1:250,000

5 0 5 10 15 Statute Miles 20

5 0 5 10 15 20 25 Kilometers 30

CONTOUR INTERVAL 100 FEET

NAME OF LANDFILL

NIAGARA SANITATION COMPANY (DEC #932054)

LOCATION Nash Road, Town of Wheatfield

The site is estimated to be about seven acres in size and located north of the Niagara Mohawk easement which straddles the North Tonawanda - Wheatfield town line. The site extends from the eastern end of the access road running from Nash Road approximately 350 yards east to the fork in the power easement (Tower #365). The site is estimated to be 120 yards wide at the western end tapering to about 70 yards wide at the eastern end.

The landfill location and extent are shown on the attached drawing.

OWNERSHIP

The property is owned by the Town of Wheatfield.

HISTORY

This landfill was used by the Niagara Sanitation Company for waste disposal from 1964 to 1968. The refuse site was used for both industrial and municipal refuse. The site received refuse from Niagara Falls Air Force Base, Bell Aerospace, Carborundum, Frontier Chemical, Graphite Specialties, Continental Can and Grief Bros. Wastes disposed of may include caustics, plating tank sludge and municipal wastes.

Historical information was obtained from Hazardous Waste Disposal Sites in New York State, Volume 3, NYS DEC.

INVESTIGATION

A site visit was made by Mr. M.E. Hopkins of the Niagara County Health Department on June 11, 1981. The site was found to be poorly covered with protruding refuse. Visible items included rubber blocks, tubes and hoses, tires, concrete fragments and other demolition debris, broken glass, ash, wood, rusted cans and pieces of graphite rods. Also found were what appeared to be remnants of steel drums. There was evidence of some unauthorized dumping after the site was closed. Access to the site was not restricted.

Red-brown (rust-colored) stains were found on vegetation and soil in numerous locations around the perimeter of the site, particularly along the northern and western edges. Additional stained areas were found throughout the marshes and other low points within the site. Although most of these stained areas were dry, two areas were found beneath standing water. It was noted that although the ground was stained beneath the water, the water was not discolored. No flowing leachate streams were found. The sampling well was not found on the June 11th visit. A well was found on June19th on a subsequent visit. The well was located 20 feet east of Niagara Mohawk Tower #363. The location is shown on the attached drawing. The well had apparently been

INVESTIGATION (continued)

vandalized. The upper standpipe had been broken off at ground level and the well had, therefore, been left uncovered. The well may still be useable for sampling.

No evidence of landfill activity was noted east of Niagara Mohawk Tower #365. However, USDA aerial photographs (ARE 3V-75;1966) indicate that the landfilled area may extend 300 to 400 ft. east of Tower #365.

SOILS

The soils surrounding the site are Raynham and Canandaigua series soils. The composition of the soil contained with the site itself is not known, although it is expected to be largely composed of refuse. The surface is generally a silty clay material with some sand in spots. Portions of the site are marshy while others appear well drained, indicating that the soil may not be uniform throughout the site. Boring records of the sampling well immediately south of the site, indicate a profile of silty sand and sandy silt to a depth of about 9 feet over clay to an unknown depth. The records also show the water table at 4 feet. This suggests that the water table may be perched. Fluctuations of the water table are not known.

CONCLUSIONS

The potential for the migration of contaminants off-site is present. Visible leachate stains and the odor in the well south of the landfill indicate that material may be leaching in perched groundwater. Permeable soils in some areas could allow lateral migration. The site requires proper closing. The proximity of houses along Forbes Road and potential for migration justify sampling at this site.

SAMPLING

Well and soil samples were taken for THO, heavy metals and phenol analysis. It was noted at the time of sampling, that the water drawn from the well was discolored gray and strongly odorous with an organic odor. A slight oily sheen was present on the surface of the sample. Two soil samples were taken near Towers #364 and #365. These samples were taken from the bottoms of hand augered holes roughly 4 feet deep. The boring near pole #364 indicated a gray silt over a darker gray silty clay layer at the point of sampling. The second boring showed a tan silty clay over clay at about 4 feet. The sample was taken from this interface. Groundwater was encountered slightly below the 4 foot level in both holes.

RECOMMENDATIONS

This site must be properly closed. Additional sampling wells along the Niagara Mohawk easement would be desireable to facilitate future sampling. The existing well should be maintained. Annual inspection and periodic monitoring is recommended. The Town of Wheatfield was notified to submit an abatement plan for the site.

93. NASH ROAD #932054

Geologic Information

The geology of the site consists of a Holocene lacustrine clay unit overlying a bedrock of Camillus Shale. Four test borings were drilled on the site and their locations are shown in figure 1. The geologic description of the borings is as follows:

Well No.	Depth (ft)	Description
1	0 - 5.0	Fill.
	5.0 - 6.5	Clay, pink.
		WATER SAMPLE: 6.0 ft.
2	0 - 8.0	Clay, tan to light green, sandy, dry.
	8.0 - 10.0	Clay, green.
	10.0 - 11.5	Clay, pink.
		SOIL SAMPLE: 8 - 10 ft.
3	0 - 1.5	Tan and black fill.
	1.5 - 3.5	Clay, greenish, sandy, dry.
	3.5 - 7.0	Clay, greenish, sandy, wet.
		SOIL SAMPLE: 7 ft.
4	0 - 1.0	Topsoil.
	1.0 - 3.5	Clay, sandy, dry.
	3.5 - 6.5	Clay, greenish, wet.
		SOIL SAMPLE: 6.5 ft.

Table 1.—Analyses of ground-water and substrate samples from Nash Road, Wheatfield, New York

	Sample number			
	1	2	3	4
Date collected	062482	062482	062482	062482
Depth (ft)	6.0	9.5	7.0	6.5
Sample Type[1]	gw	s	s	s
pH	6.4	-	-	-
Conductivity (uMHOS)	2650	-	-	-
Temperature (°C)	17.0	-	-	-
Inorganic Constituents[2]				
Antimony				
Arsenic	5;5	<1000;<1000	<1000	<1000
Cadmium	1;1	1000;1000	1000	1000
Chromium	<10;<10	2000;4000	2000	2000
Copper	17;21	77000;100000	71000	71000
Iron	90000;90000	2500000;5000000	2100000	2400000
Lead	67;74	20000;20000	13000	20000
Mercury	0.3;0.5	<10;<10	<10	<10
Nickel	34;34	<10000;<10000	<10000	<10000
Selenium				
Zinc				
Flouride				
Sulfide				
Cyanide				
Organic Compounds[2]				
1,2,3-trimethylbenzene[5]	6.2;-[7]	-;-	<300	-
1,2,4-trimethylbenzene[5]	18;-[7]	-;-	<300	-
1,4-dichlorobenzene[5]	7.3;-[7]	-;-	<300	-
(1-methylethyl)benzene[5]	9.3;-[7]	-;-	<300	-
1,3,3-Trimethyl-bicyclo-[2.2.1]heptan-2-one[4]	62;-[7]	-;-	<300	-
1,7,7-Trimethyl-bicyclo-[2.2.1]heptan-2-one[4]	390;17[7]	-;-	<300	-

1 Sample type: gw=ground water, sw=surface water, and s=substrate.
2 Concentrations: ug/L for water and ug/Kg for substrate. Blank spaces indicate that no analyses were performed; dashes indicate that constituents and compounds were not found.
3 Cu(D): analysis done by direct aspiration because of high iron concentration.
4 Identity determined by library match; no standard available. Concentration results are semiquantitative and are based on the response factor of the internal standard.
5 Identity based on less than library match; identification seemed reasonable. As for footnote 4, concentration results are semiquantitative.
6 Volatile found in GC/ms extractions. Concentration results probably less than actual.
7 Low surrogate recoveries.
8 Estimated value less than detection limit.

Table 1.—Analyses of ground-water and substrate samples from Nash Road, Wheatfield, New York—continued

	Sample Number			
	1,	2	3	4
Organic Compounds[2] (continued)				
1,7,7-Trimethyl-bicyclo-[2.2.1]heptane-2.5-dione[5]	<5;20[7]	-;-	-	-
3-(1,1-dimethylethyl) phenol[5]	20;2.0[8]	-;-	-	-
2-methylbenzochloride[5]	<5;-[7]	-;-	-	-
Diethylphthalate [5]	6.2;8.0[7]	-;-	-	-
Phosphoric acid, tributylester [5]	10;110[7]	-;-	-	-
2(3H)-benzothiazolone[5]	<5;60[7]	-;-	-	-
Di-n-butylphthalate [5]	2.5[8];5.7[7]	-;-	-	-
1,2,3,4,4a,9,10,10a-octahydro-1,4a-dimethyl-7-(1-methyethyl)-[1R-(1 alpha, 4a beta, 10a alpha)]-1-phenanthrenecarbox-aldehyde [5]	<5;1.5[8]	-;-	-	-
Cyclohexlphthalate [5]	2.6[8];-[7]	-;-	-	-
3,5-Dimethyl phenol[5]	-;11[7]	-;-	-	-
2-ethyl-4-phenol-.delta. 2-1,3,4-oxadiazolin-5-one[5]	-;100[7]	-;-	-	-
n-butylbenzene sulfonamide [5]	-;9.9[7]	-;-	-	-
3-(2-phenylethyl)phenol[5]	-;2.1[8]	-;-	-	-
2H-1-benzopyran [5]	-;<5[7]	-;-	-	-
2-methylpentadecane[5]	-;<5[7]	-;-	-	-
Heptadecane[5]	-;<5[7]	-;-	-	-
Octacosane[5]	-;<5[7]	-;-	-	-
4,8,12-Trimethyl-3, 7,11-tridecatriene-nitrile,4[5]	-;<5[7]	-;-	-	-
Nonadecane[5]	-;<5[7]	-;-	-	-
3,8-Dimethylundecane[5]	-;<5[7]	-;-	-	-
o-methyloxime-3,5-dimethyl-2-cyclohexen-1-one [5]	-;-	804;-	-	-

[1] Sample type: GW=ground water, SW=surface water, and S=substrate.
[2] Concentrations: ug/L for water and ug/Kg for substrate. Blank spaces indicate that no analyses were performed; dashes indicate that constituents and compounds were not found.
[3] Cu(D): analysis done by direct aspiration because of high iron concentration.
[4] Identity determined by library match; no standard available. Concentration results are semiquantitative and are based on the response factor of the internal standard.
[5] Identity based on less than library match; identification seemed reasonable. As for footnote 4, concentration results are semiquantitative.
[6] Volatile found in GC/ms extractions. Concentration results probably less than actual.
[7] Low surrogate recoveries.
[8] Estimated value, less than detection limit.

Table 1 .—Analyses of ground-water and substrate samples from Nash Road, Wheatfield, New York

	Sample Number 1	2	3	4
Organic Compounds[2] (continued)				
Iodocyclohexane [5]	-;-	10052;-	-	-
N-[2-methyl-1-(1-methylethyl) butylidiene]methanamine[5]	-;-	36569;-	-	-
N-(2 hydroethyl)-dodecanamide [5]	-;-	16342;-	-	-
1-(2-butenyl)-2,3-dimethylbenzene [5]	-;-	1301;-	-	-
2,3,5,6,7,8,9,10-octahydri-5-hydroxy-2,2,7,7,9-pentamethyl-5,9-menthano-benzocycloocten-4(1H)-one[4]	-;-	6294;-	-	-
10-methylcisosane [4]	-;-	<300;-	-	-
Hexamethylcyclotrisiloxane[5]	-;-	-;-	-	1300
Octamethylcyclotetra-siloxane [5]	-;-	-;-	-	5440
Decamethylcyclopenta-siloxane [5]	-;-	-;-	-	295[8]
Dodecamethylcyclohexa-siloxane [5]	-;-	-;-	-	90.7
5-Methyl-3-hexen-2-one[5]	-;-	-;3500	-	-
Dichloromethylbenzene[5]	-;-	-;<300	-	-
2-(1,1-Dimethyl)-4-methylfuran[5]	-;-	-;183000	-	-
2,4-Dimethyl-2-pentene		-;182000	-	-
3-Octanol[5]		-;47500	-	-
2,6-Bis(1,1-dimethylethyl) napthalene[5]	-;-	-;1650	-	-
1,1,4,5,5,8-Hexamethyl-S-hydrindacene[5]	-;-	-;5750	-	-
Flouranthene	-;-	-;538	-	-
Benz(a)anthracene	-;-	-;272[8]	-	-
Chrysene	-;-	-;274[8]	-	-
Benzo(b)flouranthene	-;-	-;223[8]	-	-
Benzo(k)flouranthene	-;-	-;249[8]	-	-
2,6-Dimethyl-2,5-hepta-dien-4-one[5]	-;-	-;-	509	-
2-Methyl-2-octen-4-one[5]	-;-	-;-	13300	-
1,2,4-Trimetnyl-5-(1-methyl-ethenyl)benzene[5]	-;-	-;-	159	-

[1] Sample type: gw=ground water, sw=surface water, and s=substrate.
[2] Concentrations: ug/L for water and ug/Kg for substrate. Blank spaces indicate that no analyses were performed; dashes indicate that constituents and compounds were not found.
[3] Cu(D): analysis done by direct aspiration because of high iron concentration.
[4] Identity determined by library match; no standard available. Concentration results are semiquantitative and are based on the response factor of the internal standard.
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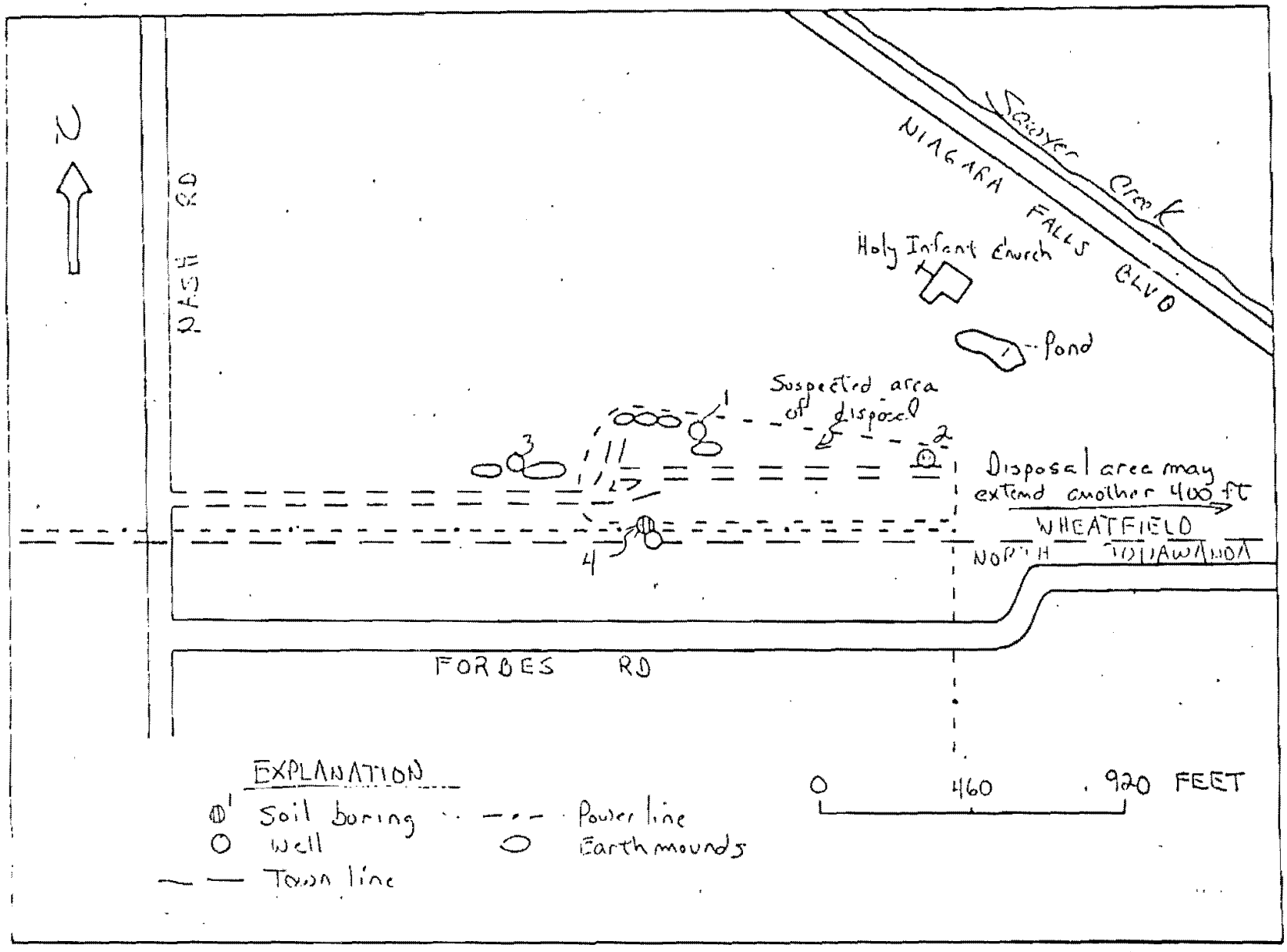


Figure 1. Location of sampling sites on the Nash Road property.

APPENDIX B

NYS REGISTRY FORM

HAZARDOUS WASTE DISPOSAL SITES REPORT
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Code: _____

Site Code: 932054

Name of Site: Niagara Sanitation Co. Region: 9

County: Niagara Town/City N. Tonawanda

Street Address Nash Road

Status of Site Narrative:

A combination of municipal and industrial disposal site. Improperly covered, with protruding refuse visible. Used by Niagara Falls AF Base, Bell Aerospace, Carborundum, Frontie Chemical, Graphite Specialties, Continental Can, and Grief Brothers. Approximately 1,600 cubic yards of contaminated soil from Love Canal were reportedly disposed in the mid 1960's.

Type of Site: Open Dump ☐ Treatment Pond(s) ☐ Number of Ponds _____
Landfill ☒ Lagoon(s) ☐ Number of Lagoons _____
Structure ☐

Estimated Size 12 Acres

Hazardous Wastes Disposed? Confirmed ☒ Suspected ☐

*Type and Quantity of Hazardous Wastes:

TYPE	QUANTITY (Pounds, drums, tons, gallons)
Caustics	Unknown
Plating tank sludge	
Municipal waste	
Soil contaminated with organic chemicals	1,600 yards

* Use additional sheets if more space is needed.

APPENDIX C

GENERIC HEALTH AND SAFETY PLAN

APPENDIX C

HEALTH AND SAFETY PLAN OUTLINE

I. PURPOSE

The purpose of this plan is to assign responsibilities, establish personnel protection standards, mandatory operating procedures, and provide for contingencies that may arise while operations are being conducted at the site.

II. APPLICABILITY

The provisions of the plan are mandatory for all on-site investigation personnel and personnel under contract while initial site reconnaissance and/or preliminary investigation activities are being conducted at the site. These activities include investigation, sampling, and monitoring undertaken on the site or at any off-site areas which may be affected by contamination from the site.

III. RESPONSIBILITY

1. Principal Investigator (PI)
   a. The PI shall direct on-site investigation efforts for each discipline. At the site, the PI, assisted by the Team Safety Officer, has the primary responsibility for:

      1) Assuring that appropriate personnel protection equipment is available and properly utilized by all on-site personnel and subcontractor personnel.
      2) Assuring that personnel are aware of the provisions of this plan, are instructed in the work practices necessary to

ensure safety, and in planned procedures for dealing with emergencies (Provisions, Work Practices and Emergency Procedures) appropriate to this investigation.

3) Assuring that personnel are aware of the potential hazards associated with site operations.
4) Supervising the monitoring of safety performance by all personel to ensure that required work practices are employed.
5) Correcting any work practices or conditions that may result in injury to personnel or exposure to hazardous substances.

HEALTH AND SAFETY PRELIMINARY SITE INVESTIGATION

Based on the appropriate listed field activity plans, as well as other site information (such as waste types and chemistry) as learned from the data collecting and analysis, the Principal Investigator/Team Safety Officer will develop an appropriate health and safety plan for the site.

Planning for Site Entry

In order to determine whether it is safe for the investigative team to proceed with the study and/or to determine what appropriate level of protective clothing and equipment should be used, the nature and extent of the on-site hazards will be assessed prior to site inspection. An on-site reconnaissance utilizing appropriate monitoring equipiment will check for:

- exposivity
- atmospheric concentrations of hazardous vapors, bases, fumes, and dusts
- oxygen deficiencies
- physical hazards posed by site features/topography

If during the initial site reconnaissance, the monitoring equipment detects evidence of fire or explosion potential or high levels of radiation, further entry into the site will not be allowed. The site inspection will be delayed until such problems can be resolved appropriately.

The initial site reconnaissance will be performed by team personnel equipped with the level of protective clothing and any additional gear

that is required for their safe entry to the site. In order to provide sufficient lead time to "fine tune" safety and data gathering plans, this initial site reconaissance should be performed at least one week before the scheduled site investigation.

Based on this information regarding the associated conditions, a detailed plan providing for the safety of field personnel and the public will be developed in accordance with EPA and OSHA and regulations and USAF operating procedures. This plan may address such factors as (dependent on specific site/waste conditions):

- Types of exposures to hazardous materials (e.g., inhalation, skin absorption, ingestion, and eye contact), and the potential effects of each exposure pathway for each hazardous waste.
- High risk areas (surface contamination, exposed containers, or areas containing concentrations of chemical vapor, oxygen deficiency, explosive or flammable potential or radioactivity).
- Required protective and related equipment and procedures to adequately protect field personnel from perceived hazards on site.
- Decontamination procedures.
- Procedures for the prevention of accidental releases of hazardous substances to the air, soil, or surface water and procedures for implementation of proper contingency plans if such releases do occur.
- Procedures for the proper disposal of hazardous wastes generated in the course of the site inspection.
- Equipment and procedures for handling special site inspection conditions (e.g., prolonged operations, weather extremes, etc.).
- Emergency procedures.
- Arrangements with local hospitals and other local authorities.

The site-specific safety plan should be sufficient to provide the site inspection team with all applicable information assure health and safety. However, additional procedures may need to be considered and developed given site-specific conditions identified both before and during the site inspection.

Site Entry and Field Activities

Three sequential stages are identified to constitute the field activities:

- Initial setup
- Exploration and sampling
- Demobilization

Initial Setup

The main functions in this step are to secure entry and establish safety criteria. All operations will be managed from a central point, including:

- General supervision of area activities
- Decontamination process coordination
- Field communication
- Safety and medical coordination
- Equipment staging
- Recordkeeping
- Other functions as required

Exploration and Sampling

During this stage most field activities will be performed by pairs or small groups of team members. These tasks will include the following:

- Observation of visible spills, leachate seeps, etc., and sampling water and/or soils at these areas.
- Photography.
- Geophysical surveys (Electromagnetic or Metal Detection).
- Electrical resistivity measurements to detect ground-water contamination.
- Soil sampling using hand-operated equipment and drilling rigs.
- Ground-water sampling and water level measurements from existing wells.
- Surface water sampling.

Demobilization

This is the final stage of field activities in which field personnel will:

- Decontaminate used equipment.
- Transfer equipment and samples obtained to the decontamination staging area.
- Undergo personnel decontamination procedures.
- Load all equipment and samples on to the project vehicle(s).

The PI will supervise all the above steps through its conclusion. Field team members should not depart until all subcontractors personnel and equipment have left the site.

APPENDIX D

GENERAL FIELD PROCEDURES

APPENDIX D

General Field Procedures

Installation of Groundwater Quality Monitoring Wells

To investigate the groundwater quality within the aquifer of concern, groundwater monitoring wells will be installed. To accomplish the purposes of the monitoring wells a series of separate field procedures have been prepared. These include:

A - Drilling Procedures
B - Monitoring Well Construction Procedures
C - Water Sampling Procedures

The field program will be under the overall direction of the geologist in charge. Detailed supervision of the field work will be the responsibility of the field geologist. In particular, the field geologist will have the following responsibilities.

- Supervision of all drilling work and well construction
- Maintenance of the boring log for each boring
- Collection, labeling, and identification of formation samples, including rock cores.
- Conducting in cooperation with the driller, required in situ falling head tests and pumping tests.
- Performance of the water sampling program.
- Maintenance of pertinent notes in his/her field notebook and on daily field memos.

Health and safety procedures as set forth by the site Health and Safety Plan will be adhered to for all field operations.

A. Drilling Procedures

General Procedures

A qualified drilling subcontractor will be selected to provide all the equipment materials and skilled labor necessary to advance the test borings to the depths specified by the field geologist.

Order of Drilling Wells: All wells will be drilled in numerical sequence from what is considered the upgradient location (least contaminated) to the downgradient (most contaminated) with the upgradient boring being labeled "B-1".

Method of Drilling: Minimum of 4" ID hollow stem augers. If formational materials preclude the use of augers rotary drilling methods will be employed (e.g. for coring of bedrock).

Formational Sampling: Samples will be collected at a minimum of every 5 feet in the borings and at each lithographic change noted. A D&M sampler will be used to obtain one sample from each major layer in each boring. Other samples will be obtained with a standard split spoon sampler. Bedrock will be sampled continuously by coring with an NX double tube core barrel. All sampling equipment will be thoroughly cleaned after obtaining each sample.

The cleaning method employed will be dependent upon the type of contaminant suspected to be present at that location.

Measurements: The depth to the water level in each boring being drilled should be measured each morning and just prior to installation of any monitoring devices into a boring. The depth of the boring should be measured and recorded on the boring log upon reaching final depth.

Decontamination Requirements	All downhole equipment and above hole equipment that may come in contact with subsurface materials will be steam cleaned at the drilling location prior to initiating any drilling and between each boring and at the conclusion of the drilling program. The steam cleaning rinse water will be allowed to discharge to the ground surface at the well site. Care will be taken to assure this water does not come in contact with any surface water source.
Site Cleanup	All drill cuttings remaining after well installation will be removed for proper disposal. All debris, paper, etc. will be removed and all depressions resulting from drilling operations will be filled in.

Drilling Procedures for Bedrock Boring

1. Sample formation every 5 feet and at every major lithologic change.

2. Drill and sample the unconsolidated formations until bedrock is encountered.

3. Ream the hole to at least 6 inches in diameter.

4. Make ready an appropriate length of steel casing by cleaning.

5. Place enough volclay pellets in the hole to make a layer of about one-foot thickness at the bottom of the boring.

6. Place the steel casing in the hole, and bottom it snugly into the bentonite. Once the casing is set, it should not be lifted until the completion of the well.

7. Circulate the drilling fluid; drill a few inches below the bottom of the volclay layer and circulate for a few minutes to clean the boring of most of the bentonite. Clean out this part of the boring by circulating clean water.

8. Drill into the bedrock the required depth using the NX double-tube core barrel.

9. Store the rock cores in specially constructed wooden rock-core boxes, for inspection and description by the field geologist.

10. Measure water level in boring.

11. Construct well in the boring

Drilling Procedures for Soil Borings

1. Sample formation every 5 feet and at every major lithologic change.

2. Drill to the depth estimated.

3. Measure water level in boring.

4. Construct well in boring.

Procedure for Abandoning a Boring

A cement slurry containing about 5 lbs. bentonite and one bag of cement per 8 to 10 gallons of water should be pumped into the hole to the ground surface.

B. MONITORING WELL CONSTRUCTION PROCEDURES

General Specifications and Procedures

Casing and Well Screen:	2-inch I.D. Schedule 40 PVC with flush screw joints or 2-inch I.D. stainless steel with flush screw joints.
Screen Slot Size:	Based upon materials encountered in boring.
Storage of Casing and Screen:	The casing and screen lengths will not be stored directly on the ground. The well string shall be prepared on a clean plastic sheet spread out over level ground.
Cleaning of Casing and Screen:	Casing and screen shall be cleaned before installing in the boring.
Bottom Cap and Blank Casing:	A length of blank casing of about two feet complete with a bottom cap shall be placed below the well screen in all cases.
Gravel Pack:	The gravel pack material will be 90 percent by weight larger than the screen size and should have a uniformity coefficient of 2.5 or less.
Placement of the Gravel Pack:	The gravel pack should be emplaced so that it extends to three feet above the top of the well screen. This should be confirmed by measuring down the annular space with a weighted tape or with a measured small-diameter pipe. The volume of gravel pack material emplaced should be compared with the volume computed as required, based on the screen diameter and length. The gravel pack may be poured directly down the annular space provided the well is pressurized and an upward flow of pure water is maintained in the annular space by introducing the water at a low rate through the well casing which would enter the annular space through the well screen openings.

Bentonite Seal: A bentonite seal shall be placed in the annular space above the gravel pack in each well by emplacing 1/4-inch diameter volclay pellets in the annular space during which time the low flow rate up the annular space in maintained. This bentonite seal should be at least 2 feet thick. The bentonite shall be compacted with a donut shaped weight that slides over the well casing.

Well Development: Each well should be developed for about 30 minutes to one hour using an air-lift surging method. Appropriate piping should be assembled for the discharge water so as to discharge it and dispose of it in a manner to limit contamination of the surrounding area. The discharge during development should be estimated by using a 5-gallon bucket and a stop watch. In the course of development, if a well turns out to have a very low specific capacity, it may prove necessary to add some clean water in order to remove as many fines as possible from the vicinity of the well screen. Development should be continued until all but a trace amount of fines and suspended solids appear in the discharge water. Following development, the air line hose or pipe and associated fittings should be thoroughly cleaned and then rinsed.

Grouting Annular Space: A bentonite-cement grout (5 lbs. bentonite and one bag of cement to 8-10 gallons of water) will be pumped into the annular space to fill the space from the top of the volclay bentonite seal to the ground surface.

Protective Casing: A length of 6-inch I.D. steel casing with a lockable cap should be placed over the well casing in each case to protect it. It should be set about one foot into the bentonite cement grout in the annular space, and should stick up above ground about 2 to 3 feet.

Well Labeling: The full number of each monitoring well should be painted on the protective casing and cap.

Surveying: A level survey will be performed in which the elevation of the top of the inside casing of each well will be determined 0.01 ft. and the reference point marked.

The Construction site makes it impossible to prescribe one single Deep or Shallow well construction configuration. Therefore a generic well construction configuration for both deep and shallow wells has been developed.

Deep Well Construction

1. Place well screen so as to screen entire thickness of lower sand and gravel layer (if it exists), unless the layer exceeds 20 feet in thickness; the well screen should extend about two feet into the top of bedrock.

2. If a clay layer immediately overlies the bedrock and the overlying surficial sand and gravel is less than 30 feet, place the screen in only the upper five feet of bedrock.

3. If no significant clay/lacustrine layer exists and if the surficial sand and gravel layer is greater than 20 feet thick place screen in lower 15 to 20 feet of the sand and gravel layer, extending also two feet into bedrock.

4. If no significant clay/lacustrine layer exists and if the surficial sand and gravel layer is less than 20 feet in thickness screen entire saturated thickness, in addition to about 5 feet above the summer static water level and about two feet into the underlying bedrock.

5. After installation of the well screen and casing, and the gravel pack, emplace volclay pellets to form a 2 to 4 foot thick seal in the annular space above the gravel pack. Use 1/4-inch diameter pellets and maintain a low flow rate up the annular space during emplacement so as to insure that they settle in place evenly around the annular space. Measure the depth to the top of the seal.

6. Using a bentonite-cement grout (described in the foregoing section), pump grout into the annular space so as to grout up to the top of the clay layer.

7. Jack the 6-inch casing out of the hole.

8. Develop the well and complete it as described under the foregoing section.

Shallow Well Construction

1. Place the well screen so that it extends from the top of any clay layer (if it exists) to about 5 feet above the summer static water level, unless the saturated thickness is greater than 20 feet, in which case the screen should be placed opposite the upper 20 feet of the saturated part of the unit, extending as well about 5 feet above the summer static water level. In the case of shallower wells less than 20 feet deep, place screen from bottom of hole to within 5 feet of land surface. For very shallow water table, the top of screen should be two feet above the estimated high water table or no closer than two feet to the land surface.

2. Emplace the volclay pellets as described above for the deep wells. A one-foot thick bentonite seal should be adequate.

3. Develop and complete the well as described under General Specifications Procedures.

C. GROUNDWATER SAMPLING PROCEDURES

Following the installation of the well, individual groundwater samples will be collected according to the procedures included below from each well for analyses. These samples will be collected using a positive displacement sampling device made entirely from stainless steel and teflon. This procedure will permit us to collect a sample that is more representative of the aquifer water and to limit the possibility of degassing and volatilization. The well storage water will be evacuated with a submersible pump or air lift system whereby the air is not permitted to come in direct contact with the aquifer. The

sampling pump will be cleaned between wells by immersion into a solvent, followed by a distilled deionized water rinse. A quantity of each of these will be pumped through the pump and teflon tubing.

As a part of our ongoing QA program, field blanks, consisting of distilled deionized water from the discharge of the pump following cleaning will be taken between selected wells to monitor the effectiveness of the cleaning procedures. Two typed of trip blanks will also be taken. The first type consists of a sample bottle filled with distilled, deionized water that will be capped and accompany the samples at all times. The second type will consist of a sample bottle filled with distilled, deionized water and set aside open to the atmosphere, during the sampling of the wells. The purpose of these trip blanks is to evaluate the potential for atmospheric contamination, and to assure that proper sample bottle preparation and handling techniques have been employed.

The samples collected from these sampling efforts will be analyzed for indicator parameters identified during the Phase I.

WATER SAMPLING PROCEDURES.

1. Open well and trip blank and record initial static water levels.

2. Wash down pump:

- For organics use hexane followed by methanol and finally distilled water

- Collect wash solvents and rinse in a bucket, etc. (a 5 gal. container w/ a large funnel works well)

- Wash pump inside and outside

3. Install pump in well: Use stainless steel pump and teflon tubing

- Each well should have its own tubing. Tubing should be cleaned and thoroughly rinsed between sampling events.

- Pump should have a check valve, preventing water having been in internal contact with the pump and the tubing from draining back into the well.

4. Pump at least two exchanges of water

- Care should be taken so as not to over pump, whereby excessive concentrations are drawn into the well. The number of exchanges pumped should be based upon the soil typed, flow patterns and aquifer properties of each well.

5. Take a sample:

- From pump discharge: Insert discharge tube to bottom of jar. Withdraw tube ahead of the sample so that aeration and turbulence is minimized.

- Some samples must be filtered in the field. This should be done prior to filling the sample container.

- For volatile organics samples should not be taken from the pump discharge. Aeration from the pump will destroy organic volatiles.

6. Immediately perform field tests such as temperature, pH, specific conductivity and D.O.

7. Refrigerate samples at $4^{o}C$.

8. Cap well and trip blank.

9. Wash all equipment.

NOTES: - The sampling procedures should reflect the sample parameters. Those parameters subject to change with changes in pH, D.O. may need to be sampled using stainless steel bailers.

- Some sample parameters require filtering in the field.

- For accountability and traceability of the samples, two forms are included which are examples of what we presently use.

EQUIPMENT BLANKS:

- Wash pump with solvents, collecting solvent rinse. Care must be taken in the selection of solvents, so damage to the pump will not occur. Rinse with distilled water.

- Take a sample of "clean" water,

- Turn on pump, sample first "slug" of water from the pump

- Pump volume equivalent to amount typically pumped from the well. DO NOT recirculate the water.

- Take sample from pump at end of pumping period

- Refrigerate samples.

APPENDIX E

QUALITY ASSURANCE

APPENDIX E

OUTLINE OF QUALITY ASSURANCE PROCEDURES

1.0 GROUND-WATER SAMPLING

1.1 General Requirements

(a) Obtain representative ground-water quality samples
  (1) Wells located properly
  (2) Sampling zone defined
  (3) Well constructed properly
  (4) Well developed properly
(b) Select sampling method in accordance with analyses of interest and well characteristics, see Figure B.1.
(c) Sampling procedures should not materially alter sample, see Figure B.2.
(d) Storage/shipment procedure must not alter sample

1.2 Procedures for Monitoring Well Development

(a) Perform prior to each sampling effort
(b) Measure water level
(c) Determine volume of water stored in casing
(d) Remove three to five volumes of water from well
  (1) Bail
  (2) Pump
(e) Insure that device does not introduce contaminants into well
(f) Measure water level recovery
(g) Sample after complete recovery
(h) Perform in-situ tests
  (1) Flow direction & velocity (Flow Meter®)
  (2) Quality (Hydrolab®)
  (3) Permeability
(i) Insure that in-place testing does not contaminate well prior to sample acquisition

1.3 Sampler Construction Material

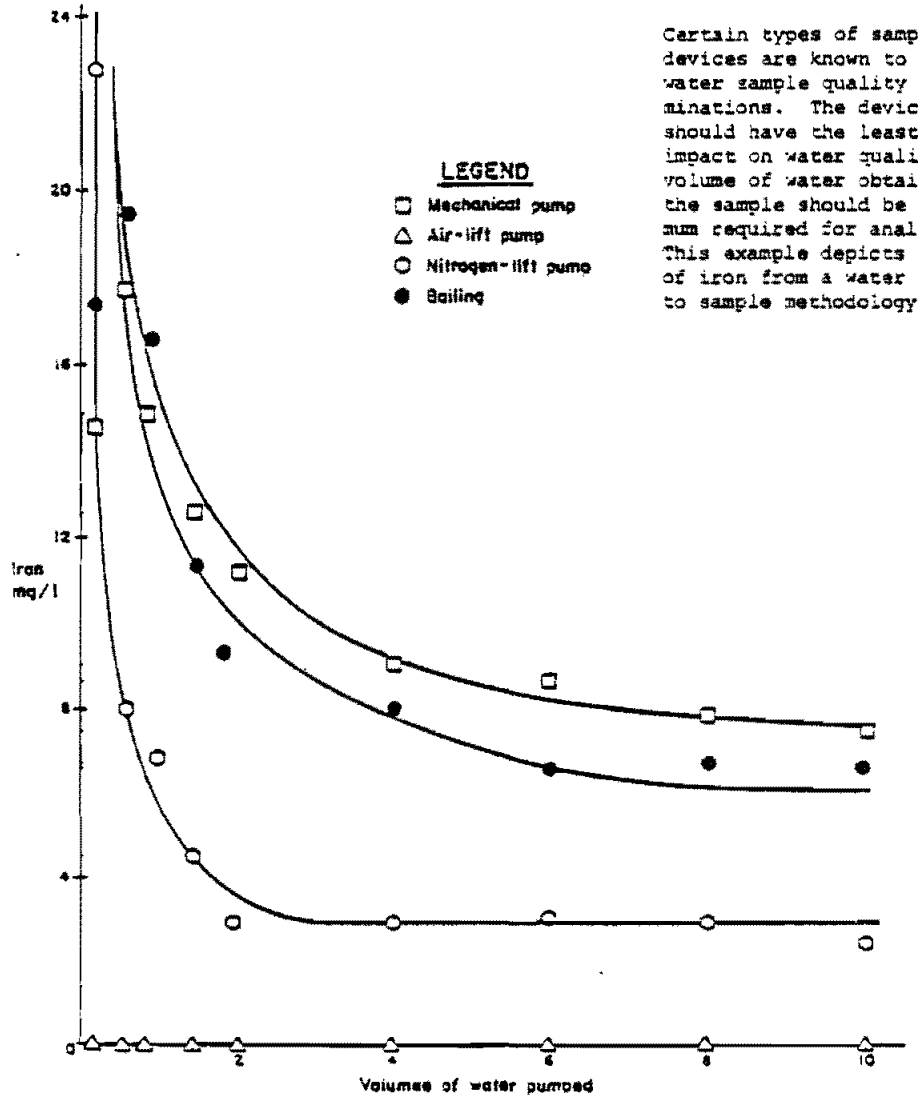
A major point to consider is the type of contaminants anticipated in the ground-water system. A sampling device should be constructed of inert materials that will not alter the trace concentrations of chemical parameters. Sampler construction materials are listed in order of preference.

Sampler Construction Materials:

(a) Glass
(b) Teflon®

FIGURE E.1

Effects of Various Sampling Methodologies on Water Quality



Certain types of sampling devices are known to impact water sample quality determinations. The device selected should have the least negative impact on water quality. The volume of water obtained for the sample should be the minimum required for analysis. This example depicts the loss of iron from a water sample due to sample methodology.

SOURCE: "Monitoring Well Sampling and Preservation Techniques," Proceedings of the Sixth Annual Research Symposium / Disposal of Hazardous Wastes, March, 1980.

FIGURE E.2

SAMPLING EQUIPMENT SELECTION

Diameter Casing	Bailer	Peristaltic Pump	Vaccum Pump	Airlift	Diaphragm "Trash" Pump	Submersible Diaphragm Pump	Submersible Electric Pump	Submersible Electric Pump w/Packer
1.25-inch								
Water level <20 ft.		X	X	X	X			
Water level >20 ft.				X				
2-inch								
Water level <20 ft.	X	X	X	X	X	X	X	
Water level >20 ft.	X			X		X	X	
4-inch								
Water level <20 ft.	X	X	X	X	X	X	X	X
Water level >20 ft.	X			X		X	X	X
6-inch								
Water level <20 ft.				X	X		X	X
Water level >20 ft.				X			X	X
8-inch								
Water level <20 ft.				X	X		X	X
Water level >20 ft.				X			X	X

(c) Stainless Steel
(d) PVC
(e) Other dense plastics

Note: Do not use rubber or synthetic rubber such as that used in packers or older bladder pumps.

1.4 Sampling

1.4.1 Typical Ground-Water Sampling Devices

(a) Bailers
  Kemmerer
  Tube
(b) Suction Lift Pump
  Peristaltic
  Hand operated diaphragm
(c) Submersible Pump
(d) Air-lift Device
(e) Tomson Pump (all glass)
(f) Gas Operated Bladder Pump
(g) Gas Driven Piston Pump
(h) Specialized Organic Material Samplers
  Grab Sampler
  Continuous Sampler
  Microbiological Sampler
  Soil-Water Sampler

Detailed discussion of the above listed sampling devices is given in the Manual of Ground-Water Sampling Procedures, pp. 45-54.

1.4.4 Specialized Organic Material Samplers

(a) Grab Sampler (at well head) for non-volatile organics may be used with peristaltic pumps (ground-water depth 20 ft)® or non-contaminating submersible pumps. A Teflon bailer may be used for volatile organic sample acquisition.

(b) Continuous Sampler (at well head) uses a peristaltic pump (shallow conditions) or a non-contaminating submersible pump to force a continuous stream of water through a fixing column using selected adsorbents to concentrate organic materials.

(c) Microbiological Sampler (at well head) uses a vacuum pumping system to draw water samples from shallow depths. Samples to be tested for microbial agents may be collected in a flask; samples to be tested for viruses of pathogenic bacteria may be collected on filters installed in the system.

(d) Soil-Water Sampler (unsaturated zone) can be used to obtain small unsaturated zone samples drawn through a collection trap in shallow applications.

A detailed discussion of these devices and their utilization is presented in the Manual of Ground-Water Sampling Procedures, pp 53-60.

1.5 Field Tests and Sample Preservation

1.5.1 Field Testing

Many parameters are relatively stable. Others such as pH, temperature, etc., will begin to alter immediately upon collection. In order to mitigate this unwanted modification of water quality, testing of sensitive parameters must be performed in the field. Testing may be performed at the well head following sample removal or in-situ by use of a Hydrolab or similar down-hole device.

Samples requiring more complicated analysis procedures must be preserved and transported to a laboratory. Preservation must be performed in the field, contingent upon analytical parameters of interest. Laboratory analyses should be performed as soon as possible in accordance with EPA Guidelines.

1.5.2 Sample Preservation

1.5.2.1 General typical preservatives currently employed, actions and applications are given:

Preservative	Action	Applicable to:
$HgCl_2$	Bacterial Inhibitor	Nitrogen forms, phosphorus forms
Acid (HNO_3)	Metals solvent, prevents precipitation	Metals
Acid (H_2SO_4)	Bacterial Inhibitor	Organic samples (COD, oil and grease, organic carbon)
	Salt formation with organic bases	Ammonia, amines
Alkali (NaOH)	Salt formation with volatile compounds	Cyanides, organic acids

Preservative	Action	Applicable to:
Refrigeration	Bacterial Inhibitor	Acidity - alkalinity, organic materials, BOD, color, odor, organic P, organic N, carbon, etc., biological organism (coliform, etc.)

1.5.2.2 Organic Parameters

The general method of preserving samples for organic analysis is to exclude air, pack in ice, and transport promptly. Specific recommendations are furnished in the Manual of Ground Water Sampling Procedures, p. 62.

1.5.2.3 Microbiological Parameters

Due to the complicated nature of this type of sampling, reference is made to the Manual of Ground-Water Sampling Procedures, p. 62.

1.5.2.4 Sampling and Preservation Requirements

The following Table B.1, presented from the Manual of Ground-Water Quality Sampling Procedures, pp 63-66, is included to provide specific collection and preservation data in accordance with the analyses of interest. It may be quickly observed that numerous variations occur in volume of sample required per test, type of container, preservative, and holding time. Preservation techniques must be chosen to be consistent with the selected analyses.

TABLE E.1.

RECOMMENDATION FOR SAMPLING AND PRESERVATION OF SAMPLES ACCORDING TO MEASUREMENT[a]

Measurement	Vol. Req. (ml)	Container[b]	Preservative	Holding Time[c]
Physical Properties				
Color	50	P, G	Cool, 4°C	24 Hrs.[d]
Conductance	100	P, G	Cool, 4°C	24 Hrs.[d]
Hardness	100	P, G	Cool, 4°C	6 Mos.[e]
			HNO_3 to pH<2	
Odor	200	G only	Cool, 4°C	24 Hrs.
pH	25	P, G	Det. on site	6 Hrs.
Residue				
Filterable	100	P, G	Cool, 4°C	7 Days
Non-Filterable	100	P, G	Cool, 4°C	7 Days
Total	100	P, G	Cool, 4°C	7 Days
Volatile	40	P, G	Cool, 4°C	7 Days
Settleable Matter	1000	P, G	None Req.	24 Hrs.
Temperature	1000	P, G	Det. on site	No Holding
Turbidity	100	P, G	Cool, 4°C	7 Days
Metals				
Dissolved	200	P, G	Filter on site	6 Mos.[e]
			HNO_3 to pH<2	
Suspended	200		Filter on site	6 Mos.
Total	100	P, G	HNO_3 to pH<2	6 Mos.[e]
Mercury				
Dissolved	100	P, G	Filter on site HNO_3 to pH<2	38 Days (Glass) 13 Days (Hard Plastic)
Total	100	P, G	HNO_3 to pH<2	38 Days (Glass) 13 Days (Hard Plastic)

TABLE 5.1 (Continued)

Measurement	Vol. Req. (ml)	Container[b]	Preservative	Holding Time[c]
Inorganics, Non-Metallics				
Acidity	100	P, G	None Req.	24 Hrs.
Alkalinity	100	P, G	Cool, 4°C	24 Hrs.
Bromide	100	P, G	Cool, 4°C	24 Hrs.
Chloride	50	P, G	None Req.	7 Days
Chlorine	200	P, G	Det. on site	No Holding
Cyanides	500	P, G	Cool, 4°C NaOH to pH 12	24 Hrs.
Fluoride	300	P, G	None Req.	7 Days
Iodide	100	P, G	Cool, 4°C	24 Hrs.
Nitrogen				
Ammonia	400	P, G	Cool, 4°C	24 Hrs.
Kjeldahl, Total	500	P, G	H_2SO_4 to pH<2 Cool, 4°C	24 Hrs.[f]
Nitrate plus Nitrite	100	P, G	H_2SO_4 to pH<2 Cool, 4°C	24 Hrs.[f]
Nitrate	100	P, G	H_2SO_4 to pH 2 Cool, 4°C	24 Hrs.
Nitrite	50	P, G	Cool, 4°C	48 Hrs.
Dissolved Oxygen				
Probe	300	G only	Det. on site	No Holding
Winkler	300	G only	Fix on site	4-8 Hrs.
Phosphorus	50	P, G	Filter on site Cool, 4°C	24 Hrs.
Ortho-phosphate, Dissolved				
Hydrolyzable	50	P, G	Cool, 4°C	24 Hrs.[f]
Total	50	P, G	H_2SO_4 to pH<2 Cool, 4°C H_2SO_4 to pH<2	24 Hrs.[f]

TABLE E.1 (Continued)

Measurement	Vol. Req. (ml)	Container[b]	Preservative	Holding Time[c]
Total, Dissolved	50	P, G	Filter on site Cool, 4°C H_2SO_4 to pH<2	24 Hrs.[f]
Silica	50	P only	Cool, 4°C	7 Days
Sulfate	50	P, G	Cool, 4°C	7 Days
Sulfide	500	P, G	2 ml zinc acetate	24 Hrs.
Sulfite	50	P, G	Det. on site	No Holding
Routine Organics				
BOD	1000	P, G	Cool, 4°C	24 Hrs.
COD	50	P, G	H_2SO_4 to pH<2	7 Days[f]
Oil & Grease	1000	G only	Cool, 4°C H_2SO_4 or HCL to pH<2	24 Hrs.
Organic Carbon	25	P, G	Cool, 4°C H_2SO_4 or HCL to pH<2	24 Hrs.
Phenolics	500	G only	Cool, 4°C H_3PO_4 to pH<4 1.0 g $CuSO_4$/l	24 Hrs.
MBAS	250	P, G	Cool, 4°C	24 Hrs.
NTA	50	P, G	Cool, 4°C	24 Hrs.

a. A general discussion on sampling of water and industrial wastewater may be found in ASTM, Part 31, p. 72-82 (1976) Method D-3370.

b. Plastic (P) or Glass (G). For metals polyethylene with a polypropylene cap (no liner) is preferred.

c. It should be pointed out that holding times listed above are recommended for properly preserved samples based on currently available data. It is recognized that for some sample types, extension of these times may be possible while for other

types, these times may be too long. Where shipping regulations prevent the use of the proper preservation technique or the holding time is exceeded, such as the case of a 24-hr composite, the final reported data for these samples should indicate the specific variance procedures.

d. If the sample is stabilized by cooling, it should be warmed to 25°C for reading, or temperature correction made and results reported at 25°C.

e. Where HNO_3 cannot be used because of shipping restrictions, the sample may be initially preserved by icing and immediately shipped to the laboratory. Upon receipt in the laboratory, the sample must be acidified to a pH <2 with HNO_3 (normally 3 ml 1:1 HNO_3/liter is sufficient). At the time of analysis, the sample container should be thoroughly rinsed with 1:1 HNO_3 and the washings added to the sample (volume correction may be required).

f. Data obtained from National Enforcement Investigations Center-Denver, Colorado, support a four-week holding time for this parameter in Sewerage Systems. (SIC 4952).

2.0 SAMPLING SUBSURFACE SOLIDS (Earth Materials)

2.1 General

The sampling and testing of earth materials may be necessary to augment a ground-water quality study as contamination typically occurs in the unsaturated zone first, before entering the saturated zone. Several reasons exist for solids testing:

(a) Study effects of alteration
(b) Determine actual extent of contamination - not just in saturated zones
(c) Obtain accurate evaluation of microbial populations that may alter pollutants
(d) Solids provide best samples of aquifer microorganisms (samples obtained from saturated zone).

2.2 Sampling Procedures

Sampling of subsurface solids may be conducted by split spoon by Standard Penetration Test (ASTM D-1586-67) equipped with non-contaminating soil sample retainer or by undisturbed methods (ASTM D-1587-67). In any event, sampling, sample extrusion, preservation, shipment and testing must be accomplished in a sterile environment.

Due to the complex nature of the task, the possibility of introducing cross-contamination and the difficulty involved in sample processing, reference is made to the Manual of Ground-Water Sampling Procedures, pp. 72-79, which provides detailed guidelines for soil sample handling.

3.0 SAMPLE RECORDS AND CHAIN-OF-CUSTODY

3.1 General

The maintenance of complete sample records is critical to the monitoring process. The following is a basic guideline for development of sample records and chain-of-custody procedures:

3.2 Sample Records

(a) Sample description--type (ground water, surface water), volume;

(b) Sample source--well number, location;

(c) Sampler's identity--chain of evidence should be maintained; each time transfer of a sample occurs, a record including signatures of parties involved in transfer should be made. (This procedures has legal significance.);

(d) Time and date of sampling;

(e) Significant weather conditions;

(f) Sample laboratory number;

(g) Pertinent well data--depth, depth to water surface, pumping schedule, and method;

(h) Sampling method--vacuum, bailer, pressure;

(i) Preservatives, (if any)--type and number (e.g., NaOH for cyanide, H_3PO and $CuSO_4$ for phenols, etc.);

(j) Sample containers--type, size, and number (e.g., three liter glass-stoppered bottles, one gallon screw-cap bottle, etc.);

(k) Reason for sampling--initial sampling of new landfill, annual sampling, quarterly sampling, special problem sampling in conjunction with contaminant discovered in nearby domestic well, etc.;

(l) Appearance of sample--color, turbidity, sediment, oil on surface, etc.;

(m) Any other information which appears to be significant--(e.g., sampled in conjunction with state, county, local regulatory authorities; samples for specific conductance value only; sampled for key indicator analysis; sampled for extended analysis; resampled following engineering corrective action, etc.);

(n) Name and location of laboratory performing analysis;

(o) Sample temperature upon sampling;

(p) Thermal preservaton--(e.g., transportation in ice chest);

(q) Analytical determinations (if any) performed in the field at the time of sampling and results obtained--(e.g., pH, temperature, dissolved oxygen, and specific conductance, etc.);

(r) Analyst's identity and affiliation.

3.3 Chain-of-Custody

(a) As few people as possible should handle the sample.

(b) Samples should be obtained by using standard field sampling techniques, if available.

(c) The chain-of-custody records should be attached to the sample container at the time the sample is collected, and should contain the following information: sample number, date and time taken, source of the sample (include type of sample and name of firm), the preservative and analysis required, name of person taking sample, and the name of witness. The prefilled side of the card should be signed, timed, and dated by the person sampling. The sample container should then be sealed, containing the regulatory agency's designation, date, and sampler's signature. The seal should cover the string or wire tie of the chain of custody record, so that the record or tag cannot be removed and the container cannot be opened without breaking the seal. The tags and seals should be filled out in legible handwriting. When transferring the possession of samples, the transferee should sign and record the date and time on the chain-of-custody record. Custody transfers, if made to a sample custodian in the field, should be recorded for each individual sample. To prevent undue proliferation of custody records, the number of custodians in the chain of possession should be as few as possible. If samples are delivered to the laboratory when appropriate personnel are not there to receive them, the samples should be locked in a designated area within the laboratory so that no one can tamper with them.

(d) Blank samples should be collected in containers, with and without preservatives, so that the laboratory analysis can be performed to show that there was no container contamination.

(e) A field book or log should be used to record field measurements and other pertinent information necessary to refresh the sampler's memory in the event he later becomes a witness in an enforcement proceeding. A separate set of field notebooks should be maintained for each survey and stored in a safe place where they can be protected and accounted for at all times. A standard format should be established to minimize field entries and should include the types of information listed above. The entries should then be signed by the field sampler. The responsibility for preparing and retaining field notebooks during and after the survey should be assigned to a survey coordinator or his designated representative.

(f) The field sampler is responsible for the care and custody of the samples collected until properly dispatched to the receiving laboratory or turned over to an assigned custodian. He must assure that each container is in his physical possession or in his view at all times or stored in a locked place where no one can tamper with it.

(g) Photographs can be taken to establish exactly where the particular samples were obtained. Written documentation on the back of the photograph should include the signature of the photographer, the time, date, and site location.

(h) Each laboratory should have a sample custodian to maintain a permanent log book in which he records for each sample the person delivering the sample, the person receiving the sample, date and time received, source of sample, sample number, method of transmittal to the lab, and a number assigned to each sample by the laboratory. A standardized format should be established for log-book entries. The custodian should insure that heat-sensitive or light-sensitive samples or other sample materials having unusual physical characteristics or requiring special handling are properly stored and maintained. Distribution of samples to laboratory personnel who are to perform analyses should be made only by the custodian. The custodian should enter into the log the laboratory sample number, time, date, and the signature of the person to whom the samples were given. Laboratory personnel should examine the seal on the container prior to opening and should be prepared to testify that their examination of the containers indicated that it had not been tampered with or opened.