REMEDIAL ACTION DESIGN
at the
LOCKPORT CITY LANDFILL

LOCKPORT (C), NIAGARA (C), NEW YORK
NYSDEC SITE No. 9-32-010

CITY OF LOCKPORT, NEW YORK

Long Term Monitoring Program

MARCH 1994

prepared by:

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LONG TERM MONITORING PLAN

CLOSURE OF LOCKPORT CITY LANDFILL
LOCKPORT, NEW YORK
NYSDEC SITE NO. 932010

Submitted to:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 WOLF ROAD
ALBANY, NEW YORK 12233

MARCH 1994

STATE OF NEW YORK
JAMES A. LANZO
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LICENSED PROFESSIONAL ENGINEER

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1.0 INTRODUCTION

The Lockport City Landfill will be closed in accordance with the Record of Decision (ROD) issued by the New York State Department of Environmental Conservation (NYSDEC), December, 1992. The ROD is based upon the findings of the Remedial Investigation/Feasibility Study (RI/FS) of the site performed 1989-1992 by URS Consultants, Inc.

The goals established in the ROD for the remedial program at this site are:

- Prevent direct contact with on-site contaminated soil/fill;
- Reduce erosion of on-site contaminated soil/fill into The Gulf; and
- Reduce infiltration through the landfill.

To achieve these goals, the remedial design selected in the ROD consists of the following components:

- Installation of a 6 NYCRR Part 360 cap over all areas of fill except the steep embankment. The cap includes a gas venting layer, a low permeability soil layer ($K \leq 1 \times 10^{-7}$ cm/sec), a barrier protection layer, and a topsoil layer;
- Excavation of the waste along the steep embankment of the western edge of the site (empty drums, trash, etc.), and placement under the cap; and
- Construction of a perimeter fence.

Installation of a low permeability soil layer will reduce infiltration of surface water into the landfill wastes. That, in turn, will reduce the potential for migration of contaminants into groundwater leaving the site. To provide information necessary to evaluate and monitor the effectiveness of that layer (i.e., reduction of the surface water infiltration through the landfill), the City of Lockport will implement a groundwater sampling and testing program as described in this document.

2.0 DEVELOPMENT OF THE MONITORING PLAN

2.1 Identification of Elements of Environmental Concern

The Baseline Health Risk Assessment prepared during the Remedial Investigation indicates that the materials contained in the landfill are believed to pose a potential threat to the groundwater through contaminant migration with infiltrating water. During the sampling program performed as part of the Remedial Investigation, only three organic chemical compounds were found in concentrations sufficient to be of concern. Those are vinyl chloride; 1,2-dichloroethene; and trichloroethene and will comprise the site-specific parameter list (SSPL).

2.2 Determination of Sampling Locations

Two of the three compounds of concern listed above (vinyl chloride and 1,2-dichloroethene) were detected in samples obtained from monitoring wells 8D and 9I and from the discharge of a 36-inch diameter concrete pipe which drains into The Gulf. Trichloroethene, the third compound, was detected in samples obtained from well 8D. Overburden wells 3~~5~~S and 9~~5~~S and well 6D showed some contamination during the Remedial Investigation.

All of these locations are considered to be downgradient from the landfill. MW-6D and MW-8D are screened in the Irondequoit formation, while MW-9I is screened in the Rockway and Grimsby formations. Contamination in flow at the various formation interfaces and near-surface bedrock fractures may be monitored at those points. The 36-inch concrete pipe was installed to carry the flow from a natural spring to the Gulf during the construction of the landfill. Samples taken at its discharge (L2) should give an indication of conditions within the landfill.

In summary, the following six sampling points are included in the long term monitoring program:

- MW-3S,
- MW-6D,
- MW-8D,
- MW-9S,
- MW-9I, and
- L-2, (a 36-inch storm sewer discharge).

Locations of the wells to be sampled are shown in Figure 1. Boring logs will be found in Appendix A.

2.3 Sampling Frequency

During the initial semi-annual sampling event, samples will be obtained from monitoring wells, MW-3S, MW-6D, MW-8D, MW-9S, and MW-9I, and from the discharge of the 36-inch diameter pipe, L-2. Upgradient wells MW-1S and MW-8I will be maintained but not sampled unless there is an unexplained increase in contamination at one or more of the routinely sampling points. After the initial sampling event, the sampling frequency will be decreased to annually. [Any subsequent increase or decrease in sampling frequency will be based on the evaluation of the available data obtained during the long term monitoring program. The sampling frequency will only be revised in consultation between NYSDEC and the City of Lockport.]

2.4 Action Levels

Concentrations at which SSPL compounds are detected during long term monitoring may initially be above those detected during the Remedial Investigation without implying a failure in the remedial program. That is due primarily to variability inherent in sampling and analysis but may also come from other (e.g. seasonal) factors. To allow for that variability, action levels are established as concentrations twice that of the highest contaminant levels observed during the Remedial Investigation as shown in Table 1. Over the long term, however, contaminant loadings are expected to steadily decrease. Once that trend is established, action levels will change to twice the value of a moving average of the previous three sampling results.

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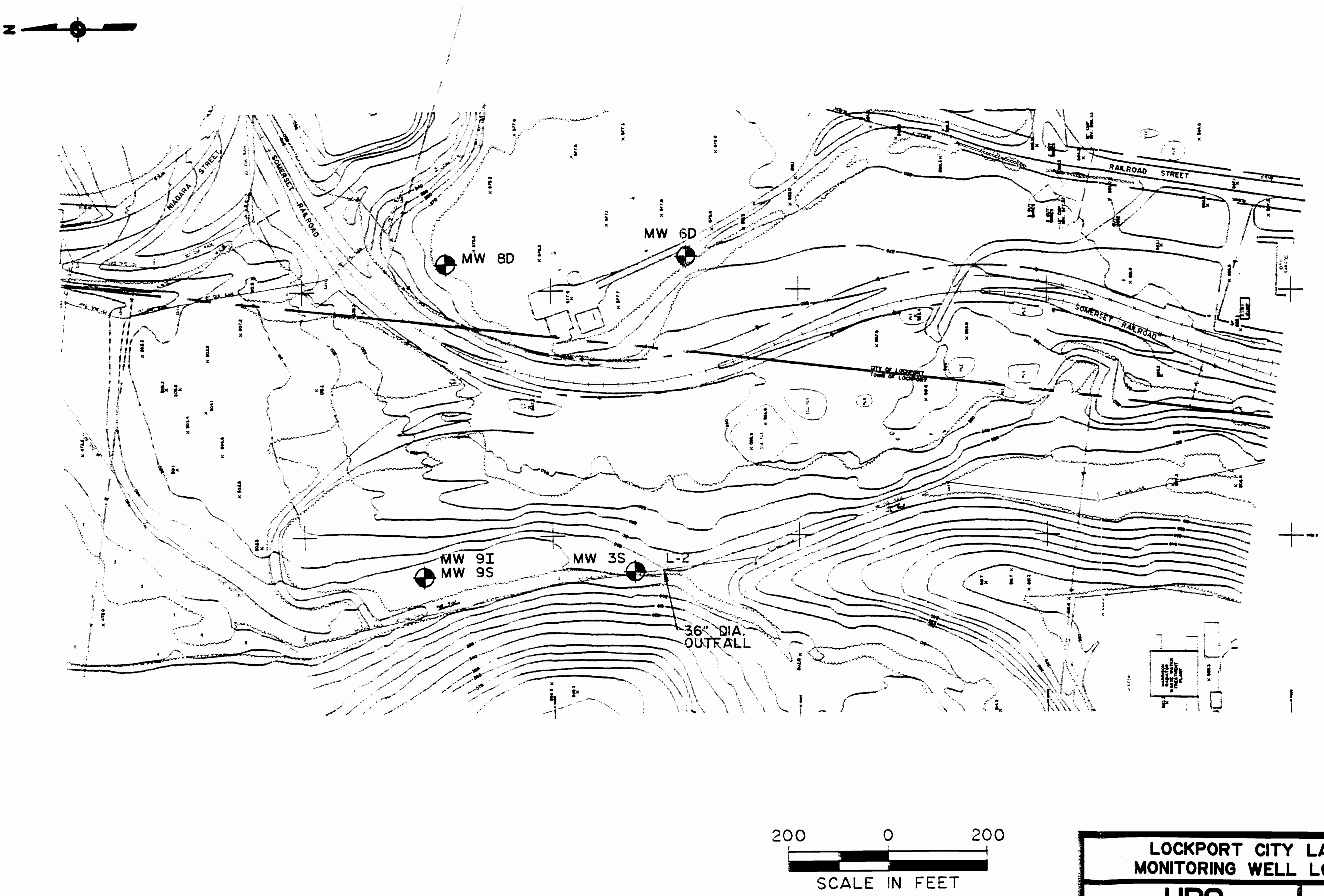


LOCKPORT CITY LANDFILL
MONITORING WELL LOCATIONS

URS
CONSULTANTS, INC.

FIGURE 1

CC-2628

TABLE 1

Sample Location	Contaminant	Max RI Level	Action Level
MW-8D	Vinyl chloride 1,2-dichloroethene trichloroethene	81 790 130	162 1580 260
MW-9I	Vinyl chloride 1,2 dichloroethene	12 21	24 42
L-2	Vinyl chloride 1,2 dichloroethene	47 140	94 280

Note: All values in mg/L (ppb)

In the event that action level concentrations are obtained at one or more sampling locations, contingency sampling will be instituted as described in Section 4. Elevated concentrations in MW-3S; MW-6D, or MW-9S will be discussed with NYSDEC to determine the need for further action.

3.0 METHODOLOGY

3.1 Quality Assurance Project Plan

A Quality Assurance Project Plan including data audit procedures, is included as Appendix B.

3.2 Field Sampling Plan

A Field Sampling Plan is included as Appendix C.

3.3 Reporting Requirements

A report detailing the results obtained from each sampling event will be submitted for review by NYSDEC at the conclusion of each round of sampling. That report will include:

- Analytical results
- Groundwater elevations and other pertinent field observations;
- Field sampling logs, including purging methods, description of sampling equipment, and field parameter measurements;
- Discussion of results; and
- Analysis of causes of unexpected results, if any, and proposed actions.

4.0 CONTINGENT SAMPLING

4.1 Determination of Need for Contingent Sampling

In the event that an SSPL concentration detected during a sampling event exceeds the established action level concentration shown in Table 1, contingent sampling will be required to confirm, and aid in determination of probable cause for, the exceedance.

4.2 Contingent Sampling Locations

As discussed in Section 2.2, hydrogeologic flow at this site is complex and variable, however, the use of the upgradient (background) wells selected could provide considerable insight into the possibility of horizontal infiltration of contaminants from off-site locations. Therefore, after consultation with NYSDEC a sample from MW-1S and from MW-8I will be taken. All samples will be analyzed for parameters as shown in Appendix B.

4.3 Contingent Sample Frequency

Contingent sampling is performed to aid in the determination of the cause of an action level exceedance and, in many cases, to aid in selection of a remedy. The frequency and duration of contingent sampling will be a subject for discussion between the City of Lockport and NYSDEC.

APPENDIX A
BORING LOGS

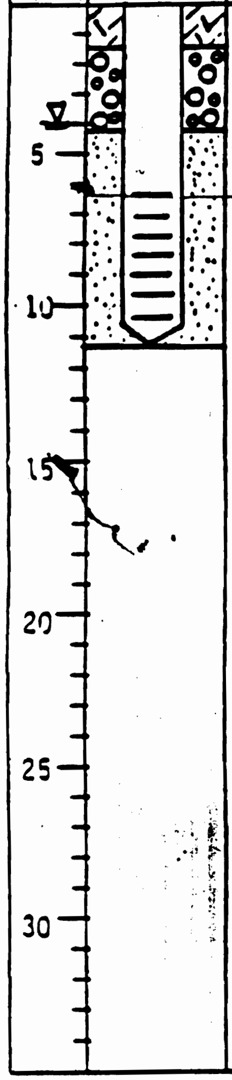
'/T872

RENAMED MW-1S

DATE STARTED 6/21/84 DATE FINISHED 6/21/84 SHEET 1 OF 1	RECRA RESEARCH, INC. SUBSURFACE LOG	HOLE NO. MW-1 SURFACE ELEV. 580.6 G.W. DEPTH 577.12

PROJECT NYS DEC Superfund Phase II
Project #2EM84001.3000

LOCATION Lockport City Landfill
Lockport, New York
130' Southeast of intersection of
Oakhurst and Railroad Streets



DEPTH (ft)	SAMPLE TYPE	SAMPLE #	BLOWS ON SAMPLER 0–6 / 12–18	BLOWS ON SAMPLER 6–12 / 18–24	DESCRIPTION	NOTES
			6	8	Mottled Brown/black silty sandy CLAY, dry, organic at top	Boring advanced with 3 3/4 inch hollow stem auger trailer mounted CME 45-C drill rig
			12	28		SS-1 retained for chemical analysis
5					Coarse gravelly CLAY, saturated	
					Top of bedrock 6.2 ft. Dark grey, aphanitic, limestone, bedding planes approximately 90° to core axis	NX Coring 6.2 -11.2 ft Recovery = 4.5 ft. = 90% RQD = 37%

CLASSIFICATION Field Visual (ASTM D - 2488-69)
METHOD OF INVESTIGATION Trailer mounted CME-45C Rig
(ASTM D-1586, D-2113-70)

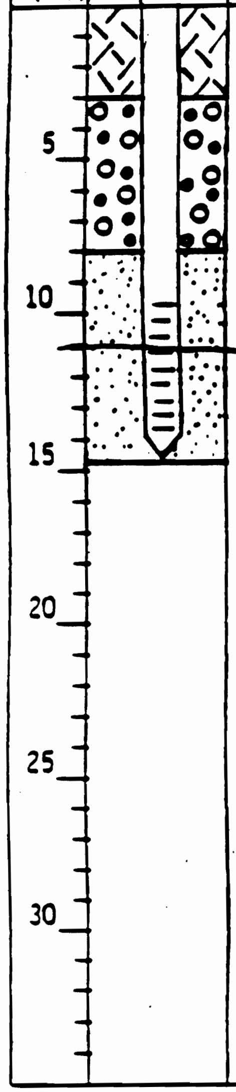
872

RENAMED MW-3S

DATE STARTED 7/17/84 DATE FINISHED 7/18/84 SHEET 1 OF 1	RECRA RESEARCH, INC. SUBSURFACE LOG	HOLE NO. MW-3A SURFACE ELEV. 486.32 G.W. DEPTH 486.69

PROJECT NYS DEC Superfund Phase II
Project #2EM84001.3000

LOCATION Lockport City Landfill
Lockport, New York
10' North of MW-3



DEPTH (ft)	SAMPLE	TYPE	SAMPLE #	BLOWS ON SAMPLER 0-6 / 12-18	BLOWS ON SAMPLER 6-12 / 18-24	DESCRIPTION	NOTES
0						No samples taken, see description for MW-3 WL .37' Above GS	
11.5						Top of BEDROCK 11.5 ft. grey limestone, clay seams at 13.5 ft., broken	NX Coring 11.5-16.5 ft Recovery - 3 ft = 60% RQD = 8%

CLASSIFICATION Field Visual (ASTM D-2488-69)
METHOD OF INVESTIGATION ATV mounted rig CME-45C
(ASTM D-1586, D-2113-70)

URS CONSULTANTS, Inc. **MAKING TECHNOLOGY WORK**	**TEST BORING LOG** **BORING NO.** MW 6D
PROJECT: LockPort LANDFill	**SHEET NO.** 1 OF 3
CLIENT: City of LockPort	**JOB NO. :** 35180
BORING CONTRACTOR: BuFFAlo Drilling	**ELEVATION:** 578.8

GROUND WATER:					**CAS.**	**SAMP**	**CORE**	**TUBE**	
DATE	**TIME**	**LEV**	**TYPE**	**TYPE**	DIP	SS	HX		**DATE STARTED:** 1/17/90
2/14/90	2:30pm	68.10	Core hole	**DIA.**	6"	2"	4"		**DATE FINISHED:** 2/14/90
			Completion	**WT.**		140lb			**DRILLER:** K. Krieger
				FALL		30"			**DRILL RIG:** DiEDRich D-50
				• POCKET PENETROMETER READING					**GEOLOGIST:** D. SHELDON / R. WEST

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"		RECOVERY RQD *	DESCRIPTION COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	REMARKS
		S-1	SS	3 3	3 5	40	RED BRN ↓ TAN	MED STIFF	SilTY ClAY, MoTTlED DRY AND Fissile	CL	Tr. SAND, organics Sl. Moist
		S-2	SS	5 32	20 50	45	GRAY	HARD	↓	↓	
		S-3	SS	47	100/3	20	↓	↓	↓	↓	Some Angular Gravel 5-14.0'.
		S-4	SS	36 100/4	65	35	↓	↓	↓	↓	
		S-5	SS	44	100/4	15	Lt. BRN	↓	↓	↓	
		S-6	SS	44	100/4	10	↓	↓	↓	↓	
14.0		S-7	SS	31	100/5	15	↓	↓	↓	↓	
		S-8	SS	100/3		<5	GRAY	MED SOFT	WEATHERED SHALE, SOME ClAY	V.Br.	WET
18.0		S-9	SS	100/1		<5	↓	↓	↓	↓	WET
		RC-1	RC			REC ↓ 96/20 ↑ RQD	D.GRAY	MED HARD	RocHESTER SHAlE	V.Br.	Auger Refusal At 18' WEll Fractured 18.0-22.0' Becomes more competent
29.0		RC-2	RC			REC ↓ 100/80 ↑ RQD	↓	↓	↓	↓	WEATHERED Fractures at 24.4' AND 25.3' Bioherms 28.3-29.0'.
									Continued on NEXT PAGE		Drilling Note: HARD AUGERING. Difficult pulling AUGERS.

COMMENTS BAcKGround BoRing

PROJECT NO. 35180

BORING NO. MW 6D

URS CONSULTANTS, Inc. **MAKING TECHNOLOGY WORK**	**TEST BORING LOG** **BORING NO.** MM 6D
PROJECT: LockPort Landfill	**SHEET NO.** 2 **OF** 3
CLIENT: City of LockPort	**JOB NO. :** 35180
BORING CONTRACTOR:	**ELEVATION:**

GROUND WATER:					CAS.	SAMP	CORE	TUBE	DATE STARTED:
DATE	TIME	LEV	TYPE	TYPE					DATE FINISHED:
				DIA.					DRILLER:
				WT.					DRILL RIG:
				FALL					GEOLOGIST:
				* POCKET PENETROMETER READING					

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	SAMPLE BLOWS PER 6"	SAMPLE RECOVERY RQD %	DESCRIPTION COLOR	DESCRIPTION CONSISTENCY HARDNESS	DESCRIPTION MATERIAL DESCRIPTION	DESCRIPTION CLASS USCS	REMARKS
29.0		RC-3	RC		REC ↓ 95/35 ↑ RQD	D. GRAY	MED HARD	Rochester Shale	BR	Well Fractured 29-34.0' Predominant Bio-Herms 29-33.7' Very Fossiliferous 33-39' Trilobites and Mullusks.
39.0		RC-4	RC		REC ↓ 97/43 ↑ RQD	↓	↓	↓	↓	Well Fracture
49.0		RC-5	RC		REC ↓ 87/34 ↑ RQD	↓	↓	↓	↓	BioHerms 476-49.0' BioHerms 50.7-53.2'
59.0										

Continued on Next Page

COMMENTS

PROJECT NO. 35180
BORING NO. MW 6D

URS CONSULTANTS, Inc. **MAKING TECHNOLOGY WORK**	**TEST BORING LOG** **BORING NO.** MW 6D
PROJECT: LockPort Landfill	**SHEET NO.** 3 **OF** 3
CLIENT: City of LockPort	**JOB NO. :** 35180
BORING CONTRACTOR:	**ELEVATION:**

GROUND WATER:					CAS.	SAMP	CORE	TUBE	
DATE	TIME	LEV	TYPE	TYPE					DATE STARTED:
				DIA.					DATE FINISHED:
				WT.					DRILLER:
				FALL					DRILL RIG:
				* POCKET PENETROMETER READING					GEOLOGIST:

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	REMARKS
59.0		RC-6	RC		REC 93 / 52 RQD	D. GRAY	MED HARD	ROCHESTER SHALE	BR	MORE Competent Interval. Minor Fractures 60', 62' AND 65.5' BioHERMS 67-69'
69.0										Highly Fossiliferous 69-71.8'
71.8		RC-7	RC		REC 94 / 45 RQD	TAN GRAY	HARD	IRONDEQUOIT LIMESTONE		Top of Limestone 71.8' Total loss of coring water 72.4' - END of Hole
77.3		RC-8	RC		REC 56 / 36 RQD					WEll Fractured at 80.5' SHALE SEAM AND Fractures 84.9-85.1'
86.6	BOH									

COMMENTS

PROJECT NO. 35180

BORING NO. MW6D

URS CONSULTANTS, Inc.
MAKING TECHNOLOGY WORK

TEST BORING LOG
BORING NO. MW 8I

PROJECT: LockPort LandFill	SHEET NO. 1 OF 1
CLIENT: City of LockPort	JOB NO. : 35180
BORING CONTRACTOR: BuFFalo Drilling	ELEVATION: 574.4

GROUND WATER:					CAS.	SAMP	CORE	TUBE	
DATE	TIME	LEV	TYPE	TYPE	DIP	SS	HX		DATE STARTED: 1/19/90
1/22/90	9:45 Am	17.7	B.H. (62 hr.)	DIA.	6"	3"	4"		DATE FINISHED: 2/8/90
2/7/90	1:50 Pm	17.5'	CoreHole	WT.		140lb			DRILLER: K. KRIEGER
			Completion (0 hr.)	FALL		30"			DRILL RIG: DiEDRicH D-50
				* POCKET PENETROMETER READING					GEOLOGIST: RON TRAMPOSCH

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"		RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	REMARKS
									SEE MW 8D BORING LOG For OverburDEN Description		
19.0		RC-1	RC			REC 88/0 RQD	D. GRAY	MED HARD	ROCHESTER SHALE	V. Br.	Fossiliferous VERTical Fracture At 23.5'
23.5		RC-2	RC			REC 100/0 RQD					
27.5		RC-3	RC			REC 75/25 RQD					
31.5		RC-4	RC			REC 100/60 RQD				BR.	
34.5	BOH										

COMMENTS BackGround Boring. Environmental sample taken on the 2-4' interval.

PROJECT NO. 35180
BORING NO. MW 8I

URS CONSULTANTS, Inc.
MAKING TECHNOLOGY WORK

TEST BORING LOG	
BORING NO.	MW 8D
PROJECT:	Lockport Landfill
CLIENT:	City of Lockport
BORING CONTRACTOR:	Buffalo Drilling
SHEET NO.	1 OF 4
JOB NO.:	35180
ELEVATION:	574.3
DATE STARTED:	1/18/90
DATE FINISHED:	1/30/90
DRILLER:	K. Krieger
DRILL RIG:	Diedrich D-50
GEOLOGIST:	D. Sheldon / R. West

GROUND WATER:

DATE	TIME	LEV	TYPE
2/6		64.5'	Corehole completion

	CAS.	SAMP	CORE	TUBE
TYPE	DIP	SS	NX/HX	
DIA.	6"	2"	3"/4"	
WT.		140 lb.		
FALL		30"		

• POCKET PENETROMETER READING

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	REMARKS
		S-1	SS	3 6 17 44	90	TAN GRAY	HARD	Silty Clay, Dense. Fissured	CL	Mottled, trace Gravel, organics.
		S-2	SS	16 41 60 75	80					DRY
		S-3	SS	23 43 49 75	80					Tr. Gravel, DRY Mottled
		S-4	SS	24 48 66 100/5	85					DRY tr. root material
		S-5	SS	28 53 100/5	90	Lt. BRN				DRY
		S-6	SS	20 36 35 56	85					Mottled, Sl. moist D. BRN. Organics
		S-7	SS	19 37 65 81	95					Sl. Moist. Fossils at 13' Tr. Organics
		S-8	SS	24 100 50/3	95	BRN				DENSE, Sl. moist
		S-9	SS	14 33 100/4	90					WET, some rock Frags - Shale
12.5		S-10	SS	100/3	5	GRAY	MED SOFT	WEATHERED Shale Tr. clay	UBR	Shale Frags, silt.
13.6		RC-1	RC		REC 59/0 RQD	D GRAY	MED HARD	Rochester SHALE	V. BR.	
27.0										

Continued on Next Page

Drilling Notes: Run#1 cored very easily. excessive barrel wobble.

COMMENTS BackGround Boring.

PROJECT NO. 35180
BORING NO. MW 8D

URS CONSULTANTS, Inc.
MAKING TECHNOLOGY WORK

TEST BORING LOG
BORING NO. MW 8D

PROJECT: LockPort Landfill
CLIENT: City of LockPort
BORING CONTRACTOR:

SHEET NO. 2 **OF** 4
JOB NO. : 35180
ELEVATION:
DATE STARTED:
DATE FINISHED:
DRILLER:
DRILL RIG:
GEOLOGIST:

GROUND WATER:

DATE	TIME	LEV	TYPE

	CAS.	SAMP	CORE	TUBE
TYPE				
DIA.				
WT.				
FALL				

* POCKET PENETROMETER READING

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	REMARKS
27.0		RC-2	RC		REC ↓ 100/50 ↑ RQD	D. Gray ↓	Med Hard ↓	Rochester Shale ↓	BR. ↓	BioHerms 27-28'; 29-30.5' Weathered Fractures 27-28'; 23.9' and 35.3'
37.0		RC-3	RC		REC ↓ 95/36 ↑ RQD					BioHerms throughout Run #3. Fractures 38.3-39.2'
47.0		RC-4	RC		REC ↓ 100/40 ↑ RQD					BioHerms throughout Run #4. Weathered Fracture at 54.2'
57.0								Continued on Next Page		Drilling Notes: Return water From Run #4 thick with Fines. Coring water had to be changed at 53.8'

COMMENTS

PROJECT NO. 35180
BORING NO. MW 8D

URS CONSULTANTS, Inc.
MAKING TECHNOLOGY WORK

TEST BORING LOG	
BORING NO.	MW 8D
PROJECT: LockPort LANDFill	**SHEET NO.** 3 **OF** 4
CLIENT: City of LockPorT	**JOB NO. :** 35180
BORING CONTRACTOR: BuFFalo Drilling	**ELEVATION:**
GROUND WATER:	**DATE STARTED:**
	DATE FINISHED:
	DRILLER:
	DRILL RIG:
	GEOLOGIST:

DATE	TIME	LEV	TYPE		CAS.	SAMP	CORE	TUBE
				TYPE				
				DIA.				
				WT.				
				FALL				

* POCKET PENETROMETER READING

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	REMARKS
57						D GRAY ↓	MED. HARD ↓	ROCHESTER SHALE ↓	BR	EXtENSiVE Bio-HERMS + weathERED FrActures 58.5-59.1'
59.5		RC-5	RC		REC ↓ 86/8 ↑ RQD	H.GRAY / tAN	HARD	IrONDEQUOIT Limestone		Top of Limestone at 59.5' VERtical FrActures 59.8-61.2' WELL FRactured 66-67.4' Competent 67.4-75.5'
65.5		RC-6	RC		REC ↓ 63/52 ↑ RQD					
75.5						↓	↓	↓		
77.0		RC-7	RC		REC ↓ 97/88 ↑ RQD.	D.GREEN / Bl-GRAY	MED HARD	RockAwAY Dolostone		77.0', Top of Dolostone SHAlE PARTINGS AND VUGS typical in ROCKAWAY Dolostone. Sugary texture to weathered Surfaces.
85.5						↓	↓	↓	↓	Drilling notES: CHANGED to A 3" core bit at StART ON RUN #6. Run #6 cored Very EAsily.

Continued on NEXT PAGE

COMMENTS

PROJECT NO. 35180
BORING NO. MW 8D

URS CONSULTANTS, Inc. **MAKING TECHNOLOGY WORK**	**TEST BORING LOG** **BORING NO.** MW 8D
PROJECT: Lockport Landfill	**SHEET NO.** 4 **OF** 4
CLIENT: City of Lockport	**JOB NO. :** 35180
BORING CONTRACTOR: Buffalo Drilling	**ELEVATION:**

GROUND WATER:					**CAS.**	**SAMP**	**CORE**	**TUBE**	**DATE STARTED:**
DATE	**TIME**	**LEV**	**TYPE**	**TYPE**					**DATE FINISHED:**
				DIA.					**DRILLER:**
				WT.					**DRILL RIG:**
				FALL					**GEOLOGIST:**
				• POCKET PENETROMETER READING					

DEPTH FT	STRATA	SAMPLE NO.	SAMPLE TYPE	BLOWS PER 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	REMARKS
85.5		RC-8	RC		Rec ↓ 96/54 ↑ RQD	Blue Gray ↓	MED HARD ↓	Rockaway Dolostone ↓	BR ↓	
89.6						D.Gray D Blue ↓		Limestone (Merritton or Hickory Corners) ↓		Top of Limestone 89.6' Fractures at 90.0'
95.5		RC-9	RC		Rec ↓ 90/53 ↑ RQD	Lt. Green ↓		Neahga Shale ↓		Neahga Shale 96.5-98.2'
96.2										
98.2						Green Red ↓		Grimsby Sandstone ↓		Top of Sandstone at 98.2' Fractures at 104.0-104.2'
105.5		RC-10	RC		Rec ↓ 100/31 ↑ RQD					Run #10 well fractured. Fine sand on fractured surfaces.
113.0	BOH									

COMMENTS

PROJECT NO. 35180
BORING NO. MW 8D

URS CONSULTANTS, Inc.
MAKING TECHNOLOGY WORK

TEST BORING LOG
BORING NO. MW 9I

PROJECT: Lockport Landfill
CLIENT: City of Lockport
BORING CONTRACTOR: Buffalo Drilling

SHEET NO. 1 **OF** 1
JOB NO. : 35180
ELEVATION: 484.1
DATE STARTED: 1/4/90
DATE FINISHED: 1/10/90
DRILLER: M. Gerstung
DRILL RIG: Mobile B34S
GEOLOGIST: R. Tramposch

GROUND WATER:					CAS.	SAMP	CORE	TUBE
DATE	TIME	LEV	TYPE	TYPE	DIP	SS	NX	
1/11/90		4.5'	Corehole Completion (14 hr.)	DIA.	6"	2"	3"	
				WT.		140lb.		
				FALL		30"		
				• POCKET PENETROMETER READING				

DEPTH FT	STRATA	SAMPLE					DESCRIPTION				REMARKS
		NO.	TYPE	BLOWS PER 6"		RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	
		S-1	SS	4 3	4 7	50	TAN BRN ↓ BLK	MED STIFF ↓	Silty Clay, some Sand ↓	CL ↓	
		S-2	SS	WH 2	3 2	25		SOFT ↓ STIFF	Black Organic Layer, wood chips. Some silt + sand ↓	Pt ↓	Water at 30'
		S-3	SS	2 17	11 15	40			Sandy silt, some Gravel ↓	GM	
		S-4	SS	5 9	6 8	50	BLK. BRN ↓				
9.5		S-5	SS	15 95/3	116	35	BRN	HARD	Clayey silt, some sand and gravel	↓	
12.8		RC-1	RC			REC 65 / 30 RQD	Lt GRAY D. GRAY ↓ BRN	MED HARD ↓ HARD	MED. Grained Limestone grading down to Aphinitic Dolostone Numerous Fractures. Sand, Gravel + Clay in lower Portion	V.BR ↓	9.5-10.5's white colored return water 10.5'-19.5'; Brown Return Water.
14.5		RC-2	RC			REC 0 / 0 RQD	↓	↓	Sand, Gravel - Coarse grained, sub angular ↓	GW ↓	
16.5		S-6	SS	100/5		12					
		S-7	SS	[illegible]	[illegible]	0					
19.5		RC-3	RC			REC 80 / 80 RQD	D. GRAY D. GRN.	MED HARD ↓	Rockaway Dolostone ↓	V.BR ↓	Gravel 18.0-18.5'
20.9		RC-4	RC			36 / 0					
24.5		RC-5	RC			REC 77 / 20 RQD	↓ Lt. GRN.	SOFT ↓ MED HARD	Neahga Shale ↓ Grimsby Sandstone	↓	
	BOH										

COMMENTS

PROJECT NO. 35180
BORING NO. MW 9I

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN

(QAPP)

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APPENDICES

B1.0 INTRODUCTION

The Quality Assurance Project Plan (QAPP) is designed to provide an overview of quality assurance and control procedures and programs which will be adhered to during the Long Term Monitoring Program described in the Work Plan. It will give specific methods and Quality Assurance/Quality Control (QA/QC) procedures for chemical testing of environmental samples obtained from the site. The QAPP will help ensure the quality and ultimate defensibility of data produced.

B1.1 Project QA/QC Objectives

The project QA/QC objectives for all tasks performed and data collected during the Long Term Monitoring Program are stated below:

1) That the highest possible scientific/professional standards for each task and/or procedure be maintained.

2) That all data collected meet or exceed the referenced guidelines and requirements developed and/or approved by USEPA, NYSDEC, or Standard Scientific Methods.

3) That the ultimate defensibility of the data produced during the Long Term Monitoring Program be assured.

These objectives will be attained by strict adherence to the Work Plan, QAPP, FSP, and HASP, as well as by utilizing trained and experienced personnel to perform all tasks. Specific QA/QC objectives of the various program elements are discussed in the following sections.

B1.2 QA/QC for Environmental Sampling

The project QA/QC goals will be attained for the collection of environmental samples by strict compliance with the sampling methods as specified in the Field Sampling Plan. Only trained personnel, after consultation with the Project Manager and/or onsite coordinator, will carry out these sampling procedures. QA/QC will also be assured by the use of appropriate containers and preservatives as listed in Table B1-1. All samples will be held under proper chain-of-custody and be controlled by appropriate labels/paperwork (Section B4.0).

Initially, groundwater and surface water (outfall) samples will be analyzed for Schedule B (baseline) parameters only, as specified in Table B1-2, then all subsequent sampling (semi-annual for first year and then once a year for five years) will be analyzed for Schedule A only.

B1.3 Methods for Chemical Measurement

To achieve the previously stated QA/QC goals, most of the chemical analyses, as listed in Table B1-2, will be performed in accordance with the NYSDEC Analytical Services Protocol (ASP) September 1989, 12/91 Revisions (or latest publication) which meets or exceeds USEPA CLP protocols. The NYSDEC ASP requires very strict QA/QC procedures which will be followed on all water samples collected and analyzed for the parameters listed in Table B1-2.

Only one field parameter (i.e., redox potential) will be performed using non-ASP methodologies. However, the chemical analyses (Schedule B on Table B1-2) will be performed using USEPA acceptable methodologies as presented in the table. QA/QC goals are also achieved by the use of the required number of field and laboratory quality control samples as indicated on Table B1-3. The definitions of each QC sample type are found in Section B2.1.

Dilutions may only be performed in order to bring the concentration of a specific analyte within linear range of quantification. All volatile analyses must be completed within 7 days of validated time of sample receipt (VTSR) at the laboratory (IEA, Inc.). Prior to any deviation being made to the above-referenced analytical protocols, the NYSDEC QA/QC officer must be notified, and documentation must follow defining those deviations and their reasons.

B1.4 QA/QC Objectives for Chemical Measurement

The QA/QC objectives for chemical measurement consist of five (5) components: precision, accuracy, sensitivity, representativeness, and comparability. Each of these

TABLE B1-1
SAMPLE BOTTLE REQUIREMENTS

Parameters (Schedule A Waters)	Containers/ Sample	Size	Type*	Cap**	Preservation
TCL Volatiles	2	40 ml.	2 (VOA)	2 (Septum)	Cool 4°C
Group Parameter (Schedule B Waters)					
1 Purgeable Halocarbons	2	40 ml.	2 (VOA)	2(Septum)	Cool 4°C
Purgeable Aromatics	2	40 ml.	2(VOA)	2(Septum)	Cool 4° C
Metals (Total)	2	1000 ml.	1	1	HNO_3 to pH <2
Cyanide	1	1000 ml.	1	1	Cool 4°C, NaOH to pH >12, 0.6g Ascorbic Acid
2 BOD$_5$ Sulfate Total Dissolved Solids Alkalinity Chloride Turbidity Color Hexavalent Chromium	1	2000 ml.	1	1	Cool 4°C
3 COD TOC Ammonia-Nitrogen TKN Nitrate-Nitrogen Total Phenols	2	1000 ml.	1	1	Cool 4°C, H_2SO_4 to pH <2
4 Hardness	1	250 ml.	1	1	Cool 4°C, HNO_3 to pH <2

*	Bottle type	**	Cap liner
1 =	Polyethylene	1 =	Polyethylene
2 =	Glass	2 =	Teflon

TABLE B1-2
ANALYTICAL SCHEDULES AND METHOD REFERENCES

Parameters	Document/Method No.	Reference
Schedule A (Groundwater)		
Target Compound List (TCL) Volatiles	91-1	1
Schedule B Baseline (Surface Water)		
Purgeable Halocarbons	601	1
Purgeable Aromatics	602	1
Total Metals:	200.7/206.2/239.2/ 270.2/279.2	1
Aluminum Antimony Arsenic Barium Beryllium Boron Cadmium Calcium Chromium Copper Iron Lead Magnesium Manganese Mercury Nickel Potassium Selenium Silver Sodium Thallium Zinc		
Total Cyanide	335.2	1
Total Phenols	420.1	1
Alkalinity	310.1	1
Ammonia - Nitrogen	350.3	1
BOD_5	405.1	1
Chloride	325.3	1
Color	110.1	1
COD	410.1	1
Hardness as $CaCO_3$	130.2	1
Hexavalent Chromium	218.4	1
Nitrate - Nitrogen	352.1	1
Sulfate	375.4	1
TDS	160.1	1
TKN	351.4	1

TABLE B1-2
ANALYTICAL SCHEDULES AND METHOD REFERENCES

Parameters	Document/Method No.	Reference
Schedule B (Waters) - Continued		
TOC	415.1	1
Turbidity	180.1	1
Specific Conductance (field)	120.1	1
pH (field)	150.1	1
Redox Potential (field)	D1498	2
Dissolved Oxygen (field)	360.1	1
Temperature (field)	170.1	1

References

1. New York State Department of Environmental Conservation Analytical Services Protocol - September 1989, 12/91 Revisions.

2. American Society of Testing Materials; Section 11 Water and Environmental Technology ASTM, 1989.

TABLE B1-3

SAMPLES AND REQUIRED ANALYSIS

Environmental Samples

Matrix	**Number of Samples**	**Analytical Schedules (Table B1-2)**
Groundwater (Well)	35	A
	5	B
Surface Water (Outfall)	7	A
	1	B
Field QC Samples		
Groundwater and Surface Water		
Trip Blank	7	A
Laboratory QC		
Groundwater (Well)		
Matrix Spike	7	A
Matrix Spile Duplicate	7	A
Surface Water (Outfall)		
Matrix Spike	1	A,B
Matrix Spike Duplicate	1	A ,B (VOA only)
Matrix Duplicate	1	B (no VOA)

laboratory/project objectives, as defined below, are designed to assure the data user that proper QA/QC procedures have been implemented. It should be noted that each component is not evaluated separately, instead all are assessed in conjunction with each other to determine the overall acceptability of the analytical results.

- Precision - The laboratory objective for precision is to equal or exceed the precision demonstrated for the applied analytical methods on samples of the same matrix. For this investigation, precision is evaluated using analyses of laboratory matrix duplicate/matrix spike/matrix spike duplicates, which not only exhibit sampling and analytical precision, but also the reproducibility of the analytical results. Relative Percent Difference (RPD) criteria, published by the NYSDEC as part of ASP, and those determined from laboratory performance data, are used to evaluate precision employing matrix duplicate/matrix spike/matrix spike duplicates.

- Accuracy - The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical methods on samples of the same matrix. Percent recovery criteria, published by the NYSDEC as part of ASP and those determined from laboratory performance data, are used to estimate accuracy based on recovery in the matrix spike and matrix spike duplicate samples. The spike and spike duplicate will give an indication of matrix effects that may be affecting the target compounds, and also are a good gauge of method efficiency.

- Sensitivity - The sensitivity or detection limits that are required for each analysis are those specified by NYSDEC as part of the ASP document. Before any field samples are analyzed under this protocol, the instrument detection limits must be determined by the laboratory for each instrument used. Actual instrument detection limits may be somewhat lower than those required by the ASP protocol. Detection limits for water quality analyses (Schedule B, Table B1-3) will be the published method detection limits (MDLs) for each analytical method. It should be noted that detection limits are highly matrix-dependent and may not always be achievable.

- Representativeness - Representativeness expresses the degree to which data accurately and precisely represent the environmental condition, characteristics of a population, parameter variations at a sampling point, or a process condition. The representativeness of the data from the site depends on the sampling procedures. The sampling procedures, as described in the FSP, have been designed with the goal of obtaining representative samples for each of the different matrices: groundwater and surface water (outfall).

  Representativeness of the analytical data is also a function of the procedures used in processing the samples. Representativeness may be determined for this objective by a comparison of the quality control data for these samples against other data for similar samples analyzed at the same time.

- Comparability - Analytical results are comparable to results of other laboratories because of the following procedures/programs: instrument standards traceable to National Institute of Standards and Technology (NIST) or USEPA sources; the use of standard methodology; reporting results from similar matrices in consistent units; applying appropriate levels of quality control within the context of the laboratory quality assurance program; and participation in interlaboratory studies to document laboratory performance. By using traceable standards and standard methods, the analytical results may be compared to other laboratories operating similarly. The laboratory QA Program documents internal performance, and the interlaboratory studies document performance compared to other laboratories. Periodic laboratory proficiency studies are instituted as a means of monitoring interlaboratory performance.

B2.0 CHEMICAL DATA REDUCTION, VALIDATION, AND USABILITY

For all analyses, the reporting and deliverable requirements for each sampling event will conform to NYSDEC ASP Category A criteria and are to include:

- SDG narrative
- Instrument detection limits (as defined in NYSDEC ASP-12/91)
- Analytical summary (TCL-no TICs) - Form I (or equivalent)
- Holding time summary
- Chromatograms (total ion) for all organic analyses
- Quantitation report/instrument printout for all organic and metal analyses; run logs for all wet chemistry parameters
- Surrogate percent recovery - Form II (or equivalent)
- Matrix spike/matrix spike duplicate summary - Form III, V, VI (or equivalent)

Contract required quantitation limits (CRQL) are to be reported in accordance with Exhibit C of NYSDEC ASP, 12/91 Revisions. The standard NYSDEC ASP report forms (see Appendix A) will be completed by the analytical laboratory and included in each deliverable data package.

Laboratory analytical data are first generated in raw form at the instrument. These data may be in either graphic or printed tabular form and are presented in a standard format. Specific data generation procedures and calculations are found in each of the referenced methods (Table B1-2) presented in Section B1.3. Analytical results must be reported consistently. Data for water samples will be reported in concentrations of micrograms per liter (ug/L) or milligrams per liter (mg/L).

Data review and validation is a three-step process. A summary of the process common to all analyses is presented as follows:

A. Data reduction - Identification of all analytes must be accomplished with an authentic standard of the analyte, traceable to NIST or USEPA sources. Other criteria that must be utilized when determining the presence or absence of target compounds are mass spectra comparisons, retention time windows, and response factors relative to those of the authentic standard. Data reduction is to be performed by individuals experienced with a particular analysis, and knowledgeable of ASP and non-ASP requirements.

B. Data validation - This will be accomplished at URS Consultants, under the supervision of the QA/QC Officer, by environmental chemists. The data will be audited and validated in accordance with the referenced methods and the deliverable criteria, as referenced above.

Data deliverables and completeness; holding times; blank contamination; surrogate spike recoveries; and duplicate results are just some of the items that URS chemists audit in order to validate the data packages submitted. If discrepancies or deviations are found in the data package, IEA, Inc. will be contacted to clarify items that are unclear. IEA will be given 10 days to respond to all inquiries. Once the validation process is completed, data usability is then determined.

C. Data usability - A report will be submitted to NYSDEC and the City of Lockport entitled "Analytical Data Assessment." This will include our recommendation on the usability of the analytical data, based upon our review of the data and telephone conversations and letters between URS and IEA, Inc. The data are categorized on a sample-by-sample and fraction-by-fraction basis. In evaluating these data, we have established four (4) categories which are, for the most part, gradational in nature. These categories are defined as follows:

Category 1a - Usable and Defensible - Fully usable, despite possible minor deviations from ASP criteria.

Category 1b - Usable Though Not Fully Defensible - Usable with caution; cumulative deviations from ASP criteria are greater than Category 1a, although not considered so significant as to jeopardize the chemical representativeness of the sample results.

Category 2a - Rejected Fractions/Compounds Due to Holding Time Violations - Did not comply with ASP holding time.

Category 2b - Rejected Fraction(s)/Compound(s) Due to Various ASP Deviations - In a sample fraction, some compounds may be usable and defensible, other compounds may be rejected, or the sample fraction may be rejected due to various deviations from ASP.

A table is generated and the fractions are assigned single categories, indicating that they are either considered usable in their entirety or rejected in their entirety. The notes accompanying this table indicate the reason for rejection (Categories 2a, 2b) and for only conditional acceptances (Category 1b). Also in this table, some fractions may be assigned dual categories. This indicates that, while some compounds within the fraction are usable, others are rejected due to contamination in one or more of the QC blanks. A separate table will accompany the "Analytical Data Assessment" and will identify the specific compounds within each sample which are rejected due to blank contamination.

B2.1 Quality Control Samples

Data validation can be envisioned as a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of its validity prior to its intended use. The process of data validation involves the use of such techniques as performance audits (Section B3.0), instrument calibrations (Section B5.0), and the analysis of quality control samples. QC samples are especially useful for detecting cross-contamination from sources foreign to the sample, but present in the laboratory or field. These QC samples also allow a direct check on the variability in the methods of analysis and sampling, and in the sample material itself. QC samples will be analyzed from the field and the laboratory and include blank samples and matrix spike samples.

B2.1.1 Field Quality Control Samples

A. Trip Blanks - The primary purpose of the trip blank is to detect additional sources of contamination that might potentially influence contaminant values reported in actual samples.

Possible sources of contamination may be laboratory reagent water, sample containers, or sample handling procedures in the field and at the laboratory. Trip blanks will be defined as two 40 ml VOA (Volatile Organics Analysis) vials filled with laboratory-demonstrated analyte-free water. This water must originate from one common source within the laboratory and must be the same water used by the laboratory performing the analysis. Trip blanks should be handled and transported in the same manner as the samples acquired that day, except that trip blanks are not opened in the field. Instead, they travel with the samples in coolers. Trip blanks must return to the laboratory with the same set of bottles they accompanied to the field, and are analyzed for volatile organics only.

B2.1.2 Laboratory Quality Control Samples

A. Method Blanks - Method blank is defined as laboratory-demonstrated analyte-free water that is carried through the entire analytical procedure. The method blank is used to determine the level of laboratory background contamination. Per the NYSDEC ASP, methylene chloride, acetone, 2-butanone, and toluene are common laboratory contaminants. These four (4) compounds may be present in the method blanks but are not to exceed the criteria stipulated by the ASP document, or corrective action is to be used before samples are analyzed. Method blanks are analyzed at a frequency defined by the ASP document.

B. Matrix Duplicate Samples - An aliquot of a matrix (water) is subjected to the entire analytical procedure in order to indicate precision of the method for the matrix by measuring the relative percent difference (RPD) of the two samples. The duplicate and original sample are used to assess the matrix interferences within the sample, as well as to evaluate the reproducibility of analytical results. Matrix duplicates are analyzed for inorganic parameters only (i.e. metals and water quality parameters).

C. Matrix Spike Samples - An aliquot of a matrix (water) is fortified (spiked) with known concentration of specific compounds, as stipulated in the ASP document. The matrix spike and matrix spike duplicate are subjected to the same analytical procedure as the samples. Both accuracy and precision of the method are determined by measuring the percent recovery and RPD of the two spiked samples. These samples are used to assess matrix interference, as well as to evaluate instrument performance.

B3.0 LABORATORY PERFORMANCE AUDITS

All laboratories must have successfully completed the analysis of "proficiency samples" in order to receive New York State Department of Health ELAP Certification. This certification is a requirement in order to participate in the NYSDEC ASP Program. The laboratory, as per Volume 8 of the NYSDEC ASP, will receive a performance evaluation sample set from NYSDOH on a semi-annual basis to verify the laboratory's continuing ability to produce acceptable analytical results. IEA, Inc. must maintain this certification throughout the duration of this project, or another certified laboratory will be used.

B4.0 SAMPLE CUSTODY AND SHIPPING

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody procedures. Chain-of-custody procedures are essential for presentation of sample analytical results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures used in this Long Term Monitoring Program follow the chain-of-custody guidelines of NEIC Policies and Procedures, prepared by the National Enforcement Investigations Center (NEIC) of the U.S. Environmental Protection Agency Office of Enforcement.

B4.1 Custody Definitions

- Chain-of-Custody Officer - The URS Consultants, Inc., employee responsible for oversight of all associated chain-of-custody activities is the Quality Assurance Officer of the URS Buffalo office.

- Under Custody - A sample is "Under Custody" if:

  1. It is in your possession, or
  2. It is in your view, after being in your possession, or
  3. It was in your possession and you locked it up, or
  4. It is in a designated secure area.

B4.2 Responsibilities

The Chain-of-Custody Officer shall be responsible for monitoring all chain-of-custody activities and for collecting legally admissible copies of chain-of-custody documentation for the permanent project file. The Chain-of-Custody Officer shall be responsible for:

(1) An initial review of sample labels or tags, closure tapes, and chain-of-custody record provided by the laboratory.

(2) Training of all field sampling personnel in the methodologies for carrying out chain-of-custody and the proper use of all chain-of-custody forms and record documents.

(3) Monitor implementation of chain-of-custody procedures.

B4.3 Chain-of-Custody

The chain-of-custody is actually initiated in the laboratory (IEA, Inc.) when the sample bottles are cleaned, packed, and shipped to URS for use in the field. When the bottles are received by URS they will be checked for any breach of chain-of-custody seals or any evidence of tampering.

The sample bottles will be carried into the field by a URS field technician, where they will be used to collect samples. When the samples are collected, bottle labels shall be filled out by the URS field technician. Each label will include the following information:

- Site name
- Sample identification (see Section B4.5)
- Project number
- Date/time
- Samplers' initials
- Sample preservation (if any)
- Analysis required

At the time of sampling, the field technician will also record sample information in a logbook and on a chain-of-custody form (Figure B4-1), noting on each any difficulties encountered in sampling. All label, logbook, and chain-of-custody form entries shall be made in waterproof ink. The sample information recorded in the logbooks should be at least as detailed

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URS CONSULTANTS

CHAIN OF CUSTODY RECORD

PROJECT NO	SITE NAME
SAMPLERS (SIGNATURE)	

STATION NO	DATE	TIME	COMP	GRAB	STATION LOCATION	NO OF CONTAINERS							REMARKS

RELINQUISHED BY (SIGNATURE)	DATE TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE TIME	RECEIVED FOR LABORATORY BY (SIGNATURE)	DATE TIME	REMARKS	

Distribution Original accompanies shipment, copy to coordinator field files

FIGURE B4-1

as that recorded on labels, and should indicate the type of sample (e.g., groundwater and surface water), preservation technique, and sampling location, in sufficient detail to allow resampling at the same location.

After containers are filled, the field technician will place the filled containers in coolers or ice chests. The field technician will maintain custody of all samples during sample processing. After samples are processed in the field (e.g. taking field measurements, and adding preservatives as necessary) they will be prepared for shipping.

B4.4 Sample Identification Code

Each sample will be assigned a unique identification alpha-numeric code. An example of this code and a description of its components is presented below:

Examples

1. LCL-MW-1-S

LCL = Lockport City Landfill
MW1 = Monitoring Well 1
S = Shallow Well

List of Abbreviations

Monitor Type

S = Shallow
I = Intermediate
D = Deep

Sample Type

L-2 = Outfall #2
SW = Surface Water
MW = Monitoring Well
TB = Trip Blank
MS = Matrix Spike
MSD = Matrix Spike Duplicate
MD = Matrix Duplicate

B4.4.1 Paperwork/Labels

All paperwork and labels will be according to methods outlined in the FSP Section C5.0-C6.0. It is the responsibility of the field technician, on-site coordinator and the chain-of-custody officer to assure strict compliance with these procedures.

B4.4.2 Shipping of Samples

All samples to be collected will be categorized as environmental samples. The environmental samples will consist of potentially contaminated groundwater and surface water samples. It is therefore anticipated that all environmental samples that will be collected are likely to have low concentrations of contaminants and shall be handled as such for shipping purposes.

B5.0 MAINTENANCE AND CALIBRATION OF EQUIPMENT

B5.1 Analytical Equipment

All instruments used to perform ASP analyses are calibrated according to the procedures presented in the NYSDEC ASP September 1989, 12/91 Revision document. All non-ASP analyses will be calibrated according to the procedures presented in the EPA-approved analytical method.

All laboratory equipment is maintained according to the manufacturer's recommendations, including preventive maintenance.

B5.2 Field Sampling Equipment

Field equipment to be used during the collection of environmental samples includes a disposable bailer, turbidimeter, HNu meter, dissolved oxygen meter, pH meter, conductivity meter, and photoionization detector. The disposable bailer will require no maintenance including decontamination between sampling locations. Calibration procedures for each electronic instrument, as well as any applicable special maintenance procedures, are discussed in the manufacturer's operating manual. Copies of the manufacturer's operating manual for each instrument will be kept at the command office.

B6.0 CORRECTIVE ACTIONS

If the validity of the data should become suspect during performance of the QA/QC procedures found in the preceding sections of the QAPP, then corrective actions will be initiated. The actual trigger, as well as the form of the appropriate corrective action, is dependent on the specific method/procedures, time at which the error was detected, and the type of error that has occurred.

For example, if the data had been collected from an instrument, the general corrective actions would be as follows:

1. Recalibration or standardization of instruments.
2. Acquiring new standards (if applicable).
3. Replacing equipment.
4. Repairing equipment.
5. Reanalyzing samples or redoing sections of work.

System audits and calibration procedures defined in this document, along with data review, will be conducted at a frequency ensuring that errors and problems are detected early, thus avoiding the prospect of redoing large segments of work.

APPENDIX A

NYSDEC REPORTING FORMS

To be included with all lab data and with each workplan

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE IDENTIFICATION AND ANALYTICAL REQUIREMENT SUMMARY

Customer Sample Code	Laboratory Sample Code	Analytical Requirements					
		*VOA GC/MS Method #	*BNA GC/MS Method #	*VOA GC Method #	*Pest PCBs Method #	*Metals	*Other

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
SEMIVOLATILE (BNA)
ANALYSES

Laboratory Sample ID	Matrix	Date Collected	Date Rec'd at Lab	Date Extracted	Date Analyzed

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
VOLATILE (VOA)
ANALYSES

Laboratory Sample ID	Matrix	Date Collected	Date Rec'd at Lab	Date Extracted	Date Analyzed

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
PESTICIDE/PCB
ANALYSES

Laboratory Sample ID	Matrix	Date Collected	Date Rec'd at Lab	Date Extracted	Date Analyzed

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SAMPLE PREPARATION AND ANALYSIS SUMMARY
SEMIVOLATILE (BNA)
ANALYSES

Laboratory Sample ID	Matrix	Analytical Protocol	Extraction Method	Auxiliary Cleanup	Dil/Conc Factor

SAMPLE PREPARATION AND ANALYSIS SUMMARY
INORGANIC ANALYSES

Laboratory Sample ID.	Matrix	Metals Requested	Date Rec'd at Lab	Date Analyzed

APPENDIX C

FIELD SAMPLING PLAN

C1.0 INTRODUCTION

The Field Sampling Plan (FSP) is designed to provide detailed step-by-step procedures for the field activities outlined in the Work Plan for the Long Term Monitoring Program of the Lockport City Landfill. This Section (C) will serve as the field procedure manual which will be strictly followed by all URS personnel. Adherence to these procedures will ensure the quality and defensibility of the field data collected. In addition to the field procedures outlined in this document, all personnel performing field activities must do so in compliance with: (1) the appropriate health and safety guidelines found in the Health and Safety Plan; (2) the quality assurance/quality control measures outlined in Part B; and (3) the scope of work outlined in Section 2.0 of the Work Plan.

C2.0 GROUNDWATER WELL PURGING/SAMPLING

Summary: To collect representative groundwater samples, groundwater wells must be adequately purged prior to sampling. Purging will require the removal of three to five volumes of standing water in rapidly recharging wells and at least one volume from wells with slow recharge rates. Shallow wells in which the screen intersects the water table should require a minimum amount of purging since the groundwater would flow through the screen and not be entrapped in the casing. Deeper wells should be purged more thoroughly since they may be located in confined aquifers and water may rise up into the casing. A thorough purging would require the removal of several volumes of this trapped water to ensure that representative groundwater is brought into the casing for sampling. Sampling should commence as soon as adequate recharge has occurred, or within 24 hours of purging the wells.

Groundwater sampling locations and frequency of sampling are defined in Section 2 of the Work Plan. The wells will be sampled following procedures found in Section C2.2 of this FSP. The samples will be labeled and shipped following procedures outlined in Section C6.0 and C7.0, respectively, and analyzed according to the program outlined in Section B1.3 of the Quality Assurance Project Plan.

C2.1 Well Purging Procedures

(1) The well cover will be unlocked and carefully removed to avoid having any foreign material enter the well. The interior of the riser pipe will be monitored for organic

vapors using a photoionization detector. If a reading of greater than 5 ppm is recorded, the well will be vented until levels are below 5 ppm before pumping continues.

(2) Using an electronic water level detector, the water level below the top of the casing will be measured. Knowing the total depth of the well, it will be possible to determine the volume of water in the well. The end of the probe will be soap-and-water-washed and deionized-water-rinsed between wells.

(3) On wells with water levels that remain 25 feet or less below the top of casing, a suction-lift pump will be used to remove three to five times the well volume, measured into a calibrated pail. (A well volume will be defined as the volume of water standing inside the casing measured prior to evacuation.) Dedicated new polyethylene discharge and intake tubing (3/8" I.D. low-density polyethylene) will be used for each well.

During this evacuation of the well, the intake opening of the pump tubing will be positioned just below the surface of the well water. If the water level drops, then the tubing will be lowered as needed to maintain flow. Pumping from the top of the water column will ensure proper flushing of the well. Pumping will continue until the required volumes are removed.

If the well purges to dryness and recharges rapidly (within 15 minutes), water will continue to be removed as it recharges until the required volumes are removed. If the well purges to dryness and is slow to recharge (greater than 15 minutes), evacuation will be terminated.

(4) If the water level of a well is initially below 25 feet, or draws down to this level because of a slow recharge rate, then a 1-1/2-inch bailer, 5 to 10 feet in length, will be used to evacuate the well. The line for this bailer will be dedicated new 1/4-inch nylon. It will be discarded after use. Prior to use in the field, the dedicated purging bailer will be cleaned (Section C5.0).

An optional method to purge deeper wells will be with the use of the Waterra TM pump using dedicated polyethylene tubing and check valve.

(5) Purging will continue until a predetermined volume of water has been removed. The discharge volume will be established on a well-by-well basis following the procedure described in Groundwater Monitoring Review, Spring, 1986. Measurements for pH, conductivity, temperature, and turbidity will be recorded during purging. The stability of these measurements with time will be used to guide the decision to discontinue purging.

(6) All well purgings will be collected into 55-gallon drums at the well head and later transferred to a storage tank for eventual disposal.

(7) Well purging data are to be recorded in the field notebook and on the Well Development/Purging Log (Figure C2-1).

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WELL DEVELOPMENT/PURGING LOG

PROJECT TITLE: ____________________

PROJECT NO.: ____________________

STAFF: ____________________

DATE: ____________________

WELL NO.:

① TOTAL CASING AND SCREEN LENGTH (FT.): ________

② CASING INTERNAL DIAMETER (in.): ________

③ WATER LEVEL BELOW TOP OF CASING (FT.) ________

④ VOLUME OF WATER IN CASING (GAL.) ________

$V = 0.0408\,(②)^2 \times (① - ③) =$ ________ GAL.

WELL I.D.	VOL. GAL./FT.
1"	0.04
2"	0.17
3"	0.38
4"	0.66
5"	1.04
6"	1.50
8"	2.60

PARAMETERS	ACCUMULATED VOLUME PURGED (GALLONS)										

COMMENTS:

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FIGURE C2-1

C2.2 Groundwater Sampling Procedures

(1) Well sampling may be performed on the same date as purging at any time after the well has recovered sufficiently to sample, or within 24 hours after evacuation, if the well recharges slowly. If a well does not contain or yield sufficient volume for all required laboratory analytical testing (including quality control), then a decision will be made to prioritize analyses. If a well takes longer than 24 hours to recharge, then a decision will be made after consultation with NYSDEC whether or not the sample will be considered valid.

(2) After well purging is completed and the well has recharged sufficiently per the previous item, a sample will be collected into appropriate containers using a disposable, certified clean HDPE bailer. The bailer will have a 5-foot monofilament polypropylene "leader" which will be attached to a clean, dedicated 1/4-inch nylon line. The bailer will be lowered below the surface of the water so as to allow the water to touch only the "leader" and not the nylon rope.

(3) All sample bottles will be labelled in the field using a waterproof permanent marker. Procedures outlined in Sections C6.0 and C7.0 will be followed. Labels will include:

- Site name
- Sample identification code
- Project number
- Date/time
- Sampler's initials
- Preservation added (if any)

- Analysis to be performed

(4) Samples will be collected into pre-cleaned bottles (containing required preservatives) and placed on ice in coolers for processing (preservation and packing) prior to shipment to IEA, Inc.. Chain-of-custody will be initiated.

(5) A separate sample of approximately 60 mls will be collected into a 16-ounce plastic bottle to measure pH, conductivity, temperature, and turbidity of the well in the field.

(6) Well sampling data are to be recorded in the field notebook and on the Well Development/Purging Log (Figure C2-1).

(7) The wells to be sampled are MW-3S, MW-6D, MW-8D, MW-9S and MW-9I. The location of these wells can be found on Figure C2-2.

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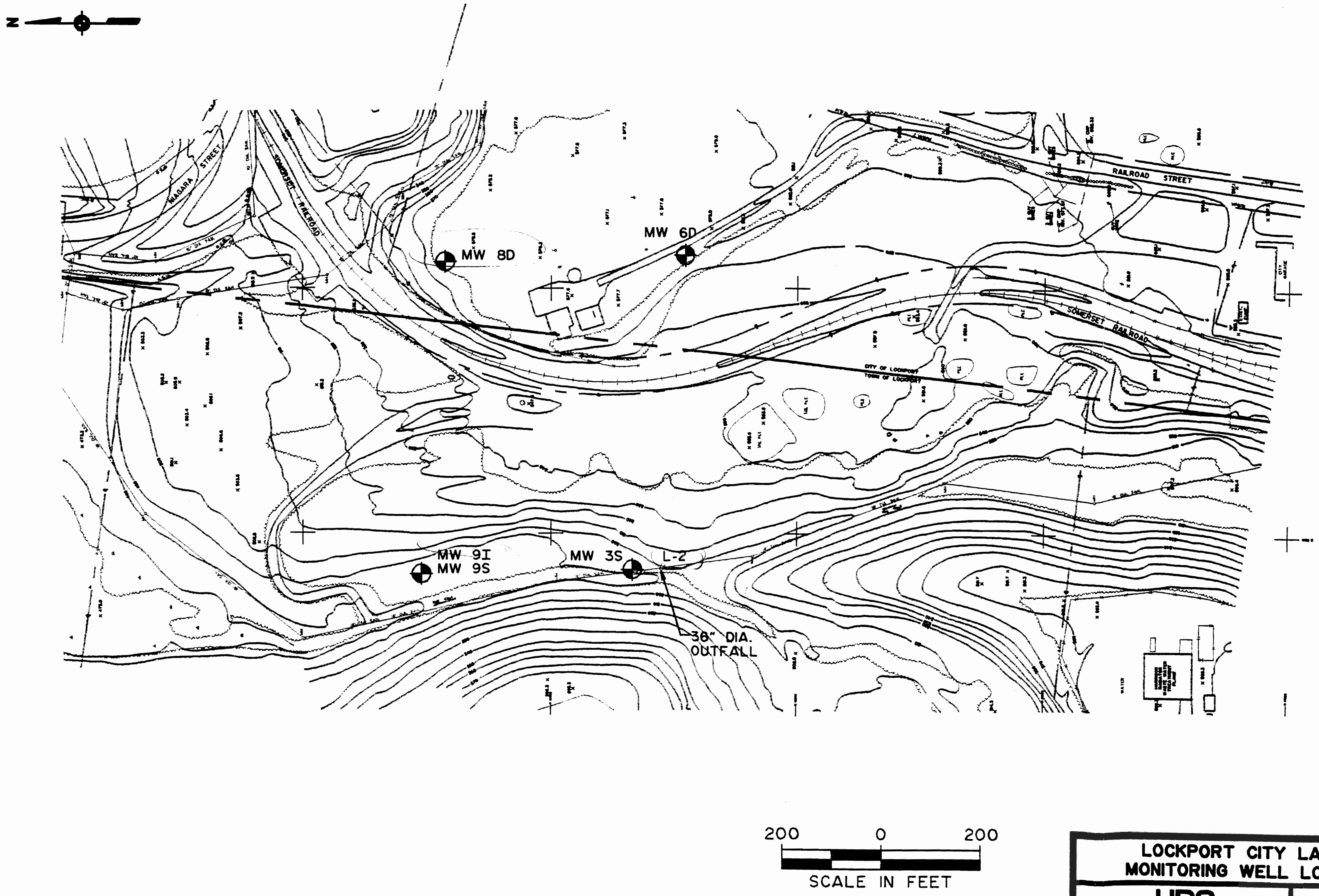

LOCKPORT CITY LANDFILL
MONITORING WELL LOCATIONS

URS
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FIGURE C2-2

CC-2636

C3.0 WATER LEVEL MONITORING

Summary: Determination of groundwater surface elevations throughout a monitoring well network makes possible the construction of the water surface contour map and determination of groundwater flow patterns.

Water levels in all monitoring wells will be measured using a Brainard Kilman Model 2220 water level indicator or equivalent. Water levels will be measured prior to the groundwater sampling. Water level measurement procedures are presented below.

Procedure: 1) Clean water level probe and lower portion of cable following standard decontamination procedures (Section C5.0) and test water level meter to ensure that the batteries are charged.

2) Lower probe slowly into the monitor until audible alarm indicates water.

3) Read depth, to the nearest 100th of a foot from the graduated cable using the highest point on the monitoring pipe as a reference.

4) Repeat the measurement for confirmation and record the water level.

5) Remove the probe from the monitor slowly, drying the cable and probe with a clean "Chem Wipe" or tissue.

6) Replace monitor cap and lock protective cap in place.

7) Return water level meter for decontamination (Section C5.0) if additional measurements are to be taken.

C4.0 SURFACE WATER (OUTFALL) SAMPLING

Summary: The surface water (outfall) on the site may be sampled by direct submersion of the sample container. If however, the sample location does not lend itself to easy access then an extendable pond sampler (Figure C4-1) may be used to collect samples by attaching the sample container or precleaned sampling beaker made of appropriate material (glass, stainless steel, or teflon) to the pond sampler. Volatile samples should be collected by submerging the VOA vial and capping underwater if possible, otherwise care must be taken when using a separate container for collection so as not to agitate the water during collection or transfer into the VOA vials. This sample will be collected during the Long Term Monitoring Program and analyzed for appropriate indicator parameters. The location of outfall L-2 is shown on Figure C2-2.

Procedure: 1) Assemble the pond sampler. Make sure that the sampling beaker and the bolts and nuts that secure the clamp to the pole are tightened properly.

2) With proper protective garment and gear, take grab samples by slowly submerging the precleaned beaker with minimal surface disturbance.

3) Retrieve the pond sampler from the surface water with minimal disturbance.

4) Remove the cap from the sample bottles and slightly tilt the mouth of the bottle below the dipper/device edge.

5) Empty the sampler slowly, allowing the sample stream to flow gently down the side of the bottle with minimal entry turbulence.

6) Continue delivery of the sample until the bottle is almost completely filled.

EXTENDABLE POND SAMPLER

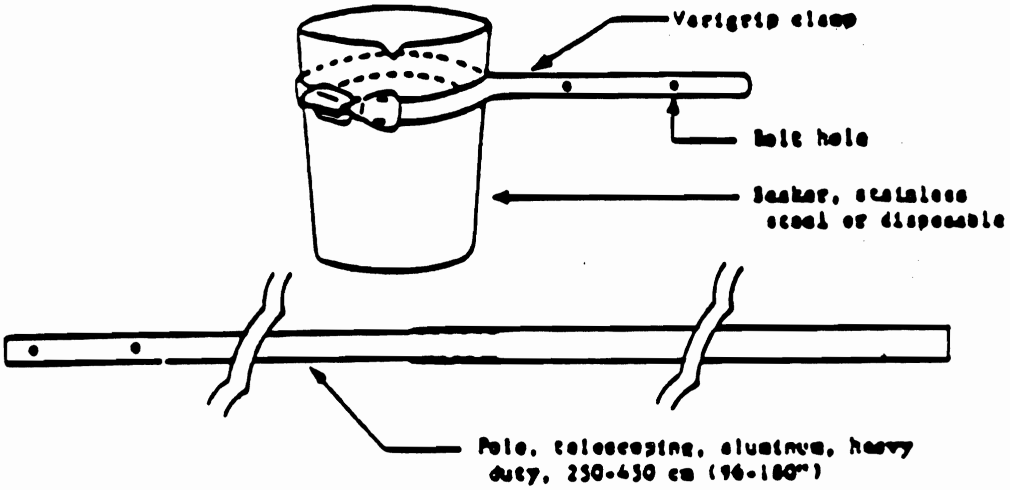

FIGURE C4-1

7) In the same manner, fill all required sample bottles and preserve the sample as required.

8) Secure the appropriately lined (teflon or polyethylene) cap tightly.

9) Attach another precleaned beaker prior to sampling at the next location.

10) Record all field data in the field notebook.

Reference: "Characterization of Hazardous Waste Sites Manual, Volume 2, Available Sampling Methods", 3rd Ed., USEPA, Nov. 1986.

C5.0 EQUIPMENT CLEANING PROCEDURES

Summary: To assure that no outside contamination will be introduced into the sample/data, thereby invalidating the sample/data. The following cleaning protocols will apply for all equipment used to collect samples/data during the field investigations.

Procedures:
1) Thoroughly clean equipment with soap and water, until all visible contamination is gone.
2) Rinse with tap water, until all visible evidence of soap is gone.
3) Rinse several times with deionized water.
4) Air dry before using.

C6.0 SAMPLE LABELING

Summary: In order to prevent misidentification and to aid in the handling of environmental samples collected during the field investigation, the following procedures will be followed:

Procedure: 1) Affixed to each sample container will be non-removable (when wet) label. The sample bottle will be wrapped with 2-inch cellophane tape. Apply label and wrap with tape to cover label. The following information will be written with permanent marker:

- Site name
- Sample identification
- Project number
- Date/time
- Sampler's initials
- Sample preservation
- Analysis required

Each sample of each matrix will be assigned a unique identification alpha-numeric code. An example of this code and a description of its components is presented below:

Examples

1. LCL-MW-1S

LCL = Lockport City Landfill

MW1 = Monitoring Well 1
S = Shallow Well

List of Abbreviations

Monitor Type
S = Shallow
I = Intermediate
D = Deep

Sample Type

L-2 = Outfall #2
SW = Surface Water
MW = Monitoring Well
TB = Trip Blank
MS = Matrix Spike
MSD = Matrix Spike Duplicate

C7.0 SAMPLE SHIPPING

Summary: Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody procedures. Chain-of-custody procedures are essential for presentation of sample analytical results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures used in the Long Term Monitoring Program follow the chain-of-custody guidelines outlined in NEIC Policies and Procedures, prepared by the National Enforcement Investigations Center (NEIC) of the U.S. Environmental Protection Agency Office of Enforcement.

Procedure: 1) The chain-of-custody record should be completely filled out, with all relevant information as in the example (Figure C7-1).

2) The white original goes with the samples. It should be placed in a ziplock bag and taped inside the sample cooler.

3) Mark volume level on bottle with grease pencil.

4) Place about 3 inches of inert cushioning material such as vermiculite or zonolite in bottom of cooler.

5) Place bottles in cooler in such a way that they do not touch (use cardboard dividers).

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CHAIN OF CUSTODY RECORD

PROJECT NO	SITE NAME
SAMPLERS (SIGNATURE)	

STATION NO	DATE	TIME	COMP	GRAB	STATION LOCATION	NO OF CONTAINERS								REMARKS

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY (SIGNATURE)	DATE	TIME	REMARKS		

Distribution: Original accompanies shipment, copy to coordinator field files

FIGURE C7-1

6) Put VOA vials in ziplock bag and place them in the center of the cooler.

7) Pack bottles, especially VOA vials, in ice in plastic bags.

8) Pack cooler with water ice in ziplock plastic bags.

9) Pack cooler with cushioning material.

10) Put paperwork in plastic bags and tape with masking tape to inside lid of cooler.

11) Tape drain shut.

12) Wrap cooler completely with strapping tape at two locations. Secure lid by taping. Do not cover any labels.

13) Place lab address on top of cooler.

For out-of-town laboratory, add the following:

- Put "This side up" labels on all four sides and "Fragile" labels on at least two sides.

- Affix numbered custody seals on front right and left of cooler. Cover seals with wide, clear tape.