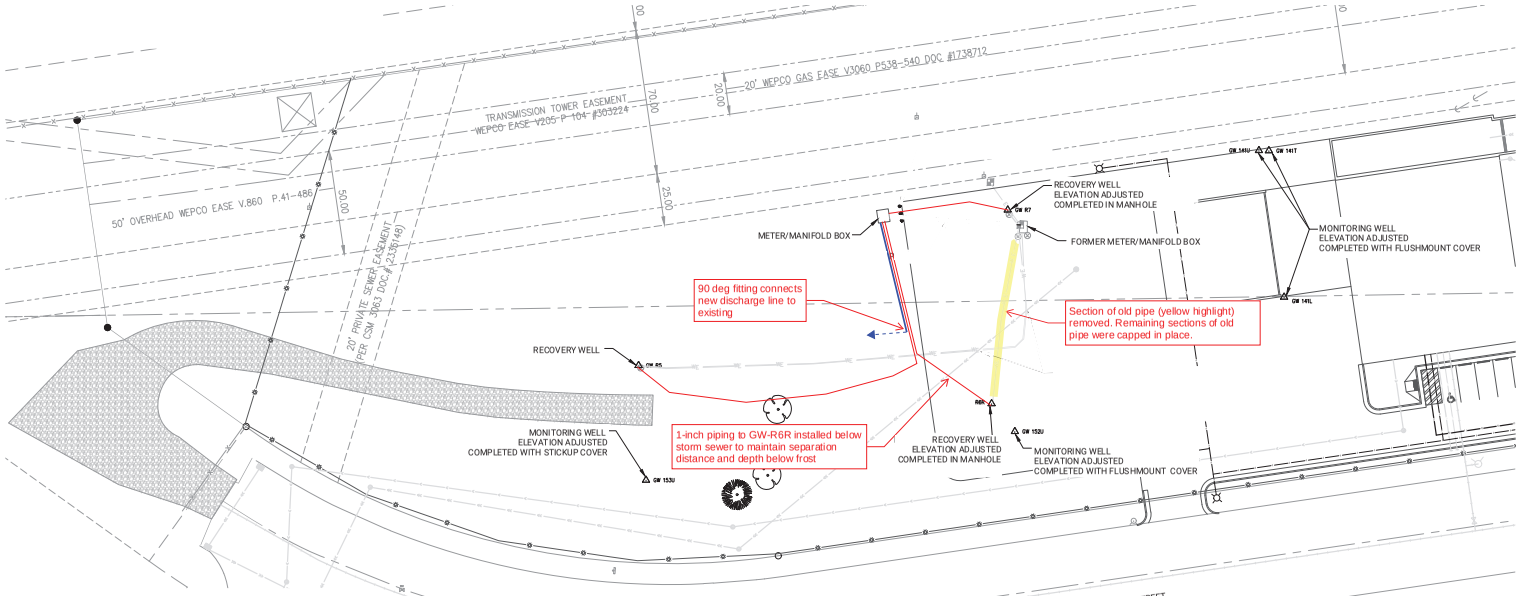
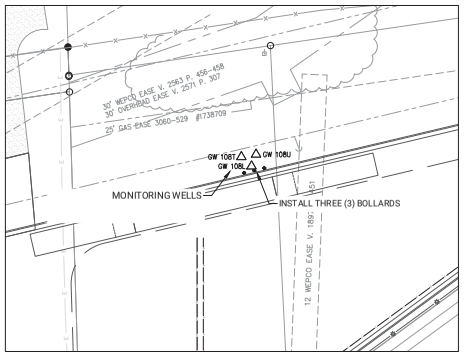
KEY

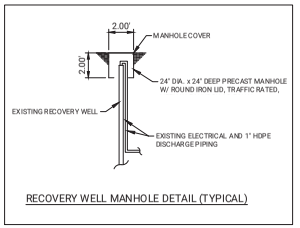
APPROX. NEW 1-IN. HDPE PIPE AND ELECTRICAL CONDUIT

DISCHARGE LINE

NOTE PIPE LOCATIONS ARE APPROXIMATE.
MONITORING AND RECOVERY WELLS WERE SURVEYED ON 6/27/2024







RECOVERY WELL MANHOLE DETAIL (TYPICAL)

0 30 60
scale feet

Foth

Foth Infrastructure & Environment, LLC
7044 S. Clippert Drive, Suite 200
Franklin, WI 53132
Phone 414-336-7900 Fax 414-336-7901

CITY OF RACINE
TRANSFER STATION
6110 - 6300 21ST STREET
RACINE, WI

WISCONSIN
RACINE COUNTY

DATE: MAY 2024
BY: ASL
CHKD: SMB2

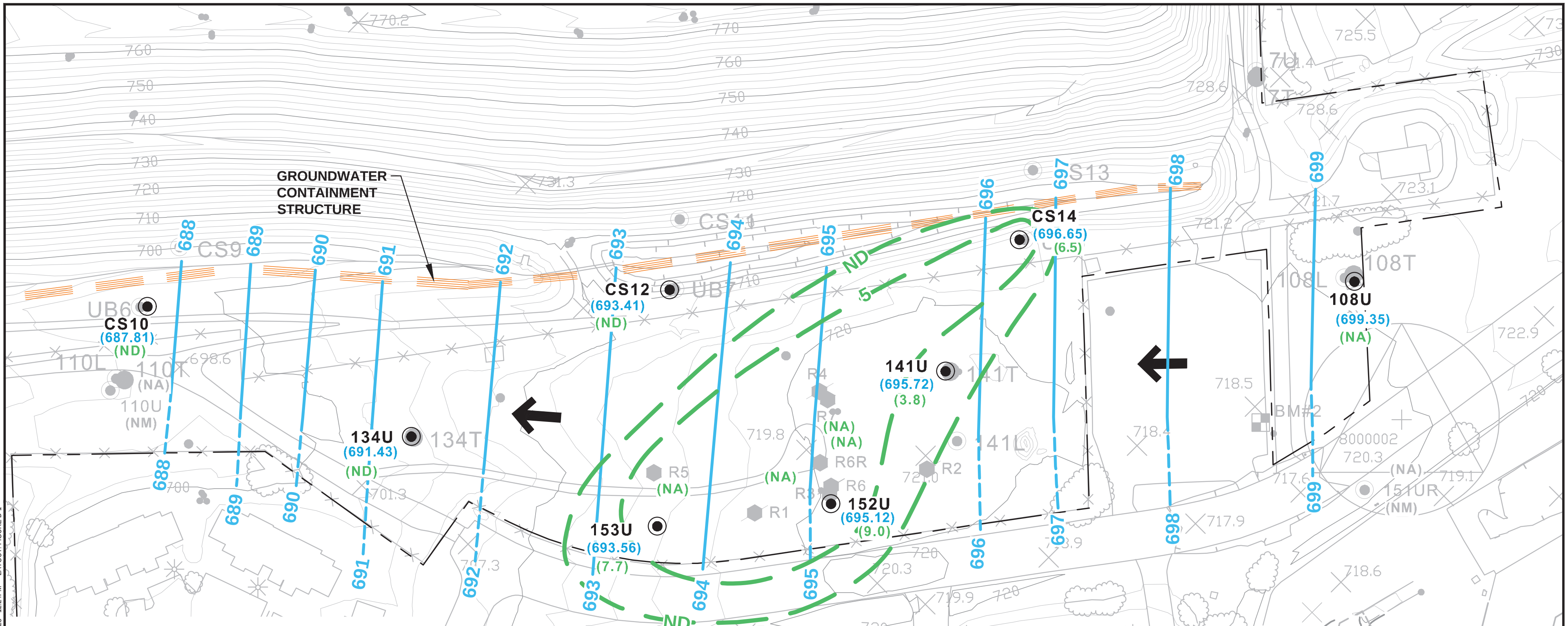
REMEDIAL SYSTEMS DOCUMENTATION

PROJECT ID 22R021.00

SHEET 1

Aug 18, 2023 - 3:51pm mcr C:\pw_workdir\pw_ie\Vd_mcr\d0638297\C3.00.dwg

Appendix F.2
Excerpt from 2024 Annual Report – Figure D-1: Vinyl Chloride Plume



LEGEND

— — —	APPROXIMATE PROPERTY LINE
(5.2)	VINYL CHLORIDE CONCENTRATION (ug/L)
(NA)	NOT ANALYZED
(ND)	NOT DETECTED
(NM)	NOT MEASURED
	SLURRY WALL/BENTONITE WALL
10	CONTOUR FOR VINYL CHLORIDE CONCENTRATION BASED ON OCTOBER 2024 DATA (DASHED WHERE INFERRED)
141T	WATER TABLE OBSERVATION WELL LOCATION AND NUMBER
134U	PIEZOMETER IN THE UNIT A SAND
R-1	RECOVERY WELL
R-4	RECOVERY WELL ABANDONED
(690.12)	GROUNDWATER ELEVATION (FEET M.S.L.) (OCTOBER 9, 2024)
689	GROUNDWATER CONTOUR (DASHED WHERE INFERRED)
	GROUNDWATER FLOW DIRECTION

NOTES

1. WATER LEVELS WERE MEASURED DURING OCTOBER 2024.
2. GROUNDWATER SAMPLES WERE COLLECTED DURING THE OCTOBER 2024 MONITORING PROGRAM.
3. RECOVERY WELLS R-5, R-6R, & R-7 AVERAGE PUMPING RATE DURING 2024 WAS 1.5 GPM AS CALCULATED FROM THE MONTHLY DATA PROVIDED BY KESTREL HAWK LANDFILL.

0 100 200
SCALE IN FEET

PROJECT:
KESTREL HAWK LANDFILL
2024 ANNUAL REPORT
RACINE, WISCONSIN

TITLE: POTENTIOMETRIC SURFACE CONTOURS AND VINYL CHLORIDE ISOCONCENTRATION MAP - UNIT A SAND 141U AREA

DRAWN BY:	T. FIEBRANZ	PROJ NO.:	635454.0000
CHECKED BY:	J. EMERSON		FIGURE D-1
APPROVED BY:	T. MARTIN		
DATE:	JUNE 2025		

TRC
999 Fourier Drive
Suite 101
Madison, WI 53717
Phone: 608.826.3600

FILE NO.: 635454.0000.D1.dwg

DRAWING NAME: J:\Republic\Kestrel Hawk\635454 - 2024 Annual Report\0000\ 635454.0000.D1.dwg --- PLOT DATE: June 10, 2025 - 12:24PM --- LAYOUT: FIGURE D-1

Version: 2017-03-03

Appendix F.3
Excerpt from 2024 Annual Report – Vinyl Chloride Trends

Figure D-3
Kestrel Hawk Landfill
Vinyl Chloride Concentration: Well 141U

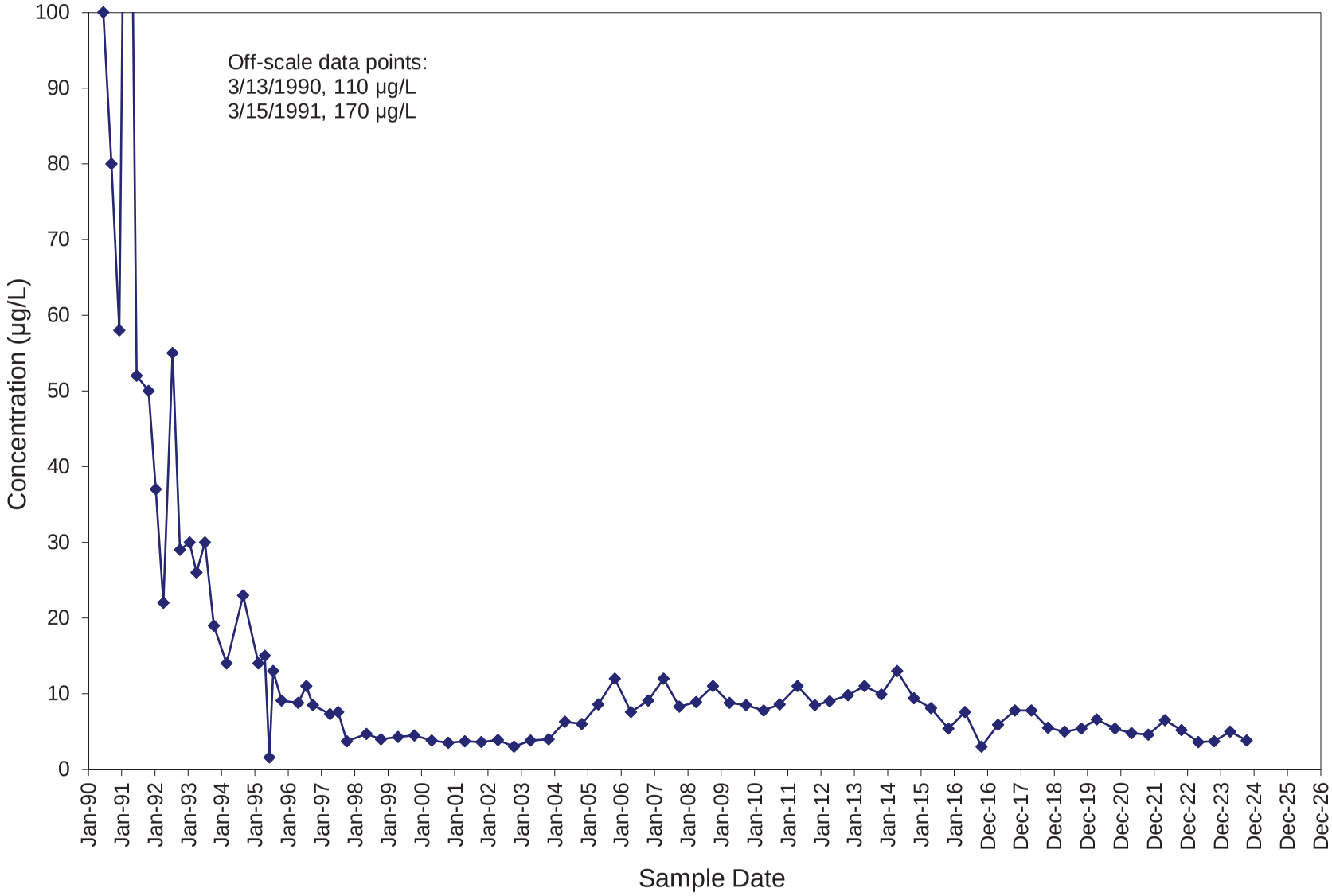
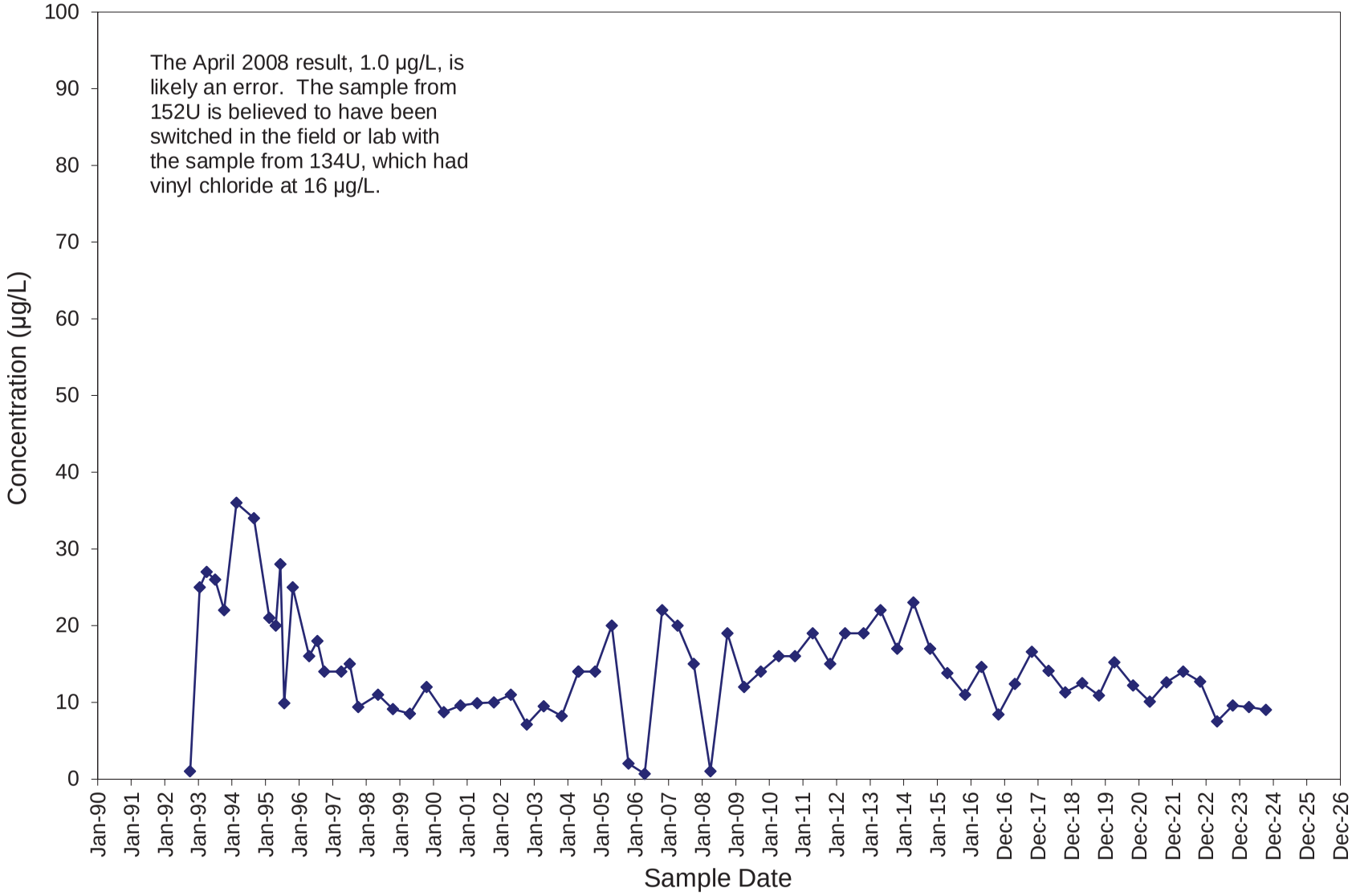
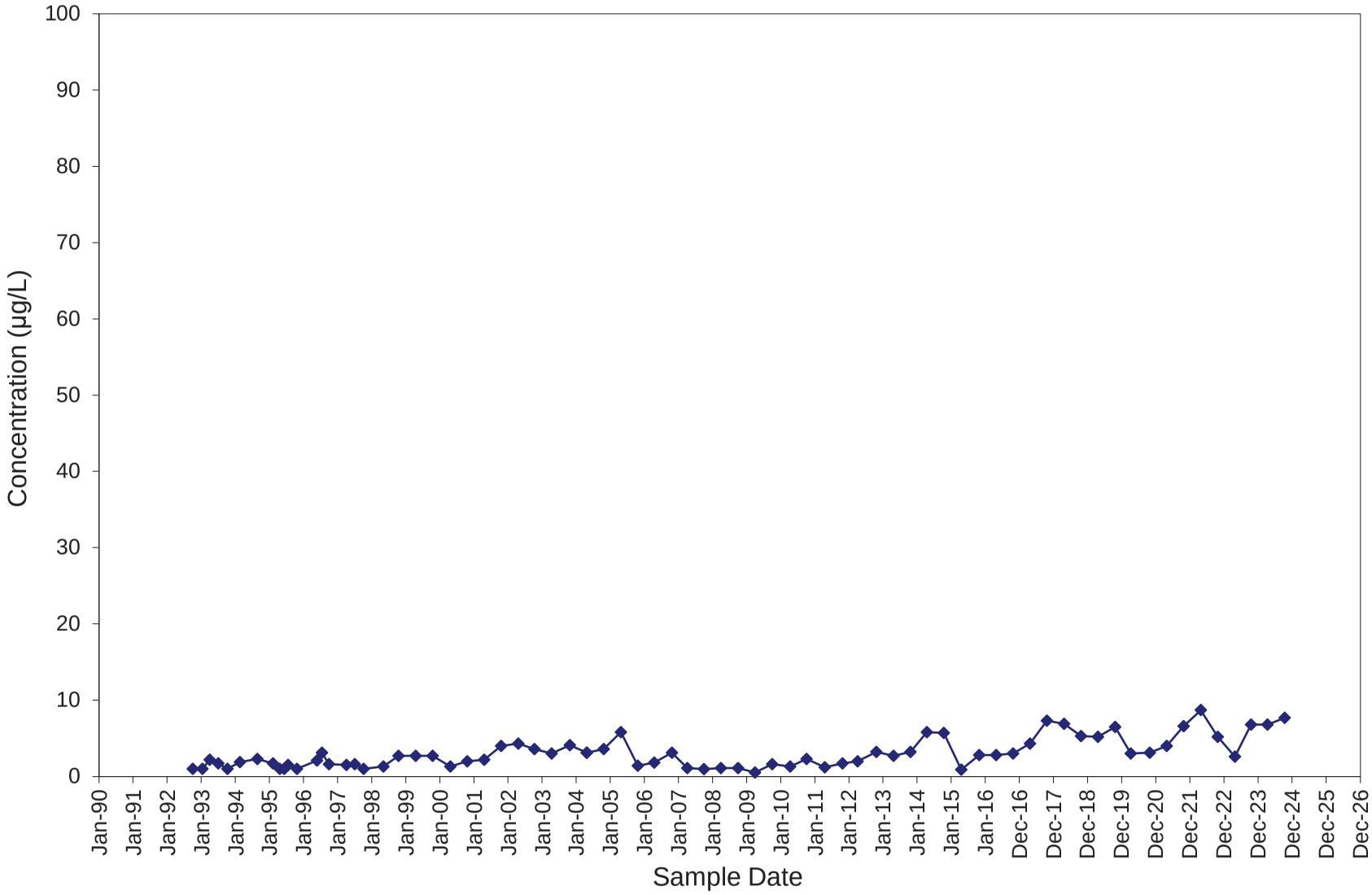


Figure D-4
Kestrel Hawk Landfill
Vinyl Chloride Concentration: Well 152U



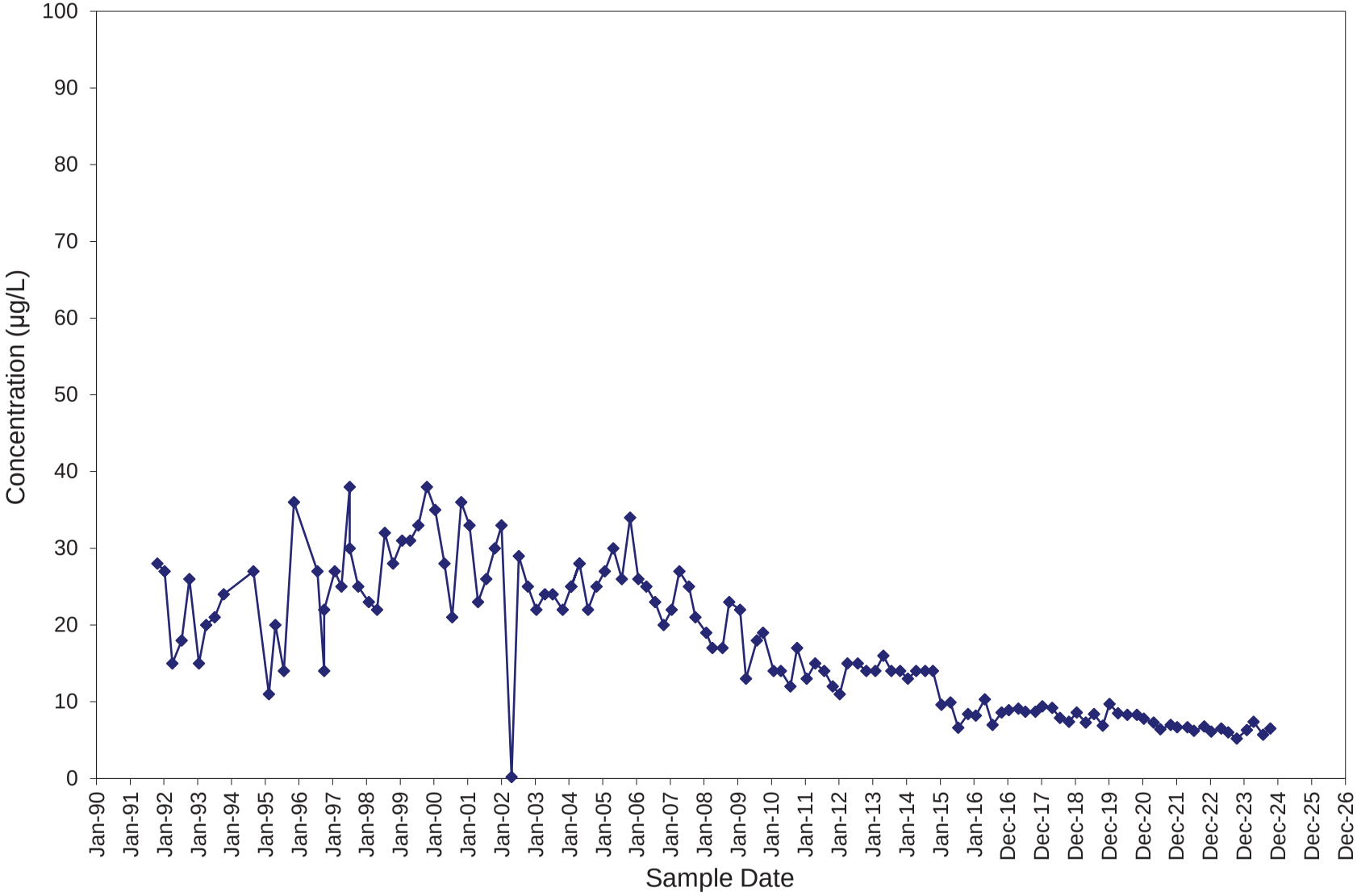
\\madison-vfp\Records\-\WPMSN\PJT2\635454\0000\000002\Files for R-001\Appendix D\2_24AR Appendix D Fig D3-D6 VC Plots.xlsx

Figure D-5
Kestrel Hawk Landfill
Vinyl Chloride Concentration: Well 153U



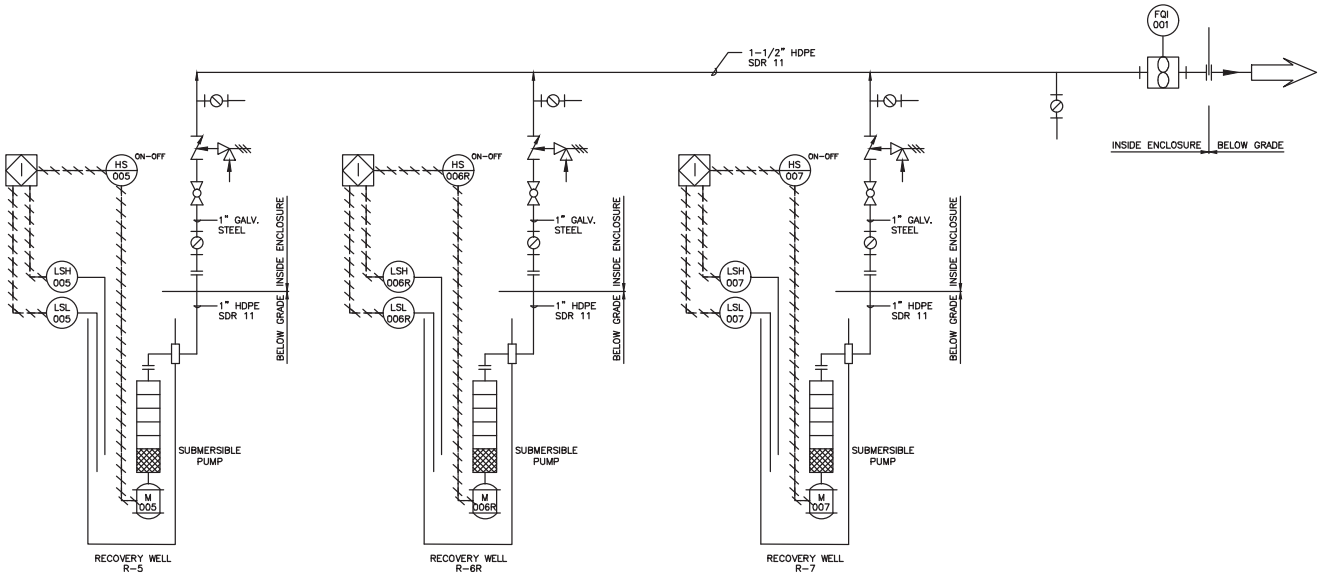
\\madison-vfp\Records\-\WPMSN\PJT2\635454\0000\000002\Files for R-001\Appendix D\2_24AR Appendix D Fig D3-D6 VC Plots.xlsx

Figure D-6
Kestrel Hawk Landfill
Vinyl Chloride Concentration: Well CS-14



\\madison-vfp\Records\-\WPMSN\PJT2\635454\0000\000002\Files for R-001\Appendix D\2_24AR Appendix D Fig D3-D6 VC Plots.xlsx

Appendix F.4
Excerpt from 2024 Annual Report – Figure D-2: 141U Area Instrumentation Diagram



LEGEND

- FLOW INDICATOR w/ TOTALIZER
- BALL VALVE
- SAMPLE TAP
- GLOBE VALVE
- CHECK VALVE WITH VACUUM RELIEF VALVE
- INTERLOCK
- LSH 001 — LEVEL SWITCH (HIGH)
- LSL 001 — LEVEL SWITCH (LOW)
- HS 001 ON-OFF — HAND SWITCH (ON/OFF)
- FQI 001 — FLOW INDICATOR w/ TOTALIZER

NOTE

1. REPLACEMENT WELL R-6R WAS INSTALLED IN JUNE-SEPTEMBER 2008. R-6 WAS ABANDONED IN JUNE 2008.

PROJECT:
KESTREL HAWK LANDFILL
2024 ANNUAL REPORT
RACINE, WISCONSIN

TITLE:
141-U AREA
CONSTRUCTION RECORD DRAWING & INSTRUMENTATION DIAGRAM

DRAWN BY:	T. FIEBRANZ	PROJ NO.:	635454.0000
CHECKED BY:	J. EMERSON		
APPROVED BY:	T. MARTIN		**FIGURE D-2**
DATE:	JUNE 2025		

TRC
999 Fourier Drive
Suite 101
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Phone: 608.826.3600

FILE NO.: 635454.0000.D2.dwg

Appendix F.5
Excerpt from Corrective Measures Study – List of Documents about 141U Area

LIST OF DOCUMENTS PREPARED FOR THE WELL 141U AREA
LAND RECLAMATION COMPANY LANDFILL
RACINE, WISCONSIN

Gibbons, Robert D. 1996. Statistical Comparison of Upgradient versus Downgradient Ground-Water Quality for the Land Reclamation Company RFI. January 1996.

Law Engineering and Environmental Services, Inc. 1992. Description of current conditions report (DCCR). April 23, 1992.

Law Engineering and Environmental Services, Inc. 1994. Revised RCRA Facility Investigation Workplan for Land Reclamation Company, April 29, 1994.

Law Engineering and Environmental Services, Inc. 1994. Interim Measures Assessment Report, Land Reclamation Company, Racine, Wisconsin, Facility. Prepared for Land Reclamation Company, May 1994.

Law Engineering and Environmental Services, Inc. 1996. Draft RCRA Facility Investigation Report. Prepared for Land Reclamation Company, February 2, 1996. Supplement: LRC/Sanifill Response to Comments (April 3, 1996), dated September 26, 1996.

RMT, Inc. 1994. Evaluation of Field Sampling Methods for Groundwater Metals Analysis. Prepared for Land Reclamation Company, December 1994.

RMT, Inc. 1995. Workplan for Pilot Test of the Interim Corrective Measure of Unit A Sand. Prepared for Land Reclamation Company, June 1995.

RMT, Inc. 1995. Report of the Pilot Pumping Test for the Interim Corrective Action in the Unit A Sand. Prepared for Land Reclamation Company: A Sanifill of Wisconsin Company, November 1995.

The Section of the Environmental Epidemiology and Prevention of the Bureau of Public Health, Wisconsin Division of Health. 1995. Investigation of Health Concerns Among Residents Near Land Reclamation Company Landfill. April 10, 1995.

Appendix F.6
Excerpt from Corrective Measures Study – Vinyl Chloride Historic Data

TABLE 1

LAND RECLAMATION COMPANY, WELL 141U AREA WELLS
VINYL CHLORIDE CONCENTRATIONS (µg\L)

	Well I.D.															
Sample Dates	108U	110U	134U	141U	151U(R)	152U	153U	155U	CS12	CS14	UB7	UB8	R-1	R-2	R-3	R-4
3/8-9/90		ND	ND													
3/13/90	ND			110												
6/19-21/90	ND	ND	ND	100												
9/19/90	ND	ND	ND	80												
12/7/90		ND														
12/11-12/90	ND		ND	58												
3/14-15/91		ND		170												
3/18-20/91	ND		ND		ND											
6/18-20/91	ND	ND	ND	52	ND											
10/22-25/91	ND	ND	ND						ND		ND	ND				
10/28-29/91				50	ND					28						
1/14-16/92	ND	ND	ND	37	ND				ND	27	ND	ND				
4/7-9/92	ND	ND	ND	22	ND				ND	15	ND	ND				
7/14-17/92	ND	ND	ND		ND				ND	18	ND	ND				
7/20/92				55												
10/6-8/92	ND	ND	ND	29	ND	ND	ND		ND	26	ND	ND				
1/19-21/93	ND	ND	ND	30	ND	25	ND		ND	15	ND	ND				
4/6-7/93	ND	ND	ND	26	ND	27	2.2		ND	20	ND	ND				
7/7-9/93	ND	ND	ND	30		26	1.7			21	ND	ND				
7/13/93					ND				ND							
10/12-14/93	ND	ND	ND	19	ND	22	ND		ND	24	ND	ND				
2/25/94			ND			36	1.9									
3/3/94				14												
8/29-31/94	ND			23			2.3			27	ND	ND				
9/1-2/94			ND			34		ND	ND							
2/13-15/95			ND	14		21	1.7	ND	ND	11	ND	ND				
2/22/95				49		160										
4/26-27/95			ND	15		20	ND	ND	ND	20	ND	ND				
6/15-16/95													ND		15-17	
7/10/95														22	17	17
7/26-27/95			ND	13		9.9	1.5	ND	ND	14	ND	ND				
9/12/95													ND	16	16	17
10/27/95				9.1		25	ND									
11/13/95	ND		ND						ND	36	ND	ND				
Apr-May '96			ND	8.8		16	2.1									
7/23/96			ND	11		18	3.1		ND	27			ND	21		27

NOTES:
The Preventive Action Limit (PAL) for vinyl chloride is 0.02 µg/L. The Enforcement Standard (ES) is 0.2 µg/L.
All detections to date exceed both the PAL and the ES for vinyl chloride.
Blank space indicates that no sample was collected.
ND indicates vinyl chloride not detected above the estimated quantitation limit.

Prepared By: JMR 10-20-96
Checked By: SSM 11-7-96

LAND RECLAMATION LANDFILL
VINYL CHLORIDE RESULTS
WELL 141U AREA

SAMPLE IDENTIFIER	SAMPLE DATE	RESULT	DATA FLAGS	UNITS
108U	13-MAR-90	< 0.5		UG/L
108U	21-JUN-90	< 0.5		UG/L
108U	19-SEP-90	< 1		UG/L
108U	11-DEC-90	< 1		UG/L
108U	19-MAR-91	< 1		UG/L
108U	19-JUN-91	< 1		UG/L
108U	22-OCT-91	< 1		UG/L
108U	14-JAN-92	< 1.0		UG/L
108U	08-APR-92	< 1.0		UG/L
108U	16-JUL-92	< 1.0		UG/L
108U	06-OCT-92	< 1.0		UG/L
108U	19-JAN-93	< 1.0		UG/L
108U	06-APR-93	< 1.0		UG/L
108U	09-JUL-93	< 1.0		UG/L
108U	12-OCT-93	< 1.0		UG/L
108U	29-AUG-94	< 1.0		UG/L
108U	13-NOV-95	< 1.0		UG/L
110U	08-MAR-90	< 0.5		UG/L
110U	19-JUN-90	< 0.5		UG/L
110U	19-SEP-90	< 1		UG/L
110U	07-DEC-90	< 1		UG/L
110U	14-MAR-91	< 1		UG/L
110U	18-JUN-91	< 1		UG/L
110U	23-OCT-91	< 1		UG/L
110U	14-JAN-92	< 1.0		UG/L
110U	09-APR-92	< 1.0		UG/L
110U	16-JUL-92	< 1.0	W	UG/L
110U	07-OCT-92	< 1.0		UG/L
110U	20-JAN-93	< 1.0		UG/L
110U	07-APR-93	< 1.0		UG/L
110U	08-JUL-93	< 1.0		UG/L
110U	13-OCT-93	< 1.0		UG/L
134U	09-MAR-90	< 0.5		UG/L
134U	20-JUN-90	< 0.5		UG/L
134U	19-SEP-90	< 1		UG/L
134U	11-DEC-90	< 1		UG/L
134U	18-MAR-91	< 1		UG/L
134U	20-JUN-91	< 1		UG/L
134U	25-OCT-91	< 1		UG/L
134U	14-JAN-92	< 1.0		UG/L
134U	08-APR-92	< 1.0		UG/L
134U	17-JUL-92	< 1.0	W	UG/L
134U	07-OCT-92	< 1.0		UG/L
134U	20-JAN-93	< 1.0		UG/L
134U	07-APR-93	< 1.0		UG/L
134U	08-JUL-93	< 1.0		UG/L
134U	14-OCT-93	< 1.0		UG/L

LAND RECLAMATION LANDFILL
VINYL CHLORIDE RESULTS
WELL 141U AREA

SAMPLE IDENTIFIER	SAMPLE DATE	RESULT	DATA FLAGS	UNITS
134U	25-FEB-94	< 1.0		UG/L
134U	01-SEP-94	< 0.5		UG/L
134U	15-FEB-95	< 1.0		UG/L
134U	26-APR-95	< 1.0		UG/L
134U	26-JUL-95	< 1.0		UG/L
134U	13-NOV-95	< 1.0		UG/L
134U	25-APR-96	< 1.0		UG/L
134U	23-JUL-96	< 1.0		UG/L
141U	13-MAR-90	110		UG/L
141U	19-JUN-90	100		UG/L
141U	19-SEP-90	80		UG/L
141U	12-DEC-90	58		UG/L
141U	15-MAR-91	170		UG/L
141U	20-JUN-91	52		UG/L
141U	29-OCT-91	50		UG/L
141U	16-JAN-92	37		UG/L
141U	08-APR-92	22		UG/L
141U	20-JUL-92	55		UG/L
141U	08-OCT-92	29		UG/L
141U	21-JAN-93	30		UG/L
141U	07-APR-93	26		UG/L
141U	08-JUL-93	30		UG/L
141U	13-OCT-93	19		UG/L
141U	03-MAR-94	14		UG/L
141U	31-AUG-94	23		UG/L
141U	14-FEB-95	14		UG/L
141U	22-FEB-95	49		PPBV
141U	26-APR-95	15		UG/L
141U	27-JUL-95	13		UG/L
141U	27-OCT-95	9.1		UG/L
141U	25-APR-96	8.8		UG/L
141U	23-JUL-96	11		UG/L
151UR	13-JUL-93	< 1.0		UG/L
151UR	12-OCT-93	< 1.0		UG/L
152U	08-OCT-92	< 1.0		UG/L
152U	20-JAN-93	25		UG/L
152U	07-APR-93	27		UG/L
152U	08-JUL-93	26		UG/L
152U	13-OCT-93	22		UG/L
152U	25-FEB-94	36		UG/L
152U	02-SEP-94	34	D	UG/L
152U	15-FEB-95	21		UG/L
152U	22-FEB-95	160		PPBV
152U	26-APR-95	20		UG/L
152U	27-JUL-95	9.9		UG/L
152U	27-OCT-95	25		UG/L
152U	25-APR-96	16		UG/L

LAND RECLAMATION LANDFILL
VINYL CHLORIDE RESULTS
WELL 141U AREA

SAMPLE IDENTIFIER	SAMPLE DATE	RESULT	DATA FLAGS	UNITS
152U	23-JUL-96	18		UG/L
153U	08-OCT-92	< 1.0	W	UG/L
153U	20-JAN-93	< 1.0		UG/L
153U	07-APR-93	2.2		UG/L
153U	09-JUL-93	1.7		UG/L
153U	13-OCT-93	< 1.0		UG/L
153U	25-FEB-94	1.9		UG/L
153U	31-AUG-94	2.3		UG/L
153U	15-FEB-95	1.7		UG/L
153U	26-APR-95	< 1.0		UG/L
153U	26-JUL-95	1.5		UG/L
153U	27-OCT-95	< 1.0		UG/L
153U	31-MAY-96	2.1		UG/L
153U	23-JUL-96	3.1		UG/L
155U	01-SEP-94	< 0.5		UG/L
155U	15-FEB-95	< 1.0		UG/L
155U	27-APR-95	< 1.0		UG/L
155U	27-JUL-95	< 1.0		UG/L
CS-10	23-OCT-91	< 1		UG/L
CS-10	15-JAN-92	< 1.0		UG/L
CS-10	07-APR-92	< 1.0		UG/L
CS-10	15-JUL-92	< 1.0		UG/L
CS-10	07-OCT-92	< 1.0		UG/L
CS-10	19-JAN-93	< 1.0		UG/L
CS-10	07-APR-93	< 1.0		UG/L
CS-10	08-JUL-93	< 1.0		UG/L
CS-10	12-OCT-93	< 1.0		UG/L
CS-10	31-AUG-94	< 0.5		UG/L
CS-10	14-FEB-95	< 1.0		UG/L
CS-10	25-APR-95	< 1.0		UG/L
CS-10	26-JUL-95	< 1.0		UG/L
CS-10	26-OCT-95	< 1.0		UG/L
CS-12	24-OCT-91	< 1		UG/L
CS-12	15-JAN-92	< 1.0		UG/L
CS-12	08-APR-92	< 1.0		UG/L
CS-12	16-JUL-92	< 1.0		UG/L
CS-12	07-OCT-92	< 1.0		UG/L
CS-12	20-JAN-93	< 1.0		UG/L
CS-12	07-APR-93	< 1.0		UG/L
CS-12	13-JUL-93	< 1.0		UG/L
CS-12	14-OCT-93	< 1.0		UG/L
CS-12	01-SEP-94	< 0.5		UG/L
CS-12	15-FEB-95	< 1.0		UG/L
CS-12	26-APR-95	< 1.0		UG/L
CS-12	26-JUL-95	< 1.0		UG/L
CS-12	13-NOV-95	< 1.0		UG/L
CS-12	23-JUL-96	< 1.0		UG/L

LAND RECLAMATION LANDFILL
VINYL CHLORIDE RESULTS
WELL 141U AREA

SAMPLE IDENTIFIER	SAMPLE DATE	RESULT	DATA FLAGS	UNITS
CS-14	29-OCT-91	28		UG/L
CS-14	15-JAN-92	27		UG/L
CS-14	08-APR-92	15		UG/L
CS-14	15-JUL-92	18		UG/L
CS-14	07-OCT-92	26		UG/L
CS-14	19-JAN-93	15		UG/L
CS-14	07-APR-93	20		UG/L
CS-14	08-JUL-93	21		UG/L
CS-14	13-OCT-93	24		UG/L
CS-14	31-AUG-94	27		UG/L
CS-14	14-FEB-95	11		UG/L
CS-14	26-APR-95	20		UG/L
CS-14	26-JUL-95	14		UG/L
CS-14	13-NOV-95	36		UG/L
CS-14	23-JUL-96	27		UG/L
R-01	23-JUL-96	< 1.0		UG/L
R-02	23-JUL-96	21		UG/L
R-04	23-JUL-96	27		UG/L
R-05	10-JUL-96	< 1.0		UG/L
R-06	10-JUL-96	< 1.0		UG/L
R-07	10-JUL-96	< 1.0		UG/L
UB-07	24-OCT-91	< 1		UG/L
UB-07	16-JAN-92	< 1.0		UG/L
UB-07	07-APR-92	< 1.0		UG/L
UB-07	14-JUL-92	< 1.0		UG/L
UB-07	07-OCT-92	< 1.0		UG/L
UB-07	19-JAN-93	< 1.0		UG/L
UB-07	06-APR-93	< 1.0		UG/L
UB-07	07-JUL-93	< 1.0		UG/L
UB-07	12-OCT-93	< 1.0		UG/L
UB-07	31-AUG-94	< 0.5		UG/L
UB-07	14-FEB-95	< 1.0		UG/L
UB-07	26-APR-95	< 1.0		UG/L
UB-07	26-JUL-95	< 1.0		UG/L
UB-07	13-NOV-95	< 0.50		UG/L
UB-08	25-OCT-91	< 1		UG/L
UB-08	16-JAN-92	< 1.0		UG/L
UB-08	07-APR-92	< 1.0		UG/L
UB-08	15-JUL-92	< 1.0		UG/L
UB-08	07-OCT-92	< 1.0		UG/L
UB-08	19-JAN-93	< 1.0		UG/L
UB-08	06-APR-93	< 1.0		UG/L
UB-08	07-JUL-93	< 1.0		UG/L
UB-08	12-OCT-93	< 1.0		UG/L
UB-08	29-AUG-94	< 0.5		UG/L
UB-08	13-FEB-95	< 1.0		UG/L
UB-08	26-APR-95	< 1.0		UG/L

LAND RECLAMATION LANDFILL
VINYL CHLORIDE RESULTS
WELL 141U AREA

SAMPLE IDENTIFIER	SAMPLE DATE	RESULT	DATA FLAGS	UNITS
UB-08	26-JUL-95	< 1.0		UG/L
UB-08	13-NOV-95	< 0.50		UG/L

Appendix G: Photographic Log

Photographic Log

Client Name:	Site Location:	Project No.:
Republic Services of Wisconsin, Limited Partnership	Kestrel Hawk Landfill Racine, WI	557469

Photo No.	Date
1	11/12/2024

Description
Hazardous waste unit looking east.

Photo No.	Date
2	11/12/2024

Description
View of the Northwest Expansion (non-hazardous waste unit)

Photographic Log

Client Name:	Site Location:	Project No.:
Republic Services of Wisconsin, Limited Partnership	Kestrel Hawk Landfill Racine, WI	557469

Photo No.	Date
3	11/12/2024

Description
Typical view of the Former City of Racine Landfill.

Photo No.	Date
4	11/12/2024

Description
Typical view of the Kestrel Hawk Landfill.

Photographic Log

Client Name:	Site Location:	Project No.:
Republic Services of Wisconsin, Limited Partnership	Kestrel Hawk Landfill Racine, WI	557469

Photo No.	Date
5	11/12/2024

Description
Typical view of lift stations used to convey leachate, condensate, and impacted groundwater to the City of Racine waste water treatment plant.

Photo No.	Date
6	11/12/2024

Description
Drainage swale located north of the Kestrel Hawk Landfill.

Photographic Log

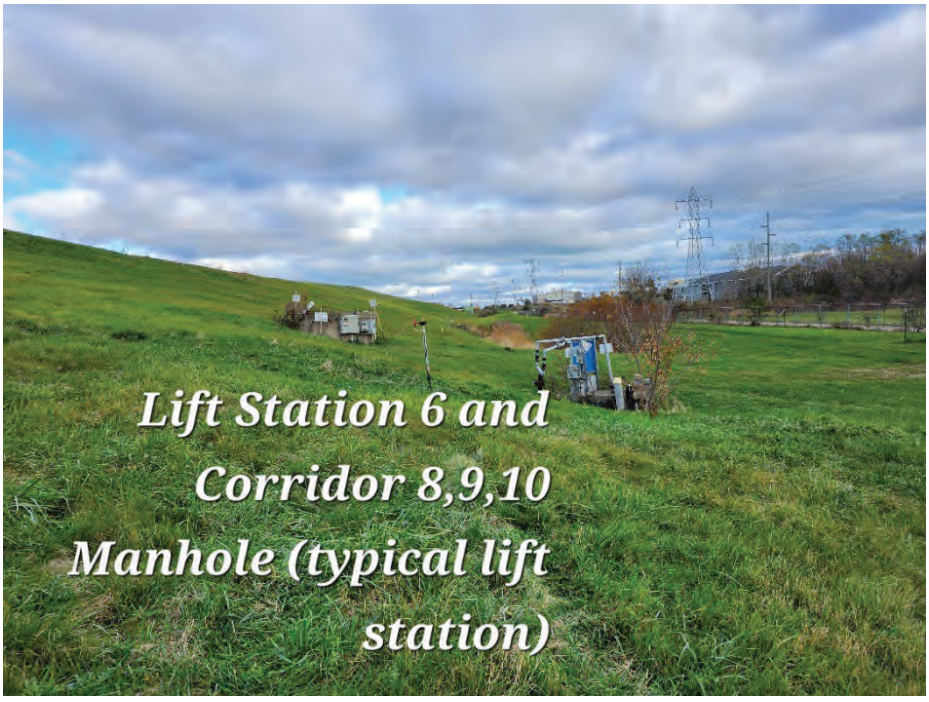
Client Name:	Site Location:	Project No.:
Republic Services of Wisconsin, Limited Partnership	Kestrel Hawk Landfill Racine, WI	557469

Photo No.	Date
7	11/12/2024

Description
View of Kestrel Hawk facilities.

Photo No.	Date
8	11/12/2024

Description
Typical view of lift stations used to convey leachate, condensate, and impacted groundwater to the City of Racine waste water treatment plant.



Photographic Log

Client Name:	Site Location:	Project No.:
Republic Services of Wisconsin, Limited Partnership	Kestrel Hawk Landfill Racine, WI	557469

Photo No.	Date
9	11/12/2024

Description
Connection location for Kestrel Hawk Landfill's discharge to the City of Racine waste water treatment plant.

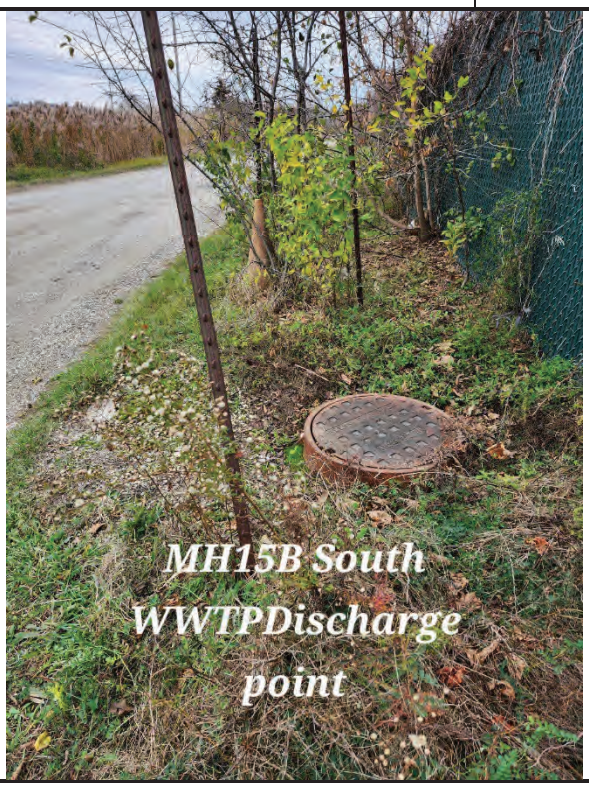
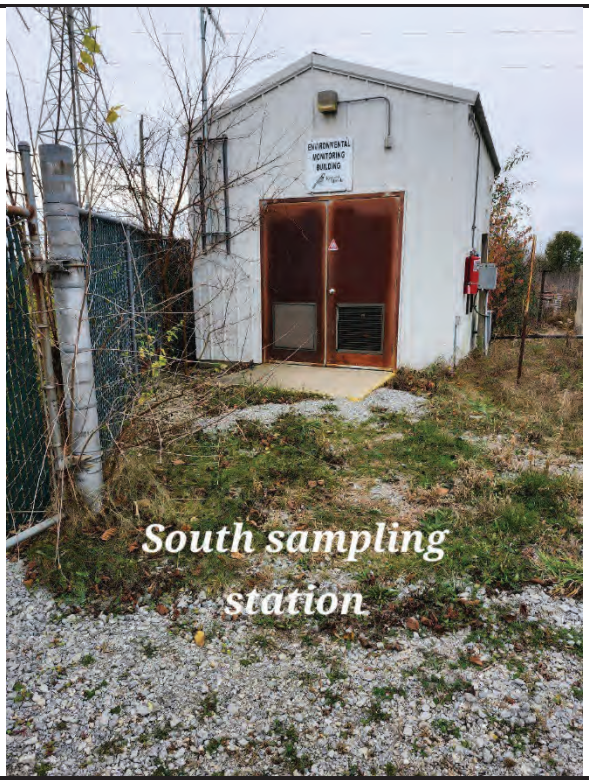


Photo No.	Date
10	11/12/2024

Description
View of Kestrel Hawk Landfill's environmental monitoring building.

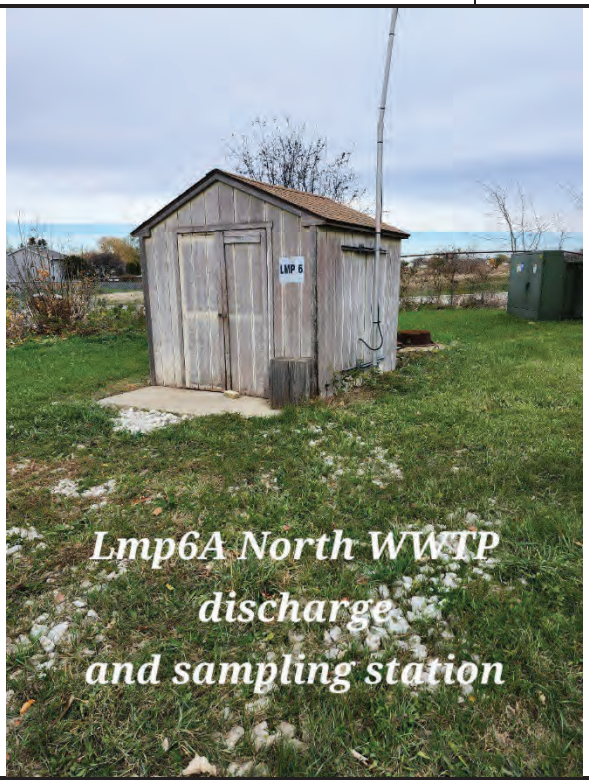


Photographic Log

Client Name:	Site Location:	Project No.:
Republic Services of Wisconsin, Limited Partnership	Kestrel Hawk Landfill Racine, WI	557469

Photo No.	Date
11	11/12/2024

Description
LMP6 sampling location.



Appendix H: Groundwater, Surface Water, and Leachate Sampling Guidelines

GROUNDWATER, SURFACE WATER, AND LEACHATE SAMPLING GUIDELINES

Sanifill, Inc.
Groundwater, Surface Water, and Leachate Sampling Standard

1.0 STANDARD REVIEW REQUIREMENT

This Standard should be reviewed and signed by the sampling team leader prior to initiation of routine or special groundwater sampling events at all Sanifill sites. All well construction information and documentation of completed sampling events should be filed at the site and at the Region Sanifill office.

Site conditions or local regulatory requirements may necessitate a deviation from the Standard as described herein. Should such a deviation be necessary changes to this Standard must be documented by the sampling team leader and coordinated with the appropriate Sanifill Corporate Hydrogeologist and Regional Engineering Manager (REM) or the Region Compliance Manager prior to the sampling event.

2.0 OVERVIEW OF STANDARD

This Standard represents the minimum requirements for groundwater, surface water, and leachate sample collection at Sanifill sites. This standard is consistent with guidelines set forth in the following ASTM Environmental Standards:

ASTM Standard D1129-90, (1990) ***"Terminology Related to Water"*****,**
ASTM Standard D4448 85a, (1992) ***"Guide for Sampling Groundwater Monitor Wells"*****,**
ASTM Standard D3370-82, (1989) ***"Standard Practices for Sampling Water"*****,**
ASTM Standard D4840-88, (1993) ***"Practice for Sampling Chain of Custody Procedures"*****,**
ASTM Standard D3694-93, ***(1993) "Practices for Preparation of Sample Containers and for Preservation of Organic Constituents"*****,**
ASTM Standard D5088-90 (1993), ***"Practice for Decontamination of Field Equipment Used at Non-Radioactive Waste Sites".***

This Standard is a guideline that may be supplemented based on site-specific conditions and/or state specific requirements which preclude strict adherence to the Standard as described herein. Possible reasons for variation to this Standard include, but are not limited to, unusual site hydrogeologic conditions (e.g., low permeability formations requiring long recharge

times), deep monitor wells that may require unusual purge volumes, and state-specific sampling requirements that significantly differ from this Standard.

The site sampling technician and/or consultant (hereinafter referred to as sampling team) is responsible for the proper collection of samples at Sanifill's groundwater sample points, piezometers, surface water locations and leachate wells. As such, the sampling team must be familiar with the contents of this Standard prior to the initiation of a sampling event. The sampling team is also responsible for ensuring that all sampling requirements described in the site's operating permit, approved monitoring plan, local regulations, and any other associated documents are complied with in full. In cases where any of the aforementioned documents are not available for review, it is the responsibility of the sample team leader to confer with the site engineer and/or the appropriate Corporate Hydrogeologist prior to initiation of sampling. The designated Sanifill Project Manager/engineer should provide oversight to ensure that the final sample results satisfy both Sanifill's minimum standards and the requirements of the appropriate State regulatory authority.

3.0 SAMPLING EQUIPMENT, PRESAMPLING PROCEDURES AND DOCUMENTATION

Before any sampling is performed at a facility, a number of preliminary tasks must be completed. These tasks include reviewing the site permit and approved site specific groundwater monitoring plan, identifying well characteristics, verifying the sampling schedule, identifying the parameters to be analyzed, and identifying sampling point order (i.e., clean wells first).

Presampling procedures include calibrating field meters and equipment, inspecting coolers and bottles sets, initiating Chain-of-Custody records, obtaining the proper Field Information Forms, and coordinating timely sample set delivery from the laboratory. It is suggested that preparation begin at least one week prior to the event to provide the sample team enough time to complete all of the steps addressed in this standard and to address any problems that may occur. For unplanned or emergency events, contact the laboratory and/or Sanifill for help on abbreviating procedures.

3.1 Equipment and Materials

All non-dedicated equipment should be cleaned and/or decontaminated, checked to ensure proper functioning and calibrated before going into the field.

3.1.1 Pumps

The specific pump used depends on site conditions and type of analyses being performed. Dedicated displacement bladder pumps constructed of Teflon and stainless steel or PVC (e.g., QED Well Wizards or MicroPurge ® System) are preferred for most sampling programs and are the Sanifill default sampling system. Notify the appropriate Sanifill Corporate Hydrogeologist of any well network not utilizing dedicated bladder pumps. When non-dedicated pumps or sampling devices are used, stringent cleaning procedures must be followed between sampling locations (see Section 3.2). Under no circumstances should pumps without check valves be used during purging. It is the sampling team's responsibility to ensure that proper decontamination procedures are followed and that associated documentation is maintained in field notes and/or Field Information Forms (see Section 3.4).

3.1.2 Bailers

Bailers should be made of suitable inert materials, when monitoring for organic compounds, (such as stainless steel or PVC or in some cases Teflon) and should be dedicated or disposable. Dedicated stainless steel or disposable teflon bailers should be used for such applications as "oily" matrices where ease of cleaning and durability may be a factor. PVC bailers with non-glued joints may also be used. Non-dedicated/reusable equipment should only be used as an exception or in emergencies. When used, non-dedicated bailers must be thoroughly decontaminated (see Section 3.2) and triple-rinsed with deionized water (or laboratory reagent water) before and after sampling at each location. Equipment blanks must also be obtained in accordance with Section 4.2.5 of this Standard. Dedicated bailers require no decontamination. Disposable bailers may be used at each well if necessary and if pre-approved by the Sanifill Project Manager.

3.1.3 Sample Coolers and Sample Bottles

The sampling team is responsible for checking all sample containers and sample coolers for broken bottles and proper preservatives when received and for obtaining ice packs prior to the sampling event. Filtering requirements, as indicated on sample labels and bottle schematic should be corroborated with the site permit and approved Groundwater Monitoring plan. The sampling team must communicate with site personnel to ensure access to the facility before the sampling event so that the event may proceed on schedule, and equipment, sample coolers, and supplies may be checked. (Note: It is important that sample coolers be stored in buildings that do not contain solvents, cleaners, gasoline, diesel fuels, or other potential contaminants.)

Upon receipt, an inventory of the coolers and bottles and their condition should be noted in field notes and documented on the Field Information Form. Each sample bottle is provided with its own bottle I.D., which refers to the laboratory group, filtering requirements, necessary

preservatives, sample point/location, analytical method, and bottle size. This information must be checked, verified, and included on Field Information Forms and Chain-of-Custody records. Should an error occur within the bottle set, the laboratory must be notified immediately.

The proper number of sample containers will be provided in each sample cooler. The type of bottle will vary depending on the analysis required. ~~With the exception of bottles for VOAs and TOX, samples requiring preservation in the field will have an associated preservative supplied in separate containers. VOA's and TOX containers will be preserved at the laboratory. Each sample bottle is labeled with a sticker to identify the preservative required. It is the sample team's responsibility to ensure that the appropriate preservatives are added in the field (see Section 7.1). Preservatives must not be added to bottles that do not require them.~~

Each Sample cooler that includes bottles for volatile organic analyses, must include a Trip Blank (see Section 4.2.6 of this standard). When volatile organic analyses have been requested, the sample cooler will contain a Trip Blank regardless of whether a request has been placed for analysis of the Trip Blank. An effort to pack all VOAs in one cooler should be made to reduce trip blank costs. Prior to shipment, the Laboratory checks each Trip Blank vial to ensure that it has no air bubbles. Note the condition of the Trip Blanks as well as any relevant information about the sample cooler on the Chain-of-Custody Record (see Section 7.5). Trip Blanks may contain air bubbles due to atmospheric conditions and cooling of samples. If large (i.e., pea sized) bubbles are present, then immediately contact the laboratory for replacement trip blanks. Empty bottles will be included within the sample cooler for Field Blank (and equipment blanks if necessary) analyses. One Field Blank should be collected for each day of sampling conducted at the site (see section 4.2.5). The sampling team should coordinate with the laboratory to identify the number of days required for sampling.

The sample cooler will not contain ice packs upon receipt from the laboratory. Sanifill requires the use of wet ice to maintain sample temperature at the levels required by EPA methods during shipment of samples back to the laboratory. It is the sampler's responsibility to ensure that ice packs are available to cool samples upon collection. Furthermore, the sampling team is responsible to ensure that provisions have been made in advance for those facilities which do not have accommodations to maintain ice packs. In such cases, it is recommended to bring pre-chilled coolers and extra ice packs to the site.

3.2 Decontamination Procedures for Non-Dedicated and Down-Hole Equipment

All non-dedicated sample-contacting and down-hole equipment must be thoroughly decontaminated prior to its use in sample collection activities. This includes non-dedicated pumps, non-dedicated bailers, groundwater level measurement devices, field parameter measurement devices and non-dedicated filtering apparatuses.

Decontamination procedures must, at a minimum, consist of prewashing and scrubbing (both inside and outside of non-dedicated bailers) with a non-phosphatic detergent solution followed by a series of rinses (i.e., 2 to 3) with control water (i.e., water of a known chemistry) and one

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rinse with deionized water. Decontamination of pumps must, at a minimum, consist of circulation of three pump volumes of clean water through the pump system and all associated discharge tubing at separate stations. A series of three precleaned fluid storage containers will aid in this respect. The first container should contain a non-phosphatic solution. The remaining two should consist of water of a known chemistry.

Equipment Blanks must be collected from equipment following decontamination based on a schedule of one sample for each day of sample collection (see Section 4.2.5). Equipment Blanks will be analyzed for VOCs (USEPA Method 8260 or equivalent). Equipment blanks for pump systems should be collected from the discharge tubing subsequent to decontamination

3.3 Calibration and Use of Meters

The proper measurement and documentation of field analyses are integral to the monitoring program. Before going to the field, all equipment must be cleaned and checked for any malfunctions. The sampling team must calibrate all meters each morning before using them in the field following manufacturers' calibration procedures. In all cases, it is the sampling team's responsibility to ensure proper documentation of all calibration procedures for each sampling event.

It is the sampling team's responsibility to maintain log books for all field meters. These log books must contain the same information as those for permanent laboratory instruments (e.g., serial number, name and model of meter, year purchased, etc.). These books also must contain quality control (QC) results, maintenance performed by the factory, and calibration notes for each day the equipment is used. If such log books do not already exist, contact the appropriate Corporate Hydrogeologist prior to proceeding. Sanifill requires that calibration for temperature, pH, and electrical conductivity be collected at a minimum for each day of sampling. However, some permits may require additional data and therefore additional calibration data (i.e., turbidity, dissolved oxygen, redox potential, etc.) will need to be documented.

3.4 Field Record Keeping

Proper chain-of-custody documentation is a crucial part of the monitoring program's quality assurance and quality control (QA/QC). Comprehensive, consistent, and accurate documentation of field tests, measurements, decontamination procedures, meter calibration, and field observations is extremely important.

Two forms must be filled out by the sampling team during each sampling event: a Field Chain-of-Custody Record and a Field Information Form. A copy of each form must be sent with the samples to the laboratory. **Under no circumstances will samples be analyzed without these forms.** The forms are returned to Sanifill with the analytical report. These forms must be completed with ball point ink only. Pencils and felt-tip pens should not be used. Copies of all forms are also to be maintained at the site and/or Region Office for easy reference.

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3.5 Field Information Forms

The Field Information Form contains information regarding site and well conditions, sampling and purging procedures, field measurements, and bottle set information. The Field Information Form must be filled out by the sampling team for each sample point and a copy placed along with the Chain-of-Custody Record in the cooler(s) shipped to the laboratory. An example of the Sanifill Field Information Form is provided as Attachment 1. At a minimum, the following information must be documented.

3.5.1 Purging Information

This section should be completed if the sample points are groundwater wells, piezometers, or water supply wells. All wells/piezometers must be purged prior to sampling. The date and time the well was purged, the elapsed time for purging, the volume of water purged, the color of purged water, how the water level reacted to purging, the total volume of water in the casing and filter pack(gallons) or discharge lines (with MicroPurge ®), and if the well was purged dry must be documented. The Field Information Form must indicate whether the well was dry and un-sampleable. Further information on purging practices is presented in Section 4.1.

3.5.2 Purging and Sampling Equipment

Document the types of equipment used for purging/sample collection and the materials of which they are constructed. If QED MicroPurge ® systems or pumps are used, the pump and tubing material must be documented.

3.5.3 Field Measurements

For groundwater, leachate, and surface water sampling events, the fluid surface elevation (depth to groundwater or leachate adjusted to MSL), temperature, pH, and specific conductance (at 25 degrees Celsius) are required to be determined prior to, during, and subsequent to purging (see Section 4.2.2). Additional field measurements such as dissolved oxygen, turbidity, and redox potential (Eh), may also be required (space is provided for additional measurements, as required, on the Field Information Form). Note on the Field Information Forms the units and values of these measurements.

3.5.4 Field Comments

The section on field comments should include field observations such as:

* Condition of the well and dedicated equipment, and any abnormalities (e.g., cracked cement pad, surface seal, malfunctioned or missing lock, broken protective casing, ponded water, cracked or bent pump/tubing, etc.)

* Weather condition such as wind direction and speed, upwind activities, temperature, barometric pressure (where needed for regulatory requirements). Any difference in weather conditions between purging and sampling should also be noted,
* Any landfill gas odor emanating from or evident at the sample point,
* Sample Appearance including odor, color, and turbidity,
  Odor: e.g., rotten eggs, earthy, strong, moderate, slight, metallic.
  Color: true "color" is the color after the turbidity has been removed. True color may be caused by metallic ions, humus, peat, or industrial chemicals. Hold the sample up to the light and describe the color in as much detail as possible.
* Turbidity:
  None: (sample is clear.).
  Trace: (sediment only slightly clouds or colors the sample; sediment does not accumulate at the bottom of the bottle.);
  Moderate: (definite cloudiness, sediment accumulates at the bottom of sample bottle.),
  High: (muddy/dark brown appearance),
  If a turbidity measuring device is used, measurements must be provided in nephelometric units.
* Reference point for well measurements (i.e., is it clearly marked on top of casing),
* Well I.D. where the Field Blank or duplicate sample is collected,
* All calculations for purge volumes and temperature conversions. Note when wells are purged dry, or explain when less than three casing volumes are removed (not applicable for MicroPurge Sampling),
* Duplicate field measurement results,
* Other conditions, such as sample splits with regulatory agencies, potential safety or health hazards (e.g., fire ants, presence of landfill gas in well). Note whether sampling occurred downwind from the on-site disposal activity.

NOTE: When samples are split with regulatory agencies, document appropriately on the Field Information Form including the condition of the bottles or preservatives, sample collection methods if different from the Sanifill standard, and the laboratory used by the agency.

3.5.5 Sampling Certification

On the bottom of the Field Information Form, the sample team leader must sign the form certifying that the sampling procedures were in accordance with applicable federal and state regulations, and corporate policy as outlined in this standard and the approved monitoring plan. The person(s) providing the sampling certification assumes full responsibility that the sample process satisfied the above criteria.

3.5.6 Maintenance Conditions at Well

The condition of the well and its surrounding area must be observed and problems and changes recorded on the Field Information Form upon arrival at the well location. The following information, at a minimum, should be noted:

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* Presence and condition of the well's identification sign,
* Whether the well was recently painted,
* Whether the well's protective casing is locked and whether the key works,
* Well integrity:
  - physical surroundings (e.g., high weeds, standing water, cleanliness, nearby activities),
  - condition of the QED MicroPurge ® system, bladder pump, or dedicated bailer,
  - any obstructions or kinks in the well casing,
  - any presence of water in the annular space,
  - any grease or other un-natural substances around top of the well or on the threaded caps,
  - whether the cap fits securely to prevent the introduction of contaminants,
  - evidence of natural contamination (e.g., animal or insect parts in the well),
  - well guard post and concrete pad condition.

3.5.7 Static Water Level Measurements

The depth to water and elevation of the water level (MSL) should be recorded to the nearest hundredth of a foot (i.e., 0.01 ft). Water levels should be collected prior to and subsequent to purging to assess drawdown effects at each well, and to produce a representative static groundwater contour map. To alleviate potential errors, previous water level data should be used for comparison purposes during field activities.

3.5.8 Depth of Well Measurements

The total depth of well is required to be measured at least once every other year, or when tampering is noted. Total well depths should be measured every year for wells without dedicate pump systems. The depth of the well, when not physically measured, should be obtained and recorded on the Field Information Form from site records or the approved groundwater monitoring plan.

3.5.9 Additional Field Measurements

Protective casing stickup length (ft.), well casing size, and material of construction must be recorded on the Field Information Form as required once per year. The condition of flush-mounted well head covers and locks must also be recorded once per year.

4.0 GROUNDWATER SAMPLING PROCEDURES

4.1 Purging Procedures

After the necessary initial field measurements/observations are made and the depth to water has been determined from every well, the purging process can begin. Purged water should be discarded to the ground far enough away from the well footing to prevent the possibility of

affecting shallow soils or groundwater water near the well. Permit conditions or results from previous sampling events may prevent disposal of purge water to the ground. The appropriate Sanifill Corporate Hydrogeologist will define the proper method for the disposal of purge water. If purge water is deemed contaminated by previous testing, it may be necessary to collect all purge water in drums to dispose of them in the site leachate collection system or other approved manner as defined by the Sanifill Project Manager or State/Local regulation.

4.1.1 Procedure using MicroPurge ®

Many Sanifill sites have been approved for utilization of the MicroPurge ® technique using the QED MicroPurge® sampling system. In such cases, purging procedures should consist of evacuating the total volume of groundwater present in the sampling system at low flow rates to clear the system lines of any stagnant water left from prior sampling events. The maximum flow rate is determined by pumping a rate which causes no net drawdown of the water level surface within the well. Low flow rate pumping (i.e., less than 1.0 liter/minute) is continued throughout the sample collection process. Field measurements, as described in Section 4.2.2, should be initiated at the start of purging and continued at evenly spaced intervals until stabilization. Once stabilization has been achieved, sampling can be conducted at the same rate. Some states have maximum allowable flow rates for certain analyses. It is the sampling team's responsibility to ensure that all state requirements are adhered to.

4.1.2 Traditional Purging Methods

When MicroPurge ® techniques are not utilized, monitoring wells should be pumped or bailed prior to sample withdrawal to prevent collection of non-representative stagnant water in a sample. As a general rule, pump or bail a minimum of three times the volume of water standing in the borehole (for moderate-to high-yield formations) and at least one borehole (including the filter pack) volume for low-yield formations (those with slow recharge), if possible. Well purging should be sufficient to increase the likelihood that the water collected is representative of the groundwater within the formation around the well. Purging should continue, when possible, until field parameters (including pH, temperature, and electrical conductivity) have stabilized (see Section 4.2.2).

If a monitor well is a very low-yield well, bail or pump the volume of water standing in the well and allow the well to recharge for up to 24 hours or as stipulated by local or state regulation. If there is not sufficient water for sampling any parameter, then the well is considered dry for the purpose of sampling. If water is available to partially complete sampling requirements, samples should be obtained such that volatile organic compounds are collected first, followed by remaining state analysis requirements. Contact the laboratory for minimum testing volumes for each analyte. If a sample cannot be obtained from a given well, notify the Sanifill Project Manager immediately.

When it is necessary to use bailers, nylon, stainless steel rope, or polypropylene, preferably braided, is to be used. This rope must be new, clean, and in good condition. The end of the rope

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should be fastened to the well cap or to a large spool to prevent losing the rope and bailer in the well. The rope should be securely tied onto the bailer and checked with each bail during the purging process. Care should be taken not to excessively disturb the column of water in the well casing. Gently lower the bailer into the well with each cycle. The samplers knowledge of the depth to water will help in this regard. Attempt to lower the bailer into the water only to the extent necessary to fill or nearly fill the chamber. Avoid submerging the top of the bailer.

Non-dedicated pumps are most often used for purging when large volumes of water must be removed from the well before sampling. The best (and most commonly used) pumps are submersible, centrifugal pumps. These pumps are generally used in 2-inch diameter or larger wells. Pumps without check valves should not be used for purging monitor wells. Disposable PVC or latex powderless gloves must be worn when handling unsealed samples or sample equipment. New gloves should be used at each well, or more frequently (e.g., if they become dirty or torn).

All of the down-hole equipment must be thoroughly decontaminated (see Section 3.2) and rinsed with deionized or laboratory reagent quality water and air dried before use. In addition, an Equipment Blank must be collected following the procedures discussed in Section 4.2.5 of this standard.

4.2 Sampling the Well

The following section describes standard procedures for collecting samples from wells subsequent to purging activities at Sanifill sites. Methodologies for the collection of field measurements, field filtered samples, and Field/Equipment and Trip Blanks are also presented.

4.2.1 When Not to Sample

During a sampling event, all scheduled wells must be sampled, except in the following cases:

* If the well has been destroyed or otherwise rendered unsampleable (e.g., casing broken off or severely bent so as to preclude sampling),
* If the well is dry, or
* If the well is new and has not been properly developed (pH, temperature, and specific conductance must be stabilized and drilling effects eliminated from the well).

4.2.2 Field Measurements

At a minimum, field measurements for pH, electrical conductivity, and temperature must be collected at each sample point prior to and during purging and sampling. Purging must be continued until the final three consecutive measurements for each parameter agree to within 10% of each other prior to sample collection. Measurements should be taken at appropriate intervals (based on total volume to be purged) during the purging process to determine stabilization. All results must be recorded on the Field Information Form noting all units to one significant figures.

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All pH meters must provide a reading to the nearest hundredth [e.g., 7.14]. When field measurement errors occur, a line should be drawn through any error or correction, and the entry initialed and dated.

If the values obtained are not within the normal ranges, as indicated on previous Field Information Forms, notify the Sanifill Project Manager immediately. Such readings may result from inadequate purging, instrument malfunction, or a change in the character of the groundwater. The instrument should be recalibrated and additional samples may be requested by the Sanifill Project Manager to ascertain the cause of the abnormal readings. All calibration information must be documented in field log books.

Groundwater samples should be collected in the shortest possible time subsequent to purging the well. The method to be used for sampling is usually the same as that used for purging, unless otherwise specified by site conditions or regulation.

4.2.3 Filtration

Field filtering is to be conducted at all Sanifill sites unless otherwise prohibited by local and/or state regulation, or the approved groundwater monitoring plan for the facility. All samples (except those listed below) must be filtered through a 0.45 micron membrane pressure filter, unless regulatory requirements specify otherwise.

Samples Never Requiring Filtration

Alkalinity
Turbidity
Total Dissolved Solids (lab filtration)
Total Suspended Solids (TSS)
Total Solids
Semi Volatile Organics
Volatile Organics (VOA)
Total Metals
pH
Specific conductivity
Oil and grease
Surfactants
Pesticides
Herbicides
Color
Total Residual Chlorine
Biological and Bacteriological Parameters
Total Petroleum Hydrocarbons

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Regulatory and permit requirements will generally specify whether to analyze, for example, for "total" metals as opposed to "dissolved" metals. Sanifill policy is to filter all heavy metals samples unless otherwise specifically requested. The requirements must be noted on the field Chain-of-Custody Records in the column labeled "Remarks" (see Section 7.5). Specific filtering instruction are included on the Laboratory Contract Addendum, the approved Groundwater Monitoring Plan, and in some cases the site's operating permit. Furthermore, samples which will require filtering will be noted on individual bottle labels and bottle schematics.

It is recommended that all filtration be performed using an in-line filtration system. A minimum of three pump cycles of water must be allowed to pass through the filter before obtaining a sample. The filter should be changed between sample points unless clogging promotes a greater frequency. If samples are collected utilizing disposable bailers, then vacuum filters are an acceptable method of filtering. Where in-line filtration is not possible, pre-filtration bottles may be used to collect the samples. Pre-filtration bottles must be obtained from the laboratory with the sample coolers and identified at the time of initiating the bottle request.

Additional Notes:

0.45

* Filtering should be performed during sample collection while in the field.
* Filters must be ~~0.045~~ microns and dedicated for groundwater only. Do not use any filtering apparatus that is used for other procedures such as TCLP.
* Surface water and leachate samples are never filtered unless specifically required by permit.
* Pre-filtration bottles, as in the case of Vacuum or pump filtering, should not be used between wells. If re-use is absolutely necessary, prefiltrations bottles must be thoroughly decontaminated between wells in accordance with Section 3.1.4 of this Standard. The use of Pre-filtration bottles must be noted on the Field Chain-of-Custody Record in the "Remarks" column.

4.2.4 Filling Sample Bottles

Sample bottles should be filled directly from the bailer, dedicated bladder pump, or filter apparatus with minimal air contact. Volatile and semi-volatile organic analyses (VOA) and Total Organic Halides (TOX), and alkalinity bottles should be headspace-free (i.e., no air bubbles in the sample bottle).

When filling the sample bottles, the following procedures and precautions should be adhered to:

1. Bottle caps should be removed carefully so that the inside of the cap is not touched. Caps should never be put on the ground. Caps for VOA vials should contain a Teflon lined septum. The Teflon side of the septum must be facing the sample to prevent contamination of the sample through the septum.
2. The sampling team should wear appropriate surgical, PVC, or vinyl gloves. Gloves should be changed between wells or on a more frequent basis.

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3. Tubing or hoses from the sampling systems must not touch or be placed in the sample bottles.
4. After filtering, ~~sufficient space should be available in the sample bottles for the addition of required preservatives (see Section 7.1 of this Standard)~~. The bottle caps should then be replaced tightly.
5. TOX and VOA vials must be filled so that they are headspace-free. These sample bottles, therefore, need to be slightly overfilled (water tension will maintain a convex water surface in the bottle). The caps for these bottles should be replaced gently, to eliminate any air bubbles in the sample. These bottles must then be checked by inverting them and tapping them sharply with a finger. If any air bubbles appear, open the bottle, add more water, and repeat this process until all air bubbles are gone. Do not empty the bottle and refill it. VOA and TOX bottles already contain preservatives (see Section 7.1). Do not add additional preservatives to VOAs prior to sample collection.
6. Sample bottles, caps, or septums that fall on the ground before filling should be thoroughly rinsed with sample water before being used. All circumstances regarding dropped caps or bottles, and their subsequent rinsing and use, must be noted on the Field Information Form.
7. The sampling team must collect a sufficient volume of liquid to allow for analysis of all required parameters. In the event that an insufficient volume of water exists for collection of the requisite suite of samples, VOA and semi-VOA samples should be collected first, followed by leachate indicator parameters, metals, etc.
8. The sequence of filling vessels should ensure that samples are representative of natural groundwater conditions. This is accomplished by evenly distributing bailer contents amongst containers by analyte type (i.e., leachate indicator parameters, metals, major cations/anions, etc). For example, all sample vessels designated for analysis of major cations and anions should be filled prior to proceeding to sample vessels for another analyte type.
9. Under no circumstances should bottles (sample or Pre-filtration) or caps not supplied by the laboratory be used for any sampling!
10. Sample coolers should be present at all sample locations and should be equipped with pre-chilled, double bagged ice packs for immediate placement of sample bottles subsequent to collection.

4.2.5 Trip, Field, and Equipment Blanks

Trip Blanks, Field Blanks and Equipment Blanks are used to detect contamination that may be introduced in the field (either from the atmosphere or from sampling equipment), in transit to or from the sampling site, or in bottle preparation. Upon return to the laboratory, Trip Blanks, Field Blanks, and Equipment Blanks will be analyzed using the same laboratory procedures and methods that are used for the collected field samples.

4.2.5.1 Trip Blanks

Trip Blanks are samples of volatile organic-free, laboratory quality water (e.g., Type II reagent grade) which are prepared at the laboratory. They remain with the sample bottles while in transit to the site, during sampling, and during the return trip to the laboratory. Trip Blank sample bottles are not opened at any time during this process. Trip Blanks are to be reported in the laboratory results as separate samples, using the designations TB-(well#) as their sample point designation. If Trip Blank sample bottles are accidentally opened, note this fact on the Field Chain-of-Custody Record.

One Trip Blank per cooler is recommended for Sanifill sites (or as stated in the approved site groundwater monitoring plan). Each sample cooler that includes bottles for volatile organic analyses, must include a Trip Blank. When volatile organic analyses have been requested, the sample cooler will contain a Trip Blank regardless of whether a request has been placed for analysis of the Trip Blank.

4.2.5.2 Field Blanks

Field Blanks are prepared in the field (at the sampling site), using laboratory supplied bottles and the deionized or laboratory reagent quality water. Each Field Blank should be prepared by pouring the deionized water into the sample bottles at the location of one of the wells in the sampling program. The well at which the Field Blank is prepared must be identified on the Field Information Form along with any information/observations that may explain any anomalous results (e.g., prevailing winds, upwind potential sources of contamination, etc.). Once a Field Blank is collected, it is handled and shipped in the same manner as the rest of the samples. If filtration is conducted, but not in-line, the de-ionized or laboratory quality water is exposed to air, poured into pre-filtration bottles, filtered as required, and placed in the Field Blank bottles, with the proper preservative subsequently being added.

Field Blank results will be reported in the laboratory results as separate samples, using the designations FB-(well#) as their sample designation point. A minimum of one Field Blank for each day that monitor wells are sampled is recommended.

4.2.5.3 Equipment Blanks

Equipment Blanks are required for all sampling events utilizing non-dedicated equipment. Decontamination procedures for non-dedicated equipment are outlined in Section 3.2 of this document. Equipment Blanks for non-dedicated equipment are collected by pouring the deionized or laboratory reagent quality water into or over the sampling device (e.g., the bailer) after it has been properly decontaminated, then pouring the sample into the Equipment Blank bottles. Equipment blanks should be filtered if appropriate for the analytical method. At a minimum, nondedicated sampling equipment blanks should be analyzed for VOC's. Whether or not the sample is filtered, this water should be placed into the Equipment Blank bottles, and the

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proper preservative added (as required). As in the case of Field Blanks, VOA sample bottles will be pre-equipped with preservatives.

Equipment Blank results will be reported in the laboratory results as separate samples, using the designations EB-(well#) as their sample designation point. A minimum of one Equipment Blank for each day that monitor wells are sampled is recommended.

5.0 SURFACE WATER SAMPLE COLLECTION

This section of the standard is applicable to sampling water from sources such as rivers, streams, and lakes. Prior to commencing with surface water sampling activities, Field Information Forms for each sample location should be completed. The sampler should note any areas of dead or distressed vegetation, odors, discolored water, oily sheens, weather conditions, wind direction, nearby activities, etc. At a minimum, field measurements for pH, electrical conductivity, and temperature must be collected at each sample point prior to sampling. All results must be recorded on the Field Information Form.

The location of the sample point should be selected with care to ensure that a representative sample of water is obtained for testing. The sample point should be selected so as to minimize intrusion of particulate matter within the sample container. Samples collected from shallow depths can readily be obtained by merely submerging the sample container below the water surface. The containers mouth or opening should be positioned such that the mouth faces in a downstream direction if flowing water is encountered. The sample container should be lowered into the water while still capped, uncapped under water to allow the sample bottle to fill, and re-capped before removal from the water. The sampler should stand in a downstream position so as to prevent any sources of cross contamination and to prevent sediment disturbance.

When sampling consecutive points in streams of flowing water, sampling should begin in the furthest downstream location and proceed in an upstream direction. In separate channels or water bodies, the locations expected to exhibit the greatest impacts should be sampled last. To ensure that the surface water samples are representative, samples should be collected from the center of the stream or body of water when possible, and at mid depth.

Should samples be collected from a boat, the sampler must take care to avoid collection points where the turbulence caused by the propeller or by the oars has disturbed the characteristics of the water. Such samples should be collected from the lower half of the water column of the surface water body.

Surface water samples are not to be field filtered unless specified under local and/or state regulations or as otherwise stated in the sites operating permit or approved Groundwater Monitoring Plan. Sample filling techniques and preservation should follow those described in Section 4.2.4 and 7.1 of this Standard, respectively.

6.0 LEACHATE SAMPLE COLLECTION

This section of the standard is applicable to sampling fluids from leachate wells, leachate manholes, and/or leachate retention basins. Prior to commencing with leachate sampling activities, Field Information Forms for each sample point should be completed. Upon arrival at the sample location, the general condition of the sample location and its surroundings should be recorded on the Field Information Form. The sampler should note any obvious odors in the vicinity of the sample point, foaming, discolored surface fluids, weather conditions, wind direction, nearby activities, leachate color, etc.

All leachate sampling equipment must be dedicated to each sample point or must be disposable. Fluid level measuring equipment used at leachate monitoring points should never be used at groundwater monitor points. Leachate fluid levels should be measured prior to sample collection. At a minimum, field measurements for pH, electrical conductivity, and temperature must be collected at each sample point prior to sampling. All results must be recorded on the Field Information Form, noting units to three significant figures. Leachate risers and manholes do not require purging prior to sample collection. Samples should be collected by gently lowering a dedicated or disposable bailer into the sampling port and transferring the collected liquid into the sample bottles. Sample filling techniques are described in Section 4.2.4 of this standard. Leachate samples are not to be field filtered unless specified under local and/or state regulations or as otherwise stated in the sites Operating Permit or Groundwater Monitoring Plan.

Special care should be taken when preserving leachate samples with acid since a violent reaction may occur. Acid should be added slowly and carefully to the leachate samples to avoid a violent reaction. Sample filling techniques and preservation should follow those described in Section 4.2.4 and 7.1 of this Standard, respectively. Leachate samples should not be placed in the same coolers used for shipping residential, water supply well samples, or other typically uncontaminated samples.

7.0 SAMPLE PRESERVATION, STORAGE, AND SHIPMENT

7.1 Sample Preservation

Samples are to be preserved ~~immediately after filtering or immediately after sample collection~~ (if samples are not filtered). ~~TOX and VOA's, which are allowed no headspace~~ (no air bubbles trapped in the sample), will have preservatives included in the sample bottle.

~~Under normal circumstances, preservatives will be provided in small labeled vials and will be packed in a separate ziplock baggie and labeled as such. The preservatives should be added to the sample bottle after it has been filled with the sample.~~ The sample bottle should be filled to within 1/2 inch of the top of the sample container. ~~Subsequent to filling, the sample container should be topped off with the appropriate sample preservative.~~ Once the preservative has been added and the sample container capped, the sample container should be inverted to ensure

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complete mixing with the sample. The sample container is not to be shaken.

7.2 Temperature Control

The sample container and samples should be cooled to 4 degrees Celsius from the time the sample is collected through the time of analysis. Samples should be maintained in temperature regulated refrigerators, in coolers, or in sample coolers containing double bagged or commercial frozen wet ice packs. It is the sampler's responsibility to ensure that provisions have been made in advance for those facilities which do not have accommodations to freeze the ice packs. In such cases, it is recommended to bring pre-chilled coolers and extra ice packs to the site. The ice packs should be frozen solid prior to use. It is the sample team leader's responsibility to ensure that the samples are properly cooled during shipment to the laboratory.

7.3 Sample Packing and Storage

7.3.1 Checking Sample Designations and Numbers

Prior to packing the sample bottles into the shipment coolers, the sampling team must record the sample designations in the appropriate spaces on the Field Chain-of-Custody Records and Field Information Form. It is important that the proper designations be recorded in the proper space on the form and that they be double-checked before sealing the sample cooler.

All bottles filled from the same sample point at the same time must have identical sample designations (except Field Duplicates). Samples that are split with regulatory agencies should also be checked for consistent sample point designation numbers and for other methods of identification used by the agency.

7.3.2 Sample Packing

After the sample is collected and the preservatives are added (when applicable), the bottles should be capped and placed in the sample cooler. The frozen ice packs should be placed into the sample cooler such that they are not in direct contact with sample bottles. Glass containers should not be packed in contact with each other. Bottle holders/cushions and/or bubble wrap should be used for glass bottles to protect them from potential breakage.

All bottles should be wiped clean with paper towels before placement in the sample cooler. The sample cooler must be kept as clean as possible to minimize the potential for cross contamination. All bottle caps should be checked to ensure they are tight and will not become loose when inserted in the Sample cooler. Bottle caps should not be taped. Labels should be taped only if they are loose, and this should be noted on the Field Information Form or Chain-of-Custody Record.

The Field Chain-of-Custody Records (see Section 7.5) and Field Information Forms must then be reviewed to ensure that they have been completed properly. All paperwork should be placed in a

plastic bag, sealed, and placed inside the sample cooler. The sampling team should maintain a copy of all Chain-of-Custody documents and Field Information Forms for verification purposes.

7.3.3 Sample Storage

Samples should be stored at 4 degrees Celsius, in an enclosed cooler or darkened refrigerator where possible, before shipment to the laboratory for analysis. Samples should be shipped daily to the laboratory to ensure proper temperature control and holding time requirements are met.

7.4 Sample Shipment

Samples must be shipped to the laboratory or the subcontract laboratory as soon as possible such that there is no exceedance of holding times. Due to the extremely short hold and extraction times involved with many of these methods, it is recommended that the shipment occurs on the same day that the samples are collected. It is the sample teams sole responsibility to ensure expedient delivery of samples to the laboratory, such that the samples arrive at the laboratory at the proper temperature and well within the range of specified holding times.

A member of the sampling team must be appointed to arrange sample pickup and/or transportation to the laboratory. Friday shipment of samples to the laboratory should be avoided to ensure that holding times are not exceeded over a weekend. Delivery requested on Saturday must be noted specifically on the shipping/packing air bill for the courier. The laboratory must be notified within 48 hours preceding the anticipated delivery.

Sample coolers should be returned via the courier specified by the Sanifill Project Manager. When contacting the courier for transport of a sample, specify the sample cooler's contents. Alert the courier to the potential problems of the samples freezing in the winter or ice packs melting in the summer, and note these potential problems on the shipping/packing label. Sample coolers should be received at the laboratory within 24 to 48 hours of when the frozen ice packs were placed in the sample cooler. This is necessary for temperature preservation and to meet required holding times for some analyses. Any necessary delay in shipment of the coolers to the laboratory must be documented on the Field Chain-of-Custody Record.

7.5 Sample Chain-of-Custody Record

To help maintain the integrity of the samples, strict chain-of-custody procedures are necessary. These procedures help to ensure that tampering with the samples does not occur. From the time the sample bottles leave the laboratory until the issuance of the analytical laboratory results, the samples and/or sample containers must be in the custody of assigned Sanifill personnel or an assigned consultant or contractor or the laboratory. In order to maintain the chain-of-custody, the samples must be in sight of the assigned custodian or locked in a tamper-proof location. A written record of sample bottle possession and any transfers of samples must be maintained and documented on the Field Chain-of-Custody Record.

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The Sample Chain-of-Custody must contain, at a minimum, the following information:

Site Name
Station Numbers (Line No. on COC, ascending order)
Date Samples are collected (by sample)
Time Sample Collected (by Sample)
Type of Sample (Composite, Grab, Groundwater, leachate, surface water)
Number of containers per sample point
Filtering Requirements (Remarks Column)
Preservatives (Remarks Column)
Analysis Required
Special Remarks (at base of Form)

The Field Chain-of-Custody Record must further be signed with the date and time for the following activities:

* Receipt of the sample cooler (s)
* Each time the sample cooler is transferred to the custody of another person.
* Immediately before sealing the sample cooler for transport to the laboratory. (The form must be signed and enclosed within the cooler in a water tight bag.)

Samples from the same sample point that are placed in more than one sample cooler require a Field Chain-of-Custody Record in each sample cooler. Any problems with the sample cooler's contents must also be noted on the form. Upon receipt of the sample cooler by the lab, the condition of the samples, temperature, date, and time are recorded on the Field Chain-of-Custody Record by the log-in personnel receiving the sample coolers. The Field Chain-of-Custody Record indicates by bottle and analysis group whether samples are to be preserved. If actual preservation and filtration procedures vary from the instructions provided in these spaces, the chain-of-custody instructions must be modified by a member of the sampling team and initialed in the appropriate locations provided on the Field Chain-of-Custody Record or on the Filed Information Form. Failure to complete the Field Chain-of-Custody Record will render the resulting data useless. An example of the Sanifill Field Chain of Custody Form is provided as Attachment 2.

ATTACHMENT I

WELL SAMPLING FIELD INFORMATION FORM

SANIFILL, INC.

Well Sampling Field Information Form

Site Name: _____

Sample Point: _____

Date: _____

Well/Equipment Information

DTW (pre/post) _____ (ft)/ _____ (ft)
Cons. Well Depth _____ (ft)
Reference Elev: _____ (msl)
Water Level Elev: _____ (msl)

Actual Well Depth: _____ (ft)
Casing Vol: _____ (gallons)
Well/Borehole Vol: _____ (gallons)
Pump Sys. Vol: _____ (gallons)

Dedicated Equipment: Yes No
QED Sampling Systems: Yes No
MicroPurge Yes No
Purging Device: _____
Sampling Device: _____
Filtering (device): _____

Purge Start Date: _____ End Purge Date: _____ Sample Date: _____
Purge Start Time: _____ : End Purge Time: _____ : Sample Time: _____ :

Field Measurements:

	Initial	1st	2nd	3rd	4th	Sample
pH						
E.C. (uS)						
Temp. (F)						
Volume (gal)	na					
Other: _____						
Time :	:	:	:	:	:	:

Sample Attributes: Color: _____ Odor: _____ Turbidity: _____
Eh _____ D.O. _____ Alkalinity _____

Sample Vessels:
Intact: Yes / No
Explain Below

Bot. Type	Time	Analysis	Analysis	Number	Volume	Preserv.	Filter (Y/N)

Field Comments:

Notes: (weather conds., temp., wind direction, near-by activities) _____

Well Head/Surrounding Conditions (distressed veg, surface completion conditions): _____

I certify that all sampling procedures were conducted in accordance with the Sanifill Groundwater, Surface Water, and Leachate Sampling Standard and State/Federal Regulations.

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Date: _____ Signature/Title _____ Company _____

ATTACHMENT II

SAMPLE CHAIN OF CUSTODY FORM

EN CHEM INC.

1241 Bellevue St., Suite 9
Green Bay, WI 54302
414-469-2436 • 1-800-736-2436
FAX 414-469-8827

802 Deming Way
Madison, WI 53717
608-827-5501 • 1-888-530-2436
Fax: 608-827-5503

2231 Catl... ...ve., Suite 420
Superior, WI 54880
715-392-5844 • 1-800-837-8238
FAX 715-392-5843

CHAIN OF CUSTODY

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Page _____ of _____

P.O. # _____ Quote # _____

Company Name: _____

Branch or Location: _____

Project Contact: _____

Telephone: _____

Project Number: _____

Project Name: _____

Project Location: _____

Sampled By (Print): _____

Regulatory Program *(circle)*: UST RCRA CLP SDWA
NPDES/WPDES CAA NR_____
Other _____

NR720 Confirmation Analysis Required? *(circle)*: Y N
(En Chem will confirm unless otherwise instructed.)

Mail Report To: _____
Company: _____
Address: _____

Invoice To: _____
Company: _____
Address: _____

Mail Invoice To: _____

ANALYSES REQUESTED

FILTERED? (YES/NO)
PRESERVATION (CODE)*

FIELD ID	SAMPLE DESCRIPTION	COLLECTION DATE	COLLECTION TIME	FIELD SCREEN	MATRIX	SHADED AREA FOR LABORATORY USE ONLY: GOOD COND.	TOTAL BOTTLES	COMMENTS	LABORATORY NUMBER

EXAMPLE

*Preservation Code
A=None B=HCL C=H2SO4
D=HN03 E=EnCore F=Methanol**
G=NaOH O=Other (Indicate)

**If not using En Chem's methanol, indicate volume of methanol added and mark the appropriate samples.

Relinquished By:	Date/Time:	Received By:	Date/Time:	En Chem Project No.
Relinquished By:	Date/Time:	Received By:	Date/Time:	Sample Receipt Temp.
Relinquished By:	Date/Time:	Received By (En Chem):	Date/Time:	Sample Receipt pH (Wet/Metals)

Appendix I: Inspection Manual

Inspection Manual

Kestrel Hawk Landfill
Racine, Wisconsin

Revised April 2025

WDNR License No. 0572

Prepared For:

Republic Services of Wisconsin, Limited Partnership
City of Racine, Racine County, Wisconsin

Prepared By:

TRC
999 Fourier Dr., Suite 101
Madison, Wisconsin 53717

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1.0 Introduction

1.1 Purpose

The purpose of this Inspection Manual (Manual) is to address the general inspection requirements for the hazardous waste unit (HWU), comprised of Corridors 1 through 6, at the Kestrel Hawk Landfill. This Manual was prepared in accordance with s. NR 664.0015, Wis. Adm. Code, and identifies systems of the HWU that require inspection at regular intervals. A general description of the HWU systems and their major components is included within this Manual.

This Manual is prepared for the Inspector(s) at Kestrel Hawk Landfill and provides direction and guidance for conducting inspections. In addition, it provides procedures, schedules, and inspection forms to identify problems, such that the problems can be corrected before potential harm to human health or the environment occurs.

Though this Manual was developed specifically for the HWU, general inspection requirements for the remaining portions of Kestrel Hawk Landfill (non-hazardous waste) are provided in **Section 3.0**. Details provided in the remainder of **Section 1.0** and **Section 2.0** relate only to the HWU.

1.2 Background

The HWU as part of the Kestrel Hawk Landfill is located south of Wisconsin State Highway 20 and west of Wisconsin State Highway 31 in the northern one-half of Section 23, Township 3 North, Range 22 East, in the City of Racine, Racine County, Wisconsin. Kestrel Hawk Landfill is bordered to the west by Oakes Road, the north by 16th Street, the east by a residential area, and the south by 21st Street. Entrance to the site is from Oakes Road.

The Old Site (approved by the Wisconsin Department of Natural Resources [WDNR]) included 13 sequential phases identified as corridors, and the former City of Racine landfill area. The corridors have since been renumbered to include Corridors 1 through 11, as shown on **Figure 1**. Corridors 1 through 6 have been designated by the WDNR as the HWU. The HWU is in the southeastern corner of the Old Site and consists of approximately 38 acres.

Hazardous waste was co-disposed with nonhazardous municipal solid waste in the HWU until 1982 when Kestrel Hawk Landfill discontinued acceptance of hazardous waste. It is estimated that hazardous waste consisted of approximately 3% by volume of the total waste placed in the HWU. Following the cessation of hazardous waste disposal, non-hazardous waste disposal areas continued to be developed at Kestrel Hawk Landfill. Non-hazardous waste disposal areas included the remainder of the Old Site and the Northwest Expansion that vertically and horizontally expanded the Kestrel Hawk Landfill footprint. The Plan of Operation for the Northwest Expansion at Kestrel Hawk Landfill was approved by the WDNR on August 30, 1996.

Kestrel Hawk Landfill ceased accepting waste on December 30, 2022, and by July 2024 final cover had been placed on the entirety of the Kestrel Hawk Landfill. Upon completion of the final cover construction, the monitoring trailer and scale house previously located at the site were removed. The site complex includes the following structures which reside outside the HWU: landfill office, maintenance building, and the biogas compressor buildings. The landfill office contains files and records of the site's operation.

The design for Corridors 1 through 6 was modified to provide physical and hydraulic separation of the HWU from the remaining corridors of the Old Site and the former City of Racine Landfill. This separation is provided by the north barrier wall (NBW) and west barrier wall (WBW). Several design modifications for the HWU were submitted to the WDNR for review and approval in a series of design reports prepared by Foth & Van Dyke (Foth) through 1988. WDNR requirements for the pre-1988 design reports are defined in a March 31, 1988 approval letter addressing Modifications to the Hazardous Waste Closure and Long-Term Care Plan and Plan of Operation Approval. The March 31, 1988 letter specified the requirements for closure of the HWU and included containment structure construction (slurry wall and groundwater collection trench), barrier wall construction, leachate and gas extraction system construction, south slope stabilization, and RCRA cover construction. Subsequent WDNR approvals on July 1, 2004, July 2, 2004, and September 8, 2004 have modified materials, sequencing, and timing for the final cover (both RCRA and non-RCRA cover systems) construction.

The following reports have been completed to document construction related to the HWU:

Containment Structure

- Construction Observation Report for the Groundwater Containment Structure, Foth, August 1991.

South Slope Cover

- Construction Observation Report, South Slope Construction Hazardous Waste Unit, Warzyn, January 1992.
- Addendum to the Construction Observation Report, South Slope Construction Hazardous Waste Unit, Warzyn, March 1993.
- Addendum No. 2 to the Construction Observation Report, South Slope Construction Hazardous Waste Unit, Warzyn, January 1994.

West Barrier Wall

- Construction Observation Report, Interior Manhole and Piping System, Warzyn, December 1991.
- Construction Observation Report, Phase II of West Barrier Wall and Horizontal Gas Well Construction Hazardous Waste Unit, Warzyn, August 1993.
- Construction Documentation Report for Barrier Wall Construction, RMT, July 1996.

North Barrier Wall

- Construction Observation Report, Corridor No. 7, Addendum No. 1, Foth, January 1987.
- Construction Observation Report for Phase II Construction of the North Barrier Wall, Foth, December 1987.
- Construction Observation Report for Phase III Construction of the North Barrier Wall, Foth, July 1988.

- Construction Observation Report, North Barrier Wall - Phase IV & V Construction, Warzyn, February 1992.

East Slope Cover

- Post-Construction Documentation Report, East Slope Final Clay Cover, Warzyn, April 1991.
- Construction Observation Report, East Slope Construction Hazardous Waste Unit, Warzyn, February 1992.
- Construction Observation Report, Corridor 7 East Slope Final Cover, Warzyn, February 1994.

RCRA Cover

- RCRA Phase I Cover Construction, Hazardous Waste Unit, GeoSyntec Consultants, March 1992.
- Construction Observation Report, RCRA Phase II Final Cover, Montgomery Watson, December 1994.
- Old Site 2001 Final Cover Construction Documentation, STS Consultants, January 2002.
- Construction Documentation Report, 2023-2024 Composite Cover, Weaver Consultants Group, July 2024.

Gas and Leachate Extraction System

- Construction Observation Report, 1990 & 1991 Temporary/Permanent Construction, Gas and Leachate Extraction System, Warzyn, November 1991.
- Construction Observation Report - Addendum, Permanent Gas and Leachate Piping Construction, Hazardous Waste Unit, Warzyn, April 1992.
- Construction Observation Report, East Slope and Corridor 7, Gas and Leachate Extraction System, Warzyn, December 1993.
- Construction Observation Report, Corridor 7 Gas and Leachate Extraction System, Montgomery Watson, August 1995.
- Gas Collection and Control System Improvements Construction Quality Assurance, EMCON/OWT Solids Waste Services, December 2001.
- Construction Documentation Report Gas Management System improvements/Expansion 2003, Earth Tech, Inc. August 2001.

Groundwater Remediation System

- Corrective measures study and corrective measures implementation, RMT, November 1996.
- Groundwater Remediation System Alteration Construction Observation, City of Racine Transfer Station Project, Foth, August 2024.

1.3 Use of Inspection Manual

The Manual is to be read and understood by Kestrel Hawk RDF staff involved in inspections. The Manual is intended to provide direction and guidance to identify problems that may cause, or lead to, a potential discharge of hazardous waste or solid waste.

In accordance with s. NR 664.0015(1), Wis. Adm. Code, inspections must be performed to identify malfunctions and deterioration, operator errors, and discharges which may be causing, or may lead to, a discharge of hazardous waste (or their constituents), so as to minimize risk to human health or to the environment. The purpose of this Manual is to provide guidance to landfill personnel such that a proactive maintenance program can be undertaken to reduce the possibility of a hazardous waste discharge. The inspection program is intended to identify potential problems in a timely manner so they may be corrected before they harm human health or the environment. The Manual will be kept on file in the landfill office and the maintenance building.

This Manual includes a description of the facility layout and the Inspection Plan. **Figures 1** through **6** are provided as references for the systems that are part of the HWU. The Inspection Plan includes details pertaining to inspection procedures, inspection forms, and corrective actions. Kestrel Hawk Landfill employees, who have responsibilities in the inspected areas and have duties outlined in this Manual, will receive training to carry out actions discussed in this Manual. They will also receive training when changes are incorporated into the Manual.

2.0 Facility Layout

2.1 General

This section of the Manual presents a description of the systems in operation as part of the HWU at the Kestrel Hawk Landfill. Components relating to the non-hazardous waste portions of Kestrel Hawk Landfill are not included. A discussion of the existing and proposed major components of each system is provided. The systems include:

- Final Cover System
- Surface Water Management System
- Gas Control System
- Leachate Control System
- Groundwater Containment System
- Groundwater Remediation System
- Site Security System

The Environmental Monitoring Program for the landfill, including those of the HWU, are included in the report titled "Proposed Amendment to Existing Environmental Monitoring Program," July 1993, Warzyn, and the Plan of Operation Approval for the Northwest Expansion dated August 30, 1996. The Closure and Long-Term Care Plan License Application for the Kestrel Hawk Landfill includes the most recent Environmental Monitoring Program for the landfill.

2.2 Final Cover System

The cover system for the HWU consists of five components: Resource Conservation and Recovery Act (RCRA) cap, South Slope cap, West Barrier Wall (WBW), North Barrier Wall (NBW), and the East Slope cap. Construction documentation reports for these various segments are listed in **Section 1.2** and are detailed in the Revised Corridors 1-6 Closure Status Report. Refer to **Figure 1** for final cover area locations.

The RCRA cover system for Phases I, II, and III consists of, from top down:

- 6 inches of topsoil
- 1.5 feet rooting zone
- geotextile fabric
- 1 foot drainage layer
- geomembrane
- 3 feet of compacted clay

In July 2024, the last portion of RCRA cover system was completed and consists of, from top to bottom:

- 6 inches of topsoil
- 2.5 feet rooting zone
- Geocomposite drainage layer
- 40 mil LLDPE geomembrane
- Geosynthetic clay liner (GCL)
- 2 feet of compacted clay

The South Slope and East Slope caps consist of 4 feet of compacted clay overlain by 6 inches of topsoil. The NBW and WBW consist of 7 feet of compacted clay with 1 foot of drainage layer both above and below.

The major closure phases for the facility are detailed in the WDNR's December 19, 1984 Conditional Plan of Operation Approval and WDNR March 31, 1988 Modified Closure and Long-Term Care Plan Approval and WDNR July 2, 2004 Final Cover Approval.

The purpose of the HWU cover is to limit infiltration of precipitation and surface water into the waste. The NBW and WBW also provide physical and hydraulic separation from the non-hazardous portions of the landfill. The RCRA cover provides the added protection of a membrane and drainage layer to further reduce infiltration and the production of leachate. Water that percolates to the drainage layer will be intercepted and routed into the surface water management system.

Details of the surface water management system are described in the report titled, "Plan of Operation Modification, Surface Water Management," RMT, April 1993. In addition, the RCRA, South Slope, and East Slope cover systems reduce gas migration through the cover and limits air intrusion into the landfill and gas extraction system.

The RCRA, South Slope, and East Slope cover systems are to be maintained so they can function properly. The cover systems are to be maintained with a good, vegetated cover with minimal erosion which will allow the cover to perform as designed.

2.3 Surface Water Management System

The surface water management system for the HWU consists of diversion berms, ditches, culverts, flumes, sedimentation basins, and other erosional control measures. The primary purpose of this system is to efficiently collect and convey stormwater off the landfill to perimeter ditches, so that erosional damage to the final cover or exposure to hazardous waste is minimized.

Surface water collected on the landfill is generally conveyed to one of 5 sedimentation basins (No. 1, 4, 5, 6, or 7). Surface water collected off the HWU final cover is directed primarily to Sedimentation Basin No. 1 located within the southwestern corner of the Old Site. Sedimentation Basins No. 4 and No. 7 may also receive surface water from the HWU due to the drainage patterns at the landfill. Discharge from Sedimentation Basin No. 1 occurs through the site's southern drainage ditch. Discharge from Sedimentation Basin No. 4 flows to the Gunderson Drainage

Ditch. Discharge from Sedimentation Basin No. 7 flows from an outlet structure on the northern perimeter of the basin. Refer to **Figure 2** and **Figure 3** for locations of the surface water management system.

The ditches created by the surface water diversion berms collect surface water from the HWU. Downslope flumes collect the flow from the diversion berm ditches and direct it to the perimeter ditches. The perimeter ditches carry the surface water to the sedimentation basins.

There are two inlets to Sedimentation Basin No. 1. A single culvert intersects the northeast side of the basin. A double culvert enters the basin at the southeast. The basin outlet consists of a riser pipe with perforations which allow the water in the basin to discharge to an 18-inch diameter outlet pipe. An 18-inch gate valve is located on the outlet pipe to contain surface water in the basin if necessary. An emergency spillway, located at the western end of the basin, provides an outlet during peak storm events.

Sedimentation Basin No. 4 has a single inlet on the south side. The basin outlet contains a 30-inch diameter riser pipe and 24-inch diameter outlet pipe. The emergency spillway for Sedimentation Basin No. 4 is located at the northwest corner above the outlet pipe.

Sedimentation Basin No. 7 has a single outlet on the northern side of the basin. The basin outlet contains a 30-inch diameter riser pipe. The emergency spillway for Sedimentation Basin No. 7 is located along the northern perimeter above the outlet pipe.

Maintaining surface water management system components both within the HWU and in the non-hazardous disposal areas will provide for proper handling of surface water. The ditches, flumes, and culvert inlets and outlets are to be kept clear of obstructions to surface water flow. Erosion control measures are to be maintained, as needed. The sedimentation basins should be maintained and cleaned, as needed.

2.4 Gas Control System

The gas control system installed in the HWU operates in conjunction with the gas control system for the entire site, for the purpose of:

- emission control,
- migration control, and
- energy recovery.

The gas control system on the HWU consists of gas extraction wells, horizontal gas extraction trenches, gas monitoring and control stations, gas header pipe, and gas monitoring probes. Gas collected from the HWU combines with that from other landfill areas. The compressor located at the Biogas East Facility withdraws gas from the extraction wells and directs it to the Biogas West Facility. At the Biogas West Facility, landfill gas is directed to either the S.C. Johnson Inc. facility for energy recovery and/or to a utility flare. The utility flare is located at the Biogas West Facility. Refer to **Figure 3** for the biogas buildings and flare locations.

There are four horizontal gas extraction trenches associated with the HWU. Two trenches, GT-1 and GT-2, are located beneath the NBW in Corridor 6 of the HWU. The other two trenches, GT-3

and GT-4, are located beneath the WBW. Monitoring no longer occurs at the trenches near the WBW.

Following is a list of the gas extraction wells installed within the HWU.

Gas Only	Combined Gas and Leachate			
GW11	LGW36DR	LGW300	LGW309	LGW318R
GW12	LGW38DR	LGW301	LGW310	LGW319
GW(LHW)104	LGW39S/D	LGW302	LGW311	LGW320R
GW213S/D	LGW40S/D	LGW303	LGW312R	LGW321
GW214S/DR	LGW44S/D	LGW304	LGW313	LGW322
GW330	LGW45DR	LGW305	LGW314R	LGW323
GW331	LGW46DR	LGW306	GW315R	LGW324
GW21	LGW47S/D	LGW307	LGW315RR	LGW325
GW206R	LGW308	LGW317	LGW316	
GW208	LGW326S/DRR			
GW211	LGW327S/DR			
	LGW328S/DR			
	LGW329S/DR			

At gas extraction wells with S/D labels, two gas wells are installed in the same borehole. The shallow well pipe (S) extends through waste and ends above the NBW or WBW. The deep well pipe (D) extends through the NBW or WBW and is part of the HWU. Gas extraction wells and horizontal gas extraction trenches GT-1 and GT-2 include wellheads which connect the wells to the landfill gas header pipe system. The wellheads provide the equipment needed to adjust gas flow and to collect monitoring data. Refer to **Figure 4** for a detail of a typical leachate/gas extraction wellhead.

To monitor for migration, a migration control trench was installed on the eastern perimeter of the HWU. The trench includes three risers: GTR1, GTR2, and GTR3. Each riser includes a wellhead connection to the gas header pipe system. In the event gas is detected in the trench, a vacuum may be applied to the trench.

Existing gas probes installed around the landfill for additional migration monitoring are as follows:

Gas Probes			
GMW-1RA	GMW-26A/B	GP-15	TP6
GMW-1RB	GMW-27 A	GP-16	TP7
GMW-2R	GP-10GP-11	TP1	TP8
GMW-8	GP-11	TP2	TP9
GMW-9	GP-12	TP3	GMP-6A/B
GMW-23 A/B	GP-13	TP4	141U
GMW-24 A/B	GP-14	TP5	

Probes TP1 through TP9 are installed east of the migration control trench for additional migration detection points. The gas extraction system and gas probe monitoring locations and schedules are presented in the Environmental Monitoring Program (Figure 5 of the Long-term Care Application).

Condensate produced in the gas header pipes of the HWU flows by gravity to driplegs DL1, DL1A, DL2, and DL3. The condensate produced in the gas line to the West Biogas Facility is removed at dripleg DL4R and discharged to the leachate management system at manhole LS-5. From driplegs DL2 and DL3, the condensate combines with extracted leachate and flows by gravity to a vault, LMP8A, near lift station LS8. From driplegs DL1 and DL1A, the condensate flows by gravity directly to lift station LS8 and is metered at U-trap LMP1. From lift station LS8, the condensate flows to manhole MH10. Refer to **Figure 5** for locations of the condensate system.

Refer to the Environmental Monitoring Program (Figure 5 of the Long-Term Care Application) for the locations of gas extraction infrastructure and monitoring points for the areas outside the HWU.

2.5 Leachate Control System

The leachate extraction system in the HWU consists of vertical leachate extraction wells, and horizontal leachate collection pipes installed as part of the base liner collection system. The extraction wells use pneumatic pumps to discharge leachate to the leachate conveyance system (below grade header pipes). The leachate combines with the condensate at driplegs DL1, DL1A, DL2, and DL3. From these locations, the combined liquid flows through metering points LMP1 and/or LMP8A before entering the City of Racine sanitary sewer at manhole MH10.

There are three base liner leachate collection pipes installed in the HWU. Corridors 4, 5, and 6 each contain one collection pipe. The leachate collected in Corridors 4 and 5 flows by gravity directly to interior manhole MH1. The leachate collected in interior manhole MH2 from the Corridor 6 collection pipe also flows to interior manhole MH1. The combined leachate from interior manhole MH1 is pumped to lift station LS4. From lift station LS4, the leachate is pumped to lift station LS5 and to the City of Racine sewer system at a point just east of manhole MH15B. Refer to **Figure 5** for the leachate collection system locations.

All existing leachate extraction wells include a wellhead with controls and fittings for use with the pneumatic pumps. Refer to **Figure 4** for typical wellhead details.

Leachate headwells have been installed to monitor leachate head levels within the HWU. The leachate extraction system and leachate head monitoring program are presented in the Environmental Monitoring Program (Figure 5 of the Long-Term Care Application).

The leachate head monitoring wells installed within the HWU are as follows:

Leachate Head Monitoring Wells			
LHW100	LHW105	LHW110	LHW121
LHW101R	LHW106	LHW111	LHW122
LHW102	LHW107	LHW112RR	LHW123
LHW103	LHW108	LHW113	LHW124
LHW104	LHW109	LHW114R	LHW401-A/B/C
			LHW402-A/B/C

2.6 Groundwater Containment System

The groundwater containment system of the HWU includes a groundwater collection pipe installed within trenches around portions of the HWU. The groundwater collection pipe starts at manhole MH9, located at the southeastern corner of the landfill, and extends along the southern edge of the HWU to lift stations LS8 and LS6. From lift station LS6, the collection pipe continues to the west to lift station LS5 and also to the north. The collection pipe north of lift station LS6 borders the HWU on the west and extends to interior manhole MH1.

The groundwater collection pipe is designed to collect any liquids which may migrate from the HWU. The groundwater which is collected in the collection pipe from the HWU flows by gravity to lift stations LS6 and/or LS8. Lift stations LS6 and LS8 pump to the City of Racine sewer system at manholes MH13 and MH10, respectively. Refer to **Figure 5** for locations of the groundwater containment system for the HWU.

The ch. NR 635, Wis. Adm. Code, groundwater monitoring wells associated with the HWU are as follows:

Groundwater Monitoring Wells		
49LR	CS7	CS11
UB6	CS8	CS12
UB8	CS9	CS13
UB9	CS10	CS14

Refer to the Environmental Monitoring Program (Figure 5 of the Long-Term Care Application) for the monitoring well locations and respective sampling schedules.

2.7 Groundwater Remediation System

A groundwater extraction and treatment system is located near the southeastern corner of the HWU. The system was installed to address vinyl chloride contamination in the groundwater. The existence of vinyl chloride is attributed to contaminant release from the HWU. Three recovery wells (R5, R6R, and R7) extract groundwater for treatment. Extracted groundwater is discharged to the City of Racine sanitary sewer at manhole MH11. The layout of the groundwater remediation system is shown on **Figure 6**.

2.8 Site Security

The site security system at the Kestrel Hawk Landfill consists of a perimeter fence, lockable gates, and the site access roads. The fence, gates, and roads are indicated on **Figure 3**. The gates are designated as follows:

- Landfill entrance and gate
- North gate
- South slope access entrance and gate

- 21st Street gate
- East entrance and gate

As part of the site security system, the Contingency Plan (provided separately) indicates evacuation routes for the HWU along with the location of the following items:

- First-aid kit and location
- Two-way radio location
- Fire extinguisher location
- Telephone location

Radio communications are available to personnel who may be required to work in the HWU area. Construction within the HWU area is limited to maintenance activities. Contractors are required to have a Health and Safety Plan and be familiar with the Contingency Plan for the HWU.

3.0 Inspections

3.1 General

In accordance with s. NR 664.0015, Wis. Adm. Code, a description of the Inspection Plan for the HWU is provided in this section. The purpose of this plan is to provide landfill inspection personnel with the information necessary to perform routine inspections of the HWU systems and facilities, and to identify problems or potential problems which may exist and could cause a release of a hazardous waste. These inspections are critical to minimizing the risks to human health and the environment.

Activities in the HWU areas consist primarily of inspection and maintenance of the HWU systems by landfill personnel. Outside contractors may be working on the repairs/maintenance of the HWU final cover, infrastructure, or other large or specialized projects.

This Inspection Plan includes:

- Procedures to be used when performing inspections to identify problems, such as equipment malfunction for the HWU.
- An inspection schedule.
- Inspection forms.
- Description of tasks necessary for proper record-keeping of performed inspections.

In the event that inspections result in recommendations for corrective actions, a tracking mechanism will be implemented to promote timely and efficient problem remediation as detailed below.

3.2 Contingency Plan Training and Emergency Response

Inspectors are to be trained in emergency response as noted in the Contingency Plan for Kestrel Hawk Landfill. An inspector training sign-off sheet is included in **Attachment A** of this Manual. An emergency response by landfill personnel is limited to the items detailed in the Contingency Plan.

If at any time during an inspection the potential for Immediate Danger to Life or Health (IDLH) conditions exist, or if there is potential for a release of a hazardous waste or hazardous waste constituents to the environment, the Emergency Coordinator or Alternate (as defined in the Contingency Plan) must be contacted immediately and the procedures outlined in the Contingency Plan are to be followed.

3.3 Inspection Schedule

HWU infrastructure is to be inspected based on the frequencies detailed in **Sections 3.5** (weekly inspections), **3.6** (monthly inspections), and **3.7** (quarterly inspections). The inspection schedules for the HWU have been organized as follows:

- Weekly inspections will be performed on a regular working day during the week.

- Monthly tasks will be performed around the last working day of each month.
- Quarterly inspections are anticipated to take place during the months of March, June, September, and December.

In addition to the HWU systems, systems associated with the non-hazardous waste portions of Kestrel Hawk Landfill are anticipated to be inspected annually as detailed in **Section 3.8**.

3.4 Inspection Procedures

The HWU systems consist of: the final cover system, surface water management system, gas control system, leachate control system, groundwater containment system, groundwater remediation system, and site security systems. **Sections 3.5**, **3.6**, and **3.7** detail the inspection requirements for the weekly, monthly, and quarterly inspections, respectively. Similar to the HWU system, the non-hazardous waste system consists of: the final cover system, surface water management system, gas control system, and leachate control system. **Section 3.8** details the inspection requirements for annual inspections of Non-HWU system components. Inspections shall be performed by trained personnel who will complete the provided inspection forms in **Attachment B**.

The Inspector is to note maintenance activities which may be taking place during the inspection. If activities appear to be inappropriate or an unsafe condition exists, appropriate action shall be taken, and the Landfill Supervisor shall be contacted immediately.

Conditions which indicate a potential release to the environment will be reported immediately to the Emergency Coordinator or Alternate (as defined in the Contingency Plan).

3.5 Weekly Inspections

The HWU site shall be inspected weekly for general site conditions. This inspection is intended to be performed primarily as a drive-by type inspection to identify conditions which require action. Activities being performed on the HWU shall be noted.

Conditions which may require action for the HWU systems include:

3.5.1 Final Cover System

- Leachate seeps
- Noticeable gas odors venting through cover soils
- Significant erosion (>4-in. depth)

3.5.2 Surface Water Management System

Sedimentation Basins

- Little to no available storage capacity (levels approaching spillway elevation)
- Significant erosion (>4-in. depth)

3.5.3 Gas and Leachate Extraction and Groundwater Containment Systems

3.5.3.1 Wells/Wellheads

- Visibly damaged or cracked equipment
- Disconnected pipes or hoses

3.5.3.2 Lift Stations/Manholes

- Lack of power (red power indicator light is off)
- High liquid level alarms
- Meter readings (hours and total flow)

3.5.4 Groundwater Remediation System

- Visibly damaged or leaking equipment
- Lack of power

3.5.5 Site Security System

- Damaged fences and gates
- Inaccessible site access roads

Conditions which require action shall be reported on the Weekly Inspection Form.

3.6 Monthly Inspections

Monthly inspections within the HWU are designed to be performed thoroughly by the Inspector in a walk-through manner. The Inspector shall identify conditions which require action.

3.6.1 Final Cover System

Inspection shall be performed to observe the condition of the final cover. At a minimum, the following conditions which require action shall be noted:

- Landfill gas release through the cover soils based on noticeable odors, hissing sounds, bubbling through surface water
- Leachate seeps
- Exposed refuse
- Erosion of topsoil, vegetation or clay cover (>4-in. depth)
- Stressed or lack of vegetation

- Cracks or holes in cover soils due to weathering or burrowing animals
- Ponded water on landfill cover
- Clogged or eroded drain pipes associated with the RCRA caps

3.6.2 Surface Water Management System

Inspection shall be performed to observe the sediment build-up in the basins and ditches, storage capacity remaining in the basins, outlet shutoff valve position, condition of ditches for potential erosion, and condition of inlets and outlets for scouring or erosion.

The following items should be observed for the sedimentation basins:

- Available storage capacity (distance from water level to the spillway outlet elevation)
- Condition of containment berm (signs of erosion or leakage)
- Outlet shutoff valve position (open to allow discharge or closed to contain surface water)
- Sediment build-up

3.6.2.1 Sedimentation Basins

Conditions which require action for the sedimentation basins are as follows:

- Erosion that threatens interior and exterior condition of the basins
- Outlet valve in closed position (valve open for normal operation)
- Significant erosion of waterways
- Insufficient vegetation to prevent erosion
- Insufficient riprap at overflow structure

3.6.2.2 Swales, Downslope Flumes, Culverts, and RCRA Cap Drains/Drain Pipes

Conditions which require action are as follows:

- Presence of debris or sediment which may obstruct flow
- Erosion of swale sidewalls or waterways (>4-in. depth)
- Insufficient vegetation to control erosion
- Erosion around drainage structures
- Ponding of surface water
- Insufficient erosion control measures at culvert inlets and outlets (e.g. rip-rap, erosion mat)

If a condition threatens the stability of the basin or any drainage feature, it will be immediately reported to the Landfill Supervisor.

3.6.3 Gas and Leachate Extraction Systems

The Inspector shall observe the condition of each extraction wellhead, inspecting for deterioration of the riser pipes, flexible hoses, valves, and surface seals around the pipes. Inspection of the system components shall be performed during monitoring events, when possible.

Wellheads and Monitoring and Control Stations

- Noticeable gas odors or hissing sounds associated with leaks in pipes or hoses
- Leachate or condensate leaks on wellhead pipes or hoses (visible liquids, stained conditions)
- Inoperable valves or sample ports
- Damaged or leaking of gas through ground surface seals
- Ponding of surface water

3.6.4 Leachate Control and Groundwater Containment Systems

The Inspector shall observe the condition of the liquids handling system components including holding tanks, lift stations, and manholes. The following items should be observed at the manholes and lift stations:

- Condition of manholes and manhole covers
- Meter readings (hour and total flow)
- Manhole and lift station operation systems (i.e., power, pump operation)

The lift station pumps shall be tested by starting the pumps in the manual mode to verify operation.

Conditions which require action at a minimum are as follows:

- Damaged or inaccessible manholes, pipes, or seals
- Inoperable lift station pumps or metering devices
- Full condensate tank at positive pressure dripleg
- Leachate or condensate leaking at pipe connections
- High liquid or sediment levels (inoperable pumps)
- Unusually high or low pump run times (based on previous monitoring data)
- Open manholes or missing locks
- Manual override pump operation fails

3.6.5 Groundwater Remediation System

The Inspector shall observe the condition of each recovery well and discharge hoses or piping. Conditions which require action at a minimum include:

- Leaking contaminated groundwater from discharge hoses or piping
- Inoperable pumps or meters

3.6.6 Site Security System

Fence and gates shall be inspected for identification of any unauthorized openings and damage to fence, posts, or gates. Site access roads shall be inspected to determine if roads are in good condition.

Conditions which require action at a minimum are as follows:

- Damage to fence or gates
- Missing warning signs
- Missing and/or inoperable locks
- Damaged, inaccessible, or eroded site access roads

Conditions requiring action shall be reported on the Monthly Inspection Form. Conditions associated with system failure will be reported immediately to the Landfill Supervisor.

3.7 Quarterly Inspections

In addition to the monthly inspection requirements detailed in **Section 3.6**, the following features are to be inspected on a quarterly basis within the HWU.

3.7.1 Environmental Monitoring

Groundwater monitoring wells, probes for gas migration, and leachate headwells shall be inspected for condition of protective casing pipes, surface seals, padlocks and caps, and well riser pipes and fittings. Wells associated with the non-hazardous waste landfill can be inspected on a semiannual basis.

Conditions which require action at a minimum include:

- Missing or damaged padlocks
- Damaged ground protective casings
- Damaged ground surface seals
- Inoperable caps or lids

Conditions which require action shall be reported on the Quarterly inspection Form. Space has been provided on the inspection form for the Inspector to comment about conditions noted during inspections that do not appear as one of the items listed.

3.8 Annual Inspections

Inspections within the non-HWUs portions of Kestrel Hawk Landfill are designed to be performed thoroughly by the Inspector in a walk-through manner. Annual inspections of the non-HWUs portions can be completed concurrently with a quarterly inspection of the HWU. The inspection should be recorded on the Quarterly Inspection form provided in **Attachment B**. Conditions requiring action shall be reported on the Quarterly Inspection Form. Conditions associated with system failure will be reported immediately to the Landfill Supervisor.

The Inspector shall identify conditions which require action.

3.8.1 Final Cover System

Inspection shall be performed to observe the condition of the final cover. At a minimum, the following conditions which require action shall be noted:

- Landfill gas release through the cover soils based on noticeable odors, hissing sounds, bubbling through surface water
- Leachate seeps
- Exposed refuse
- Erosion of topsoil, vegetation or clay cover (>4-in. depth)
- Stressed or lack of vegetation
- Cracks or holes in cover soils due to weathering or burrowing animals
- Ponded water on landfill cover
- Clogged or eroded drain pipes

3.8.2 Surface Water Management System

Inspection shall be performed to observe the sediment build-up in the basins and ditches, storage capacity remaining in the basins, outlet shutoff valve position, condition of ditches for potential erosion, and condition of inlets and outlets for scouring or erosion.

The following items should be observed for the sedimentation basins:

- Available storage capacity (distance from water level to the spillway outlet elevation)
- Condition of containment berm (signs of erosion or leakage)
- Outlet shutoff valve position (open to allow discharge or closed to contain surface water)
- Sediment build-up

3.8.2.1 Sedimentation Basins

Conditions which require action for the sedimentation basins are as follows:

- Erosion that threatens interior and exterior condition of the basins

- Outlet valve in closed position (valve open for normal operation)
- Significant erosion of waterways
- Insufficient vegetation to prevent erosion
- Insufficient riprap at overflow structure

3.8.2.2 Swales, Downslope Flumes, Culverts, and Drain Pipes

Conditions which require action are as follows:

- Presence of debris or sediment which may obstruct flow
- Erosion of swale sidewalls or waterways (>4-in. depth)
- Insufficient vegetation to control erosion
- Erosion around drainage structures
- Ponding of surface water
- Insufficient erosion control measures at culvert inlets and outlets (e.g. rip-rap, erosion mat)

If a condition threatens the stability of the basin or any drainage feature, it will be immediately reported to the Landfill Supervisor.

3.8.3 Gas Extraction System

The Inspector shall observe the condition of each landfill gas extraction wellhead, inspecting for deterioration of the riser pipes, flexible hoses, valves, and surface seals around the pipes. Inspection of the system components shall be performed during monitoring events, when possible. At a minimum, the following conditions require action if noted:

- Noticeable gas odors or hissing sounds associated with leaks in pipes or hoses
- Leachate or condensate leaks on wellhead pipes or hoses (visible liquids, stained conditions)
- Inoperable valves or sample ports
- Damaged or leaking of gas through ground surface seals
- Ponding of surface water at extraction well location

3.8.4 Leachate Extraction and Conveyance System

The Inspector shall observe the condition of the liquids handling system components including lift stations/manholes. The following items should be observed:

- Condition of manholes and manhole covers
- Condition of leachate head well and cleanout access points
- Meter readings (hour and total flow)
- Manhole, lift station, and extraction well operation systems (i.e., power, pump operation)

Pumps shall be tested by starting the pumps in the manual mode to verify operation. Conditions which require action at a minimum are as follows:

- Damaged or inaccessible manholes, pipes, or seals
- Inoperable lift station/extraction well pumps or metering devices
- Full condensate tank at positive pressure dripleg
- Leachate or condensate leaking at pipe connections
- High liquid or sediment levels (inoperable pumps)
- Unusually high or low pump run times (based on previous monitoring data)
- Open manholes or missing locks
- Manual override pump operation fails

3.8.5 Site Security System

Portions of the site security system not previously inspected as part of the HWU inspections should be completed annually. Fence and gates shall be inspected for identification of any unauthorized openings and damage to fence, posts, or gates. Site access roads shall be inspected to determine if roads are in good condition.

Conditions which require action at a minimum are as follows:

- Damage to fence or gates
- Missing warning signs
- Missing and/or inoperable locks
- Damaged, inaccessible, or eroded site access roads

3.8.6 Environmental Monitoring

Groundwater monitoring wells, probes for gas migration, gradient control, and leachate headwells shall be inspected for condition of protective casing pipes, surface seals, padlocks and caps, and well riser pipes and fittings.

Conditions which require action at a minimum include:

- Missing or damaged padlocks
- Damaged ground protective casings
- Damaged ground surface seals
- Inoperable caps or lids

3.9 Inspection Forms

Inspection forms have been provided in **Attachment B**, which shall be used for all inspections. A form is provided for each type of inspection (weekly, monthly, and quarterly). Inspection forms are to be completed with the Inspector names, date, and time of inspection, inspection results, and comments. Inspection forms will be signed by the Inspector indicating the inspection has been completed, and presented to the Landfill Supervisor for signature, indicating that the Landfill Supervisor is aware of potential problems.

If corrective action is required, it will be noted on the inspection form, and the Corrective Action Form presented in **Attachment C** will be utilized. Inspection forms will be kept for at least three years in accordance with s. NR 664.0015(4), Wis. Adm. Code.

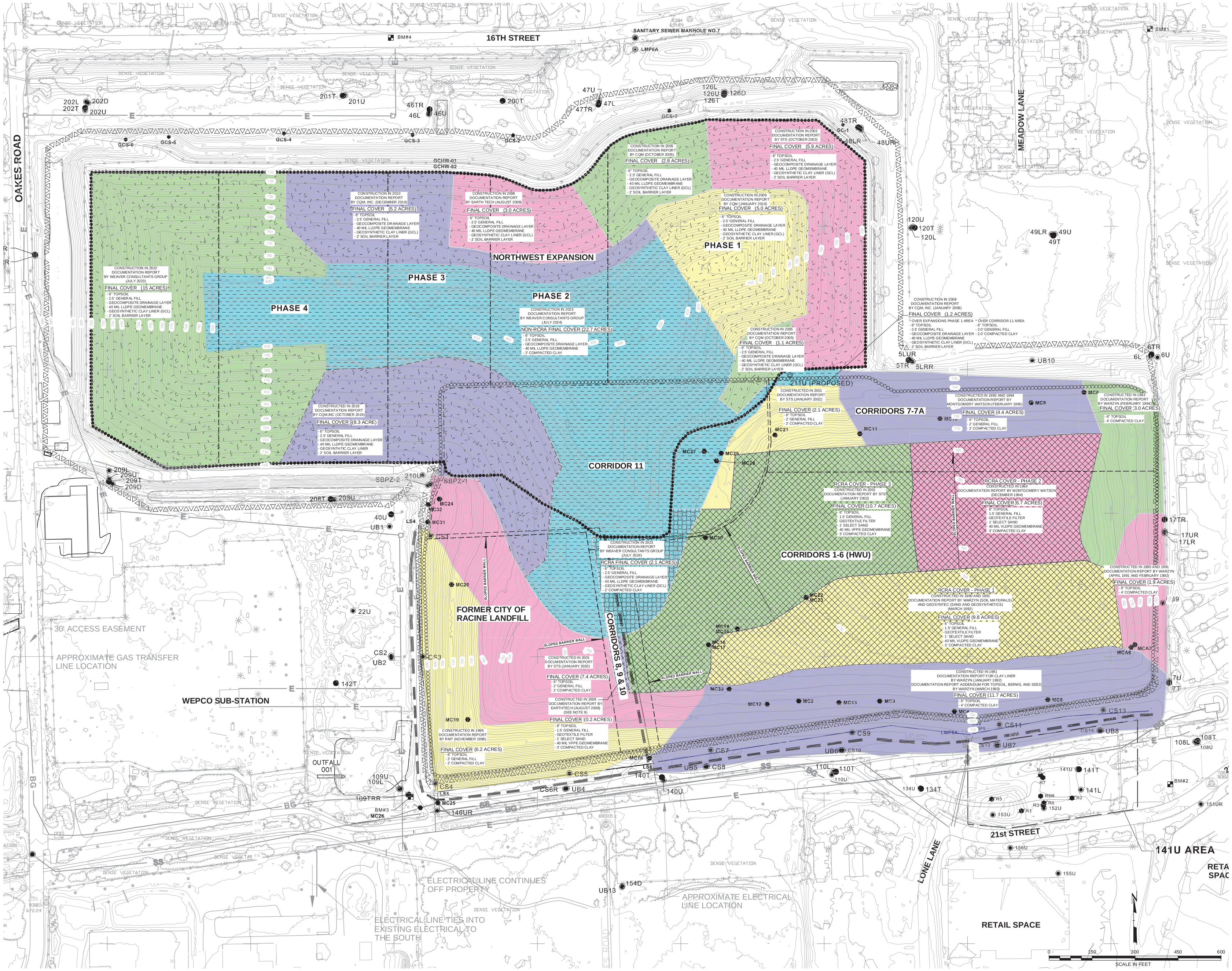
3.10 Corrective Actions

The routine inspections may result in recommendations for corrective actions. A specific tracking mechanism shall be used to make sure that all noted deficiencies are corrected, forms completed, and proper filing maintained.

When a corrective action is required, the inspection form will initiate the process. The "work required" portion of a Corrective Action Report (**Attachment C**) shall be filled out by the Inspector and given to the person responsible for the correction or repair.

After the deficiency is corrected, the completed Corrective Action Report will be provided to the Inspector to be signed by the Inspector and Landfill Supervisor. The Corrective Action Report will be attached to the inspection form in the file which first noted the deficiency.

During the next scheduled inspection, the Inspector will verify that the deficiency was corrected. By using this system, the Inspector will track the deficiencies from identification to correction. A file system will be maintained such that completed inspection forms are filed by date and are accessible.



LEGEND

- APPROXIMATE PROPERTY LINE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING SPOT ELEVATION
- TREES AND / OR BRUSH
- SITE GRID COORDINATE
- 161T — EXISTING WATER TABLE OBSERVATION WELL LOCATION AND NUMBER
- UB5 — PIEZOMETER LOCATION AND NUMBER
- SW1 OR SG2 — STAFF GAUGE LOCATION AND NUMBER
- LS5 OR MH3 — MANHOLE/LIFT STATION LOCATION AND NUMBER
- APPROXIMATE LOCATION OF GROUNDWATER CONTAINMENT STRUCTURE
- NORTHWEST EXPANSION LIMITS OF WASTE
- OLD SITE LIMITS OF WASTE
- DESIGN MANAGEMENT ZONE
- APPROXIMATE LIMITS OF WASTE (EXISTING SITE)
- APPROXIMATE LIMITS OF WASTE CORRIDORS (EXISTING SITE)
- SANITARY SEWER
- OVERHEAD ELECTRICAL
- OUTFALL 005 — SEDIMENTATION BASIN OUTFALL LOCATION AND NUMBER
- R-2 — RECOVERY WELL / MC GAS CONTROL VALVE

COVER DESIGNS

1991 TO 1993 (NON-RCRA)
- 6" TOPSOIL
- 4' COMPACTED CLAY

1990 TO 2001 (RCRA)
- 6" TOPSOIL
- 1.5' GENERAL FILL
- GEOTEXTILE FILTER
- 1' SELECT SAND
- 40 MIL VLDPE GEOMEMBRANE
- 3' COMPACTED CLAY

LOCATION OF INSTALLED RCRA FINAL COVER

1994 TO 2001 (NR 180)
- 6" TOPSOIL
- 2' GENERAL FILL
- 2' COMPACTED CLAY

2002 TO 2022 (NR 500)
- 6" TOPSOIL
- 2.5' GENERAL FILL
- GEOCOMPOSITE DRAINAGE LAYER
- 40 MIL LLDPE GEOMEMBRANE
- GEOSYNTHETIC CLAY LINER (GCL)
- 2' SOIL BARRIER LAYER

LOCATION OF INSTALLED NR 500 FINAL COVER

2023 TO 2024 (NR 500 AND RCRA)

RCRA AREA
- 6" TOPSOIL
- 2.5' GENERAL FILL
- GEOCOMPOSITE DRAINAGE LAYER
- 40 MIL LLDPE GEOMEMBRANE
- GEOSYNTHETIC CLAY LINER (GCL)
- 2' COMPACTED CLAY

LOCATION OF REVISED RCRA FINAL COVER UPDATED

NON-RCRA AREA (REVISED NR 500)
- 6" TOPSOIL
- 2.5' GENERAL FILL
- GEOCOMPOSITE DRAINAGE LAYER
- 40 MIL LLDPE GEOMEMBRANE
- 2' COMPACTED CLAY

LOCATION OF NR 500 FINAL COVER (REVISED)

NOTES

1. SITE LOCATION PART OF THE NORTH 1/2 OF SECTION 23, TOWNSHIP 3 NORTH, RANGE 22 EAST, IN THE CITY OF RACINE, COUNTY OF RACINE, STATE OF WISCONSIN.
2. TOPOGRAPHIC BASE MAP WAS OBTAINED FROM AERO-METRIC ENGINEERING, INC. (DATE OF PHOTOGRAPHY OCTOBER 06, 1994; JUNE 1995, MARCH 28, 2005 MARCH 29, 2008), HENDERSON AERIAL SURVEYS, INC. (DATE OF PHOTOGRAPHY APRIL 9, 2012), FIRMATEK AERIAL SURVEYS CO. (DATE OF SURVEY OCTOBER 23, 2024)
3. MONITORING WELL LOCATIONS DETERMINED BY SURVEY INFORMATION PROVIDED BY KESTREL HAWK LANDFILL.
4. APPROXIMATE LIMITS OF EXISTING WASTE WERE PROVIDED BY KESTREL HAWK LANDFILL.
5. VERTICAL DATUM IS USGS MEAN SEA LEVEL. TOPOGRAPHIC CONTOUR INTERVAL IS TWO FEET.
6. HORIZONTAL DATUM IS BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM. THE SITE GRID IS PARALLEL AND PERPENDICULAR TO THE STATE PLANE COORDINATE SYSTEM. SITE GRID IS REFERENCED TO STATE PLANE COORDINATE GRID WITH SITE GRID COORDINATE 0+00N, 100+00E EQUAL TO STATE PLANE COORDINATE 264,196.55N, 2,573,700.72E.
7. LOCATION OF PROPERTY LINE PROVIDED BY KESTREL HAWK LANDFILL.
8. THE WESTERN BOUNDARY OF THE RCRA COVER EXTENDS TO THE WESTERN BOUNDARY OF THE GEOMEMBRANE LINER PLACED ON THE BASE OF CORRIDORS 8, 9, AND 10 PER THE AUGUST 2008 DOCUMENTATION REPORT BY EARTHTECH.

PROJECT:	KESTREL HAWK LANDFILL INSPECTION MANUAL RACINE, WISCONSIN		
TITLE:	CONSTRUCTED FINAL COVER LOCATIONS		
DRAWN BY:	T. FIEBRANZ	PROJ NO.:	557469.0000
CHECKED BY:	B. KAHNK		FIGURE 1
APPROVED BY:	T. MARTIN		
DATE:	APRIL 2025		

TRC
999 Fourier Drive
Suite 101
Madison, WI 53717
Phone: 608.826.3600

FILE NO.: 557469.0000.CFCL-IM.dwg

DRAWING NAME: J:\Republic\Kestrel Hawk\557496 - Closure Process\0000\ 557469.0000.CFCL-IM.dwg --- PLOT DATE: April 03, 2025 - 2:25PM --- LAYOUT: CONSTRUCTED FINAL COVER LOCATIONS

NOTES:

1. TOPOGRAPHY SHOWN WAS OBTAINED FROM AERIAL SURVEY CONDUCTED BY FIRMATEK ON OCTOBER 23, 2024.

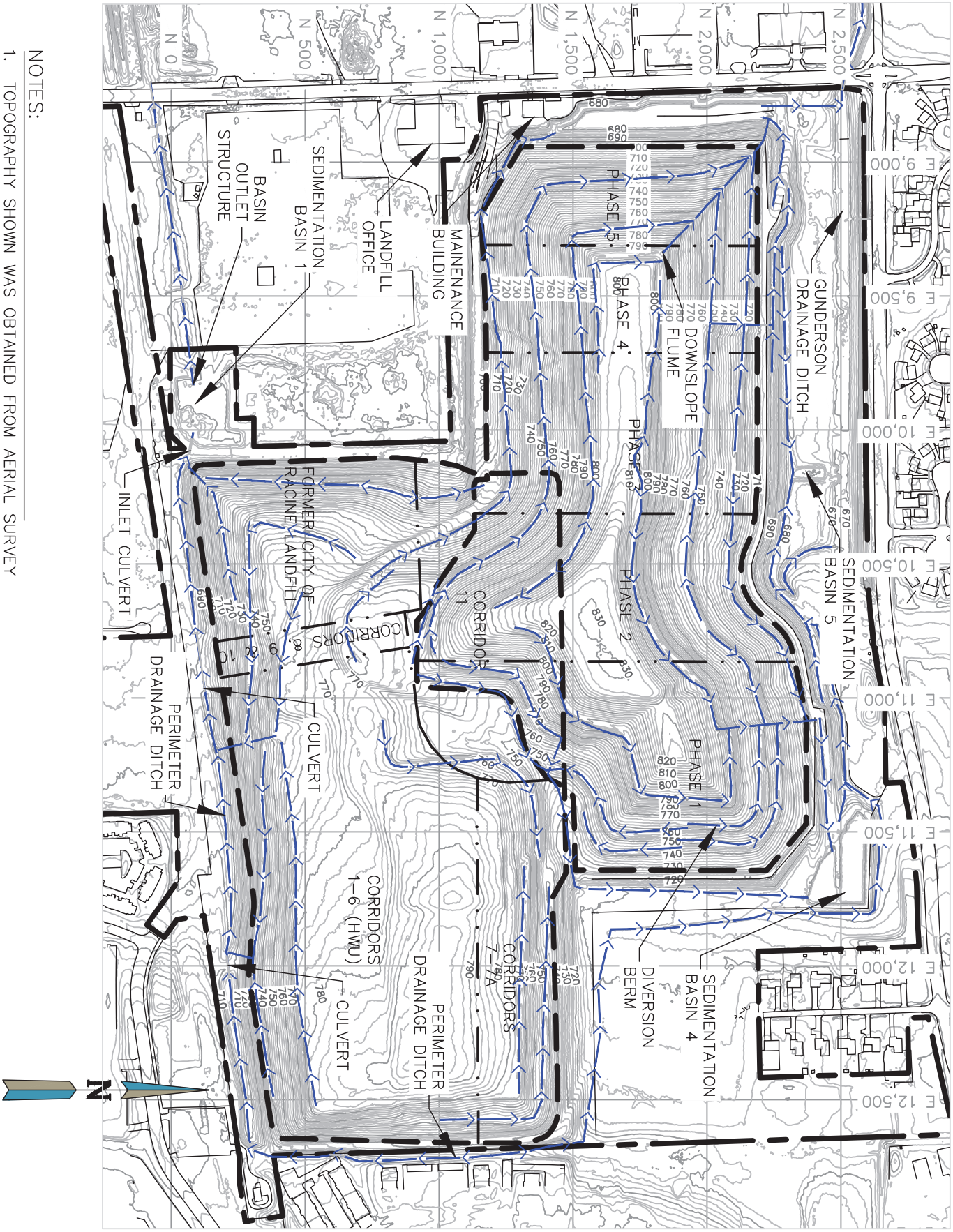


FIGURE 2

PREPARED FOR:

KESTREL HAWK LANDFILL

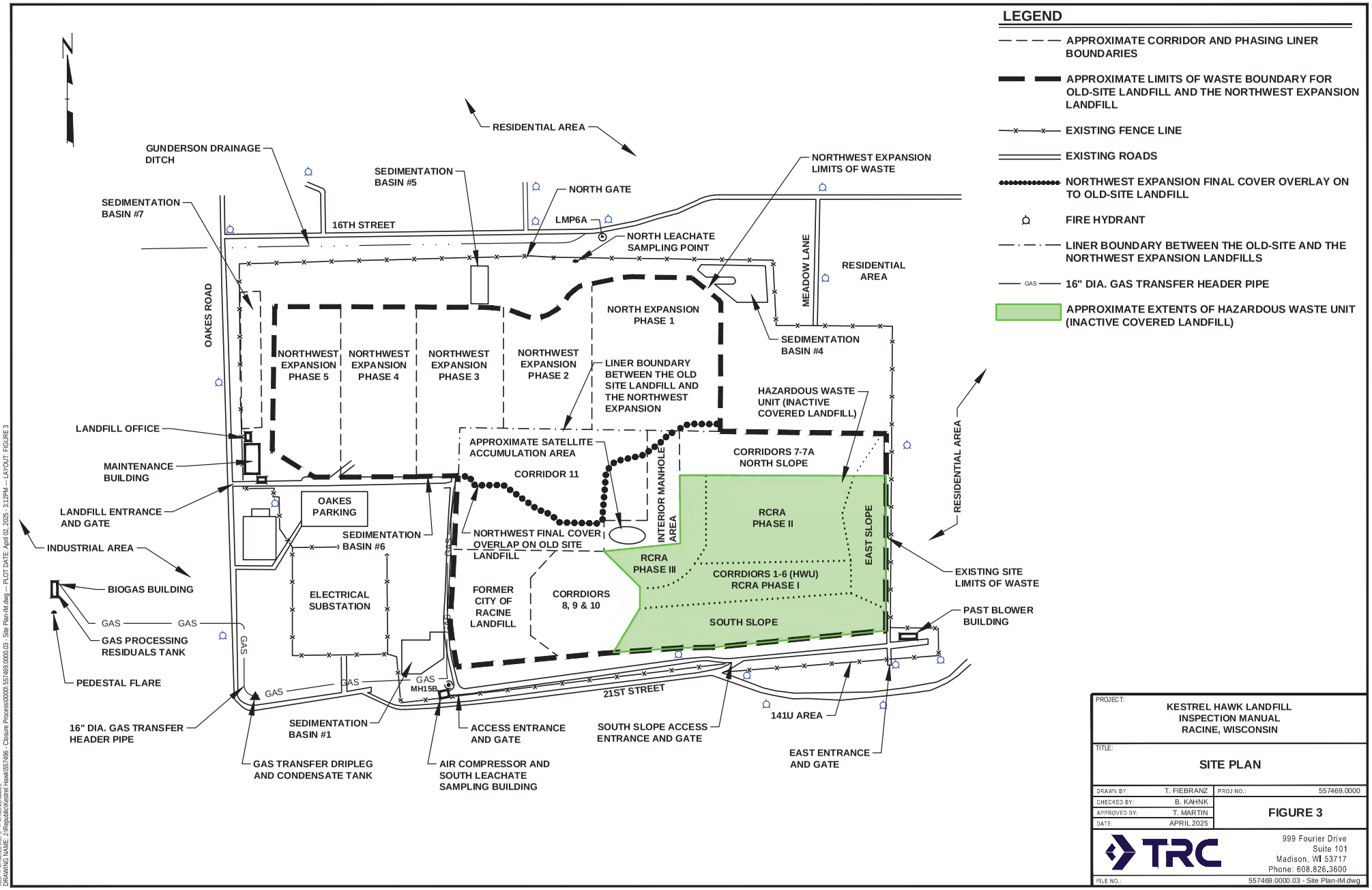
SURFACE WATER FLOW TO NAVIGABLE WATERWAYS

KESTREL HAWK LANDFILL
RACINE, WISCONSIN

Weaver Consultants Group
NAPERVILLE, ILLINOIS
(630) 717-4848 www.wcgrp.com

DRAWN BY:	BPS
REVIEWED BY:	CJB
DATE:	03/25/2025
FILE:	0120-184-DWG
CAD:	KH000542.dwg

FIGURE 1



LEGEND

- APPROXIMATE CORRIDOR AND PHASING LINER BOUNDARIES
- APPROXIMATE LIMITS OF WASTE BOUNDARY FOR OLD-SITE LANDFILL AND THE NORTHWEST EXPANSION LANDFILL
- EXISTING FENCE LINE
- EXISTING ROADS
- NORTHWEST EXPANSION FINAL COVER OVERLAY ON TO OLD-SITE LANDFILL
- FIRE HYDRANT
- LINER BOUNDARY BETWEEN THE OLD-SITE AND THE NORTHWEST EXPANSION LANDFILLS
- GAS — 16" DIA. GAS TRANSFER HEADER PIPE
- APPROXIMATE EXTENTS OF HAZARDOUS WASTE UNIT (INACTIVE COVERED LANDFILL)

PROJECT:
KESTREL HAWK LANDFILL
INSPECTION MANUAL
RACINE, WISCONSIN

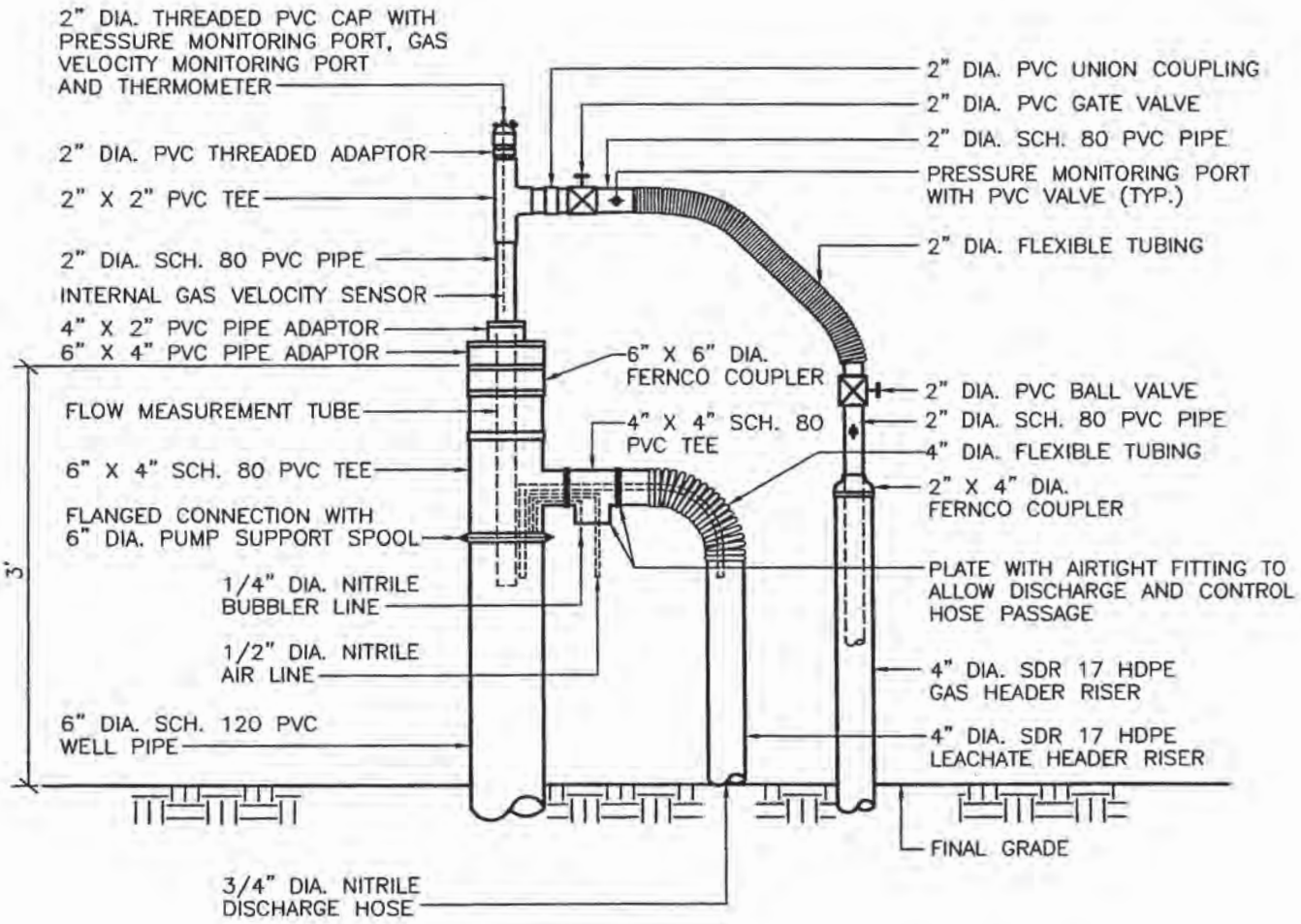
TITLE:
SITE PLAN

DRAWN BY:	T. FIEBRANZ	PROJ NO.:	557469.0000
CHECKED BY:	B. KAHNK		
APPROVED BY:	T. MARTIN		FIGURE 3
DATE:	APRIL 2025		

TRC
999 Fourier Drive
Suite 101
Madison, WI 53717
Phone: 608.826.3600

FILE NO.: 557469.0000.03 - Site Plan-IM.dwg

1x17 --- ATTACHED IMAGES: ---
DRAWING NAME: J:\Republic\Kestrel Hawk\557486 - Closure Process\0000\557469.0000.03 - Site Plan-IM.dwg --- PLOT DATE: April 02, 2025 - 3:12PM --- LAYOUT: FIGURE 3



TYPICAL LEACHATE/GAS EXTRACTION WELLHEAD DETAIL

SCALE: 3/4" = 1'

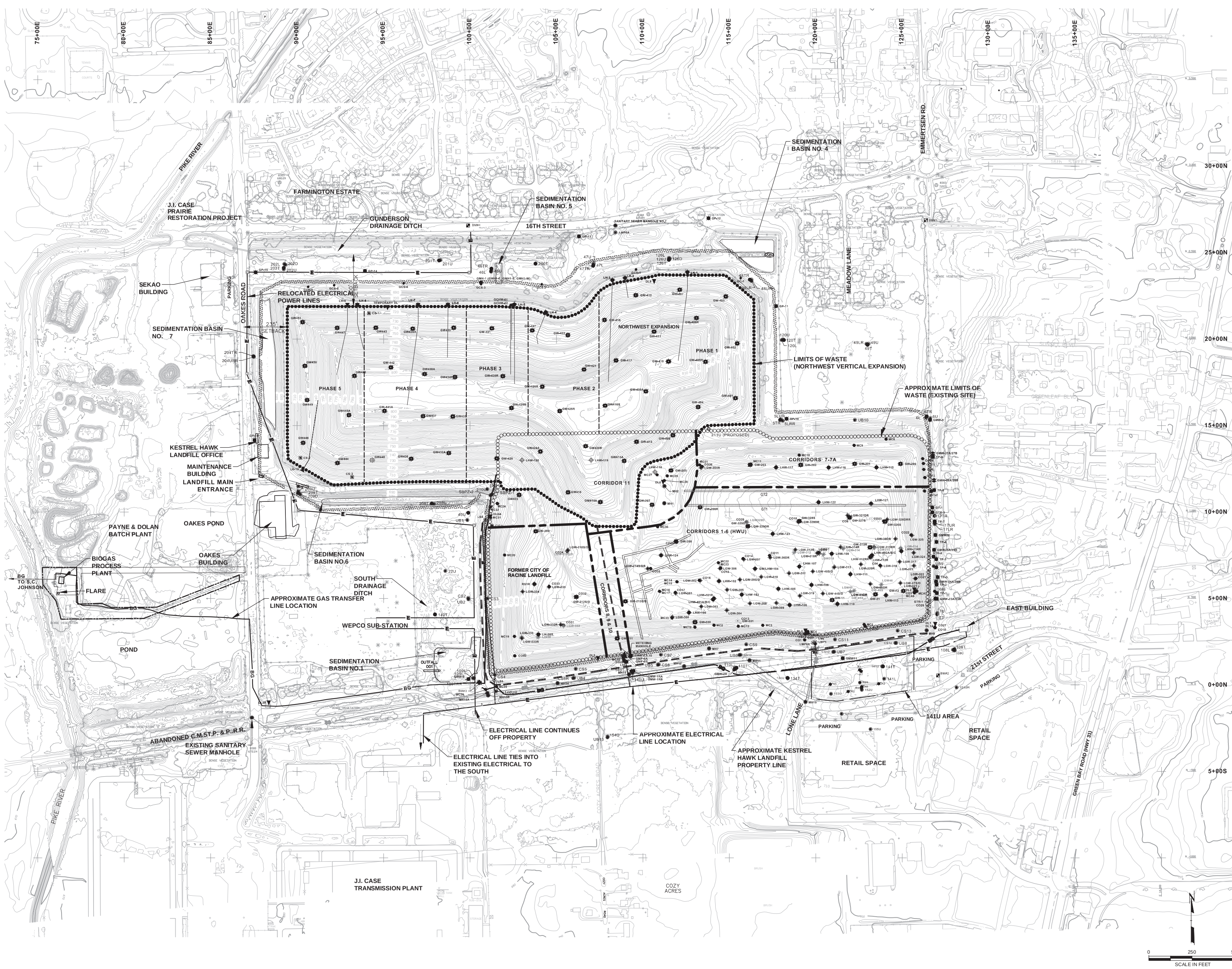
NOTES

1. THE LANDTEC ACCU-FLO MODEL 200 WELLHEAD INCLUDES THE EQUIPMENT FROM THE 4" X 2" PVC PIPE ADAPTOR AT THE WELL PIPE. ACROSS TO, AND INCLUDING, THE 2: FLEXIBLE TUBING.
2. ACCU FLO™ IS A REGISTERED TRADEMARK OF LANDFILL CONTROL TECHNOLOGIES (LANDTEC).

FIGURE 4

Management Review — Other
Technical Review — Project Manager DTL 1-29-03
QUALITY CONTROL — Graphic Standards DI 1-29-03 — Lead Professional

Developed By DTL	Drawn By DLF	**WELLHEAD DETAIL**	Drawing Number 2082574 01180101 A2
Approved By Dale T. Lane	Date 2-20-03	INSPECTION MANUAL FOR THE HAZARDOUS WASTE UNIT REPUBLIC SERVICES KESTREL HAWK RECYCLING AND DISPOSAL FACILITY RACINE, WISCONSIN EPA ID NO. WID-076171008 WDNR LICENSE NO. 572	MWH MONTGOMERY WATSON HARZA
Reference 2081788.01180101-A2			
Revisions			



LEGEND

- APPROXIMATE PROPERTY LINE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- SITE FENCING (AS EXISTING IN 6/04)
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING SPOT ELEVATION
- TREES AND / OR BRUSH
- SITE GRID COORDINATE
- NEW WELL INSTALLED
- EXISTING WATER TABLE OBSERVATION WELL LOCATION AND NUMBER
- PIEZOMETER LOCATION AND NUMBER
- ABANDONED WATER TABLE OBSERVATION WELL LOCATION AND NUMBER
- ABANDONED PIEZOMETER LOCATION AND NUMBER
- GAS MONITORING WELL LOCATION AND NUMBER (TWO NUMBERS INDICATES A WELL NEST)
- GAS CONDENSATE DRIPLEG LOCATION AND NUMBER
- PROPOSED GAS CONDENSATE DRIPLEG LOCATION AND NUMBER
- LEACHATE HEADWELL LOCATION AND NUMBER (PROPOSED)
- LEACHATE HEADWELL LOCATION AND NUMBER (EXISTING)
- ABANDONED LEACHATE HEADWELL LOCATION AND NUMBER
- GAS T-PROBE LOCATION AND NUMBER
- ABANDONED GAS T-PROBE LOCATION AND NUMBER
- STAFF GAUGE LOCATION AND NUMBER
- MANHOLE/LIFT STATION LOCATION AND NUMBER
- LEACHATE COLLECTION CLEANOUT RISER PIPE LOCATION AND NUMBER
- LEACHATE GAS WELL LOCATION AND NUMBER
- ABANDONED LEACHATE GAS WELL LOCATION AND NUMBER
- GAS PROBE LOCATION AND NUMBER
- GAS WELL LOCATION AND NUMBER
- LEACHATE MONITORING POINT LOCATION AND NUMBER
- LEACHATE HEADWELL MONITORING PORT
- LEACHATE HEAD MONITORING LOCATION AND NUMBER
- GRADIENT CONTROL HEADWELL
- APPROXIMATE LOCATION OF GROUNDWATER CONTAINMENT STRUCTURE
- EXISTING LIMITS OF WASTE (NORTHWEST HORIZONTAL AND VERTICAL EXPANSION)
- DESIGN MANAGEMENT ZONE
- APPROXIMATE LIMITS OF WASTE (EXISTING SITE)
- APPROXIMATE LIMITS OF WASTE CORRIDORS (EXISTING SITE)
- SANITARY SEWER
- BIOGAS
- ABANDONED IN-PLACE BIOGAS
- OVERHEAD ELECTRICAL
- PROPOSED GAS EXTRACTION WELL LOCATION AND NUMBER
- PROPOSED PIEZOMETER LOCATION AND NUMBER
- GRADIENT CONTROL SYSTEM MONITORING POINT AND NUMBER
- GRADIENT CONTROL SYSTEM MANHOLE
- SEDIMENTATION BASIN OUTFALL LOCATION AND NUMBER
- GAS TRENCH LOCATION (MONITORED)
- GAS TRENCH LOCATION (NOT MONITORED)
- PROPOSED FENCE LINE
- OLD SITE CORRIDOR BOUNDARY
- RECOVERY WELL / MC GAS CONTROL VALVE
- LEACHATE RISER VAULT
- BENCH MARK LOCATION AND NUMBER
- ABANDONED RECOVERY WELL
- 141U AREA BOUNDARY
- CONDENSATE SUMP AND NUMBER

NOTES

1. SITE LOCATION: PART OF THE NORTH 1/2 OF SECTION 23, TOWNSHIP 3 NORTH, RANGE 22 EAST, IN THE CITY OF RACINE, COUNTY OF RACINE, STATE OF WISCONSIN.
2. TOPOGRAPHIC BASE MAP WAS OBTAINED FROM AERO-METRIC ENGINEERING, INC. (DATE OF PHOTOGRAPHY OCTOBER 06, 1994; JUNE 1995, MARCH 28, 2005 MARCH 29, 2008), HENDERSON AERIAL SURVEYS, INC. (DATE OF PHOTOGRAPHY APRIL 9, 2012), FIRMATEK AERIAL SURVEYS CO. (DATE OF SURVEY OCTOBER 23, 2024)
3. MONITORING WELL LOCATIONS DETERMINED BY SURVEY INFORMATION PROVIDED BY KESTREL HAWK LANDFILL.
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7. LOCATION OF PROPERTY LINE PROVIDED BY KESTREL HAWK LANDFILL.

PROJECT:	KESTREL HAWK LANDFILL INSPECTION MANUAL RACINE, WISCONSIN		
TITLE:	FACILITY MAP		
DRAWN BY:	T. FIEBRANZ	PROJ NO.:	557469.0000
CHECKED BY:	B. KAHNK	FIGURE 5	
APPROVED BY:	T. MARTIN		
DATE:	APRIL 2025		
TRC	999 Fourier Drive Suite 101 Madison, WI 53717 Phone: 608.826.3600		
FILE NO.:	557469.0000.02-IM.dwg		

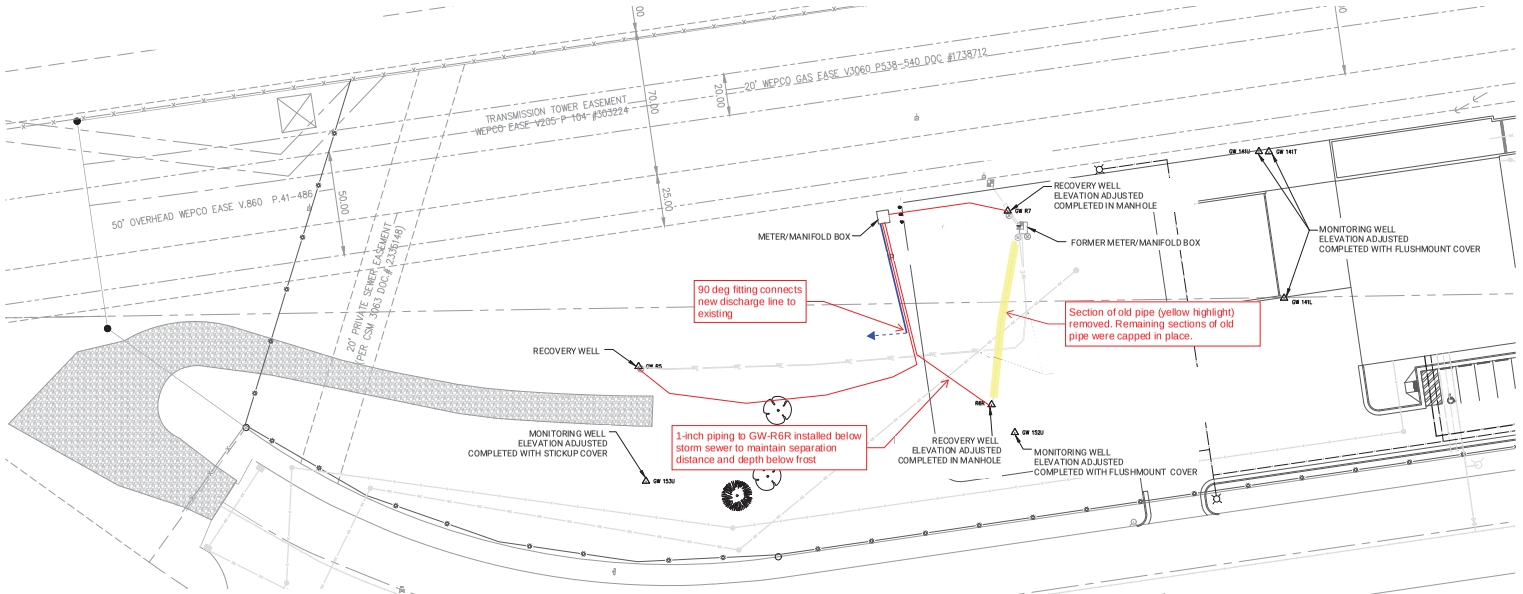
24x36 --- USER: TFiebranz --- ATTACHED XREFS: pipe old-site; utility; proposed; bmrnt; EG - 2024-10-23; Site Features; bmc 2019 May; gas; gas trench --- ATTACHED IMAGES:
DRAWING NAME: J:\Republic\Kestrel Hawk\557496 - Closure Process\0000\557469.0000.02-IM.dwg --- PLOT DATE: April 03, 2025 - 2:25PM --- LAYOUT: FACILITY MAP

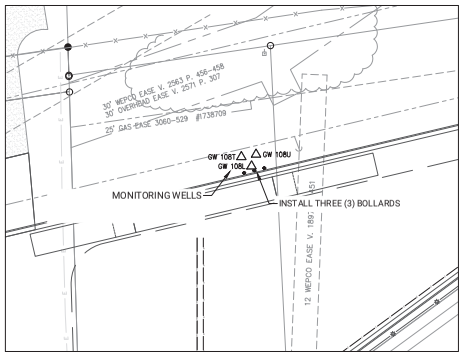
KEY

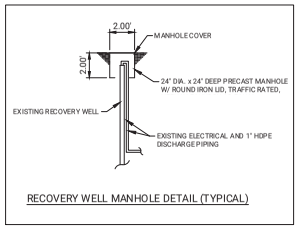
APPROX. NEW 1-IN. HDPE PIPE AND ELECTRICAL CONDUIT

DISCHARGE LINE

NOTE PIPE LOCATIONS ARE APPROXIMATE.
MONITORING AND RECOVERY WELLS WERE SURVEYED ON 6/27/2024







RECOVERY WELL MANHOLE DETAIL (TYPICAL)

0 30 60
scale feet

FIGURE 6

Foth Infrastructure & Environment, LLC
7044 S. Lovers Drive, Suite 200
Franklin, WI 53132
Phone: 414-336-7900 Fax: 414-336-7901

CITY OF RACINE
TRANSFER STATION
6110 - 6300 21ST STREET
RACINE, WI

WISCONSIN
RACINE COUNTY

DATE: MAY 2024
BY: ASL
CHKD: SMB2

REMEDIAL SYSTEMS DOCUMENTATION

PROJECT ID 22R021.00

SHEET 1

Attachment A: Inspector Training Sign-Off Sheet

INSPECTOR TRAINING SIGN-OFF SHEET

Kestrel Hawk Landfill employees who will have responsibilities on the hazardous waste unit (HWU) area are to read this Inspection Manual, understand its contents, receive training per s. NR G64 Wis. Adm. Code, and OSHA 29 CFR 1910.120 to perform the duties specified in the Inspection Manual and discuss details with the Landfill Supervisor. By signing below, you are indicating you have read this Inspection Manual, understood its contents, have been given the training necessary to perform the inspection duties, have had the opportunity to discuss details with the Landfill Supervisor, and agree to abide by its requirements.

Date	**Name**	**Title**	**Signature**

Trainers:

Landfill Supervisor:

Attachment B: Inspection Forms

Weekly Inspection Form

Kestrel Hawk RDF Hazardous Waste Unit

Form 4A

Date: ___/___/_____ Time Start (24 hr): _____

Inspector: _____ Time End (24 hr): _____

Weather Conditions: _____

	Action Required? Yes	No	Comments/Observations/ Locations
Final Cover System			
• Leachate seeps	☐	☐	_____
• Landfill gas released through the cover soils based on noticeable odors, hissing sounds, bubbling through surface water	☐	☐	_____
• Erosion of topsoil, vegetation (>4-in. depth)	☐	☐	_____
Surface water management system			
Sedimentation basins			
• Little to no available storage capacity (levels approaching spillway elevation)	☐	☐	_____
• Significant erosion (>4-in. depth)	☐	☐	_____
Gas and Leachate Extraction and Groundwater Containment Systems			
• Wellheads (refer to list on Page 2)	☐	☐	_____
o Visibly damaged or cracked equipment	☐	☐	_____
o Disconnected pipes or hoses	☐	☐	_____
• Lift Stations/Manholes (refer to list on page 2)	☐	☐	_____
o Lack of power (red power indicator light is off)	☐	☐	_____
o High liquid alarms	☐	☐	_____
o Meter readings (hour and total flow)	☐	☐	
Groundwater Remediation System			_____
• Visibly damaged or leaking equipment	☐	☐	_____
• Lack of power	☐	☐	_____
Site Security System			
• Damaged fences and gates	☐	☐	_____
• Inaccessible site access roads	☐	☐	_____

Identify additional areas which require attention (attach separate sheets, if necessary):_____

_____

_____

Identify any equipment not operating or in need of repair:_____

_____

_____

Action Items (Identify items and target completion date)

Person assigned_____ Target Completion date_____ Item/Area_____

Person assigned_____ Target Completion date_____ Item/Area_____

Person assigned_____ Target Completion date_____ Item/Area_____

Signatures

Inspector_____ Date_____

Landfill Supervisor_____ Date_____

Itemized inspection list (cross off Item after inspection)

Leachate/Gas wells

GW12	LGW328S/DR	LGW309	LGW319	LGW320R **	
GW104	LGW300	LGW310	LGW44D	LGW305 **	
LGW307	LGW301	LGW311	LGW321**	LGW304 **	
GW213S	LGW302	LGW312R	LGW322 **	LGW47 **	
LGW36DR	LGW303	LGW313	LGW323 **	LGW40 **	
GW214D	LGW327S/DR	LGW314	LGW324 **	GW39 **	
LGW331	LGW326S/DRR	LGW315RR	LGW325 **	GW214S **	
LGW329DR	LGW306	LGW316	LGW46DR **	LGW38DR **	
LGW317	LGW45DR	LGW308	LGW318R **		

- *Each well has two pipes one 8” gas and one 6” leachate
- **Not Connected to Gas System

Lift Stations/ Manholes

LS8
LMP8A
LS4
LS5
LS6
MH1

GW Recovery

R5
R6R
R7

MONTHLY INSPECTION FORM
KESTREL HAWK RDF HAZARDOUS WASTE UNIT

FORM 43

Date: ____/____/____ Time Start (24 hr): _____

Inspector: _____ Time End (24 hr): _____

Weather Conditions: _____

	Action Required? Yes	No	Comments
Final Cover System			
• Landfill gas release through the cover soils based on noticeable odors, hissing sounds, bubbling to surface water	❑	❑	_____
• Leachate seeps	❑	❑	_____
• Exposed refuse	❑	❑	_____
• Erosion of topsoil, vegetation (>4-in. Depth)	❑	❑	_____
• Stressed or lack of vegetation	❑	❑	_____
• Cracks or holes in cover soils due to weathering or burrowing animals	❑	❑	_____
• Ponded water on landfill cover	❑	❑	_____
Surface Water Management System			
a. Sedimentation Basins			
• Little to no available storage capacity (levels approaching spillway elevation)	❑	❑	_____
• Erosion that threatens interior and exterior condition of the basin	❑	❑	_____
• Outlet valve position	❑	❑	_____
• Significant erosion of waterways (>4-in. depth)	❑	❑	_____
• Insufficient vegetation to prevent erosion	❑	❑	_____
• Insufficient rip-rap at overflow structure	❑	❑	_____
• Sediment accumulation	❑	❑	_____
b. Swales, Downslope Flumes, Culverts, and RCRA Cap Drains			
• Presence of debris or sediment which may obstruct flow	❑	❑	_____
• Erosion of swale sidewalls or waterways (>4-in. depth)	❑	❑	_____
• Insufficient vegetation to control erosion	❑	❑	_____
• Erosion around drainage structures	❑	❑	_____
• Ponding of surface water	❑	❑	_____
• Insufficient erosion control measures at culvert and outlets (e.g., rip-rap, erosion mat)	❑	❑	_____

	Action Required? Yes	No	Comments
Gas and Leachate Extraction Systems			
a. Wellheads and Monitoring and Control Stations (refer to lists on Page 3)			
• Visibly damaged or cracked equipment	❑	❑	_____
• Disconnected pipes or hoses	❑	❑	_____
• Noticeable gas odors or hissing sounds associated with leaks in pipes or hoses	❑	❑	_____
• Leachate or condensate leaks on wellhead pipes or hoses (visible liquids, stained conditions)	❑	❑	_____
• Inoperable valves or sample ports	❑	❑	_____
• Damaged or leaking of gas through ground surface seals (including protective boots)	❑	❑	_____
• Ponding of surface water	❑	❑	_____
Leachate Control and Groundwater Containment Systems			
a. Lift Stations/Manholes (refer to list on Page 3)			
• Damaged or inaccessible manholes, pipes, or seals	❑	❑	_____
• Lack of power (red power indicator light is off)	❑	❑	_____
• Inoperable lift station pumps or metering devices	❑	❑	_____
• Full condensate tank at positive pressure dripleg	❑	❑	_____
• Leachate or condensate leaking at pipe connections	❑	❑	_____
• High liquid and/or sediment levels (inoperable pumps and/or floats)	❑	❑	_____
• Unusually high or low pump run times (based on previous monitoring data)	❑	❑	_____
• Open manholes or missing locks	❑	❑	_____
• Use manual override to test pump	❑	❑	_____
• Meter readings (hour and total flow)[1]	❑	❑	_____
Groundwater Remediation System			
a. Recovery Wells (refer to list on Page 3)			
• Leaking contaminated groundwater	❑	❑	_____
• Inoperable pumps or meters	❑	❑	_____
Site Security System			
• Damage to fence or gates	❑	❑	_____
• Missing warning signs	❑	❑	_____
• Missing and/or inoperable locks	❑	❑	_____
• Damaged, inaccessible, or eroded site access road	❑	❑	_____

Footnote:

(1) Record meter readings (hour and total flow) in log book.

Identify additional areas which require attention (attach separate sheets, if necessary): _____

_____

_____

Identify any equipment not operating or in need of repair: _____

_____

_____

SIGNATURES

Inspector: _____ Date: _____

Landfill Supervisor: _____ Date: _____

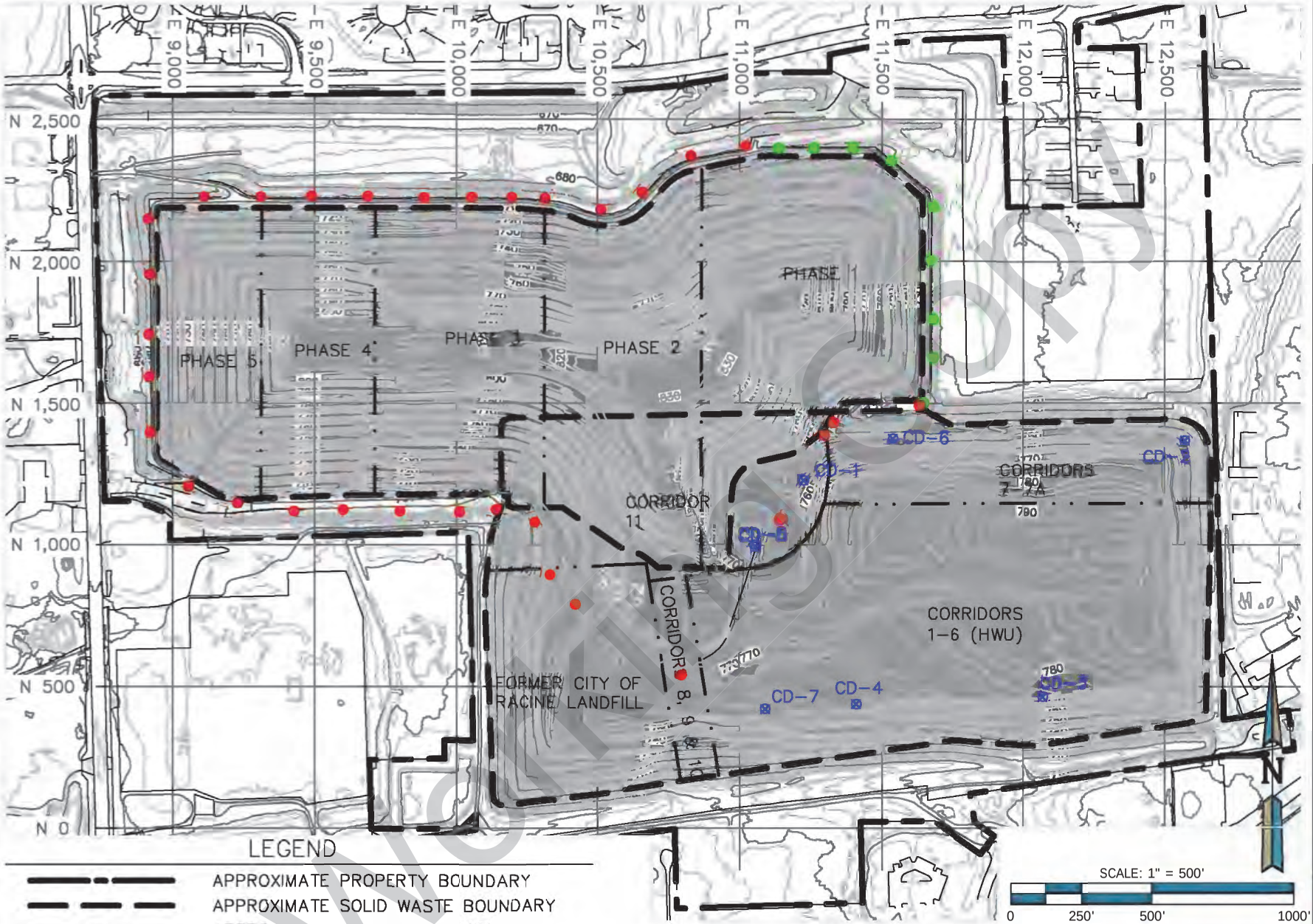
Itemized Inspection List (**cross off item after inspection**)

	Leachate/Gas Wellheads			Monitoring and Control Assembly Stations	Lift Stations/Manholes	Groundwater Recovery Wells
GW11	LGW47	LGW314	LGW325	MC1	LS8	R5
GW12	LGW300	LGW315RR	LGW326/DRR	MC2	LMP8A	R6R
GW12	LGW301	LGW316	LGW327/DR	MC3	LMP1	R7
GW21	LGW302	LGW317	LGW328/DR	MC4	LS4	
LGW104	LGW303	LGW318R	**LGW329DR	MC5	LS5	
LGW36DR	LGW304	LGW319	LGW330	MC6	LS6	
LGW38DR	LGW305	LGW3330R	LGW331	MC7	MH1	
LGW39	LGW306	LGW321	LGW213/D	MC8		
LGW40	LGW307	LGW322	LGW214S/DR	MC9		
LGW44D	LGW308	LGW323	LGW331	MC10		
LGW45DR	LGW309	LGW320R		MC111 TO mc13		
LGW46DR	LGW310	LGW321		MC18 TO MC23		
	LGW311	LGW322		MC25 TO MC30		
	LGW312R	LGW323		MC33		
	LGW313	LGW324				

Note:

*** Each of these wells has two well pipes. First is an 8" leachate well, and second is a 6" gas well.**

**** Shallow well @ LGW 329S is not connected to gas system.**



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE SOLID WASTE BOUNDARY
- APPROXIMATE PHASE BOUNDARY
- EXISTING 10' CONTOURS
- EXISTING 2' CONTOURS
- CONSTRUCTED FINAL COVER
- CD–1 APPROXIMATE RCRA CAP DRAIN LOCATION
- RECORD SUBTITLE D CAP DRAIN LOCATION
- APPOXIMATE SUBTITLE D CAP DRAIN LOCATION

NOTES:

1. TOPOGRAPHY SHOWN INSIDE SWB WAS OBTAINED FROM AERIAL SURVEY CONDUCTED ON JULY 10, 2024, NOVEMBER 17, 2023, MARCH 20, 2023 & NOVEMBER 14, 2022.
2. TOPOGRAPHY SHOWN OUTSIDE SWB WAS OBTAINED FROM AERIAL SURVEY CONDUCTED ON SEPTEMBER 29, 2022.

DRAWN BY: BPS
REVIEWED BY: CJB
DATE: 10/03/2024
FILE: 0120-184-DWG
CAD: KH000515.dwg
FIGURE 1

Weaver Consultants Group
NAPERVILLE, ILLINOIS
(630) 717-4848 www.wcgrp.com

SITE PLAN
KESTREL HAWK LANDFILL
RACINE, WISCONSIN

PREPARED FOR:
KESTREL HAWK LANDFILL

F:\PROJECTS\0120\184 - Kestral Hawk\dwg\KH000515.dwg;WCGv19b5;bsimek;October 4, 2024

QUARTERLY INSPECTION FORM
KESTREL HAWK RDF HAZARDOUS WASTE UNIT
Form 4C

Date: ____/____/_____ Time Start (24 hr): _____

Inspector: _____ Time End (24 hr): _____

Weather Conditions: _____

	Action Required? Yes	No	Comments/Observations/Locations
Final Cover System			
• Landfill gas release through the cover soils based on noticeable odors, hissing sounds, bubbling to surface water	☐	☐	_____
• Leachate seeps	☐	☐	_____
• Exposed refuse	☐	☐	_____
• Erosion of topsoil, vegetation (>4-in. Depth)	☐	☐	_____
• Stressed or lack of vegetation	☐	☐	_____
• Cracks or holes in cover soils due to weathering or burrowing animals	☐	☐	_____
• Ponded water on landfill cover	☐	☐	_____
Surface Water Management System			
a. Sedimentation Basins			
• Little to no available storage capacity (levels approaching spillway elevation)	☐	☐	_____
• Erosion that threatens interior and exterior condition of the basin	☐	☐	_____
• Outlet valve position	☐	☐	_____
• Significant erosion of waterways (>4-in. depth)	☐	☐	_____
• Insufficient vegetation to prevent erosion	☐	☐	_____
• Insufficient rip-rap at overflow structure	☐	☐	_____
• Sediment accumulation	☐	☐	_____
b. Swales, Downslope Flumes, Culverts, and RCRA Cap Drains			
• Presence of debris or sediment which may obstruct flow	☐	☐	_____
• Erosion of swale sidewalls or waterways (>4-in. depth)	☐	☐	_____
• Insufficient vegetation to control erosion	☐	☐	_____
• Erosion around drainage structures	☐	☐	_____
• Ponding of surface water	☐	☐	_____
• Insufficient erosion control measures at culvert and outlets (e.g., rip-rap, erosion mat)	☐	☐	_____

	Action Required? Yes	No	Comments
Gas and Leachate Extraction Systems			
a. Wellheads and Monitoring and Control Stations (refer to lists on Page 4)			
• Visibly damaged or cracked equipment	☐	☐	_____
• Disconnected pipes or hoses	☐	☐	_____
• Noticeable gas odors or hissing sounds associated with leaks in pipes or hoses	☐	☐	_____
• Leachate or condensate leaks on wellhead pipes or hoses (visible liquids, stained conditions)	☐	☐	_____
• Inoperable pumps or meters	☐	☐	_____
• Inoperable valves or sample ports	☐	☐	_____
• Damaged or leaking of gas through ground surface seals (including protective boots)	☐	☐	_____
• Ponding of surface water	☐	☐	_____
• Identification tags visible	☐	☐	_____
Leachate Control and Groundwater Containment Systems			
a. Lift Stations/Manholes (refer to list on Page 4)			
• Damaged or inaccessible manholes, pipes, or seals	☐	☐	_____
• Lack of power (red power indicator light is off)	☐	☐	_____
• Inoperable lift station pumps or metering devices	☐	☐	_____
• Full condensate tank at positive pressure dripleg	☐	☐	_____
• Leachate or condensate leaking at pipe connections	☐	☐	_____
• High liquid and/or sediment levels (inoperable pumps and/or floats)	☐	☐	_____
• Unusually high or low pump run times (based on previous monitoring data)	☐	☐	_____
• Open manholes or missing locks	☐	☐	_____
• Use manual override to test pump	☐	☐	_____
• Meter readings (hour and total flow)[1]	☐	☐	_____
• Identification tags visible	☐	☐	_____
Groundwater Remediation System			
a. Recovery Wells (refer to list on Page 4)			
• Leaking contaminated groundwater	☐	☐	_____
• Inoperable pumps or meters	☐	☐	_____
• Identification tags visible	☐	☐	_____

	Action Required? Yes	No	Comments
Site Security System			
• Damage to fence or gates	☐	☐	_____
• Missing warning signs	☐	☐	_____
• Missing and/or inoperable locks	☐	☐	_____
• Damaged, inaccessible, or eroded site access road	☐	☐	_____
Monitoring Wells (refer to list on Page 4)[(2)]			
• Missing or damaged padlocks	☐	☐	_____
• Damaged protective casings	☐	☐	_____
• Damaged ground surface seals	☐	☐	_____
• Inoperable caps or lids	☐	☐	_____
• Identification tags visible	☐	☐	_____
Gas Probes (refer to list on Page 4)[(2)]			
• Missing or damaged padlocks	☐	☐	_____
• Damaged protective casings	☐	☐	_____
• Damaged ground surface seals	☐	☐	_____
• Inoperable caps or lids	☐	☐	_____
• Identification tags visible	☐	☐	_____
Leachate Headwells (refer to list on Page 4)[(2)]			
• Missing well casings	☐	☐	_____
• Damaged ground surface seals	☐	☐	_____
• Inoperable caps or lids	☐	☐	_____
• Identification tags visible	☐	☐	_____

Footnotes:

(1) Record meter readings (hour and total flow) in log book.

(2) For locations of groundwater monitoring wells, gas probes, and leachate headwells refer to the Environmental Monitoring Plan

Identify additional areas which require attention (attach separate sheets, if necessary): _____

_____

_____

Identify any equipment not operating or in need of repair: _____

_____

_____

Attach the Leachate Extraction Pump Maintenance Form to this Quarterly Inspection Form.

Action Items (Identify person assigned and target completion date)

Person Assigned _____ Target Date _____ Item/Area _____

Person Assigned _____ Target Date _____ Item/Area _____

Person Assigned _____ Target Date _____ Item/Area _____

SIGNATURES

Inspector: _____ Date: _____

Landfill Supervisor: _____ Date: _____

Itemized Inspection List (**cross off item after inspection**)

Leachate/Gas Wellheads

GW11	LGW300	LGW312R	LGW326S/DRR
GW12	LGW301	LGW313	LGW327S/DR
GW21	LGW302	LGW314	LGW328S/DR
	LGW303	LGW315RR	**LGW329DR
GW104	LGW304	LGW316	LGW330
	LGW305	LGW317	LGW331
	LGW306	LGW318R	
LGW36DR	LGW307	LGW319	
LGW38DR	LGW308	LGW320R	LGW213S/D
*LGW39	LGW309	LGW321	LGW214S/DR
*LGW40	LGW310	LGW322	
LGW44D	LGW311	LGW323	
LGW45DR		LGW324	
LGW46DR		LGW325	
*LGW47			

Monitoring and Control Assembly Stations

MC1
MC2
MC3
MC4
MC5
MC6
MC7
MC8
MC9
MC10
MC11 to MC13
MC18 to MC20
MC21 to MC23
MC25 to MC30
MC33

Monitoring Wells

5LRR	UB6
17LR	UB7
49U	UB8
49LR	CS10
120T	CS12
141U	CS14
UB4	CS9
UB5	CS11
	CS13
	CS7
	CS8

Gas Probes

GMW1RA	GMW23A/B	TP1	GP1
GMW1RB	GMW24A/B	TP2	GP2
GMW2R	GMW26A/B	TP3	GP3
	GMW27A/B	TP4	GP4
GMW8		TP5	
GMW9		TP6	
		TP7	
	GMW141U	TP8	
		TP9	

Groundwater Recovery Wells

R5
R6R
R7

Lift Station/ Manholes

LS8
LMP8A
LMP1
LS4
LS5
LS6
MH1

Leachate Headwells

LHW100	LHW110
LHW101R	LHW111
LHW102	LHW112R
LHW103	LHW113
LHW105	LHW114
LHW106	LHW121
LHW107	LHW122
LHW108	LHW123
LHW109	LHW124
	LHW401
	LHW402

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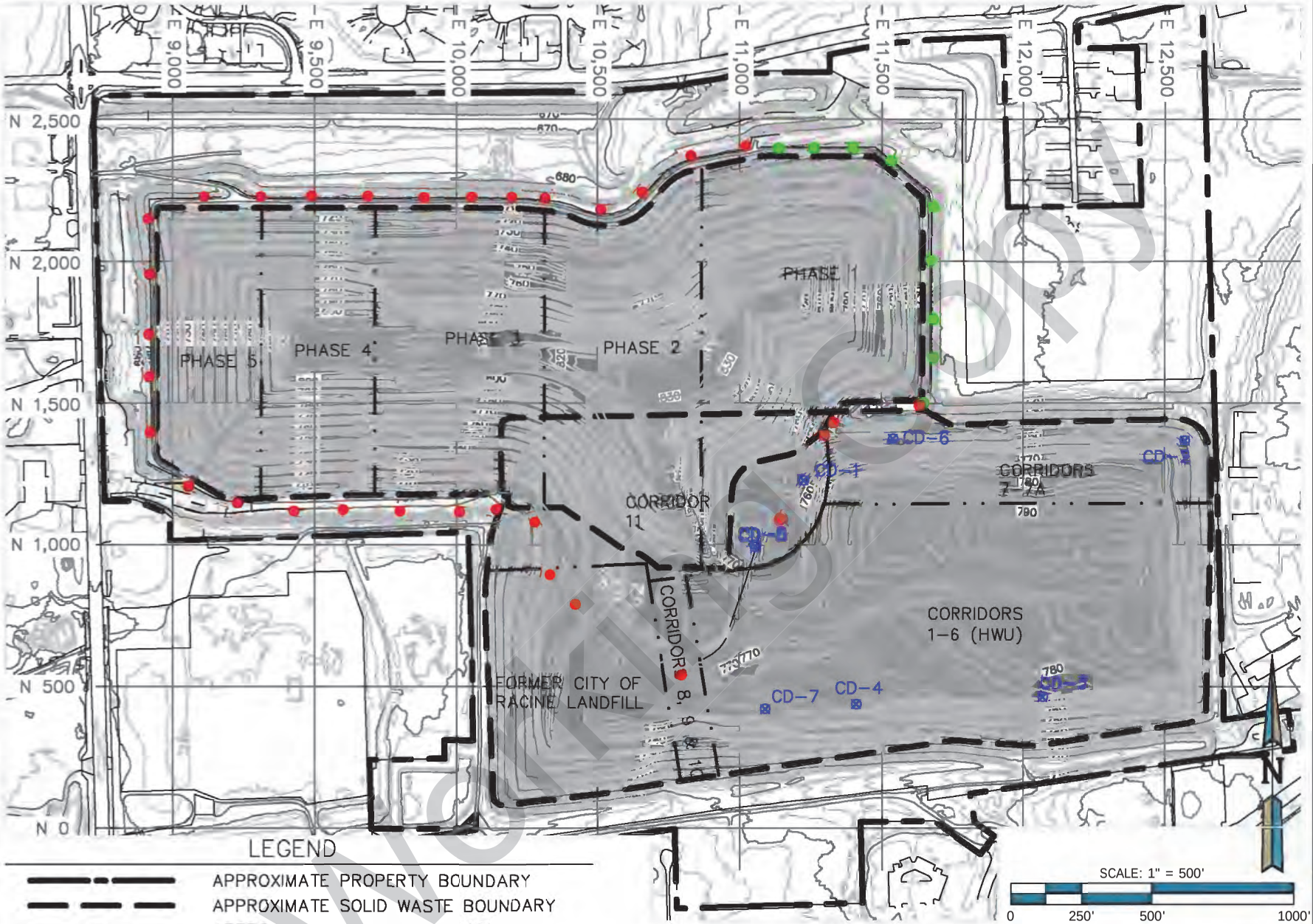
Note:

* Each of these wells has two well pipes. First is an 8" leachate well, and second is a 6" gas well.

** Shallow well @ LGW 329S is not connected to gas system.

Revised: 11/09



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE SOLID WASTE BOUNDARY
- APPROXIMATE PHASE BOUNDARY
- EXISTING 10' CONTOURS
- EXISTING 2' CONTOURS
- CONSTRUCTED FINAL COVER
- CD–1 APPROXIMATE RCRA CAP DRAIN LOCATION
- RECORD SUBTITLE D CAP DRAIN LOCATION
- APPOXIMATE SUBTITLE D CAP DRAIN LOCATION

NOTES:

1. TOPOGRAPHY SHOWN INSIDE SWB WAS OBTAINED FROM AERIAL SURVEY CONDUCTED ON JULY 10, 2024, NOVEMBER 17, 2023, MARCH 20, 2023 & NOVEMBER 14, 2022.
2. TOPOGRAPHY SHOWN OUTSIDE SWB WAS OBTAINED FROM AERIAL SURVEY CONDUCTED ON SEPTEMBER 29, 2022.

DRAWN BY: BPS
REVIEWED BY: CJB
DATE: 10/03/2024
FILE: 0120-184-DWG
CAD: KH000515.dwg
FIGURE 1

Weaver Consultants Group
NAPERVILLE, ILLINOIS
(630) 717-4848 www.wcgrp.com

SITE PLAN
KESTREL HAWK LANDFILL
RACINE, WISCONSIN

PREPARED FOR:
KESTREL HAWK LANDFILL

F:\PROJECTS\0120\184 - Kestral Hawk\dwg\KH000515.dwg;WCGv19b5;bsimek;October 4, 2024

Attachment C: Corrective Action Report

CORRECTIVE ACTION REPORT
HAZARDOUS WASTE UNIT
KESTREL HAWK RDF
RACINE, WISCONSIN
Form 4D

Date Identified: _____

Inspector: _____

Work Required:

_____

_____

_____

Describe Work: (Performed by _____, Date _____)

_____

_____

_____

Survey Information:

New Elev.	Description	Date Surveyed	Surveyor
_____	_____	_____	_____
_____	_____	_____	_____

New Location: _____

SIGNATURE:

Inspector: _____

Date: _____

Landfill Supervisor: _____

Date: _____

Note: Upon completion, attach signed Corrective Action Report to the Inspection Form on the date identified.

Appendix J: Excerpts from 2005 Hydrogeologic Evaluation Summary Report

- J.1 – Old Unit Construction Summary
- J.2 – Groundwater Flow Figures and Section

Appendix J.1
Old Unit Construction Summary

Appendix A

Description of Old Site Landfill Design

Summary of the History for the Old Site

Operations at the Kestrel Hawk Recycling and Disposal Facility (Kestrel Hawk RDF) (formerly known as Land Reclamation, Ltd., and before that as the City of Racine Landfill) began in the early 1960s (see Figure A-1 of this appendix; note that figures developed specifically for this appendix are labeled with an "A", i.e., A-1, and contained in this appendix of the report). The Kestrel Hawk RDF currently consists of the original Kestrel Hawk Landfill and the Northwest Expansion Landfill (Northwest Expansion). Approximately 70.1 acres comprise the Kestrel Hawk Landfill, which is sometimes referred to as the "Old Site," and which includes the closed RCRA hazardous waste unit (HWU) (Corridors 1 through 6), Corridors 7 and 7A, the former City of Racine Landfill (CORL), and the partially closed municipal solid waste units (Corridors 8, 9, 10, and 11). The Northwest Expansion consists of Phases 1 through 5, of which Phases 1, 2, 3, and 4 have been constructed.

Minimal information was recorded as to design features, the waste placement procedures, or the construction activity for the CORL, although the initial waste filling likely occurred in the southwestern portion of the CORL. In 1971, the site began operating as a sanitary landfill following approval of a license to operate from the WDNR in 1970. Waste filling operations began in 1972 in a new area to the east of the CORL and along the southern boundary of the HWU and was identified as Corridor 1 (see Figure A-1). Following filling of Corridor 1, additional corridors were constructed going to the north with these fill areas identified as Corridors 2 through 7 (note that Corridor 3 is south of Corridor 2). Following the filling of Corridor 7, additional corridors identified as 8, 9, and 10 filled in a saddle between the CORL and Corridors 1 through 5. Following filling of Corridors 8, 9, and 10, Corridor 11 was constructed, which is located to the north of the CORL and west of Corridors 6 and 7.

The CORL and Corridors 1 through 11 for discussion purposes have been divided into three areas, which accepted the following waste types:

1. The CORL primarily accepted foundry waste and municipal waste. There is no record that hazardous waste was ever placed in this landfill.
2. Corridors 1 through 4 primarily accepted municipal waste with some hazardous waste. In 1975, the WDNR granted Land Reclamation, Ltd., a permit to accept certain hazardous waste in the landfill. Hazardous waste placement started in Corridors 3 and 4 on November 19, 1980. Corridors 1 through 4 do not have a liner. Corridors 1 through 6 are identified as the HWU.

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3. Corridors 5 through 11 have an engineered liner system and primarily accepted municipal waste.

The following information describes the liner designs, leachate collection systems, permit approvals, final cover systems, gas collection systems, and other engineered features that are present within, and in the vicinity of, the HWU and the CORL.

Liner Systems Inside the HWU and the CORL

Former City of Racine Landfill

The former City of Racine Landfill is an unlined facility with a vertical leachate collection system. A horizontal leachate collection pipe is present between the CORL and Corridor 11 (see Figure A-1). Waste filling in this area began in the early 1960s. Information from borings located in the area of this landfill indicated that 10 to 15 feet of soil had been excavated below the original ground surface. This fill area was originally identified as the Old City of Racine Landfill until 1970, after which time the entire site was known as the Land Reclamation Landfill and was licensed as a sanitary landfill.

Corridor 1

The operation of Corridor 1 commenced in 1971 when Land Reclamation, Ltd., received a conditionally approved license to operate a nonhazardous waste sanitary landfill. The waste filling began in this corridor during 1972.

Corridor 1 is unlined with a vertical leachate collection system. Engineering plans approved for construction of Corridor 1 were general in nature and did not provide control for phasing of operations, leachate collection, material handling, or final abandonment. According to the site operators and from information obtained from borings, Corridor 1 was excavated approximately 20 feet below the original ground surface and is sloped at 2-5 percent from east to west.

In 1974, the WDNR required that new engineering plans and specifications be developed for the remaining site capacity to provide for acceptable operation and abandonment. In mid-1975, the WDNR granted a permit to accept certain hazardous wastes and requested that a feasibility report and new engineering plans be developed to bring the site up to current standards.

Corridor 2

Corridor 2 was constructed along an east-to-west transect parallel to, and approximately 125 feet north of, Corridor 1. It is located between Corridors 3 and 4. Waste filling began in Corridor 2 in 1974. Corridor 2 is unlined and has a vertical leachate collection

system. Corridor 2 was excavated to depths of approximately 25 to 35 feet below the original ground surface.

Corridor 3

Corridor 3 was constructed between Corridors 1 and 2, with waste filling beginning around 1976. Corridor 3 is unlined with a vertical leachate collection system. Corridor 3 was estimated to have been excavated to depths ranging from 20 to 40 feet below ground surface according to the site operator. This corridor had little slope on the base because excavation between the two adjacent corridors was difficult as a result of sidewall collapses during construction.

Hazardous wastes were placed in Corridors 3 and 4, along with municipal solid waste, beginning in November 19, 1980.

Corridor 4

Corridor 4 was excavated in 1978. This corridor is unlined with a vertical and horizontal leachate collection system. The leachate collection system consists of one 4-inch–diameter pipe (Acrylonitrile-Butadiene-Styrene [ABS]) and is located at pipe invert elevation 653.18 (western end) and 665.18 (eastern end) (see Figures A-3 and A-4 of this appendix). This pipe was later connected to the manhole installed during the Corridor 5 construction. Corridor 4 was created by multiple excavations. On the eastern end of the corridor, for a distance of approximately 400 feet, the base was excavated down another 20 feet below the leachate collection system to an approximate elevation of 642. Construction problems were encountered at this low depth, so the remainder of Corridor 4 was kept at the same elevation as the leachate collection system.

Corridor 5

Construction of Corridor 5 began in December 1979 and was completed in early 1981. A construction documentation report was submitted to the WDNR in February 1981.

Corridor 5 has a compacted clay liner that ranges from approximately 4 to 8 feet in thickness. The base grades of Corridor 5 slopes from approximately 670 on the southeast to approximately 655 on the northwest. A perforated leachate collection pipe was installed in a trench backfilled with coarse aggregate along the northern side of Corridor 5 (see Figures A-3 and A-5). This corridor was excavated up to 70 feet below the water table, which required dewatering for several months prior to beginning excavation in the corridor.

The horizontal leachate collection system installed in Corridor 5 consists of approximately 1,300 linear feet of perforated pipe connected to a manhole (MH1). The collection pipe is installed along the base of the corridor along the northern edge of the

Corridor 5 fill area and is sloped from east to west to provide for drainage of leachate to the manhole located at the western end of the fill area.

The pipe was placed in a trench with the invert elevation of 655.79 feet M.S.L. on the eastern end of the collection pipe and 646.69 feet M.S.L. at the manhole. The excavation and placement of the manhole was completed on June 20, 1980, and the installation of the pipe was on June 24, 1980.

The collection pipe is 6 inches in diameter and is manufactured from a thermoplastic, heat resistant plastic, Acrylonitrile-Butadiene-Styrene (ABS). The pipe is installed in a 7-foot–deep trench excavated 2 feet below the base excavation grade at a 0.625 percent slope.

Corridor 6

Construction of Corridor 6 began in 1979 with a partial excavation of the corridor. Placement of a 5.0- to 5.9-foot–thick clay liner began on May 13, 1985, and ended on July 1, 1985.

The leachate collection system was installed using 8-inch perforated PVC pipe bedded in ¾-inch to 1-inch stone (see Figures A-3 and A-6). The pipe slopes from the east to the west, where it connects to a manhole (MH2) at an approximate elevation of 646.5 feet M.S.L.

Landfill Permitting

In mid-1983, a Conditional Plan of Operation for the Land Reclamation, Ltd., Landfill site, including Corridors 1 through 11, was submitted to the WDNR and approved on December 19, 1984. In the approval letter, the WDNR designated Corridors 1 through 6 as a HWU and required that a physical and hydraulic separation barrier be installed between the HWU and the adjacent corridors, and between the corridors adjacent to the CORL. In 1988, the WDNR and the USEPA approved a design for a physical and hydraulic barrier wall and the final cover for the HWU as part of a Closure and Long-Term Care Plan. The approved design consisted of five major components, as follows:

- A containment structure, including a slurry cut-off wall and a groundwater collection trench
- Barrier walls constructed between the HWU and Corridor 7 (North Barrier Wall) and between the HWU and Corridors 8, 9, and 10 (West Barrier Wall), and between the CORL and Corridors 8, 9, 10, and 11.
- A leachate and gas extraction system consisting of vertical leachate and gas extraction wells (LGWs)
- An East and South Slope final cover system, along with southern slope stabilization

- A RCRA final cover system that ties into the barrier walls and the East and South Slope final cover systems

Physical and Hydraulic Barriers

Barrier Wall (West and North) Installation

The barrier walls consist of a 7-foot–thick (measured perpendicular to the slope) compacted clay constructed on a 3:1 slope. The approximate locations of the barrier walls are shown on Figure A-1. The subbase consists of a 1-foot–thick layer of sand placed above the waste in the HWU and below the bottom of the clay barrier.

The barrier walls were constructed during several construction events, with documentation being provided to the WDNR upon completion, as follows:

North Barrier Wall

- Construction of the first phase of the North Barrier Wall was performed in conjunction with construction of the base liner and leachate collection system for Corridor 7. The WDNR approved Phase I of the North Barrier Wall construction on June 15, 1987.
- Construction of Phase II of the North Barrier Wall began in March of 1987 and was completed in December 1987. The WDNR verbally approved the construction of Phase II in February 1988.
- Construction of Phase III of the North Barrier Wall began in November 1987 and was completed in May 1988. The WDNR approved Phase III of the North Barrier Wall construction on November 17, 1989.
- Construction of Phase IV of the North Barrier Wall began in 1988 and was completed in early 1989. Documentation of this construction work was submitted in 1991, along with the documentation report for the Phase V North Barrier Wall construction work.
- Construction of Phase V of the North Barrier Wall was performed during the period of September through December of 1990 and July of 1991. A documentation report for Phase V, which included the work performed for Phase IV construction, was submitted to the WDNR in February of 1991 and 1992. The WDNR approved this construction on March 14, 1994.

West Barrier Wall

- Construction of Phase I of the West Barrier Wall was performed in conjunction with the base liner and leachate collection system for the interior manhole area. The documentation report for this construction was

submitted to the WDNR in December 1991. The WDNR approved the construction of Phase I of the West Barrier Wall on May 11, 1992.

- Construction of Phase II of the West Barrier Wall began in September 1992 and ended in August 1993. The documentation report for this construction was submitted to the WDNR in August 1993. The WDNR approved construction of Phase II of the West Barrier Wall in November of 1993.
- Construction of Phase III of the West Barrier Wall was performed in three construction events: between July and September of 1994, between May and July of 1995, and between May and June of 1996. The WDNR approved construction of Phase III of the West Barrier Wall in August of 1996.

Final Cover System Installation

City of Racine Landfill Final Cover

The final cover system over the CORL consists of the following layers:

- 6 Inches of topsoil
- 2 Feet of rooting zone (general fill)
- 2 Feet of compacted clay

The final cover system over the CORL was installed during two construction events performed in 1996 and 2001. The final cover on the southern and eastern slopes of the CORL was constructed in 1996, while the top portion of the landfill was completed in 2001. The northeast portion of the CORL is currently uncovered.

Final Cover System Over the Hazardous Waste Unit

Closure design for the Hazardous Waste Unit (HWU) was approved by the WDNR on March 31 1988. In addition to construction of the barrier walls, a final cover system was designed to meet the requirements of the 1988 approval letter and was approved by the WDNR on September 16, 1991. The HWU final cover system consists of three components: The Resource Conservation and Recover Act (RCRA) cap, the Southern Slope cap, and the Eastern Slope cap (see Figure A-2). The northern and western barrier walls described above also act as the cover over the waste in the HWU, and are also a portion of the liner system for Corridors 7, 8, 9, and 10, which lap over the HWU.

The RCRA cap consists of the following layers:

- 6 Inches of topsoil
- 18 Inches of rooting zone (general fill)
- Geotextile

- 1 Foot of sand drainage
- Geomembrane
- 3 Feet of compacted clay

The South and East Slope caps consist of the following layers:

- 6 Inches of topsoil
- 4 Feet of compacted clay

RCRA Cover System

Phase I of the RCRA cover system was completed in October of 1991 and was approved by the WDNR on April 13, 1993. The total area of Phase I is approximately 10 acres.

Phase II of the RCRA cover system was completed in September 1994. The total area of Phase II is approximately 6.7 acres.

Phase III of the RCRA cover system was completed in May of 2001, with a documentation report being submitted to the WDNR in January of 2002. The total area of Phase III is approximately 10.7 acres.

In addition to the components identified above for the RCRA cover, in the areas where the perimeter drainage ditches were constructed, these components were included:

- Geotextile layer below the drainage layer
- 12-Inch–thick layer of pipe bedding gravel
- 4-Inch–diameter HDPE drainage pipe
- Geonet layer
- Geotextile cushion layer

East Slope Final Cover System

Construction of the final cover on the East Slope of the HWU was performed during several construction events starting in July 1985 and ending in 1991. The WDNR approved final cover documentation submittals on July 29, 1991, and again on April 19, 1994.

South Slope Final Cover System

Construction of the final cover for the South Slope was completed in August 1991, with a construction observation report submitted to the WDNR in January 1992.

Construction repairs on the south slope final cover system were performed to fulfill an agreement made with the WDNR during a site inspection performed by the WDNR on

February 4, 1993. This construction took place from 1991 to 1992 to address the areas of erosion identified in a Facility Inspection Form prepared by Ken Hein from the WDNR. An addendum to the previous construction observation report was submitted to the WDNR in March 1993.

Soil/Bentonite Slurry Wall

Construction of the soil/bentonite slurry wall along the southern boundary of the Old Site commenced on September 26, 1989, and was completed on October 26, 1989. The approximate location of the groundwater collection trench and bentonite cutoff wall is shown on Figure A-1. The soil/bentonite slurry wall measures approximately 4,490 linear feet and a minimum of 30 inches wide. The trench was excavated to varying depths to provide a minimum 3-foot key into the Unit No. 3 soil layer (Lower Unit A clay) to provide a permanent barrier against off-site migration of groundwater and landfill gas. The depth of the trench ranged from 15 to 34 feet, with an average depth of approximately 25 feet.

Groundwater Collection Trench

Installation of the groundwater collection trench (trench) started on June 5, 1989, and was completed on September 15, 1989. The trench is designed to work in conjunction with the slurry wall, which is described above. The slurry wall and groundwater collection trench are located along the entire southern side of the Old Site; the western side of the CORL; and under the center of Corridors 8, 9, and 10. Approximately 4,281 linear feet of trench was installed.

The trench was excavated using a trenching machine, which simultaneously excavated a 10- to 12-inch–wide trench to a maximum depth of 24 feet; 3 to 5 inches of gravel bedding were placed at the bottom of the trench; a 6-inch–diameter perforated ADS polyethylene pipe was installed above the bottom gravel layer; and the remainder of the trench was backfilled with gravel. Approximately 4,281 linear feet of trench were installed.

Water collected in the trench discharges into Lift Stations Nos. 5, 6, and 8, where it is pumped to the 21st Street Sanitary Sewer extension for discharge at manhole MH15B.

Construction of the three lift stations (Nos. 5, 6, and 8) and two manholes (Nos. 7 and 9) associated with the Groundwater Containment System was performed during the installation of the groundwater collection trench.

Gas Control Systems

The gas control system on the HWU and the CORL consists of gas extraction wells, horizontal gas extraction trenches, gas monitoring and control stations, gas header pipes, and gas monitoring probes. The gas is routed to a biogas plant on-site and then directed to S. C. Johnson, Inc., or to a flare.

There are four horizontal gas extraction trenches associated with the HWU, two beneath the North Barrier Wall in Corridor 6, and two beneath the West Barrier Wall (see Figure 2 of report). The gas collection trench was also constructed in conjunction with the Groundwater Containment System described above. The gas collection trench in this area was constructed in 1989. Approximately 1,930 linear feet of trench were installed.

Multiple gas extraction wells are located within the HWU and the CORL. Some of the wells within the HWU are located in Corridor 7 and extend down through the barrier wall into Corridor 6. The gas extraction wells and horizontal gas extraction trenches are connected to the header pipe system.

Gas probes are located at the perimeter of the landfill to detect gas migration and within the waste mass to monitor the effectiveness of the gas extraction system. Condensate produced in the gas system is directed to driplegs around the landfill for removal as leachate.

An additional trench was constructed between Lift Station No. 6 and Manhole No. 9 for gas collection. This trench was constructed using a backhoe to excavate a 3-foot–wide by 6-foot–deep trench that is hydraulically connected to the groundwater collection trench. A 6-inch perforated pipe was placed in the trench to aid in the removal of landfill gas (primarily methane and carbon dioxide), which may migrate into the groundwater collection trench. At the western end of the pipeline, adjacent to Lift Station No. 6, a 6-inch HDPE cap was installed to prevent air from entering the system and for monitoring purposes. On the eastern end, the gas collection pipe was installed east of Manhole No. 9 and connected to a 12-inch header pipe for the active gas extraction system. A 6-inch nonperforated SDR 17 HDPE pipe was installed from Manhole No. 9 to the 12-inch header pipe. A 6-inch butterfly valve was installed to regulate vacuum on this line.

Leachate Control Systems

The leachate extraction system in the HWU consists of approximately 40 vertical leachate extraction wells (LGWs) and three horizontal leachate extraction collection pipes installed as part of the base liner collection system (see Figures A-1, A-3, A-4, A-5, A-6, and Figure 2). The leachate conveyance system is described on Figure A-7. The extraction wells use pneumatic pumps to discharge leachate to the leachate conveyance system header pipes. The header lines discharge at LMP8A. The leachate is combined with the condensate at the driplegs and enters the 21st Street sanitary sewer system at Manhole MH10. There are three leachate collection pipes at the base of the HWU that are located in Corridors 4, 5, and 6 as described above. The leachate collected in the pipes in Corridors 4 and 5 flows to Manhole MH1, while the leachate in Corridor 6 flows to Manhole MH2. Leachate collected in the manholes is directed to the 21st Sanitary Sewer System.

Leachate collected from the six extraction wells in the CORL is conveyed through header pipes to Lift Station LS6, where it is pumped to the 21st Street sanitary sewer system. The leachate

collected in the horizontal extraction pipe that is located between the CORL and Corridor 11 drains to Lift Station 4.

Sources for Information Provided Above

Summary of the History for Old Site

Residuals Management Technology, Inc. 1981. Feasibility/In-field conditions report. March 1981.

Warzyn, Inc. 1992. Construction observation report. RCRA Phase I cover construction hazardous waste unit. March 1992.

Liner Systems Inside the HWU and the CORL

Former Old City of Racine Site

Residuals Management Technology, Inc. 1981. Feasibility/In-field conditions report. March 1981.

Corridor 1

Residuals Management Technology, Inc. 1981. Feasibility/In-field conditions report. March 1981.

Corridor 2

Based on Boring B21 in Residuals Management Technology, Inc. 1981. Feasibility/In-field conditions report. March 1981.

Corridor 3

Residuals Management Technology, Inc. 1979. Interim operations plan. December 1979.

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Corridor 4

Residuals Management Technology, Inc. 1979. Interim operations plan. December 1979.

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Corridor 5

Residuals Management Technology, Inc. 1981. Documentation of corridor 5 construction. February 1981.

Corridor 6

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Conditional approval of the plan of operation, December 19, 1984.

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Physical and Hydraulic Barriers

Barrier Wall (West and North) Installation

Warzyn, Inc. 1991. Construction documentation report north barrier wall - Phase IV &V hazardous waste unit. February 1991.

Warzyn, Inc. 1992. Construction observation report. North barrier wall - Phase IV & V construction hazardous waste unit. February 1992.

RMT, Inc. 1996. Construction documentation report or barrier wall Construction. July 1996.

Foth & Van Dyke and Associates, Inc. 1987. Construction observation report for Phase II construction of the north barrier wall. December 1987.

Final Cover Systems Installation

RCRA Cover System

STS Consultants, Ltd. 2002. Kestrel Hawk RDF Old Site Closure for Phase III of the RCRA final cover system. January 2002

GeoSyntec Consultants. 1992. Final report on construction quality assurance monitoring services for construction of Phase I of the RCRA final cover system. March 1992.

East Slope Final Cover system

Warzyn, Inc. 1991. Post-Construction documentation report. East slope final clay cover Hazardous Waste Unit Land Reclamation Landfill. April 1991.

Warzyn, Inc. 1992. Construction observation report. East slope construction hazardous waste unit. February 1992.

South Slope Final Cover system

Warzyn, Inc. 1993. Addendum to the construction documentation report. south slope construction hazardous waste unit. Land Reclamation Company. March 1993.

Warzyn, Inc. 1992. Construction observation report. South slope construction hazardous waste unit. January 1992.

Bentonite/Soil Slurry Wall

Foth & Van Dyke and Associates, Inc. 1991. Construction observation report for Groundwater Containment Structure. August 1991.

Groundwater Collection Trench

Foth & Van Dyke and Associates, Inc. 1991. Construction observation report for Groundwater Containment Structure. August 1991.

Gas Control Systems

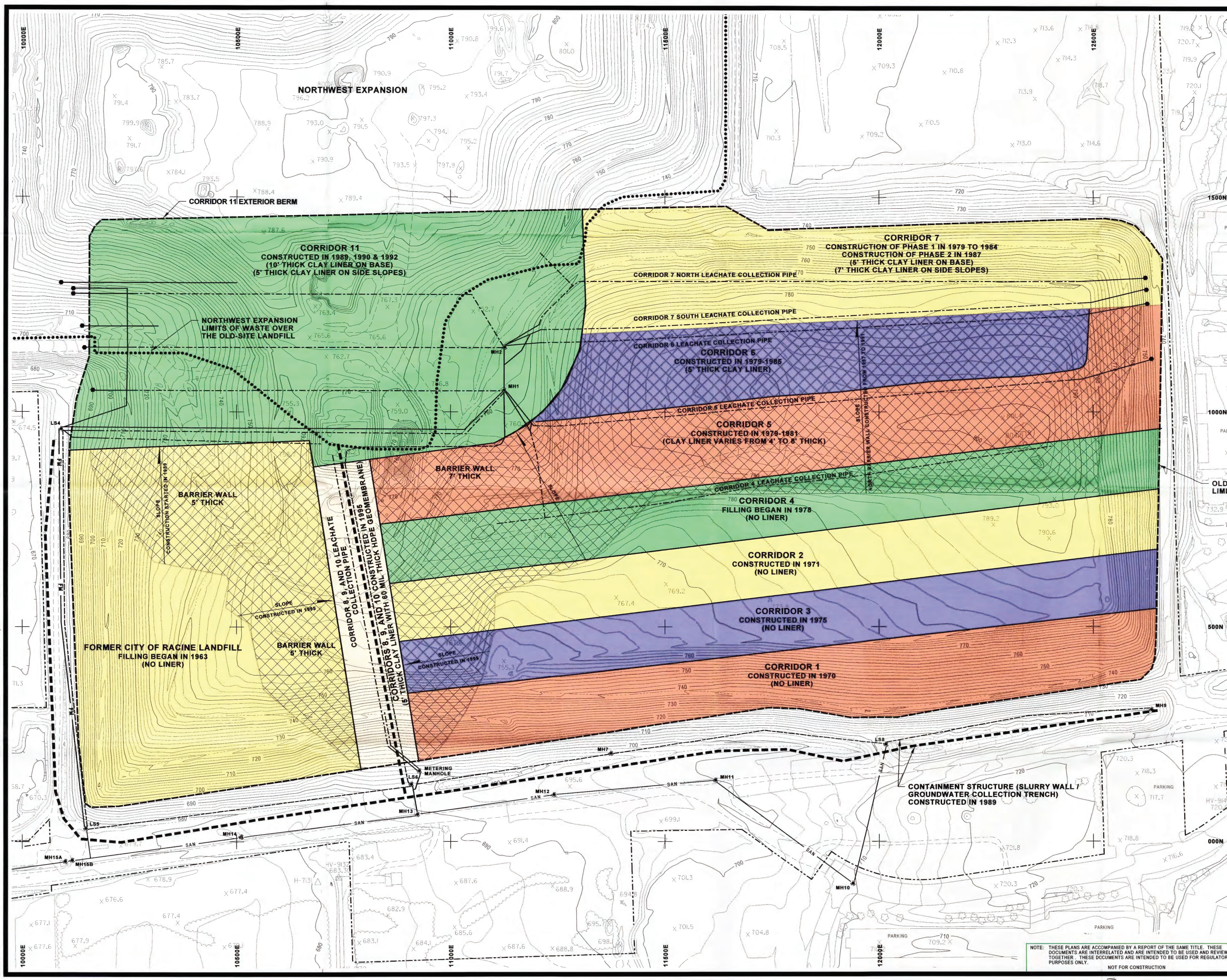
RMT, Inc. 1998. Follow-up to WDNR annual RCRA inspection. August 1998.

Foth & Van Dyke and Associates, Inc. 1991. Construction observation report for Groundwater Containment Structure. August 1991.

Leachate Control Systems

RMT, Inc. 1998. Follow-up to WDNR annual RCRA inspection. August 1998.

RMT, Inc. 2004. 2004 annual pipe cleaning observation report. May 2005.



LEGEND

- APPROXIMATE PROPERTY LINE
- LIMITS OF WASTE BOUNDARY FOR NORTHWEST EXPANSION
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING FENCE LINE
- 710 EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- x 673.4 EXISTING SPOT ELEVATION
- TREES AND / OR BRUSH
- 30+00N SITE GRID COORDINATE
- APPROXIMATE LOCATION OF GROUNDWATER CONTAINMENT STRUCTURE
- APPROXIMATE LIMITS OF WASTE (OLD-SITE LANDFILL)
- LEACHATE COLLECTION PIPES (PERFORATED)
- LEACHATE CLEANOUT PIPE (SOLID WALL)
- MH9 MANHOLE
- FM FORCEMAIN PIPE
- GROUNDWATER COLLECTION PIPE
- SAN SANITARY SEWER PIPE
- APPROXIMATE LOCATION OF CLAY BARRIER WALL
- LS8 LIFT STATION MANHOLE

NOTES

1. SITE LOCATION: PART OF THE NORTHEAST 1/4 AND THE NORTHWEST 1/4 OF SECTION 23, TOWNSHIP 3 NORTH, RANGE 22 EAST, IN THE CITY OF RACINE, COUNTY OF RACINE, STATE OF WISCONSIN.
2. TOPOGRAPHIC BASE MAP WAS OBTAINED FROM AERO-METRIC ENGINEERING, INC. DATE OF PHOTOGRAPHY : MARCH 28, 2005.
3. APPROXIMATE LIMITS OF EXISTING WASTE WERE PROVIDED BY KESTREL HAWK RDF.
4. VERTICAL DATUM IS USGS MEAN SEA LEVEL. TOPOGRAPHIC CONTOUR INTERVAL IS TWO FEET.
5. HORIZONTAL DATUM IS BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM. THE SITE GRID IS PARALLEL AND PERPENDICULAR TO THE STATE PLANE COORDINATE SYSTEM. SITE GRID IS A TRUNCATED STATE PLANE COORDINATE GRID WITH COORDINATE 0+00N, 100+00E EQUAL TO STATE PLANE COORDINATE 264,196.55N, 2,573,700.72E.
6. LOCATION OF PROPERTY LINE OBTAINED FROM NORTH SHORE ENGINEERING OF MEQUON, WISCONSIN, SURVEY DATE DECEMBER 1994.

0 100 200 300 400

SCALE: 1"=100'

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE. THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED AND REVIEWED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY.

NOT FOR CONSTRUCTION

NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT: KESTREL HAWK LANDFILL
OLD SITE HYDROGEOLOGIC EVALUATION
PHASE I SUMMARY REPORT

SHEET TITLE: OLD SITE LANDFILL
LINER LOCATIONS (APPROXIMATE)

DRAWN BY: NOLDENR	SCALE:	PROJ. NO.	4865.94\old site
CHECKED BY: DM	1" = 100'	FILE NO.	corridor.plt
APPROVED BY: JO	DATE PRINTED:		
DATE: OCTOBER 2005	OCT 18 2005	FIGURE A-1	

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Appendix J.2
Groundwater Flow Figures and Section

LEGEND

- APPROXIMATE PROPERTY LINE
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- SITE FENCE (AS EXISTING IN 6/04)
- EXISTING GROUND SURFACE 10' CONTOUR
- EXISTING GROUND SURFACE 2' CONTOUR
- EXISTING SPOT ELEVATION
- TREES AND / OR BRUSH
- 30+00N — SITE GRID COORDINATE
- EXISTING WATER TABLE OBSERVATION WELL LOCATION AND NUMBER
- PIEZOMETER LOCATION AND NUMBER
- ABANDONED WATER TABLE OBSERVATION WELL LOCATION AND NUMBER
- ABANDONED PIEZOMETER LOCATION AND NUMBER
- GAS CONDENSATE DRIPLEG LOCATION AND NUMBER
- LEACHATE HEADWELL LOCATION AND NUMBER (EXISTING)
- GAS MONITORING PROBE LOCATION AND NUMBER
- STAFF GAUGE LOCATION AND NUMBER
- MANHOLE/LIFT STATION LOCATION AND NUMBER
- LEACHATE COLLECTION CLEANOUT RISER PIPE LOCATION AND NUMBER
- LEACHATE GAS WELL LOCATION AND NUMBER
- GAS WELL LOCATION AND NUMBER
- LEACHATE MONITORING POINT LOCATION AND NUMBER
- APPROXIMATE LOCATION OF GROUNDWATER CONTAINMENT STRUCTURE
- PROPOSED LIMITS OF WASTE (NORTHWEST HORIZONTAL AND VERTICAL EXPANSION)
- DESIGN MANAGEMENT ZONE
- APPROXIMATE LIMITS OF WASTE (EXISTING SITE)
- APPROXIMATE LIMITS OF WASTE CORRIDORS (EXISTING SITE)
- GRADIENT CONTROL SYSTEM MONITORING POINT AND NUMBER
- GRADIENT CONTROL SYSTEM MANHOLE
- SEDIMENTATION BASIN OUTFALL LOCATION AND NUMBER
- GAS TRENCH LOCATION (MONITORED)
- GAS TRENCH LOCATION (NOT MONITORED)
- PROPOSED FENCE LINE
- APPROXIMATE LOCATION OF 100 YEAR FLOOD PLAIN BOUNDARY/ STANDING OR SURFACE WATER
- RECOVERY WELL
- A A' — CROSS SECTION LOCATION

NOTES

1. SITE LOCATION: PART OF THE NORTH 1/2 OF SECTION 23, TOWNSHIP 3 NORTH, RANGE 22 EAST, IN THE CITY OF RACINE, COUNTY OF RACINE, STATE OF WISCONSIN.
2. TOPOGRAPHIC BASE MAP WAS OBTAINED FROM AERO-METRIC ENGINEERING, INC. DATE OF PHOTOGRAPHY : OCTOBER 6, 1994; JUNE 1995, APRIL 1, 2004 AND MARCH 28, 2005.
3. MONITORING WELL LOCATIONS DETERMINED BY SURVEY INFORMATION PROVIDED BY KESTREL HAWK RDF.
4. APPROXIMATE LIMITS OF EXISTING WASTE WERE PROVIDED BY KESTREL HAWK RDF.
5. VERTICAL DATUM IS USGS MEAN SEA LEVEL. TOPOGRAPHIC CONTOUR INTERVAL IS TWO FEET.
6. HORIZONTAL DATUM IS BASED ON THE WISCONSIN STATE PLANE COORDINATE SYSTEM. THE SITE GRID IS PARALLEL AND PERPENDICULAR TO THE STATE PLANE COORDINATE SYSTEM. SITE GRID IS A TRUNCATED STATE PLANE COORDINATE GRID WITH COORDINATE 0+00N, 100+00E EQUAL TO STATE PLANE COORDINATE 264,196.55N, 2,573,700.72E.
7. LOCATION OF PROPERTY LINE OBTAINED FROM NORTH SHORE ENGINEERING OF MEQUON, WISCONSIN, SURVEY DATE DECEMBER 1994.
8. LOCATION OF PRIVATE RESIDENCE WELLS PROVIDED BY KESTREL HAWK RDF.
9. THE PIKE RIVER FLOODPLAIN LOCATION BASED ON THE FLOOD INSURANCE MAP AND PROPOSED FLOODPLAIN BOUNDARIES (5/16/90).

N

0 200 400 600 800

SCALE 1"= 200'

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1.				

PROJECT: **KESTREL HAWK LANDFILL OLD SITE HYDROGEOLOGIC EVALUATION PHASE 1 SUMMARY REPORT**

SHEET TITLE: **CROSS SECTION LOCATOR MAP**

DRAWN BY: NOLDENR	SCALE: 1" = 200'	PROJ. NO. 4865.94/updated
CHECKED BY: TS		FILE NO. x-sections.plt
APPROVED BY: JO	DATE PRINTED: OCT 10 2005	**FIGURE 5**
DATE: OCTOBER 2005		

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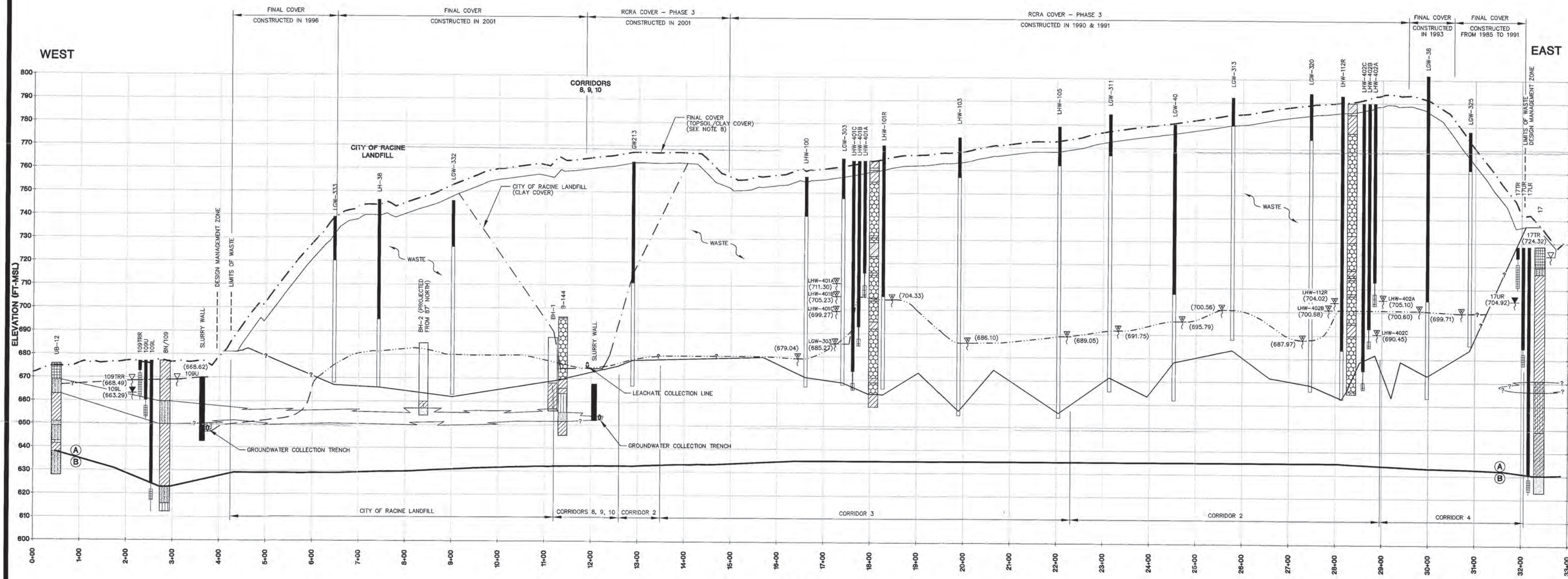

A-A'

LEGEND

- STRATIGRAPHIC BOUNDARY (DASHED WHERE INFERRED)
- EXISTING GROUND SURFACE (3/28/05)
- LEACHATE HEAD SURFACE
- WATER TABLE SURFACE
- (679.04) GROUND WATER OR LEACHATE ELEVATION IN WELL (FT. M.S.L.)
- LEACHATE LEVEL IN LHW OR LGW WELLS (FT. M.S.L.)
- WATER TABLE ELEVATION IN MONITORING WELLS (FT. M.S.L.)
- POTENTIOMETRIC HEAD ELEVATION IN MONITORING WELLS (FT. M.S.L.)
- (A) UNIT A
- (B) UNIT B

MONITORING WELL CONSTRUCTION

- WELL SEAL
- WELL CASING
- WELL SCREEN

LEACHATE HEAD OR GAS WELL CONSTRUCTION

- GRAVEL PACK OR WELL SEAL
- WELL SCREEN

GEOLOGIC SYMBOLOGY

CLAYS

- LEAN CLAY/ LEAN CLAY WITH SAND/GRAVEL (CL)
- SANDY LEAN CLAY/SANDY LEAN CLAY WITH GRAVEL (CL)
- SILTY CLAY/SILTY CLAY WITH SAND/GRAVEL (CL-ML)
- SANDY SILTY CLAY/SANDY SILTY CLAY WITH GRAVEL (CL-ML)

SANDS

- WELL-GRADED/POORLY-GRADED SAND (SW OR SP)
- WELL-GRADED/POORLY-GRADED SAND, WITH GRAVEL (SW OR SP)

SILTS

- SILT/SILT WITH SAND GRAVEL (ML)
- CLAYEY SILT
- SANDY SILT/SANDY SILT WITH GRAVEL (ML)
- GRAVELLY SILT/GRAVELLY SILT WITH SAND (ML)
- ELASTIC SILT/ELASTIC SILT W/ SAND ELASTIC SILT W/ GRAVEL (MH)

GRAVELS

- WELL-GRADED/POORLY-GRADED GRAVEL (GW OR GP)

MISCELLANEOUS MATERIALS

- PEAT
- TOPSOIL
- EARTHEN FILL

SLURRY WALL CONSTRUCTION

NOTES

1. THE CORRELATION LINES ARE BASED ON INTERPOLATION BETWEEN BORINGS AND MAY NOT REPRESENT ACTUAL SUBSURFACE CONDITIONS.
2. HORIZONTAL DISTANCES ARE MEASURED AND THE GROUNDWATER AND LEACHATE HEAD DATA ARE PLOTTED WITH RESPECT TO THE CENTER OF EACH BORING LOCATION. WELL CONSTRUCTION SCHEMATICS ARE OFFSET FOR CLARITY.
3. REFER TO FIGURE 5 FOR NOTES REGARDING THE EXISTING TOPOGRAPHY AND CROSS SECTION LOCATIONS.
4. ELEVATIONS ARE SHOWN IN REFERENCE TO USGS MEAN SEA LEVEL (M.S.L.) DATUM.
5. THE GROUNDWATER ELEVATIONS ARE BASED ON MEASUREMENTS TAKEN BY RMT ON OCTOBER 18 & 19, 2004. THE LEACHATE ELEVATIONS ARE BASED ON MEASUREMENTS TAKEN BY RMT BETWEEN OCTOBER 19 AND 21, 2004.
6. BORINGS SHOWN TO BE ABOVE OR BELOW EXISTING GROUND SURFACE (MARCH 28, 2005) PREDATE EITHER FILL OR EXCAVATION ACTIVITIES IN THOSE AREAS. WASTE IN AREAS 8, 9 AND 10 AS INDICATED IN BORINGS 144, 145 AND 168 WAS REMOVED PRIOR TO CONSTRUCTION OF SLURRY WALL IN 1991.
7. EXISTING GROUNDWATER CONTAINMENT STRUCTURE LOCATIONS AND DEPTHS WERE APPROXIMATED FROM A COPY OF THE CONSTRUCTION OBSERVATION REPORT FOR THE GROUNDWATER CONTAINMENT STRUCTURE PLAN SET RECEIVED AUGUST 1991. (FOTH & VAN DYKE).
8. FINAL COVER THICKNESS SHOWN AS 4.5-FEET THICK. ACTUAL THICKNESS MAY VARY BASED ON LOCATION WITHIN SPECIFIC FINAL COVER PHASING.
9. LANDFILL BASE ELEVATIONS AT LOCATIONS WHERE NO BORINGS OR WELLS ARE PRESENT ARE PROJECTED BASED ON INFORMATION FROM ADJACENT BORINGS OR WELLS.
10. THE TOP OF UNIT B ELEVATIONS BENEATH THE LANDFILL ARE BASED ON A PROJECTED CONTOUR MAP USING STRATIGRAPHIC DATA FROM SOIL BORINGS INSTALLED AROUND THE PERIMETER AND WITHIN THE LANDFILL.
11. THE BASEGRADES WITHIN CORRIDOR 4 WERE EXCAVATED 20' BELOW THE CORRIDOR 4 LEACHATE COLLECTION PIPE 400 FEET FROM THE EAST PIPE END. REFER TO APPENDIX A OF THIS REPORT FOR ADDITIONAL INFORMATION.

PROFILE SCALE: HORIZONTAL SCALE: 1"=100' VERTICAL SCALE: 1"=20'

VERTICAL EXAGGERATED = 6X

NO.	BY	DATE	REVISION	APP'D.
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PROJECT: **KESTREL HAWK LANDFILL OLD SITE HYDROGEOLOGIC EVALUATION PHASE I SUMMARY REPORT**

SHEET TITLE: **CROSS SECTION A-A'**

DRAWN BY:	MEYERHOC	SCALE:	PROJ. NO. 4865.94
CHECKED BY:	TS	AS SHOWN	FILE NO. 48659421_REV1.DWG
APPROVED BY:	JO	DATE PRINTED:	FIGURE 6
DATE:	OCTOBER 2005	OCT 10 2005	

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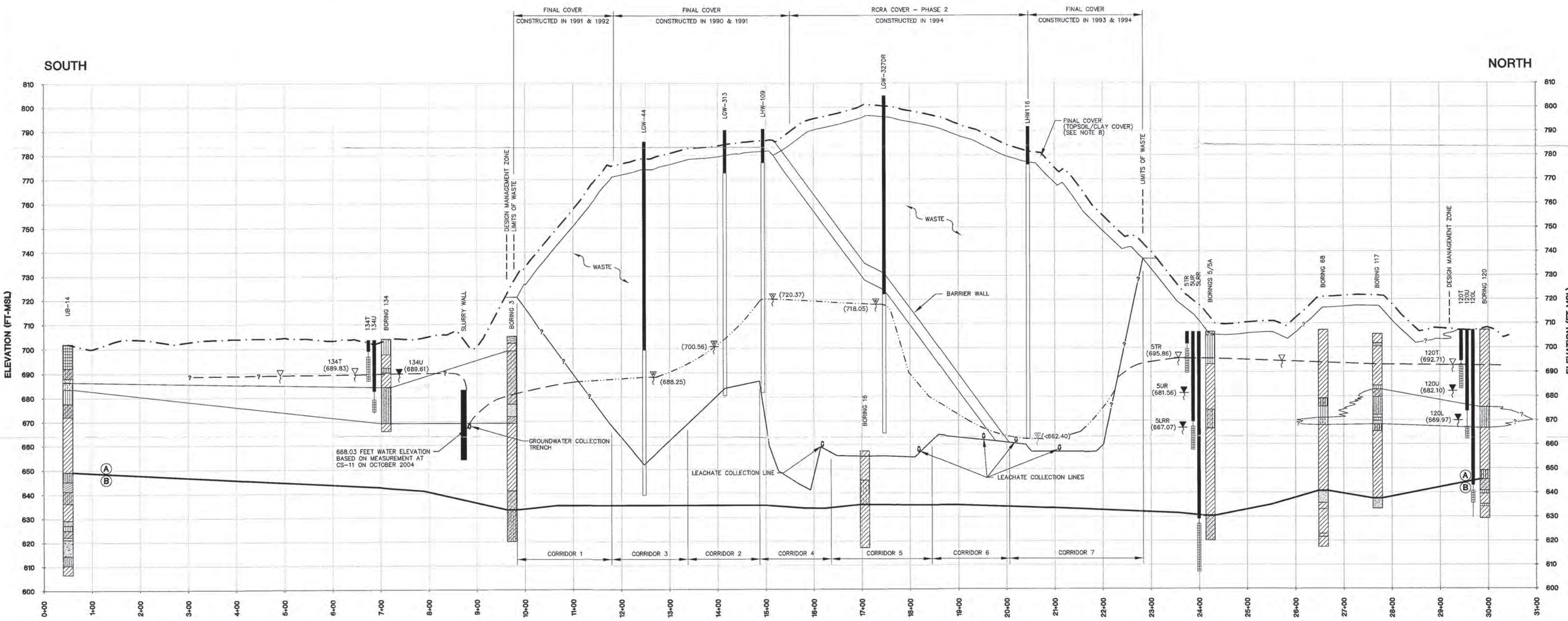

B-B'

LEGEND

- STRATIGRAPHIC BOUNDARY (DASHED WHERE INFERRED)
- EXISTING GROUND SURFACE (3/28/05)
- LEACHATE HEAD SURFACE
- WATER TABLE SURFACE
- (679.04) GROUND WATER OR LEACHATE ELEVATION IN WELL (FT, M.S.L.)
- LEACHATE LEVEL IN LHW OR LGW WELLS (FT, M.S.L.)
- WATER TABLE ELEVATION IN MONITORING WELLS (FT, M.S.L.)
- POTENTIOMETRIC HEAD ELEVATION IN MONITORING WELLS (FT, M.S.L.)
- (A) UNIT A
- (B) UNIT B

MONITORING WELL CONSTRUCTION

- WELL SEAL
- WELL CASING
- WELL SCREEN

LEACHATE HEAD OR GAS WELL CONSTRUCTION

- GRAVEL PACK OR WELL SEAL
- WELL SCREEN

GEOLOGIC SYMBOLOGY

CLAYS

- LEAN CLAY/ LEAN CLAY WITH SAND/GRAVEL (CL)
- SANDY LEAN CLAY/SANDY LEAN CLAY WITH GRAVEL (CL)
- SILTY CLAY/SILTY CLAY WITH SAND/GRAVEL (CL-ML)
- SANDY SILTY CLAY/SANDY SILTY CLAY WITH GRAVEL (CL-ML)

SANDS

- WELL-GRADED/POORLY-GRADED SAND (SW OR SP)
- WELL-GRADED/POORLY-GRADED SAND, WITH GRAVEL (SW OR SP)

SILTS

- SILT/SILT WITH SAND GRAVEL (ML)
- CLAYEY SILT
- SANDY SILT/SANDY SILT WITH GRAVEL (ML)
- GRAVELLY SILT/GRAVELLY SILT WITH SAND (ML)
- ELASTIC SILT/ELASTIC SILT W/ SAND ELASTIC SILT W/ GRAVEL (MH)

GRAVELS

- WELL-GRADED/POORLY-GRADED GRAVEL (GW OR GP)

MISCELLANEOUS MATERIALS

- PEAT
- TOPSOIL
- EARTHEN FILL

SLURRY WALL CONSTRUCTION

NOTES

1. THE CORRELATION LINES ARE BASED ON INTERPOLATION BETWEEN BORINGS AND MAY NOT REPRESENT ACTUAL SUBSURFACE CONDITIONS.
2. HORIZONTAL DISTANCES ARE MEASURED AND THE GROUNDWATER AND LEACHATE HEAD DATA ARE PLOTTED WITH RESPECT TO THE CENTER OF EACH BORING LOCATION. WELL CONSTRUCTION SCHEMATICS ARE OFFSET FOR CLARITY.
3. REFER TO FIGURE 5 FOR NOTES REGARDING THE EXISTING TOPOGRAPHY AND CROSS SECTION LOCATIONS.
4. ELEVATIONS ARE SHOWN IN REFERENCE TO USGS MEAN SEA LEVEL (M.S.L.) DATUM.
5. THE GROUNDWATER ELEVATIONS ARE BASED ON MEASUREMENTS TAKEN BY RMT ON OCTOBER 18 & 19, 2004. THE LEACHATE ELEVATIONS ARE BASED ON MEASUREMENTS TAKEN BY RMT BETWEEN OCTOBER 19 AND 21, 2004.
6. BORINGS SHOWN TO BE ABOVE OR BELOW EXISTING GROUND SURFACE (MARCH 28, 2005) PREDATE EITHER FILL OR EXCAVATION ACTIVITIES IN THOSE AREAS. WASTE IN AREAS 8, 9 AND 10 AS INDICATED IN BORINGS 144, 145 AND 168 WAS REMOVED PRIOR TO CONSTRUCTION OF SLURRY WALL IN 1991.
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8. FINAL COVER THICKNESS SHOWN AS 4.5–FEET THICK. ACTUAL THICKNESS MAY VARY BASED ON LOCATION WITHIN SPECIFIC FINAL COVER PHASING.
9. LANDFILL BASE ELEVATIONS AT LOCATIONS WHERE NO BORINGS OR WELLS ARE PRESENT ARE PROJECTED BASED ON INFORMATION FROM ADJACENT BORINGS OR WELLS.
10. THE TOP OF UNIT B ELEVATIONS BENEATH THE LANDFILL ARE BASED ON A PROJECTED CONTOUR MAP USING STRATIGRAPHIC DATA FROM SOIL BORINGS INSTALLED AROUND THE PERIMETER AND WITHIN THE LANDFILL.
11. THE BASEGRADES WITHIN CORRIDOR 4 WERE EXCAVATED 20' BELOW THE CORRIDOR 4 LEACHATE COLLECTION PIPE 400 FEET FROM THE EAST PIPE END. REFER TO APPENDIX A OF THIS REPORT FOR ADDITIONAL INFORMATION.

PROFILE SCALE: 20' SCALE: 1"= 20'
HORIZONTAL 0 100' SCALE: 1"=100'
VERTICAL EXAGGERATED = 5X

NO.	BY	DATE	REVISION	APP'D.
3.				
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PROJECT: **KESTREL HAWK LANDFILL OLD SITE HYDROGEOLOGIC EVALUATION PHASE I SUMMARY REPORT**

SHEET TITLE: **CROSS SECTION B-B'**

DRAWN BY: MEYERHOC	SCALE:	PROJ. NO. 4865.94
CHECKED BY: TS	AS SHOWN	FILE NO. 48659420_REV1.DWG
APPROVED BY: JO	DATE PRINTED: OCT 19 2005	FIGURE 7
DATE: OCTOBER 2005		

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