WARZYN

February 12, 1991

RECEIVED

FEB 13 1991

BUREAU OF SOLID & HAZARDOUS WASTE MANAGEMENT

Ms. Theresa Evanson
Wisconsin Department of Natural Resources
Environmental Response & Repair Section
Bureau of Solid and Hazardous Waste Management
101 South Webster Street, GEF II, SW/3
Madison, Wisconsin 53707

Re: Gas Monitoring Program
Annual Report
Refuse Hideaway Landfill
Agreement No. 81217.89-3
Project No. 13928.87

Dear Ms. Evanson:

This letter report has been prepared to present our findings regarding the Gas Monitoring Program for 1990. Gas monitoring has been performed in accordance with the January 1990 Warzyn document titled "Gas Monitoring Program; Refuse Hideaway Landfill". The Gas Monitoring Report submittal requirement was changed from a quarterly to an annual reporting basis (see Appendix A).

Warzyn installed gas monitoring probe nest, GPW-1 on the Summers' property on February 9, 1990 (see enclosed Drawing 13928-A4 for details). Additionally, Warzyn retrofitted the existing monitored gas probes by replacing each existing PVC cap with a new PVC cap fitted with a brass hose barb, new hose, and a 1/4 in. PVC labcock valve. These modifications provide tighter seals and enable the sampler to obtain a more accurate estimate of gas pressure, methane, and oxygen content.

Table 1, attached, presents the monitoring data for 1990. To date, no combustible gas has been detected at the monitored residences or the new gas probe, GPW-1. Refer to Drawing 13928-26 for Gas Probe Location Plan and to Drawing 13928-B4 for Residential Monitoring Location Plan. Combustible gas has been detected, however, at all other monitored gas probes with the exception of G-10. Refer to Table 1 for specified dates and magnitudes of detections. Monitoring of the Speedway Sand & Gravel buildings resulted in the detection of 80% and 100% of the lower explosive limit (LEL) for methane gas in the scale house in April and August, respectively (see Appendix B). The detections occurred at a loose pipe penetration in the floor of the scale house restroom. As a result, the WDNR and Warzyn notified Speedway Sand & Gravel and Mr. Tom DeBeck of the detections (see Appendix B). The pipe penetration was sealed by Mr. Tom DeBeck and no subsequent detections have occurred.

THE PERFECT BALANCE
BETWEEN TECHNOLOGY
AND CREATIVITY.

MADISON
ONE SCIENCE COURT
P.O. BOX 5385
MADISON, WI 53705
(608) 231-4747
FAX (608) 273-2513

The Gas Monitoring Program will continue under the contract for the "Construction Observation and Operation and Maintenance Phase".

The Gas and Leachate Extraction System is scheduled to be completed April 1, 1991. With this system in operation the possibility of landfill gas migration beyond the perimeter of the site will be reduced. Upon WDNR's direction gas monitoring services will conclude May 1, 1991.

Warzyn will continue monitoring per our schedule and will be pleased to discuss any comments you may have regarding the monitoring program.

Sincerely,

WARZYN INC.

Dean R. Free
Project Engineer

Jan C. Kucher, P.E.
Project Manager

DRF/kml/JCK/WB/RWM
[sss-112-91]
13928.87

Enclosures: Table 1
Drawings 13928-A4, 13928-26, 13928-B4
Appendix A
Appendix B

THE PERFECT BALANCE
BETWEEN TECHNOLOGY
AND CREATIVITY.

MADISON
ONE SCIENCE COURT
P.O. BOX 5385
MADISON, WI 53705
(608) 231-4747
FAX (608) 273-2513

WARZYN INC.
MADISON, WISCONSIN

TABLE 1

REFUSE HIDEAWAY LANDFILL
GAS MONITORING PROGRAM DATA
PROJECT 13928.87

PROBE #, BUILDING, OR RESIDENCE	PARAMETER	DATE	12-7-89	12-8-89	1-4-90	1-17-90	2-5-90	2-21-90	3-8-90	3-23-90	4-11-90	4-26-90	5-18-90	6-15-90	8-2-90	8-15-90	9-12-90	10-22-90	11-12-90	11-29-90	12-7-90	12-28-90
		BARO."Hg	30.42"	29.57"	29.94"	29.81"	29.93"	30.19"	30.12"	30.30"	30.11"	29.76"	29.96"	29.99"	30.10"	30.14"	30.10"	30.09"	30.37"	30.41"	29.92"	30.04"
		R/S/F	S	S	R	F	F	F	F	R	R	F	S	F	F	R	S	F	R	F	F	F
		TEMP	18 DEG	24 DEG	31 DEG	45 DEG	55 DEG	55 DEG	35 DEG	19 DEG	32 DEG	50 DEG	70 DEG	80 DEG	78 DEG	84 DEG	90 DEG	49 DEG	35 DEG	55 DEG	31 DEG	28 DEG
G-1S	METHANE	% LEL	0		0	0	100	20	100	0	0	80	0	100	100	100	100	0	0	0	0	0
2' - 17'		% VOL	0		0	0	5	1	25	0	0	4	0	42	45	40	42	0	0	0	0	0
	OXYGEN	%	21		21	21	16	20	5	20	21	5	21	0	0	0	0	21	21	21	21	21
	PRESSURE	in. WC	0					0	0	0.1	0	0	0	0	0	0	0	0	-0.01	-0.05	-0.05	0
G-1D	METHANE	% LEL	0		0	0	0	50	60	0	0	60	0	100	100	100	100	0	0	0	0	0
20' - 30'		% VOL	0		0	0	0	2.5	3	0	0	5	0	42	42	40	5	0	0	0	0	0
	OXYGEN	%	21		21	21	21	18	18	20	21	5	21	0	0	0	18	21	21	21	21	21
	PRESSURE	in. WC	0		0			0	0	0	-0.1	0.1	-0.1	0	0	0	+0.05	0	-0.05	-0.05	-0.05	-0.05
G-6	METHANE	% LEL	0		0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0
20'- 30'		% VOL	0		0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
	OXYGEN	%	21		21	21	21	21	21	21	21	21	21	20	20	17	20.5	21	21	21	21	21
	PRESSURE	in. WC	0		0			0	0	0	0	0.1	0	0	0	-0.05	0	0	0.03	0	0	0
G-8	METHANE	% LEL	0		0	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0	0
29'- 39'		% VOL	0		0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
	OXYGEN	%	21		21	17	20.5	12	5	21	21	21	21	21	21	20.5	20.5	21	21	21	21	21
	PRESSURE	in. WC	0		0			0.25	0.4	0	-0.1	0.2	0	0	0	0	0	0	0	0	0	0
G-9	METHANE	% LEL		50	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130' - 170'		% VOL	NOT	1.5	0	0	0	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OXYGEN	%	AVAIL.	20.5	21	21	18	18	15	21	21	21	21	21	21	21	20.5	21	21	21	21	21
	PRESSURE	in. WC		0	0			0.3	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
G-10	METHANE	% LEL	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
155'- 175'		% VOL	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OXYGEN	%	21		21	21	20	21	21	21	21	21	21	21	20	20.5	21	21	21	21	21	21
	PRESSURE	in. WC	0		0			1.5	>2	1.75	0.6	0.8	-0.6	-0.1	-0.4	-0.05	+0.25	-0.15	-0.55	-1.4	0.7	0.5
GP-11S	METHANE	% LEL	0		0	0	0	0	0	0	0	80	40	100	100	100	100	40	0	0	0	0
2' - 15'		% VOL	0		0	0	0	0	0	0	0	4	2	50	5	45	42	2	0	0	0	0
	OXYGEN	%	21		21	21	21	17.5	21	21	21	0	6	0	15	0	0	21	21	21	21	21
	PRESSURE	in. WC	0		0	0		0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0
GP-11D	METHANE	% LEL	0		0	0	0	100	0	0	0	80	60	100	20	100	100	100	0	0	0	0
20' - 35'		% VOL	0		0	0	0	5	0	0	0	4	3	52	2	45	48	45	0	0	0	0
	OXYGEN	%	21		21	16	20	2	20	21	21	0	0	0	15	0	0	0	21	21	21	21
	PRESSURE	in. WC	0		0	0		0.25	0.1	0	0	0.1	0	0.1	0.1	0.1	+0.1	0.05	-0.05	+0.04	-0.02	-0.02

WARZYN INC.
MADISON, WISCONSIN

TABLE 1 (Cont')
Page 2 of 3

PROBE #, BUILDING, OR RESIDENCE	PARAMETER	DATE	12-7-89	12-8-89	1-4-90	1-17-90	2-5-90	2-21-90	3-8-90	3-23-90	4-11-90	4-26-90	5-18-90	6-15-90	8-2-90	8-13-90	9-12-90	10-22-90	11-12-90	11-29-90	12-7-90	12-28-90
		BARO."Hg	30.42"	29.37"	29.94"	29.81"	29.93"	30.19"	30.12"	30.50"	30.11"	29.76"	29.96"	29.99"	30.10"	30.14"	30.10"	30.09"	30.37"	30.41"	29.92"	30.04"
		R/S/F	S	S	R	F	F	F	F	R	R	F	S	F	F	R	S	F	R	F	F	F
		TEMP	18 DEG	24 DEG	51 DEG	43 DEG	55 DEG	55 DEG	55 DEG	19 DEG	32 DEG	50 DEG	70 DEG	80 DEG	78 DEG	84 DEG	90 DEG	49 DEG	55 DEG	53 DEG	51 DEG	28 DEG
GPW-1S	METHANE	% LEL						0	0	0	0	0	0	0	0	0	0		0	0	0	0
4'- 16'		% VOL						0	0	0	0	0	0	0	0	0	0		0	0	0	0
	OXYGEN	%						20	20	20	21	21	21	21	20	20.5	19		21	21	21	20
	PRESSURE	in. WC						0	0.5	0.2	0	0.1	0	0	0	0	0		0	0	0	0
GPW-1M	METHANE	% LEL						0	0	0	0	0	0	0	0	0	0		0	0	0	0
21' - 33'		% VOL						0	0	0	0	0	0	0	0	0	0		0	0	0	0
	OXYGEN	%						19	18	20	21	19	21	20	19.5	19.5	20		20	21	19.5	19
	PRESSURE	in. WC						1	0.5	0.4	0.4	0.2	0.2	-0.2	0.5	0.1	-0.2		-0.02	-0.75	0.55	0.6
GPW-1D	METHANE	% LEL						0	0	0	0	0	0	0	0	0	0		0	0	0	0
38'- 50'		% VOL						0	0	0	0	0	0	0	0	0	0		0	0	0	0
	OXYGEN	%						20	21	21	21	21	21	20	19.5	19.5	19		21	21	20	19
	PRESSURE	in. WC						0.75	0	0.55	0.5	0.3	0.2	-0.2	0.4	0.1	-0.15		-0.05	-0.85	0.3	0.8
SPEEDWAY	METHANE	% LEL			0		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
SHOP		% VOL			0		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
	OXYGEN	%			21		21	21	21	21	21	21	21	21	21	21	21		21	21	21	21
SPEEDWAY	METHANE	% LEL			0		0	0	0	0	0	80*	0	0	100*	100*	0		0	0	0	0
SCALE HOUSE		% VOL			0		0	0	0	0	0	4	0	0	10	15	0		0	0	0	0
	OXYGEN	%			21		21	21	21	21	21	15	21	21	10	2	21		21	21	21	21
SPEEDWAY	METHANE	% LEL			0		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
GARAGE		% VOL			0		0	0	0	0	0	0	0	0	0	0	0		0	0	0	0
	OXYGEN	%			21		21	21	21	21	21	21	21	21	21	21	21		21	21	21	21
SUMMERS	METHANE	% LEL	0		0	0	0			0	0		0	0	0	0	0		0	0	0	0
		% VOL	0		0	0	0			0	0		0	0	0	0	0		0	0	0	0
	OXYGEN	%	21		21	21	21			21	21		21	21	21	21	21		21	21	21	21
STOPPLEWORTH	METHANE	% LEL	0								0						0			0		0
		% VOL	0								0						0			0		0
	OXYGEN	%	21								21						21			21		21
GABER/HOLZ/ HANZ	METHANE	% LEL	0								(a) 0						0			NOT	0	0
		% VOL	0								0						0			AVAIL.	0	0
	OXYGEN	%	21								21						21				21	21

WARZYN INC.
MADISON, WISCONSIN

TABLE 1 (Cont')

PROBE #, BUILDING, OR RESIDENCE	PARAMETER	DATE	12-7-89	12-8-89	1-4-90	1-17-90	2-5-90	2-21-90	3-8-90	3-23-90	4-11-90	4-26-90	5-18-90	6-15-90	8-2-90	8-15-90	9-12-90	10-22-90	11-12-90	11-29-90	12-7-90	12-28-90
		BARO."Hg	30.42"	29.37"	29.94"	29.81"	29.93"	30.19"	30.12"	30.30"	30.11"	29.76"	29.96"	29.99"	30.10"	30.14"	30.10"	30.09"	30.37"	30.41"	29.92"	30.04"
		R/S/F	S	S	R	F	F	F	F	R	R	F	S	F	F	R	S	F	R	F	F	F
		TEMP	18 DEG	24 DEG	31 DEG	45 DEG	35 DEG	35 DEG	35 DEG	19 DEG	32 DEG	50 DEG	70 DEG	80 DEG	78 DEG	84 DEG	90 DEG	49 DEG	35 DEG	35 DEG	31 DEG	28 DEG
HARRIS/ JULSON	METHANE	% LEL									0						(c) 0			0		NOT
		% VOL									0						0			0		AVAIL.
	OXYGEN	%									21						21			21		
VOSEN	METHANE	% LEL									0						0			0		0
		% VOL									0						0			0		0
	OXYGEN	%									21						21			21		21
LISKA/ BICKEL	METHANE	% LEL									0						0			NOT AVAIL.	NOT AVAIL.	NOT AVAIL.
		% VOL									0						0					
	OXYGEN	%									21						21					
COYLE	METHANE	% LEL									(b) 0						0			NOT AVAIL.	0 0	0 0
		% VOL									0						0					
	OXYGEN	%									21						21				21	21
SCHULTZ	METHANE	% LEL									0						0			0		0
		% VOL									0						0			0		0
	OXYGEN	%									21						21			21		21

NOTES

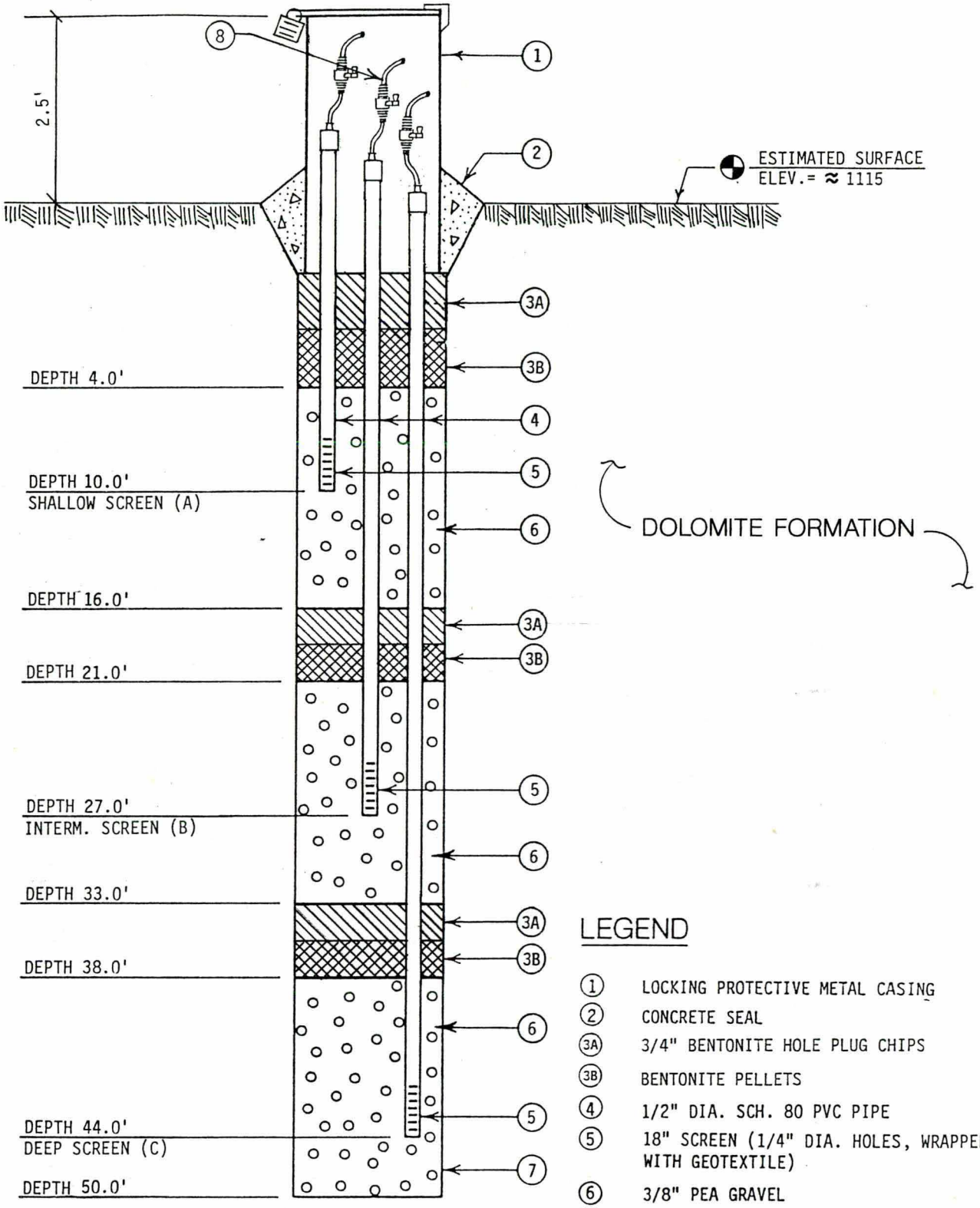
1. Barometric pressure data from the National Weather Service at (608)249-6645, or weather recording at (608)936-1212.
2. %LEL = Percent of Lower Explosive Limit of methane.
3. R/S/F = Atmospheric pressure is inches of mercury was Rising/Steady/Falling.

* - Methane concentration at open pipe penetration in restroom floor of Speedway Scale House.

(a) Monitoring performed on 4/23/90.
(b) Monitoring performed on 4/17/90.
(c) Monitoring performed on 9/26/90.

[File: Gasmon.wk1]
[Disk: DRF No. 1]

DRF/JCK



LEGEND

1. LOCKING PROTECTIVE METAL CASING
2. CONCRETE SEAL
3A. 3/4" BENTONITE HOLE PLUG CHIPS
3B. BENTONITE PELLETS
4. 1/2" DIA. SCH. 80 PVC PIPE
5. 18" SCREEN (1/4" DIA. HOLES, WRAPPED WITH GEOTEXTILE)
6. 3/8" PEA GRAVEL
7. 6" DIA. AUGER HOLE
8. 1" PVC CAP, TYGON TUBE, ¼" PVC LABCOCK AND HOSE

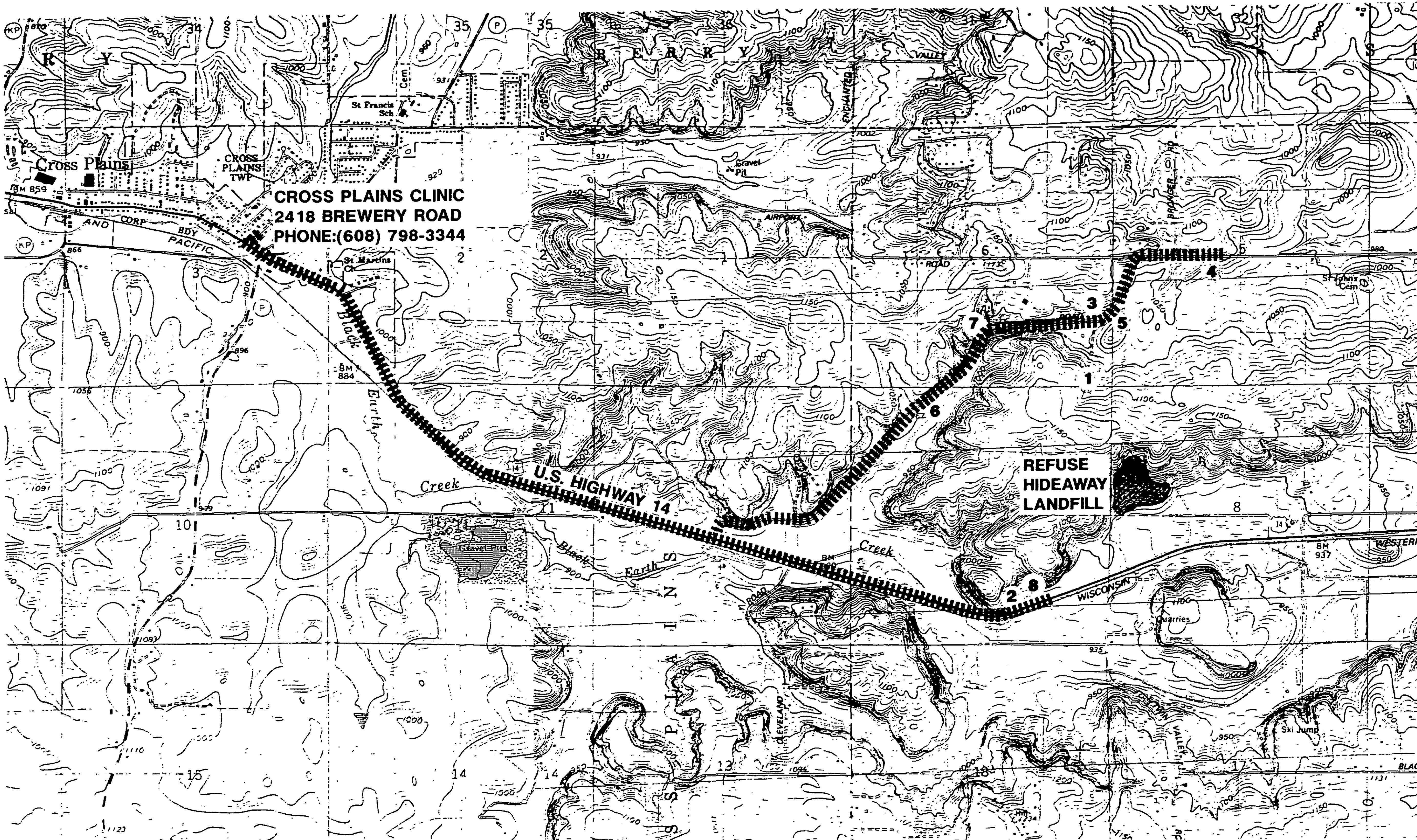
NOTES

1. DEPTH = DEPTH BELOW GROUND SURFACE.
2. APPROXIMATE RECORD LOCATION: 402,235N, 2,111,790E.

NOT TO SCALE

QUALITY CONTROL
Lead Professional Section
INITIALS DRF DATE 1-15-91 Division
INITIALS JC DATE 2-11-91 Other

WARZYN	RECORD GAS MONITORING PROBE DETAIL (GPW-1)	Drawn JC, LCL Checked DRF	App'd. JCK
	GAS MONITORING PROGRAM REFUSE HIDEAWAY LANDFILL SECTION 8, T7N, R8E TOWN OF MIDDLETON, DANE COUNTY, WISCONSIN	Revisions	Date 2-11-91
			13928 A4



KEY (RESIDENTIAL GAS MONITORING LOCATIONS)

1 SUMMERS TREE FARM

2 STOPPLEWORTH RESIDENCE

3 GABER/HOLTZ/HANZ RESIDENCE

4 HARRIS RESIDENCE

5 VOSEN RESIDENCE

6 LISKA/BICKEL RESIDENCE

7 COYLE RESIDENCE

8 SHULTZ RESIDENCE

LEGEND

IIIIIIIIIIIIIIIII CLINIC ROUTE

NOTE

1. BASE MAP DEVELOPED FROM THE CROSS PLAINS AND MIDDLETON, WISCONSIN, 7½ MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAPS, DATED 1962, PHOTOREVISED 1982; AND 1983, RESPECTIVELY.

north

0 2000 4000

SCALE IN FEET

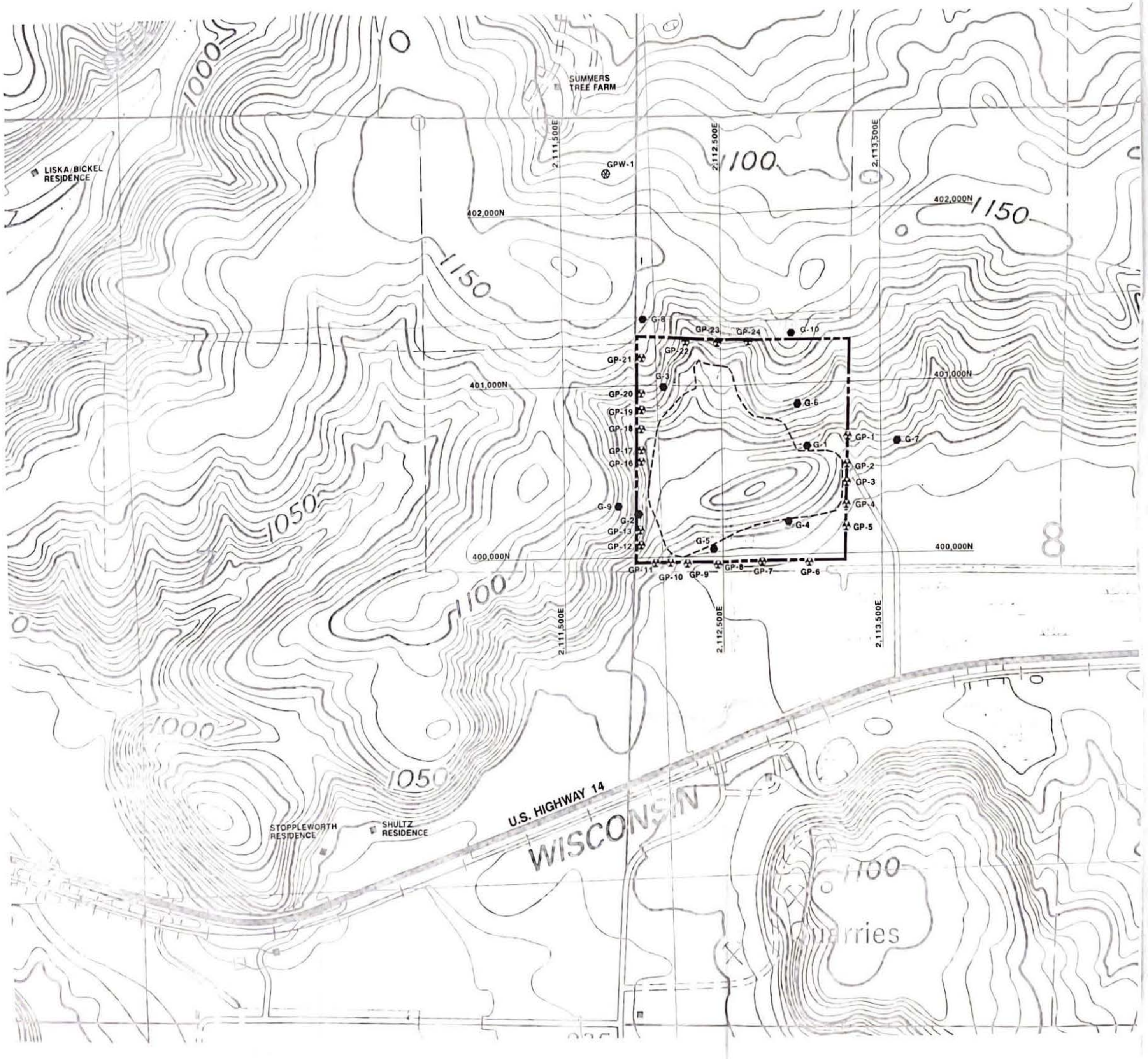
RESIDENTIAL MONITORING LOCATION PLAN AND CLINIC ROUTE

GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
SECTION 8, T7N, R8E
TOWN OF MIDDLETON
DANE COUNTY, WISCONSIN

WARZYN

Designed By JCK Drawn By DLF Checked By JCK
Approved By [signature] Date 1/12/90
Reference 13709-B1

Project Number 13928 B4



LEGEND

- G-1 EXISTING GAS PROBE LOCATION AND NUMBER ("G" SERIES)
- GP-1 EXISTING GAS PROBE LOCATION AND NUMBER ("GP" SERIES)
- GPW-1 RECORD GAS PROBE LOCATION AND NUMBER
- LIMITS OF LANDFILL
- APPROXIMATE PROPERTY LINE

NOTES

1. BASE MAP DEVELOPED FROM THE CROSS PLAINS AND MIDDLETON, WISCONSIN 7 1/2 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAPS, DATED 1962, PHOTOREVISED 1982; AND 1983, RESPECTIVELY.
2. LANDFILL LIMITS AND PROPERTY LINE INFORMATION OBTAINED FROM DRAWING PREPARED BY RMT, INC., DATED NOVEMBER 1988, REMEDIAL ACTION REPORT CONSENT ORDER SOD-88-02A, RMT, INC.
3. GRID SHOWN IS STATE PLANE COORDINATE SYSTEM.
4. LIMITS OF LANDFILL DO NOT REFLECT LIMITS OF REFUSE.
5. GAS PROBE LOCTIONS WERE OBTAINED FROM WISCONSIN DEPARTMENT OF NATURAL RESOURCES, RMT FIGURE 1, PROJECT NO. 1181.05, CONCEPTUAL LANDFILL GAS MANAGEMENT PLAN, DATED JUNE 1988 AND RMT SHEET 2 OF 8, PROJECT NO. 1181.09, EXISTING CONDITIONS MAP, DATED OCTOBER 1988.
6. GAS PROBES G-1 THROUGH G-6 WERE INSTALLED IN JUNE 1987, GAS PROBE G-8 WAS INSTALLED IN JUNE 1988, GAS PROBE G-9 WAS INSTALLED IN JULY 1988 AND GP SERIES GAS PROBES WERE INSTALLED IN JANUARY 1989. ALL GAS PROBES WERE INSTALLED BY RMT, INC.
7. GAS PROBE GPW-1 WAS INSTALLED ON FEBRUARY 9, 1990 BY WARZYN INC.

north

0 300 600
SCALE IN FEET

Checked By DRF | Date 2-11-91 | Reference 13928-8
Drawn By JC
Designed By DRF/JCK
Approved By [signature]

WARZYN
WARZYN ENGINEERING INC.

Date · By · App'd
Revisions

GAS PROBE LOCATION PLAN

GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
SECTION 8, T7N, R8E
TOWN OF MIDDLETON
DANE COUNTY, WISCONSIN

Project Number
13928 **26**

WARZYN

WARZYN

June 7, 1990

Ms. Theresa A. Evanson
Wisconsin Department of Natural Resources
Environmental Response Repair Section
Bureau of Solid Waste Management
101 S. Webster Street, GEF II, SW/3
P.O. Box 7921
Madison, WI 53707

RE: Gas Monitoring Reporting
Refuse Hideaway Landfill
Project No. 13928.87

Dear Ms. Evanson:

This letter is to confirm our agreement at the May 22, 1990 meeting concerning the Gas Monitoring Report for the Refuse Hideaway Landfill. In our agreement, the Gas Monitoring Summary Report was to be submitted to you on a quarterly basis. However, on May 22, 1990, this requirement was changed to an annual reporting basis.

Warzyn will continue to perform gas monitoring activities at the Refuse Hideaway Landfill and the Wisconsin Department of Natural Resources will be promptly advised of any potentially dangerous concentrations.

If you have any questions or comments on this change, please let me know.

Sincerely,

WARZYN ENGINEERING INC.

Joel V. Schittone

Joel V. Schittone, P.E.
Project Manager

TFL/jkk/JVS
[jkk-106-74]
13928.87

cc: Ms. Celia Van Der Loop - WDNR
Ms. Sally Kefer - WDNR

THE PERFECT BALANCE
BETWEEN TECHNOLOGY
AND CREATIVITY

MADISON
ONE SCIENCE COURT
P.O. BOX 5585
MADISON, WI 53705
(608) 231-4747
FAX (608) 273-2515

WARZYN

April 27, 1990

Speedway Sand & Gravel, Inc.
7812 Hwy. 14
Middleton, WI 53562

RE: Gas Monitoring of Speedway Buildings
Refuse Hideaway Landfill
Project No. 13928.87

Dear Sirs:

On April 26, 1990 Warzyn performed routine landfill gas monitoring at the Refuse Hideaway Landfill. On April 27th, we contacted your office to inform you that we had detected 80% of the lower explosive limit for methane gas in the bathroom at the scale house building at Refuse Hideaway Landfill. We spoke with Ms. Jan Muellen of your office, and a message was left for you to return the call as soon as possible.

We recommend that you investigate and remediate this matter immediately. As a preliminary measure, we recommend you consider sealing all pipe penetrations or any voids in the concrete slab that would act as a conduit for landfill gas to migrate into the scale house building. Resolution of this matter is of significant importance for the health and safety of your employees. Please do not hesitate to contact Warzyn and/or Ms. Terry Evanson of the Wisconsin Department of Natural Resources (266-0941) should you have questions.

Sincerely,

WARZYN ENGINEERING INC.

Jan C. Kucher, P.E.
Project Engineer

Joel V. Schittone, P.E.
Project Manager

JCK/jkk/JVS/TEL
[wpmisc-104-39]
13928.87

cc: Ms. Terry Evanson - WDNR
Ms. Celia Van Der Loop - WDNR

Warzyn Engineering Inc
One Science Court
University Research Park
P.O. Box 5385
Madison, Wisconsin 53705
(608) 273-0448

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Carroll D. Besadny, Secretary
Box 7921
Madison, Wisconsin 53707
DNR TELEFAX NO. 608-267-3579
TDD NO. 608-267-6897
SOLID WASTE TELEFAX NO. 608-267-2768

May 4, 1990 IN REPLY REFER TO: 4440

Mr. Tom DeBeck
Speedway Sand & Gravel, Inc.
7812 U.S. Hwy 14
Middleton, WI 53562

SUBJECT: Gas Concentrations Measured Within the Scale House at the Refuse Hideaway Landfill

Dear Mr. DeBeck:

This letter is to state our concerns with the high levels of methane gas recently detected in the scale house at the Refuse Hideaway Landfill. In a letter dated April 27, 1990, Warzyn Engineering informed you that routine monitoring had detected methane at 80% of the lower explosive limit. Laws regulating landfills (NR 506.07(3), Wis. Adm. Code) allow no more than 25% of the lower explosive level for methane in any landfill facility structure. Methane gas is extremely hazardous and we are concerned for the health and safety of yourself and your employees who may use this building.

The Department of Natural Resources is currently taking steps to control methane migration from the landfill. A full gas and leachate extraction system is presently being designed by Warzyn and we anticipate that the extraction system will be constructed in Fall, 1990. The system should be operational by Spring, 1991.

However, until the gas extraction system is operating and achieving design expectations, build-up of methane gas within facility structures will continue to threaten the health and safety of workers who use those facilities. We suggest that, at a minimum, the following precautionary measures be taken:

1. Place warning signs on the building that an explosion hazard exists and that all smoking materials or other open flames must be extinguished.

2. Seal all pipe penetrations, cracks and voids in the concrete slab that are allowing gas to migrate into the facility.

3. Adequately ventilate the building.

We also suggest that you consult with a building contractor or engineering firm of your choice for further guidance in this matter. You may also want to consider abandoning and removing the building.

If you have any questions about this letter, please call me at 266-0941 any weekday morning.

Sincerely,

Terry Evanson, Hydrogeologist
Environmental Response and Repair Section
Bureau of Solid and Hazardous Waste Management

TAE/tae/gasDeBec.rhl

cc. Ray Tierney / Mark Giesfeldt - SW/3
Chuck Leveque - LC/5
Marie Stewart - SD
Joel Schittone - Warzyn Engineering Inc.
John DeBeck - 2114 Sunnyside Crescent

WARZYN

August 10, 1990

Mr. Tom DeBeck
Speedway Sand & Gravel, Inc.
7812 Hwy. 14
Middleton, WI 53562

RE: Gas Monitoring of Speedway Buildings
Refuse Hideaway Landfill
Project No. 13928.87

Dear Mr. DeBeck:

On August 10th, we contacted your office to inform you that we had detected 100% of the lower explosive limit (LEL) for methane gas in the restroom at the scale house building at Refuse Hideaway Landfill. We spoke with Ms. Jan Muellen of your office, and a message was left for you to return the call as soon as possible.

In April, we had contacted your office to inform you that we detected 80% of the LEL for methane gas (at the same location). More specifically, the detections occurred at a loose pipe penetration in the floor of the scale house restroom. At that time (April 27, 1990), we recommended that you seal the penetrations to prevent gas from entering.

Again, we recommend that you investigate and remediate this matter immediately. As a preliminary measure, we recommend you consider sealing all pipe penetrations or any voids in the concrete slab that would act as a conduit for landfill gas to migrate into the scale house building. Resolution of this matter is of significant importance for the health and safety of your employees. Please do not hesitate to contact Warzyn and/or Ms. Terry Evanson of the Wisconsin Department of Natural Resources (266-0941) should you have questions.

Sincerely,

WARZYN ENGINEERING INC.

Dean R. Free
Project Engineer

Jan C. Kucher, P.E.
Project Manager

DRF/gds/JCK
[wpmisc-104-39]
13928.87

cc: Ms. Terry Evanson - WDNR
Ms. Celia Van Der Loop - WDNR

THE PERFECT BALANCE
BETWEEN TECHNOLOGY
AND CREATIVITY

MADISON
ONE SCIENCE COURT
PO BOX 5585
MADISON, WI 53705
(608) 231-4747

WARZYN

Engineers & Scientists
Environmental Services
Waste Management
Water Resources
Site Development
Special Structures
Geotechnical Analysis

January 12, 1990

Ms. Theresa Evanson
Wisconsin Department of Natural Resources
Bureau of Solid and Hazardous Waste Management
101 S. Webster Street, GEF II
Madison, Wisconsin 53707

Re: Gas Monitoring Program
Refuse Hideaway Landfill
Agreement 81217.89-3
Project 13928.87

Dear Ms. Evanson:

Enclosed are three copies of the Gas Monitoring Program for the Refuse Hideaway Landfill project. A draft copy of this document was submitted to the Wisconsin Department of Natural Resources for review on January 9, 1990. Review comments were received during a telephone conversation with Sue Fisher on January 11, 1990 and have been incorporated.

If you have any questions, please contact us.

Sincerely,

WARZYN ENGINEERING INC.

Jan C. Kucher, P.E.
Project Engineer

Joel V. Schittone, P.E.
Project Manager

JVS/bcn/JVS
[bcn-601-91a]

Enclosure: Gas Monitoring Program (3)

cc: Ms. Susan Fisher, WDNR
Mr. Mark Giesfeldt, WDNR
Ms. Sally Kefer, WDNR (w/o encl)

Warzyn Engineering Inc.
One Science Court
University Research Park
PO Box 5385
Madison, Wisconsin 53705
(608) 273-0440

WARZYN

Refuse Hideaway Landfill
Town of Middleton
Dane County, Wisconsin

Agreement No. 81217.89-3

January 1990

TABLE OF CONTENTS

	Page No.
INTRODUCTION	1
PREVIOUS INVESTIGATIONS	2
PURPOSE AND SCOPE	3
EXISTING CONDITIONS	4
MONITORING PROGRAM	4
General	4
Monitoring Locations	5
Monitoring Parameters	6
Monitoring Frequency	7
Scheduled Monitoring	7
Unscheduled Monitoring/Data Evaluation	8
Report Preparation	8

TABLE

TABLE 1 - MONITORING DATA SUMMARY

DRAWINGS

13928-8 GAS PROBE LOCATION PLAN
13928-A2 TYPICAL EXISTING GAS MONITORING PROBE DETAIL
13928-A3 PROPOSED GAS MONITORING PROBE DETAIL (GPW-1)
13928-B3 WATER TABLE MAP (SEPTEMBER 1988)
13928-B4 RESIDENTIAL MONITORING LOCATION PLAN AND CLINIC ROUTE

APPENDIX

APPENDIX A - HEALTH AND SAFETY PLAN

GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
TOWN OF MIDDLETON
DANE COUNTY, WISCONSIN
13928.87

INTRODUCTION

The Refuse Hideaway Landfill (Landfill), located on Highway 14 in the Town of Middleton, Dane County, Wisconsin was closed under a Consent Order in 1988 after volatile organic compounds (VOCs) were detected in three private water supply wells in the vicinity of the Landfill. Since that time, the Wisconsin Department of Natural Resources (WDNR) has taken an active role in managing remedial activities relating to the Landfill. Warzyn Engineering Inc. (Warzyn) has contracted with the WDNR to perform interim remedial measures as an initial step to characterize and control the contamination originating at the Landfill.

Monitoring of gas probes in 1989 has indicated the presence of landfill gas beyond the perimeter of the Landfill. These monitoring results indicate that combustible gases (assumed to be primarily methane) were detected in concentrations greater than 25% of the lower explosive limit (LEL) (1.25% by volume) of methane beyond the facility property boundary, which exceeds the limits specified in NR 506.07(3), Wisconsin Administrative Code. Local geology, consisting of fractured bedrock, may be facilitating the migration of the landfill gas (LFG) away from the Landfill.

Landfill gas is produced by the decomposition of organic materials in an anaerobic state. Landfill gas is typically composed of 40% to 60% methane (CH_4), 40% to 60% carbon dioxide (CO_2) and trace concentrations of mercaptans, VOCs and water vapor. As these gases are produced, positive pressures develop and they tend to follow a path of least resistance, such as permeable soils and/or fractures in rock. In the event there are direct permeable paths to the surface due to cracks or fissures in the landfill cover, some gas pressure can be relieved vertically. However, if the cover surface is relatively impermeable, gas flow laterally through the surrounding soils may be increased. Gas migration is typically influenced in nature by confining layers of frozen, saturated and/or low permeability soils, surface water or

the water table (see Drawing 13928-B3 - Water Table Map, September 1988). Since methane is relatively insoluble in water, the water will act as a barrier to its movement.

Carbon dioxide is an inert gas which is about 1 1/2 times as dense as air. Concern for high concentrations of this gas range from nuisance levels, where it dissolves in water and makes the water slightly acidic, to cases where it displaces oxygen in the root zone of vegetation and eventually causes the death of the vegetation. Due to the relatively low possibility of carbon dioxide causing a safety hazard to nearby properties, this monitoring program will deal primarily with the other major component of landfill gas, methane, and its potential hazards.

Methane gas is very reactive at high temperatures, and is the major component of natural gas which we burn as a heat source and fuel. The primary concern with high concentrations of methane in a landfill environment is the danger to life and property from fire and explosion. Methane is combustible when at concentrations between 5% to 15% by volume in air, the LEL and Upper Explosive Limit (UEL), respectively.

As the methane gas exits the Landfill, either through underground soil layers, or through the surface of the Landfill, it must pass through the explosive range (5% to 15% by volume) as the gas is diluted with air. In most instances, an ignition source is not present when the methane reaches the flammable range.

PREVIOUS INVESTIGATIONS

During the period February through April 1989, Strand Associates, Inc. (Strand) performed gas monitoring at the existing gas probes located in the vicinity of the Landfill. These results indicate that a significant amount of landfill gas is migrating radially through surrounding subsoils, outside the Landfill facility property boundary. However, limited off-site gas migration appears to be occurring to the south and southwest of the Landfill. Gas monitoring results are summarized in Table 1 and gas probe locations are

illustrated on Drawing 13928-8.

Because of the elevated methane levels measured at the existing gas probes, and the concern that methane could potentially be migrating to and infiltrating into homes located in the vicinity of the Landfill, the WDNR contracted with Warzyn in March 1989 to monitor the basements of eight nearby homes for combustible gas. Results of this monitoring were summarized in a June 1989 report entitled "Monitoring Report, Refuse Hideaway Landfill" (Warzyn Project No. 13709). In summary, combustible gases were not detected in any of the eight homes at the time of monitoring.

PURPOSE AND SCOPE

Concerns remain relating to the potential for off-site landfill gas migration. The purpose of this report is to review existing data, geology and results of previous gas monitoring at the landfill perimeter gas probes to develop a prudent and appropriate landfill gas monitoring program. This monitoring program will be used to maintain a level of safety and response time to protect nearby residences, as well as serve to track gas movement off-site.

The partial gas and leachate extraction system currently being constructed by Warzyn is anticipated to be operational in January 1990. This partial extraction system is being installed to: (1) gather data necessary to design a full gas and leachate extraction system, and (2) extract landfill gas and leachate from the Landfill. Because of the partial extraction system's limited scope, it is not anticipated to significantly control off-site migration of gas from the Landfill.

The need for this monitoring program is further accentuated by the onset of winter, which may limit the release of landfill gas through the cover and ground surface due to frozen soil, and lead to its migration further laterally from the Landfill.

EXISTING CONDITIONS

The general geology in the vicinity of the Landfill consists of a sandstone stratum overlain by dolomite of the Prairie du Chien group. The dolomite is overlain by a layer of soils with varying thickness, consisting of silty clay soils and/or glacial till soils consisting of sands and gravels. Based on previous well construction and boring logs, the dolomite is highly fractured, providing a relatively permeable media for gas migration. The dolomite is very near the surface (less than 5 ft) in the areas west, north and northeast of the Landfill.

The south and southeast perimeter of the Landfill generally has a 2- to 30-ft thick confining layer consisting of silt and clay soils over the fractured dolomite. This confining layer is anticipated to reduce gas migration to the south and southeast. Another confining aspect is the water table, which can mitigate gas flow to the south of the site, due to its close proximity to the ground surface at that location (see Drawing 13928-B3). Except at isolated locations, it appears that the water table is located above the fractured dolomite and is well within the relatively impermeable silt and clay soil layer, leaving a relatively narrow and possibly disjoint avenue for gas to migrate to the south and southeast.

In south only SS

Existing gas probes, installed by RMT, Inc. (RMT) include 32 locations of probe nests, consisting of 64 multi-depth probes (see Drawing 13928-A2). Based on available data, it appears the majority of the gas probes are located within 300 ft of the Landfill limits, and four of the gas probes are located outside of the Landfill property boundary (G-7, G-8, G-9 and G-10). Gas probe locations are illustrated on Drawing 13928-8. Information relating to the existing gas probes are summarized in Table 1.

MONITORING PROGRAM

General

After examining existing gas monitoring data, local geologic and hydrogeologic data and construction details of the existing gas probes, a gas monitoring

program has been developed. The monitoring program includes the monitoring of several key existing gas probes, several buildings and homes and installation of a proposed multi-depth gas probe. Monitoring will be performed for a duration of approximately one year under this contract.

Gas probes will be monitored to determine gas pressures and combustible gas concentrations at the time of sampling, and also to track relative changes in these parameters with time. This data will be a valuable tool in predicting the relative increase or decrease of landfill gas migration (i.e., will provide early-warning signs of increasing off-site migration, if it occurs).

Monitoring Locations

Several representative existing gas probes were selected for monitoring because of their relative locations to the Landfill, screened interval, and historic combustible gas monitoring data. The probes selected include: G-1, G-6, G-8, G-9, G-10 and GP-11. It is estimated that monitoring results at probes G-1, G-6 and G-10 will be representative of gas migration to the east and northeast of the site. Probe G-1 is also being monitored because of its close proximity to the Speedway Sand and Gravel (Speedway) buildings located adjacent to the Landfill. Permeable soils in the vicinity of the Speedway buildings could allow gas flow into these buildings. Gas migration to the north will be evaluated by sampling probe G-8. Probes GP-11 and G-9 will serve to monitor gas flow to the west and southwest.

Because of the Summers Tree Farm's proximity to the Landfill and the underlying soil conditions, we have proposed the installation of a new gas probe (GPW-1) to be located between the Summers Tree Farm residence and the Landfill. The proposed location of gas probe GPW-1 is approximately 1200 ft northwest of the Landfill, on the Summers' property. This location was selected to provide the capability to detect the presence of landfill gas prior to its becoming a threat to structures at the Summers residence. It is expected that landfill gas has not migrated to that location at this time (see Drawing 13928-8 for location). Approval for access to install the gas probe on the Summers Tree Farm property will be required to install probe GPW-1.

Proposed probe nest GPW-1 will contain multi-depth probes screened in three strata segments, to a total depth of approximately 50 ft. The deepest probe will extend into the dolomite formation to an elevation at or below the estimated elevation of the Summers Tree Farm residence basement floor (see Drawing 13928-A3 for construction detail).

Structures proposed to be monitored include the Speedway building and the eight homes monitored by Warzyn in March 1989 (see Drawing 13928-B4). The Speedway buildings are located adjacent to the Landfill and are apparently built on relatively permeable soils. Therefore, there is a relatively high potential for landfill gas to migrate into their buildings, especially in the winter with frozen soil conditions. Provided access is granted, these buildings will be included on the monitoring schedule. This monitoring will supplement the gas monitoring currently being performed by Speedway. We recommend Speedway continue to operate the constant-monitoring combustible gas meters installed in several of their buildings, as well as any other monitoring or safety precautions practiced.

Monitoring Parameters

The following parameters will be monitored during a typical monitoring round:

Location	Parameters
Gas Probes	- gauge pressure in inches of water column - percent combustible gas (by volume and/or LEL) - percent oxygen by volume
Speedway Buildings	- percent combustible gas (by volume and/or LEL)
Home basements	- percent combustible gas (by volume and/or LEL)

Pressure will be monitored using a magnehelic pressure gauge, and combustible gases and oxygen will be monitored using a Gastech 1939 OX explosimeter. Barometric (atmospheric) pressure and whether it is steady, rising or falling; temperature, ground conditions and other pertinent data will be recorded on the day of monitoring. Existing gas probes may require modification to adequately monitor for gas pressure. Gas pressures will serve as an additional indicator of gas movement potential.

Monitoring will preferably be performed on days with low or falling barometric

pressure. On days with low or falling barometric pressure, gas will tend to move out of landfill boundaries in an effort to equalize pressure below ground with atmospheric pressure. Monitoring frequency will be greater when frozen or saturated soil conditions exist.

Monitoring Frequency

Scheduled Monitoring

The monitoring schedule proposed includes scheduled bimonthly sampling for weather periods with frozen or saturated soils and scheduled monthly sampling when weather conditions are not as likely to promote lateral gas flow. The term "scheduled" is used to indicate a window of time when the monitoring will occur, with the understanding that a day with falling or low barometric pressure will be selected.

Because of the relatively long distances existing between the Landfill and the eight homes, the probability that landfill gas will migrate into these homes is low. However, the potential for this to occur still does exist. Therefore, with the exception of the Summers Tree Farm residence (because of its relatively close proximity to the Landfill), the other seven homes will be monitored less frequently than the Summers Tree Farm, gas probes and the Speedway buildings. As addressed above, the intent of monitoring the gas probes is to provide an early warning that gas migration away from the landfill may be increasing. The seven homes will be monitored on four scheduled rounds, when cover soil and weather conditions change at the onset of new seasons.

The monitoring program is summarized below:

Month	Scheduled Monitoring Frequency
December 1989	2 times* - All homes
January 1990	2 times
February 1990	2 times
March 1990	2 times
April 1990	2 times* - All homes
May 1990	1 time
June 1990	1 time
July 1990	1 time
August 1990	1 time
September 1990	1 time* - All homes
October 1990	1 time
November 1990	2 times* - All homes

Bi-monthly

Monthly

WARZYN

Locations:

Gas Probes
G-1 G-9
G-6 G-10
G-8 GP-11
Summers Tree Farm Residence Basement
Speedway Buildings
Proposed Probe Nest GPW-1

* All eight homes shown on Drawing 13928-B4 will be monitored.

Unscheduled Monitoring/Data Evaluation

If the following conditions develop, we recommend an increased frequency of monitoring:

- If scheduled monitoring results indicate significantly increasing off-site landfill gas migration;
- If rapidly falling barometric pressure conditions develop; and/or
- If homeowners notify the WDNR or Warzyn of possible landfill gas presence in the home.

If any of these conditions exist, we recommend monitoring at all monitoring locations addressed above, including all eight homes, on a daily basis, or other frequency determined by the WDNR and Warzyn, until conditions are determined to be safe by the WDNR, with input from Warzyn. Recommendations will be made to rectify the problem, if one exists. Remedial actions of this nature can be provided, but are currently not part of this contract.

Report Preparation

Monitoring results will be provided to the WDNR on a quarterly basis in the form of a brief letter report. Monitoring data will be summarized and recommendations for temporary actions to be implemented by homeowners or the WDNR will be addressed, such as improving physical access to monitoring locations, caulking foundation cracks, etc., as appropriate.

JCK/bcn/JVS/SGW
[bcn-601-91]

TABLE 1

01-12-90

MONITORING DATA SUMMARY
REFUSE HIDEAWAY LANDFILL
13928.87

PROBE #	(1) SURFACE ELEVATION	(2) SCREENED RANGE	(3) SCREENED ELEVATION	(4) GEOLOG:	(5) EST WATER ELEVATION	(6) SAMPLE DATE/ATM (IN. Hg) % METHANE BY VOLUME 2-28-89 29.90 in	3-10-89 30.14 in	3-14-89 29.34 in	3-23-89 30.15 in	4-4-89 29.61 in	4-18-89 30.14 in
G-1S	965	2'-17'	948-963	SANDSTONE:	926	<0.1*	0.6*	26	30	29	1.4
G-1D	965	20'-30	935-945	SANDSTONE:	926	<0.1*	<0.1*	24	21	22	<0.1
G-2S	1000	2'-17'	983-998	SANDSTONE:	920	<0.1*	<0.1*	32	32	30	30
G-2	1000	20'-30'	970-980	SANDSTONE:	920	<0.1*	14*	16	14	26	26
G-3S	1081	2'-10'	1071-1079	DOLOMITE :	931	14	12	17	1.8	10	14
G-3D	1081	12'-20'	1061-1069	DOLOMITE :	931	<0.1	<0.1*	17	1.6	10	13
G-4	946	2'-14'	932-944	SANDY CLA:	914	10	34	36	34	33	34
G-5	935	2'-8'	927-933	SILTY SAN:	928	35*	38*	40	35	6	10
G-6	1021	20'-30'	991-1001	SANDSTONE:	926	<0.1*	<0.1*	<0.1	<0.1	<0.1	<0.1
G-7	964	--	--	--	921	<0.1	<0.1*	2.5	1.5	5	4.5
G-8	1140	29'-59'	1081-1111	DOLOMITE :	929	<0.1*	5*	5	0.3	1.8	<0.1
G-9	1093	130'-170'	923-963	DOLOMITE :	920	<0.1*	<0.1*	0.3	0.6	0.6	<0.1
G-10	1122	135'-175'	947-987	DOLOMITE :	924	<0.1*	<0.1*	<0.1	<0.1	<0.1	<0.1
GP-1	963	2'-15'	948-961	SILTY CLA:	920	<0.1	<0.1	24	17	22	<0.1
	963	25'-40'	923-938	SAND & GR:	920	0.7	<0.1	<0.1	3.7	6	5
GP-2	950	2'-15'	935-948	SAND & GR:	920	10	16	24	21	20	7
	950	25'-40'	910-925	SAND & GR:	920	0.5	0.5	8	3.3	4.5	1.7
GP-3	936	2'-22'	914-934	SAND & GR:	920	<0.1	<0.1	1.0	2.3	4.5	2.7
GP-4	932	2'-29'	903-930	SILT & CL:	918	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
GP-5	924	2'-8'	916-922	SILT & CL:	918	<0.1	<0.1	0.2	<0.1	<0.1	<0.1
GP-6	925	2'-10'	915-923	SILT & CL:	917	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
GP-7	927	2'-10'	917-925	--	921	0.8	2.6	4.7	13	6	1.7
GP-8	930	2'-17'	913-928	SILT & CL:	921	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
GP-9	934	--	--	SILT & CL:	920	<0.1*	<0.1	<0.1	<0.1	<0.1	<0.1
GP-10	938	2'-19'	919-936	SILT & CL:	920	0.5	4.5	16	4.7	26	9
GP-11	953	2'-15'	938-951	SILT & CL:	920	<0.1	<0.1	<0.1	<0.1	3.3	3.7
	953	20'-35'	918-933	TILL	920	<0.1	<0.1	0.1	<0.1	6	17
GP-12	1000	2'-15'	985-998	DOLOMITE :	920	25	24	33	27	30	31
	1000	25'-40'	960-975	DOLOMITE :	920	25	25	28	29	30	32
GP-13	1020	2'-15'	1005-1018	DOLOMITE :	920	7	27	31	31	31	32
	1020	25'-40'	980-995	DOLOMITE :	920	33	30	33	27	31	31
GP-16	1017	2'-15'	1002-1015	DOLOMITE :	923	34	30	31	32	28	28
	1017	25'-40'	977-992	DOLOMITE :	923	30	30	31	24	28	27
	1017	55'-70'	947-962	DOLOMITE :	923	20	22	28	28	30	29

WARZYN

TABLE 1

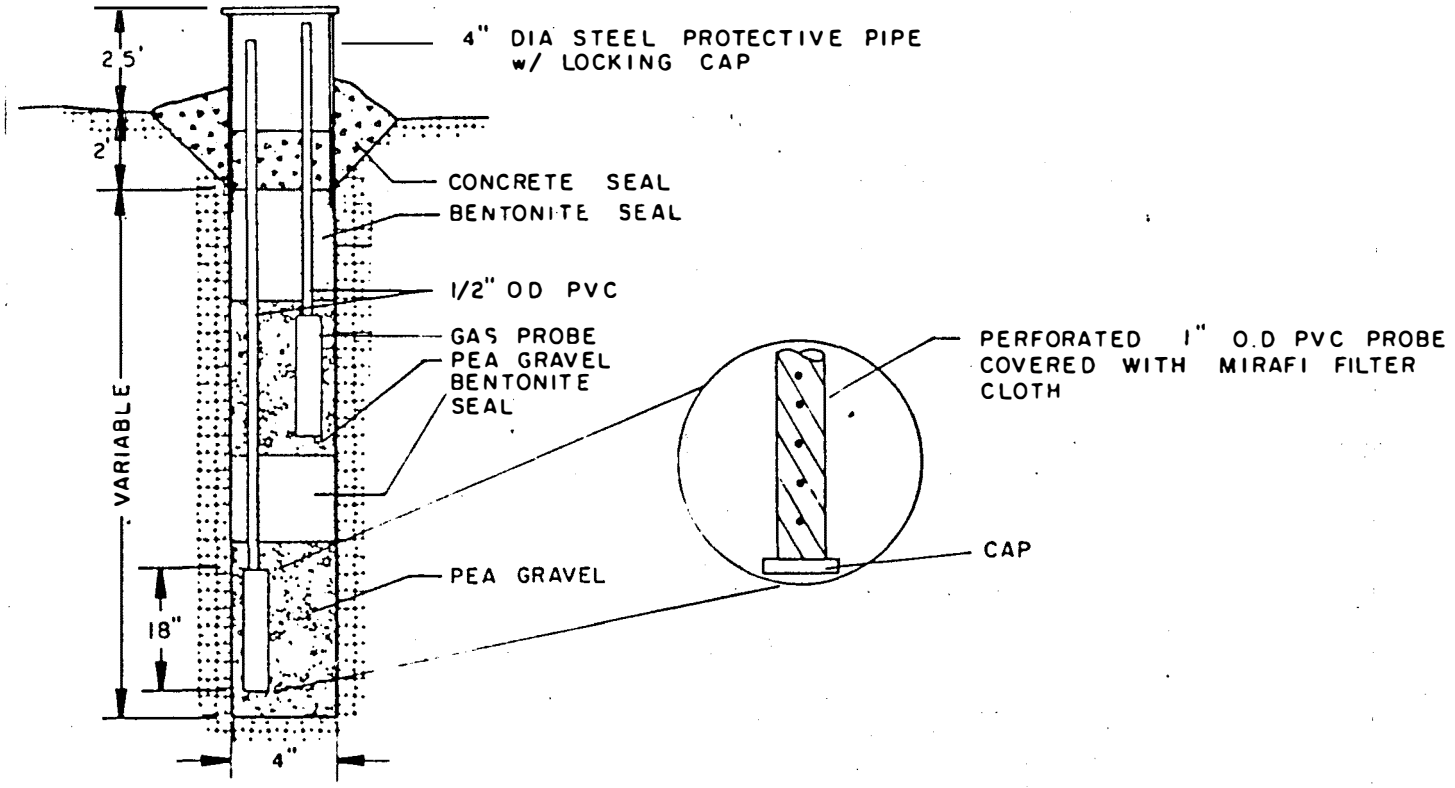
MONITORING DATA SUMMARY
REFUSE HIDEAWAY LANDFILL
13928.87

PROBE #	(1) SURFACE ELEVATION	(2) SCREENED RANGE	(3) SCREENED ELEVATION	(4) GEOLOG:	(5) EST WATER ELEVATION	(6) SAMPLE DATE/ATM (IN. Hg) % METHANE BY VOLUME 2-28-89 29.90 in	3-10-89 30.14 in	3-14-89 29.34 in	3-23-89 30.15 in	4-4-89 29.61 in	4-18-89 30.14 in
GP-17	1010	2'-15'	995-1008	DOLOMITE	924	24	22	33	30	30	30
	1010	25'-40'	970-985	DOLOMITE	924	33	22	27	32	24	25
	1010	55'-70'	940-955	DOLOMITE	924	20	18	26	24	25	22
GP-18	1016	2'-15'	1001-1014	DOLOMITE	928	2.8	23	40	19	32	32
	1016	25'-40'	976-991	DOLOMITE	928	8	18	26	30	23	19
	1016	55'-70'		DOLOMITE	928	9	5	10	14	20	20
GP-19	1055	2'-15'	1040-1053	DOLOMITE	929	24	24	19	19	22	21
	1055	25'-40'	1015-1030	DOLOMITE	929	20	20	21	21	16	17
	1055	55'-70'	985-1000	DOLOMITE	929	22	20	20	19	16	17
	1055	85'-100'	955-970	DOLOMITE	929	17	12	12	12	12	7
GP-20	1083	2'-15'	1068-1081	DOLOMITE	934	18	12	16	16	1.4	1.8
	1083	25'-40'	1043-1058	DOLOMITE	934	16	12	14	13	6	8
	1083	55'-70'	1013-1028	DOLOMITE	934	14	13	14	13	6	6
	1083	85'-100'	983-998	DOLOMITE	934	14	15	16	14	13	10
GP-21	1108	2'-15'	1093-1106	DOLOMITE	934	6	9	9	9	6	2.5
	1108	25'-40'	1068-1083	DOLOMITE	934	8	10	9	11	10	4.8
	1108	55'-70'	1038-1053	DOLOMITE	934	6	5	8	5	10	10
	1108	85'-100'	1008-1023	DOLOMITE	934	6	6	6	8	7	6
GP-22	1075	2'-15'	1060-1073	DOLOMITE	931	29	27	23	30	23	11
	1075	25'-40'	1035-1050	DOLOMITE	931	28	27	27	27	20	21
	1075	55'-70'	1005-1020	DOLOMITE	931	29	24	15	27	20	4.5
	1075	85'-100'	975-990	DOLOMITE	931	28	20	23	22	21	23
GP-23	1068	2'-15'	1053-1066	DOLOMITE	928	8	31	21	29	23	24
	1068	25'-40'	1028-1043	DOLOMITE	928	30	30	29	30	24	22
	1068	55'-70'	998-1013	DOLOMITE	928	28	28	23	29	24	23
	1068	85'-100'	968-983	DOLOMITE	928	29	34	29	33	<0.1*	27
GP-24	1082	2'-15'	1067-1080	SAND & GR	926	23	25	22	29	20	24
	1082	25'-40'	1042-1057	DOLOMITE	926	<0.1	14	9	21	21	20
	1082	55'-70'	1012-1027	DOLOMITE	926	<0.1	15	9	20	18	10
	1082	85'-100'	982-997	DOLOMITE	926	20	10	9	19	17	3.3

(1)-(5) REFERENCE: RMT REMEDIAL ACTION REPORT CONSENT ORDER SOD-88-02A (NOV. 1988)
(TEXT, TABLES AND GEOLOGICAL CROSS SECTIONS)
AND RMT DRAWING 8 OF 8 PROJECT 1189.09 (OCT. 1988).
(6) SAMPLING DATA OBTAINED FROM STRAND ASSOCIATES.
* GAS PROBE EXPOSED TO ATMOSPHERE INSIDE CASING
NOTE: GP PROBE SERIES INSTALLED IN SPRING OF 1989 (WDNR PRINT DATED 1-23-89).

WARZYN

[GASMON2]
VJR/jck/JCK/BEM

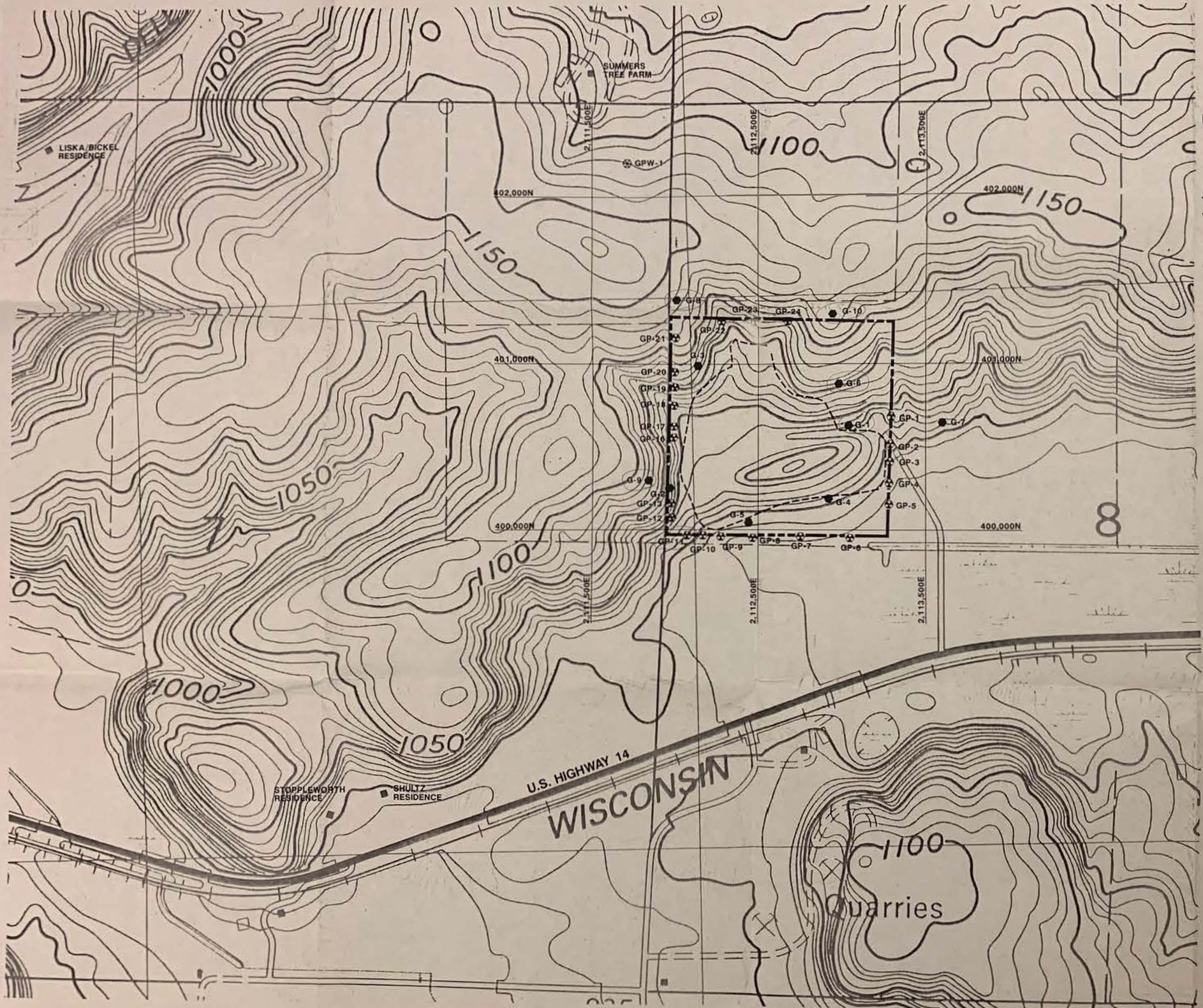


NOTE

1. DETAIL OBTAINED FROM DRAWING PREPARED BY RMT, INC., PROJECT NO. 1181.02, SHEET 13 OF 13, DATED 11/21/86.

NOT TO SCALE

WARZYN	**EXISTING TYPICAL GAS MONITORING PROBE DETAIL** GAS MONITORING PROGRAM REFUSE HIDEAWAY LANDFILL SECTION 8, T7N, R8E TOWN OF MIDDLETON DANE COUNTY, WISCONSIN	Drawn DLF	Checked JVA, JLK	App'd. JVA
		Revisions		Date 1/12/90
				13928 **A2**



LEGEND

- G-1 ● — EXISTING GAS PROBE LOCATION AND NUMBER ("G" SERIES)
- GP-1 ⊗ — EXISTING GAS PROBE LOCATION AND LOCATION ("GP" SERIES)
- GPW-1 ⊗ — PROPOSED GAS PROBE LOCATION AND NUMBER
- LIMITS OF LANDFILL
- APPROXIMATE PROPERTY LINE

NOTES

1. BASE MAP DEVELOPED FROM THE CROSS PLAIN AND MIDDLETON, WISCONSIN, 7½ MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAPS, DATED 1962, PHOTOREVISED 1982, AND 1983, RESPECTIVELY.
2. LANDFILL LIMITS AND PROPERTY LINE INFORMATION OBTAINED FROM DRAWING PREPARED BY RMT, INC., DATED NOVEMBER 1988, REMEDIAL ACTION REPORT CONSENT ORDER SOD-88-02A, RMT, INC.
3. GRID SHOWN IS STATE PLANE COORDINATE SYSTEM.
4. LIMITS OF LANDFILL DO NOT REFLECT LIMITS OF REFUSE.
5. GAS PROBE LOCATIONS WERE OBTAINED FROM WISCONSIN DEPARTMENT OF NATURAL RESOURCES, RMT FIGURE I, PROJECT NO. 1181.05, CONCEPTUAL LANDFILL GAS MANAGEMENT PLAN, DATED JUNE 1988 AND R SHEET 2 OF 8, PROJECT NO. 1181.09, EXISTING CONDITIONS MAP, DATED OCTOBER 1988.
6. GAS PROBES G-1 THROUGH G-6 WERE INSTALLED IN JUNE 1987, GAS PROBE G-8 WA INSTALLED IN JUNE 1988, GAS PROBE G-S WAS INSTALLED IN JULY 1988 AND GP SERIES GAS PROBES WERE INSTALLED IN JANUARY 1989. ALL GAS PROBES WERE INSTALLED BY RMT, INC.

north

0 300 600
SCALE IN FEET

Designed By JCK
Drawn By JC
Checked By DVL, JCK
Approved By Joel V. Schilton
Date 1/12/90
Reference

WARZYN ENGINEERING INC.
Madison • Milwaukee
Minneapolis • Chicago
Detroit

Date • By • App'd
Revisions

GAS PROBE LOCATION PLAN

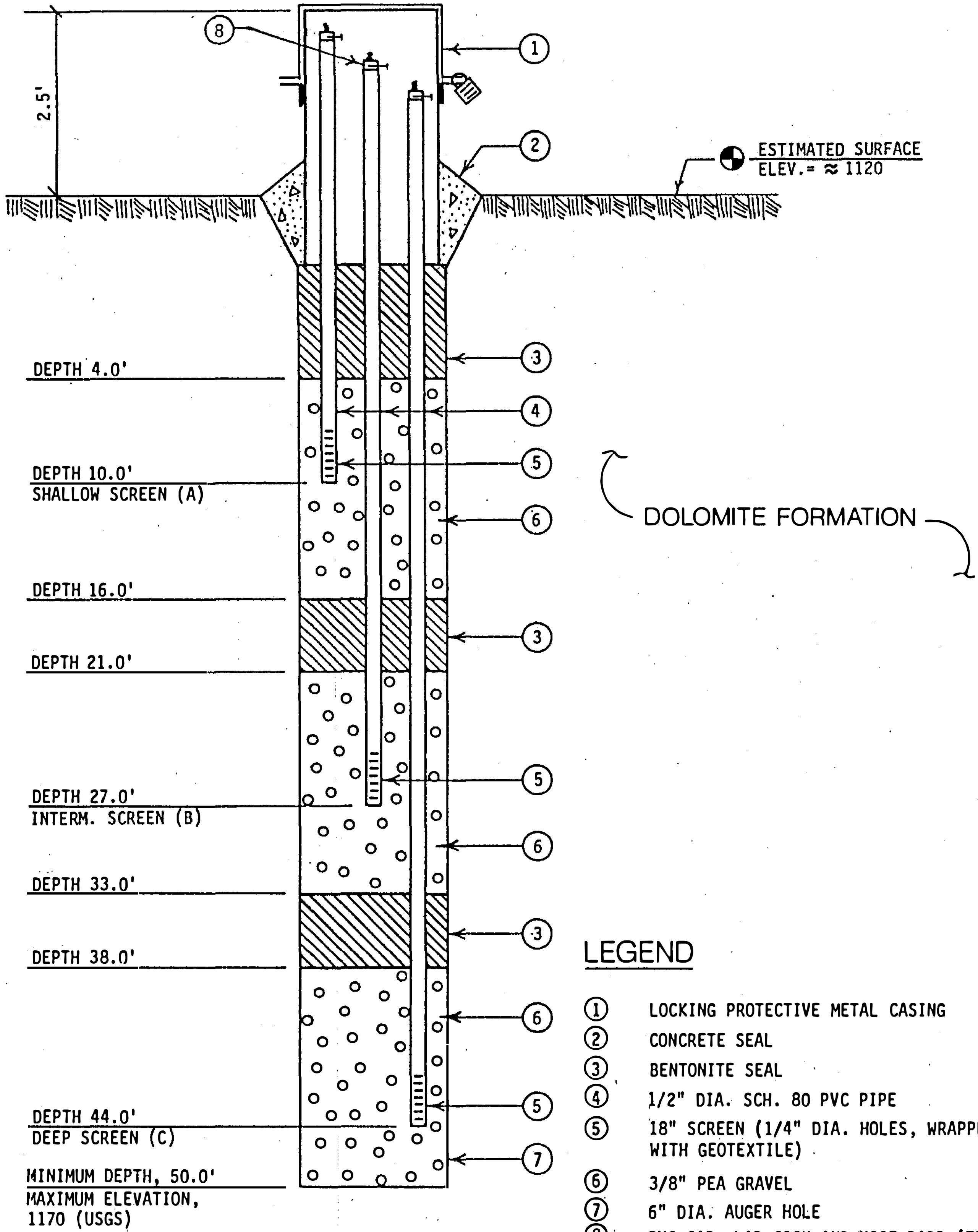
GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
SECTION 8; T7N, R8E
TOWN OF MIDDLETON
DANE COUNTY, WISCONSIN

Project Number
13928

8

WARZYN

QUALITY CONTROL
Drafting Studio / Lead Professional / Section / Division / Other



LEGEND

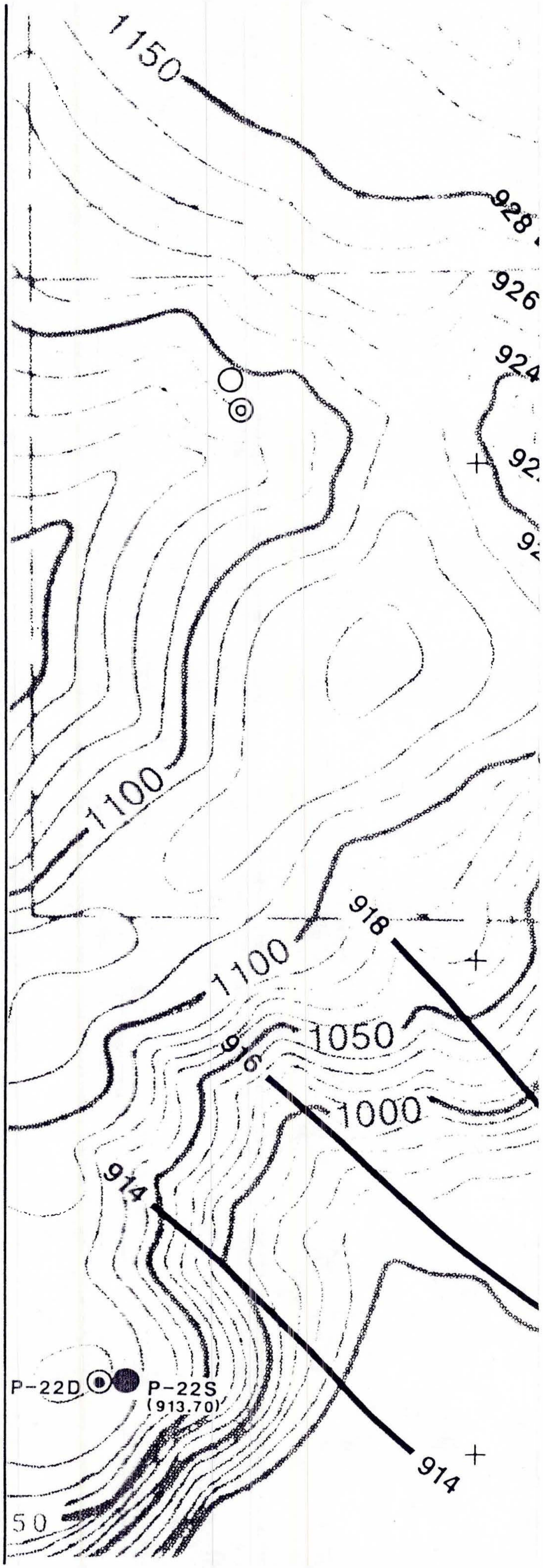
1. LOCKING PROTECTIVE METAL CASING
2. CONCRETE SEAL
3. BENTONITE SEAL
4. 1/2" DIA. SCH. 80 PVC PIPE
5. 18" SCREEN (1/4" DIA. HOLES, WRAPPED WITH GEOTEXTILE)
6. 3/8" PEA GRAVEL
7. 6" DIA. AUGER HOLE
8. PVC CAP, LAB COCK AND HOSE BARB (TYP.)

NOTE

1. DEPTH = DEPTH BELOW GROUND SURFACE.

NOT TO SCALE

WARZYN	**PROPOSED GAS MONITORING PROBE DETAIL (GPW-1)** GAS MONITORING PROGRAM REFUSE HIDEAWAY LANDFILL SECTION 8, T7N, R8E TOWN OF MIDDLETON DANE COUNTY, WISCONSIN	Drawn JC Revisions	Checked JVA, JCK	App'd. JVd Date 1/12/90 13928 **A3**

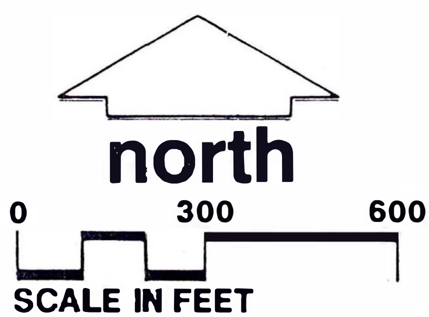


LEGEND

- EXISTING 50' CONTOUR
- EXISTING 10' CONTOUR
- EXISTING BUILDING
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING RAILROAD
- WET AREA
- GRAVEL PIT
- DRAINAGE DITCH
- PROPERTY BOUNDARY
- LIMITS OF LANDFILL
- WATER TABLE OBSERVATION WELL LOCATION
- PIEZOMETER LOCATION
- LEACHATE HEAD WELL LOCATION
- 914 — WATER TABLE CONTOUR (DASHED WHERE INFERRED, 2' INTERVAL)
- (919.45) — WATER TABLE ELEVATION (9/13/88)
- PROPOSED ADDITIONAL WATER TABLE OBSERVATION WELL
- PROPOSED ADDITIONAL PIEZOMETER

NOTES

1. INFORMATION SHOWN WAS OBTAINED FROM DRAWING PREPARED BY RMT, INC., PROJECT NO. 1181.09, SHEET 8 OF 8, DATED 10/88.
2. WATER LEVELS MEASURED SEPTEMBER 13, 1988 EXCEPT FOR P-26S MEASURED SEPTEMBER 26, 1988 (BY RMT, INC.).



Designed By: RMT, INC.
Drawn By: DLF
Checked By: JAG, JCK
Approved By: Joel R. Schitton
Date: 1/12/90
Reference: RMT, INC.

WARZYN
WARZYN ENGINEERING INC.
Madison • Milwaukee
Minneapolis • Chicago
Detroit

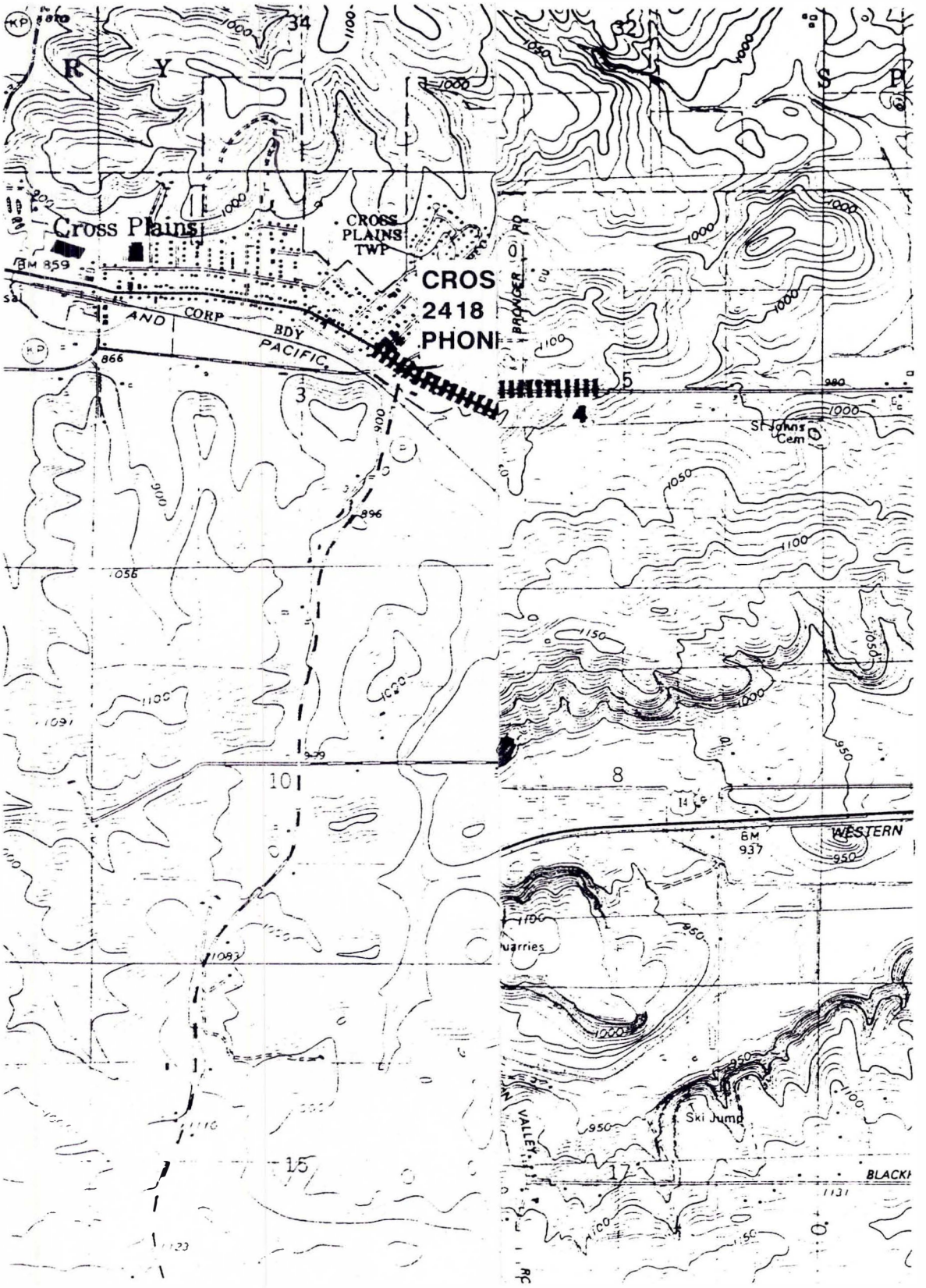
Date • By • App'd.
Revisions

WATER TABLE MAP (SEPTEMBER 1988)
GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
SECTION 8, T7N, R8E
TOWN OF MIDDLETON
DANE COUNTY, WISCONSIN

JAN 12 1990

Project Number
13928 B3

WARZYN



KEY (RESIDENTIAL GAS MONITC

1	SUMMERS TREE FARM	5	
2	STOPPLEWORTH RESIDENCE	6	
3	GABER/HOLTZ/HANZ RESIDENCE	7	
4	HARRIS RESIDENCE	8	

north

0 2000 4000

SCALE IN FEET

Designed by JCK
Drawn by DLF
Checked by WA, JCK
Approved by Joel V. Hutton
Date 1/12/90
Reference 13709-B1

WARZYN
WARZYN ENGINEERING INC
Madison • Milwaukee
Minneapolis • Chicago
Detroit

RESIDENTIAL MONITORING LOCATION PLAN AND CLINIC ROUTE
GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
SECTION 8, T7N, R8E
TOWN OF MIDDLETON
DANE COUNTY, WISCONSIN

JAN 12 199

Project Number 13928 B4

WARZYN

Appendix A

Health and Safety Plan

HEALTH AND SAFETY PLAN
GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL

INTRODUCTION

Purpose and Scope

The purpose of this Health and Safety Plan (Plan) is to provide information for the safety of field personnel performing methane gas monitoring at gas probes and residential building basements identified by the Wisconsin Department of Natural Resources (WDNR) adjacent to the Refuse Hideaway Landfill (Landfill). This document has also been prepared to present response action levels related to the gas monitoring results. These action levels were developed by the WDNR and Warzyn.

Project Description

Residences and gas probes in the area of the Refuse Hideaway Landfill will be surveyed for the potential accumulation of methane. The survey methodology is described under Hazard Evaluation in this Plan. The eight residences involved in the survey are included below. Their locations are shown on Drawing 13928-B4.

Landfill Gas Monitoring
Participating Residences

1. W.B. and J.J. Summers
   4610 Rocky Dell Road
   (608) 831-4414

2. A.J. and Jean Stoppleworth
   7750 Hwy 14
   (608) 831-4214

3. Gaber/Holtz/Hanz
   4621 Rocky Dell Road
   (608) 836-1076

4. Donna Harris/Dan Julson
   8607 Airport Road
   Work: (608) 831-5125

5. Bud Vosen
   4622 Rocky Dell Road
   (608) 831-4695

6. Joe Liska/Terry Bickel
   4526 Rocky Dell Road
   (608) 836-4817

7. P.J. and J.A. Coyle
   4593 Rocky Dell Road
   (608) 836-6472

8. Craig Shultz
   7734 Hwy 14
   (608) 831-2860

CHEMICAL AND PHYSICAL HAZARDS

The principal chemical hazards anticipated from the landfill gas migration investigation are associated with methane.

Methane

Methane gas is a simple asphyxiant: it displaces the oxygen normally breathed in the air. There is no smell to methane, and it is not irritating to eyes, nose or throat. However, in association with landfill gas, it is easily detected by odor.

If inhaled in large quantities, dizziness, difficulty in breathing, and/or loss of consciousness may occur. If these effects are noted, the victim should be removed to fresh air and allowed to breathe freely until dizziness has passed. If the victim is unconscious and not breathing, begin artificial respiration.

Methane is flammable in air at concentrations between 5% and 15%, the lower explosive limit (LEL) and upper explosive limit (UEL) of methane, respectively. Explosions can occur when methane is ignited in confined areas.

Physical Hazards

Physical hazards of concern include areas of poor lighting and movement restricted by structures and stationary or movable objects. Personnel in such areas should carry a supplemental light source (e.g., non-sparking flashlight).

HAZARD EVALUATION

Monitoring Protocol

The investigation of landfill gas migration involves the monitoring of residential basements and gas probes for the presence of explosive, toxic or oxygen deficient atmospheres. The Warzyn employee will use an explosion/oxygen meter for surveying indoor below-ground areas. Readings will be made:

- at the basement entrance (foot of stairs)
- in sumps/drains and other foundation penetrations
- near cracks in the foundation
- near basement ignition sources (e.g., pilot lights, electric motors)
- at gas probes

Instrument Action Levels

Any detection of methane in basements will immediately be communicated to the WDNR and any decisions affecting occupants' life or property will be made by the WDNR.

In ambient air:

≥3% of LEL - proceed with caution, ventilate if possible and evacuate until ambient air concentrations are < 3% of LEL. Notify Fire Department and Utility Company of potential hazard.

≥40% of LEL - immediately evacuate the building and evaluate monitoring and ventilation procedures. Call the Fire Department and Utility Company to extinguish combustion sources (e.g., turn off electrical power service, gas service, etc.).

At localized points (foundation cracks, etc.):

≥3% of LEL - notify homeowner and occupants to increase ventilation. Increase monitoring frequency to daily.

≥40% of LEL - increase ventilation, notify Fire Department and Utility Companies of potential hazard. Re-evaluate hazard potential.

EMERGENCY RESPONSE

Emergency Procedures

If detectable concentrations of gases (≥3% of LEL) are recorded in the ambient basement air on monitoring instruments, the residents will be notified and advised to evacuate.

If action limits of monitoring instruments are exceeded (≥40% of LEL in ambient air), monitoring personnel will leave the building and recommend the residents do the same. The Fire Department and Utility Company will be notified from a neighbor's telephone and the gas and electricity shut off. The building will then be ventilated from the outside.

Emergency Resources

The 911 telephone number activates police, fire and ambulance resources. Alternative and additional telephone numbers include:

Organization	Emergency Number	General Number
Middleton Fire Dept.	831-5432	831-2751
Middleton Police Dept.	831-2111	831-2751
Rescue/Ambulance	831-2111	--
Madison General Hospital	267-6206	267-6000
Cross Plains Clinic	798-3344	--
Poison Control Center	414-931-4114	--
Warzyn Engineering Inc.		
Project Manager - Joel Schittone		231-4747
Corporate Health & Safety Director - Mary Ann Latko		273-0558
Client Contact - WDNR (Theresa Evanson)		266-0941

Clinic Route: From houses along Rocky Dell Road or Airport Road, turn south onto Rocky Dell Road and proceed to U.S. Highway 14. Turn right on Route 14. For residences along Highway 14, go west on that highway. Take Highway 14 to the second street in Cross Plains, Brewery Road. Turn right (north) and proceed on Brewery Road to 2418, the Cross Plains Clinic (see Drawing 13928-B4).

JFK/bcn/JVS/SGW
[bcn-601-91b]

WARZYN

Monitoring Report 13709

Refuse Hideaway Landfill Gas Monitoring Program Town of Middleton Dane County, Wisconsin

Prepared for:

State of Wisconsin
Department of Natural Resources
Madison, Wisconsin

Prepared by:

Warzyn Engineering Inc.
Madison, Wisconsin

June 1989

WARZYN

Engineers & Scientists
Environmental Services
Waste Management
Water Resources
Site Development
Special Structures
Geotechnical Analysis

June 30, 1989
13709.00

RECEIVED
JUL 3 1989
BUREAU OF SOLID - HAZARDOUS WASTE MANAGEMENT

Mr. Mark F. Giesfeldt, Chief
Environmental Response and Repair Section
Bureau of Solid & Hazardous Waste Management
Department of Natural Resources
101 S. Webster, GEF 2 Building
Box 7921
Madison, WI 53707

Re: Gas Monitoring Program
Refuse Hideaway Landfill
Middleton, Wisconsin

Dear Mr. Giesfeldt:

Enclosed are three copies of the Monitoring Report which summarizes results of the gas monitoring program performed by Warzyn Engineering Inc. at homes located near the Refuse Hideaway Landfill in Middleton, Wisconsin.

If you have any comments or questions regarding this document, please contact us.

Sincerely,

WARZYN ENGINEERING INC.

Richard D. Yabroff
Project Engineer

RECEIVED
JUL 17 1989
DEPT. OF NATURAL RESOURCES
MADISON AREA

Joel V. Schittone

Joel V. Schittone, P.E.
Project Manager

JVS/bcn/DWH

Enclosure: Monitoring Report (3)

cc: Mr. Ray Tierney, WDNR
Ms. Susan Fisher, WDNR

Warzyn Engineering Inc.
One Science Court
University Research Park
P.O. Box 5385
Madison, Wisconsin 53705
(608) 273-0440

WARZYN

Refuse Hideaway Landfill
Gas Monitoring Program
Town of Middleton
Dane County, Wisconsin

June 1989

TABLE OF CONTENTS

	Page No.
INTRODUCTION	1
SCOPE OF WORK	1
MONITORING PROTOCOL	2
MONITORING RESULTS	3
CONCLUSIONS	3
RECOMMENDATIONS	4

DRAWINGS

13709-A1A Summers Tree Farm
13709-A1B Summers Tree Farm
13709-A2A Stoppleworth Residence
13709-A2B Stoppleworth Residence
13709-A3 Gaber/Holtz/Hanz Residence
13709-A4 Harris/Julson Residence
13709-A5 Vosen Residence
13709-A6 Liska/Bickel Residence
13709-A7 Coyle Residence
13709-A8 Shultz Residence
13709-B1 Monitoring Location Plan and Clinic Route

APPENDIX

APPENDIX A - HEALTH AND SAFETY PLAN

[bcn-600-47]

GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
TOWN OF MIDDLETON
DANE COUNTY, WISCONSIN

INTRODUCTION

The Refuse Hideaway Landfill (Landfill) is located on Highway 14 within the Town of Middleton, Dane County, Wisconsin. The 20-acre landfill was licensed in 1974 by the Wisconsin Department of Natural Resources (WDNR) to accept residential and commercial solid waste. The Landfill was closed under a Consent Order in 1988 after volatile organic components were detected in two private wells adjacent to the Landfill.

Gas probes located around the perimeter of the Landfill were monitored for methane gas by others in February and March 1989. During this monitoring, methane was detected in concentrations greater than that allowed by the WDNR regulations (NR 506.07(3); 1.25 percent by volume beyond the facility boundary). The geology of the area is characterized by fractured bedrock which may facilitate landfill gas (LFG) migration away from the Landfill. Methane is typically a major component of LFG.

Due to the concern that methane may be migrating to and infiltrating into homes adjacent to the Landfill, the WDNR contracted Warzyn Engineering Inc. (Warzyn) to monitor the basements of eight specific homes adjacent to the Landfill for methane.

SCOPE OF WORK

The eight homes identified by the WDNR and monitored by Warzyn are shown on Drawing 13709-B1 and are summarized below. These homes are all within a one-mile radius of the Landfill.

Landfill Gas Monitoring
Participating Residences

1. W.B. and J.J. Summers
   4610 Rocky Dell Road
   (608) 831-4414

2. A.J. and Jean Stoppleworth
   7750 Hwy 14
   (608) 831-4214

3. Gaber/Holtz/Hanz
   4621 Rocky Dell Road
   (608) 836-1076

4. Donna Harris/Dan Julson
   8607 Airport Road
   Work: (608) 831-5125

5. Bud Vosen
   4622 Rocky Dell Road
   (608) 831-4695

6. Joe Liska/Terry Bickel
   4526 Rocky Dell Road
   (608) 836-4817

7. P.J. and J.A. Coyle
   4593 Rocky Dell Road
   (608) 836-6472

8. Craig Shultz
   7734 Hwy 14
   (608) 831-2860

The scope of work described in Warzyn's proposal dated March 13, 1989, and accepted by the WDNR, is summarized as follows:

- A Health and Safety Plan will be developed to reflect the WDNR's response action levels related to gas monitoring results.
- Field monitoring will include monitoring for methane gas inside eight homes located near the Landfill. Field monitoring will include three scheduled monitoring events. Warzyn will be available for unscheduled monitoring as requested by the WDNR.
- One report summarizing the three scheduled monitoring events will be prepared, including the monitoring results, drawings for each house illustrating monitoring locations, and recommended temporary actions to be implemented by homeowners or the WDNR. Additional monitoring reports may be provided if future unscheduled monitoring occurs.
- An Optional Scope of Work included private well methane monitoring and additional gas probe monitoring. The WDNR has not authorized any of the Optional Scope of Work at this time.

MONITORING PROTOCOL

A Health and Safety Plan was developed by Warzyn to provide information for the safety of field personnel performing methane gas monitoring in the homes and to present the WDNR's response action levels related to the gas monitoring results. This Plan is presented in Appendix A.

Because of concern that methane may migrate within the unsaturated soil layer and infiltrate into homes adjacent to the Landfill, the potential pathways for methane infiltration were investigated during the first monitoring round. Sketches were made of the areas of the homes which were constructed below grade. Those potential pathways which were visible and available were noted.

Schematic drawings of the basements of each home are included in this report as Drawings 13709-A1 through -A8.

Residents were contacted prior to monitoring and permission to monitor the basements was received from each. The areas were monitored using a GasTech 1939 OX explosimeter which had been calibrated for methane. The GasTech was set on a scale which ranged from 0 to 100 percent of the lower explosive limit (LEL). The LEL of methane is 5 percent by volume in air.

The following types of areas were investigated and monitored:

- Penetrations in the sub-grade foundation such as sumps and floor drains.
- Confined air spaces exposed to bare soil.
- Cracks in sub-grade foundations.
- Around combustion sources such as electrical service entrances, fuse boxes and furnaces.

Monitoring results were noted along with any indications from the residents of odor problems.

MONITORING RESULTS

The eight homes were monitored on the following days:

1st Round: March 8 and 10, 1989

2nd Round: March 19, 1989

3rd Round: March 30, 1989

The basements of the homes were monitored along with the Summers' well pit. No methane was detected in any of the homes or other monitoring points at the times they were monitored. The monitoring instruments were calibrated prior to the actual monitoring.

CONCLUSIONS

The monitoring conducted as part of this contract to date did not reveal the

presence of methane in the eight homes identified by the WDNR. However, because of the proximity of the homes to the Landfill and the fractured bedrock geology predominant in the area, this limited monitoring should not indicate that the potential for methane migration and infiltration does not exist. Given the short period of time since the Landfill has received a final cover, methane migration may not have occurred over the distances required to affect the homes by the time of this monitoring. In addition, seasonal influences on methane migration such as frozen soils were not present during this monitoring period and may increase methane migration during other times of the year.

The benefits of the work conducted are two-fold: it demonstrated that methane was not present in the homes in detectable concentrations at the time of the monitoring; and the basements of the eight homes have been described and the most likely infiltration points identified.

RECOMMENDATIONS

The potential for methane to migrate out of the Refuse Hideaway Landfill is very high, as confirmed by the available gas probe monitoring data. The extent of the methane migration is unknown at this time. As a result, there will always be a concern over potential methane infiltration into the homes adjacent to the Landfill until either the extent of migration is defined and/or the existing migration is reduced such that the existing gas probes do not detect methane.

The WDNR is proposing to install a partial gas and leachate extraction system in the Landfill. This system will consist of three extraction wells, which will recover both LFG and leachate. These wells have been located based on leachate recovery potential and not gas recovery potential. The influence of the three wells on reducing the methane concentrations at the property boundary and migration control are not totally predictable. Therefore, a concern over methane infiltration into the adjacent homes will persist until site monitoring determines the actual system effectiveness.

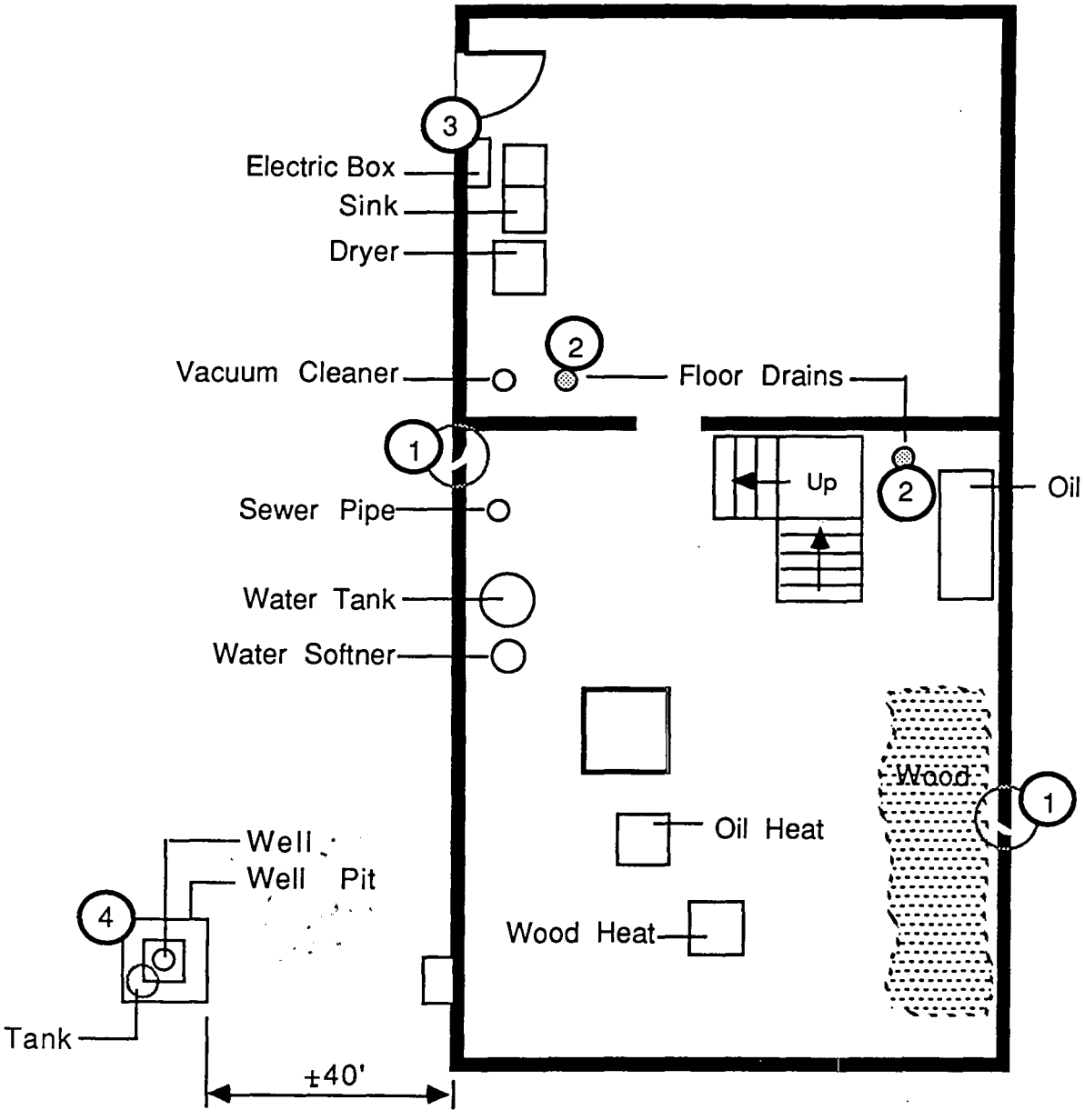
In order to address this concern, several options are available, including:

- Additional gas probes installed
- Continued periodic gas monitoring of homes
- Installation of continuous gas monitoring devices
- Increased monitoring of gas probes
- Modify design of proposed partial extraction system wells

The least expensive alternative appears to be to modify the design of the proposed extraction wells to maximize their migration control capability. One of the most expensive alternatives is to install additional gas probes. Continuous monitoring is advantageous; however, the instruments must be maintained and are only representative of the room they are located in. Some of the basements monitored have numerous rooms, which are normally closed off for heating purposes.

In order to maximize the proposed system's migration control capability, modifications should be considered to the well design. In order to control the methane migration occurring at the north end of the Landfill, the zone of negative pressure developed by the well, called the well's area of influence, needs to extend approximately 500 ft away from the well. The buried refuse has a higher permeability in the horizontal direction than vertically, and the extent of a well's area of influence is affected by the distance between the perforated well pipe (including stone pack) and the surface of the landfill. Therefore, for the area of influence to extend longer distances horizontally, the vertical distance between the perforated well pipe (and stone pack) and the landfill surface must also be increased. Landfill gas extraction wells typically have the lower two-thirds of their well pipes perforated. This well design often produces a cylindrically-shaped area of influence. However, to attempt to obtain the desired area of influence for this site (without adding additional wells), it may be advantageous to install a shorter length of perforated pipe (less than two-thirds of the well depth) a short distance above the saturated zone of the landfill. This may create a larger and deeper radius of influence, thus being more likely to control migration of gas off-site.

RDY/bcn/JVS/DWH
[bcn-600-47]



KEY (GAS MONITORING LOCATIONS)

(1)	Foundation Cracks (2)	(3)	Electrical Box
(2)	Floor Drain (2)	(4)	Cistern

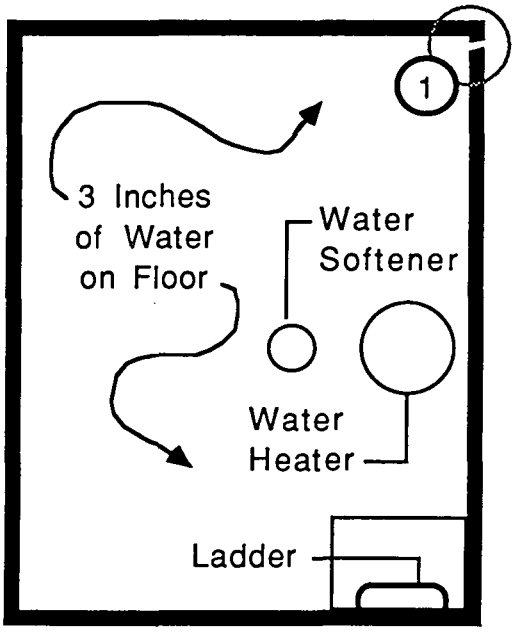
NOT TO SCALE

DWN LEL	APP'D DVA	DATE 6-30-89	13709	A1A	WARZYN

SUMMERS TREE FARM
BASEMENT SCHEMATIC

GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
TOWN OF MIDDLETON, WISCONSIN

TELEDYNE POST NA7178



KEY (GAS MONITORING LOCATIONS)

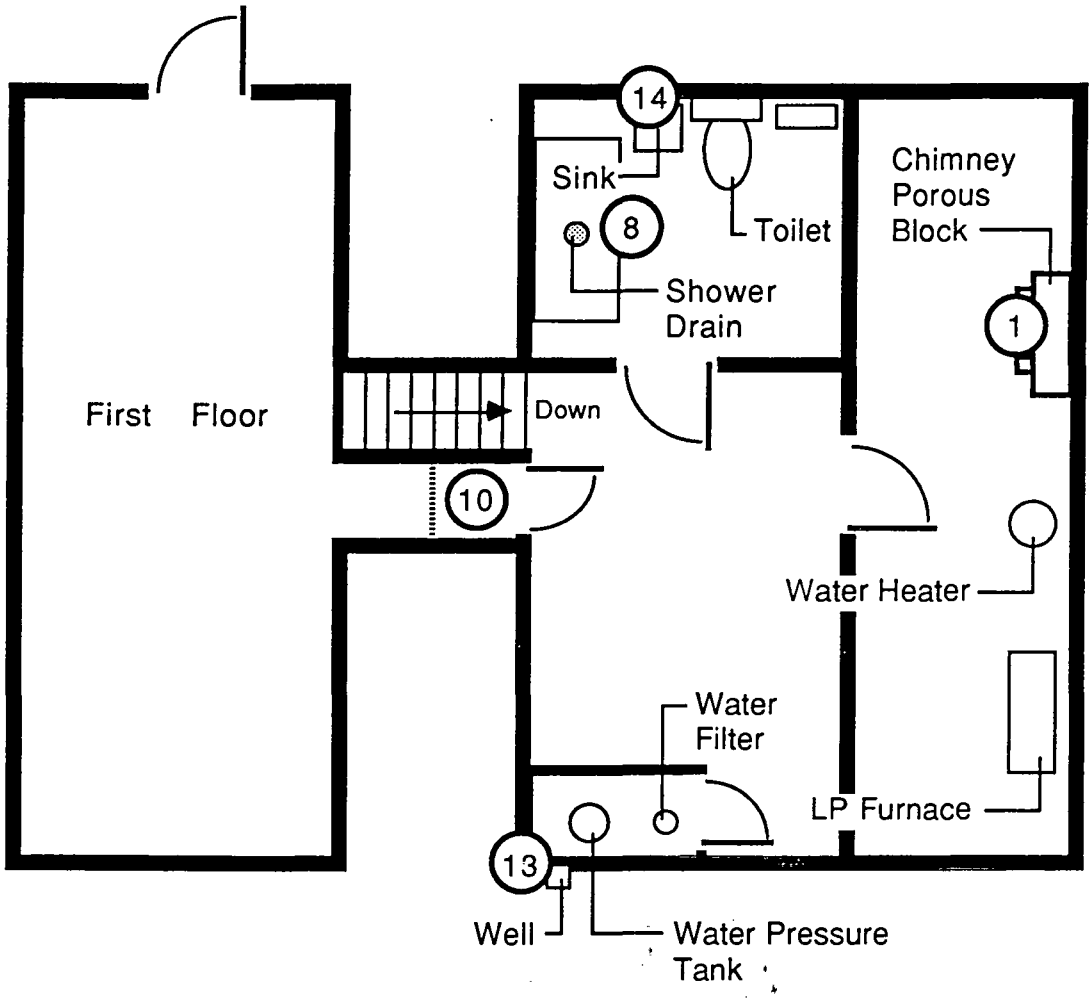
(1) Foundation Cracks

NOT TO SCALE

DWN LEE	APP'D DVA	DATE 6-30-89	13709	A1B	WARZYN

SUMMERS TREE FARM
COTTAGE CISTERN

GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
TOWN OF MIDDLETON, WISCONSIN



KEY (GAS MONITORING LOCATIONS)

- (1) Foundation Cracks
- (8) Shower Drain
- (10) Closet (Open to air space below First Floor)
- (13) Well Casing
- (14) Water Supply Line

NOT TO SCALE

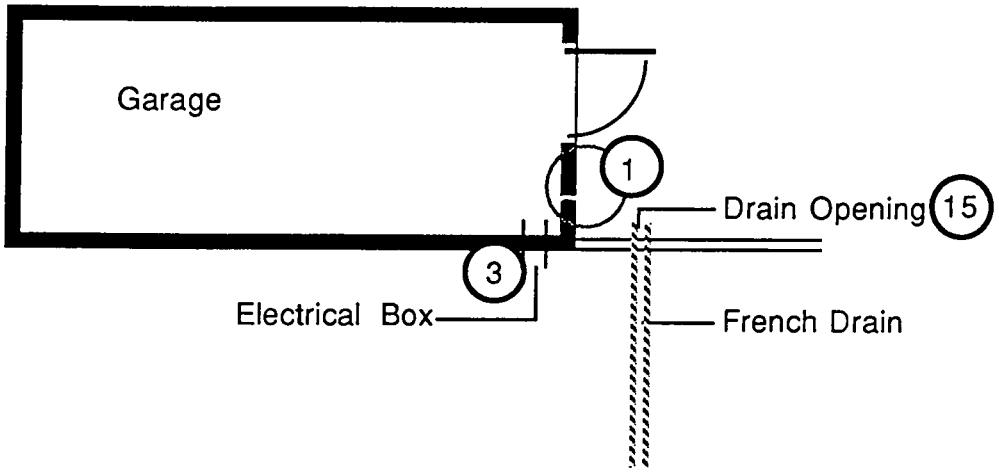
DWN LCK	APP'D JVL	DATE 6-30-89	13709	A2A

WARZYN

STOPPELWORTH RESIDENCE
BASEMENT SCHEMATIC

GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
TOWN OF MIDDLETON, WISCONSIN

TELEDYNE POST N67178



KEY (GAS MONITORING LOCATIONS)

(1) Foundation Cracks

(15) Drain Opening

(3) Electrical Box

NOT TO SCALE

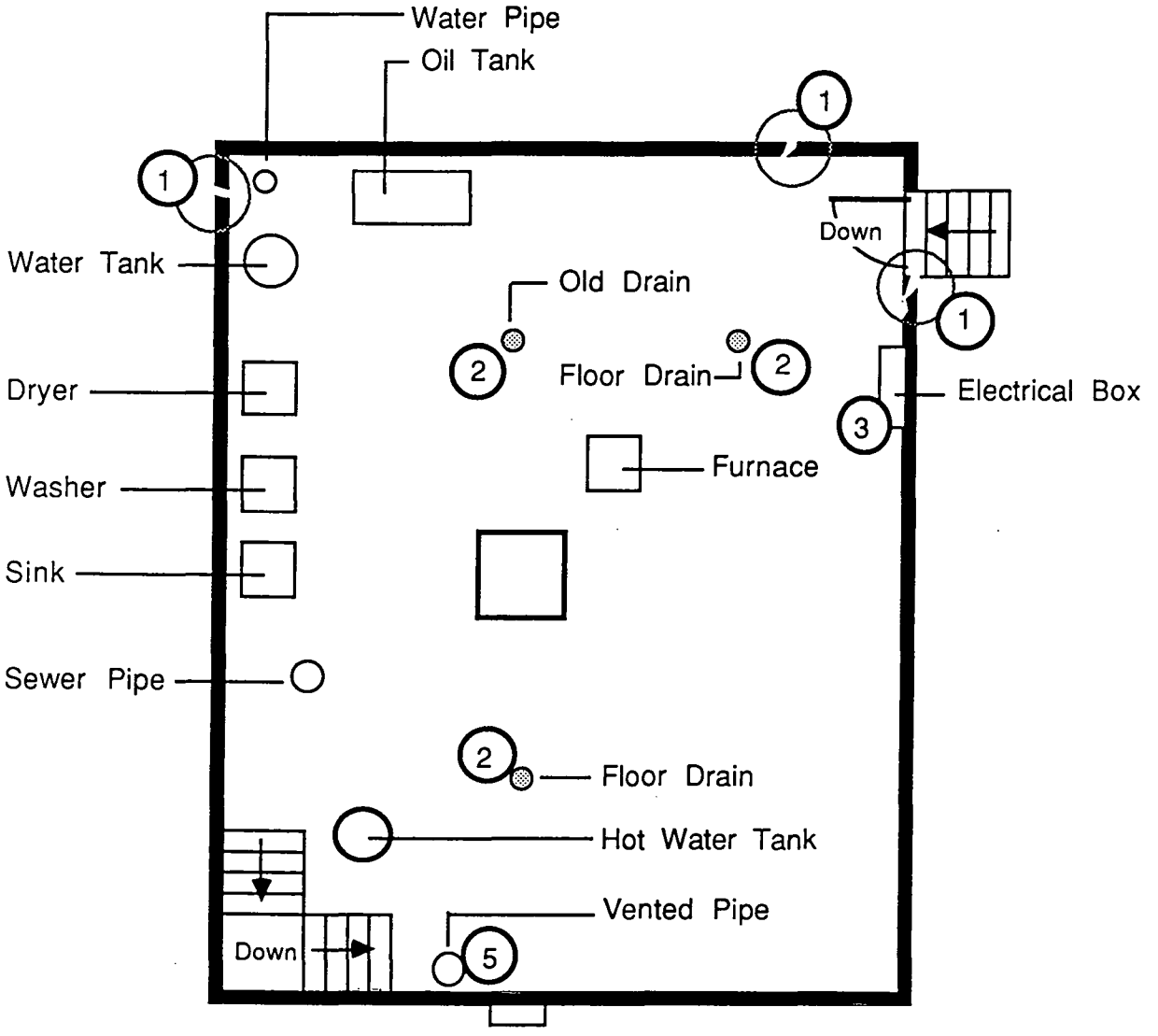
DWN LCL	APP'D JVA	DATE 6-30-89	13709	A2B

WARZYN

STOPPELWORTH RESIDENCE
GARAGE SCHEMATIC

GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
TOWN OF MIDDLETON, WISCONSIN

TELEDYNE POST NU7178



KEY (GAS MONITORING LOCATIONS)

1	Foundation Cracks (3)	3	Electrical Box
2	Floor Drain (3)	5	Vented Pipe

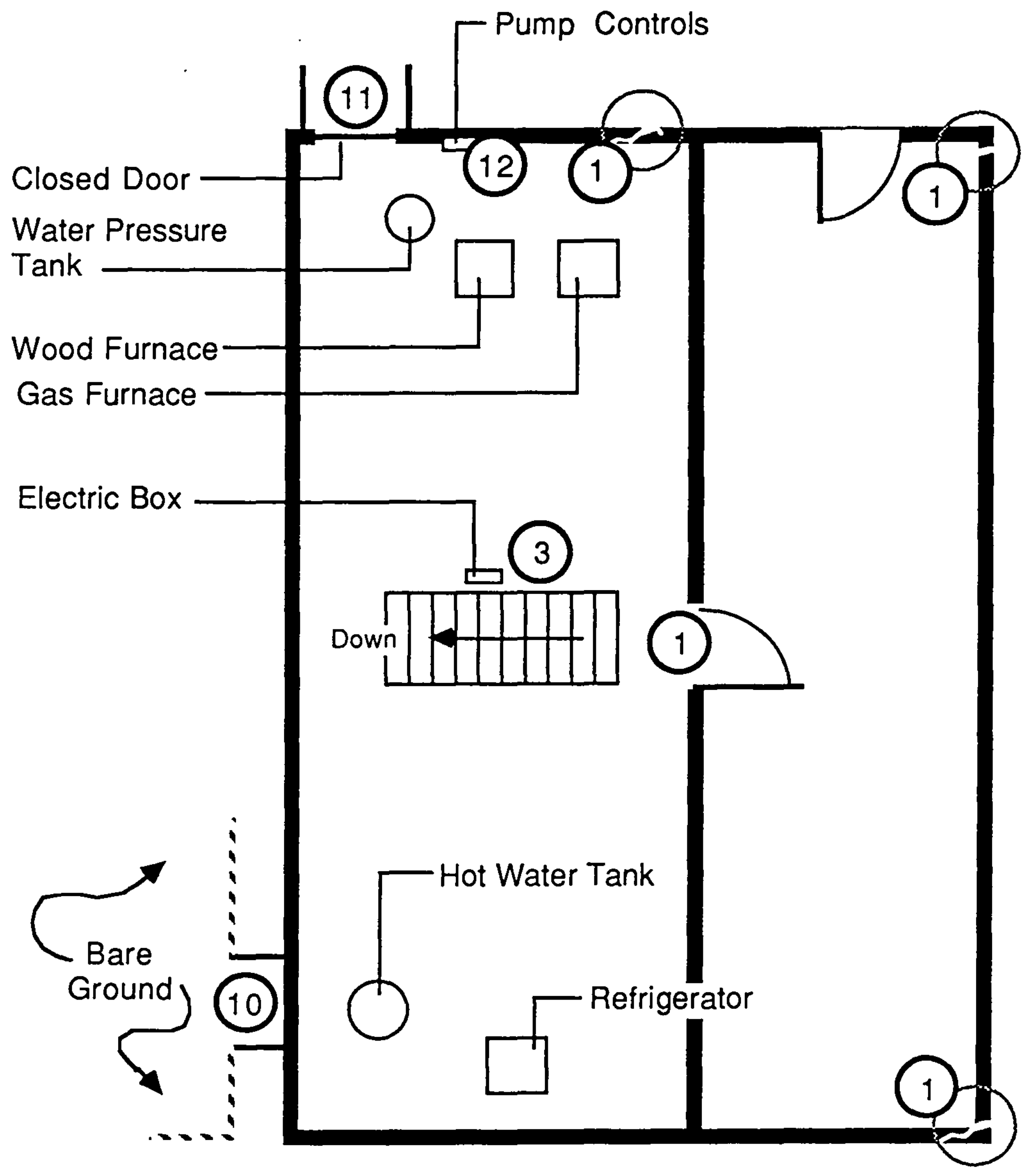
NOT TO SCALE

DWN KL	APP'D DVA	DATE 6-30-89	13709	A3	WARZYN

GABER / HOLT / HANZ RESIDENCE
BASEMENT SCHEMATIC

GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
TOWN OF MIDDLETON, WISCONSIN

TELEDYNE HOST N47178

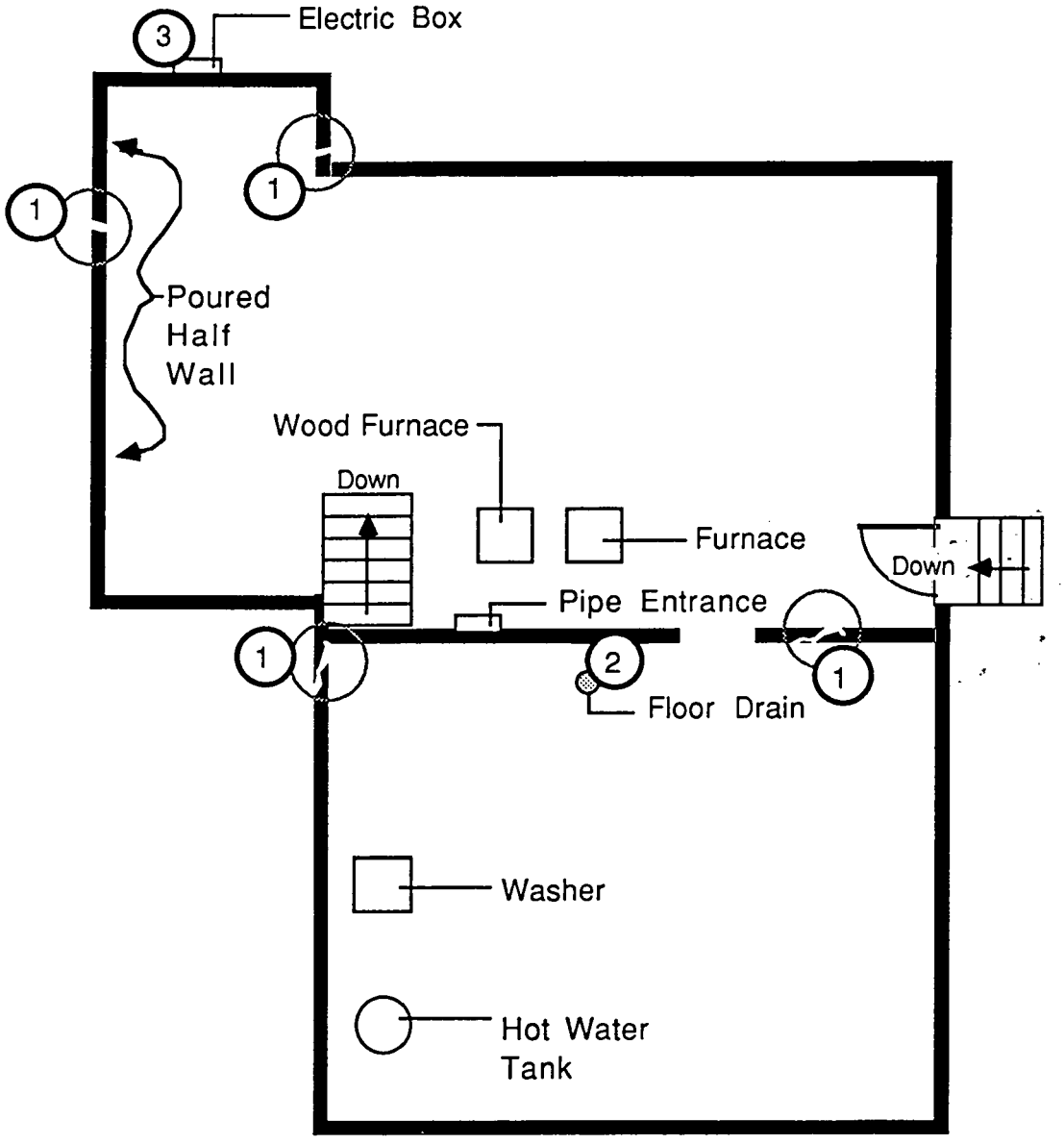


KEY (GAS MONITORING LOCATIONS)

1	Foundation Cracks (4)	11	Space Behind Door
3	Electrical Box	12	Pump Controls
10	Confined Space (Open to Bare Ground)		

NOT TO SCALE

DWN LGE	APP'D JVA	DATE 6-30-89	13709	A4	WARZYN	HARRIS / JULSON RESIDENCE BASEMENT SCHEMATIC GAS MONITORING PROGRAM REFUSE HIDEAWAY LANDFILL TOWN OF MIDDLETON, WISCONSIN



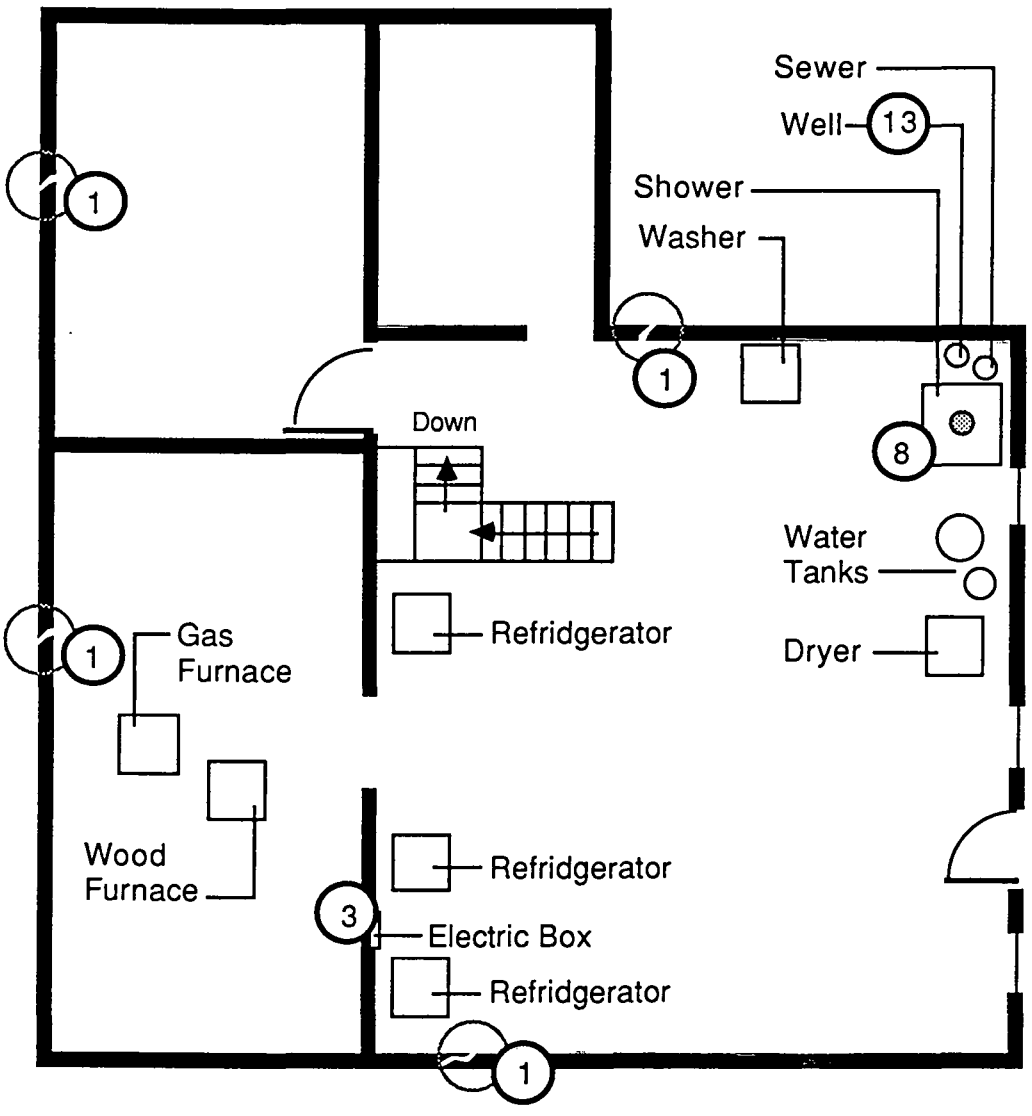
KEY (GAS MONITORING LOCATIONS)

1. Foundation Cracks (4)
2. Floor Drain
3. Electrical Box

NOT TO SCALE

DWN LEE	APP'D JVA	DATE 6-30-89	13709	A5	WARZYN

VOSEN RESIDENCE
BASEMENT SCHEMATIC
GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
TOWN OF MIDDLETON, WISCONSIN



KEY (GAS MONITORING LOCATIONS)

1	Foundation Cracks (4)	8	Shower Drain
3	Electrical Box	13	Well Casing

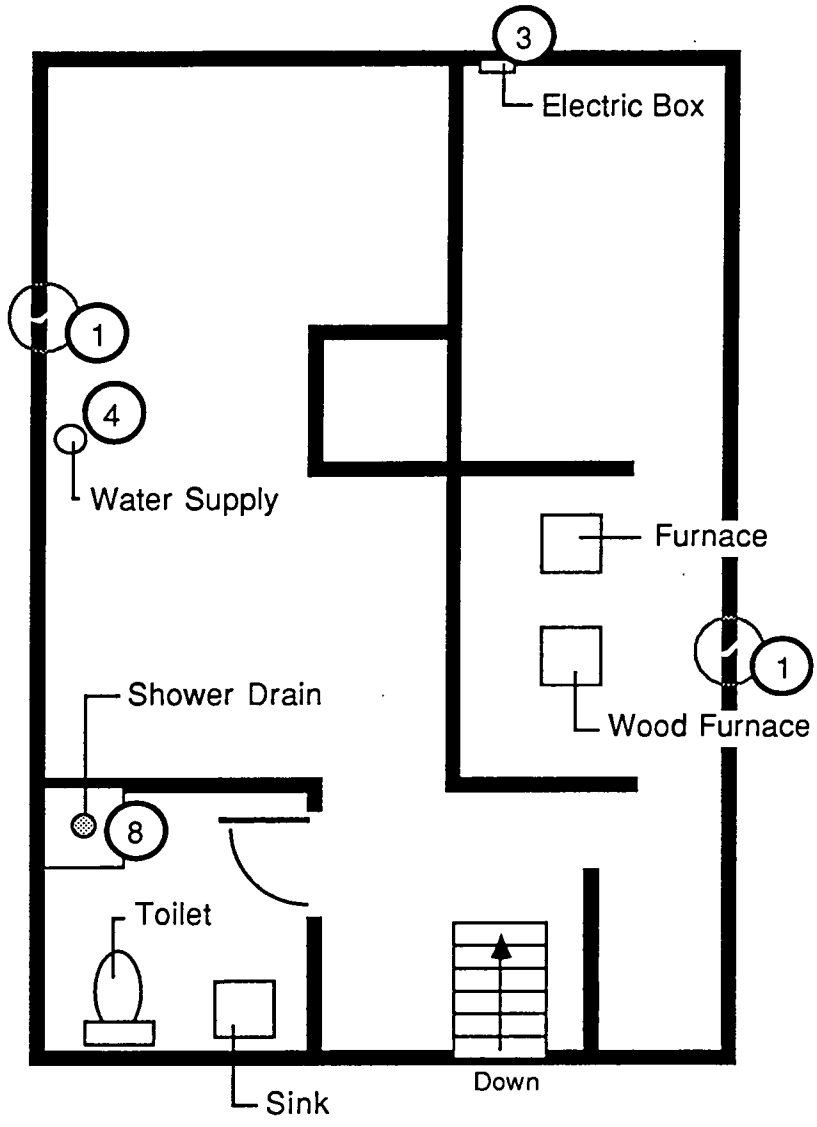
NOT TO SCALE

DWN	APP'D	DATE 6-30-89	13709	A6	WARZYN

LISKA / BICKEL RESIDENCE
BASEMENT SCHEMATIC

GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
TOWN OF MIDDLETON, WISCONSIN

TELEDYNE ROST N4717B



KEY (GAS MONITORING LOCATIONS)

1	Foundation Cracks (2)	8	Shower Drain
2	Electric Box	14	Water Supply Pipe

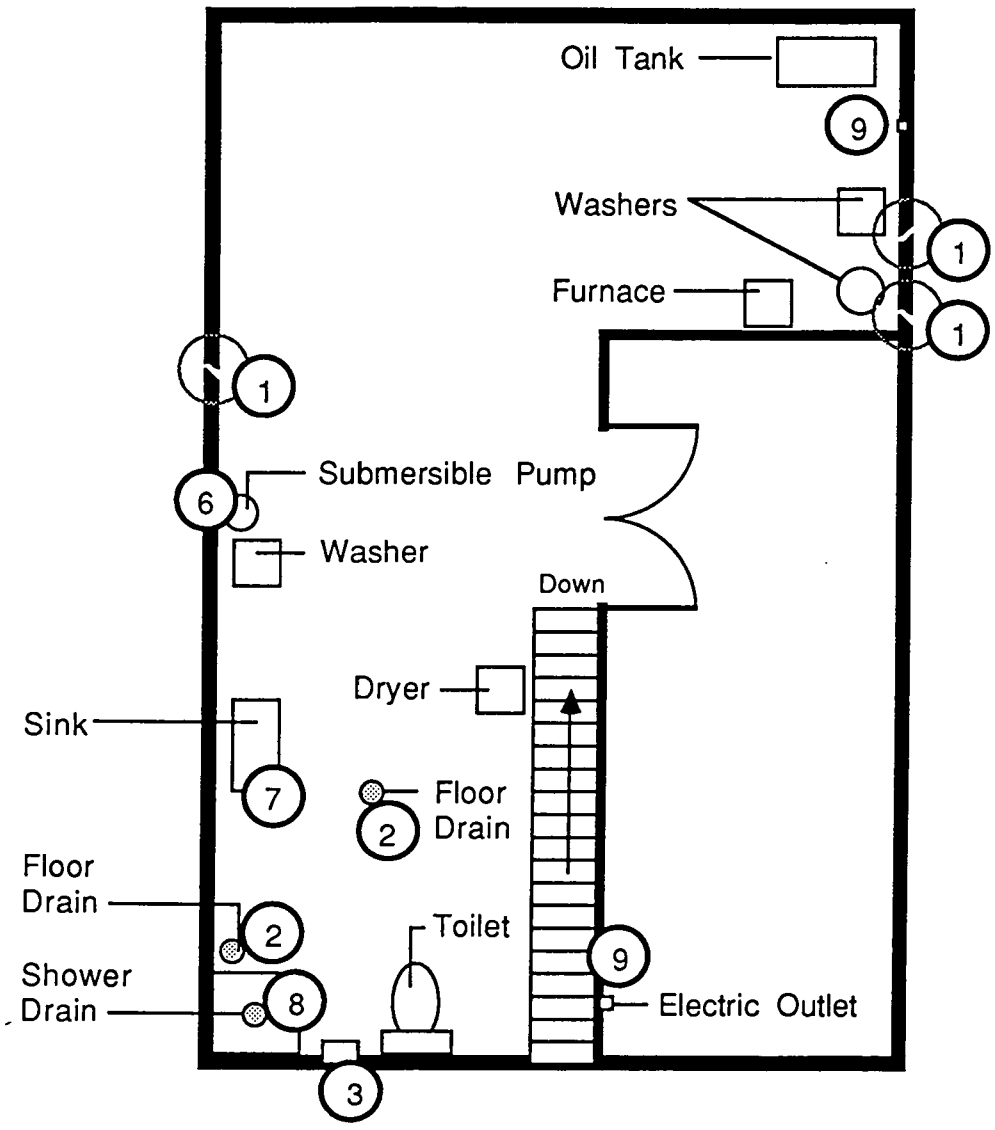
NOT TO SCALE

DWN LCE	APP'D JRL	DATE 6-30-89	13709	A7	WARZYN

COYLE RESIDENCE
BASEMENT SCHEMATIC

GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
TOWN OF MIDDLETON, WISCONSIN

TELEDYNE POST N47178



KEY (GAS MONITORING LOCATIONS)

1. Foundation Cracks (3)
2. Floor Drain (2)
3. Electrical Box
6. Sump Pump
7. Sink Drain
8. Shower Drain
9. Electrical Outlet (2)

NOT TO SCALE

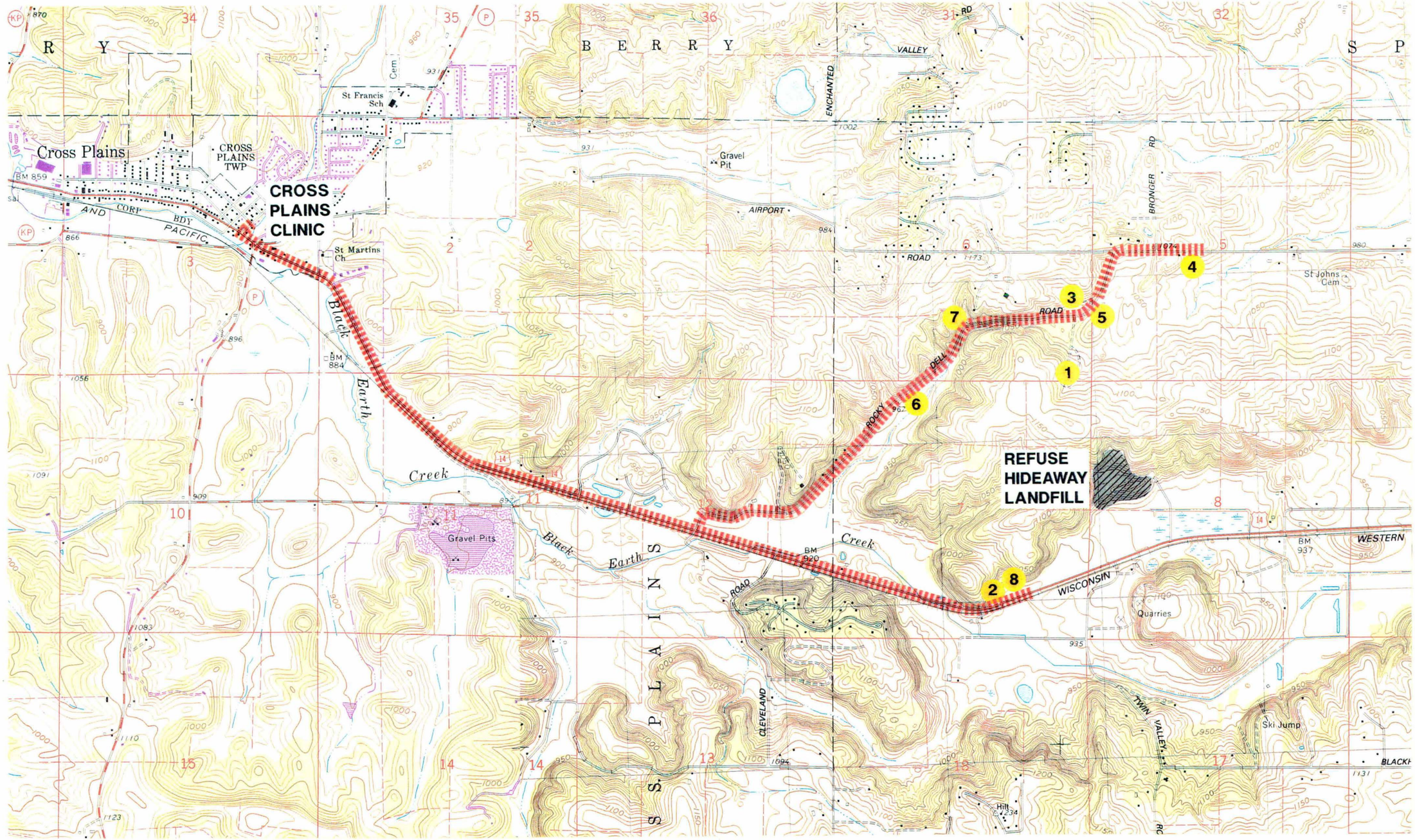
DWN	APP'D	DATE		
KE	JVA	6-30-89	13709	A8

WARZYN

SCHULTZ RESIDENCE
BASEMENT SCHEMATIC

GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
TOWN OF MIDDLETON, WISCONSIN

TELEDYNE POST 942178



KEY (GAS MONITORING LOCATIONS)

1	SUMMERS TREE FARM	5	VOSEN RESIDENCE
2	STOPPLEWORTH RESIDENCE	6	LISKA/BICKEL RESIDENCE
3	GABER/HOLTZ/HANZ RESIDENCE	7	COYLE RESIDENCE
4	HARRIS RESIDENCE	8	SHULTZ RESIDENCE

LEGEND

CLINIC ROUTE

NOTES

1. BASE MAP DEVELOPED FROM THE CROSS PLAINS AND MIDDLETON, WISCONSIN, 7½ MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAPS, DATED 1962, PHOTOREVISED 1982; AND 1983, RESPECTIVELY.

north

0 2000 4000

SCALE IN FEET

Date · By · Appd

WARZYN ENGINEERING INC.
Madison · Milwaukee
Minneapolis · Chicago
Detroit

Designed By RDY Drawn By DLF Checked By RDY JWS

Approved By Joel V. Arbuthnot Date 6-30-89 Reference

Revisions

MONITORING LOCATION PLAN AND CLINIC ROUTE
GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL
SECTION 8, T7N, R8E
TOWN OF MIDDLETON
DANE COUNTY, WISCONSIN

JUN 30 1989

Project Number 13709 **B1**

WARZYN

APPENDIX A

HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN
GAS MONITORING PROGRAM
REFUSE HIDEAWAY LANDFILL

INTRODUCTION

Purpose and Scope

The purpose of this Health and Safety Plan (Plan) is to provide information for the safety of field personnel performing methane gas monitoring in the residential building basements identified by the Wisconsin Department of Natural Resources (WDNR) adjacent to the Refuse Hideaway Landfill (Landfill). This document has also been prepared to present response action levels related to the gas monitoring results. These action levels were developed by the WDNR and Warzyn.

Project Description

Residences in the area of the Refuse Hideaway Landfill will be surveyed for the potential accumulation of methane in basements. The survey methodology is described under Hazard Evaluation in this Plan. The eight residences involved in the survey are included below. Their locations are shown on Drawing 13709-B1.

Landfill Gas Monitoring
Participating Residences

1. W.B. and J.J. Summers
   4610 Rocky Dell Road
   (608) 831-4414

2. A.J. and Jean Stoppleworth
   7750 Hwy 14
   (608) 831-4214

3. Gaber/Holtz/Hanz
   4621 Rocky Dell Road
   (608) 836-1076

4. Donna Harris/Dan Julson
   8607 Airport Road
   Work: (608) 831-5125

5. Bud Vosen
   4622 Rocky Dell Road
   (608) 831-4695

6. Joe Liska/Terry Bickel
   4526 Rocky Dell Road
   (608) 836-4817

7. P.J. and J.A. Coyle
   4593 Rocky Dell Road
   (608) 836-6472

8. Craig Shultz
   7734 Hwy 14
   (608) 831-2860

CHEMICAL AND PHYSICAL HAZARDS

The principal chemical hazards anticipated from the landfill gas migration investigation are associated with methane.

Methane

Methane gas is a simple asphyxiant: it displaces the oxygen normally breathed in the air. There is no smell to methane, and it is not irritating to eyes, nose or throat. However, in association with landfill gas, it is easily detected by odor.

If inhaled in large quantities, dizziness, difficulty in breathing, and/or loss of consciousness may occur. If these effects are noted, the victim should be removed to fresh air and allowed to breathe freely until dizziness has passed. If the victim is unconscious and not breathing, begin artificial respiration.

Methane is flammable in air at concentrations between 5% and 15%, the lower explosive limit (LEL) and upper explosive limit (UEL) of methane, respectively. Explosions can occur when methane is ignited in confined areas.

Physical Hazards

Physical hazards of concern include areas of poor lighting and movement restricted by structures and stationary or movable objects. Personnel in such areas should carry a supplemental light source (e.g., non-sparking flashlight).

HAZARD EVALUATION

Monitoring Protocol

The investigation of landfill gas migration involves the monitoring of residential basements for the presence of explosive, toxic or oxygen deficient atmospheres. The Warzyn employee will use an explosion/oxygen meter for surveying indoor below-ground areas. Readings will be made:

- at the basement entrance (foot of stairs)
- in sumps/drains and other foundation penetrations
- near cracks in the foundation
- near basement ignition sources (e.g., pilot lights, electric motors)

Instrument Action Levels

Any detection of methane will immediately be communicated to the WDNR and any decisions affecting occupants' life or property will be made by the WDNR.

In ambient air:

≥3% of LEL - proceed with caution, ventilate if possible and evacuate until ambient air concentrations are < 3% of LEL. Notify Fire Department and Utility Company of potential hazard.

≥40% of LEL - immediately evacuate the building and evaluate monitoring and ventilation procedures. Call the Fire Department and Utility Company to extinguish combustion sources (e.g., turn off electrical power service, gas service, etc.).

At localized points (foundation cracks, etc.):

≥3% of LEL - notify homeowner and occupants to increase ventilation. Increase monitoring frequency to daily.

≥40% of LEL - increase ventilation, notify Fire Department and Utility Companies of potential hazard. Re-evaluate hazard potential.

EMERGENCY RESPONSE

Emergency Procedures

If detectable concentrations of gases (≥3% of LEL) are recorded in the ambient air on monitoring instruments, the residents will be notified and advised to evacuate.

If action limits of monitoring instruments are exceeded (≥40% of LEL in ambient air), monitoring personnel will leave the building and recommend the residents do the same. The Fire Department and Utility Company will be notified from a neighbor's telephone and the gas and electricity shut off. The building will then be ventilated from the outside.

Emergency Resources

The 911 telephone number activates police, fire and ambulance resources. Alternative and additional telephone numbers include:

Organization	Emergency Number	General Number
Middleton Fire Dept.	831-5432	831-2751
Middleton Police Dept.	831-2111	831-2751
Rescue/Ambulance	831-2111	--
Madison General Hospital	267-6206	267-6000
Cross Plains Clinic	798-3344	--
Poison Control Center	414-931-4114	--
Warzyn Engineering Inc.		
Project Manager - Joel Schittone		273-0440
Corporate Health & Safety Director - Mary Ann Latko		273-0558
Client Contact - WDNR (Sue Fisher)		267-9387

Clinic Route: From houses along Rocky Dell Road or Airport Road, turn south onto Rocky Dell Road and proceed to U.S. Highway 14. Turn right on Route 14. For residences along Highway 14, go west on that highway. Take Highway 14 to the second street in Cross Plains, Brewery Road. Turn right (north) and proceed on Brewery Road to 2418, the Cross Plains Clinic (see Drawing 13709-B1).

JFK/bcn/JVS/DWH
[bcn-600-47]