Volatile organic compound contamination of private water supplies adjacent to abandoned landfills in Marathon County. [DNR-041] 1988?

Marathon County Health Department
Madison, Wisconsin: Wisconsin Department of Natural Resources, 1988?

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Wisconsin Groundwater Management Practice Monitoring Project No. 38

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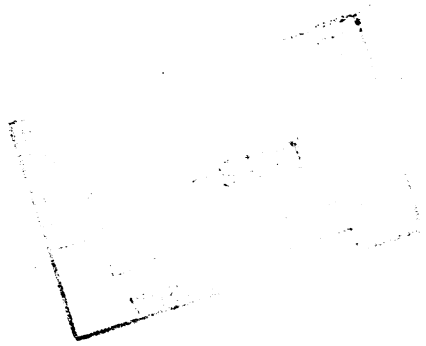
GROUNDWATER MANAGEMENT

PRACTICE MONITORING PROJECT

"VOLATILE ORGANIC COMPOUND CONTAMINATION OF PRIVATE WATER SUPPLIES ADJACENT TO ABANDONED LANDFILLS IN MARATHON COUNTY"

[1988 ?]



ABSTRACT

Thirty-four abandoned landfills were prioritized utilizing an internally designed Health Hazard Risk Assessment (HHRA) document. Each landfill site was ranked based on the weighted twelve parameter HHRA document. Private wells within 2,500 feet of the highest prioritized landfills were sampled and tested for volatile organic chemicals. The greatest percentage of the private wells found to be contaminated with VOC's were adjacent to the 5 highest ranked landfills. The application of the HHRA document proved to be a cost effective tool in the implementation of the abandoned landfill sampling program by identifying landfills with a greater risk of VOC contamination.

INTRODUCTION

In July of 1986, the Marathon County Health Department received a grant for the fiscal year, 1986-87, from the Wisconsin Groundwater Coordinating Council in the amount of five thousand dollars ($5,000). This grant enabled the MCHD to provide Volatile Organic Compounds screening on private water supplies within 2,500 feet of abandoned landfills in Marathon County. In addition to the grant money received, the Marathon County Health Department, Environmental Health Division, budgeted two thousand dollars to supplement volatile organic compound screening in the project.

Volatile organic compounds (VOC's) have been found above health advisory levels, preventive action limits and/or enforcement levels in Marathon County since 1980, specifically in five cities and villages providing municipal water supplies and in one subdivision built over an abandoned landfill. Several well head areas have been found to contain volatile organic compounds indicating contamination by solvents, degreasers and gasoline by-products. Several other contaminated critical groundwater areas have been identified in Marathon County from volatile organic compounds or pesticides.

Several non-community water supply systems such as restaurants, mobile home parks, taverns, and gas stations have been found to contain VOC's approaching or above the preventive action limits.

In addition, areas around several abandoned solid waste landfills have been found to contain VOC's above the preventive action limits.

This prompted the Marathon County Health Department to request a grant from the Department of Natural Resources to perform VOC monitoring in areas adjacent to abandoned landfills.

The Department of Natural Resoures (DNR) had identified, to date, over 85 abandoned landfills in Marathon County. Of these, the DNR has classified six as "high factor three" and one as "high factor two". These seven are a top priority for the DNR and are presently being investigated or will be in the near future. Also, three of the landfills are in the Environmental Protection Agency's Super Fund Program.

However, due to the DNR's priority rating system, limited funds and manpower, it was evident to the department the vast majority of remaining abandoned landfills may not receive as prompt attention. The Marathon County Health Department estimated that, at the current rate of DNR inspection, it would take a minimum of six and one-half years to complete the initial volatile organic compound screening of wells at risk of being contaminated with leachate from nearby abandoned landfills. The volatile organic compounds tend to travel through aquifers faster than other contaminants, and may be detected earlier.

The need for more expeditious water supply testing is clearly shown by the fact that for one third of the abandoned landfills in Marathon County the contents are not known. Another one third (classified low factor two) are known to contain at least some non-inert materials and may be within a quarter mile of a private water supply.

Method

The first step in the information gathering process was to produce a list of abandoned landfills to be evaluated (Abandoned Landfill Evaluation List, Appendix A). This list was compiled from the DNR registry of abandoned landfills (Reference 1) and from private individuals in the County. In order to narrow the evaluation to the most potentially hazardous landfills and not duplicate work being done by the DNR, the evaluation list was limited to those abandoned landfills with contents unknown, or were classified as low factor two. Those which were known to be a priority for the DNR were excluded, to avoid duplication of effort.

The majority of the abandoned landfills were already located to the quarter quarter section. For those which were not, old and new air photos were used to determine the most probable location. Using this location information, soil maps for the areas around each abandoned landfill were obtained from the Soil Conservation Service (SCS). Characteristics of the soils around each landfill to a depth of 6' were recorded using soil maps and soil intepretation sheets. Characteristics included were soil type, high water table, depth to bedrock (if known) and both clay content and permability by depth of the soil.

The direction of both groundwater flow and surface runoff in the area around each abandoned landfill were recorded next.

This information was used in determining potential VOC flow direction down gradient of the landfill. The distance and direction to surface water nearest each abandoned landfill was also recorded at this time. Groundwater flow directions were taken from a map of water table elevations in Marathon County, prepared by the Wisconsin Geological and Natural History Survey. Information on surface waters, and runoff flow was obtained from both SCS soil maps and the Marathon County Land Atlas and Plat Book. The two documents were also used to determine 1) the number of households at risk, 2) households within a quarter mile, 3) households within a half mile, and 4) households down gradient of any abandoned landfill.

Well driller's well log reports were another source of information. A copy of the well log from each well installed, if submitted, in Marathon County was obtained from the regional DNR office. The depth of the normal water table, depth to bedrock, total well depth and type of well were obtained from the well logs of wells drilled within a mile of any of the abandoned landfills.

Important data concerning each abandoned landfill were unobtainable. Details of any engineering controls, such as a clay cap or liner, nor any manifest or listings of contents, for any of the abandoned landfills could be found.

Lastly, the data concerning each landfill was transferred to a Landfill Evaluation Form (Appendix B) to better organize the data and facilitate the Health Hazard Risk Assessment document (Appendix C).

After the data was transferred to the Landfill Evaluation Form, the data was then entered onto the Health Hazard Risk Assessment form, to rank the abandoned landfills. The Health Hazard Risk Assessment document was developed by the Division's Groundwater and Hazardous Materials Coordinator and assisted by a student intern. Results of this priority ranking process are presented in Table I.

Table I

HEALTH HAZARD RISK ASSESSMENT COMPUTATION SHEET

Landfill Number	Homes Within 1/4 mile	Homes Within 1/2 mile	Depth To Water Table	Depth To Bedrock	Total Points	Priority Ranking
1	0	3	16-25'	<10'	104	4
2	0	1	16-25'	28-45'	67	24
3	0	1	16-25'	>95'	32	-
4	2	3	16-25'	10-27'	93	9
5	0	3	9-15'	28-45'	73	22
6	2	3	9-15'	10-27'	97	8
7	1	0	26-35'	>75'	28	-

8	2	2	16-25'	46-59'	63	27
9	1	3	16-25'	>75'	36	-
10	7	20	26-35'	10-27'	99	6
11	5	5	9-15'	60-74'	59	31
12	4	0	16-25'	10-27'	89	12
13*	0	0	16-25'	28-45'	65	26
14	1	2	3-8'	10-27'	99	7
15	V.of Colby		9-15'	28-45'	69	15
16	1	2	9-15'	28-45'	75	18
17	0	0	9-15'	28-45'	69	23
18	1	1	16-25'	10-27'	89	13
19	6	5	16-25'	46-59'	66	25
20	0	0	16-25'	Unknwn	20	30
21	1	2	9-15'	28-45'	75	19
22	25+	0	16-25'	28-45'	75	20
23	1	0	26-35'	28-45'	63	28
24	3	2	26-35'	46-59'	59	32
25	1	0	3-8'	28-45'	75	21
26*	1	1	26-35'	28-45'	65	26
27	1	0	16-25'	10-27'	87	14
28	7	1	9-15'	10-20'	82	16
29	1	3	16-25'	<10'	106	2
30*	25	25	16-25'	60-74'	65	26
31	3	3	3-8'	28-45'	81	17
32	3	2	16-25'	60-74'	53	-
33	0	0	26-35'	60-74'	41	-
*34	0	2	9-15'	74-94'	43	-
35	3	3	3-8'	60-74'	61	29
36	25	25	16-25'	10-27'	105	3
37	-	-	-	-	-	-
38	25+	0	16-25'	>95'	40	-
39	10	24	16-25'	<10'	116	1
40	3	1	16-25'	10-27'	91	11
41	1	1	3-8'	60-74'	57	34
42	-	-	-	-	-	-
43	V.of Brokaw		26-35'	>95'	26	-
44	20	5	16-25'	60-74'	58	33
45	V.of Athens		16-25'	10-27'	101	5
46	1	3	9-15'	10-27'	93	10
47	?	0	26-35'	46-59'	51	-

*Landfill Number 13, 26 and 30 Total Points equal 65. The Priority Ranking was 26 for all three. Therefore, 36 landfills were prioritized resulting in 34 Priority Rankings.

Sampling:

The VOC sampling program began on September 15, 1986. The first 24 samples were submitted to the University of Wisconsin-Stevens Point, Environmental Task Force Lab., Stevens Point, WI for analysis. These initial samples were paid for by the MCHD. All confirmation samples were submitted to the State Lab of Hygiene for analysis under the project grant.

The Marathon County Health Department along with providing the VOC sampling, analyzed the private water supplies for several parameters to determine general groundwater and drinking water quality. These parameters included bacteriological quality, nitrates, fluorides, iron, copper, magnesium, hardness, alkalinity and pH.

Table II

Sample Results

Priority Number 1 - Landfill: Town of Texas #39

1 - Owner constructed dug well 1975 -

Facility ID #037059770		Sample Date:	9-15-86
Water Quality:	Unsafe	Iron:	0.83mg/l
Nitrates:	0.3mg/l	Manganese:	0.20mg/l
Fluoride:	0.12mg/l	Hardness:	2gpg
Alkalinity:	36mg/l	pH:	6.2
Copper:	0.05mg/l		

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

2 - Drilled well, depth 120', 6" casing, 1976

Facility ID #037059880		Sample Date:	9-15-87
Water Quality:	Safe	Iron:	0.03mg/l
Nitrates:	1.5mg/l	Manganese:	<0.05mg/l
Fluoride	0.58mg/l	Hardness:	5gpg
Alkalinity:	70mg/l	pH:	6.7
Copper:	0.02mg/l		

Volatile Organic Screening: 1.9ppb Ethylbenzene, UW Stevens Point Environmental Task Force Lab.

Confirmation Sample: No detection, <1.0ppb Ethylbenzene, State Lab. of Hygiene

3 - Drilled Well, Lang Well Drilling, 475' deep, 6" casing, 1974

Facility ID#037059990		Sample Date:	9-15-86

Water Quality:	Safe	Iron:	0.03mg/l
Nitrates:	0.6mg/l	Manganese:	<0.05mg/l
Fluoride:	0.21mg/l	Hardness:	4gpg
Alkalinity:	64mg/l	pH:	6.4
Copper:	0.03mg/l		

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

4 - Drilled Well, Lang Well Drilling, 204' deep, 6" casing, 1974

Facility ID# 037060100		Sample Date:	9-15-87
Water Quality:	Safe	Iron:	0.03mg/l
Nitrates:	2.1mg/l	Manganese:	0.05mg/l
Fluoride:	0.25mg/l	Hardness:	3gpg
Alkalinity:	38mg/l	pH:	6.8
Copper:	0.12mg/l		

Volatile Organic Screening: 0.1ppb Dichloromethane (possible lab contamination), UW Stevens Point Environmental Task Force Lab.

Confirmation Sample: No detection, <1.0ppb Dichloromethane, State Lab. of Hygiene

Priority Number 2 - Landfill: Town of Rib Mountain #29

1 - Drilled Well, 6" casing, depth ?

Facility ID#037060210		Sample Date:	9-22-86
Water Quality:	Safe	Iron:	0.08mg/l
Nitrates:	0.3mg/l	Manganese:	<0.05mg/l
Fluoride:	0.88mg/l	Hardness:	3gpg
Alkalinity:	20mg/l	pH:	6.2
Copper:	0.05mg/l		

Volatile Organic Screening: 0.1ppb Tetrachloroethylene or 1,1,2,2, Tetrachlorethane, UW Stevens Point Environmental Task Force Lab.

Confirmation Sample: No detection, State Lab. of Hygiene, 11-3-86, <3.0 1,1,2,2, Tetrachloroethane, <1.0 Tetrachloroethylene

2 - Drilled well, Lang Well Drilling, 6" casing, depth 40', depth to water 28', depth to bedrock 15', total well depth 98', 8-6-83

Facility ID#037060320		Sample Date:	9-22-86
Water Quality:	Safe	Iron:	0.04mg/l
Nitrates:	2.4mg/l	Manganese:	<0.05mg/l
Flouride:	1.91mg/l	Hardness:	11gpg
Alkalinity:	30mg/l	pH:	6.0
Copper:	0.05mg/l		

Volatile Organic Screening: 3ppb Chloroform, 2ppb Tetrachloroethylene, 1,1,2,2, Tetrachloroethane, >.2ppb Other Unidentified peaks, UW Stevens Point Environmental Task Force Lab.

Confirmation Sample: 11-5-86, State Lab. of Hygiene: Detect: <3.0 1,1,2,2, Tetrachloroethane, 1,1 Tetrachloroethylene

3 - Drilled Well, 6" casing, depth 300', Haupt Well Drilling, ? Date

Facility ID#037061860		Sample Date:	9-22-86
Water Quality	Safe	Iron:	0.05mg/l
Nitrates:	3.0mg/l	Manganese:	<0.05mg/l
Fluorides:	2.15mg/l	Hardness:	4gpg
Alkalinity:	50mg/l	pH:	6.35
Copper:	0.06mg/l		

Volatile Organic Screening: No detection, UW Stevems Point Environmental Task Force Lab.

4 - Drilled Well, 6" casing, depth 325', Haupt Well Drilling, 1986

Facility ID#037060430		Sample Date:	9-22-86
Water Quality:	Safe	Iron:	0.05mg/l
Nitrates:	0.6mg/l	Manganese:	<0.05mg/l

Fluoride: 2.33mg/l Hardness: 4gpg

Alkalinity: 56mg/l pH: 6.45

Copper: 0.06mg/l

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

Priority Number 3 - Landfill: Town of Stettin #36

1 - Drilled Well, 6" casing, depth 52', Land Well Drilling, 1978

Facility ID#037060540 Sample Date: 9-29-86

Water Quality: Safe Iron: 0.26mg/l

Nitrates: 0.6mg/l Manganese: <0.05mg/l

Fluoride: 0.54mg/l Hardness: Soft gpg

Alkalinity: 16mg/l pH: 6.3

Copper: 0.05mg/l

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

2 - Drilled well, 6" casing, depth 84', Haupt Well Drilling, 1976

Facility ID#037060650 Sample Date: 9-29-86

Water Quality: Safe Iron: 0.04mg/l

Nitrates: 2.1mg/l Manganese: <0.05mg/l

Fluoride: 0.58mg/l Hardness: 2gpg

Alkalinity: 22mg/l pH: 5.9

Copper: 0.15mg/l

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

3 - Drilled well, 6" casing, depth 103', Haupt Well Drilling, 1979

Facility ID#037060760 Sample Date: 9-29-86

Water Quality: Safe Iron: 0.04mg/l

Nitrates: 3.0mg/l Manganese: <0.05mg/l

Fluoride: 1.14mg/l Hardness: 3gpg

Alkalinity: 32mg/l pH: 6.2

Copper: 0.10mg/l

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

Priority Number 4 - Landfill: Town of Bergen #1

1 -

Facility ID# - None Sample Date: 11-29-86

Water Quality: Unsafe Iron: 0.03mg/l

Nitrates: 5.6mg/l Manganese: <0.05mg/l

Fluoride: 0.25mg/l Hardness: 10gpg

Alkalinity: 124mg/l pH: 6.4

Copper: 0.13mg/l

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

2 - Drilled well, 6" casing, well depth 40', Lang Well Drilling, 1961

Facility ID# - None Sample Date: 11-24-86

Water Quality: Unsafe Iron: 0.30mg/l

Nitrates: 1.2mg/l Manganese <.05mg/l

Fluoride: 0.34mg/l Hardness: 3gpg

Alkalinity: 28mg/l pH: 5.9

Copper: 0.69mg/l

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

Priority Number 5 - Landfill: Village of Athens #45

1 - Dug well, 24" casing, ?depth, ?date

Facility ID#037075610 Sample Date: 10-27-86

Water Quality: Unsafe Iron: 0.05mg/l

Nitrates: 2.4mg/l Manganese: <0.05mg/l

Fluoride: 0.25mg/l Hardness: 8gpg

Alkalinity: 98mg/l pH: 6.7

Copper: 0.12mg/l

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

2 -

Facility ID#037075500 Sample Date: 10-27-86

Water Quality: Iron: 0.02mg/l

Nitrates: 9.2mg/l Manganese: <0.05mg/l

Fluoride: 0.21mg/l Hardness: 19pgp

Alkalinity: 278mg/l pH: 7.3

Copper: 0.08mg/l

Volatile Organic Screening: Detection: 0.4ppb Dichloroethane, UW Stevens Point Environmental Task Force Lab.

Confirmation Sample: No detection, <1.0ppb, 1,2 Dichloroethane, State Lab. of Hygiene

Priority Number 6 - Landfill: Town of Green Valley #10

1 - Well sampled in response to a neighborhood concern 5-6-85, drilled well, 6" casing, depth 93', 40' casing, Marvin Brandl, 1973

Facility ID# - None Sample Date: 5-6-85

Water Quality: Safe

Nitrates: 5.1mg/l

Fluoride: 0.69mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

2 - Well sampled in response to a neighborhood concern 5-6-85, drilled well, 6" casing, depth 118', 40" casing, Haupt Well Drilling, 1979

Facility ID# - None Sample Date: 5-6-85

Water Quality: Safe

Nitrates: 5.9mg/l

Fluoride: 1.12mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

Priority Number 7 - Landfill: Town of Harrison #14

1 - Drilled well in well pit, 10" casing, depth 35'

Facility ID#037072310 Sample Date: 11-17-86

Water Quality: Safe Iron: 0.13mg/l

Nitrates: 2.7mg/l Manganese: 0.05mg/l

Fluoride: 0.25mg/l Hardness: 4gpg

Alkalinity: 22mg/l pH: 6.65

Copper: 0.36mg/l

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

2 - Drilled well, 6" casing, depth 68', 20", H. Lang 1971

Facility ID#037072200 Sample Date: 11-17-86

Water Quality: Safe Iron: 0.13mg/l

Nitrates: 0.3mg/l Manganese: 0.05mg/l

Fluoride: 0.12mg/l Hardness: 1gpg

Alkalinity: 14mg/l pH: 6.8

Copper: 0.24mg/l

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

3 - Drilled well, 6" casing, depth 142', 40', A. Lang 1974

Facility ID#037072420 Sample Date: 11-17-86

Water Quality: Safe Iron: 0.47mg/l

Nitrates: <0.2mg/l Manganese: 0.05mg/l

Fluoride: 1.0mg/l Hardness: 6gpg

Alkalinity: 82mg/l pH: 7.0

Copper: 0.05mg/l

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

4 - Drilled well, 6" casing, depth 186', Lang 1960's?

Facility ID#037072090 Sample Date: 11-17-86

Water Quality: Iron: 0.05mg/l

Nitrates: 3.9mg/l Manganese: <0.05mg/l

Fluoride: 0.47mg/l Hardness: 4gpg

Alkalinity: 42mg/l pH: 6.62

Copper: 0.30mg/l

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

Priority Number 8 - Landfill: Town of Day #6

1 - Drilled well, 6" casing, depth 60', 30', 1937

Facility ID #037080340 Sample Date: 2-23-87

Water Quality: Safe Iron: 0.05mg/l

Nitrates: 12.7mg/l Manganese: <0.05mg/l

Fluoride: 0.17mg/l Hardness: 8gpg

Alkalinity: 60mg/l pH: 6.5

Copper: 0.13mg/l

Volatile Organic Screening: No detection, State Lab of Hygiene.

2 - Drilled well, 6" casing, depth 158', Haupt Well 1978

Facility ID #037080230 Sample Date: 2-23-87

Water Quality: Safe Iron: 0.06mg/l

Nitrates: 6.0mg/l Manganese: <0.05mg/l

Fluoride: 0.12mg/l Hardness: 5gpg

Alkalinity: 30mg/l pH: 6.4

Copper: 0.39mg/l

Volatile Organic Screening: No detection, State Lab of Hygiene.

3 - Unable to locate well-snow cover, owner not available

Facility ID #037080120		Sample Date:	2-23-87
Water Quality:	Safe	Iron:	0.02mg/l
Nitrates:	4.2mg/l	Manganese:	<0.05mg/l
Fluoride:	0.17mg/l	Hardness:	7gpg
Alkalinity:	70mg/l	pH:	6.7
Copper:	0.06mg/l		

Volatile Organic Screening: No detection, State Lab of Hygiene.

Priority Number 9 - Landfill: Village of Edgar #4

1 - No well data

Facility ID #037081330		Sample Date:	4-6-87
Water Quality:	Unsafe	Iron:	0.06mg/l
Nitrates:	6.4mg/l	Manganese:	<0.05mg/l
Fluoride:	0.34mg/l	Hardness:	8gpg
Alkalinity:	104mg/l	pH:	7.5
Copper:	0.03mg/l		

Volatile Organic Screening: No detection, State Lab of Hygiene.

2 - Drilled well, 6" casing, depth 88', 40', Lang 1981

Facility ID #037080450		Sample Date:	2-23-87
Water Quality:	Safe	Iron:	0.03mg/l
Nitrates:	5.2mg/l	Manganese:	<0.05mg/l
Fluoride:	0.21mg/l	Hardness:	Soft
Alkalinity:	78mg/l	pH:	7.2
Copper:	0.06mg/l		

Volatile Organic Screening: No detection, State Lab of Hygiene.

Priority Number 10 - Landfill: Village of Edgar

1 - Drilled well, 6" casing, depth 72', 23', H. Lang 1954

Facility ID #037066040		Sample Date:	11-10-86
Water Quality:	Safe	Iron:	0.05mg/l
Nitrates:	1.8mg/l	Manganese:	0,05mg/l
Fluoride:	0.17mg/l	Hardness:	9gpg
Alkalinity:	134mg/l	pH:	6.45
Copper:	0.03mg/l		

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

2 - Drilled well, 6" casing, depth 116', 40', H. Lang 1975

Facility ID #037065930		Sample Date:	11-10-86
Water Quality:	Safe	Iron:	0.07mg/l
Nitrates:	1.5mg/l	Manganese:	0.05mg/l
Fluoride:	0.23mg/l	Hardness:	16gpg
Alkalinity:	254mg/l	pH:	6.8
Copper:	0.10mg/l		

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

Priority Number 11 - Landfill: Town of Halsey #12

1 - Drilled well, 6" casing, depth 232', casing 40', R. Lang Well Drilling 1974

Facility ID #07078580		Sample Date:	1-12-87
Water Quality:	Safe	Iron:	0.14mg/l
Nitrates:	2.7mg/l	Manganese:	<0.05mg/l
Fluoride:	0.17mg/l	Hardness:	4gpg
Alkalinity:	130mg/l	pH:	8.1
Copper;	0.05mg/l		

Volatile Organic Screening: No detection, State Lab. of Hygiene

2 - Drilled well, 6" casing, depth 382', casing 40', R. Lang Well Drilling 1981

Facility ID #07078690		Sample Date:	1-12-87
Water Quality:	Safe	Iron:	0.37mg/l
Nitrates;	<0.2mg/l	Manganese:	<0.05mg/l
Fluoride:	0.34mg/l	Hardness:	5gpg
Alkalinity:	130mg/l	pH:	6.4
Copper:	0.05mg/l		

Volatile Organic Screening: No Detection, State Lab. of Hygiene

3 - Drilled well, 6" casing, depth 156', casing 21', Haupt Well Drilling, 1969

Facility ID #037078360		Sample Date:	1-12-87
Water Quality:	Safe	Iron:	0.06mg/l
Nitrates:	2.1mg/l	Manganese:	<0.05mg/l
Fluoride:	0.12mg/l	Hardness:	1gpg
Alkalinity:	48mg/l	pH:	6.4
Copper:	0.28mg/l		

Volatile Organic Screening: No Detection, State Lab. of Hygiene

4 - Drilled well in well pit, depth 100'

Facility ID #037078470		Sample Date:	1-12-87
Water Quality:	Unsafe	Iron:	0.06mg/l
Nitrates:	5.6mg/l	Manganese:	<0.05mg/l
Fluoride:	0.12mg/l	Hardness:	3gpg
Alkalinity:	30mg/l	pH	6.0
Copper:	0.39mg/l		

Volatile Organic Screening: No detection, State Lab. of Hygiene

Priority Number 12 - Landfill: Mosinee Paper #18

1 - Spring

Facility ID #0370821000 Sample Date: 5-4-87

Water Quality: Requested only VOC analysis

Volatile Organic Screening: No detection, State Lab. of Hygiene

2 - Well type unknown

Facility ID #037082210 Sample Date: 5-4-87

Water Quality: Unsafe Iron: 0.03mg/l

Nitrates: 11.7mg/l Manganese: <0.05mg/l

Fluoride: 0.17mg/l Hardness: 7gpg

Copper: 0.08mg/l pH: 6.7

Volatile Organic Screening: No detection, State Lab. of Hygiene

3 - Drilled well, 6" casing, well depth 58', Baltz Well Drilling, 1977

Facility ID #037082320 Sample Date: 5-4-87

Water Quality: Safe Iron: 0.09mg/l

Nitrates: 3.0mg/l Manganese: <0.05mg/l

Fluoride: 0.17mg/l Hardness: 2gpg

Alkalinity: 20mg/l pH: 6.5

Copper: 0.08mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

Priority Number 13 - Landfill: Erving Kolbe #28

1 - Driven point, 2" casing, 40' depth, Owner 1983

Facility ID #037065710 Sample Date: 11-10-86

Water Quality: Safe Iron: 0.34mg/l

Nitrates: 0.6mg/l Manganese: 0.05mg/l

Fluoride: 0.12mg/l Hardness: 3gpg

Alkalinity: 26mg/l pH: 7.5

Copper: 0.08mg/l

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

2 - Drilled well, 6" casing, Haupt Well Drilling, 1985

Facility ID #037071980		Sample Date:	11-17-86
Water Quality:	Safe	Iron:	1.08mg/l
Nitrates:	<0.2mg/l	Manganese:	<0.05mg/l
Fluoride:	0.30mg/l	Hardness:	Soft water*
Alkalinity:	74mg/l	pH:	6.75
Copper:	0.05mg/l	*Water conditioning unit	

Volatile Organic Screening; No detection, UW Stevens Point Environmental Task Force Lab.

3 - Driven point, 2" casing, Owner, 1961

Facility ID #037065820		Sample Date:	11-10-86
Water Quality:	Safe	Iron:	0.97mg/l
Nitrates:	0.6mg/l	Manganese:	<0.05mg/l
Fluoride:	0.17mg/l	Hardness:	2gpg
Alkalinity:	30mg/l	pH:	6.9
Copper:	0.06mg/l		

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

4 - Drilled, 6" casing, casing depth 61', depth 62', Lang Well Drilling, 1972

Facility ID #037065600		Sample Date:	11-10-86
Water Quality:	Unsafe	Iron:	2.25mg/l
Nitrates:	<0.2mg/l	Manganese:	0.20mg/l
Fluoride:	0.61mg/l	Hardness:	4gpg
Alkalinity:	68mg/l	pH:	7.2
Copper:	0.05mg/l		

Volatile Organic Screening: No detection, UW Stevens

Point Environmental Task Force Lab.

5 - Well data not available

Facility ID #037087930 Sample Date: 3-16-87

Water Quality: Safe Iron: 0.36mg/l

Nitrates: 2.1mg/l Manganese: <0.05mg/l

Fluoride: 0.58mg/l Hardness: 13gpg

Alkalinity: 28mg/l pH: 6.4

Copper: 1.97mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

6 - Well data not available

Facility ID #0370820 Sample Date: 3-16-87

Water Quality: Safe Iron: 0.04mg/l

Nitrates: 1.5mg/l Manganese: <0.05mg/l

Fluoride: 2.38mg/l Hardness: Soft Water

Alkalinity: 68mg/l pH: 7.4

Copper: 0.05mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

Priority Number 14 - Land: Town of Rietbrock #31

1 - Drilled well, 6" casing, drilled 1980, no well construction report

Facility ID #037087380 Sample Date: 3-2-87

Water Quality: Safe Iron: 1.35mg/l

Nitrates: 0.3mg/l Manganese: 0.35mg/l

Fluoride: 0.21mg/l Hardness: 13gpg

Alkalinity: 92mg/l pH: 6.4

Copper: 0.06mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

2 - No well data available

Facility ID #037087600 Sample Date: 3-2-87

Water Quality: Safe Iron: 0.02mg/l

Nitrates: 1.2mg/l Manganese: <0.05mg/l

Fluoride: 0.34mg/l Hardness: 13gpg

Alkalinity: 244mg/l pH: 7.6

Copper: 0.06mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

3 - Hand dug - then drilled, 8" casing

Facility ID #037087490 Sample Date: 3-2-87

Water Quality: Unsafe Iron: 0.14mg/l

Nitrates: 1.5mg/l Manganese: <0.05mg/l

Fluoride: 0.4mg/l Hardness: 6gpg

Alkalinity: 224mg/l pH: 7.7

Copper: 0.06mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

Priority Number 15 - Landfill: Town of Marathon #22

1 - Drilled well, 6" casing

Facility ID #037082650 Sample Date: 5-4-87

Water Quality: Safe Iron 0.06mg/l

Nitrates: 0.6mg/l Manganese: <0.05mg/l

Fluoride: 1.37mg/l Hardness: 4gpg

Alkalinity: 48mg/l pH: 6.7

Copper: 0.05mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

2 - Drilled well, 6" casing

Facility ID #037082430 Sample Date: 5-4-87

Water Quality: Safe Iron: 0.06mg/l

Nitrates: 1.2mg/l Manganese: <0.05mg/l

Fluoride: 1.58mg/l Hardness: 3gpg

Alkalinity: 32mg/l pH: 6.8

Copper: 0.3mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

3 - Drilled well, 6" casing, 1975

Facility ID #07082540 Sample Date: 5-4-87

Water Quality: Safe Iron: 0.03mg/l

Nitrates: 1.8mg/l Manganese: <0.05mg/l

Fluoride: 1.37mg/l Hardness: 2gpg

Alkalinity: 24mg/l pH: 6.5

Copper: 0.10mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

4 - Drilled well, 6" casing, 40' casing depth, well depth 82', bed rock 38', Baltz Well Drilling 1979

Facility ID #037080670 Sample Date: 3-2-87

Water Quality: Safe Iron: 0.22mg/l

Nitrates: 2.1mg/l Manganese: <0.05mg/l

Fluoride: 0.5mg/l Hardness:

Alkalinity: 16mg/l pH: 6.1

Copper: 1.24mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

5 - Drilled well, 6" casing, casing depth 40', well depth 110', 1966

Facility ID #037080560 Sample Date: 3-2-87

Water Quality: Safe

Iron: 0.04mg/l

Nitrates: 1.5mg/l

Manganese: <0.05mg/l

Fluoride: 1.58mg/l

Hardness: 4gpg

Alkalinity: 32mg/l

pH: 6.4

Copper: 0.24mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

Priority Number 16 - Landfill: Town of Easton/Plover #25

1 - Drilled 6' casing, 40' depth, total depth 160', depth to bedrock 12', depth to water 20', Balty Well Drilling, 7-20-77

Facility ID #037075940

Sample Date: 11-3-86

Nitrates: 1.2mg/l

Manganese: <0.05mg/l

Fluoride: 0.34mg/l

Hardness: 5gpg

Alkalinity: 82mg/l

pH: 7.4

Copper: 0.08mg/l

Volatile Organic Screening: 0.5ppb Trichloroethane, UW Stevens Point Environmental Task Force Lab.

Confirmation Sample: No detection, State Lab. of Hygiene, January 5, 1987

2 - Dug well, 36" dia. concrete casing, 18', owner constructed 1934

Facility ID #037076050

Sample Date: 11-3-86

Water Quality: Unsafe/Fecal

Iron: 0.56mg/l

Nitrates: 0.3mg/l

Manganese: <0.05mg/l

Fluoride: 0.12mg/l

Hardness: 2 gpg

Alkalinity: 44mg/l

pH: 7.4

Copper: 0.02mg/l

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

3 - Drilled 6" casing, 40'depth, well depth 112', bedrock 35', water depth 6', Lang Well Drilling, 1-15-73

Facility ID # 037076160 Sample Date: 11-3-86

Water Quality: Safe Iron: 0.53mg/l

Nitrates: 0.8mg/l Manganese: 0.05mg/l

Fluoride: 0.21mg/l Hardness: 4gpg

Alkalinity: 64mg/l pH: 7.2

Copper: 0.03mg/l

Volatile Organic Screening: No detection, UW Stevens Point Environmental Task Force Lab.

Priority Number 17 - Landfill: Village of Stratford #5

1 - Drilled well 6" casing, 40' depth, total depth 106', bedrock 6', water table 8', Brunner Well Drilling, 1977

Facility ID #037088150 Sample Date: 3-16-87

Water Quality: Unsafe Iron: 0.02mg/l

Nitrates: 4.2mg/l Manganese: <0.05mg/l

Fluoride: 0.30mg/l Hardness: 7gpg

Alkalinity: 82mg/l pH: 7.4

Copper: 0.12mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

Priority Number 18 - Landfill: Town of Johnson #17

1 - Drilled well 6" casing, depth to water 120', depth to bedrock 125'

Facility ID # Sample Date: 3-16-87

Water Quality: Safe Iron: 0.80mg/l

Nitrates: <0.2mg/l Manganese: <0.05mg/l

Fluoride: 0.54mg/l Hardness: 9gpg

Alkalinity: 180mg/l pH: 7.6

Copper: 0.06mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

Priority Number 19 - Landfill: Town of Berlin #2

1 - Drilled well 6" casing, total well depth 85', Haupt Well Drilling, 1972

Facility ID #037081550		Sample Date:	4-27-87
Water Quality:	Safe	Iron:	0.11mg/l
Nitrates:	1.2mg/l	Manganese:	<0.05mg/l
Fluoride:	0.25mg/l	Hardness:	10gpg
Alkalinity:	146mg/l	pH:	7.2
Copper:	0.05mg/l		

Volatile Organic Screening: No detection, State Lab. of Hygiene

2 - Drilled well 6" casing, approximate well depth 80', Lang Well Drilling 1972

Facility ID #037081660		Sample Date:	4-27-87
Water Quality:	Safe	Iron:	0.02mg/l
Nitrates:	<0.2mg/l	Manganese:	<0.05mg/l
Fluoride:	0.23mg/l	Hardness:	8gpg
Alkalinity:	124mg/l	pH:	7.9
Copper:	0.06mg/l		

Volatile Organic Screening: No detection, State Lab. of Hygiene

3 - Drilled well, 6"casing, total well depth 113', 1971

Facility ID #037081440		Sample Date:	4-27-87
Water Quality:	Safe	Iron:	0.49mg/l
Nitrates:	0.6mg/l	Manganese:	<0.05mg/l
Fluoride:	0.3mg/l	Hardness:	6gpg
Alkalinity:	108mg/l	pH:	7.4
Copper:	0.3mg/l		

Volatile Organic Screening: No detection, State Lab. of Hygiene

Priority Number 20 - Landfill: Donald Smith #19

1 - Drilled well, 6" casing, 1977

Facility ID #037081990	Sample Date: 4-27-87
Water Quality: Safe	Iron: 0.02mg/l
Nitrates: 3.9mg/l	Manganese: <0.05mg/l
Fluoride: 0.25mg/l	Hardness: 7gpg
Alkalinity: 108mg/l	pH: 7.4
Copper: 0.05mg/l	

Volatile Organic Screening: No detection, State Lab. of Hygiene

2 - Drilled well, 6" casing, casing depth 27', total well depth 50', 1972

Facility ID #037081880	Sample Date: 4-27-87
Water Quality: Safe	Iron: 0.05mg/l
Nitrates: 5.6mg/l	Manganese: <0.05mg/l
Fluoride: 0.3mg/l	Hardness: 6gpg
Alkalinity: 92mg/l	pH 7.4
Copper: 0.08mg/l	

Volatile Organic Screening: No detection, State Lab. of Hygiene

3 - Drilled well, 6" casing, total well depth 70', Lang Well Drilling, 1972

Facility ID #037081770	Sample Date: 4-27-87
Water Quality: Safe	Iron: 0.02mg/l
Nitrates: 0.3mg/l	Manganese: <0.05mg/l
Fluoride: 0.3mg/l	Hardness: 7gpg
Alkalinity: 112mg/l	pH: 8.0
Copper: 0.05mg/l	

Volatile Organic Screening: No detection, State Lab. of Hygiene

Priority Number 21 - Landfill: Village of Spencer #35

1 - Drilled well, 6" casing, total depth 250'

Facility ID #037081110	Sample Date: 4-6-87
Water Quality: Safe	Iron: 0.04mg/l
Nitrates: 6.0mg/l	Manganese: <0.05mg/l
Fluoride: 0.38mg/l	Hardness: 13gpg
Alkalinity: 170mg/l	pH: 7.7
Copper: 0.10mg/l	

Volatile Organic Screening: No detection, State Lab. of Hygiene

2 - Drilled well, 6" casing, total depth 42', depth to water 10', Haupt Well Drilling, 1948

Facility ID #037081000	Sample Date: 4-6-87
Water Quality: Safe	Iron: 0.03mg/l
Nitrates: 5.6mg/l	Manganese: <0.05mg/l
Fluoride: 0.40mg/l	Hardness: 12gpg
Alkalinity: 170mg/l	pH: 7.7
Copper: 0.12mg/l	

Volatile Organic Screening: No detection, State Lab. of Hygiene

3 - Drilled well, 6" casing

Facility ID #037080890	Sample Date: 4-6-87
Water Quality: Unsafe	Iron: 0.060mg/l
Nitrates: <0.2mg/l	Manganese: <0.05mg/l
Fluoride: 0.54mg/l	Hardness: 9gpg
Alkalinity: 166mg/l	pH: 7.5
Copper: 0.06mg/l	

Volatile Organic Screening: No detection, State Lab. of Hygiene

4 - No well data available

Facility ID #037081220 Sample Date: 4-6-87

Water Quality: Unsafe Iron: 0.12mg/l

Nitrates: <0.2mg/l Manganese: <0.05mg/l

Fluoride: 0.42mg/l Hardness: 8gpg

Alkalinity: 146mg/l pH: 7.4

Copper: 0.05mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

5 - Drilled well, 6" casing, total depth 100'

Facility ID #037080780 Sample Date: 4-6-87

Water Quality: Safe Iron: 0.04mg/l

Nitrates: 1.5mg/l Manganese: <0.05mg/l

Fluoride: 0.50mg/l Hardness: 9gpg

Alkalinity: 156mg/l pH: 7.8

Copper: 0.05mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

Priority Number 22 - Landfill: Town of Wien

1 - Well #1 Milkhouse, drilled well, 6" casing, total well depth 97', depth to water 25', 1920's

Facility ID #037072750 Sample Date: 5-18-87

Water Quality: Safe Iron: 0.03mg/l

Nitrates: 3.3mg/l Manganese: <0.05mg/l

Fluoride: 1.23mg/l Hardness: 10gpg

Alkalinity: 178mg/l pH: 7.5

Copper: 0.03mg/l

Volatile Organic Screening: No detection, State Lab. of Hygiene

2 - Well #2 Home, dug well, depth 55'

Facility ID #07072750 Sample Date: 5-18-87

Water Quality:	Unsafe	Iron:	0.03mg/l
Nitrates:	6.4mg/l	Manganese:	<0.05mg/l
Fluoride:	0.34mg/l	Hardness:	7gpg
Alkalinity:	110mg/l	pH:	7.2
Copper:	0.02mg/l		

Volatile Organic Screening: No detection, State Lab. of Hygiene

Results

Chemical contaminant screening of 69 private water supplies adjacent and down gradient of 23 of the 36 abandoned landfills prioritized were sampled. The remaining 13 landfill were not sampled due to a number of reasons, such as homes on municipal water services to a lack of participation by homeowner. Table III summarizes the number of wells sampled in each landfill area. Each landfill is located on a map in Appendix D, by referencing the third column in Table I and III labeled "Landfill Number".

Table III

Abandoned Landfill Sampling Summary

Priority #	Landfill	Landfill Number	Number Of Wells Sampled
1	Town of Texas	#39	4
2	Town of Rib Mountain	#29	4
3	Town of Stettin	#36	3
4	Town of Bergen	# 1	2
5	Village of Athens	#45	2
6	Town of Green Valley	#10	2
7	Town of Harrison	#14	4
8	Town of Day	# 6	3
9	Village of Edgar	# 4	2
10	Thornapple Road	#46	B*
11	Village of Edgar	#40	2
12	Town of Halsey	#12	4
13	Mosinee Paper	#18	3
14	Town of Rib Falls	#27	B*
15	City of Colby	#15	A*
16	Erving Colby	#28	6
17	Town of Rietbrock	#31	3
18	City of Abbotsford	#16	A*
19	Town of Marathon	#21	B*
20	Town of Marathon	#22	5
21	Town of Easton/Plover	#25	3
22	Village of Stratford	# 5	1

23		Town of Johnson	#17	1
24		Town of Berlin	# 2	3
25		Donald Smith	#19	3
26	Tie	Town of Hamburg	#13	B*
26	Tie	Town of Reid	#26	C*
26	Tie	Minnesota Mining	#30	A*
27		Town of Frankfort	# 8	2
28		Town of McMillan	#23	C*
29		Village of Spencer	#35	5
30		3M Corp	#20	B*
31		Village of Athens	#11	C*
32		Town of Norrie	#24	C*
33		Village of Marathon	#44	A*
34		Town of Wien	#41	2

23 Landfills Sampled 69 Private Wells Sampled

*Not sampled due to:

A - Municipal Water Supply
B - No Homes In Vicinity
C - Unable To Contact

Of the 69 private water supplies sampled, there were six initial VOC detections. These samples had been sent to the University of Wisconsin Stevens Point, Environmental Task Force Laboratory, for analysis. All initial VOC detections were resampled and submitted to the State Laboratory of Hygiene for confirmation. Of the six initial VOC detections one sample was confirmed (Table IV).

Table IV

Priority	Landfill	#of Samples	#of Detects	# Confirmed
1	Tn/Texas	4	2	0
2	Tn/Rib Mt.	4	2	1
5	V/Athens	2	1	0
21	Tn/Easton Tn/Plover	3	1	0

Discussion

The objective of the project was to identify populations at risk of VOC contamination in the immediate vicinity of abandoned landfills in Marathon County utilizing a Health Hazard Risk Assessment document, developed by the health department. The document was developed to provide the department with the ability to effectively and efficiently utilize limited personnel and financial resources.

Action steps that were designed to meet the project objective were: 1) to implement the Health Hazard Risk Assessment document establishing a landfill priority testing system for abandoned landfills, not within the DNR high

priority list of factor two or factor three landfills, and 2) to investigate (14) abandoned landfills and sample all private water supply systems within 2,500 feet of each site.

The Health Hazard Risk Assessment document was used to prioritize 36 abandoned landfills (Table III). A total of 23 landfill sites were investigated and 69 private water supplies were sampled and analyzed for volatile organic compounds. One private water supply was confirmed by the State Laboratory of Hygiene to be contaminated with 1,1,2,2 tetrachloroethane and 1,1 tetrachloroethylene (Priority Number 2-Landfill: Town of Rib Mountain #29, Well #2).

Several other VOC screening samples analyzed by University of Wisconsin-Stevens Point, Environmental Task Force Lab, indicated contamination as noted in Table II, Priority Number 1-Landfill: Town of Texas #39, Well # 2 and 4; Priority Number 2-Landfill: Town of Rib Mountain #29, Well #1; Priority Number 5-Landfill: Village of Athens #45, Well #2; Priority Number 16-Landfill: Town of Easton/Plover #25, Well #1.

The evaluation of the Health Hazard Risk Assessment document indicates the use and its application in this project was beneficial. The one State Laboratory of Hygiene confirmed VOC contamination occurred at Priority Number 2-Landfill. The remaining VOC detections by the University of Wisconsin-Stevens Point but not confirmed by the State Laboratory of Hygiene were all within the five highest priority landfill sites, with one exception. [Please note the detection level at the University of Wisconsin Stevens Point (uncertified laboratory) is lower than the State Laboratory of Hygiene.]

This exception was Well #1 in Priority Number 16-Landfill. Two other wells were samples in this same area. Both wells were closer to the landfill than the contaminated 160' well with a 40' casing in 28' of bedrock. One well was constructed by the owner in 1934 and consisted of a dug well, 36" casing, and 18' deep. The second well was a drilled well with a 6" casing, 40' deep, well depth 112', water depth 6', bedrock 35' and constructed in January, 1973. It was also noted that certain activities on the premise, such as auto repair, could potentially impact on the water quality. We believe for the reasons cited above, the VOC detect on Well #1, Priority Number 16-Landfill not be considered in the evaluation of the Health Hazard Risk Assessment document.

It is our recommendation that VOC water sampling of any water supply noted in the project having a detected, unconfirmed, VOC analysis be tested annually.

Water quality information provided from this project should assist in future decision-making concerning the over 50

remaining abandoned landfill areas in the county and other water quality projects in these areas.

Appendix A

ABANDONED LANDFILL EVALUATION LIST

Number	Facility Name	Town/City	Legal Description		
1.	Bergen	Bergen	NE 1/4	NE 1/4	S.26
2.	Berlin	Berlin	NW	SW	S.19
3.	Brighton	Brighton	SE	NE	S.21
4.	Vil. Edgar L.F>	Cassel	(NE	SW)*	S.06
5.	Vil. Stratford	Cleveland	E 1/2	SW	S.21
6.	Day	Day	NE	SW	S.28
7.	Elderon	Elderon	NE	SW	S.20
8.	Frankfort	Frankfort	NW	SW	S.35
9.	Vil. Elderon	Elderon	NE	NW	S.04
10.	Tn. Green Valley	Green Valley	NW	SW	S.02
11.	Vil. Athens	Halsey	SE	SE	S.30
12.	Tn. Halsey	Halsey	NW	NE	S.24
13.	Tn. Hamburg	Hamburg	SW	SW	S.18
14.	Tn. of Harrison	Harrison	SE	SW	S.22
15.	City Colby	Hull	NW	NW	S.18
16.	City Abbotsford	Hull	SW	NE	S.06
17.	Tn. Johnson	Johnson	SW	NE	S.21
18.	Mosinee Paper Co.	Kronenwetter	N 1/2	SW	S.32
19.	Donald Smith	Maine	(SW)*	SW	S.18
20.	3M Corp.	Maine	NE	NW	S.11
21.	Tn. Marathon	Marathon	SW	NE	S.36
22.	Tn. Marathon	Marathon	SE	NE	S.24
23.	Tn. McMillan	McMillan	SW	SE	S.25
24.	Tn. Norrie	Norrie	NE	SE	S.34
25.	Tn. Easton/Plover	Plover	NE	NE	S.19
26.	Tn. Reid	Reid	SW	NW	S.15
27.	Tn. Rib Falls	Rib Falls	NW	NW	S.16
28.	Erving Kolbe	Rib Mt.	(SE)*	NE	S.06
29.	Tn. Rib Mt.	Rib Mt.	SE	NE	S.19
30.	Minnesota Mining	Rib Mt.	S 1/2	SW	S.19
31.	Rietbrock	Rietbrock	NE	NE	S.21
32.	Tn. Ringle	Ringle	SE	SW	S.22
33.	Tn. Spencer	Spencer	NW	NW	S.11
34.	The Lamplighter	Spencer	(NE)*	SE	S.15
35.	Vil. Spencer	Spencer	(NE	SW)*	S.04
36.	Tn. Stettin	Stettin	SW	NE	S.24
37.	Tn. Stettin	Stettin	NW	NE	S.24
38.	Sigmund Narlock LF	Stettin	(SW	SE)*	S.34
39.	Tn. Texas	W. Texas	SE	SW	S.13
40.	Vil. Edgar	Wien	SW	NW	S.13
41.	Tn. Wien	Wien	SE	SW	S.21
42.	Vil. Athens	Vil. Athens	Black Creek		
43.	Wausau Paper Co.	Vil. Brokaw	SE	SE	S.34
44.	Vil. Marathon	Vil Marathon	NE	SE	S.06
45.	Vil. Athens	Halsey	SW	SE	S.31
46.	"Thornapple Rd"	Rib Mt.	NW	NE	S.19
47.	"Redwing Ave"	Rib Mt.	NW	NE	S.14

*Parenthesis indicates that an estimation was made using air photos.

Appendix B

LANDFILL EVALUATION FORM

Landfill No._____

Landfill Name:_____

Legal Description:___1/4___1/4, Section____T__N, R__E

Air Photo No._____DNR File No._____

Plat Book Page_____Priority Ranking_____

Soil Types 1)_____

2)_____

1)	2)
HGW_____ft.	HGW_____ft.
BR_____in.	BR_____in.
Clay O-_____%	Clay O-_____%
_____%	_____%
_____%	_____%
Perm O-_____in/hr	Perm O-_____in/hr
_____in/hr	_____in/hr

Surface Water Flow Direction_____

Groundwater Flow Direction_____

Distance & Direction to Surface Water_____

Homes within 1/4 mile radius of landfill.

1)_____

2)_____

3)_____

4)_____

5)_____

Homes within 1/2 mile down gradient of landfill.

1)_____

2)_____

3)_____

4)_____

5)_____

Well Log Data

Legal Description___1/4___1/4, Sec._____T___N

Name_____ _____O-_____

Normal Water Table_____ _____ -_____

Depth While Pumping_____ _____ -_____

Legal Description___1/4___1/4, Sec._____T___N

Name_____O-_____

Normal Water Table_____ _____ -_____

Depth While Pumping_____ _____ -_____

Legal Description___1/4___1/4, Sec._____T___N

Name_____ _____O-_____

Normal Water Table_____ _____-_____

Depth While Pumping_____ _____ -_____

Legal Description___1/4___1/4, Sec._____T___N

Name_____ _____O-_____

Normal Water Table_____ _____ -_____

Depth While Pumping_____ _____ -_____

Landfill Contents - DNR File____Yes____No

Appendix C

HEALTH HAZARD RISK ASSESSMENT

Part I. Site Characteristics

Parameter	Parameter Rating	Multiplier
A. Depth to Water Table	0 ft. 9	4
(Assumption: Estimate below base of contamination source more than 5% of the year.)	0-2 " 8 3-8 " 7 9-15 " 6 16-25 " 5 26-35 " 4 36-60 " 3 61-90 " 2 91-200 " 1 200+ " 0	

B. Permeability and Sorption Characteristics of Unconsolidated Materials

Type of Bedrock(A)	Clay(1) I	Clay(1) II	Clay with no more than 50% sand II	Clay with no more than 50% sand II	Sand with 15-30% clay I	Sand with 15-30% clay II	Sand with less than 15% clay I	Sand with less than 15% clay II	Clean fine sand I	Clean fine sand II	Clean gravel or coarse sand I	Clean gravel or coarse sand II	
More than 95	0	0	2	2	4	4	6	6	8	8	9	9	
75-94	0	1	1	2	3	4	5	6	7	8	9	9	
60-74	0	2	1	3	4	5	5	6	7	8	9	9	
46-59	0	3	1	4	4	6	5	7	7	8	9	9	10
28-45	0	4	2	5	4	6	5	7	7	9	9	9	
10-27	1	6	2	7	5	7	5	8	7	9	9	9	
Less than 10	1	8	3	8	5	9	5	9	7	9	9	9	
Bedrock at land surface	5	9	5	9	5	9	5	9	5	9	5	9	

(A) Type of bedrock

I. Shale
II. Sandstone, Vol, Ign, Melamorphic, Carbonate

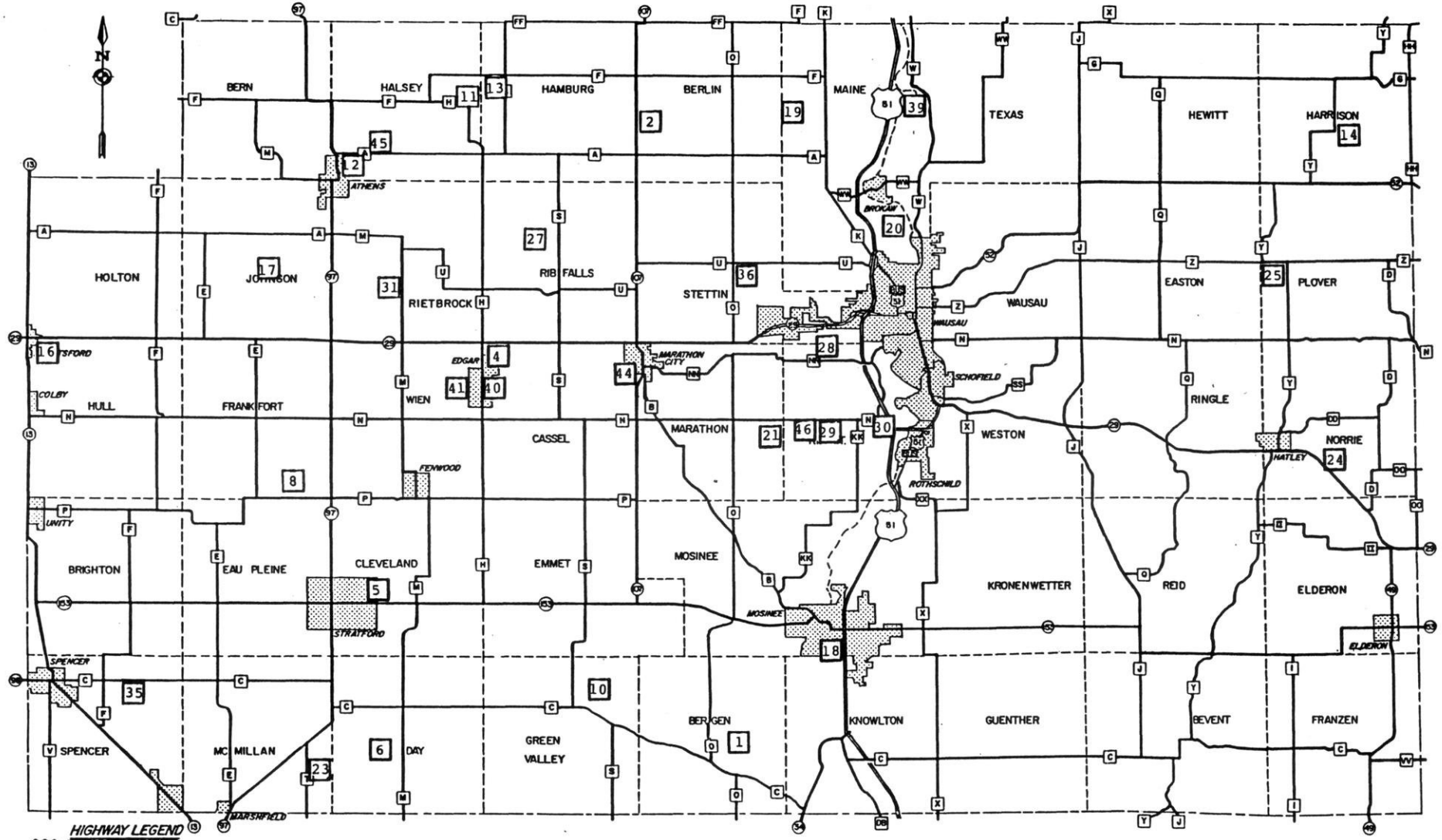
C. Contaminant Characteristics

Toxic Chemicals	10	10
Bacteria Virus	5	
Public Welfare Concern	1	

Parameter	Parameter Rating		Multiplier
D. Potential loading rate of discharge	over 1 gal/sq. ft/day	10	
	.5-1 " " " "	5	2.5
	0-.5 " " " "	1	
E. Potential frequency of pollutant discharge	30-365 days/yr.	10	
	8-30 " "	5	2.5
	0-7 " "	1	
F. Point/Area of Discharge	To geologic formation	10	
	Below soil surface	5	2
	To surface of soil	1	
G.1 Level of prevention control and/or regulation	Low level	10	
	Moderate level	5	2
	High level	1	
OR			
G.2 Engineering Controls			
(a) Underground Storage Tank			
Bare carbon steel (no epoxy)	15 years	5	
	15-20 years	8	
	Over 20 years	10	
With epoxy coating	15 years	3	
	15-20 years	6	2
	Over 20 years	8	
Epoxy coated and anode protection or fiberglass	15 years	0	
	15-20 years	1	
	Over 20 years	6	
(b) Presence of liners	No	5	2
	Yes	0	
(c) Presence of leachate	No	5	
	Yes	0	
H. Population Influenced			
.1 # of households on wells within 25+ 1/4 of a mile radius	25+	10	
	10-24	8	
	5-9	6	1
	2-5	4	
	0-1	2	
.2 # of households on wells within 1/4 and 1/2 of a mile down gradient source (direction of groundwater movement)	25+	10	
	10-24	8	
	5-9	6	1
	2-5	4	
	0-1	2	

scd

APPENDIX D



MARATHON COUNTY

WISCONSIN

DRAWN BY: ROBERT J. ROZEWICZ, MARATHON COUNTY PLANNING DEPARTMENT, 1987

050870- Volatile Organic Compound Contamination of Private Water Supplies Adjacent to Abandoned Landfills in Marathon County