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which is incorrect in reports
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SPECIAL GROUNDWATER PROJECT

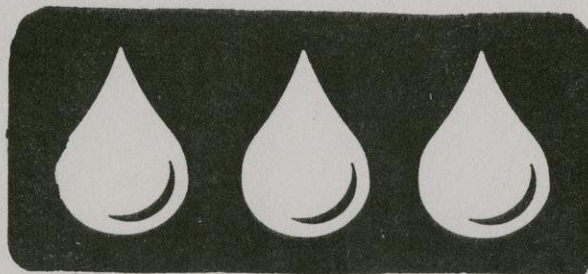
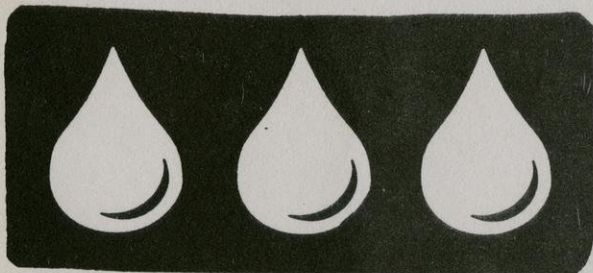
PHASE II = TOWNS OF

ST. LAWRENCE

AND

LITTLE WOLF

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University of Wisconsin - MSN
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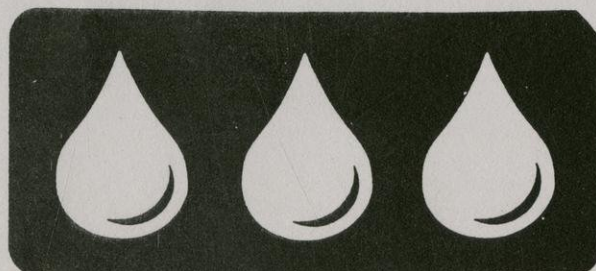


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University of Wisconsin - MSN
1975 Willow Drive
Madison, WI 53706

Waupaca County

University of Wisconsin

September, 1992



WAUPACA COUNTY GROUNDWATER TESTING AND EDUCATIONAL PROGRAM

PHASE II REPORT 6-30-92

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REVISED PHASE II REPORT 9-21-92

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TABLE OF CONTENTS

<u>Section</u>	<u>Page No.</u>
I. Introduction	1
II. Selection Process	4
III. Water Sampling and Testing Procedures	4
IV. Audience and Level of Knowledge	6
V. Existing Knowledge About Groundwater	6
VI. Well Test Results	8
VII. Educational Workshop	10
VIII. Participant Post-Test Knowledge About Groundwater	10
IX. Conclusions	12

LIST OF EXHIBITS

Exhibit 1	State of Wisconsin Map	2
Exhibit 2	Waupaca County Map	3
Exhibit 3	Nitrogen and Phosphorus Containing Pesticide Reports	14 - 16
Exhibit 4	Volatile Organic Compound Reports	17 - 20
Exhibit 5	Participant Distribution and Testing Results	21 - 27
Exhibit 6	Post-Test Survey	28 - 29

LIST OF TABLES

Table I	Phase II Initial Response Summary	5
Table 2	Phase II Farmer/Non-Farmer Participant Response Summary	5
Table 3	Pre- and Post-Program Survey Responses	7
Table 4	Homeowner Well Test Summary	9

WAUPACA COUNTY GROUNDWATER TESTING AND EDUCATIONAL PROGRAM

PHASE 2 - TOWNS OF ST. LAWRENCE AND LITTLE WOLF

I. INTRODUCTION

During the first phase (1990) of the groundwater testing and education program, the Waupaca County UWEX Office concentrated educational efforts in the Towns of Lebanon and Scandinavia. Seventy three wells were tested for bacteria, nitrates, pH, alkalinity, chlorides, hardness, and conductivity. As a result of grant money from the Department of Natural Resources and the Golden Sands Resource Conservation and Development, these same wells were also tested for volatile organic chemicals and pesticides. The results of that program are detailed in the report "Special Groundwater Project - Towns of Lebanon and Scandinavia".

Grant money from the Golden Sands Resource Conservation and Development as well as the Wisconsin Department of Natural Resources was extended for a second year. As a result of this funding, a similar program was organized for residents of the Towns of St. Lawrence and Little Wolf (Exhibits 1 and 2). Together these efforts provided well test information in a 6 mile wide "strip" from west to east across the entire county.

Currently, water quality information in Waupaca County is limited to the annual summary prepared for the past five years by the Central Wisconsin Groundwater Center. This summary includes an average of 200 to 300 private wells per year. Private well samples analyzed at the Task Force Lab at UW-Stevens Point and at the State Lab of Hygiene have shown some test results of bacterial contamination and nitrate levels exceeding acceptable health advisory standards of 10 parts per million (PPM). Although the current data on groundwater quality is limited, recent tests of various community wells have identified contamination from both bacteria and volatile organic compounds (VOC'S). Except for the Grade A Dairy Farm well test program and a few DNR special project sites, very little VOC or pesticide testing has been conducted on private wells in Waupaca County.

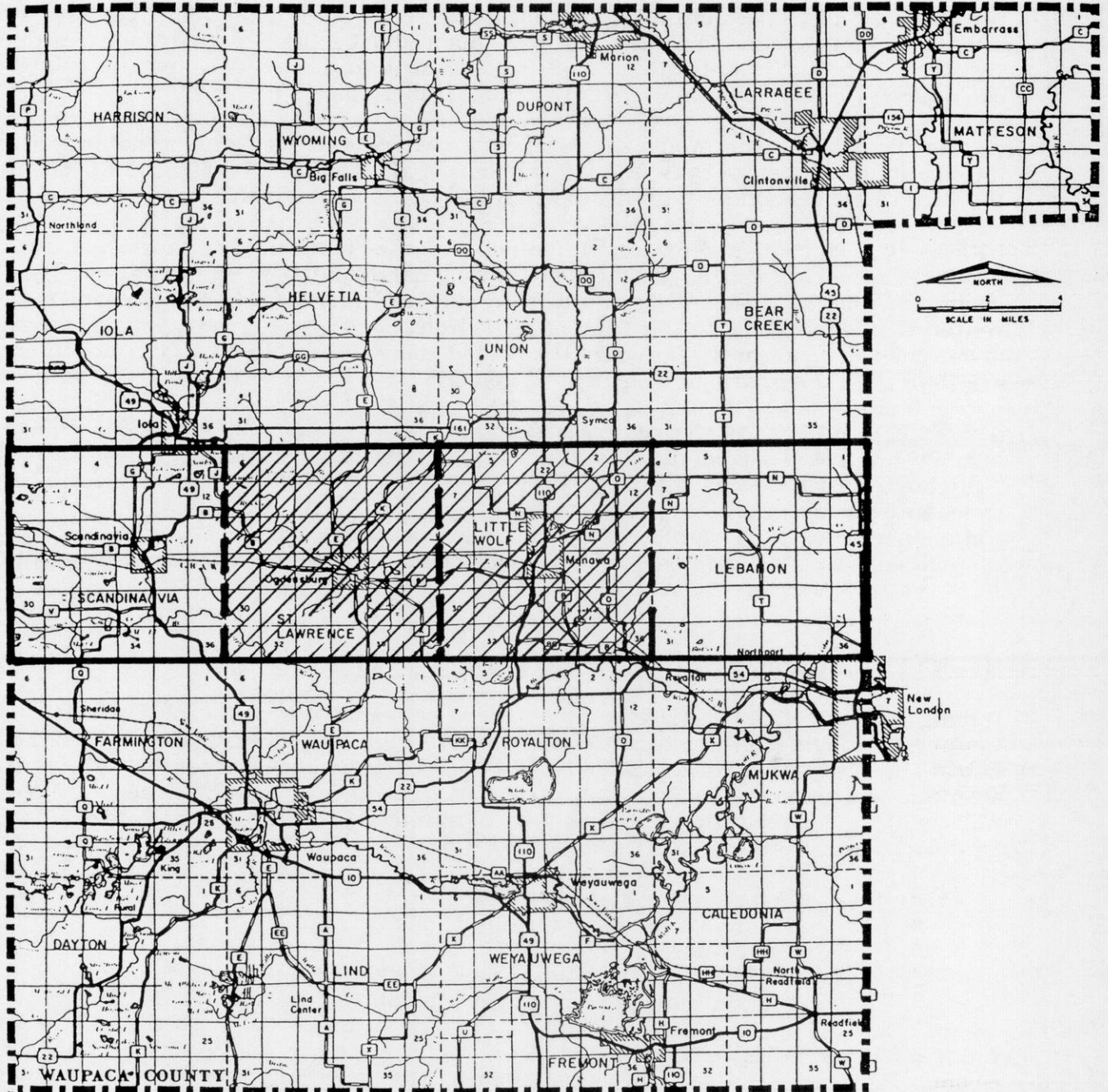
The objectives for the second year's educational program were the same as those in the first year. However, they warrant repeating below:

1. Obtain additional private well water quality data on pesticides, VOC's, and several other inorganic water quality parameters in several Waupaca County towns.
2. Inform, ultimately educate, and evaluate up to 150 private well owners (75 for 1991) about the quality of their water and identify potential ways to reduce the risk of future contamination.
3. Foremost, this project will identify knowledge gained about groundwater protection; have participants analyze their particular farmstead or rural homesite in terms of groundwater protection measures; and identify practices that have been changed to protect groundwater.
4. Provide an incentive for other rural residents to test their water quality and evaluate their management practices.

EXHIBIT 1



EXHIBIT 2



Waupaca County

II. SELECTION PROCESS

During the summer of 1991 all of the residents with building improvements in the Towns of St. Lawrence and Little Wolf were sent a letter explaining the program and asking them if they wished to be a volunteer participant. In St. Lawrence 288 property owners were sent a letter along with two DNR publications "You and Your Well" and "Well Abandonment". Fifty-seven (20%) of the St. Lawrence residents responded to the initial letter. Of those responding, 26 (46%) requested to be considered for participation in the program (Table 1).

In the Town of Little Wolf, 474 property owners received the same letter and publications. Seventy-four (16%) responded to the survey. Fifty-four percent of the Little Wolf respondents indicated they were interested in the project.

Ultimately, 26 property owners (29 wells) in the Town of St. Lawrence and 40 property owners from the Town of Little Wolf participated in the program. In St. Lawrence, 69% of the participants were rural non-farm, 23% were farmers, and 8% rented their farmland. In the Town of Little Wolf, 58% of participants were rural non-farm, 30% were currently farming, 10% rented their farmland and 2% did not indicate whether they were farm or non-farm (Table 2).

Although publicity for the program was identical between 1990 and 1991, the total number of people responding to the initial letter was considerably less in 1991. Telephone conversations with some farmers in Little Wolf and St. Lawrence indicated concern over the direct or indirect implication of a "bad" test result due to recent contamination of local municipal wells in Manawa and Bear Creak. Therefore, all respondents that indicated a desire to participate in the 1991 program were accepted.

III. WATER SAMPLING AND TESTING PROCEDURES

During August of 1991, water samples were collected by members of the Waupaca County Wisconsin Conservation Corp and delivered to the Environmental Task Force Lab at UW-Stevens Point for analysis. The wells selected were inventoried and given a unique well number from the Department of Natural Resources. Eventually these wells will be incorporated into the DNR Groundwater Information Network (GIN) System. Water test analysis included:

- * EPA 507 for currently used pesticides
- * EPA 608 for PCB'S and older pesticides
- * Volatile organic compounds (VOC'S)
- * Current Task Force Lab "Homeowner Package" (nitrates, bacteria, pH, chloride, conductivity, alkalinity, hardness, and saturation index)

Water quality results were recorded in a way that they can potentially be linked to a computerized geographic information system (GIS). Other data recorded included well location, year of well construction, owner of well at construction, well installer, type of well, depth of well, depth of casing, depth to water table, source of information, other wells on the property and presence of fuel storage tanks.

TABLE 1

PHASE II = INITIAL RESPONSE SUMMARY
(in number and percentage of response)

	St. Lawrence	Little Wolf	Total
Letters Sent	288	474	762
Responses	57 (20%)	74 (16%)	131 (17%)
Responses Wishing to Participate	26 (46%)	40 (54%)	66 (50%)
Responses Not Wishing to Participate	31 (54%)	34 (46%)	65 (50%)

TABLE 2

PHASE II - FARMER/NON-FARMER PARTICIPANT RESPONSE SUMMARY
(percentage of responses)

	St. Lawrence	Little Wolf	Total
Farmers	(6) 23%	(12) 32%	(18) 27%
Farmers - Rent Land Out	(2) 8%	(4) 10%	(6) 9%
Rural Non-Farms	(18) 69%	(23) 58%	(41) 62%
No Response	---	(1) 2%	(1) 2%
Total Responses	26	40	66

Compiled by: Thomas J. Wilson
Waupaca County UW-Extension
Resource Development Agent
June, 1992

IV. AUDIENCE AND LEVEL OF KNOWLEDGE

Residents of the Towns of St. Lawrence and Little Wolf who voluntarily chose to participate in the testing and educational program were considered the primary target audience. Other audiences included, the rest of the property owners in the Towns of St. Lawrence and Little Wolf; the general public; and individuals, groups, organizations or departments interested in results of the testing and/or educational project.

Respondents to the initial informational letter were asked multiple choice questions about their current knowledge of groundwater. The questions relate to the following: (Exhibit 6)

- * Where groundwater comes from
- * How groundwater moves
- * When wells should be tested
- * Common health problems related to groundwater
- * Nitrates
- * How groundwater becomes contaminated
- * Unsafe drinking water

V. EXISTING KNOWLEDGE ABOUT GROUNDWATER

Eighty-five percent of the 131 respondents did not know that groundwater comes from local precipitation...half said that local groundwater comes from underground rivers or streams. Sixty-nine percent did not know that groundwater moves through the soil generally from higher to lower areas. Only half the respondents indicated that private well water should be tested once each year.

Sixty percent did not identify bacteria as the most common health problem related to groundwater...incorrect answers were evenly distributed among pesticides, nitrates or those who admitted not knowing. When asked about unsafe levels of nitrates, forty percent of the respondents did not know that nitrate contaminated water usually looks and tastes fine. However, only thirteen percent did not know that a laboratory is needed to detect drinking water is unsafe.

Of all the respondents, eight percent felt they very well informed; sixty-five percent said they were somewhat informed, and twenty-six percent said they were not informed at all about the potential causes and solutions for groundwater contamination on their property.

When comparing general prior knowledge of groundwater between those who declined to participate in the program (Table 3, Group 1), versus those who had their well tested but did not attend the educational workshop (Table 3, Group 2), versus those who had their well tested and also attended the educational workshop (Table 3, Group 3)...there was very little difference in prior knowledge regardless of their level of participation in the program. Furthermore, there appears to be no difference in prior general knowledge about groundwater between the 131 respondents from the towns of St. Lawrence and Little Wolf in 1991 and the 187 preliminary responses from the towns of Lebanon and Scandinavia in 1990.

TABLE 3

PRE- AND POST-PROGRAM SURVEY RESPONSES

 Table 3...Percent of correct responses from pre- and post-program surveys between three different levels of program participation. \a

Survey Questions (see Exhibit 6)	Percent Correct Answers					
	Group 1		Group 2		Group 3	
	Pre	Post	Pre	Post	Pre	Post
	N=65	N=37	N=23	N=14	N=42	N=37
Origin of groundwater.....	14%	8%	13%	14%	19%	40%
Movement of groundwater.....	35%	35%	18%	21%	33%	59%
Frequency of well test.....	57%	46%	35%	58%	50%	86%
Most common health problem.....	38%	33%	31%	36%	48%	57%
Nitrate contamination appearance..	57%	70%	52%	65%	71%	76%
Lab test to detect contamination..	85%	81%	87%	71%	88%	100%
Very well informed.....	8%	11%	4%	21%	10%	35%
Prevention practices implemented..	NA	16%	NA	21%	NA	46%
Prevention practices planned.....	NA	14%	NA	36%	NA	51%
/a Group 1 = Did not participate in well test or workshop.						
/a Group 2 = Well test results and information received by mail.						
/a Group 3 = Well test results and information provided through an educational workshop.						

Compiled by: Greg Blonde
 Waupaca County UW-Extension
 Agriculture Agent
 August, 1992

VI. WELL TEST RESULTS

According to participant well reports, average well depths were between 50 and 100 feet. These reports also indicated that the water table was generally within 50 feet of the surface. Sixty-five percent indicated that their well was drilled, 26% driven, 3% hand dug, and 6% did not respond.

Nine percent of the 69 groundwater quality samples had bacterial problems. This percentage of bacterial contamination is a little below average for all of Waupaca County based on tests done by the Environmental task Force Lab over the past five years and several percentage points lower than the average for the state as a whole. Participants wells with bacteria contamination were encouraged first to retest the water. In addition we provided verbal and written information on how to pursue the potential causes of the bacterial contamination.

Ninety-four percent of the wells had nitrate levels less than the health advisory level - 10 ppm (Table 4). Four wells had nitrate levels between 10 and 20 ppm. No wells tested over 20 ppm nitrate.

Eighty-seven percent of the wells had hardness values between 200 and 400 ppm of CaCo₃; indicating very hard water as a result of limestone in the aquifer. Five wells tested hardness at higher than 400 ppm.

Ninety-three percent of the water samples had a pH in the range of 7.5 to 8.5, very alkaline, again reflective of the amount of limestone in the aquifer.

Natural chloride levels in Wisconsin's groundwater are below 5 mg/l or ppm. Results of the testing indicated that 68% of the wells had chloride levels between 1 and 10 ppm. Only 14% of the wells had chloride levels about 25 ppm.

The homeowner sampling package also measured the conductivity and saturation index for each sample. The explanation of these and other parameters are further explained in the "Guide to Interpreting Water Quality Data for Drinking Water". This reference and a verbal explanation of the parameters and how to potentially resolve a problem were provided to all participants. Those who had their well tested but were not able to attend the workshop, were sent letters encouraging them to contact our office to schedule a time to review their water test and discuss water quality protection alternatives. About 50% of those unable to attend the workshop, contacted our office for consultation. All others were sent the well test results and educational material via the mail.

The 69 wells were also tested for nitrogen and phosphorus containing pesticides and volatile organic compounds (VOC's). Three of the wells tested (4%), indicated detects of pesticides (See Exhibit 3) including Atrazine and De-ethyl Atrazine. Only one of the well water tests indicated levels of pesticides above the Wisconsin Health Advisory level. The water quality of this well has been retested by the Department of Natural Resources and the owners are looking at replacing their well with assistance from the State's Well Compensation Program.

Four of the 69 wells (6%) tested for volatile organic compounds (VOC'S) indicated detects (See Exhibit 4). Present were Benzene, Ethylbenzene, Toluene, M&P-Xylene, O-Xylene, and Tetrachloroethylene. All participants with VOC detects in their wells were provided an explanation of the material and a copy of the volatile organic compound report.

TABLE 4

10/23/91

Little Wolf/St. Lawrence

Summary Report

UWEX Private Well Project - Waupaca Co

WATER SAMPLES: 69- 69

SOFTENERS: 45 65%

BACTERIA 6 9%

WELL CONSTRUCTION METHOD

No Response	4	6%
Driven	18	26%
Dug	2	3%
Drilled	45	65%

DEPTH:	AQUIF	WELL	WATER	CASE	YEARS SINCE LAST WATER TEST	
Unknown	39%	17%	36%	30%	Unknown	69 100%
[1 - 25)	19%	7%	22%	7%	Never	0 0%
[25 - 50)	17%	16%	22%	12%	[... 1)	0 0%
[50 -100)	17%	30%	14%	33%	[1 - 2)	0 0%
[100-150)	3%	16%	4%	12%	[2 - 5)	0 0%
[150-200)	1%	7%	1%	4%	[5 - 10)	0 0%
[200 ...	3%	6%	0%	1%	[10 ...	0 0%

OBSERVED PROBLEMS

No Response	11	16%
None	46	67%
Color	4	6%
Taste	3	4%
Odor	4	6%
Health	0	0%
Corrosion	3	4%

CONDUCTIVITY (umhos/cm)

A [... 50)	0	0%
B [50 - 100)	0	0%
C [100 - 200)	1	1%
D [200 - 500)	23	33%
E [500 - 800)	42	61%
F [800 - 1000)	1	1%
G [1000 ...	2	3%

NITRATE-NITRITE (ppm N)

A NONE DETECTED	22	32%
B [0.2 - 2.0)	16	23%
C [2 - 5)	18	26%
D [5 - 10)	9	13%
E [10 - 20)	4	6%
F [20 ...	0	0%

SI (Saturation index)

A [... -3)	0	0%
B [-3 - -2)	0	0%
C [-2 - -1)	0	0%
D [-1 - 0)	2	3%
E [0 - 1)	56	81%
F [1 ...	11	16%

TOTAL HARDNESS (ppm CaCO3)

A NONE DETECTED	0	0%
B [2 - 25)	0	0%
C [25 - 50)	1	1%
D [50 - 150)	2	3%
E [150 - 200)	1	1%
F [200 - 300)	25	36%
G [300 - 400)	35	51%
H [400 - 500)	3	4%
I [500 ...	2	3%

ALKALINITY (ppm CaCO3)

A NONE DETECTED	0	0%
B [2 - 25)	0	0%
C [25 - 50)	0	0%
D [50 - 150)	1	1%
E [150 - 200)	5	7%
F [200 - 300)	30	43%
G [300 - 400)	30	43%
H [400 - 500)	1	1%
I [500 ...	2	3%

pH

A [... 5.0)	0	0%
B [5.0 - 5.5)	0	0%
C [5.5 - 6.0)	0	0%
D [6.0 - 6.5)	0	0%
E [6.5 - 7.0)	0	0%
F [7.0 - 7.5)	4	6%
G [7.5 - 8.0)	45	65%
H [8.0 - 8.5)	19	28%
I [8.5 ...	1	1%

CHLORIDE (ppm)

A NONE DETECTED	0	0%
B [1 - 10)	47	68%
C [10 - 25)	12	17%
D [25 - 50)	7	10%
E [50 - 100)	3	4%
F [100 - 200)	0	0%
G [200 ...	0	0%

VII. EDUCATIONAL WORKSHOP

A single day-long workshop was held for participants from both the Town of St. Lawrence and Little Wolf. The morning session concentrated on teaching the basics of groundwater, the local geology of Waupaca County, and the aggregate summary of groundwater quality test results. During this time frame, participants received their individual water quality test results. Approximately sixty five people attended the morning session.

The afternoon session centered on reviewing the Farmstead Assessment System (Farm-A-Syst). This self-assessment system allowed participants an opportunity to prioritize the risk of their residential and/or farmstead structures, facilities and practices predisposed to groundwater contamination.

Waupaca County employees were seated at tables throughout the meeting room to answer questions about the various worksheets. These employees included the Land Conservationist, Solid Waste Manager, Emergency Government Director, Agricultural Agent, Resource Development Agent and UWEX Water Quality Specialist. Participants were free to move about the room as they worked independently to complete their own worksheets.

Since half of the participants left immediately after lunch, it appears that condensing the educational program into a one-day workshop was no more effective at increasing the number of participants who completed the Farmstead Assessment Worksheets when compared to the "split" program approach in 1990. (The 1990 educational program delivery method included separate weekday evening meetings in each town to explain well test results. A separated Saturday meeting from 9 a.m. to 3 p.m. was then held at a central location between the towns with an exclusive focus on Farmstead Assessment Worksheets...approximately half attended the full-day Farm-A-Syst program).

Evidently, participants who chose not to participate in the Farm-a-Syst portion of the educational program are satisfied with their well test results and do not recognize a worthwhile benefit spending additional time determining potential sources of groundwater contamination.

VIII. PARTICIPANT POST-TEST KNOWLEDGE ABOUT GROUNDWATER

In March of 1992, five months after the educational workshop, a follow-up survey was mailed to those residents of St. Lawrence and Little Wolf who had returned the preliminary project survey in the summer of 1991. Thirty-seven (57%) of those who completed the original preliminary survey, but declined to participate in any aspect of the program, returned the post-program survey. Fourteen (61%) of the those who had their well tested, but did not attend the special educational workshop in November returned the follow-up survey. Thirty-seven (87%) of those who had their well tested and attended the educational workshop returned the post-program survey (Table 3).

As expected, comparison within the group of respondents who did not participate in either the well testing or the educational workshop (Group 1) showed virtually no change in the percent correct responses to the multiple choice questionnaire using the identical pre- and post-program survey (Table 3).

Comparing responses to the same pre- and post-program survey within the group of respondents who had their well tested and did not attend the educational workshop, but received their well test results and educational material through the mail (Group 2) showed only a slight change in the percent of correct answers (Table 3) five months after the program.

However, a substantial increase in knowledge was measured within the group of respondents who had their well tested and received their results and informational material by attending the educational workshop (Group 3) in November (Table 3). The percent change in frequency of correct responses within Group 3 includes:

- * 21% more of the respondents correctly indicated that groundwater in Waupaca County comes from local precipitation. Unfortunately, over half of this group still answered incorrectly on the post-program survey.
- * 26% more of the respondents correctly identified that groundwater moves through the soil generally from higher to lower areas. However, 40% still answered this post-program question incorrect.
- * 36% more of the respondents correctly indicated that private well water should be tested each year. Only 14% of the respondents answered incorrectly on the post-program survey.
- * Only 9% more of the respondents correctly identified the most common health problems related to groundwater contamination are caused by bacteria. Nearly half the respondents still missed this question.
- * Only 5% more of the respondents correctly indicated that water with unsafe nitrate levels usually looks and tastes fine. But, almost three-quarters of the respondents answered correctly on both the pre- and post-program survey.
- * 12% more of the respondents correctly identified that only a lab test can detect if drinking water is unsafe. In fact, all post-program survey respondents answered this question correctly.
- * 25% more of the respondents indicated they were very well informed about the potential cause and solution to groundwater contamination on their property. This represented an increase from 10% prior to the program to 35% five months after the program.

Furthermore, the post-program survey also indicated the more involved participants were more likely to implement groundwater prevention practices. When asked what prevention practices had been implemented since the summer of 1991 16% of Group 1; 21% of Group 2, and 46% of Group 3 indicated that action had been taken. The four most frequent changes made across all three groups included:

- * improved design and/or management of the well
- * reduced use and/or improved handling of pesticides and fertilizers
- * septic system design and/or management
- * petroleum product storage

Group 3 also had a much higher percentage of their respondents who had not yet implemented groundwater prevention practices, but were planning to make changes: 14% of Group 1 planned changes; 36% of Group 2 had plans for change, and 51% of Group 3 indicated that changes were planned for future implementation. The four most frequently identified plans for change across all three groups included:

- * new or improved well design
- * remove and/or improve petroleum product storage
- * improved manure handling system
- * fertilizer handling and application

IX. CONCLUSIONS

- * In general, Waupaca County private well owners have good water quality. The percentage of wells in the County's special testing programs in 1990 and 1991 with bacteria contamination and elevated nitrates are about the same as the five year summary analysis of the Environmental Task force Lab at UW-Stevens Point. These percentages are somewhat less than the State's average for bacteria contamination and elevated nitrates.
- * A small percentage of wells tested (generally less than 5%) revealed the presence of VOC's and pesticides, most which were far below the state's Preventive Action Limit (PAL).
- * It is unlikely that people will get their drinking water tested for pesticides or VOC's without financial support. (Grant dollars were used to pay for the pesticide/VOC tests.)
- * Less than one out of five residents who were invited to participate in the program returned the initial survey and less than ten percent actually had their well tested. Farmers were even more apprehensive than their rural non-farm neighbors even though special effort was made to involve an equal number of farmers in the program.
- * Additional testing is needed to further evaluate and compare Waupaca County private wells with the rest of the state. Our results from 1990 and 1991 include a total of 142 wells for VOC's, pesticides, nitrates, bacteria and minerals across a 6 mile wide stretch through central Waupaca County.
- * Respondents have a poor general knowledge of groundwater regardless of their interest (or lack of) to participate in a special groundwater testing and educational program. Well testing alone does not necessarily increase a persons general knowledge about groundwater, but it may slightly increase the likelihood of planning and implementing prevention practices. The greatest increase in both general groundwater knowledge and prevention practices incorporates both a broad-spectrum well testing program as well as an interactive educational workshop.

- * Additional assistance is needed to help those farmers and rural non-farm residents address their water quality problem whether it be nitrate, bacteria, pesticides or VOC's. Local assistance seems to be most widely accepted, but many people seem to be unaware of the local resources available to them.
- * An organized program is advantageous to encourage rural residents to investigate their water quality. Two hundred to four hundred wells from Waupaca county were tested each year at the Task Force Lab in Stevens Point during 1990 and 1991, and approximately 25% of those tested in each of the past two years were results of this special UWEX groundwater education program.
- * More than half of the Farm-A-Syst worksheets are relevant to the rural non-farm resident. Many rural non-farm participants appeared interested in the farm analysis as well which provides the non-farm residents with an improved understanding of groundwater protection procedures for their farm neighbors.

EXHIBIT 3

ENVIRONMENTAL TASK FORCE LABORATORY NITROGEN AND PHOSPHOROUS CONTAINING PESTICIDE REPORT

EPA METHOD 507

SAMPLE SOURCE: WAUPACA COUNTY

SAMPLE NAME: EZ-200

SAMPLE # 387-91- 14

DATE SAMPLE EXTRACTED: 8/16/91

DATE OF REPORT: 9/18/91

TRADE NAME	OTHER NAMES	CONCENTRATION (ug/L)
VERNAM	VERNOLATE	ND
*PROPACHLOR	-----	ND
*BALAN	BENFLURALIN	ND
SIMAZINE	-----	ND
PROPAZINE	-----	ND
*TOLBAN	PROFLURALIN	ND
DUAL	METOLACHLOR	ND
*PROWL	PENDIMETHALIN	ND
*OXADIAZON	-----	ND
EPTAM	EPTC	ND
SUTAN	BUTYLATE	ND
TILLAM	PEBULATE	ND
ORDRAM	MOLINATE	ND
RO-NEET	CYCLOATE	ND
*TREFLAN	TRIFLURALIN	ND
ATRAZINE	-----	10.2
DE-ETHYL ATRAZINE		3.6
TERBACIL	-----	ND
SENCOR	METRIBUZIN	ND
BROMACIL	-----	ND
*PAARLAN	ISOPROPALIN	ND
*GOAL	OXYFLUORFEN	ND
VELPAR	HEXAZINONE	ND
DIAZINON	-----	ND
LISSO	ALACHLOR	ND
*BLADEX	CYANAZINE	ND

Wisconsin
Health Advisory
(ppb)

3.0 proposed
3.0 proposed

* indicates compound not covered by EPA Method 507

ug/L = parts per billion (ppb)

ND = Not detected

ppb = parts per billion. A part per billion is equivalent to one drop of pesticide in a billion drops of water. For comparison, this is equivalent in concentration to 8 drops of water in an Olympic size swimming pool. Such small amounts may seem insignificant, but may still have important health implications.

COMMENTS: De-ethyl atrazine is a decomposition product of atrazine. The level of atrazine residues in this sample exceeds the U.S.EPA maximum contaminant level of 3.0 ug/L.

EXHIBIT 3

ENVIRONMENTAL TASK FORCE LABORATORY NITROGEN AND PHOSPHOROUS CONTAINING PESTICIDE REPORT

EPA METHOD 507

SAMPLE SOURCE: WAUPACA COUNTYSAMPLE NAME: EZ-179SAMPLE # 387-91-8DATE SAMPLE EXTRACTED: 8/23/91DATE OF REPORT: 9/18/91

<u>TRADE NAME</u>	<u>OTHER NAMES</u>	<u>CONCENTRATION</u> <u>(ug/L)</u>
VERNAM	VERNOLATE	ND
*PROPACHLOR	-----	ND
*BALAN	BENFLURALIN	ND
SIMAZINE	-----	ND
PROPAZINE	-----	ND
*TOLBAN	PROFLURALIN	ND
DUAL	METOLACHLOR	ND
*PROWL	PENDIMETHALIN	ND
*OXADIAZON	-----	ND
EPTAM	EPTC	ND
SUTAN	BUTYLATE	ND
TILLAM	PEBULATE	ND
ORDRAM	MOLINATE	ND
RO-NEET	CYCLOATE	ND
*TREFLAN	TRIFLURALIN	ND
ATRAZINE	-----	0.4
TERBACIL	-----	ND
SENCOR	METRIBUZIN	ND
BROMACIL	-----	ND
*PAARLAN	ISOPROPALIN	ND
*GOAL	OXYFLUORFEN	ND
VELPAR	HEXAZINONE	ND
DIAZINON	-----	ND
LISSO	ALACHLOR	ND
*BLADDEX	CYANAZINE	ND

* indicates compound not covered by EPA Method 507

ug/L = parts per billion (ppb)

ND = Not detected

ppb = parts per billion. A part per billion is equivalent to one drop of pesticide in a billion drops of water. For comparison, this is equivalent in concentration to 8 drops of water in an Olympic size swimming pool. Such small amounts may seem insignificant, but may still have important health implications.

COMMENTS: DE-ETHYL ATRAZINE, a breakdown product of ATRAZINE was detected at a level below .1 ug/L.

EXHIBIT 3

ENVIRONMENTAL TASK FORCE LABORATORY NITROGEN AND PHOSPHOROUS CONTAINING PESTICIDE REPORT

EPA METHOD 507

SAMPLE SOURCE: WAUPACA COUNTY

SAMPLE NAME: EZ-187

SAMPLE # 366-91-10

DATE SAMPLE EXTRACTED: 8/15/91

DATE OF REPORT: 9/18/91

<u>TRADE NAME</u>	<u>OTHER NAMES</u>	<u>CONCENTRATION</u> <u>(ug/L)</u>
VERNAM	VERNOLATE	ND
*PROPACHLOR	-----	ND
*BALAN	BENFLURALIN	ND
SIMAZINE	-----	ND
PROPAZINE	-----	ND
*TOLBAN	PROFLURALIN	ND
DUAL	METOLACHLOR	ND
*PROWL	PENDIMETHALIN	ND
*OXADIAZON	-----	ND
EPTAM	EPTC	ND
SUTAN	BUTYLATE	ND
TILLAM	PEBULATE	ND
ORDRAM	MOLINATE	ND
RO-NEET	CYCLOATE	ND
*TREFLAN	TRIFLURALIN	ND
ATRAZINE	-----	ND
DE-ETHYL ATRAZINE		0.4
TERBACIL	-----	ND
SENCOR	METRIBUZIN	ND
BROMACIL	-----	ND
*PAARLAN	ISOPROPALIN	ND
*GOAL	OXYFLUORFEN	ND
VELPAR	HEXAZINONE	ND
DIAZINON	-----	ND
LASSO	ALACHLOR	ND
*BLADEX	CYANAZINE	ND

* indicates compound not covered by EPA Method 507

ug/L = parts per billion (ppb)

ND = Not detected

ppb = parts per billion. A part per billion is equivalent to one drop of pesticide in a billion drops of water. For comparison, this is equivalent in concentration to 8 drops of water in an Olympic size swimming pool. Such small amounts may seem insignificant, but may still have important health implications.

COMMENTS: DE-ETHYL ATRAZINE is a breakdown product of ATRAZINE.

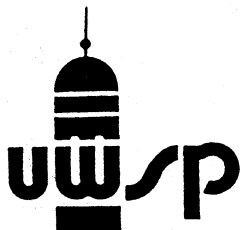


EXHIBIT 4

university of wisconsin/stevens point • stevens point, wisconsin 54481

ENVIRONMENTAL TASK FORCE LABORATORY VOLATILE ORGANIC COMPOUND REPORT

EPA METHOD 8021

SAMPLE SOURCE: Waupaca County

SAMPLE NAME: EZ-220

SAMPLE #387-91-14

DATE SAMPLE RECEIVED: 08-13-91

DATE SAMPLE ANALYZED: 08-16-91

Detection limits (ug/L) are
indicated in brackets [].

Concentration
(ug/L)

Benzene	[0.4]	1.5
Bromodichloromethane	[0.5]	ND
Bromoform	[0.6]	ND
Carbon Tetrachloride	[0.5]	ND
Chlorobenzene	[0.4]	ND
2-Chloroethylvinyl Ether	[0.6]	ND
Chloroform	[0.5]	ND
Dibromochloromethane	[0.7]	ND
1,1-Dichloroethane	[0.5]	ND
1,2-Dichloroethane	[0.5]	ND
1,1-Dichloroethylene	[0.7]	ND
trans-1,2-Dichloroethylene	[0.3]	ND
Dichloromethane	[2.0]	ND
1,2-Dichloropropane	[0.6]	ND
cis-1,3-Dichloropropene	[0.6]	ND
trans-1,3-Dichloropropene	[1.8]	ND
Ethylbenzene	[0.4]	ND
1,1,2,2-Tetrachloroethane	[0.6]	ND
Tetrachloroethylene	[0.8]	ND
Toluene	[0.4]	ND
1,1,1-Trichloroethane	[0.5]	ND
1,1,2-Trichloroethane	[1.2]	ND
Trichloroethylene	[0.4]	ND
M&P-Xylene	[0.4]	ND
O-Xylene	[0.4]	ND
1,2-Dichlorobenzene	[0.4]	ND
1,3-Dichlorobenzene	[0.4]	ND
1,4-Dichlorobenzene	[0.4]	ND
Vinyl Chloride	[2.4]	ND

ND = Not Detected

NOTE: 2 unidentified compounds were detected in this sample

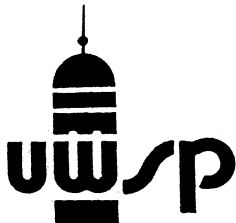


EXHIBIT 4

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ENVIRONMENTAL TASK FORCE LABORATORY
VOLATILE ORGANIC COMPOUND REPORT

EPA METHOD 8021
SAMPLE SOURCE: Waupaca Co.
SAMPLE NAME: EZ-166

SAMPLE #352-91-8
DATE SAMPLE RECEIVED: 07-30-91
DATE SAMPLE ANALYZED: 08-06-91

Detection limits (ug/L) are
indicated in brackets [].

Concentration
(ug/L)

Benzene	[0.4]	ND
Bromodichloromethane	[0.5]	ND
Bromoform	[0.6]	ND
Carbon Tetrachloride	[0.5]	ND
Chlorobenzene	[0.4]	ND
2-Chloroethylvinyl Ether	[0.6]	ND
Chloroform	[0.5]	ND
Dibromochloromethane	[0.7]	ND
1,1-Dichloroethane	[0.5]	ND
1,2-Dichloroethane	[0.5]	ND
1,1-Dichloroethylene	[0.7]	ND
trans-1,2-Dichloroethylene	[0.3]	ND
Dichloromethane	[2.0]	ND
1,2-Dichloropropane	[0.6]	ND
cis-1,3-Dichloropropene	[0.6]	ND
trans-1,3-Dichloropropene	[1.8]	ND
Ethylbenzene	[0.4]	ND
1,1,2,2-Tetrachloroethane	[0.6]	ND
Tetrachloroethylene	[0.8]	0.8
Toluene	[0.4]	ND
1,1,1-Trichloroethane	[0.5]	ND
1,1,2-Trichloroethane	[1.2]	ND
Trichloroethylene	[0.4]	ND
M&P-Xylene	[0.4]	ND
O-Xylene	[0.4]	ND
1,2-Dichlorobenzene	[0.4]	ND
1,3-Dichlorobenzene	[0.4]	ND
1,4-Dichlorobenzene	[0.4]	ND
Vinyl Chloride	[2.4]	ND

ND = Not Detected

NOTE: The presence of Tetrachloroethylene may be due to lab contamination.

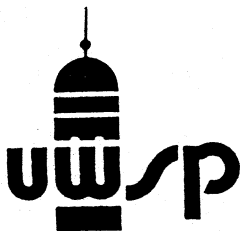


EXHIBIT 4

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ENVIRONMENTAL TASK FORCE LABORATORY
VOLATILE ORGANIC COMPOUND REPORT

EPA METHOD 8021

SAMPLE SOURCE: Waupaca County

SAMPLE NAME: EZ-211

SAMPLE #387-91-7

DATE SAMPLE RECEIVED: 08-13-91

DATE SAMPLE ANALYZED: 08-16-91

Detection limits (ug/L) are
indicated in brackets [].Concentration
(ug/L)

Benzene	[0.4]	ND
Bromodichloromethane	[0.5]	ND
Bromoform	[0.6]	ND
Carbon Tetrachloride	[0.5]	ND
Chlorobenzene	[0.4]	ND
2-Chloroethylvinyl Ether	[0.6]	ND
Chloroform	[0.5]	ND
Dibromochloromethane	[0.7]	ND
1,1-Dichloroethane	[0.5]	ND
1,2-Dichloroethane	[0.5]	ND
1,1-Dichloroethylene	[0.7]	ND
trans-1,2-Dichloroethylene	[0.3]	ND
Dichloromethane	[2.0]	ND
1,2-Dichloropropane	[0.6]	ND
cis-1,3-Dichloropropene	[0.6]	ND
trans-1,3-Dichloropropene	[1.8]	ND
Ethylbenzene	[0.4]	ND
1,1,2,2-Tetrachloroethane	[0.6]	ND
Tetrachloroethylene	[0.8]	ND
Toluene	[0.4]	0.8
1,1,1-Trichloroethane	[0.5]	ND
1,1,2-Trichloroethane	[1.2]	ND
Trichloroethylene	[0.4]	ND
M&P-Xylene	[0.4]	**
O-Xylene	[0.4]	ND
1,2-Dichlorobenzene	[0.4]	ND
1,3-Dichlorobenzene	[0.4]	ND
1,4-Dichlorobenzene	[0.4]	ND
Vinyl Chloride	[2.4]	ND

ND = Not Detected

NOTE: ** DETECTED AT A LEVEL LESS THAN .4 ug/L.

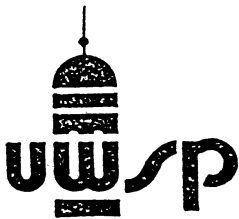


EXHIBIT 4

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ENVIRONMENTAL TASK FORCE LABORATORY
VOLATILE ORGANIC COMPOUND REPORT

EPA METHOD 8021

SAMPLE SOURCE: Waupaca County

SAMPLE NAME: EZ-216

SAMPLE #387-91-3

DATE SAMPLE RECEIVED: 08-13-91

DATE SAMPLE ANALYZED: 08-16-91

Detection limits (ug/L) are
indicated in brackets [].Concentration
(ug/L)Wisconsin
Enforcement Standard
(ppb)

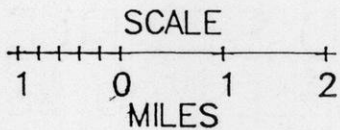
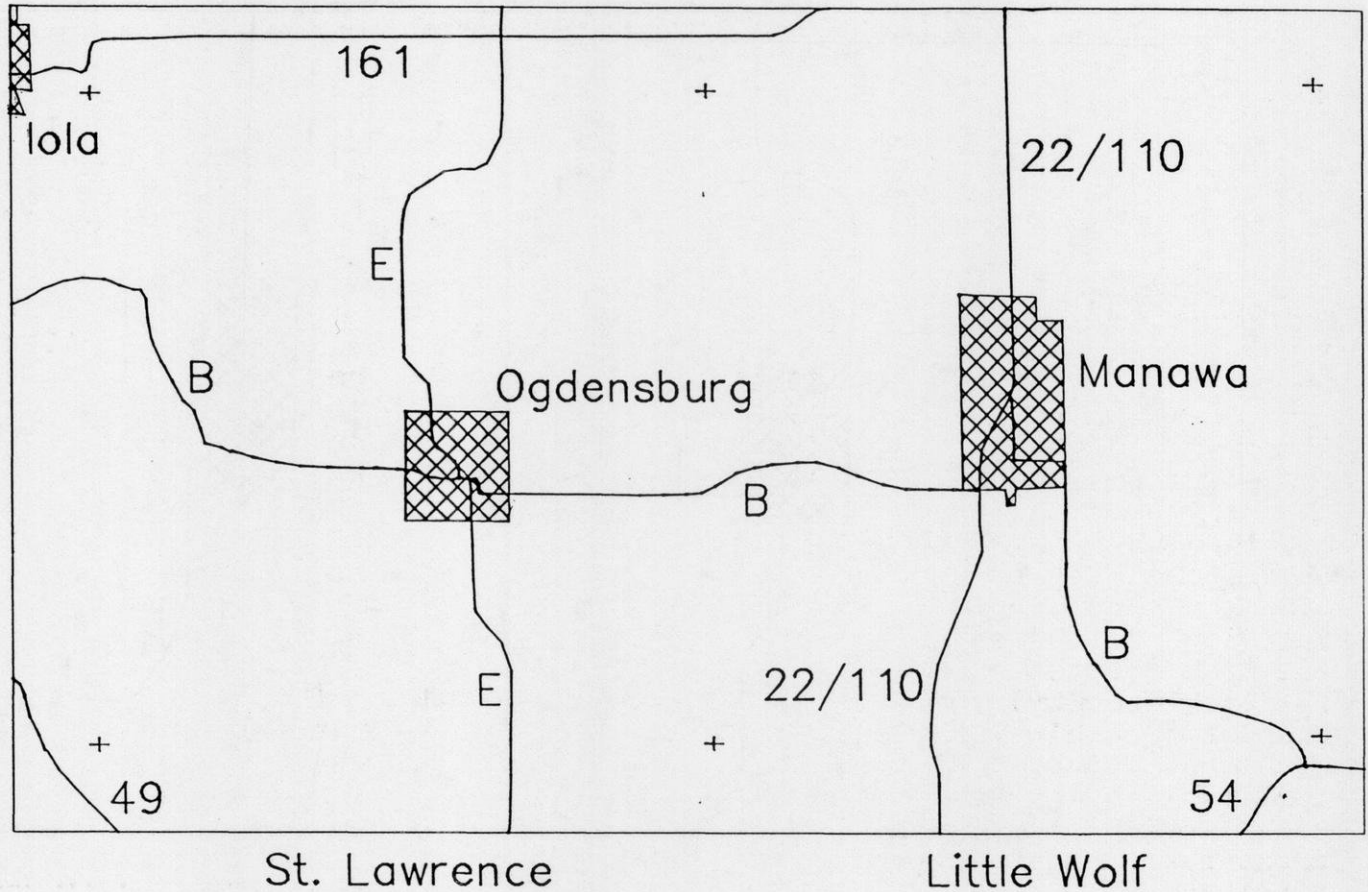
Benzene	[0.4]	ND	
Bromodichloromethane	[0.5]	ND	
Bromoform	[0.6]	ND	
Carbon Tetrachloride	[0.5]	ND	
Chlorobenzene	[0.4]	ND	
2-Chloroethylvinyl Ether	[0.6]	ND	
Chloroform	[0.5]	ND	
Dibromochloromethane	[0.7]	ND	
1,1-Dichloroethane	[0.5]	ND	
1,2-Dichloroethane	[0.5]	ND	
1,1-Dichloroethylene	[0.7]	ND	
trans-1,2-Dichloroethylene	[0.3]	ND	
Dichloromethane	[2.0]	ND	
1,2-Dichloropropane	[0.6]	ND	
cis-1,3-Dichloropropene	[0.6]	ND	
trans-1,3-Dichloropropene	[1.8]	ND	
Ethylbenzene	[0.4]	0.4	1.360 (ppb)
1,1,2,2-Tetrachloroethane	[0.6]	ND	
Tetrachloroethylene	[1.5]	ND	
Toluene	[0.4]	1.4	343 (ppb)
1,1,1-Trichloroethane	[0.5]	ND	
1,1,2-Trichloroethane	[1.2]	ND	
Trichloroethylene	[0.4]	ND	
M&P-Xylene	[0.4]	0.5	620 (ppb)
O-Xylene	[0.4]	0.5	620 (ppb)
1,2-Dichlorobenzene	[0.4]	ND	
1,3-Dichlorobenzene	[0.4]	ND	
1,4-Dichlorobenzene	[0.4]	ND	
Vinyl Chloride	[2.4]	ND	

ND = Not Detected

NOTE:

EXHIBIT 5

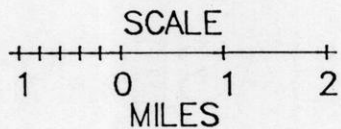
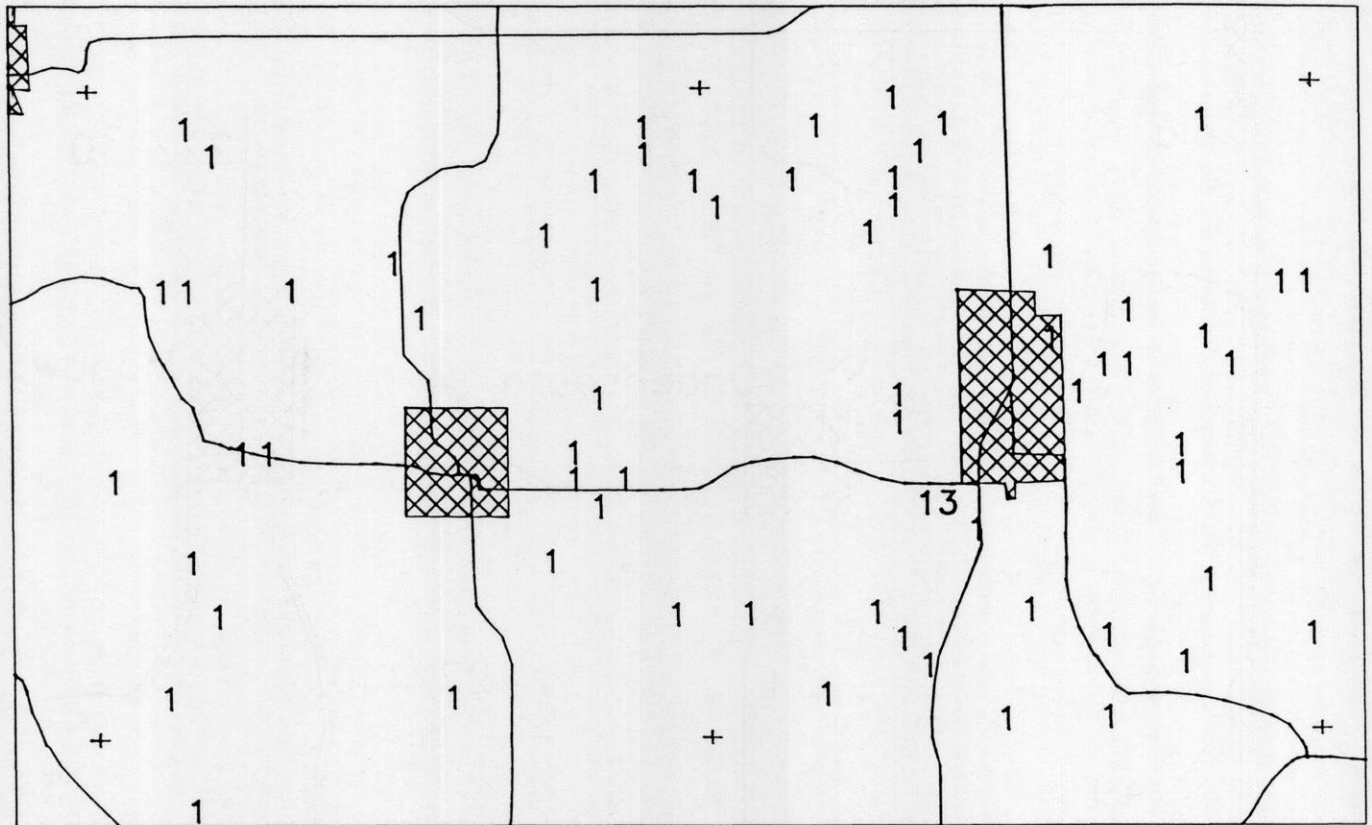
ST. LAWRENCE — LITTLE WOLF TOWNSHIPS
WAUPACA COUNTY 1991



BASE MAP

EXHIBIT 5

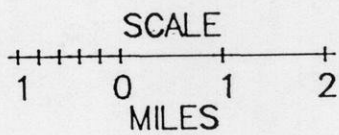
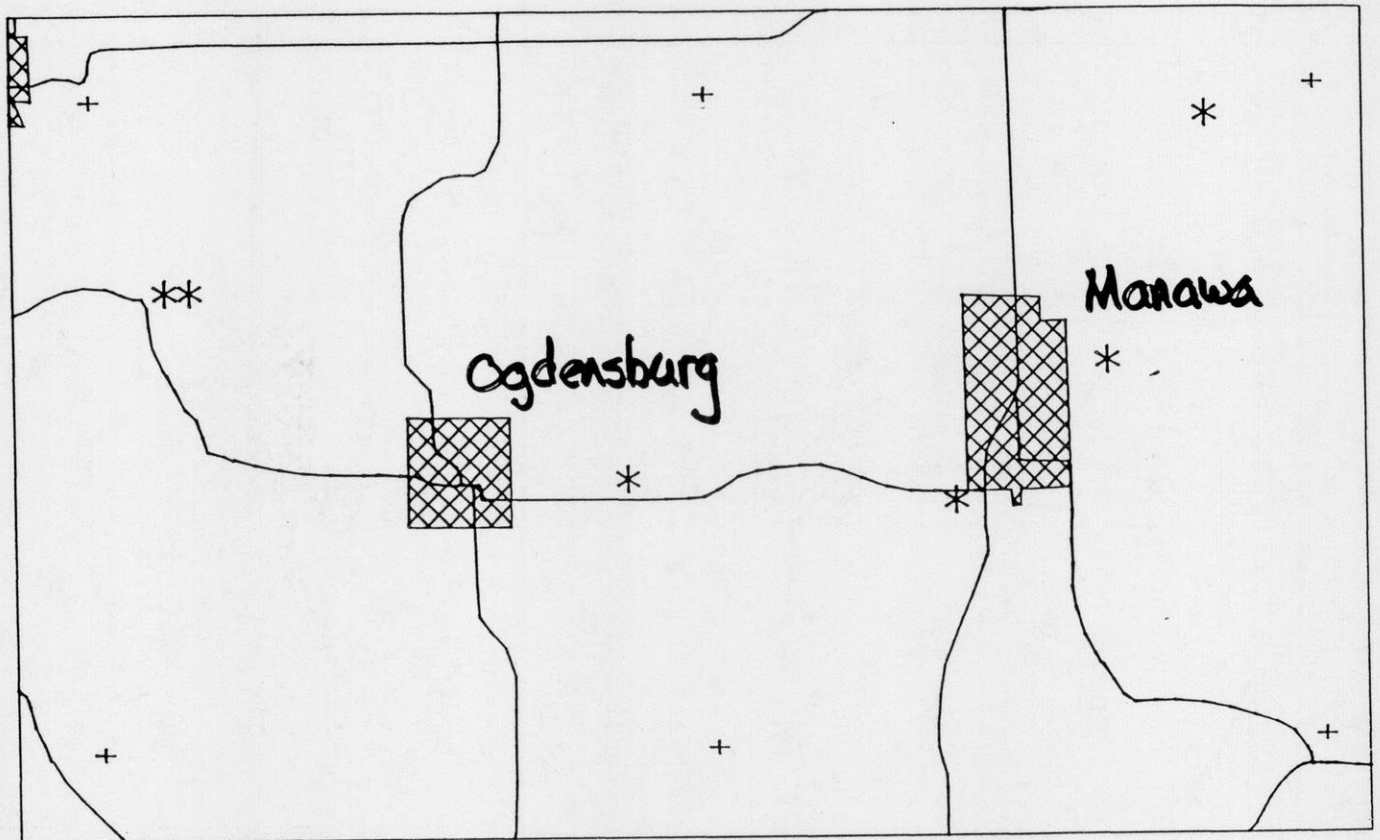
ST. LAWRENCE — LITTLE WOLF TOWNSHIPS
WAUPACA COUNTY 1991



SAMPLE DISTRIBUTION
NUMBER SAMPLES/QQ SECTION

EXHIBIT 5

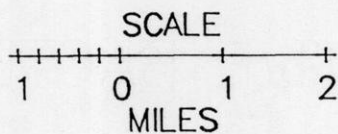
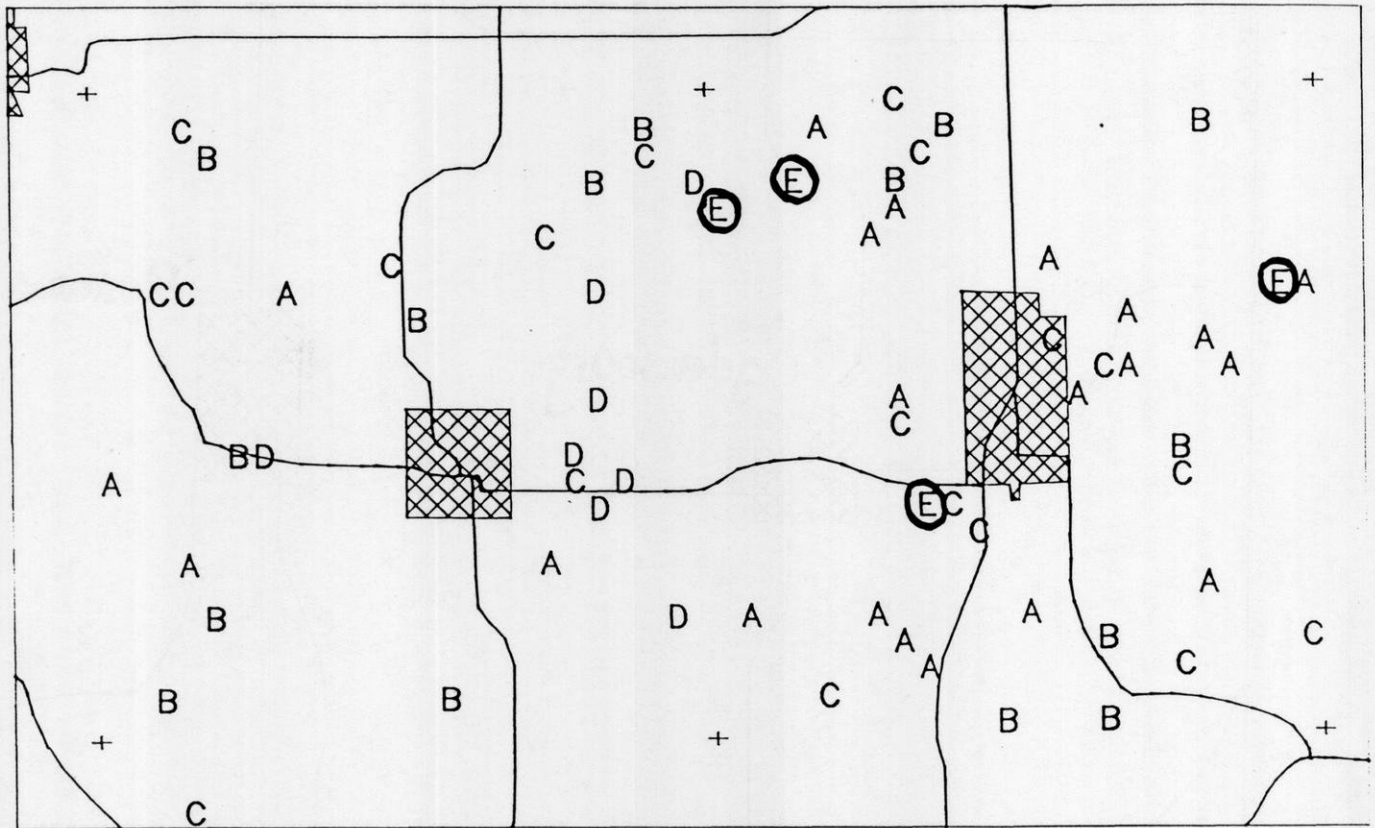
ST. LAWRENCE — LITTLE WOLF TOWNSHIPS
WAUPACA COUNTY 1991



* POSITIVE BACTERIA

EXHIBIT 5

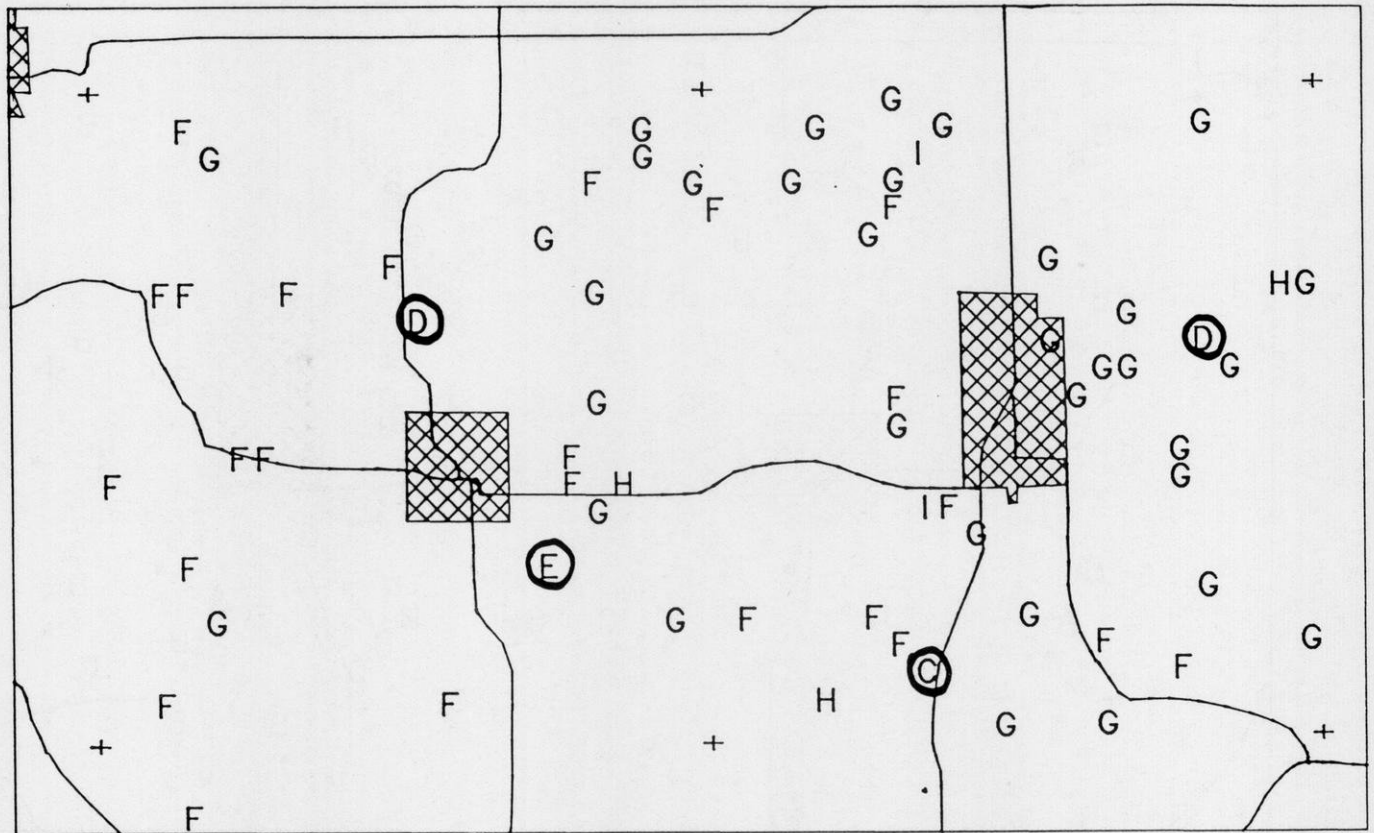
ST. LAWRENCE — LITTLE WOLF TOWNSHIPS
WAUPACA COUNTY 1991



NITRATE—NITRITE (ppm N)			
A	NONE DETECTED	22	32%
B	[0.2 — 2.0)	16	23%
C	[2 — 5)	18	26%
D	[5 — 10)	9	13%
E	[10 — 20)	4	6%
F	[20 ...	0	0%

EXHIBIT 5

ST. LAWRENCE — LITTLE WOLF TOWNSHIPS
WAUPACA COUNTY 1991



TOTAL HARDNESS (ppm CaCO_3)

C [25 — 50)	1	1%
D [50 — 150)	2	3%
E [150 — 200)	1	1%
F [200 — 300)	25	36%
G [300 — 400)	35	51%
H [400 — 500)	3	4%
I [500 ...	2	3%

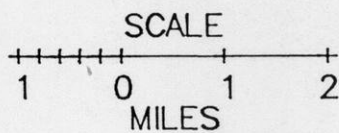
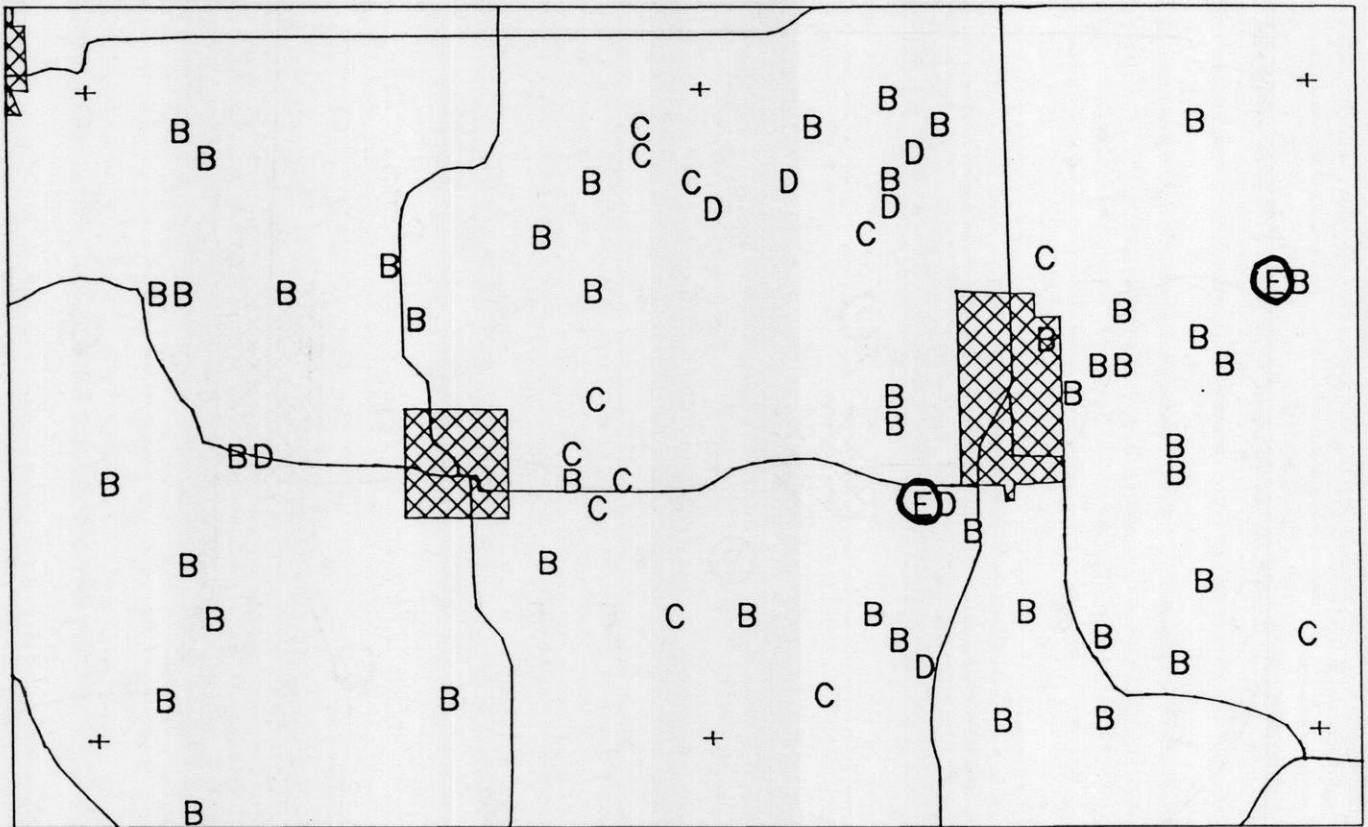


EXHIBIT 5

ST. LAWRENCE — LITTLE WOLF TOWNSHIPS
WAUPACA COUNTY 1991



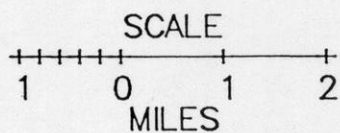
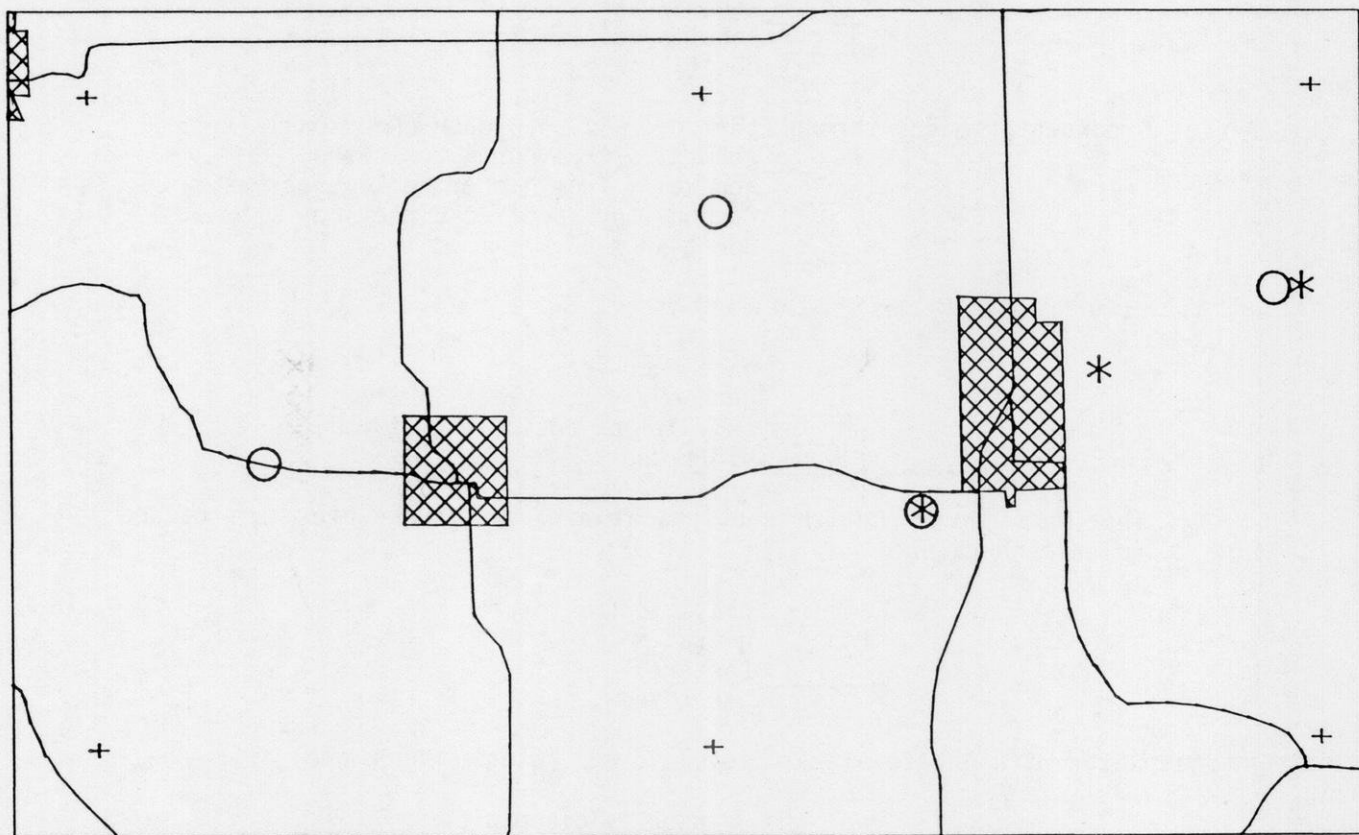
CHLORIDE (ppm)

A	NONE DETECTED	0	0 %
B	[1 — 10)	47	68 %
C	[10 — 25)	12	17 %
D	[25 — 50)	7	10 %
E	[50 — 100)	3	4 %
F	[100 — 200)	0	0 %
G	[200 ...	0	0 %

SCALE
1 0 1 2
MILES

EXHIBIT 5

ST. LAWRENCE — LITTLE WOLF TOWNSHIPS
WAUPACA COUNTY 1991



* VOC DETECTS
O PESTICIDE DETECTS

EXHIBIT 6

WAUPACA COUNTY FOLLOW-UP GROUNDWATER TESTING
AND EDUCATIONAL PROGRAM QUESTIONNAIRE

Please take the time to complete this questionnaire. Your responses will be helpful in developing educational programs related to groundwater in our county.

- 1) Groundwater in Waupaca County comes from . . . (please check one)
 - ☐ underground rivers or streams
 - ☐ Canada/Lake Superior
 - ☐ local precipitation
 - ☐ don't know
- 2) Groundwater moves through the soil . . . (please check one)
 - ☐ generally from north to south
 - ☐ generally from higher to lower areas
 - ☐ without any specific direction
 - ☐ don't know
- 3) Private well water should be tested . . .
 - ☐ once each year
 - ☐ once every ten years
 - ☐ only if you notice a problem
 - ☐ don't know
- 4) The most common health problems related to groundwater are caused by . . . (please check one)
 - ☐ pesticides
 - ☐ nitrates
 - ☐ bacteria
 - ☐ don't know
- 5) Water with unsafe nitrate levels . . . (please check one)
 - ☐ is usually discolored
 - ☐ usually looks and tastes fine
 - ☐ has a salty taste
 - ☐ don't know
- 6) List two major ways groundwater becomes contaminated . . . (please list two)

- 7) If drinking water is unsafe . . . (please check one)
 - ☐ people drinking it will become ill within hours
 - ☐ it will taste or smell bad
 - ☐ only a laboratory may be able to detect it
 - ☐ don't know
- 8) How knowledgeable do you feel about the cause and solution to potential groundwater contamination on your property . . . (please check one)
 - ☐ very well informed
 - ☐ somewhat informed
 - ☐ not informed at all

EXHIBIT 6

- 9) Since last summer, have you implemented practices that you feel will reduce the potential of groundwater contamination of your private well? (please check one)

☐ yes
☐ no

If your response is yes, please list below those things that you feel will lessen the potential of groundwater contamination. (Please list as many as you wish)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

10. If you have not implemented any groundwater protection practices for your private well, do you plan to do so in the future? (Please check one)

☐ yes
☐ no

Again, if your response is yes, please list below those things that you plan to do to reduce the potential of groundwater contamination of your private well. (please list as many as you wish)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

- 11) Would you like additional information or assistance in evaluating your well site and establishing a priority list of measures to reduce the potential of groundwater contamination? (please check one)

☐ yes
☐ no

If yes, please list your name, address and phone number to allow someone from our office to contact you to arrange a visit to your well site.

Name: _____

Address: _____

Phone Number: _____

Thank you for your interest and help! Please place this questionnaire in the enclosed stamped, self-addressed envelope and return by Friday, March 20, 1992.

Tom Wilson

Thomas J. Wilson
Waupaca County UW-Extension
Resource Development Agent

Greg P. Blonde

Greg P. Blonde
Waupaca County UW-Extension
Agricultural Agent

89072244148



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051100 Special Groundwater Project
c.1 Phase II -- Towns of St.
Lawrence and Little Wolf

DEMCO

89072244148



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