



Ground Water Indicator Pilot Study In The State Of Minnesota



**GROUND-WATER INDICATOR PILOT STUDY
IN THE STATE OF MINNESOTA**

**Office of Water
U.S. Environmental Protection Agency**

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EXECUTIVE SUMMARY

The U.S. Environmental Protection Agency (EPA), Office of Ground Water and Drinking Water (OGWDW) is investigating the use of indicators to track progress and trends in ground-water protection efforts. This report presents the results of a pilot study in the State of Minnesota to identify the availability and usefulness of existing ground-water data to support the use of these indicators. EPA chose Minnesota for this pilot study for three reasons: 1) the State has collected ground-water data over time, 2) the State has established waste site and drinking water programs, and 3) approximately 75 percent of the State's population relies wholly, or in part on ground water for their drinking water supply.

Five ground-water quality indicators were investigated in this pilot study:

- **Maximum Contaminant Level (MCL) exceedances** in ground-water based public drinking water supplies;
- **On-site and Off-site contamination at hazardous waste sites;**
- **Nitrate** concentration in ground water;
- **Volatile organic compound (VOC) concentrations** in ground water; and
- **Pesticide use.**

EPA conducted this pilot study to determine whether the criteria for reporting ground-water indicators, as developed by a 1986 EPA workgroup, could be met with data collected for the State of Minnesota. These criteria include the following:¹

- indicators should be based on actual data measurement;
- indicators should lend themselves to graphic display to convey trends and other information readily;
- whenever possible, existing data should be used rather than requiring new data collection;
- data should be collected over time at the same locations; and
- data can have limitations and still be useful as an 'indicator' of ground-water problems or progress.

In general, this study found that data characterizing four of the five indicators are available and that these data do lend themselves to graphic display, as depicted in this report. EPA determined that sufficient data were not available to characterize the pesticide indicator adequately. EPA used only existing data for this analysis, although EPA noted the need for additional data collection to better characterize several of the indicators. EPA also found that much of the ground-water monitoring data compiled for this study did not fully support trend analyses because samples were not always taken from the same locations over time. Nonetheless, EPA concluded that if the limitations are understood, data are available in Minnesota to at least partially characterize four of the five ground-water indicators.

¹ U.S. EPA Office of Ground-Water Protection, April 1989. "Indicators for Measuring Progress in Ground-Water Protection." EPA 44016-88-006.

Indicator Data Sources in Minnesota

One or more sources of data were identified to characterize each indicator. After reviewing these sources, EPA identified one or more principle data sources for each indicator as follows:

- MCL and drinking water data were compiled from the U.S. EPA Federal Reporting Data System (FRDS).
- Waste site data was gathered primarily from paper records maintained by the Minnesota Pollution Control Agency, and EPA Region V.
- Nitrate data were retrieved from the U.S. Geological Survey National Water Information System (NWIS) and the Minnesota Ambient Ground-Water Monitoring Network.
- VOC data were also retrieved from the NWIS and the Minnesota Ambient Ground-Water Monitoring Network.
- No pesticide data were collected for this study.

Analysis of the Data

The data drawn from the above sources are summarized in this report in graphical format. The raw data are also presented in tables in appendices to this report. Analysis of these data was complicated by differences in data format and organization among the data bases. In addition, some of the agencies participating in this study which maintain identified data bases did not have sufficient resources to support the study fully. Therefore, the Pilot Study focused on the use of readily available data, although additional relevant data sources are noted in this report.

Achievement of the National Objectives for the Indicators

In an April 1989 report, U.S. EPA identified specific national objectives for each of the five indicators examined in this Pilot Study. EPA's ability to achieve the objectives for each of the indicators varied:

Maximum Contaminant Levels: Data from the FRDS-II data base are sufficient to support the national objectives for this indicator. Although EPA limited this analysis to county-level summaries of MCL violation information, the analysis could be focused at different geographic levels and could include analyses of the populations potentially at risk from the violations. However, the population data maintained in FRDS may not entirely reflect the actual size of the population exposed to a particular MCL violation.

On-Site and Off-Site Contamination at Hazardous Waste Sites: Sufficient data are available in Minnesota CERCLA files to characterize the level of contamination, the status of off-site contaminant migration, and the populations at risk for specific sites or facilities. These data are also available for RCRA facilities, but they were not provided by the State for this analysis. Minnesota has not recorded CERCLA or RCRA data in automated data management systems. Therefore, the data presented in this study were collected by the State and EPA from paper files and organized manually to format for presentation. Information in this report was compiled from 104 of the 166 sites on the Minnesota Permanent List of Priorities. Therefore, the on-site and off-site hazardous waste site data presented in this report represent only a portion of the extent of contamination at waste sites in Minnesota.

Volatile Organic Compounds: EPA accessed data maintained in the USGS National Water Information System and the Minnesota Ambient Ground-Water Monitoring Network to characterize this indicator. EPA was able to organize the available data at the county level and display trends in VOC levels graphically. However, EPA determined that the lack of consistent repeat analyses at many of the sampled wells limited

the usefulness of the data to support a state analysis. A more thorough and consistent VOC sampling and analysis program should be developed to better support analyses of trends in VOC levels State-wide.

Nitrates: EPA accessed data maintained in the USGS National Water Information System and the Minnesota Ambient Ground-Water Monitoring Network to characterize this indicator. EPA was able to organize these data at the county level and display trends in nitrate levels graphically. However, EPA determined that the lack of consistent repeat analyses at many of the sampled wells limited the usefulness of the data to support the national objectives fully. A more thorough and consistent nitrate sampling and analysis program should be developed. However, the current effort by the State to generate maps displaying mean nitrate levels should meet the objective to "identify the pattern and level of ground-water quality with respect to the area-wide sources throughout the country," at the State level. In addition, continuation of the Ambient Ground-Water Monitoring Network Program should allow, with time, trend analysis at the county and State level.

Pesticide Use: Sufficient data are not available in Minnesota to characterize this indicator. Therefore, EPA could not collect data to assess the extent of pesticide use State-wide. It is recommended that the State collect and automate data to characterize pesticide use.

Additional Indicators: Minnesota personnel identified tritium analyses as an additional indicator of ground-water vulnerability. Minnesota has completed a tritium study in one portion of the State and has developed a proposal for completing tritium analyses in 400 public water supply wells.

The following discussion presents a summary of the general lessons learned during the course of this pilot study. The discussion first addresses the technical issues and data management practices encountered in this pilot study. The discussion then outlines suggested revisions to these existing practices that can be adopted by the State to better support future ground-water indicator reporting. Finally, the resources needed to further support indicator reporting and next steps are briefly discussed.

Existing Practices

In completing this pilot study, EPA encountered a number of problems relating to the quality and availability of the compiled data which limit their application to support the indicator objectives. The problems concerning the quality of the data related both to the representativeness or geographic coverage of the data and to the procedures used to collect the analytical results. In particular, EPA identified the following technical issues:

- data are limited in geographic coverage;
- sampling is not consistent in geographic coverage;
- sampling is not consistent over time;
- securing and analyzing samples was not uniform;
- limited repeat sampling is conducted at the same location; and
- there is an insufficient volume of data particularly regarding pesticide use.

In addition to these technical issues, EPA also identified problems with regard to the way in which the collected data were managed. These data management issues limited EPA's ability to access and use the information provided by the State:

- data sources were fragmented;
- several data files were received with insufficient documentation (e.g., file format information and identifiers for specific contaminants were not provided);

- data bases were originally organized to support different objectives from those the indicators were designed to address; and
- several data files did not include Federal Information Processing Standard identifier codes as geographic locators.

Suggested Revisions to Existing Practices to Support Indicator Reporting

EPA is strongly promoting the wider use of indicator data collection across all Federal and State programs. An EPA Task Force, with State participation, developed concrete principles and objectives to ensure effective and consistent decision-making in all Agency decisions affecting ground water, and will also institute State Comprehensive Ground-Water Protection Programs². Monitoring and data collection is one area that will be addressed.

As Minnesota continues its monitoring and data collection efforts and begins to develop its comprehensive program, it is important to keep the issues noted in the pilot study in mind. For example, sampling and analytical consistency may be promoted by establishing consistent scientific and data collection protocols and by expanding their ground-water monitoring network, as appropriate, to provide trend data. Data management activities that employ standard data collection formats for each of the indicators are already underway in Minnesota to maintain standard data management protocols between agencies. Cooperative efforts between EPA and Minnesota will ensure that information collection activities support the objective of protecting the nation's ground-water resources.

To begin moving toward data consistency, EPA along with the States and other Federal agency work group participants developed a set of the most critical data elements for ground-water quality information. These data elements form the foundation upon which ground-water data users may build their own data base, adding elements to meet their specific needs. The use of this minimum set of data elements (MSDE)³ will ensure that EPA and the States can share and manipulate ground-water data to support better environmental decision-making, and facilitate cross-program integration.

Once adopted, these revisions could support the collection, management, and reporting of indicator data needed for future 305(b) reports.

Resources For Implementing

Initially, the resources required at the State level to implement national indicator reporting may be extensive. Minnesota cannot significantly improve its data collection and reporting without expending the necessary resources to correct deficiencies. As the State expands its Ambient Ground-water monitoring network and integrates their information systems, data will become more accessible for use in indicator development. Furthermore, after the information is collected and the data elements and data reporting formats for including ground-water indicators in 305(b) reports are identified and applied, the effort expended for completing the 305(b) report will be greatly reduced.

² U.S. EPA, Office of the Administrator, "Protecting the Nation's Ground Water: EPA's Strategy for the 1990s," EPA 21Z-1020, (Washington, D.C.) July 1991.

³ U.S. EPA, Office of Ground Water and Drinking Water, "Definitions for the Minimum Set of Data Elements for Ground-Water Quality," (Washington, D.C.) July 1991 (draft final).

Next Steps

This pilot study is one of three studies EPA completed investigating the use of ground-water indicators in 305(b) reports. A Findings Report has been prepared which outlines and summarizes the information and knowledge gathered in Idaho, Minnesota, and New Jersey. The Findings Report also makes recommendations regarding the implementation of indicators in future 305(b) reports. Based on these recommendations, EPA is developing a Technical Assistance Document (TAD)⁴ to provide technical guidance to the States on how to gather and use indicator data as part of their 1992 305(b) Reports. The TAD is also intended to help set the stage for those States that are moving toward developing comprehensive ground-water monitoring and information systems, particularly in relationship to ground-water indicator reporting, and to assist those which are already in the process. The TAD is expected to be completed by early 1992.

⁴ U.S. EPA, Office of Ground Water and Drinking Water, "Technical Assistance Document," (Washington, D.C.) September 1991 (draft).

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I. INTRODUCTION

A. OVERVIEW AND PURPOSE OF THE REPORT

The Environmental Protection Agency (EPA), Office of Ground Water and Drinking Water (OGWDW) is responsible for ground-water policy coordination and planning for the Agency. OGWDW is also responsible for working with the States to develop and implement State ground-water policies and guidelines, enhance ground-water data management, and initiate and conduct special studies of ground-water contamination.¹

As part of this overall ground-water effort, U.S. EPA has been investigating the use of indicators to track progress and trends in ground-water protection efforts. In April 1989, EPA published the report, Indicators for Measuring Progress in Ground-Water Protection, which presented the results of a three phase process used to develop a set of ground-water indicators. The process stressed a number of principles that should be considered when choosing and verifying potential indicators, including:

- indicators should be based on actual data measurement;
- indicators should lend themselves to graphic display to convey trends and other information readily;
- whenever possible, existing data should be used rather than requiring new data collection;
- ideally data should be collected over time at the same locations; and
- data can have limitations and still be useful as an "indicator" of ground-water problems or progress.

The indicators, which are described below, can be used by States as part of their biennial National Water Quality Inventory Report to Congress under the Clean Water Act, Section 305(b).

EPA selected three states (New Jersey, Minnesota and Idaho) as part of a pilot study to investigate the usefulness of these indicators to track progress in ground-water protection efforts. This report presents the results of the investigation in the State of Minnesota to identify the availability and usefulness of existing ground-water data. EPA selected Minnesota for this pilot study for three reasons:

- the State has collected ground-water data over time,
- the State has established waste site and drinking water programs, and
- approximately 75 percent of the State's population relies wholly, or in part on ground water for their drinking water supply.

EPA collected the data presented in this report with the assistance of the State of Minnesota; City of Rochester, Minnesota; and U.S. Geological Survey personnel. While EPA discusses a number of data bases in this report, only selected data are presented due to problems in data acquisition and resource limitations. Additional supplementary publications regarding indicators are listed in Appendix G.

¹ U.S. EPA Office of Ground-Water Protection, April 1989, "Indicators for Measuring Progress in Ground-Water Protection," EPA 44016-88-006.

Rationale for Ground-Water Indicators

EPA developed a set of indicators that EPA and the States can use to track progress and set priorities in ground-water protection efforts.² The initial set of ground-water indicators includes:

- **Maximum Contaminant Levels (MCLs)** - This indicator measures quality of ground-water used for public drinking water supplies, the effectiveness of ground-water protection efforts, and the population at risk from contaminated supplies.
- **On-Site and Off-Site Contamination from Hazardous Waste Sites** - This indicator tracks contamination in and around hazardous waste sites as a measure of the effectiveness of ground-water protection programs, potential risk to drinking water supplies, and the population served by those supplies.
- **Volatile Organic Compounds (VOCs)** - This indicator measures ground-water contamination from industrial and non-industrial activity.
- **Nitrates** - This indicator measures area-wide ground-water contamination from sources such as agricultural activity and septic systems.
- **Extent of Agricultural Pesticide Use** - This indicator measures pesticide usage in agricultural areas.

These indicators encompass existing data and data that can be collected by the State over time. The indicators also lend themselves to graphic display to convey trends in ground-water quality and vulnerability.

Reporting Indicators Under the 305(b) Process

An important application for the indicator data will be in developing State Water Quality Reports for inclusion in the biennial National Water Quality Inventory Report to Congress under Section 305(b) of the Clean Water Act. Section 305(b) mandates that States develop and report information concerning the quality of the nation's water resources to EPA and the U.S. Congress. The 305(b) process is an essential aspect of the national water pollution control effort. It is the principal means by which EPA, Congress, and the public evaluate water quality, the progress made in maintaining and restoring water quality, and the extent to which water quality problems remain. Many States rely on the 305(b) process to gather the information needed to conduct program planning and to report to their legislatures on progress in ground-water pollution control and resource protection programs.

The Minnesota 1990 State Water Quality Report (305(b) Report) is the eleventh in a series of State Reports prepared by the Minnesota Pollution Control Agency (MPCA) since 1974. The Report presents an assessment of current water quality conditions in the State's major rivers and lakes; describes which waters are attaining State designated water uses and national clean water goals; identifies pollution problems in surface waters; and identifies the suspected and known sources of water pollution.³ The 305(b) report describes the quality of both surface and ground-water supplies within the state, although the primary emphasis is on surface water quality. The report presents a discussion of ground-water quality and quantity conditions in the State and the current management

² U.S. EPA, February 1989, "Guidelines for the Preparation of the 1990 State Water Quality Assessment (305(b) Report)," page 23.

³ Minnesota Pollution Control Agency, 1990, Minnesota 1990 State Water Quality Report.

efforts for the resource. Minnesota Pollution Control Agency presents the following conclusions on Minnesota's ground-water quality.

Reliance on Ground Water and Overall Ground-Water Quality

- Approximately 75 percent of the state's population relies wholly, or in part, on ground water for their drinking supply.
- Public water supplies draw 55 percent of their supplies from ground water and account for 40 percent of the total volume of ground water withdrawn Statewide.
- The natural quality of Minnesota's ground water is generally quite good, with contaminant concentrations usually falling far below primary drinking water standards.
- While Minnesota's ground water appears to be only beginning to show the impact of human activities, significant problems have been found in some local areas.

Sources of Contamination

- The five sources of contamination of greatest concern include septic tanks, municipal landfills, underground storage tanks, abandoned hazardous waste sites, and agricultural activities.
- The MPCA has identified the most serious localized or point sources of anthropogenic pollution as State Superfund sites and has added them to Minnesota's Permanent List of Priorities (PLP). The PLP included a total of 165 sites as of December 1989.
- Between 1985 and the end of 1989, MPCA recorded more than 36,000 underground storage tanks from more than 13,000 sites around Minnesota. MPCA staff estimate that more than 40,000 tanks will be registered when the inventory is complete. Of these thousands of tanks, many are known or are suspected to be leaking and causing environmental damage.

Volatile Organic Compounds (VOCs)

- Since 1978, MPCA has detected VOCs in 11 percent of the 375 samples collected from the State's 450 monitoring points. Trihalomethanes were the most commonly detected group of VOCs in this sampling, followed by 1,1,2-trichloroethylene.
- The Minnesota Department of Health (MDH) detected VOCs in nearly 8 percent of Minnesota community water systems, with nearly 2 percent at levels exceeding acceptable drinking water standards.
- Minnesota Department of Health indicated in a December 1988 study of 300 non-community water supply systems at risk of contamination that VOCs were present in approximately 25 percent of these wells. Only 2 percent exceeded acceptable drinking water standards. More representative sampling of non-community water systems finds VOCs at a level more similar to community water systems.

Nitrates

- Minnesota Pollution Control Agency found that the most common constituents exceeding State standards for waters used as drinking water supplies were, in order of decreasing frequency, iron, manganese, sulfate, nitrate, and chloride. MPCA attributed the elevated levels of iron, manganese, sulfate, and chloride to the natural composition of the aquifer material. Studies found elevated nitrate concentrations most frequently in surficial aquifers in areas of intense agricultural development and/or animal feedlot proliferation.

Pesticides

- Minnesota Department of Health conducted a sampling program to detect pesticides in wells located in sensitive areas, and found one or more pesticides in 39 percent of the 725 wells sampled. Although the percentage of detections was relatively high, the concentrations found were low, with 83 percent of all detections below 1.0 µg/l.

B. DESCRIPTION OF GENERAL RESEARCH APPROACH FOR THE STUDY

EPA compiled this study to demonstrate the manner in which ground-water indicator data are and can be collected and reported in the State of Minnesota. The activities included on-site interviews, follow up contacts, preparation of a project plan, collection and analysis of data, and final report preparation. EPA conducted on-site interviews with Minnesota personnel on December 18 and 19, 1989 to discuss the project, review supporting documentation, identify available information, discuss data formats, determine data management requirements, identify responsible parties and key contacts, and request assistance in preparing the specified information. Personnel responsible for each of the major data bases were present at the meetings. EPA scheduled follow-up contacts to discuss specific comments and to review data availability and usefulness. EPA developed a written Project Plan to document the results of the interviews and follow-up contacts and to identify specific characteristics for each of the data bases to be used to collect indicator data.⁴

Following distribution of the Project Plan, personnel responsible for each of the key data bases were contacted by EPA to review any specific questions, respond to data requests, and set time frames to collect the data. State and Federal Agency personnel provided indicator data on tape, computer disk, and in hard copy. This report presents the results of the analysis of those data and discusses the methodologies used and the concerns identified during the data compilation efforts.

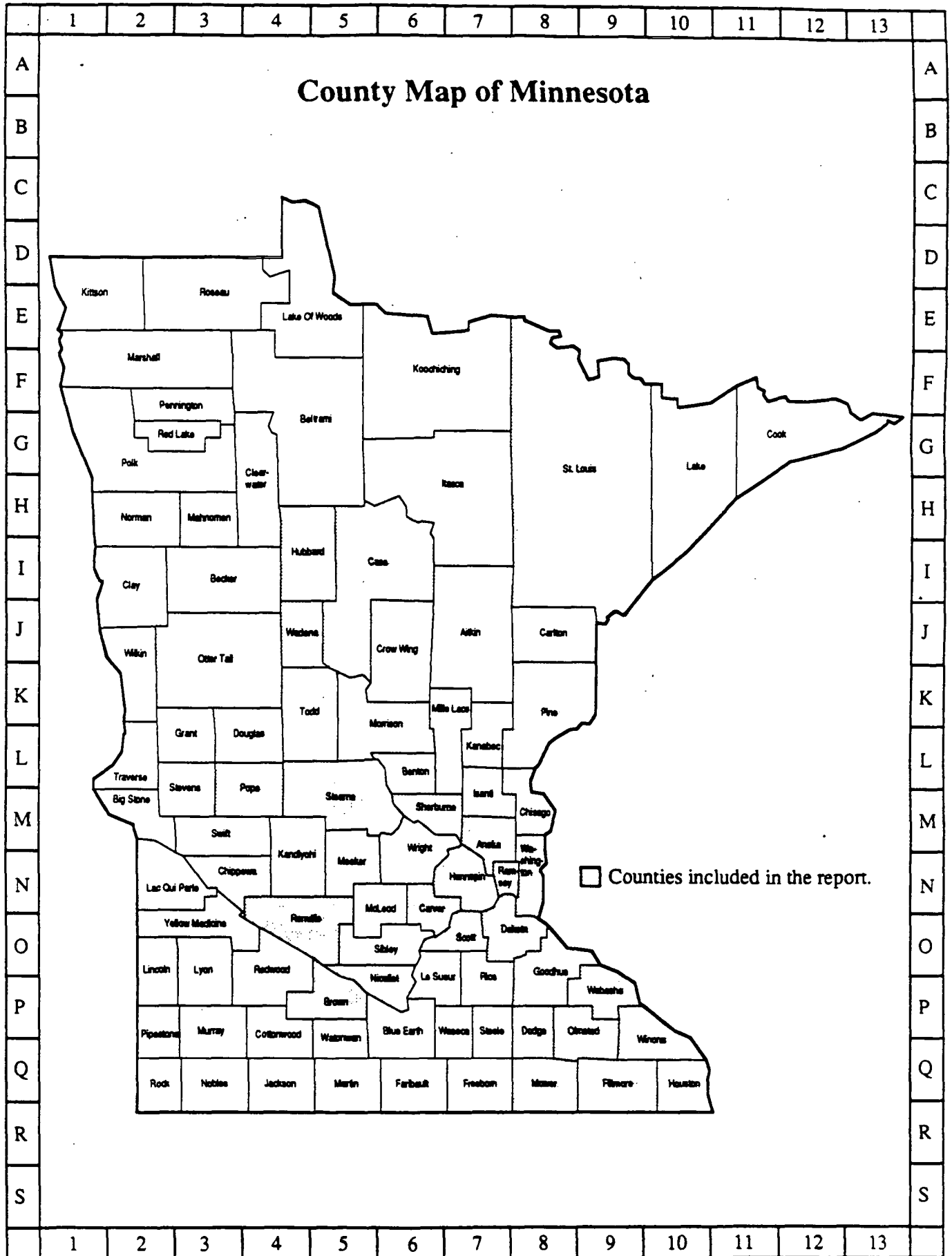
EPA collected indicator data State-wide by county, where available, for each of the five indicator parameters. Because of limited resources, EPA chose to limit its analysis of the indicators to a subset of 29 of Minnesota's 87 counties; these counties are highlighted on the State map presented in Exhibit 1(a). The other 58 counties, by and large, will have far fewer data available.

To develop this subset of counties, EPA considered the following factors:

- The subset should represent most, if not all, of the geographic, hydrogeologic, urban, and agricultural regions of the State;

⁴ Please note that since completion of these initial activities, Minnesota personnel have developed a summary of ongoing monitoring activities entitled, "1990 Catalog of Ground Water Monitoring Programs and Projects in Minnesota." Please refer to this document for additional information.

EXHIBIT 1(a)



- The subset should include those counties for which data are available in as many of the data bases that were evaluated for each indicator as possible.

Where possible, EPA evaluated this subset of counties for each data base that it assessed across all of the indicators. Data were not available, however, for each county in each of the data bases.

C. OUTLINE OF THE REPORT

Section I presents an introduction to the indicator concept for measuring the progress of ground-water protection efforts. Section II of this report presents a summary of the hydrogeologic setting in Minnesota and characterizes ground-water use and the populations that rely on this resource. Section III presents detailed information on each of the ground-water indicators analyzed in Minnesota. Each indicator discussion presents information on the national objectives of the indicator; a description of the indicator; a discussion of relevant sources of ground-water data in Minnesota and the data management for each of these sources; the approach used to characterize the data and the results of the data collection efforts; suggested revisions to the data collection process; and a conclusion regarding the availability of sufficient data to address the national objectives. Section III concludes with a discussion of additional indicators identified which may be applicable to measure progress in ground-water protection efforts. Section IV presents the study conclusions including a summary of the findings for each indicator, a discussion of the technical and data management factors limiting the availability of data to support the study, suggestions for modification to technical and data management practices, and, finally, a brief discussion on resources needed and the next steps EPA is planning to implement ground-water indicator reporting.

II. SUMMARY OF MINNESOTA HYDROGEOLOGY AND GROUND-WATER USE

A. HYDROGEOLOGIC SETTING

The Minnesota Pollution Control Agency identified 13 primary aquifers, important on both regional and local basis, in the 1987 report "An Appraisal of Minnesota's Ground Water Quality". The aquifers are described briefly below in reverse order of the aquifer's geologic age.

Surficial Sands

Surficial Sand aquifers predominate throughout much of central Minnesota and are present, although not as extensively, in many other parts of the State. These deposits were laid down when continental glaciers covered much of Minnesota. The aquifers are generally unconfined and sustained well yields range from 10 gallons per minute (gpm) to 1,000 gpm. These deposits, which consist of fine to coarse sand and gravel, are usually less than 100 feet thick, but may reach a maximum of 500 feet thick in places.⁵ The ground water in these aquifers, which have been moderately developed, is easily obtained in quantities suitable for domestic and agriculture use. Surficial Sand aquifers are susceptible to contamination from non-point sources of pollution since their recharge areas are extensive and the aquifer materials are highly permeable.

Buried Sands

Buried Sand aquifers were generally formed as a result of continental glaciation, which covered much of Minnesota for many thousands of years. Buried Sand aquifers occur throughout the State, with the exception of the "driftless" areas of southeastern Minnesota, and are usually less than 10 feet thick but may be as much as 150 feet thick in isolated areas.⁶ They are generally not extensive and may be found at depths of a few feet below the land surface or just above bedrock. These aquifers yield 10 gpm to 1,000 gpm and are a major source of water for municipal and domestic supply wells in central and southwestern Minnesota.

Cretaceous Sandstone

The Cretaceous Sandstone aquifer is composed of sand and silt which was deposited in a variety of ancient environments including: swamp, and floodplain deposits; and marine type environments which include beach, offshore, and other high energy conditions.⁷ The Cretaceous Sandstone aquifer is used as a source of water for homes and municipalities in southwestern Minnesota. The deposits consist of gray, soft, clayey shale that contains sand beds which are nearly continuous in the western half of the State. The aquifer is not widely used and typically yields 5 gpm to 50 gpm.

Cedar Valley-Maquoketa-Dubuque-Galena

This aquifer, also referred to as the Upper Carbonate aquifer is composed of limestone, dolomite, and dolomitic limestone.⁸ These types of rocks are characteristic of warm shallow water, low-energy environments such as those found in the Bahamas today. It is the youngest in a series of

⁵ U.S. Geological Survey, 1981. "Designation of Principal Water-Supply Aquifers in Minnesota." Water Resource Investigation 81-51.

⁶ Ibid.

⁷ Matsch, C. and R. Ojakangas, 1982. "Minnesota's Geology." Minneapolis: University of Minnesota Press, p.250.

⁸ U.S. Geological Survey, 191. "Designation of Principal Water-Supply Aquifers in Minnesota." Water Resource Investigation 81-51.

sedimentary Paleozoic formations and extends approximately 80 miles northward into Minnesota from the Iowa border. Wells generally yield from 200 gpm to 500 gpm. In many places material thinly covers the bedrock, which makes the aquifer very susceptible to contamination from human activity.

St. Peter Sandstone

The St. Peter aquifer was probably formed by sands deposited in a shallow water low energy environment and is composed of white, fine to medium grained sandstone. The aquifer extends as far north as the Twin Cities, but, because more productive aquifers are available, the St. Peter is not widely used as a municipal supply. Yields typically range from 10 gpm to 100 gpm with the maximum amount reported being 1,000 gpm.⁹

Prairie du Chien—Jordan

The Prairie du Chien—Jordan aquifer consists of two distinct rock types: the Prairie du Chien Group carbonates and the sands of the Jordan Sandstone. These rock units are considered a single aquifer because they are hydraulically connected. The aquifer covers the southeast portion of Minnesota. The Prairie du Chien Group carbonates, which have been compared with modern deposits found in Sharks Bay, Australia, probably had a wide range of depositional environments, from shallow water, low energy offshore setting to a higher energy environment closer to shore. This is the most widely used aquifer in the Twin Cities and southeastern Minnesota and yields as much as 2,700 gpm in wells in both units.¹⁰ Karstic conditions exist in the Prairie du Chien Group in southeastern Minnesota where it occurs at or near the surface. These karstic conditions make this aquifer very susceptible to surface derived contamination.

Franconia—Ironton—Galesville

The Franconia Formation consists of sandstone, shale, and dolomite which is reflective of depositional environments ranging from shallow water—nearshore with moderate energy to offshore—low energy. The Franconia—Ironton—Galesville is an important aquifer in areas adjacent the Mississippi and Minnesota Rivers, particularly in Anoka, Hennepin, Scott, and Carver counties.¹¹ Yields commonly range from 40 gpm to 400 gpm.

Mt. Simon—Hinckley

The Mt. Simon—Hinckley aquifer is composed of two separate sandstone units representing a high energy marine type environment. This aquifer supplies about 15 percent of the ground water used in the Twin Cities metropolitan area, especially in the northern suburbs. This relatively thick unit is composed of sandstone, siltstone, and shale that underlies all of the southeast part of Minnesota as far north as Duluth¹². The aquifer commonly yields 500 gpm, however, local yields may be as high as 2,000 gpm. The Mt. Simon—Hinckley aquifer is present under much of east central and southeastern Minnesota.

⁹ Ibid.

¹⁰ Ibid.

¹¹ Sabel, G. and E. Porcher, 1987. "Ground Water Quality Monitoring Program: An Appraisal of Minnesota's Ground Water Quality," 1987. Minnesota Pollution Control Agency, Division of Solid and Hazardous Waste. p.23.

¹² U.S. Geological Survey, 1981. "Designation of Principal Water-Supply Aquifers in Minnesota." Water Resource Investigation 81-51.

Precambrian Age Aquifers

The locations of the Biwabik Iron Formation, Fond-du-Lac, North Shore Volcanics, Sioux Quartzite, and Precambrian Undifferentiated are scattered throughout the State.

The Fond-du-Lac Formation is believed to have been deposited by rivers flowing through areas which were highly erodible. Very little is known about the areal extent of the Fond-du-Lac aquifer.

The North Shore Volcanic aquifer is the major bedrock aquifer along the north shore of Lake Superior. It is composed of a series of basaltic flows interbedded with sedimentary rocks. Yields obtained from wells less than 300 feet to 400 feet deep are usually less than 25 gpm, however, they may be as high as 100 gpm.

The Sioux Quartzite aquifer, which may have been formed in either a stream or beach type of environment, underlies most of southwestern Minnesota and furnishes water to several municipalities as well as numerous domestic and stock wells. Yields range from 1 gpm to 450 gpm and are usually obtained from fractured and weathered zones of sandstone.

The most productive source of ground water in the Mesabi Iron Range is the Biwabik Iron Formation. Individual yields range from 250 gpm to 750 gpm and are obtained from zones of bedrock altered by faulting or leaching.

The undifferentiated Pre-Cambrian aquifer, which underlies the entire State, consists of igneous and metamorphic rocks such as granite, greenstone, and slate. These rocks are generally not considered aquifers except in the southwest, central, and northeastern parts of Minnesota where they yield small quantities of water in fractures, faults and weather zones.¹³

B. POPULATIONS RELYING ON GROUND WATER

Ground water is the drinking water source for approximately seventy-five percent of the State's population or about 3.2 million people, based on the 1986 total State population reported in Exhibit 1(b).

¹³ Ibid.

Exhibit 1(b)
County Populations and Locations
for County Map in Exhibit 1(a)

County Name	Population 1986	Location on Map	County Name	Population 1986	Location on Map
Aitkin	13,600	J- 7	Marshall	12,200	F- 2
Anoka	221,200	M- 7	Martin	24,500	Q- 5
Becker	29,500	I- 3	Meeker	21,100	N- 5
Beltrami	33,000	G- 4	Mille Lacs	18,900	L- 7
Benton	27,100	L- 6	Morrison	30,200	K- 6
Big Stone	7,300	M- 2	Mower	38,900	Q- 8
Blue Earth	51,000	P- 6	Murray	10,600	P- 3
Brown	28,000	P- 5	Nicollet	27,600	P- 6
Carlton	29,900	J- 8	Nobles	20,600	Q- 3
Carver	40,900	N- 6	Norman	8,500	H- 2
Cass	21,500	I- 6	Olmsted	98,000	P- 9
Chippewa	14,200	N- 3	Otter Tail	52,200	K- 3
Chisago	28,100	M- 8	Pennington	13,800	F- 3
Clay	47,800	I- 2	Pine	20,700	K- 8
Clearwater	8,700	G- 4	Pipestone	11,000	P- 2
Cook	4,100	G-12	Polk	33,400	G- 2
Cottonwood	13,900	P- 4	Pope	11,400	M- 4
Crow Wing	44,600	J- 6	Ramsey	474,000	N- 7
Dakota	228,300	O- 8	Red Lake	5,000	G- 2
Dodge	15,300	P- 8	Redwood	18,500	O- 4
Douglas	29,100	L- 4	Renville	19,600	O- 4
Faribault	18,400	Q- 6	Rice	47,500	P- 7
Fillmore	21,400	Q- 9	Rock	10,400	Q- 2
Freeborn	34,500	Q- 7	Roseau	13,200	E- 3
Goodhue	39,400	P- 8	St. Louis	201,900	G- 8
Grant	6,700	L- 3	Scott	50,200	O- 7
Hennepin	987,900	N- 7	Sherburne	34,200	M- 6
Houston	19,000	Q-10	Sibley	15,000	O- 6
Hubbard	14,900	I- 4	Stearns	113,800	M- 5
Isanti	25,300	M- 7	Steele	30,000	P- 7
Itasca	42,500	H- 6	Stevens	10,600	M- 3
Jackson	13,200	Q- 4	Swift	12,100	M- 3
Kanabec	12,600	L- 7	Todd	25,400	K- 4
Kandiyohi	38,100	N- 4	Traverse	5,100	L- 2
Kittson	6,200	E- 1	Wabasha	19,500	P- 9
Koochiching	15,400	F- 6	Wadena	13,900	J- 4
Lac Qui Parle	10,000	N- 2	Waseca	18,100	P- 7
Lake	11,500	G-10	Washington	128,300	N- 8
Lake of the Woods	3,800	E- 5	Watsonwan	11,900	P- 5
Le Sueur	23,400	P- 6	Wilkin	7,900	J- 2
Lincoln	7,600	O- 2	Winona	46,300	P-10
Lyon	25,000	O- 3	Wright	64,500	N- 6
McLeod	31,200	N- 6	Yellow Medicine	13,000	O- 3
Mahnomen	5,300	H- 3			
			Total	4,213,900	

III. GROUND-WATER INDICATORS

The following section discusses the data availability and findings related to the five indicators investigated in the State of Minnesota.

A. MAXIMUM CONTAMINANT LEVELS

This section presents the national objectives, approach and findings of the study of maximum contaminant levels (MCLs) as an indicator of ground-water quality in public drinking water supplies in Minnesota.

National Objectives

EPA designed the MCL indicator to address the following national objectives:¹⁴

- identify the degree to which ground-water based water supply systems meet all applicable MCLs,
- identify the size of the population at risk from systems in violation,
- provide an understanding of the geographic distribution of populations potentially at risk,
- identify specific contaminants for which systems are failing to meet the MCLs, and
- identify those contaminants which are responsible for the greatest number of MCL violations.

The following discussion describes the data sources identified in Minnesota to address these objectives and presents and analyses the data results.

Description of the Indicator

Maximum contaminant levels are water quality standards set under the authority of the Safe Drinking Water Act (SDWA). The Act authorized EPA to establish a cooperative program among local, State, and Federal agencies to protect drinking water quality and to ensure that human health is not adversely affected by water-borne pollutants. Maximum contaminant levels are set for inorganic, organic, microbiological contaminants, radionuclides, and turbidity.¹⁵

An MCL is the highest amount of a specific contaminant allowed in the drinking water supplied by a public water system. Primary MCLs are established for contaminants that are known to occur in drinking water, cause adverse health effect, and can be measured with existing instrumentation. As one of the indicators of ground-water quality, MCLs are useful determinants of the quality of the ground water that is used for public drinking water supplies.

¹⁴ U.S.EPA Office of Ground-Water Protection, April 1989, "Indicators for Measuring Progress In Ground-Water Protection," EPA 44016-88-006.

¹⁵ Data characterizing turbidity violations are not described in this report because this parameter is generally not considered relevant to analyses of ground-water based supplies.

Indicator Data Management in Minnesota

Water-quality data for finished (i.e., treated) water from community public water supply systems are collected and compiled by the Minnesota Department of Health (MDH). These data are compiled on a cumulative basis each year. The Minnesota Department of Health reviews these data for MCL violations but does not record violations in the data base; moreover, MDH maintains no automated tracking system for MCL violations.

A majority of the water-quality data compiled by MDH is maintained in WordPerfect files. Laboratory identification and sample numbers for bacteria analyses are logged into a dBASE III Plus data base management system; however, no contaminant concentrations are recorded in the data base. Community data to the late 1800s are on microfiche, filed by Public Water Supply identification number.

Although MDH manually tracks MCL violations, violations are not recorded in the MDH WordPerfect files. Instead, MDH reports MCL violations to the Federal Reporting Data System (FRDS) each quarter via EPA's FRDS-DE II data entry program. The Federal Reporting Data System serves as the national data base for tracking MCL compliance data provided by the States. FRDS-DE II is a menu-driven PC-based program written in Clipper that prints a copy of a Data Transmission Format, a summary of the MCL compliance results that will be entered into FRDS. The Minnesota Department of Health has used FRDS-DE II since 1988, and keeps this summary (electronic and hard copies) until they receive confirmation that the compliance results have been entered into FRDS; the summary file is then erased. Thus, automated historic data are not maintained for Minnesota.

EPA's Office of Drinking Water maintains the FRDS data base to support the Agency's information collection requirements established under the Safe Drinking Water Act. The Federal Reporting Data System tracks a number of data elements, including:

- the Public Water System (PWS) identification number;
- the location of the PWS;
- the population served by the PWS;
- the sources of drinking water (ground and/or surface water);
- the MCL constituent violated;
- the concentration reported;
- the Federally mandated maximum allowable concentration level;
- the date of the violation;
- the number of months that the system was in violation; and
- the number of reporting violations (i.e., PWS not reporting annual water quality information).

The data from FRDS, however, contains the following deficiencies.

- FRDS data reflect the analysis of finished drinking water and therefore do not represent ground-water quality at the well.
- The locations of PWSs are provided in longitude and latitude of either the drinking water source (as provided by the owner) or the centroid of the zip code of the system mailing address. Either of these data may be erroneous, as the owner may provide inaccurate information, or the mailing address of the water system may be miles away from the well source.

- Systems that are served solely by ground water are designated as ground-water based systems, but those systems that are served by both ground and surface water are designated as surface-water based systems, regardless of the degree to which the system relies on ground water.
- Population data provided by FRDS are total populations served by PWSs. As a PWS may use several sources to serve this population, it may be difficult to estimate the size of the population exposed to MCL violations.
- FRDS provides no information on the location of actual exposure points, the proportion of reported population served by each source, or the term for which each source is used.
- Data on location of private wells and the population using private wells for drinking water are not collected in FRDS; and
- FRDS personnel support are likely to be overburdened with requests if States cannot access data themselves.

Furthermore, the use of the FRDS-DE II program requires knowledge of codes used in FRDS to identify MCL violations. Although an interactive retrieval system for FRDS does exist, MDH personnel have not used it.

The City of Rochester Department of Public Utilities monitors the quality of raw (unfinished) water from the 22 municipal wells that serve its public water supply system. Rochester treats its ground-water supply with fluoride, chlorine, and a corrosion inhibitor. The Minnesota Department of Health samples finished water, analyzes for all constituents of concern except for bacteria, and monitors MCL violations for the supply. Rochester Public Utilities performs bacteriological analyses and reports the results to MDH. Rochester Public Utilities maintains its data on unfinished water quality in the data base management system RBASE. The Rochester data base includes chemical analyses of untreated water for more than 50 parameters, including major cations and anions, some metals, Kjeldahl nitrogen, BOD, TOC, redox potential, a suite of VOC compounds, and base neutral pesticides. Not all available data for the Rochester data base have been entered into the RBASE system, and the system is not yet suitable for public use (i.e., not "user friendly"). It is not possible at this time to evaluate temporal trends in concentrations.

Approach for Characterizing the Indicator

EPA's review of the data sources described above revealed that the Federal Reporting Data System (FRDS) would provide the most consistent State-wide source of data for the federal MCL constituents. The MDH data base was not used because it does not contain information regarding MCL violations. The Rochester RBASE system also was not use because it was not readily available and was limited in geographic coverage. Furthermore, EPA believed that the data available through FRDS were consistent with those maintained on the MDH data base. Therefore, FRDS served as the sole data source for characterizing the indicator.

EPA obtained data by county from FRDS on the number of ground-water based public water supplies that meet applicable quality standards and the specific contaminants responsible for the violations as well as their concentrations. FRDS data was provided in a machine-readable format on three-and-a-half inch diskettes for the last ten years.

Data items received from the FRDS data base are as follows:

- date and identification of the MCL of violations for each of the past ten years,
- well or system ID number for all Public Water System (PWS) in each of the twenty-nine counties summarized,
- number of public water supplies relying on ground water in each of the twenty-nine Minnesota counties,
- number of public water supplies reporting MCL violations by constituent for each of the twenty-nine counties for each of the past ten years, and
- specific contaminants responsible for violations as well as the contaminant concentrations.

Study Results and Interpretation of Data

The FRDS data base listed a total of 11,955 PWS systems served by ground water in the State of Minnesota. A total of 175 MCL violations were reported statewide in these systems since 1980, and a total of 57 MCL violations were reported for the twenty-nine county subset over the past ten years.

More than half the violations (32) were for total coliform. Pipestone and Hubbard counties were the only counties reporting violations for nitrates. Pipestone, which is located in the southeastern corner of Minnesota, had ten of the thirteen nitrate violations, reporting at least one violation in every year except 1987 and 1988. Hubbard County is located in north central Minnesota. The only county to report a violation of the arsenic MCL was Renville county, reporting violations in 1981 and 1982. Violations for combined radium were reported in seven counties. Two counties, Scott and Anoka, are found within the seven-county metro area. No violations for combined radium were reported prior to 1987. Total coliform appears to be a more ubiquitous contaminant than the other three constituents, with more than half the counties (18) reporting violations. Maximum contaminant level violations for total coliform were reported in at least one county for every year during the 1980's.

Maximum contaminant level violation data are reported in Appendix A. The data represent all reported violations in each of the twenty-nine county subset for the past ten years. Tables A-1 through A-4 present the number of PWS reporting violations of the Federal MCL for arsenic, nitrate, total coliform, and combined radium. A summary of Federal MCL violations in Minnesota between 1980 and 1989 in the twenty-nine county subset is presented in Exhibit A-1.

The pilot study did show that:

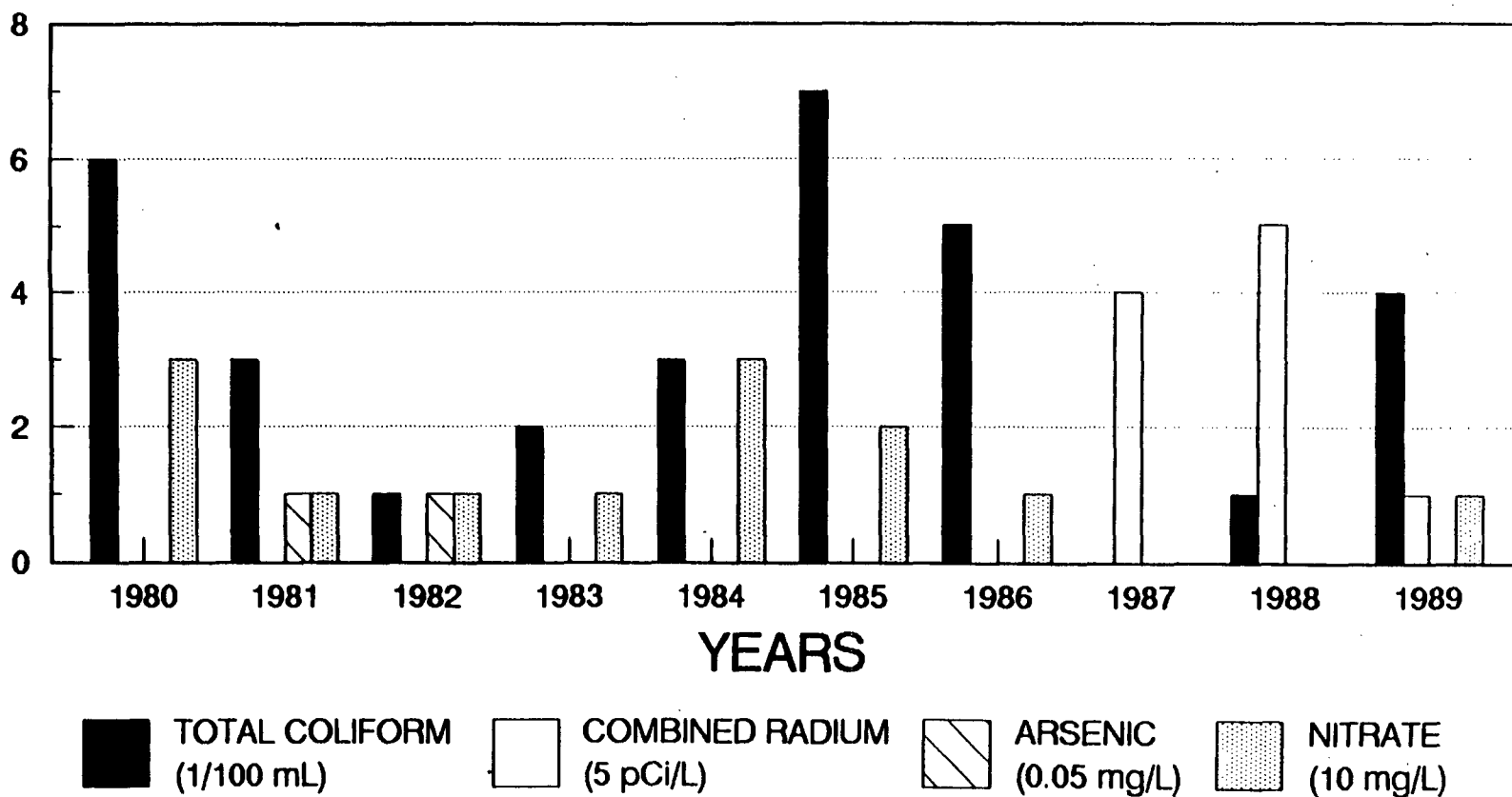
- MCL data are reported statewide and available at the county level,
- MCL data lend themselves to visual representation, and
- MCL data allow for comparison among counties and within a county across time.

Hence, the data available from FRDS-II data base support a portion of the national objectives for the MCL indicator described above. However, this pilot study did not collect sufficient data either to characterize the geographic distribution of the MCL violations beyond the county level or to identify the sizes of the population at risk from these violations. Nonetheless, such an analysis could be supported because the FRDS-II data base does record the location of public water supply systems

EXHIBIT A-1

SUMMARY OF FEDERAL MCL VIOLATIONS IN MINNESOTA, U.S. EPA

NUMBER OF MCL VIOLATIONS



Source: Federal Reporting Data System (FRDS-II)
U.S. Environmental Protection Agency

and the populations served by these systems. As a result, the geographic distributions of the public water supply systems could be developed. Nonetheless, there are limitations to the usefulness of the population data recorded in FRDS:

- Population data represent the total population served by a PWS. As a PWS may use several sources to serve this population, it may be difficult to estimate the extent of exposure to MCL violations.
- Population data are recorded only periodically and, thus, accurately represent only certain years of the period of record.

Despite these limitations, EPA believes that the population data maintained in FRDS can give a broad brush representation of the national objective to "provide an understanding of the geographic distribution of populations at risk." Populations at risk were not analyzed in this pilot study due to resource limitations. In addition, data on populations served by PWSs were not supplied in a timely manner. Despite these limitations, EPA believes that the population data maintained in FRDS can give a broad brush representation of the national objective to "provide an understanding of the geographic distribution of populations at risk." Populations at risk were not analyzed in this pilot study due to resource limitations. In addition, data on populations served by PWSs were not supplied in a timely manner.

Another uncertainty inherent in the data from FRDS is that they reflect the analysis of finished drinking water rather than raw ground water, and therefore, do not necessarily represent the quality of ground water at the wellhead. This uncertainty is generic to the characterization of the indicator and is not solely a function of the available data.

Revisions to the Indicator Data Collection Process

In order to assess the geographic distribution of populations at risk for MCL violations, future studies could utilize public water supply population information available through FRDS.

Conclusions

Data from the FRDS data base are sufficient to support the national objectives described above. EPA limited the analysis of supply system geographic distribution to aggregate data organized at the county level, and did not analyze populations potentially at risk. However, data on geographic distributions and populations served by PWSs are available from FRDS and are believed to be sufficient to provide a general understanding of the geographic distribution of the populations at risk.

B. ON-SITE AND OFF-SITE CONTAMINATION FROM HAZARDOUS WASTE SITES

This section presents the national objectives, approach, and findings of the study of on-site and off-site contamination from hazardous waste sites as an indicator of ground-water contamination in Minnesota.

National Objectives

EPA designed this indicator of on- and off-site contamination from hazardous waste sites to support the following national objectives:¹⁶

¹⁶ U.S. EPA Office of Ground-Water Protection, April 1989, "Indicators for Measuring Progress in Ground-Water Protection," EPA 440/6-88-006.

- identify the number of Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA) sites with ground-water contamination on-site and off-site;
- provide an indication of the risk posed by such contamination to the population in the vicinity of off-site contamination; and,
- identify the relative frequency with which various types of contaminants are responsible for ground-water contamination at CERCLA and RCRA sites.

The following discussion describes the manner in which this study was able to address these national objectives with the waste site data collected in Minnesota.

Description of the Indicator

Active and abandoned hazardous waste sites can serve as significant sources of ground-water contamination and may pose serious risks to human health and the environment. The level of ground-water contamination at these hazardous waste sites, the potential risks to drinking water supplies, and the risk to the populations served by those supplies are each assessed under this indicator.

This indicator also tracks changes in the number of CERCLA and RCRA sites with on-site and off-site ground-water contamination over time as a measure of the progress in managing waste sites. Such indicator data could also be used to monitor progress made in dealing with contaminated sites by evaluating changes in site identification, remedial investigations, remedial design implementations, and site closures.

Indicator Data Management in Minnesota

The Minnesota Pollution Control Agency tracks progress on investigations of 166 hazardous waste sites through its Permanent List of Priorities (PLP). Forty of these sites are on EPA's National Priority List. The Permanent List of Priorities is a written list (not an automated data base) of hazardous waste sites and progress made in their investigation under Minnesota's Environmental Response and Liability Act. Sites include inactive sanitary landfills, industrial disposal lagoons, impoundments and pits, buried drums, and underground storage tanks. Approximately 125 of the 166 sites are in some phase of cleanup and have ground-water quality data available.

For each site, the PLP includes the township and county where the site is located; its priority, which specifies the level of investigation at which the site is under (e.g., Remedial Investigation/Feasibility Study); whether or not the site is on the National Priorities List; the site's score through the Hazardous Ranking System (HRS); a description of the site, including defined ground-water contamination; staff assigned to the site; actions taken to date; and actions needed.

Minnesota Pollution Control Agency is also responsible for issuing permits and inspecting 43 active RCRA treatment, storage, and disposal (TSD) facilities. Eight of these 43 sites are land disposal facilities, and the remainder are mostly storage facilities. Most of these facilities do not monitor ground water at their sites; however, all of the land disposal facilities are required by permit to monitor ground water at the site, and each has undergone a RCRA Facility Assessment (RFA). Two of the storage facilities are required to monitor ground water, one of which has undergone a RFA, and one of which has completed a RCRA Facility Investigation (RFI). Fifteen of the 43 active sites are in some phase of corrective action. There are no automated data bases for the TSD facilities or other RCRA facilities regulated by the State. All data are maintained in paper files.

Minnesota Pollution Control Agency tracks waste volumes generated by approximately 350 large quantity generators (LQGs), 2,000 small quantity generators (SQGs), 6,000 very small quantity

generators (VSQGs), and the 43 active TSD facilities. Minnesota Pollution Control Agency inspects LQGs annually. County hazardous waste staffs inspect SQGs annually or biannually in the seven-county metropolitan area.

Minnesota Pollution Control Agency has also compiled an Open Dump Inventory that includes information on 1,300 open dumps throughout the State. Many of these dumps are listed on the PLP. Because sites on the Inventory are located by latitude and longitude, the Inventory may be cross-referenced with the PLP to locate some of the sites on the PLP. The following elements are included in the Open Dump Inventory: facility name, facility type (e.g., solid waste, mixed municipal, industrial waste), identification number (either permit number or Agency-assigned number), county, facility status, public land system coordinates, type of map location was digitized from, latitude/longitude, area of site, date surveyed, and MPCA and owner/operator contacts. Columns are also available for type of waste and the availability of water quality information, but this information is not available for most sites. The Open Dump Inventory have been transferred to the MPCA's VAX mainframe computer. Ground-water quality information appears to be unavailable for many sites listed in the Open Dump Inventory.

Approach for Characterizing the Indicator

After reviewing the above data sources, EPA chose to use data characterizing the PLP sites for the indicator analysis. The Open Dump Inventory was not utilized as a data source in this pilot study. Information tracked in the Open Dump Inventory is insufficient to assess the extent of on-site and off-site contamination at these sites. Instead, an Environmental Indicator Questionnaire, presented in Appendix C of this document, was sent to State officials to compile information on ground-water quality at approximately 125 of the 166 sites on the Minnesota Permanent List of Priorities. EPA also requested data for Minnesota RCRA facilities; however, those data were not supplied in a timely manner. Therefore, RCRA facility data were not included in this analysis. Specific data requested for the CERCLA/PLP sites on the questionnaire included the following:

- site number, name and location;
- concentration level status of PCBs, Pesticides, other organics, metals, and bacteria; and
- the extent of ground-water pollution at the sites, as determined by detection of the plume off-site, and an estimate of the population at risk and whether contamination has been detected in drinking water wells.

Study Results and Interpretation of Data

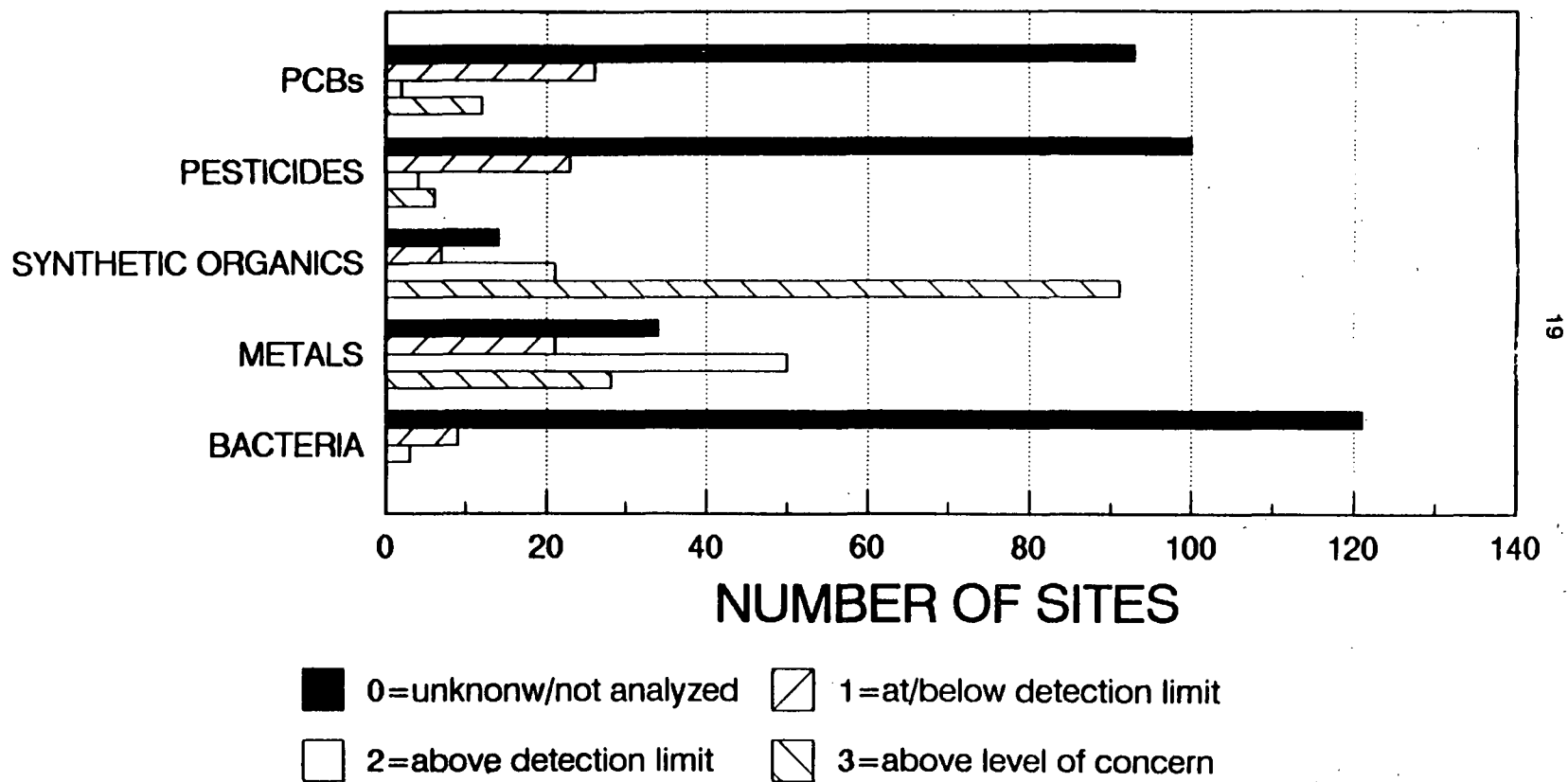
Information was compiled on 104 hazardous waste sites across a subset of 26 counties. Fifty-eight of the 104 sites are located within the seven-county metro area. Hennepin county alone has 26 sites. With the exception of Hennepin county, the number of sites per county statewide range from one to nine, averaging approximately three sites per county. Populations range from zero in Dodge, Fillmore, Hubbard, Morrison, and Pipestone counties to approximately 650,000 in Ramsey county and 1,400,000 in Hennepin county. Contamination has reached drinking water wells from 27 of the 104 hazardous waste sites, ranging from zero to five sites per county. Information gathered from the Environmental Indicator Questionnaires on contamination from hazardous waste sites is summarized in Exhibit B-1. Summary data from the Environmental Indicator Questionnaire is presented in Appendix C to this report.

EXHIBIT B-1

SUMMARY OF HAZARDOUS WASTE SITE CONTAMINATION

CONCENTRATION LEVELS IN MINNESOTA

CONCENTRATION LEVEL



Source: Permanent List of Priorities,
Minnesota Pollution Control Agency, 1990.

The pilot study did show that:

- data are available at the county level,
- data lend themselves to visual presentation, and
- data allow for comparisons among and within counties.

However, the data presented in this pilot study does not allow for comparisons across time, and therefore, temporal trend analysis is not possible. In order to facilitate future trend analysis, biennial surveys, similar to the Environmental Indicator Questionnaire, could be conducted for on- and off-site contamination. By comparing the information compiled in these biennial surveys, data would eventually be suitable for trend analysis of the impact of hazardous waste sites on ground-water quality.

Additional problems associated with the hazardous waste site data include:

- over estimation of populations within three miles of all sites in a county, and
- the lack of quantitative information available to describe the extent of contamination.

Analysis of hazardous waste site data meets all three national objectives described earlier in this section. The data clearly identifies the number of PLP sites, which include CERCLA sites, with on-site and off-site ground-water contamination. In the 26-county subset analyzed in this report, 104 hazardous waste sites were identified. The data also provides an indication of the risks posed by such contamination to the populations living in the vicinity of sites with off-site contamination. Approximately 2.7 million people are estimated to live within three miles of at least one hazardous waste site in the 26-county subset. No graphics were completed regarding the populations at risk due to the potential for over estimating populations at risk. Finally, the relative frequency with which various types of contaminants are responsible for ground-water contamination at CERCLA and RCRA sites have been identified. Although similar data were not provided for RCRA facilities, EPA believes those data do exist in hard copy.

While data gathered from the questionnaires can meet the national objectives, the approach of using questionnaires to obtain information from paper files requires substantial human resources.

Suggested Revisions to Indicator Data Collection Process

In order to meet the national objectives and effectively track trends in the 305(b) reporting process the following recommendations are made on the experience gained in this pilot study:

- compile data on an annual or biennial basis,
- refine methodology for estimating populations living in the vicinity of hazardous waste sites to more accurately depict the actual population size, and
- develop a more precise method of categorizing contaminant concentration levels and defining the extent of ground-water contamination.

If these recommendations can be implemented on a statewide basis, with time, trend analysis would be possible.

Conclusions

The Minnesota hazardous waste site data can be used as a broad description of the extent of contamination from hazardous waste sites in the State. Data are available in paper files that meet the national objectives; however, temporal trend analysis is not possible. If data are compiled on a regular basis, and if data limitations are corrected, in time, more efficient data retrievals and trend analysis will be feasible statewide.

C. VOLATILE ORGANIC COMPOUNDS

This section presents the national objective, approach, and findings of the study of volatile organic compounds (VOCs) as indicators of ground-water contamination in Minnesota.

National Objective

EPA designed the VOC indicator to address the following national objective:¹⁷

- identify the frequency with which various VOCs are found in ground water.

The following discussion describes the data sources identified in Minnesota to address the objective, and presents and analyses the data results.

Description of the Indicator

Volatile organic compounds typically include solvents and other chlorinated hydrocarbons. They serve as indicators of ground-water contamination resulting from industrial and non-industrial activities. These activities or sources can include landfills, septic systems, spills, hazardous waste sites, leaking underground storage tanks, underground injection control wells, industrial sites generally, and other potential point sources. Volatile organic compounds can reach the ground water from improper material handling, and leakage of tanks and industrial equipment at the ground surface.

There is an interest in the level and frequency of VOC contamination due to possible health hazards posed by VOCs, and other contaminants from similar sources. As a result, measuring changes in VOC concentrations over time may provide a valuable indicator of future trends in drinking water quality resulting from industrial and non-industrial activities.

Indicator Data Management in Minnesota

Data on VOC concentrations in ground water are collected and maintained in five data bases:

- USGS District NWIS data base;
- Minnesota Department of Health reports;
- Minnesota Pollution Control Agency's Ambient Ground Water Monitoring Network data base;

¹⁷ U.S.EPA Office of Ground-Water Protection, April 1989, "Indicators for Measuring Progress In Ground-Water Protection," EPA 44016-88-006.

- Tanks and Spill Section of Minnesota Pollution Control Agency's Hazardous Waste Division records; and
- City of Rochester Department of Public Utilities records.

The USGS, Water Resources Division, Minnesota District has collected VOC data for several Minnesota counties for various projects such as hazardous waste studies, county-level water quality studies, and regional aquifer assessments. These data are maintained in the National Water Information System (NWIS).¹⁸ As part of these studies, ground-water samples are collected at the wellhead and tested for as many as 72 constituents. Information recorded for each sample includes location (e.g., latitude and longitude), data reliability, primary use of water (e.g., public, industrial), and aquifer code information. Most of the VOC data within the data base were reported during the last five years, and most wells tracked in the data base were sampled and analyzed only once for VOCs.

The Minnesota Department of Health (MDH) collects water quality data for community and non-community public water supply (PWS) wells and public and private drinking water wells. The community PWS well data were collected from samples taken between October 1982 and June 1985 for all 2,050 community PWS wells within the State. These samples were analyzed for 48 VOC compounds. Water quality data for non-community PWS wells represent a state-wide sample of 300 wells between 1985 and 1987. Selection of wells for inclusion in the survey was based on their proximity to one or more of the following potential sources of VOCs: landfills or dumps, underground storage tanks (especially petroleum tanks), hazardous waste spill or disposal sites, and industrial or commercial VOC use sites. Samples were analyzed for 55 VOC compounds. Minnesota Department of Health also assesses water quality in public and private drinking water wells located within one mile of 132 mixed municipal solid waste disposal sites in the seven-county metropolitan area. This on-going study began in 1986; the most recent summary of survey data was completed in 1989. Samples collected from wells near solid waste disposal facilities in the metropolitan area were analyzed for 54 VOC compounds and seven parameters indicating solid waste leachate (ammonia, chloride, iron, sulfate, nitrate plus nitrite nitrogen, pH, and specific conductance).

The Minnesota Pollution Control Agency (MPCA) has collected ground-water samples at 450 monitoring points (wells and springs) throughout all of Minnesota's 87 counties in its Ambient Ground Water Monitoring Network. These samples have been analyzed for a suite of inorganic, bacteriological, and physical parameters. Data from the Ambient Ground Water Monitoring Network can be organized by county, township, drainage basin, and aquifer. Minnesota Pollution Control Agency has collected ground-water samples in the Ambient Ground Water Monitoring Network since 1978. As of the end of 1989, 375 of these samples had been analyzed for VOCs. Most of these 375 samples were collected in geologically sensitive areas. The Minnesota Pollution Control Agency is currently redesigning the Program to provide more complete and useful data than is now available.

The Tanks and Spills Section of the Minnesota Pollution Control Agency's Hazardous Waste Division maintains data on ground-water quality near 2,500 petroleum and chemical storage tanks. Approximately ten years of data have been collected; however, a majority of the data have been collected since 1988. Most samples have been analyzed for benzene, toluene, xylene, and ethylbenzene.

The City of Rochester Department of Public Utilities has consistently monitored untreated water from the 22 municipal wells that serve its public water supply system for VOC's since 1988; some VOC data exist from the late 1970's and early 1980's. These data are maintained in a data base written in RBASE.

¹⁸ The NWIS data base was previously referred to as the Water Data Storage and Retrieval System or "WATSTORE."

Approach for Characterizing the Indicator

After reviewing the data sources discussed above, EPA concluded that the data retrievals from USGS NWIS and the Ambient Ground-Water Monitoring Network data bases would provide the best available information to track trends in VOCs in Minnesota. The NWIS and Ambient Ground-Water Monitoring Network data bases were chosen because, they provide:

- the greatest amount of data per data base;
- sites identified with geographic locators;
- the greatest number of sites per data base;
- the greatest consistency in collecting, analyzing, and reporting of data;
- the broadest State coverage;
- the broadest temporal coverage;
- existing data base documentation; and
- existing data base personnel support.

The other data sources were not evaluated due to the limited geographic area or number of wells represented by the data or difficulty in retrieving or interpreting the data. The analysis of VOC data focused on samples collected in twenty-seven of the twenty-nine selected counties analyzed in the MCL indicator study. EPA requested the following information from NWIS for the counties analyzed:

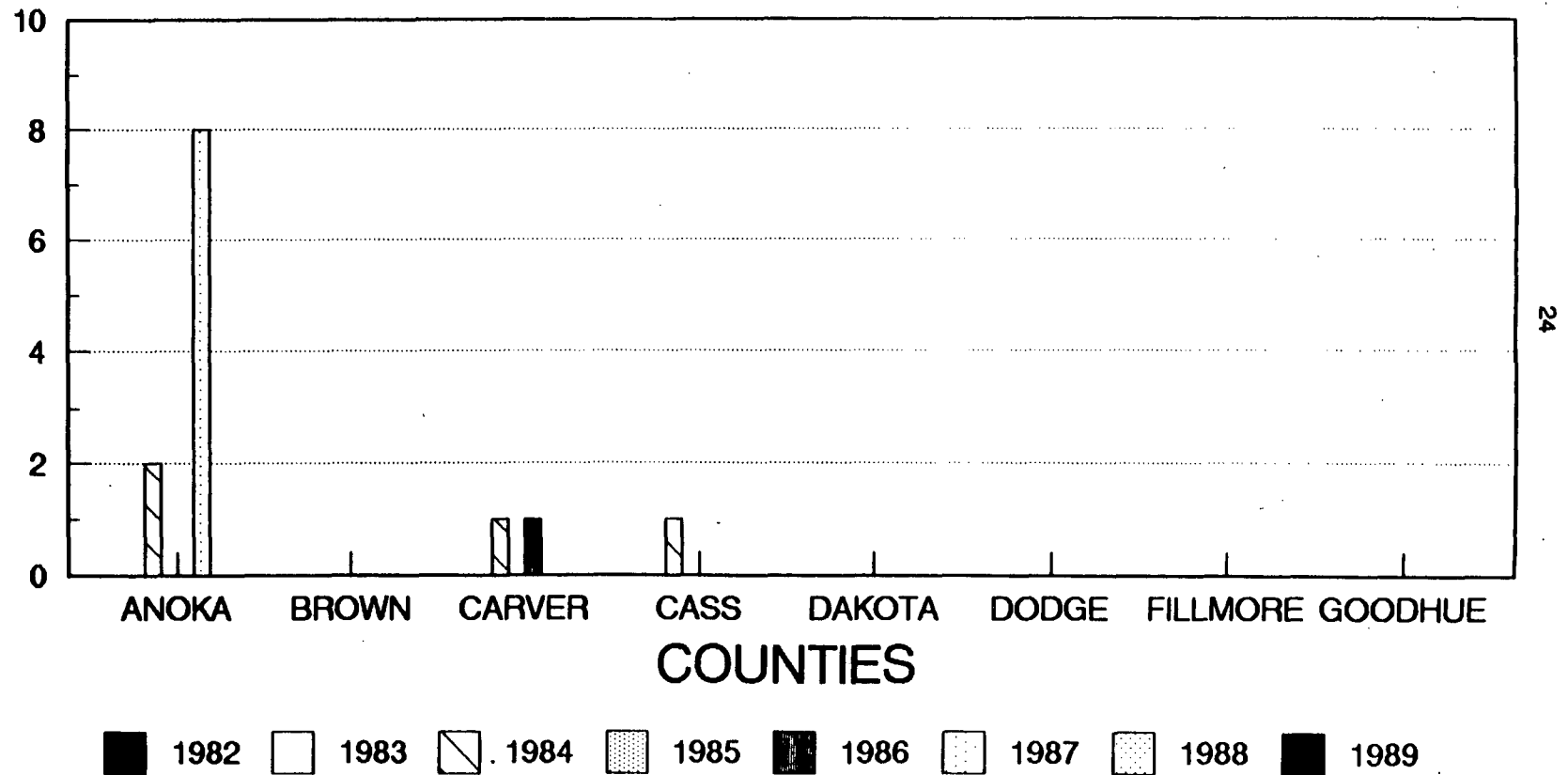
- the number of wells monitored for VOCs;
- the number of wells in which VOCs have been detected;
- the number of wells in which MCLs have been exceeded; and
- yearly trends in VOC monitoring practices and detections.

Study Results and Interpretation of Data

The Ambient Ground-Water Monitor Network data provided a more comprehensive geographic distribution than the NWIS data. The Ambient Ground-Water Monitor Network included twenty-seven of the twenty-nine selected counties where VOC analyses were completed over the 1980 to 1990 period (data were not available from NWIS for years 1980, 1981, and 1989). The analysis indicates that there were 15 samples with VOC concentrations that exceeded health-based thresholds collected in Anoka, Cass, Hennepin, Hubbard, Morrison, Pine, Wabasha, Wadena, and Washington Counties. The other twenty-counties had no detections that exceeded health-based thresholds. A total of 33 detections were recorded for all twenty-nine counties out of a total of 5,694 sample analyses. A number of counties had no wells sampled in certain years (e.g., Hubbard County for the years 1982, 1983, and 1985 through 1988 and Morrison County in years 1982, 1986, 1987, and 1988). Summary VOC data for individual compounds are provided in Appendix D (refer to Table D-1 through Table D-27).

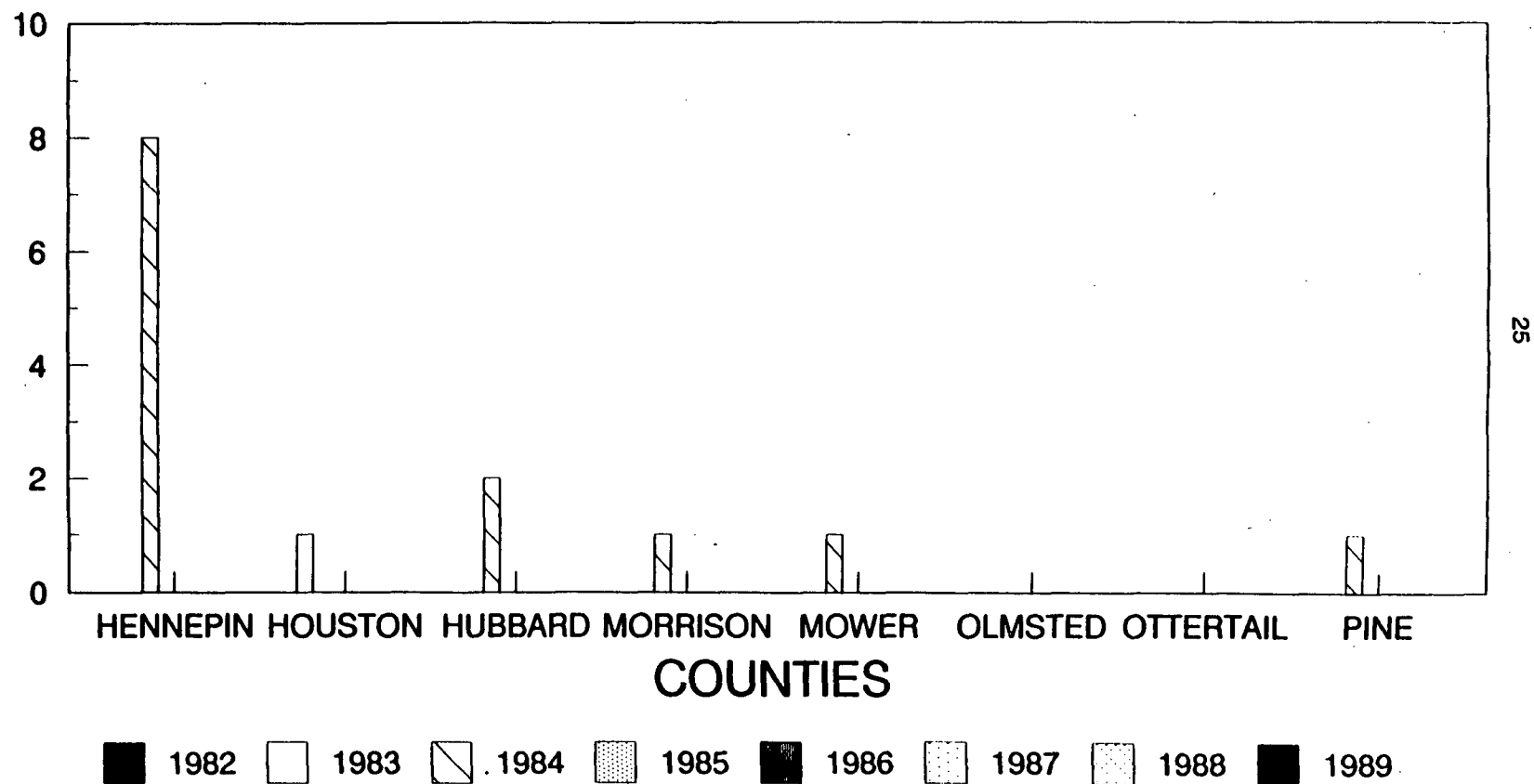
Exhibit C-1 graphically presents the VOC detections for the twenty-seven counties. Trends in VOC detections over time cannot be made based on these data since samples were taken from wells that, for the most part, were tested only once. Therefore, increases or decreases in VOC detections may result from samples being taken in different regions of a county. In addition, the number of wells sampled and the number of samples analyzed varied from year to year and from county to county. Most of the variation in the number of sample detections from year to year and between counties (shown in Exhibits C-1.1 through C-1.4) can be explained by the differences in the number of samples analyzed. For example, in Anoka County in 1983, 2 wells were sampled and a total of 54 analyses were completed on the 2 samples collected. In 1984, 3 samples were collected from 3 wells and 89 analyses were completed. The percentage of VOC detections per the number of analyses completed

EXHIBIT C-1.1 **SUMMARY OF VOC DETECTIONS FOR SELECTED COUNTIES** **IN MINNESOTA, MINNESOTA POLLUTION CONTROL AGENCY** **NUMBER OF VOC DETECTIONS**



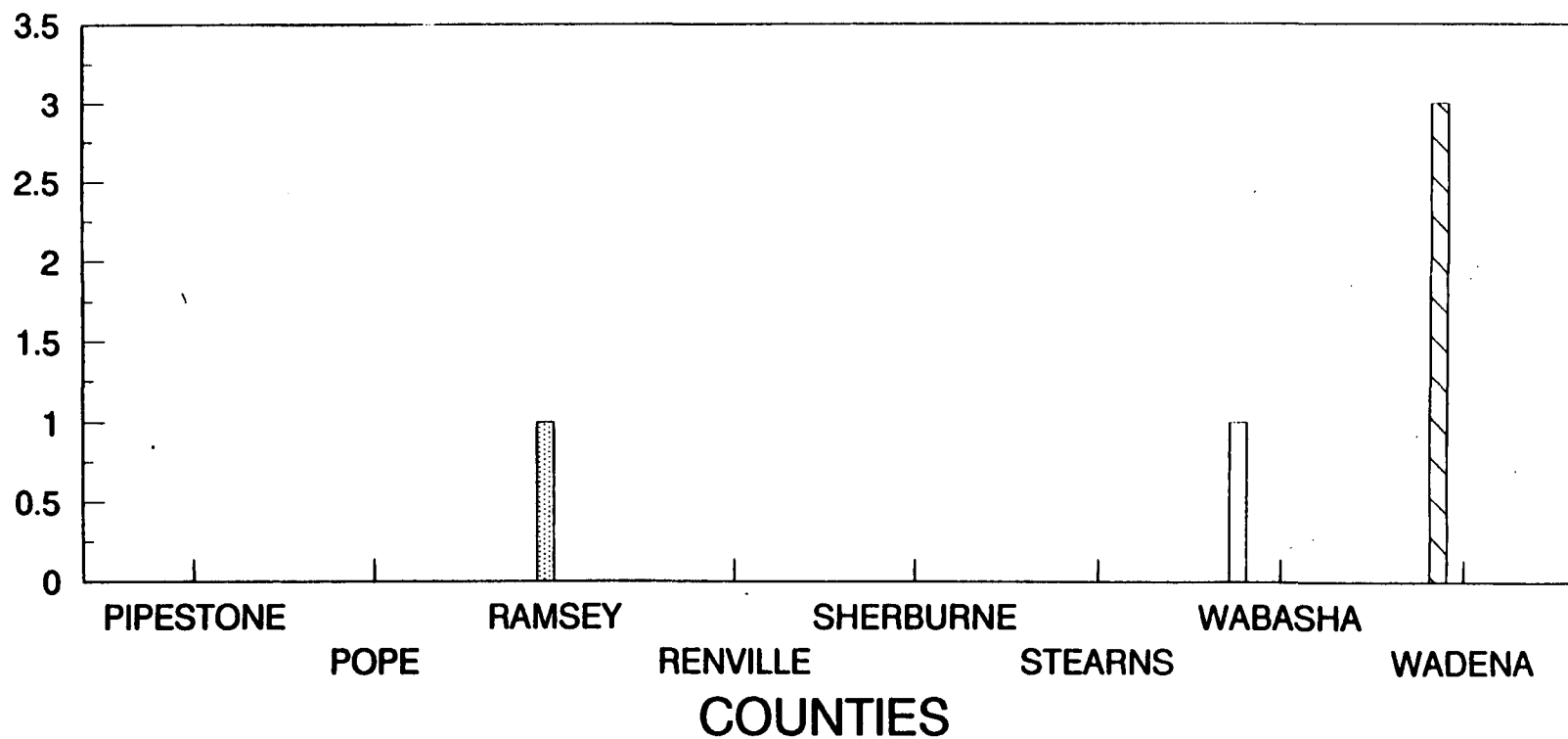
Source: Ambient Ground-Water Monitoring Network
 Minnesota Pollution Control Agency

EXHIBIT C-1.2 **SUMMARY OF VOC DETECTIONS FOR SELECTED COUNTIES** **IN MINNESOTA, MINNESOTA POLLUTION CONTROL AGENCY** **NUMBER OF VOC DETECTIONS**



Source: Ambient Ground-Water Monitoring Network
 Minnesota Pollution Control Agency

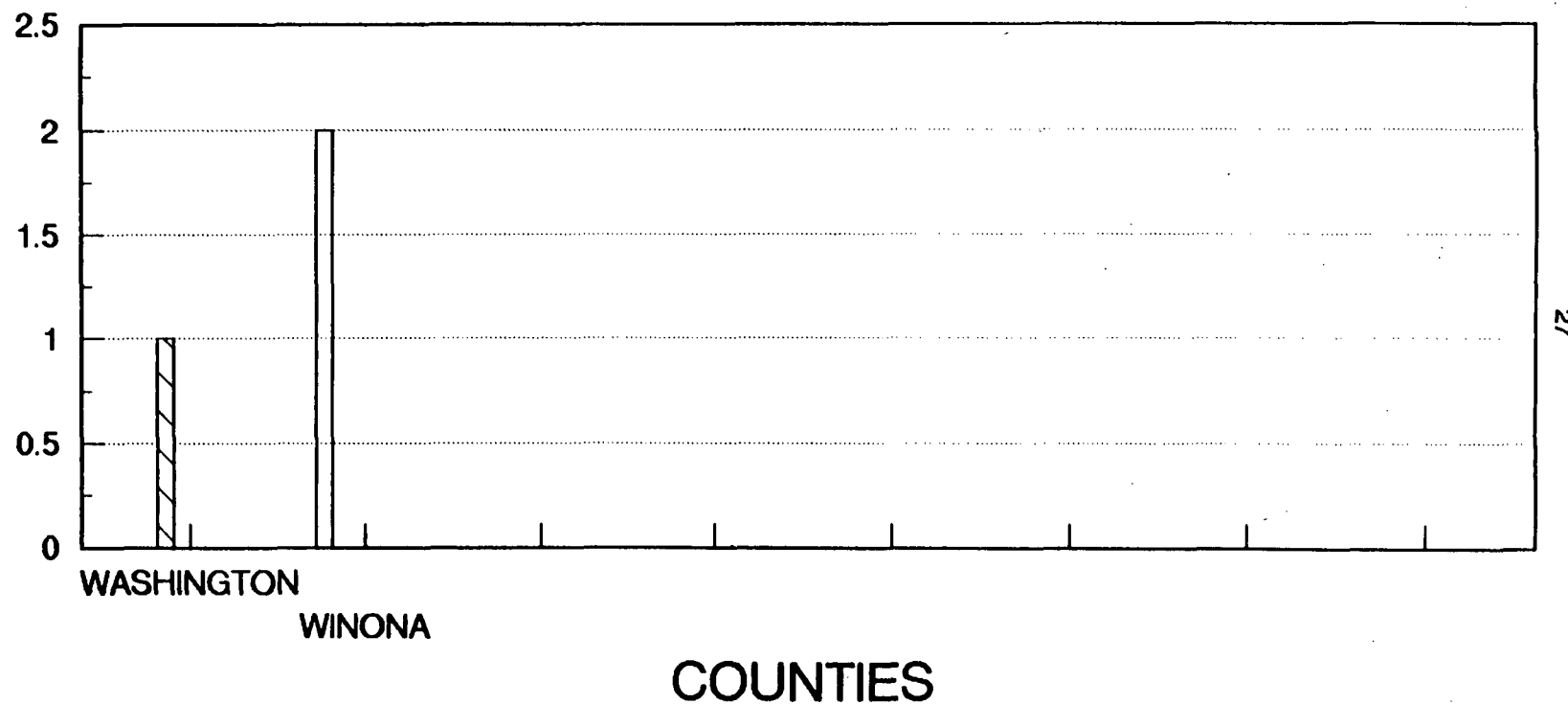
EXHIBIT C-1.3 **SUMMARY OF VOC DETECTIONS FOR SELECTED COUNTIES** **IN MINNESOTA, MINNESOTA POLLUTION CONTROL AGENCY** **NUMBER OF VOC DETECTIONS**



1982
 1983
 1984
 1985
 1986
 1987
 1988
 1989

Source: Ambient Ground-Water Monitoring Network
Minnesota Pollution Control Agency

EXHIBIT C-1.4 **SUMMARY OF VOC DETECTIONS FOR SELECTED COUNTIES** **IN MINNESOTA, MINNESOTA POLLUTION CONTROL AGENCY** **NUMBER OF VOC DETECTIONS**



1982
 1983
 1984
 1985
 1986
 1987
 1988
 1989

Source: Ambient Ground-Water Monitoring Network
 Minnesota Pollution Control Agency

was 0.0 percent and 2.5 percent for the years 1980 and 1981 respectively, which is not a significant change. Based on the above relationship, the frequency of specific VOC detections and health-based threshold exceedances may be a function of the number of samples analyzed. However, if multiple samples were frequently collected from the same wells that were suspected of contamination, the results may be biased. As a result, the distribution of VOCs in ground water at the sample locations may not adequately represent the actual distribution of VOCs in ground water county-wide or state-wide.

Exhibit C-2 graphically presents VOC detections for the four counties where USGS VOC data were available. This exhibit indicates that no historic trends in the VOC data are evident, since well samples were taken in only one or two years over this period. Moreover, the nominal span of years does not lend itself to inferring any long-term trends.

The USGS NWIS data, (see Tables D-28 through D-31 in Appendix D) provided limited insight into any trends for VOC detections or MCL threshold exceedances between 1986 and 1989, due to: (1) the small number of counties in which VOCs were monitored, and (2) infrequent sampling of wells that occurred over this period. For example, wells in Hennepin and Ramsey were sampled only in 1986 and 1988, respectively. In addition, only four of the subset of twenty-nine selected counties (Anoka, Cass, Hennepin, and Ramsey) had any VOC well monitoring data.

The pilot study did show that:

- VOC data are available at the county level,
- VOC data lend themselves to visual representation, and
- the frequency of detection of individual VOCs remained consistent across several of the counties.

However, there are many uncertainties regarding the data and the ability to make valid interpretations concerning significant trends. Conditions that contribute to this include:

- data are limited in geographic coverage;
- sampling is not consistent in geographic coverage;
- sampling is not consistent over time;
- sampling, for the most part, is on a one time basis;
- non-uniformity in securing and analyzing samples;
- sample depths vary; and
- number of samples with detections and the number of samples in which MCLs have been exceeded were recorded instead of the number of wells with detections or MCL violations.

Thus, the usefulness of these data are minimized as indicators of ground-water quality within the counties themselves, as well as across the state. The frequency of specific VOC detections and MCL exceedances as a function of the number of samples analyzed can be determined, but this analysis does not completely meet the national objective to "identify the frequency with which various VOCs are found in ground water," because of the uncertainties inherent in the data.

Revisions to the Indicator Data Collection Process

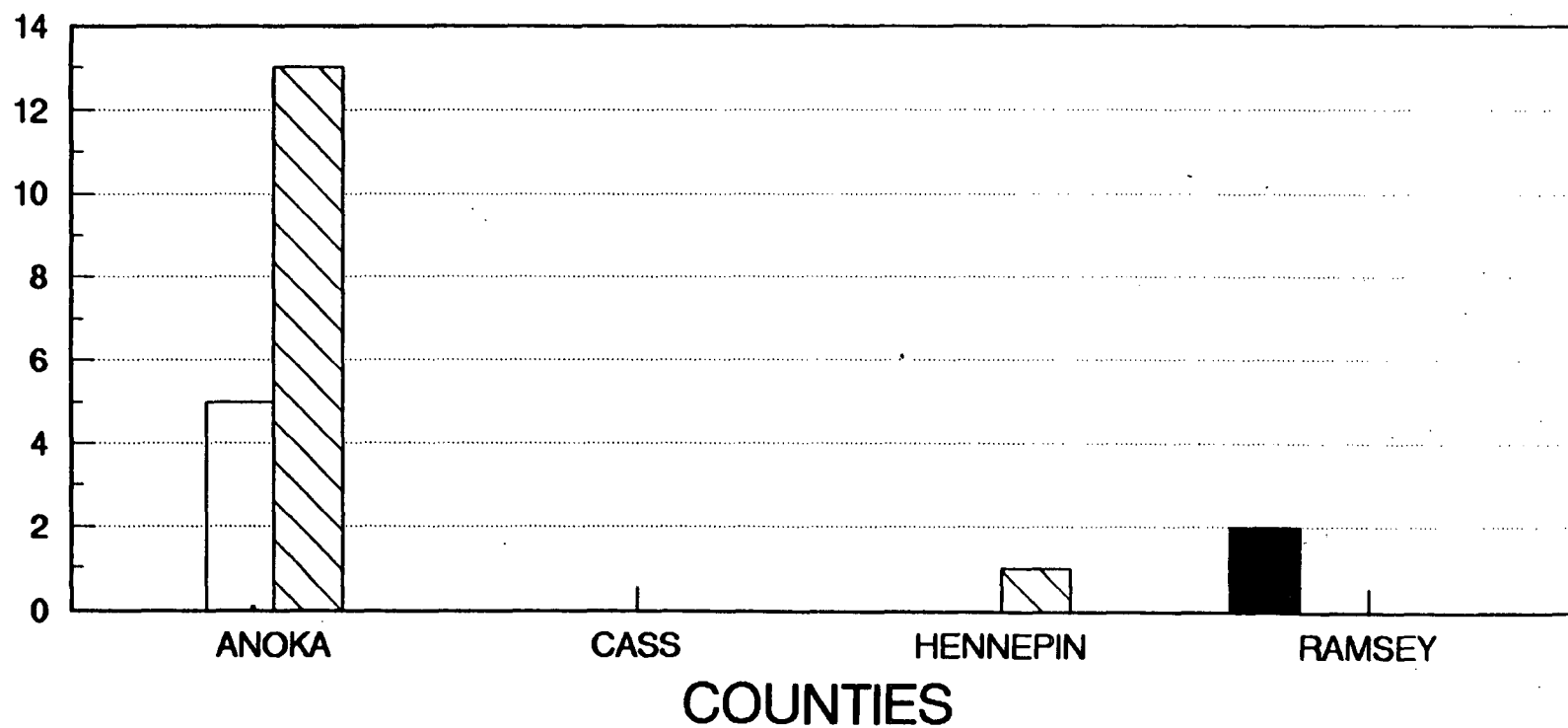
The ambient ground-water monitoring network is a good system to analyze State-wide the extent of ground-water contamination due to VOCs. However, in order to make valid analyses of temporal trends, a systematic sampling program with repeat sampling conducted over time at the same wellheads should be implemented.

EXHIBIT C-2

SUMMARY OF VOC DETECTIONS FOR SELECTED COUNTIES

IN MINNESOTA, U.S. GEOLOGICAL SURVEY

NUMBER OF DETECTIONS



1986
 1987
 1988
 1989

Source: National Water Information System (NWIS)
US Geological Survey

The approach to characterize this indicator could also be expanded to include VOC information that is currently managed in computer data bases or paper files for CERCLA and RCRA waste sites and MPCA permitted facilities to expand the data base.

Other information on VOCs provided to MPCA could be sorted and included in the analysis for the 305(b) report. This information may include testing from private drinking water wells, ground-water data collected during the design of new septic systems, results of the cleanup of underground storage tanks, and ground-water data at industrial sites.

Conclusion

Data on VOCs are available at the county-level; however, certain counties appear to have a greater quantity of VOC data than others. Furthermore, apparent trends in VOC detections in some of the counties may be explained by differences in the number of samples taken and analyzed. Thus, data on VOCs maintained in the NWIS and the Ambient Ground-Water Monitoring Network data bases are not sufficient to support the national objectives fully. A more thorough and consistent VOC sampling and analysis program should be developed to determine trends in VOC levels State-wide.

D. NITRATES

This section presents the national objectives, approach, and findings of the study of nitrates as an indicator of area-wide ground-water contamination sources in Minnesota.

National Objectives

EPA designed the nitrate indicator to support the following two national objectives:¹⁹

- identify the pattern and level of ground-water quality with respect to the area-wide sources throughout the country by identifying the geographic pattern of contamination on a county-by-county basis over a given time span, and
- display State-by-State trends over time in the area-wide quality of ground-water by identifying the number of counties, State-by-State where ground-water concentrations of nitrates are improving versus those where they are deteriorating.

The following discussion describes the data sources identified in Minnesota to address these objectives and presents and analyzes the data results.

Description of Indicator

Nitrates are commonly found in ground water in regions that are affected by area-wide sources of contamination, such as agriculture and septic systems. Nitrates can leach into ground water from normal agricultural practices (e.g., the use of nitrogen fertilizers) and wastewater disposal because of their high solubility in water and their inability to adsorb to soil particles. The detection of nitrates also can often indicate the possible presence of other ground-water contaminants. For example, a correlation between areas susceptible to nitrate contamination and those susceptible to pesticide contamination has been suggested. This is likely because chemicals that leach into ground water tend to be water soluble, poorly adsorbed by soil, and have a partial or full negative charge at ambient pH. Some pesticides (such as the triazine and acetanilide herbicides and carbamate

¹⁹ U.S.EPA Office of Ground-Water Protection, April 1989, "Indicators for Measuring Progress In Ground-Water Protection," EPA 44016-88-006.

insecticides) share these properties with nitrates. In one study completed in New Jersey, the samples collected showed higher nitrate concentrations in wells where pesticide residues were also detected.²⁰

Approximately 75 percent of the population in Minnesota relies wholly, or in part on ground water for their drinking water supply. As a result, measuring changes in nitrate concentrations over time may provide a valuable indicator of future trends in drinking water quality. In addition, high nitrate concentrations in drinking water supplies are a recognized human health concern, especially for young children. Exposure to high levels of nitrate can result in methemoglobinemia or "blue-baby syndrome." As a result, the primary drinking water standard for nitrate has been set at 10 mg/l (as nitrogen).²¹

Indicator Data Management in Minnesota

Data on nitrate concentrations in Minnesota's ground water are collected and maintained in six data bases:

- USGS District NWIS data base;
- Southeastern Minnesota Cooperative Well Testing Program reports;
- Brown-Nicollet Community Health Service voluntary testing program;
- Minnesota Pollution Control Agency's Ambient Ground Water Monitoring Network data base;
- Minnesota Department of Agriculture data bases; and
- Minnesota Department of Health reports.

The Southeastern Minnesota Cooperative Water Well Testing Program, which serves six counties in southeastern Minnesota (Dodge, Fillmore, Goodhue, Houston, Olmsted, and Wabasha), has provided water-quality analyses of private well water since 1986. The Olmsted County Health Department serves as the regional laboratory. In 1986, the laboratory expanded its capabilities, adding nitrite, chloride, sulfate, phosphate, and fluoride to its list of analytes; in 1988, the laboratory began analyzing samples for atrazine.

The Brown-Nicollet Community Health Service has sampled more than 3,000 private wells in Brown and Nicollet counties and adjacent townships in south-central Minnesota through a voluntary testing program. In this program, private well owners submit samples for analysis of nitrates as well as fecal coliform, sulfate, and chloride. Many of these wells have been sampled up to ten times; approximately 100 wells have been sampled four to five times since mid 1988.

The Minnesota Pollution Control Agency has collected ground-water samples at 450 monitoring points (wells and springs) throughout all of Minnesota's 87 counties in its Ambient Ground Water Monitoring Network (refer to Section C for description of this data source). Nitrate data were also collected in four recently completed MPCA studies, one in western Minnesota (Beardsley in Big Stone County), a second in the Garvin Brook Area of Winona County adjacent to Olmsted County, and two others in central Minnesota (Benton and Stearns Counties).

²⁰ State of New Jersey, Department of Environmental Protection, 1989. *Effect of Agricultural Chemicals on Ground-Water Quality in New Jersey Coastal Plain*, presented at a conference entitled "Pesticides in Terrestrial and Aquatic Environments," sponsored by the Virginia Water Resources Research Center, Virginia Polytechnic Institute and State University Richmond, Virginia.

²¹ 40 CFR Part 141.11

The MPCA and the Minnesota Department of Agriculture (MDA) are currently combining nitrate data from several data bases to create SAS-readable files that will be used to generate State maps displaying mean nitrate concentrations, land use, and hydrogeologic sensitivity to nitrate loading in ground water at the section level of the Public Land Survey system. The MPCA estimates that the SAS files will be complete by the end of 1990.

Between 1985 and 1987, MDA and the Minnesota Department of Health conducted cooperative surveys of water wells for selected pesticides. As part of this study, the authors determined nitrate levels in a portion of the wells and evaluated whether those levels positively correlated with the presence of the pesticides. Only 43.3 percent of the wells with detectable nitrate also had detectable levels of pesticide, and pesticides were found in 32 wells in which nitrate was not detected.

Approach for Characterizing the Nitrate Indicator

A review of the data sources described above indicated that the NWIS data base and the Ambient Ground Water Monitoring Network data base would provide the best available source of information to track trends in nitrate concentrations in Minnesota. The NWIS and Ambient Ground-Water Monitoring Network data bases were chosen because, of the six data bases examined, they provide:

- the greatest amount of data per data base;
- sites identified with geographic locators;
- the greatest number of sites per data base;
- the greatest consistency in collecting, analyzing, and reporting of data;
- the broadest State coverage;
- the broadest temporal coverage;
- existing data base documentation; and
- existing data base personnel support.

The other data sources were not evaluated due to the limited area or number of wells represented by the data or difficulty in retrieving or interpreting the data necessary to analyze nitrate concentrations. In addition, the SAS files being created to generate State maps of nitrate concentrations were not available for this study.

Data retrievals were collected from the NWIS and Ambient Ground Water Monitoring Network data bases for the entire state; however, only data from the subset of 29 counties described at the beginning of this report were selected for the analysis of nitrate concentrations. Of these twenty-nine counties, five counties were included in the USGS data retrieval (Brown, Carver, Houston, Olmstead, and Pipestone). The retrievals consisted of the following information for the year 1980 through 1989:

- wells monitored for nitrates,
- number of samples taken and analyzed for nitrates from each well,
and
- nitrate levels reported for each sample.

Study Results and Interpretation of Data

Based on the data retrieved from the Ambient Ground-Water Monitoring Network and the NWIS data bases, four types of information were derived that characterize the nitrate indicator in the counties for each of the years 1980 through 1989:

- number of wells monitored for nitrates,
- number of samples taken and analyzed for nitrates,
- number of samples with detectable levels of nitrates, and
- number of samples with nitrate concentrations in excess of the drinking water standard (10 mg/l).

Nitrate detections, as recorded in the Ambient Ground-Water Monitoring Network, were highest for the years 1982 through 1984. However, the number of samples taken were also highest for these years (see Exhibit D-1), which suggests a relationship between the number of samples analyzed and the number of detections. The annual number of samples where the nitrate concentration exceeded the MCL remained fairly constant for the 1980 to 1989 period of record.

The USGS data indicate that nitrate detections were highest overall in 1980, while Hubbard, Morrison, Otter Tail, Pope, and Wadena Counties had the highest number of nitrate detections and MCL threshold exceedances in the years 1980 through 1984. Subsequently, these counties show no detections or MCL thresholds for years 1985 through 1989, with the exception of Pope County, which indicates a slight increase in both detections and MCL exceedances. However, this may be explained by the absence of well sampling for Hubbard, Morrison, Otter Tail, and Wadena Counties in the years 1985 through 1989. Moreover, the number of wells sampled in Pope County increased over this same period. However, the number of samples taken were also highest in the these years.

Exhibit D-2 graphically presents well samples, nitrate detections and MCL exceedances as recorded in the NWIS data base for the 29 counties between 1980 and 1989. This shows nitrate detections were highest in 1980, followed by much lower detections in the following years. However, these trends shown in Exhibits D-1 and D-2 may be further explained by the relationship between the number of nitrate analyses and the number of detections, as discussed above for Pope County, which suggests a relationship between the number of samples analyzed and the number of detections.

Summaries of the nitrate data from both data bases for the twenty-nine counties are presented in Appendix E to this report.

The pilot study demonstrates that:

- nitrate data are available at the county level;
- nitrate data lend themselves to visual representation; and,
- nitrate data would allow, with time, for comparison among counties and within a county across time.

There are many unknowns concerning the data which make identification of significant trends difficult in both data sets. Conditions that contribute to this include:

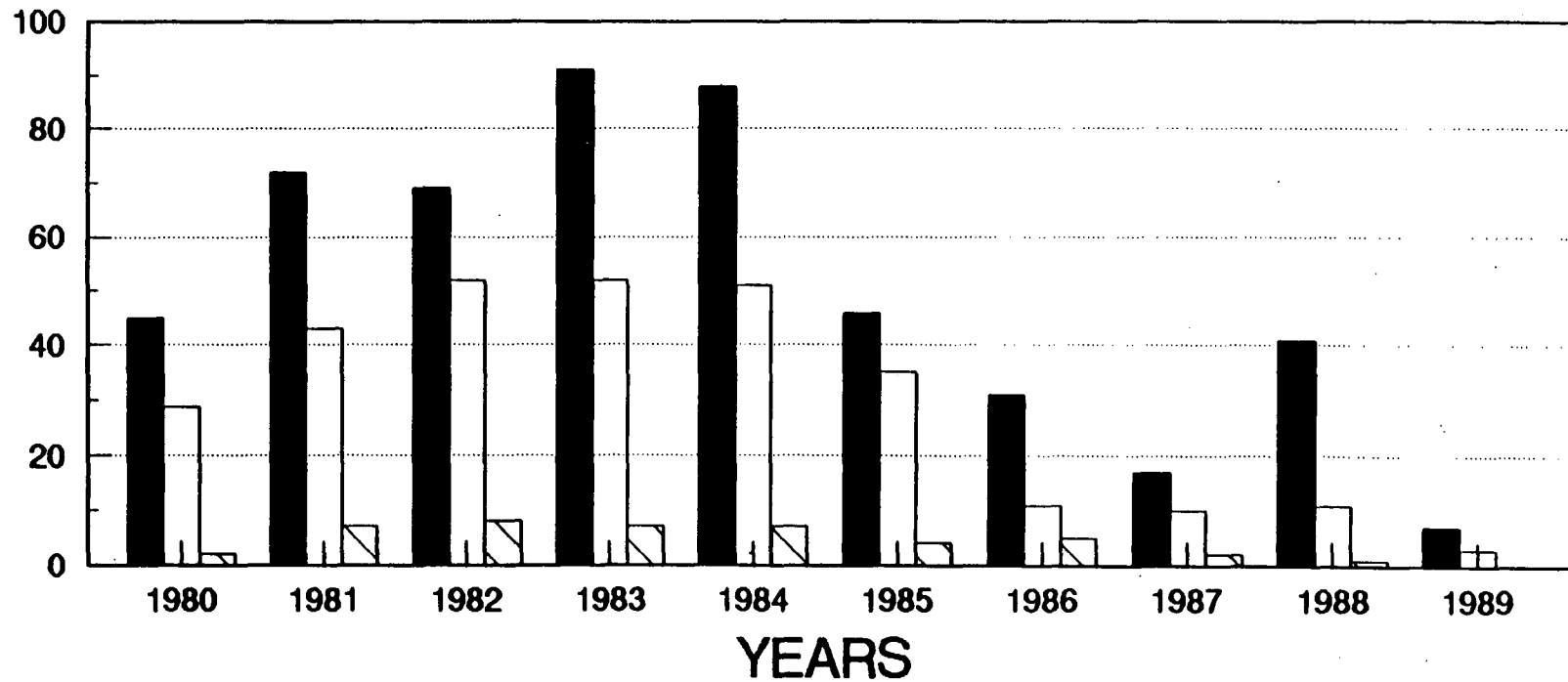
- data are limited in geographic coverage;
- sampling is not consistent in geographic coverage;
- sampling is not consistent over time;
- sampling, for the most part, is on a one-time basis;
- there is nonuniformity in securing and analyzing samples; and
- sampling depths vary.

The approach selected to collect and analyze Minnesota nitrate data focused on the use of data readily available from the Ambient Ground-Water Monitoring Network and the USGS NWIS data bases. Broad generalizations can be made from the Minnesota nitrate data, but it is necessary to understand

EXHIBIT D-1

SUMMARY OF NITRATE ANALYSES FOR SELECTED COUNTIES IN MINNESOTA, MPCA

NUMBER



SAMPLES TAKEN
 SAMPLE DETECTIONS
 MCL EXCEEDANCES

Source: Ambient Ground-water Quality Monitoring

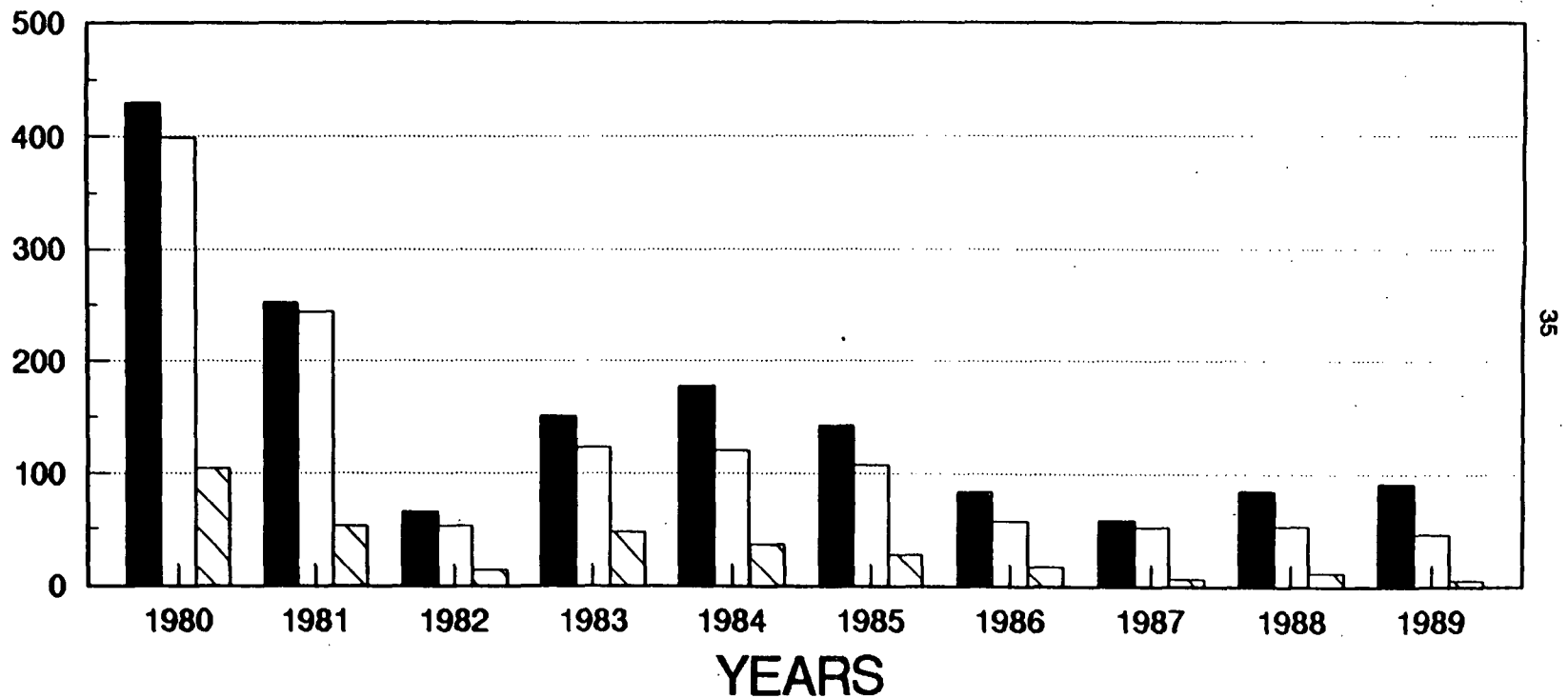
Network, Minnesota Pollution Control

MCL: 10 mg/l

EXHIBIT D-2

SUMMARY OF NITRATE ANALYSES FOR SELECTED COUNTIES IN MINNESOTA, US GEOLOGICAL SURVEY

NUMBER



SAMPLES TAKEN
 SAMPLE DETECTIONS
 MCL EXCEEDANCES

Source: National Water Information System (NWIS)

MCL 10 mg/l

that this approach does not meet the national objective to "display county-by-county trends over time in the area-wide quality of ground water by identifying the number of counties where ground-water concentrations of nitrates are improving versus those where they are deteriorating."

Revisions to the Indicator Data Collection Process

In order to collect data to meet the national objective and effectively track trends in the 305(b) reporting environment, the following recommendations are made based on the experience gained in this pilot study.

- maintain consistency in sample analyses,
- sample on an annual basis,
- develop and use a standard data collection format,
- use data bases that are consistent State-wide, and
- use data bases that are maintained by one office or bureau.

If these recommendations can be implemented on a statewide basis, with time, trend analysis could be supported.

Conclusions

Currently available Minnesota nitrate data can be used to characterize nitrate trend analysis broadly if the limitations are identified. However, the current joint effort by the MPCA and MDA to generate State maps displaying mean nitrate concentrations, land use, and hydrogeologic sensitivity to nitrate loading in ground water should meet the objective to "identify the pattern and level of ground-water quality with respect to the area-wide sources throughout the country," at the State level. In addition, continuation of the Ambient Ground-Water Monitoring Network Program should allow, with time, trend analysis at the county and the State levels.

E. EXTENT OF AGRICULTURAL PESTICIDE USE

This section presents the national objectives, description, approach and findings of the study of agricultural pesticide use as an indicator of ground-water contamination in Minnesota.

National Objectives

EPA designed the agricultural pesticide use indicator to support the following objectives:²²

- identify the relative intensity of pesticide use on a county-by-county basis,
- identify the relative vulnerability to ground-water contamination on a county-by-county basis, and
- provide an indication of where potential ground-water problems from pesticide use might occur, based on geographic patterns of use and vulnerability.

²² U.S.EPA Office of Ground-Water Protection, April 1989, "Indicators for Measuring Progress In Ground-Water Protection," EPA 44016-88-006.

The following discussion describes the manner in which this study was able to address the first three objectives with agricultural pesticide usage data collected in Minnesota.

Description of the Indicator

The use of pesticides, primarily associated with agricultural practices, has been identified as potential source of ground-water degradation. This indicator is considered to be particularly important when leachable pesticides are applied in areas where ground water may be vulnerable. The potential degradation of ground water due to the application of pesticides in Minnesota is an important issue for reasons such as those described below:

- Approximately seventy-five percent of the population of Minnesota relies on ground water for drinking water supply, and, in many areas of the State, ground water is the only available source of drinking water; and
- the diversity of agricultural crops has a corresponding diversity in the amounts and types of pesticides used.

Indicator Data Management in Minnesota

The Minnesota Agricultural Statistics Service of the U.S. Department of Agriculture conducted annual surveys of pesticide usage across the State between 1969 and 1984. A different random sampling of farmers, not stratified by county, was queried each year. Minnesota Department of Agriculture personnel, who provided information on the data, estimate a 25% response rate for 8,000-10,000 surveys mailed annually. Summaries of these data have been compiled in annual reports, but the raw data are not automated.

The MDA has also conducted annual surveys of sales of restricted use pesticides (RUPs) to private applicators since 1985. These data, which have been entered into a data base, include the customer's city, state, and zip code; the amount of RUP purchased; and the type and acreage of crop, type and number of animals, and/or type of pest to be treated or controlled.

In addition, MDA and the Minnesota Department of Health conducted cooperative surveys of water wells for selected pesticides between 1985 and 1987. These surveys were conducted to provide baseline data on the occurrence and extent of agricultural pesticide contamination in the State's ground water and drinking water. Wells were selected for sampling in agricultural regions with soils and hydrogeologic conditions that make ground water susceptible to pesticide contamination; in particular, the study focused on regions with karst aquifers and shallow sand and gravel aquifers. Minnesota Department of Agriculture sampled 100 observation, irrigation, and private drinking water wells and five drain tiles on a repeat basis, most often four samples per monitoring point. Minnesota Department of Health collected one sample from each of 400 public drinking water supply wells and resampled any wells in which pesticides were detected in the first sample. Overall, fifteen pesticides (thirteen herbicides, one insecticide, and one wood preservative) were detected in the survey. Atrazine, the most commonly detected pesticide, was found in 31 percent of the wells.²³

In 1989, the Rochester-Olmsted County Planning Department surveyed farm cooperatives in Olmsted County and in towns that sit near Olmsted's border with adjacent counties for volumes of pesticides sold.

²³ Minnesota Department of Health, and Minnesota Department of Agriculture, 1988. "Pesticides and Ground Water: Surveys of Selected Minnesota Wells."

The Minnesota Geological Survey has prepared a map identifying areas of Olmsted County that are particularly sensitive to ground-water pollution due to properties of materials covering bedrock.²⁴ Data from either or both the MDA RUP surveys and the Rochester-Olmsted County Planning Department may be cross-referenced with this map to identify areas that may be sensitive to ground-water pollution by pesticides.

Approach for Characterizing the Indicator

After the initial review of the data sources, EPA determined that the available data were too fragmented and were insufficient for characterizing the indicator in terms of the national objectives.

Revisions to the Indicator Data Collection Process

In order to collect pesticide use data to meet the national objective of this indicator it is recommended that the State develop an automated data base on pesticide use and/or purchase information. The State has an excellent opportunity to design a system that provides high quality information that can easily be used for future 305(b) reporting as well as meeting its own requirements.

F. ADDITIONAL INDICATORS IDENTIFIED BY MINNESOTA PERSONNEL

Description of the Additional Indicators

Minnesota personnel identified the use of tritium analyses to gauge the vulnerability of ground water to contamination. Tritium is the heaviest isotope of hydrogen, is weakly radioactive, and is found in the environment as the result of past atmospheric testing of nuclear weapons. Because tritium decays at a known rate, measuring the concentration of the isotope in ground water can indicate how quickly water moves from the land surface down to the aquifer. This information can then be used to estimate the recharge rate for the aquifer.

The University of Minnesota completed a tritium study in the St Peter and Prairie du Chien aquifers in 1987. Based on this study, the age of the water found in these aquifers was estimated at less than 40 years. Minnesota has also developed a proposal to sample 400 public water supply wells for tritium. The sample of wells is designed to assess recharge rates in different hydrogeologic settings. This project is still pending at this time.²⁵

²⁴ Olsen, B. and H. Hobbs, 1988. Sensitivity of the Ground-Water System to Pollution (Olmsted County). County Atlas Series, Atlas C-3, Plate 6 of 9. Minnesota Geological Survey.

²⁵ Tom Clauseus, personal communication

IV. STUDY CONCLUSIONS

EPA conducted this pilot study to determine whether the criteria for reporting ground-water indicators, as developed by the EPA workgroup, could be met with data collected for the State of Minnesota. These criteria include the following:²⁶

- indicators should be based on actual data measurement;
- indicators should lend themselves to graphic display to convey trends and other information readily;
- whenever possible, existing data should be used rather than requiring new data collection;
- data should be collected over time at the same locations; and
- data can have limitations and still be useful as an "indicator" of ground-water problems or progress.

In general, this study found that data characterizing four of the five indicators are available and that these data do lend themselves to graphic display, as depicted in this report. EPA used only existing data for this analysis, although EPA noted the need for additional data collection to better characterize several of the indicators. A summary of agencies and data bases that track indicator data in Minnesota is given in Appendix F. EPA also found that much of the ground-water monitoring data compiled for this study did not fully support trend analyses because samples were not always taken from the same locations over time. Nonetheless, EPA concluded that if the limitations are understood, data are available in Minnesota to at least partially characterize four of the five ground-water indicators. The following discussion presents specific conclusions relating to the data collected for each of the indicators.

Maximum Contaminant Levels: Data from the FRDS-II data base are sufficient to support the national objectives for this indicator. Although EPA limited this analysis to county-level summaries of MCL violation information, the analysis could be organized at different geographic levels and could include analyses of the populations potentially at risk from the violations. The population data maintained in FRDS, however, may not entirely reflect the actual size of the population exposed to a particular MCL violation.

On-Site and Off-Site Contamination at Hazardous Waste Sites: Sufficient data are available in Minnesota PLP/CERCLA files to characterize the level of contamination, the status of off-site contaminant migration, and the populations at risk for specific sites or facilities. These data are also available for RCRA facilities, but they were not provided by the State for this analysis. Minnesota has not recorded CERCLA or RCRA data in automated data management systems. Therefore, the data presented in this study were collected by the State of Minnesota and EPA from paper files and organized manually to format for presentation. Information in this report was compiled from 104 of the 166 sites on the Minnesota Permanent List of Priorities. Therefore, the on-site and off-site hazardous waste site data presented in this report represent only a portion of the extent of contamination at the Minnesota waste sites.

Volatile Organic Compounds: EPA accessed data maintained in the USGS National Water Information System and the Minnesota Ambient Ground-Water Monitoring Network to characterize this indicator. EPA was able to organize the available data at the county level and display trends in VOC

²⁶ U.S. EPA Office of Ground-Water Protection, April 1989. "Indicators for Measuring Progress in Ground-Water Protection." EPA 44016-88-006.

levels graphically. However, EPA determined that the lack of consistent repeat analyses at many of the sampled wells limited the usefulness of the data to support a State analysis. A more thorough and consistent VOC sampling and analysis program could be developed to better support analyses of trends in VOC levels State-wide.

Nitrates: EPA accessed data maintained in the USGS National Water Information System and the Minnesota Ambient Ground-Water Monitoring Network to characterize this indicator. EPA was able to organize these data at the county level and display trends in nitrate levels graphically. However, EPA determined that the lack of consistent repeat analyses at many of the sampled wells limited the usefulness of the data to support the national objectives fully. A more thorough and consistent nitrate sampling and analysis program could be developed to achieve this goal. The current effort by the State to generate maps displaying mean nitrate levels, however, should meet the objective to "identify the pattern and level of ground-water quality with respect to the area-wide sources throughout the country," at the State level. In addition, continuation of the Ambient Ground-Water Monitoring Network Program should allow trend analysis at the county and State level with time.

Pesticide Use: Sufficient data are not available in Minnesota to characterize this indicator. Therefore, EPA could not collect data to assess the extent of pesticide use State-wide. The State may wish to begin collecting information on use of pesticides for indicator reporting.

Additional Indicators: Minnesota personnel identified tritium analyses as an additional indicator of ground-water vulnerability. Minnesota has completed a tritium study in one portion of the State and has developed a proposal for completing tritium analyses in 400 public water supply wells.

The following discussion presents a summary of the general lessons learned during the course of this pilot study. The discussion first addresses the technical issues and data management practices encountered in this pilot study. The discussion then outlines suggested revisions to these existing practices that can be adopted by the State to better support future ground-water indicator reporting. Finally, the resources needed to further support indicator reporting and next steps are briefly discussed.

A. EXISTING PRACTICES

In completing this pilot study, EPA encountered a number of problems relating to the quality and availability of the compiled data which limit their application to support the indicator objectives. The problems concerning the quality of the data related both to the representativeness or geographic coverage of the data and to the procedures used to collect the analytical results. In particular, EPA identified the following technical issues:

- data are limited in geographic coverage;
- sampling is not consistent in geographic coverage;
- sampling is not consistent over time;
- securing and analyzing samples was not uniform;
- limited repeat sampling is conducted at the same location; and
- there is an insufficient volume of data particularly regarding pesticide use.

In addition to these technical issues, EPA also identified problems with regard to the way in which the collected data were managed. These data management issues limited EPA's ability to access and use the information provided by the State:

- data sources were fragmented;
- several data files were received with insufficient documentation (e.g., file format information and identifiers for specific contaminants were not provided);
- data bases were originally organized to support different objectives from those the indicators were designed to address; and
- several data files did not include Federal Information Processing Standard identifier codes as geographic locators.

B. SUGGESTED REVISIONS TO EXISTING PRACTICES TO SUPPORT INDICATOR REPORTING

EPA is strongly promoting the wider use of indicator data collection across all Federal and State programs. An EPA Task Force, with State participation, developed concrete principles and objectives to ensure effective and consistent decision-making in all Agency decisions affecting ground water, and will also institute State Comprehensive Ground-Water Protection Programs²⁷. Monitoring and data collection is one area that will be addressed.

As Minnesota continues their monitoring and data collection efforts and begin to develop comprehensive programs, it is important to keep the issues noted in the pilot study in mind. For example, sampling and analytical consistency may be promoted by establishing consistent scientific and data collection protocols and by expanding their ground-water monitoring network, as appropriate, to provide trend data. Data management activities that employ standard data collection formats for each of the indicators are already underway in Minnesota to maintain data management protocols between agencies. Cooperative efforts between EPA and Minnesota will ensure that information collection activities support the objective of protecting the nation's ground-water resources.

To begin moving toward data consistency, EPA along with the States and other Federal agency work group participants developed a set of the most critical data elements for ground-water quality information. These data elements form the foundation upon which ground-water data users may build their own data base, adding elements to meet their specific needs. The use of this minimum set of data elements (MSDE)²⁸ will ensure that EPA and the States can share and manipulate ground-water data to support better environmental decision-making, and facilitate cross-program integration.

Once adopted, these revisions could support the collection, management, and reporting of indicator data needed for future 305(b) reports.

C. RESOURCES FOR IMPLEMENTING

Initially, the resources required at the State level to implement national indicator reporting may be extensive. Minnesota cannot significantly improve its data collection and reporting without expending the necessary resources to correct deficiencies. As the State expands its Ambient Ground-Water Monitor Networks and integrates their information systems, data will become more accessible for use

²⁷ U.S. EPA, Office of the Administrator, "Protecting the Nation's Ground Water: EPA's Strategy for the 1990s," EPA 212-1020, (Washington, D.C.) July 1991.

²⁸ U.S. EPA, Office of Ground Water and Drinking Water, "Definitions for the Minimum Set of Data Elements for Ground-Water Quality," (Washington, D.C.) July 1991 (draft final).

in indicator development. Furthermore, after the information is collected and the data elements and data reporting formats for including ground-water indicators in 305(b) reports are identified and applied, the effort expended for completing the 305(b) report will be greatly reduced.

D. NEXT STEPS

This pilot study is one of three studies EPA completed investigating the use of ground-water indicators in 305(b) reports. A Findings Report has been prepared which outlines and summarizes the information and knowledge gathered in Idaho, Minnesota, and New Jersey. The Findings Report also makes recommendations regarding the implementation of indicators in future 305(b) reports. Based on these recommendations, EPA is developing a Technical Assistance Document (TAD)²⁹ to provide technical guidance to the States on how to gather and use indicator data as part of their 1992 305(b) Reports. The TAD is also intended to help set the stage for those States that are moving toward developing comprehensive ground-water monitoring and information systems, particularly in relationship to ground-water indicator reporting, and to assist those which are already in the process. The TAD is expected to be completed by early 1992.

²⁹ U.S. EPA, Office of Ground Water and Drinking Water, "Technical Assistance Document," (Washington, D.C.) September 1991 (draft).

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**APPENDIX A - NUMBER OF MCL VIOLATIONS FOR
SELECTED COUNTIES IN MINNESOTA**

Table A-1: Number of Violations of the Federal MCL for Arsenic in Minnesota, U.S. Environmental Protection Agency

COUNTY	YEAR									
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ANOKA	0	0	0	0	0	0	0	0	0	0
BROWN	0	0	0	0	0	0	0	0	0	0
CARVER	0	0	0	0	0	0	0	0	0	0
CASS	0	0	0	0	0	0	0	0	0	0
DAKOTA	0	0	0	0	0	0	0	0	0	0
DODGE	0	0	0	0	0	0	0	0	0	0
FILLMORE	0	0	0	0	0	0	0	0	0	0
GOODHUE	0	0	0	0	0	0	0	0	0	0
HENNEPIN	0	0	0	0	0	0	0	0	0	0
HOUSTON	0	0	0	0	0	0	0	0	0	0
HUBBARD	0	0	0	0	0	0	0	0	0	0
MORRISON	0	0	0	0	0	0	0	0	0	0
MOWER	0	0	0	0	0	0	0	0	0	0
NICOLLET	0	0	0	0	0	0	0	0	0	0
OLMSTEAD	0	0	0	0	0	0	0	0	0	0
OTTER TAIL	0	0	0	0	0	0	0	0	0	0
PINE	0	0	0	0	0	0	0	0	0	0
PIPESTONE	0	0	0	0	0	0	0	0	0	0
POPE	0	0	0	0	0	0	0	0	0	0
RAMSEY	0	0	0	0	0	0	0	0	0	0
RENVILLE	0	1	1	0	0	0	0	0	0	0
SCOTT	0	0	0	0	0	0	0	0	0	0
SHERBURNE	0	0	0	0	0	0	0	0	0	0
ST. LOUIS	0	0	0	0	0	0	0	0	0	0
STEARNS	0	0	0	0	0	0	0	0	0	0
WABASHA	0	0	0	0	0	0	0	0	0	0
WADENA	0	0	0	0	0	0	0	0	0	0
WASHINGTON	0	0	0	0	0	0	0	0	0	0
WINONA	0	0	0	0	0	0	0	0	0	0
TOTALS	0	1	1	0	0	0	0	0	0	0

MCL: 0.05 mg/L

Source: Federal Reporting Data System (FRDS-II), U.S. Environmental Protection Agency

Table A-2: Number of Violations of the Federal MCL for Nitrate in Minnesota, U.S. Environmental Protection Agency

County	YEAR									
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ANOKA	0	0	0	0	0	0	0	0	0	0
BROWN	0	0	0	0	0	0	0	0	0	0
CARVER	0	0	0	0	0	0	0	0	0	0
CASS	0	0	0	0	0	0	0	0	0	0
DAKOTA	0	0	0	0	0	0	0	0	0	0
DODGE	0	0	0	0	0	0	0	0	0	0
FILLMORE	0	0	0	0	0	0	0	0	0	0
GOODHUE	0	0	0	0	0	0	0	0	0	0
HENNEPIN	0	0	0	0	0	0	0	0	0	0
HOUSTON	0	0	0	0	0	0	0	0	0	0
HUBBARD	0	0	0	0	2	1	0	0	0	0
MORRISON	0	0	0	0	0	0	0	0	0	0
MOWER	0	0	0	0	0	0	0	0	0	0
NICOLLET	0	0	0	0	0	0	0	0	0	0
OLMSTEAD	0	0	0	0	0	0	0	0	0	0
OTTER TAIL	0	0	0	0	0	0	0	0	0	0
PINE	0	0	0	0	0	0	0	0	0	0
PIPESTONE	3	1	1	1	1	1	1	0	0	1
POPE	0	0	0	0	0	0	0	0	0	0
RAMSEY	0	0	0	0	0	0	0	0	0	0
RENVILLE	0	0	0	0	0	0	0	0	0	0
SCOTT	0	0	0	0	0	0	0	0	0	0
SHERBURNE	0	0	0	0	0	0	0	0	0	0
ST. LOUIS	0	0	0	0	0	0	0	0	0	0
STEARNS	0	0	0	0	0	0	0	0	0	0
WABASHA	0	0	0	0	0	0	0	0	0	0
WADENA	0	0	0	0	0	0	0	0	0	0
WASHINGTON	0	0	0	0	0	0	0	0	0	0
WINONA	0	0	0	0	0	0	0	0	0	0
TOTAL	3	1	1	1	3	2	1	0	0	1

MCL: 10 mg/L

Source: Federal Reporting Data System (FRDS-II), U.S. Environmental Protection Agency

Table A-3: Number of Violations of the Federal MCL for Total Coliform in Minnesota, U.S. Environmental Protection Agency

COUNTY	YEAR									
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ANOKA	0	0	1	0	0	0	1	0	0	0
BROWN	0	0	0	0	0	0	0	0	0	0
CARVER	1	0	0	0	0	0	0	0	0	0
CASS	0	0	0	0	0	0	0	0	0	0
DAKOTA	0	1	0	0	0	0	1	0	0	0
DODGE	0	0	0	0	0	0	0	0	0	0
FILLMORE	1	0	0	0	0	0	1	0	0	0
GOODHUE	0	0	0	0	0	0	0	0	0	0
HENNEPIN	0	1	0	0	0	1	0	0	0	0
HOUSTON	0	0	0	0	0	0	0	0	0	0
HUBBARD	0	0	0	0	0	0	0	0	0	0
MORRISON	0	0	0	0	0	0	0	0	0	0
MOWER	0	0	0	0	0	0	0	0	0	0
NICOLLET	0	0	0	0	0	0	0	0	0	0
OLMSTEAD	0	0	0	0	0	0	0	0	0	1
OTTER TAIL	0	0	0	0	1	0	0	0	0	0
PINE	0	0	0	0	0	0	0	0	0	1
PIPESTONE	0	0	0	0	0	0	1	0	0	0
POPE	0	0	0	0	0	0	0	0	0	0
RAMSEY	0	0	0	0	0	1	0	0	0	0
RENVILLE	0	0	0	0	0	1	0	0	0	1
SCOTT	0	0	0	0	0	1	1	0	0	0
SHERBURNE	0	0	0	0	0	0	0	0	1	0
ST. LOUIS	2	0	0	1	0	1	0	0	0	0
STEARNS	0	0	0	1	1	2	0	0	0	1
WABASHA	1	1	0	0	0	0	0	0	0	0
WADENA	0	0	0	0	0	0	0	0	0	0
WASHINGTON	0	0	0	0	1	0	0	0	0	0
WINONA	1	0	0	0	0	0	0	0	0	0
TOTALS	6	3	1	2	3	7	5	0	1	4

MCL: 1/100 mL

Source: Federal Reporting Data System (FRDS-II), U.S. Environmental Protection Agency

Table A-4: Number of Violations of the Federal MCL for Combined Radium in Minnesota, U.S. Environmental Protection Agency

COUNTY	YEAR									
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ANOKA	0	0	0	0	0	0	0	0	1	0
BROWN	0	0	0	0	0	0	0	0	0	0
CARVER	0	0	0	0	0	0	0	0	0	0
CASS	0	0	0	0	0	0	0	0	0	0
DAKOTA	0	0	0	0	0	0	0	0	1	0
DODGE	0	0	0	0	0	0	0	0	0	0
FILLMORE	0	0	0	0	0	0	0	0	0	0
GOODHUE	0	0	0	0	0	0	0	0	0	0
HENNEPIN	0	0	0	0	0	0	0	0	0	0
HOUSTON	0	0	0	0	0	0	0	0	0	1
HUBBARD	0	0	0	0	0	0	0	0	0	0
MORRISON	0	0	0	0	0	0	0	0	0	0
MOWER	0	0	0	0	0	0	0	0	0	0
NICOLLET	0	0	0	0	0	0	0	1	0	0
OLMSTEAD	0	0	0	0	0	0	0	0	0	0
OTTER TAIL	0	0	0	0	0	0	0	0	0	0
PINE	0	0	0	0	0	0	0	0	2	0
PIPESTONE	0	0	0	0	0	0	0	1	0	0
POPE	0	0	0	0	0	0	0	0	0	0
RAMSEY	0	0	0	0	0	0	0	0	0	0
RENVILLE	0	0	0	0	0	0	0	0	0	0
SCOTT	0	0	0	0	0	0	0	2	1	0
SHERBURNE	0	0	0	0	0	0	0	0	0	0
ST. LOUIS	0	0	0	0	0	0	0	0	0	0
STEARNS	0	0	0	0	0	0	0	0	0	0
WABASHA	0	0	0	0	0	0	0	0	0	0
WADENA	0	0	0	0	0	0	0	0	0	0
WASHINGTON	0	0	0	0	0	0	0	0	0	0
WINONA	0	0	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	4	5	1

MCL: 5 pCi/L

Source: Federal Reporting Data System (FRDS-II), U.S. Environmental Protection Agency

APPENDIX B - ENVIRONMENTAL INDICATOR QUESTIONNAIRE

Environmental Indicator Questionnaire

DATE: _____

SITE ID #: _____

SITE NAME: _____

SITE LOCATION: _____

STATE: _____

COUNTY: _____

LATITUDE: _____

LONGITUDE: _____

PROGRAM:

RCRA

CERCLA

OTHER: _____

GROUND WATER
CONTAMINANTSCONCENTRATION
LEVEL STATUS

PCB's: _____

Enter the following values for
concentrations:

PESTICIDES: _____

OTHER ORGANICS: _____

METALS: _____

CONVENTIONAL: _____

BACTERIA: _____

0 - unknown

1 - at or below detection limit

2 - above detection limit

3 - above level of concern

HAS THE PLUME BEEN DETECTED OFF-SITE?:

(yes/no/unknown)

POPULATION POTENTIALLY AT RISK (3 mile radius):

IS CONTAMINATION REACHING DRINKING WATER WELLS?:

(yes/no/unknown)

ACTUAL POPULATION AFFECTED:

**APPENDIX C - SUMMARY OF HAZARDOUS WASTE SITES
FOR MINNESOTA**

TABLE C-1: SUMMARY OF HAZARDOUS WASTE SITES FOR MINNESOTA

COUNTY	NUMBER OF SITES	CONCENTRATION LEVEL																				POPULATION WITHIN 3 MILES OF ALL SITES	NUMBER OF SITES WITH CONTAMINATED WELLS
		PCBS				PESTICIDES				SYNTHETIC ORGANICS				METALS				BACTERIA					
		NUMBER OF SITES				NUMBER OF SITES				NUMBER OF SITES				NUMBER OF SITES				NUMBER OF SITES					
Concentration Level		0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	Concentration Level	
ANOKA	6	3	3	0	0	3	3	0	0	0	0	1	5	2	0	2	2	5	1	0	0	42,280	3
CASS	3	1	1	0	1	2	1	0	0	0	0	2	1	1	1	0	1	3	0	0	0	2,076	0
CROW WING	3	2	1	0	0	3	0	0	0	0	0	0	3	1	0	2	0	3	0	0	0	22,508	0
DAKOTA	7	4	2	0	1	4	3	0	0	0	0	2	5	1	0	2	4	7	0	0	0	89,780	3
DODGE	1	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0
FILMORE	1	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0
GOODHUE	1	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	13,000	0
HENNEPIN	26	17	6	0	3	21	3	2	0	3	1	4	18	8	6	9	3	24	2	0	0	1,427,520	2
HOUSTON	2	2	0	0	0	1	1	0	0	1	0	0	1	1	1	0	0	1	1	0	0	1,500	1
HUBBARD	1	1	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0
MORRISON	1	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0
MOWER	1	1	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	1,000	1
OLMSTED	1	1	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1,200	0
OTTER TAIL	3	3	0	0	0	3	0	0	0	2	0	0	1	1	0	1	1	3	0	0	0	1,000	0
PINE	2	2	0	0	0	1	1	0	0	0	0	0	2	0	1	1	0	1	1	0	0	388	1
PIPESTONE	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0
RAMSEY	8	3	2	0	3	4	2	1	1	1	1	0	6	1	0	3	4	6	2	0	0	650,000	3
RICE	3	1	2	0	0	1	2	0	0	0	0	2	1	0	2	0	1	3	0	0	0	33,190	1
SCOTT	2	2	0	0	0	2	0	0	0	0	0	1	1	0	0	2	0	2	0	0	0	9,941	0
SHERBURNE	1	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	1	0	0	0	230	0
STEARNS	6	4	1	0	1	5	0	0	1	1	1	0	4	2	2	0	2	6	0	0	0	78,700	5
ST. LOUIS	8	4	2	0	2	6	1	1	0	1	0	0	7	1	1	0	6	8	0	0	0	76,680	1
WABASHA	1	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	270	0
WADENA	3	2	1	0	0	2	1	0	0	2	0	0	1	1	1	0	1	2	1	0	0	1,020	1
WASHINGTON	9	8	1	0	0	7	1	0	1	0	0	1	8	3	1	2	3	8	0	1	0	214,616	4
WINONA	3	2	0	0	1	2	1	0	0	0	2	0	1	1	1	1	0	3	0	0	0	24,438	1

TOTAL	104	68	23	1	12	75	21	4	4	13	5	15	71	26	18	29	31	94	8	2	0	2,721,337	27
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0 =unknown/not analyzed

1 =at/below detection limit

2 =above detection limit

3 =above level of concern (MCL, health advisory, or other action level)

Source: Permanent List of Pirotirites, Minneosta Pollution Control Agency, 1990.

**APPENDIX D - SUMMARY OF VOC DATA FOR
SELECTED COUNTIES IN MINNESOTA**

Table D-1.1: Summary of VOC Detections for Anoka County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
			No.		No.		No.		No.		No.		No.		No.		No.		No.		
		No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets
		No.	Takn	Sam	Exc	No.	Takn	Sam	Exc	No.	Takn	Sam	Exc	No.	Takn	Sam	Exc	No.	Takn	Sam	Exc
		Well	Anlz	Dets	HBT	Well	Anlz	Dets	HBT	Well	Anlz	Dets	HBT	Well	Anlz	Dets	HBT	Well	Anlz	Dets	HBT
		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
VOLATILE ORGANIC CHEMICALS																					
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	3	3	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	3	3	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	3	3	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	3	3	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	3	3	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	3	3	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	3	3	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	3	3	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	3	3	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	3	3	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	3	3	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	3	3	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	3	3	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	3	3	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	3	3	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	3	3	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	3	3	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	3	3	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	3	3	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	3	3	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	3	3	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	3	3	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	3	3	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	3	3	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	3	3	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	3	3	2	2
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	3	3	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		54	0	0		81	2	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-1.2: Summary of VOC Detections for Anoka County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.		
		Takn	Sam	Exc	HBT	Takn	Sam	Exc	HBT	Takn	Sam	Exc	HBT	Takn	Sam	Exc	HBT	Takn	Sam	Exc	HBT
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	2	2	0	NT	4	4	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	2	2	0	0	4	4	0	0	0	0	0	0	1	1	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	2	2	0	0	4	4	0	0	0	0	0	0	1	1	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	2	2	0	0	4	4	0	0	0	0	0	0	1	1	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	2	2	0	NT	4	4	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	2	2	0	0	4	4	0	0	0	0	0	0	1	1	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	2	2	0	NT	4	4	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	2	2	0	NT	4	4	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	2	2	0	0	4	4	0	0	0	0	0	0	1	1	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	2	2	0	0	4	4	0	0	1	1	1	0	1	1	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	2	2	0	0	4	4	0	0	0	0	0	0	1	1	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	2	2	0	0	4	4	0	0	0	0	0	0	1	1	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	2	2	0	NT	4	4	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	2	2	0	0	4	4	0	0	0	0	0	0	1	1	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	2	2	0	NT	4	4	0	NT	1	1	1	NT	1	1	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	2	2	0	0	4	4	0	0	1	1	1	1	1	1	0	0	-	-	-	-
(2)	CHLOROBENZENE	2	2	0	0	4	4	0	0	1	1	1	1	1	1	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	2	2	0	NT	4	4	0	NT	1	1	1	NT	1	1	0	NT	-	-	-	NT
NT	CHLOROFORM	2	2	0	NT	4	4	0	NT	1	1	1	NT	1	1	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	2	2	0	NT	4	4	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	2	2	0	NT	4	4	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	2	2	0	0	4	4	0	0	1	1	1	0	1	1	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	2	2	0	0	4	4	0	0	1	1	1	1	1	1	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	2	2	0	NT	4	4	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	2	2	0	NT	4	4	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
TOTALS			50	0	0		100	0	0		8	8	3		25	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-2.1: Summary of VOC Detections for Brown County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
			No.		No.		No.		No.		No.		No.		No.		No.		No.		
		No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets
		No.	Anlz	Sam	Exc	No.	Anlz	Sam	Exc	No.	Anlz	Sam	Exc	No.	Anlz	Sam	Exc	No.	Anlz	Sam	Exc
		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
VOLATILE ORGANIC CHEMICALS																					
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	0	0	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	0	0	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	0	0	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	0	0	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	0	0	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	0	0	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	0	0	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	0	0	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	0	0	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	0	0	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	0	0	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	0	0	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	0	0	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	0	0	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	0	0	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	0	0	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	0	0	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	0	0	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	0	0	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	0	0	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	0	0	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	0	0	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	0	0	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	0	0	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	0	0	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	0	0	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	0	0	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		81	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-2.2: Summary of VOC Detections for Brown County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			0	0	0		75	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

" - " Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-3.1: Summary of VOC Detections for Carver County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT
			Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	1	1	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	1	1	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	1	1	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	1	1	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	1	1	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	1	1	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	1	1	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	1	1	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	1	1	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	1	1	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	1	1	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	1	1	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	1	1	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	1	1	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	1	1	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	1	1	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	1	1	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	1	1	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	1	1	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	1	1	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	1	1	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	1	1	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	1	1	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	1	1	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	1	1	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	1	1	1	1
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	1	1	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		81	0	0		27	1	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - * Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL
 (2) Health Based Threshold is based on Proposed Federal MCL
 (3) Health Based Threshold is based on Federal Ambient Water Quality Criteria
 NT No Health Based Threshold Available

(A) Number of Wells
 (B) Number of Samples Taken and Analyzed
 (C) Number of Sample Detections
 (D) Number of Detections that Exceed the HBT

Table D-3.2: Summary of VOC Detections for Carver County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT
			(A)	(B)	(C)		(D)	(A)	(B)		(C)	(D)	(A)		(B)	(C)	(D)		(A)	(B)	(C)
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	0	0	0	NT	1	1	1	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			0	0	0		25	1	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-4.1: Summary of VOC Detections for Cass County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
(2)	1,2-TRANS-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	1	1
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		0	0	0		54	1	1

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"-" Signifies that Data are Missing for that Year

- (1) Health Based Threshold (HBT) is based on Final Federal MCL
 (2) Health Based Threshold is based on Proposed Federal MCL
 (3) Health Based Threshold is based on Federal Ambient Water Quality Criteria
 NT No Health Based Threshold Available

- (A) Number of Wells
 (B) Number of Samples Taken and Analyzed
 (C) Number of Sample Detections
 (D) Number of Detections that Exceed the HBT

Table D-4.2: Summary of VOC Detections for Cass County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICALS																					
NT	1,1,1,2-TETRACHLOROETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			25	0	0		0	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT: No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-5.1: Summary of VOC Detections for Dakota County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	6	6	0	NT	0	0	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	6	6	0	0	0	0	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	6	6	0	0	0	0	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	6	6	0	0	0	0	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	6	6	0	NT	0	0	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	6	6	0	0	0	0	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	6	6	0	NT	0	0	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	6	6	0	NT	0	0	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	6	6	0	NT	0	0	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	6	6	0	0	0	0	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	6	6	0	0	0	0	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	6	6	0	0	0	0	0	0
(2)	1,2-TRANS-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	6	6	0	0	0	0	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	6	6	0	NT	0	0	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	6	6	0	NT	0	0	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	6	6	0	0	0	0	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	6	6	0	NT	0	0	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	6	6	0	NT	0	0	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	6	6	0	0	0	0	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	6	6	0	0	0	0	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	6	6	0	NT	0	0	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	6	6	0	NT	0	0	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	6	6	0	NT	0	0	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	6	6	0	NT	0	0	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	6	6	0	0	0	0	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	6	6	0	0	0	0	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	6	6	0	NT	0	0	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		162	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

" - " Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-5.2: Summary of VOC Detections for Dakota County(1985 – 1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
			No.		No.		No.		No.		No.		No.		No.		No.		No.		
		No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets
		Well	Anlz	Sam	Exc	Well	Anlz	Sam	Exc	Well	Anlz	Sam	Exc	Well	Anlz	Sam	Exc	Well	Anlz	Sam	Exc
		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
VOLATILE ORGANIC CHEMICALS																					
NT	1,1,1,2-TETRACHLOROETHANE	8	8	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	8	8	0	0	2	2	0	0	0	0	0	0	2	2	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	8	8	0	0	2	2	0	0	0	0	0	0	2	2	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	8	8	0	0	2	2	0	0	0	0	0	0	2	2	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	8	8	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	8	8	0	0	2	2	0	0	0	0	0	0	2	2	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	8	8	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	8	8	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	8	8	0	0	2	2	0	0	0	0	0	0	2	2	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	8	8	0	0	2	2	0	0	0	0	0	0	2	2	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	8	8	0	0	2	2	0	0	0	0	0	0	2	2	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	8	8	0	0	2	2	0	0	0	0	0	0	2	2	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	8	8	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	8	8	0	0	2	2	0	0	0	0	0	0	2	2	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	8	8	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	8	8	0	0	2	2	0	0	0	0	0	0	2	2	0	0	-	-	-	-
(2)	CHLOROBENZENE	8	8	0	0	2	2	0	0	0	0	0	0	2	2	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	8	8	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
NT	CHLOROFORM	8	8	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	8	8	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	8	8	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	8	8	0	0	2	2	0	0	0	0	0	0	2	2	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	8	8	0	0	2	2	0	0	0	0	0	0	2	2	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	8	8	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	8	8	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
TOTALS			200	0	0		50	0	0		0	0	0		50	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT: No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-6.1: Summary of VOC Detections for Dodge County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Anlz	No. Sam Dets	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	1	1	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	1	1	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	1	1	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	1	1	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	1	1	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	1	1	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	1	1	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	1	1	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	1	1	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	1	1	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	1	1	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	1	1	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	1	1	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		0	0	0		27	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - * Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-6.2: Summary of VOC Detections for Dodge County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT
			Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			0	0	0		0	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-7.1: Summary of VOC Detections for Fillmore County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	3	3	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	3	3	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	3	3	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	3	3	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	2	2	0	NT	0	0	0	NT	3	3	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	3	3	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	3	3	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	3	3	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	3	3	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	3	3	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	3	3	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	3	3	0	0
(2)	1,2-TRANS-DICHLOROETHENE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	3	3	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	2	2	0	NT	0	0	0	NT	3	3	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	3	3	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	3	3	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	3	3	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	2	2	0	NT	0	0	0	NT	3	3	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	3	3	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	3	3	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	2	2	0	NT	0	0	0	NT	3	3	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	2	2	0	NT	0	0	0	NT	3	3	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	3	3	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	3	3	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	3	3	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	3	3	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	3	3	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		38	0	0		0	0	0		81	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

" - " Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-7.2: Summary of VOC Detections for Fillmore County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets
			Takn				Anlz				Exc				HBT				Takn		
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	3	3	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	3	3	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	3	3	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	3	3	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	3	3	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	3	3	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	3	3	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	3	3	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	3	3	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	3	3	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	3	3	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	3	3	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	3	3	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	3	3	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	3	3	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	3	3	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	3	3	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	3	3	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	3	3	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	3	3	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	3	3	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	3	3	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	3	3	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	3	3	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	3	3	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			75	0	0		50	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT: No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-8.1: Summary of VOC Detections for Goodhue County (1980 - 1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well (A)	No. Sam Takn Anlz (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)	No. Well (A)	No. Sam Takn Anlz (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)	No. Well (A)	No. Sam Takn Anlz (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)	No. Well (A)	No. Sam Takn Anlz (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)				
			VOLATILE ORGANIC CHEMICALS																		
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	10	10	0	NT	0	0	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	10	10	0	0	0	0	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	10	10	0	0	0	0	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	10	10	0	0	0	0	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	10	10	0	NT	0	0	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	10	10	0	0	0	0	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	10	10	0	NT	0	0	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	10	10	0	NT	0	0	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	10	10	0	NT	0	0	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	10	10	0	0	0	0	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	10	10	0	0	0	0	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	10	10	0	0	0	0	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	10	10	0	0	0	0	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	10	10	0	NT	0	0	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	10	10	0	NT	0	0	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	10	10	0	0	0	0	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	10	10	0	NT	0	0	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	10	10	0	NT	0	0	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	10	10	0	0	0	0	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	10	10	0	0	0	0	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	10	10	0	NT	0	0	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	10	10	1	NT	0	0	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	10	10	0	NT	0	0	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	10	10	0	NT	0	0	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	10	10	0	0	0	0	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	10	10	0	0	0	0	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	10	10	0	NT	0	0	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		270	1	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

" - " Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-8.2: Summary of VOC Detections for Goodhue County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.		
		Well	Takn	Sam	Exc	Well	Takn	Sam	Exc	Well	Takn	Sam	Exc	Well	Takn	Sam	Exc	Well	Takn	Sam	Exc
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	0	0	0	NT	3	3	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			0	0	0		73	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - * Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-9.1: Summary of VOC Detections for Hennepin County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well (A)	No. Sam Takn Anlz (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)	No. Well (A)	No. Sam Takn Anlz (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)	No. Well (A)	No. Sam Takn Anlz (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)	No. Well (A)	No. Sam Takn Anlz (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)				
			VOLATILE ORGANIC CHEMICALS																		
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	5	6	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	5	6	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	5	6	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	5	6	1	1
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	5	6	1	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	5	6	1	1
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	5	6	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	5	6	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	5	6	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	5	6	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	5	6	1	1
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	5	6	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	5	6	1	1
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	5	6	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	5	5	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	5	6	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	5	5	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	5	6	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	5	6	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	5	6	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	5	6	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	5	6	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	5	6	2	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	5	6	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	5	6	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	3	3	0	0	5	6	1	1
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	3	3	0	NT	5	6	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		81	0	0		161	8	5

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

" - " Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-9.2: Summary of VOC Detections for Hennepin County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.		
		Well	Takn	Sam	Dets	Well	Takn	Sam	Dets	Well	Takn	Sam	Dets	Well	Takn	Sam	Dets	Well	Takn	Sam	Dets
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	5	5	0	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	5	5	0	0	0	0	0	0	0	0	0	0	2	2	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	5	5	0	0	0	0	0	0	0	0	0	0	2	2	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	5	5	0	0	0	0	0	0	0	0	0	0	2	2	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	5	5	0	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	5	5	0	0	0	0	0	0	0	0	0	0	2	2	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	5	5	0	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	5	5	0	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	5	5	0	0	0	0	0	0	0	0	0	0	2	2	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	5	5	0	0	0	0	0	0	0	0	0	0	2	2	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	5	5	0	0	0	0	0	0	0	0	0	0	2	2	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	5	5	0	0	0	0	0	0	0	0	0	0	2	2	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	5	5	0	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	5	5	0	0	0	0	0	0	0	0	0	0	2	2	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	5	5	0	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	5	5	0	0	0	0	0	0	0	0	0	0	2	2	0	0	-	-	-	-
(2)	CHLOROBENZENE	5	5	0	0	0	0	0	0	0	0	0	0	2	2	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	5	5	0	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
NT	CHLOROFORM	5	5	0	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	5	5	0	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	5	5	0	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	5	5	0	0	0	0	0	0	0	0	0	0	2	2	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	5	5	0	0	0	0	0	0	0	0	0	0	2	2	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	5	5	0	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	5	5	0	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT	-	-	-	NT
TOTALS			125	0	0		0	0	0		0	0	0		50	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-10.1: Summary of VOC Detections for Houston County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT
			Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	2	2	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	2	2	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	2	2	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	2	2	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	2	2	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	2	2	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	2	2	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	2	2	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	2	2	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	2	2	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	1	0	2	2	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	2	2	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	2	2	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	2	2	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	2	2	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	2	2	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	2	2	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	2	2	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	2	2	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	2	2	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	2	2	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	2	2	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	2	2	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	2	2	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	2	2	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	2	2	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	2	2	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		108	1	0		54	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-10.2: Summary of VOC Detections for Houston County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets
			Takn				Exc				Anlz				Exc				Takn		
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			0	0	0		50	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-11.1: Summary of VOC Detections for Hubbard County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets
			Takn		Exc		Anlz		Takn		Exc		Anlz		Takn		Exc		Anlz		Takn
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	6	6	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	6	6	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	6	6	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	6	6	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	6	6	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	6	6	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	6	6	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	6	6	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	6	6	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	6	6	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	6	6	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	6	6	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	6	6	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	6	6	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	6	6	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	6	6	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	6	6	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	6	6	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	6	6	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	6	6	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	6	6	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	6	6	1	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	6	6	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	6	6	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	6	6	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	6	6	1	1
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	6	6	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		0	0	0		162	2	1

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-11.2: Summary of VOC Detections for Hubbard County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			0	0	0		0	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

" - " Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-12.1: Summary of VOC Detections for Morrison County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT
			Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	8	8	0	NT	1	1	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	8	8	0	0	1	1	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	8	8	0	0	1	1	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	8	8	0	0	1	1	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	8	8	0	NT	1	1	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	8	8	0	0	1	1	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	8	8	0	NT	1	1	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	8	8	0	NT	1	1	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	8	8	0	NT	1	1	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	8	8	0	0	1	1	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	8	8	0	0	1	1	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	8	8	0	0	1	1	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	8	8	0	0	1	1	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	8	8	0	NT	1	1	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	8	8	0	NT	1	1	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	8	8	0	0	1	1	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	8	8	0	NT	1	1	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	8	8	0	NT	1	1	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	8	8	0	0	1	1	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	8	8	0	0	1	1	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	8	8	0	NT	1	1	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	8	8	0	NT	1	1	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	8	8	0	NT	1	1	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	8	8	0	NT	1	1	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	8	8	0	0	1	1	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	8	8	0	0	1	1	1	1
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	8	8	0	NT	1	1	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		216	0	0		27	1	1

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-12.2: Summary of VOC Detections for Morrison County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No. Well	No. Sam	No. Sam	No. Dets Exc HBT	No. Well	No. Sam	No. Sam	No. Dets Exc HBT	No. Well	No. Sam	No. Sam	No. Dets Exc HBT	No. Well	No. Sam	No. Sam	No. Dets Exc HBT	No. Well	No. Sam	No. Sam	No. Dets Exc HBT
			Takn Anlz				Takn Anlz				Takn Anlz				Takn Anlz				Takn Anlz		
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			25	0	0		0	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

" - " Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-13.1: Summary of VOC Detections for Mower County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam	No. Dets	No. Dets	No. Well	No. Sam	No. Dets	No. Dets	No. Well	No. Sam	No. Dets	No. Dets	No. Well	No. Sam	No. Dets	No. Dets	No. Well	No. Sam	No. Dets	No. Dets
			Takn	Sam	Exc		HBT	Takn	Sam		Exc	HBT	Takn		Sam	Exc	HBT		Takn	Sam	Exc
		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
VOLATILE ORGANIC CHEMICALS																					
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	5	5	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	5	5	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	5	5	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	5	5	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	5	5	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	5	5	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	5	5	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	5	5	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	5	5	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	5	5	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	5	5	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	5	5	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	5	5	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	5	5	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	5	5	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	5	5	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	5	5	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	5	5	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	5	5	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	5	5	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	5	5	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	5	5	1	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	5	5	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	5	5	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	5	5	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	5	5	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	5	5	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		0	0	0		135	1	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-13.2: Summary of VOC Detections for Mower County (1985-1989), Minnesota Pollution Control Agency (Continued)

	1985				1986				1987				1988				1989			
	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICALS																				
NT 1,1,1,2-TETRACHLOROETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1) 1,1,1-TRICHLOROETHANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3) 1,1,2,2-TETRACHLOROETHANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2) 1,1,2-TRICHLOROETHANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT 1,1-DICHLOROETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1) 1,1-DICHLOROETHENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT 1,1-DICHLOROPROPENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT 1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT 1,2-DIBROMOMETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2) 1,2-DICHLOROBENZENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1) 1,2-DICHLOROETHANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2) 1,2-DICHLOROPROPANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2) 1,2-TRANS-DICHLOROETHENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT 1,3-DICHLOROBENZENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT 1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1) 1,4-DICHLOROBENZENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT 2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT BROMOFORM	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1) CARBON TETRACHLORIDE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2) CHLOROBENZENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT CHLORODIBROMOMETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT CHLOROFORM	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT CIS-1,2-DICHLOROETHENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT CIS-1,3-DICHLOROPROPENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2) ETHYLBENZENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2) METHYLENE CHLORIDE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT TRANS-1,3-DICHLOROPROPENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT TRICHLOROFLUOROMETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS		25	0	0		0	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-14.1: Summary of VOC Detections for Olmsted County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT
			(A)	(B)	(C)		(D)	(A)	(B)		(C)	(D)	(A)		(B)	(C)	(D)		(A)	(B)	(C)
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	3	0	NT	0	0	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	2	3	0	0	0	0	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	2	3	0	0	0	0	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	2	3	0	0	0	0	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	3	0	NT	0	0	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	2	3	0	0	0	0	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	3	0	NT	0	0	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	3	0	NT	0	0	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	3	0	NT	0	0	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	2	3	0	0	0	0	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	2	3	0	0	0	0	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	2	3	0	0	0	0	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	2	3	0	0	0	0	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	3	0	NT	0	0	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	3	0	NT	0	0	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	2	3	0	0	0	0	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	3	0	NT	0	0	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	3	0	NT	0	0	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	2	3	0	0	0	0	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	2	3	0	0	0	0	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	3	0	NT	0	0	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	3	0	NT	0	0	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	3	0	NT	0	0	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	3	0	NT	0	0	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	2	3	0	0	0	0	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	2	3	0	0	0	0	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	3	0	NT	0	0	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		81	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - * Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-14.2: Summary of VOC Detections fo Olmsted County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989				
		No. Well	No. Sam Tkn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Tkn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Tkn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Tkn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Tkn	No. Sam Dets	No. Dets Exc HBT	
			(A)	(B)	(C)		(D)	(A)	(B)		(C)	(D)	(A)		(B)	(C)	(D)		(A)	(B)	(C)	(D)
VOLATILE ORGANIC CHEMICALS																						
NT	1,1,1,2-TETRACHLOROETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
(1)	1,1,1-TRICHLOROETHANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
(3)	1,1,2,2-TETRACHLOROETHANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
(2)	1,1,2-TRICHLOROETHANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
NT	1,1-DICHLOROETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
(1)	1,1-DICHLOROETHENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
NT	1,1-DICHLOROPROPENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
NT	1,2-DIBROMOMETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
(2)	1,2-DICHLOROBENZENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
(1)	1,2-DICHLOROETHANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
(2)	1,2-DICHLOROPROPANE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
(2)	1,2-TRANSDICHLOROETHENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
NT	1,3-DICHLOROBENZENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
(1)	1,4-DICHLOROBENZENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
NT	BROMOFORM	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
(1)	CARBON TETRACHLORIDE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
(2)	CHLOROBENZENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
NT	CHLORODIBROMOMETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
NT	CHLOROFORM	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
NT	CIS-1,2-DICHLOROETHENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
NT	CIS-1,3-DICHLOROPROPENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
(2)	ETHYLBENZENE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
(2)	METHYLENE CHLORIDE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
NT	TRANS-1,3-DICHLOROPROPENE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
NT	TRICHLOROFLUOROMETHANE	1	1	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
TOTALS			25	0	0		0	0	0		0	0	0		0	0	0		0	0	0	

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-15.1 Summary of VOC Detections for Ottertail County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT
	VOLATILE ORGANIC CHEMICALS	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	5	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	5	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	5	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	5	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	5	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	5	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	5	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	5	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	5	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	5	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	5	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	5	0	0
(2)	1,2-TRANS-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	5	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	5	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	5	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	5	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	5	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	5	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	5	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	5	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	5	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	5	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	5	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	5	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	5	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	5	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	5	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
	TOTALS		0	0	0		0	0	0		0	0	0		0	0	0		135	0	0

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Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - * Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL
 (2) Health Based Threshold is based on Proposed Federal MCL
 (3) Health Based Threshold is based on Federal Ambient Water Quality Criteria
 NT No Health Based Threshold Available

(A) Number of Wells
 (B) Number of Samples Taken and Analyzed
 (C) Number of Sample Detections
 (D) Number of Detections that Exceed the HBT

Table D-15.2: Summary of VOC Detections for Ottertail County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No. Well	No. Sam	No. No.	No. Dets	No. Well	No. Sam	No. No.	No. Dets	No. Well	No. Sam	No. No.	No. Dets	No. Well	No. Sam	No. No.	No. Dets	No. Well	No. Sam	No. No.	No. Dets
			Takn	Sam	Exc		Takn	Sam	Exc		Takn	Sam	Exc		Takn	Sam	Exc		Takn	Sam	Exc
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			0	0	0		0	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-16.1: Summary of VOC Detections for Pine County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	1	1	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	1	1	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	1	1	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	1	1	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	1	1	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	1	1	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	1	1	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	1	1	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	1	1	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	1	1	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	1	1	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	1	1	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	2	2	0	0	0	0	0	0	1	1	1	1
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		38	0	0		0	0	0		27	1	1

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-16.2: Summary of VOC Detections for Pine County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.		
		Takn	Sam	Dets	Exc	Takn	Sam	Dets	Exc	Takn	Sam	Dets	Exc	Takn	Sam	Dets	Exc	Takn	Sam	Dets	Exc
		No. Well	Anlz	Dets	HBT	No. Well	Anlz	Dets	HBT	No. Well	Anlz	Dets	HBT	No. Well	Anlz	Dets	HBT	No. Well	Anlz	Dets	HBT
		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
VOLATILE ORGANIC CHEMICALS																					
NT	1,1,1,2-TETRACHLOROETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			0	0	0		0	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-17.1: Summary of VOC Detections for Pipestone County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Takn	No. Sam Dets	No. Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Exc HBT
			Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	1	1	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	1	1	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	1	1	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	1	1	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	1	1	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	1	1	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	1	1	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	1	1	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	1	1	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	1	1	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	1	1	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	1	1	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	1	1	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	1	1	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	1	1	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	1	1	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	1	1	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	1	1	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	1	1	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	1	1	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	1	1	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	1	1	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	1	1	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	1	1	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	1	1	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	1	1	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	1	1	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		27	0	0		27	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - * Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-17.2: Summary of VOC Detections for Pipestone County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No.		No.		No.		No.		No.		No.		No.		No.					
		Well	Takn	Sam	Exc	Well	Takn	Sam	Exc	Well	Takn	Sam	Exc	Well	Takn	Sam	Exc	Well	Takn	Sam	Exc
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			0	0	0		0	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - * Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-18.1: Summary of VOC Detections for Pope County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Tkn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Tkn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Tkn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Tkn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Tkn	No. Sam Dets	No. Dets Exc HBT
			Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	7	7	0	0	0	0	0	0	0	0	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	7	7	0	0	0	0	0	0	0	0	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	7	7	0	0	0	0	0	0	0	0	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	7	7	0	NT	0	0	0	NT	0	0	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	7	7	0	0	0	0	0	0	0	0	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	7	7	0	0	0	0	0	0	0	0	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	7	7	0	0	0	0	0	0	0	0	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	7	7	0	0	0	0	0	0	0	0	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	7	7	0	0	0	0	0	0	0	0	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	7	7	0	NT	0	0	0	NT	0	0	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	7	7	0	0	0	0	0	0	0	0	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	7	7	0	NT	0	0	0	NT	0	0	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	7	7	0	0	0	0	0	0	0	0	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	7	7	0	0	0	0	0	0	0	0	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	7	7	0	NT	0	0	0	NT	0	0	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	7	7	0	NT	0	0	0	NT	0	0	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	7	7	0	0	0	0	0	0	0	0	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	7	7	0	0	0	0	0	0	0	0	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	7	7	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		133	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - * Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-18.2: Summary of VOC Detections for Pope County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No. Well	No. Sam	No. Dets	No. Exc	No. Well	No. Sam	No. Dets	No. Exc	No. Well	No. Sam	No. Dets	No. Exc	No. Well	No. Sam	No. Dets	No. Exc	No. Well	No. Sam	No. Dets	No. Exc
			Takn	Sam	HBT		Takn	Sam	HBT		Takn	Sam	HBT		Takn	Sam	HBT		Takn	Sam	HBT
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	0	0	0	NT	6	6	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	0	0	0	NT	6	6	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	0	0	0	NT	6	6	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	0	0	0	NT	6	6	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	0	0	0	NT	6	6	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	0	0	0	NT	6	6	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	0	0	0	NT	6	6	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	0	0	0	NT	6	6	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	0	0	0	NT	6	6	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	6	6	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	6	6	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	0	0	0	NT	6	6	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			0	0	0		150	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-19.1: Summary of VOC Detections for Ramsey County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	0	0	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	0	0	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	0	0	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	0	0	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	0	0	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	0	0	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	0	0	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	0	0	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	0	0	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	0	0	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	0	0	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	0	0	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	0	0	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	0	0	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	0	0	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	0	0	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	0	0	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	0	0	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	0	0	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	0	0	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	0	0	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	0	0	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	0	0	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	0	0	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	0	0	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	0	0	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	0	0	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		108	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - * Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-19.2: Summary of VOC Detections for Ramsey County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT
			(A)	(B)	(C)		(D)	(A)	(B)		(C)	(D)	(A)		(B)	(C)	(D)		(A)	(B)	(C)
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	6	6	0	NT	1	1	0	NT	0	0	0	NT	5	5	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	6	6	1	0	1	1	0	0	0	0	0	0	5	5	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	6	6	0	0	1	1	0	0	0	0	0	0	5	5	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	6	6	0	0	1	1	0	0	0	0	0	0	5	5	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	6	6	0	NT	1	1	0	NT	0	0	0	NT	5	5	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	6	6	0	0	1	1	0	0	0	0	0	0	5	5	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	6	6	0	NT	1	1	0	NT	0	0	0	NT	5	5	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	6	6	0	NT	1	1	0	NT	0	0	0	NT	5	5	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	6	6	0	0	1	1	0	0	0	0	0	0	5	5	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	6	6	0	0	1	1	0	0	0	0	0	0	5	5	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	6	6	0	0	1	1	0	0	0	0	0	0	5	5	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	6	6	0	0	1	1	0	0	0	0	0	0	5	5	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	6	6	0	NT	1	1	0	NT	0	0	0	NT	5	5	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	6	6	0	0	1	1	0	0	0	0	0	0	5	5	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	6	6	0	NT	1	1	0	NT	0	0	0	NT	5	5	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	6	6	0	0	1	1	0	0	0	0	0	0	5	5	0	0	-	-	-	-
(2)	CHLOROBENZENE	6	6	0	0	1	1	0	0	0	0	0	0	5	5	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	6	6	0	NT	1	1	0	NT	0	0	0	NT	5	5	0	NT	-	-	-	NT
NT	CHLOROFORM	6	6	0	NT	1	1	0	NT	0	0	0	NT	5	5	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	6	6	0	NT	1	1	0	NT	0	0	0	NT	5	5	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	6	6	0	NT	1	1	0	NT	0	0	0	NT	5	5	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	6	6	0	0	1	1	0	0	0	0	0	0	5	5	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	6	6	0	0	1	1	0	0	0	0	0	0	5	5	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	6	6	0	NT	1	1	0	NT	0	0	0	NT	5	5	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	6	6	0	NT	1	1	0	NT	0	0	0	NT	5	5	0	NT	-	-	-	NT
TOTALS			150	1	0		25	0	0		0	0	0		125	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-20.1: Summary of VOC Detections for Renville County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
			No.		No.		No.		No.		No.		No.		No.		No.		No.		
		No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets
		No.	Takn	Sam	Exc	No.	Takn	Sam	Exc	No.	Takn	Sam	Exc	No.	Takn	Sam	Exc	No.	Takn	Sam	Exc
		Well	Anlz	Dets	HBT	Well	Anlz	Dets	HBT	Well	Anlz	Dets	HBT	Well	Anlz	Dets	HBT	Well	Anlz	Dets	HBT
		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
VOLATILE ORGANIC CHEMICALS																					
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	0	0	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	0	0	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	0	0	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	0	0	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	0	0	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	0	0	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	0	0	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	0	0	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	0	0	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	0	0	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	0	0	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	0	0	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	0	0	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	0	0	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	0	0	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	0	0	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	0	0	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	0	0	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	0	0	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	0	0	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	0	0	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	0	0	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	0	0	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	0	0	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	0	0	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	2	2	0	0	0	0	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	2	2	0	NT	0	0	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		54	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-20.2: Summary of VOC Detections for Renville County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets
			Takn	Exc	HBT		Takn	Exc	HBT		Takn	Exc	HBT		Takn	Exc	HBT		Takn	Exc	HBT
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			0	0	0		50	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-21.1: Summary of VOC Detections for Scott County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT
			(A)	(B)	(C)		(D)	(A)	(B)		(C)	(D)	(A)		(B)	(C)	(D)		(A)	(B)	(C)
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	2	2	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	2	2	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	2	2	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	2	2	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	2	2	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	2	2	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	2	2	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	2	2	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	2	2	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	2	2	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	2	2	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	2	2	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	2	2	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	2	2	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	2	2	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	2	2	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	2	2	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	2	2	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	2	2	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	2	2	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	2	2	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	2	2	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	2	2	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	2	2	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	2	2	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	1	1	0	0	2	2	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	2	2	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		27	0	0		54	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - Signifies that Data are Missing for that Year

- (1) Health Based Threshold (HBT) is based on Final Federal MCL
 (2) Health Based Threshold is based on Proposed Federal MCL
 (3) Health Based Threshold is based on Federal Ambient Water Quality Criteria
 NT No Health Based Threshold Available

- (A) Number of Wells
 (B) Number of Samples Taken and Analyzed
 (C) Number of Sample Detections
 (D) Number of Detections that Exceed the HBT

Table D-21.2: Summary of VOC Detections for Scott County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets	No. Well	No. Sam	No. Sam	No. Dets
			Takn		Exc		HBT		Takn		Exc		HBT		Takn		Exc		HBT		Takn
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	0	0	0	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0	-	-	-	-
(2)	CHLOROBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
NT	CHLOROFORM	0	0	0	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	1	1	0	NT	-	-	-	NT
TOTALS			0	0	0		50	0	0		0	0	0		25	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

" - " Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT: No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-22.1: Summary of VOC Detections for Sherburne County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well (A)	No. Sam Takn (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)	No. Well (A)	No. Sam Takn (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)	No. Well (A)	No. Sam Takn (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)	No. Well (A)	No. Sam Takn (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)	No. Well (A)	No. Sam Takn (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)
VOLATILE ORGANIC CHEMICALS																					
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	4	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	4	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	4	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	4	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	4	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	4	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	4	0	0
(2)	1,2-TRANS-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	4	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	4	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	4	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	4	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	4	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	4	4	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		0	0	0		108	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL
 (2) Health Based Threshold is based on Proposed Federal MCL
 (3) Health Based Threshold is based on Federal Ambient Water Quality Criteria
 NT No Health Based Threshold Available

(A) Number of Wells
 (B) Number of Samples Taken and Analyzed
 (C) Number of Sample Detections
 (D) Number of Detections that Exceed the HBT

Table D-22.2: Summary of VOC Detections for Sherburne County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
			No.		No.		No.		No.		No.		No.		No.		No.		No.		
		No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets
		Well	Anlz	Sam	Exc	Well	Anlz	Sam	Exc	Well	Anlz	Sam	Exc	Well	Anlz	Sam	Exc	Well	Anlz	Sam	Exc
		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
VOLATILE ORGANIC CHEMICALS																					
NT	1,1,1,2-TETRACHLOROETHANE	1	1	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	1	1	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	1	1	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	1	1	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	1	1	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	1	1	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	1	1	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	1	1	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	1	1	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	1	1	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	1	1	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	1	1	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			25	0	0		25	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-23.1: Summary of VOC Detections for Stearns County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well (A)	No. Sam Takn Anlz (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)	No. Well (A)	No. Sam Takn Anlz (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)	No. Well (A)	No. Sam Takn Anlz (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)	No. Well (A)	No. Sam Takn Anlz (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)	No. Well (A)	No. Sam Takn Anlz (B)	No. Sam Dets (C)	No. Dets Exc HBT (D)
			VOLATILE ORGANIC CHEMICALS																		
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	2	2	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		0	0	0		54	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT: No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-23.2: Summary of VOC Detections for Stearns County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No. Well	No. Sam Takn Anlz	No. Dets Sam Anlz	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Dets Sam Anlz	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Dets Sam Anlz	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Dets Sam Anlz	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Dets Sam Anlz	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANS-DICHLOROETHENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			0	0	0		0	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - * Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-24.1: Summary of VOC Detections for Wabasha County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	0	0	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	1	1	0	0	1	1	0	0	0	0	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	1	1	0	0	1	1	0	0	0	0	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	1	1	0	0	1	1	0	0	0	0	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	1	1	0	NT	1	1	0	NT	0	0	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	1	1	0	0	1	1	0	0	0	0	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	0	0	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	0	0	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	0	0	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	1	1	0	0	1	1	0	0	0	0	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	1	1	0	0	1	1	0	0	0	0	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	1	1	0	0	1	1	0	0	0	0	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	1	1	0	0	1	1	0	0	0	0	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	1	1	0	NT	1	1	0	NT	0	0	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	0	0	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	1	1	0	0	1	1	0	0	0	0	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	0	0	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	1	1	0	NT	1	1	0	NT	0	0	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	1	1	0	0	1	1	0	0	0	0	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	1	1	0	0	1	1	0	0	0	0	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	1	1	0	NT	1	1	0	NT	0	0	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	1	1	0	NT	1	1	0	NT	0	0	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	0	0	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	0	0	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	1	1	0	0	1	1	0	0	0	0	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	1	1	0	0	1	1	1	1	0	0	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	1	1	0	NT	0	0	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		19	0	0		27	1	1		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - * Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-24.2: Summary of VOC Detections for Wabasha County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989				
		No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	
			(A)	(B)	(C)		(D)	(A)	(B)		(C)	(D)	(A)		(B)	(C)	(D)		(A)	(B)	(C)	(D)
VOLATILE ORGANIC CHEMICALS																						
NT	1,1,1,2-TETRACHLOROETHANE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
(1)	1,1,1-TRICHLOROETHANE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
NT	1,1-DICHLOROETHANE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
(1)	1,1-DICHLOROETHENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
NT	1,1-DICHLOROPROPENE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
NT	1,2-DIBROMOMETHANE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
(2)	1,2-DICHLOROBENZENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
(1)	1,2-DICHLOROETHANE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
(2)	1,2-DICHLOROPROPANE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
(2)	1,2-TRANSDICHLOROETHENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
NT	1,3-DICHLOROBENZENE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
(1)	1,4-DICHLOROBENZENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
NT	BROMOFORM	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
(1)	CARBON TETRACHLORIDE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
(2)	CHLOROBENZENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
NT	CHLORODIBROMOMETHANE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
NT	CHLOROFORM	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
NT	CIS-1,2-DICHLOROETHENE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
(2)	ETHYLBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
(2)	METHYLENE CHLORIDE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-	
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
NT	TRICHLOROFLUOROMETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT	
TOTALS			0	0	0		30	0	0		0	0	0		0	0	0		0	0	0	

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-25.1: Summary of VOC Detections for Wadena County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	10	10	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	10	10	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	10	10	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	10	10	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	10	10	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	10	10	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	10	10	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	10	10	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	10	10	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	10	10	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	10	10	1	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	10	10	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	10	10	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	10	10	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	10	10	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	10	10	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	10	10	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	10	10	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	10	10	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	10	10	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	10	10	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	10	10	1	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	10	10	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	10	10	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	10	10	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	4	4	0	0	10	10	1	1
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	4	4	0	NT	10	10	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		108	0	0		270	3	1

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-25.2: Summary of VOC Detections for Wadena County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No. Well	No. Sam	No. No.	No. Dets	No. Well	No. Sam	No. No.	No. Dets	No. Well	No. Sam	No. No.	No. Dets	No. Well	No. Sam	No. No.	No. Dets	No. Well	No. Sam	No. No.	No. Dets
			Takn	Sam	Exc		Takn	Sam	Exc		Takn	Sam	Exc		Takn	Sam	Exc		Takn	Sam	Exc
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			0	0	0		50	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - * Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-26.1: Summary of VOC Detections for Washington County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	7	7	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	7	7	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	7	7	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	7	7	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	7	7	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	7	7	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	7	7	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	7	7	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	7	7	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	7	7	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	7	7	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	7	7	0	0
(2)	1,2-TRANSDICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	7	7	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	7	7	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	6	6	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	7	7	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	6	6	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	7	7	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	7	7	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	7	7	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	7	7	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	7	7	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	7	7	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	7	7	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	7	7	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	0	0	0	0	7	7	1	1
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	7	7	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	1	1	0	NT
TOTALS			0	0	0		0	0	0		0	0	0		0	0	0	188	1	1	

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - * Signifies that Data are Missing for that Year

- (1) Health Based Threshold (HBT) is based on Final Federal MCL
 (2) Health Based Threshold is based on Proposed Federal MCL
 (3) Health Based Threshold is based on Federal Ambient Water Quality Criteria
 NT No Health Based Threshold Available

- (A) Number of Wells
 (B) Number of Samples Taken and Analyzed
 (C) Number of Sample Detections
 (D) Number of Detections that Exceed the HBT

Table D-26.2: Summary of VOC Detections for Washington County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No.		No.		No.		No.		No.		No.		No.		No.					
		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.				
VOLATILE ORGANIC CHEMICALS		No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets
		Well	Anlz	Sam	Exc	Well	Anlz	Sam	Exc	Well	Anlz	Sam	Exc	Well	Anlz	Sam	Exc	Well	Anlz	Sam	Exc
		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	4	4	0	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	4	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	4	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	4	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	4	4	0	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	4	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	4	4	0	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	4	4	0	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	4	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	4	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	4	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	4	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	4	4	0	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	4	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	4	4	0	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	4	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0	-	-	-	-
(2)	CHLOROBENZENE	4	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	4	4	0	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT	-	-	-	NT
NT	CHLOROFORM	4	4	0	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	4	4	0	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	4	4	0	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	4	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	4	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	4	4	0	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	4	4	0	NT	0	0	0	NT	0	0	0	NT	4	4	0	NT	-	-	-	NT
TOTALS			100	0	0		0	0	0		0	0	0		100	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

* - Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-27.1: Summary of VOC Detections for Winona County (1980-1984), Minnesota Pollution Control Agency

		1980				1981				1982				1983				1984			
		No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	9	10	0	NT	0	0	0	NT
(1)	1,1,1-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	9	10	0	0	0	0	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	9	10	0	0	0	0	0	0
(2)	1,1,2-TRICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	9	10	0	0	0	0	0	0
NT	1,1-DICHLOROETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	9	10	0	NT	0	0	0	NT
(1)	1,1-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	9	10	0	0	0	0	0	0
NT	1,1-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	9	10	0	NT	0	0	0	NT
NT	1,2,3-TRICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	9	10	0	NT	0	0	0	NT
NT	1,2-DIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	9	10	0	NT	0	0	0	NT
(2)	1,2-DICHLOROBENZENE	-	-	-	-	-	-	-	-	14	14	0	0	9	10	0	0	0	0	0	0
(1)	1,2-DICHLOROETHANE	-	-	-	-	-	-	-	-	0	0	0	0	9	10	2	0	0	0	0	0
(2)	1,2-DICHLOROPROPANE	-	-	-	-	-	-	-	-	0	0	0	0	9	10	0	0	0	0	0	0
(2)	1,2-TRANS-DICHLOROETHENE	-	-	-	-	-	-	-	-	0	0	0	0	9	10	0	0	0	0	0	0
NT	1,3-DICHLOROBENZENE	-	-	-	NT	-	-	-	NT	14	14	0	NT	9	10	0	NT	0	0	0	NT
NT	1,3-DICHLOROPROPANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	9	10	0	NT	0	0	0	NT
(1)	1,4-DICHLOROBENZENE	-	-	-	-	-	-	-	-	14	14	0	0	9	10	0	0	0	0	0	0
NT	2-CHLOROETHYL VINYL ETHER	-	-	-	NT	-	-	-	NT	0	0	0	NT	9	10	0	NT	0	0	0	NT
NT	BROMOFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	9	10	0	NT	0	0	0	NT
(1)	CARBON TETRACHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	9	10	0	0	0	0	0	0
(2)	CHLOROBENZENE	-	-	-	-	-	-	-	-	0	0	0	0	9	10	0	0	0	0	0	0
NT	CHLORODIBROMOMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	9	10	0	NT	0	0	0	NT
NT	CHLOROFORM	-	-	-	NT	-	-	-	NT	0	0	0	NT	9	10	0	NT	0	0	0	NT
NT	CIS-1,2-DICHLOROETHENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	9	10	0	NT	0	0	0	NT
NT	CIS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	9	10	0	NT	0	0	0	NT
(2)	ETHYLBENZENE	-	-	-	-	-	-	-	-	14	14	0	0	9	10	0	0	0	0	0	0
(2)	METHYLENE CHLORIDE	-	-	-	-	-	-	-	-	0	0	0	0	9	10	0	0	0	0	0	0
NT	TRANS-1,3-DICHLOROPROPENE	-	-	-	NT	-	-	-	NT	0	0	0	NT	9	10	0	NT	0	0	0	NT
NT	TRICHLOROFLUOROMETHANE	-	-	-	NT	-	-	-	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			0	0	0		0	0	0		56	0	0		270	2	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold (HBT) is based on Final Federal MCL
 (2) Health Based Threshold is based on Proposed Federal MCL
 (3) Health Based Threshold is based on Federal Ambient Water Quality Criteria
 NT No Health Based Threshold Available

(A) Number of Wells
 (B) Number of Samples Taken and Analyzed
 (C) Number of Sample Detections
 (D) Number of Detections that Exceed the HBT

Table D-27.2: Summary of VOC Detections for Winona County (1985-1989), Minnesota Pollution Control Agency (Continued)

		1985				1986				1987				1988				1989			
		No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn	No. Sam Dets	No. Dets Exc HBT
			Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz		Anlz	Anlz	Anlz
VOLATILE ORGANIC CHEMICALS		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
NT	1,1,1,2-TETRACHLOROETHANE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1,1-TRICHLOROETHANE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROETHANE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,1-DICHLOROETHENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,1-DICHLOROPROPENE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2,3-TRICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,2-DIBROMOMETHANE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(1)	1,2-DICHLOROETHANE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-DICHLOROPROPANE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	1,2-TRANSDICHLOROETHENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	1,3-DICHLOROBENZENE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	1,3-DICHLOROPROPANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	2-CHLOROETHYL VINYL ETHER	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	BROMOFORM	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(1)	CARBON TETRACHLORIDE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	CHLOROBENZENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	CHLORODIBROMOMETHANE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CHLOROFORM	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,2-DICHLOROETHENE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
(2)	ETHYLBENZENE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
(2)	METHYLENE CHLORIDE	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	-	-	-
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
NT	TRICHLOROFLUOROMETHANE	0	0	0	NT	1	1	0	NT	0	0	0	NT	0	0	0	NT	-	-	-	NT
TOTALS			0	0	0		25	0	0		0	0	0		0	0	0		0	0	0

Source: Ambient Ground-Water Monitoring Network, Minnesota Pollution Control Agency

"- " Signifies that Data are Missing for that Year

(1) Health Based Threshold is based on Final Federal MCL

(2) Health Based Threshold is based on Proposed Federal MCL

(3) Health Based Threshold is based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-28: Summary of VOC Detections for Anoka County, U.S. Geological Survey

		1986				1987				1988				1989			
		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
		Well	Takn	Sam	Dets	Well	Takn	Sam	Dets	Well	Takn	Sam	Dets	Well	Takn	Sam	Dets
VOLATILE ORGANIC CHEMICAL		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
(1)	BENZENE	0	0	0	0	4	4	0	0	9	11	4	0	0	0	0	0
(1)	CARBONTETRACHLORIDE	0	0	0	0	4	4	0	0	9	11	0	0	0	0	0	0
(2)	CHLOROBENZENE	0	0	0	0	4	4	0	0	9	11	0	0	0	0	0	0
NT	CHLOROETHANE	0	0	0	NT	4	4	1	NT	9	11	1	NT	0	0	0	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	4	4	0	NT	9	11	0	NT	0	0	0	NT
NT	DICHLORODIFLUOROMETHANE	0	0	0	NT	4	4	0	NT	9	11	0	NT	0	0	0	NT
(2)	ETHYLBENZENE	0	0	0	0	4	4	0	0	9	11	0	0	0	0	0	0
(2)	TOLUENE	0	0	0	0	4	4	0	0	9	11	1	0	0	0	0	0
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	4	4	0	NT	9	11	0	NT	0	0	0	NT
NT	1,1-DICHLOROETHANE	0	0	0	NT	4	4	2	NT	9	11	4	NT	0	0	0	NT
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	4	4	0	0	9	11	0	0	0	0	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	4	4	0	0	9	11	0	0	0	0	0	0
NT	1,2-DIBROMOMETHANE	0	0	0	NT	0	0	0	NT	2	2	0	NT	0	0	0	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	4	4	0	0	9	11	0	0	0	0	0	0
(1)	1,2-DICHLOROETHANE	0	0	0	0	4	4	2	0	9	11	3	0	0	0	0	0
(2)	1,2-DICHLOROPROPANE	0	0	0	0	4	4	0	0	9	11	0	0	0	0	0	0
NT	1,3-DICHLOROBENZENE	0	0	0	NT	4	4	0	NT	9	11	0	NT	0	0	0	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	4	4	0	0	9	11	0	0	0	0	0	0
TOTALS			0	0	0		68	5	0		189	13	0		0	0	0

Source: National Water Data Storage and Retrieval System (WATSTORE),
U.S. Geological Survey

- (1) Health Based Threshold is Based on Final Federal MCL
 (2) Health Based Threshold is Based on Proposed Federal MCL
 (3) Health Based Threshold is Based on Federal Ambient Water Quality Criteria
 NT No Health Based Threshold Available

- (A) Number of Wells
 (B) Number of Samples Taken and Analyzed
 (C) Number of Sample Detections
 (D) Number of Detections that Exceed the HBT

Table D-29: Summary of VOC Detections for Cass County, U.S. Geological Survey

		1986				1987				1988				1989			
		No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICAL		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
(1)	BENZENE	0	0	0	0	2	2	0	0	0	0	0	0	2	2	0	0
(1)	CARBONTETRACHLORIDE	0	0	0	0	2	2	0	0	0	0	0	0	2	2	0	0
(2)	CHLOROBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	2	2	0	0
NT	CHLOROETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT
NT	DICHLORODIFLUOROMETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT
(2)	ETHYLBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	2	2	0	0
(2)	TOLUENE	0	0	0	0	2	2	0	0	0	0	0	0	2	2	0	0
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT
NT	1,1-DICHLOROETHANE	0	0	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	2	2	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	2	2	0	0
NT	1,2-DIBROMOMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	2	2	0	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	2	2	0	0
(1)	1,2-DICHLOROETHANE	0	0	0	0	2	2	0	0	0	0	0	0	2	2	0	0
(2)	1,2-DICHLOROPROPANE	0	0	0	0	2	2	0	0	0	0	0	0	2	2	0	0
NT	1,3-DICHLOROBENZENE	0	0	0	NT	2	2	0	NT	0	0	0	NT	2	2	0	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	2	2	0	0	0	0	0	0	2	2	0	0
TOTALS			0	0	0		34	0	0		0	0	0		36	0	0

Source: National Water Data Storage and Retrieval System (WATSTORE),
U.S. Geological Survey

- (1) Health Based Threshold is Based on Final Federal MCL
 (2) Health Based Threshold is Based on Proposed Federal MCL
 (3) Health Based Threshold is Based on Federal Ambient Water Quality Criteria
 NT No Health Based Threshold Available

- (A) Number of Wells
 (B) Number of Samples Taken and Analyzed
 (C) Number of Sample Detections
 (D) Number of Detections that Exceed the HBT

Table D-30: Summary of VOC Detections for Hennepin County, U.S. Geological Survey

		1986				1987				1988				1989			
		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
		Well	Takn Anlz	Sam Dets	Exc HBT	Well	Takn Anlz	Sam Dets	Exc HBT	Well	Takn Anlz	Sam Dets	Exc HBT	Well	Takn Anlz	Sam Dets	Exc HBT
VOLATILE ORGANIC CHEMICAL		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
(1)	BENZENE	0	0	0	0	0	0	0	0	3	4	1	0	0	0	0	0
(1)	CARBONTETRACHLORIDE	0	0	0	0	0	0	0	0	3	4	0	0	0	0	0	0
(2)	CHLOROBENZENE	0	0	0	0	0	0	0	0	3	4	0	0	0	0	0	0
NT	CHLOROETHANE	0	0	0	NT	0	0	0	NT	3	4	0	NT	0	0	0	NT
NT	CIS-1,3-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	3	4	0	NT	0	0	0	NT
NT	DICHLORODIFLUOROMETHANE	0	0	0	NT	0	0	0	NT	3	4	0	NT	0	0	0	NT
(2)	ETHYLBENZENE	0	0	0	0	0	0	0	0	3	4	0	0	0	0	0	0
(2)	TOLUENE	0	0	0	0	0	0	0	0	3	4	0	0	0	0	0	0
NT	TRANS-1,3-DICHLOROPROPENE	0	0	0	NT	0	0	0	NT	3	4	0	NT	0	0	0	NT
NT	1,1-DICHLOROETHANE	0	0	0	NT	0	0	0	NT	3	4	0	NT	0	0	0	NT
(2)	1,1,2-TRICHLOROETHANE	0	0	0	0	0	0	0	0	3	4	0	0	0	0	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	0	0	0	0	0	0	0	0	3	4	0	0	0	0	0	0
NT	1,2-DIBROMOMETHANE	0	0	0	NT	0	0	0	NT	3	4	0	NT	0	0	0	NT
(2)	1,2-DICHLOROBENZENE	0	0	0	0	0	0	0	0	3	4	0	0	0	0	0	0
(1)	1,2-DICHLOROETHANE	0	0	0	0	0	0	0	0	3	4	0	0	0	0	0	0
(2)	1,2-DICHLOROPROPANE	0	0	0	0	0	0	0	0	3	4	0	0	0	0	0	0
NT	1,3-DICHLOROBENZENE	0	0	0	NT	0	0	0	NT	3	4	0	NT	0	0	0	NT
(1)	1,4-DICHLOROBENZENE	0	0	0	0	0	0	0	0	3	4	0	0	0	0	0	0
TOTALS			0	0	0		0	0	0		72	1	0		0	0	0

Source: National Water Data Storage and Retrieval System (WATSTORE),
U.S. Geological Survey

(1) Health Based Threshold is Based on Final Federal MCL

(2) Health Based Threshold is Based on Proposed Federal MCL

(3) Health Based Threshold is Based on Federal Ambient Water Quality Criteria

NT No Health Based Threshold Available

(A) Number of Wells

(B) Number of Samples Taken and Analyzed

(C) Number of Sample Detections

(D) Number of Detections that Exceed the HBT

Table D-31: Summary of VOC Detections for Ramsey County, U.S. Geological Survey

		1986				1987				1988				1989			
		No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT	No. Well	No. Sam Takn Anlz	No. Sam Dets	No. Dets Exc HBT
VOLATILE ORGANIC CHEMICAL		(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)
(1)	BENZENE	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	CARBONTETRACHLORIDE	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(2)	CHLOROBENZENE	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	CHLOROETHANE	5	5	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
NT	CIS-1,3-DICHLOROPROPENE	5	5	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
NT	DICHLORODIFLUOROMETHANE	5	5	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
(2)	ETHYLBENZENE	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(2)	TOLUENE	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	TRANS-1,3-DICHLOROPROPENE	5	5	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
NT	1,1-DICHLOROETHANE	5	5	2	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
(2)	1,1,2-TRICHLOROETHANE	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(3)	1,1,2,2-TETRACHLOROETHANE	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	1,2-DIBROMOMETHANE	0	0	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
(2)	1,2-DICHLOROBENZENE	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	1,2-DICHLOROETHANE	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(2)	1,2-DICHLOROPROPANE	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NT	1,3-DICHLOROBENZENE	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(1)	1,4-DICHLOROBENZENE	5	5	0	NT	0	0	0	NT	0	0	0	NT	0	0	0	NT
TOTALS			85	2	0		0	0	0		0	0	0		0	0	0

Source: National Water Data Storage and Retrieval System (WATSTORE),
U.S. Geological Survey

(1) Health Based Threshold is Based on Final Federal MCL
(2) Health Based Threshold is Based on Proposed Federal MCL
(3) Health Based Threshold is Based on Federal Ambient Water Quality Criteria
NT No Health Based Threshold Available

(A) Number of Wells
(B) Number of Samples Taken and Analyzed
(C) Number of Sample Detections
(D) Number of Detections that Exceed the HBT

ERRATA

The preceding tables list 1,2-TRANSDICHLOROETHENE as a VOC sampled by the Minnesota Pollution Control Agency. They should read TRANS-1,2-DICHLOROETHENE.

In addition, MPCA provided the following information on VOC detections to supplement the data presented in the tables:

Acetone

County	Year	Number of Wells	Number of Samples Taken and Analyzed	Number of Sample Detections
Pope	1982	7	7	0
	1986	6	6	1

Benzene

County	Year	Number of Wells	Number of Samples Taken and Analyzed	Number of Sample Detections
Sherburne	1984	4	4	0
	1985	1	1	0
		1	1	1

Bromodichloromethane

County	Year	Number of Wells	Number of Samples Taken and Analyzed	Number of Sample Detections
Wadena	1983	4	4	0
	1984	10	10	1
	1986	2	2	0

Toluene

County	Year	Number of Wells	Number of Samples Taken and Analyzed	Number of Sample Detections
Goodhue	1983	10	10	2
	1986	3	3	0

1,1,2-Trichloroethene

County	Year	Number of Wells	Number of Samples Taken and Analyzed	Number of Sample Detections
Dakota	1983	6	6	0
	1985	8	8	3
	1986	2	2	0
	1988	2	2	1
Hennepin	1983	3	3	0
	1984	6	6	2
	1985	5	5	2
	1988	2	2	0
Morrison	1983	8	8	2
	1984	1	1	0
	1985	1	1	0
Ramsey	1983	4	4	0
	1985	6	6	1
	1986	1	1	0
	1988	3	3	0

The data listed in these tables are based on Recommended Allowable Limits (RALs) used by MPCA in early 1990. The data are provided for discussion purposes only and should not be used for in depth trend analyses.

**APPENDIX E - SUMMARY OF NITRATE DETECTIONS FOR
SELECTED COUNTIES IN MINNESOTA**

Table E-1.1: Summary of Nitrate Detections (1980-1984), Minnesota Pollution Control Agency

COUNTY	1980				1981				1982				1983				1984			
	No. Well	No. Sam Takn Anlz	No. Sam Dets (C)	No. Dets Exc Fed. MCL (D)	No. Well	No. Sam Takn Anlz	No. Sam Dets (C)	No. Dets Exc Fed. MCL (D)	No. Well	No. Sam Takn Anlz	No. Sam Dets (C)	No. Dets Exc Fed. MCL (D)	No. Well	No. Sam Takn Anlz	No. Sam Dets (C)	No. Dets Exc Fed. MCL (D)	No. Well	No. Sam Takn Anlz	No. Sam Dets (C)	No. Dets Exc Fed. MCL (D)
ANOKA	2	2	0	0	2	2	1	0	1	1	0	0	4	4	1	0	3	3	1	0
BROWN	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0
CARVER	0	0	0	0	1	1	0	0	0	0	0	0	4	4	1	0	1	1	0	0
CASS	4	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	0
DAKOTA	5	5	3	0	6	6	3	2	1	1	0	0	9	9	6	0	0	0	0	0
DODGE	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
FILLMORE	2	2	2	0	13	13	13	1	2	2	2	1	0	0	0	0	3	3	3	0
GOODHUE	0	0	0	0	0	0	0	0	1	1	0	0	13	13	5	0	0	0	0	0
HENNEPIN	1	1	1	0	6	6	3	0	0	0	0	0	3	3	1	0	11	11	3	0
HOUSTON	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0	0	2	2	2	0
HUBBARD	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	7	7	6	0
MORRISON	2	2	0	0	0	0	0	0	0	0	0	0	8	8	8	2	1	1	0	0
MOWER	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	2	0
NICOLLET	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0
OLMSTED	1	1	1	0	0	0	0	0	0	0	0	0	2	2	2	0	0	0	0	0
OTTER TAIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	5	1
PINE	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0
PIPESTONE	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
POPE	0	0	0	0	0	0	0	0	7	7	5	1	0	0	0	0	0	0	0	0
RAMSEY	3	3	2	0	5	5	1	0	1	1	1	0	5	5	4	0	2	2	0	0
RENVILLE	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0
SCOTT	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	3	3	2	0
SHERBURNE	7	7	5	1	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	1
ST. LOUIS	4	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	0
STEARNS	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0
WABASHA	0	0	0	0	0	0	0	0	2	2	1	0	1	1	1	0	0	0	0	0
WADENA	8	8	5	1	0	0	0	0	0	0	0	0	4	4	4	2	10	10	7	2
WASHINGTON	2	2	2	0	6	6	5	0	0	0	0	0	0	0	0	0	6	6	3	0
WINONA	0	0	0	0	17	32	17	4	18	51	42	6	26	26	17	2	17	17	9	2
TOTALS	45	45	29	2	57	72	43	7	36	69	52	8	91	91	52	7	88	88	51	7

Source: Ambient Ground-Water Monitoring Network,
Minnesota Pollution Control Agency

MCL: 10.0 mg/L

(A) Number of Wells
(B) Number of Samples Taken and Analyzed
(C) Number of Sample Detections
(D) Number of Detections that Exceed the Federal MCL

Table E-1.2: Summary of Nitrate Detections (1985-1989), Minnesota Pollution Control Agency (Continued)

COUNTY	1985				1986				1987				1988				1989			
	No. Well	No. Sam. Anlz	No. Sam. Dets	No. Dets Exc MCL	No. Well	No. Sam. Anlz	No. Sam. Dets	No. Dets Exc MCL	No. Well	No. Sam. Anlz	No. Sam. Dets	No. Dets Exc MCL	No. Well	No. Sam. Anlz	No. Sam. Dets	No. Dets Exc MCL	No. Well	No. Sam. Anlz	No. Sam. Dets	No. Dets Exc MCL
ANOKA	2	2	1	0	4	4	0	0	0	0	0	0	1	1	0	0	0	0	0	0
BROWN	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	3	3	0	0
CARVER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CASS	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DAKOTA	10	10	7	2	2	2	1	1	0	0	0	0	4	4	0	0	0	0	0	0
DODGE	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
FILLMORE	13	13	12	2	2	2	2	1	0	0	0	0	3	3	2	0	2	2	2	0
GOODHUE	0	0	0	0	3	3	0	0	0	0	0	0	2	2	0	0	0	0	0	0
HENNEPIN	5	5	2	0	0	0	0	0	0	0	0	0	4	4	0	0	1	1	1	0
HOUSTON	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HUBBARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MORRISON	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOWER	1	1	1	0	0	0	0	0	0	0	0	0	3	3	1	0	0	0	0	0
NICOLLET	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OLMSTED	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
OTTER TAIL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PINE	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0
PIPESTONE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
POPE	0	0	0	0	6	6	5	2	0	0	0	0	0	0	0	0	0	0	0	0
RAMSEY	6	6	5	0	1	1	1	0	0	0	0	0	5	5	0	0	0	0	0	0
RENVILLE	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	1	1	0	0
SCOTT	0	0	0	0	2	2	0	0	0	0	0	0	1	1	0	0	0	0	0	0
SHERBURNE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ST. LOUIS	1	1	1	0	0	0	0	0	0	0	0	0	9	9	6	0	0	0	0	0
STEARNS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WABASHA	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WADENA	0	0	0	0	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
WASHINGTON	4	4	4	0	0	0	0	0	0	0	0	0	4	4	2	1	0	0	0	0
WINONA	0	0	0	0	1	1	1	0	17	17	10	2	0	0	0	0	0	0	0	0
TOTALS	46	46	35	4	31	31	11	5	17	17	10	2	41	41	11	1	7	7	3	0

Source: Ambient Ground-Water Monitoring Network,
Minnesota Pollution Control Agency

MCL: 10.0 mg/L

(A) Number of Wells
(B) Number of Samples Taken and Analyzed
(C) Number of Sample Detections
(D) Number of Detections that Exceed the Federal MCL

Table E-2.1: Nitrate Detections for Selected Counties in Minnesota (1980-1984), U.S. Geological Survey

COUNTY	1980				1981				1982				1983				1984			
		No.		No.		No.		No.		No.		No.		No.		No.		No.		No.
	No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets	No.	Sam	No.	Dets
	Takn	Sam	Exc	Fed.	Takn	Sam	Exc	Fed.	Takn	Sam	Exc	Fed.	Takn	Sam	Exc	Fed.	Takn	Sam	Exc	Fed.
	Anlz	Dets	MCL		Anlz	Dets	MCL		Anlz	Dets	MCL		Anlz	Dets	MCL		Anlz	Dets	MCL	
(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)	(B)	(C)	(D)	(A)
ANOKA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	58	40	6
BROWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CARVER	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CASS	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
DAKOTA	6	6	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DODGE	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FILLMORE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GOODHUE	2	2	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HENNEPIN	15	15	3	0	7	7	4	0	0	0	0	0	13	14	3	0	6	8	1	1
HOUSTON	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HUBBARD	15	45	45	17	13	46	46	16	5	5	5	2	5	5	5	2	5	5	5	3
MORRISON	15	48	48	12	14	45	45	10	5	5	5	1	5	5	5	1	2	2	2	0
MOWER	3	3	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
NICOLLET	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OLMSTED	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OTTER TAIL	14	44	44	10	14	48	47	10	5	5	4	1	5	5	4	1	5	5	4	0
PINE	1	1	1	0	13	13	13	0	0	0	0	0	0	0	0	0	0	0	0	0
PIPESTONE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
POPE	2	2	2	0	2	2	2	0	14	14	13	5	15	55	52	18	5	5	5	1
RAMSEY	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RENVILLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SCOTT	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SHERBURNE	10	20	20	0	0	0	0	0	0	0	0	0	0	0	0	0	33	52	34	13
ST. LOUIS	1	1	1	0	5	5	4	1	4	17	9	0	8	8	3	0	7	7	3	1
STEARNS	0	0	0	0	0	0	0	0	14	14	12	4	19	54	47	24	24	30	22	9
WABASHA	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WADENA	32	226	226	65	32	83	81	16	5	5	4	1	5	5	4	1	6	6	4	2
WASHINGTON	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WINONA	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	133	430	399	104	103	252	244	53	52	65	52	14	75	151	123	47	118	178	120	36

Source: National Water Data Storage and Retrieval System (WATSTORE),
U.S. Geological Survey

MCL: 10.0 mg/L

(A) Number of Wells
(B) Number of Samples Taken and Analyzed
(C) Number of Sample Detections
(D) Number of Detections that Exceed the Federal MCL
" - " Missing Data

Table E-2.2: Nitrate Detections for Selected Counties in Minnesota (1985-1989), U.S. Geological Survey (Continued)

COUNTY	1985				1986				1987				1988				1989			
	No. Well (A)	No. Sam Anlz (B)	No. Sam Dets (C)	No. Dets Exc Fed. MCL (D)	No. Well (A)	No. Sam Anlz (B)	No. Sam Dets (C)	No. Dets Exc Fed. MCL (D)	No. Well (A)	No. Sam Anlz (B)	No. Sam Dets (C)	No. Dets Exc Fed. MCL (D)	No. Well (A)	No. Sam Anlz (B)	No. Sam Dets (C)	No. Dets Exc Fed. MCL (D)	No. Well (A)	No. Sam Anlz (B)	No. Sam Dets (C)	No. Dets Exc Fed. MCL (D)
ANOKA	14	24	20	3	16	21	16	1	15	15	14	1	19	27	11	0	21	28	4	0
BROWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CARVER	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CASS	0	0	0	0	0	0	0	0	6	6	3	0	1	2	2	0	7	9	6	0
DAKOTA	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0
DODGE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FILLMORE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GOODHUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HENNEPIN	0	0	0	0	0	0	0	0	0	0	0	0	8	13	4	0	0	0	0	0
HOUSTON	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HUBBARD	5	5	5	2	0	0	0	0	5	6	3	0	11	19	17	3	5	5	2	0
MORRISON	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOWER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NICOLLET	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	0
OLMSTED	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OTTER TAIL	5	5	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PINE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PIPESTONE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
POPE	11	11	6	1	21	21	13	3	19	29	29	4	19	19	19	9	34	34	25	6
RAMSEY	0	0	0	0	12	12	3	0	0	0	0	0	0	0	0	0	8	8	6	0
RENVILLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	2	0
SCOTT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
SHERBURNE	31	51	36	11	10	10	10	7	0	0	0	0	0	0	0	0	0	0	0	0
ST. LOUIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STEARNS	26	39	30	9	20	20	15	6	2	2	2	2	3	3	0	0	0	0	0	0
WABASHA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WADENA	4	4	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WASHINGTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WINONA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	99	142	107	28	79	84	57	17	47	58	51	7	63	85	53	12	82	91	46	6

Source: National Water Data Storage and Retrieval System (WATSTORE),
U.S. Geological Survey

MCL: 10.0 mg/L

(A) Number of Wells
(B) Number of Sample Detections
(C) Number of Detections that Exceed the Federal MCL
(D) Number of Samples Taken and Analyzed
"- " Missing Data

**APPENDIX F - SUMMARY OF AGENCIES THAT TRACK INDICATOR DATA
IN MINNESOTA**

The following table outlines the State agencies that track indicator data and describes the relevant data bases and types of data collected. In several cases, more than one agency or organization tracks relevant information. Indicator data management for each data base is discussed in greater detail in Section III of this study.

Indicator	Responsible Agency	Data Base / Type of Information
MCLs	Minnesota Department of Health, Division of Environmental Health	MDH compiles water quality data for community public systems on a cumulative basis each year. MCL violations are tracked manually and reported to FRDS each quarter via EPA's FRDS-DE II data entry program. Data are currently maintained in Wordperfect files and are being entered into a data base management system. Only lab ID and sample numbers, but not levels, for bacteria analyses are currently managed on-line. The files do not contain MCL violations.
	City of Rochester, Department of Public Utilities	The city of Rochester monitors water quality for unfinished water from the 22 municipal wells that serve its public water system. The data are maintained in a RBASE data base management system.
	U.S. EPA, Office of Drinking Water	EPA maintains the Federal Reporting Data System (FRDS-II), which serves as the national data base for tracking MCL compliance data provided by States.
Hazardous	Minnesota Pollution Control Waste Sites Agency	MPCA tracks progress on investigations of 166 hazardous waste sites through its Permanent List of Priorities (PLP). Forty of these sites are on EPA's National Priority List.
	Minnesota Pollution Control Agency	MPCA is also responsible for issuing permits and inspecting 43 active RCRA treatment, storage, and disposal (TSD) facilities. Eight of these 43 sites are land disposal facilities, and the remainder are mostly storage facilities. Most of these facilities do not monitor ground water at their sites; however, all of the land disposal facilities are required by permit to monitor ground water at the site, and each has undergone a RCRA Facility Assessment (RFA). Two of the storage facilities are required to monitor ground water, one of which has undergone a RFA, and one of which has completed a RCRA Facility Investigation (RFI). Fifteen of the 43 active sites are in some phase of corrective action.
VOCs	Minnesota Department of Health	MDH sampled all of the 2,050 community public water supply (PWS) wells in Minnesota for VOCs between October 1982 and June 1985. MDH also conducted a State-wide Survey of 300 noncommunity PWS wells for VOCs between 1985 and 1987. In addition, MDH is assessing water quality in 1,111 public and private wells located within one mile of 132 mixed municipal solid waste disposal sites in the seven-county metropolitan area. Results from sampling of the 2,050 community PWS wells are maintained in paper files. Results of the State-wide survey of the 300 noncommunity PWS wells are also maintained in paper files; MDH will automate these data in the near future. Results of the water quality analyses from wells near solid waste disposal sites in the metropolitan area have been entered into a data base using DBASE3+ in a format compatible with the State's Land Management Information System.

	Minnesota Pollution Control Agency	Since 1978, the Minnesota Pollution Control Agency has collected approximately 1,100 ground-water samples at 450 monitoring points (wells and springs) throughout all of Minnesota's 87 counties in its Ambient Ground Water Monitoring Program. These samples have been analyzed for a suite of inorganic, bacteriological, and physical parameters. As of the end of 1989, 375 of these samples had been analyzed for VOCs; MPCA detected VOCs in approximately eleven percent of these samples. Most of these 375 samples were collected in geologically sensitive areas. MPCA maintains these data in STORET.
	Minnesota Pollution Control Agency	The Tanks and Spills Section of the MPCA's Hazardous Waste Division maintains data on ground-water quality near 2,500 petroleum and chemical storage tanks. Approximately ten years of data have been collected, the majority of which have been collected since 1988. Most samples have been analyzed for benzene, toluene, xylene, and ethylbenzene. These data are maintained in paper files.
	City of Rochester, Department of Public Utilities	The city of Rochester monitors water quality for unfinished water from the 22 municipal wells that serve its public water system. The data are maintained in a RBASE data base management system. Since 1988, the Department has consistently analyzed unfinished water for VOCs; some VOC data exist from the late 1970's and early 1980's.
Nitrates	Olmsted County Health Department	OCHD serves as a regional laboratory for the Southeastern Minnesota Cooperative Water Well Testing Program. Ten thousand samples have been analyzed for nitrate and coliform bacteria since 1983 for seven counties in southeastern Minnesota. The data are maintained on a IBM computer using a dBase IV data management system, which may be down loaded by PC. At present, about fifty percent of the data collected in Olmsted County have been entered into the Olmsted County Well Index, an inventory of well information and results of analyses. Five additional counties have some nitrate data in their CWIs; these counties are listed in Section III.D.3.i.
	Brown-Nicollet Community Health Service	Since 1988, Brown-Nicollet has sampled more than 3,000 private wells in these two counties and adjacent townships in south-central Minnesota. Samples are analyzed for nitrate, fecal coliform, sulfate, and chloride. Multiple samples have been taken for many wells. Nitrate data are maintained on the PC-based METAVIEW data base management system. These data will be moved to microcomputer by June 1990.
	Minnesota Pollution Control Agency	The Minnesota Pollution Control Agency has collected approximately 1,100 ground-water samples at 450 monitoring points (wells and springs) throughout all of Minnesota's 87 counties in its Ambient Ground Water Monitoring Program. All of these samples have been analyzed for nitrates, and results have been entered into STORET.
	Minnesota Pollution Control Agency	Nitrate data have been collected in four MPCA studies: one in Big Stone County, a second from the Garvin Brook Rural Clean Water Project in Winona County, and two others in Benton and Stearns Counties. All of these data are maintained in STORET and can be accessed through a VAX minicomputer at the MPCA. Data from the Garvin Brook

project include samples from 15 wells and 3 springs collected in 1987 in the Garvin Brook Watershed and 12 wells in the adjacent Ground Water Recharge Area during 1988 and 1989. The Winona County Extension performed annual nitrate analyses of 80 domestic wells in the watershed from 1983 to 1989 and sampled 82 wells in the Ground Water Recharge Area for nitrate from 1985 to 1989. These data are included in the Garvin Brook report, but the format in which they are maintained is not known at this time.

MPCA-Minnesota Department
of Agriculture

The MPCA and the MDA are currently combining nitrate data from several data bases to create SAS-readable files that will be used to generate State maps displaying mean nitrate concentrations, land use, and hydrogeologic sensitivity to nitrate loading in ground water at the section level of the Public Land Survey system. MPCA estimates that the SAS files will be complete by September or October 1990.

Minnesota Department of
Agriculture-MDH

Between 1985 and 1987, MDA and MDH conducted cooperative surveys of water wells for selected pesticides; the authors also determined nitrate levels in a portion of the wells and evaluated whether those levels positively correlated with the presence of the pesticides. These data are maintained in DBASE3+.

Pesticides

Minnesota Agricultural
Statistical Service,
U.S. Department of Agriculture

MASS conducted annual surveys of pesticide usage, across the State between 1969 and 1984. Responses were received from approximately 25 percent of the 8,000 - 10,000 surveys mailed annually. The sampling was not stratified by County. Summaries of these data have been compiled in annual reports, but the raw data are not automated.

MDA

MDA has conducted annual surveys of sales of restricted use pesticides (RUPs) to private applicators since 1985. MDA RUP sales data collected through 1988 are maintained on the PC-based PARADOX data base management system; data collected in 1989 should be entered in the system by spring, 1990.

MDA-MDH

Between 1985 and 1987, MDA and MDH conducted cooperative surveys of water wells for selected pesticides; these surveys were conducted to provide baseline data on the occurrence and extent of agricultural pesticide contamination in the State's ground water and drinking water. MDA sampled 100 observation, irrigation, and private drinking water wells and five drain tiles on a repeat basis, most often four samples per monitoring point. MDH collected one sample from each of 400 public drinking water supply wells and resampled any wells in which pesticides were detected in the first sample. These data are maintained in DBASE3+.

Rochester-Olmsted County
Planning Department

Rochester-Olmsted surveyed farm cooperatives in Olmsted County and in towns within adjacent counties that sit near Olmsted's border for volumes of pesticides sold. Data are compiled in a Lotus 1-2-3 spreadsheet.

APPENDIX G - SUPPLEMENTARY PUBLICATIONS FOR MINNESOTA

Several publications (primarily reports from State agencies) that contain relevant data on all of the indicators are available. Some of these publications may contain data that were presented from the data bases described in the body of this report. Thus, there may be some duplication of data. A number of supplementary publications are listed below:

- "In Search of Nitrates," Brown-Nicollet Community Health Services, February 27, 1989.

This report provides a description and reporting forms from an ongoing township water testing program.

- "1990 Herbicide, Insecticide, and Fungicide Use Survey" (draft), Minnesota Department of Agriculture, Agronomy Services Division.

This report proposes the format, organization, and execution of a 1990 survey on pesticide use in Minnesota.

- "Volatile Organic Survey of Community Water Supplies: Report to the Legislative Commission on Minnesota Resources," Minnesota Department of Health, Section of Water Supply and Engineering, July, 1985.

This study sought to expand State knowledge of contamination of community public water supply (PWS) wells and systems. Samples were collected from 887 PWS systems and 1,801 PWS wells and analyzed for volatile organic compounds.

- "Noncommunity Public Water Supply Survey for Volatile Organic Chemicals: Report to the Legislative Commission on Minnesota Resources," Minnesota Department of Health, Section of Water Supply and Engineering, December, 1988.

This study sought to expand State knowledge of contamination of noncommunity public water supply (PWS) wells. Three hundred noncommunity PWS wells at risk of contamination were sampled for volatile organic compounds between July 1985 and July 1987.

- "Proposals for Alternative Funding for Water Supply Monitoring and Surveillance in Minnesota: Report to the 1989 Minnesota Legislature," Minnesota Department of Health, Section of Water Supply and Engineering, Division of Environmental Health, December, 1988.

This report to the Minnesota Legislature develops and analyzes alternative funding proposals for water supply monitoring activities. Other States' funding activities are also analyzed.

- "Pesticides and Groundwater: A Survey of Selected Private Wells in Minnesota," Minnesota Department of Health, Prepared for U.S. EPA, Office of Ground Water, Region 5, August, 1989.

This study sampled selected wells, predominantly farm wells, for pesticides. The MDH sampled 25 private/public wells on a repetitive basis and 200 private wells on a one-time basis between April 1986 and May 1987.

- "Public Water Supply Data 1989. Volume 1 - Municipal Systems (A-L); Volume 2 - Municipal Systems (M-Z); and Volume 3 - Non-municipal Community Systems," Minnesota Department of Health, Division of Environmental Health.

This report contains the annual compilation of water-quality data for all Minnesota community public water supply systems.

- "Water Supply Monitoring Near Metropolitan Solid Waste Disposal Facilities: Status Report to the Legislative Commission on Waste Management," Minnesota Department of Health, Section of Water Supply and Well Management, November 15, 1989.

- "Groundwater Use" (in the Olmsted County Water Planning Area), Minnesota Department of Health, Southeast District and Rochester Public Utilities, Water Division, November, 1989.
- "Pesticides and Groundwater: Surveys of Selected Minnesota Wells," Minnesota Department of Health and Department of Agriculture, Prepared for the Legislative Commission on Minnesota Resources, December, 1988.

This study provided baseline information on the occurrence and extent of agricultural pesticide contamination in the State's ground water and drinking water. Between July 1985 and June 1987, MDA collected and analyzed samples from 100 observation, irrigation, and private drinking water wells and five drain tiles on a repetitive basis; and MDH collected a single sample at each of 400 public drinking water wells.

- Minnesota Geological Survey, 1988. Geologic Atlas, Olmsted County, Minnesota. County Atlas Series, Atlas C-3, 9 plates. N. H. Balaban, ed. St. Paul: University of Minnesota.
- Minnesota Geological Survey, 1979. Hydrogeologic Map of Minnesota. State Map Series S-5 and S-6. Matt Walton, Director. University of Minnesota.
- "Agricultural and Lake Influences on Water Quality in Outwash Aquifers in the School Section Lake Area of Stearns County, Minnesota" (in press), Minnesota Pollution Control Agency, Water Quality Division, 1990.
- "Factors Relating to Nitrate Contaminated Wells in an Agricultural/Residential Area of Benton County, Minnesota" (in press), Minnesota Pollution Control Agency, Water Quality Division, 1990.
- "Factors Influencing Ground Water Quality Near Beardsley, Minnesota: A report on ground water quality monitoring and assessment conducted from 1987-1989," Minnesota Pollution Control Agency, Water Quality Division, November, 1989.

This study identified the factors affecting ground-water quality in a ten-square-mile region primarily south and west of Beardsley, Minnesota. 19 wells were sampled six times each between May 1987 and September 1988. These ground-water samples were then analyzed for a variety of parameters, including nitrate, phosphorus, ammonia, major cations and anions, certain trace metals, 16 different pesticides, tritium, and carbon isotopes.

- "Introductory Guide to IGWIS (Integrated Ground Water Information System)," Minnesota Pollution Control Agency, October 1, 1989.

This document provides a basic, general description of IGWIS for those unacquainted with the system.

- "Permanent List of Priorities," Minnesota Pollution Control Agency, December, 1989.

This document lists the most serious localized or point sources of pollution. To date, a total 165 sites have been identified as State Superfund sites.

- "Water Quality Monitoring and Assessment in the Garvin Brook Rural Clean Water Project Area: Stream and Ground Water Monitoring and Best Management Practice Implementation Assessment (1981-1989)," Minnesota Pollution Control Agency, Division of Water Quality. Prepared for the Legislative Commission on Minnesota Resources, November 1989.

This study assessed the Garvin Brook Rural Clean Water Project, both in terms of water quality trends and Best Management Practice implementation. Numerous sampling programs were conducted from 1981 to 1989 on Garvin Brook and the underlying ground water. Nitrate and pesticide data, as well as many other parameters, were periodically collected and statistically analyzed.

- "Southeastern Minnesota's Cooperative Water Testing Program," Olmsted County (Minnesota) Health Department, 4 pages, no date.
- "Summary of well water analysis for nitrate - Rochester Izaak Walton League Testing, July 29, 1985 to July, 19, 1986" (Dodge, Fillmore, Goodhue, Mower, Olmsted, Wabasha, and Winona counties), Olmsted County (Minnesota) Health Department, 1986.
- "Fountain Drainfield Monitor Wells Data, 1987-88" (Nitrate-nitrogen data for six wells; two pages.), Olmsted County (Minnesota) Health Department, October 27, 1988.
- "A Study of the Wells, Onsite Wastewater Treatment Systems, and Groundwater Quality in the Tongen and Cavilima Subdivisions," Olmsted County (Minnesota) Health Department, Rochester, April 27, 1989.
- "Regional summary by well type of water quality of Olmsted County municipal and private wells, 1988" (Includes nitrate, total solids, chloride, sulfate, and bacteria.), Olmsted County (Minnesota) Health Department, 17 pages, February 14, 1989.
- "Regional summary by well type of water quality of Olmsted County municipal and private wells, 1989" (Includes nitrate, total solids, chloride, sulfate, and bacteria.), Olmsted County (Minnesota) Health Department, 7 pages, through July, 1989, July 20, 1989.
- "An Inventory Of Potential Impacts To Groundwater Supplies In South Rochester," Olmsted County (Minnesota) Health Department, 1988.
- "Olmsted County Groundwater Monitoring and Related Studies," Olmsted County (Minnesota) Health Department, November 22, 1988.

The report contains a brief summary of water quality testing programs and studies conducted in Olmsted County. Regulated and voluntary programs are described and a summary of test results is included.

- "Project Work Plan," Olmsted County (Minnesota) Clean Water Partnership, November 1, 1989.

This cooperative effort in ground water quality monitoring is the single largest effort of its kind in the County.

- "Monitoring Plan for the Olmsted County Ground Water and Wellhead Protection Project," Olmsted County (Minnesota) Clean Water Partnership, October, 1989.
- "Olmsted County Uses of Computerized Geographic Information," Rochester-Olmsted County Planning Department, February 13, 1989.
- "Water Well Management in Minnesota" (report to the Division of Environmental Health, Minnesota Department of Health), Technical Advisory Group on Water Well Management, Richard Peter, Chair and Director, Division of Environmental Health, Olmsted County Health Department, September, 1988.
- "Pesticides Used on Minnesota Farms," U.S. and Minnesota Departments of Agriculture, (6 reports, 1979-1984), Minnesota Agricultural Statistics Service.
- "1984 Pesticide Usage Survey" (including data acquisition forms), U.S. and Minnesota Departments of Agriculture, Minnesota Agricultural Statistics Service.