CITY OF ST. MARYS, OHIO DRINKING WATER SOURCE PROTECTION PLAN

Appendix G

Potential Pollution Sources Inventory Report

REPORT

POTENTIAL POLLUTION SOURCES INVENTORY (PPSI)

Submitted to the:

City of St. Marys, Ohio

October 2000

TABLE OF CONTENTS

			<u> Page No.</u>
EXE	CUTIVE	E SUMMARY	1
1.0	INTR	CODUCTION	3
	1.1	General	3
	1.2	Activities Performed	3
2.0	DELI	NEATION OF THE WELLHEAD PROTECTION AREA	5
	2.1	Description of the Study Area	5
	2.2	Water Supply	5
		2.2.1. South Wellfield 2.2.2. North Wellfield 2.2.3. Installed Pumping Capacity	7
	2.3	Brief Geological Overview	8
		2.3.1. General Geology of the Area	8
	2.4	Delineation of the WHPA	9
3.0	RESU	JLTS OF THE PPSI	15
	3.1	General/Rating Criteria	15
	3.2	Database Search	16
		3.2.1. Classification of Potential Sources of Pollution	18
	3.3	Visual Survey	21
	3.4	Land Use/ Land Cover Map	24
	3.5	Zoning Map	24
	3.6	Transportation Routes and Transmission Lines	24
	3.7	Historical Land Use	29
	3.8	Sewered and Unsewered Areas	29
	3.9	Injection and Oil & Gas Wells	29
	3.10	Home Fuel Oil Tanks	29

TABLE OF CONTENTS (cont'd)

	Page No.
•	TABLES
Table 1	Installed Pumping Capacity
Table 2	Areal Extension of the WHPA
Table 3	Rating System for Various Classifications
Table 4	Priority Ranking of the Potential Pollution Sources
Table 5	Rating System for Database Search
Table 6	Identified Potential Pollution Sites Database Search Priority Settings 20
Table 7	Priority Setting - Visual Survey
	FIGURES
Figure 1	Location of Study Area
Figure 2	Regional Bedrock Surface Topography10
Figure 3	3-Dimensional View of the Bedrock Surface
Figure 4	Groundwater Flow
Figure 5	Wellhead Protection Area
Figure 6	PPS Identified During Database Search
Figure 7	Results of Visual Survey
Figure 8	Land Use in the WHPA
Figure 9	Zoning Map of the MHPA
Figure 10	Transportation/Transmission Lines
Figure 11	Sewered and Unsewered Areas in the WHPA
Figure 12	Location of Oil, Gas, and Injection Wells
Figure 13	Location of Gas Lines
	APPENDICES
Appendix B:	Miscellaneous Correspondence Results of Database Search Oil and Gas Wells Information

EXECUTIVE SUMMARY

In a continuing effort to understand and protect its groundwater resources, the City of St. Marys has been actively involved in developing a comprehensive Wellhead Protection Program (WHPP). To achieve this objective the City has conducted a delineation of WHPA, the efforts of which is detailed in a separate report. This report presents the results of the activities conducted in relation to the inventory of potential pollution sources within the wellhead protection area.

This report was developed based on suggested practices outlined by the Ohio EPA in "Guidance for Conducting Potential Pollution Source Inventories in Wellhead Protection Areas", January 1997.

Activities conducted include, a database search, visual/windshield survey that includes walking/driving around the WHPA, determining land use and zoning within the WHPA, identifying relevant transportation routes and oil/gas transmission lines, conducting an evaluation of historical land use, identifying sewered and unsewered areas, location of oil/gas and injection wells, and home fuel oil tanks

All items described above are addressed in this report, with the exception of the historical land use. Due to the time-consuming nature of this activity, it will be conducted as part of the management strategies.

The City of St. Marys is aware of the importance and need to obtain detailed information on each of the potential pollution sources identified during this phase of the wellhead protection program. The City is also aware of the importance of obtaining a clear understanding of past activities within and around the WHPA. It is evident, however, that the process of gathering historical information is time consuming and will require not only the efforts of the City, but also of interested citizens and local organizations such as historical societies and volunteer groups. In consideration of the above, the City has opted to retain the services of a consultant to perform a PPSI that include those activities that were more of a technical nature and which could be readily accomplished. The result of these activities are included in this document, which is intended as a starting point for the implementation of the management strategies. The City is also aware that periodic updates of this document will be necessary and will be performed regularly as information is generated.

The City is in the process of organizing a Planning Committee which will be responsible for the development of management strategies, including compiling a detail database of each of the potential pollution sources within the WHPA. Considering the critical nature of assessing the threats to the wellfield, the City will make a reasonable effort to ensure that all potential pollution sources are properly identified and documented as part of the management strategies. Also, the City will take measures to ensure that appropriate mechanisms for periodic updating of the PPSI are incorporated as a routine procedure within the management strategies.

Finally, it is the City's expectation that with the implementation of an adequate Public Information and Education Strategy, the process of generating the needed information will be greatly enhanced. To this regards, the City hopes to enlist the assistance of the Ohio EPA as

advisors to the Planning Committee, to ensure that critical components of the management strategies are incorporated into its wellhead protection program.

Included in a pocket at the end of this report is a plate that summarizes the results of the PPSI. It should be noted, however, that the results of a few activities (e.g.: zoning map and oil & gas well survey) are not included on the map to allow clarity in the presentation. The map is intended to provide a quick reference of the potential pollution sources identified during this study. Additional information on each site can be obtained throughout the report and the accompanying appendices.

1.0 INTRODUCTION

1.1 General

In an effort to protect its groundwater supply, the City of St. Marys has been actively engaged in wellhead protection program activities. As part of these efforts the City has performed an inventory of potential sources of pollution in and around the vicinity of the Wellhead Protection Area (WHPA). This report presents the results of the inventory performed.

The inventory of potential sources of contamination is a major component in the management and protection of wellhead protection areas. This activity includes not only the identification of the sources, but also the characterization/rating of the potential threat that those sources may pose to the wellfield. Consequently, the potential pollution sources inventory (PPSI) pollution performed in this study also includes a priority setting approach. This approach is mostly a risk screening tool to assess the threat posed by specific sources of contamination.

The results of this study can be used to assist in various management activities including:

- Planning and zoning to control the siting of new potential sources of contamination.
- Evaluation and permitting of new sources within the WHPA.
- Prioritizing source management efforts such as site inspection, monitoring, enforcement, and data collection.

The activities conducted in the development of this report were based on recommendation provided by the Ohio EPA in "Guidance for Conducting Potential Pollution Source Inventories in Wellhead Protection Areas", January 1997.

1.2 Activities Performed

The main activities performed can be classified into the following categories.

- Database Search The database search involved a comprehensive compilation of information contained in the different databases maintained by regulatory agencies. This also includes a review of past incidents which may have an impact on the wellfield such as spills and reported illegal dumping.
- Visual Survey that includes walking/driving around the WHPA, noting information on specific potential sources as well as general land use.
- Land Use/Zoning Map of the WHPA.

- Transportation Routes and Transmission Lines The Ohio EPA recommends that the potential pollution source inventory (PPSI) address all major transportation and transmission lines within the WHPA.
- Historical Land Use The Ohio EPA also recommends that the inventory include a historical investigation of past land use. This activity should include review of historical records such as aerial photos (available through ODNR), Sandborn Fire Insurance Maps (available through the Library of Congress, Washington, DC). Also recommended was research with local historical societies and interviews with life long residents and senior citizens.
- Sewered and Unsewered Areas It is recommended that the PPSI include a map of any unsewered area within the WHPA due to the potential presence of residential and commercial septic systems.
- Injection Wells Also recommended is the identification of injection wells and oil & gas production wells within the WHPA.
- Home Fuel Oil Tanks It is recommended that the PPSI include a map illustrating areas with gas lines within the WHPA. All areas without gas lines are assumed to be potential sites of homes with fuel oil storage tanks.

All items described above are addressed in this report, with the exception of Historical Land Use. Considerable effort was dedicated to obtaining fire insurance maps of the area of interest. Due to the negative results obtained, the services of companies specialized in this type of search was contracted in an attempt to obtain the information desired. However, it appears that no such maps were developed for the area of interest. Included in Appendix A are letters by the companies contracted to do the search, indicating the negative results obtained.

Additional historical searches and interviews with long time residents were not included in this report. Due to the time-consuming nature of these activities, they will be completed as completed as part of the management of the wellhead protection area.

Considerable effort was dedicated to obtaining maps illustrating the location of major oil and transmission lines within the WHPA. Information was sought from PUCO, State and local departments of transportation, Federal Energy Regulatory Commission, OUPS, and private database companies. Only general maps were available, indicating major oil and transmissions lines in the State of Ohio. The maps are inserted in pockets at the end of this report.

2.0 DELINEATION OF THE WELLHEAD PROTECTION AREA

2.1 Description of the Study Area

The City of St. Marys is located in the west-central portion of Auglaize County, which itself is located in the west-central portion of Ohio, approximately 20 miles East of the Indiana-Ohio border (Figure 1). The study area is characterized by a relatively flat topography with ground elevations ranging from approximately 850 to 900 feet above USGS datum for a relief of approximately 50 feet. The ground slopes gently in a northerly direction, therefore, the highest elevations are encountered in the south portion of the study area.

Regionally, the study area is located near a surface water divide in which the area immediately north of the City drains into St. Marys River, eventually reaching the Maumee River and draining into Lake Erie. On the other hand, the area immediately south of the study is drained by the Miami River which eventually drains into the Ohio River and finally discharges into the Gulf of Mexico. The area of interest, however, is drained by St. Marys River which has its origin within study area and moves northward for a short distance before taking a west-northwesterly direction into the state of Indiana where it joins the Maumee river on the west side of the City of Fort Wayne, before draining into Lake Erie.

2.2 Water Supply

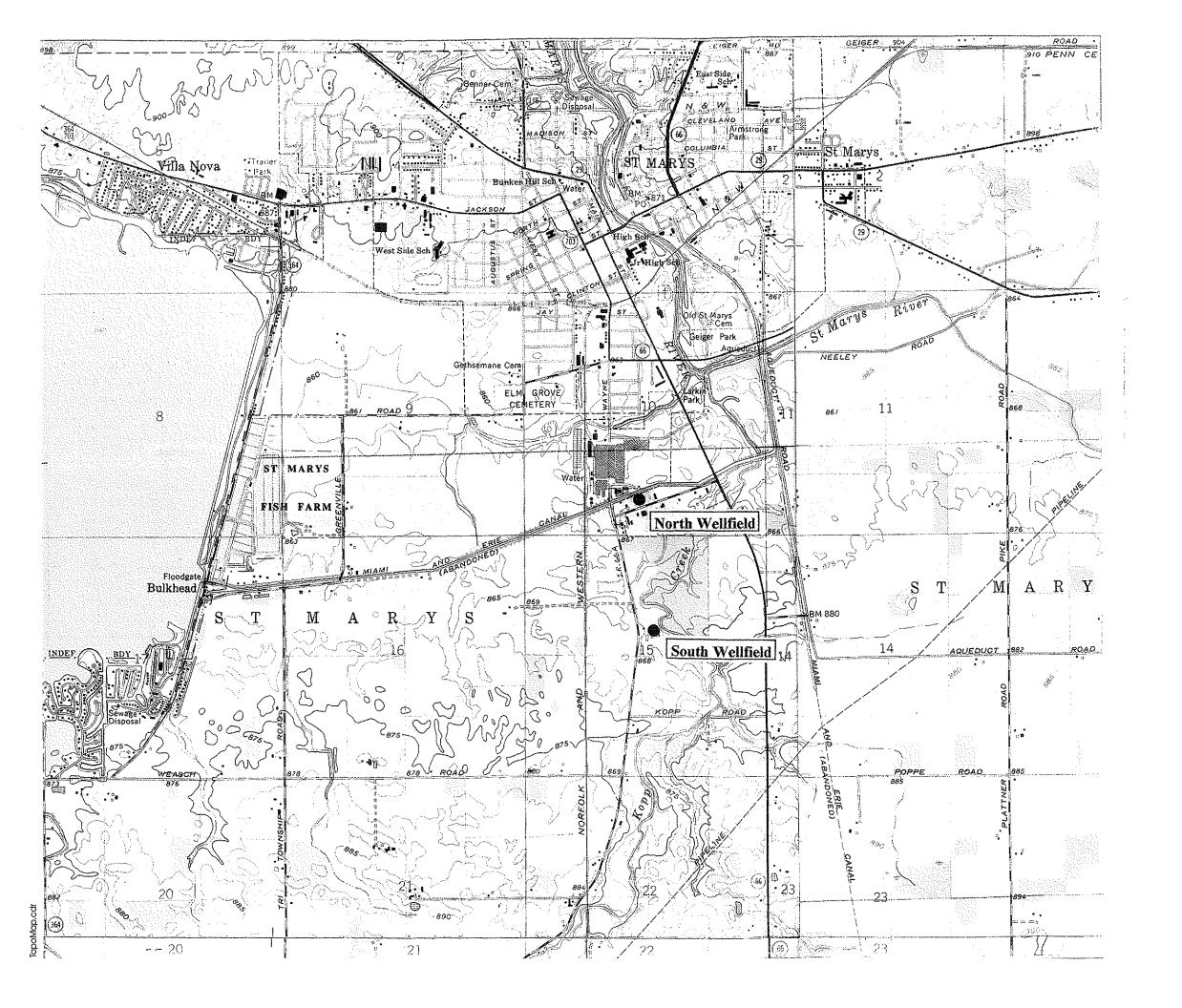
The City of St. Marys relies entirely on groundwater for its water supply. The "Average-Day" water demand is estimated at approximately 1.3 mgd. This demand is expected to increase to 2.8 mgd by the year 2020.

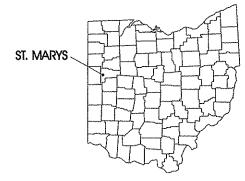
The City currently operates two wellfields. The first wellfield to be developed was the South Wellfield which is located approximately one-half mile north of Route 219 on the east side of County Road 66A (See Figure 1). The other wellfield developed is the North Wellfield which is located approximately 3/4 miles north of the South Wellfield, between State Route 66 and County Road 66A and north of South Park Drive. Following is a brief description of the characteristics of each wellfield.

2.2.1. South Wellfield

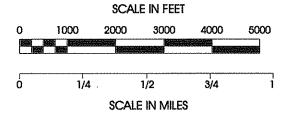
Development of the South Wellfield begun in 1943 with the construction of Well 3. An additional 12 inch well was constructed in 1946 at approximately 250 feet southeast of Well 3 and is identified as Well 4. A new well, identified as Well 5 was constructed in the south wellfield in 1999 to replace Well 3 which is failing.

The aquifer intercepted by the wells located in the South Wellfield consists of sand and gravel deposits within the valley formed by the ancestral Teays River. This aquifer is overlain by more than 250 feet of glacial till and moraine. The information available indicates that the glacial deposits in the South Wellfield area may be over 400 feet thick.









ST. MARYS, OHIO POTENTIAL POLLUTION SOURCE INVENTORY

LOCATION OF STUDY AREA



During construction of Well 3 it was noted that the main aquifer is encountered at a depth of approximately 275 feet below the ground surface. Well 3 was drilled to a depth of 332 feet, penetrating approximately 57 feet into the aquifer. The aquifer in this area is under high hydrostatic pressure, producing an artesian effect that causes the groundwater to flow above the top of the well casing. At the time of construction of Well No. 3 it was determined that the rate at which the well overflowed was approximately 990 gpm. Well 3 has been abandoned.

At the site of well No 4, the aquifer was intercepted at approximately 311 feet. The well was drilled to a depth of 343 feet and intercepts 32 feet of aquifer. An artesian effect was also noted in this well causing the groundwater level in the well to rise to within 6 feet below the ground surface, however, the effect did not produce a flow of water over the top of the casing, probably due to the operation of Well No. 3.

The drilling of Well No. 5 was completed in December 1998. During its construction it was noted that the main aquifer was encountered at a depth of approximately 288 feet below the ground surface. The well was drilled to a depth of 354 feet, of which the last 6 was reported to contain a substantial percentage of clay. Based on information derived from the log of Well 5 it is estimated that the main aquifer is approximately 60 feet thick. Overlying the main aquifer are alternating layers of clay, and clay with sand and/or gravel. Due to the artesian effect described previously, it was noted that the water level in the well rises to near ground level (approximately 12 feet), depending on the activity in the wellfield. It is estimated that if operations in the wellfield should be suspended for a prolonged period of time, the water level would rise above the ground surface.

2.2.2. North Wellfield

Development of the North Wellfield begun in November 1967 with the construction of a 12 inch well, currently identified as Well 1. Construction of Well 2 begun in May 1968, immediately after the construction of Well No.1. Well No. 2 is also a 12-inch well. Both wells intercept a bedrock aquifer.

The bedrock aquifer in the vicinity of St. Marys consists of a alternating layers of light gray, blue and yellow consolidated limestone and in certain locations there is some evidence of sandstone. In the area of Well No. 1, the limestone aquifer is approximately 190 feet thick and is overlaid by 75 feet of glacial deposits consisting mainly of clay or clay and gravel and boulders. In the area of Well No. 2 the limestone aquifer is 171 feet thick and is overlain by 94 feet of glacial deposits consisting mainly of clay. Underlying the limestone aquifer is a blue shale formation which, according to the well logs, is over 20 feet thick. Both wells were finished in the shale formation, leading to the conclusion that the wells fully intercepted the limestone aquifer. An artesian effect was also noted in both North Wellfield wells, resulting in groundwater levels at approximately 27 feet below the ground surface at the time of construction.

2.2.3. Installed Pumping Capacity

Table 1 provides a summary of the pumping capacity of each well. The Ohio EPA rates the pumping capacity of a system based on operation with the largest pumping unit out of service. Consequently, the rated capacity of the system is approximately 2,900 gpm (4.17 mgd). Also, considering the current and future water demand, it can be concluded that both wellfields have adequate installed capacity to meet the future water demands of the City.

TABLE 1
INSTALLED PUMPING CAPACITY

WELL L.D.	PUMPING RATES (1991)	PUMP SETTING (feet)	MAXIMUM OPERATING DYNAMIC LEVELS (feet)
Well No. 1	1166 gpm	60 ft	N/A
Well No. 2	1012 gpm.	80 ft	20 feet
Well No. 4	720 gpm	65 ft	51 feet
Well No. 5	1300 gpm	200 ft	120 feet

2.3 Brief Geological Overview

In the vicinity of the City of St. Marys, groundwater can be obtained from two different aquifers. The first, and seldom used, is a surficial aquifer consisting of discontinuous lenses of sand and/or gravel located within the glacial deposits which blanket most of the area. It is accepted that, in general, sand and gravel aquifers in glacial deposits have the best potential for developing high yield wells. However, in the vicinity of St. Marys, this resource is hardly used, perhaps due to the fact that the bedrock formation has capacity to supply most domestic demands. In addition, bedrock wells are more economical to construct and maintain and, in general, have a longer life-span.

The second source of groundwater in the vicinity of St. Marys, and most widely used, is an aquifer located within the bedrock which underlies the glacial deposits. The uppermost portion of the bedrock in the study area consists mostly of limestone. However, several wells drilled in the area have reported to encountered some sandstone.

Underlying the limestone formation in the study area is a shale layer which, based on the well logs available, is at least 20 feet thick. Shale is a fine-grained sedimentary rock formed by the consolidation of clay, silt, or mud and is virtually impermeable. As a result, it is of little or no value as a groundwater resource.

2.3.1. General Geology of the Area

St. Marys lies within the Till Plains region of Ohio which is characterized by a relatively level to rolling area shaped by the smoothing and depositional action of the Pleistocene Glaciers. The thickness of the glacial deposits in the vicinity of St. Marys vary from approximately 40 to 90 feet in most of the area to over

400 feet in the vicinity of the South Wellfield. The glacial deposits consist mostly of stratified clay lenses alternated with sand and gravel.

An outstanding geological feature in the area, is a buried bedrock valley associated with the ancient preglacial Teays River which ran across central Ohio into Indiana (Figure 2). The main body of the Teays flowed just south of the city of St. Marys with a predominantly westerly flow and was joined by tributaries in the general area where the City of St. Marys is now located. The thickness of the glacial deposits in the area is influenced by this occurrence and is what gives the bedrock its current configuration (Figure 3). Throughout the glaciation periods, the valley carved by the Teays has been filled with glacial deposits producing the current surface topography.

2.3.2. Groundwater Flow and Recharge.

In order to obtain a preliminary assessment of the direction of groundwater flow, a map depicting the groundwater flow was developed based on static groundwater levels reported on the well logs at the time of well construction, and using ground elevations obtained from topographic maps of the area (Figure 4). Figure 4 indicates that the groundwater flow in the bedrock formation in the vicinity of St. Marys, is to the north, apparently driven by the St. Marys River drainage system. There is no indication that groundwater flow in the bedrock formation is affected by the ancient Teays River.

Based on Figure 4 it can be concluded that the recharge to the bedrock formation occurs south of the study area, probably in the vicinity of New Bremen and Minster which corresponds to a surface water divide located in that area.

Due to the limited number of wells constructed in the glacial deposits it was not possible to develop a map depicting the direction of groundwater flow in the sand and gravel formation. However, based on similarities of groundwater levels in a few glacial wells compared to adjacent bedrock wells, it was estimated that groundwater flow in the glacial deposits may be similar to the bedrock aquifer. This, in combination with the similarities in groundwater quality, leads to the conclusion that there may be an intimate relationship between the bedrock and glacial aquifers.

2.4 Delineation of the WHPA

Delineation of the wellhead protection area (WHPA) for the City of St. Marys was based on the Time of Travel (TOT) criteria. Capture zones based on a 1-year, and 5-year TOT were defined for the wellfield, as recommended in the Wellhead Protection Program for the State of Ohio. It should be noted, that both the bedrock aquifer and the aquifer located in the sand and gravel deposits within the Teays River Valley are fairly deep. Moreover, they are overlaid by thick layers of clay and, therefore, they are not susceptible to contamination. None-the-less, several conservative assumptions were used in defining the WHPA's, as described below.

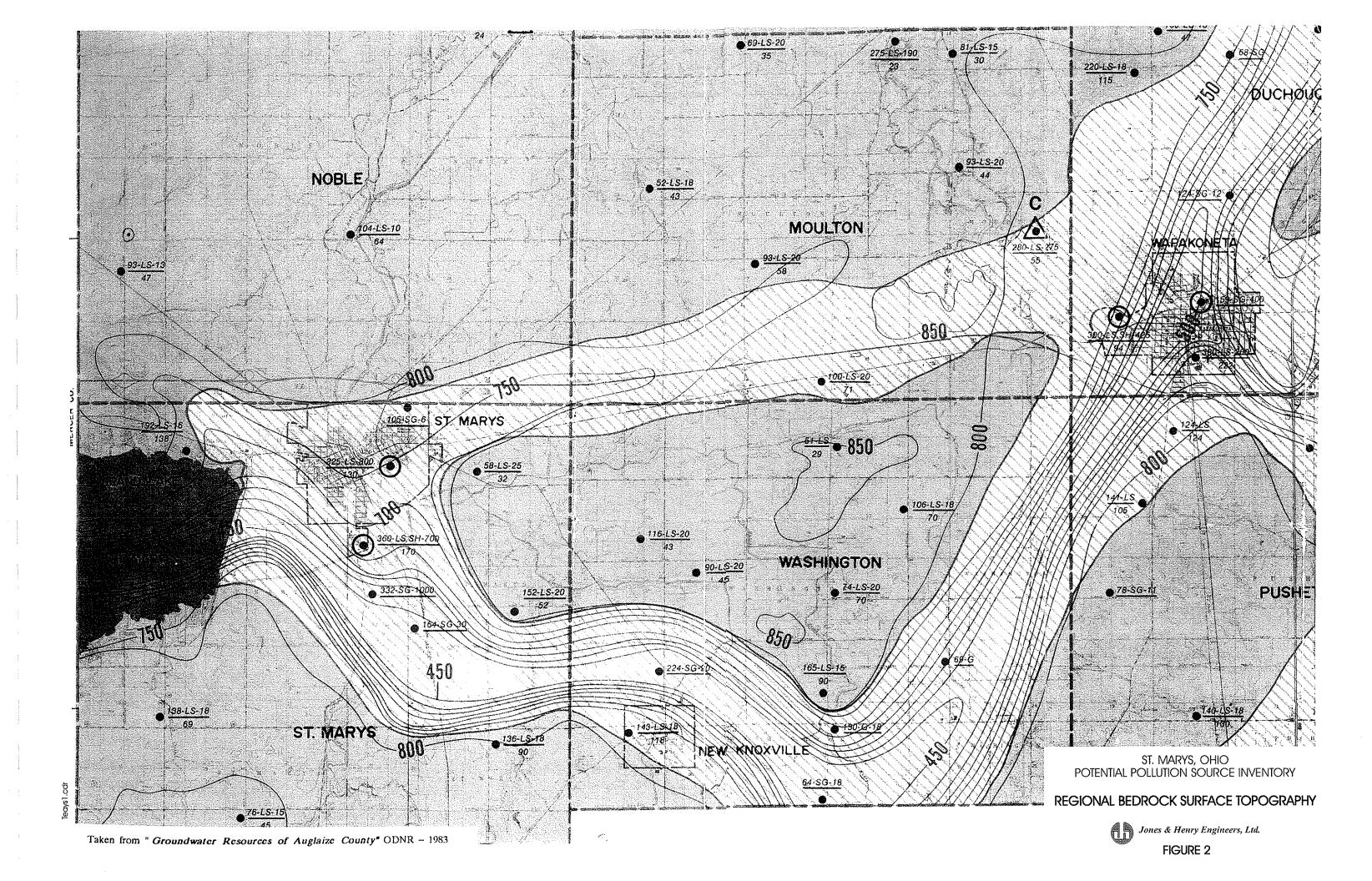


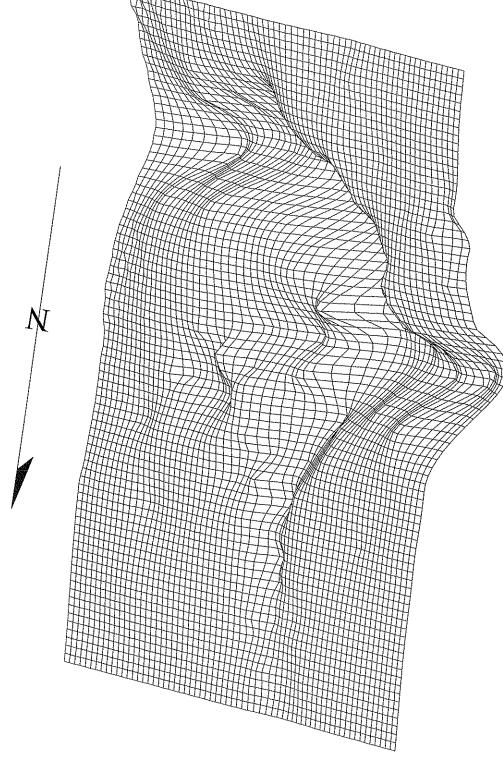
FIGURE 3

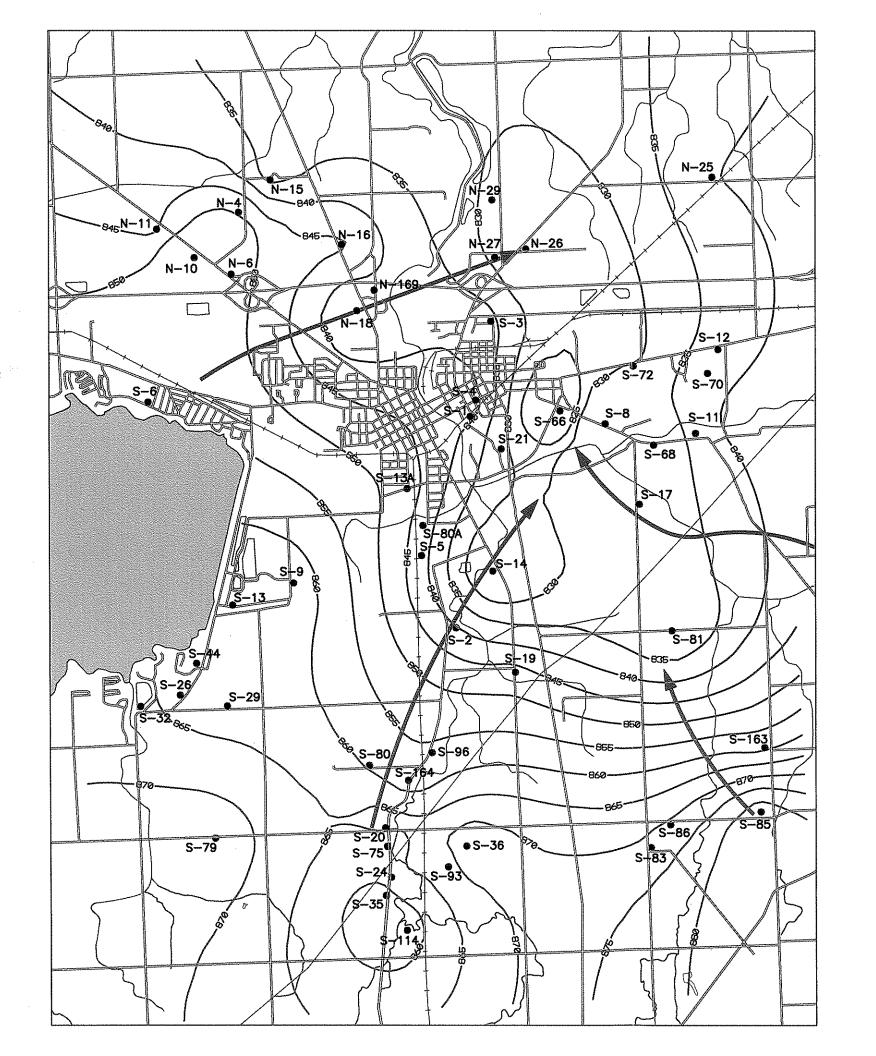
Jones & Henry Engineers, Ltd.

3-DIMENSIONAL VIEW OF THE BEDROCK SURFACE



ST. MARYS, OHIO POTENTIAL POLLUTION SOURCE INVENTORY



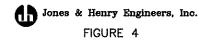




6 1/4 1/2 3/4 1 1 1/2 2 MILE SCALE IN MILES

> ST. MARYS, OHIO POTENTIAL POLLUTION SOURCE INVENTORY

GROUNDWATER FLOW



Considering the complexity of the geology of the area, a "3-dimensional" numerical flow model was developed to assist in the delineation of the wellhead protection areas. The model selected for the mathematical simulation of the wellfields is the numerical model known as MODFLOW. MODFLOW is the most widely used and accepted groundwater flow modeling program. Particle tracking for delineation of the wellhead protection area was performed with MODPATH. The modeling process was accomplished using the modeling software known as GMS which is a pre and post-processor for both MODFLOW and MODPATH.

GMS is considered by many experts in the groundwater modeling industry as the most advanced, powerful and comprehensive groundwater modeling package available. The program was developed by the Engineering Computer Graphics Laboratory of Brigham Young University under the direction of the U.S. Corps of Engineers with support from the Department of Defense, the Department of Energy and the Environmental Protection Agency.

The WHPA's defined for St. Marys wellfields were based on projected future "average-day" demand for the year 2020 which was estimated at approximately 2.8 mgd (1,944 gpm). As a conservative approach, each wellfield was assumed to provide the entire water demand, effectively doubling the estimated rate.

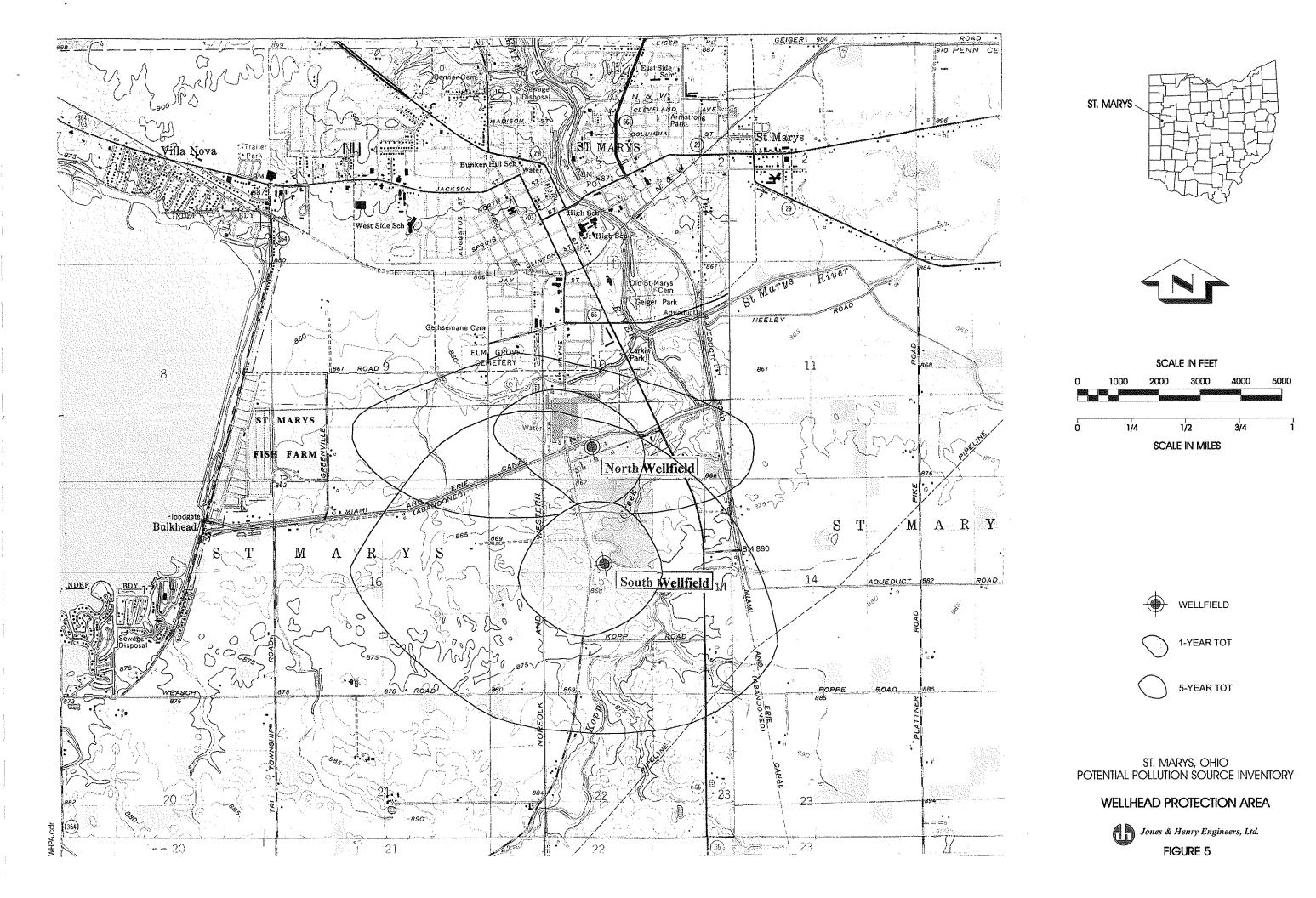
For the purpose of defining the wellhead protection areas, the bedrock aquifer was assumed to have a homogeneous effective porosity of 10%. The sand and gravel deposits were assumed to have an effective porosity of 20%. These values are somewhat low, however, they were selected to provide an additional conservative measure in defining the WHPA's. The resulting WHPA (Figure 5) is fairly large and is due in part to the conservative approach taken in the development of the model of the wellfields.

As can be noted on Figure 5, there is an "overlapping" of the wellhead protection areas defined for each wellfield. This is due to the fact that the two wellfields are located in completely different aquifers, each with its distinct characteristics. Therefore, considering the relative proximity of the wellfields, it is logical and not unusual for the areas to overlap.

The areal extension of the wellhead protection area was estimated at approximately 1,938 acres (3.03 mile²). This is less than the sum of the individual capture areas and is due to the "overlapping" of the WHPA's.

TABLE 2 AREAL EXTENSION OF THE WHPA

	Areal Extension of the 1-Year TOT (acres)	Areal Extension of the Combined 1 and 5-Year TOT (acres)	
North Wellfield	186	695	
South Wellfield	212	1,546	



3.0 RESULTS OF THE PPSI

3.1 General/Rating Criteria

The activities conducted during the potential pollution source inventory were varied in nature. In some instances specific points of were identified, while in other instances general potential pollution areas were defined, as in the case of land use and zoning maps. Consequently, not all the activities conducted involved a rating of the potential pollution sources.

Where applicable, two main criteria were used in the rating of the potential sources of contamination. These criteria are:

- Distance of the source from the wellfield and its location relative to the WHPA. Higher ratings were given if located within the 1-year TOT with a lower rating assigned if located within the 5-year TOT. The rating was significantly lower if located outside of the wellhead protection area.
- The potential risk associated with the activity at the site. This includes the type of activity and the volume of materials that are handled.

Each criterion was weighted numerically with higher ratings assigned to the sites with higher potential for contamination. The overall rating for each site was determined based on the sum of the ratings of the different criteria evaluated. The sites were then classified from very low to very high, depending on the cumulative risk rating. Table 3 shows the weight given to each facility based on their location relative to the wellhead protection area. Additional weight was added based on the activity and is described in each individual section. The final rating of each site was based on the criteria listed on Table 4.

TABLE 3
RATING SYSTEM FOR VARIOUS CLASSIFICATIONS

TIME OF TRAVEL	RATING
Beyond the Five-Year Time of Travel Capture Zone	5
Within the Five-Year Time of Travel Capture Zone	10
Within the One-Year Time of Travel Capture Zone	20

TABLE 4
PRIORITY RANKING OF THE POTENTIAL POLLUTION SOURCES

CUMULATIVE RATING	PRIORITY RANKING
0 - 20	VERY LOW
25	LOW
. 30	HIGH
>30	VERY HIGH

3.2 Database Search

As the name indicates, the database search involved a comprehensive compilation of information contained in the different databases maintained by regulatory agencies. In the identification of the potential threats to the wellfield, not only existing facilities were evaluated, but also past incidents which may have an impact on the wellfield. Specific information on the sites/incidents is included in Appendix B of this report, and contains information from both federal and state databases. The databases from which the information was obtained were used in the classification of the sites and are described briefly.

RCRA Generator

Resource Conservation and Recovery Information System (RCRIS - Large and Small Quantity Generators) contains information on hazardous waste handlers regulated by the US EPA under the Resource Conservation and Recovery Act (RCRA). It is a national system used to track events and activities that fall under RCRA. The generator database is a subset of the complete RCRIS file that includes hazardous waste generators that create more than 100 kg of hazardous waste per month or meet other requirements of the RCRA. Information regarding formerly regulated RCRA sites, compliance and corrective actions is also considered. Additional data regarding treatment, storage and disposal of hazardous substances is also included in the study.

ERNS (Emergency Response Notification System)

ERNS is a national database that contains information on specific notification of releases of oil and hazardous substances into the environment. The system stores data regarding the site of the spill, the material released and the medium into which it occurred. As a joint effort, the Department of Transportation and the EPA have compiled more than 290,000 records.

TRI (Toxic Release Inventory)

TRI contains information from facilities that manufacture, process, or import any of the more than 300 listed toxic chemicals, that are released directly into the air, water, or land or are transported off-site. The database includes facts on amounts of chemicals stored and emitted from the facility.

TSCA (Toxic Substances Control Act Inventory)

The TSCA inventory includes the locations and chemical production of more than 7000 processors and manufacturers of chemicals. This database is no longer released to the public by the US EPA.

NRIS (Nuclear Regulatory Information System)

NRIS contains information on sites licensed by the NRC to handle radioactive materials.

FINDS (Facility Index System)

The FINDS is an inventory of all facilities that are regulated or tracked by the US EPA.

MSL (Ohio Master Sites List)

This database identifies sites deemed by the State of Ohio for remediation and is released annually.

SWF (Ohio Solid Waste Facilities)

This state database lists known active and inactive solid waste disposal sites in the State of Ohio.

LUST (Ohio Leaking Underground Storage Tank List)

The Ohio LUST list provides information on known leaking underground storage tanks and tank removal actions in the State of Ohio.

SPILL (Ohio Spills Database)

This includes information on known spills in the State of Ohio. It should be noted, however, that the threat to the City of St. Marys wellfield from several of these spills is insignificant considering the amount of material spilled, the single occurrence, and their location.

UST (Ohio Underground Storage Tank List)

The Ohio UST list provides the location of registered underground storage tanks. Recently, the Bureau of the Underground Storage Tank Regulation removed from the publicly available list of underground storage tanks all tanks with a "removed" status, citing the availability of all sites with tank removals on the LUST list.

CERCLA (Comprehensive Environmental Response, Compensation and Liability Act)

CERCLIS maintains information on more than 15,000 sites nationally identified as hazardous or potentially hazardous that may require action. These sites are currently being investigated or an investigation has been completed regarding the release of hazardous substances. The most serious of this list as ranked by the hazardous ranking system are transferred to the NPL (National Priorities List).

3.2.1. Classification of Potential Sources of Pollution

Several sites identified in the database search were listed under various classifications. The rating of these sites was based on the highest ranking depending on the most critical classification. Table 5 shown below indicates the weight given to each site based on the database from which it was extracted.

TABLE 5
RATING SYSTEM FOR DATABASE SEARCH

DATABASE IDENTIFICATION	RATING
NRIS (Nuclear Regulatory Information System)	5
TRI (Toxic Release Inventory)	10
SWF (Ohio Solid Waste Facilities)	10
UST (Underground Storage Tank List)	10
RCRA Generator	10
TSCA (Toxic Substances Control Act Inventory)	. 10
LUST (Ohio Leaking Underground Storage Tank)	15
ERNS (Emergency Response Notification System)	10
SPILL (Ohio Spills Database)	10
MSL (Ohio Master Sites List)	15
CERCLA	15

Thirty-one potential sources/incidents were identified in and around the general area of the WHPA. However, only 5 of these are located within the WHPA. Another five are located in the immediate vicinity of the WHPA. Table 6 below, presents the different classification rating and priority assigned to each site. The location of these sites is shown on Figure 6.





FEDERAL DATABASES

- ▼ FINDS Sites
- TRI Sites
- A RCRA Generator Sites
- ▼ TSCA Sites

STATE DATABASES

- LUST Sites
- ▼ SPILL Sites

MULTIPLE MATCHES

- Two Database Matches
- Three Database Matches
- 1-YEAR TOT
- 5-YEAR TOT

ST. MARYS, OHIO POTENTIAL POLLUTION SOURCE INVENTORY

PPS IDENTIFIED DURING DATABASE SEARCH



TABLE 6 IDENTIFIED POTENTIAL POLLUTION SITES DATABASE SEARCH PRIORITY SETTING

SITE I.D.	SOURCE NAME	APPLICABLE CLASSIF:	CLASSIF, RATING	TOT RATING	TOTAL RATING	RANK
1	CASAD Mfg. Corp.	FINDS RCRA	5 10	20	30	High
2	Electricon Corp.	FINDS RCRA	5 10	20	30	High
3	CROPMATE Co.	FINDS	5	20	25	Low
4	Goodyear Tire & Rubber Co.	SPILL RCRA CERCLA MSL TRI	5 10 15 15 10	20	35	Very High
5	Moran Refrigeration, Inc.	LUST	15	15	30	High
6	700 Block of S. Wayne	SPILL	5	10	15	Very Low
7	Hoge Lumber	TRI	10	10	20	Very Low
8	St. Marys Trucking Co.	LUST	15	10	25	Low
9	Sturgeon Estate	LUST	15	10	25	Low
10	127 Aqueduct Rd.	SPILL	5	10	15	Very Low
11	St. Marys One Hour Cleaner	FINDS RCRA	5 10	5	15	Very Low
12	Lassus Brothers Oil	UST LUST	10 15	5	20	Very Low
13	BP Oil Co.	FINDS UST	5. 10	5	15	Very Low
14	11 N. Main St.	SPILL	5	5	10	Very Low
15	St. Marys Chrysler Plymouth	LUST	15	5	20	Very Low
16	City of St. Marys	FINDS	5	5	10	Very Low
17	S. Street to Front St. on Miami Erie Canal	SPILL	5	5	10	Very Low
18	Grand Lake Petroleum	LUST	15	5	20	Very Low
19	100 W. High St.	SPILL	5	5	10	Very Low
20	Cotton Mill	RCRA	10	5	15	Very Low
21	Sherwin-Williams Co.	FINDS RCRA	5 10	5	15	Very Low
22	St. Marys Foundry	RCRA TRI LUST FINDS	10 10 15 5	ŏ	20	Very Low

SITE I.D.	SOURCE NAME	APPLICABLE CLASSIF.	CLASSIF. RATING	TOT RATING	TOTAL RATING	RANK
23	Gorby's Transmission	RCRA FINDS	10 5	5	15	Very Low
24	Speedway # 1177	UST LUST (3) FINDS	10 15 5	5	20	Very Low
25	City of St. Marys	LUST	15	5	20	Very Low
26	ODNR Wildlife Div. Fish Hatchery	RCRA FINDS	10 5	10	20	Very Low
27	PAK-A-SAK	LUST UST	15 10	5	20	Very Low
28	TA Morgan Oil Co.	LUST	15	5	20	Very Low
29	222 Indiana Ave	SPILL	5	5	10	Very Low
30	Dales Marathon	LUST	15	5	20	Very Low
31	Minster Machine Training Ctr.	LUST	15	10	25	Low

Specific and more detailed information regarding each of the sites listed above is included in Appendix B. The results of the priority setting approach for the sites identified in the database search, indicates that one site is classified as "Very High" threat to the wellfields. Three additional sites are listed as "High". The remaining Sites are listed either as "Low" or "Very Low." Personal interviews, mail or telephone surveys of each of these facilities will be conducted at a later date as part of the management strategies.

3.3 Visual Survey

A visual survey of the WHPA was conducted in which a detailed inspection was performed by driving and walking around the WHPA. During the inspection, all PPS that were visible were noted and recorded.

Thirty-four potential sources of contamination were identified during the visual survey, and their location is shown of Figure 7.



Three of these sites were previously identified during the database search, resulting in thirty-one additional sources. Table 7 presents the rating and priority assigned to each site. It indicates that four sites were rated as a "Very High" potential source of contamination. Five additional sites were rates as "High". The remaining sites were either rated "Low" or "Very Low".

TABLE 7
PRIORITY SETTING - VISUAL SURVEY

SITE I.D.	SOURCE NAME	APPLICABLE CLASSIF:	CLASSIF: RATING	TOT RATING	TOTAL RATING	PRIORITY
4	Good Year Rubber Co.		15	20	35	Very High
5	Moran Refrigeration		15	10	25	Low
8	St. Marys Trucking Co.		15	10	25	Low
32	Cemetery		5	15	20	Very Low
33	St. Marys Marble & Granite Co.		5	15	20	Very Low
34	Stroh Contracting Co.	General Contractors	5	10	15	Very Low
35	Acme Metal & Mfg. Co.		5	10	15	Very Low
36	J&S Electronics II		5	10	15	Very Low
37	Bulk Storage	Above Ground Storage tanks	15	10	25	Low
38	Wick's	Reconditioning of Appliance	5	10	15	Very Low
39	Speckman Automotive	Parts Sale	10	10	20	Very Low
40	City of St. Marys	Water Dept.	15	10	25	Low
41	D. H. Automotive	Auto Repair	15	10	25	Low
42	St. Marys Veterinary Clinic		5	10	15	Very Low
43	Nelson Body Shop	Auto Body Shop	15	10	25	Low
44	Lenox Quality Plumbing and Heating	Refrigeration, Plumbing, Heating, AC	15	10	25	Low
45	Southside Auto Wrecking	Junk Yard	15	5	20	Very Low
46	Storage Facility Self-Store		10	20	30	High
47	Moran Corporation	Storage / AGST	10	20	30	High
48	Polkat	Lime/Sludge Haulers	15	20	35	Very High
49	Thomas Shelby Co.		5	20	25	Low

SITE LD:	SGURCE NAME	APPLICABLE CLASSIF:	CLASSIF. RATING	TOT RATING	TOTAL RATING	PRIORITY
50	Mercer Tool Corporation		5	20	25	Low
51	Classic Delight, Inc.		5	20	25	Low
52	Fluid Power Assembly Corp.		10	20	30	High
53	Reliable Products Co.		5	20	25	Low
54	Foremost Tool Inc.		5	20	25	Low
55	T&P Autobody Repair		15	20	35	Low
56	St. Marys Foundry		15	20	35	Very High
57	One Stop Shop D&J	Industrial & Commercial Supplies	10	20	30	High
58	World Press Repair		10	20	30	High
59	Electrical Substation		15	20	35	Very High
60	City of St. Marys	Water Treatment Plant	5	20	25	Low
61	Leer Fire Equipment Co.		5	10	15	Very Low
62	Lime Sludge Lagoon		5	20	25	Low

Personal interviews, mail or telephone surveys of each of these facilities will be conducted at a later date as part of the management strategies.

3.4 Land Use/ Land Cover Map

A land use and land cover map could only be obtained at the 1:250,000 scale. The map covers several counties in Ohio and also includes a portion of Indiana. A copy of the map is included in a pocket at the end of this report. An enlarged portion of the area of interest is shown on Figure 8. As can be noted from Figure 8, the WHPA covers mostly "cropland and pasture" with some "deciduous forest land". Only a small portion of the WHPA is located in "other urban or built-up land" and land used for "commercial and services".

3.5 Zoning Map

A zoning map of the area in the immediate vicinity of the WHPA, is illustrated on Figure 9. The map was edited from a zoning map provided by the City. Most of the WHPA has been zoned as Agricultural (approximately 90%). A small portion of the area (approximately 10%) is zoned as General Industrial.

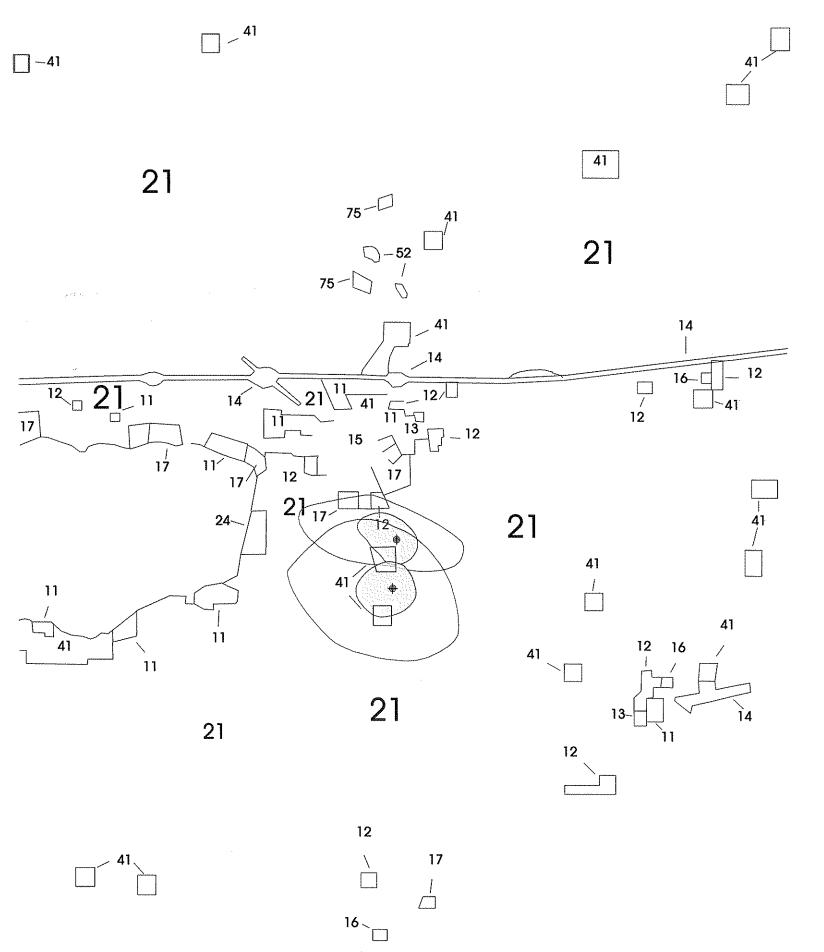
3.6 Transportation Routes and Transmission Lines

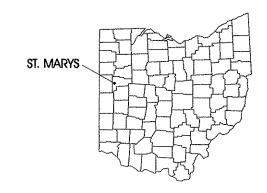
Considerable effort was dedicated to obtaining maps illustrating the location of major oil and transmission lines within the WHPA. Information was sought from PUCO, State and local departments of transportation, Federal Energy Regulatory Commission, OUPS, and private database companies. General maps were obtained, indicating the location of major gas and electrical transmission lines in the State of Ohio. These maps are inserted in pockets at the end of this report. The maps indicate that there is no major electrical transmission line in the WHPA. In the general area of the City of St. Marys there is a major gas line which runs in an east-west direction, located in the northern portion of the City but not near the WHPA.

On occasions, topographic maps developed by the USGS provide information of major oil and gas pipelines as well as transmission lines. Figure 10, is a recently updated topographic map illustrating the WHPA. As can be noted, there are no major pipelines or transmission lines within the wellhead protection area. However, the topographic map does indicate that there is a major oil pipeline located in the south-east portion of the WHPA.

Figure 10 also illustrates the major transportation routes in the wellhead protection area and its vicinity. As can be noted, the most significant transportation route within the WHPA is State Route 66 which traverse the WHPA from North to South.

Of special significance from a WHPP standpoint is the location of the now abandoned Miami and Erie Canal. The canal represents the northern border of the North Wellfield. A branch of the canal also borders the east side of the WHPA. Also, of significance is the location of the R. J. Corman Railroad with traverse the WHPA from north to south. Both elements are illustrated on Figure 10.





LAND USE AND LAND COVER, 1981 MUNCIE, INDIANA; OHIO

URBAN OR BUILT-UP LAND

- 11 Residential
- 12 Comercial and Services
- 13 Industrial
- Transportation Communication and Utilities
- Industrial and Commercial Complexes
- Mixed Urban or Built-up Land
- 17 Other Urban or Built-up Land

2 AGRICULTURAL LAND

- Cropland and Pasture
- Orchard, Groves, Vineyards Nurseries, and Ornamental
- Contained Feeding Operations
- 24 Other Agricultural Land

3 RANGELAND

- 31 Herbaceous Rangeland32 Shrub and Brush Rangeland
- Mixed Rangeland

4 FORREST LAND

- 41 Deciduous Forrest Land
- Evergreen Forrestland Mixed Forrest Land

5 WATER

- 51 Streams and Canals
- 52 Lakes
- Reservoirs 53
- 54 Bays and Estuaries

6 WTLAND

- 61 Forested Wetland
- 62 Nonforested Wetland

7 BARREN LAND

- 71 Dry Salt Flats
- 72 Beaches
- Sandy Areas Other than Beaches 73
- Bare Exposed Rock
- Strip Mines, Quarries, and
 - Gravel Pits
- Transitional Areas
- 77 Mixed Barren Land

8 TUNDRA

- Shrub and Brush Tundra
- Herbaceous Tundra
- 83 Bare Ground Tundra
- 84 Wet Tundra
- 85 Mixed Tundra





5-YEAR TOT

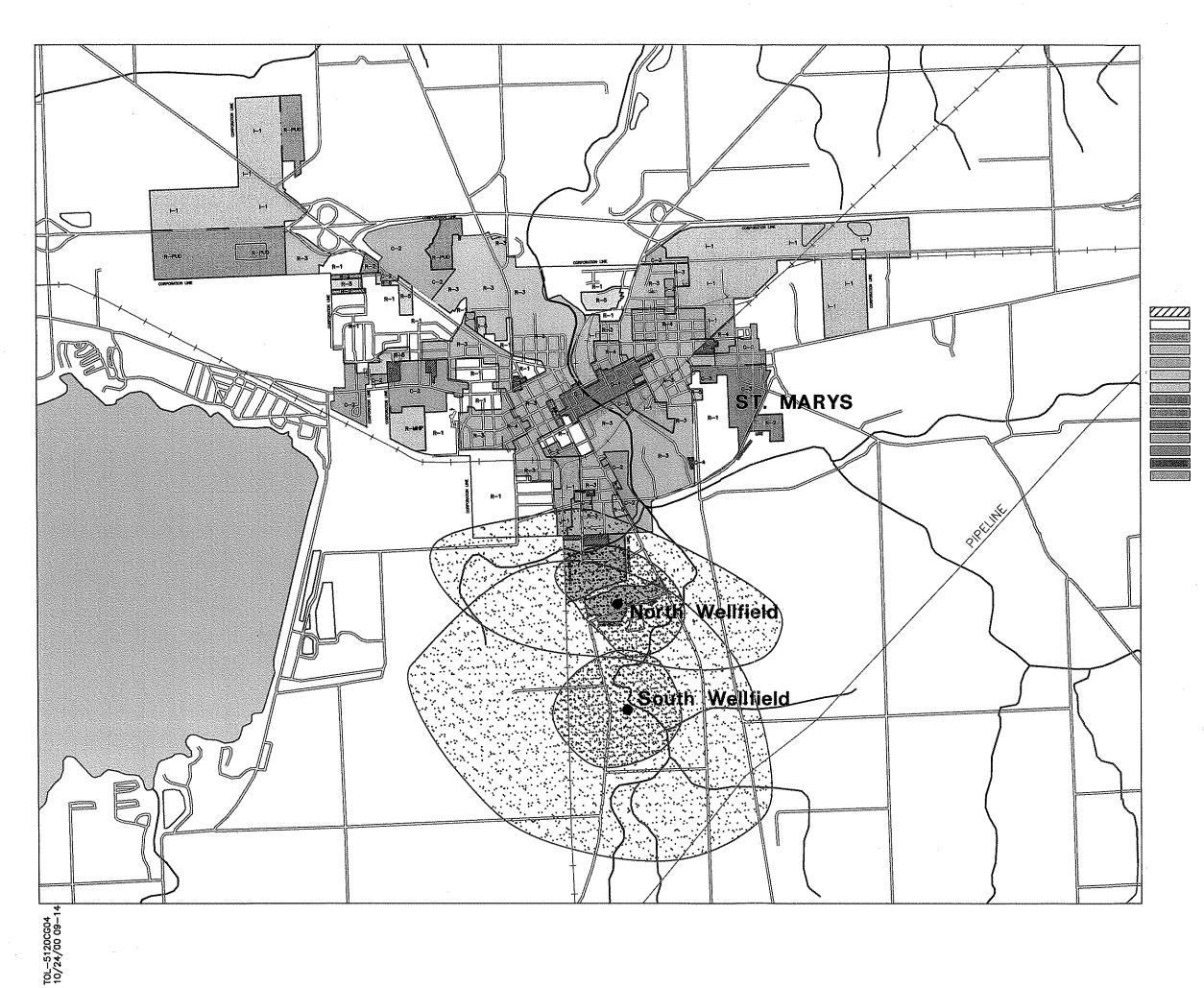
LAND USE LAND COVER

ST. MARYS, OHIO POTENTIAL POLLUTION SOURCE INVENTORY

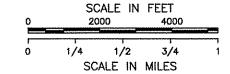


Jones & Henry Engineers, Ltd.

FIGURE 8







NOT INCORPORATED AREA

R-1 SINGLE FAMILY RESIDENTIAL

R-2 SINGLE FAMILY RESIDENTIAL

R-3 SINGLE FAMILY RESIDENTIAL R-4 SINGLE FAMILY RESIDENTIAL

R-5 MULTI-FAMILY RESIDENTIAL

R-MHP MOBILE HOME PARK

R-PUD RESIDENTIAL PLANNED UNIT DEVELOPMENT

RP-1 RESIDENTIAL PROFESSIONAL

C-1 CENTRAL COMMERCIAL

C-2 GENERAL COMMERCIAL

C-3 OFFICE-MEDICAL FACILITIES
C-4 NEIGHBORHOOD COMMERCIAL

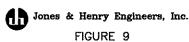
I-1 INDUSTRIAL

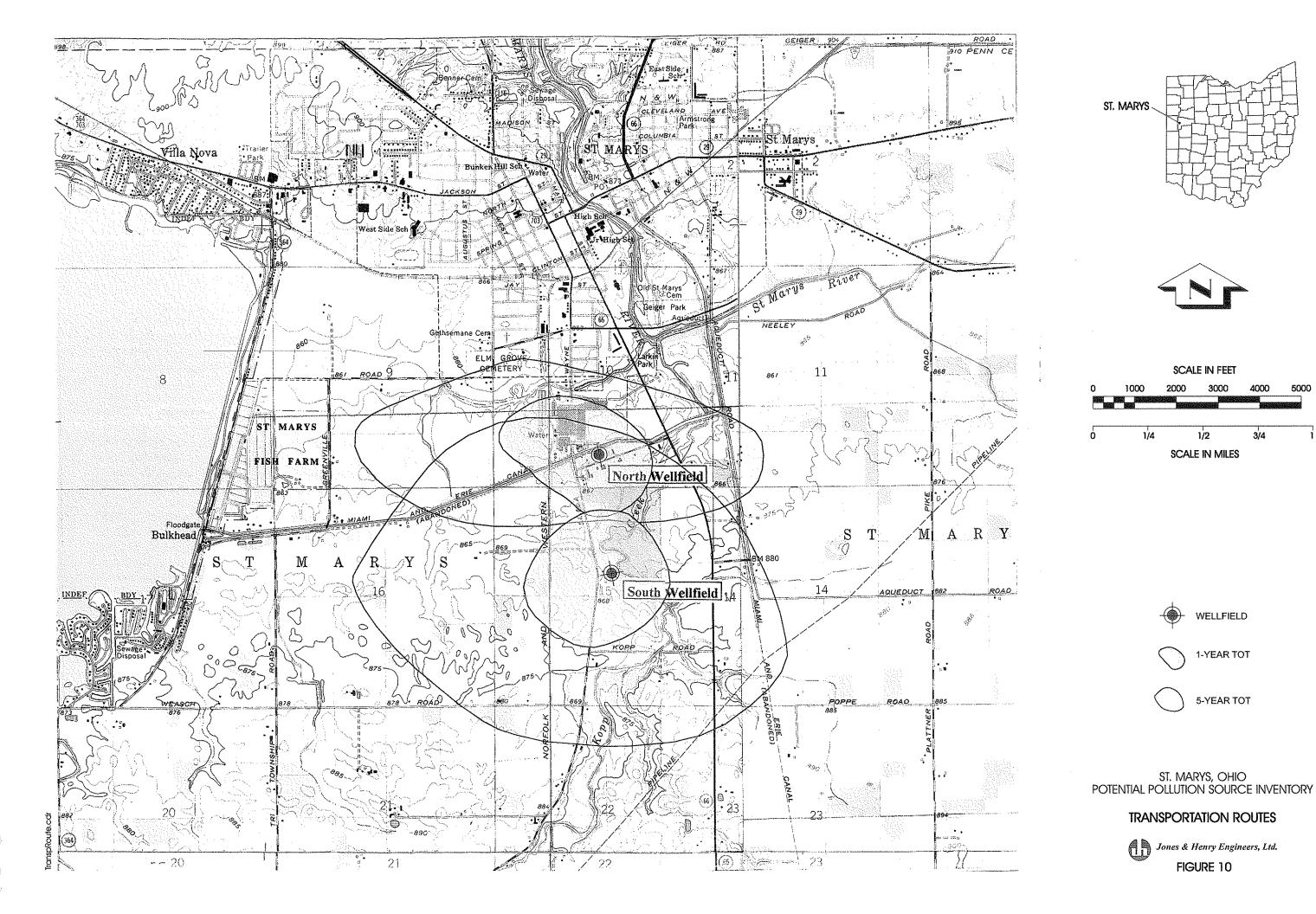
1 YEAR TOT

5 YEAR TOT

ST. MARYS, OHIO POTENTIAL POLLUTION SOURCE INVENTORY

ZONING MAP





3.7 Historical Land Use

As mentioned previously, this item will be addressed as part of the wellhead protection program management strategies, and, therefore, it is not discussed in this report. It is important to reiterate, however, that a search of fire insurance maps of the area in the vicinity of the wellfield has been conducted with negative results. To assist in the search, firms specializing in this type of activity were contracted. Apparently, fire insurance maps of the area of interest have not been developed. Included in Appendix A, are letters provided by the search firms indicating the negative results obtained. Additional data collection and review of information available, along with interviews with long time residents, will be completed as part of the management of the wellhead protection area.

3.8 Sewered and Unsewered Areas

A map illustrating the unsewered area in the wellhead protection area was developed with information provided by the City's wastewater utility department. The objective of this map is to indicate areas with potential septic systems that may pose a threat to the wellfield. The unsewered area is shown on Figure 11. As can be noted, a large portion of the WHPA is located in an unpopulated area which, therefore, is unsewered.

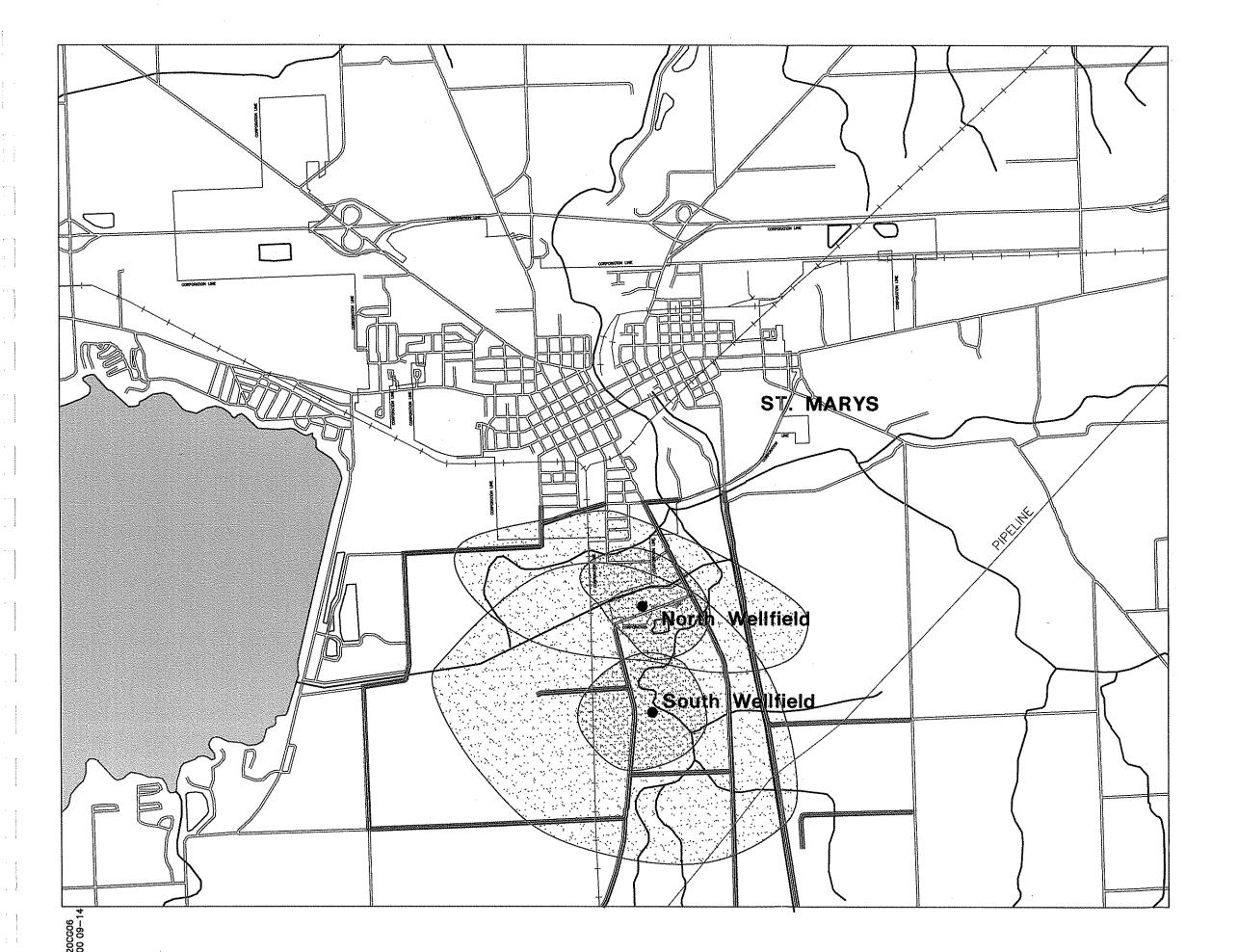
3.9 Injection and Oil & Gas Wells

The location of oil, gas, and injection wells in the vicinity of the wellhead protection area was downloaded from the Ohio Department of Natural Resources web site. The information obtained consists of a county-wide database listing the coordinates of the wells, along with additional information such as well type, formation intercepted, results obtained, and other miscellaneous information.

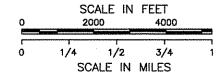
A considerable number of Oil & Gas wells have been drilled in the vicinity of the City of St. Marys, many of which are located within the wellhead protection area. Figure 12 illustrates the location of the wells and their identification. A table summarizing relevant data of each well is included in Appendix C. Also included, is a sheet explaining the meaning of the code assigned to each well.

3.10 Home Fuel Oil Tanks

The objective of this activity was to identify areas in which it is likely to encounter home fuel oil storage tanks. To achieve this, the Ohio EPA recommended identifying areas where there are no gas lines. It is assumed that areas without gas lines are more likely to have alternate heating energy, including fuel oil. It should be noted, however, that the absence of gas lines does not necessarily imply the presence of home fuel oil tanks. Similarly, the presence of gas lines does not necessarily imply the absence of fuel oil tanks. However, it is only logical to assume that the probability of encountering home fuel oil tanks is greater in areas where there are no gas lines available. Moreover, in areas with gas lines, it is logical to assume that the residents will take advantage of this cheaper and more reliable source of energy. Figure 13 is a map illustrating the location of gas lines in the wellhead protection area.







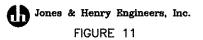
UNSEWERED AREA

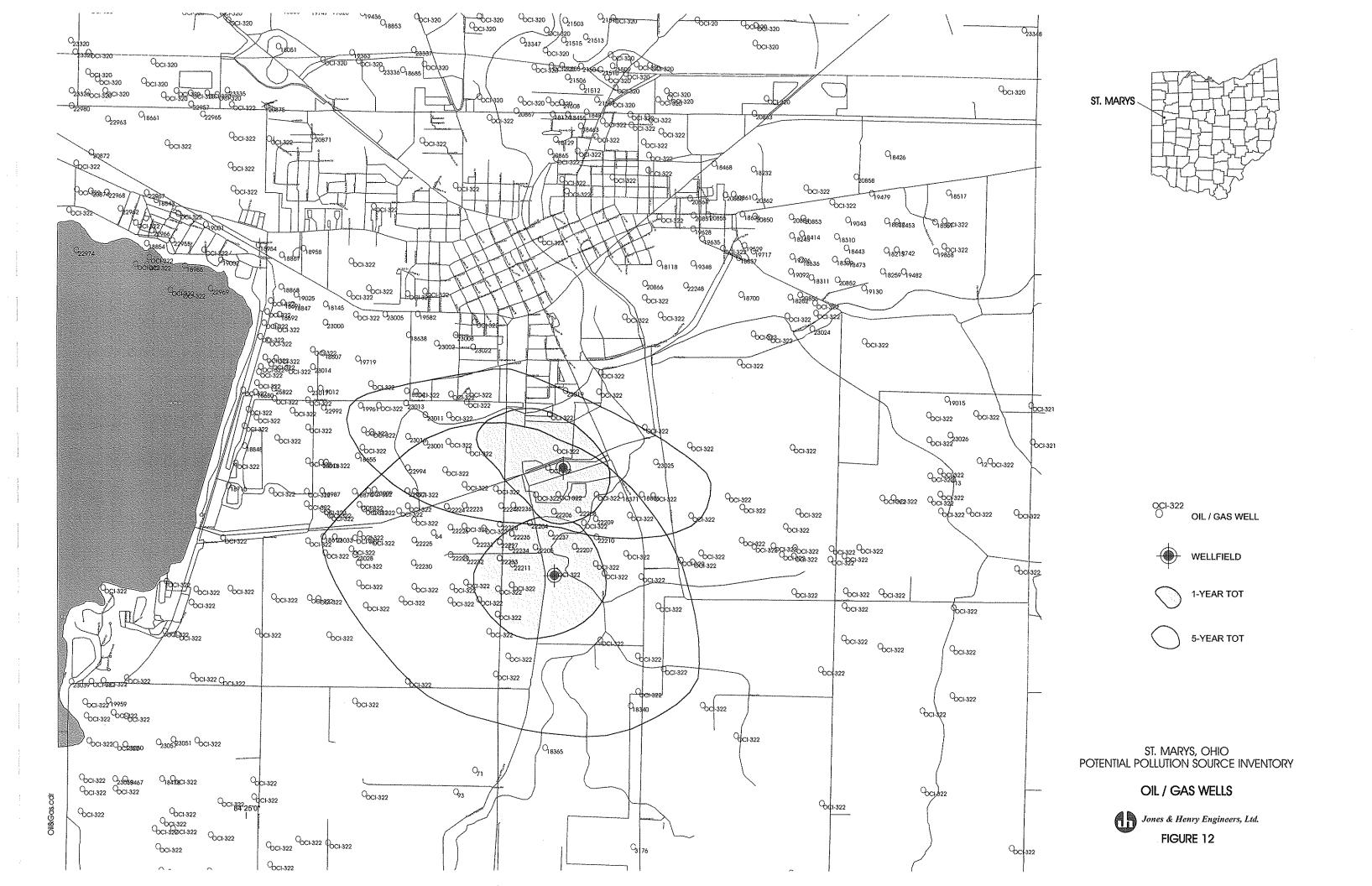
1 YEAR TOT

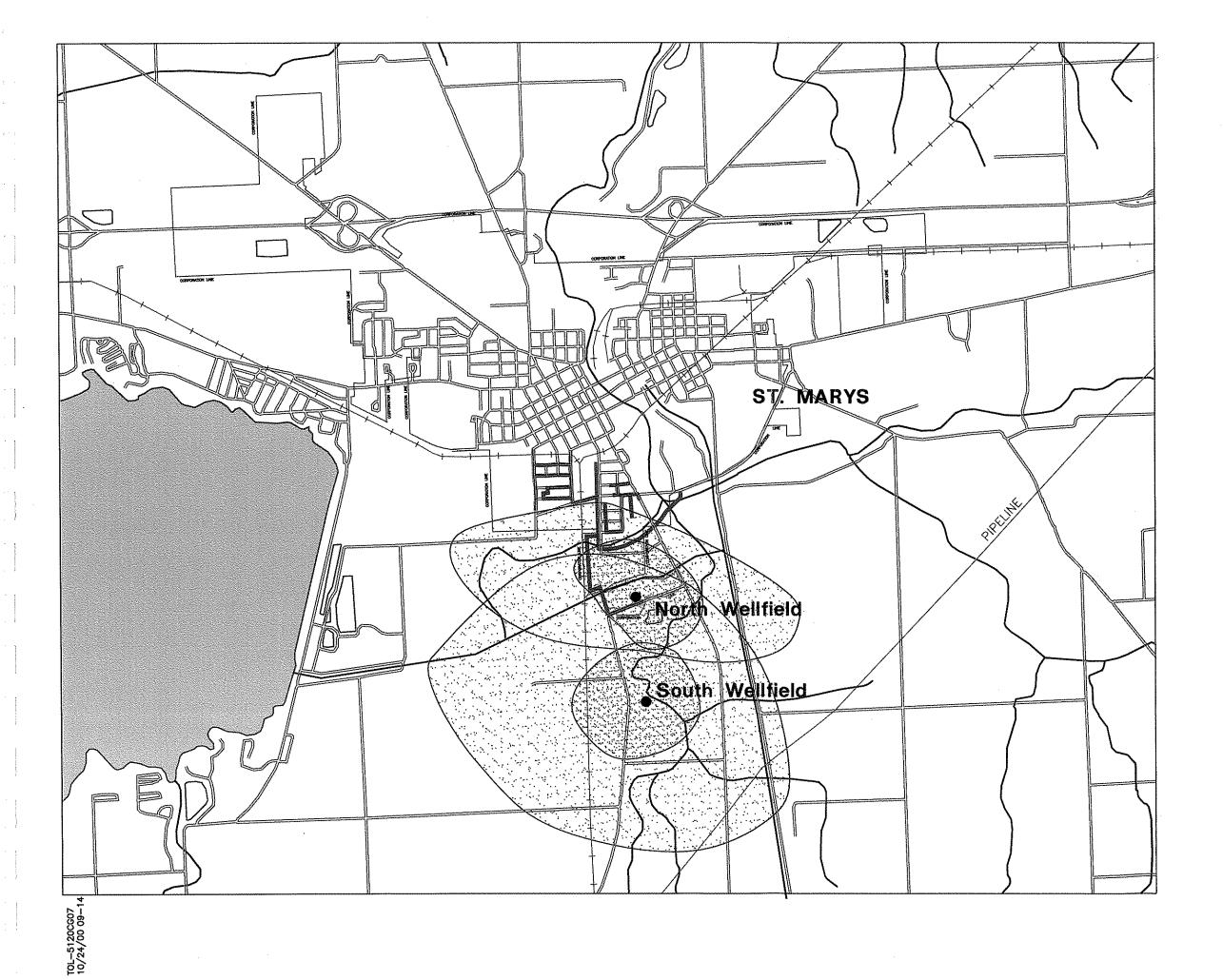
5 YEAR TOT

ST. MARYS, OHIO POTENTIAL POLLUTION SOURCE INVENTORY

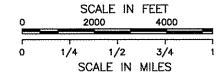
UNSEWERED AREA WITHIN WHPA











EXISTING GAS LINES

外部 1 YEAR TOT

5 YEAR TOT

ST. MARYS, OHIO POTENTIAL POLLUTION SOURCE INVENTORY

GAS LINES WITHIN WHPA

