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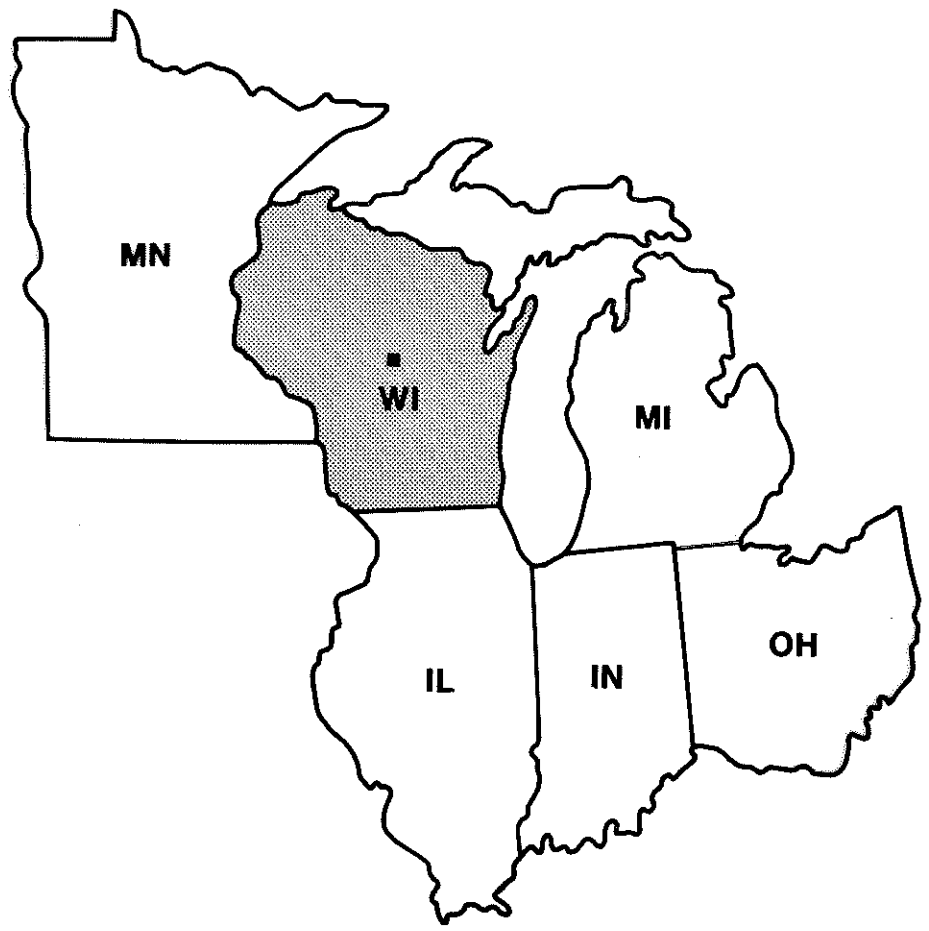
AERIAL PHOTOGRAPHIC ANALYSIS OF THE WAUSAU WATER SUPPLY

Wausau, Wisconsin

EPA Region 5



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AERIAL PHOTOGRAPHIC ANALYSIS OF THE WAUSAU WATER SUPPLY

Wausau, Wisconsin

by

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ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
LAS VEGAS, NEVADA 89114

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ABSTRACT

This report presents the results of analysis of historical and current aerial photographs of municipal well sites in Wausau, Wisconsin. Municipal wells #3, #4, and #6 are under study by the U.S. Environmental Protection Agency's Region 5 Office to determine possible sources of water contamination. This report documents physical conditions and activity within the study area that are potential sources of the contamination. Three selected dates of black-and-white and color photographs acquired over an 18-year period (1968-1986) are the source data for the analysis.

The historical photos reveal four commercial sites that operated bulk storage tanks north of municipal wells #3 and #4. In addition, a landfill situated north of municipal well #6 was identified and delineated.

The U.S. Environmental Protection Agency's Environmental Monitoring Systems Laboratory in Las Vegas, Nevada, prepared this report for the Agency's Environmental Services Division in Region 5 and Office of Emergency and Remedial Response in Washington, D.C.

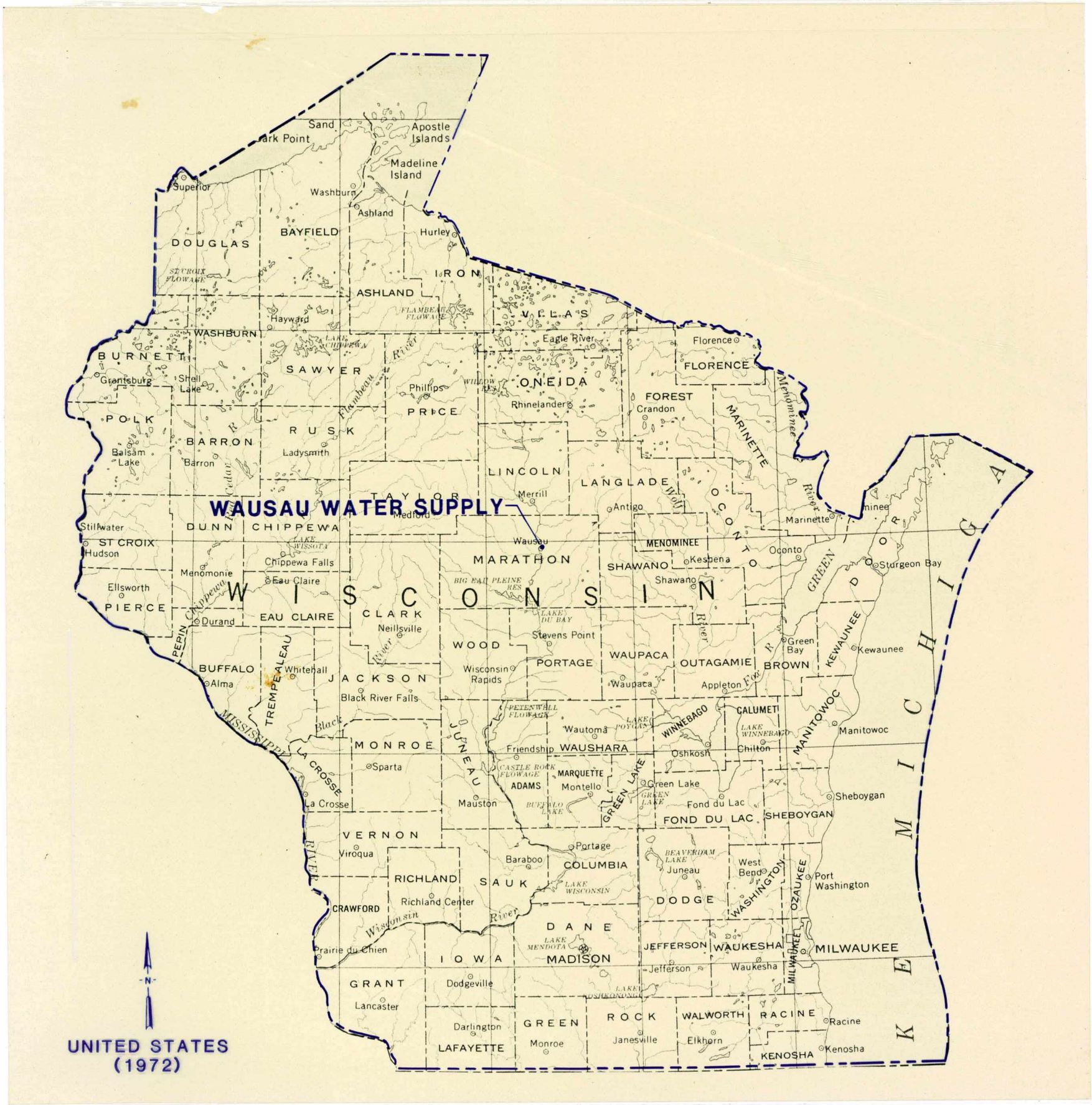

Figure 1. Study area regional location, Wisconsin. Scale 1:2,500,000.

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INTRODUCTION

The report presents a multidate analysis of historical and current aerial photographs of municipal water well sites in Wausau, Wisconsin. The study area around these wells is in northern Wausau along both sides of the Wisconsin River (Figures 1 and 2). The municipal wells #3, #4, and #6 are approximately within a 1-mile radius of each other. The report documents physical conditions and potential environmental hazards at the well field since 1968 to the present. Black-and-white and color aerial photographs dated 1968, 1978, and 1986 are used in this analysis. The well field is under study by the U.S. Environmental Protection Agency (EPA) Region 5 Office to determine the source of groundwater contamination by halogenated organic solvents. Background information on the municipal wells found to be contaminated was taken from November 12, 1985, Wausau Water Study Reports supplied by the Agency's Region 5 Office.

Topics addressed in this report include surface water contamination, indications of leachate, drainage patterns, disposal and/or burial of solid, liquid, and sludge waste, and visible vegetation stress associated with facility operations. The results of analysis are shown on annotated overlays.

This report is one of five that examine six sites in Wisconsin under this project (Table 1). This project includes a total of 35 sites in 6 states.

The U.S. Environmental Protection Agency's Environmental Monitoring Systems Laboratory in Las Vegas, Nevada, prepared this report for the Agency's Environmental Services Division in Region 5 and Office of Emergency and Remedial Response in Washington, D.C.

BACKGROUND

In 1982, volatile organic compounds were discovered in Wausau municipal wells #3, #4, and #6. These compounds are halogenated organic solvents used in industry.

TABLE 1. REGION 5 SITES COVERED UNDER TS-AMD-86710†

Report serial number†	Site name	Location	Analysis type
1	Tri County Landfill	South Elgin, IL	Intensive
2	HOD Landfill	Antioch, IL	Intensive
3	Parsons Casket Hardware	Belvidere, IL	Intensive
4	Himco Dump	Elkhart, IN	Intensive
5	Douglas Road Landfill	Mishawaka, IN	Intensive
6	Old City Landfill #1	Columbus, IN	Intensive
7	Firestone Landfill	Noblesville, IN	Intensive
8	Pestolite Battery Division	Vincennes, IN	Intensive
9	Tri State Plating	Columbus, IN	Intensive
10	Waste Inc., Landfill	Michigan City, IN	Intensive
11	Southside Sanitary Landfill	Indianapolis, IN	Intensive
12	Rockwell International	Allegan, MI	Intensive
13	Folkerisma Refuse	Grand Rapids, MI	Intensive
14	American Anodeo Inc.	Ionia, MI	Intensive
15	Kent City Mobile Home Park	Kent City, MI	Intensive
16	Honker Chemical	Montague, MI	Intensive
17	Kysor of Cadillac	Cadillac, MI	Intensive
18	H. Brown Co.	Grand Rapids, MI	Intensive
19	Avon Township Landfill	Rochester, MI	Intensive
20	Metal Working Shop	Lake Ann, MI	Intensive
21	St. Augusta Sanitary Landfill	St. Augusta, MN	Intensive
22	East Bethel Demo. Landfill	E. Bethel Township, MN	Intensive
23	Freeway Sanitary Landfill	Burnsville, MN	Intensive
24	Waite Park Ground Water	Waite Park, MN	Intensive
25	La Grande Sanitary Landfill	Alexandria, MN	Intensive
26	TRW Inc.	Minerva, OH	Intensive
27	Ormet Corp.	Hannibal, OH	Intensive
28	Xerxes Corp.	Avon, OH	Intensive
29	Koppers Co.	Youngstown, OH	Intensive
30	Algoma Landfill	Algoma, WI	Intensive
31	*Wausau Water Supply	Wausau, WI	Intensive
32	Hunts Disposal Landfill	Racine, WI	Intensive
33	Tomah Sanitary Landfill	Tomah, WI	Intensive
34	Hagen Farm	Stoughton, WI	Single-Date
34	Freeman Chemical	Saukville, WI	Single-Date

*Site covered in this report.

Municipal well #3 was found to be contaminated with tetra-, tri-, and di-chloroethylene compounds. Municipal well #4 was found to be contaminated with tetra-, tri-, and di-chloroethylene compounds in addition to xylene and toluene. Municipal well #6 was discovered to contain trichloroethylene.

METHODOLOGY

Stereoscopic pairs of historical and current aerial photographs are used to perform the analysis. Stereo viewing enhances the interpretation because it allows the analyst to observe the vertical as well as horizontal spatial relationships of natural and cultural features. Stereoscopy is also an aid in distinguishing between various shapes, tones, textures, and colors that can be found within the study area.

Evidence of waste burial is a prime consideration when conducting a hazardous waste analysis. Leachate or seepage resulting from burial and dumping of hazardous materials might threaten existing surface or ground-water sources. Pools of unexplained liquid are routinely noted because they can indicate seepage from buried wastes and may enter drainage channels that allow contaminants to move off the site. An excellent indicator of how well hazardous materials are being handled at a site is the presence or absence of spills, spill stains, and vegetation damage. Trees and other forms of vegetation that exhibit a marked color difference from surrounding members of the same species are labeled "dead," "stressed," or "damaged" based upon the degree of noticeable variation. Vegetation is so labeled only after consideration of the season in which the photographs were acquired.

The U.S. Environmental Protection Agency's Statement of Procedures on Floodplain Management and Wetlands Protection (Executive Orders 11988 and 11990, respectively) requires EPA to determine if removal or remedial actions at hazardous wastes sites will affect wetlands or floodplains and to avoid or minimize adverse impacts on those areas. To aid in compliance with these orders, significant wetland areas located within and adjacent to the sites have been identified and delineated. However, the sites have not been visited to verify the accuracy of wetland identification.

Drainage analysis determines the direction a spill or surface runoff would follow. Direction of drainage is determined from analysis of the photographs and from U.S. Geological Survey topographic maps. Whenever they are available, 7.5-minute quadrangle maps (scale 1:24,000) are used to show site location and to provide geographic and topographic information.

Results of the analysis are shown on annotated overlays attached to the photos. The prints in this report have been enlarged when appropriate to show maximum detail. The following table provides specifications of the photographs used in this report.

TABLE 2. AERIAL PHOTOGRAPHY SPECIFICATIONS

Site name, location, and geographic coordinates	Figure	Date of acquisition	Original scale	Film type†	Photo source‡
Qausau Water Supply					
Wausau, Wisconsin					
Well #6 (44°58.9'N89°37.8'W)	3	5/11/68	1:20,000	B&W	ASCS
Well #3 (44°58.5'N89°37.6'W)	4	9/23/78	1:40,000	B&W	ASCS
Well #4 (44°58.3'N89°37.8'W)	5,6	3/23/86	1:6,000	CC	EMSL
	7	3/23/86	Oblique	CC	EMSL

†Film type identification:
B&W: Black-and-white
CC: Conventional color

‡Photo source identification:
ASCS: U.S. Department of Agriculture, Agricultural Stabilization and Conservation Service, Salt Lake City, Utah.
EMSL: U.S. Environmental Protection Agency, Environmental Monitoring Systems Laboratory, Las Vegas, Nevada.

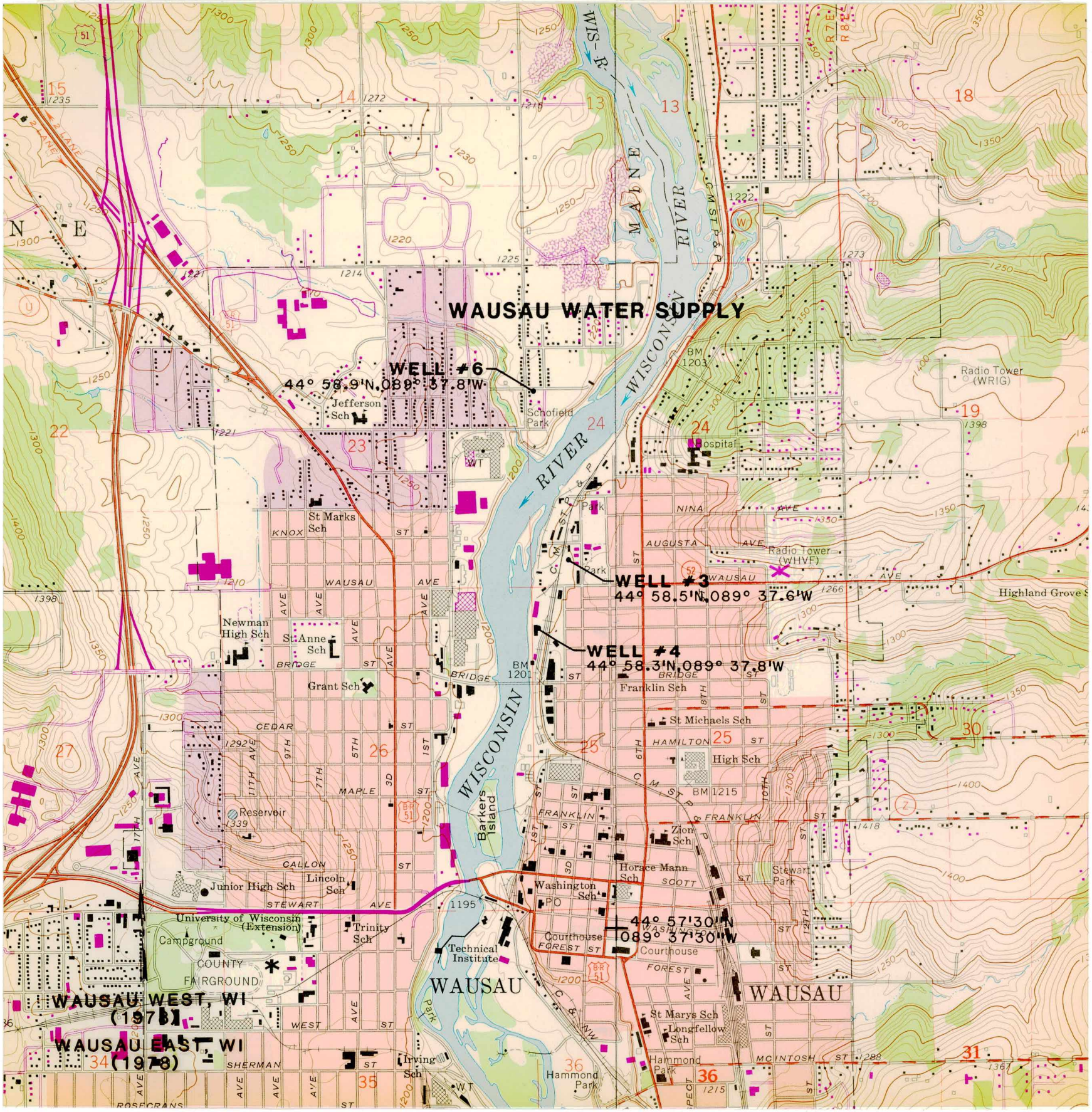

Figure 2. Local site location, Wausau. Scale 1:24,000.

ANALYSIS SUMMARY

The Wausau water supply, well field is situated in the northern portion of the Wausau along both banks of the Wisconsin River. The municipal wells #3, #4, and #6 are within a 1-mile radius of each other. Black-and-white and color photographs from 1968, 1978, and 1986 were used in this analysis.

The 1968 photograph reveals that wells #3 and #4 were situated near industrial and commercial areas of Wausau next to the railroad line. Several bulk storage tank facilities were near these wells. Municipal well #6 was in a residential area. By 1978 two bulk storage tank facilities north of municipal well #3 had been dismantled. Earthmoving activity at sand and gravel pits was observed north of municipal well #6. In 1986 landfilling of these pits is taking place. Numerous storage tanks and drums of the Wausau Chemical Company are north of municipal well #4.

The close proximity of these municipal wells to the Wisconsin River make them vulnerable to flooding.

PHOTO ANALYSIS

MAY 15, 1968

The 1968 photograph (Figure 3) shows the locations of five wells in the Wausau water supply system. The wells #3 and #4 are situated in industrial and commercial sections of the city of Wausau next to the railroad line. There are several bulk storage tank facilities in this section of the city. Three storage tank areas are at the east end of Winton Street. Municipal well #3 is next to open storage yards of the Wergin Construction facility. Municipal well #4 is approximately 400 feet south of a bulk storage tank area of the Wausau Chemical Company. The small scale of the photograph prevents observing details around these tanks.

Municipal well #6 is on the western side of the Wisconsin River. The well location is adjacent to a residential area. There are no visible industrial facilities nearby and no visible evidence of waste disposal activity.

INTERPRETATION CODE

BOUNDARIES AND LIMITS

- FENCED SITE BOUNDARY
- UNFENCED SITE BOUNDARY
- FENCE
- STUDY AREA

DRAINAGE

- DRAINAGE
- FLOW DIRECTION
- INDETERMINATE DRAINAGE

TRANSPORTATION/UTILITY

- VEHICLE ACCESS
- RAILWAY

SITE FEATURES

- DIKE
- STANDING LIQUID
- SL — STANDING LIQUID
- EXCAVATION, PIT (EXTENSIVE)
- MOUNDED MATERIAL (EXTENSIVE)
- MM — MOUNDED MATERIAL (SMALL)
- CR — CRATES/BOXES
- DR — DRUMS
- HT — HORIZONTAL TANK
- PT — PRESSURE TANK
- VT — VERTICAL TANK
- CA — CLEARED AREA
- DG — DISTURBED GROUND
- FL — FILL
- IM — IMPOUNDMENT
- LG — LAGOON
- OF — OUTFALL
- SD — SLUDGE
- ST — STAIN
- SW — SOLID WASTE
- TR — TRENCH
- VS — VEGETATION STRESS
- WD — WASTE DISPOSAL AREA
- WL — WETLAND

Figure 3. Wausau Water Supply, May 15, 1968. Approximate scale 1:24,000.

SEPTEMBER 23, 1978

The 1978 photograph (Figure 4) reveals the locations of municipal wells #3, #4, and #6. Two bulk storage tank facilities observed on the 1968 photograph (Figure 4) at the east end of Winton Street are dismantled. The storage area associated with the Wausau Chemical facility is not clearly seen due to the small scale and poor quality of the photograph. No indications of leakage or spillage from these bulk storage tanks are visible.

Ground scars (annotation A) are visible in an area north of Bugbee Avenue adjacent to the well field of municipal wells #6, #7, and #9. The massive earthmoving activity is soil borrowing and/or a sand and gravel operation. Large mounds of sand and gravel are nearby. There is no visible indication of dumping solid or liquid waste and/or landfilling action at this excavation site.

INTERPRETATION CODE

BOUNDARIES AND LIMITS

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Figure 4. Wausau Water Supply, September 23, 1978. Approximate scale 1:24,000.

APRIL 23, 1986

The 1986 photographs (Figures 5,6,7) show the land on which the municipal wells #3 and #4 are located remains an industrial and commercial section of Wausau. Two bulk storage tank areas observed on the 1978 photograph (Figure 4) are absent; however, the storage tank area (Annotation A) associated with the Wausau Chemical facility is present. This storage area has 11 vertical and 1 horizontal uncontained bulk storage tanks and is on the southeast corner of the property. There is a large open storage area with stacks of 55-gallon drums standing on the bare ground that also lack secondary containment. Spillage or leakage of the liquids in these tanks and/or drums could infiltrate into the soil and threaten the groundwater supply. Municipal well #3 is nearest to this Wausau Chemical storage area.

The municipal well #4 is adjacent to a storage yard of the Wergin Construction facility. No storage tanks or drums are discernible around this well.

On the west side of the Wisconsin River are municipal wells #6, #7, and #9 (Figure 6). Potential impact to this well field is a landfilling effort north of Bugbee Avenue at sand and gravel pits. These sand and gravel pits were described on the 1978 photograph and portions of the pits have since been partially covered with fill material. The terrain of this landfill has been recontoured with what appears to be construction rubble and fill. No solid or liquid waste dumping activity is visible and there is no visible evidence of leachate seepage or vegetation stress in this area.

INTERPRETATION CODE

BOUNDARIES AND LIMITS

- FENCED SITE BOUNDARY
- UNFENCED SITE BOUNDARY
- FENCE
- STUDY AREA

DRAINAGE

- DRAINAGE
- FLOW DIRECTION
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- SD SLUDGE
- ST STAIN
- SW SOLID WASTE
- TR TRENCH
- VS VEGETATION STRESS
- WD WASTE DISPOSAL AREA
- WL WETLAND

Figure 5. Wausau Water Supply, April 23, 1986 (1 of 2). Approximate scale 1:6,000.

INTERPRETATION CODE

BOUNDARIES AND LIMITS

- FENCED SITE BOUNDARY
- UNFENCED SITE BOUNDARY
- FENCE
- STUDY AREA

DRAINAGE

- DRAINAGE
- FLOW DIRECTION
- INDETERMINATE DRAINAGE

TRANSPORTATION/UTILITY

- VEHICLE ACCESS
- RAILWAY

SITE FEATURES

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- SL STANDING LIQUID
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- MOUNDED MATERIAL (EXTENSIVE)
- MM MOUNDED MATERIAL (SMALL)
- CR CRATES/BOXES
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- IM IMPOUNDMENT
- LG LAGOON
- OF OUTFALL
- SD SLUDGE
- ST STAIN
- SW SOLID WASTE
- TR TRENCH
- VS VEGETATION STRESS
- WD WASTE DISPOSAL AREA
- WL WETLAND

Figure 6. Wausau Water Supply, April 23, 1986 (2 of 2). Approximate scale 1:6,000.

INTERPRETATION CODE

BOUNDARIES AND LIMITS

- FENCED SITE BOUNDARY
- UNFENCED SITE BOUNDARY
- FENCE
- STUDY AREA

DRAINAGE

- DRAINAGE
- FLOW DIRECTION
- INDETERMINATE DRAINAGE

TRANSPORTATION/UTILITY

- VEHICLE ACCESS
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SITE FEATURES

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- SW SOLID WASTE
- TR TRENCH
- VS VEGETATION STRESS
- WD WASTE DISPOSAL AREA
- WL WETLAND

Figure 7. Wausau Water Supply, April 23, 1986. Oblique looking south.