

Wellhead Protection Plan Unit Well 15 City of Madison, Wisconsin

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EXECUTIVE SUMMARY

This report is a Wellhead Protection Plan (WHPP) for the City of Madison Unit Well 15. The purpose of this plan is to establish specific criteria for protection of the Well 15 recharge area. This WHPP was prepared for Unit Well 15 to conform with the requirements of the Wisconsin Administrative Code, Chapter NR 811, Section 16(5), for wellhead protection (WHP) planning.

Unit Well 15 is located at 3900 East Washington Street in the eastern part of the City of Madison. Construction of Unit Well 15 was completed in 1965. Unit Well 15 is 753 feet deep, is open to the lower bedrock (sandstone) aquifer and has a design capacity of approximately 2,200 gallons per minute (gpm).

Land use in the vicinity of Unit Well 15 is primarily conservancy, with some commercial, agricultural, industrial and residential development. The land surrounding Unit Well 15 is zoned commercial, but consists of the City of Madison's Reindahl Park.

As part of the Dane County regional hydrologic study, a regional groundwater flow model was prepared for Dane County and was used to delineate time-related (5-, 50-, and 100-year time of travel (TOT)) zones of contribution (ZOCs) for municipal wells (Krohelski et. al., 2000). This model was used to develop the 5-, 50- and 100-year timed travel for Unit Well 15. ZOCs extend north northeast of Unit Well 15 in the simulated upgradient groundwater flow direction.

Figure 3-4 shows the wellhead protection area (WHPA) for Unit Well 15. Two zones of protection are within the WHPA. Zone A is defined by the 5-year TOT ZOC. Zone B is defined by a 1,200-foot fixed radius around Unit Well 15. The WHPA will provide a conservative protection zone to account for changes in pumping rates, pumping duration, and interference drawdown from other existing and future wells.

A contaminant source inventory (CSI) was performed for the Unit Well 15 area during the first quarter of 2003. Potential and existing contaminant sources within a half-mile radius of Unit Well 15 include potential spills along roads and main transportation corridors, active and closed underground storage tank (UST) sites, commercial or industrial hazardous waste generators, road salt use, and pesticide, herbicide and nutrient loading on commercial and residential lawns.

Programs and activities to be used by the City of Madison and others for WHPA management at Unit Well 15 can be found in the Wellhead Protection Plan for Unit Well 28, City of Madison, prepared by EarthTech, Inc., in April of 2002.

The Madison Water Utility has an existing water conservation program and Public Education and Awareness program. The Utility has formulated a contingency plan for providing water in the event that Unit Well 15 or one or more of the City's other water supply wells becomes contaminated or removed from service.

A copy of the City of Madison's WHP ordinance is included in the Appendix to this report. The City of Madison is developing an overlay zoning district to add the WHPA for Unit Well 15. The WHP ordinance will help ensure that other potential contaminant sources are not located in the Unit Well 15 WHPA.

1.0 INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

This report is a WHPP for the City of Madison Unit Well 15. The purpose of this plan is to establish specific criteria for protection of the local recharge area in the vicinity of Unit Well 15.

This WHPP was prepared for Unit Well 15 to conform with the requirements of the Wisconsin Administrative Code, Chapter NR 811, Section 16(5), for WHP planning. A copy of this section of the code is in Appendix A. The project scope included the following:

1. Research available information regarding the geology and hydrogeology of the well sites and aquifer parameters.
2. Research well construction and operation of Unit Well 15.
3. Coordinate with Dane County Regional Planning Commission (DCRPC) for previously delineated 5-year TOT capture zones for Unit Well 15.
4. Perform a CSI to identify and characterize existing and potential contamination sources within the 5-year TOT capture zone and within a ½-mile radius of Unit Well 15.
5. Assist with the determination of a WHPA for Unit Well 15.

1.2 LOCATION AND BACKGROUND

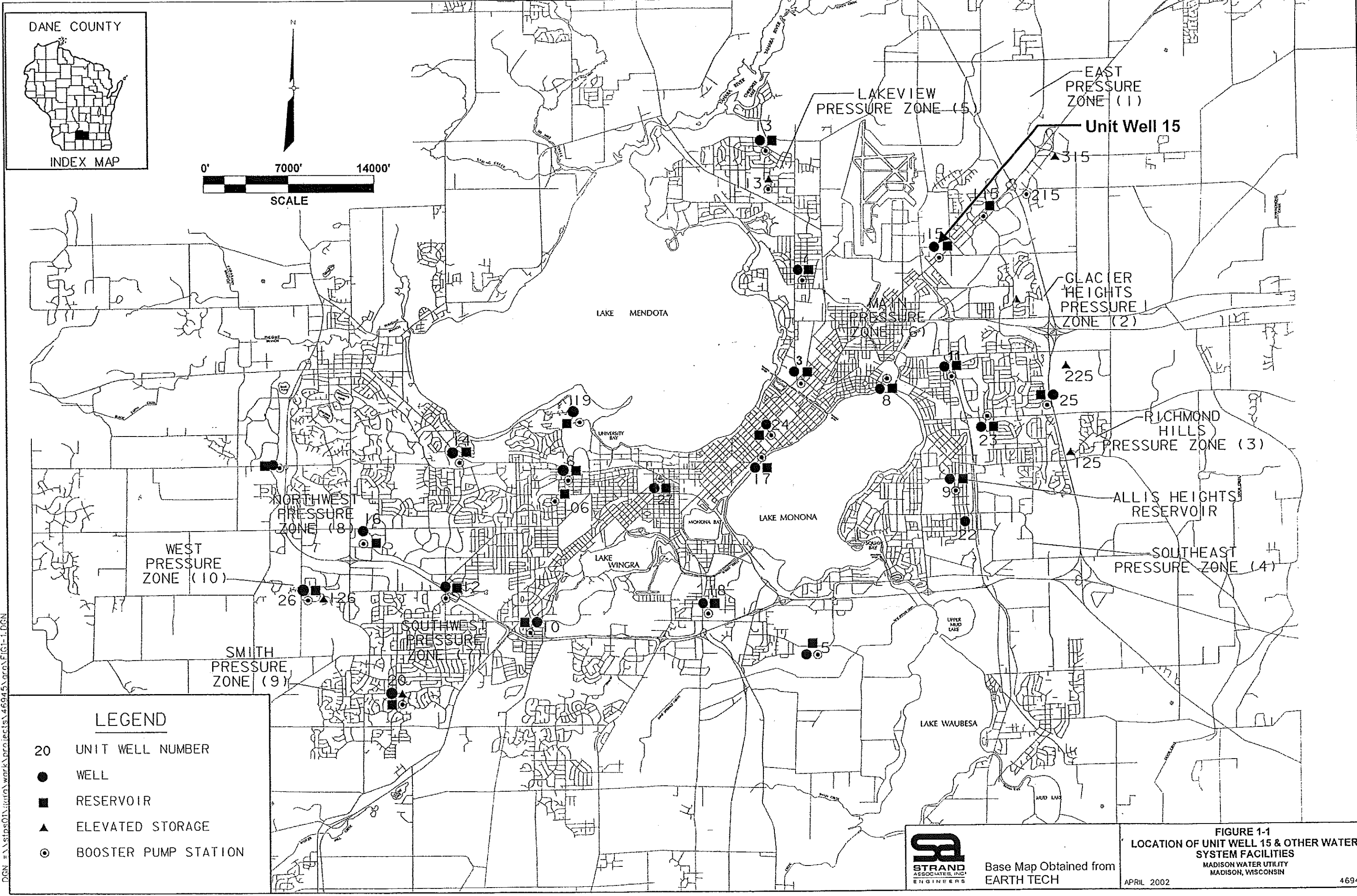
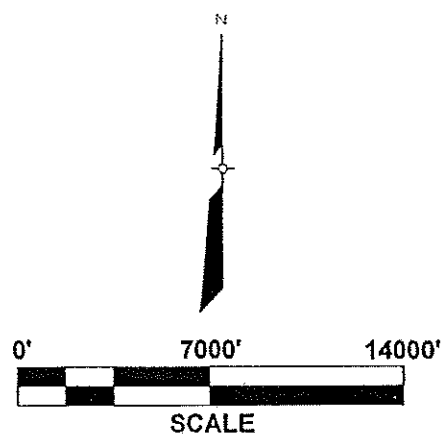
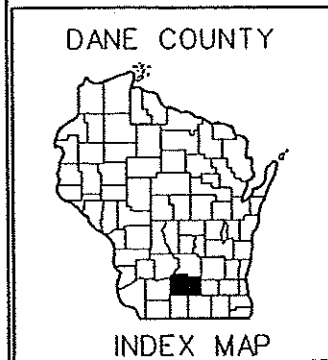
Unit Well 15 is located at 3900 East Washington Street in the eastern part of the City of Madison. The site is in the SE¼ of the SW¼, of Section 28, Township 8 North, Range 10 East, Dane County, Wisconsin. Figure 1-1 shows the location of Unit Well 15 and other water system facilities in the City of Madison. A portion of the survey plat showing the well site is in Appendix B. Construction of Unit Well 15 was completed in 1965.

The City water system serves approximately 215,000 people and consists of 24 active wells, 28 booster pumping facilities, 24 ground storage reservoirs, 5 elevated water storage tanks, and approximately 777 miles of water transmission and distribution mains. Because of the varying topography in the Madison area, the water system is divided into 10 separate pressure zones. Unit Well 15 is located in the City's Main Pressure Zone. Unit Well 15 is located approximately 7,200 feet northwest of Unit Well 29 (currently under construction) and 11,500 feet east of Unit Well 7.

1.3 UNIT WELL 15

Unit Well 15 was constructed to a depth of 753 feet. The well is cased with 30-inch OD steel casing driven to a depth of 125 feet below ground. A 29-inch open hole extends from the bottom of the 30-inch casing to a depth of 172 feet below ground. A 24-inch OD steel casing is grouted in from the surface to a depth of 172 feet below ground. A 22-inch diameter open borehole extends from 172 to 753 feet in depth. Broken limestone (dolomite) with sand was encountered at a depth of 28 feet. The geologic log for the well reported encountering the top of sandstone at a depth of 123 feet. The samples from 123 feet to 300 feet were lost and not analyzed. The well was terminated in the sandstone formation at a depth of 753

feet. Unit Well 15 was test pumped at a rate of 2,400 gallons per minute (gpm) for five hours. The specific capacity of Unit Well 15 was approximately 25.6 gallons per minute per foot (gpm/ft) of drawdown. A construction report prepared by the driller is in Appendix C. The geologic logs for the test and production wells for Well 15, prepared by the Wisconsin Geologic and Natural History Survey, also are found in Appendix C.



DGN: \\sps01\spirit\work\projects\46945\proj\FIG1-1.DGN

LEGEND	
20	UNIT WELL NUMBER
●	WELL
■	RESERVOIR
▲	ELEVATED STORAGE
⊙	BOOSTER PUMP STATION



Base Map Obtained from
EARTH TECH

FIGURE 1-1
LOCATION OF UNIT WELL 15 & OTHER WATER
SYSTEM FACILITIES
MADISON WATER UTILITY
MADISON, WISCONSIN
APRIL 2002

2.0 HYDROGEOLOGIC CONDITIONS

2.1 LAND USE, TOPOGRAPHY, AND DRAINAGE

Land use in the area is a mix of conservancy, commercial, industrial and residential development. Current zoning immediately around Unit Well 15 is Conservancy (C), General Commercial (C2), and single-family residential (R1). Other zoning in the area is:

Zoning Designation	Description
R2	Single-Family Residence District
R3	Single- and Two-Family Residence District
R9	General Residence District
C3	Highway Commercial District
C3L	Commercial Service and Distribution District
M1	Limited Manufacturing District
A	Agricultural District

The topography in the area of the well generally slopes from east to west with local elevation ranging from 900 to the east to 870 to the west and south. The surface elevation at Unit Well 15 is approximately 870 feet MSL. Drainage in the vicinity of Unit Well 15 is western, toward Starkweather Creek. Starkweather Creek discharges to Lake Monona south-southwest of the well site.

2.2 GEOLOGY

The area was glaciated by the Green Bay Lobe during the Wisconsin Stage. The rocks and unlithified deposits in the area range from Precambrian basement rocks to recent soils. The bedrock from oldest to youngest includes Precambrian crystalline rocks and Cambrian and Ordovician age bedrock consisting of sandstone, dolomite, and shale.

A formation log for strata encountered at Unit Well 15 is in Appendix C. The stratigraphic sequence encountered in the wells is briefly described in the following:

2.2.1 Precambrian Basement Bedrock

Precambrian bedrock was not encountered. Based upon the construction log for nearby Well 29, the anticipated depth of the top of the Precambrian bedrock is estimated to be approximately 870 feet below grade.

2.2.2 Cambrian and Ordovician Bedrock

Cambrian and Ordovician age rocks encountered in Unit Well 15 include in ascending order the Mount Simon Formation, the Eau Claire Formation, Galesville Member, Ironton Member and Franconian Formation. Sandstone was encountered between 123 feet and 300 feet below grade. The samples for this section were lost, so no geologic log information is available. Given the thickness of the unexamined sandstone, it is possible that some of this formation may be from the Trempealeau Group.

Cambrian and Ordovician rocks are relatively flat lying in the Madison area in the east-west direction and dip slightly to the south. The thickness of deep rock units appears to be relatively consistent in the Madison area, although there are textural and compositional changes, laterally.

2.2.3 Unlithified Deposits

No samples were analyzed from the drilling of the Well 15 production well. A geologic log of the test well constructed at relatively the same location as Well 15 shows that from 0 feet to 90 feet below the surface, the drift consists primarily of light yellow sand, with a mixed sand from 90 feet to 115 feet.

Soils in the immediate vicinity of Unit Well 15 are classified as the Plano, Dodge, Ringwood, Dresden, and Saint Charles silt loams. These soils have good attenuation potential. The DCRPC assigned a risk classification of low to moderate from surface activities in the Unit Well 15 area on the basis of several factors including soil properties (DCRPC, 1999).

2.3 HYDROGEOLOGY

In the study area, groundwater occurs within the bedrock aquifer and the unlithified (sand and gravel) aquifer. Locally, the sand and gravel aquifer is used for private domestic supplies. Municipal and industrial wells are constructed into the bedrock aquifer. Following is a brief discussion about the aquifers:

2.3.1 Bedrock Aquifer

The bedrock aquifer occurs in the Mount Simon Formation, and lower part of the Eau Claire Formation. The Precambrian bedrock is the base of the bedrock aquifer. Water occurs within horizontal and vertical fractures, along bedding planes, and between sand grains in the aquifer. Mount Simon Sandstones typically yield the greatest amount of water, while Eau Claire Sandstone yields moderate amounts of water. In general, hydraulic characteristics for an aquifer may be represented by two values – hydraulic transmissibility and storage coefficient. Transmissibility is expressed as the rate of flow of water at the prevailing water temperature, in gallons per day, through a vertical strip of the aquifer one foot wide, under a hydraulic gradient of 1 foot per foot. Storage coefficient is defined as the volume of water released from or taken into storage per unit surface area of the aquifer per unit change in the component of head normal to that surface. Previous studies of Dane County groundwater determined that the typical coefficient of transmissibility for Cambrian sandstones is greater than 45,000 gpd per foot, and the typical storage coefficient is approximately 0.0004 (Cline, 1965). The grouted casing in Unit Well 15 extends into the bedrock aquifer's Dresbach Formation. Therefore, water levels measured in Unit Well 15 are believed to be representative of the bedrock aquifer and are unaffected by the sand and gravel aquifer.

2.3.2 Sand and Gravel Aquifer

The sand and gravel aquifer occurs in sand and gravel deposits near the surface. The unlithified materials are thin in the vicinity of Unit Well 15. Construction logs for Unit Well 15 indicate that deposits are supplanted by sandstone by a depth of 123 feet below the surface. No water is withdrawn from the sand and gravel aquifer by Unit Well 15, since the well is cased to a depth of 172 feet below ground.

2.3.3 Groundwater Flow System

Average annual precipitation in the City of Madison area is reported to be approximately 30 to 30.5 inches per year (Cline, 1965; Cotter et. al., 1969). Cline (1965) estimated that the amount of recharge to the groundwater reservoir in the Upper Yahara River basin was approximately 6 in/yr. More recently Swanson (1996) estimated that the recharge rate in Dane County ranges from 0.3 to 6.7 inches per year (in/yr) and has an average value of 2.6 in/yr. Precipitation infiltrates through the till layer and recharges the unlithified and shallow bedrock aquifers. In some areas, a small percentage of water moves downward from the upper bedrock aquifer through the Eau Claire confining layer and into the lower bedrock aquifer. Map 7 in Appendix D shows areas of recharge to and discharge from the lower bedrock (Mount Simon) aquifer (Bradbury et. al, 1999; DCRPC 1999). Discharge from the unlithified and shallow bedrock aquifers is to pumping wells and/or to surface waters (lakes, streams and wetlands) in the area. Locally, discharge from the lower bedrock aquifer is primarily to pumping wells.

3.0 WELLHEAD PROTECTION AREA DELINEATION

This chapter describes methodologies used to define the Zone of Influence (ZOI) and Zone of Contribution (ZOC) for Unit Well 15.

3.1 ZOI

The ZOI for Unit Well 15 was estimated in accordance with Wisconsin Department of Natural Resources (DNR) requirements based on 30 days of continuous pumping at the rated pump capacity, assuming no aquifer recharge. The ZOI was determined using the Theis equation. The estimated ZOI for Unit Well 15 to a radius where there is 1 foot of drawdown is approximately 8.8 miles. This estimated ZOI is believed to be conservatively large, because the Theis equation does not incorporate aquifer recharge or the effects of potential hydraulic boundaries. Groundwater modeling performed by the Dane County Regional Planning Commission, as described in detail in Section 3.2 below, estimates the ZOI for Unit Well 15 to have a radius of 7.2 miles. This generally agrees with the calculated value above, and is smaller since the DCRPC ZOI includes aquifer recharge.

3.2 GROUNDWATER MODEL DEVELOPMENT AND ZOC DELINEATION

As part of the Dane County regional hydrologic study, a regional groundwater flow model was prepared for Dane County and was used to delineate time-related ZOCs for municipal wells (Krohelski et. al., 2000) including Unit Well 15. The Dane County regional hydrologic study was conducted cooperatively by the WGNHS, DCRPC, and the United States Geological Survey (USGS). The USGS modular groundwater modeling code (MODFLOW (McDonald & Harbaugh, 1988)) was used to simulate groundwater flow. After the calibrated groundwater flow model was prepared, PATH3D (Zheng, 1991) was used to determine time-related ZOCs.

The model domain covers an area of 50 by 60 miles and is divided into 144,000 nodes. Each node has regular spacing of 1,312.4 feet (400 meters) on a side. The grid has 200 rows and 240 columns (Krohelski et. al., 2000).

In 2002, the groundwater flow model was converted from a three layer model to a four layer model. The sand and gravel aquifer is Layer 1. The upper bedrock aquifer is Layer 2. The Eau Claire Formation is Layer 3. The lower bedrock aquifer is Layer 4. The model was recalibrated and various boundary conditions were modified (DCRPC, 2001). Other aquifer parameters input into the model were as previously described in Chapter 2 and in Krohelski et. al., 2000.

Three groundwater flow simulations were performed using the calibrated model and different pumping rates for existing and known future municipal supply wells in Dane County (Bradbury, 1998). Simulation No. 1 was performed using the projected pumping rates from municipal wells for the year 2025. The projected pumping rate for Unit Well 15 is 1.383 million gallons per day (MGD). Pumping at a rate of 1.383 MGD is equivalent to pumping continuously at a rate of approximately 960 gallons per minute (gpm). Simulation No. 2 was performed using the "maximum sustained pumping rate" or "one-half design capacity" (Bradbury, 1998). The maximum sustained pumping rate (one-half design capacity) for Unit Well 15 is 1.584 MGD. The design capacity of Unit Well 15 is approximately 2,200 gpm (3.17 MGD), and city data indicates that the well has been pumping at 2,155 gpm (3.10 MGD). Pumping at a rate of 1.584 MGD is equivalent to pumping continuously at a rate of 1,100 gpm, or half the well's nominal capacity. Simulation No. 3 was performed using full design capacity. Full capacity for Unit Well

15 is 3.168 MGD. Pumping at a rate of 3.168 MGD is equivalent to pumping continuously at a rate of 2,200 gpm.

3.3 ZOC

The area that recharges or contributes water to Unit Well 15 is defined as the ZOC. The areal extent of the ZOC (capture zone) depends on the pumping rate, amount of horizontal and vertical recharge, aquifer characteristics, pumping duration, and other stresses such as other pumping wells. It is beneficial to know the well capture zone, because contaminants introduced within the zone could reach Unit Well 15.

Figure 3-1 shows the 5-, 50-, and 100-year TOT ZOCs for Unit Well 15 based on the projected 2025 pumping rates (Simulation No. 1). Figure 3-2 shows the 5-, 50-, and 100-year TOT ZOCs for Unit Well 15 based on the one-half design capacity pumping rate (Simulation No. 2). Figure 3-3 shows the 5-, 50-, and 100-year TOT ZOCs for Unit Well 15 based on the full-capacity pumping rate (Simulation No. 3). The capture zones extend north northeast in the simulated upgradient groundwater flow direction. Table 3-1 summarizes the upgradient and downgradient extent of capture zones for the various pumping simulations. The ZOCs delineated using the Simulation No. 3 pumping rates are more conservative in length and width compared to the ZOCs delineated using Simulation Nos. 1 and 2 pumping rates.

The ZOCs estimated for Simulation Nos. 1, 2 and 3 are representative of anticipated pumping conditions.

Maps 21 and 22 and Figure 2 in Appendix G show regional and local ZOCs for municipal wells in Dane County. Figure 2 in Appendix G shows ultimate ZOCs for municipal wells in Dane County. The ZOCs for Unit Well 15 are located entirely within Dane County.

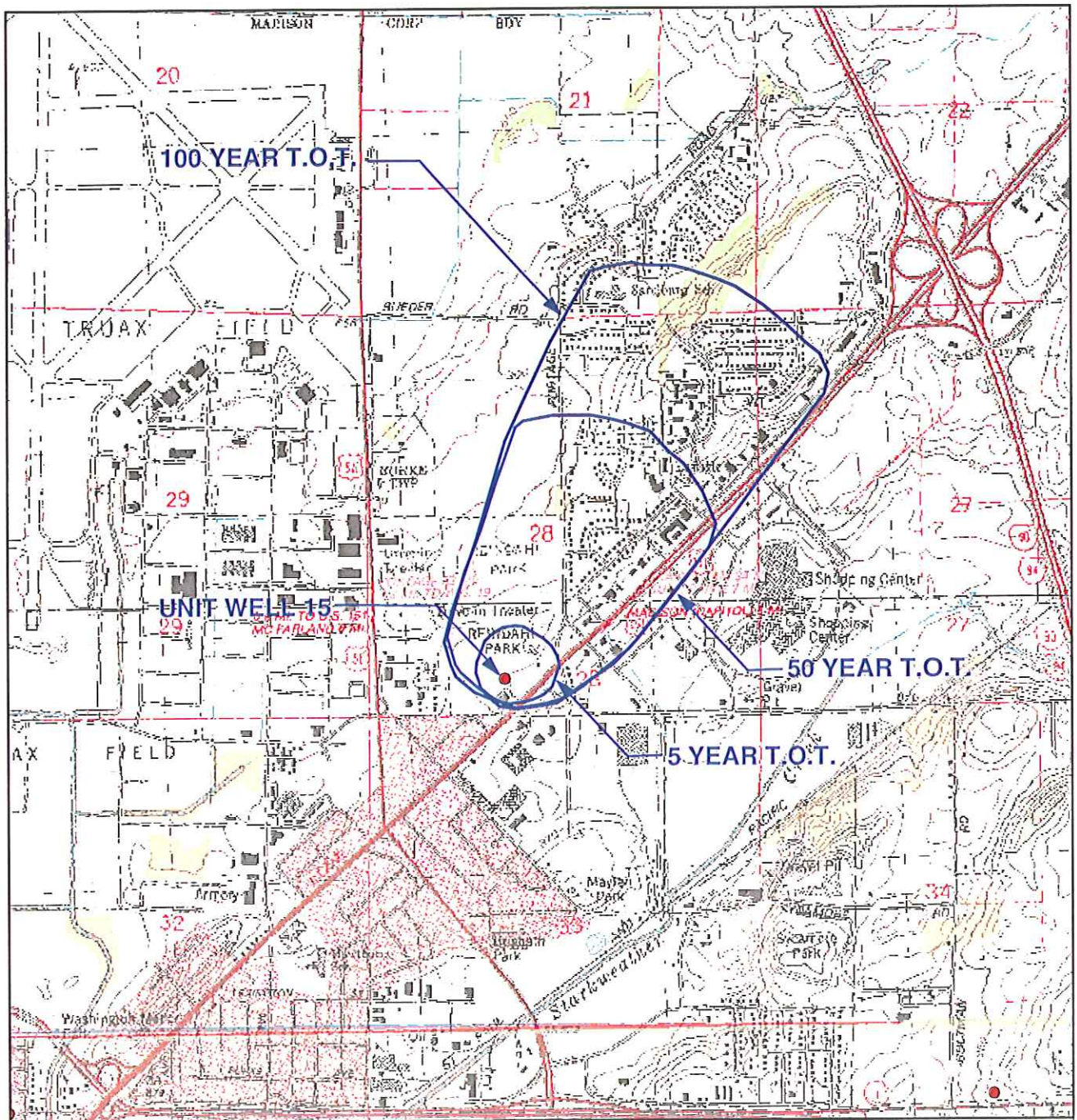
3.4 WELLHEAD PROTECTION AREA

The Wisconsin Administrative Code (Chapter NR811.16(5)(e)) requires that WHPAs for municipal water supply wells “encompass, at a minimum, that portion of the recharge area equivalent to a 5-year time of travel to the well.” Any of the three simulations described above could be used to model the 5-year TOT ZOC for Unit Well 15. For the city’s Unit Well 28, the half-capacity pumping level (Simulation No. 2) was used to represent the most likely scenario under which water would be withdrawn from the aquifer over the next five years. For Unit Well 15, however, Simulation No. 3 provides a more realistic, albeit conservative, model of actual water withdrawal. City pumping logs indicate that Unit Well 15 historically has run near full capacity without interruption, suggesting that half-capacity withdrawals might be insufficient to model the zone of capture. For this reason, the results of Simulation No. 3 are used to generate the 5-year TOT ZOC for Unit Well 15.

The 5-year TOT ZOC is irregular in shape and extends up to 2,000 feet on the upgradient side of the well. Downgradient, the 5-year TOT ZOC extends between 550 feet and 1,100 feet from the well, depending upon direction.

The 100-year TOT ZOC extends up to 9,500 feet upgradient from Unit Well 15. However, protecting the entire 100-year TOT ZOC from Unit Well 15 to the upgradient boundary at the same level of protection as the area within the 5-year TOT ZOC is likely too severe.

Figure 3-4 shows the WHPA for Unit Well 15. Two zones of protection are within the WHPA. Zone A is the area around Unit Well 15 that is defined by the 5-year TOT ZOC delineated for Simulation No. 3 (full design capacity pumping rate). Zone B is the area that is defined by a 1,200-foot fixed radius around



SOURCE: USGS 7.5 MINUTE QUADRANGLE,
MIDDLETON, WISCONSIN, 1982

T.O.T. = TIME OF TRAVEL
Z.O.C.s = POTENTIAL CONTAMINANT SOURCE OR ROUTE

SCALE 1 : 24,000

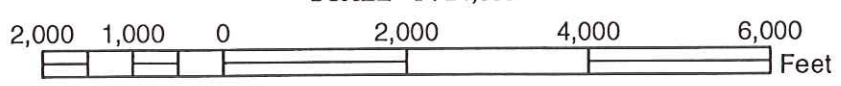
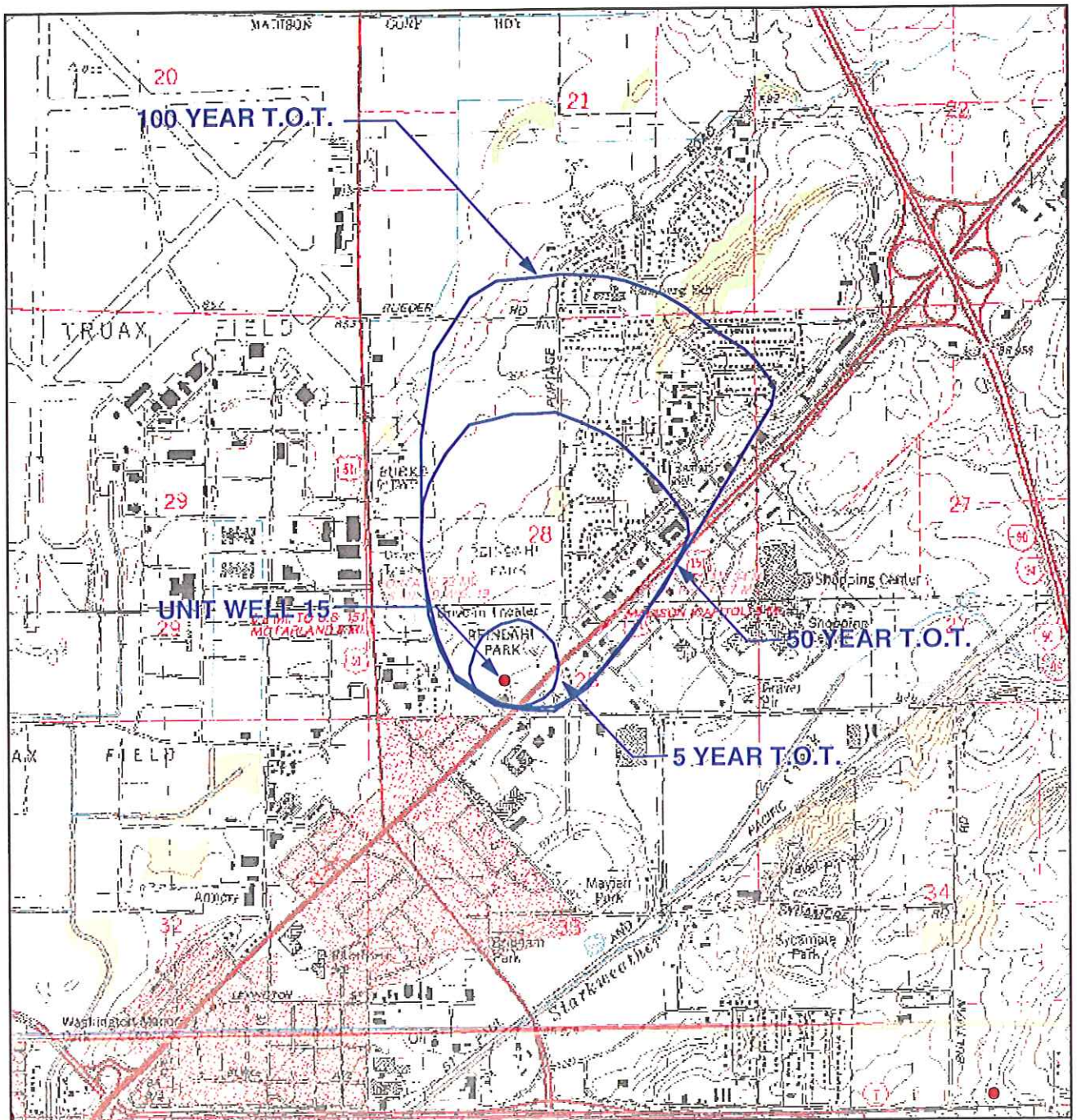


FIGURE 3-1
5, 50 & 100 YEAR T.O.T. Z.O.C.s ASSUMING
PROJECTED 2025 PUMPING RATE
MADISON, WISCONSIN
APRIL 2003



SOURCE: USGS 7.5 MINUTE QUADRANGLE,
MIDDLETON, WISCONSIN, 1982

T.O.T. = TIME OF TRAVEL
Z.O.C.s = POTENTIAL CONTAMINANT SOURCE OR ROUTE

SCALE 1 : 24,000

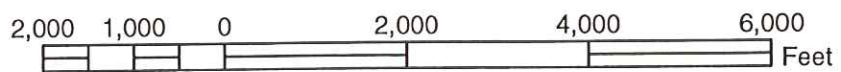
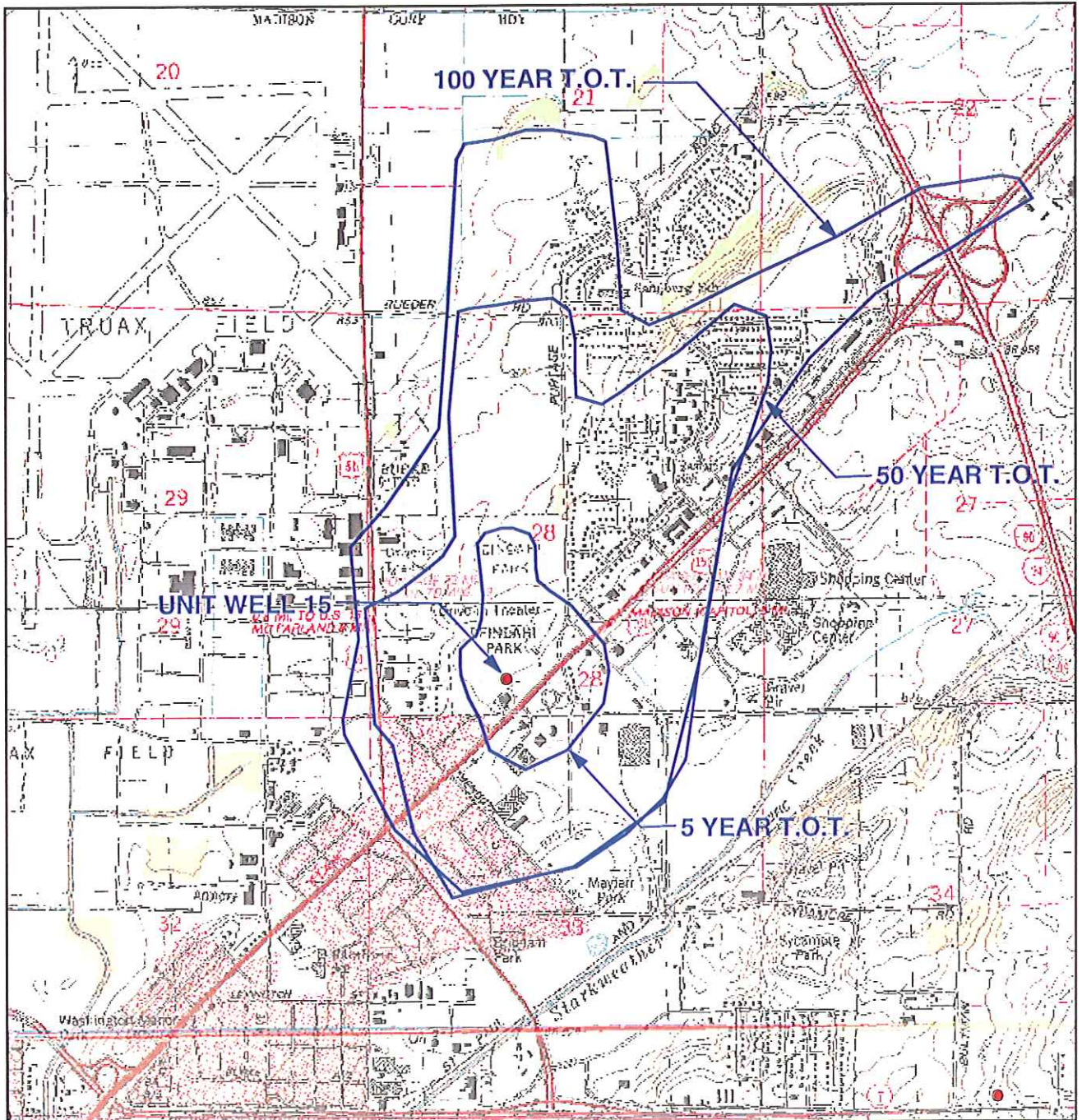


FIGURE 3-2
5, 50 & 100 YEAR T.O.T. Z.O.C.s
ASSUMING 50 PERCENT CAPACITY PUMPING RATE
MADISON, WISCONSIN

APRIL 2003



SOURCE: USGS 7.5 MINUTE QUADRANGLE,
MIDDLETON, WISCONSIN, 1982

T.O.T. = TIME OF TRAVEL
Z.O.C.s = POTENTIAL CONTAMINANT SOURCE OR ROUTE

SCALE 1 : 24,000

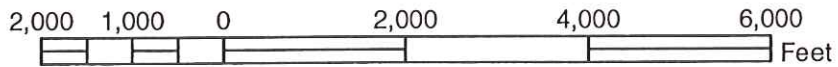


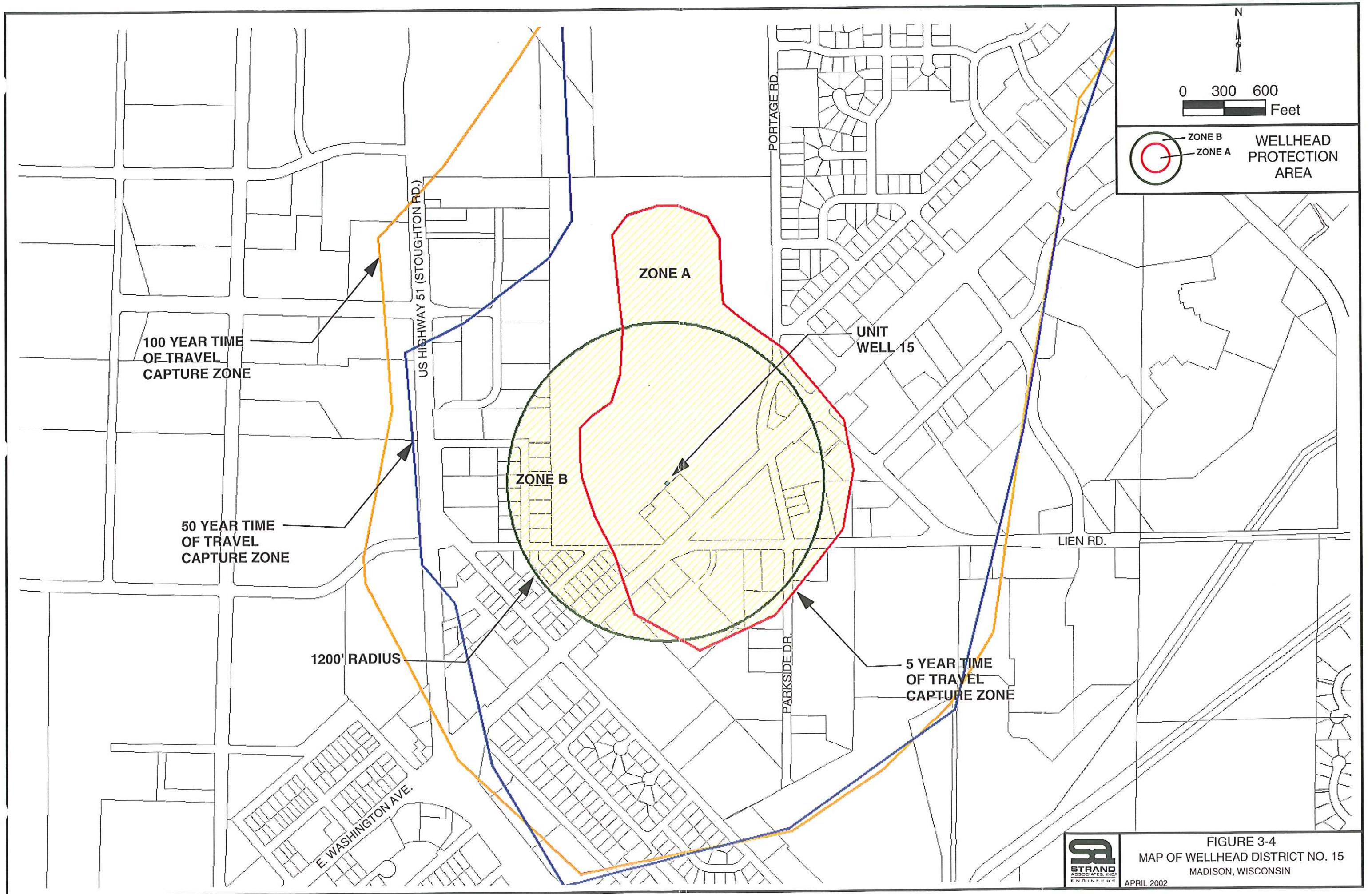
FIGURE 3-3
5, 50 & 100 YEAR T.O.T. Z.O.C.s ASSUMING
PUMPING AT 100 PERCENT CAPACITY (3MGD)
MADISON, WISCONSIN
APRIL 2003

**TABLE 3-1
SUMMARY OF EXTENT OF ZOCs (CAPTURE ZONE)
WELLHEAD PROTECTION UNIT WELL 15
MADISON, WISCONSIN**

Item	Simulation No. 1 (projected 2025 pumping rates)	Simulation No. 2 (one-half design capacity pumping rates)	Simulation No. 3 (continuous pumping at maximum capacity)
Simulated Pumping Rate (MGD)	1.383	1.584	3.168
Upgradient Extent of ZOC (feet)			
5-year TOT	800	850	2,000
50-year TOT	4,800	3,600	5,800
100-year TOT	6,100	5,600	9,500
Downgradient Extent of ZOC (feet)			
5-year TOT	300	300	600

Notes:

MGD = Million Gallons per Day
 ZOC = Zone of Contribution
 TOT = Time of Travel



Unit Well 15. This radius is selected because the Wisconsin Administrative Code, Chapter NR811.16(4) requires a 1,200-foot minimum separation distance between a municipal water supply well and certain contamination sources.

The boundary of Zone B is slightly larger than the 5-year TOT ZOC delineated for Unit Well 15 on the downgradient side of the well, but is smaller on the upgradient side. The WHPA will provide a conservative protection zone to account for changes in pumping rates, pumping duration, and interference drawdown from other existing and future wells. The WHPA is located entirely within the City of Madison.

4.0 POTENTIAL CONTAMINANT SOURCES

4.1 CONTAMINANT SOURCE INVENTORY

A CSI was performed for the Unit Well 15 area during the first quarter of 2003. The CSI consisted of a search of government records, interviews, review of aerial photographs, and a reconnaissance survey completed March 24, 2003, of the area within a ½-mile radius of Unit Well 15. A copy of the CSI is in Appendix H.

Figures 4-1 and 4-2 show the location of potential and existing contaminant sources within a ½-mile radius of Unit Well 15. Figure 4-1 shows the topography of the area, and Figure 4-2 shows the land subdivisions. Table 4-1 summarizes potential contaminant sources that were identified and/or reported to be within the WHPA and review area.

Potential and existing contaminant sources within the WHPA for Unit Well 15 include potential spills along roads and main transportation corridors, active and closed underground storage tank (UST) sites, commercial and industrial hazardous waste generators, closed waste disposal sites, and herbicide and nutrient loading on commercial and residential lawns.

On the basis of available information, following are descriptions of known existing or potential contaminant sources in the WHPA and/or within a 1/2-mile radius of Unit Well 15:

The nearest private sewage disposal system is located outside the WHPA.

The nearest private water supply well is located outside the WHPA.

The nearest storm sewer is located on East Washington Avenue, approximately 250 feet south of Unit Well 15, and is constructed of reinforced concrete pipe materials.

The nearest sanitary sewer main is located approximately 50 feet west of Unit Well 15.

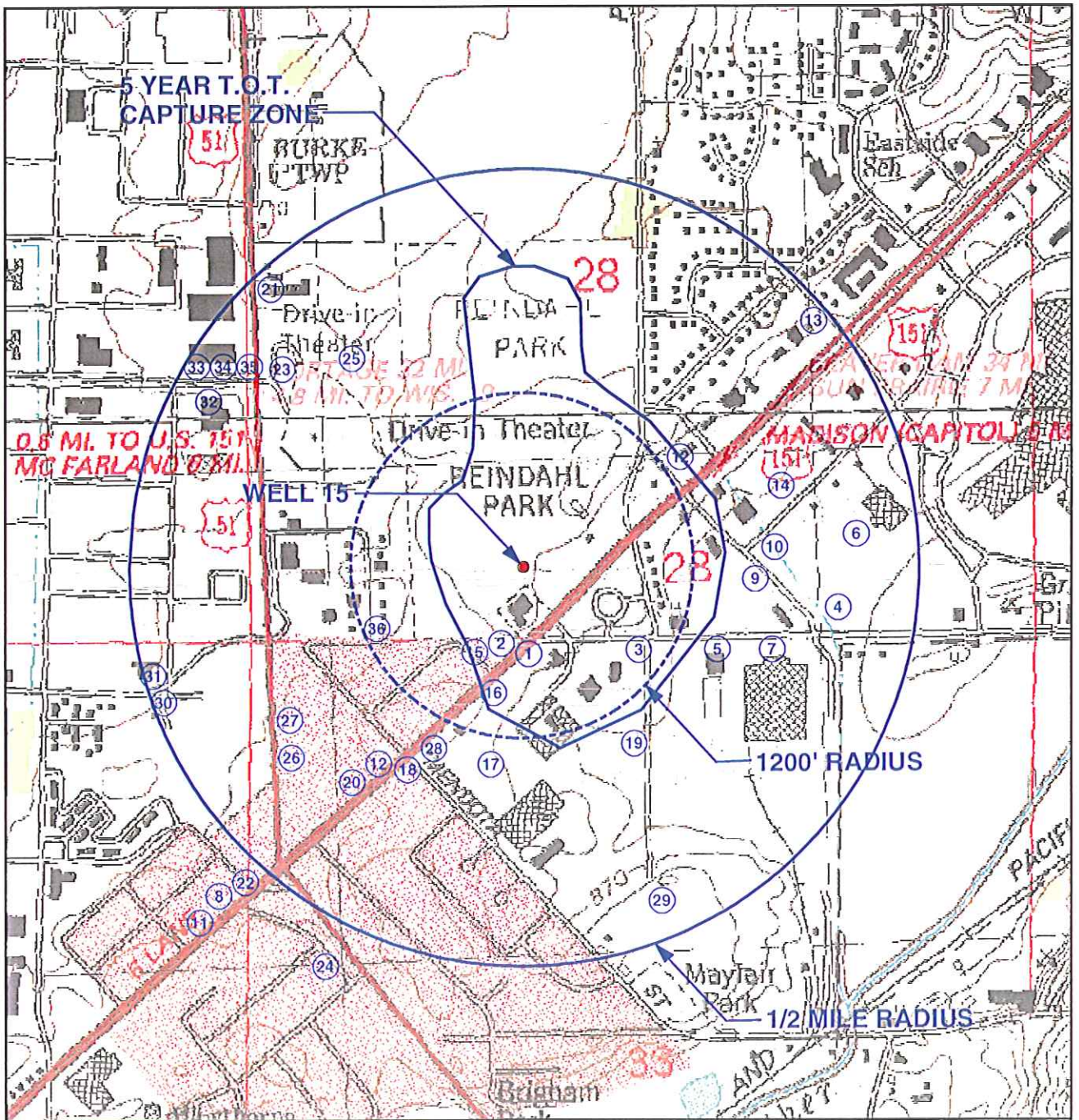
On the basis of the site reconnaissance and a review of the Wisconsin registered storage tank list, the nearest USTs are believed to be located at the Mobil Oil station located approximately 500 feet south of Unit Well 15. The nearest reported leaking underground storage tank was located 700 feet southwest of Unit Well 15 at 3868 E. Washington Ave.

On the basis of site reconnaissance and a review of the Wisconsin registered storage tank list, no above-ground storage tanks could be located within the WHPA.

A dry-cleaning business is located approximately 1,500 feet east of Unit Well 15.

No golf courses are located in the vicinity of Unit Well 15.

The nearest identified solid waste storage site in the vicinity of Unit Well 15 is the Russ Darrow Inc. Landfill approximately 2,150 feet east of the well. DNR records indicate the landfill contains foundry sand and was abandoned by 1978. Another foundry sand disposal site, the RTRV Partnership Landfill, is located approximately 2,250 feet east of Unit Well 15 and was closed in 1990, according to DNR records.



SOURCE: USGS 7.5 MINUTE QUADRANGLE,
MIDDLETON, WISCONSIN, 1982

T.O.T. = TIME OF TRAVEL

③ POTENTIAL CONTAMINANT SOURCE OR ROUTE

SCALE 1 : 12,000

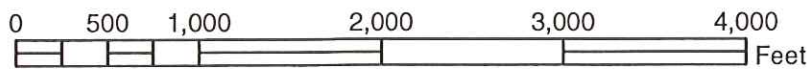
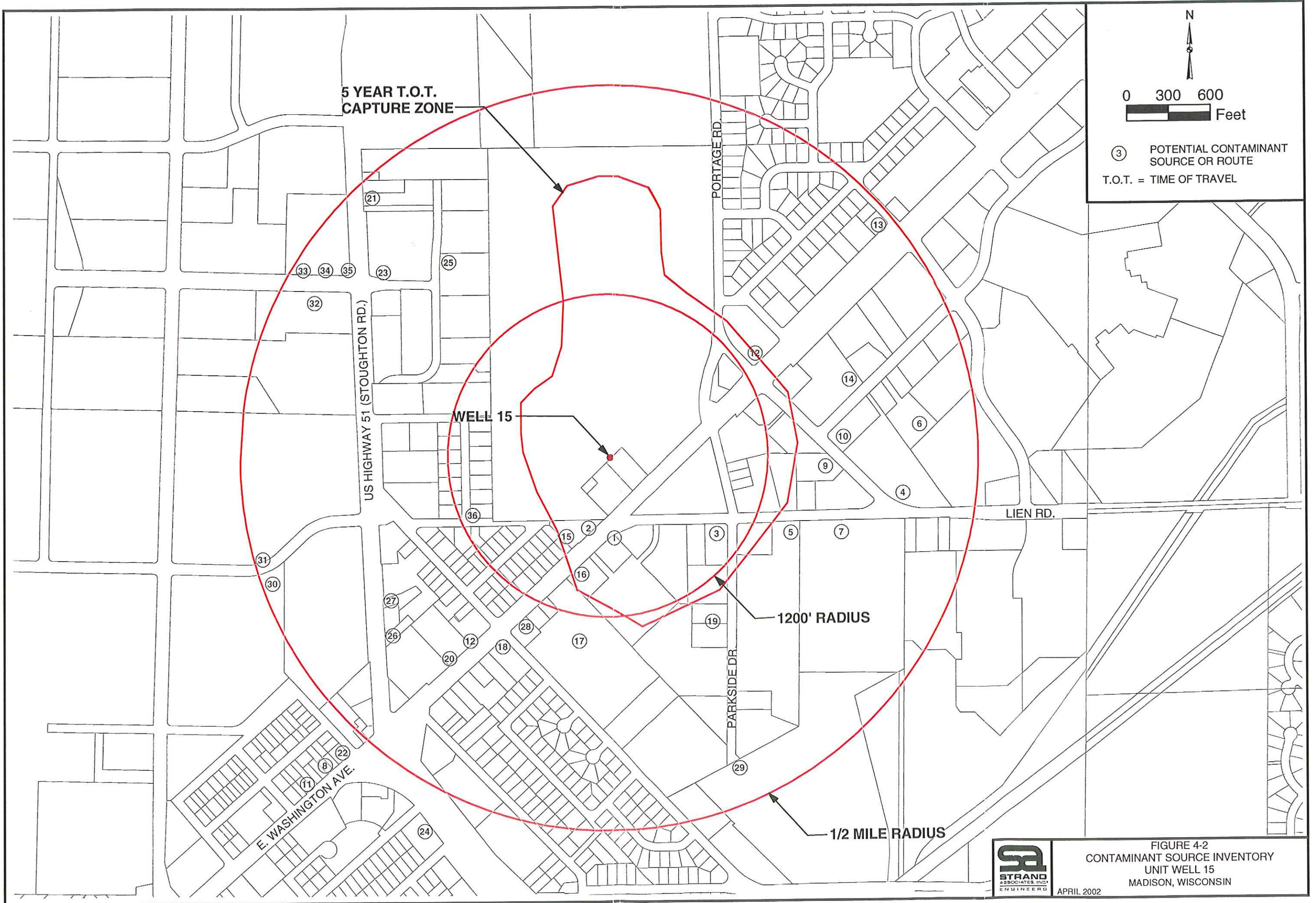


FIGURE 4-1
CONTAMINANT SOURCE INVENTORY
UNIT WELL 15
MADISON, WISCONSIN

APRIL 2003



5 YEAR T.O.T.
CAPTURE ZONE

WELL 15

1200' RADIUS

1/2 MILE RADIUS

N

0 300 600 Feet

③ POTENTIAL CONTAMINANT SOURCE OR ROUTE

T.O.T. = TIME OF TRAVEL



FIGURE 4-2
CONTAMINANT SOURCE INVENTORY
UNIT WELL 15
MADISON, WISCONSIN
APRIL 2002

**TABLE 4-1
CONTAMINANT SOURCE INVENTORY SUMMARY
WELLHEAD PROTECTION UNIT WELL 15
MADISON, WISCONSIN
APRIL 2003**

Map Site No.	Owner/Location	Database or Reference Source	Existing, Potential, or Former Contaminant Sources	Reported Status	Approximate Distance to Unit Well 20	Location within Capture Zone	Estimated Threat to Supply Wells
1	Mobil Oil station 3859 E. Washington Ave. Madison, WI	Wisconsin BRRTS database	USTs, gasoline	Active	500 ft. south	5 year TOT	moderate
2	Kinko's Copy Shop 3902 E. Washington Ave. Madison, WI	Visual Inspection	Printing, copying chemicals	Active	500 ft. southwest	5 year TOT	low
3	City of Madison Fire Department 3945 Lien Road Madison, WI	Wisconsin BRRTS database	Underground storage tank	Active	950 ft southeast	5 year TOT	moderate
4	Russ Darrow Inc. Landfill Thierer Road at Lien Road Madison, WI	Registry of Waste Disposal Sites in Wisconsin	Foundry sand disposal site	Abandoned	2150 ft east	Downgradient beyond capture zone	low
5	DRG Packaging/Rexam 4101 Lien Road Madison, WI	Wisconsin BRRTS database, USPEA EnviroFacts Data Warehouse	Spills, environmental repair program, hazardous waste generator	Active	1400 ft southeast	Downgradient beyond capture zone	low
6	RTRV Partnership Landfill adjacent to Lien Road Madison, WI	Registry of Waste Disposal Sites in Wisconsin	Foundry sand disposal site	Closed	2250 ft east	Downgradient beyond capture zone	low
7	Manville Forest Products/ Olympic Packaging (closed) 4201 Lien Road Madison, WI	Wisconsin BRRTS databse	Environmental repair program, hazardous waste generator	Closed	1750 ft southeast	Downgradient beyond capture zone	low
8	Doctor Horners Radiator Service 3586 E. Washington Ave. Madison, WI	Visual Inspection	Automotive fluids	Active	3,000 ft southwest	Downgradient beyond capture zone	low
9	Klinke Cleaners 1726 Thierer Road Madison, WI	Wisconsin BRRTS database	Hazardous waste generator	Active	1500 ft east	Downgradient beyond capture zone	low
10	Mermaid Car Wash 4001 East Towne Boulevard Madison, WI	Wisconsin BRRTS database	Underground storage tank	Active	1600 ft east	Downgradient beyond capture zone	low
11	Jerry's Garage 3582 E. Washington Ave. Madison, WI	Visual Inspection	Automotive fluids	Active	3200 ft southwest	Downgradient beyond capture zone	low
12	Elver RV 3762 E. Washington Madison, WI	Visual Inspection	Vehicle storage, automotive fluids	Active	1600 ft southwest	Downgradient beyond capture zone	low
13	K&J Foods/Amoco 4222 E. Washington Ave. Madison, WI	Wisconsin BRRTS database	Leaking underground storage tank, spills	Active	2550 ft northeast	Upgradient beyond capture zone	low

14	UW Health/Physicians 4122 East Towne Boulevard Madison, WI	Wisconsin BRRTS database	Hazardous material spill	Active	1800 ft east	Upgradient beyond capture zone	low
15	3868 E. Washington LLC 3868 E. Washington Ave. Madison, WI	Wisconsin BRRTS database	Leaking underground storage tank	Site investigation report approved	700 ft southwest	5 yr TOT	moderate
16	3841 E. Washington 3841 E. Washington Ave. Madison, WI	Wisconsin BRRTS database	Hydraulic oil spill – 20 gal.	Inactive	850 ft south	5 yr TOT	low
17	KMart 3801 E. Washington Ave. Madison, WI	Wisconsin BRRTS database	Underground storage tank	Active	1300 ft south	Downgradient beyond capture zone	low
18	Goodyear Auto Service Center 3773 E. Washington Ave. Madison, WI	Wisconsin BRRTS database	Hazardous waste generator	Active	1500 ft South	Downgradient beyond capture zone	low
19	PraxAir Gases & Welding Supplies 1426 Parkside Drive, Madison, WI	Visual Inspection	Industrial gases and materials	Active	1900 ft southeast	Downgradient beyond capture zone	low
20	Klein Trust Property 3702 E. Washington Ave. Madison, WI	Wisconsin BRRTS database	Leaking underground storage tank	Closed	1850 ft southwest	Downgradient beyond capture zone	low
21	Benz Oil 2123 N. Stoughton Madison, WI	Visual Inspection	Oil storage and transport	Active	2500 ft northwest	Upgradient beyond capture zone	low-moderate
22	Valvoline Oil Change 3594 E. Washington Ave. Madison, WI	Wisconsin BRRTS database	Leaking underground storage tank	Active	2800 ft southwest	Downgradient beyond capture zone	low
23	Federal Express distribution center 3700 Kinsman Blvd. Madison, WI	Visual Inspection	Motor pool	Active	2100 ft northwest	Upgradient beyond capture zone	low
24	Zimbrick Automotive 1430 N. Stoughton Road Madison, WI	Wisconsin BRRTS database	Hazardous waste generator	Active	3000 ft southwest	Downgradient beyond capture zone	low
25	multiple freight terminals off Stoughton Road near Kinsman Blvd.	Visual Inspection	Vehicle and materials storage and transport	Active	1800 ft northwest	Upgradient beyond capture zone	low-moderate
26	Clark Retail 1601 N. Stoughton Road Madison, WI	Wisconsin BRRTS database	Underground storage tank; hazardous waste generator	Active	2000 ft southwest	Downgradient beyond capture zone	low
27	PDQ #125 1625 N. Stoughton Road Madison, WI	Wisconsin BRRTS database	Leaking underground storage tank	Active	1900 ft southwest	Downgradient beyond capture zone	low
28	Tires Plus 1450 McArthur Road Madison, WI	Wisconsin BRRTS database	Hazardous waste generator	Active	1300 ft south	Downgradient beyond capture zone	low
29	Quarry? Parkside Drive Madison, WI	Visual Inspection	Unknown	Unknown	2300 ft south	Downgradient beyond capture zone	low

30	Community Development Authority 3509 Anderson St. Madison, WI	Wisconsin BRRTS database	Hazardous waste generator	Active	2600 ft west	Downgradient of capture zone	low
31	MATC 3550 Anderson St. Madison, WI	Wisconsin BRRTS database	Leaking underground storage tanks, spills	Active	2700 ft west	Downgradient of capture zone	low
32	Bell Laboratories 3699 Kinsman Blvd. Madison, WI	USEPA Envirofacts Data Warehouse	Spills, toxic waste generator	Active	2400 ft northwest	Upgradient of capture zone	moderate
33	Silliker Labs of Wisconsin 3688 Kinsman Blvd. Madison, WI	Wisconsin BRRTS database	Hazardous waste generator	Active	2400 ft northwest	Upgradient of capture zone	low
34	Otis Elevator Co. 3682 Kinsman Blvd. Madison, WI	Wisconsin BRRTS database	Hazardous waste generator	Active	2400 ft northwest	Upgradient of capture zone	low
35	Print Tech 3694 Kinsman Blvd. Madison, WI	Wisconsin BRRTS database	Hazardous waste generator	Active	2400 ft northwest	Upgradient of capture zone	low
36	McCormick Property #5 1705 Onsgard Road Madison, WI	Wisconsin BRRTS database	Leaking underground storage tank	Closed	1000 ft west	Within 1200-foot radius capture zone	low

No cemetery is located in the vicinity of the Unit Well 15 WHP area.

The nearest pond is located 3,500 feet south of Unit Well 15.

Wisconsin DNR records indicate that no approved septage application sites are located within one-half mile of Unit Well 15.

No bulk salt storage sheds, or bulk pesticide, fertilizer storage, and/or mix-load sites were identified within a 1-mile radius of Unit Well 15.

The separation distances between Unit Well 15 and potential contaminant sources identified in Wisconsin Administrative Code NR 811.16 are summarized in Table 4-2.

4.2 LAND USES AND WELLHEAD PROTECTION PLANNING

Many of the existing land uses in the vicinity of Unit Well 15 are generally compatible with WHP planning. However, the area around the wellhead includes commercial and industrial zones. Generally speaking, it is not desirable to have commercial, manufacturing, or industrial districts located in WHPAs.

Land uses summarized in Table 4-2 should be prohibited in the vicinity of Unit Well 15, within the respective minimum separation distances shown. Additionally, we recommend land uses summarized in Table K-1 in Appendix K be prohibited from WHPA Zones A and B. Where any of the uses listed in Table K-1 currently exist within Zones A and B, owners should be allowed to upgrade the facilities as long as the proposed improvements include provisions to facilitate or enhance groundwater protection. The current wellhead protection ordinance has provisions to facilitate this.

Tables 4-4 and 4-5 in Appendix K summarize several potential sources of groundwater contamination and land uses and their relative risk to groundwater, respectively.

**TABLE 4-2
MINIMUM SEPARATION REQUIREMENTS
BETWEEN PUBLIC WELLS AND
POTENTIAL CONTAMINANT SOURCES
WELLHEAD PROTECTION PLAN, UNIT WELL 15
MADISON, WISCONSIN**

Potential Contamination Source	Minimum Separation Distance
Storm Sewer	50 feet
Sanitary Sewer	200 feet ¹
Sanitary Lift Station	200 feet
Single Family Residential Fuel Oil Tank	200 feet
Septic Tank Receiving Less than 8,000 gpd	400 feet
Cemetery	400 feet
Storm Water Drainage Pond	400 feet
Gasoline or Fuel Oil Tank Approved by Comm 10.10	600 feet
Land Application of Municipal, Commercial, or Industrial Waste	1,000 feet
Commercial or Municipal Wastewater Lagoons or Storage Structures	1,000 feet
Manure Stacks or Storage Structures	1,000 feet
Septic Tanks or Soil Absorptive Units Receiving Greater than 8,000 gpd	1,000 feet
Solid Waste Storage, Transportation, Transfer, Incineration, Air Curtain Destructor, Processing, Wood Burning, or One-Time Disposal or Small Demolition Facility	1,200 feet
Sanitary Landfill	1,200 feet
Coal Storage Area	1,200 feet
Salt or Deicing Material Storage	1,200 feet
Gasoline or Fuel Oil Storage Tanks not Approved by Comm 10.10	1,200 feet
Bulk Fuel Storage Facilities	1,200 feet
Pesticide or Fertilizer Handling or Storage Facilities	1,200 feet

Reference: Wisconsin Administrative Code, NR 811, November 2002

Footnote:

¹ Lesser separation for sanitary sewer may be allowed if the sewer is constructed of water main materials and pressure tested. Less than 50 feet separation is not allowed.

5.0 MANAGEMENT STRATEGIES

A full discussion of wellhead protection management strategies may be found in the Wellhead Protection Plan for Unit Well 28, including alternative management strategies, water conservation programs, contingency plan and management plan.