APPENDIX A

WISCONSIN ADMINISTRATIVE CODE, WELLHEAD PROTECTION PLAN

The Wisconsin Administrative Code, Chapter NR 811, Section 16(5) states:

(5) Well Head Protection Plan. A wellhead protection plan shall be provided for all new wells for municipal water systems. The plan shall be developed by the owner of the municipal water system or its agent. No new municipal well may be placed into service until the department has approved the wellhead protection plan. The plan shall include but is not limited to:

(a) Identification of the recharge area for the proposed well.

(b) Identification of the zone of influence for the proposed well.

(c) Identification of the groundwater flow direction.

(d) An inventory of existing potential contamination sources within a ½ mile radius of the proposed well and an assessment of existing potential contamination sources within the recharge area of the well.

(e) Establishment of a well head protection area for the proposed well. The wellhead protection area shall encompass, at a minimum, that portion of the recharge area equivalent to a 5-year time of travel to the well. The wellhead protection area may be determined by a hydrogeologic investigation.

(f) A public education program for wellhead protection.

(g) A water conservation program.

(h) A contingency plan for providing safe water and protecting the well from contamination based on the inventory and assessment of potential contamination sources.

(i) A management plan, based upon an assessment of alternatives for addressing potential contamination sources, describing the local ordinances, zoning requirements, monitoring program, and other local initiatives proposed within the well head protection area established in subpar.(e). The management plan shall address maintaining the separation distances established by well siting in sub.(4)(d).

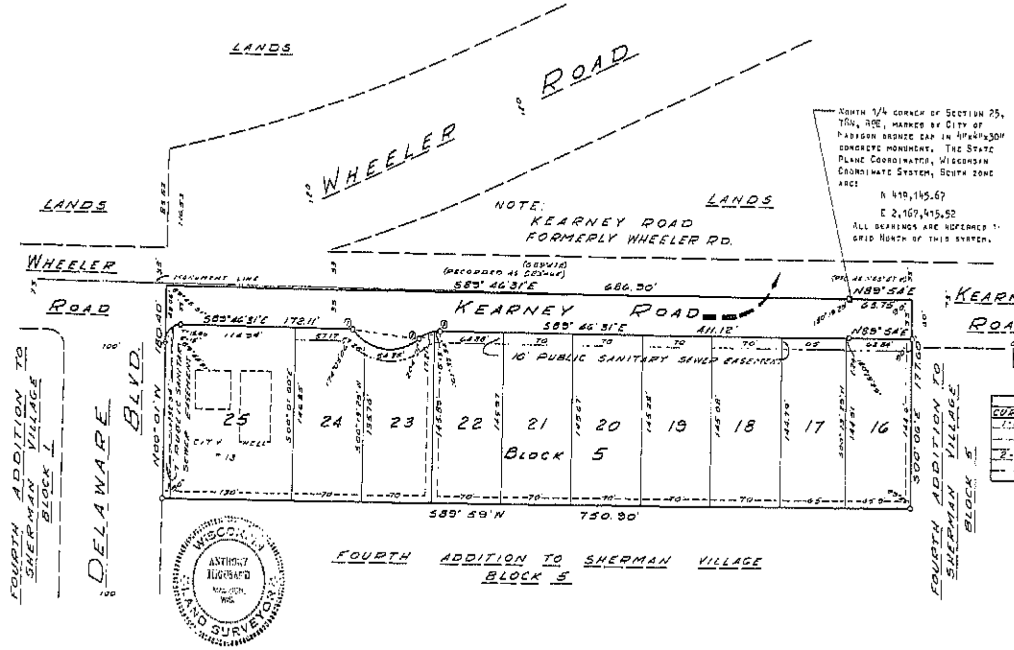
APPENDIX B

SURVEY PLAT - UNIT WELL 13

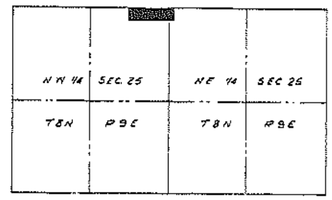
1232730 — Vol. 35 - Pg 4

FIFTH ADDITION TO SHERMAN VILLAGE

LOCATED IN THE NW 1/4 OF THE NE 1/4 AND THE NE 1/4 OF THE NW 1/4 SECTION 25, T8N, R9E, CITY OF MADISON, DANE COUNTY WISCONSIN



NOTE
BEARINGS ARE BASED ON FOURTH ADDITION TO SHERMAN VILLAGE. ALL BEARINGS REQUIRE A 57' TURN TO THE EAST TO AGREE WITH GRID NORTH OF WISCONSIN STATE PLANE COORDINATE SYSTEM



SCALE 1 INCH = 60 FEET

CURVE	LOT	CHORD	BEARING	RADIUS	CENT. ANG.	TAN. BEARING
1-2	1	67.93	S85°51'37"E	50.0'	85°34'12"	S41°04'31"E
	24	17.25	S51°00'21"E	50.0'	19°51'40"	
	23	54.25	N86°12'33"E	50.0	65°42'32"	
2-3		22.14	N71°47'23"E	35.0	36°58'12"	N53°21'17"E
	23	17.21	N67°36'07"E	35.0	28°27'40	
	22	5.13	N85°01'13"E	35.0	8°24'32"	

LEGEND

○ 1¼"×30" SOLID ROUND IRON STAKE 4.17 LBS/FT. ALL OTHER LOT CORNERS ARE MARKED WITH 1"×24" IRON PIPE 1.13 LBS/FT.

ALL DISTANCES LENGTHS AND WIDTHS ARE MEASURED TO THE NEAREST HUNDREDTH OF A FOOT.

DISTANCES SHOWN ALONG CURVES ARE CHORD LENGTHS

UTILITY EASEMENT

There are no objections to this plat with respect to Secs. 236.15, 236.16, 236.20 and 236.21 (1) and (2), Statutes.

Certified this 31st day of OCTOBER 1968.
[illegible]
Director, Local and Regional Planning
Department of Local Affairs & Development.

"KEARNEY ROAD WILL TERMINATE IN A CUL-DE-SAC IN FRONT OF LOTS 23 AND 24 AT THE TIME WHEELER ROAD IS IMPROVED. KEARNEY ROAD WILL NOT CONNECT TO WHEELER ROAD AT THAT TIME AND LOTS 23 AND 24 WILL HAVE ACCESS ONLY TO KEARNEY ROAD CUL-DE-SAC."

I, ANTHONY THOUSAND, SURVEYOR, HEREBY CERTIFY THAT IN FULL COMPLIANCE WITH THE PROVISIONS OF CHAPTER 236, WISCONSIN STATUTES AND THE SUBDIVISION REGULATIONS OF THE CITY OF MADISON, AND UNDER THE DIRECTION OF THE OWNERS BELOW, I HAVE SURVEYED, DIVIDED AND MAPPED "FIFTH ADDITION TO SHERMAN VILLAGE", AND THAT SUCH PLAT CORRECTLY REPRESENTS ALL EXTERIOR BOUNDARIES AND SUBDIVISION OF THE LAND SURVEYED AND IS LOCATED IN THE NW1/4 OF THE NE1/4 AND THE NE1/4 OF THE NW1/4 OF SECTION 25, T8N, R9E, CITY OF MADISON, DANE COUNTY, WISCONSIN, TO-WIT:
BEGINNING AT THE NORTH QUARTER CORNER OF SAID SECTION 25; THENCE N89°54'E, 63.75 FEET; THENCE S00°06'E, 177.60 FEET; THENCE S89°59'W, 750.90 FEET; THENCE N00°01'W, 120.40 FEET; THENCE S89°46'31"E, 686.90 FEET TO THE POINT OF BEGINNING.

DATED THIS 23rd DAY OF October, 1968.
REVISED THIS 20th DAY OF November, 1968.

ANTHONY THOUSAND, REGISTERED LAND SURVEYOR, NO. S-363

AS OWNER, I, ALEX TEMKIN, HEREBY CERTIFY THAT I CAUSED THE LAND DESCRIBED ON THIS PLAT TO BE SURVEYED, DIVIDED, MAPPED AND DEDICATED AS REPRESENTED ON THE PLAT. I ALSO CERTIFY THAT THIS PLAT IS REQUIRED BY S. 236.10 OR S. 236.12 TO BE SUBMITTED TO THE FOLLOWING FOR APPROVAL OR OBJECTION:

DIRECTOR, LOCAL AND REGIONAL PLANNING, DEPARTMENT OF LOCAL AFFAIRS & DEVELOPMENT
THE COMMON COUNCIL OF THE CITY OF MADISON

WITNESS THE HAND AND SEAL OF SAID OWNER THIS 20th DAY OF JANUARY, 1969.

IN THE PRESENCE OF:

D. WILLIAM KARNS — DAVID K. KOTTKE — ALEX TEMKIN

STATE OF WISCONSIN) S.S.
COUNTY OF DANE)
PERSONALLY CAME BEFORE ME THIS 20th DAY OF JANUARY, 1969, THE ABOVE NAMED ALEX TEMKIN TO ME KNOWN TO BE THE PERSON WHO EXECUTED THE FOREGOING INSTRUMENT AND ACKNOWLEDGED THE SAME.

MY COMMISSION EXPIRES August 16, 1972

NOTARY PUBLIC, DANE COUNTY, WISCONSIN
CATHERINE WARNEKE

STATE OF WISCONSIN) S.S.
COUNTY OF DANE)
I, MARTIN GUNNULSON, BEING THE DULY ELECTED, QUALIFIED AND ACTING TREASURER OF THE COUNTY OF DANE, DO HEREBY CERTIFY THAT THE RECORDS IN MY OFFICE SHOW NO UNREDEEMED TAX SALES AND NO UNPAID TAXES OR SPECIAL ASSESSMENTS AS OF THE 20th DAY OF January, 1969, AFFECTING THE LAND INCLUDED IN "FIFTH ADDITION TO SHERMAN VILLAGE".

MARTIN GUNNULSON, DANE COUNTY TREASURER
[illegible] Deputy Dane County Treasurer

RECEIVED FOR RECORD THIS 22 DAY OF Jan, 1969, AT 8:30 O'CLOCK, A.M., AND RECORDED IN VOLUME 35 OF PLATS ON PAGE 4.

HAROLD K. HILL, DANE COUNTY REGISTER OF DEEDS

AS OWNER, THE CITY OF MADISON, A WISCONSIN CORPORATION, HEREBY CERTIFIES THAT IT CAUSED THE LAND DESCRIBED ON THIS PLAT TO BE SURVEYED, DIVIDED, MAPPED AND DEDICATED AS REPRESENTED ON THIS PLAT, AND THAT THIS PLAT IS REQUIRED BY S.236.10 OR S.236.12 TO BE SUBMITTED TO THE FOLLOWING FOR APPROVAL OR OBJECTION:

DIRECTOR, LOCAL AND REGIONAL PLANNING, DEPARTMENT OF LOCAL AFFAIRS & DEVELOPMENT
THE COMMON COUNCIL OF THE CITY OF MADISON

IN WITNESS WHEREOF, SAID CITY OF MADISON, HAS CAUSED THESE PRESENTS TO BE SIGNED BY OTTO FESTGE, ITS MAYOR, AND ELDON L. HOEL, ITS CLERK, AND AFFIXED WITH ITS CORPORATE SEAL, AT MADISON, WISCONSIN, THIS 2nd DAY OF January, 1969.

IN THE PRESENCE OF:

JANETTE M. ERICKSON — THOMAS J. SCHWARTZ — OTTO FESTGE, MAYOR — ELDON L. HOEL, CLERK

STATE OF WISCONSIN) S.S.
COUNTY OF DANE)
PERSONALLY CAME BEFORE ME THIS 22 DAY OF January, 1969, OTTO FESTGE, MAYOR, AND ELDON L. HOEL, CLERK OF THE ABOVE NAMED CORPORATION, TO ME KNOWN TO BE SUCH MAYOR AND CLERK OF SAID CORPORATION, AND THE PERSONS WHO EXECUTED THE FOREGOING INSTRUMENT, AND ACKNOWLEDGED THAT THEY EXECUTED THE SAME AS THE DEED OF SAID CORPORATION, BY ITS AUTHORITY.

MY COMMISSION EXPIRES June 28, 1970

NOTARY PUBLIC, DANE COUNTY, WISCONSIN

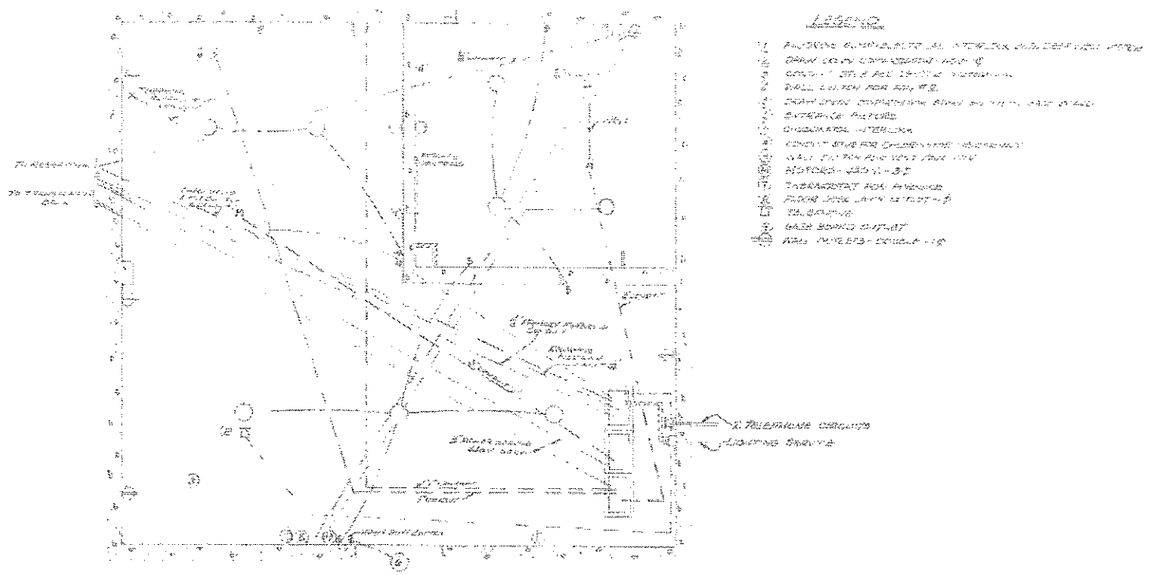
"RESOLVED THAT A PLAT KNOWN AS "FIFTH ADDITION TO SHERMAN VILLAGE", WHICH HAS BEEN DULY FILED FOR APPROVAL OF THE COMMON COUNCIL OF THE CITY OF MADISON, DANE COUNTY, WISCONSIN, BE AND THE SAME IS HEREBY APPROVED AS REQUIRED BY CHAPTER 236, WISCONSIN STATUTES, 1967."
I HEREBY CERTIFY THAT THE ABOVE IS A TRUE AND CORRECT COPY OF A RESOLUTION ADOPTED BY THE COMMON COUNCIL OF THE CITY OF MADISON THIS 14th DAY OF November, 1969.

ELDON L. HOEL, CITY CLERK

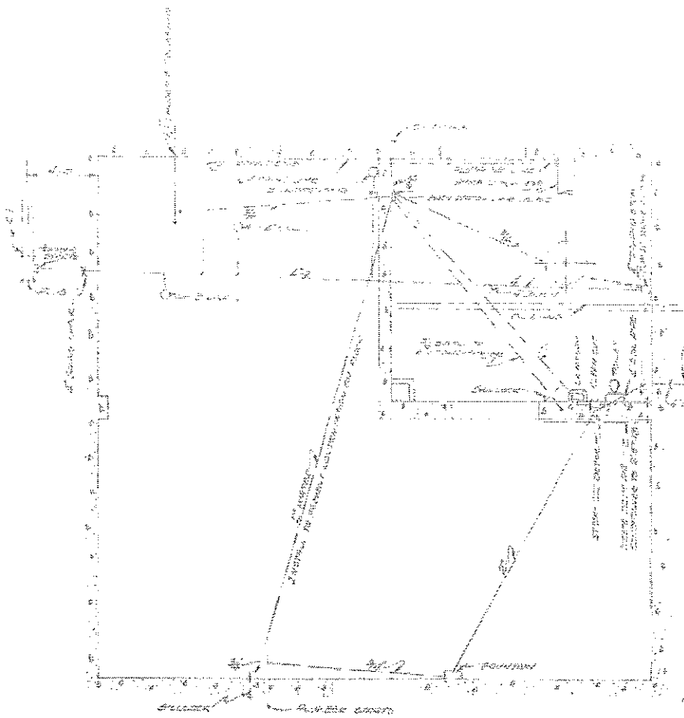
STATE OF WISCONSIN) S.S.
COUNTY OF DANE)
I, WALTER G. HUNTER, BEING THE DULY APPOINTED, QUALIFIED AND ACTING CITY TREASURER OF THE CITY OF MADISON, DO HEREBY CERTIFY THAT IN ACCORDANCE WITH THE RECORDS IN MY OFFICE, THERE ARE NO UNPAID TAXES OR UNPAID SPECIAL ASSESSMENTS AS OF THE 20th DAY OF January, 1969, AFFECTING THE LAND INCLUDED IN "FIFTH ADDITION TO SHERMAN VILLAGE".

WALTER G. HUNTER, CITY TREASURER

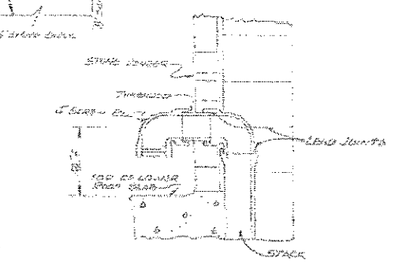
THIS INSTRUMENT WAS DRAFTED BY HOWARD LEGHT.



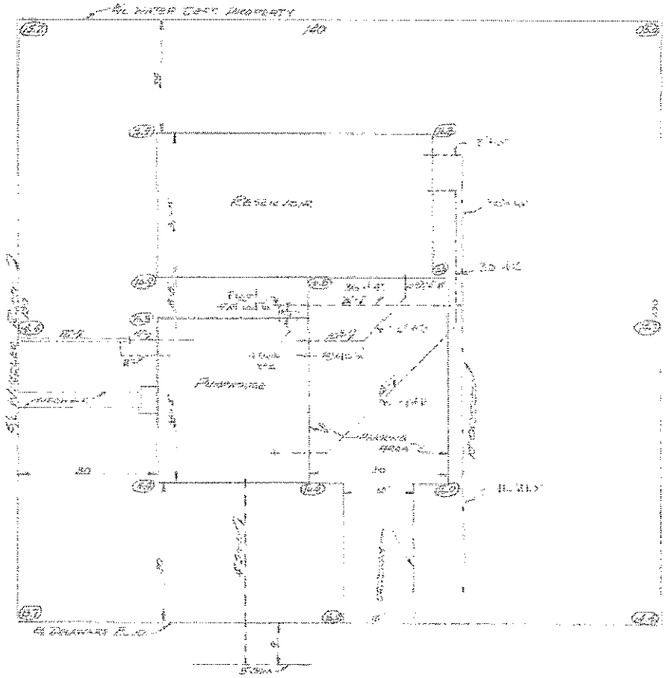
ELECTRICAL WORK
SCALE 1"=6'-0"



PLUMBING WORK
SCALE 1"=10'



STACK THROUGH REAR WALL DETAIL
SCALE 1"=1'-0"



PLAN VIEW
OF
UNIT WELL No. 3 SITE
SCALE 1"=10'-0"

GENERAL

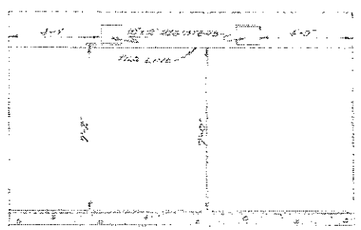
THIS CONTRACT DOES NOT INCLUDE ANY PLUMBING WORK
" " " " " " AIR CONDITIONING
" " " " " " WATER PIPING WORK
OUTSIDE OF THE BUILDING EXCEPT AS NOTED.

THIS CONTRACT DOES NOT INCLUDE FURNISHING THE GASKET PAN, CONDE WATER PIPE AND STRAINER, WATER LINE CONTROL VALVES, REMOVABLE DOOR CLIMBING COVERS.
WATER DROP WILL FURNISH OIL SLEEVES AND PIPING TO PLATES AND HANGERS FOR AIR CONDITIONER IN BOILER.
CONTRACTOR WILL SET SLEEVES AND HANGERS.

CONTRACTOR TO PROVIDE OPENINGS, SET SLEEVES AND HANGERS

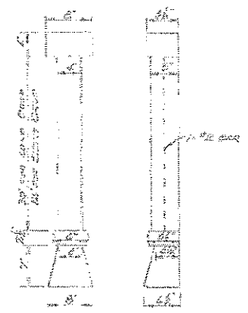
IN	FOR
SLEEVE IN CHLORINATOR ROOM REAR FOUNDATION WALL	CENTRIFUGAL PUMP SUCTION PIPE
" " " " " "	CHLORINE FEED PIPE
OPENINGS IN FOUNDATION FOR SUCTION WALL	FOR THE FLOATING
SLEEVES " " " " " "	SUCTION FLOATING DISCHARGE HOSE
" " IN WALL BOOT REAR FOUNDATION WALL	DEEP WELL PUMP DISCHARGE
" " CHLORINATOR ROOM SIDE FOUNDATION WALL	LIQUID LEVEL CONTROLLER
OPENING IN CHLORINATOR ROOM SIDE WALL	AIR CONDITIONED INTAKE
" " " " " "	ADJUSTABLE LOUVERS
SLEEVE " " " FRONT WALL	CENTRIFUGAL PUMP DISCHARGE AND
HANGERS " " " ROOF BEAMS	AIR CONDITIONER UNIT
OPENING " WELL ROOM SIDE FOUNDATION WALL	SANITARY SEWER ENTRAL
SLEEVE " CHLORINATOR ROOM SIDE WALL	DRAIN PAN

HEATING WORK



HEATING REGISTER DETAIL
WEST WALL OF CHLORINATOR & PUMP ROOM
SCALE 1"=1'-0"

SEE PLUMBING PLAN FOR LOCATION OF OIL LINES
SEE SPECIFICATION FOR AIR N.O. CONTROL & SERVICE



DETAIL OF PLASTER DROPS
SCALE 1"=1'-0"

CITY OF MADISON, WISCONSIN
WATER DEPARTMENT

UNIT WELL No. 3
PUMPHOUSE

SCALED & DRAWN: [illegible] APRIL 1961
CONSTRUCTION ENGR. SUPT. OF WATER DEPT.
DESIGNED BY GAS DRAWN BY GAS SHEET 3 OF 3

APPENDIX C

UNIT WELL 13 CONSTRUCTION REPORT, FORMATION LOG AND GEOPHYSICAL LOGS

Search

Home About A-Z Index Contact

Well Construction Reports

Help Reports

WI Unique Well No:	BF513	**High Capacity Well No:**	77133
Hi Cap Well:		**Hi Cap Property:**	
County Well Location:		**DNR Region:**	South Central
County:	Dane	**Muni Type:**	C
Municipality:	MADISON	**Tax Parcel No:**	
Completion Date:	07/01/1959 mm/dd/yyyy	**DNR Received Date:**	
Status:	New Well	**Original Year:**	
Replacement Reason:		**Previous WI Well No:**	
Replacement WI Well No:		**Well Construction Type:**	Drilled
Other Const. Type:		**Category:**	Municipal/Community
Well Depth:	780 ft	**# Services:**	
Facility Type:		**Highest Point on Property:**	
In Floodplain:		**Rotary - Mud Circulation:**	
Rotary - Air:		**Rotary - Foam:**	
Reverse Rotary:		**Cable Tool Bit:**	
Cable Bit Diameter:	in	**Temp Outer Casing:**	
Temp Casing Diameter:	in	**Temp Casing Removed:**	
Why not removed?:		**Other Drilling method:**	
Other Drilling Description:		**Screen Diameter:**	inches
Screen Description:		**Screen From:**	feet
Screen To:	feet	**Sealant Method:**	
Static Water level:	10 feet Below Ground	**Pumping level:**	110 feet
Pumping at:	2400	**Pumping units:**	Minutes
For:	40 Hour(s)	**Well Starting Depth:**	0 inches
Developed:		**Disinfected:**	
Capped:		**Proper Seal:**	
Seal Description:		**Contractor Signed on:**	
Rig Operator Signed on:		**Geologic Log Number:**	DN0372
Common Well Number:	013	**Calculated Specific Capacity:**	24
DNR Facility ID:	113022470	**Well Name:**	WHEELER ROAD WELL #13
Water Quality Comments:		**Water Quantity Comments:**	
Drilling Difficulty:		**Other Driller Comments:**	
Exception Area Comments:			

Distances in Feet to Nearest Objects

No Records returned

Download

Drillhole Dimensions

Diameter (in)	From Depth (ft.)	To Depth (ft.)
30	0	70
28	70	128
23	128	780

Download

Casing & Liner

Diameter (inches)	Description	From Depth (ft.)	To Depth (ft.)
30		0	70
24		0	128

Download

Grout or Other Sealant Materials

Kind of Sealing Material	From Depth (ft.)	To Depth (ft.)	Amount	Units
CEMENT	0	128		

Download

Geology

Geology	Geology Description	Driller's Description	USGS Code	From Depth (feet)	To Depth (feet)
T-I-	Tan/Brown; Soil-Organic;	SOIL		0	5
--S-	Sand;	SAND		5	35
-MG-	Medium; Gravel/Cobbles/Boulders/Stones;	GRAVEL		35	40
--TL	Till; Limey or Dolomitic;	TILL		40	60
-NNL	Fine; Sandstone; Limey or Dolomitic;	SANDSTONE-FRANCONIAN		60	120
--N-	Sandstone;	SANDSTONE-FRANCONIAN		120	130

--N-	Sandstone;	SANDSTONE-GALESVILLE		130	215
--NL	Sandstone; Limey or Dolomitic;	SANDSTONE-EAU CLAIRE		215	240
--N-	Sandstone;	SANDSTONE/SHALE/SILTSTONE -EC		240	245
--NL	Sandstone; Limey or Dolomitic;	SANDSTONE-EC		245	480
--N-	Sandstone;	SANDSTONE-MT SIMON		480	760
-NAN	Fine; Conglomerate; w/Sandstone;	CONGLOMERATE-MT SIMON		760	780

Download

Samples

Sample Date	Collected By	Description	Laboratory	Lab Sample ID
06/30/1993	AFC	MADISON WATER UTILITY	113133790	ID110659
04/29/1994	CASTILLO	1201 WHEELER RD BOOSTER PUMP SAMPLE TAP	113133790	IE024288

Records 1 to 2 of 2

Download

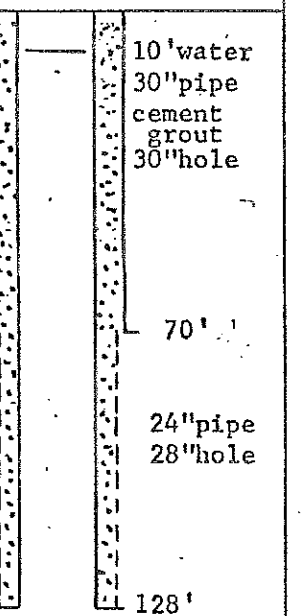
- Abandonment (0 Rows)
- Variances (0 Rows)
- Rehabilitation/Redevelopment (0 Rows)

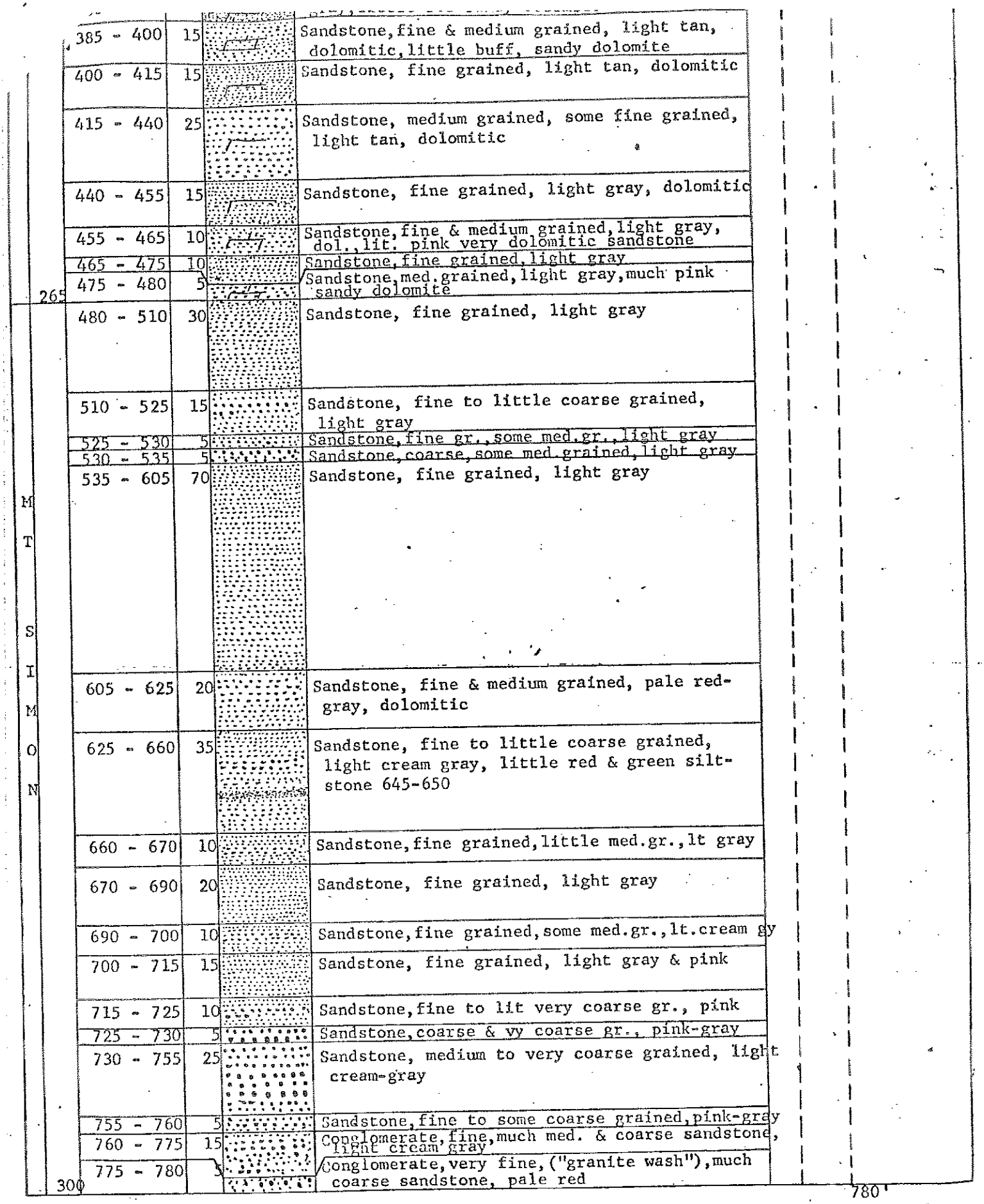
Last Revised: 02/14/2011

WISCONSIN GEOLOGICAL SURVEY, Science Hall, Madison, Wisconsin — Log No. Dn-372

MADISON UNIT WELL NO. 13, MADISON, WISCONSIN
NE¼, NW¼, Sec. 25, T 8N, R 9E, 1201 Wheeler Road
Glen Goldsmith, Engineer
Milaeger Well & Pump Company, Driller, July 1959
Sample Nos. 209727-209882 - Examined by J. B. Steuerwald

DRIFT		0 - 5	5		Soil, brown, sandy, silty, clayey
		5 - 15	10		Sand, fine to little very coarse, some silt, brown-gray, dolomitic
		15 - 20	5		Sand, fine-coarse, lit. fine gvl., bn-gy, gvl. 15-16'
		20 - 30	10		Sand, fine to coarse, tan, dolomitic
		30 - 35	5		Sand, fine, tan, dolomitic
		35 - 40	5		Gravel, medium, no sand
	60	40 - 60	20		Till, brown-gray, very stony, some silt, dolomitic
FRANCONIA		60 - 110	50		Sandstone, fine and very fine grained, buff, very dolomitic, trace of glauconite
		110 - 120	10		Sandstone, very fine & fine grained, buff, dolomitic
		120 - 125	5		Sand, fine to coarse grained, light gray
	70	125 - 130	5		Sandstone, vy fine-coarse gr., lt cream-gy, dolo.
GALESVILLE		130 - 145	15		Sandstone, fine to little coarse grained, light gray
		145 - 155	10		Sandstone, fine & medium grained, light gray
		155 - 215	60		Sandstone, fine to some coarse grained, light gray
	85				
EAU CLAIRE		215 - 225	10		Sandstone, fine to some coarse grained, light gray, little buff, slightly dolomitic
		225 - 240	15		Sandstone, fine & medium grained, light gray, little buff, dolomitic, no sample 235-240
		240 - 245	5		Sandstone, fn. gr. rd-gy, dolo., lit. sts. & sh. NS42-45
		245 - 255	10		Sandstone, fn. gr., some vy fn. gr., dolo. some siltst.
		255 - 265	10		Sandstone, medium grained, little coarse grained, light gray
		265 - 280	15		Sandstone, medium & fine grained, light gray
		280 - 290	10		Sandstone, medium grained, light gray, little buff, sandy dolomite
		290 - 310	20		Sandstone, fine grained, light gray, dolomitic, little buff, sandy dolomite 300-305
		310 - 370	60		Sandstone, fine & medium grained, light gray, dolomitic, some buff, very dolomitic sandstone 325-370
		370 - 380	10		Sandstone, fine grained, light gray, dolomitic
		380 - 385	5		Sandstone, fine & very fine grained, pale red-gray, little red sandy dolomite





Tested for 40 hrs. at 2400 gpm, specific capacity 24.0 gpm/ft, of drawdown
Formations: Drift, Franconia, Galesville, Eau Claire, Mt. Simon
Additional copies may be secured from the Wisconsin Geological Survey, Science Hall, Madison 6, Wisconsin

WISCONSIN UNIQUE WELL NUMBER **BF513**

Source: SWAP PROJECT KEYED

State of Wi-Private Water Systems-DG/2
Department Of Natural Resources, Box 7921
Madison, WI 53707

Form 3300-77A
(Rev 02/02)bw

Depth 780 FT

Property Owner: MADISON, CITY OF		Telephone Number: 608 -266 -4656	
Mailing Address: 523 E MAIN ST			
City: MADISON	State: WI	Zip Code: 53703	
County of Well Location: 13 DANE	Co Well Permit No: W	Well Completion Date: July 1, 1959	

1. Well Location

T=Town C=City V=Village: C of MADISON

Fire#:

Street Address or Road Name and Number: 1201 WHEELER RD #13

Subdivision Name	Lot#	Block #

Gov't Lot or NE 1/4 of NW 1/4 of Section 25 T 8 N;R 9 E

Latitude Deg. Min.

Longitude Deg Min.

Well Constructor: MILAEGER WELL @ PUMP CO INC		License #: 82	Facility ID (Public): 113022470
Address: 20950 ENTERPRISE AVE			Public Well Plan Approval#: 59-0150
City: BROOKFIELD	State: WI	Zip Code: 53045	Date Of Approval: 04/30/1959
Hrcap Permanent Well #: 77133	Common Well #: 013		Specific Capacity: 24 gpm/ft

2. Well Type 1 (See item 12 below)

1=New 2=Replacement 3=Reconstruction

of previous unique well # _____ constructed in 0

Reason for replaced or reconstructed Well?

Lat/Long Method: GPS003

1 1=Drilled 2=Driven Point 3=Jetted 4=Other

3. Well Serves: M # of homes and or (eg: barn, restaurant, church, school, industry, etc.)

M=Munic O=OTM N=NonCom P=Private Z=Other X=NonPot A=Anode L=Loop H=Drillhole

High Capacity: Well?

Property?

4. Is the well located upslope or sideslope and not downslope from any contamination sources, including those on neighboring properties?

Well located in floodplain?

Distance in feet from well to nearest: (including proposed)

1. Landfill
2. Building Overhang
3. 1=Septic 2= Holding Tank
4. Sewage Absorption Unit
5. Nonconforming Pit
6. Buried Home Heating Oil Tank
7. Buried Petroleum Tank
8. 1=Shoreline 2= Swimming Pool
9. Downspout/ Yard Hydrant
10. Privy
11. Foundation Drain to Clearwater
12. Foundation Drain to Sewer
13. Building Drain 1=Cast Iron or Plastic 2=Other
14. Building Sewer 1=Gravity 2=Pressure 1=Cast Iron or Plastic 2=Other
15. Collector Sewer: ___ units ___ in . diam.
16. Clearwater Sump
17. Wastewater Sump
18. Paved Animal Barn Pen
19. Animal Yard or Shelter
20. Silo
21. Barn Gutter
22. Manure Pipe 1=Gravity 2=Pressure 1=Cast iron or Plastic 2=Other
23. Other manure Storage
24. Ditch
25. Other NR 812 Waste Source

5. Drillhole Dimensions and Construction Method

Dia.(in.)	From (ft)	To (ft)
30.0	surface	70
28.0	70	128
23.0	128	780

Upper Enlarged Drillhole / Lower Open Bedrock

-- 1. Rotary - Mud Circulation
-- 2. Rotary - Air
-- 3. Rotary - Air and Foam
-- 4. Drill-Through Casing Hammer
-- 5. Reverse Rotary
-- 6. Cable-tool Bit _ n. dia
-- 7. Temp. Outer Casing _ in. dia. _____ depth ft. Removed ?

Other

6. Casing Liner Screen Material, Weight, Specification Manufacturer & Method of Assembly

Dia. (in.)	From (ft.)	To (ft.)
30.0	surface	70
24.0	0	128

Dia.(in.)	Screen type, material & slot size	From	To

7. Grout or Other Sealing Material

Method / Kind of Sealing Material	From (ft.)	To (ft.)	# Sacks Cement
CEMENT	surface	128.0	

Geology Codes	8. Geology Type, Caving/Noncaving, Color, Hardness, etc	From (ft.)	To (ft.)
T_I_	SOIL	0	5
__S_	SAND	5	35
_MG_	GRAVEL	35	40
__TL	TILL	40	60
_NNL	SANDSTONE-FRANCONIAN	60	120
__N_	SANDSTONE-FRANCONIAN	120	130
__N_	SANDSTONE-GALESVILLE	130	215
__NL	SANDSTONE-EAU CLAIRE	215	240
__N_	SANDSTONE/SHALE/SILTSTONE-EC	240	245
__NL	SANDSTONE-EC	245	480
__N_	SANDSTONE-MT SIMON	480	760
_NAN	CONGLOMERATE-MT SIMON	760	780

9. Static Water Level

10.0 feet B ground surface (A=Above B=Below)

10. Pump Test

Pumping level 110.0 ft. below surface

Pumping at 2400.0 GP M 40.0 Hrs

11. Well Is: 0 in. Grade (A=Above B=Below)

Developed?

Disinfected?

Capped?

12. Did you notify the owner of the need to permanently abandon and fill all unused wells on this property?

If no, explain

13. Initials of Well Constructor or Supervisory Driller Date Signed

Initials of Drill Rig Operator (Mandatory unless same as above) Date Signed

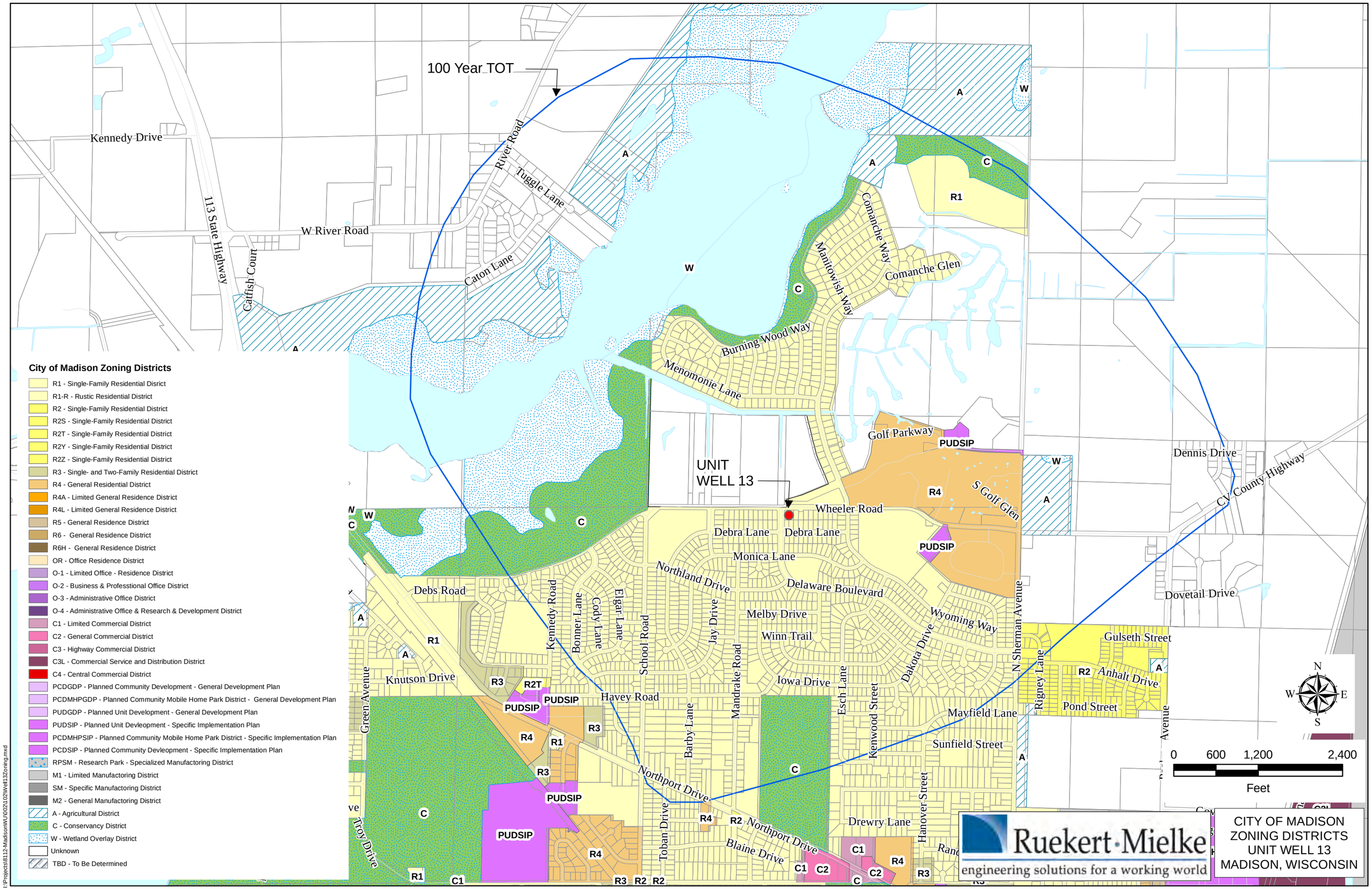
Additonal Comments? Y Variance Issued?

Owner Sent Label? Y More Geology?

Batch 551

APPENDIX D

CITY OF MADISON ZONING MAP



City of Madison Zoning Districts

- R1 - Single-Family Residential Disrict
- R1-R - Rustic Residential District
- R2 - Single-Family Residential District
- R2S - Single-Family Residential District
- R2T - Single-Family Residential District
- R2Y - Single-Family Residential District
- R2Z - Single-Family Residential District
- R3 - Single- and Two-Family Residential District
- R4 - General Residential District
- R4A - Limited General Residence District
- R4L - Limited General Residence District
- R5 - General Residence District
- R6 - General Residence District
- R6H - General Residence District
- OR - Office Residence District
- O-1 - Limited Office - Residence District
- O-2 - Business & Professtional Office District
- O-3 - Administrative Office District
- O-4 - Administrative Office & Research & Development District
- C1 - Limited Commercial District
- C2 - General Commercial District
- C3 - Highway Commercial District
- C3L - Commercial Service and Distribution District
- C4 - Central Commercial District
- PCDGDP - Planned Community Development - General Development Plan
- PCDMHPGDP - Planned Community Mobile Home Park District - General Development Plan
- PUDGDP - Planned Unit Development - General Development Plan
- PUDSIP - Planned Unit Devleopment - Specific Implementation Plan
- PCDMHPSIP - Planned Community Mobile Home Park District - Specific Implementation Plan
- PCDSIP - Planned Community Devleopment - Specific Implementation Plan
- RPSM - Research Park - Specialized Manufactoring District
- M1 - Limited Manufactoring District
- SM - Specific Manufactoring District
- M2 - General Manufactoring District
- A - Agricultural District
- C - Conservancy District
- W - Wetland Overlay District
- Unknown
- TBD - To Be Determined

I:\Projects\8112-Madison\WU002102\Well13Zoning.mxd

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CITY OF MADISON
ZONING DISTRICTS
UNIT WELL 13
MADISON, WISCONSIN

APPENDIX E

POTENTIOMETRIC SURFACE - LOWER BEDROCK (MOUNT SIMON) AQUIFER AND AREAS OF RECHARGE AND DISCHARGE

Figure 4. Simulated 2000 heads in Mt. Simon aquifer. Contours in feet above mean sea level (msl). 8112002.102

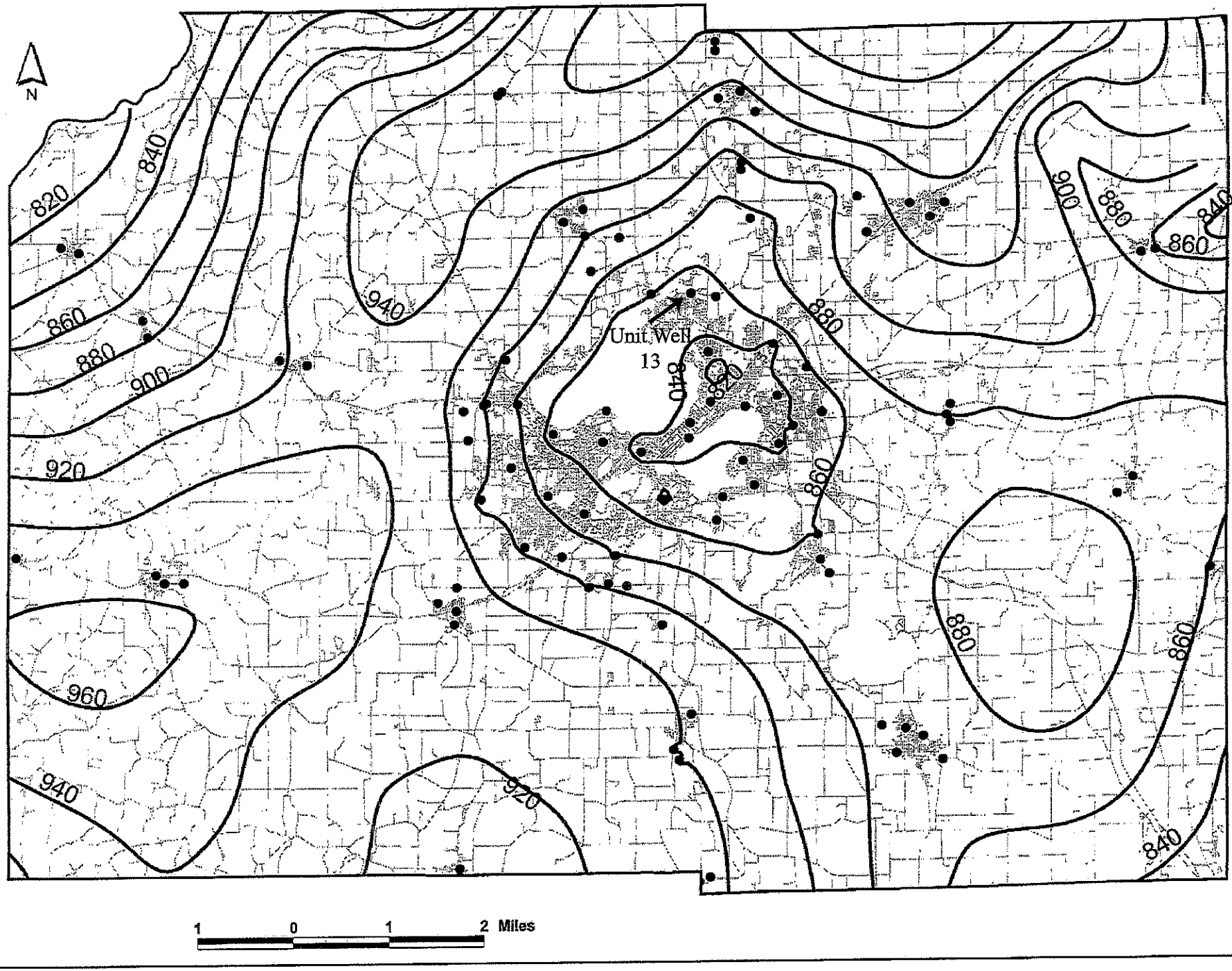
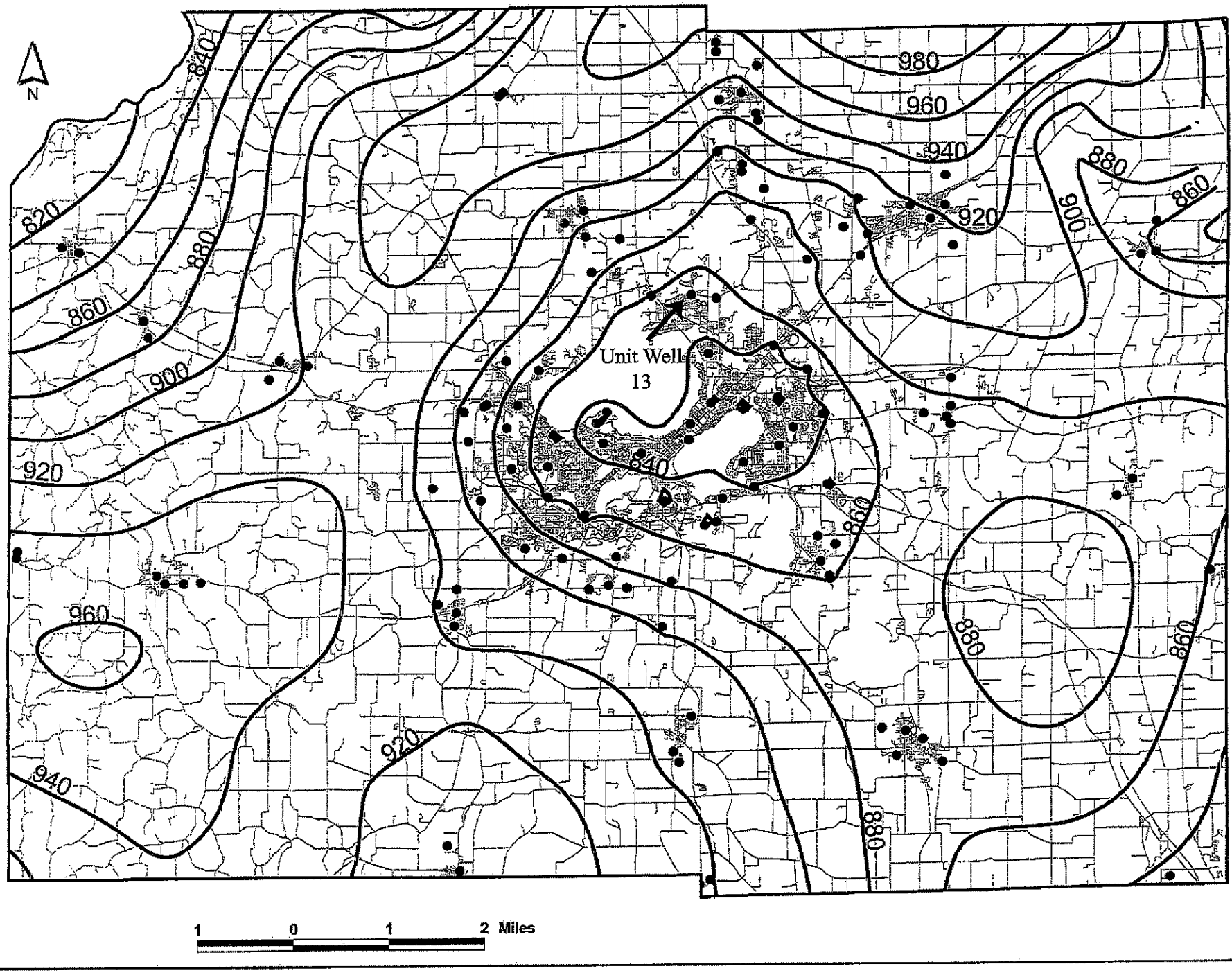
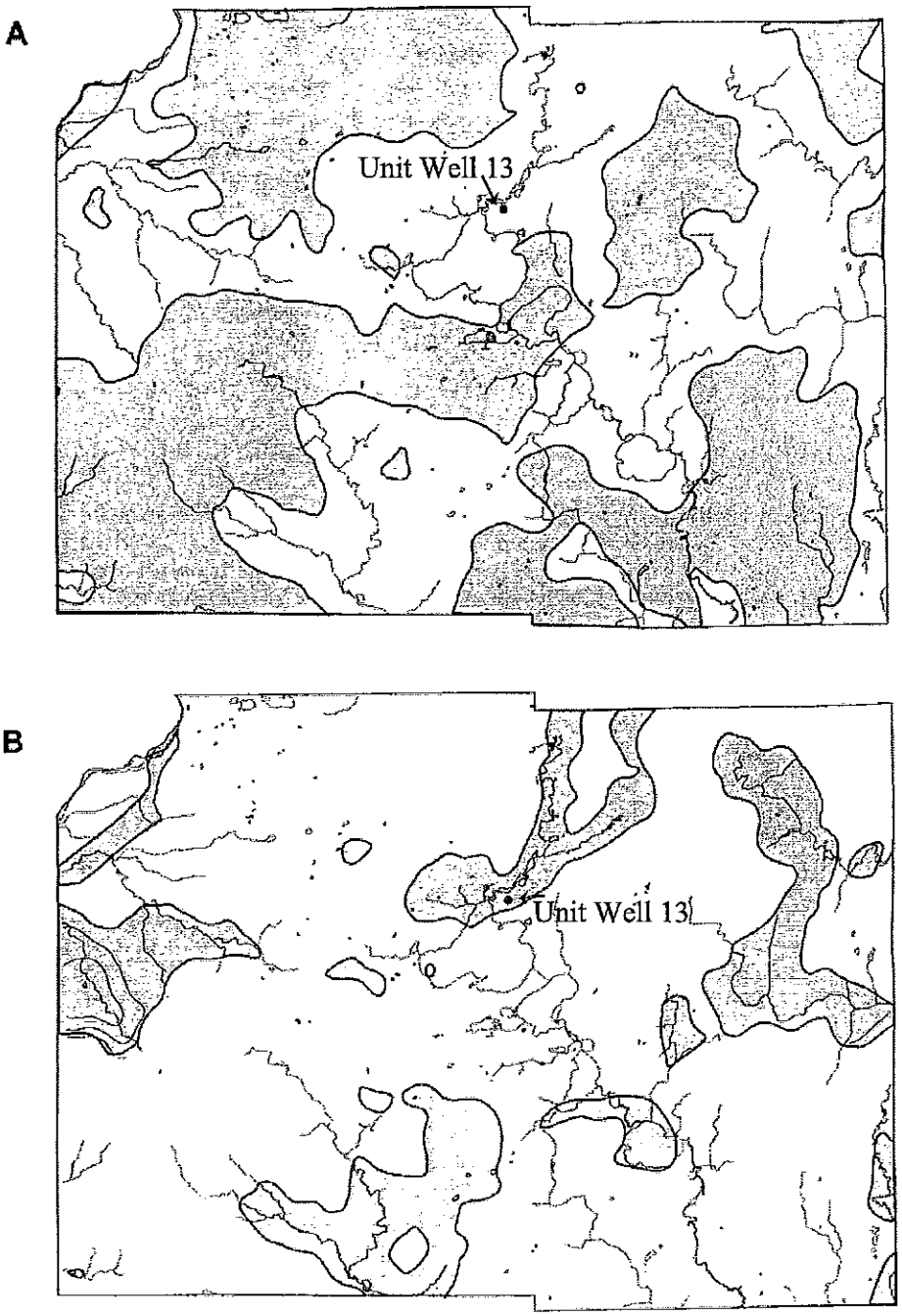


Figure 6. Simulated 2030 heads in Mt. Simon aquifer. Contours in feet above mean sea level (msl). 8112002.102



MAP 7



Areas of Recharge to and Discharge from the Mt. Simon Aquifer* Dane County, Wisconsin

A: areas of recharge
B: areas of discharge

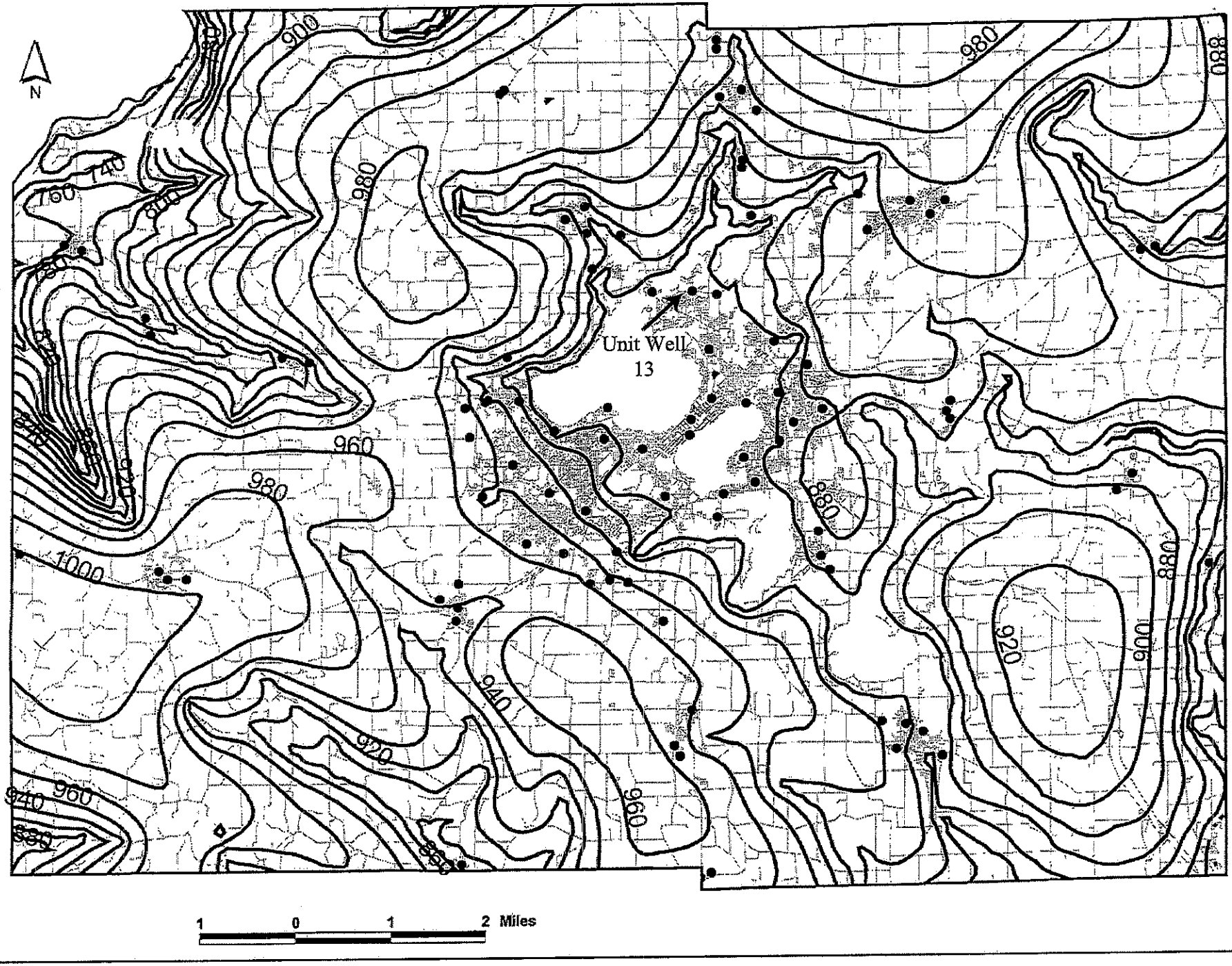
*Based on measured water levels

Source: *Hydrogeology of Dane County*, Bradbury, et. al., 1999.

APPENDIX F

POTENTIOMETRIC SURFACE - WATER TABLE ELEVATION

Figure 3. Simulated 2000 water table. Contours in feet above mean sea level (msl). 8112002.102



APPENDIX G

DISTANCE-DRAWDOWN CALCULATION
(ZONE OF INFLUENCE)

UNIT WELL 13 ZONE OF INFLUENCE

For the purposes of wellhead protection, the land above the cone of depression is called the zone of influence for that well. The zone of influence (ZOI) is typically based on calculations using the aquifer's hydraulic properties and delineating a boundary at which the drawdown in the aquifer due to pumping the well is negligible. The shape of the ZOI is defined as the distance from a well where changes in the groundwater surface can be measured or inferred as a result of pumping (USEPA Handbook on Groundwater and Well Head Protection, 1994). The ZOI for a well is may be calculated using the Cooper and Jacob modified Nonequilibrium equation, as shown below, to estimate the drawdown in the well.

$$s = \frac{264Q}{T} \log \frac{0.3Tt}{r^2S}$$ (Driscol, 1986, pg 219)

Where: s = drawdown in feet
Q = pumping rate = 2,300 gpm (design pumping rate)
T = Transmissivity = 42,000 gpd/ft. (Theoretical T derived from initial pumping test calculations)
t = time pumping = 30 days
r = radius of well = 0.96 feet
S = Storage coefficient = 0.0003 (Bradbury, 2001)

By this method, the theoretical drawdown in Well 8 will be approximately 132.2 feet based on 30 days of continuous pumping with no recharge.

The slope of the cone of depression was calculated by the distance–drawdown modification of the Cooper Jacob equation (Driscol, 1986, pg 236):

$$T = \frac{528Q}{\Delta s} \quad \text{Therefore}, \Delta s = \frac{528Q}{T}$$

Where: T = Transmissivity = 42,000 gpd/ft. (Theoretical T derived from initial pumping test calculations)

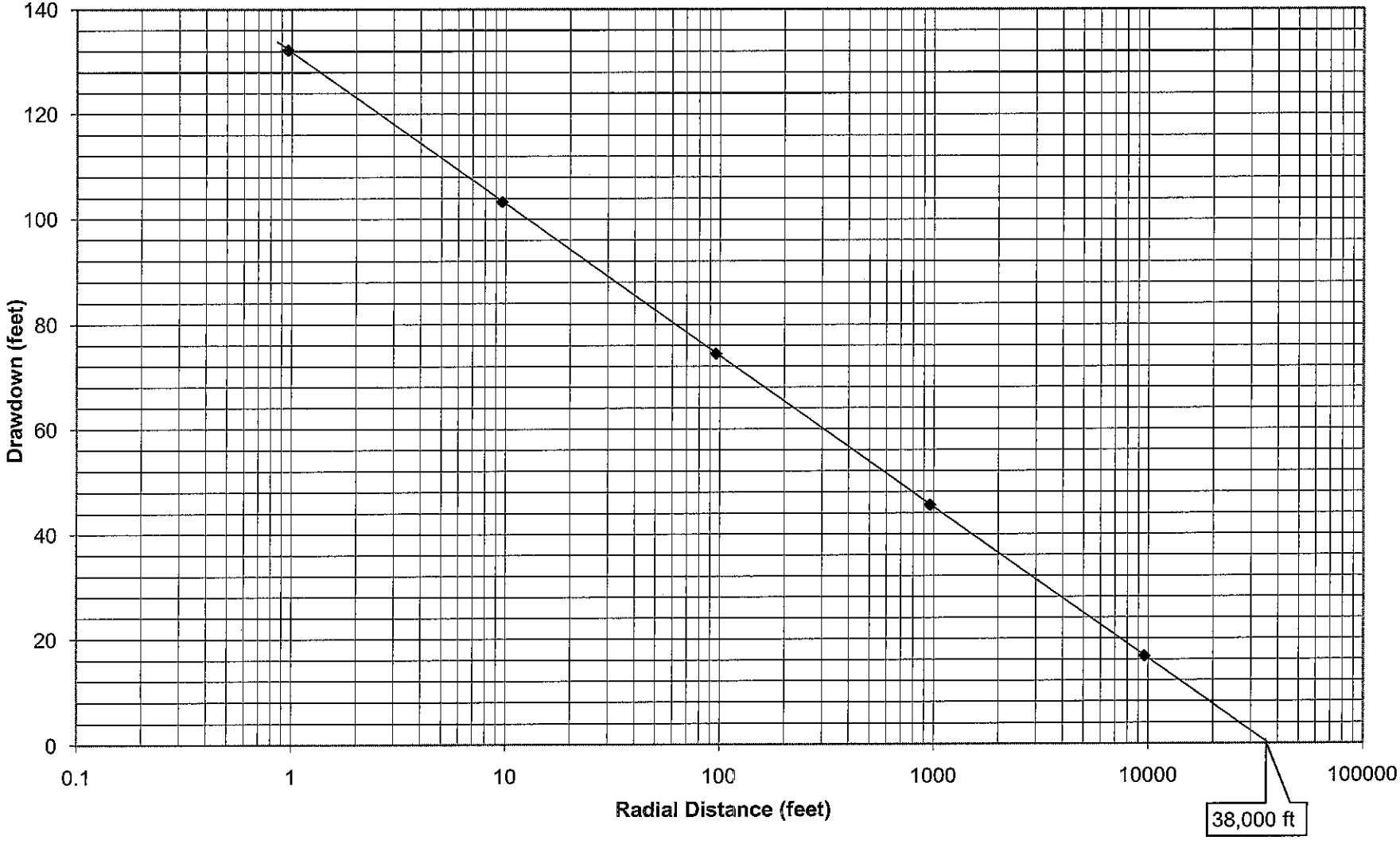
Q = pumping rate = 2,300 gpm

Δs = change in drawdown per log cycle of distance

By this method, Δs = 28.9 ft/log cycle.

The ZOI was then determined graphically to be approximately 38,000 feet, as shown on the attached graph.

Zone of Influence
Unit Well 13
City of Madison, WI



APPENDIX H

ULTIMATE ZOCS FOR MUNICIPAL WELLS IN DANE COUNTY

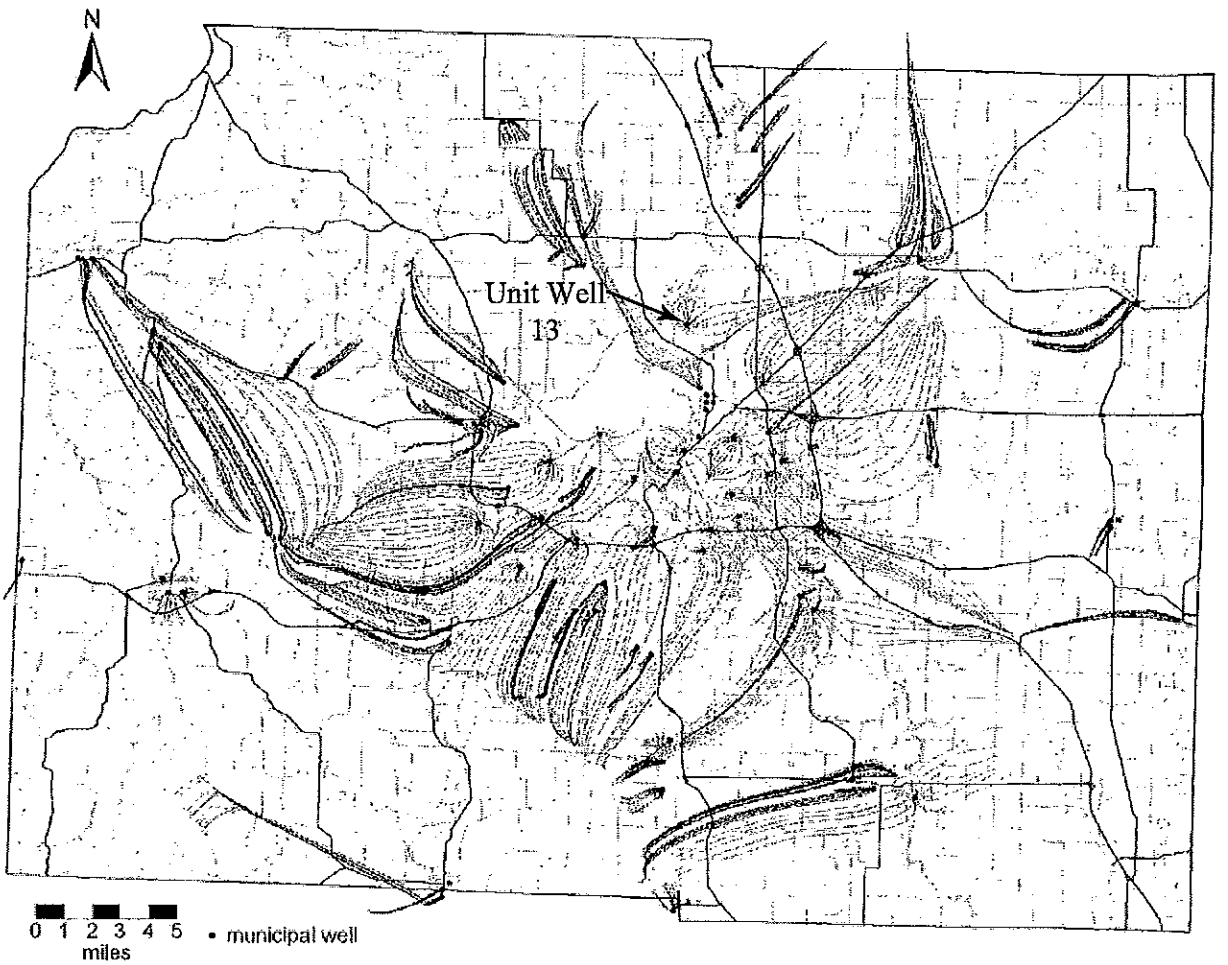


Figure 16.. Pathlines outlining zones of contribution for municipal wells in Dane County.

Source: *Hydrogeology of Dane County*, Bradbury, et. al., 1999.

APPENDIX I

KNOWN ACTIVE AND ABANDONED WELLS WITHIN THE 100-YEAR CAPTURE ZONE OF UNIT WELL 13

TABLE I-1
KNOWN ACTIVE AND ABANDONED PRIVATE WELLS WITHIN 100-YEAR CAPTURE ZONE OF UNIT WELL 13
UNIT WELL 13 WELLHEAD PROTECTION PLAN
MADISON, WISCONSIN

ACTIVE PRIVATE WELLS

Item	Depth Expiration	X	Y Status	Gid House	Ufid Age	Customer Well Year	Address Pit	Home Phone Well Type	Business Phone Well Location	Notes Well Depth	Alder District	Parcel Number
1	446.78 ft	–	–	–	10	661	Clandia Carrera	334-7761	4513 Sherman Avenue	250-5222		
New cover and extension pipe installed (06/07); No date entered on well permit, assumed to be date of last sample (7/29/09 – jdg).												
	12	081019304253			20120711000000.000		Permitted 1959					

ABANDONED PRIVATE WELLS

Item	Depth	X	Y	Gid	Ufid	Customer	Address	Home Phone	Business Phone	Notes	Alder District	Parcel Number
1	401.87 ft	–	–	–	9	645 James Lund	4602 Barby Lane				18	080925210265
2	407.00 ft	–	–	–	9	660 Habitat for Humanity	4501 N. Sherman Ave.	223-0404			12	081019304211
3	6983.96 ft.	–	–	–	9	649 Dane Co. Public Works	1202 Northport Dr.				18	080925300991

APPENDIX J

PROHIBITED LAND USES IN WHPAs,
POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION AND LAND USES,
AND THEIR RELATIVE RISK TO GROUNDWATER

TABLE J-1
RECOMMENDED PROHIBITED LAND USES
UNIT WELL 13 WELLHEAD PROTECTION ZONES
MADISON, WISCONSIN

ZONE A - PROHIBITED USES

Commercial animal confinement facilities
Animal waste facilities
Asphalt products manufacturing
Auto body repair businesses
Auto sales & service
Auto salvage yards (junk yards)
Bus or truck terminals
Commercial bulk fertilizer and/or pesticide facilities (storage, mixing and/or loading)
Cemeteries
Dry cleaning businesses/facilities
Electroplating businesses/facilities
Exterminating businesses/facilities
Fuel storage tanks (heating oil)
Furniture manufacturing and refinishing
Garage and vehicular towing
Hazardous and/or toxic materials storage
Hazardous and/or toxic waste facilities
Industrial businesses that use hazardous chemicals as defined by the EPA
Industrial pipelines
Landfills or waste disposal facilities
Machine shops
Paint and coating manufacturing
Photo processing
Plastics manufacturing
Printing and duplicating businesses that use hazardous chemicals as defined by the EPA
Public and municipal maintenance garages
Radioactive waste facilities
Recycling facilities
Research laboratories
Retail liquid motor fuel dispensing facilities
Salt storage
Septage and/or sewage sludge spreading
Spray wastewater facilities
Stormwater impoundments/retention areas
Underground and aboveground petroleum and chemical product storage tanks
Unsewered residential, commercial, or industrial development
Vehicle Repair shops
Wastewater treatment or disposal facilities

TABLE J-1 (cont.)

ZONE B - PROHIBITED USES

Commercial animal confinement facilities
Animal waste facilities
Asphalt products manufacturing
Auto body repair businesses
Auto salvage yards (junk yards)
Bus or truck terminals
Commercial bulk fertilizer and/or pesticide facilities (storage, mixing and/or loading)
Dry cleaning businesses/facilities
Electroplating businesses/facilities
Exterminating businesses/facilities

ZONE B - PROHIBITED USES (cont.)

Garage and vehicular towing
Hazardous and/or toxic materials storage
Hazardous and/or toxic waste facilities
Industrial businesses that use hazardous chemicals as defined by the EPA
Landfills or waste disposal facilities
Manufacturing businesses that use hazardous chemicals as defined by the EPA
Paint and coating manufacturing
Printing and duplicating businesses that use hazardous chemicals as defined by the EPA
Public and municipal maintenance garages
Radioactive waste facilities
Recycling facilities
Retail liquid motor fuel dispensing facilities
Salt storage
Septage and/or sewage sludge spreading
Spray wastewater facilities
Underground and aboveground petroleum and chemical product storage tanks (less than 600 feet from well)
Unsewered residential, commercial, or industrial development (if sewage system receives 8,000 gallons per day or more)
Vehicle Repair shops
Wastewater treatment or disposal facilities

Source: USEPA, 1993. Wellhead Protection: A Guide for Small Communities. Seminar Publication EPA/625/R-93/002, Washington, DC

Table 4-4. Potential Sources of Ground Water Contamination

Source	Health, Environmental, or Aesthetic Contaminant[1,2,3]
NATURALLY OCCURRING SOURCES	
Rocks and soils	*Aesthetic Contaminants:* Iron and iron bacteria; manganese; calcium and magnesium (hardness) *Health and Environmental Contaminants:* Arsenic; asbestos; metals; chlorides; fluorides; sulfates; sulfate-reducing bacteria and other microorganisms
Contaminated water	Excessive sodium; bacteria; viruses; low pH (acid) water
Decaying organic matter	Bacteria
Geological radioactive gas	Radionuclides (radon, etc.)
Natural hydrogeological events and formations	Salt-water/brackish water intrusion (or intrusion of other poor quality water); contamination by a variety of substances through sink-hole infiltration in limestone terrains
AGRICULTURAL SOURCES	
Animal feedlots and burial areas	Livestock sewage wastes; nitrates; phosphates; chloride; chemical sprays and dips for controlling insect, bacterial, viral, and fungal pests on livestock; coliform[4] and noncoliform bacteria; viruses
Manure spreading areas and storage pits	Livestock sewage wastes; nitrates
Livestock waste disposal areas	Livestock sewage wastes; nitrates
Crop areas and irrigation sites	Pesticides;[5] fertilizers;[6] gasoline and motor oils from chemical applicators
Chemical storage areas and containers	Pesticide[5] and fertilizer[6] residues
Farm machinery areas	Automotive wastes;[7] welding wastes
Agricultural drainage wells and canals	Pesticides;[5] fertilizers;[6] bacteria; salt water (in areas where the fresh-saltwater interface lies at shallow depths and where the water table is lowered by channelization, pumping, or other causes)
RESIDENTIAL SOURCES	
Common household maintenance and hobbies	*Common Household Products:*[8] Household cleaners; oven cleaners; drain cleaners; toilet cleaners; disinfectants; metal polishes; jewelry cleaners; shoe polishes; synthetic detergents; bleach; laundry soil and stain removers; spot removers and dry cleaning fluid; solvents; lye or caustic soda; household pesticides;[9] photochemicals; printing ink; other common products *Wall and Furniture Treatments:* Paints; varnishes; stains; dyes; wood preservatives (creosote); paint and lacquer thinners; paint and varnish removers and deglossers; paint brush cleaners; floor and furniture strippers *Mechanical Repair and Other Maintenance Products:* Automotive wastes;[7] waste oils; diesel fuel; kerosene; #2 heating oil; grease; degreasers for driveways and garages; metal degreasers; asphalt and roofing tar; tar removers; lubricants; rustproofers; car wash detergents; car waxes and polishes; rock salt; refrigerants
Lawns and gardens	Fertilizers;[5] herbicides and other pesticides used for lawn and garden maintenance[10]
Swimming pools	Swimming pool maintenance chemicals[11]
Septic systems, cesspools, and sewer lines	Septage; coliform and noncoliform bacteria;[4] viruses; nitrates; heavy metals; synthetic detergents; cooking and motor oils; bleach; pesticides;[9,10] paints; paint thinner; photographic chemicals; swimming pool chemicals;[11] septic tank/cesspool cleaner chemicals;[12] elevated levels of chloride, sulfate, calcium, magnesium, potassium, and phosphate
Underground storage tanks	Home heating oil
Apartments and condominiums	Swimming pool maintenance chemicals;[11] pesticides for lawn and garden maintenance and cockroach, termite, ant, rodent, and other pest control;[9,10] wastes from onsite sewage treatment plants; household hazardous wastes[8]

Table 4-4. Potential Sources of Ground Water Contamination (continued)

Source	Health, Environmental, or Aesthetic Contaminant[1,2,3]
MUNICIPAL SOURCES	
Schools and government offices and grounds	Solvents; pesticides;[9,10] acids; alkalis; waste oils; machinery/vehicle servicing wastes; gasoline and heating oil from storage tanks; general building wastes[13]
Park lands	Fertilizers;[6] herbicides;[10] insecticides[9]
Public and residential areas infested with mosquitoes, gypsy moths, ticks, ants, or other pests	Pesticides[5,9]
Highways, road maintenance depots, and deicing operations	Herbicides in highway rights-of-way;[5,10] road salt (sodium and calcium chloride); road salt anticaking additives (ferric ferrocyanide, sodium ferrocyanide); road salt anticorrosives (phosphate and chromate); automotive wastes[7]
Municipal sewage treatment plants and sewer lines	Municipal wastewater; sludge;14 treatment chemicals[15]
Storage, treatment, and disposal ponds, lagoons, and other surface impoundments	Sewage wastewater; nitrates; other liquid wastes; microbiological contaminants
Land areas applied with wastewater or wastewater byproducts	Organic matter; nitrate; inorganic salts; heavy metals; coliform and noncoliform bacteria;[4] viruses; nitrates; sludge;[14] nonhazardous wastes[16]
Storm water drains and basins	Urban runoff; gasoline; oil; other petroleum products; road salt; microbiological contaminants
Combined sewer overflows (municipal sewers and storm water drains)	Municipal wastewater; sludge;[14] treatment chemicals;[15] urban runoff; gasoline; oil; other petroleum products; road salt; microbial contaminants
Recycling/reduction facilities	Residential and commercial solid waste residues
Municipal waste landfills	Leachate; organic and inorganic chemical contaminants; wastes from households[8] and businesses;[13] nitrates; oils; metals
Open dumping and burning sites, closed dumps	Organic and inorganic chemicals; metals; oils; wastes from households[8] and businesses[13]
Municipal incinerators	Heavy metals; hydrocarbons; formaldehyde; methane; ethane; ethylene; acetylene; sulfur and nitrogen compounds
Water supply wells, monitoring wells, older wells, domestic and livestock wells, unsealed and abandoned wells, and test hole wells	Surface runoff; effluents from barnyards, feedlots, septic tanks, or cesspools; gasoline; used motor oil; road salt
Sumps and dry wells	Storm water runoff; spilled liquids; used oil; antifreeze; gasoline; other petroleum products; road salt; pesticides;[5] and a wide variety of other substances
Drainage wells	Pesticides;[9,10] bacteria
Well pumping that causes interaquifer leakage, induced filtration, landward migration of sea water in coastal areas; etc.	Saltwater; excessively mineralized water
Artificial ground water recharge	Storm water runoff; excess irrigation water; stream flow; cooling water; treated sewage effluent; other substances that may contain contaminants, such as nitrates, metals, detergents, synthetic organic compounds, bacteria, and viruses
COMMERCIAL SOURCES	
Airports, abandoned airfields	Jet fuels; deicers; diesel fuel; chlorinated solvents; automotive wastes;[7] heating oil; building wastes[13]
Auto repair shops	Waste oils; solvents; acids; paints; automotive wastes;[7] miscellaneous cutting oils
Barber and beauty shops	Perm solutions; dyes; miscellaneous chemicals contained in hair rinses
Boat yards and marinas	Diesel fuels; oil; septage from boat waste disposal areas; wood preservative and treatment chemicals; paints; waxes; varnishes; automotive wastes[7]

Table 4-4. Potential Sources of Ground Water Contamination (continued)

Source	Health, Environmental, or Aesthetic Contaminant[1,2,3]
Bowling alleys	Epoxy; urethane-based floor finish
Car dealerships (especially those with service departments)	Automotive wastes;[7] waste oils; solvents; miscellaneous wastes
Car washes	Soaps; detergents; waxes; miscellaneous chemicals
Camp grounds	Septage; gasoline; diesel fuel from boats; pesticides for controlling mosquitoes, ants, ticks, gypsy moths, and other pests;[5,9] household hazardous wastes from recreational vehicles (RVs)[8]
Carpet stores	Glues and other adhesives; fuel from storage tanks if forklifts are used
Cemeteries	Leachate; lawn and garden maintenance chemicals[10]
Construction trade areas and materials (plumbing, heating and air conditioning, painting, paper hanging, decorating, drywall and plastering, acoustical insulation, carpentry, flooring, roofing and sheet metal, wrecking and demolition, etc.)	Solvents; asbestos; paints; glues and other adhesives; waste insulation; lacquers; tars; sealants; epoxy waste; miscellaneous chemical wastes
Country clubs	Fertilizers;[6] herbicides;[5,10] pesticides for controlling mosquitoes, ticks, ants, gypsy moths, and other pests;[9] swimming pool chemicals;[11] automotive wastes
Dry cleaners	Solvents (perchloroethylene, petroleum solvents, Freon); spotting chemicals (trichloroethane, methylchloroform, ammonia, peroxides, hydrochloric acid, rust removers, amyl acetate)
Funeral services and crematories	Formaldehyde; wetting agents; fumigants; solvents
Furniture repair and finishing shops	Paints; solvents; degreasing and solvent recovery sludges
Gasoline services stations	Oils; solvents; miscellaneous wastes
Golf courses	Fertilizers;[6] herbicides;[5,10] pesticides for controlling mosquitoes, ticks, ants, gypsy moths, and other pests[9]
Hardware/lumber/parts stores	Hazardous chemical products in inventories; heating oil and fork lift fuel from storage tanks; wood-staining and treating products such as creosote
Heating oil companies, underground storage tanks	Heating oil; wastes from truck maintenance areas[7]
Horticultural practices, garden nurseries, florists	Herbicides, insecticides, fungicides, and other pesticides[10]
Jewelry/metal plating shops	Sodium and hydrogen cyanide; metallic salts; hydrochloric acid; sulfuric acid; chromic acid
Laundromats	Detergents; bleaches; fabric dyes
Medical institutions	X-ray developers and fixers;[17] infectious wastes; radiological wastes; biological wastes; disinfectants; asbestos; beryllium; dental acids; miscellaneous chemicals
Office buildings and office complexes	Building wastes;[13] lawn and garden maintenance chemicals;[10] gasoline; motor oil
Paint stores	Paints; paint thinners; lacquers; varnishes; other wood treatments
Pharmacies	Spilled and returned products
Photography shops, photo processing laboratories	Biosludges; silver sludges; cyanides; miscellaneous sludges
Print shops	Solvents; inks; dyes; oils; photographic chemicals
Railroad tracks and yards	Diesel fuel; herbicides for rights-of-way; creosote for preserving wood ties
Research laboratories	X-ray developers and fixers;[17] infectious wastes; radiological wastes; biological wastes; disinfectants; asbestos; beryllium; solvents; infectious materials; drugs; disinfectants (quaternary ammonia, hexachlorophene, peroxides, chlornexade, bleach); miscellaneous chemicals

Table 4-4. Potential Sources of Ground Water Contamination (continued)

Source	Health, Environmental, or Aesthetic Contaminant[1,2,3]
COMMERCIAL SOURCES (continued)	
Scrap and junk yards	Any wastes from businesses[13] and households;[8] oils
Sports and hobby shops	Gunpowder and ammunition; rocket engine fuel; model airplane glue
Above-ground and underground storage tanks	Heating oil; diesel fuel; gasoline; other petroleum products; other commercially used chemicals
Transportation services for passenger transit (local and interurban)	Waste oil; solvents; gasoline and diesel fuel from vehicles and storage tanks; fuel oil; other automotive wastes[7]
Veterinary services	Solvents; infectious materials; vaccines; drugs; disinfectants (quaternary ammonia, hexachlorophene, peroxides, chlornexade, bleach); x-ray developers and fixers[17]
INDUSTRIAL SOURCES	
Material stockpiles (coal, metallic ores, phosphates, gypsum)	Acid drainage; other hazardous and nonhazardous wastes[16]
Waste tailing ponds (commonly for the disposal of mining wastes)	Acids; metals; dissolved solids; radioactive ores; other hazardous and nonhazardous wastes[15]
Transport and transfer stations (trucking terminals and rail yards)	Fuel tanks; repair shop wastes;[7] other hazardous and nonhazardous wastes[15]
Above-ground and underground storage tanks and containers	Heating oil; diesel and gasoline fuel; other petroleum products; hazardous and nonhazardous materials and wastes[16]
Storage, treatment, and disposal ponds, lagoons, and other surface impoundments	Hazardous and nonhazardous liquid wastes;[16] septage; sludge[14]
Chemical landfills	Leachate; hazardous and nonhazardous wastes;[16] nitrates
Radioactive waste disposal sites	Radioactive wastes from medical facilities, power plants, and defense operations; radionuclides (uranium, plutonium)
Unattended wet and dry excavation sites (unregulated dumps)	A wide range of substances; solid and liquid wastes; oil-field brines; spent acids from steel mill operations; snow removal piles containing large amounts of salt
Operating and abandoned production and exploratory wells (for gas, oil, coal, geothermal, and heat recovery); test hole wells; monitoring and excavation wells	Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals[16]
Dry wells	Saline water from wells pumped to keep them dry
Injection wells	Highly toxic wastes; hazardous and nonhazardous industrial wastes;[16] oil-field brines
Well drilling operations	Brines associated with oil and gas operations
INDUSTRIAL PROCESSES (PRESENTLY OPERATED OR TORN-DOWN FACILITIES)[18]	
Asphalt plants	Petroleum derivatives
Communications equipment manufacturers	Nitric, hydrochloric, and sulfuric acid wastes; heavy metal sludges; copper-contaminated etchant (e.g., ammonium persulfate); cutting oil and degreasing solvent (trichloroethane, Freon, or trichloroethylene); waste oils; corrosive soldering flux; paint sludge; waste plating solution
Electric and electronic equipment manufacturers and storage facilities	Cyanides; metal sludges; caustics (chromic acid); solvents; oils; alkalis; acids; paints and paint sludges; calcium fluoride sludges; methylene chloride; perchloroethylene; trichloroethane; acetone; methanol; toluene; PCBs
Electroplaters	Boric, hydrochloric, hydrofluoric, and sulfuric acids; sodium and potassium hydroxide; chromic acid; sodium and hydrogen cyanide; metallic salts
Foundries and metal fabricators	Paint wastes; acids; heavy metals; metal sludges; plating wastes; oils; solvents; explosive wastes

Table 4-4. Potential Sources of Ground Water Contamination (continued)

Source	Health, Environmental, or Aesthetic Contaminant[1,2,3]
Furniture and fixtures manufacturers	Paints; solvents; degreasing sludges; solvent recovery sludges
Machine and metalworking shops	Solvents; metals; miscellaneous organics; sludges; oily metal shavings; lubricant and cutting oils; degreasers (tetrachlorethylene); metal marking fluids; mold-release agents
Mining operations (surface and underground), underground storage mines	Mine spoils or tailings that often contain metals; acids; highly corrosive mineralized waters; metal sulfides
Unsealed abandoned mines used as waste pits	Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals[16]
Paper mills	Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals;[16] organic sludges; sodium hydroxide; chlorine; hypochlorite; chlorine dioxide; hydrogen peroxide
Petroleum production and storage companies, secondary recovery of petroleum	Hydrocarbons; oil-field brines (highly mineralized salt solutions)
Industrial pipelines	Corrosive fluids; hydrocarbons; other hazardous and nonhazardous materials and wastes[16]
Photo processing laboratories	Cyanides; biosludges; silver sludges; miscellaneous sludges
Plastics materials and synthetics producers	Solvents; oils; miscellaneous organics and inorganics (phenols, resins); paint wastes; cyanides; acids; alkalis; wastewater treatment sludges; cellulose esters; surfactant; glycols; phenols; formaldehyde; peroxides; etc.
Primary metal industries (blast furnaces, steel works, and rolling mills)	Heavy metal wastewater treatment sludge; pickling liquor; waste oil; ammonia scrubber liquor; acid tar sludge; alkaline cleaners; degreasing solvents; slag; metal dust
Publishers, printers, and allied industries	Solvents; inks; dyes; oils; miscellaneous organics; photographic chemicals
Public utilities (phone, electric power, gas)	PCBs from transformers and capacitors; oils; solvents; sludges; acid solution; metal plating solutions (chromium, nickel, cadmium); herbicides from utility rights-of-way
Sawmills and planers	Treated wood residue (copper quinolate, mercury, sodium bazide); tanner gas; paint sludges; solvents; creosote; coating and gluing wastes
Stone, clay, and glass manufacturers	Solvents; oils and grease; alkalis; acetic wastes; asbestos; heavy metal sludges; phenolic solids or sludges; metal-finishing sludge
Welders	Oxygen, acetylene
Wood preserving facilities	Wood preservatives; creosote

[1]In general, ground water contamination stems from the *misuse and improper disposal* of liquid and solid wastes; the *illegal dumping or abandonment* of household, commercial, or industrial chemicals; the *accidental spilling* of chemicals from trucks, railways, aircraft, handling facilities, and storage tanks; or the *improper siting, design, construction, operation, or maintenance* of agricultural, residential, municipal, commercial, and industrial drinking water wells and liquid and solid waste disposal facilities. Contaminants also can stem from *atmospheric pollutants*, such as airborne sulfur and nitrogen compounds, which are created by smoke, flue dust, aerosols, and automobile emissions, fall as acid rain, and percolate through the soil. When the sources listed in this table are used and managed properly, ground water contamination is not likely to occur.

[2]Contaminants can reach ground water from activities occurring on the land surface, such as industrial waste storage; from sources below the land surface but above the water table, such as septic systems; from structures beneath the water table, such as wells; or from contaminated recharge water.

[3]This table lists the most common wastes, but not all potential wastes. For example, it is not possible to list all potential contaminants contained in storm water runoff or research laboratory wastes.

[4]Coliform bacteria can indicate the presence of pathogenic (disease-causing) microorganisms that may be transmitted in human feces. Diseases such as typhoid fever, hepatitis, diarrhea, and dysentery can result from sewage contamination of water supplies.

[5]Pesticides include herbicides, insecticides, rodenticides, fungicides, and avicides. EPA has registered approximately 50,000 different pesticide products for use in the United States. Many are highly toxic and quite mobile in the subsurface. An EPA survey found that the most common pesticides found in drinking water wells were DCPA (dacthal) and atrazine, which EPA classifies as *moderately toxic* (class 3) and *slightly toxic* (class 4) materials, respectively.

[6]The EPA National Pesticides Survey found that the use of fertilizers correlates to nitrate contamination of ground water supplies.

[7]Automotive wastes can include gasoline; antifreeze; automatic transmission fluid; battery acid; engine and radiator flushes; engine and metal degreasers; hydraulic (brake) fluid; and motor oils.

[8]Toxic or hazardous components of common household products are noted in Table 3-2.

[9]Common household pesticides for controlling pests such as ants, termites, bees, wasps, flies, cockroaches, silverfish, mites, ticks, fleas, worms, rats, and mice can contain active ingredients including napthalene, phosphorus, xylene, chloroform, heavy metals, chlorinated hydrocarbons, arsenic, strychnine, kerosene, nitrosamines, and dioxin.

[10]Common pesticides used for lawn and garden maintenance (i.e., weed killers, and mite, grub, and aphid controls) include such chemicals as 2,4-D; chlorpyrifos; diazinon; benomyl; captan; dicofol; and methoxychlor.

[11]Swimming pool chemicals can contain free and combined chlorine; bromine; iodine; mercury-based, copper-based, and quaternary algicides; cyanuric acid; calcium or sodium hypochlorite; muriatic acid; sodium carbonate.

[12]Septic tank/cesspool cleaners include synthetic organic chemicals such as 1,1,1 trichloroethane, tetrachloroethylene, carbon tetrachloride, and methylene chloride.

[13]Common wastes from public and commercial buildings include automotive wastes; rock salt; and residues from cleaning products that may contain chemicals such as xylenols, glycol esters, isopropanol, 1,1,1-trichloroethane, sulfonates, chlorinated phenolys, and cresols.

[14]Municipal wastewater treatment sludge can contain organic matter; nitrates; inorganic salts; heavy metals; coliform and noncoliform bacteria; and viruses.

[15]Municipal wastewater treatment chemicals include calcium oxide; alum; activated alum, carbon, and silica; polymers; ion exchange resins; sodium hydroxide; chlorine; ozone; and corrosion inhibitors.

[16]The Resource Conservation and Recovery Act (RCRA) defines a hazardous waste as a solid waste that may cause an increase in mortality or serious illness or pose a substantial threat to human health and the environment when improperly treated, stored, transported, disposed of, or otherwise managed. A waste is hazardous if it exhibits characteristics of ignitability, corrosivity, reactivity, and/or toxicity. Not covered by RCRA regulations are domestic sewage; irrigation waters or industrial discharges allowed by the Clean Water Act; certain nuclear and mining wastes; household wastes; agricultural wastes (excluding some pesticides); and small quantity hazardous wastes (i.e., less than 220 pounds per month) generated by businesses.

[17]X-ray developers and fixers may contain reclaimable silver, glutaldehyde, hydroquinone, phenedone, potassium bromide, sodium sulfite, sodium carbonate, thiosulfates, and potassium alum.

[18]This table lists potential ground water contaminants from many common industries, but it does not address all industries.

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Table 4-5. Land Uses and Their Relative Risk to Ground Water

LEAST RISK	A.	1. Land surrounding a well or reservoir, owned by a water company.
		2. Permanent open space dedicated to passive recreation.
		3. Federal, state, municipal, and private parks.
		4. Woodlands managed for forest products.
		5. Permanent open space dedicated to active recreation.
	B.	1. Field crops: pasture, hay, grains, vegetables.
		2. Low density residential: lots larger than 2 acres.
		3. Churches, municipal offices.
	C.	1. Agricultural production: dairy, livestock, poultry, nurseries, orchards, berries.
		2. Golf course, quarries.
		3. Medium density residential: lots from 1/2 to 1 acre.
	D.	1. Institutional uses: schools, hospitals, nursing homes, prisons, garages, salt storage, sewage treatment facilities.
		2. High density housing: lots smaller than 1/2 acre.
		3. Commercial uses: limited hazardous material storage and only sewage disposal.
	E.	1. Retail commercial: gasoline, farm equipment, automotive, sales and services; dry cleaners; photo processor; medical arts; furniture strippers; machine shops; radiator repair; printers; fuel oil distributors.
		2. Industrial: all forms of manufacturing and processing, research facilities.
		3. Underground storage of chemicals, petroleum.
GREATEST RISK		4. Waste disposal: pits, ponds, lagoons, injection wells used for waste disposal; bulky waste and domestic garbage landfills; hazardous waste treatment, storage and disposal sites.

Source: Adapted from U.S. EPA, 1989a.

APPENDIX K

CLEAN SWEEP COLLECTION PROGRAM

MADISON / DANE COUNTY CLEAN SWEEP

2009 Annual Report

Paint Disposal

Mercury Disposal

Local Government Resources

Coming to a collection near you!

Health & Safety Info Household Products

Safe Product Alternatives

MedDrop

Español

Household Hazardous Waste Program

Clean Sweep provides an opportunity for residents of Madison and Dane County to safely dispose of hazardous waste, free of charge.

We are now closed for the 2010 collection season and will reopen on May 3rd 2011.

2011 Collection Season

Clean Sweep will reopen open on May 3rd, 2011 and run through October 29th, 2011. We'll be open every Tuesday, Wednesday, Friday, and Saturday from 7:30 A.M. to 2:00 P.M. Our facility is located in Madison at 2302 Fish Hatchery Road (on the north end of the Dane County Highway Garage property).
View a map to CleanSweep site.

Guidelines for Materials Brought to Clean Sweep

When you bring materials, they should be packaged to keep them from spilling or breaking on the way. Leave materials in their original containers. DO NOT MIX like or unlike materials together. Leaking containers may be placed, as is, in another container. Be sure to label the outside container.

Disposal options for common items

Although we do our best to accept as much household hazardous waste as possible, there are some things we cannot take off your hands. Click on the items below to display information regarding their disposal.

Note: If an item is in this list, it does not necessarily mean that Clean Sweep will accept it.

Please click on the item of interest to learn about its proper disposal.

Aerosol cans
Asbestos
Ammunition, explosives, and fireworks
Antifreeze and oil filters
Batteries
Ballasts
Brake, transmission, power steering fluid
Computers
Cooking oil
Driveway sealer -- Solvent-based (tar, aspl
Fertilizer
Fire extinguishers
Flammable solvents, fuels and aerosols
Fluorescent light bulbs
Gasoline additives (not oil), engine degrea
Gasoline and gasoline/oil mixes
Household products containing organic sol

Last Revised: April 7, 2009

For a printable version of the disposal options for the most common household items, please click here.

Please note that the drop-down list above is more comprehensive and contains many useful links to help answer your material disposal questions.

Clean Sweep does not accept tires, paper or cardboard products, yard waste, construction, debris, rubbish, glass, solid metals, solid waste, appliances, etc. Contact your local official, trash hauler, or private recycler for details.

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Med Drop

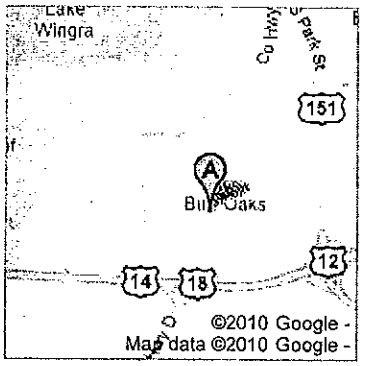
Español

What is Cleansweep?

Clean Sweep is a place to bring hazardous household materials such as Oil-Based Paints and Paint-Related Products, Pesticides & Poisons, Household Products Containing Organic Solvents, Ignitables, and Aerosols, and Rechargeable Batteries.

Why Cleansweep?

By providing the public with a free opportunity to safely dispose of such hazardous products, we keep these products out of landfills and lower the environmental risks associated with such improper disposal. The payoff is a cleaner, healthier environment.



2302 Fish Hatchery Road (on the north end of the Dane County Highway Garage property)

Contact

For more information, call our recorded information line at 608-243-0368 or contact Dave Radisewitz at 608-243-0347 or email him at dradisewitz@publichealthmdc.com

What's New

Survey

Participate in our new survey.

Schedule

We are curently closed for the 2010 season and will reoopen May 3rd 2011.

Fact Sheets

Clean Sweep Fact Sheets have been improved and updated for 2010.

- printer friendly version

Agricultural Clean Sweep Grants

Due to a lack of DATCP grant funding for 2010, no subsidies will be available for agricultural related businesses (Agricultural VSQGs) for the 2010 season. Agricultural VSQGs are welcome to use the program; however, agri-businesses will be charged the full price for disposal, same as our other non-agricultural business customers. Dane County will provide a 100% subsidy for Dane County farmers for 2010.

Educational Game

Last Revised: April 7, 2009

Check out an entertaining and educational game on the hazards present in your home. The National Institute of Health proves that learning can be fun. Play Tox Mystery today!

Agricultural Waste Program

The Agricultural Waste Program allows agricultural businesses and farmers to dispose of hazardous materials and wastes conveniently and cost-effectively using state subsidies. For additional information on the status of on the ag program, click here.

Household Hazardous Waste Program

The Household Hazardous Waste Program provides an opportunity for residents of Dane County to safely dispose of hazardous waste, free of charge. More on household hazardous waste.

Business Waste Program

The Business Waste Program allows businesses to dispose of hazardous materials and wastes conveniently and cost-effectively. More on the business waste program.

Product Exchange

The Product Exchange is a program for residents to take, free of charge, the high quality and usable products brought into Clean Sweep. More on the product exchange

Other Recycling Programs

More information on recycling programs can be found at Dane County Department of Public Works Recycling Page and also at the City of Madison Streets & Recycling Page.

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Dane County Public Works

City of Madison Home Page
Public Health Madison Dane County

2010 Clean Sweep Fact Sheet

MADISON / DANE COUNTY

HOUSEHOLD HAZARDOUS WASTE

Hours: **Tuesday, Wednesday, Friday, Saturday**
7:30 am - 2:00 pm
May 1 through October 30

Location: Dane County Highway Garage
2302 Fish Hatchery Rd. (north end)
On the corner of Fish Hatchery and Badger Roads
Tel: (608) 243-0368
www.danecountycleansweep.com

Clean Sweep is a program designed to lower the environmental risks associated with improper disposal of hazardous materials by providing the public with an opportunity to dispose of unwanted pesticides, household products and chemicals for safe and legal disposal before they cause problems. Household materials accepted include OIL-BASED PAINTS AND PAINT-RELATED PRODUCTS, PESTICIDES & POISONS, HOUSEHOLD PRODUCTS CONTAINING ORGANIC SOLVENTS, IGNITABLES, AND AEROSOLS, and RECHARGEABLE BATTERIES. Please see the table below for disposal methods of common materials.

Material	Disposal Method
Aerosol Cans	
Partially full or full	BRING TO: Clean Sweep
Empty	• Remove and trash the caps and nozzles, place the empty can in with your recyclables
Ammunition, Explosives and Fireworks	BRING TO: Dane County Sheriff's Office Bomb Squad Technician, (608) 255-2345
Antifreeze and Oil Filters*	BRING TO: Valvoline® Instant Oil Change* (closest to Clean Sweep site) 2512 S. Stoughton Rd., 222-8858
Ballasts (Electrical)	
If they are electronic or say "No PCBs"	BRING TO: • Private lamp recyclers [fee charged] (see Fluorescent Light Bulbs section), or • Throw in your trash
If they contain oil and DO NOT say "No PCBs"	BRING TO: Clean Sweep
Batteries	
Lead / acid automotive type and other rechargeable batteries	BRING TO: Clean Sweep, Batteries Plus, and other places that sell them*
Button batteries	BRING TO: Clean Sweep
Alkaline, single use & other disposables	BRING TO: • Private lamp recyclers [fee charged] (see Fluorescent Light Bulbs section), or • Batteries Plus (free) • Throw in your trash
Cell Phones	BRING TO: Clean Sweep, Radio Shack, Best Buy
Cleaners, Laundry Additives, and Other Water-Based Household Products	• Flush liquids down your sanitary sewer • Throw solids in your trash
Cleaners and Products that Contain Strong Acids and Bases Including Photographic Fixer, Muriatic Acid, Drain Clog Removers	BRING TO: Clean Sweep

Material	Disposal Method
Computers & Electronics	BRING TO: • Madison Recycling Center* [fee charged] 2200 Fish Hatchery Rd., (608) 251-2115 • Best Buy
Cooking Oil Liquid vegetable oil	• City of Madison Residents - BRING TO: City of Madison Streets - East: 4602 Sycamore Ave. - West: 1501 W. Badger Rd. • Dane County Residents - Solidify by freezing or mixing with Oil Dry® or shredded paper, and place in a plastic bag for disposal in your trash
Animal fat, solid vegetable-based oils, greases and lard	Solidify by freezing or mixing with Oil Dry® or shredded paper, and place in a plastic bag for disposal in your trash
Driveway Sealer / Roofing Tar Hardened, hardened with water on top, water-based semi-solid	• See page 4, "Disposal of Latex Paint & Water-Based Driveway Sealer"
Empty Container / Lids	• Throw in your trash
Solvent-based (tar, asphalt)	BRING TO: Clean Sweep
Empty Aerosol Cans	• Put in with your recyclables. Remove and trash tops and nozzles. (Full or partially full ones can be brought to Clean Sweep)
Empty Hazardous Material Containers	• Recycle as appropriate or throw in your trash (no drums >5 gallons)
Fertilizer Fertilizer that does not contain pesticides or herbicides	• Throw in your trash
Fertilizer that contains pesticides or herbicides (weed-n-feed, insect control)	BRING TO: Clean Sweep
Fire Extinguishers	BRING TO: Cintas Fire Protection (Call First) 804 Walsh Rd., (608) 241-1993
Lamps Including Fluorescent CFLS, Tubes and Other Lamps	• City of Madison and Dane County ordinances require that all stores selling fluorescent lamps must accept used lamps for recycling • Incandescent lamps can be thrown in your trash or brought to a private lamp recycler. All other lamps should be brought to a private lamp recycler • PRIVATE LAMP RECYCLERS* - PKK Lighting [fee charged] 7182 Hwy. 14, Capital Ct., 836-7821 - BJ Electric Supply Inc [fee charged] 805 Plaenert Dr., 257-4777
Fuels and Other Ignitables Including Gasoline, Kerosene, Fuel, Oil, and Solvent-Based Driveway Sealer	BRING TO: Clean Sweep • Also see **"Recycling Hazardous Materials"** on page 4 • Clean Sweep does not accept 20-pound propane cylinders (see "PROPANE CYLINDERS" below)
Infectious / Medical Wastes / Sharps	• Check with your local pharmacy
Mercury and Mercury Containing Products Including Non-Electronic Thermostats and Non-Alcohol Thermometers	BRING TO: Clean Sweep • Clean Sweep does not accept fluorescent lamps (See "Lamps" above)
Oil or Solvent-Based Paints	BRING TO: Clean Sweep

Material	Disposal Method
Pesticides and Poisons Including Cyanide, Stump Remover, Pool Chemicals, Herbicides, Insecticides, Pet Pesticides, Weed-N-Feed or Pest Control Fertilizers	BRING TO: Clean Sweep • Clean Sweep does not accept non-weed-n-feed and non-pest control fertilizer (see "Fertilizer" above)
Pharmaceuticals, Unwanted Medication	• Wait for the next **Med Drop** event to bring in for disposal. Medicines should be kept in their original containers with personal information removed / defaced. Go to www.meddropdane.org for details. • Pharmacies do not accept these products
Propane Cylinders Empty 20 pound tanks with open valves from City of Madison Residents	• City of Madison Residents - BRING TO: City of Madison Streets - East: 4602 Sycamore Ave. - West: 1501 W. Badger Rd.
20 pound tanks • Empty	• Most places that refill them [fee charged] (call first)
• Partially Full	BRING TO: U-Haul (fee charged)
1 pound cylinders (all)	BRING TO: Clean Sweep
Radioactive Materials Including Smoke Detectors	• Return them to the manufacturer (Smoke detectors that do not contain americium or radioactive materials can be thrown in your trash)
Solvents Including Finish Removers, Furniture Strippers, Paint Thinners, Mineral Spirits, Pastes, Polishes, Caulks That are Combustible or Flammable, Petroleum Distillates, Acetone, Toluene, Xylene	BRING TO: Clean Sweep • Also see **"Recycling Hazardous Products"** on page 4
Solid / Semi-Solid Latex Materials, Caulk, Joint Compound, Glue	• Throw in your trash
Used Motor Oil & Other Automotive Fluids (not antifreeze or gasoline)* Oil Filters	• City of Madison residents - BRING TO: City of Madison Oil Drop-off Sites: - East: City Garage, First and East Johnson St., Monona Golf Course, Monona Dr., and E. Dean Ave. - Northeast: Wheeler and School Rds. - West: Glenway Golf Course, 3747 Speedway Rd. • Other Dane County residents - BRING TO: - Your Local Service Garage (used motor oil only)* - Dane County Oil Drop Off Site: 2302 Fish Hatchery Rd.; NOTE: City of Madison and Dane County Waste Oil Drop-off sites will also accept hydraulic fluid, transmission fluid, power steering fluid and brake fluid. NOTE: Oil filters are accepted at City of Madison oil drop-off sites.

* For other recycling locations throughout Dane County, contact your local recycling office or county web page at www.countyofdane.com/pwht/recycling.aspx. For more information on City of Madison curbside services and disposal options, refer to the "Recyclopedia" or www.cityofmadison.com/streets, or call Clean Sweep at (608) 243-0368. You can also check out our website at www.danecountycleansweep.com.

The listed municipal agencies or private businesses will accept the materials not accepted by Clean Sweep. Listings on these sheets do not imply endorsements or recommendations of firms or their services. The program accepts only those materials for which there is no other disposal option in the county.

OTHER MATERIALS CLEAN SWEEP DOES NOT ACCEPT

Tires, paper or cardboard products, yard waste, construction debris, asbestos, rubbish, glass, solid metals, solid waste, etc. Contact your local government or trash hauler for details on proper disposal.

If you are unsure about any of your household items, please call Dave Radisewitz at (608) 243-0368 or email him at dradisewitz@publichealthmdc.com.

DISPOSAL OF LATEX PAINT & WATER-BASED DRIVEWAY SEALER

Latex Paint and Water-Based Driveway Sealer are NOT Hazardous.

Dry them thoroughly with latex paint dryer, kitty litter, Oil Dry® or newspapers and trash them. However, make sure the lids are off when you set them at your curb, or place them in your **trash cart** if you have automated trash pick-up.

If the material is hard on the bottom with some liquid on top, pour the liquid down an indoor drain (sanitary sewer) and place the dried can at your curb without the lid or place the dried can in your trash cart if you have automated trash pick-up. You may flush small amounts of **latex paint** (less than 1/3 full for a 1-gallon container) down an **indoor** drain. Clean Sweep will accept containers of liquid latex paint that are more than half full.

SMALL BUSINESSES (VSQGS)

Businesses should contact Dave Radisewitz at (608) 243-0347 or email him at dradisewitz@publichealthmdc.com for information on how to dispose of hazardous materials.

HOW TO TRANSPORT MATERIALS

Products and materials should be packaged to keep them from spilling or breaking while being transported to Clean Sweep. Leave materials in their original containers. **DO NOT MIX ANY MATERIALS.** Leaking containers may be placed, as is, in another container. Label the outside container.

RECYCLING HAZARDOUS PRODUCTS

Dirty Thinners — Reuse thinner and other solvents for rinsing brushes and guns. Let solids from dirty thinner, turpentine, etc. settle in the bottom of a clear container. Filter the remaining liquid through cheesecloth or an old nylon until the solvent is clear. Dry and dispose of the particles and paint chips in your regular trash.

Gasoline — Gasoline drained from a snow blower, lawn mower, chainsaw, etc. that is mixed with oil may be used up in your vehicle. Check the gasoline to see if it is clear except for the color of the oil used. If clear, pour into your gas tank on a 10:1 ratio (ten gallons of new gas to one gallon of old gas). The small amount of oil in the old gas will not affect the performance of your vehicle. If your gas cannot be used in this way, bring into Clean Sweep in a container you can leave.

PRODUCT EXCHANGE

Need a pint of stain or a gallon of basement paint? Does your roof need patching or are you stripping a piece of furniture? When you bring in products that are in good and usable condition, we will stock them on the shelves of our Product Exchange, a kind of free store open to the public. The Clean Sweep & Product Exchange attempts to reuse or recycle as much of the material as possible that is brought into the facility.

Agriculture

Due to a lack of DATCP grant funding for 2010, no subsidies will be available for agricultural related businesses (Agricultural VSQGs) for the 2010 season. Agricultural VSQGs are welcome to use the program; however, agri-businesses will be charged the full price for disposal, same as our other non -agricultural business customers. Dane County will provide a 100% subsidy for Dane County farmers for 2010.

Frequently Asked Questions

- Can I bring in unknown chemicals?
- Can I participate if I am not a farm?
- How much will I be charged?
- Can I get directions to the CleanSweep site?

2010 Appointment Scheduling

Agricultural chemicals are accepted by appointment only during our May – October season. Appointments are normally scheduled on Thursday mornings. See the "Make an Appointment" section below.

Appointments for the 2010 season will be available on Thursdays from May 6th until October 14th, 2010.

The Agricultural Hazardous Waste Disposal Program

Due to the lack of DATCP subsidies other agri-businesses will be charged the full small business charge.

Collection Dates

Agricultural Clean Sweeps will be held every Thursday morning by appointment between May 6 and October 14. Please note that pre-registration is required. The exact time and date for your drop-off will be assigned upon registration.

Items acceptable under the Agricultural Clean SweepItems acceptable under the Agricultural Clean Sweep

- Unused, damaged, cancelled, banned, or otherwise unwanted agricultural chemicals, including herbicides, insecticides, fungicides, rodenticides, and wood preservatives.
- Common pesticides such as 2,4-D, captan, malathion, DDT, parathion, toxaphene, chlordane, heptachlor, lindane, 2,4,5-T, and pentachlorophenol.
- Other agricultural chemicals including veterinary supplies, lead paint, acid washes, wood finishes, solvents, and engine cleaners.

Unacceptable chemicals

- Explosives, including detonators and blasting caps

- Radioactives, including smoke alarms
- Infectious and biological wastes
- Propane cylinders. Certain compressed gas cylinder will be accepted; however, you must pre-register to determine whether or not your particular cylinder is acceptable. There are no exceptions to this rule.

Last Revised: April 7, 2009

How to Transport Materials to Clean Sweep

Products and materials should be packaged to keep them from spilling or breaking on the way to Clean Sweep. Leave materials in their original containers. DO NOT MIX like or unlike materials together. Leaking containers may be placed, as is, in another container. Label the outside container.

Make an Appointment

Appointments for the 2010 season will be available on Thursdays from May 6th until October 14th, 2010.

If you'd like to set up an appointment to bring in your agricultural hazardous waste, please fill out our online preregistration form. If you have questions about the program or if you are unsure whether you qualify, you can find answers in the preregistration form or by contacting Dave Radisewitz at 608-243-0347 (phone), 608-267-3105 (fax), or email him at dradisewitz@publichealthmdc.com.

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Guidelines for Materials Brought to Clean Sweep

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Disposal options for common items

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Note: If an item is in this list, it does not necessarily mean that Clean Sweep will accept it.

Please click on the item of interest to learn about its proper disposal.

Aerosol cans
Asbestos
Ammunition, explosives, and fireworks
Antifreeze and oil filters
Batteries
Ballasts
Brake, transmission, power steering fluid
Computers
Cooking oil
Driveway sealer -- Solvent-based (tar, aspl
Fertilizer
Fire extinguishers
Flammable solvents, fuels and aerosols
Fluorescent light bulbs
Gasoline additives (not oil), engine degrea:
Gasoline and gasoline/oil mixes
Household products containing organic sol

Last Revised: April 7, 2009

For a printable version of the disposal options for the most common household items, please click here.

Please note that the drop-down list above is more comprehensive and contains many useful links to help answer your material disposal questions.

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Small Business

Clean Sweep is currently closed.

The Small Business Hazardous Waste Disposal Program

The small business program allows farms and businesses to dispose of agricultural chemicals or other hazardous materials and waste in a convenient and cost-effective manner. Very Small Quantity Generator (VSQG) wastes are accepted by appointment only during our May – October season.

Frequently Asked Questions

- What's a very small quantity generator (VSQG)?
- When can I bring in my hazardous waste?
- How much will I be charged?
- Can I get directions to the CleanSweep site?

Appointment Scheduling

Small business chemicals are accepted by appointment only during our May – October season. Appointments are normally scheduled on Thursday mornings. See the "Make an Appointment" section below.

Appointments for the 2011 season will be available on Thursdays from May 5th until October 14th, 2011.

Reduced costs

The small business program, as an add-on to the Household Hazardous Waste Program, is able to take advantage of its economies of scale and provide significant cost savings. State law requires that all Wisconsin businesses producing hazardous waste manage and dispose of their materials and wastes properly. Buisnesses generating large quantities of waste must hire a chemical contractor to sort, package, and transport the waste to a licensed facility. This option proves very costly for generators of small quantities of waste, especially if they have different waste streams (e.g. solvents and paints). This makes the reduced costs offered by Clean Sweep particularly attractive to small businesses.

Reduced Regulations

Under normal regulations, the procedures and paperwork for small businesses can be confusing and complicated. However, the Wisconsin DNR has designed a program to assist generators of small quantities of waste to effectively dispose of their hazardous materials in a simplified manner, which allows Dane County Clean Sweep, to waive manifest requirements and authorize us to accept business waste.

Proper Treatment

As a VSQG, you can be assured that your waste will be properly managed by the Clean Sweep program. Clean Sweep makes sure

that the facilities to which this waste is sent are audited regularly. We also help to minimize liability, by assuring that these materials are displosed of through a hierarchy of disposal: Reuse, Recycle, Treatment, or Incineration. This hierarchy of disposal makes sure that wastes are disposed of in the most cost-efficient and environmentally-conscious manner.

Last Revised: April 7, 2009

How to Transport Materials to Clean Sweep

Products and materials should be packaged to keep them from spilling or breaking on the way to Clean Sweep. Leave materials in their original containers. DO NOT MIX like or unlike materials together. Leaking containers may be placed, as is, in another container. Please make sure to properly label the outside container.

Make an Appointment

Appointments for the 2011 season will be available on Thursdays from May 5th until October 14th, 2011.

You have two options to set up an appointment to bring in your hazardous waste:

- online pre-registration form
- small business program brochure and application (print and mail)

If you have questions about the program or if you are unsure whether you qualify, you may contact Dave Radisewitz at 608-243-0347 (voice), 608-267-3105 (fax), or email him at dradisewitz@publichealthmdc.com.

MADISON / DANE COUNTY CLEAN SWEEP

2009 Annual Report

Paint Disposal

Mercury Disposal

Local Government Resources

Coming to a town near you!

Health & Safety Info Household Products

Safe Product Alternatives

Med Drop

Español

Product Exchange Program

This program allows you to bring in chemicals that are still useable, including paint, thinners, solvents, and pesticides. We make these products available free to the public at our on-site product exchange store. Please note that in accordance with Dane County ordinance Chapter 80 and City of Madison ordinance MGO 7.48, Clean Sweep cannot provide phosphorus containing lawn fertilizer in the Product Exchange. If you're looking for any other free materials that Clean Sweep has on its shelves, stop by and see what may be useful to you.

The City of Madison/Dane County Clean Sweep Facility cannot, and does not, guarantee the integrity, safety, usability, or effectiveness of the products taken from the Product Exchange. When you take products from this facility, you do so at your own risk. Every product is provided "as is", and there are no express or implied warranties, including but not limited to warranties of merchantability and fitness for particular purpose.

Madison Freecycle

Madison Freecycle is an email list and Yahoo! group whose purpose is to "reduce waste by providing an alternative to sending unneeded, but still usable items to the landfill." Check them out if you've got something of use that you don't want to throw away or if you're looking for free items.

Madison Stuff Exchange

The Madison Stuff Exchange "provides area residents and businesses with a convenient way to exchange, re-use, or sell items they no longer need or want." The difference between the Stuff Exchange and the Freecycle is that some items on the Stuff Exchange may be sold for up to $99.

APPENDIX L

CITY OF MADISON WELL ABANDONMENT ORDINANCE - DANE COUNTY ORDINANCE RELATING TO PRIVATE WATER SYSTEMS

13.21 WELL ABANDONMENT.

(1) Purpose . To prevent contamination of groundwater and to protect public health, safety and welfare by assuring that unused, unsafe or noncomplying wells, wells which may serve as conduits for contamination or wells which may be illegally cross-connected to the Madison Water Utility are properly abandoned.

(2) Applicability . This ordinance applies to all wells located in the City of Madison or on premises served by the Madison Water Utility.

(3) Definitions .

Noncomplying means a well or pump installation which does not comply with the provisions of Ch. NR 812, Wisconsin Administrative Code, in effect at the time the well was constructed, a contamination source was installed, the pump was installed or work was done on either the well or pump installation.

Pump installation means the pump and related equipment used for withdrawing water from a well including the discharge piping, the underground connections, pitless adapters, pressure tanks, pits, sampling faucets and well seals or caps.

Unsafe means a well or pump installation which produces water which is bacteriologically contaminated or contaminated with substances in excess of the standards of Chapters NR 809 or 140, Wisconsin Administrative Code, or for which a Health Advisory has been issued by the Department of Natural Resources.

Unused means a well or pump installation which is not in use or does not have a functional pumping system.

Well means an excavation or opening into the ground made by digging, boring, drilling, driving, or other methods for the purpose of obtaining groundwater for consumption or other use. Wells for the express purpose of monitoring the quality of ground water and/or gases and/or soil characteristics are exempt from this Ordinance.

Well abandonment means the filling and sealing of a well according to the provisions of Chap. NR 812, Wisconsin Administrative Code.

(4) Abandonment Required . All wells located in the City of Madison or on premises served by the Madison Water Utility shall be abandoned if no valid well operation permit has been obtained from the Madison Water Utility or if so required under NR Sec. 812.26(2),Wisconsin Administrative Code. An application for a well operation permit shall be made within ninety (90) days of the date of any abandonment notice from the Madison Water Utility. (Am. by Ord. 12,567, 5-3-00)

(5) Well Operation Permit . No person may operate a well without having obtained a well operation permit. The Madison Water Utility may grant a permit to a private well owner to operate a well for a period not to exceed five (5) years providing the conditions of this section are met. An owner may request renewal of a well operation permit by submitting information verifying that the conditions of this section are met. The Madison Water Utility, or its agent, may conduct inspections or have water quality tests conducted at the applicant's expense to obtain or verify information necessary for consideration of a permit application or renewal. Permit applications and renewals shall be made on forms provided by the Madison Water Utility. A permit fee of one hundred dollars ($100) shall accompany the application. This fee shall include the cost of conducting bacterial examinations of water samples obtained from the well. The Madison Water Utility may require abandonment of a well for failure to renew a permit or to pay renewal fee within ninety (90) days of the date of any abandonment notice from the Madison Water Utility; otherwise, abandonment shall

be required. The following conditions must be met for issuance or renewal of a well operation permit:

(a) The well and pump installation meet or are upgraded to meet the requirements of Chap. NR 812, Wisconsin Administrative Code.

(b) The well construction and pump installation have a history of producing bacteriologically safe water as evidenced by at least two (2) samplings taken a minimum of two (2) weeks apart. No exception to this condition may be made for unsafe wells, unless the Department of Natural Resources approves, in writing, the continued use of the well.

(c) There are no cross-connections between the well and pump installation and the Madison Water Utility.

(Am. by Ord. 12,567, 5-3-00)

(6) Required Inspection . Whenever real property with a well on the premises is conveyed pursuant to Chapter 706, Wisconsin Statutes, the seller shall contact the Madison Water Utility at least fourteen (14) days prior to the transfer of property. Upon proper notice, the Madison Water Utility may conduct an inspection to determine whether the well should be permitted or abandoned under this section.

(7) A representative of the Madison Water Utility shall have the power and authority at all reasonable times, for any proper purpose, to enter upon any property in the City of Madison and make inspection thereof. If entry is refused, such representative may obtain a special inspection warrant under Section 66.0119, Wisconsin Statutes. Upon request by a representative of the Madison Water Utility, the owner, lessee or occupant of any property so served shall furnish to the inspection agency any pertinent information regarding the well on such property if such information is known to such owner, lessee or occupant. (Am. by Ord. 12,567, 5-3-00)

(8) Abandonment Procedures .

(a) All wells abandoned under the jurisdiction of this ordinance or rule shall be abandoned according to the procedures and methods of Chap. NR 812, Wisconsin Administrative Code. All debris, pump, piping, unsealed liners and any other obstructions which may interfere with sealing operations shall be removed prior to abandonment.

(b) The owner of the well, or the owner's agent, shall notify the Madison Water Utility at least forty-eight (48) hours prior to commencement of any well abandonment activities. The abandonment of the well may be observed by the Madison Water Utility.

(c) An abandonment report form, supplied by the Department of Natural Resources, shall be submitted by the well owner to the Madison Water Utility and the Department of Natural Resources within ten (10) days of the completion of the well abandonment.

(d) The Madison Water Utility may require any person who has abandoned a well not in compliance with Subdivision (a) to return and take corrective action so that the well is abandoned by him or her in a complying manner. (Cr. by Ord. 12,567, 5-3-00)

(9) This law does not supersede the State Plumbing Code, Section NR 811, Wisconsin Administrative Code, or Chapter 18 of the Madison General Ordinances entitled "Plumbing Code" but is supplementary to them.

(10) Penalties . The penalty for violation of this section may be not less than twenty-five dollars ($25) nor more than one thousand dollars ($1,000) and the cost of prosecution. Each day of violation is a separate offense. If any person fails to comply with this ordinance for more than ten (10) days after receiving written notice of the violation, the City may impose a penalty and cause the well abandonment to be performed and the expense to be assessed as a special tax against the

property.

(Sec. 13.21 Cr. by Ord. 10,136, 11-14-90; Am. by Ord. 12,345, 3-12-99; Am. by Ord. 12,567, 5-3-00; Ord. 13,500, 1-23-04)

TITLE 9
HEALTH AND SANITATION

Chapter 45 Relating to Private Water Systems
Chapter 46 Private Sewage System Ordinance and Health Ordinance
Chapter 47 Animal Control

CHAPTER 45
RELATING TO PRIVATE WATER SYSTEMS

45.01 Authority and Adoption.
45.02 Jurisdiction.
45.03 Purpose.
45.04 Intent.
45.05 Effective Date.
45.06 Severability and Non-liability.
45.07 Repeal.
45.08 Definitions.
[45.09 - 45.10 reserved.]
45.11 County Responsibilities; Private Well Location Permits.
45.12 County Responsibilities; Existing Private Water Systems.
45.13 Cooperation With Other Units.
45.14 Administrator.
45.15 Qualifications of Administrator.
45.16 Powers of Administrator.
45.17 Duties of Administrator.
[45.18 - 45.20 reserved.]
45.21 Requirements and Permits.
45.22 Appeals.
45.23 Violations.
45.24 Administrative Directives and Orders.
45.25 Enforcement Actions.
[45.26 - 45.50 reserved.]
45.51 Fee Schedules.
[45.52 - 45.99 reserved.]

45.01 AUTHORITY AND ADOPTION. (1) This ordinance is adopted under the authority of ss. 59.067 and 162.07, Wis. Stats., and Ch. NR 845, Wis. Admin. Code.
(2) This ordinance is subject to the provisions of ss. 59.067 and 162.07, Wis. Stats., and all rules promulgated thereunder regulating private water systems.
(3) This ordinance may not be more lenient nor more stringent than the rules promulgated pursuant to ch. 162, Stats.
(4) Failure to comply with any of the provisions of such regulations shall constitute a violation of this ordinance, actionable according to the penalties provided herein.
(5) This ordinance applies to the entire county and includes cities, towns, villages and sanitary districts in the county.

45.02 JURISDICTION. The provisions of this ordinance shall apply to all private water systems within Dane County.

45.03 PURPOSE. The purpose of this ordinance is to protect the drinking water and groundwater resources of the county by governing access to groundwater through regulating (1) private well location and (2) existing private water systems.

45.04 INTENT. The intent of this ordinance is to regulate (1) the locations of wells and (2) existing water systems and to provide for the administration and enforcement of this ordinance.

45.05 EFFECTIVE DATE. (1) This ordinance shall be effective July 1, 1987 for well location.
[HISTORY: (2) rep., OA 29, 1995-96, pub. 12/06/95.]

45.06 SEVERABILITY AND NON-LIABILITY. If any section, provision or portion of this ordinance is adjudged unconstitutional or invalid by a court of competent jurisdiction, the remainder of this ordinance shall not be affected. The county asserts that there is no liability on the part of the board of supervisors, its agencies or employees for any health hazards or damages that may occur as a result of reliance upon, and compliance with, this ordinance.

45.07 REPEAL. All other county ordinances or parts of ordinances inconsistent or conflicting with this ordinance, to the extent of the inconsistency only, are repealed.

45.08 DEFINITIONS. As used in this ordinance, the following words and phrases have the meanings indicated:
(1) *Administrator* means the county employee designated by the county executive to issue permits for private well location and to administer ch. NR 812, Wis. Admin. Code, in the county as authorized by the department. The administrator is hereby empowered to delegate his or her authority under this ordinance to any or all of the certified well inspectors employed by the community support and health services department of the County of Dane.

(2) *Central office* means the department's bureau of water supply, located in Madison, which functions as the coordinating authority for the statewide water supply program.
(3) *Community water system* has the meaning designated in s. NR 811.02(7), Wis. Admin. Code.
(4) *County* means the County of Dane.
(5) *County office staff* means county office personnel trained to answer general well location questions and to accept permit applications.
(6) *Delegation level* means the program level, as set forth in s. NR 845.05, Wis. Admin. Code, at which a county is authorized to administer and enforce ch. NR 812, Wis. Admin. Code.
(7) *Department* means the Department of Natural Resources of the State of Wisconsin.
(8) *District office* means the department's office located in Madison, Wisconsin.
(10) *Existing installations* has the meaning designated in ch. NR 812, Wis. Admin. Code.
(11) *Health hazard* means a condition which constitutes:
(a) A violation of ch. NR 812, Wis. Admin. Code, regarding the installation, construction, operation or maintenance of a private well; or
(b) Confirmed bacteriologically unsafe well water quality.
(11m) *Large parcel* means, for the purpose of this ordinance, a parcel having dimensions such that all boundary lines cannot be shown on a sheet of paper not to exceed 8½ inches by 11 inches for a plan diagram that has a scale of 1 inch equals 100 feet or smaller.
(12) *Noncommunity water system* means a public water supply system that serves at least 25 people at least 60 days each year. A noncommunity water system commonly serves a transient population rather than permanent year-round residents. This is typically an individual well serving a restaurant, industry, service station, tavern, motel, campground or church.
(13) *Noncomplying well* means a private water system not in compliance with all provisions of ch. NR 812, Wis. Admin. Code, in effect at the time the well was constructed.
(14) *Person* means an individual, corporation, company, association, cooperative, trust, institution, partnership, state, public utility, sanitary district, municipality or federal agency.
(15) *Personal interest* means having a financial interest in a property or being related by marriage or birth to a person having a financial interest in a property.
(16) *Primary drinking water standards* means those maximum contaminant levels which represent minimum public health standards set forth in ch. NR 809, Wis. Admin. Code.
(17) *Private water system* means the water collection, storage and treatment facilities and all structures, piping and appurtenances by which water is provided for human consumption by other than community water systems. For the purpose of this ordinance, it includes non-community water systems.
(18) *Private water systems ordinance* means a county ordinance, approved by the department, regulating private water systems at the county's authorized delegation level.
(19) *Private well* means, for the purpose of this ordinance, any drilled, driven point, dug, bored or jetted well constructed for the purpose of obtaining groundwater for potable use, including wells constructed in special well casing depth areas, wells constructed to potable well standards regardless of the intended use of the well and noncommunity wells. It does not include springs, or private or public wells that require written plan approval from the department.
(20) *Public water system* has the meaning designated in ch. NR 812, Wis. Admin. Code.
(21) *Reconstruction* means modifying the original construction of a private well. It includes, but is not limited to, deepening, lining, installing or replacing a screen, underreaming, hydrofracturing and blasting.
(22) *Variance* means an approval issued by the department under ch. NR 812, Wis. Admin. Code, allowing a private water system to vary from ch. NR 812, Wis. Admin. Code, requirements if department approved conditions are met.
(23) *Water system* means the water collection, storage, treatment facilities and all structures, piping and appurtenances by which water is provided.
(24) *Well* has the meaning designated in ch. 162, Wis. Stats.
(25) *Well construction* means the procedures, methods, materials and equipment used during the construction or reconstruction of a private well.
(25m) *Well constructor* means any person who constructs a well.
(26) *Well location permit* means a permit, or comparable registration system, issued by the county which allows the construction or reconstruction of a private well.
(HISTORY: (1) am., Sub. 1 to OA 43, 1987-88, pub. 06/18/88; (9) rep., (12) am. and (25m) cr., OA 29, 1995-96, pub. 12/06/95; (11m) cr. and (19) am., OA 21, 2002-03, pub. 03/04/03.]

[45.09 - 45.10 reserved.]

45.11 COUNTY RESPONSIBILITIES; PRIVATE WELL LOCATION PERMITS. In accepting Level 1 and Level 5 responsibility from the department, the county hereby agrees to:
(1) Issue permits authorizing the location of new and replacement private wells, including drilled, driven point, dug, bored or jetted wells, or the reconstruction or rehabilitation of existing private wells.
(2) Conduct inspections of wells for which well location permits are required as soon as possible after the well is constructed.
(3) Determine whether the casing height of a permitted well complies with ch. NR 812, Wis. Admin. Code, and that there is a cap or seal on the upper terminus of the well.
(4) Require the abandonment of wells not in service, or that will be taken out of service, if the well is unused, noncomplying or bacteriologically unsafe. The county may require abandonment of a well or drillhole as per s. NR 812.26, Wis. Admin. Code, or which has other chemical compounds, including inorganic and organic compounds, for which state health advisory limits have been issued, after consultation with and approval by the department.
(5) Require upgrading of all inspected private wells that are not in compliance with the minimum private well locational distances in ch. NR 812, Wis. Admin. Code.
[HISTORY: (intro.) am., OA 29, 1995-96, pub. 12/06/95; (4) am., OA 21, 2002-03, pub. 03/04/03; (4) am., OA 10, 2003-04, pub. 09/12/03.]

45.12 COUNTY RESPONSIBILITIES; EXISTING PRIVATE WATER SYSTEMS. (1) On the request of a property owner or a lending institution, the administrator will conduct an evaluation of the well and collect a water sample for coliform bacteria analysis and, if also requested, collect a nitrate-nitrogen sample from the private water supply.
(2) The administrator will conduct a private water system evaluation whenever any water sample is collected as part of a complaint or problem follow-up, unless directed not to do so by the department.
(3) The administrator shall require upgrading of all inspected private water systems that are not in compliance with the minimum private well location standards of ch. NR 812, Wis. Admin. Code.
[HISTORY: 45.12 am., OA 29, 1995-96, pub. 12/06/95.]

45.13 COOPERATION WITH OTHER UNITS. The administrator shall cooperate with all other governmental units and agencies in the enforcement of all state and local laws and regulations pertaining to matters in this ordinance.

45.14 ADMINISTRATOR. (1) The county director of environmental health shall act as the Dane County administrator and is assigned the duties of administering the private water system program in accordance with department rules.
(2) The administrator shall have the power and duty to enforce the provisions of this ordinance and all other ordinances, laws and orders of the county and of the State of Wisconsin which relate to the construction, alteration or installation of all private water systems within the county, at the county's authorized delegation level.

45.15 QUALIFICATIONS OF ADMINISTRATOR. (1) The administrator shall be informed on the principles and practices of private well construction. If the administrator has a personal interest in the construction or modification of any well subject to the provisions of ch. 162, Wis. Stats., ch. NR 812, Wis. Admin. Code, or county ordinance, the county executive shall, after consultation with the department, designate another knowledgeable person to examine the application to issue the required permit(s) and to make the necessary inspections.

45.16 POWERS OF ADMINISTRATOR. The administrator shall have all the powers necessary to enforce the provisions of this ordinance commensurate with the level or levels of the county's delegated authority, including the following:
(1) In the discharge of his or her duties, the administrator or an authorized assistant may enter any building or property upon presentation of the proper credential, during reasonable hours for the purpose of inspecting the private water system and may request the owner or operator to produce the private well location required under this ordinance. No person may interfere with the administrator or an authorized assistant in the performance of his or her duties. Any person interfering shall be in violation of this ordinance and subject to penalty as provided by this ordinance. If consent to enter property for inspection purposes is denied, the administrator may obtain a special inspection warrant under ss. 66.122 and 66.123, Wis. Stats.

(2) Order any person owning, operating or installing a private water system to abandon, repair or place it in a complying safe or sanitary condition if the system is found to be unused, bacteriologically unsafe or not in compliance with ch. NR 812, Wis. Admin. Code, or this ordinance.
(3) Prohibit the use of any new well which is found to be installed, located, constructed, operated or maintained so as to be a health hazard to the users, neighbors or community.
(4) Appoint assistants to aid in processing applications for well location permits.
(5) Enforce any or all ordinances applicable to private water systems in accordance with department rules.
(6) If the administrator of the private water systems ordinance or an authorized assistant determines that the location or construction of a private well does not comply with this ordinance, the administrator or assistant shall post, in a conspicuous place upon the site, a suspension of work order demanding cessation of work. The administrator shall notify the well constructor and property owner in writing of the noncompliance and the nature of the work to be discontinued and corrected, identifying the location and the name of the person issuing the order. It shall be a violation of this ordinance to engage in work at conflict with the terms of an order or to make an unauthorized removal of a posted order. Work may resume on the site only under the direction of the administrator.
[HISTORY: (3) am., OA 29, 1995-96, pub. 12/06/95.]

45.17 DUTIES OF ADMINISTRATOR. It shall be the duty of the administrator to enforce the provisions of this ordinance and perform the following duties commensurate with the level or levels of the county's delegated authority:
(1) Record all permits, fees, inspections and other official actions and make an annual report thereon to the county board of supervisors.
(2) Provide the department with copies of all permits and correspondence as required by ch. NR 845, Wis. Admin. Code.
(3) Inspect the location of new private water systems upon completion.
(5) Investigate and record all private water system complaints.
(6) Investigate cases of noncompliance with this ordinance, ch. NR 812, Wis. Admin. Code, and ch. 162, Wis. Stats., issue orders to abate the noncompliance and submit complaints to the corporation counsel for enforcement.
(7) Refer complaints and cases of noncompliance believed to be or known to be beyond the scope of the county's delegation level to the department.
(8) Cooperate with all other governmental units and agencies in the enforcement of all state and local laws and regulations of matters related to this ordinance.
(9) Assist the department as specified in ch. NR 845, Wis. Admin. Code.
(10) Refer variance requests and actions which require department approval to the department.
(11) Advise owners not to drink or use water from private water systems under conditions specified in ch. NR 845, Wis. Admin. Code.
(12) The administrator, a trained county inspector or county office staff shall be available at the administrator's office for answering questions regarding permit applications and for accepting applications for well location for a minimum of four regularly scheduled hours each working day.
[HISTORY: (4) rep., OA 29, 1995-96, pub. 12/06/95.]

[45.18 - 45.20 reserved.]

45.21 REQUIREMENTS AND PERMITS. (1) No person may install a private well or water system unless the owner of the property on which the private water system is to be installed holds a valid well location permit issued by the county or has made arrangements to acquire a permit by notifying the administrator prior to construction. Notification shall include providing the administrator with the property owner's name and address, property legal description, proposed starting date and identification of the person who will be obtaining the permit. Unless other arrangements are made in advance, the permit shall be applied for on the first workday following initial construction.
(2) No private water system may be located, installed or operated within the jurisdictional limits of the county without the appropriate permit being obtained in compliance with sub. (1) above and without being in full compliance with the provisions of this ordinance and all other applicable state and local laws and regulations. Permit applications for the location of a well shall be made by the property owner or the property owner's designated agent. Permits shall be issued from the office of the administrator.
(3) The permit application shall be on forms provided by the administrator, and shall include the following:
(a) A site plan diagram. The plan diagram shall be submitted on paper not less than 8½ by 11 inches and shall include the location of all

structures, septic tanks, septic absorption fields, underground fuel storage tanks, animal yards and other sources of contamination; at least one property line, the property access road and nearest public road. Distances shall be provided by dimension or to scale. For large parcels the plan must include a small scale diagram showing all property lines and adjacent roads in addition to the large scale diagram showing site details.

(b) A copy of any variance granted by the department including proof that the variance has been properly recorded.

(4) Well location permit applications shall be signed by the property owner or the property owner's designated agent. Well location permit applications shall be submitted to the administrator at least 2 working days prior to construction if the property owner or well constructor is interested in receiving information about potential contamination sources such as landfills, underground storage tanks, primary and replacement on-site sewage disposal system areas on the development site and on adjacent properties, and special casing areas. When a well permit application is submitted less than 2 working days prior to construction, the well constructor shall be responsible for maintaining full compliance with all provisions of ch. NR 812, Wis. Admin. Code. The permit application may be submitted by the property owner or the property owner's designated agent and shall be issued to the property owner.

(5)(a) The administrator shall assist applicants by answering questions and providing forms, reviewing applications and approve, disapprove or notify an applicant of the need to seek a variance or special approval from the department or return the permit application due to incompleteness for all private water systems to be constructed or modified in the county, within 2 working days following submission of the permit application. The administrator may reserve final approval or- disapproval of a permit which requires department action until the variance or special approval request has been acted on by the department.

(b) If a permit is disapproved because an applicant submits an incomplete or inaccurate application, one-half of the application fee shall be retained by the county. Any reapplication shall require the same fee as a new application.

(7) The administrator shall issue written notice to each applicant whose permit application is disapproved. An application shall be disapproved if the well construction would result in noncompliance with ch. NR 812, Wis. Admin. Code, or if a well construction variance or special approval request was denied by the department. Each notice shall:

(a) State the specific reason for denial.

(b) Inform the applicant of the right to request a special approval or a variance from the department and the procedures for making such a request.

(8) When construction occurs on a weekend or holiday, notification shall be provided to the administrator on the first workday following the weekend or holiday in the same manner as described in sub. 4 above. Unless other arrangements are made with the administrator, the permit application shall be obtained on the first workday following the weekend or holiday. The well constructor shall be responsible for maintaining full compliance with all provisions of ch. NR 812, Wis. Admin. Code.

(10) A permit transfer application shall be submitted to the county when there is a change of property owner after the application is submitted but before well construction is completed. Failure to submit a transfer application to the county shall invalidate a previously issued permit. The application shall be on a form made available by the administrator.

(11) As soon as the well location permit is received it shall be displayed conspicuously at the well site during construction, for a minimum of seven (7) days following completion of construction or until the well has been inspected by county staff, whichever occurs first.

(12) A well location permit shall be valid for a period of one year or until construction is completed, whichever comes first. If the permit expires, a new application shall be submitted to the administrator. Reapplications shall be evaluated so that construction will comply with the provisions of ch. NR 812, Wis. Admin. Code, in effect at the time of the reapplication. The administrator may require additional inspection and fees for reapplications.

(13) A well location permit is not required nor shall be issued by the county for private water systems requiring written plan approval from the department.

(14) Any permit issued under this section shall be void if any false or inaccurate statement is made or if any inaccuracy is shown on any application for a permit.

(15) No permit may be issued to any property owner or designated agent of the property owner who is in violation of this ordinance, until the

violation has been corrected, unless the permit is to allow correction of the violation.
[HISTORY: (5)(a) and (b) am., Sub. 1 to OA 43, 1987-88, pub. 06/18/88; (1), (2), (4), (5), (7), (8), (10), (11) and (15) am. and (6) and (9) rep., OA 29, 1995-96, pub. 12/06/95; (3) am., OA 21, 2002-03, pub. 03/04/03; (3)(a) am., OA 10, 2003-04, pub. 09/12/03.]

45.22 APPEALS. Persons seeking to appeal a decision of the administrator under this ordinance shall file written letters of appeal with the administrator. The administrator shall place the appeal on the agenda of the county board of health and the appeal shall be given a due process proceeding in accord with s. 46.17. The board shall decide whether to uphold, uphold with modifications or reverse the administrator's decision based upon the terms and intent of this ordinance and of relevant state laws and administrative rules. No appellate decision of the committee shall have the effect of approving an existing or proposed condition that would violate this ordinance or state law or administrative rule. Appeals that may only be approved by the granting of a variance to ch. NR 812, Wis. Admin. Code, shall be referred to the department pursuant to ch. NR 845, Wis. Admin. Code. Board appellate decisions shall be made in writing and shall be filed in the administrator's office. Appeals of decisions made by authorized agents on behalf of the administrator shall be made first to the administrator and then be appealable as provided herein.

45.23 VIOLATIONS. The administrator shall investigate violations of this ordinance and ch. NR 812, Wis. Admin. Code, at the county's authorized delegation level(s), issue orders to abate the violations and submit orders to the corporation counsel for enforcement.

45.24 ADMINISTRATIVE DIRECTIVES AND ORDERS. (1) The administrator, after investigation and a determination that a violation exists, may issue a written field directive. This field directive may consist of a hand written note on an inspection report, or similar paper, identifying the violation that has occurred and assigning a date by which the violation must be corrected, and shall include the inspector's telephone number and office address.
(2) A formal letter may be issued which states the violation, the ordinance, administrative rule or statutory section violated, the date the violation was noted, the name of the inspector who noted the violation and the date by which the correction must be made.
(3) Upon discovery and after documentation of a violation, the administrator may issue a correction order. The administrator may use a stepped enforcement procedure by issuing a directive before an order or may proceed directly to issuing a correction order. An order shall include the following:
(a) The location of the violation (site).
(b) The name of the parties: owner, permittee, well constructor.
(c) The section of the ordinance and Wisconsin Administrative Code violated.
(d) The date of inspection of the site where the violation occurred.
(e) The name of the person who conducted the inspection which revealed the violation.
(f) The date by which the correction must be completed.
(g) The name of the person who must be contacted regarding subsequent inspection of the site.
(h) A statement that if the order is not complied with, the administrator will refer the violation to the corporation counsel with a recommendation to seek injunctive relief or forfeitures, or both, from the circuit court of Dane County. Orders must be signed by the administrator.
(i) Orders shall be served on the owner or well constructor by certified mail. Where appropriate, the administrator may request the sheriff to serve any particular order. The administrator shall report all orders that have not been complied with to the corporation counsel for enforcement.
[HISTORY: (3)(i) am., Sub. 1 to OA 43, 1987-88, pub. 06/18/88.]

45.25 ENFORCEMENT ACTIONS. (1) An enforcement action may be brought by the corporation counsel against a person or persons for any of the following violations:
(a) Failure to comply with any provision of this ordinance;
(b) Failure to comply with any permit specification or requirement;
(c) Failure to comply with any directive or order issued by the county administrator;
(d) Resisting, obstructing or interfering with the county administrator's or an authorized assistant's actions undertaken pursuant to this ordinance.
(2) The county corporation counsel may, for any violation, seek injunctive relief or forfeitures of not less than $50.00 nor more than $200.00, or both, for each violation.

(3) Each day a violation exists is a separate offense.
(4) Any person who has the ability to pay any forfeiture entered against him or her under this ordinance but refuses to do so may be confined in the county jail until such forfeiture is paid, but in no event to exceed thirty (30) days. In determining whether an individual has the ability to pay a forfeiture imposed under this section, all items of income and all assets may be considered regardless of whether or not the income or assets are subject to garnishment, lien or attachment by judgment creditors under the laws of this state.
[HISTORY: (2) am., OA 16, 2000-01, pub. 02/05/01.]

[45.26 - 45.50 reserved.]

45.51 FEE SCHEDULES. (1) The fee for a well siting permit shall be $72.00.
(2) The fee for a transfer of a well siting permit shall be $36.00.
(3) The fee for a re-inspection of a well site shall be $27.00.
[HISTORY: (1) and (2) am., and (4) rep., OA 21, 2002-03, pub. 03/04/03; (1) – (3) am., OA 37, 2003-04, pub. 04/28/04.]

[45.52 – 45.99 reserved.]

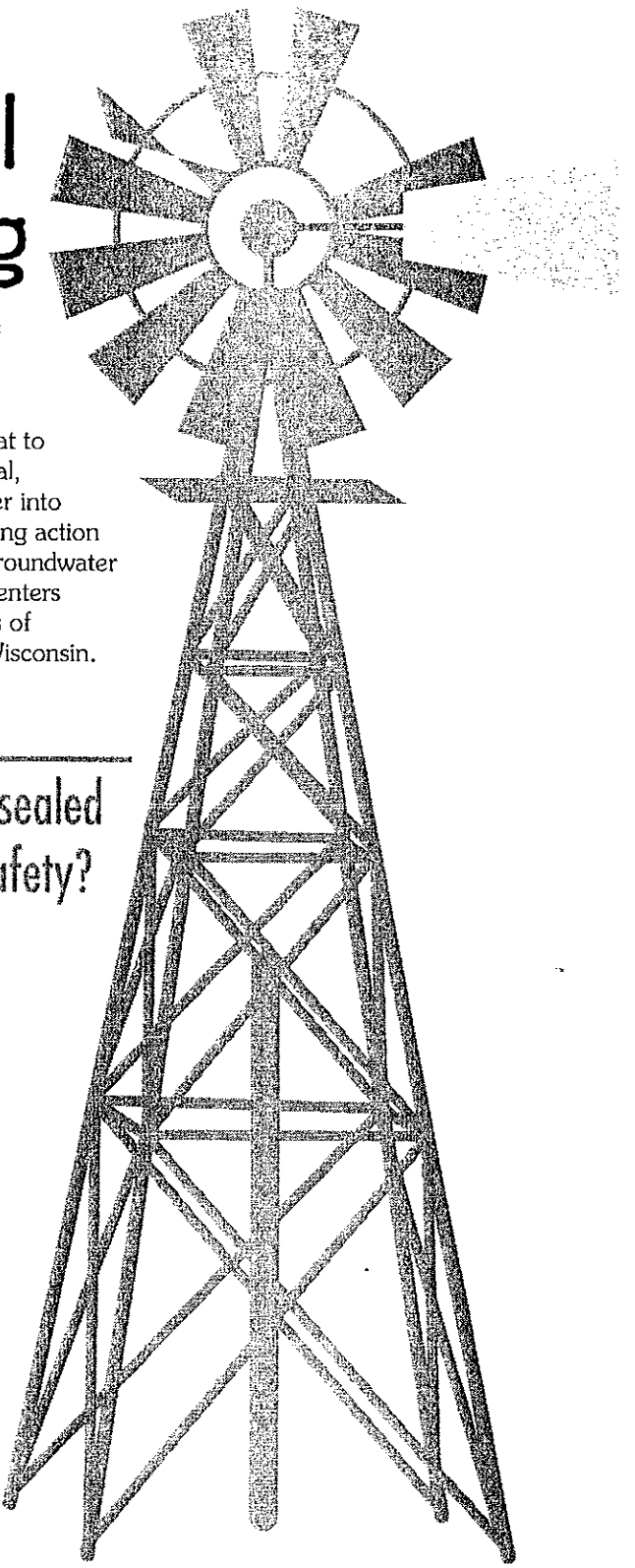
END OF CHAPTER

[HISTORY: Ch. 45 cr., OA 4, 1987-88, pub. 09/14/87; references throughout chap. 45 to NR 11.03(2), NR 109, NR 112, NR 145 and NR 145.05 were changed to, respectively, NR 811.02(7), NR 809, NR 812, NR 845 and NR 845.05, OA 29, 1995-96, pub. 12/06/95.]

APPENDIX M

PRIVATE WELLS AND WELL ABANDONMENT INFORMATION

Answers to Your Questions on Well Filling and Sealing



Why are unused and improperly filled and sealed wells threats to groundwater?

Unused and improperly filled and sealed wells are a significant threat to groundwater quality. If not properly filled with impermeable material, unused wells can directly channel contaminated surface or soil water into groundwater. Water that gets into unused wells bypasses the purifying action that normally takes place in the upper layers of the soil. Because groundwater flows in soil and bedrock formations (aquifers), contamination that enters old wells can move to nearby drinking water wells. Many thousands of improperly filled and sealed wells are threatening groundwater in Wisconsin. Whenever you see an old deteriorating windmill in the countryside, there is likely an improperly filled and sealed well underneath.

How can unused and improperly filled and sealed wells threaten groundwater and personal safety?

- Contaminated surface water can enter a well if the casing pipe does not extend high enough above the ground surface and the well cap has been broken or removed; or if there are cracks or holes in the casing due to damage or deterioration with age.
- Contaminated surface water can seep down along the casing pipe of an improperly constructed well.
- Wells in low areas are sometimes illegally left open to drain surface water from heavy rainfall or snowmelt.
- Open wells offer tempting disposal receptacles for liquid and solid wastes. The disposal of any pollutant or wastewater in a well is prohibited by State codes.
- Large-diameter open wells, especially old dug wells, pose safety hazards for small children and animals. In recent years, there have been instances in Italy, Missouri and Kansas where children have fallen into wells. Although such occurrences are infrequent, they should never be allowed to happen.
- Improperly filled and sealed flowing wells can be a nuisance and may lower artesian pressure in neighboring wells.

When should wells be properly filled and sealed?

Wells must be properly filled when they are removed from service. Wells are removed from service for a number of reasons, including construction of a replacement well, destruction of the building being served, failure of the well to produce safe water, failure of the well to meet the State Well Code (NR812) standards, or when a community water system is extended into an area formerly served by individual private wells.

After wells are removed from service they are seldom used. They often get forgotten after a property transfer and, in time, may get covered by a parking lot or a building. Sometimes in this way all traces of old wells disappear. Such wells can cause groundwater contamination. In one recent case in Wisconsin, a house burned down over an improperly filled and sealed well located in the basement. The well provided a point of entrance into the aquifer and allowed ash-laden water to contaminate the neighbor's well.

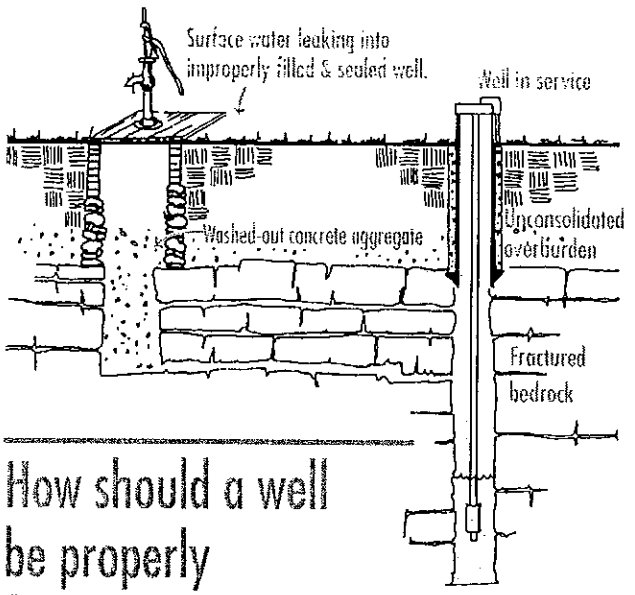
In another case, a buried well having only a stone set on the top of the open casing caused severe contamination of the drinking water pumped from another well on the same property. The unused well was near both an animal yard and a sewage absorption field and thus provided direct access for the entrance of contamination into the groundwater.

After a well gets covered, it is very difficult, if not impossible, to find it and determine if it's causing contamination. When new wells are constructed in an area with improperly filled and sealed wells, they may have to be cased much deeper or to alternate aquifers to provide safe water. These problems can be avoided by the proper filling and sealing of unused wells. Chapters NR811 and NR812, Wis. Adm. Codes, require proper permanent filling and sealing of unused wells.

Who can perform proper well filling and sealing work?

As of June 1, 2008, only licensed well drillers and pump installers may be hired to fill and seal wells. These contractors are familiar with correct filling and sealing materials and procedures, are knowledgeable about wells, and have access to the necessary equipment. It's usually more economical to fill and seal an old unused well at the same time the well driller is at the site constructing a new well.

Improperly filled and sealed well



How should a well be properly filled and sealed?

First determine the construction and condition of the well

The first step in proper well filling and sealing is to obtain information on the construction and condition of the well. Construction information is best obtained from the Well Construction Report on file with the Wisconsin Geological and Natural History Survey (WGNHS) or on DNR's website at dnr.wi.gov. Search for 'Well Construction Reports.' The records date back to 1936.

IMPORTANT INFORMATION TO KNOW WHEN REQUESTING A WELL CONSTRUCTION REPORT:

To request a report, you must furnish a legal description in terms of ¼ - ¼ Section, ¼ - Section, Section, Township and Range designations of the property where the well is located. It's also helpful if you can obtain the name of the well driller, the property owner or agent at the time of drilling, the approximate date of construction and the street address or lot #. The chances of finding the report are greater with more information. Order forms and other information about well construction reports are available on the WGNHS (Wisconsin Geological & Natural History Survey) uwex.edu/wgnhs/well.htm.

Specific forms include:

- To request a Well Construction Report for a specific well uwex.edu/wgnhs/pdfs/wcrpdf/wellord.pdf.
- To request a Well Construction Report for an area uwex.edu/wgnhs/pdfs/wcrpdf/wellord2.pdf.

A site inspection will help you locate the well and see what condition it is in. You should determine if the well is easily accessible in the yard; or if it is in a pit or a basement. It's possible the top of the well is buried in the yard, in which case you may be able to find it using a metal detector.

During your inspection you can also check to see if the pump has been removed.

Clearing, filling and sealing the well

Before the well is filled and sealed, the pump and its associated piping, any ungrouted liner pipe, or other obstacles must be removed from the well. If debris has been thrown in the well, a well driller may have to first drill it out. After the well is cleared, it must be filled from the bottom up with neat cement grout, sand-cement grout, concrete or approved bentonite chips. Well drillers and pump installers are familiar with these materials and know how to calculate and place the proper volume of material.

The filling material must be placed through a conductor (tremie) pipe extending to the bottom of the well except when approved bentonite chips are used according to DNR instructions (see pages 4 and 5). Use of a conductor pipe will assure that the filling material won't be diluted by the water in the well and will not plug in the well part-way down. The bottom of the conductor pipe must be kept submerged in the material during filling, but may be pulled as the well is being filled.

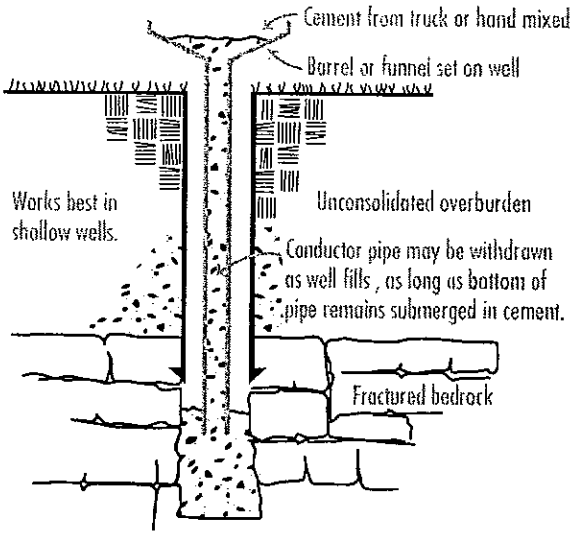
Except when using bentonite chips, a well driller or pump installer may not just pour or dump the filling material into the well without the use of a conductor pipe because this could cause the filling material to become diluted or bridge in the well part-way down. If dilution occurs, the fill material will not be impermeable. If bridging occurs, the well will only get partially filled. An improperly filled and sealed well can be as much a threat to groundwater quality as an open well.

After properly filling and sealing the well from the bottom up, the filling material may terminate a few feet below the ground surface to allow the top of the casing to be cut off, if preferred. The casing may also be left in place. If the well discharged through a non-pressure conduit, the end of this conduit (in the basement) must be sealed watertight with a steel plate.

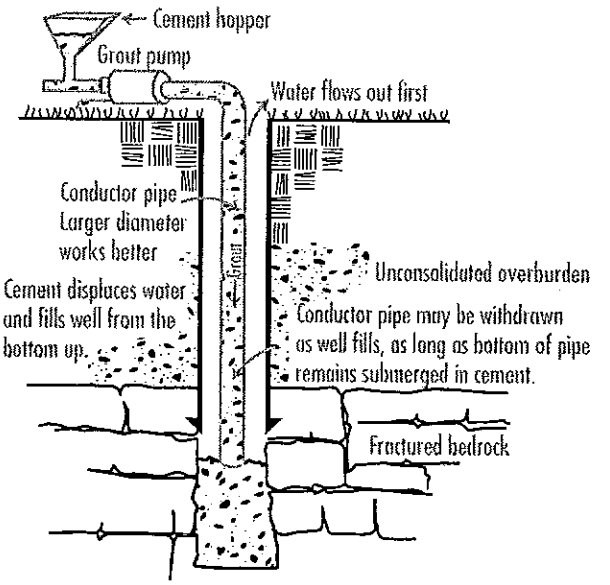
Flowing wells

Flowing artesian wells that flow at high rates may require special techniques to reduce the flow before the well is filled and sealed.

Gravity method for well filling and sealing



Pumped method for well filling and sealing



Driven-point (sand-point) wells

Driven-point or jetted wells 2 inches or less in diameter must be filled with neat cement grout. Only licensed well drillers and pump installers are allowed to fill and seal driven point wells. Grout may be poured down the casing or pumped down through a conducter pipe. The drive pipe and screen may be pulled before the grout is poured if the well is 25-feet deep or less. Bentonite chips may **not** be used for these wells because the chips can too easily bridge in the casing pipe.

Many driven-point wells terminate in pits or in the basements of buildings. Since April 10, 1953 such well locations have been prohibited by the State Well Code.

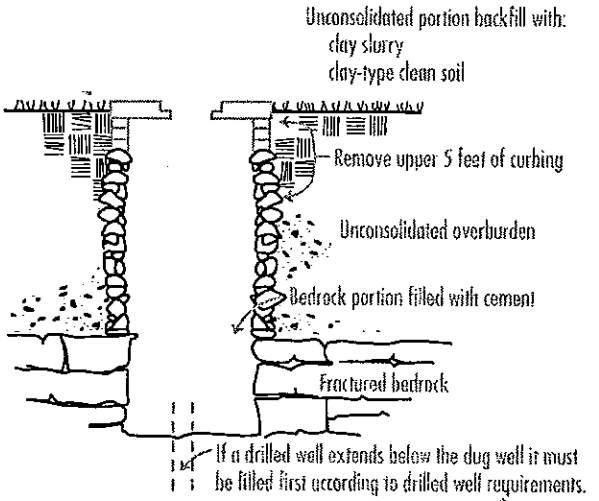
If your well was constructed after this date, the well does not comply and must be properly filled and sealed except when the DNR approves its continued use.

Dug wells

To properly fill and seal a dug well, a well driller or pump installer must first remove the well cover and remove any piping or debris before filling the well. (If a drilled well extends below the dug well it must be filled first.) The dug well must be filled and sealed with clean clay, silt, clean native clay or silt-type soil free of organic material (if compacted), concrete, sand-cement grout or bentonite chips. If the dug well penetrates partially or completely into bedrock, the well must be filled with concrete or sand-cement grout to a point at least two feet above the top of the bedrock. The top 5 feet of curbing of the dug well must be removed to allow for a good contact between the filling material and the soil. The curbing may be caved into the dug well while the well is being filled if it's done in a manner to prevent plugging of the filling material part-way down; or this step may also be done near the end of the filling and sealing procedure.

If the dug well is less than 18 inches in diameter, a conductor (tremie) pipe must be used to place the filling material, except when bentonite chips are used. For very deep or large diameter dug wells, alternate materials may be allowed.

Dug well filling and sealing



Well pits

When a pit well is unused, the pit structure must also be filled and sealed. To properly fill and seal a well pit, perforate or knock in at least one wall, break up or perforate the floor, and then fill the pit with clean native clay, silt, or clean native soil. If the pit is a subsurface pump room (alcove) connected to the building foundation, the pit does not have to be filled.

Well filling and sealing using bentonite chips

In Wisconsin approved bentonite chips may be used to fill wells and drillholes. The chips may be used for both sand and gravel formation wells and bedrock wells. They may only be used for wells & drillholes meeting the following specifications.

- 4 inches or larger in diameter.
- Not more than 500 feet deep.
- Not more than 350 feet of water standing in the well or drillhole.

*(Note: Bentonite chips may **not** be used to fill wells or drillholes filled with drilling mud or clay slurry and may **not** be used for small diameter driven point wells.)*

Bentonite chips may also be used for the following:

- To fill dug wells.
- As an alternative to concrete in the top 5 feet when clay slurry is used to fill a well or drillhole from the bottom up to the 5-foot depth.

(Note: Bentonite chips come in two basic size ranges (¼" - ⅜" and ½" - ¾" chips). The ½" - ¾" chips should be used for 4-inch diameter wells. Bentonite chips are irregularly shaped pieces of sodium bentonite clay that look very much like crushed limestone. They should not be confused with pellets or tablets which are not allowed).

Well drillers and pump installers must follow these procedures when using bentonite chips:

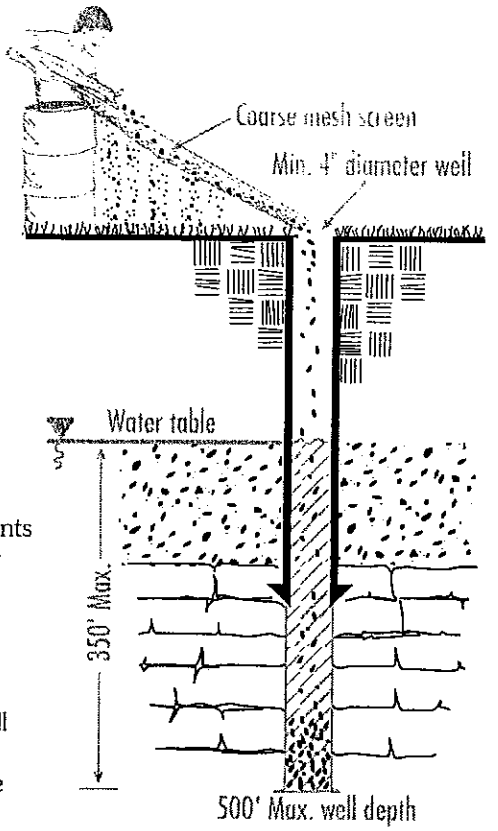
1. Determine the construction details of the well or drillhole including at least the:
   a. Well or drillhole diameter, by simply measuring the inside diameter of the well casing pipe or drillhole; and
   b. Well or drillhole depth, by lowering a weighted line down to the bottom. (Make sure the weight is securely attached).
2. Remove the pump, pump piping and any other material obstructions or debris in the well or drillhole that could prevent complete filling and sealing.
3. Calculate the volume of the well or drillhole to determine the number of bags of chips that will be required by using:
   a. The attached Table I page 5; OR
   b. The formula:

$$\frac{\pi r^2 h}{0.69\ ft^3/bag}$$

   π = pi = 3.14
   r = well radius (in feet)
   h = well depth (in feet)
   0.69 = number of ft^3 filled by one 50 lb. bag

(Remember: Divide the well radius (in inches) by 12 to get the radius in feet.)

4. Fine particles and dust contained in the bags of bentonite chips must not be allowed to enter the well. This is prevented by pouring the bentonite chips out of the bag such that they tumble under their own weight down across a coarse-mesh screen 2 to 3 feet in length. This allows the dust to fall through the screen onto the ground. The screen should be formed into a U-shape like a rain gutter. One end of the screen should be placed on the top of the well casing while the other end is supported at a steep angle. Removal of the dust prevents bridging of the chips at the water table. Do not push or pull the chips down across the screen as this will only create more dust.
5. Pour the bentonite chips across the screen into the top of the well at a rate not faster than about 3 minutes per bag. Pour at this rate so bridging of the chips does not occur – the chips must fall all the way to the bottom of the well. (Do not use a conductor-tremie pipe). Check well periodically with weighted line for possible bridging of chips.



6. Make sure the well "accepts" the entire number of bags calculated to fill it. If it doesn't, bridging may have occurred. The point of bridging must be broken so the bentonite chips will fall to the bottom. If the bridge cannot be broken, the well may have to be drilled out and re-filled with neat cement grout.
7. If the standing water in the well does not rise to the surface during the filling procedure, clean, uncontaminated water must be poured down into the well (through the chips) until water rises up to the top of the well and stays there. The chips will then swell and create an impermeable plug in the well.

Table 1: Method for determining the number of 50 lb. bags of bentonite chips to fill a well

Hole size and volume table

Hole diameter inches	Hole volume (ft3/foot)	Pounds bentonite chips to fill 1 ft	Feet filled by one bag bentonite chips	Bags bentonite chips to fill 100 Ft
4	0.087	6.3	7.9	12.6
4-½	0.110	7.9	6.3	15.8
5	0.136	9.8	5.1	19.6
5-½	0.165	11.9	4.2	23.8
6	0.196	14.1	3.5	28.2
6-½	0.230	16.6	3.0	33.2
7	0.267	19.2	2.6	38.4
7-½	0.307	22.1	2.3	44.2
8	0.349	25.1	2.0	50.2
8-½	0.394	28.4	1.8	56.8
9	0.442	31.8	1.6	63.6
9-½	0.492	35.4	1.4	70.8
10	0.545	39.2	1.3	78.4
11	0.660	47.5	1.1	95.0
12	0.785	56.5	0.89	113.0
15	1.227	88.3	0.57	176.6
18	1.767	127.2	0.39	254.4
20	2.182	157.1	0.32	314.2
25	3.409	245.4	0.20	490.8
30	4.909	353.4	0.14	706.8

Table C - Acceptable materials and methods for well filling and sealing

	Well type	Materials: Clean clay or silt or clean native soil	Approved bentonite chips ◆	Neat cement grout ■	Concrete ▲	Sand-cement grout	Bentonite-sand slurry w/min. mud wt. 11 lbs/gal	Chlorinated, sand-free pea gravel	Methods
Wells & drillholes	Driven-Point (sand-point) wells ↓ & drillholes ≤ 2 ½" diameter	No	No	Yes	No	No	No	No	Cement grout may be poured without using a conductor ● pipe
	Wells & drillholes > 2 ½" diameter	No	Yes, provided well is 4" minimum diameter & 500' maximum depth	Yes	Yes	Yes	Yes, provided top 5' filled with neat cement grout, sand-cement grout or concrete	● Yes, but in depths below 250'	Conductor ● pipe required except when bentonite chips or pea gravel is used
	Dug wells ◦	Yes (top 5' of curbing must be removed following filling)	Yes	Yes	Yes	Yes	No	No	Conductor ● pipe not required unless well is ≤+18" diameter
Bedrock Wells	Bedrock wells not extending through Maquoketa Shale	No	Yes, provided 4" minimum diameter & 500' maximum depth	Yes	Yes	Yes	No	● Yes, but in depths below 250'	Conductor ● pipe required except when bentonite chips or pea gravel is used
	Bedrock wells extending through Maquoketa Shale	No	Yes in top 500' & for 40' plugs at top & bottom of Maquoketa Shale contact surfaces	Yes	Yes	Yes	No	● Yes, in depths below 250', but not at Maquoketa Shale contact surfaces	Conductor ● pipe required except when bentonite chips or pea gravel is used
	Dug wells ◦	Yes, but only in unconsolidated portion of well	Yes	Yes	Yes	Yes	No	No	Conductor pipe required only for placement of grout or concrete; or if well is ≤+18" diameter
	Well pits	Yes	Yes	Yes	Yes	Yes	No	No	Must perforate floor & 1 wall of pit

◆ *Bentonite chips may only be used for wells **not** deeper than 500 feet and having **not** more than 350 feet of standing water in them. The chips must be poured across a coarse mesh screen such that excess dust does not enter the well. Pour rate should not be faster than 3 min. per 50 lb. bag to prevent bridging.*

■ *Neat cement grout and sand-cement grout must have a density of at least 15.2 lbs per gallon*

▲ *When concrete is used, the gravel size may not exceed ½ the inside diameter of the conductor pipe used.*

↓ *Driven-Point (Sand-Point) Wells may be pulled prior to filling the hole if the well is 25' deep or less.*

● *The terms conductor pipe and tremie pipe are synonymous. The bottom of the pipe must remain submerged in the grout throughout the filling procedure. Conductor pipe must be metal pipe, thermoplastic pipe rated for at least 100 psi or rubber-covered hose reinforced with braided fiber or steel and rated for at least 300 psi.*

● *40' impermeable plugs shall be provided at each bedrock formation change. [See s. NR 812.26(7)(a)]*

◦ *The top 5 feet of dug well curbing must be knocked out to provide a soil contact with the filling material.*

"Clean clay or silt or clean native soil" means low permeability soil material, free of organic humus or any other contamination.

"Clay or Bentonite-sand slurry" means a mixture having the minimum ratio of 50 pounds of native clay or approved bentonite mixed with 100 gallons of water (from a known safe and uncontaminated source) and 10-25% sand by volume of the slurry such that a mud weight of at least 11 lbs./gal. is achieved.

"Neat Cement Grout" means a mixture of cement and water in the proportion of one bag of Portland cement (94 lbs.) meeting ASTM C 150, Type I or API-10A, Class A standard; and 5 to 5.5 gallons of water from a known safe and uncontaminated source. Powdered bentonite may be added up to ratio of 5 pounds per 94-pound bag of cement provided 1.3 gallons of water are added for each 2 pounds of bentonite added.

"Concrete (sand-cement) grout" means a mixture of cement, sand and water in the proportion of one bag of Portland cement (as described above), a cubic foot of dry sand and 5 to 5.5 gallons of clean water from a known safe and uncontaminated source.

"Concrete" means a mixture of cement, water, sand and gravel in the proportion of one bag of Portland cement (as described above), an equal measure of gravel (by weight or by volume) and not more than 5.5 gallons of water from a known safe and uncontaminated source. A commercially-prepared mix may be used provided the mix has at least 6 bags of cement per cubic yard.

"Approved chipped bentonite products" are as follows:

ABI Plug ..... ABI, Inc.

Bentonite Plug..... Loresco (medium: ¼ - ⅜ and coarse ½ - ¾")

Black Hills Bentonite Plug...Black Hills Bentonite, LLC

CETCO Chip..... CETCO (medium: ¼ - ⅜" & coarse: ⅜ - ¾")

Cowboy Brand ..... Cowboy Mining Co. (Fine, Medium & Coarse)

Econoplug ..... Economy Mud Products Co. (both medium chips: ¼" to ⅜" and coarse chips: ½" to ¾")(mfg. by Wyo-Ben, Inc.)

Enviroplug ..... Wyo-Ben, Inc. (both medium chips: ¼" to ⅜" and coarse chips: ½" to ¾")

Federal Plug ..... M-1 Drilling Fluids (Federal) – 100% of chipped sodium bentonite (both medium chips: ¼" to ⅜" and coarse chips: ½" to ¾")

Holeplug ..... Baroid Industrial Drilling Products (⅜" and ¾" chips)

Kwik Plug ..... Federal Summit (⅜" and ¾" chips)

Naturapel ..... Wyo-Ben, Inc. (chips)

Opti Seal ..... Bentonite Corp. (⅜" and ¾" chips)

PdsCo Plug ..... PdsCo. (Polymer Drilling Systems)(medium and coarse chips)

Permaplug ..... Cathodic Engineering Equipment Co. (both coarse chips: ¾" and medium chips: ⅜")

Pure Gold Chips..... CETCO (both medium ¼" to ⅜" and coarse ⅜" to ¾" chips)

Tower Plug ..... Black Hills Bentonite, LLC (⅜" and ¾" chips)

Well-Plug ..... Fluidril Mud Systems (from Black Hills Bentonite) 100% chipped bentonite (⅜" and ¾" chips)

Conductor (tremie) pipe used for well filling and sealing shall be any of the following:

1. Metal pipe,
2. Rubber-covered hose reinforced with braided fiber or steel and rated for at least 300 psi, or
3. Thermoplastic pipe rated for at least 100 psi including:
   a. polyvinyl chloride (PVC),
   b. chlorinated polyvinyl chloride (CPVC),
   c. polyethylene (PE),
   d. polybutylene (PB), and
   e. acrylonitrile butadiene styrene (ABS)

Must I report the well filling and sealing to the DNR?

Yes. When groundwater contamination investigations are undertaken, it's important to know the location of active, unused and former wells. Further, this information is important documentation for property transfers. Well Filling and Sealing Reports (Form #3300-005) are available to licensed well drillers and pump installers from DNR central office. Well Filling and Sealing Reports must be used to report how the well was filled and sealed and document that the well no longer exists. The form must be completed, signed, and sent to DNR central office by the licensed person performing the well filling and sealing work. The second copy is the owner's copy.

What administrative rules cover well filling and sealing?

NR 812.26 governs proper abandonment of private water supply wells. The filling requirements are also printed on the back of the well abandonment form. NR141, Wis. Adm. Code, governs the proper abandonment of monitoring wells. NR 811.17, has rules for abandonment of community wells.

Where can I obtain additional information?

For further information on drinking water supplies and groundwater quality check the DNR website at dnr.wi.gov/org/water/dwg/index.htm. Also check the UW Extension website at: learningstore.uwex.edu/Drinking-Water-C120.aspx

This brochure was revised by the Wisconsin Department of Natural Resources with assistance from the Education Subcommittee of the Groundwater Coordinating Council.

APPENDIX N

CITY OF MADISON WELLHEAD PROTECTION ORDINANCE

13.22 WELLHEAD PROTECTION.

(1) To prevent contamination of wells supplying municipal water systems, the Water Utility General Manager or his/her designee shall review all proposed uses on zoning lots in Zones A and B in Wellhead Protection Districts.

(2) Review will be based on the presence, use, or storage on the lot of hazardous chemicals, as defined by the Environmental Protection Agency. Consideration will be given to factors including but not limited to the following: whether the zoning lot is in Zone A or Zone B, effective storage or containment of particular hazardous chemicals, and the magnitude and/or frequency of use of the hazardous chemicals. Approval of the use may be contingent on specific conditions being met. A current list of hazardous chemicals, as defined by the Environmental Protection Agency, shall be maintained. (Cr. by Ord. 13,106, 7-23-02)

28.107 WELLHEAD PROTECTION DISTRICTS.

(1) Statement of Purpose. The Common Council of the City of Madison finds that certain uses can seriously threaten or degrade groundwater quality. To promote the public health, safety, and general welfare of the City of Madison, the Wellhead Protection Districts are created to protect municipal water supplies.

(2) Applicability. The requirements of the Wellhead Protection Districts shall apply to all zoning lots located in such districts in addition to all requirements in the Madison General Ordinances that apply to the principal zoning district classification of said zoning lots.

(3) Protection Zones. Each wellhead shall have two (2) zones of protection around it.

(a) Zone A shall be the area around the well in which it has been determined that groundwater and potential contaminants will take five (5) years or less to reach the pumping well.

(b) Zone B shall be the smaller of the area around the well in which it has been determined that groundwater and potential contaminants will take one hundred (100) years or less to reach the pumping well, or the area within a twelve hundred (1,200) foot radius around the well, except for the area in Zone A.

(4) Uses. All uses in Zones A and B of any Wellhead Protection District shall be approved by the Water Utility General Manger or his/her designee. A use may be approved with conditions. Approval by the Water Utility General Manager or his/her designee shall be in addition to all other approvals required for the proposed use.

(a) Permitted Uses In Zones A and B. Any use allowed as permitted in the principal zoning district, except those uses not approved pursuant to Sec. 13.22.

(b) Conditional Uses In Zones A and B. Any use allowed as a conditional use in the principal zoning district except those uses not approved pursuant to Sec. 13.22. All conditional uses are subject to the provisions of Sec. 28.12(11).

(5) Existing Uses. Any lawful use existing at the time of the creation of a Wellhead Protection District may be continued, however, no expansion or enlargement of such use is allowed without approval pursuant to Sec. 13.22 by the Water Utility General Manager or his/her designee.

(6) Wellhead Protection District No. 28. The location of Well No. 28 and the surrounding Zone A and Zone B are shown in Section 28.107(6)(a).

APPENDIX O

WATER CONSERVATION INFORMATION

WATER CONSERVATION

Tom Heikkinen
General Manager

Administrative Office
119 East Olin Avenue
Madison WI 53713
Main: (608) 266-4651
Fax: (608) 266-4426
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Email: **Water Utility**

To report an emergency, 24/7
call Madison Water Utility at (608) 266-4665

Office Hours:
Monday-Friday: 7:30am - 4:00pm

The Madison Water Utility has led an effort to develop a comprehensive water conservation program for the city. **The Water Conservation and Sustainability Plan of 2008** (PDF) looks at a variety of things that can be done by the city and its residents and businesses to reduce our impact on the water resources that help make Madison such a great place to live, work and play. **Read a message from the design team that developed the plan** (PDF)

GOOD OUTDOOR WATERING PRACTICES

- Water lawn and garden, not pavement: Position sprinklers so that water lands on plantings and isn't lost to evaporation or the storm drain.
- Check weather reports or buy a rain gauge to monitor whether watering in addition to rain is needed; most established lawn and garden plantings do well on an inch of water per week.
- During drought, turf grass plants need only 1/4 inch of water a month to survive. If lawn and garden do need water, limit loss to evaporation.
- Water before 8:00 a.m. when it isn't windy, position a sprinkler to avoid losing water on driveways or sidewalks, and water slowly so the soil can absorb the water.
- Water the lawn only when needed. Step on the grass; if it springs back up when you move your foot, it does not need water.
- Water less frequently and thoroughly. A good soaking is better than watering frequently and will allow the roots to grow to greater depths and help make turf more drought tolerant. Lawns need about 1 inch per week. Hint: Place 3-5 empty tuna or cat food cans at varied distances from the sprinkler. The time it takes to fill the cans is about how long you should water your lawn.
- Consider alternate-side use in hot, dry conditions when many people may be watering. In addition to the recommendations above, if your house has an even-number address, limit outdoor use to even-numbered calendar days; if it has an odd-number address choose odd-numbered calendar days.
- The University of Wisconsin-Extension publishes an excellent **lawn watering guide** (pdf).

COLLECT RAIN WATER IN A RAIN BARREL OR CISTERN

Water that runs off hard surfaces such as roofs can be collected and put to use in the garden. Rain water is "soft," without groundwater minerals or chlorine, so it's more plant-friendly than tap water. Capturing water from gutters and downspouts in a well-designed rain barrel conserves the municipal supply while providing the best water for lawn and garden. To learn more, visit **Sustain Dane's rain barrel program**.

Resources

- **Sustain Dane**
- **My Fair Lakes.com**
- **Dane County Office of Lakes and Watersheds Rain Garden Information**
- **UW Extension Home & Garden**
- **EnAct Program**
- **Wisconsin DNR Water Protection Milestones**
- **City of Madison Engineering Division Water Quality Initiatives**
- **Special drug disposal collection days, City Streets Division** and **Dane County MedDrop**
- **EPA WaterSense**

ONLY RAIN IN THE STORM DRAIN!

Everything from our streets drains to surface waters and someone's ground water, so we need to try to keep plant material, toxins (fertilizer, pesticide, herbicide) and debris out of the storm sewers—and we need to avoid wasting ground water by sending it down the storm drain.

RAIN GARDENS

Manage rainfall on your property as much as possible, using the contour of the area and plantings to slow the flow of water, use it and offer it back to the atmosphere. To learn more, visit **City of Madison Engineering, Water Quality Initiatives, Rain Gardens**

City of Madison

Water Utility

Water Conservation and Sustainability Plan

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"When the well is dry, we know the worth of water"
—Benjamin Franklin

Water is absolutely critical to successful, growing communities where residents can enjoy a high quality of life. Madison and Dane County are fortunate to have abundant supplies of water that if protected and used in a sustainable manner will last long into the future. Recent news about the water shortages in Atlanta, Georgia and elsewhere in the southeast, continuing concerns about the ability of communities in the southwestern United States to grow when water supplies are scarce, and the uncertainty caused by climate change, drive home the point that communities are not necessarily guaranteed a water supply. With proper management, planning and conservation now, Madison can help ensure clean and abundant water supplies far into the future.

It may seem counterintuitive for a utility that derives its income from selling water to plan for conservation, as more water sold means more income for the utility, on a unit by unit basis. But if the utility has to meet rising customer demand every year, it has to continually increase its pumping and delivery capacity, and it may eventually have to find additional sources of water if its primary source is overwhelmed. Each increase in capacity and supply costs the utility money to develop and operate, and it is actually cheaper for both the utility and its customers to invest in water efficiency rather than increased supply. Additional benefits of water conservation include improved water quality; a reduced burden on surface water quality, as less wastewater is generated; reduced greenhouse gas emissions due to reduced energy spent on water pumping; and increased spring, stream, and river flows, as less of the groundwater that feeds them is withdrawn.

Conservation Goal
Maintain the current annual rate of groundwater pumping, based on an average of five years (2002-2006), while reducing residential per capita water use by 20% below current levels by the year 2020.

BACKGROUND

GROUNDWATER RESOURCES

Below Wisconsin's surface is an estimated 1.2 *quadrillion* (1,200,000,000,000,000) gallons of groundwater which, if above ground, would flood the entire state to 100 feet deep. That fact may beg the question of why water resources are a concern at all in our state (Kassulke & Chern, 2006). A key point to understand initially is that groundwater moves much more slowly than surface water. This fact makes planning for drinking water quantity and quality a challenge. When water is not replaced or recharged at the same rate at which it is pumped out of the ground, shortages can occur. Though we receive about 32 inches of rainfall each year, only 18-30% of that soaks into the ground. The rest either

runs off to the nearest water body or evaporates (UW-ASC, 2007). The amount of infiltration is controlled by a number of factors, including the intensity of each rain event and the soil type, but one of the primary influences in an urban area such as Madison is the ground cover. While natural areas, such as forests and prairies usually have high infiltration rates, urban surfaces, such as roofs and pavement, allow almost no infiltration at all. Thus, maintaining a sustainable infiltration rate in an urban area poses a particularly difficult challenge.

An additional challenge in maintaining quality groundwater for drinking water supply is preventing contamination. Industrial and other potential groundwater contaminants are abundant in urban areas, and keeping them out of the aquifer requires widespread acceptance of water quality protection plans. When groundwater becomes contaminated, it can become unusable as a drinking water source for many years. With over 70% of Wisconsinites using groundwater for their water supply and various industries relying on it for their livelihood, it is imperative that we keep this resource plentiful and free of anthropogenic contaminants (GCC, 2006).

Dane County sits atop two aquifers that are separated by an aquitard (collectively called the Cambrian Eau Claire Formation). The aquitard, a mostly-impermeable shale layer, occurs at around 200 feet below the surface and is up to 60 feet thick in some areas. The upper aquifer is a source of water for many private wells, while the lower aquifer, called the Mount Simon Formation, is the main water source for all Dane County municipalities, and is up to 700 feet thick (Bradbury et al., 2007). The 23 Madison municipal wells range from 500 feet to 1,175 feet deep. Figure 1 below shows a cross-section of the major aquifers in southern Wisconsin. Figure 2 is a profile of Dane County's aquifer formations.

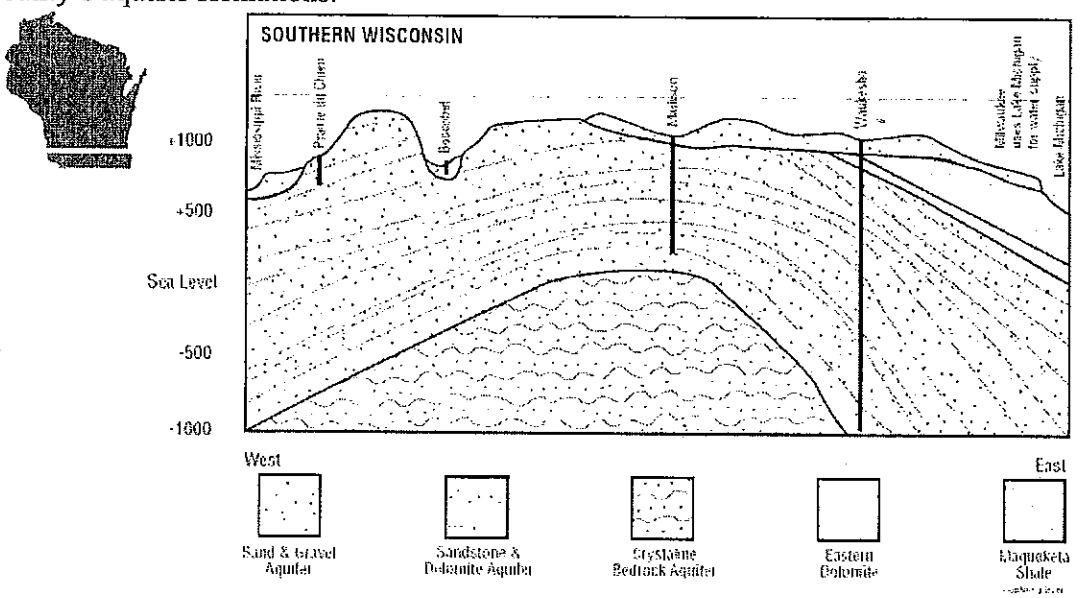

Figure 1: From Wisconsin's Buried Treasure: Groundwater Study Guide (WDNR, 2006)

GROUNDWATER LEVELS

The amount of available groundwater varies by season and region. Water flows slowly underground, its speed varying with the hydraulic conductivity of each type of bedrock material. When traveling through coarse sand, water can reach speeds of up to several feet per day. In very clay-rich areas water may only move inches in a year. Levels of groundwater can vary naturally throughout the year without human intervention. Some snowmelt will infiltrate each spring, allowing groundwater to rise. There is often a drop in levels during the summer months due to plant uptake, decreased rainfall, increased evaporation, and discharge to surface water bodies. When the plants become dormant in the fall, levels often rise again. When the ground is frozen in the winter, with little to no infiltration, the levels usually fall. From year to year, the level varies due to changes in precipitation (Hunt, 2003).

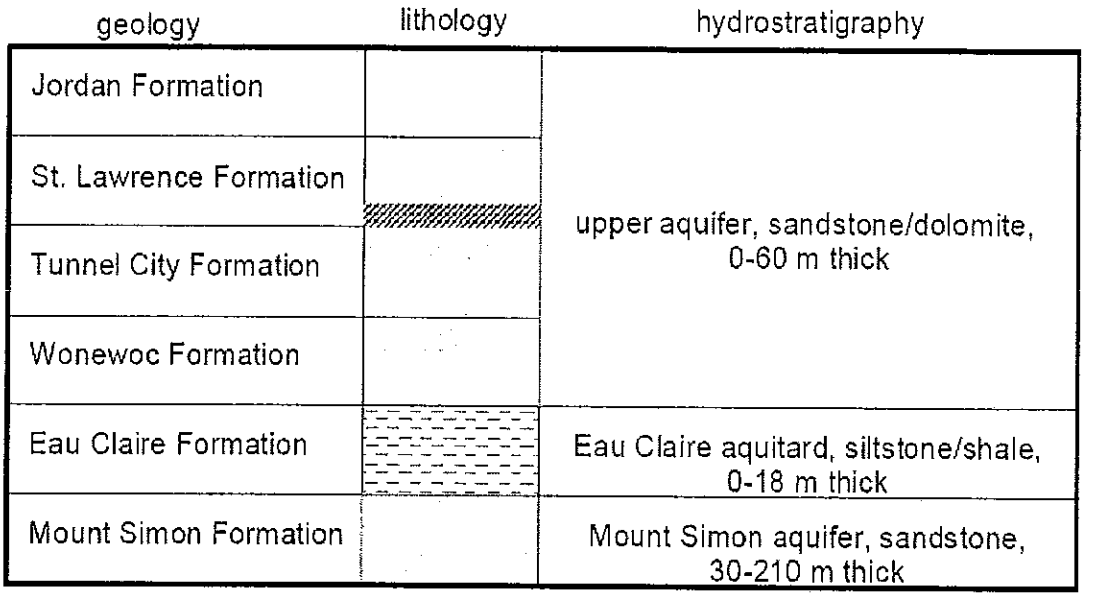

Figure 2: Cambrian stratigraphy of Dane County, Wisconsin (Bradbury et al., 2007)

[1 meter = 3.28 ft]

Human Impact

Madison citizens use, on average, about 73 gallons of water per day (based on the five-year average of 2002 to 2006). To supply these needs, the City of Madison pumps between 20 million and 54 million gallons per day (City of Madison Water Utility Data, 2007). Dane County pumps around 50 million gallons per day (Hunt et al., 2001), while the state pumps over a billion gallons each day to supply the drinking, industrial, commercial, livestock, irrigation, and other needs of its citizens.

With the introduction of high-efficiency toilets, low-flow showerheads, faucet aerators, and other conservation measures, groundwater use per capita has generally stabilized nationwide (Hunt, 2003). However, an increasing population continues to create a demand for groundwater. In some areas around the state, such as the Fox River Valley, southeastern Wisconsin, and Dane County, the groundwater levels have already been significantly drawn down (WGAC , 2006).

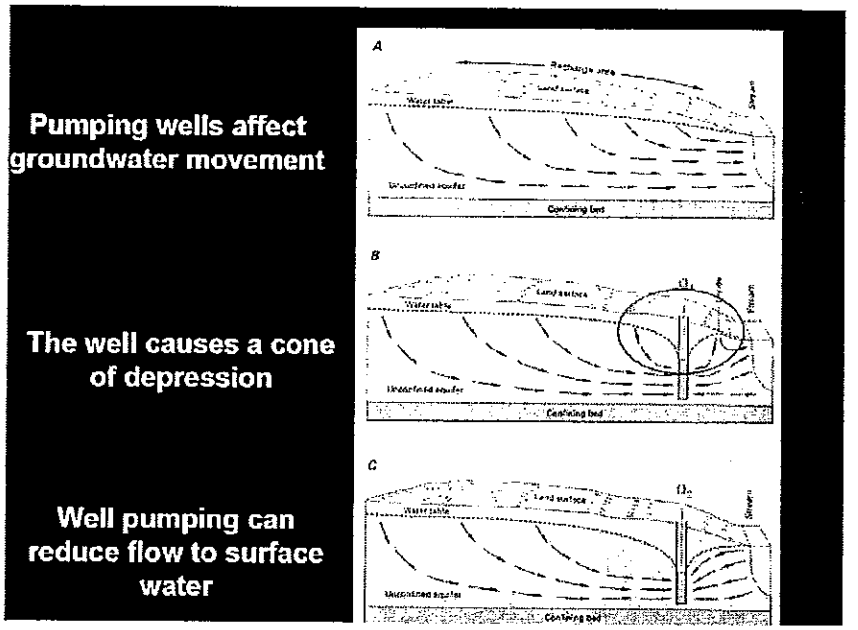

Figure 3: Groundwater Drawdown (from K. Bradbury presentation, September 14, 2006)

In addition to direct pumping of groundwater, humans have also impacted aquifers by decreasing the surface area available for recharge. Land development increases the amount of impervious surfaces, such as roofs and pavement, which causes more runoff and less infiltration of precipitation and snowmelt. In addition to the problems this trend causes for the aquifer, it can also contribute to flooding and surface water pollution, as stormwater carries dirt and oil from parking lots and streets to the nearest water body. In undeveloped areas, a higher percentage of rainwater stays where it lands, sinking into the ground and eventually becoming groundwater (WDNR, 1997).

GROUNDWATER DRAWDOWN

Because groundwater moves slowly, when a well is pumped for a long period of time, a cone of depression in the water table is formed surrounding that well (the water level is lowered significantly adjacent to the well, and less farther away, creating a cone shape). If pumping stops, the cone eventually disappears. When groundwater is pumped at a higher rate than it is recharged, drawdown occurs. When too many wells are placed near one another, their cones of depression merge and drawdown can be severe. Severe drawdown in a deep aquifer may pull water out of shallow aquifers, which in turn can affect springs and surface water bodies as well.

Streams, lakes, and wetlands can all be affected by groundwater drawdown. Some streams rely entirely on groundwater for their baseflow during dry periods, and without enough groundwater input they may run dry, compromising wildlife habitat. Many wetlands rely on groundwater for up to 70% of water input. Groundwater drawdown can greatly impact these sensitive areas (WDNR, 1997). In Dane County, there is a cone of depression of about 30 feet in the deep aquifer (Mount Simon Formation), caused by municipal water use. This drawdown affects the surface water by drawing down the shallow aquifer *at least* 40 feet in localized areas (Bradbury, 2006).

Because of this substantial drawdown, the Wisconsin Groundwater Advisory Committee has warned it could designate Dane County as a Groundwater Management Area. The governor and State Senate and Assembly leaders appointed the members of this committee. Their charge, as directed by 2003 Wisconsin Act 310, is to identify areas with groundwater quantity issues. Two areas of the state were immediately identified as Groundwater Management Areas: the southeast area (all or parts of the Milwaukee, Waukesha, Washington, Ozaukee, Walworth, Kenosha, and Racine counties) and the Lower Fox River Valley (all of Brown and parts of Calumet and Outagamie Counties). These two areas have experienced drawdown of more than 150 feet. Identifying locations as Groundwater Management Areas triggers a requirement to create a regional groundwater management plan with assistance from the Department of Natural Resources. It also gives the DNR more authority over the approval process for high capacity wells (WGAC, 2006).

In its 2006 report, the Groundwater Advisory Committee recommended that Dane County be listed as a Groundwater Attention Area, which is one step below a Groundwater Management Area. An Attention Area is considered a warning that the groundwater conditions are such that a coordinated management plan should be put into place to prevent further drawdown. General managers from Dane County water utilities have been meeting since early 2007 to discuss regional groundwater issues.

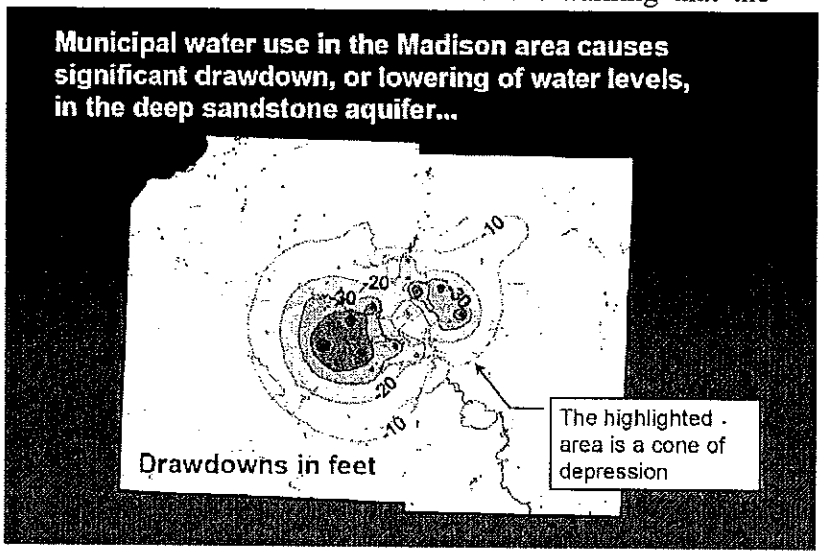

Figure 4: Groundwater Drawdown (from K. Bradbury presentation, September 14, 2006)

One cause of groundwater drawdown in the Dane County area is the fact that the Madison Metropolitan Sewerage District (MMSD) discharges most of its effluent to Badfish Creek, which is outside the originating watershed of the city's drinking water. The groundwater is

pumped from one watershed and discharged into another one. An exception to the MMSD's handling of wastewater is the case of the City of Verona, whose effluent is returned to its originating watershed in Badger Mill Creek. However, the effluent does not necessarily address groundwater recharge.

The drawdown has caused a decrease in baseflow for many of Madison's streams and shallow springs, especially around Starkweather Creek and Lake Wingra. Prior to groundwater pumping, it is believed that groundwater flowed into the Madison area lakes, but in some locations it now appears that this flow has reversed, drawing lake water into the groundwater (WDNR, 1997). Research by Baumann and colleagues (1974) indicated that at least 28 springs in the Lake Wingra watershed have dried up.

Concerns about the drawdown spurred a multi-departmental collaboration in 1992 called the Regional Hydrologic Modeling and Management Program to look more closely at groundwater issues. The group continues to update a regional groundwater-modeling program. The model is able to show current conditions as well as predicted conditions based on various pumping rates (DCRPC, 2004).

Mitigation Projects

Concerns about threats to groundwater quantity have spurred several area mitigation projects. One such project resulted from the construction of the new West Campus Cogeneration Facility on the UW campus. Since spring 2005, the facility has used water from Lake Mendota in its operations. While the amount withdrawn has minimal effects on the lake itself, it could potentially lead to problems downstream in the Yahara River during droughts. To mitigate any adverse effects from pumping, a group of public and governmental entities worked together to create a mitigation plan.

After about 20 site evaluations, the Odana Hills Golf Course was chosen as the best location to infiltrate treated stormwater. Stormwater draining to the Odana Ponds is treated onsite and pumped to an underground infiltration field located in the golf course. The water quality and quantity is monitored extensively before infiltration. Completed in 2006, the Ponds' infiltrated water will eventually feed shallow springs that flow into Lake Wingra, with minimal impacts to the existing pond. While it will take about 30 years for the infiltrated stormwater to reach the springs, an effect is likely to be seen much sooner, due to an increase in head pressure in the upper aquifer. The goal of this project is to infiltrate 80 million gallons per year. (MGE, 2007). See Figure 5 for a map of this project.

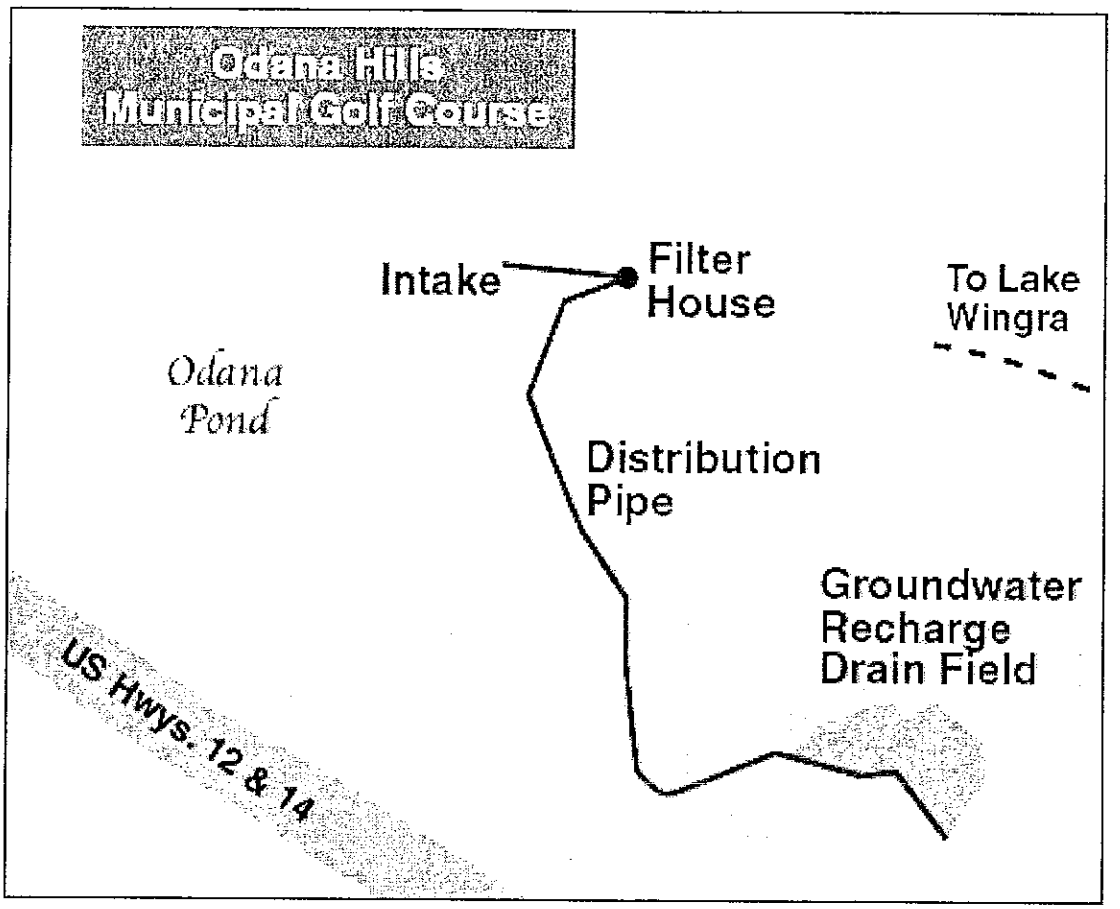

Figure 5: Map of the Odana Hills Golf Course stormwater infiltration project (MGE, 2007)

GROUNDWATER QUALITY

Certain areas around the state are fairly susceptible to groundwater contamination and shortages. For example, areas with bedrock very close to the surface have limited available water and are prone to contamination because percolating water receives only minimal filtration. Other areas have very sandy soils that allow water to flow through faster than it can be filtered and so are prone to problems with contamination from fertilizers and pesticides (WDNR, 1997). In southeastern Wisconsin and the Fox River Valley, increasing levels of radium are encountered due to groundwater drawdown. Some of these areas are now faced with the need for new water sources.

Because groundwater moves slowly relative to surface water, contamination below ground can have an impact for many, many years. Depending on soil conditions, residue from a spill might be detectable for hundreds or even thousands of years. The relatively slow movement of groundwater has significant implications for water quantity as well as quality (Bradbury et al, 1985; Alley et al, 1999).

Wellhead Protection Plans

In 1986, the federal government, through amendments to the federal Safe Drinking Water Act, required statewide wellhead protection programs. In 1993, the EPA approved a state program overseen by the Wisconsin Department of Natural Resources. In turn, the DNR requires a wellhead protection plan for any municipal well constructed after May 1992. There is a second, voluntary state program for wells developed prior to 1992. Wellhead protection is intended to protect public water supply wells from contaminants that could enter the public water supply by managing land use activities in areas that contribute water to the wells. Sixteen of the 34 Dane County municipal water systems have at least one wellhead protection plan in place. Fourteen systems have wellhead protection ordinances. The City of Madison has completed wellhead protection plans for 11 wells thus far and has a wellhead protection ordinance in place.

Madison's General Ordinance 28.107 established Wellhead Protection Districts. Each well district has two zones. Zone A is defined as "the area around the well in which it has been determined that groundwater and potential contaminants will take five (5) years or less to reach the pumping well." Zone B is the area in which it would take contaminants 100 years to reach the well or within 1,200 feet of the well. The Water Utility reviews proposed uses that fall within either of the zones before construction plans can be approved. Existing uses are allowed, but expansion of those uses must be approved. Proposed uses are considered on a case-by-case basis. The City of Madison's General Ordinance Chapter 13.22 Wellhead Protection states the following:

> To prevent contamination of wells supplying municipal water systems, the Water Utility General Manager or his/her designee shall review all proposed uses on zoning lots in Zones A and B in Wellhead Protection Districts.
>
> Review will be based on the presence, use, or storage on the lot of hazardous chemicals, as defined by the Environmental Protection Agency. Consideration will be given to factors including but not limited to the following: whether the zoning lot is in Zone A or Zone B, effective storage or containment of particular hazardous chemicals, and the magnitude and/or frequency of use of the hazardous chemicals. Approval of the use may be contingent on specific conditions being met. A current list of hazardous chemicals, as defined by the Environmental Protection Agency, shall be maintained.

Water Utility staff are currently working on creating a wellhead protection plan for each municipal well in the city by 2010. Changes to the ordinance are currently under consideration that would establish wellhead protection areas around each of the 23 wells, even before the wellhead protection plans are completed.

DRINKING WATER

In 1880, a petition to the Madison Common Council requested that a municipal water service be constructed for its 10,324 citizens. The Madison Water Utility now provides service to more than 62,000 locations in the City of Madison, Town of Madison,

Shorewood Hills, Maple Bluff, Blooming Grove, and Town of Burke. Despite being adjacent to Lakes Mendota and Monona, the City developed its water supply system using deep wells.

Overall, Wisconsin has high quality drinking water, though some areas are more susceptible to well contamination than others. In recent years, complaints of colored water, a result of elevated levels of Manganese (Mn) and Iron (Fe), have shaken public confidence in the safety of Madison's public water supply. While the colored water is not a public health problem, it is considered a water quality problem. The Water Utility has proposed to treat four wells that have had levels of Mn and Fe that exceed the EPA's Secondary Standards for water quality.

Economic and Environmental Costs of Water Use

In 2007 MWU pumped 11.392 billion gallons of water and used 22.287 million kilowatt hours (kWh) of electricity to pump that water. In 2007 it took an average of 1,956 kWh to pump 1 million gallons of water.

	Per Million Gallons of Water Pumped
2007 Electricity Usage	
Average kWh	1,956
Average kWh cost	.088
Electricity cost	$172.10
2007 Chemical Usage	
Average cost of Chlorine	2.17
Average cost of Fluoride	13.51
Total Cost to Pump and Treat	$187.79
CO2 produced @ 2.216 lbs per kWh	4,334.50 lbs
CO2 in tons	2.1673 tons

A Focus on Energy Report from May 2004 provides statewide emissions factors of 2.216 pounds of CO2 produced per kWh. That equates to 4,334.5 pounds of CO2 produced for every million gallons of water pumped. Madison Water Utility is enrolled in the Green Power Tomorrow program with MG&E and is purchasing 2,265,900 kWh of Green Power Tomorrow electricity. This purchase will offset electricity use at an annual cost of $22,659. The annual offset of CO2 will be 5,021,234 pounds.

Conservation benefits attributed to this topic would be that for every 1million gallons of water that the utility avoids pumping, the result would be a savings of $187.79 in 2007 dollars, and the prevention of 4,334.50 pounds of CO2 being put into the air.

WATER CONSERVATION PLAN

This plan has been compiled for the City of Madison Water Utility as a guidance document to **maintain the current annual rate of groundwater pumping**, excepting growth in new areas, provided that the recharge rates in new areas are sustainable. In the City of Madison, annual pumping has remained steady at about 11.3 billion gallons per year for the past 10 years. The introduction of water-saving appliances has assisted in conserving water at every level. The loss of high water demand industries has also contributed to the reduction in the growth of consumption. The University of Wisconsin and Oscar Mayer have also implemented aggressive conservation plans.

In order to maintain the current pumping level, however, certain measures will need to be put in place to further reduce the per capita use. Consequently, a secondary objective is to **reduce the residential per capita water use by 20% by the year 2020.** The current average for residential water use is about 73 gallons per day (5-year average, 2002-2006). In order to meet the 20% goal, each person would need to decrease their daily water use by about 15 gallons, which corresponds to a residential goal of **58 gallons per day**.

Because the Madison Water Utility has different types of customers who use water in very different ways, the conservation steps outlined in this plan are broken into sections corresponding to each of these groups. Included are sections for residential, commercial, industrial, and municipal/government accounts, as well as the University of Wisconsin.

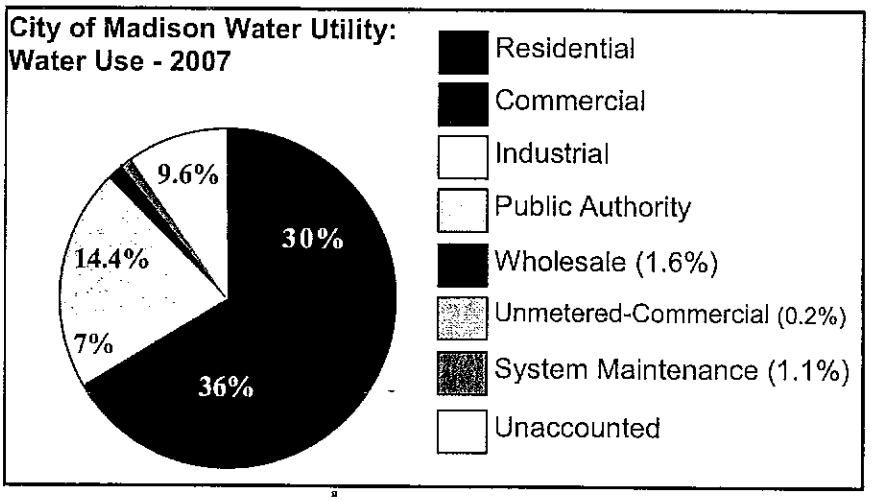

Figure 6: Percent Annual Water Use by Water Utility Customers, 2007

RESIDENTIAL

Goal: To reduce per capita residential use of water by 20% by 2020.

The 55,000 residential accounts in the City of Madison far exceed the number of commercial, industrial and municipal accounts, though representing only 41% of metered sales.

Water Use Statistics

Nationwide, daily **indoor** water use per capita is 69.3 gallons. By installing all high-efficiency fixtures, this daily use drops by about 35% to 45.3 gallons. The breakdown by activity follows:

Table 1: Indoor Water Use (Vickers, 2002)

Use	Gallons Per Capita Per Day– Typical	Gallons Per Capita Per Day-Conservation
Showers	11.6	8.8
Clothes Washers	15.0	10.0
Dishwashers	1.0	0.7
Toilets	18.5	8.2
Baths	1.2	1.2
Leaks	9.5	4.0
Faucets	10.9	10.8
Other Domestic Uses	1.6	1.6
TOTAL	**69.3**	**45.3**

In the City of Madison, the residential average daily use per capita (indoor and outdoor) is about 73 gallons per day. By 2020, the City of Madison is expected to have over 245,000 residents, assuming a growth rate of 1.1%. Reducing per capita residential water use by 20% by 2020 would keep total residential water usage approximately equal to, or perhaps slightly less than current rates. The daily average use would need to be about **58 gallons per person**. This is the foundation for being able to maintain the current annual pumping rates, which is the overall goal. Progress toward this goal shall be measured using a rolling 5-year average in order to minimize fluctuations due to weather variations.

Water Utility staff recently compared average water use of an established, older neighborhood and a new neighborhood to see if higher-efficient appliances/fixtures in the newer homes have an impact on average water use. Data was derived from a cross-section of 1,029 customers in seven different billing routes, some of which were in the older neighborhoods and some in newer. The results, surprisingly, indicated a near-identical water use between the two neighborhoods. It does not appear that the newer homes exhibit any greater water efficiency than the older homes. It is difficult to determine how much water use can be attributed to irrigation in the larger lot sizes (pervious area) because there seems to be a greater correlation with home size

(impervious area), which would no doubt relate to more people in the home consuming water for all household purposes.

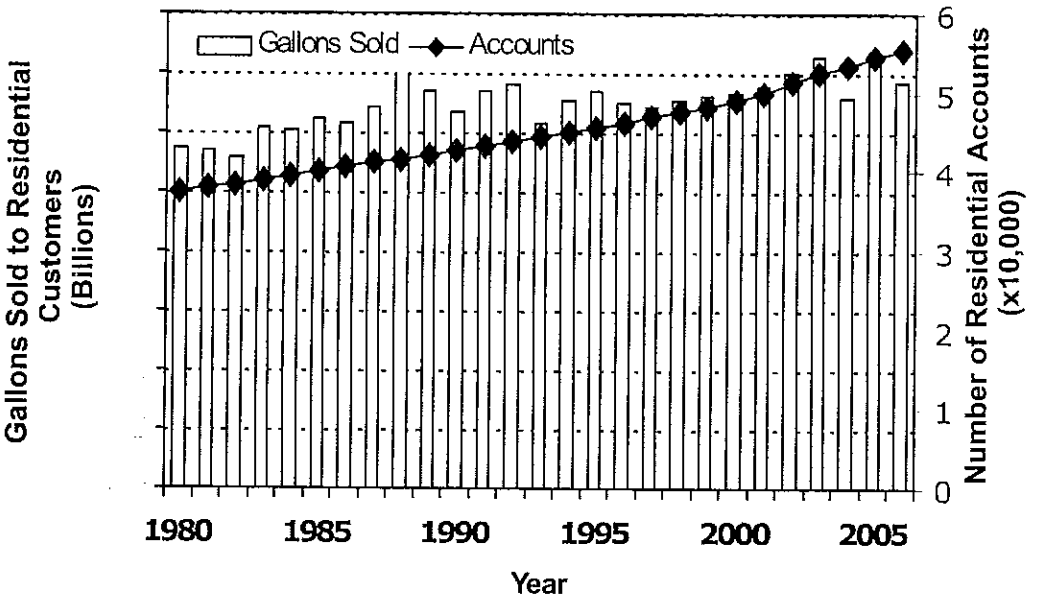

Figure 7: Gallons of water pumped by City of Madison Water Utility and the number of customers served (1980-2006) (data from Madison Water Utility)

Seasonal Water Use

For many residents, water use increases significantly in the summer due to outdoor activities such as car washing, lawn care, and swimming pool use. According to the EPA, lawn care makes up about ⅓ of all outdoor water use nationwide. Also, when using a hose to wash off sidewalks and driveways, about 50 gallons of water is used every 5 minutes.

In some municipalities, ordinances related to outdoor use are put in place to control the increased demand for water in the summer. According to the University of Wisconsin Extension office, an established lawn requires only about 1 inch of water each week, and it is best to water just once per week to encourage vigorous root growth. In addition, watering during the middle of the day causes most of the water to be lost to evaporation before it has a chance to infiltrate. However, many homeowners can be seen watering their lawns nearly every day and often during the hottest time of the day.

While encouraging indoor water conservation will continue to be an important aspect of groundwater sustainability, water-efficient appliances make this a fairly easy step for many homeowners. Outdoor water conservation will likely have the biggest impact from

the residential sector. A recent analysis of one residential billing group showed a 25% increase in summer over winter use.

The Utility has a 6-month billing system, and residents fall into one of six billing cycles. This can make it difficult for the Utility to estimate monthly residential use as well as for homeowners to track their prior use. The amount of water *pumped* is tracked monthly, though this does not necessarily reflect the amount of water that is *sold* each month as the Utility needs to pump more water than it sells. Figure 9 shows the total monthly pumping rates in 2007 for all classes.

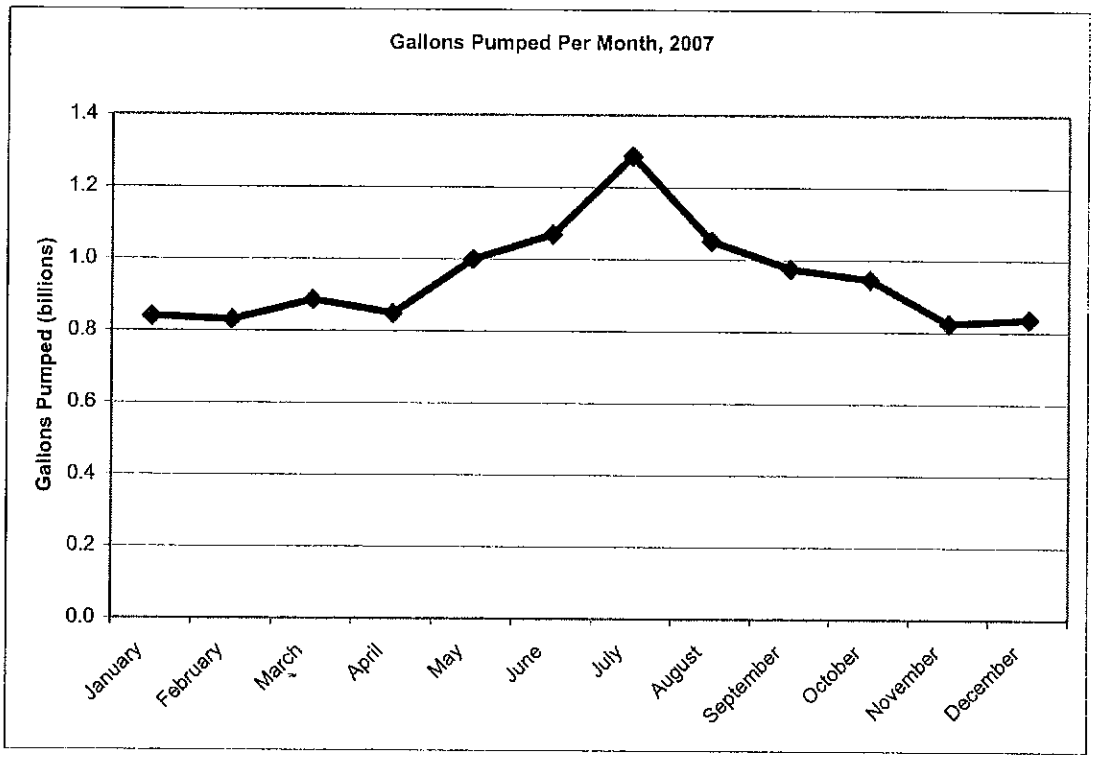

Figure 8: Gallons of water pumped per month by City of Madison Water Utility in 2007

Water Rates

Basic economic principles dictate that higher prices will decrease demand for nearly any good, and water is no exception. Conservation rate structures create a higher rate charge when water use exceeds a predetermined level. Rate structure may also have multiple tiers with increasing rate associated with each subsequent tier. Western Resource Advocates, a non-profit environmental law and policy organization, recently evaluated thirteen Colorado utilities on their water conservation strategies. One component of their analysis was the rate structure. Ten of the thirteen Colorado utilities employed an inclining block rate structure in which a higher per unit charge is imposed when a threshold is exceeded.

Moving to a system of rates that actively promotes conservation needs to be done carefully to minimize impacts on low-income residents while also maintaining an adequate revenue stream. Changes to billing frequency and incorporation of new software need to be addressed, both of which generate additional costs. Despite these added costs, communities across the country are implementing conservation rate structures. Madison Water Utility is committed to doing what is best for customers and the long-term sustainability of our water resources, and so shall analyze the costs and benefits of making such a switch.

Currently, the Water Utility uses a declining block rate structure for all classes of customers. Only the biggest water users benefit from the declining rate structure. The **average residential customer (a 2.5 person household) uses 45 CCF every six months or 184 gallons per day.** The Madison Water Utility should consider a conservation rate structure in its 2009 rate case.

Table 2 provides examples of inclining rates for Ann Arbor, MI, Boulder, CO, Tucson, AZ, and Waukesha, WI. Boulder and Tucson are arid, and water resources have been an historic issue. Waukesha has well contamination problems and is undertaking water conservation strategies to assist the City's interest in tapping Lake Michigan's surface water.

As indicated in Table 2, both Ann Arbor and Tucson have used a low rate price point around 15 CCF (61 gallons/day), which is similar to the City of Madison's 20th percentile ranking (20% of all residential customers use 15 CCF or less). This could be described as "subsistence water use level." Waukesha purports to have a conservation rate structure but has set its second rate step so high that few residential customers would be affected.

The staff of the Wisconsin Public Service Commission have informed the Water Utility that the commission has reservations about a conservation rate structure for communities that bill less frequently than four times per year. The Water Utility has projected in its 2010 and 2011 budget years funding for an automatic reading system (AMR) that would enable the utility to bill on a quarterly or monthly basis. This would then meet the PSC's requirement to implement a conservation rate structure.

With these issues in mind, a sustainable rate structure has been proposed in Table 2 for Madison. Inclining rates were calculated based on four different levels of water use. The lowest water users fall into the 20th percentile of current use rates, "the subsistence level." The next level is what a Madison family would use if the 20% reduction goal were met, "the conserving level." The third level is what the current average Madison family uses, the "median level," and the final level shows the 80th percentile of water use (highest water users).

Table 2 also proposes a rate structure for 2009 for illustrative purposes. (The actual rate structure proposed will be determined based upon the PSC procedures.) The proposed

rate structure would not increase for the lowest level of usage. To address the issue of the semi-annual bill, the Water Utility should point out that the cost differences at the various rate steps are reasonably in accord with the current rate structure and the fact that the City could bill quarterly in five to six years.

Table 2: Examples of Conservation Rate Structures

Muncipality	Billing Cycle	Base Meter Rate - 6 Months	Rate Per CCF (748 Gallons) Rate Steps		Rate/CCF	Semi-Annual Cost for Madison Residential Customer 20th Percentile	Conserving	Median	80th Percentile
Semi-Annual Consumption (CCF)						15	36	45	55
Average Daily Use (Gallons)						61	148	184	225
Ann Arbor, MI	Quarterly	$ 22.50	0.0	14.0	$ 1.07				
			14.0	56.0	$ 2.25	$ 39.73	$ 86.98	$ 107.23	$ 129.73
			56.0	90.0	$ 3.61				
			>90.0		$ 4.95				
Boulder, CO	Quarterly	$ 51.30	0.0	33.7	$ 1.41	$ 72.45			
			33.7	56.2	$ 1.87		$ 103.12	$ 119.95	$ 138.65
			56.2	84.2	$ 3.78				
			84.2	112.3	$ 5.61				
			>112.3		$ 9.35				
Tucson, AZ	Monthly	$ 32.52	0.0	15.0	$ 1.17	$ 50.07			
			15.0	30.0	$ 4.09				
			30.0	45.0	$ 5.78		$ 232.80	$ 284.82	
			>45		$ 8.03				$ 365.12
Waukesha, WI	Quarterly	$ 39.00	0.0	80.2	$ 1.95	$ 68.25	$ 138.45	$ 156.00	$ 175.50
			80.2	107.0	$ 2.20				
			>107		$ 2.70				
Madison, WI	Semi-Annual	$ 25.50	0.0	500.0	$ 1.20	$ 43.50	$ 68.70	$ 79.50	$ 91.50
			>500		$ 0.86				
Madison, WI A Proposed Sustainable Rate Structure for Residential Customers.	Semi-Annual	$ 27.50	0.0	15.0	$ 1.20	$ 45.50			
			15.0	40.0	$ 1.30		$ 72.72		
			40.0	55.0	$ 1.32			$ 84.50	$ 97.70
			>55		$ 1.38				

Toilet rebate program

By federal law, manufacturers may not make a toilet that uses more than 1.6 gallons per flush (residential and commercial). A model that uses 1.6 gallons per flush (GPF) is considered a "low-flow" toilet, whereas a high-efficiency toilet (HET) uses no more than 1.28 GPF. The Water Utility proposes to create a new program that would offer incentives to replace old, inefficient toilets with high-efficiency models, similar to the lead pipe replacement program that the utility offered in past years. Pending Public Service Commission approval, the city would work with local plumbers and retail outlets to offer a rebate for the installation of a high-efficiency toilet. In order to receive the rebates, residents would have to prove that older toilets were actually replaced, and each household would be eligible for a rebate on only one toilet. Final details of the program are yet to be determined.

Residential water audit

Most residents simply do not realize how much water they use at home or what they can do to reduce their consumption. The water utility could offer audits of home water use in which utility employees would analyze all water-using appliances and systems. The homeowners would be informed about cost effective ways to reduce their in-home water consumption. Given the staffing burden this could potentially pose to the utility, there would need to be a charge for the service, but it is anticipated that a rebate might be able to cover the cost of the audit if additional steps are taken as a result of the audit, such as replacing toilets, faucets, washers, etc.

Currently, if a customer has an unusually high water bill, water utility staff will send a letter and set up an in-home audit for leak detection. The Water Utility does about 150 audits each year.

Landscaping

Many non-native plants that are used for landscaping purposes require much more water than native species. Using native plants that are adapted to local climate conditions and can withstand seasonal droughts will be encouraged and promoted by the utility and other city departments.

Several cities across the U.S. have already created landscape ordinances for new development that encourage water efficiency. The City of Santa Cruz (CA) enacted a municipal ordinance to promote water conservation in order to control the peak summer water demand. They require a landscape and irrigation plan for new commercial, multi-family, and single-family lots over ½ acre as well as for current customers who are required to modify their landscape in conjunction with a land use approval process. A city water conservation office approves the plans. Requirements include a separate water

meter for irrigation purposes, a landscape water budget, and an irrigation /landscape design.

Education and outreach

The Water Utility will work with SustainDane to publicize and promote the water conservation kits and rain barrels that they provide. They will also continue to provide support and speakers as requested to schools and community organizations to promote education about the importance of water conservation. During times of high water use (hot, dry periods), the utility will continue to run public service announcements reminding residents of the importance of reducing water use and how to do so.

The Utility and City will actively promote the EPA's WaterSense labeling program for toilets, washers, showerheads and irrigation sprinkler systems and will lead by example by choosing WaterSense labeled products for city facilities.

The Water Utility is also getting involved and making a financial commitment to locally promoting 'Green*Plumbers*'. This is a national accreditation program that educates plumbers on new, water-saving techniques and general water conservation. The program's goal is to reach 40,000 plumbers nationwide.

Bottom Line

The five most important actions residents can take to conserve water are:

1. Fix leaks
2. Replace old toilets (largest water user in the home)
3. Replace clothes washer (second largest water user)
4. Plant the right plants
5. Water only what lawn/gardens need

COMMERCIAL

Goal: Promote water conservation through rebate promotions and education

For billing purposes, commercial accounts refer to businesses as well as multi-family housing (more than 3 units). Conservation strategies for this customer class, including targeted rebates, education, ordinances, and a certification program, are briefly described below. The strategies described represent a suite of options available to the utility for consideration.

Multi-family/commercial property high-efficiency toilet rebate

Apartment property owners/managers could be eligible for a rebate for replacing a 3.5-gallons per flush (GPF) or higher toilets with a new, higher efficiency toilets that use 1.6 GPF or less. Other utilities offer rebates of $25-$250, where the size of the rebate depends on the efficiency of the replacement toilet.

Denver Water offers a $25 rebate for replacement of an older toilet with a qualifying. low-flow unit that uses 1.6 GPF or less. Commercial customers are eligible for a $125 rebate when they replace an older toilet with a high-efficiency model that uses 1 GPF or less. Denver also offers a rebate of $200 per unit for the replacement of urinals with models that use 0.5 GPF or less. Similarly, Marin Municipal Water District (CA) offers a $250 rebate and the Contra Costa Water District (CA) offers a $175 rebate for the replacement of a 3.5-GPF toilet with one rated at 1.28-GPF or less.

Water utilities in the cities of Sioux Falls (SD), Seattle (WA), and Aurora (CO) offer owners of multifamily housing and commercial establishments rebates that range from $50-$100 for the replacement of older, less efficient toilets. Seattle offers a free high-efficiency toilet (rated at 1.28-GPF) or $80 rebate to replace toilets installed before 1994. Some communities such as Boulder, CO, allow unlimited high-efficiency toilet rebates, while others impose a cap. The city of Aurora limits the rebate to $10,000 per property.

There do not appear to be many programs offering rebates for installing high-efficiency toilets in newly constructed buildings, likely because new toilets are all 1.6 GPF or less. Most programs do not provide recycling or disposal of old toilets. The Santa Clara Valley Water District provides a list of toilet recyclers and their fees, for informational purposes.

The high-efficiency toilet rebate program could also include waterless urinals, which use no water and have no flush. They use a liquid-filled trap in the drain of the unit to allow liquids to flow through while blocking sewer odors. The Dedham-Westwood Water District (MA) offers rebates of $100 for installation of waterless urinals in new construction and $200 for the replacement of conventional urinals.

Commercial laundry equipment rebate

Commercial accounts would be eligible for a rebate, based on the number of gallons saved per year over the previous machine. Before implementing this rebate program, the

utility should survey existing laundry facilities to determine the extent to which these establishments are already using water-efficient washers. In addition, the utility would need to establish whether the rebate was dependent on the type of equipment replaced, i.e. coin-operated top/front loading equipment or larger industrial units used by linen/diaper service companies, hospitals, and hotels. Denver (CO) offers a $150 rebate for each domestic-size, coin-operated laundry machine that replaces an older, inefficient one. Commercial accounts in Boulder (CO) are eligible for $100 per machine rebates for qualifying water-efficient washing machines; there are no limits on the number of eligible rebates per account.

The Contra Costa Water District (CA) offers a rebate of up to $220 for the purchase or lease of a high-efficiency commercial washer, coupled with a $130 rebate from Pacific Gas and Electric Company. There is no requirement that the efficient washers replace older models. However, washers must be installed in commercial laundries or multifamily developments. Seattle (WA) offers rebates up to $100 for the purchase of high-efficiency commercial or shared washing machines. The exact amount of the rebate depends on the efficiency of the machine.

Commercial dishwasher rebate

Commercial accounts could be eligible for a dishwasher rebate whose value is based on the number of gallons saved per year over the previous machine. For example, Marin Municipal Water District (CA) offers a rebate of up to $500 for the five-year lease of a water-efficient commercial dishwasher.

Targeted education and outreach to promote water conservation

Specific commercial enterprises that could be targeted for education/outreach include the hospitality industry, nursing home/retirement communities, hospitals/medical centers, carwashes, business parks, laundromats/linen service, and landscaping. Specific educational materials would be provided in conjunction with any rebate or incentive program. Examples of some proposed outreach activities are provided below.

1. Encourage/provide incentives (rebates) for replacement of older, less-efficient washing machines in

    - Hospitality Industry
    - Laundromats
    - Linen/Diaper Service
    - Hospitals
    - Nursing Homes

2. Encourage/provide incentives (rebates) for replacement of 3.5-GPF or higher toilets with high efficiency toilets in all commercial and multi-family buildings.

3. Provide/promote use of "Request linen washing" cards to the hospitality industry.

4. Promote landscaping/xeriscaping with native plants that minimizes need for watering due to their natural suitability to the existing climate. Landscaping companies would be the primary audience; however, owners of all commercial properties including business parks, retirement communities, nursing homes, shopping centers, and medical clinics with extensive green spaces would also be targeted. In addition to promoting native landscaping, information on plant watering requirements, ideal times for watering, and water-conserving irrigation/watering systems will also be provided. Seminars or workshops on native landscaping also would be planned.

5. Recommend water audits or leak detection surveys to reduce water waste from leaky toilets, faucets, and showers in

   - Multi-family housing
   - Hotels/motels
   - Restaurants
   - Shopping centers/malls
   - Office/business parks

6. Provide best management practice information to car washes and provide certification to those car washes implementing water conservation techniques.

Proposed ordinances

New ordinances that should be considered for implementation are as follows

1. *Water sprinkling ordinance*
   Many communities in water-scarce areas such as Southern California and the arid Southwest impose water-sprinkling restrictions that limit the times of day and/or days of the week when watering may occur. In 2006, Waukesha Water Utility imposed restrictions that limiting watering to two days per week. The ordinance also requires that watering takes place before 9 a.m. and after 5 p.m. The decision to impose water restrictions was driven by water quality issues at a number of city wells, specifically radium levels that exceeded federal drinking water guidelines.

   Currently, the Madison Water Utility General Manager has the authority to impose mandatory or voluntary outdoor water use restrictions. This authority is described in Madison General Ordinance 13.04. Although the utility has the authority, it has not been exercised in the past. Previous general managers have preferred education and public service announcements promoting water

conservation rather than imposing mandatory restrictions. It is our goal to implement a sprinkling ordinance by 2010.

2. *Replacement of all 3.5-GPF or higher toilets*
   Similar to the lead service replacement program for residential customers, all multi-family housing units and other commercial customers would be encouraged to replace all 3.5-GPF or higher toilets with a more efficient (1.6-GPF or less) toilet during a ten-year window. The City of Madison Water Utility would share the cost by offering a rebate available once it was shown that a less efficient toilet was actually replaced by a more efficient one.

3. *Landscape ordinance*
   Examples of directives included in a landscape ordinance could include downspouts directed to turf instead of pavement and requiring a 'water-friendly' landscape plan with new or major reconstruction.

   One component of LEED™ (Leadership in Energy and Environmental Design) certification is the use of water efficient landscaping. More communities are starting to require or encourage LEED™ certification, and so water efficiency will naturally become more important in building design.

4. Car wash reclamation ordinance
   New automatic car washes or existing car washes that upgrade/enlarge their service facility must recycle at least 50% of the water used.

5. *Revise credit meter program and costs*
   Currently, residential and commercial users frequently install 'sewer deduct' meters as there is no initial cost to install from the Water Utility. Installation cost charged by plumbers depends upon the complexity of the plumbing. Once installed, the meter base charge is determined by the size of the meter.

Certification program for businesses that are "water efficient"

Working with partners in the business community, the Water Utility would establish a program for certifying businesses that are "water-efficient." Water efficiency could be demonstrated by evaluation of historic water use at a facility, conservation/water efficiency practices/programs implemented, and the results of a water audit for the facility. Partners would collaborate with the Water Utility to establish the standards, a monitoring program, and promotion of the certification program. Alternatively, the business community could develop a certification program independent of the Water Utility, which could serve as a technical advisor to the program.

Water efficiency is already a part of the Wisconsin Department of Tourism's existing "Travel Green Wisconsin" program, which certifies businesses in the restaurant and hospitality industries on a voluntary basis. The standards do not contain many specific

targets, however; they simply ask businesses if they engage in water efficient practices. These standards could be updated with specific targets.

INDUSTRIAL

Goal: To have a water conservation plan in place for each industrial customer

There are 23 industrial customers in the City of Madison, and they account for 10% of the total water use. Although this is a small number of customers, the opportunity for water savings in this area is significant. Water conservation generally falls into three categories: reducing water usage, reducing water loss, and reusing water that is currently being discarded.

Industrial Customer Water Conservation Plan

Step one in preparing an individualized plan is to prepare and gather pertinent information from company and utility records. This information is gathered using a pre-audit checklist, which would include the following:

1. People who are familiar with the industrial customer's daily operations
2. Building and location information, facility floor plans, plumbing schematics and drawings, operating schedules, number of employees, location maps identifying each water supply meter, and all sub-meters
3. Inventory of plumbing fixtures and all water-using equipment
4. Outdoor water use data, utility records that show water and sewer use, and any prior water and energy audits

Step two would be to perform a site audit of each industrial customer. An initial onsite water audit of all water-using equipment and processes would be used to identify water use. This includes a detailed examination of where and how much water enters the system, and where and how much water leaves the system. Water system audits assess current water use, provide data needed to reduce water and revenue losses, and forecast future demand. With this information, system improvements can be identified where conservation efforts are most needed. Follow-up audits would be conducted twice per year to check on each customer's water conservation progress, inform industrial customers of new water conservation practices, answer customer questions, and educate employees. In order for a water conservation program to succeed, it is important that a good record-keeping system be established to monitor operation and maintenance costs, revenues, and water use.

Step three is preparing an audit report. After the completion of the physical inspection of the facility, in which each water-use area is carefully examined, and water-use data is recorded, it is important to develop a final audit report. This report will provide a baseline for water conservation efforts.

Step four is to identify water conservation opportunities and to develop a site-specific water conservation action plan for the industrial customer. Based on the information

gathered, potential opportunities for reducing water usage, reducing water loss, and reusing water are identified. The following systems should be evaluated for efficiency and water conservation opportunities: cooling towers, boilers, flow meters and sub meters, automated controls, landscaping, irrigation, single-pass cooling, gray water, and reverse osmosis or de-ionized water. In some cases, water-using equipment can be replaced. In other cases, retrofitting existing equipment will be appropriate.

Similarly, a review of opportunities for improvements in equipment maintenance and repair should be completed. The following areas should be reviewed: plumbing fixtures, recirculation pumps, leaks, reused or recycled water systems, proper cleaning and sanitation of equipment, instrumentation-pH meters, total dissolved solids measuring devices, monitoring equipment for correct rinsing process, flow valves, flow restrictors, shut-off valves, reducing valves, solenoid timers, and water meters. Procedural changes can often result in substantial water savings. Furthermore, water conservation measures often pay for themselves by reducing energy costs. Once water conservation opportunities have been identified, a water conservation action plan is developed.

Step five is educating employees and involving them in water conservation efforts. Employees can have a major effect on the success of a water conservation program. It is important to educate and train key employees to make conservation efforts the most effective. Employees must be informed about the program and be made an integral part of the water reduction effort. An important part of this process is the formation of a water conservation and energy team within the organization, though the facility's water conservation goals should be shared with all employees. Industrial customers should educate employees about costs for water, sewer and electrical. These costs should be logged periodically. It is important for the industrial customer to stress to employees that even small projects can produce large savings in water consumption and to publicize water conservation successes--internally and externally. The Water Utility would provide educational materials specific to each customer's need, based on the site audit and water conservation plan.

Water Conservation Award

The Water Utility should consider an awards program to reward and honor industrial customers for their water conservation successes. The Water Utility would present a suitable plaque or certificate of achievement to the chosen industrial customers.

Winners could be selected based on the results of their water conservation efforts in the following areas: landscape and irrigation, plumbing fixture retrofits, quality and effectiveness of the water conservation plan, water leak detection, water recycling or reuse, innovative water conservation measures and methods, overall reduction of water use, and implementation of public education and community relations programs.

Funding for Public Water Conservation Education Programs

In order to make the water conservation effort as successful as possible, a public water conservation education program is essential. Industrial customers may be willing to help fund educational materials for water conservation youth programs or retrofits in low-

income homes. They could also work with Focus On Energy to assist customers in attaining available rebates. Rebate information would be published as part of the educational materials in the public water conservation education program.

MUNICIPAL

Goal: Governmental buildings shall enact water saving programs that support the main goal of maintaining sustainable pumping levels

The municipal division comprises the governmental entities of the City of Madison, Dane County, State of Wisconsin, and Federal government. All buildings that are serviced by the City of Madison Water Utility of these government entities will be included in the Water Conservation Program.

City of Madison Water Utility

The most important section of the City of Madison is the Water Utility itself. The enacting of water conservation measures within the Water Utility can serve as a model for other governmental buildings as well as the public at large. Before conservation measures are implemented, an audit shall be performed of all Water Utility buildings, and toilets, showerheads, and sink aerators will be checked for compliance with current water conservation standards for new construction. The amount of water that is dumped from reservoirs into the storm drains will also be investigated. The flushing program implemented to reduce manganese from the water supply will be inspected. The placement of water meters at the wells and other peripheral buildings will be explored for feasibility. All new Water Utility buildings will be built with water conservation measures in mind.

The following are water saving programs that could be instituted at the Water Utility:

Emphasize and expand the leak detection program
Many leaks in the water distribution system go undetected. By purchasing more leak detection equipment and devoting work-hours, we can reduce leaks. Older pipes and those in areas prone to main leaks will be checked on a systematic basis. The El Paso Water Utility has enacted a leak detection program using devices called "loggers" placed on valves that in three years of use have saved 725 million gallons of water (Buehrer, 2008).

Install low-flush toilets, low-flow showerheads, and sink aerators
Following the internal audit, old toilets shall be replaced with high-efficiency models, showerheads changed to low-flow, and aerators placed on sinks without them.

Quantify water use by utility through better record keeping
Increase the amount of data gathered on Water Utility water use activities and centralize data for ease of accessibility and comparability. New data gathered includes amount of water used during hydrant flushing, amount of water lost when reservoirs are dumped, and amount of water lost from a main break. Gather data from the Fire Department about

amount of water used to extinguish a fire. This new data could be compared to the amounts of water that are unaccounted for when compiling the annual audit of water pumped. A new central computer system could be implemented to ease the ability of pulling up data and comparing water use against various variables.

Installation of meters in wells
Water Utility wells currently do not have meters for the water that is used inside a well, i.e., for toilets and sinks. The feasibility of placing meters in the wells will be investigated. By having meters in the wells, the Water Utility can better monitor how much water is being used and if leaks occur.

Hydrant flushing
Historically, the Water Utility has employed conventional flushing twice a year to remove mineral sediment from water mains. Unidirectional flushing was begun in 2005 as a better technique to scour the water mains and remove sediment. The utility will continue to evaluate its flushing program to minimize the amount of water needed to clean the pipes. Ongoing research at the utility is expected to provide guidance on the frequency needed for flushing.

Well operation and maintenance
The operation and maintenance of a municipal well occasionally requires pumping the water to a sanitary or storm water sewer. The Water Utility should maintain better record keeping for how often these events occur and how much water is pumped to waste. Periodic review of this data should identify potential water conserving strategies for well operations and maintenance.

Use of rain barrels/ rain gardens
Rain barrels can be used at all Water Utility buildings to catch rainwater and reuse the water for lawn/flower watering. Rain gardens may be used to reduce runoff where appropriate. In the building of the new Operations Center, the use of rain barrels and rain gardens should be included.

Other Governmental Buildings (City, County, State, and Federal)

Audits will be performed of all other governmental buildings served by the Water Utility. Individuals in charge of the buildings may perform the audits. A questionnaire would be provided to assist individuals in auditing their own buildings, and further information will be provided to explain potential water saving programs. Ordinances and/or other legislation could be put in place to bring governmental buildings under a predetermined "Green" standard. Information about water saving programs will be made available on the Water Utility website.

Water conservation measures may include replacing old toilets, installing sink aerators, and installing rain gardens and rain barrels. The Madison Common Council recently adopted a Green Building Resolution proposed by Alder Satya Rhodes-Conway that will require any new or substantially renovated city-owned building to be certified under the

LEED© standard. This standard ensures new city buildings will be as energy-and water-efficient as possible.

UNIVERSITY OF WISCONSIN

The University started a water conservation program in 2002 (Dave Bonfield, UW Plumbing Shop Supervisor, Personal Communication). The plan included replacing old toilets with high-efficiency models and installing sink aerators and low-flow showerheads, and removing urinal flush tanks. Due to new construction and major remodeling, he estimates that 90% of the toilets on campus are now high-efficiency. While the showerheads have been accepted by users, the sink aerators were not very popular, and so some may have been altered. Since the inception of the water conservation program, daily water use has decreased by about 30%.

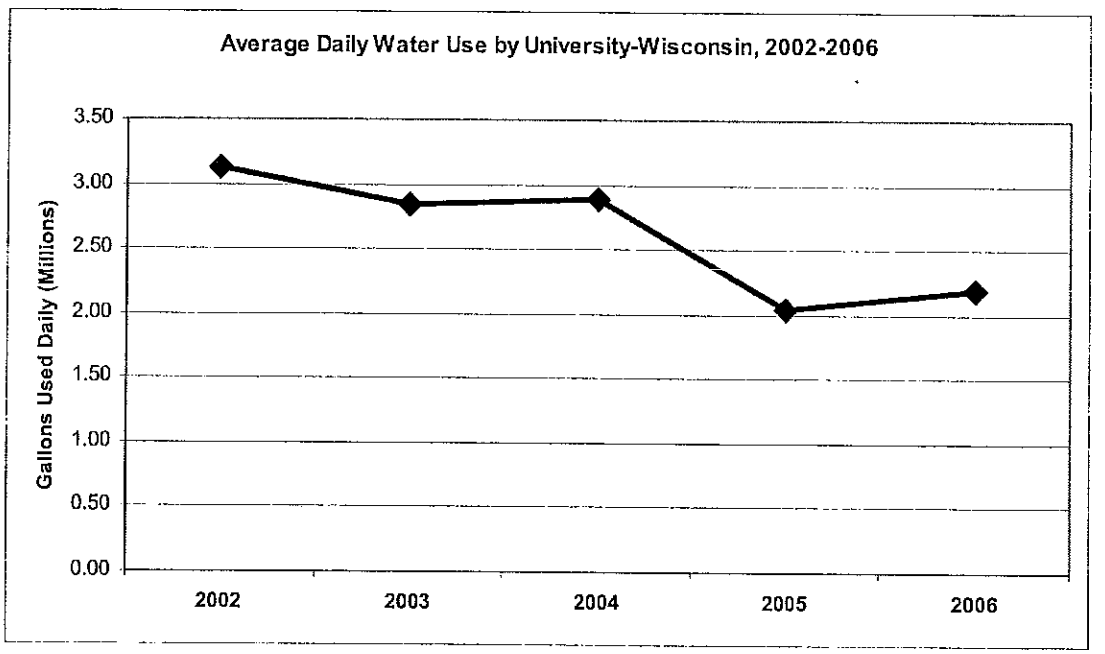

Figure 9: Average Daily Water Use at UW; data does not include dorms on Johnson Street or buildings south of University Ave or East of Randall Ave.

SUMMARY OF EDUCATIONAL COMPONENTS

RESIDENTIAL

- The promotion of the (future) **toilet-rebate program** will be an important educational opportunity for water conservation
- **Rain barrels** may be installed at some MWU facilities for demonstration purposes to allow the public to see their operational features. **Rain gardens** may

be used to reduce runoff where appropriate. MWU will incorporate the use of rain barrels and rain gardens in the renovation of the Operations Center Vehicle Maintenance Facility

- The Water Utility will continue to **provide support and speakers**, as requested, to schools and community organizations to promote education about the importance of water conservation.
- During times of high water use (hot, dry periods), the utility will continue to run **public service announcements** reminding residents of the importance of reducing water use and how to do so.
- The Utility and City will actively **promote the EPA's WaterSense** labeling program for toilets, washers, showerheads and irrigation sprinkler systems, and will lead by example by choosing WaterSense labeled products for city facilities.
- The Water Utility is getting involved in and will be making a financial commitment to locally promoting '**Green*Plumbers***.' This is a national accreditation program that educates plumbers on new, water-saving techniques and general water conservation. The program's goal is to reach 40,000 plumbers nationwide.

COMMERCIAL

- **Targeted education/outreach** to promote water conservation by commercial users is an important component of any educational program.
- **Offer educational information for clothes washers or dishwashers**, which would serve as an important educational component to several sectors of the commercial industry, specifically, the hospitality industry, nursing home/retirement communities, hospitals/medical centers, laundromats/linen service.
- Other incentive/rebate programs could include:
    - Commercial/multi-family **toilet rebate program**
    - Promotion of **"Request linen washing" cards** to the hospitality industry
    - Promotion of **xeriscaping**/landscaping with native plants that require minimal water once established
        - While landscaping companies would be the primary audience, owners of all commercial properties with extensive green spaces (business parks, retirement communities, nursing homes, shopping centers, and medical clinics) would also be targeted. In addition to promoting native landscaping, information on watering requirements, ideal times for watering, and water-conserving irrigation/watering systems will also be provided. Seminars or workshops on native landscaping could also be planned.
    - Recommendation of **water audits** or leak detection surveys to reduce water waste from leaky toilets, faucets, and showers in
        - Multi-family housing
        - Hotels/motels
        - Restaurants

    - Shopping centers/malls
    - Office/business parks
  - Provide best management practice **information to car washes** and provide certification to those car washes implementing water conservation techniques.

INDUSTRIAL

After developing **individual facility plans**, the final step is educating employees and involving them in water conservation efforts. Employees can have a major effect on the success of a water conservation program. It is important to educate and train key employees to make conservation efforts the most effective. Employees must be informed about the program and be made an integral part of the water reduction effort. An important part of this process is the formation of a water conservation and energy team within the organization, though the facility's water conservation goals should be shared with all employees. Industrial customers should educate employees about costs for water, sewer and electrical. These costs should be logged periodically. It is important for the industrial customer to stress to employees that even small projects can produce large savings in water consumption and to publicize water conservation successes--internally and externally. The Water Utility would provide educational materials specific to each customer's need, based on the site audit and water conservation plan.

- The Water Utility should consider an **awards program** to reward and honor industrial customers for their water conservation successes. The Water Utility would present a suitable plaque or certificate of achievement to the chosen industrial customers.

SUMMARY OF CONSERVATION GOALS

The following list is a summary of recommendations put forth in this plan. The goals within each category are listed in order of suggested priority.

	Objective: Maintain Current Pumping Levels			
	Recommendations	**Implementation**	**Timeline**	**Cost**
RESIDENTIAL	**Reduce per capita water use by 20% by year 2020.**	Concerted effort by customers, Water Board, Common Council, & Water Utility Staff	2020	
	Establish a toilet rebate program. Using the figures of the AWWA, Table 1, high efficiency toilets could reduce the daily water use by 10.3 gallons per capita or about 2,301,000 gallons per day or about the output of one well. This represents two-thirds of goal to reduce residential water use by 20% by 2020. A rebate of $100 per dwelling unit is considered a sufficient inducement to encourage the replacement of existing fixtures with high efficiency toilets. It is estimated that the total cost to the customer, using a licensed plumber would be approximately $350 per fixture. It is anticipated that a number of residents would undertake the work themselves. The sum of $250,000 representing 2,500 toilet replacements per year at $100 per dwelling unit has been requested as a part of the annual rate structure. This rebate program would be administered in much the same manner as the Water Utility's successful lead service replacement program, which is drawing to a close. As in the lead service replacement program, the Water Utility proposes to partner with the plumbing construction firms to undertake the work. Consideration will be given to the aspect of recycling the metal from the replaced toilets. The ceramic portion of the fixtures may not lend itself to recycling. Other communities have adopted more ambitious rebate programs including rebates for dishwaters and washing machines. However, the actual reduction of water consumption is harder to document than toilets and not affordable for the Madison Water Utility, at this time.	Water Utility Staff with Assistance from the Recycling Coordinator of the Street Division.	October 2008 (Subject to Rate Structure Approval)	$250,000 annually
	Provide customers with current consumption data The Madison Water Utility issues its bills twice per year to its customers. This does pose a challenge to customers who wish to monitor their water use. However, each customer does have a remote register that measures water use. Generally these registers are located on the side of the dwelling unit and measure consumption in cubic feet. This initiative would provide instruction to customers to track their water use on a monthly basis. Each customer will be mailed a card stock form, which can be used to determine their water use and convert the usage to gallons. In addition, a digital water use tabulator shall be developed so that the customer can load their usage on their computer along with the date and number of residents. The water use tabulator can calculate usage and compare that usage with typical customers. The estimated cost should be on the magnitude of $10,000, with programming. An additional $15,000 would have to be expended for public information.	Water Utility Staff with Vendor Programming Assistance.	January 2009	$25,000

	Enact inclining rate structure A modest rate structure has been proposed to the PSC (Wisconsin Public Service Commission). The rate request was 18%, reflective of the Utility's straitened financial situation. The concept of the proposed inclining rate structure was a rate structure for: 1. The lowest 20th percentile of usage at 61 gallons per day. 2. A Conserving Level at 148 gallons per day. 3. A median level at 184 gallons per day. 4. The 80th percentile at 225 gallons per day. A more aggressive rate structure may be proposed at such time as more frequent bills can be issued or that customers are able to tract their usage with practice.	Water Utility Staff and Wisconsin Public Service Commission	October 2008 (Subject to Rate Structure Approval.)	
	Investigate the Conversion of Water Meters to Provide for Quarterly Billing and the Potential of Monthly Billing (To make a switch from semi-annual to quarterly billing using a non-AMR system would be $417,000 in semi-annual operating costs.)	Water Utility Staff	2011	Capital cost of $5,370,000 in 2010, $5,370,000 in 2011.
	Enact Outdoor Water Usage Restrictions to Maintain Pumpage Below a Preset Daily Amount Section 13.04 of the Madison General Ordinances provides for Voluntary and Mandatory Restrictions for outdoor water usage, which is generally irrigation of turfed areas. In 2007, there were 29 days where pumpage exceeded 40 MGD, 11 days in which pumpage exceeded 45 MGD, and 3 days where pumpage exceeded 50 MGD. This goal would provide that voluntary restrictions be imposed whenever pumpage exceeded 45 MGD for 3 continuous days and manatory restrictions whenever pumpage exceeds 50 MGD for 2 continuous days. While not directly tied to water conservation, the enactment of water usage restrictions would save on electricity during high use days and inform the customer regarding the limitations of the system.	Water Utility Board, and Water Utility Staff	July 2008	$0
	Expand residential water audits from the current high-bill leak detection to include individual requests for onsite inspection/ personalized recommendations	Customer Service/ PIO/ Conservation Manager	Long Term	

	Offer appliance upgrade program for washing machines/ dishwashers	PIO/ Conservation Manager	Long Term	

	Recommendations	Implementation	Timeline	Cost
COMMERCIAL	**Target high-use customers with education/outreach to promote water conservation**		Short Term	
	Enact landscaping ordinance for new development/major redevelopment	General Manager	Intermediate	
	Offer appliance upgrade program (e.g., for laundromats)	PIO/ Conservation Manager	Long Term	
	Enact a certification program for water-efficient buildings	PIO/ Conservation Manager	Long Term	
	Enact a car wash reclamation ordinance	General Manager	Long Term	
INDUSTRIAL	**Perform individual audits for customers**	PIO/ Conservation Manager	Short Term	
MUNICIPAL	**Quantify water use by Water Utility with better record keeping**	Supply/ Operations	Short Term	
	Continue to minimize reservoir dumping	Supply	Short Term	
	Emphasize and expand the leak-detection program Requires purchase of new equipment and devoted work-hours	Operations	Short Term	
	Upgrade Water Utility bill with new software	Customer Service	Short Term	
	Install use meters in well buildings	General Manager	Intermediate	
	Audit other government buildings for water use	PIO/ Conservation Manager/ Facilities Manager	Intermediate	
	Reduce hydrant flushing as well filters are installed (when appropriate)	Engineering	Intermediate	

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