The Wisconsin Administrative Code, Chapter NR 811, Section 12(6) states:

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

(a) Identification of the groundwater flow direction.

(b) Identification of the zone of influence for the well consisting of the distance to one foot of aquifer drawdown at the anticipated final pumping rate when pumpage of the well is assumed to be continuous without recharge for 30 days. The zone of influence shall be calculated using the Theis Method with or without groundwater modeling unless another method is approved by the department.

(c) Identification of the recharge area for the well. The recharge area shall be calculated using the Uniform Flow Equation or be computer modeled unless another method is approved by the department.

(d) Identification of the potential contamination sources within 0.5 mile of the well location and an assessment of the potential for the existing contamination sources within the recharge area of the well to negatively impact the well water quality. The potential contamination sources shall be summarized in a table or list including distance and direction from the well site and shall also be shown on a map surrounding the well site. The table or list shall include information obtained by checking the department’s database of contaminated properties, established in accordance with ss. 292.12 (3), 292.31 (1), and 292.57 stats.

(e) Establishment of a well head protection area for the proposed well. The well head 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 well head protection area may be determined by a hydrogeologic investigation.

(f) A public education program for well head 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, which assesses alternatives for addressing potential contamination sources, describes the local ordinances, zoning requirements, monitoring program, and other local initiatives proposed within the well head protection area established in par. (e), and addresses maintaining the minimum contamination source separation distances established by well siting in sub. (5) (d).

(j) The well head protection plan shall be labeled with the name and signature of the person who prepared the plan, the date that the plan was signed, and the name of the company or water system which the person represents. An owner approval letter shall be submitted when required in accordance with s. NR 811.10.
APPENDIX B

SURVEY PLAT - UNIT WELL 17
Property Details For Parcel 070913338012 - Property Look-up - Property Information - C...

Property Search Results: Property Details

Property Details

**Owner(s)**
CITY OF MADISON
WATER UT
WELL # 17
119 E OLIN AVE
MADISON, WI 53713-1431

**Address**
201 S Hancock St

**Parcel Number**
070913338012

**Related Details**

- **Pay Taxes Online**
- **Sales for this Area**
- **Refuse Collection**
  - District: 07A
  - Schedule

**School Details**

District: Madison
- Lapham-Marquette
- O'Keeffe
- East

**City Hall**

Aldermanic District: 4
Ald. Michael Verveer
- **Who are my elected officials?**
- **Where do I vote?**

Property Value

<table>
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<tr>
<th>Assessment Year</th>
<th>Land</th>
<th>Improvements</th>
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<tr>
<td>2013</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
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Tax Information

- **Net Taxes:** $0.00
- **Special Assessment:** $0.00
- **Other:** $0.00
- **Total:** $0.00

Property Information

- **Property Use:** Vacant
- **Property Class:** Residential
- **Zoning:** PR, UMX, WP, 17
- **Lot Size:** 11,615 sq ft
- **Frontage:** 74 - S Hancock St
- **Water Frontage:** NO
- **TIF District:** 25
- **Assessment Area:** 6601

No Building record is available online for this parcel. Please contact the Assessor's Office for additional information.
Parcel information updated on Thursday, March 13, 2014 unless otherwise noted.

**Parcel Number** - 251/0709-133-3801-2

This Parcel is in the City of Madison. City of Madison parcel information is updated every Friday. Please view the [Assessor's Website](#) for the most up-to-date City of Madison information.

**Parcel Status:** Active Parcel

**Parcel Information**

- **Municipality:** CITY OF MADISON
- **State Municipality Code:** 251
- **Township:**
- **Range:**
- **Section:**
- **Quarter:**
- **Quarter-Quarter:**
- **Plat Name:** Plat Unknown - CITY OF MADISON
- **Block/Building:**

**Zoning Information**

Contact your local city or village office for municipal zoning information.

**Owner Name**

- **Owner Status:** CURRENT OWNER
- **Name:** CITY OF MADISON WATER UT WELL # 17

**Parcel Address**

- **Primary Address:** 201 S HANCOCK ST

**billing Address**

- **Attention:**
- **Street:** 119 E OLIN AVE
- **City State Zip:** MADISON, WI 53713 1431
- **Country:** USA

**Assessment Information**

- **Assessment Year:** 2013
- **Valuation Classification:** G1
- **Assessment Acres:** 0
- **Land Value:** $0.00
- **Improved Value:** $0.00
- **Total Value:** $0.00
- **Valuation Date:** 01/01/0100

**About Annual Assessments**

**Tax Information**

No tax information available.

Please click on the [Show Tax Payment History](#) link to verify if a recent payment has been processed. Processed payments and payment history are updated nightly.

**District Information**

No district references available.

**Tax Property Description**

For a complete legal description, see the recorded documents:

ORIGINAL PLAT, PART OF BLKS 269 & 271 - COM W COR BLK 271, TH S 45 DEG E ALG S HANCOCK ST 20 FT TO POB, TH CONT S 45 DEG E ALG SD ST 74 FT, TH N 31 DEG 55 MIN E 292.55 FT M/L TO NEW ST LINE OF WILLIAMSON ST, TH S 71 DEG 56 MIN W ALG WILLIAMSON ST 17.8 FT TO NEW SE LN OF WILSON ST, TH S 44 DEG 58 MIN W 268 FT M/L TO POB.

**Recorded Documents**

No document references found.

**DocLink Now Available!**

DocLink is a feature that connects this property to recorded documents. If you’d like to use DocLink, all you need to do is select a link in this section. There is a fee that will require either a credit card or user account. [Click here for instructions.](#)

- **By Parcel Number:** 0709-133-3801
- **By Owner Name:** CITY OF MADISON WATER UT WELL # 17

**Document Types and their Abbreviations**

**Document Types and their Definitions**

**Who to Contact With Questions**

Property and assessment questions can be answered by Real Property Listing.
Real property transaction and Recording questions can be answered by the Register of Deeds Office.
Tax questions can be answered by the Treasurer's Office.
Zoning questions can be answered by the Division of Zoning.

Back to Parcel Search Page
APPENDIX C

UNIT WELL 17 CONSTRUCTION REPORT AND FORMATION LOG
Hicap Well Report

County: 13 Dane
Region: 1 South Central Region
Basin: MRB Mississippi River

Hicap Well No: 7137
Image File Name: DN8307.TIF
PWS ID: 11302247
WUWN from Well Constr BF517
File #: 13 - 9 - 11
WUWN from GRN:

Owner ID: 81511
Mail To: OWNER
Operator ID: 81511

MADISON(CITY OF)-UTILITY

523 E MAIN ST
MADISON WI 53703

Phone:
- -

Email:

Owner Well No: 17
Hicap No Pump Code: 
QQ: SE Q: SW Sect: 13 Township: 7 Range: 9 Dir: E Govt Lot:

Latitude: Deg Min Method:

Longitude: Deg Min Location Tolerance (ft):

Civil Town Name: MADISON(CITY OF)

Street Addr: 201 SOUTH HANCOCK ST
City:

Well Name: BF517-CITY WELL #17-19

Comment:

Classification: Public Water Supply
Well Use: 

County Approval No: 11
Approval Date:

Status Date:

Normal Pumpage: 656 (1000 gpd)
Max Pumpage: 3312 (1000 gpd)
Pump Capacity: 2300 (gpm)

Trout Stream: [FT] [Miles] GM:

ERW/ORW: [FT] [Miles]
Water Loss:

Springs: [FT] [Miles]
Restriction:

Protected Spring:

Approval Status:

File Location: PUBLIC H2O
Driller: 582 LAYNE NORTHWEST CO

Screen [ ] Gravel Pack [ ] Multiple Aquifers [ ] Chief Aquifer: 05 Sandstone

Well Depth: 801.9 Depth to Rock: 135 First Rock Code: 05 Sandstone

Geology

Thickness

01 Unconsolidated Sand 60
02 Unconsolidated Clay 75
09 Cambrian 862
10 Pre-Cambrian 4.9

Diameter (IN) Length(ft) Depth(ft)

Enlarged Drillhole: 29 200.6
Lower Drillhole: 23 601.3
Primary Casing: 24
Liner Casing: 
Screen: 
Sealing: 

More than 2 drillholes

Yield Test Hours: 33.5 Static Water Level: 55 feet B
Gallons per minute: 2300 Pumping Water Level: 173 feet
Specific Capacity: 25.4 Pumpage Report Flag:

Created: 12/29/98 By: Migration Last changed: 11/13/12 By: SMAILR
## DNR Drinking Water System: High Capacity Wells

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<th>Value</th>
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<td>High Capacity Well Number</td>
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<td>BF517</td>
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<tr>
<td>DNR Region:</td>
<td>South Central</td>
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<td>County:</td>
<td>Dane</td>
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<td>Water Basin:</td>
<td>012 - Rock River (lower)</td>
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<td>Operator's Well ID:</td>
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<td>Operator Address:</td>
<td>523 E MAIN ST</td>
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<td>LAYNE NORTHWEST CO</td>
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<td>582</td>
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<td>Normal pumpage:</td>
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<td>Type of Rock:</td>
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<td>Chief Aquifer:</td>
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<td>Gravel Pack:</td>
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<tr>
<td>Depth to Rock:</td>
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<tr>
<td>Multiple Aquifers:</td>
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Note: All data is sourced from the Wisconsin Department of Natural Resources.
Drilling Method: Enlarged Drillhole
Depth: 200.6 feet

Enlarged Drillhole Diameter: 29 inches

Lower Drillhole
Diameter: 23 inches
Length: 601.3 feet

More than 2 drillholes: Y

Primary Casing
Diameter: 24 inches
Depth: 200.6 feet

Primary Casing
Length: feet

Liner Casing
Diameter: inches
Length: feet

Liner Casing
Depth: feet

Screen Diameter: inches
Screen Length: feet

Sealing Material Type: Cement Grout
Sealing Material
Depth: 200.6 feet

Yield Test Time: 33.5 Hours
Yield Test Pump
Rate: 3000 gpm

Pumping Water
Level: 173 feet

Static Water
Level: 55 feet
Specific Capacity: 25.4 gpm/foot

Image File Name: DN8307.TIF

Annual Well Pumpage (gallons)

Disclaimer: Please be advised that pumpage data may be measured or estimated. The method code provided by the owner/operator each year is displayed with the pumpage data. Because the pumpage data are submitted on paper forms, transcription errors may occur. Data for public water supply wells such as municipal wells will be available in the future. It is very important that the user of this data not make conclusions based on limited information such as one piece of data from one monitoring point. Instead, the data as a whole should be evaluated by a scientist or engineer who is experienced with such evaluations, considers changes over time, and takes into account the location of each well and changes in weather patterns. Pumpage for private residential wells is not displayed.

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<th>High Capacity Well No</th>
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<th>Method Code</th>
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<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
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<td>77137</td>
<td>2012</td>
<td>TFM</td>
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<td>48,825,000</td>
<td>64,900,000</td>
<td>65,378,000</td>
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Method Code Descriptions

Use Code Descriptions

Download
**Well name:** City of Madison, Wisconsin  
**Unit Well #17**

**Owner:** City of Madison, Wisconsin  
**Address:** c/o City Clerk, City Hall, Madison, Wisconsin

**Driller:** Layne-Northwest Company  
**Engineer:** John A. Strand & Assoc., Madison, Wisconsin

**Location:** SW^4^, NE^4^, SE^4^, NW^4^, sec. 13, T. 7 N., R. 9 E.  
**County:** Dane  
**Quad.** Madison West 7-1/2

**Dia. from to** | **Dia. Wgt. & Kind from to** | **Dia. Wgt. & Kind from to** | **Dia. Wgt. & Kind from to**
---|---|---|---
30" 29" | 0 144'9" | 30" Steel, 3/4" Prime | 0 200'7"
144'9" 200'7" | 144'9" 200'7" | 24" Steel, 3/8" Prime | 144'9" 200'7"
200'7" 801'11" | 200'7" 801'11"

**Grout Kind:** Neat

**Samples from 0 to 800'2"**  
**Date received: 5/11/66**  
**Examined by: J.M. Warren**  
**Issued: 2/69**  
**Date: 5/13/66, 5/8/67**

**Formations:** Drift, Wonewoc, Eau Claire, Mt. Simon, Precambrian

**Remarks:** Well tested for 33½ hours at 3,000 gpm with 118' of drawdown. Well located south-east of the intersection of Wilson and Hanover Streets. *Downtown well or Wilson Street well*

**LOG OF WELL:**

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<th>Depth</th>
<th>0-10</th>
<th>10-15</th>
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<th>40-60</th>
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<tbody>
<tr>
<td>Description</td>
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**Well name:** City of Madison, Wisconsin, Unit Well #17  
**Sample Nos.:** 267232 to 267398

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<td>200-220</td>
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<td>225-230</td>
<td>Sh, dskv yl gn, gry gn spnk, P srgt, sgt dol; sny dol; mch sny dol; mch Vfn/C sntest;</td>
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<td>230-240</td>
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<td>Ss, V pl yl gry, M&amp;C, Snd, P srgt, mch C, ltl Vfn; ltl el;</td>
</tr>
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<td>530-540</td>
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</tr>
<tr>
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<td>Ss, V pl yl gry, M, Snd &amp; Sang, P srgt, mch fn, mch el, tr xln dol;</td>
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END OF LOG

**Duplicate samples**

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<td>225-230</td>
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<td>230-235</td>
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</tbody>
</table>
28.021 ESTABLISHMENT OF ZONING DISTRICTS.

In order to carry out the purposes and provisions of this ordinance, the following zoning districts are hereby established:

(1) **Residential Districts.**
   (a) SR-C1 Suburban Residential - Consistent District 1
   (b) SR-C2 Suburban Residential - Consistent District 2
   (c) SR-C3 Suburban Residential - Consistent District 3
   (d) SR-V1 Suburban Residential - Varied District 1
   (e) SR-V2 Suburban Residential - Varied District 2
   (f) TR-C1 Traditional Residential - Consistent District 1
   (g) TR-C2 Traditional Residential - Consistent District 2
   (h) TR-C3 Traditional Residential - Consistent District 3
   (i) TR-C4 Traditional Residential - Consistent District 4
   (j) TR-V1 Traditional Residential - Varied District 1
   (k) TR-V2 Traditional Residential - Varied District 2
   (l) TR-U1 Traditional Residential - Urban District 1
   (m) TR-U2 Traditional Residential - Urban District 2
   (n) TR-R Traditional Residential - Rustic District
   (o) TR-P Traditional Residential - Planned District

* When other Chapters of the Madison General Ordinances refer to residential districts, the Downtown Residential Districts, DR1 and DR2, shall be included.

(Am, by ORD-13-00007, 1-15-13)

(2) **Commercial and Mixed-Use Districts.**
   (a) LMX Limited Mixed-Use.
   (b) NMX Neighborhood Mixed-Use District
   (c) TSS Traditional Shopping Street District
   (d) MXC Mixed-Use Center District
   (e) CC-T Commercial Corridor - Transitional District
   (f) CC Commercial Center District

(3) **Employment Districts.**
   (a) TE Traditional Employment District
   (b) SE Suburban Employment District
   (c) SEC Suburban Employment Center District
   (d) EC Employment Campus District
   (e) IL Industrial - Limited District
   (f) IG Industrial - General District

(4) **Downtown and Urban Districts.**
   (a) DC Downtown Core
   (b) UOR Urban Office Residential
   (c) UMX Urban Mixed-Use
   (d) DR1 Downtown Residential 1
   (e) DR2 Downtown Residential 2

(5) **Special Districts.**
   (a) A Agricultural District
   (b) UA Urban Agricultural District
   (c) CN Conservancy District
   (d) PR Parks and Recreation
   (e) AP Airport District
   (f) CI Campus Institutional District
   (g) PD Planned Development District
   (h) PMHP Planned Mobile Home Park District
(6) Overlay Districts.
   (a) WP Wellhead Protection Overlay District
   (b) W Wetland Overlay District
   (c) TOD Transit Oriented Development Overlay District
   (d) NC Neighborhood Conservation Overlay Districts
   (e) F1 Floodway District.
   (f) F2 Flood Fringe District
   (g) F3 General Floodplain District
   (h) F4 Flood Storage District

28.022 INCORPORATION OF ZONING DISTRICT MAPS.
The location and boundaries of the zoning districts are hereby established as shown on maps entitled “Zoning District Maps” on file in the office of the Zoning Administrator, including the official Wetland Zoning Maps titled “Wisconsin Wetland Inventory Maps.” The zoning district maps, together with all information shown thereon and all amendments thereto, shall be as much a part of this ordinance as if fully set forth and described herein.

(1) Location of District Boundaries.
The following rules shall apply with respect to the boundaries of the zoning districts as shown on the zoning district maps:
   (a) A boundary shown as following, or approximately following, a street, alley or railroad shall be construed as following the centerline of such feature.
   (b) A boundary line shown as following, or approximately following, a lot line, section line, survey or other property line, or municipal boundary shall be construed as following such line or boundary.
   (c) Streets or alleys which are shown on the zoning district maps and which were previously vacated, or which may be vacated in the future, shall be construed to be in the same zoning district as the lots, pieces or parcels abutting both sides of the street or alley involved. If the lots, pieces or parcels abutting each side of the street or alley were located in different zoning districts before the said street or alley was vacated, the center line of such vacated street or alley shall be the boundary line of the respective zoning districts.
   (d) Where any uncertainty exists as to the exact location of zoning district boundary lines, the Zoning Board of Appeals, upon written application, shall determine the location of such boundary lines.

(2) Wetland Maps.
   (a) The Wetland Zoning Overlay District includes all wetlands greater than two (2) acres shown on the Wisconsin Wetland Inventory Maps that have been adopted and made a part of this ordinance.
   (b) Determinations of navigability and ordinary high-water mark shall initially be made by the Zoning Administrator. When questions arise, the Zoning Administrator shall contact the southern district office of the Department of Natural Resources for a final determination of navigability or ordinary high water mark.
   (c) When an apparent discrepancy exists between the Wetland District boundary shown on the official Wetland Zoning Maps and the actual field conditions at the time the maps were adopted, the Zoning Administrator shall contact the southern district office of the Department of Natural Resources to determine if the Wetland District boundary as mapped, is in error. If the Department staff concur with the Zoning Administrator that a particular area was incorrectly mapped as a wetland, the Zoning Administrator shall be responsible for initiating a wetland map amendment within a reasonable period.
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).
Areas of recharge to and discharge from the Mount Simon aquifer, based on water level measurements.
A: Areas of recharge; B: areas of discharge.

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).
APPENDIX G

DISTANCE-DRAWDOWN CALCULATION
(ZONE OF INFLUENCE)
Appendix G - Distance Drawdown Calculations - Unit Well 17

By Specific Capacity Method - Calculate Transmissivity:

\[ T = \frac{3,000 \text{ gal/min}}{118 \text{ feet}} = 25.42 \text{ gpm/ft} = 36,605 \text{ gpd/ft} \]

By Theis Equations:

\[ \frac{Q}{s} = \frac{T}{114.6 \ast W(u)} \quad u = \frac{1.87 \ast r^2 \ast S}{T \ast t} \]

- Where -

- \( T = 36,605 \text{ gpd/ft} \) - Transmissivity by Specific Capacity Method
- \( Q = 3,000 \text{ gpm} \) - Pumping rate
- \( s = 118 \text{ ft} \) - Drawdown (initial well test)
- \( S = 0.003 \) - Storage coefficient
- \( t = 30 \text{ days} \) - Time
- \( r = \text{[radius]} \text{ ft} \) - Distance from well pump to observed point
- \( W(u) = \{\text{Well function}\} \) - Tables of values are widely available.

Drawdown at Various Distances After 30 Days: \( s = \left\{\frac{114.6 \ast Q \ast W(u)}{T}\right\} \)

<table>
<thead>
<tr>
<th>Radius, r (ft)</th>
<th>u</th>
<th>W(u)</th>
<th>Drawdown, s (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>7.70E-06</td>
<td>8.423</td>
<td>95.71</td>
</tr>
<tr>
<td>500</td>
<td>0.0001277</td>
<td>8.423</td>
<td>95.71</td>
</tr>
<tr>
<td>1200</td>
<td>0.0007356</td>
<td>6.634</td>
<td>75.38</td>
</tr>
<tr>
<td>1500</td>
<td>0.0011494</td>
<td>5.985</td>
<td>68.01</td>
</tr>
<tr>
<td>2500</td>
<td>0.0031929</td>
<td>5.174</td>
<td>58.79</td>
</tr>
<tr>
<td>5280</td>
<td>0.0142419</td>
<td>3.764</td>
<td>42.77</td>
</tr>
<tr>
<td>7920</td>
<td>0.0320444</td>
<td>2.904</td>
<td>33.00</td>
</tr>
<tr>
<td>10 miles</td>
<td>10560</td>
<td>0.0585677</td>
<td>2.351</td>
</tr>
<tr>
<td>5 miles</td>
<td>26400</td>
<td>0.3560484</td>
<td>0.784</td>
</tr>
<tr>
<td>8 miles</td>
<td>42240</td>
<td>0.9114839</td>
<td>0.259</td>
</tr>
<tr>
<td>9 miles</td>
<td>47520</td>
<td>1.1535988</td>
<td>0.193</td>
</tr>
<tr>
<td>10 miles</td>
<td>52800</td>
<td>1.4241938</td>
<td>0.151</td>
</tr>
<tr>
<td>12 miles</td>
<td>63360</td>
<td>2.0508388</td>
<td>0.047</td>
</tr>
<tr>
<td>11.67 miles</td>
<td>61,624 ft</td>
<td>1.94</td>
<td>0.1064718</td>
</tr>
<tr>
<td>23.7 miles</td>
<td>8.0</td>
<td>0.00003</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Radius of Cone of Depression (Calculation based on a drawdown of 1 ft after 30 Days of Continuous Pumping):

\[ \frac{Q}{s} = \frac{T}{114.6 \ast W(u)} \Rightarrow W(u) = \frac{0.1064718}{u} = \Rightarrow r = \frac{u \ast T \ast t}{1.87 \ast S} \]

For drawdown, \( s = 1 \text{ ft} \).

\[ W(u) = 0.1064718 \]

So, \( u = 1.94 \)

\[ \frac{1.94 \ast 36,605 \ast 30}{1.87 \ast 0.0003} = \sqrt{23.7 \text{ miles}} \]

When \( s = 0 \), \( u = 8.0 \), and \( r = 23.7 \text{ miles} \)

\[ s = 1 \text{ ft} \]

\[ r = 61,624 \text{ ft} \]

\[ = 11.67 \text{ miles} \]
APPENDIX H

ULTIMATE ZOCS FOR MUNICIPAL WELLS IN DANE COUNTY
Fig. 2: Ultimate Zones of Contribution for Municipalities in Dane County, WI

Source: Bradbury, 1998
APPENDIX I

PROHIBITED LAND USES IN WHPAs,
Potential Sources of Groundwater Contamination and Land Uses,
And Their Relative Risk to Groundwater
<table>
<thead>
<tr>
<th>Zone A — Prohibited Uses</th>
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<tbody>
<tr>
<td>Animal waste facilities</td>
</tr>
<tr>
<td>Asphalt products manufacturing</td>
</tr>
<tr>
<td>Auto body repair businesses</td>
</tr>
<tr>
<td>Auto sales &amp; service</td>
</tr>
<tr>
<td>Auto salvage yards (junk yards)</td>
</tr>
<tr>
<td>Bus or truck terminals</td>
</tr>
<tr>
<td>Commercial animal confinement facilities</td>
</tr>
<tr>
<td>Commercial bulk fertilizer and/or pesticide facilities (storage, mixing or loading)</td>
</tr>
<tr>
<td>Cemeteries</td>
</tr>
<tr>
<td>Dry cleaning businesses/facilities</td>
</tr>
<tr>
<td>Electroplating businesses/facilities</td>
</tr>
<tr>
<td>Exterminating businesses/facilities</td>
</tr>
<tr>
<td>Fuel storage tanks (heating oil)</td>
</tr>
<tr>
<td>Furniture manufacturing and refinishing</td>
</tr>
<tr>
<td>Garage and vehicular towing</td>
</tr>
<tr>
<td>Hazardous and/or toxic materials storage</td>
</tr>
<tr>
<td>Hazardous and/or toxic waste facilities</td>
</tr>
<tr>
<td>Industrial businesses that use hazardous chemicals as defined by the EPA</td>
</tr>
<tr>
<td>Industrial pipelines</td>
</tr>
<tr>
<td>Landfills or waste disposal facilities</td>
</tr>
<tr>
<td>Machine shops</td>
</tr>
<tr>
<td>Paint and coating manufacturing</td>
</tr>
<tr>
<td>Photo processing</td>
</tr>
<tr>
<td>Plastics manufacturing</td>
</tr>
<tr>
<td>Printing and duplicating businesses that use hazardous chemicals as defined by the EPA</td>
</tr>
<tr>
<td>Public and municipal maintenance garages</td>
</tr>
<tr>
<td>Radioactive waste facilities</td>
</tr>
<tr>
<td>Recycling facilities</td>
</tr>
<tr>
<td>Research laboratories</td>
</tr>
<tr>
<td>Retail liquid motor fuel dispensing facilities</td>
</tr>
<tr>
<td>Salt storage</td>
</tr>
<tr>
<td>Septage and/or sewage sludge spreading</td>
</tr>
<tr>
<td>Spray wastewater facilities</td>
</tr>
<tr>
<td>Stormwater impoundments/retention areas</td>
</tr>
<tr>
<td>Underground and aboveground petroleum and chemical products storage tanks</td>
</tr>
<tr>
<td>Unsewered residential, commercial, or industrial development</td>
</tr>
<tr>
<td>Vehicle repair shops</td>
</tr>
<tr>
<td>Wastewater treatment or disposal facilities</td>
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</table>
TABLE I - 1 (continued)
RECOMMENDED PROHIBITED LAND USES
UNIT WELL 17 WELLHEAD PROTECTION ZONES
MADISON, WISCONSIN

ZONE B – PROHIBITED USES

- Animal waste facilities
- Asphalt products manufacturing
- Auto body repair businesses
- Auto salvage yards (junk yards)
- Bus or truck terminals
- Commercial animal confinement facilities
- Commercial bulk fertilizer and/or pesticide facilities (storage, mixing or loading)
- Dry cleaning businesses/facilities
- Electroplating businesses/facilities
- Exterminating businesses/facilities
- 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 disposal facilities
### Table 4-4. Potential Sources of Ground Water Contamination

<table>
<thead>
<tr>
<th>Source</th>
<th>Health, Environmental, or Aesthetic Contaminant(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NATURALLY OCCURRING SOURCES</strong></td>
<td></td>
</tr>
</tbody>
</table>
| 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 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; fertilizers; gasoline and motor oils from chemical applicators |
| Chemical storage areas and containers | Pesticide and fertilizer residues |
| Farm machinery areas | Automotive wastes; welding wastes |
| Agricultural drainage wells and canals | Pesticides; fertilizers; 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:* 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; 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 deglosers; paint brush cleaners; floor and furniture strippers  
*Mechanical Repair and Other Maintenance Products:* Automotive wastes; 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 |
<p>| Lawns and gardens | Fertilizers; herbicides and other pesticides used for lawn and garden maintenance |
| Swimming pools | Swimming pool maintenance chemicals |
| Septic systems, cesspools, and sewer lines | Septage; coliform and noncoliform bacteria; viruses; nitrates; heavy metals; synthetic detergents; cooking and motor oils; bleach; pesticides; paints; paint thinner; photographic chemicals; swimming pool chemicals; septic tank/cesspool cleaner chemicals; elevated levels of chloride, sulfate, calcium, magnesium, potassium, and phosphate |
| Underground storage tanks | Home heating oil |
| Apartments and condominiums | Swimming pool maintenance chemicals; pesticides for lawn and garden maintenance and cockroach, termite, ant, rodent, and other pest control; wastes from onsite sewage treatment plants; household hazardous wastes |</p>
<table>
<thead>
<tr>
<th>Source</th>
<th>Health, Environmental, or Aesthetic Contaminant</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MUNICIPAL SOURCES</strong></td>
<td></td>
</tr>
<tr>
<td>Schools and government offices and grounds</td>
<td>Solvents; pesticides; acids; alkalis; waste oils; machinery/vehicle servicing wastes; gasoline and heating oil from storage tanks; general building wastes</td>
</tr>
<tr>
<td>Park lands</td>
<td>Fertilizers; herbicides; insecticides</td>
</tr>
<tr>
<td>Public and residential areas infested with mosquitoes, gypsy moths, ticks, ants, or other pests</td>
<td>Pesticides</td>
</tr>
<tr>
<td>Highways, road maintenance depots, and deicing operations</td>
<td>Herbicides in highway rights-of-way; road salt (sodium and calcium chloride); road salt anticaking additives (ferric ferrocyanide, sodium ferrocyanide); road salt anticorrosives (phosphate and chromate); automotive wastes</td>
</tr>
<tr>
<td>Municipal sewage treatment plants and sewer lines</td>
<td>Municipal wastewater; sludge; treatment chemicals</td>
</tr>
<tr>
<td>Storage, treatment, and disposal ponds, lagoons, and other surface impoundments</td>
<td>Sewage wastewater; nitrates; other liquid wastes; microbiological contaminants</td>
</tr>
<tr>
<td>Land areas applied with wastewater or wastewater byproducts</td>
<td>Organic matter; nitrate; inorganic salts; heavy metals; coliform and noncoliform bacteria; viruses; nitrates; sludge; nonhazardous wastes</td>
</tr>
<tr>
<td>Storm water drains and basins</td>
<td>Urban runoff; gasoline; oil; other petroleum products; road salt; microbiological contaminants</td>
</tr>
<tr>
<td>Combined sewer overflows (municipal sewers and storm water drains)</td>
<td>Municipal wastewater; sludge; treatment chemicals; urban runoff; gasoline; oil; other petroleum products; road salt; microbial contaminants</td>
</tr>
<tr>
<td>Recycling/reduction facilities</td>
<td>Residential and commercial solid waste residues</td>
</tr>
<tr>
<td>Municipal waste landfills</td>
<td>Leachate; organic and inorganic chemical contaminants; wastes from households and businesses; nitrates; oils; metals</td>
</tr>
<tr>
<td>Open dumping and burning sites, closed dumps</td>
<td>Organic and inorganic chemicals; metals; oils; wastes from households and businesses</td>
</tr>
<tr>
<td>Municipal incinerators</td>
<td>Heavy metals; hydrocarbons; formaldehyde; methane; ethane; ethylene; acetylene; sulfur and nitrogen compounds</td>
</tr>
<tr>
<td>Water supply wells, monitoring wells, older wells, domestic and livestock wells, unsealed and abandoned wells, and test hole wells</td>
<td>Surface runoff; effluents from barnyards, feedlots, septic tanks, or cesspools; gasoline; used motor oil; road salt</td>
</tr>
<tr>
<td>Sumps and dry wells</td>
<td>Storm water runoff; spilled liquids; used oil; antifreeze; gasoline; other petroleum products; road salt; pesticides; a wide variety of other substances</td>
</tr>
<tr>
<td>Drainage wells</td>
<td>Pesticides; bacteria</td>
</tr>
<tr>
<td>Well pumping that causes interaquifer leakage, induced filtration, landward migration of sea water in coastal areas; etc.</td>
<td>Saltwater; excessively mineralized water</td>
</tr>
<tr>
<td>Artificial ground water recharge</td>
<td>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</td>
</tr>
<tr>
<td><strong>COMMERCIAL SOURCES</strong></td>
<td></td>
</tr>
<tr>
<td>Airports, abandoned airfields</td>
<td>Jet fuels; deicers; diesel fuel; chlorinated solvents; automotive wastes; heating oil; building wastes</td>
</tr>
<tr>
<td>Auto repair shops</td>
<td>Waste oils; solvents; acids; paints; automotive wastes; miscellaneous cutting oils</td>
</tr>
<tr>
<td>Barber and beauty shops</td>
<td>Perm solutions; dyes; miscellaneous chemicals contained in hair rinses</td>
</tr>
<tr>
<td>Boat yards and marinas</td>
<td>Diesel fuels; oil; septage from boat waste disposal areas; wood preservative and treatment chemicals; paints; waxes; varnishes; automotive wastes</td>
</tr>
<tr>
<td>Source</td>
<td>Health, Environmental, or Aesthetic Contaminant&lt;sup&gt;1,2,3&lt;/sup&gt;</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>Bowling alleys</td>
<td>Epoxy; urethane-based floor finish</td>
</tr>
<tr>
<td>Car dealerships (especially those with service departments)</td>
<td>Automotive wastes;&lt;sup&gt;7&lt;/sup&gt; waste oils; solvents; miscellaneous wastes</td>
</tr>
<tr>
<td>Car washes</td>
<td>Soaps; detergents; waxes; miscellaneous chemicals</td>
</tr>
<tr>
<td>Camp grounds</td>
<td>Septage; gasoline; diesel fuel from boats; pesticides for controlling mosquitoes, ants, ticks, gypsy moths, and other pests;&lt;sup&gt;5,6&lt;/sup&gt; household hazardous wastes from recreational vehicles (RVs)&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>Carpet stores</td>
<td>Glues and other adhesives; fuel from storage tanks if forklifts are used</td>
</tr>
<tr>
<td>Cemeteries</td>
<td>Leachate; lawn and garden maintenance chemicals&lt;sup&gt;10&lt;/sup&gt;</td>
</tr>
<tr>
<td>Construction trade areas and materials (plumbing, heating and air conditioning, painting, paper hanging, decorating, drywall and plastering, acoustical insulation, carpentry, flooring, rooting and sheet metal, wrecking and demolition, etc.)</td>
<td>Solvents; asbestos, paints; glues and other adhesives; waste insulation; lacquers; tars; sealants; epoxy waste; miscellaneous chemical wastes</td>
</tr>
<tr>
<td>Country clubs</td>
<td>Fertilizers;&lt;sup&gt;6&lt;/sup&gt; herbicides;&lt;sup&gt;5,10&lt;/sup&gt; pesticides for controlling mosquitoes, ticks, ants, gypsy moths, and other pests;&lt;sup&gt;9&lt;/sup&gt; swimming pool chemicals;&lt;sup&gt;11&lt;/sup&gt; automotive wastes</td>
</tr>
<tr>
<td>Dry cleaners</td>
<td>Solvents (perchloroethylene, petroleum solvents, Freon); spotting chemicals (trichloroethane, methylchloroform, ammonia, peroxides, hydrochloric acid, rust removers, amyl acetate)</td>
</tr>
<tr>
<td>Funeral services and crematories</td>
<td>Formaldehyde; wetting agents; fumigants; solvents</td>
</tr>
<tr>
<td>Furniture repair and finishing shops</td>
<td>Paints; solvents; degreasing and solvent recovery sludges</td>
</tr>
<tr>
<td>Gasoline service stations</td>
<td>Oils; solvents; miscellaneous wastes</td>
</tr>
<tr>
<td>Golf courses</td>
<td>Fertilizers;&lt;sup&gt;6&lt;/sup&gt; herbicides;&lt;sup&gt;5,10&lt;/sup&gt; pesticides for controlling mosquitoes, ticks, ants, gypsy moths, and other pests&lt;sup&gt;9&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hardware/ lumber/ parts stores</td>
<td>Hazardous chemical products in inventories; heating oil and fork lift fuel from storage tanks, wood-staining and treating products such as creosote</td>
</tr>
<tr>
<td>Heating oil companies, underground storage tanks</td>
<td>Heating oil; wastes from truck maintenance areas&lt;sup&gt;7&lt;/sup&gt;</td>
</tr>
<tr>
<td>Horticultural practices, garden nurseries, florists</td>
<td>Herbicides, insecticides, fungicides, and other pesticides&lt;sup&gt;10&lt;/sup&gt;</td>
</tr>
<tr>
<td>Jewelry/metal plating shops</td>
<td>Sodium and hydrogen cyanide; metallic salts; hydrochloric acid; sulfuric acid; chromic acid</td>
</tr>
<tr>
<td>Laundromats</td>
<td>Detergents; bleaches; fabric dyes</td>
</tr>
<tr>
<td>Medical institutions</td>
<td>X-ray developers and fixers;&lt;sup&gt;17&lt;/sup&gt; infectious wastes; radiological wastes; biological wastes; disinfectants; asbestos; beryllium; dental acids; miscellaneous chemicals</td>
</tr>
<tr>
<td>Office buildings and office complexes</td>
<td>Building wastes;&lt;sup&gt;13&lt;/sup&gt; lawn and garden maintenance chemicals;&lt;sup&gt;10&lt;/sup&gt; gasoline; motor oil</td>
</tr>
<tr>
<td>Paint stores</td>
<td>Paints; paint thinners; lacquers; varnishes; other wood treatments</td>
</tr>
<tr>
<td>Pharmacies</td>
<td>Spilled and returned products</td>
</tr>
<tr>
<td>Photography shops, photo processing laboratories</td>
<td>Biosludges; silver sludges; cyanides; miscellaneous sludges</td>
</tr>
<tr>
<td>Print shops</td>
<td>Solvents; inks; dyes; oils; photographic chemicals</td>
</tr>
<tr>
<td>Railroad tracks and yards</td>
<td>Diesel fuel; herbicides for rights-of-way; creosote for preserving wood ties</td>
</tr>
<tr>
<td>Research laboratories</td>
<td>X-ray developers and fixers;&lt;sup&gt;17&lt;/sup&gt; infectious wastes; radiological wastes; biological wastes; disinfectants; asbestos; beryllium; solvents; infectious materials; drugs; disinfectants (quaternary ammonia, hexachlorophene, peroxides, chlorhexade, bleach); miscellaneous chemicals</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Source</th>
<th>Health, Environmental, or Aesthetic Contaminant¹ ² ³</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COMMERCIAL SOURCES (continued)</strong></td>
<td></td>
</tr>
<tr>
<td>Scrap and junk yards</td>
<td>Any wastes from businesses⁴ and households;⁵ oils</td>
</tr>
<tr>
<td>Sports and hobby shops</td>
<td>Gunpowder and ammunition; rocket engine fuel; model airplane glue</td>
</tr>
<tr>
<td>Above-ground and underground storage tanks</td>
<td>Heating oil; diesel fuel; gasoline; other petroleum products; other commercially used chemicals</td>
</tr>
<tr>
<td>Transportation services for passenger transit (local and interurban)</td>
<td>Waste oil; solvents; gasoline and diesel fuel from vehicles and storage tanks; fuel oil; other automotive wastes⁷</td>
</tr>
<tr>
<td>Veterinary services</td>
<td>Solvents; infectious materials; vaccines; drugs; disinfectants (quaternary ammonia, hexachlorophene, peroxides, chloronexade, bleach); x-ray developers and fixers¹⁷</td>
</tr>
<tr>
<td><strong>INDUSTRIAL SOURCES</strong></td>
<td></td>
</tr>
<tr>
<td>Material stockpiles (coal, metallic ores, phosphates, gypsum)</td>
<td>Acid drainage; other hazardous and nonhazardous wastes¹⁶</td>
</tr>
<tr>
<td>Waste tailing ponds (commonly for the disposal of mining wastes)</td>
<td>Acids; metals; dissolved solids; radioactive ores; other hazardous and nonhazardous wastes¹⁵</td>
</tr>
<tr>
<td>Transport and transfer stations (truck terminals and rail yards)</td>
<td>Fuel tanks; repair shop wastes;⁷ other hazardous and nonhazardous wastes¹⁵</td>
</tr>
<tr>
<td>Above-ground and underground storage tanks and containers</td>
<td>Heating oil; diesel and gasoline fuel; other petroleum products; hazardous and nonhazardous materials and wastes¹⁶</td>
</tr>
<tr>
<td>Storage, treatment, and disposal ponds, lagoons, and other surface impoundments</td>
<td>Hazardous and nonhazardous liquid wastes;¹⁶ septage; sludge¹⁴</td>
</tr>
<tr>
<td>Chemical landfills</td>
<td>Leachate; hazardous and nonhazardous wastes;¹⁶ nitrates</td>
</tr>
<tr>
<td>Radioactive waste disposal sites</td>
<td>Radioactive wastes from medical facilities, power plants, and defense operations; radionuclides (uranium, plutonium)</td>
</tr>
<tr>
<td>Unattended wet and dry excavation sites (unregulated dumps)</td>
<td>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</td>
</tr>
<tr>
<td>Operating and abandoned production and exploratory wells (for gas, oil, coal, geothermal, and heat recovery); test hole wells; monitoring and excavation wells</td>
<td>Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals¹⁶</td>
</tr>
<tr>
<td>Dry wells</td>
<td>Saline water from wells pumped to keep them dry</td>
</tr>
<tr>
<td>Injection wells</td>
<td>Highly toxic wastes; hazardous and nonhazardous industrial wastes;¹⁶ oil-field brines</td>
</tr>
<tr>
<td>Well drilling operations</td>
<td>Brines associated with oil and gas operations</td>
</tr>
<tr>
<td><strong>INDUSTRIAL PROCESSES (PRESENTLY OPERATED OR TORN-DOWN FACILITIES)¹⁸</strong></td>
<td></td>
</tr>
<tr>
<td>Asphalt plants</td>
<td>Petroleum derivatives</td>
</tr>
<tr>
<td>Communications equipment manufacturers</td>
<td>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</td>
</tr>
<tr>
<td>Electric and electronic equipment manufacturers and storage facilities</td>
<td>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</td>
</tr>
<tr>
<td>Electroplaters</td>
<td>Boric, hydrochloric, hydrofluoric, and sulfuric acids; sodium and potassium hydroxide; chromic acid; sodium and hydrogen cyanide; metallic salts</td>
</tr>
<tr>
<td>Foundries and metal fabricators</td>
<td>Paint wastes; acids; heavy metals; metal sludges; plating wastes; oils; solvents; explosive wastes</td>
</tr>
<tr>
<td>Source</td>
<td>Health, Environmental, or Aesthetic Contaminant¹,²,³</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>Furniture and fixtures manufacturers</td>
<td>Paints; solvents; degreasing sludges; solvent recovery sludges</td>
</tr>
<tr>
<td>Machine and metalworking shops</td>
<td>Solvents; metals; miscellaneous organics; sludges; oily metal shavings; lubricant and cutting oils; degreasers (tetrachloroethylene); metal marking fluids; mold-release agents</td>
</tr>
<tr>
<td>Mining operations (surface and underground), underground storage mines</td>
<td>Mine spoils or tailings that often contain metals; acids; highly corrosive mineralized waters; metal sulfides</td>
</tr>
<tr>
<td>Unsealed abandoned mines used as waste pits</td>
<td>Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals¹⁶</td>
</tr>
<tr>
<td>Paper mills</td>
<td>Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals¹⁶; organic sludges; sodium hydroxide; chlorine; hypochlorite; chlorine dioxide; hydrogen peroxide</td>
</tr>
<tr>
<td>Petroleum production and storage companies, secondary recovery of petroleum</td>
<td>Hydrocarbons; oil-field brines (highly mineralized salt solutions)</td>
</tr>
<tr>
<td>Industrial pipelines</td>
<td>Corrosive fluids; hydrocarbons; other hazardous and nonhazardous materials and wastes¹⁶</td>
</tr>
<tr>
<td>Photo processing laboratories</td>
<td>Cyanides; biosludges; silver sludges; miscellaneous sludges</td>
</tr>
<tr>
<td>Plastics materials and synthetics producers</td>
<td>Solvents; oils; miscellaneous organics and inorganics (phenols, resins); paint wastes; cyanides; acids; alkanes; wastewater treatment sludges; cellulose esters; surfactant; glycols; phenols; formaldehyde; peroxides; etc.</td>
</tr>
<tr>
<td>Primary metal industries (blast furnaces, steel works, and rolling mills)</td>
<td>Heavy metal wastewater treatment sludge; pickling liquor; waste oil; ammonia scrubber liquor; acid tar sludge; alkaline cleaners; degreasing solvents; slag; metal dust</td>
</tr>
<tr>
<td>Publishers, printers, and allied industries</td>
<td>Solvents; inks; dyes; oils; miscellaneous organics; photographic chemicals</td>
</tr>
<tr>
<td>Public utilities (phone, electric power, gas)</td>
<td>PCBs from transformers and capacitors; oils; solvents; sludges; acid solution; metal plating solutions (chromium, nickel, cadmium); herbicides from utility rights-of-way</td>
</tr>
<tr>
<td>Sawmills and planers</td>
<td>Treated wood residue (copper quinolate, mercury, sodium bazide); tanner gas; paint sludges; solvents; creosote; coating and gluing wastes</td>
</tr>
<tr>
<td>Stone, clay, and glass manufacturers</td>
<td>Solvents; oils and grease; alkaline; acetic wastes; tanner gas; paint sludges; phenolic solids or sludges; metal-finishing sludge</td>
</tr>
<tr>
<td>Welders</td>
<td>Oxygen, acetylene</td>
</tr>
<tr>
<td>Wood preserving facilities</td>
<td>Wood preservatives; creosote</td>
</tr>
</tbody>
</table>

¹In 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.

²Contaminants 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.

³This 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.

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

⁵Pesticides include herbicides, insecticides, rodenticides, fungicides, and acaricides. 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 (daconil) and atrazine, which EPA classifies as moderately toxic (class 3) and slightly toxic (class 4) materials, respectively.

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

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

 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 naphthalene, phosphorus, xylene, chloroform, heavy metals, chlorinated hydrocarbons, arsenic, strychnine, kerosene, nitrosamines, and dioxin.

 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; diconal; and methoxychlor.

 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.

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

 Common wastes from public and commercial buildings include automotive wastes; rock salt; and residues from cleaning products that may contain chemicals such as xylene, glycol ethers, isopropanol, 1,1,1-trichloroethane, sulfonates, chlorinated phenyls, and cresols.

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

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

 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.

 X-ray developers and fixers may contain reclaimable silver, glutaraldehyde, hydroquinone, phenolized, potassium bromide, sodium sulfite, sodium carbonate, thiosulfates, and potassium alum.

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

 SOURCES


<table>
<thead>
<tr>
<th>Table 4-5. Land Uses and Their Relative Risk to Ground Water</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LEAST RISK</strong></td>
</tr>
<tr>
<td>A. 1. Land surrounding a well or reservoir, owned by a water company</td>
</tr>
<tr>
<td>2. Permanent open space dedicated to passive recreation.</td>
</tr>
<tr>
<td>3. Federal, state, municipal, and private parks.</td>
</tr>
<tr>
<td>4. Woodlands managed for forest products.</td>
</tr>
<tr>
<td>5. Permanent open space dedicated to active recreation.</td>
</tr>
<tr>
<td>B. 1. Field crops: pasture, hay, grains, vegetables.</td>
</tr>
<tr>
<td>2. Low density residential: lots larger than 2 acres.</td>
</tr>
<tr>
<td>3. Churches, municipal offices.</td>
</tr>
<tr>
<td>C. 1. Agricultural production: dairy, livestock, poultry, nurseries, orchards, farms</td>
</tr>
<tr>
<td>2. Golf course, quarries.</td>
</tr>
<tr>
<td>3. Medium density residential: lots from 1/2 to 1 acre.</td>
</tr>
<tr>
<td>D. 1. Institutional uses: schools, hospitals, nursing homes, prisons, garages, salt storage, sewage treatment facilities.</td>
</tr>
<tr>
<td>2. High density housing: lots smaller than 1/2 acre.</td>
</tr>
<tr>
<td>3. Commercial uses: limited hazardous material storage and only sewage disposal.</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>2. Industrial: all forms of manufacturing and processing, research facilities.</td>
</tr>
<tr>
<td>3. Underground storage of chemicale, petroleum.</td>
</tr>
<tr>
<td><strong>GREATEST RISK</strong></td>
</tr>
<tr>
<td>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.</td>
</tr>
</tbody>
</table>

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

CLEAN SWEEP COLLECTION PROGRAM
What is Clean Sweep?
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 Clean Sweep?
By providing the public with an 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.

What's New

The Dane County Clean Sweep will be closed for Thanksgiving weekend 2013 on Thursday November 28th, Friday November 29th, and Saturday November 30th.

As of November 1st 2012 the Clean Sweep facility located 2302 Fish Hatchery Road is permanently closed and cannot accept any materials.

The new year round facility, located at 7102 US Hwy 12, Madison WI 53718, (Beltline/12/18 East toward Cambridge) across from the Yahara Hills Golf Course at the Dane County Landfill is now open.

All Clean Sweep customers do not have to stop at the scale and should proceed directly to the Clean Sweep building and stop under the canopy. Clean Sweep staff will provide you with further instructions. Clean Sweep customers include those coming to pick up free materials from our Product Exchange.

Please remember that leaving materials at the site when we are closed is illegal and can lead to a $2,000 forfeiture

NEW FEES APPLY.

Hours:
Tuesdays - Fridays: 7:00am - 2:45pm

http://www.danecountycleansweep.com/
Saturdays: 8:00am - 10:45am
Closed Sundays, Mondays and Holidays

Thank you for having patience with us as we update our website during our transition.

New Fees for 2013

- **Dane County Households & Farms: $10.00 per trip** for all household hazardous waste and electronics. One television or computer monitor is included with the trip fee. Additional televisions and monitors will be billed at an additional $10.00 each.
- **Businesses: Fees based on weight and type of waste** Businesses must qualify as Very Small Quantity Generators (VSQG’s) and must schedule an appointment prior to bringing wastes to the collection facility. Out-of-County businesses are welcome. Call (608) 243-0368 for more information.
- **Out-of-County Households & Farms: $75.00 per trip** No latex paint or electronics accepted from out-of-county residents.

We reserve the right to impose additional fees for large quantities of materials or loads from multiple households. Customers with large loads are urged to call (608) 243-0368 in advance to determine the applicability of any additional fees.

Now Accepting Electronics

- Get rid of your old TV or computer monitor for $10. Other electronics accepted free of charge. Please see our Household page for details.

Please note that there have been some rule changes for our Product Exchange program. Please see the Exchange page for details.

Business Waste Program

- Appointments are now being accepted on a year round basis for the disposal of business-generated hazardous materials. Click on the business waste program link below for details.

Agricultural Clean Sweep Grants

Dane County received a Wisconsin Department of Agriculture, Trade and Consumer Protection (WDATCP) agricultural clean sweep grant award for 2013. This grant underwrites our disposal costs so there will be no cost to farmers to dispose of agriculturally-related and household wastes through the Dane County Clean Sweep program in 2013, and agricultural businesses will pay only one-half the normal business cost to dispose of agriculturally-related waste materials.

Educational Game

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. Additional information on the status of the ag program.

Household Hazardous Waste Program

The Household Hazardous Waste Program provides an opportunity for residents of Dane County to safely dispose of hazardous waste. 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.

Dane County Home Page
Dane County Public Works

City of Madison Home Page
Public Health Madison Dane County

http://www.danecountycleansweep.com/
Household Hazardous Waste Program

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

2013 Collection Season

We will be opening our new facility on May 1st 2013.

Hours:
Tuesdays - Fridays: 7:00 - 2:45
Saturdays: 8:00 - 10:45
Closed Sundays, Mondays and Holidays.

We are now (as of May 1st 2013) located at 7102 US Hwy 12, Madison WI 53718, (Beltline/12/18 East toward Cambridge) across from the Yahara Hills Golf Course at the Dane County Landfill.

Guidelines for Materials Brought to Clean Sweep

Waste materials should be packaged in boxes or rigid totes to keep products upright and prevent spillage during transportation to the collection facility. Keep materials in their original containers. DO NOT PACK OR CO-MINGLE YOUR WASTE MATERIALS IN PLASTIC TRASH BAGS. Individual items may be bagged in plastic if the original container is compromised. Do not mix any materials. Upon arrival at the landfill site, follow the entrance road, drive past the scale, go directly to the Clean Sweep building, and stop under the canopy. Clean Sweep staff will greet you and direct you to the counter (inside of the walk-in door under the canopy) to collect your payment. You will be asked to furnish proof of residency. If you have items or materials that are subject to fees, you will pay at this point. Payment is to be in the form of cash or credit card (Visa or Mastercard only). No checks or currency larger than $20 bills are accepted. After payment of fees, Clean Sweep staff will assist you in unloading your vehicle. Facility operators reserve the right to refuse any waste or material deemed unacceptable. If you are bringing gasoline or other fuels to Clean Sweep, remember to transport your fuel in an approved container (no more than 6 gal. size). Clean Sweep staff will pour off the fuels and return your container, time permitting. Unapproved or unsafe fuel containers will not be returned.

Fee Structure

- Dane County Households & Farms: $10.00 per trip for all household hazardous waste and electronics. One television or computer monitor is included with the trip fee. Additional televisions and monitors will be billed at an additional $10.00 each.
• **Out-of-County Households & Farms:** $75.00 per trip
  No latex paint or electronics accepted from out-of-county residents

We reserve the right to impose additional fees for large quantities of materials or loads from multiple households. Customers with large loads are urged to call (608)243-0368 in advance to determine the applicability of any additional fees.

**Electronics**

Electronics will be accepted from Dane County residents/households only. Fees apply to TV's and computer monitors. **NO ELECTRONICS ACCEPTED FROM BUSINESSES.**

All electronic materials will be responsibly handled in an environmentally safe and secure manner, using the best data wiping software available. Electronic materials accepted at Dane County Clean Sweep include: Monitors, laptops, servers, TV’s, printers, computers, printer/fax/scanners, DVD players, stereo equipment, VCR’s, video game consoles, computer peripherals, mice/keyboards, PDA/cell phones, all computer parts, MP3/IPods/etc., telephones, UPS batteries, copiers, typewriters, cash registers, networking equipment, and cable boxes. Also accepting radios, digital clocks, digital cameras, and remotes. **ALL BATTERIES MUST BE REMOVED FROM ELECTRONIC ITEMS.** The listing of the types of electronic materials accepted at Dane County Clean Sweep is subject to change.

**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.

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.

Please click on the item of interest to learn about its proper disposal. Your disposal instructions will appear in the disposal instructions box beneath the list.
| Disposal Instructions |

- Dane County Home Page
- Dane County Public Works
- City of Madison Home Page
- Public Health Madison Dane County
Agriculture

Dane County received a Wisconsin Department of Agriculture, Trade and Consumer Protection (WDATCP) agricultural clean sweep grant award for 2013. This grant underwrites our disposal costs so there will be no cost to farmers to dispose of agriculturally-related and household wastes through the Dane County Clean Sweep program in 2013, and agricultural businesses will pay only one-half the normal business cost to dispose of agriculturally-related waste materials.

2013 Appointment Scheduling

Agricultural chemicals are accepted by appointment only. See the "Make an Appointment" section below.

Appointments for the 2013 season will be available Tuesdays-Fridays.

The Agricultural Hazardous Waste Disposal Program

Because Dane County received a DATCP ag grant for 2013, agricultural businesses will be charged only one-half of the full small business charge for the disposal of agriculturally-related waste.

Fees

- **Dane County Households & Farms:** $10.00 per trip for all household hazardous waste and electronics. One television or computer monitor is included with the trip fee. Additional televisions and monitors will be billed at an additional $10.00 each.
- **Agricultural Businesses:** Fees based on weight & type of waste
  Click [here](http://www.danecountycleansweep.com/agriculture.aspx) for a sample application and current pricing. (1/2 price for 2013.)
- **Out-of-County Farms:** $75.00 per trip
  No latex paint or electronics accepted from out-of-county farms.

**Items 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.

**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 2013 season will be available Tuesdays-Fridays.

If you'd like to set up an appointment to bring in your agricultural hazardous waste, please fill out our [online registration form](http://www.danecountycleansweep.com/agriculture.aspx). If you have questions about the program or if you are unsure whether you qualify, you can find answers in the registration form or by contacting the Dane County Landfill at 608-838-9555 (phone), 608-267-3105 (fax), or email Dave Radisewitz at radisewitz.david@countyofdane.com.
**Small Business Hazardous Waste Disposal Program Information and Application**

**What’s Happening?**

The Clean Sweep Collection Program for households has been a service provided jointly by Dane County and the City of Madison. These two municipalities are sponsoring a program for businesses that generate small amounts of hazardous materials. The program referred to as the Business Waste Disposal Program will allow businesses to drop off, by appointment, hazardous materials at a collection point for proper disposal.

State law requires all Wisconsin businesses producing hazardous materials to manage and dispose of their materials/wastes properly. Options for businesses generating small amounts of waste are not readily available and those available are often viewed by business as complicated and costly. This program is designed to allow small generators to dispose of hazardous materials/waste in a simpler and less costly manner.

To participate, businesses will be required to pay the costs associated with handling and disposal. However, costs are expected to be lower for participants in this program than the cost of individual companies arranging for disposal on their own.

**Who Can Participate?**

In order to participate, a business may not generate more waste than is defined in the WDNR definition of a Very Small Quantity Generator (VSQG). A VSQG produces less than 100 kilograms (220 pounds or 22 gallons) of hazardous waste and less than 2.2 gallons of acutely hazardous waste per month. Through the VSQG program, businesses are allowed to dispose of hazardous materials/waste containers up to 55 gallons in size.

Businesses producing more than 264 gallons of materials/waste per year must manage or dispose of their wastes through a hazardous waste contractor and are NOT eligible to participate in this project.

**What Hazardous Wastes Could My Business Have?**

Hazardous materials/wastes are those that are toxic, flammable, corrosive, or reactive. Some examples of common hazardous materials/wastes from small generators are:

- parts-washer solvents
- paint-gun cleaners
- PCB wastes
- acids and bases
- laboratory wastes
- solvent-based cleaners/degreasers
- petroleum-based products
- automotive products
- etching compounds
- PCB contaminated oils
- inks
- mercury/amalgam
- thinners
- strippers
- paints
- pesticides
- herbicides
- insecticides
- dioxin
- oils

**What Materials Will be Accepted?** (among others)

- Paint and paint-related materials
- Solvent materials, thinners, strippers, inks, solvent-based materials/wastes
- Corrosives
- Poisons and pesticides
- Lab chemicals
- Petroleum-based materials/wastes
- Heavy metals and heavy metal-based materials wastes
- Used photographic and x-ray fixers
- Mercury Amalgam

**Wastes Not Accepted**

- Explosives
- Infectious (medical) wastes
- Radioactive wastes
- Certain poisons, pesticides and reactive wastes

**For More Information . . .**

Dave Radisewitz, CHMM, Clean Sweep Coordinator
210 Martin Luther King, Jr. Blvd., Rm. 507
Madison, WI 53703
[www.danecountycleansweep.com](http://www.danecountycleansweep.com)
(608) 243-0368 (Information Line)
(608) 243-0347 (Direct Line)
(608) 267-3105 (Fax)
dradisewitz@publichealthmadc.com
How to Apply

Businesses must apply for and receive prior approval from the Clean Sweep Coordinator for specific types and quantities of materials/wastes. Upon approval by the coordinator, the generator will be given an appointment for drop off of the materials/wastes. Small business collections will normally be scheduled on Wednesday mornings.

What Will It Cost?

Participants are required to pay for their share of the handling and disposal costs, which include contractor costs, testing (if required), handling/packaging and transportation from the collection site. The program expects costs to be significantly lower than they would be individually because of the larger quantity of materials/wastes. The final invoice will include the cost per pound determined at drop off and any additional charges that may be incurred.

How to Transport Your Materials/Wastes

Container sizes up to 55 gallons will be accepted. All containers must be securely closed, clearly labeled, and accompanied by the shipping papers. The generator must have the capacity to off load their own containers from the vehicle in which they are transported.

Accepted Product/Waste Streams Defined

The waste streams outlined (on page 4 of this brochure) are based on the program’s method of disposal for each waste stream. They reflect how the program processes the materials in order to comply with the waste hauler’s transportation requirements as well as the most efficient method of packaging to facilitate disposal of the materials when they reach final destination.

The goals of the program are to reuse (use the product as it was originally intended) or recycle (process and reuse the material) as great a percentage of the materials collected as possible while being cost effective. The materials that cannot be recycled or reused are disposed of.

Materials in different waste streams should not be combined. If this is done, you will be charged at the rate for the highest priced material in the mixture, regardless of quantity (e.g., 1 qt. halogenated solvent mixed with 2 gals. of non-halogenated solvent will result in a charge for 2 gals. and 1 qt. of halogenated solvent).

The product/waste streams defined below are commonly collected and include but are not limited to the items listed. Any product/material for disposal that is not listed below may be included in the product inventory form for review and approval.
Date: / / 

Business Name

Type of Business

Mailing Address

City/Town/Village State Zip Code

Contact Person (print)

Telephone FAX

Certification

I realize that the Dane County Business Waste Disposal Program will bill my business for disposal (and other associated costs) of the received wastes, and I will be obligated to pay these charges upon receipt of an invoice. I understand that only the types and quantities of wastes approved by the Dane County Business Waste Disposal Program can be disposed of through this project. I understand that the Dane County Business Waste Disposal Program is not assuming liability for my wastes and that future liability remains with my business.

Furthermore, I _______________ certify that I am (Print Name) currently knowledgeable of the hazardous waste regulations as they pertain to my business and certify that the hazardous waste listed was generated by a Very Small Quantity Generator of hazardous waste. I further certify that a copy of this receipt shall be kept in the business files at the place of hazardous waste generation for regulatory review for a minimum of three years from this date.

I certify that I have reviewed the information in this application and that, to the best of my knowledge, it is accurate.

Signature Date

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<tr>
<th>Material/Waste Chemical &amp; Trade Name</th>
<th>Use</th>
<th>Solid or Liquid</th>
<th>Size of Container (1 gal. 55 drum)</th>
<th>No. of Containers</th>
<th>MSDS (Y/N)</th>
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Definitions

Paints & Other Oil-Based Products: Latex (water-based) and oil or solvent-based paints; varnish, stains, and polyurethane; paints containing lead or other heavy metals; industrial and specification paints and coatings; oil-based products such as tung or linseed oil and other sealants or industrial waxes, or refinishing products; fuel oil; automotive products such as brake, power steering, and hydraulic fluids.

> Do not mix water-based with oil or solvent-based materials. While they are disposed at the same rate, the method of disposal varies.
> If the container (5 gallon size or less) is less than 1/3 full, is water based, and is liquid, flush down an indoor drain (not in septic systems). These products include latex paint, latex paint additives, wallpapering products and floor finishes in which the instructions for use include mixing with water. Semisolid or non-liquid water-based materials such as latex glues, adhesives, caulking or joint compound may be put in your normal trash.
> The material is hazardous if the container indicates that the material is flammable or combustible. Small amounts (less than an inch or two in the bottom of the container) may be dried out by adding absorbent such as oil dry or shredded newspaper to absorb the liquid. When this has dried, the container may be thrown into the regular trash.

Non-Halogenated Solvents: Concrete and deck preservatives and sealers; thinners, turpentine, lacquer thinner, acetone, and products containing petroleum distillates; solvent based automotive products such as Heet, gasoline and gasoline and oil mixtures.

Halogenated Solvents: Materials containing chloride such as parts cleaners/degreasers and strippers. Chemicals to look for are methylene chloride, MEK, 1,1,1-trichloroethane, carbon tetrachloride, and trichloroethylene.

Accepted Product/Waste Steams Defined

Pesticides, Poisons, & Cyanides: pesticides, herbicides and fungicides used for normal commercial or household lawn care; poisons contain heavy metals such as mercury, mercury amalgam, lead or potassium dichromate; cyanides such as Cyanogas. Fertilizers not containing a pesticide may be landfilled as well as pH altering chemicals such as sulfur and lime.

Oxidizers: Pool chemicals and stump remover. Chemicals to look for: sodium peroxide, perchlorates, benzoyl peroxide, chlorine, sodium/calcium hypochlorite, sodium bisulphate, chlorites, chlorates, chronic acid, nitrates, zinc phoshide, chromium trioxide, and ammonium dichromate

Flammable Solids: Isocynate based resins, cyanopyrolate esters, thermite (reactive w/air), copper (reactive w/air), bronze, aluminum powder, ethyl ether, sodium hydrosulfite, based brighteners (ethers, cleaners), lithium batteries, naphthalene and paraformaldehyde

Flammable Liquids: Flammable or combustible materials that have not hardened such as resins, epoxy, adhesives, glues and caulking, foundation and roofing tars. The materials included here may be any flammable or combustible product listed in the paint category that has deteriorated to a point where it cannot be reconstituted or where it cannot be reused or recycled but has not hardened completely. If solid, the material is no longer hazardous and may be put in the landfill. Flammable liquids are treated.

Acids/Alkaline: Acids such as acetic, sulfuric, phosphoric, oxalic, muriatic, perchloric, hydrofluoric acid; etching compounds like ferric chlorides; jewelry making compounds like gold cyanide and nitric acid; and alkalines such as phosphate cleaners, sodium/calcium hydroxide.

PCB Waste - Ballasts: Old ballasts/transformers. New ballasts/transformers will state that they do not contain PCBs and may be put in the landfill.

PCB Waste - Non-Ballasts: Automotive processes that generate PCBs and some paints. PCB contamination may be unknown until testing is performed.

Pressurized Containers: Aerosol cans containing paints, pesticides, cleaners, strippers, degreasers, or any commonly used product in a standard aerosol container, 1-pound propane cylinders, 20-pound propane cylinders. All others upon approval.

Metallic Mercury: Liquid mercury and that found in barometers, thermometers, light switches, etc.

Organic Peroxides: Wood bleach (hydrogen peroxide), dicamyl peroxide, methyl ethyl ketone peroxide, hardener w/peroxides.
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 Product Exchange is open during normal Clean Sweep program hours.

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.

All Product Exchange customers should proceed directly to the Clean Sweep building and stop under the canopy. Clean Sweep staff will provide you with further instructions.

2013 Program Changes

Dane County's new household hazardous waste facility features a larger area devoted to product reuse and exchange. Products that are received in good condition are stocked on the shelves of the product exchange room for redistribution to the public. This program is FREE to Dane County residents (non-residents are prohibited). In order to promote safety, discourage hoarding and facilitate fair distribution of product exchange materials to the general public, product exchange customers will be allowed a single entry per week to the product exchange room. The amount of product taken by each customer shall be limited to an amount which the customer can physically carry to their vehicle upon exiting the building. Re-entry is prohibited. Materials taken from the product exchange room are for personal use only and are not to be resold. Product exchange customers shall not test any product, open any container or mix or combine any chemicals or containers in the product exchange room! Persons suspected of reselling or hoarding large amounts of materials taken from the Product Exchange or otherwise violating facility rules will be banned from the facility and may be held responsible for disposal costs of any returned materials.

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


12/2/2013
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](http://www.danecountycleansweep.com/exchange.aspx) "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 K

CITY OF MADISON WELL ABANDONMENT ORDINANCE -
DANE COUNTY ORDINANCE RELATING TO PRIVATE WATER SYSTEMS
13.20 TAMPERING WITH WATER METERS PROHIBITED.
(1) No person shall modify, tamper with or in any manner interfere with, or make any connection to a water meter installed by the Madison Water Utility or to said meter’s electrical and mechanical connections or apparatuses or water pipes leading to said meters without the written authorization of the Water Utility General Manager or unless authorized by law.
(2) Any person violating this section may be subject to a forfeiture of not less than one-hundred dollars ($100) nor more than one-thousand dollars ($1,000).
(Cr. by Ord. 7848, 11-5-82)
(Sec. 13.20 Am. by Ord. 12,357, Adopted 3-16-99)

13.205 TAMPERING WITH WATER UTILITY MAINS AND PROPERTY.
(1) No person shall modify, tamper with or in any manner interfere with, or make any connection to any Madison Water Utility pipe, service, or owned facility or any other appurtenance without the authorization of the Water Utility Manager or his or her agent unless authorized by law.
(2) No person shall turn any valve or corporation cock without the authorization of the Water Utility Manager or his or her agent unless authorized by law.
(3) Any person violating this section may be subject to a forfeiture of not less than two hundred dollars ($200) nor more than two thousand dollars ($2000) each day or portion thereof shall be considered a separate violation.
(Sec. 13.205 Cr. by ORD-08-00117, 10-24-08)

13.21 WELL OPERATION PERMITS AND WELL ABANDONMENT.
(1) Purpose. The purpose of this ordinance is to prevent the contamination of groundwater and to protect the 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 public water supply are properly abandoned, and that existing private wells meet State requirements for construction and water quality. Improperly abandoned wells represent potential direct pathways for groundwater contamination to enter the municipal drinking water supply. This ordinance is enacted pursuant to an exercise of the City’s police power and Wis. Admin. Code ch. NR 810.16. (Am. by Ord-09-00124, Pub. 8-20-09, Eff. 1-1-10)
(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.
General Manager shall mean the General Manager of the Madison Water Utility, or his or her designee.
Noncomplying means a well or pump installation which does not comply with the provisions of Wis. Admin. Code ch. NR 812, 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 Wis. Admin. Code chs. NR 809 or 140, 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.
The 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 Wis. Admin. Code ch. NR 812.

(4) Abandonment Required. All wells located in the City of Madison or on premises served by the Madison Water Utility shall be abandoned by the owner of the property if there is no valid well operation permit issued by the Madison Water Utility under sub. (5) for the well, or if so required under Wis. Admin. Code § NR 812.26(2). Abandonment under this subsection shall proceed according to the requirements of sub. (6). Upon receiving an abandonment notice from the Madison Water Utility, the owner has ninety (90) days to either make an application for a well operation permit under sub. (5) or abandon the well under sub. (6), otherwise the Madison Water Utility may proceed with abatement under sub. (8). (Am. by Ord. 12,567, 5-3-00)

(5) Well Operation Permit.

(a) Permit Required. No person may operate or maintain a well without a valid well operation permit issued under this subsection.

(b) Permit Process.

1. Application and Permit Fee. Well operation permit applications and requests for permit renewals or modifications shall be made on forms provided by the Madison Water Utility. A well operation permit fee shall be set by the Water Utility General Manager, and will go into effect upon approval by the Water Utility Board. Payment of the permit fee shall accompany the application, renewal or modification request.

2. Issuance. If the requirements of this subsection are met, the Madison Water Utility may grant or modify a well operation permit to a private well owner to operate or maintain a well for a period not to exceed five (5) years. If the requirements of this subsection are not met, the Madison Water Utility may reject the permit application, permit renewal request, or permit modification request, providing the applicant with the reasons for the denial of the issuance, renewal, or modification of the well operation permit in writing.

3. Renewal. An owner may request renewal of a valid well operation permit by submitting information verifying that the requirements of this subsection are met, and that there is a continued need for the well. A request to renew a valid well operation permit must be made to the Madison Water Utility within the six (6) months prior to the expiration of the permit. Failure to timely request a renewal of a valid well operation permit will result in expiration of the permit, and the issuance of an abandonment notice by the Madison Water Utility.

4. Modification Upon Water Main Connection. Upon the connection of a property served by a permitted well to the water main, an owner may request a modification of a valid well operation permit to accommodate the continued use of the well by submitting information verifying that the requirements of this subsection are met. A request to modify a valid well operation permit must be made to the Madison Water Utility within ten (10) days of the connection to the water main. Failure to timely request a modification of a valid well operation permit will result in expiration of the permit, and the issuance of an abandonment notice by the Madison Water Utility.

5. Conditions. The following conditions must be met for issuance, renewal or modification of a well operation permit:

a. The well and pump installation have been certified by a licensed well driller or pump installer to meet, or are upgraded to meet, the requirements of Wis. Admin. Code ch. NR 812.
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.

6. Termination of Permit. A well operation permit issued or renewed under this subsection shall automatically terminate upon the permit holder’s conveyance of the property pursuant to Wis. Stat. ch. 706, or upon connection of the property served by the well to the water main unless the permit is modified under para. 4.

(c) Testing and Inspection Requirements.

1. Conditional Inspection and Testing. As a condition of the issuance, renewal or modification of a well operation permit, the Madison Water Utility, or its agent, may conduct inspections or have water quality tests conducted to obtain or verify information necessary for consideration of a permit application or renewal, including up to two (2) bacterial examinations of water samples obtained from the well, one (1) nitrate test, and the inspection of the well by a licensed well driller or pump installer to confirm that the well and pump installation meet the requirements of Wis. Admin. Code ch. NR 812. If any additional tests or inspections are required, they shall be performed at the applicant’s expense.


a. As a condition of all well operation permits issued, renewed or modified under this subsection, the permit holder must submit periodic water quality testing data conducted at the well owner’s expense to the Madison Water Utility. This testing shall be done annually, on the anniversary date of the issuance, renewal or modification of the well operation permit, or as otherwise determined by the General Manager.

b. At a minimum, such annual water quality tests must include results for coliform bacteria and nitrate. Additional testing results may be requested by the Madison Water Utility.

c. If a water quality test under this paragraph reveals that the water quality does not meet the standards of Wis. Admin. Code ch. NR 809, the property owner shall be given ninety (90) days to bring the well into compliance. The failure to do so will result in the well operation permit being voided.

d. A property owner who fails to submit the annual testing data to the Madison Water Utility as required under this paragraph is subject to the penalties set forth in Sec. 13.23, MGO.

3. Inspection Upon Transfer of Property. Whenever real property with a well on the premises is conveyed pursuant to Wis. Stat. ch. 706, 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.

4. Periodic Inspections. 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 Wis. Stat. § 66.0119. 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.
(d) **Appeal.** If a person's application for a well operation permit, or renewal or modification of a well operation permit, is denied by the Madison Water Utility, or a permit is voided as provided for in sub. (e)2.c. for failure to comply with the annual testing requirement, the person may appeal within fifteen (15) days of the mailing of the permit denial or voiding notice. Appeal shall be to the Water Utility Board. All requests for appeal shall be filed with the City Clerk and the General Manager, and must inform the Water Utility Board of the reasons for the appeal. Within forty-five (45) days, the Water Utility Board shall hold a hearing at which the parties may offer testimony and documents. Either at or within twenty (20) days of the hearing, the Water Utility Board shall affirm, modify, or reverse the determination that the well operation permit should be denied or voided. Appeal from the action of the Water Utility Board shall be to Circuit Court within thirty (30) days of the determination of the Board.

(e) **Revocation of Permit.** If, at any time after the issuance or modification of a well operation permit, the General Manager determines that a well is a serious hazard to the health or safety of the public, the General Manager may immediately revoke the well operation permit and proceed under sub. (8). The General Manager shall include the reasons for the revocation of the well operation permit in the abatement order issued under that subsection.

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

(5) **Abandonment Procedures.**

(a) All wells subject to this ordinance that are abandoned shall be abandoned by a licensed well driller or pump installer according to the procedures and methods of Wis. Admin. Code § NR 812. All debris, pump, piping, unsealed liners and any other obstructions which may interfere with scaling 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 sub. (a) to return and take corrective action so that the well is abandoned by him or her in a complying manner. (Ct. by Ord. 12,557, 5-3-00)

(7) **Well Abandonment Rebate.** Upon the proper abandonment of a well pursuant to this section, the City Engineer, in consultation with the Water Utility General Manager and the Public Health Director, is authorized to issue a rebate to the owner of a property located in the City of Madison or that is served by the Madison Water Utility of up to fifty percent (50%) of the cost to the owner of the abandonment of the well, up to a maximum rebate of one thousand dollars ($1000.00). In determining the amount of the rebate, any contributions made by Dane County under Dane County Ordinance 46.42 or the Wisconsin Department of Natural Resources under the Well Compensation Program (Chapter NR 123) shall not be considered, provided that the rebate issued by the City under this subsection, when combined with any contribution made by Dane County and WDNR, shall not exceed the total cost to the owner of abandoning the well. No rebate shall be issued to the owner of a property against whom the City has either issued a citation or made a written referral to the City Attorney for non-compliance with the requirements of this section. Rebates issued under this subsection shall be funded out of the landfill remediation fee as set forth in Sec. 35.025, MGO. (Cr. by ORD-09-00124, Pub. 8-20-09, Eff. 1-1-10)

(8) **Abatement.** If the General Manager of the Water Utility determines that an existing well is a serious hazard to the health or safety of the public, then the General Manager may order the owner or operator to abandon or repair the well at the owner or operator's expense, pursuant to this subsection. A well without a valid well operation permit issued under this section shall be deemed a public nuisance under this section.
(a) **Summary Abatement.**

1. **Order of Abatement.** If the General Manager determines that a well constitutes a public nuisance and that there is imminent danger to the public health, safety, peace, comfort or welfare, he or she may, without notice or hearing, issue an order to the owner and/or well operator reciting the existence of a public nuisance constituting imminent danger to the public and requiring immediate action be taken as he or she deems necessary to abate the nuisance, including abandonment of the well. Notwithstanding any other provisions of this subsection, the order shall be effective immediately. Any person to whom such order is directed shall comply with the order immediately.

2. **Abatement by the Utility.** Whenever the owner or operator shall refuse or neglect to remove or abate the condition described in the order, the General Manager may, in his or her discretion, enter upon the property and cause the nuisance to be removed or abated, including abandonment of the well, and the Water Utility shall recover the expenses incurred thereby from the owner or operator of the property. The expenses so incurred shall be levied as a special charge against the property.

(b) **Nonsummary Abatement.**

1. **Order of Abatement.** If the General Manager determines that a well constitutes a public nuisance but that the nature of such nuisance is not such as to threaten imminent danger to the public health, safety, peace, comfort or welfare, he or she shall issue an order reciting the existence of a public nuisance and requiring the owner and/or operator of the property to remove or abate the condition described in the order within the time period specified therein, including abandonment of the well. The order shall be served personally on the owner of the property, as well as the operator if different from the owner and applicable to the described nuisance, or, at the option of the General Manager, the notice may be mailed to the last known address of the person to be served by registered mail with return receipt requested. If the owner or the operator cannot be served, the order may be served by posting it on the main entrance of the premises and by publishing as a class 1 notice under Wis. Stat. ch. 985. The time limit specified in the order runs from the date of service or publication.

2. **Abatement by the Utility.** If the owner or operator fails or refuses to comply within the time period prescribed, the General Manager may enter upon the property and cause the nuisance to be removed or abated, including abandonment of the well, and the Water Utility shall recover the expenses incurred thereby from the owner or operator of the property. The expenses so incurred shall be levied as a special charge against the property.

(c) **Remedy from Order.** The order of the General Manager shall not be appealable to the Water Utility Board. Any person affected by orders issued under this subsection shall timely apply to the circuit court for an order restraining the Water Utility and the General Manager from entering on the premises and abating or removing the nuisance, or be forever barred.

(d) **Abatement in Accordance with State Law.** Nothing in this article shall be construed as prohibiting the abatement of public nuisances by the Water Utility or its officials in accordance with the laws of the state. The Water Utility or its officials may choose to proceed with an action under state law, upon authorization by the Water Utility Board.

(9) This law does not supersede the State Plumbing Code, Wis. Admin. Code § NR 811 or Chapter 18 of the Madison General Ordinances entitled “Plumbing Code” but is supplementary to them.

(Revised by ORD-09-00124, Pub. 8-20-09, Eff. 1-1-10)

(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; ORD-11-00170, 12-21-11; ORD-13-00018, 2-12-13)
Dane County Ordinance

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

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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.

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.

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 Department of Public Health for Madison and Dane County.
(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.

(9) Existing installations means the installations designated in ch. NR 812, Wis. Admin. Code.

(10) 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.

(11) 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.


(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. 12/26/95; (11m) cr. and (19) am., OA 21, 2002-03, pub. 03/04/03; (1) am., OA 22, 2012-13, pub. 11/21/12.]
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, 1996-96, pub. 12/06/96; (4) am., OA 21, 2002-03, pub. 03/04/03; (4) am., OA 16, 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, 1996-96, pub. 12/06/96]

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: (5) am., OA 29, 1995-96, pub. 12/01/95.]

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.

(4) Investigate and record all private water system complaints.

(5) 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.

(6) 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.

(7) 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.

(8) Assist the department as specified in ch. NR 845, Wis. Admin. Code.

(9) Refer variance requests and actions which require department approval to the department.

(10) Advise owners not to drink or use water from private water systems under conditions specified in ch. NR 845, Wis. Admin. Code.

(11) 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. 12/01/95.]

[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 reappplication 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. 09/18/88; (1), (2), (4), (5), (7), (8), (10), (11) and (15)
am. and (8) and (9) rep., OA 29, 1996-97, pub. 12/08/96; (3)
am., OA 21, 2002-03, pub. 03/04/03; (5)(a) am., OA 10,
2909-94, 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 Board of Health
for Madison and Dane County 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
appeal committee's decision 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.

[History: am., OA 22, 2012-13, pub. 11/21/12.]

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
stopped 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: (5)(i) am., Sub. 1 to OA 43, 1987-88, pub.
09/18/88.]

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.]

[45.28 - 45.50 reserved.]

45.51 FEE SCHEDULES. (1) The fee for a well siting permit shall be $100.00.

(2) The fee for a transfer of a well siting permit shall be $42.00.

(3) The fee for a re-inspection of a well site shall be $32.00.

[HISTORY: (1) and (2) am., and (4) rep., OA 21, 2002-03, pub. 03/04/03; (1) and (2) am., OA 37, 2003-04, pub. 04/23/04; am., OA 25, 2003-07, pub. 12/29/06, eff. 01/01/07; (1) am., OA 31, 2009-10, pub. 11/25/09, eff. 01/01/10; (1) and (2) am., OA 22, 2012-13, pub. 11/21/12.]

[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. 12/02/95.]

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APPENDIX L

PRIVATE WELLS AND WELL ABANDONMENT INFORMATION
YOU & YOUR WELL
WISCONSIN DEPARTMENT OF NATURAL RESOURCES

The Wisconsin Department of Natural Resources provides equal opportunity in its employment, programs, services, and functions under an Affirmative Action Plan. If you have any questions, please write to Equal Opportunity Office, Department of Interior, Washington, D.C. 20240.

This publication is available in alternative format (large print, Braille, audio tape, etc) upon request. Please call 608-266-0821 for more information.

For more information, request the following brochures: Well Abandonment (PUB-DG-016), Bacteriological Contamination of Drinking Water (PUB-DG 003), Driven-Point (Sand-Point) Wells (PUB-DG-022 92)

PUB-DG-002 2007
Is there a new well in your future? Perhaps you are building a new home, or are simply considering replacing or upgrading an existing water supply. Whatever the case, here is some information that can help you.

Who regulates water wells?
Wisconsin has had well regulations since 1936, and today is recognized as a national leader in well protection. NR 812, (formerly NR 112), Wis. Adm. Code, is administered by the Department of Natural Resources (DNR). The Well Code is based on the sound premise that if a well and water system is properly located, constructed, installed and maintained the well should provide safe water continuously without the need for treatment. Most county zoning and public health offices have a copy of the Well Code. For information about the code, contact a DNR regional water supply staff person or a licensed well driller or pump installer. Consult with licensed individuals or neighbors for background information on water quality.

Who can construct wells? Who can install pumps?
Well Driller—Only those persons holding a current well drilling license from the Department of Natural Resources may construct or reconstruct (deepen or install a liner or screen) potable wells.

Pump Installer—Only those persons holding a current pump installer license from the Department of Natural Resources may install and replace pumps, pitless adapters and accessory piping and pressure tanks on both drilled and driven point potable wells.

Exceptions—A well drilling license is not required for constructing driven point wells. A license is not required for a person constructing a well or installing a pump on property owned and occupied by him or her. State law requires, however, that no matter who does the work, it must comply with the State Private Well Code (ch. NR 812), and a Well Construction Report must be submitted to DNR. A license is not required for an individual constructing a nonpotable well or installing a pump in a nonpotable well, however the installation must comply with the well code.

What are the responsibilities of a well constructor to the owner?
The well must be constructed or reconstructed in compliance with ch. NR 812, and upon completion of a well construction or reconstruction, a well driller or point driver is required to:
1. Test pump and flush the well.
2. Disinfect the well.
3. Collect a water sample for a bacteriological test; submit the sample to a laboratory certified for bacteriological testing; and provide a report of the results to the owner within 10 days of receiving the water test results. (The DNR recommends that the water also be tested for nitrates.)
4. Provide the owner or his agent with a copy of a Well Construction Report, that describes how the well was constructed, within 30 days of completion of the well. The report assigns a unique number to the well.

The water sample test results and well construction report must also be sent to the Department.

What are the responsibilities of a pump installer to the owner?
A pump installer must install the pump, the pitless adapter, pressure tank and sample faucet in compliance with the Well Code, disinfect the pump and distribution system after installation, flush it, take a water sample for bacteriological analysis (as described in #3 above) and report the results to the owner.

The pump installer may delegate the sample collection to the owner or another agent, by leaving the sample bottle, instructions and form, but the pump installer is still responsible for the sample collection.

Some private well location requirements (from NR 812)
Always ensure that your well is located upslope and as far as possible from potential sources of contamination, but at least:
◆ 8 feet from an approved gravity building sewer pipe or 25 feet from building sewers made of other non-approved materials or a pressurized building sewer.
◆ 8 feet from a swimming pool.
◆ 100 feet from any buried petroleum tank, except that only 25 feet of separation is required for a buried fuel oil tank if the tank is used only for private residential heating.
◆ 25 feet from a septic or holding tank, or from a laundry or wastewater sump.
◆ 25 feet from the high water mark of a lake, pond or stream.
◆ 50 feet from a privy, dry well, soil absorption system (“drainfield”) or mound system.
◆ 50 feet from a municipal collector sewer.
◆ 50 feet from an animal yard or animal shelter.
◆ 250 feet from a sludge disposal area, a salvage yard or a salt storage area.
◆ 250 feet from an absorption, storage, retention or treatment pond; ridge and furrow system; or spray irrigation waste disposal site.
◆ 1,200 feet from any existing, proposed or abandoned landfill site.

NOTE: This list is not complete. Consult NR 812 or the DNR for specific requirements. Figures A and B show well location requirements.

![Figure A](Common separation distances on residential lots)

![Figure B](Common separation distances on farms)
Some general DOs and DON'Ts

**DO** Make certain the well constructor extends the well casing pipe at least 12 inches above the finished ground surface and two feet above a floodplain. (Future landscaping must be taken into account.)

**DO** Properly install a vermin-proof well cap and electrical conduit to prevent entrance of insects into the well.

**DO** Make certain any underground connection to the well is made with an approved pitless adapter or unit. Properly installed, this will provide a water tight connection to the well and allow easy pump repair or well cleaning.

**DO** Completely fill and seal any unused wells (a DNR brochure on well abandonment is available).

**DO** Collect a water sample for bacteriological analysis at least once each year and anytime you notice a change in taste, odor, color or appearance. Also sample for nitrate if the water is to be used for an infant or a pregnant woman.

**DO** Construct your driven point well to a depth of at least 25 feet (not including the screen), or, 10 feet below the static water level, whichever is the greater depth.

**DO** Install an accessible downward-facing, non-threaded sampling faucet between the pump and the pressure tank at least 12 inches above the floor to allow for sampling water directly from the well.

**DO** Use only code-complying well casing pipe. (see NR 812.17).

**DON'T** Install a well in the basement or in a crawl space of your home. (The well would not be accessible for repair.) If the basement is of the walk-out type, installation is permissible. (Offset pumps may be installed in dry basements.)

**DON'T** Construct a well, pump, or pressure tank pit. A well may not terminate in a pit or an alcove. The DNR does not allow pits because of the potential for flooding and subsequent contamination of the water supply. (Pitless adapters have made pits obsolete.)

**DON'T** Install unprotected buried suction line between a well and a pump or pressure tank in a basement. If the pipe were to develop a hole or crack, it could allow surface water to get into the water supply. Instead use a pitless adapter or unit with a pressurized piping arrangement. Do not install a non-pressure conduit to enclose the suction piping between a well and a basement.

**DON'T** Use a well for disposal or drainage of solid wastes, sewage, surface water or wastewater. This can contaminate an aquifer.

**DON'T** Develop a spring as a drinking water source without obtaining advance approval from DNR. The DNR does not recommend the use of a spring as a source of water for drinking.

### Types of acceptable pump installations

**Offset Pump Installations** (pump usually installed offset from the well in basement of house) with a seal-cross fitting or a flange adapter and pressurized, concentric discharge. Connections should be made below frost depth to eliminate the potential for freezing.

1. Offset shallow-well pump for driven point well (Figure C)
2. Packer jet assembly for offset for driven point well pump (Figure D)

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**Figure C** Shallow-well pump installation

**Figure D** Deep-well offset pump installation using a packer-jet assembly
Submersible Pumps installed within well, below water level with:

1. An above-ground discharge pipe enclosed in a heated shelter (Figure E); or
2. Approved above-ground discharge unit, directed to an inside pressure tank (Figure E); or
3. A below-ground discharge with approved pitless adapter or pitless unit (Figure G); or
4. A buried pitless receiver tank (Figure H).

Well Code requirements have been simplified for this pamphlet. For specific details on the Wisconsin Well Code (NR 812), look on our website at: [dnr.wi.gov/org/water/dwg/code.htm](https://dnr.wi.gov/org/water/dwg/code.htm). If you have questions on the specifics of NR 812, please contact staff at one of the following offices.

**Northern Region**
810 W. Maple Street
Spooner, WI 54801
(715) 635-2101
or
107 Sutliff Avenue
Rhineland, WI 54501
(715) 365-8900

**South Central Region**
3911 Fish Hatchery Road
Fitchburg, WI 53711
(608) 275-3266

**West Central Region**
1300 W. Clairemont
PO Box 4001
Eau Claire, WI 54702-4001
(715) 839-3700

**Southeast Region**
2300 N. Dr. Martin Luther King, Jr. Drive
Milwaukee, WI 53212
(414) 263-8500

**Northeast Region**
2984 Shawano Avenue
P.O. Box 10448
Green Bay, WI 54307-0448
(920) 662-5100

**Central Office**
101 S. Webster
P.O. Box 7921
Madison, WI 53707-7921
(608) 266-0821
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.

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 (WG NHS) 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/wel lord.pdf.
- To request a Well Construction Report for an area uwex.edu/wgnhs/pdfs/wcrpdf/wel lord2.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.

**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 conductor 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 (trench) 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.

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**Well filling and sealing**

Unconsolidated portion backfill with:
- Clay slurries
- Clay-type clean soil

Remove upper 5 feet of curbing

Unconsolidated overburden

Bedrock portion filled with cement

Fractured bedrock

If a drilled well extends below the dug well it must be filled first according to drilled well requirements.

---

**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.

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**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 slurries and may **not** be used for small diameter 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 slurries are 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 (1/4" - 3/8" and 1/2" - 3/4" chips). The 1/4" - 3/8" 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:
      \[
      \pi \frac{r^2 h}{0.69 \text{ ft}^3/\text{bag}} = \text{ number of ft}^3 \text{ filled by one 50 lb. bag}
      \]
      (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

<table>
<thead>
<tr>
<th>Hole diameter inches</th>
<th>Hole volume (ft³/foot)</th>
<th>Pounds bentonite chips to fill 1 ft</th>
<th>Feet filled by one bag bentonite chips</th>
<th>Bags bentonite chips to fill 100 ft</th>
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<tbody>
<tr>
<td>4</td>
<td>0.087</td>
<td>6.3</td>
<td>7.9</td>
<td>12.6</td>
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<td>7.9</td>
<td>6.3</td>
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<td>5</td>
<td>0.136</td>
<td>9.8</td>
<td>5.1</td>
<td>19.6</td>
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<td>0.165</td>
<td>11.9</td>
<td>4.2</td>
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<td>6</td>
<td>0.196</td>
<td>14.1</td>
<td>3.5</td>
<td>28.2</td>
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<td>16.6</td>
<td>3.0</td>
<td>33.2</td>
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<td>1.8</td>
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<td>-----------------------------------------------</td>
<td>----------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clean clay or still or clean native soil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Driven-Point (sand-point) wells</td>
<td>Approved bentonite chips</td>
<td>Cement grout may be poured without using a</td>
<td></td>
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<tr>
<td>&amp; drillholes ≤ 2 1/2&quot; diameter</td>
<td>No</td>
<td>conductor pipe</td>
<td></td>
<td></td>
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<tr>
<td>Wells &amp; drillholes &gt; 2 1/2&quot; diameter</td>
<td>Yes, provided well is 4&quot; minimum diameter &amp; 500' maximum depth</td>
<td>Conductor pipe required except when bentonite chips or pea gravel is used</td>
<td></td>
<td></td>
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<tr>
<td>Dug wells</td>
<td>Yes (top 5' of curbing must be removed following filling)</td>
<td>Conductor pipe not required unless well is ≤+18&quot; diameter</td>
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<td></td>
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<tr>
<td>Bedrock wells not extending through Maquoketa Shale</td>
<td>Yes, provided 4&quot; minimum diameter &amp; 500' maximum depth</td>
<td>Conductor pipe required except when bentonite chips or pea gravel is used</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bedrock wells extending through Maquoketa Shale</td>
<td>Yes in top 500' &amp; for 40' plugs at top &amp; bottom of Maquoketa Shale contact surfaces</td>
<td>Conductor pipe required except when bentonite chips or pea gravel is used</td>
<td></td>
<td></td>
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<tr>
<td>Dug wells</td>
<td>Yes, but only in unconsolidated portion of well</td>
<td>Conductor pipe required only for placement of grout or concrete; or if well is ≤+18&quot; diameter</td>
<td></td>
<td></td>
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<tr>
<td>Well pits</td>
<td>Yes</td>
<td>Most perforated floor &amp; 1 wall of pit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 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 1/4 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' permeable 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

<table>
<thead>
<tr>
<th>Product</th>
<th>Supplier/Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABI Plug</td>
<td>ABI, Inc.</td>
</tr>
<tr>
<td>Bentonite Plug</td>
<td>Loresto (medium: ¼ - ⅛ and coarse ½ - ¾”)</td>
</tr>
<tr>
<td>Black Hills Bentonite Plug</td>
<td>Black Hills Bentonite, LLC</td>
</tr>
<tr>
<td>CETCO Chip</td>
<td>CETCO (medium: ¼ - ⅛ &amp; coarse; ⅜ - ¾”)</td>
</tr>
<tr>
<td>Cowboy Brand</td>
<td>Cowboy Mining Co. (Fine, Medium &amp; Coarse)</td>
</tr>
<tr>
<td>Econoplug</td>
<td>Economy Mud Products Co. (both medium chips: ¼” to ⅜” and coarse chips: ½” to ¾”)(mfg. by Wyo-Ben, Inc.)</td>
</tr>
<tr>
<td>Enviroplug</td>
<td>Wyo-Ben, Inc. (both medium chips: ¼” to ⅛” and coarse chips: ½” to ¾”)</td>
</tr>
<tr>
<td>Federal Plug</td>
<td>M-1 Drilling Fluids (Federal) – 100% of chipped sodium bentonite (both medium chips: ¼” to ⅜” and coarse chips: ½” to ¾”)</td>
</tr>
<tr>
<td>Holeplug</td>
<td>Baroid Industrial Drilling Products (⅛” and ¼” chips)</td>
</tr>
<tr>
<td>Kwik Plug</td>
<td>Federal Summit (⅜” and ¼” chips)</td>
</tr>
<tr>
<td>Naturapel</td>
<td>Wyo-Ben, Inc. (chips)</td>
</tr>
<tr>
<td>Opti Seal</td>
<td>Bentonite Corp. (⅛” and ¼” chips)</td>
</tr>
<tr>
<td>PdsCo Plug</td>
<td>PdsCo (Polymer Drilling Systems) (medium and coarse chips)</td>
</tr>
<tr>
<td>Permaplug</td>
<td>Cathodic Engineering Equipmnet Co. (both coarse chips: ¾” and medium chips: ½”)</td>
</tr>
<tr>
<td>Pure Gold Chips</td>
<td>CETCO (both medium ¼” to ⅜” and coarse ⅜” to ⅔” chips)</td>
</tr>
<tr>
<td>Tower Plug</td>
<td>Black Hills Bentonite, LLC (⅛” and ¼” chips)</td>
</tr>
<tr>
<td>Well-Plug</td>
<td>Fluidrill Mud Systems (from Black Hills Bentonite) 100% chipped bentonite (⅛” and ¼” chips)</td>
</tr>
</tbody>
</table>
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)

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/cgw/index.htm. Also check the UW Extension website at: learningstore.uwex.edu/Drinking-Water-C120.aspx.
APPENDIX M

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)

13.23 PENALTY. Any person violating any provision of this chapter for which a separate penalty has not been imposed shall be punished by a fine of not less than fifty dollars ($50) nor more than one thousand dollars ($1,000). Each day or portion thereof such violation continues shall be considered a separate offense.

The word “fine” as used in this chapter shall be synonymous with the term “forfeiture”.

(Am. by Ord. 12,357, Adopted 3-16-99; Renumbered to Sec. 13.23 by Ord. 13,106, 7-23-02; Am. by ORD-06-00135, 10-6-06)
SUBCHAPTER 28H: OVERLAY DISTRICTS

28.101 APPLICABILITY.
The requirements of the overlay 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 primary zoning district classification of those zoning lots.
In the event of a conflict between the provisions of any overlay district and the underlying primary zoning district, the provisions of the overlay district shall apply, except where otherwise specified.

28.102 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) Protection Zones.
Each wellhead shall have two (2) zones of protection around it.
(a) Zone A is 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 is the smaller of the following:
   1. 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
   2. The area within a twelve hundred (1,200) foot radius around the well, except for the area in Zone A.

(3) Uses.
All uses in Zones A and B of any Wellhead Protection District shall be approved by the Water Utility General Manager or his/her designee. A use may be approved with conditions. Approval by the Water Utility General Manager or his/her designee is 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, MGO.
(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.

(4) 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.
(16) **Wellhead Protection District No. 17.**
The location of Well No. 17 and the surrounding Zone A and Zone B are shown in Sec. 28.102(22)(a).
(a) Map of Wellhead Protection District No. 17.
APPENDIX N

WATER CONSERVATION INFORMATION
City of Madison
Water Utility
Water Conservation and Sustainability Plan
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"When the well's 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).

<table>
<thead>
<tr>
<th>geology</th>
<th>lithology</th>
<th>hydrostratigraphy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jordan Formation</td>
<td></td>
<td>upper aquifer, sandstone/dolomite, 0-60 m thick</td>
</tr>
<tr>
<td>St. Lawrence Formation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tunnel City Formation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wonewoc Formation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eau Claire Formation</td>
<td></td>
<td>Eau Claire aquitard, siltstone/shale, 0-18 m thick</td>
</tr>
<tr>
<td>Mount Simon Formation</td>
<td></td>
<td>Mount Simon aquifer, sandstone, 30-210 m thick</td>
</tr>
</tbody>
</table>

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).

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.

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.
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.

<table>
<thead>
<tr>
<th>2007 Electricity Usage</th>
<th>Per Million Gallons of Water Pumped</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average kWh</td>
<td>1,956</td>
</tr>
<tr>
<td>Average kWh cost</td>
<td>.088</td>
</tr>
<tr>
<td>Electricity cost</td>
<td>$172.10</td>
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</table>

<table>
<thead>
<tr>
<th>2007 Chemical Usage</th>
<th></th>
</tr>
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<tbody>
<tr>
<td>Average cost of Chlorine</td>
<td>2.17</td>
</tr>
<tr>
<td>Average cost of Fluoride</td>
<td>13.51</td>
</tr>
<tr>
<td>Total Cost to Pump and Treat</td>
<td>$187.79</td>
</tr>
</tbody>
</table>

| 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 1 million 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.

![City of Madison Water Utility: Water Use - 2007](image)

*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)**

<table>
<thead>
<tr>
<th>Use</th>
<th>Gallons Per Capita Per Day–Typical</th>
<th>Gallons Per Capita Per Day–Conservation</th>
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<tr>
<td>Showers</td>
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<td>8.8</td>
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<tr>
<td>Clothes Washers</td>
<td>15.0</td>
<td>10.0</td>
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<td>Dishwashers</td>
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<td>Toilets</td>
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<tr>
<td>Baths</td>
<td>1.2</td>
<td>1.2</td>
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<tr>
<td>Leaks</td>
<td>9.5</td>
<td>4.0</td>
</tr>
<tr>
<td>Faucets</td>
<td>10.9</td>
<td>10.8</td>
</tr>
<tr>
<td>Other Domestic Uses</td>
<td>1.6</td>
<td>1.6</td>
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<td><strong>TOTAL</strong></td>
<td><strong>69.3</strong></td>
<td><strong>45.3</strong></td>
</tr>
</tbody>
</table>

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 2/3 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.

![Gallons Pumped Per Month, 2007](image)

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>
<thead>
<tr>
<th>Municipality</th>
<th>Billing Cycle</th>
<th>Base Meter Rate - 6 Months</th>
<th>Rate Per CCF (748 Gallons)</th>
<th>Semi-Annual Cost for Madison Residential Customer</th>
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<tr>
<td></td>
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<td></td>
<td>Rate Steps</td>
<td>20th Percentile</td>
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<tr>
<td>Semi-Annual Consumption (CCF)</td>
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<td>Average Daily Use (Gallons)</td>
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<td></td>
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<td></td>
<td>&gt;55</td>
<td>$1.38</td>
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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 ‘GreenPlumbers’. 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%.

![Average Daily Water Use by University-Wisconsin, 2002-2006](image)

*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**

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

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.
<table>
<thead>
<tr>
<th><strong>Enact inclining rate structure</strong></th>
<th>Water Utility Staff and Wisconsin Public Service Commission</th>
<th>October 2008 (Subject to Rate Structure Approval.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A modest rate structure has been proposed to the PSC (Wisconsin Public Service Commission). The rate request was 18%, reflective of the Utility's strained financial situation. The concept of the proposed inclining rate structure was a rate structure for:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. The lowest 20th percentile of usage at 61 gallons per day.</td>
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<tr>
<td>2. A Conserving Level at 148 gallons per day.</td>
<td></td>
<td></td>
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<tr>
<td>3. A median level at 184 gallons per day.</td>
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<td></td>
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<tr>
<td>4. The 80th percentile at 225 gallons per day.</td>
<td></td>
<td></td>
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<tr>
<td>A more aggressive rate structure may be proposed at such time as more frequent bills can be issued or that customers are able to track their usage with practice.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Investigate the Conversion of Water Meters to Provide for Quarterly Billing and the Potential of Monthly Billing</strong></th>
<th>Water Utility Staff</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>(To make a switch from semi-annual to quarterly billing using a non-AMR system would be $417,000 in semi-annual operating costs.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Enact Outdoor Water Usage Restrictions to Maintain Pumpage Below a Preset Daily Amount</strong></th>
<th>Water Utility Board, and Water Utility Staff</th>
<th>July 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
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<tr>
<td>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.</td>
<td></td>
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</tr>
<tr>
<td>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.</td>
<td></td>
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</tr>
</tbody>
</table>

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


SUSTAINABILITY

- Toilet Rebate
- Project H2O
- Home Conservation
- Lawn & Garden
- Businesses (PDF)
- Infrastructure

What does sustainability mean to you? At Madison Water Utility, it means improved leak detection, renewing our water infrastructure, and public outreach and education. It means preserving water quality through our wellhead protection program. And it means considering future generations in every decision we make.

WHAT WE'RE DOING

CATCHING LEAKS

Our Project H2O Advanced Metering Infrastructur (AMI) system allows Madison Water Utility to receive frequently updated usage data, helping us spot large leaks and plumbing problems. Some 200 residential customers have been alerted to major water leaks so far thanks to Project H2O. Eventually, customers will be able to track their day-to-day usage online, giving them the tools they need to conserve.

REBUILDING AND RENEWING

When a water main breaks, it doesn't just mean an expensive and sometimes time-consuming repair. It also means the loss of high-quality drinking water. That's why our major goal over the next several decades is the rebuilding and renewing of our massive water infrastructure.

PUBLIC OUTREACH

http://www.cityofmadison.com/water/sustainability/
Our Water Wagon is a pretty fun way to get water. But it's a lot more than that. The Water Wagon is a hands-on mobile teaching tool that we bring to community events and schools across Madison. It gets the attention of kids and adults alike and has been a great way to open a dialogue about the value of water and the importance of conservation.

WELLHEAD PROTECTION

Ensuring that future generations will have access to high quality water is our top priority. Through our Wellhead Protection Program, we work with the city to restrict future land uses that could lead to contamination of the water entering our wells. Protecting our groundwater requires the combined efforts of many entities, from regulatory agencies to individual customers and businesses.

WHAT YOU CAN DO

Believe it or not, Madison's total water use has dropped significantly over the last two decades, even as our population continues to grow. But there's always room for improvement. Check out our toilet rebate program or take a look at tips on how you can conserve both inside your home and outside when caring for your lawn and garden. When it comes to sustainability, it falls to all of us to be good stewards of our resources. Our children and grandchildren will thank us.
 RESIDENTIAL CUSTOMER TOILET REBATE
(If you meant to go to the Apartment Building Toilet Rebate page, click here.)

PROGRAM OVERVIEW

The Madison Water Utility is offering rebates of up to $100 for residential customers who replace one high water using toilet with an EPA WaterSense-rated High Efficiency Toilet (HET) model. The program is part of the utility's Water Conservation and Sustainability Plan to reduce per capita water usage 20 percent by the year 2020, with the goal of protecting the quality and quantity of the deep-well aquifer that supplies the Madison area.

Toilets eligible for rebate must be HETs (which use an average of 1.28 gallons per flush) and must be on the Environmental Protection Agency's (EPA) WaterSense list. A toilet that meets the criteria and is purchased after January 1, 2009, will be eligible. Rebates will be in the form of checks sent to the customer's residence of record or as a credit on the customer's water bill; the rebate amount will not exceed the purchase price of the toilet.

To apply for the rebate, you must submit two items: the original, dated sales receipt for the toilet showing the manufacturer's model name and number and the completed application form (PDF). (You should keep a photocopy of your receipt.) These items must be mailed to the following address:

Madison Water Utility
Toilet Rebate Program
119 East Olin Avenue
Madison, WI 53713

ELIGIBILITY

Participants in the program must be residential customers of the Madison Water Utility, and the installation address must be in the customer service area of the utility. Qualified customers are those who live in single-family homes, condos, or apartments in buildings no larger than four units. Rebates are for replacement of existing larger-capacity toilets, and are not for new construction. Rebates are first-come, first-served, until funding is exhausted. The program is for only one rebate for one toilet per household. Eligible replacement toilets must be HETs listed on the EPA WaterSense website (Click on the Product Category toilets, then click on the brand name, then on the model name, and then on the SEARCH button to find the model number—which will appear at the bottom of the WaterSense page).

INSTALLATION

Homeowners may install the toilets themselves, or they may hire a plumber or contractor to do the job. Owners are responsible for proper installation and associated costs. Installation may be subject to verification by water utility personnel. Toilets may be purchased at any supplier as long as they are on the WaterSense list of HETs.

REBATES

Rebate checks of up to $100 (not to exceed actual purchase price) will be sent to the customer's address or credited to the customer's water bill, after applications are processed. Please allow four to six weeks. Rebates are not available for the costs of installation.

DISPOSAL OF OLD TOILETS

Replaced toilets should be placed at the curb for pick-up by the City Streets and Recycling Department.

For more information, call the Madison Water Utility at (608) 266-4651.

**Download the Toilet Rebate Application Form (PDF)**

To view the Toilet Rebate Video, download [Adobe FlashPlayer](http://www.cityofmadison.com/water/inTheHome/toiletRebate.cfm).
SMART METERING

Madison Water Utility is nearly finished upgrading all customer water meters to a wireless technology network that reads and transmits water consumption on a daily basis. So far, more than 68,800 new metering systems have been installed in homes and businesses across Madison.

There is no charge for installation or for the new metering system.

BENEFITS OF THE NEW METERING SYSTEM:
- Customers will be able to track their own daily consumption online by the end of the year.
- Allows us to spot costly residential water leaks and alert customers - hundreds have been alerted so far.
- Eliminates the need for a water meter reader to visit your premises.
- Provides an energy efficient, accurate, and cost effective way for MWU to read water meters.
- Will allow us to transition to monthly billing in the spring of 2014.
- Helps the utility operate our entire system more efficiently with accurate consumption data.

MAKING YOUR APPOINTMENT

To schedule an installation call our meter shop at (608) 266-4765 or send an email. In your email, please include your name, address, and phone number.

Installations will be by appointment. In most cases, installations should take no longer than 30 minutes and will not interrupt your water service. An adult resident at least 18 years old must be present.

Employees and contractors involved with the project will be identified by photo IDs, and will arrive in Madison Water Utility work vehicles.

Note: Even if you choose to pay a monthly fee and opt out of the wireless Project H2O technology, you will still need to schedule an appointment to convert your meter to read gallons instead of cubic feet (ccf).

ANOUNCEMENTS

Project H2O is already saving customers water and money through improved leak detection. See NBC 15’s story which aired on April 1, 2013 for details: Smart Water Meters Spot Leaks in Madison.

The new system uses radio frequencies (RF) to transmit meter readings. While we believe the use of this technology is extremely safe, some customers may choose not to have a transmitter inside their home. MWU's opt-out policy offers two options: have the transmitter installed on the outside of the building, or not have it installed on the property at all. Learn about the Opt-Out Policy >>

Find out what to do with your old meter readout unit >>
HOME CONSERVATION

Madison Water Utility led an effort to develop a comprehensive water conservation program for the city. Our Water Conservation and Sustainability Plan (PDF) looks at a variety of things the city and its residents and businesses can do to reduce our impact on the water resources that help make Madison such a great place to live, work and play.

WHERE YOUR WATER GOES

![Water Usage Pie Chart]

Toilets alone can account for 28% of a family's indoor water use. In the early 1990s, that number was over 40%. But thanks to initiatives like our Toilet Rebate Program, people are upgrading to more efficient fixtures and appliances.

IS THERE A LEAK?

In 2011, Madison Water Utility caught 652 customer leaks representing more than 76 million gallons of water pumped from the local aquifer. Our Project H2O Advanced Metering Infrastructure (AMI) system will help us spot even more residential leaks and eliminate waste.

Any water-using device or pipe connection can leak. There is usually some evidence of such problems, but the evidence isn't always obvious: A toilet leak can be noisy but it can also be rather quiet; a dripping faucet can be overlooked.

Resources

- Water Sense Efficiency Program, U.S. EPA
- Do's and Don'ts Around the Home, U.S. EPA
- H2OUSE
- Energy Star water use information
- EnAct program (includes an extensive practical online guide)
- DNR Pharmaceutical Waste Information

Be a fountain of knowledge. Teach the scientists of tomorrow how to save water today.

Learn more...


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According to the EPA, more than 1 trillion gallons of water leak from U.S. homes each year — equivalent to the annual water use of Los Angeles, Miami and Chicago combined.

- At one drop a second, a leaky faucet can waste more than 3000 gallons of water in a year.
- A running toilet can waste 200 gallons of water a day.

**QUICK CONSERVATION TIPS**

- **Kitchen**
  - Only run the dishwasher when it’s full.
- **Bath**
  - Turn off the tap when brushing or shaving.
- **Car**
  - Use a professional car wash.
- **Outdoors**
  - Water in the morning.

**GOOD PRACTICES**

- Install water-saving devices: Aerator for kitchen and bath taps, flow regulators for shower heads and toilet tanks, and high-efficiency toilets to reduce the amount of water used in every flush.
- Use automatic shut-off attachments on hoses, and don’t let the water run unnecessarily while washing the car or for other outdoor uses.
- Use the most efficient settings for dishwashers and clothes washing machines. Full loads are often the most efficient. When it’s time to replace appliances, consider water efficiency in your choice.
- Think of practices and habits that might be changed to make a difference. Can showers be shorter? Sidewalk and driveway swept rather than hosed?


8/22/2013
LAWN & GARDEN CONSERVATION

OUR "20 BY 20" CONSERVATION GOAL

In Madison, we use 65.2 gallons of water per person, per day. But our Water Conservation & Sustainability Plan outlines an ambitious goal. By 2020, we want to see that number drop by about 20 percent to 58 gallons per day.

Water use

Population

Even as our population rises in Madison, good conservation practices will ensure that our overall water use as a city will stay the same. And that means paying close attention to how much water we're using on our lawns and gardens.

INDOOR VS. OUTDOOR WATER USE

On average, 30% of residential water consumption is devoted to outdoor use. But according to the EPA, as much as half of the water we use on our lawns and gardens gets wasted because of overwatering, improper landscape design and evaporation.

OUTDOOR CONSERVATION TIPS

http://www.cityofmadison.com/water/sustainability/lawn.cfm

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- An established lawn only needs one inch of water per week. Use a rain gauge and take a look at our lawn watering guide.
- Avoid cutting more than 1/3 the length of the grass at one mowing.
- Leave grass clippings on the lawn, spreading out clumps; the clippings will disappear after giving up their moisture and nitrogen.
- Use a rain barrel. 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.
- Use native plants, which need little water beyond normal rainfall. Or install a rain garden: City of Madison Engineering, Water Quality Initiatives, Rain Garden