

increased with wind speed, animal activity, and lot management practices, resulting in concentrations up to 136-fold higher than upwind concentrations. An area-source model was used to predict downwind ground-level endotoxin concentrations at distances up to 2000 m from the production facilities. Predicted concentrations decreased with distance and reached background levels within 500 to 2000 m, depending on the source emission rate and meteorological conditions.

[REDACTED]

Farmer

Socially Responsible Agricultural Project consultant [www.sraproject.org](http://www.sraproject.org)

Illinois Citizens for Clean Air and Water [www.iccaw.org](http://www.iccaw.org)

Families Against Rural Messes FARM

Elmwood, Illinois 61529

[REDACTED]

[REDACTED]

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From: [REDACTED]

Sent: Tuesday, September 04, 2012 1:50 PM

To: Baumann, Dan G - DNR

Subject: CAFO

Dan,

After reviewing Golden Sands well permit applications, I found discrepancies on applications 9 and 10. Where use is indicated, Bob Nauta put Dairy, not irrigation. These are the 2 wells at the eastern edge of the project in Portage County.

I called Mr. Nauta, and he indicated that both applications contained a mistake. So I contacted Mr. Lynch and asked him to request that Mr. Wysocki be made to resubmit those two applications with the corrected information.

My concern was, were these an indicator of a second CAFO site.



5. Setback from where the area irrigated and or sprayed (via irrigators, crop dusters or other vehicles) equal to 300 feet from property lines or land easements. My drive way is a land easement through PC 34 & PC 37. I should not have to drive though this or have my kids near this. My kids walk up and down the driveway to school each day.
6. Woods barrier on the property lines equal to 100 feet or greater. This would offer a minimal barrier to the crop fields. This would reduce the dust, spraying, and other things from impacting my residence.
7. Minimal 3 day notice prior to any spraying of the fields with anything except water (nothing added to the water).
8. The high capacity wells should not be located within 300 feet of any private well, the plans discuss 100 feet, this is not enough.
9. Frozen liquid manure should not be allowed to be spread on to the fields. No exceptions.
10. Do not allow an "emergency" 5 day per monthly spraying of liquid manure. They should have other plans in place to handle their "emergency's". My water should not be contaminated to help them out.
11. The proposed dairy should be required to have a water treatment area similar to the city of Wisconsin Rapids, their volume of waste will be substantially more than the city. If the city needs it, then the dairy should as well.

I am including Dan on this email, again I would like these added to the review of the EIS and look forward to hearing the responses to these items.

██████████

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**September 2, 2012**

From: ██████████

Sent: Sunday, September 02, 2012 11:30 AM

To: russel.anderson@wisconsin.gov

Subject: Saratoga FACTORY concerns

On concerns for the proposed dairy FACTORY in Saratoga...

I am concerned about the recreation in OUR area, the things we have all come to love. We have the precious water which we can NEVER replace. Water is life. We need it to drink , bathe, and water OUR minute gardens.



Sent: Sunday, September 02, 2012 8:36 AM

To: Baumann, Dan G - DNR

Cc: Craig, Andrew D - DNR; terrence.kafka@wisconsin.gov; Wheat, Gretchen S - DNR; larry.lynych@wisconsin.gov; Anderson, Russell A - DNR

Subject: Concerns - Golden Sands Dairy CAFO

As a resident and close neighbor to the proposed Golden Sands Dairy I would like to have the members of the Environmental Impact Team consider my concerns.

1. Drinking Water: I would like to have our families well guaranteed or made hole if there is an impact on our well. The impact could be chemical contamination caused by the farming process, water quality, and amount of water. We have been informed that there is a Supreme Court ruling that high capacity wells are required to ensure the water quality and availability is maintained. We would like this to be included in the permit process for the approval of the well permits. Residents should not be required to go to court to ensure the availability of quality water is present in their location for all time. The Wisconsin DNR is our protector to ensure this takes place for everyone as we do not own the water.

2. Recreation: Currently the land is forest crop land and we enjoy the recreation that comes from the forest crop laws. We can hunt, fish, snowmobile, use ATV trails, and hike this land. The Wisconsin DNR owns land adjacent to this land where wildlife is abundant. Is there consideration to where the wildlife will go if the CAFO and the high capacity wells are permitted? What will the Wisconsin DNR's position be if a class A Trout Stream is ruined because of a permit that they issued? What will be the impact be on hunting and fishing licenses?

3. Wildlife: The Ruffed Grouse, White Tail Deer, and Wild Turkeys the Wisconsin DNR maintains will have 6,000 acres less to survive on. What will become of them? The Ruffed Grouse used to be abundant in this area. They are almost extinct here now. There will no longer be food available for the Ruffed Grouse to exist. The habitat for the wildlife must be considered for the permit process.

4. Endangered Species: Is the Wisconsin DNR considering endangered species for the area involved?

### **September 1, 2012**

Subject: Wysocki CAFO and Saratoga Residents Water Rights (Submitted with EXCEL Spreadsheet – Email)

Date: Sat, 01 Sep 2012 22:24:05 -0500

From: [REDACTED]

Reply-To: [REDACTED]

Organization: [REDACTED]

To: editor@wisconsinrapidstribune.com

CC: [REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

The Wysocki organization is planning on purchasing a reported 8,000 forested acres in Saratoga, clearing most of the forest and replacing it with 6,400 acres of irrigated cropland in conjunction with a large CAFO. The Wysocki organization has filed 10 high capacity well applications with the Wisconsin DNR for a total of 49 high capacity wells, two of which will be located just east of County Trunk U in Portage County. The remaining 47 wells will be located in Saratoga. According to the applications, 47 of these wells will draw on average 720,000 gallons/day for 7 months of the year. Two wells will be devoted to the CAFO dairy and draw considerably less water, 137,000 and 144,000 gallons/day for 12 months/year. The average yearly consumption of water is calculated to be 7,344,325,000 gallons.

The average rainfall in southern Wood county is approximately 31 inches and the high end of the recharge rate (the amount of water that actually returns to the water table) is 12 inches/year. ( W.G. Batten, Hydrogeology of Wood County, Wisconsin, U.S. Geological Survey, 1989). What this translates to is that the 8,000 acres that Wysocki plans on purchasing will return 2,606,811,429 net gallons/year to the water table or reservoir. So they are only "supplying" 35% of their water needs. The rest of the water, a total of 4,737,53,571 gallons/year will come from the rest of us in the watershed.

There are approximately 32,778 acres in Saratoga so the Wysocki

organization will end up owning and irrigating about 1/4 of the total land area of Saratoga. There are approximately 5,102 people in the town and approximately 2,011 households. Almost everyone has their own well and many of them, such as mine, are shallow well sandpoints. We will all have water problems in the not too distant future. In addition the 7 Mile, 10 mile, and 14 Mile creeks will be adversely affected if this enterprise is allowed to proceed.

Why should we, the residents of Saratoga and neighboring communities in the watershed, be forced to subsidize the Wysocki CAFO with our water, a precious resource that we all treasure?

[REDACTED]

[REDACTED]

Wisconsin Rapids, WI 54494

[REDACTED]

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From: [REDACTED]

To: [REDACTED]

Cc: [REDACTED]

Sent: Saturday, September 01, 2012 12:10 PM

Subject: Announcement

> [REDACTED]

> I wasn't sure if this should go to Mystique, or to you.

>> The Central Wisconsin Nature Foundation a not for profit instutution, has

> joined the opposition to the Saratoga CAFO. I have attached a copy of

> their

> letter to the DNR.

>> Our concern, as always, is for the health and safety of our environment,

> and

> preserving nature for future generations to enjoy.

>> Two creeks empty into the Lake Petenwell flowage very close to Twin Lakes

> Nature Preserve, in the Town of Rome. Adding ANY nutrients to the water

> could cause irreversible damage to the ecosystem of the park and its

> wetlands.

>> In addition, taking out 6,000 acres of tree in Saratoga will leave

> innumerable wild creatures without their natural habitat. And, taking out

> trees along the creeks, will eliminate cooling shade and heat up the

> water,

> disturbing aquatic species.

>> In order to inform the public of the possible consequences of siting a

> CAFO

> so close to people and parks, the CWNF will be sponsoring a series of

> informative videos and speakers at McMillian Library. We will announce a

> scheule soon.

>

> In the meantime, the CWNF is asking for donations to help. All of your

> donations are tax deductible, and you will be helping save the environment

> for future generations to enjoy.

>

> Donations can be made in person at Nekoosa Port Edwards banks, or send

> them

> to Central Wisconsin Nature Foundation, 361 Yeoman Ct. Nekoosa, WI 54457.

>

> This is your community, help us keep it as natural as possible.

>> [REDACTED]

**August 30, 2012**

From [REDACTED] (email):

Concerns regarding the proposed CAFO

-approx. 6000 acres removed from Managed Forest Crop land that is used by the public for recreational purposes, (hunting, fishing, trapping, hiking, cross country skiing, snowmobiling, snowshoeing, horseback riding, etc)

-47 or more high capacity wells which according the University of Wisconsin hydrologist will decrease ground water (currently area ground water is estimated to be at 14-24 feet below the ground surface.

-millions of gallons of liquid manure solids applied to crop lands

-reduction of stream flow in the Seven Mile and Ten Mile Creeks

-contamination of ground and surface water with nitrates, phosphates, pesticides, herbicides, pathogens, and antibiotics

-increased soil erosion

-air pollution

-negative impact on wildlife, fish, and endangered species in the area

-health risks including respiratory illnesses for people who live and work in the area

-lower property values as land will now be classified agricultural

-increased property taxes

-need for additional road repair

-negative effects of ground water run-off on lakes, streams, creeks and rivers in the area

-animal cruelty (cows are crammed into warehouses, fed mainly corn based diets, given extremely high dosages of antibiotics to fend off disease and milked 3 times per day, often leaving them with inflamed udders)

-air pollution and stench from anaerobic reactions

Additional questions sent to the DNR on the CAFO

Is the DNR going to impose a standard on the odors emitted by the CAFO?

Is the CAFO going to be able to spread manure on snow or frozen ground thus affecting the ground water?

What methods are the DNR going to enact to collect and track public complaints if the CAFO proposal goes through?

Is there going to be water and air quality testing in the residential areas surrounded by the CAFO?

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From: [REDACTED]

Sent: Thursday, August 30, 2012 10:30 AM

To: Anderson, Russell A - DNR

Subject: Proposed Golden Sands Dairy in Saratoga

Mr. Russell

The following are issues that I feel should be addressed by the Wisconsin Department of Natural Resources in the EIS study for the proposed CAFO in the Township of Saratoga:

-The proposed crop fields for the CAFO are between private residences and will have high capacity wells that will irrigate the hay and corn crops grown on the land. What is being done to insure the residences in the area do not lose their water supply and that the water is not contaminated with nitrates, phosphates, pesticides, herbicides, pathogens, and antibiotics that are found in the manure that will be placed on these fields?

-Could the DNR study the effects of the ground water and water run-off in the township of Armenia, where Golden Sands is currently operating a CAFO before allowing a new CAFO to go into the township of Saratoga?

-The proposed CAFO will clear cut 6000 plus acres of woodlands (approx. 10 and 1/3 square miles) of woodlands and only provide 25-30 new jobs. This is an area that is used for recreational purposes including hiking, biking, snowmobiling, horseback riding, ATViing, hunting, trapping and fishing. Is someone looking at the economic and business impact that the devastation of these woodlands will bring to this area?

-What will the environmental impact be on wildlife and aquatic life? The DNR has spent a lot of money stocking trout in the 10 Mile Creek and building habitat in that area. What will be the impact on the fish?

-Since there are so many residences affected in this proposal, will crop dusting be allowed?

-What will be the affect of ground water run-off on the Wisconsin River?

Thank you for addressing my concerns.

[REDACTED]

[REDACTED]

Wisconsin Rapids, WI 54494 August 30, 2012

**August 29, 2012**

From: [REDACTED]

Sent: Wednesday, August 29, 2012 10:43 AM

To: Anderson, Russell A - DNR

Subject: Golden Sands Wysocki CAFO

We live in Grand Rapids and are concerned about the effect of the high capacity wells on the water table

In this area. Since the Wysocki's have requested so many hig capacity wells, the drawdown effect on the water table

in a large area is almost certain to be felt much further away than just the township of Saratoga. We have

a well that furnishes water to our home and would like assurance that those wells will not eventually affect

our well, even though it might not show up in the near future. How long a period might it take and what

recourse would we have if, in fact, it did result in the lowering of the water table where our well is located?

We hope you will consider the long term effects for not only us, but this whole area, which includes Wisconsin

Rapids, Grand Rapids, Saratoga and northern Adams County.

Thanks for your consideration of our request.

[REDACTED]

**August 28, 2012**

From: [REDACTED]  
Sent: Tuesday, August 28, 2012 9:32 PM  
To: Anderson, Russell A - DNR; Baumann, Dan G - DNR  
Subject: Fw: Info

Dan this sounds like a way to stop the CAFO INCLUDING NO ACTION!!! [REDACTED]

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The Science and Environmental Health Network is working to implement the precautionary principle as a basis for environmental and public health policy.

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The principle and the main components of its implementation are stated this way in the 1998 Wingspread Statement on the Precautionary Principle:

"When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context the proponent of an activity, rather than the public, should bear the burden of proof. The process of applying the precautionary principle must be open, informed and democratic and must include potentially affected parties. It must also involve an examination of the full range of alternatives, including no action." - Wingspread Statement on the Precautionary Principle, Jan. 1998

The precautionary principle, virtually unknown here six years ago, is now a U.S. phenomenon. In December 2001 the New York Times Magazine listed the principle as one of the most influential ideas of the year, describing the intellectual, ethical, and policy framework SEHN had developed around the principle.

In June 2003, the Board of Supervisors of the City and County of San Francisco became the first government body in the United States to make the precautionary principle the basis for all its environmental policy.

**August 27, 2012**

From: [REDACTED]  
Sent: Monday, August 27, 2012 12:03 PM  
To: Craig, Andrew D - DNR

Subject: Saratoga meeting

Hi Andrew,

This is [REDACTED]. I met you at the Saratoga EIS meeting on Aug 23. Thank you for your time and attention in discussing different permitting issues. You had mentioned to me that you could send me the link of the proposed high capacity well locations west and east of Highway 13 that were in color. Could you also send me the map of where the pivots are proposed to go on their property? I can not seem to find it on the Web Site. Thank you!

Here's a question I forgot to ask you at the meeting: How often are CAFOs in Wisconsin allowed to double in size? I found that in the state of IL CAFOs are allowed to double in size every 2 years without the same scrutiny as starting one from scratch. Is there any stipulation in Wisconsin that states when and under what circumstances a CAFO can expand? I understand that the New Chester CAFO is currently trying to double in size from 6,270 animal units to 12,540 animal units. How long has the current New Chester operation been in existence? How much crop land do they have?

At the beginning of our conversation you said that the proposed CAFO in Saratoga would not be spraying manure. Later you corrected yourself and stated that in 5 years or by 2017 the Wysocki's did in fact plan to spray manure and that this would have to be disclosed now. Also, you mentioned different set backs based on different manure application methods. I'm curious if somewhere in the proposal the Wysocki's have mentioned that they plan to expand and when? How much land do they need for spreading manure generated by 5,000 cows? 1 cow excretes approximately the equivalent of 15 to 20 people. 5,000 cows equates to approximately 100,000 untreated human waste product sprayed or applied everywhere. The reason I ask is because of the amount of land the Wysocki's are purchasing. I'm sure there is a mathematical equation, but the current proposed CAFO in Waushara County (Pine Breeze) is only having 3360 animal units to 3,584 acres where as Wysocki has 5300 cows and 8,000 acres. So adding another barn or two seems possible to me.

Can you confirm this standard? The DNR told a person on my committee that it is acceptable for 500 gallons of manure leakage to occur per acre, per day.

Can you please direct me to the proper location to find the current and past violations that the Wysocki's Golden Sands Dairy has incurred since their birth of 2007? I believe someone stated it would be Bob Rolan in Black River Falls?

Finally, in case we need to contact you, will you be out of the office or on vacation between now and the Sept. 21 deadline?

Thank You very much for your time!

I do appreciate it!

[REDACTED]

Concerned Citizen & Water Quality Committee

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From: [REDACTED]

Sent: Monday, August 27, 2012 11:45 AM

To: Anderson, Russell A - DNR

Subject: Town of Saratoga proposed CAFO and crop land

To Mr. Russell Anderson,

I live on the Ten Mile Creek in the town of Saratoga on [REDACTED]. When i built this place back in 1994, and had my water tested, I was told that we had some of the best water in the state of Wisconsin. I understand that near heavily farmed crop land, nitrogen levels in the surrounding ground water may rise to 20-40 milligrams per liter. The Wisconsin Department of Public Health recommends that humans avoid long term consumption of water that has levels greater than 10 milligrams per liter. I hope we don't let this happen.

I am also concerned that the 49 high capacity wells running parallel to the Ten Mile Creek, proposed by Golden Sands Dairy, will affect the level and temperature of one of Wisconsin's class "A" trout streams. This summer I noticed the water in the creek was extremely low. The temperature was above 70 degrees, which causes much stress to trout. I am convinced that the lack of rainfall in July caused this phenomenon. This reduced flow which is primarily spring fed caused the temperatures to rise above levels that can sustain trout effectively. I know that since 2005, the Little Plover River has had increasing amounts of water taken from it's watershed area. As a result of this diminished supply of water, sections of the river have gone dry. Are we going to take that chance with the Ten Mile Creek?

[REDACTED]

[REDACTED]

Wisconsin Rapids, WI 54494

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August 25, 2012 10:18 AM

To: Provost, Scott M – DNR (Provost response with Graphs)

Subject: Charts and info from Saratoga presentation

Hello Scott:

Can you please provide me with copies of the charts which you had on display in Saratoga Thursday with the Historic Flow rate, nitrogen, and phosphate levels for 10 Mile creek.

Is this information available for any other creeks or streams in the area.

Thank you for your assistance!

Sincerely;

[REDACTED]

Heartland Farms, Inc.

Phone: [REDACTED]

Cell: [REDACTED]

**August 26, 2012**

From: [REDACTED]

Sent: Sunday, August 26, 2012 11:06 PM

To: Baumann, Dan G - DNR

Subject: CAFO

Hi Dan,

I live in Saratoga and wanted to share a video with you. Here is a facebook page with the locally produced video and other CAFO videos:

<http://www.facebook.com/SaratogaConcerned>

or

here is the youtube link to "The Other Side of CAFO"

(Saratoga residents share concerns about the proposed CAFO.)

<http://www.youtube.com/watch?v=PQtWvUDjanU&feature=plcp>

My wife and I are both teachers in Nekoosa. I have taught for 30 years. The last two years have been by far the toughest ever. The one thing we have been able to do is to come home and try to forget about all the politics as we live out of town. We have four children and a dog. We often take him for walks in the woods behind our house. We eat outside over a campfire a few times a week in the summer and try once a week all year long. Now we find out about the proposed CAFO. Air, water, smell and bulldozing all the trees that so many use??? Can't imagine.

Please watch.

Thanks,

[REDACTED]

August 24, 2012

[REDACTED]

[REDACTED]

Wisconsin Rapids, WI 54494

Comments on Golden Sands:

Thinks the company should look at drilling one very deep well, put up a water tower and then pump water out to irrigation systems. Wants Wysocki's/DNR look into alternatives to drilling 49 wells and use less wells and more storage devices.

Feels the manure should be pumped into the ground and not spread. Wants study done on which would do less damage to environment.

Comments received via phone call to Kris Johansen on 8/24/12.

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MR. ANDERSON,

WE ARE AGAINST THE CAFO IN SARATOGA. WE MOVED TO THIS AREA BECAUSE OF THE RECREATIONAL OPPORTUNITIES HERE. THE CAFO MIGHT ADD A FEW JOBS, BUT IT WILL ALSO NEGATIVELY AFFECT THE LIVES OF ALL THE SURROUNDING AREA IF WE HAVE NO WATER. OUR PROPERTIES WILL DECREASE IN VALUE IF OUR WELLS RUN DRY OR IF THE WATER LEVELS IN THE LAKES IS LOWERED OR LOST TOTALLY.

AS A RETIRED COUPLE ( WHICH ALOT OF THE RESIDENTS HERE ARE) WE WOULD LOSE A MAJOR PART OF OUR INVESTMENTS IN OUR RESIDENCES.

PLEASE DON'T ALLOW THIS CAFO TO AFFECT SO MANY PEOPLE NEGATIVELY.

SINCERELY,

[REDACTED]

[REDACTED]

NEKOOSA 54457

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From: [REDACTED]

Sent: Friday, August 24, 2012 3:25 PM

To: Anderson, Russell A - DNR

Subject: comments regarding proposed cattle/dairy farm in Saratoga

Importance: High

As taxpayers and home owners in the area of Lake Arrowhead, we are firmly against the proposed dairy/cattle farm being constructed in Saratoga. We retired in this area because of its beauty and all it offers, but strongly feel that anything such as what is being proposed, severely threatens our lakes and water supplies through our wells. In our travels over the winters, we have seen areas in California where these type of farms are located and the stench as well as inhumane conditions for animals is also in question. The biggest concern for those living here are our water supplies.

I don't understand how something like this can come in and think they can do what they want based on what is a business decision with little regard from all the residents and taxpayers who were here long before they presumed to locate their farm here. If done in good faith, they would have polled the area resident ahead of time to get their input. As it is, they proceeded and then residents found out.

The future in this area as well as that of our children who would inherit, is challenged by this proposal and does not go along with the recreational, and serenity of the area as is. It would do much to distract from property values as well as dangers to our water supply and lakes.

Please put us down as firmly opposed to this proposal and if having a vote regarding it, we would definitely vote NO!!!!

Sincerely,

[REDACTED]

[REDACTED]

Nekoosa, WI 54457

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From: [REDACTED]

Sent: Friday, August 24, 2012 9:37 PM

To: Anderson, Russell A - DNR

Subject: dairy farm

I feel that the Wisocki farm should be required to investigate how the new deep wells will affect the three lakes of Arrowhead, Camelot, and Sherwood. This needs to be done especailly during drought

conditions like we are currently experiencing. Our Lake Camelot is currently down 20-24 inches. My concern is whether we will be living on a dry lake bed.

Sincerely,

[REDACTED]

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From: [REDACTED]

Sent: Friday, August 24, 2012 8:49 PM

To: Anderson, Russell A - DNR

Subject: Saratoga CAFO

Good Evening Mr Anderson

I am writing with a specific concern about the Wysocki CAFO being considered in the town of Saratoga. I did attend the August 23rd meeting at the Saratoga town hall and did fill out one of your forms with a concern to be included in the EIS. I am writing to express the concern I submitted because I am not sure I expressed myself fully in the submission. It was my understanding that in your review and issuing process that permits will be evaluated individually for each separate well being proposed. I am sure many people have expressed their concerns on the individual wells near their properties. I hope and encourage the DNR to also take a cumulative examination of the overall effect of the 46 wells combined. I spoke with your water quantity representative and he made it clear that the impact of individual wells can be projected as far as what distance the aquifer flows into the well location to replenish water used in irrigation. I would hope and encourage the DNR to also formulate a combined evaluation of the effect of the 46 wells combined. I would suggest that if it is possible to plot the coordinates of all proposed wells it would be possible to locate one individual location that could be considered the "center" of all locations and that calculations could be formulated to then evaluate the distances that will be affected and required to draw water from in order to replenish the proposed 33 to 66 million gallons of water proposed to be used on a daily basis. Over the approximately 180 day proposed "irrigation season" the quantity of water being consumed by the irrigation operation could accumulate to 5.9 billion gallons of water being consumed at the proposed "average daily use" or up to 11.8 billion gallons of water being consumed at the "maximum daily usage" proposed in the permit application. The total area required to draw water in to the area to replenish that quantity of usage would certainly seem to be larger than the area required for individual well calculations. Since many of the proposed wells are located in close proximity to each other it would appear that multiple wells could be calculated to be utilizing the same sources for replenishment and therefor since a gallon of water located at a midpoint between two wells may be included in both wells individual calculation as being drawn in to replenish water used for irrigation in reality that gallon cannot be used twice and will have

to extend the range of area that will be require as the source of replenishment. I believe that fact will dramatically increase the area that can and will have their supply of drinking water affected especially over the long range of years of the operation of this CAFO. Central Wisconsin and specifically the areas to the immediate east and southeast of this proposed project have an extremely high concentration of "high capacity wells" and the supply of drinking water for the residents who already are here prior to this facility and for those new residents that will be required for the ultimate long range survival of this area and it's economy must be given a higher priority than the commercial use of a limited resource that is vital to the future of both Saratoga and also other communities in southern Wood and northern Adams county. I feel it is imperative that the DNR place a higher value on the needs of existing residents when it comes to the use of a limited and critically vital resource like water as opposed to providing that resource to a new demand of a commercial entity.

The protection of and the determination of who has a right to the use of all of our "natural resources" has been entrusted to your department by the PEOPLE of the State of Wisconsin. The people who have entrusted that responsibility to you should be provided the first priority if a choice must be made about the use of a critical resource. Without overwhelming and indisputable evidence that there is a surplus of any specific resource above and beyond the needs of current and the future residents, the massive use of our water by a commercial enterprise should not be permitted.

There are certainly other concerns being expressed by residents in regards to nitrate pollution and air quality but my specific request urges the Department to place significant weight on an overall and cumulative view of the effect of all of the wells being requested rather than on each specific individual well permit being requested.

Thank you for your time and the interest the DNR has shown in requesting input on this issue. It is very apparent that the town of Saratoga and the residents of Saratoga and the town of Rome and it's residents have very significant concerns about the protection of the water resources that are critical for the preservation and survival of the very nature of the area that has attracted us to reside here.

Again the people of this group of communities should take priority in a decision about the use of the natural resources over the introduction of a new demand on the use of a limited and critical resource.

██████████

██████████████████

Nekoosa Wi 54457

██████████

████████████████████

**August 23, 2012**

Although the proposed operations are very large, I support a Finding of No Significant Impact for the proposal providing that all regulatory approvals required by law, including those for high capacity wells, are obtained.

Currently, the land involved consists mainly of scrub oak and jack pine, and offers little to society. The proposed operation will be the highest and best use of the land by putting it under cultivation and supporting a large dairy operation that will benefit many people.

The opposition movement is based primarily on suppositions that negative impacts will occur to residents living in the area. I understand the concern citizens may have...change can be very traumatic to some people... but I also have faith in the governmental entities charged with overseeing the public welfare. We can't allow NIMBYism to drive decisions of this magnitude,

The proposed operation will provide good jobs for a number of individuals. We must also recognize the domino effect that it will have on the local economy by providing work for truck drivers, cheese makers, milk processing employees, workers at local stores receiving business from the farm and dairy, etc. With a slow economy, it is incumbent upon government to provide opportunities for job growth when minimal negative impacts to the environment, based on studies utilizing procedures accepted in the scientific community, are anticipated.

If your department has questions or criticisms of the proposed operation, you should discuss them with the individual(s) seeking your approval in order to work out solutions that provide a win-win situation for all involved parties.

[REDACTED]

[REDACTED]

Wisconsin Rapids, WI 54494

Town of Saratoga

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From: [REDACTED]

Sent: Thursday, August 23, 2012 04:54 PM

To: Provost, Scott M - DNR; [REDACTED]

Subject: Fwd: Golden Sands Water Usage Calculations (attached: Water Calc Excel Spreadsheet)

Scott,

Please include this message in the public comments section regarding the CAFO in Saratoga, WI. If you wish to pursue these calculations further please contact me.

[REDACTED]

--- Original Message -----

Subject: Golden Sands Water Usage Calculations

Date: Thu, 23 Aug 2012 11:49:45 -0500

From: [REDACTED]

Reply-To: [REDACTED]

Organization: [REDACTED]

To: [REDACTED]  
[REDACTED]

Hello all,

I have attached an Excel spreadsheet detailing my calculations regarding the proposed Golden Sands water usage/year vs. the rainfall contribution/year associated with their 8,000 acres. The premise of my argument is that one may be entitled to the water that falls on one's land, but if you exceed that amount, you are unfairly taking water from your neighbors. According to my calculations, the proposed Golden Sands Dairy would exceed the amount contributed by a large margin.

By virtue of the assumed rainfall/year of 31 inches and an evaporative loss of 10 inches, Golden Sands would only be supplying 49.7% of the water they would be using. Looking at it another way, we in the watershed would be contributing 4,610,880,000 gallons of water/year to Golden Sands. Is this fair? I don't think so.

Like any calculation of this nature, the situation is more complex

than my first cut at it. I have made a number of assumptions, and am more than willing to make corrections if more exact data is forthcoming.

Your neighbor,

[REDACTED]

\*\*\*

From: [REDACTED]

Sent: Thursday, August 23, 2012 6:24 PM

To: Baumann, Dan G - DNR

Subject: Fwd: Fwd: Fwd: Re: Fwd: RURAL WISCONSIN and SARATOGA FARM

Hi Dan,

Was glad to meet you today. The details of Pints & Politics next month are that it will be held on Tuesday, September 25 at 6:30 PM at The Four Star Family Restaurant, at 2911 8th Street So. in Wisconsin Rapids. Hope you will be able to come.

Now following is some correspondence about the proposed Wysocki Farm. My original letter follows a note to Jeff Williamson, editor of The Voice of Wisconsin Rapids which published my letter August 9th and a correspondence between [REDACTED] and me. [REDACTED] is [REDACTED] [REDACTED] in Marshfield and brother of [REDACTED] and who owns 400+ cows out near Pittsville. That note to [REDACTED] pretty well explains that we checked the territory and his comment back. Finally my letter which was also printed in the Wisconsin Rapids Daily Tribune on Sat., August 16. The Tribune had an interesting editorial, "Dairy debate turns negative," last Sat. Aug. 18th p.6A and [REDACTED] wrote about it Aug. 16th p.9. His entitled "Saratoga has forgotten its place in our economy." Finally a silly "Listen up City Slickers" was not submitted to the papers.

I hope all of this will be considered when the DNR makes its decisions, including the two editorials that I noted. Thank you for your time.

[REDACTED]

----- Original Message -----

Subject: Fwd: Re: Fwd: RURAL WISCONSIN and SARATOGA FARM

Date: Fri, 17 Aug 2012 15:56:09 -0500

From: [REDACTED]

To: Jeff Williams <jeff@voiceofwisconsinrapids.com>



██████████  
 ████████████████████  
 ██████  
 On Sun, Aug 5, 2012 at 5:43 PM, ████████████████████ wrote:

Follow-up: Just to make sure that the Wysockis weren't destroying something beautiful we took a drive through much of the area of the proposed farm after our meeting today. My description of it was not a lie and I'm appalled that nothing has changed in the 50 plus years since LeRoy and I met and drove back and forth from Easton to Arpin. Even the sand fire lanes, jack pines are still there! There are only 6 to 10 homes along 10 Mile Creek Avenue west of 13, (██████████ lives there) 0 to none to the east of 13 along the Adams Co border with Wood Co. which is a soft sand road after a mile or so of gravel from Hwy 13 toward Kellner Rd. The Wysockis should be cheered on for wanting to make something out of it. The cow barn will be at least 3 miles from 10 Mile Creek residents. The Juno Co. farm fields are bordered by healthy looking tree lines.

----- Original Message -----

Subject: Fwd: RURAL WISCONSIN and SARATOGA FARM

Date: Sun, 05 Aug 2012 00:08:16 -0500

From: ████████████████████

To: undisclosed-recipients;

COMMENTS ABOUT THE "SARATOGA MEGA FARM"

I have a few comments to make to the people who are fighting the Wysocki Dairy farm in Saratoga Township. The person leading the fight against the farm is a "self proclaimed city girl moved from Wisconsin Rapids to their 14 acres in 1995." Eight of my relatives have owned and operated dairy farms in Wood Co. They were big farms at the time. The last one was sold last year by the great-grandson of the first. Why sell? See #5 below. The price that a farmer gets for his cow's milk has hardly changed over the years, but the price of machinery, etc. has gone out of sight. Only mega farms have a chance to survive anymore. "Ten years ago there were 1000 cows in the Seneca Corners neighborhood. Today there are 25." I asked an attendee at the first Saratoga hearing where he would get his groceries. He said at the grocery store. I asked, "And how would they get there? Fall from the sky?"

"Saratoga has always been about suburban, rural residential and rural preservation" (Quotes from the Wisconsin Rapids Voice.) Wrong! Northern Adams Co. and South Wood Co. were either farmed or it was a mess of jack pines, scrub oak, sand burrs and fleas, biting flies and a creek or two with fire towers and sand fire roads. It was not an oasis. The "Lakes Area" was no different until the creeks were dammed and people bought properties around them. Most people were not locals. Rather they were

from Milwaukee or the Chicago area. The best time for the realtors to sell was in the spring before the weeds took over.

Our sand does not retain water. That fact and the above is why there are few farms left. We took a ride to see the Wysocki farm in Juno Co. It was depressing to see the crops almost dead from the drought throughout the drive through Juneau Co. from the south. All of a sudden we came upon an oasis, The Wysocki farm. We drove at least halfway into the driveway, didn't smell cow manure.

From what the presentation by the experts that Wysockis brought to the hearing I learned: 1. trees use twice as much water as farm crops. 2. Twenty percent of the milk sold in the Dairyland State of Wisconsin is now imported.

The editor of the Voice had an editorial this week bemoaning the fact that business in this area is dwindling. Brostrom has closed. Take a ride around the whole county and count the farms that are no longer productive or functioning. We'd better hope that the Feds will be able to continue our Social Security payments and that New Page survives. A going business built by central Wisconsin natives, as the Wysockis are, would seem to be the best thing that can happen here. How many people actually live within a mile of the proposed farm? To think your surroundings would never change when buying land in the country seems very naive.

Please consider this in a light of what this area needs economically to become viable and remain stable. There was a comment in last weeks paper that no-one that was for The Farm spoke up at the Wysocki presentation at the Performing Arts Center. I didn't because the opponents had spread so much false information that they had the crowd revved up to a dangerous frenzy and I was frightened into silence. As things stand now the opposition to the Wysocki farm believes that they speak for the entire community -- that there is nothing but opposition within Saratoga Township. The opposition group is holding its next meeting at Saratoga Town Hall, Aug. 8, at 6:00 PM. The meeting is advertised as community-wide with everyone welcome. One would suppose from that, that supporters of the Wysocki dairy farm were as welcome as the opposition. Their stated agenda however contains only one item: How to stop Wysocki Farms from building their proposed dairy.

If any of you would be willing to help to oppose the opposition or at least give it a fair hearing join me Wed. night. I'm open to discussion [REDACTED].

[REDACTED]

**August 16, 2012**

Mr. Dan Baumann

Regional Director WCR DNR

Mr. Baumann,

We, the commissioners of the Town of Rome municipal water utility, would like to voice our opposition to the proposed Wysocki CAFO just upstream from us in the Town of Saratoga. Our wells are about two miles from the project being proposed, and scientific evidence offered up by Dr George Kraft of UWSP, Professor Robert Glennon of the University of Arizona, and other experts, suggests we are extremely vulnerable to water quality and quantity issues resulting from the proposed high capacity wells, concentrated animal feeding operation, and large scale agriculture operation.

We've already experienced the effects of high nitrate levels, being forced to purchase additional property and drill new wells at 85 feet a few years ago. Our original two wells were within two miles of an irrigated ag operation. Although we could not prove it at the time, we suspect nitrate leaching into one of our wells from the ag operation in 1995. The nitrates rose to 16.2 PPM in one of our wells and we were forced to add mains at a substantial cost to mix the two wells. We spent \$621,313 between 1995 and 2001 to connect the wells and drill an additional 20 test wells looking for good water in suitable soil. Since that time, we have spent an additional \$1,618,260 purchasing additional property and drilling two new wells, and adding required filtering equipment and related infrastructure. We've been told that if nitrates leach into our newer wells, we would need additional filtering equipment at the cost of \$2,000,000. Not only does this proposed CAFO pose a threat of contamination of our existing wells, the high potential of water quality and quantity issues resulting from the CAFO limits our ability to drill additional wells and expand our service to the north and west in our town as demand for municipal water grows in our town.

The Town of Rome has 7,046 properties with a total valuation (2011) of \$698,344,500. Our utility serves all 7,046 properties in the Town of Rome for fire protection, and provides drinking water to approximately 1,000 residences at this time. As a municipal water utility, we test frequently for water chemistry and water levels, under DNR supervision. Our new wells are free of nitrates and we plan to do all that we can to insure they stay that way. We've invested millions of dollars in this utility to provide safe drinking water to our citizens. We hope the DNR and any other agencies involved will consider the risk to our community this CAFO would represent if it were approved.

Commissioner Tom Birch

Commissioner Tom Deckow

Commissioner Don Fornasiere

Commissioner Betty Havlik

Commissioner Don Ystad

Water Utility Manager Chad Ziegler

CC: Glen Falkowsky – DNR

CC: Town of Rome Supervisors

**August 14, 2012**

Dear Terence:

Are you the drafter of the proposed Golden Sands Dairy WPDES permit? If not, who is?

If you are the drafter of the proposed Golden Sands Dairy WPDES permit, would you send to me the Internet link so that I may obtain the Environmental Analysis information on the dairy?

Thank you very much.

[REDACTED]

[REDACTED]

Darien, Wisconsin 53114-1208

T: [REDACTED]

E: [REDACTED]

**August 13, 2012**

From: [REDACTED]

Sent: Monday, August 13, 2012 9:30 AM

To: Baumann, Dan G - DNR

Subject: FYI

Dan,

I have a lady in the Adams County Health and Human Services dept. who is finding areas in southern Adams that are atrazine prohibited because of the high concentration of the chemical in the soil of corn fields. She has seen an increase in atrazine related diseases in people living in those areas.

I have asked her to write a letter to you detailing her findings. It seems to indicate that prolonged exposure to pesticides sprayed on corn and potatoes may have a negative cumulative effect on people. With families being so close to the proposed fields, this could be a serious threat to their health.

[REDACTED]

**August 10, 2012**

From: [REDACTED]

To: [REDACTED]

Sent: Friday, August 10, 2012 4:49 PM

Subject: Water Quality Fact Sheet 10.4.06.doc

[REDACTED]

Farmer

Socially Responsible Agricultural Project consultant [www.sraproject.org](http://www.sraproject.org)

Illinois Citizens for Clean Air and Water [www.iccaw.org](http://www.iccaw.org)

Families Against Rural Messes FARM

Elmwood, Illinois 61529

[REDACTED]

[REDACTED]

\*\*\*

Mr Anderson

3911 Fish Hatchery Road

Fitchburg, WI 53711

608-275-3467

I own a property on Lake Camelot. I have several concerns on opening the Dairy/crop farm.

1. The air quality will change just as it did when the paper mill was running. There will be an increase in dust from the 6400 acres of cropland and decreased air quality due to animal emissions from the 5300 to 6130 proposed cows. I realize they plan to replant cropland immediately after harvest, but plants take a few weeks to grow in. Dust will fly. Having asthma, I am genuinely concerned about this impact to my health and all others with various respiratory problems. Who will be responsible for increased medication usage, potential emergency room visits and decline of overall respiratory health over time? Symptoms do not always occur on day 1. The impact comes over time.

2. The digging of 49 high capacity wells seems problematic for the entire area. The runoff from the use of fertilizers and other chemicals will have a negative effect on our lakes and streams. This is a place to enjoy Wisconsin lakes, fishing, boating, water skiing and other sports. For many, it's how their living is made and others invested in lake property to enjoy the area. Lakes in Rome, downstream from Saratoga, already have excessive algae growth. What will happen when manure and fertilizers from the dairy increase the nitrates and other pollutants in the water?. What about increased cancer risks due to increased use of chemicals and fertilizers ? Would this farm go organic??? Lake Petenwell already has high amounts of nitrates and the Tri-Lakes of Rome have a high level of nitrates and phosphorus. This problem alone has already tripled my water bill. What about the effects on personal water wells? What happens when they go dry? Who will pay for the filtration system that eliminates farm nitrates out of the water? I do not feel like having my bill go even higher to pay for the farm problems.

3. Tax wise, the farm is paying for 40 acres what I have to pay for less than one acre? Is that fair????? Who plans to make up the difference? From the time I purchased my Camelot property, my property taxes have more than tripled. Now I have to worry about another increase due to this farm and its impact on the environment?

From the concerns I have listed above, this potential farm will lower the water quality and quantity, and decrease property values. Who will want to purchase a property that continually smells from cattle emissions? We property owners have a right to clean air and water. We have been here paying high taxes and trying to keep going. Now to loose all, just because of this farm is grossly unfair to me. Appears to me that this company came through the "back door" to try and open their farm without any concern for any of their new neighbors. Not a good way to start any potential relationship.

[REDACTED]

[REDACTED]

Nekoosa WI

[REDACTED]

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Fact Sheet from Hudson (X2 August 10, 2012):

#### CAFOs and Water Quality

A Compilation of Facts from: Concentrating on Clean Water: The Challenge of Concentrated Animal Feeding Operations by Carol J. Hodne, Ph.D.

Full report: [http://www.iowapolicyproject.org/2005\\_reports\\_press\\_releases/050406-cafo-fullx.pdf](http://www.iowapolicyproject.org/2005_reports_press_releases/050406-cafo-fullx.pdf)

- As Cooperband and Good (2002, p. 5075) observed, "Intensively managed livestock production systems have exacerbated conditions where manure use in crop production is more akin to waste disposal than beneficial fertilization." (Hodne, 2005, p. 6)
- ...the processes used in siting CAFOs inadequately consider water quality issues at regional and watershed levels (Jackson, Keeney, & Gilbert, 2000). (Hodne, 2005, p. 7)
- Contract producers compared to independent producers, have narrower options for manure management and other practices that affect water quality (e.g., Morrison, 1998). (Hodne, 2005, p. 4)

#### Manure Application / Runoff

- Manure runoff to surface waters is increased by manure application to: flood plains; steep land slopes; and soil that is frozen, snow covered, saturated, or of low porosity (Mulla, et al., 1999). (Hodne, 2005, p. 13)
- Manure application near waterways, natural drainage paths and surface waters increases runoff (Crane, et al., 1983; U.S. E.P.A., 1998). (Hodne, 2005, p. 13)
- The Centers for Disease Control and Prevention (CDCP, 1998) studied lagoon, surface water and ground water samples from farm sites in Iowa counties with high densities of swine CAFOs. ...The results

generally suggested the possibility that pollutants and pathogens can move through the soil and away from the point of higher pollution (i.e., lagoons) and by overland flow from the area of manure application. (Hodne, 2005, p. 18)

- Water contamination may increase with poorly planned CAFO siting that ignores issues such as regional and watershed water quality, sandy soils, shallow groundwater and flood plains (Jackson, et al., 2000). (Hodne, 2005, p. 14)

#### Manure Lagoon Seepage

- Earthen manure storage lagoons (that are soil lined or clay lined) allow seepage of wastewater, creating a source of potential groundwater contamination (Ham & DeSutter, 2000). (Hodne, 2005, p. 11)
- With or without liners, lagoons are at risk for seepage due to freezing and thawing, burrowing animals, roots, and cracking from drying walls following pumpout (Jackson, 1998). (Hodne, 2005, p. 12)

#### Water Pollutants Emitted by Factory Farms

- The main components of CAFO manure that may cause water pollution are nutrients, (i.e. nitrogen, phosphorous, and potassium), ammonia, pathogens, (e.g., bacteria), feed additives (e.g. antibiotics, hormones), salts and trace elements, organic matter, and solids (U.S. EPA, 1998). (Hodne, 2005, p. 7)

#### Antibiotics

- Antibiotics are used in CAFO animals to treat disease, prevent the spread of disease, promote growth and enhance feed efficiency (Cole, Hill, Humenik, & Sobsey, 1999; McEwan & Fedorka-Cray, 2002). ...Depending on the source, 40 percent (Nawaz, et al., 2002) to 70 percent (Mellon, et al., 2000) of antibiotics used in the United States are fed to livestock to promote growth, treat disease and minimize the risks of confinement (e.g., stress from crowding). (Hodne, 2005, p. 8.)
- Of antibiotics given to CAFO livestock, 25-75 percent pass unchanged into manure waste and may contaminate soil and water through transmission through surface water and ground water (Chee-Sanford, Aminov, Krapac, Garrigues, & Mackie, 2001). (Hodne, 2005, p. 18)
- The use of antibiotics, including subtherapeutic use as growth promoters, in CAFOs has been associated with the selection and spread of antibiotic resistance among populations of bacteria in animals. Resistant organisms may spread through infected carrier animals, feed, wildlife, or clothing. (Addis, et al., 1999; Cole, et al., 1999; McEwan & Fedorka-Cray, 2002). (Hodne, 2005, p. 19)
- Methods of transmission of antibiotic resistance to humans include direct contact, animal manure and contaminated food (Gorbach, 2001; McEwan & Fedorka-Cray, 2002). (Hodne, 2005, p. 19)

#### Hormones

- Synthetic estrogen and testosterone, which are used in livestock feed to stimulate growth, increase feed efficiency and increase productivity, end up in animal manure (Mulla, et al., 1999). (Hodne, 2005, p. 8.)

- Estrogen and Testosterone are typically transferred to surface waters by runoff and leaching, respectively (Shore, Correll, & Chakraborty, 1995). (Hodne, 2005, p. 19)

#### Nutrients

- The application of manure at a nitrogen-based agronomic rate leads to significant overapplication of P [Phosphorus], relative to crop needs (Cooperband & Good, 2002; Sims, 1995). (Hodne, 2005, p. 13)
- High nutrient concentrations have been found in Iowa surface water in river basins with denser concentrations of CAFOs. (Hodne, 2005, p. 14)

#### Pathogens

- Pathogens are microorganisms (e.g., bacteria, viruses, parasites) that can cause disease. Animal waste may carry infectious organisms including those that cause food-borne illness in humans, such as *Campylobacter*, *Escherichia coli* (E.coli) and *Salmonella*. Animal manure can carry protozoa, including *Cryptosporidium parvum* and *Giardia* species. (Addis, et al., 1999; Mulla, et al., 1999; U.S. EPA, 2001). (Hodne, 2005, p. 8.)
- The settling of fecal coliform to sediments represents a latent human health threat. This is because natural or human disturbances may cause the contaminated sediments to become resuspended (i.e., released into the water again), thereby, becoming a source of contaminated water for humans (Burkholder, et al., 1997). (Hodne, 2005, p. 10)

#### Salts and Trace Elements

- Undigested feed that passes through animals contains sodium and potassium. Trace elements in manure include those that are often added to feed as growth stimulants and biocides – arsenic, copper, selenium and zinc. (Hodne, 2005, p. 8)
- Salts and trace elements from discharges from feedlots and land-applied manure, especially when applied excessively and repeatedly, can accumulate, as they persist in the environment, and can ultimately harm soil quality and plant growth. (Hodne, 2005, p. 20)
- Increased salts and trace elements may cause environmental imbalances in fresh waters and on agricultural lands, harming birds and reducing yields. (Hodne, 2005, p. 20)
- The Iowa CDCP (1998) study found trace metals and common ions in water affected by large-scale swine CAFOs, especially in earthen manure lagoons, but also in drainage ditches and wells, tile line inlets and outlets, and an adjacent river. (Hodne, 2005, p. 20)
- Excessive amounts of copper and zinc have been found in creek sediment and wetlands, in association with cattle CAFO and swine CAFOs, respectively (U.S.EPA, 2001). (Hodne, 2005, p. 20)

All information included in this factsheet was obtained from:

Hodne, Carol J. Concentrating on Clean Water: The Challenge of Concentrated Animal Feeding Operations. The Iowa Policy Project. 2005. Full report:  
[http://www.iowapolicyproject.org/2005\\_reports\\_press\\_releases/050406-cafo-fullx.pdf](http://www.iowapolicyproject.org/2005_reports_press_releases/050406-cafo-fullx.pdf)

██████████, Farmer

Socially Responsible Agricultural Project consultant [www.sraproject.org](http://www.sraproject.org)

Illinois Citizens for Clean Air and Water [www.iccaw.org](http://www.iccaw.org)

Families Against Rural Messes FARM

Elmwood, Illinois 61529

**August 9, 2012**

Please acknowledge that i am totally opposed to this CAFO , an acronym for factory farming.

Thank you,

██████████

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Mr. Anderson:

I have lived in WI all my life and I also am a certified water operator.

I am against the proposed Golden Sands Dairy.

Please pay attention to the citizens of WI, not large business interests.

I will pay more for food to not have it be provided in this large scale manner.

PROTECT OUR RESOURCES.

WE CAN FIND BETTER WAYS TO EAT AND LIVE IN HARMONY WITH OUR ENVIRONMENT. THINK LONG TERM.

Thank you.

██████████

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Greetings Russ,

and thank you for accepting this brief comment with regard to the proposed Golden Sands Dairy in the Town of Saratoga, Wood County.

Concern and comment:

Should the proposed Golden Sands Dairy move forward and should the decision of the DNR is to issue a permit to Golden Sands Dairy to install a large number of high capacity wells for the proposed 6,400

acres of crop land – then the approved DNR permit should contain a condition that if the ground water table reaches a specified low level established by the DNR and/or a condition that fertilizer contamination of the ground water exceeds DNR established drinking water guidelines, then the high capacity well or wells will be shut down until the condition that prompted the shutdown is corrected and approved by the DNR.

[REDACTED]

[REDACTED]

Nekoosa, WI 54457

[REDACTED]

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Mr. Anderson - In addition to other concerns, there is the issue of nutrients for this proposed dairy. And often, CAFOs have the bare minimum of acreage to accommodate all available nutrients.

Phosphorus (P) is not very mobile in the soil in most situations (though P-laden runoff can be a big issue). However, in very sandy soils, due to the open soil structure, P can percolate down through such sandy soils to groundwater, and thence into streams. Wind erosion is a problem in the Golden Sands area, and airborne P-laden sediments end up in area streams. And as indicated, there may also be P-laden runoff from rain and spring thaw.

Nitrogen (N) is another concern. Anaerobic manure digestion would be expected to yield ammonia, which is normally bound in the soil. However, under conditions common in the Golden Sands area, ammonia from landspread manure or liquids readily converts to nitrate, which is easily leached to groundwater unless immediately used by plants. Even then, heavy rains may bypass root uptake of nitrate.

And how will this be accepted by those concerned with an already degraded Petenwell Flowage and WDNR efforts in the area?

If permitted, is waterway nutrient monitoring above and below the facility an option to determine impacts? But ideally, this would occur prior to commencement of activity.

Once a facility of this dimension is up and running, it is very difficult to reverse course.

[REDACTED]

[REDACTED]

[REDACTED]

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**August 8, 2012**

Hi Dan,

In respect of your time, I am a Saratoga resident helping with research. Can you please forward any specific detail plans of the proposed Anaerobic Methane Digester for the proposed Saratoga dairy. I assume that they had to be submitted with the request for permits and have an engineer that can help oversee what faults may be present. We feel this information may be very helpful in our search for complete details in what the proposed dairy may bring to our community. It is our hope that any negative effects be stopped before the building takes place instead of dealing with the negative effects once they are already established. Any information that you can pass on is greatly appreciated.

Thanks in advance,

██████████

██████████████████

Wisconsin Rapids, WI 54494

██████████

██████████████████

**August 7, 2012**

Hello, my name is ██████████ and I wanted to express my dislike for the 5300 dairy cao facility. Tis is not good for the state of Wisconsin for several reason. First it will take the place of many family farms which in turn put more people out of a job than this new place will employ. These places are so automated they do not require many people to run them. Secondly, the very large concentration of manure is dangerous to the ground water as well as any nearby streams, rivers or lakes. One mishap could cause environmental problems on a large scale, yes manure is natural but even too much of a natural thing can have grave consequences. Fourth, 49 wells? Really? The impact on the ground water levels will be great and could even require some area residents to have to drill deeper wells. Additionally the lowering of groundwater affects stream,lakes, rivers and wetlands impacting the ecology and wildlife in this area. Especially in a drought year like this one we are having now. There are many hidden consequences that are not seen and will not be incorporated into the true costs of the product produced by this facility. For example the extra nitrogen and phosphate added to the eco-systrm that will take hundreds of years to dissapate, the chemicals used on the crops to feed these animals, not to mention the fields taking to feed these animals that may ave once provided food for people or other important corm products. I can not see anything positive coming out of this, I have worked on farms in my past, I know employment numbers for smal farms and I know personally ofe these automated system. I additionally feel qualified to comment on this subject as I am a non-traditional student of wildlife ecolgy, environmental studies, wetland and prairie/wetland restoration. I urge you to not let this facility come to our state and keep our treasured small farms alive.

.....

Sincerely,

[REDACTED]

\*\*\*

Dear Mr. Anderson,

I strongly object to the proposal for "The dairy, as proposed, would encompass 8,000 acres with 6,400 in cropland. The dairy operation would involve approximately 5,300 cows. The proposal calls for 49 high capacity wells."

I worry that it would deplete the water resources for surrounding areas and that the water quality from run off would be negatively impacted. I further am concerned about the air quality of the people who have to live near such an entity and the overall degradation to the land from such a high-intensity operation.

That is too too large a concentration of large animals.

I Strongly oppose this proposal. I know I am not living in the surrounding township, but this type of operation is not just a local issue.

[REDACTED]

[REDACTED]

Madison, WI 53704

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Dear Mr. Anderson,

I was concerned about the permit application for this factory farm for a number of reasons, particularly the need for 49 high capacity wells drawing from the aquifer. There are so many reasons to oppose factory farms, and while I understand it isn't the DNR's duty to address ethical considerations, the drawdown of area water and the waste from the cows is particularly concerning. I know I'd never want to live anywhere near this proposed farm.

I hope you'll do what you can to ensure that the people's concerns are heard and appreciated, even under pressure from corporate interests. It seems this farm would benefit very few and hurt many.

Thank you for considering my comments.

Sincerely,

[REDACTED]

[REDACTED]

.....

Whitefish Bay, WI 53211

**August 6, 2012**

I was given your email address today by [REDACTED]. My husband and I have been working with [REDACTED] and [REDACTED] to try and stop the Wysocki's from building their dairy in the Town of Saratoga. I was given a copy of the Wysocki's plan – the same one given to the Town that is signed by Robert J. Pofahl. I have gone over the document and have some concerns about what it contains and what it doesn't say. I'd like to share my concerns with you.

The first thing I noticed about this plan is that it appears to be something written for another project, perhaps another CAFO, and some of the statements are questionable. For example, page 2, 1.3 Background, 1st paragraph: The proposed facility is a new operation that will integrate dairy into the current irrigated potato and vegetable production cropland. And in the 2nd paragraph, Dairy crop production will enhance the sustainable farming methods of the current potato production systems. There are no "current irrigated potato and vegetable production cropland" here, there is only timberland and I doubt crops have ever been grown on this land. The Central Sands Dairy was built in an agricultural area. Was the Wysocki's Saratoga dairy plan made with "Saratoga coordinates and facts" just cut and pasted into the Central Sands Dairy plans? If so, you can see why I'm worried about what this proposal contains. The lands in the Town of Armenia were already croplands and there are far less folks living in Armenia than we have here in Saratoga. It is as if this Saratoga dairy, and the folks living around it, are not worth being given a plan that is tailored to conditions here.

Under Water Table Information on page 5, the Wysocki's are using water table information from 1981. There weren't as many people living in Saratoga then, for one thing. Surely there must be more current data than 1981 to draw from!

On page 6 of their plan at 2.1 Leachate Collection System, when speaking of silage leachate, Wysocki says that: Leachate and runoff will flow to the collection trenches and flow to the collection tank where runoff will be pumped to storage. It doesn't say whether these collection trenches will be concrete or just sand. If just sand, the leachate will not flow to any tank but will "flow" into the ground. I have learned just how lethal silage runoff is to groundwater and streams – especially sweet corn leachate.

On page 7, under 2.1.3 Hydrology, it speaks of having 240,000 feet of trenches. Further down at 2.1.4.2 Collection Trenches, it says that the collection trenches are designed to be "watertight". The implication is that the runoff trenches will be concrete because they have included the feed storage pad and runoff under the Hydrology heading. However, nowhere does it specifically say that the silage leachate will be collected by something that will keep it out of the groundwater. Perhaps I am "nit-picking" but I have learned the hard way that what isn't written in black and white can come back to haunt you. We are all counting on our water remaining free of contaminants. The silage leachate has the potential to make our water acid, smelly, and not fit to drink. Please be sure the words in the permit have all the T's crossed and the I's dotted. So much is at stake here.

.....

At the July 19th meeting in Wisconsin Rapids when Wysocki presented their plan to the people of Saratoga, Jim Wysocki told me – and the audience – that the digester would be in and working “before the first cow arrives at the dairy”. In the plan, the digester is mentioned as being built in phase II, when the dairy is at “90% capacity”. To me 90% implies that there will be a large gap between the arrival of the cows and the building of the digester. So many parts in the Wysocki plan are based on the use of the digester. My concern is that if the digester isn’t built “before the first cow” arrives, all that manure and sand bedding will be sitting around on pads (for who knows how long) with their runoff getting into the groundwater. Here again the wording says that the rainfall and runoff from the solids pad will be collected, but it doesn’t specify collected into concrete or if they plan to “just let it go”! Why would they want the expense of building concrete trenches that they may not need once the digester is built?

The lagoon is worrisome. The idea that so much wastewater will be just sitting there uncovered, open to the wind allowing ammonia and particulates to enter the air. Here again, is the information listed under site conditions for the lagoon current? Is the lagoon’s size, its capacity, and design built for the soil conditions found here in Saratoga? The soil in Saratoga is rated as the ‘most easily contaminated area in Wood County’. Will Wysocki be monitored regularly to see that the nutrients are stored and spread correctly and safely? Or will it just be checked at 5-year intervals? Only you DNR folks know those answers.

From the beginning, the groundwater has been our main concern. We can close the windows or go somewhere else for a while, but if our water becomes contaminated, we have no other water source. Please protect us. Make the wording of the Wysocki permit specific to Saratoga and complete – maybe even going overboard on their being specific and complete. There are 5300 folks depending on the DNR to protect us.

Thank you for “listening” to me. We are grateful that you are willing to communicate with us. I appreciate your time and thank you for anything that you are able to do to keep the residents of Saratoga safe and healthy.

[Redacted]

[Redacted]

\*\*\*

I heard about this proposed so-called dairy farm through Wisconsin League of Conservation Voters - haven't any of you people there seen the documentary Food, Inc., or River of Waste? Don't you know anything about the horrible affect of this kind of factory farm? If I can understand it, you should be able to. Please use the common sense and decency that all humans possess, and don't pursue this, money isn't the only thing in this world.

[Redacted]

\*\*\*



**August 6, 2012**

Dan we are very concerned over the idea of Golden Sands dairy trying to separate out the 5 ells from the others. This is not Mr. Wysocki's water. The residents of Saratoga, Rome and Wi Rapids were here first and many of those wells are only sand points. We are working on the listing of well depths in and around this projected dairy area. Please give us time to get that information out to the DNR. Also will you take into account the 40 HC wells already in existence on the Ten Mile Watershed drawing out massive amounts of water daily. The quantity of water is not going to last forever especially in the years of drought which we are currently in. We will give you copies of the petitions to the DNR that we have accumulated to date that request no HC wells permits be allowed. Please forward this where appropriate.

Thanks [REDACTED]

Representing Protect Wood County & Its Neighbors



## Protecting Wisconsin's Groundwater Through Comprehensive Planning

---

Wood County

return to [Executive Summary](#) - [Full Report](#)

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### GROUNDWATER CONTAMINATION SUSCEPTIBILITY MAP

#### Use of this Map:

The composite [Groundwater Contamination Susceptibility Map](#) can be used by state agencies and others when deciding where they should more closely study impacts on groundwater. Local officials can also use this in determining whether they should study their region in more detail for potential groundwater problems. The groundwater contamination susceptibility map can be combined with other planning tools such as land use maps, groundwater quality data and contamination source information to help make sound groundwater management and land use decisions.

The Groundwater Contamination Susceptibility Map of Wisconsin doesn't show areas that **will** be contaminated, or areas that **cannot** be contaminated. Whether an area will have groundwater contamination depends on the likelihood of contaminant release, the type of contaminants released and the sensitivity of the area to the contamination. In turn, the likelihood of contaminant release depends on the type and intensity of the land use and contaminant sources in an area. This map highlights areas sensitive to contamination and shows them in a generalized way.

There are many limitations in the use of this composite map. It is compiled from very generalized statewide information at a small scale, and therefore, cannot be used for any site specific purposes. For example, siting waste disposal facilities or locating an industry requires site-specific, geologic and hydrogeologic information, and can't be made based on this composite map. The Groundwater Contamination Susceptibility Map doesn't consider the individual characteristics of specific contaminants or the subsurface release of contaminants. That is, it only considers the ability of water to move from the land surface to the water table.

**Map source:** Schmidt, R.R., 1987, Groundwater contamination susceptibility map and evaluation: Wisconsin Department of Natural Resources, Wisconsin's Groundwater Management Plan Report 5, PUBL-WR-177-87, 27 p.

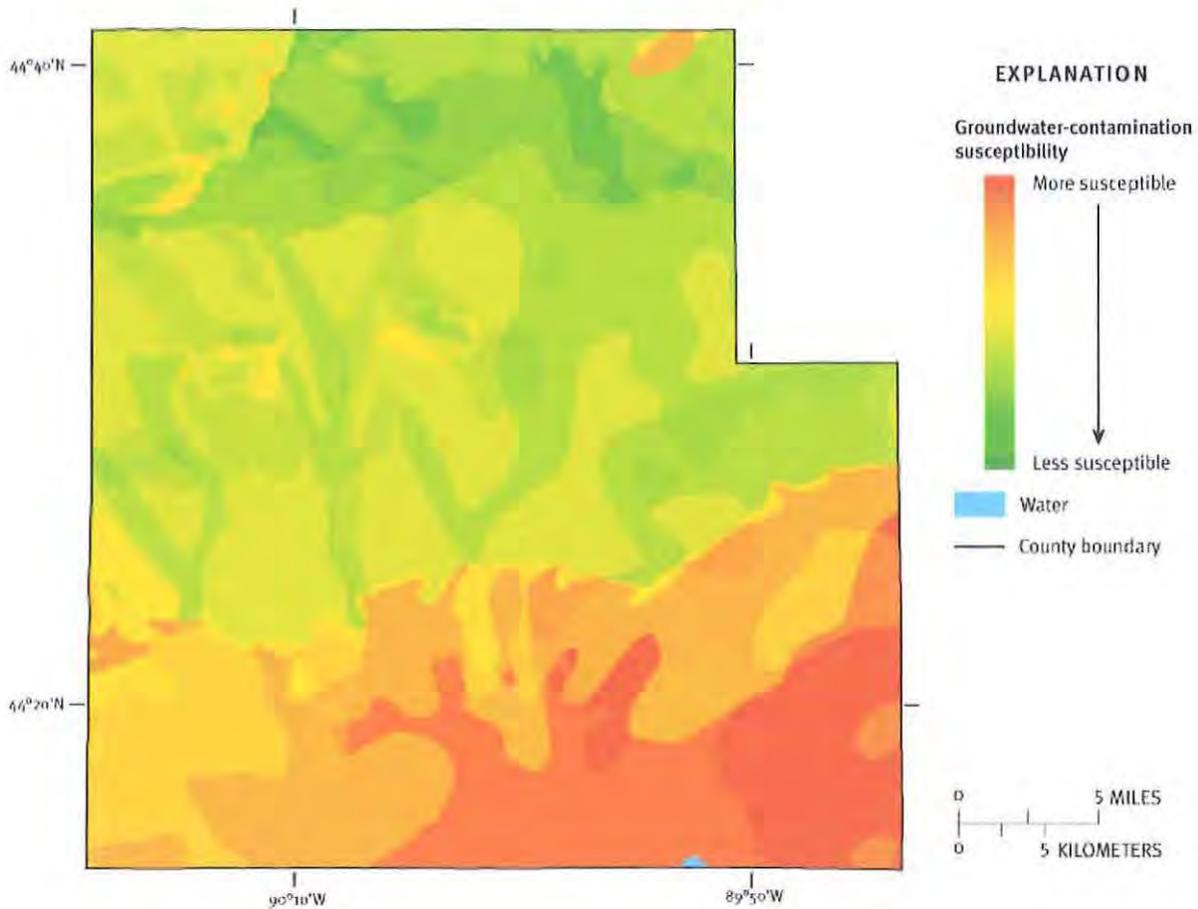
[More information about individual data layers can be found in this guidance.](#)

**County data:** Wisconsin Department of Natural Resources, 2004, 1:24,000 digital data, Wisconsin Transverse Mercator Projection, North American Datum of 1983 (1991 adjustment).

**Lake and stream data:** U.S. Geological Survey, 2003, 1:2,000,000 digital data, North American Datum of 1983.

---

### Wood County – Groundwater-Contamination Susceptibility Analysis



This groundwater-contamination susceptibility map is a composite of five resource characteristic maps, each of which was derived from generalized statewide information at small scales, and cannot be used for any site-specific purposes.

Map source: Schmidt, R.R., 1987, Groundwater contamination susceptibility map and evaluation: Wisconsin Department of Natural Resources, Wisconsin's Groundwater Management Plan Report 5, PUBL-WR-177-87, 27 p.

Figure created for the "Protecting Wisconsin's Groundwater Through Comprehensive Planning" web site, 2007, <http://wi.water.usgs.gov/gwcomp/>

In Wisconsin, 70% of residents and 97% of communities rely on groundwater as their drinking water source. Wisconsin has abundant quantities of high-quality groundwater, but once groundwater is contaminated, it's expensive and often not technically possible to clean. Because of these factors, we need to be careful to protect our groundwater from contamination. Our activities on the land can contaminate groundwater - most contaminants originate on the land surface and filter down to the groundwater. In some cases however, groundwater can become contaminated from natural causes such as radioactivity due to the presence of radium in certain types of rocks.

"Susceptibility of Groundwater to Pollutants" is defined here as the ease with which a contaminant can be transported from the land surface to the top of the groundwater called the "water table". Many materials that overlie the groundwater offer good protection from contaminants that might be transported by infiltrating waters. The amount of protection offered by the overlying material varies, however, depending on the materials. Thus, in some areas, the overlying soil and bedrock materials allow contaminants to reach the groundwater more easily than in other areas of the state.

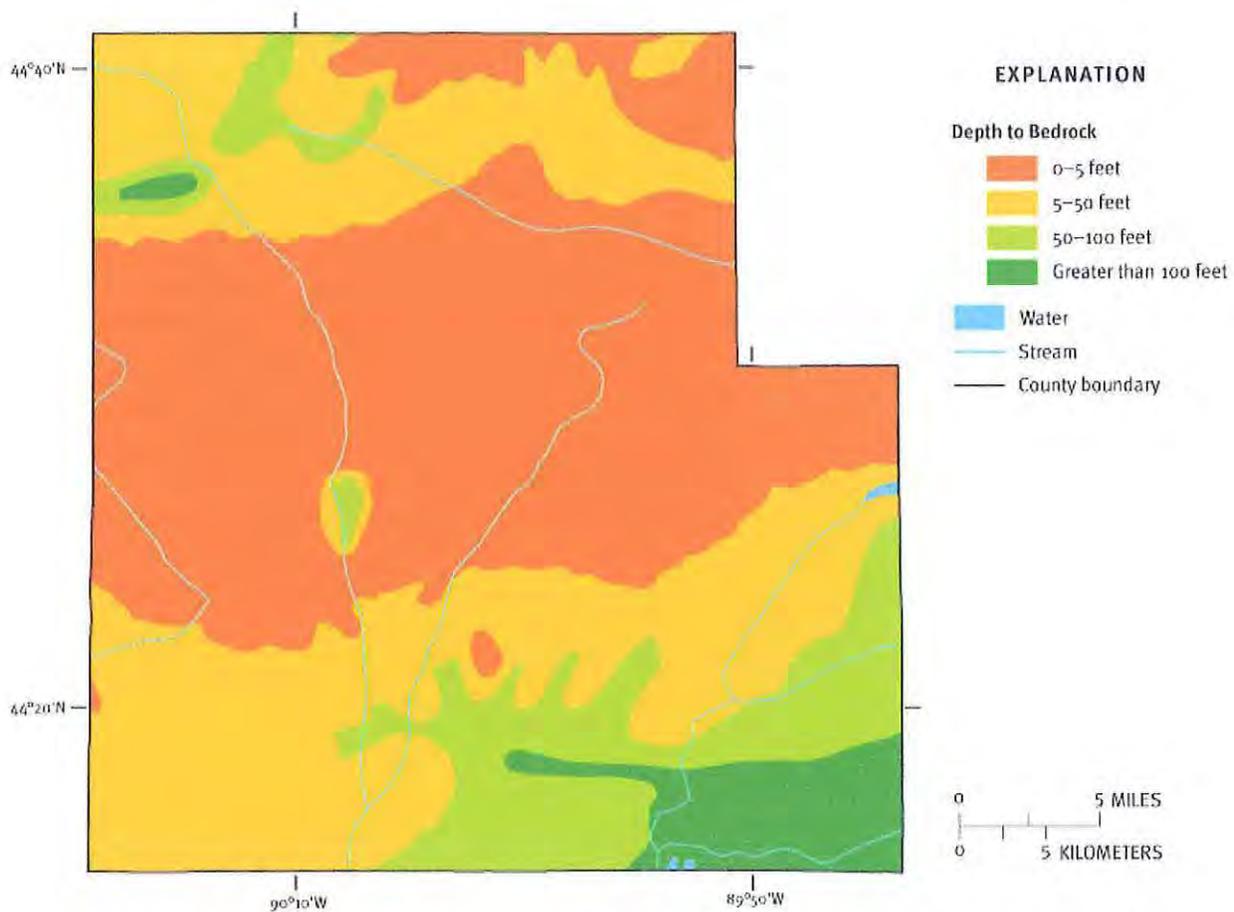
In order to identify areas sensitive to contamination, the Wisconsin Department of Natural Resources, in cooperation with the University of Wisconsin Extension, Wisconsin Geological and Natural History Survey and the USGS, has evaluated the physical resource characteristics that influence this sensitivity.

Five physical resource characteristics were identified as important in determining how easily a contaminant can be carried through overlying materials to the groundwater. These characteristics are depth to bedrock, type of bedrock, soil characteristics, depth to water table and characteristics of surficial deposits. Existing statewide maps of these five characteristics were used whenever possible. New maps were compiled when existing information wasn't already mapped. The resource characteristic maps used in this project were compiled from generalized maps at a scale of 1:250,000 or 1:500,000.

Each of the five resource characteristic maps was put into digital form using a Geographic Information Systems (GIS) program. All of the information contained in the five maps was overlaid and combined into one composite map. A numeric rating scheme developed for each map was used to score the maps and the five resource map scores were added together within GIS. The composite map shows the scores for each area – low scores represent areas that are more susceptible to contamination and high scores represent areas that are less susceptible to contamination.

The method described above is a subjective rating method; specifically an index method. An index method assigns a subjective ratings or score to physical resource characteristics of an area to develop a range of contamination susceptibility categories (ranging, in this case, from more susceptible to less susceptible). Index methods are fairly popular approaches to groundwater susceptibility, because they are quick and straightforward, and they use data that are readily available. However, the mapped distribution of susceptibility categories produced by an index method is typically fraught with uncertainty, primarily due to the subjectivity in the approach. The susceptibility categories include little quantifiable or statistical information on uncertainty and this limits their use for defensible decision making. So while susceptibility maps produced using index methods can be useful, their inherent uncertainty must be kept in mind. (National Research Council, 1993; Focazio and others, 2002).

### Wood County – Depth to Bedrock



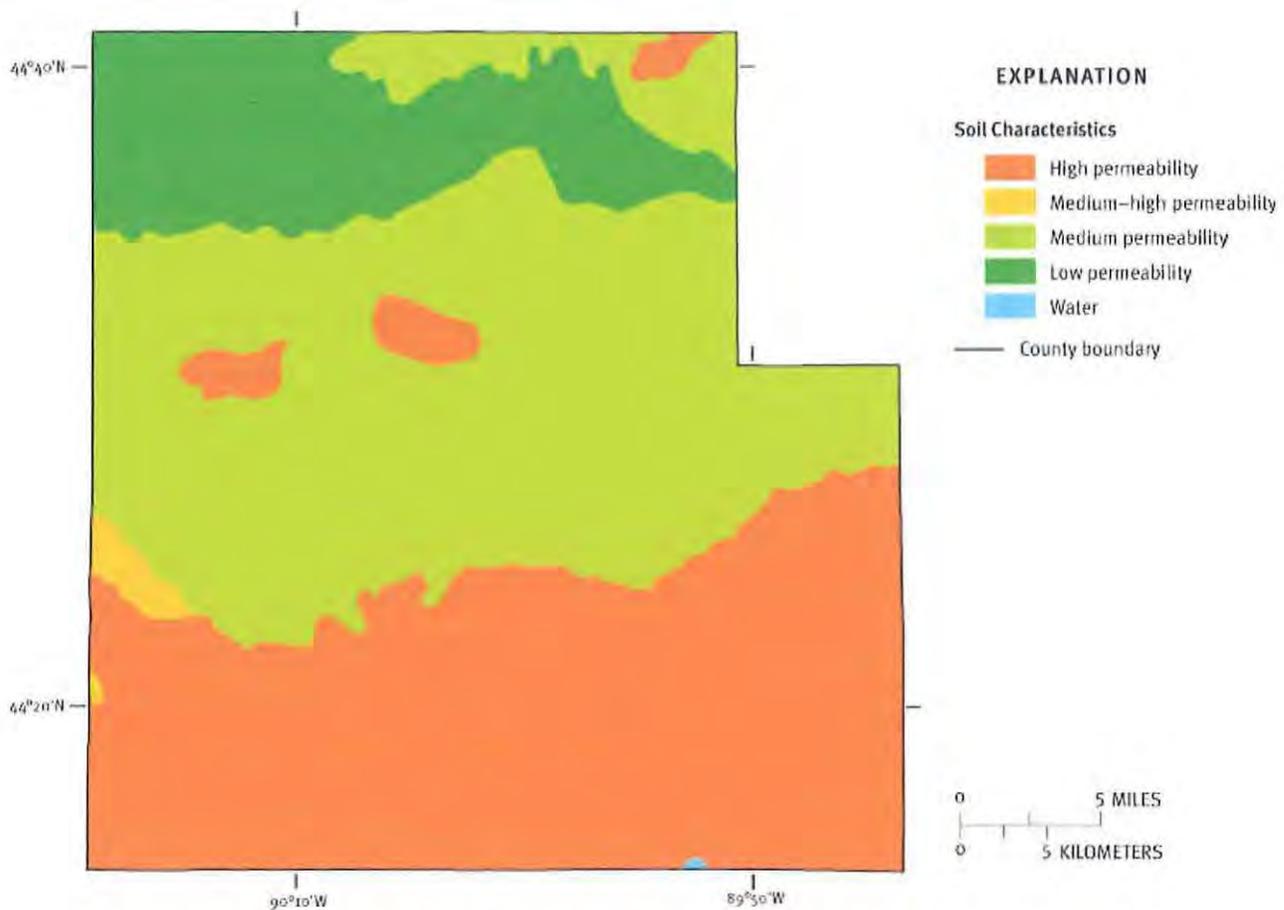
This resource characteristic map was derived from generalized statewide information at small scales, and cannot be used for any site-specific purposes.

Map source: Schmidt, R.R., 1987, Groundwater contamination susceptibility map and evaluation: Wisconsin Department of Natural Resources, Wisconsin's Groundwater Management Plan Report 5, PUBL-WR-177-87, 27 p.

Figure created for the "Protecting Wisconsin's Groundwater Through Comprehensive Planning" web site, 2007, <http://wi.water.usgs.gov/gwcomp/>

The depth to bedrock indicates the amount of soil and surficial deposits that exist in an area and, therefore how important the type of bedrock is in evaluating pollution potential. Information on the depth to bedrock map is used to determine the relative weight given to the other resource characteristic maps. For example, where the bedrock surface is deep and the water table occurs above the bedrock, the type of bedrock is not considered in determining groundwater contamination susceptibility. Where the depth to bedrock is shallow (less than 50 feet below the land surface), the water table is likely to occur in the bedrock. In that case, the type of bedrock is considered because it could influence a contaminant's ability to reach the groundwater. This map identifies areas where the depth to bedrock is 0-5 feet (in at least 35% of the area), 5-50 feet, 50-100 feet and greater than 100 feet.

## Wood County – Soil Characteristics



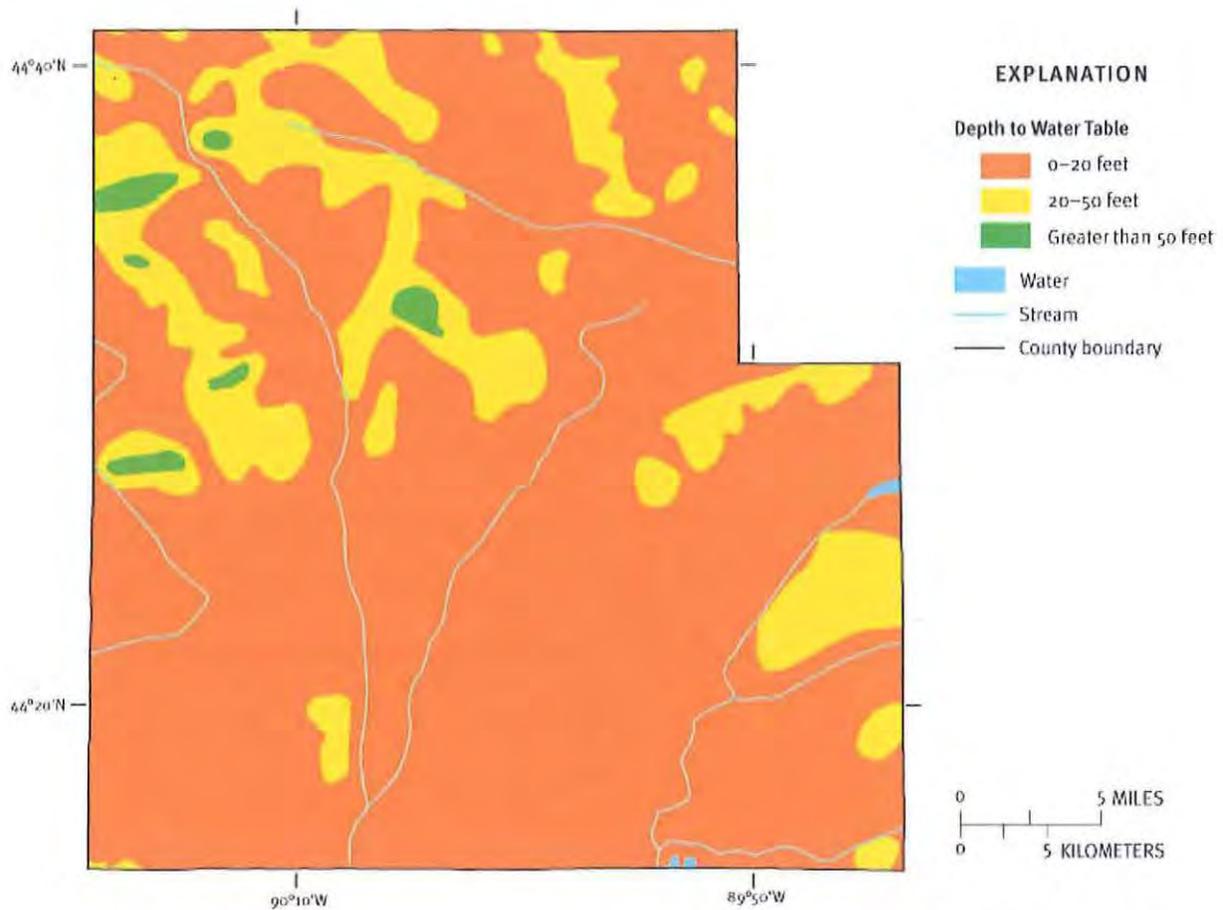
This resource characteristic map was derived from generalized statewide information at small scales, and cannot be used for any site-specific purposes.

Map source: Schmidt, R.R., 1987, Groundwater contamination susceptibility map and evaluation: Wisconsin Department of Natural Resources, Wisconsin's Groundwater Management Plan Report 5, PUBL-WR-177-87, 27 p.

Figure created for the "Protecting Wisconsin's Groundwater Through Comprehensive Planning" web site, 2007, <http://wi.water.usgs.gov/gwcomp/>

The top layer of materials covering most of the land in Wisconsin is the soil. The soil is defined as the unconsolidated material occurring from the land surface to five feet below the land surface. This is the first material through which water (and accompanying contaminants from the land surface) flow on their way to recharging the groundwater. The soil categories called "associations" have been rated by their ability to restrict the downward movement of water and accompanying pollutants. Important characteristics to consider are soil texture (the amount of sand, silt and clay), organic matter content, permeability and water holding capacity. The soil associations were grouped according to the following characteristics: high susceptibility (highly permeable soils with coarse texture, e.g., sand and gravel); medium/high susceptibility (permeable soils with coarse texture, e.g., sandy soils); medium susceptibility (moderately permeable soils with medium texture, e.g., loamy soils); and low susceptibility (least permeable soils with fine texture, e.g., silty and clayey soils).

### Wood County – Depth to Water Table



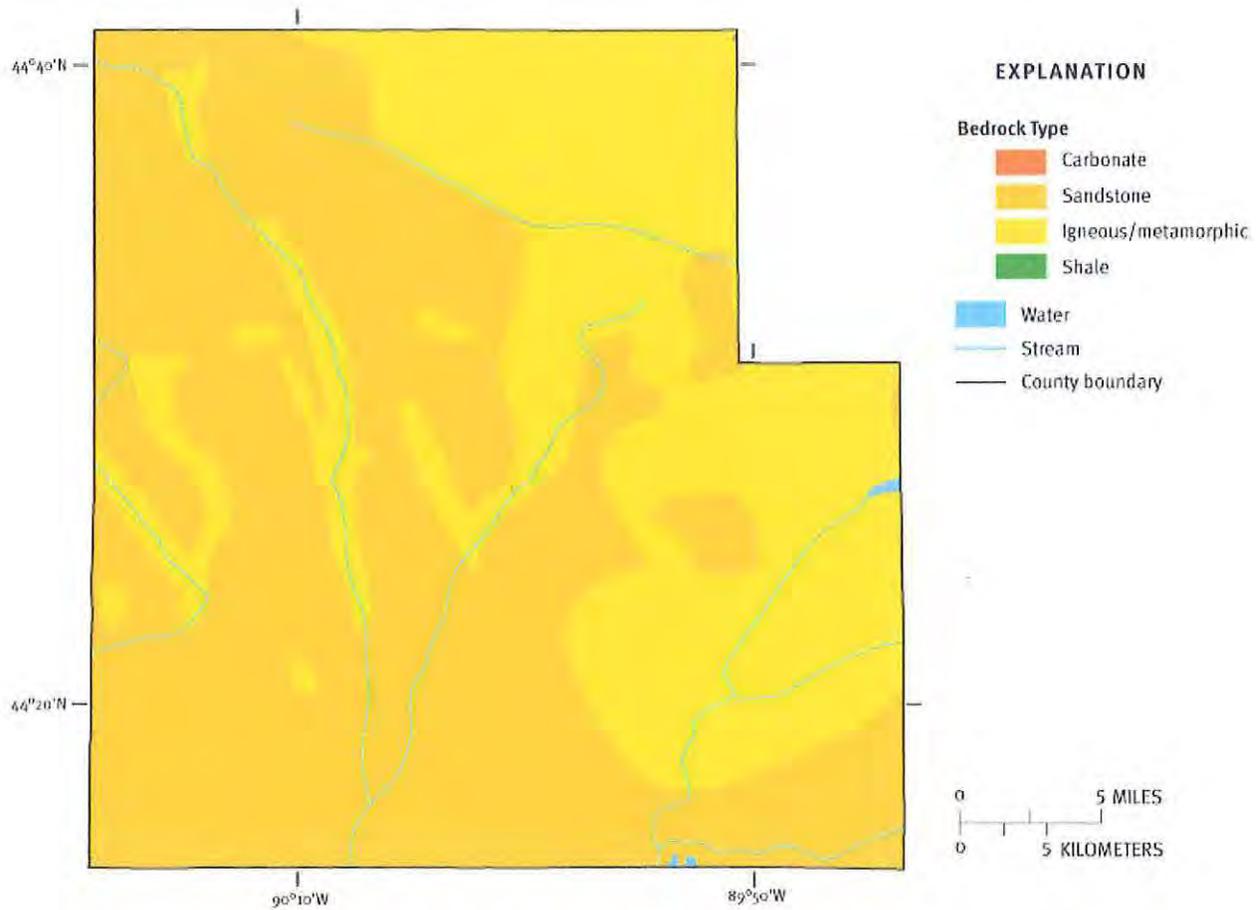
This resource characteristic map was derived from generalized statewide information at small scales, and cannot be used for any site-specific purposes.

Map source: Schmidt, R.R., 1987, Groundwater contamination susceptibility map and evaluation: Wisconsin Department of Natural Resources, Wisconsin's Groundwater Management Plan Report 5, PUBL-WR-177-87, 27 p.

Figure created for the "Protecting Wisconsin's Groundwater Through Comprehensive Planning" web site, 2007, <http://wi.water.usgs.gov/gwcomp/>

It is important to know where the water table is when trying to determine groundwater contamination susceptibility. The closer the water table is to the land surface, the less contact contaminants have with filtering materials overlying the water table. The depth to water table is difficult to map on a statewide basis because it's almost as variable as the terrain. The information used in this mapping project identified where the water table was less than 20 feet, between 20 and 50 feet, and greater than 50 feet from the land surface.

### Wood County – Bedrock Type



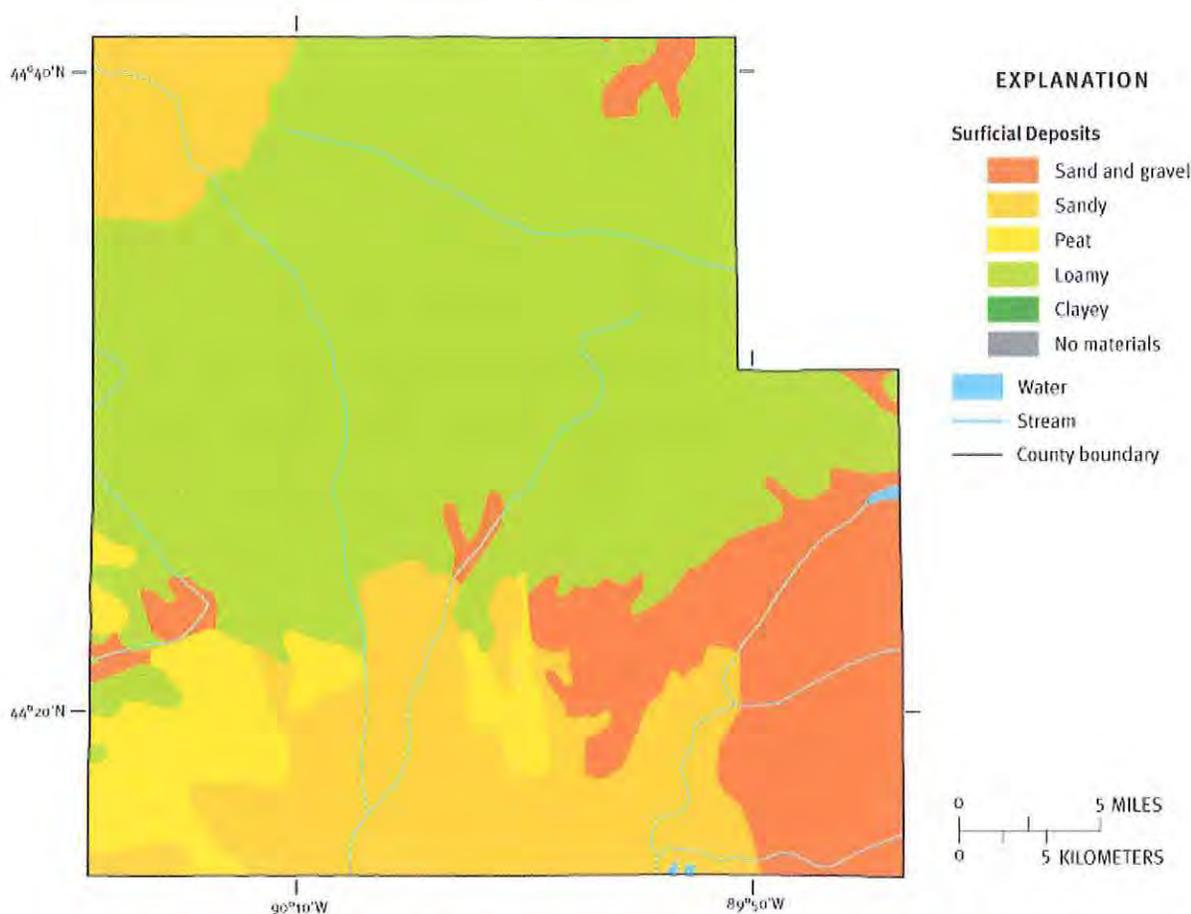
This resource characteristic map was derived from generalized statewide information at small scales, and cannot be used for any site-specific purposes.

Map source: Schmidt, R.R., 1987, Groundwater contamination susceptibility map and evaluation: Wisconsin Department of Natural Resources, Wisconsin's Groundwater Management Plan Report 5, PUBL-WR-177-87, 27 p.

Figure created for the 'Protecting Wisconsin's Groundwater Through Comprehensive Planning' web site, 2007, <http://wi.water.usgs.gov/gwcomp/>

When bedrock is less than 50 feet from the land surface and the water table occurs in the bedrock, the type of bedrock is important in determining how easily a contaminant can reach the groundwater. Bedrock types that allow water to pass quickly through them will offer less protection from contaminants. In Wisconsin, these types of bedrock are typically limestone and dolomite which are highly fractured. Igneous and metamorphic rocks (e.g. granite) and sandstone are less fractured and offer some protection from infiltrating water which may contain contaminants. On the other hand, shale bedrock is almost impermeable, and doesn't allow water and accompanying contaminants to pass through it as easily. The bedrock categories used for this project are carbonates, sandstone, igneous/metamorphic/volcanic, and shale.

### Wood County – Surficial Deposits



This resource characteristic map was derived from generalized statewide information at small scales, and cannot be used for any site-specific purposes.

Map source: Schmidt, R.R., 1987, Groundwater contamination susceptibility map and evaluation: Wisconsin Department of Natural Resources, Wisconsin's Groundwater Management Plan Report 5, PUBL-WR-177-87, 27 p.

Figure created for the "Protecting Wisconsin's Groundwater Through Comprehensive Planning" web site, 2007, <http://wi.water.usgs.gov/gwcomp/>

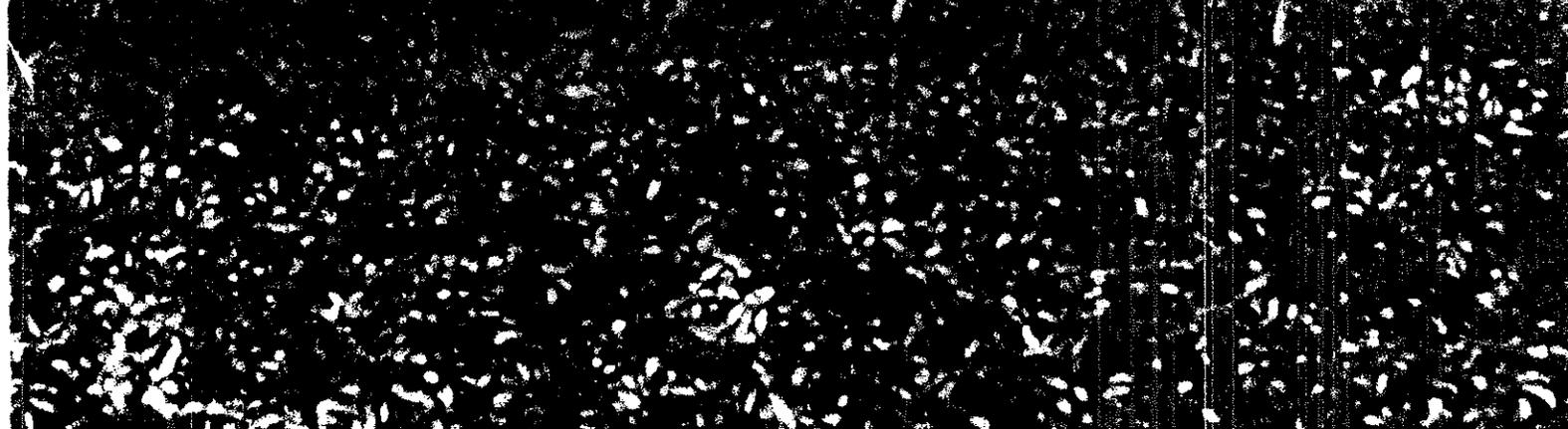
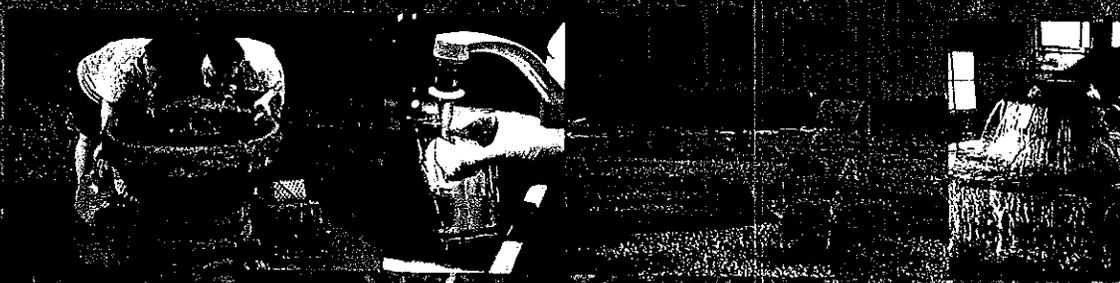
Surficial deposits are unconsolidated materials lying on top of bedrock. Except for the unglaciated southwest portion of the state, most of the surficial deposits in Wisconsin were left by glaciers. These materials differ, depending on how they were deposited. Some glacial materials were deposited by melting waters, and are well sorted or have layers of both fine materials and gravelly materials. Infiltrating waters must pass through these materials en route to the groundwater. Except in areas of shallow bedrock, the surficial deposits are considered the most important factor in determining how susceptible an area is to groundwater contamination. The surficial deposits have been categorized into six groups: sand and gravel; sandy; loamy; peat; and no materials (not shown at this scale). Areas having sand and gravel deposits are considered susceptible to groundwater contamination; and areas with clayey deposits are considered less susceptible.

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# groundwater

WISCONSIN'S SUBTERRANEAN RESOURCES



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Words in **boldface** appear in the glossary on page 32.



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Groundwater in Wisconsin is indeed a treasure. But like all our natural bounties, it is a treasure whose high value must be sustained not by accident but by purpose.

— 1983, "Groundwater: Wisconsin's buried treasure"

**C**atching trout in crisp clear streams, shooting the rapids in a canoe, lazing around the lake in an inner tube, quenching your thirst on a hot summer day — none of these activities would be possible without **groundwater**. For most of us in Wisconsin, the water we drink, wash with, float on and fish in comes from right below our feet. Groundwater is Wisconsin's invisible resource — our buried treasure. "Groundwater: Wisconsin's buried treasure" was first published in 1983 to educate citizens about the resource we use every day but can't see. Later versions of the publication highlighted actions state agencies and individuals were taking to safeguard groundwater. In 2006, we look back at the progress made and look forward to new challenges in protecting the groundwater resource. It seems fitting that we return to the original title for this new version of "Groundwater: Wisconsin's buried treasure."

### Perspectives on groundwater

In 1983, the only option state agencies had for stopping groundwater polluters was litigation under public nuisance laws. The Environmental Protection Agency had set health-based drinking water standards for only 16 harmful substances. State agencies were learning more and more about where and how groundwater occurred and about how vulnerable the resource was. Our state's pioneering "Groundwater Law" was passed in 1984 and laid a plan for state agencies to work together for groundwater protection.

Fast forward to 2006: Wisconsin has limits for over 100 pollutants that threaten groundwater; a new "Water Quantity" law to regulate use; and groundwater flow has been studied in almost every corner of the state. Read on to learn about Wisconsin's groundwater; how state and local government agencies work together to protect this precious resource, and how you can help. 



A DROP  
OF  
KNOWLEDGE!

Look for the water drop, your guide to the truth about 10 common groundwater myths!

# Using groundwater

## Wisconsin is water-rich

**W**hen it comes to water, there's no place like Wisconsin. We are water-rich. Between the mighty Mississippi River and the Great Lakes of Michigan and Superior, there are more than 15,000 lakes, 7,000 streams and five million acres of wetland. And that just scratches the surface. Below our feet Wisconsin has a buried treasure — 1.2 quadrillion gallons of groundwater. It's hard to grasp just how much water is stored underground unless you look at how much we use every day:

Municipal drinking water (all uses)	330 million gallons/day
Commercial/industrial use	256 million gallons/day
Livestock	100 million gallons/day
Irrigation (summer only)	182 million gallons/day
Home use	205 million gallons/day
<b>TOTAL</b>	<b>1,073 million gallons/day</b>

— USGS statistics estimates

Each year about 29 trillion gallons of water fall as rain or snow on Wisconsin's 36 million acres. Plants and animals consume some, some returns to the atmosphere through **evaporation** and **transpiration** by plants, and some flows into rivers, lakes and streams. The rest becomes groundwater by seeping through the soil and into groundwater **aquifers**.

If you could somehow pour all the water below ground on top, you'd need to trade in your ranch house for a houseboat: Wisconsin's bountiful groundwater could cover the whole

state to a depth of 100 feet!

### Getting a clean glass of water isn't as easy as turning on the tap!

In Wisconsin, the quality and quantity of groundwater varies from place to place. The difference is caused by a combination of **geology**, varying precipitation and use. Cities and towns in the north central and north-eastern third of Wisconsin receive the most precipitation in the state, but they are underlain by crystalline



Pure, healthy groundwater is vital to our present, past and future economies. (above) An artesian well at the Nevin Fish Hatchery. (right) A Beloit mineral spring 1873-79.

bedrock, a type of rock formation notorious for yielding only small quantities of water. Even though there may be plenty of rain, finding enough groundwater to supply municipalities in these regions can be difficult.

Groundwater levels have been going down by hundreds of feet around some of Wisconsin's growing metropolitan areas

At last estimate, there were more than 850,000 **private wells** in the



ANDREW DAHL, COURTESY OF STATE HISTORICAL SOCIETY WHI (031)67Z

SUE SWANSON

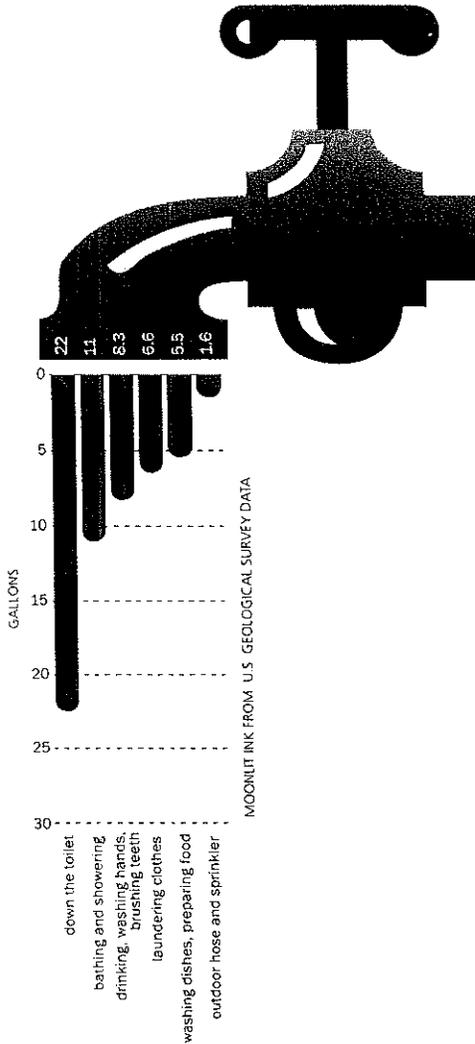
state. In areas where water moves through aquifers very slowly, private wells can still yield enough water for residential use. You can drill a hole just about anywhere in Wisconsin and find water. But is this water drinkable? Groundwater can be contaminated in several ways, which you'll read about here. But you'll also read about how you can take action at home to protect Wisconsin's buried treasure.

### The worth of water

In Wisconsin, about three-fourths of us draw nearly 205 million gallons of groundwater daily at home to slake thirsts, scrub pots, boil spaghetti and shower. Per person, that's 55 gallons of groundwater per day.

How do you use Wisconsin's ample buried treasure? Take a look at the faucet diagram on page 4.

Fifty-five gallons of groundwater



(above) Personal water use averages 55 gallons per day. That does not include groundwater used in water parks or agriculture.  
(right) A spring bubbling up in Middleton.



money. Treating used water (referred to as "wastewater") to stringent standards of purity strains every budget.

### Thirsty cities

It's used to fight fires, clean streets, fill the local pool, sprinkle golf courses and parks, drench shade trees, supply commercial customers and satisfy the needs of thirsty residents at home or at bubblers (drinking fountains, to non-Wisconsinites) around town. Ninety-seven percent of Wisconsin's cities and villages count on groundwater to provide basic water-related services often taken for granted.

The top counties and main users:

- Dane County (Madison) area, 48 million gallons per day;

ROBERT QUEEN

- Waukesha County (City of Waukesha), 27 million gallons per day; and
- Rock County (Janesville and Beloit), 20 million gallons per day.  
*(USGS statistics estimates)*

The average daily cost to a family of four in 2005: between 26 and 35.2 cents — an increase of only a few cents since 1983, when "Groundwater: Wisconsin's buried treasure" was first published.

### A fluid economy

Water is vital to Wisconsin's economic health. It's part of countless manufacturing processes, from metal fabrication to paper production to leather tanning. Some of our most important industries — fruit and vegetable processing, cheese-making, dairy farming, meat processing and brewing — need pure, clean groundwater to make the

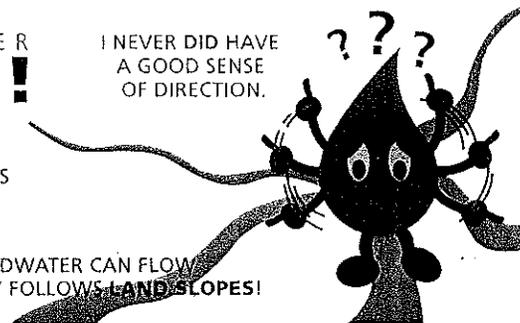
per person per day may not seem like much, but there are hidden costs for excessive water use. Your community may have to install new wells or water and sewer pipes to accommodate increasing demand. Pumping more water from private or public wells requires more energy, which costs more



**#1 GROUNDWATER ALWAYS FLOWS FROM NORTH TO SOUTH**

**IN FACT:**  
DEPENDING ON LOCATION, GROUNDWATER CAN FLOW IN ANY DIRECTION — BUT USUALLY FOLLOWS LAND SLOPES!

I NEVER DID HAVE A GOOD SENSE OF DIRECTION.



goods for which Wisconsin is famous.

Big operators aren't the only ones who need this valuable resource. Consider your local laundromat, car wash, water bottlers, restaurants, health

clubs, hairdressers...scores of services and products we use daily depend on groundwater.

Food processing soaks it up: processing one can of corn or beans

requires nine gallons of water. Cars, fast or slow, also guzzle it up: six gallons of water are needed to produce one gallon of gasoline. And to manufacture that car and put four tires on it takes 39,090 gallons of water!

Commercial and industrial companies draw over 106 million gallons of groundwater each day from their own wells and use about 150 million gallons more provided by municipal water systems, according to the USGS. Groundwater is a silent but important partner in Wisconsin's economy because it provides more than one-third of Wisconsin's business and industrial water needs.



ROBERT QUEEN

### Wet and wild

Thousands of tourists visit Wisconsin each year to enjoy the state's fabulous water resources. They spent an

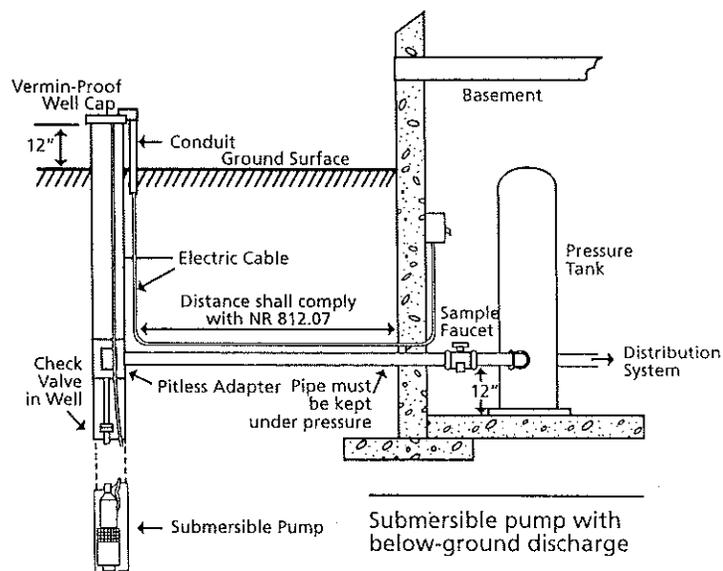
(left) Rain and snowmelt that seep through soil recharge groundwater and are discharged to lakes, streams, rivers and spectacular sights like Amnicon Falls.

## How a well works

Wisconsin has had well regulations since 1936 and today is recognized as a national leader in well protection. Well drillers and pump installers must be licensed by the DNR to make sure wells are properly constructed and located.

This figure shows one of many types of private wells constructed in the state. A pump is set inside a drilled and "cased" well at a depth well below the level of groundwater. When the pump turns on, water is drawn through openings in the casing and pushed through pipes to a pressure tank inside a house. The pressure applied by the tank insures pipes will be filled with water when you open the tap. Large **municipal wells** work in a similar manner, but at a much larger scale. Large water towers use gravity to provide the pressure needed to make water flow into distribution pipes and finally to homes.

To protect public health, private and public wells must be located far from sources of contamination. For example, a new private well cannot be installed within 250 feet of a wastewater land application site or within 1,200 feet of a landfill. For more information on rules governing wells, check out the DNR Drinking Water and Groundwater webpages at: [dnr.wi.gov/org/water/dwg/](http://dnr.wi.gov/org/water/dwg/)



DNR ILLUSTRATION

estimated \$11.8 billion in 2005 alone. That's a lot of fishing, boating and swimming. What most see is a favorite fishing hole, a secret pond with an expanse of cattails perfect for observing herons, or those wild rapids waiting to devour the raft or roll the kayak. What visitors don't see is the groundwater flowing into those water bodies. After seeping through the soil and rock, groundwater discharges in low places where the water table



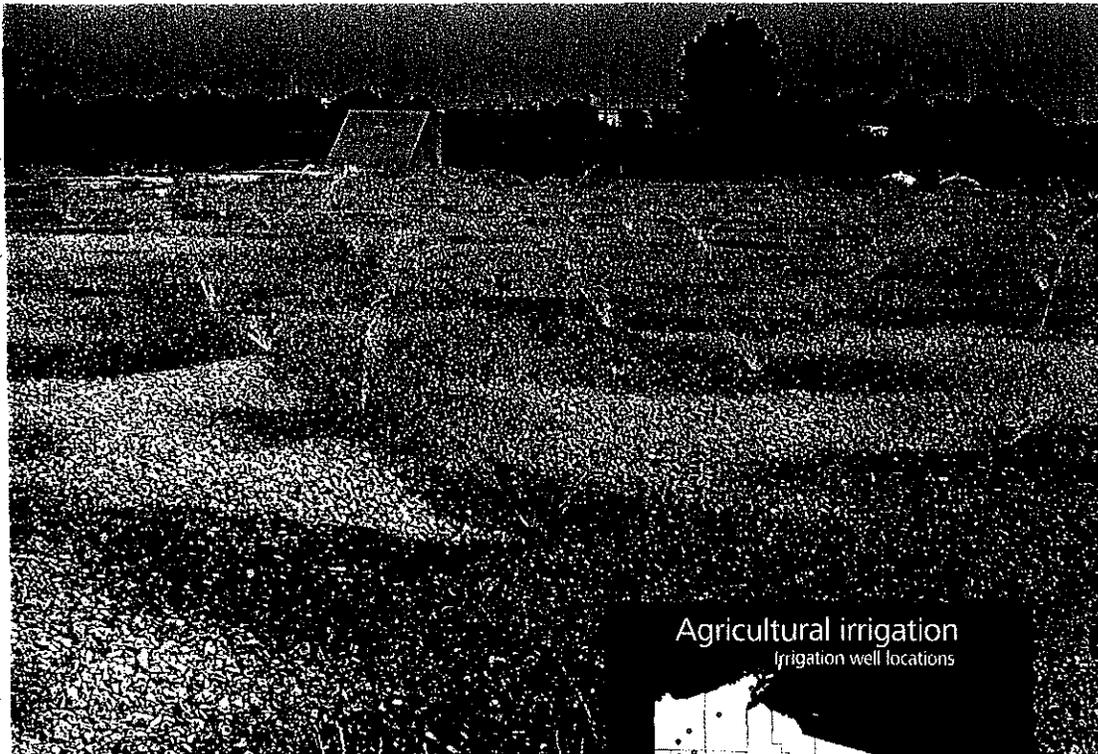
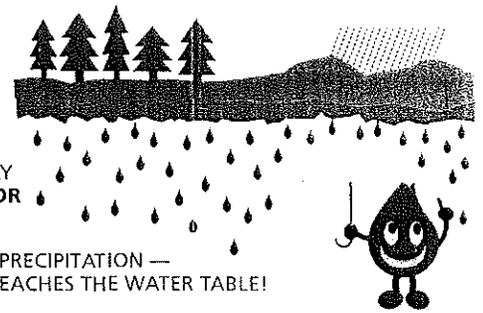
A DROP  
OF  
KNOWLEDGE!

## GROUNDWATER MYTH!

#2 GROUNDWATER COMES ALL THE WAY  
FROM CANADA AND LAKE SUPERIOR

### IN FACT:

GROUNDWATER ORIGINATES AS LOCAL PRECIPITATION —  
WHICH SEEPS INTO THE GROUND AND REACHES THE WATER TABLE!



The demand for groundwater rises as farmers install irrigation systems to increase their chances for a strong crop, especially during times of limited rainfall.

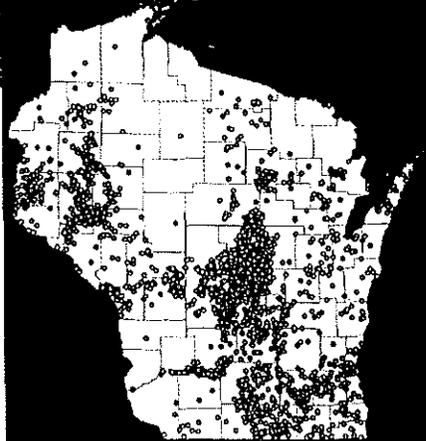
meets the land surface — streams, lakes and wetlands.

### Aquaculture?

Take a short test: A dairy cow producing 100 pounds of milk daily slurps 50 gallons of water each day to wet her whistle. There are roughly 1,235,000 dairy cows in the state. On average they each produce 17,800 pounds of milk per year. How much water will they drink in a year?

If you said over 10.9 billion gallons, you pass. For extra credit, how much of

### Agricultural irrigation irrigation well locations



AMY HELENFELDT

that water was groundwater? Ninety-six percent? Good guess!

Wisconsin's farms use about 100 million gallons of groundwater a day to water stock, maintain a high level of sanitation in the milk house and provide all-around cleanliness on the farm. Dairy farmers know that bring-

ing a quality product to market means starting with quality materials — wholesome, nutritious feed and pure, clean water.

The demand for groundwater on the farm continues to rise as increasing numbers of farmers install irrigation systems to make the risky business of farming more certain. In 1969, Wisconsin had an estimated 105,526 acres of irrigated farmland. According to the U.S. Department of Agriculture, that figure now has risen to over 390,000 acres.

Irrigation equipment uses about 182 million gallons of water per day during the growing season, almost all of it groundwater. On average, eighty percent of irrigation water is consumed — it is used by plants and not returned immediately to the soil under the fields.

Much of Wisconsin's irrigated acreage is in the relatively flat 10-county Central Sands area, where the potato is king. The tuber grows well in the sandy, loose soil, which needs less plowing and seedbed preparation than heavier soils and makes for an easy harvest. Water quickly seeps into this permeable soil and drains away almost as fast, allowing the plant roots to breathe and prevent rot. But the sandy soil doesn't hold water well, so irrigation is almost essential to ensure a good crop.

While irrigation has helped formerly marginal lands turn a profit, there is a cost: Excessive irrigation may leach **nutrients**, fertilizers and **pesticides** into groundwater and lower the water table. ☺

# Understanding the resource

## Recycling water

**W**ater might be called our most recycled resource. The water you drink today contains the same water molecules that flowed in the Nile during the building of the Egyptian pyramids and froze in glaciers when mastodons roamed the earth. Distribution of the earth's total water supply changes in time and space, but the quantity remains constant.

Wisconsin receives an average 30 to 32 inches of precipitation per year. Seventy-five percent evaporates or transpires through plants and never reaches surface water or groundwater. The six to 10 inches that do not evaporate immediately or get used by plants run off into surface waters or soak into the ground, depending on local topography, soil, land use and vegetation. For every inch of water that runs off the land to a stream or lake in gently rolling Dane County, three inches seep to the **water table**. In the sandy plains of Portage County, nine inches seep into the ground for each inch running off the land.

Water distribution is governed by a phenomenon known as the **hydrologic**, or water cycle, which is kept in motion by solar energy and gravity. Start with a spring shower. As the rain falls to earth, some flows downhill as **runoff** into a stream, lake or ocean. Some evaporates; some is taken up by plants. The rest trickles down through surface soil and rock. This water eventually reaches the water table — the top of a **saturated zone** of soil or rock, called an aquifer. The water contained in the aquifer is groundwater. Groundwater is discharged to wetlands, lakes and streams — the low places where the water table

meets the land surface. The sun causes evaporation from these surface waters, and, as water vapor accumulates in the atmosphere and clouds begin to form, the water cycle begins anew.

### On the move

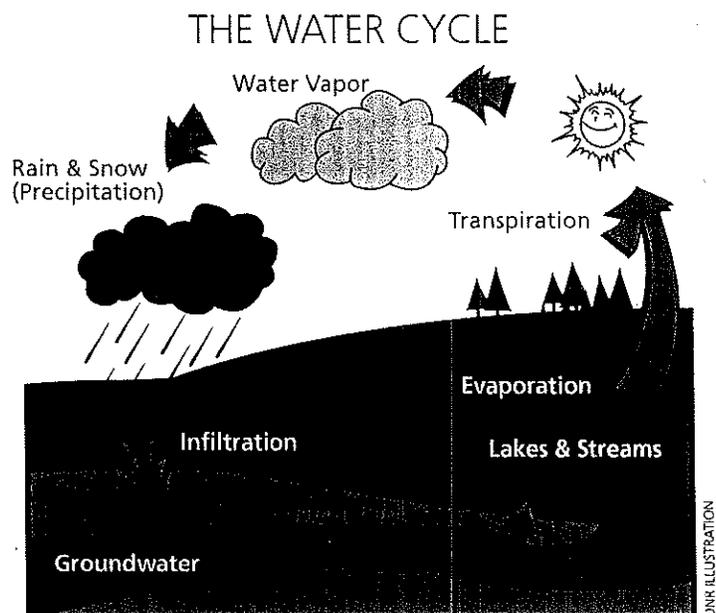
Geology controls the rate of groundwater movement. The size of the cracks in rocks, the size of the pores between soil and rock particles, and whether the pores are connected determine the rate at which water moves into, through and out of the aquifer.

Water generally moves quickly in coarse sand, sometimes as much as several feet per day. Openings between the grains are large and interconnected, resulting in high **permeability**. Very fine-grained material like clay has many pores where water can be stored, but the pores are so small that moving water through or out is difficult. Clay formations are relatively **impermeable** — water may move only a few inches a year. Permeability in **limestone**, on the other hand, primarily depends not on pore spaces, but on the size, frequency and distribution of fractures and cracks.

Groundwater is always moving toward a surface outlet

or “discharge” area, following the slope of the water table. In Wisconsin, the natural movement is from upland **recharge areas** (places where rain or melt water infiltrates the ground and reaches the water table) to lowland **discharge areas**. Most precipitation seeping into the soil moves only a few miles to the point where it is discharged; in the vast majority of cases, it stays within the same **watershed**.

Perhaps you've wondered why some streams continue to flow during dry periods and in winter, when there's no rainfall. Winter stream flow is largely groundwater discharge (called **baseflow**) that remains at a relatively constant temperature year-round — about 50° F. During the winter, groundwater from the surrounding uplands constantly replenishes streams, and most lakes and wetlands. That same 50° F groundwater baseflow is the reason streams stay icy cold in the summer. ☺

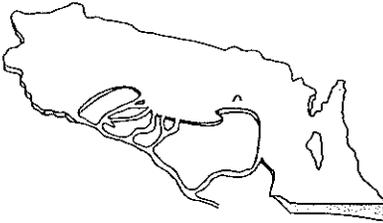




# Wisconsin's aquifers

## Sand and gravel aquifer

The sand and gravel aquifer is the surface material covering most of the state except for parts of southwest Wisconsin. It is made up mostly of sand and gravel deposited from glacial ice or in river floodplains. The glacial deposits are loose, so they're often referred to as soil — but they include much more than just a few feet of topsoil. These deposits are more than 300 feet thick in some



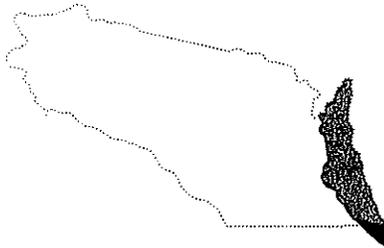
## Eastern dolomite aquifer

The eastern dolomite aquifer occurs in eastern Wisconsin from Door County to the Wisconsin-Illinois border. It consists of Niagara dolomite underlain by Maquoketa shale.

These rock formations were deposited 400 to 425 million years ago. Dolomite is a rock similar to limestone; it holds

places in Wisconsin.

The glaciers, formed by the continuous accumulation of snow, played an interesting role in Wisconsin's geology. The snow turned into ice, which reached a maximum thickness of almost two miles. The ice sheet spread over Canada, and part of it flowed in a general southerly direction toward Wisconsin and neighboring states. This ice sheet transported a great amount of rock debris, called **glacial drift**.

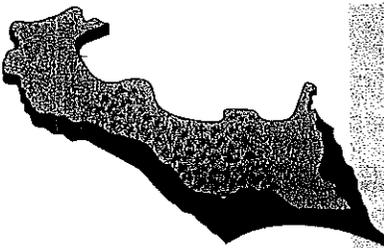


## Sandstone and dolomite aquifer

The sandstone and dolomite aquifer consists of layers of sandstone and dolomite bedrock that vary greatly in their water-yielding properties. In dolomite, groundwater mainly occurs in fractures. In sandstone, water occurs in pore spaces between loosely cemented

sand grains. These formations can be found over the entire state, except in the north central portion.

In eastern Wisconsin, this aquifer lies below the eastern dolomite aquifer and the Maquoketa shale layer. In other areas, it lies beneath the sand and gravel aquifer. These rock types gently dip



## Crystalline bedrock aquifer

The crystalline bedrock aquifer is composed of various rock types formed during the Precambrian Era, which lasted from the time the Earth cooled more than 4,000 million years ago, until about 600 million years ago, when the rocks in the sandstone and dolomite aquifer began to be formed. During this lengthy period, sediments, some of which were rich in



An aquifer is a rock or soil formation that can store or transmit water. Wisconsin's groundwater reserves are held in four principal aquifers: the sand and gravel aquifer, the eastern dolomite aquifer, the sandstone and dolomite aquifer, and the crystalline bedrock aquifer.



THOMAS V. REWE

As the ice melted, large amounts of sand and gravel were deposited, forming "outwash plains." Pits formed in the outwash where buried blocks of ice melted; many of these pits are now lakes. The sand and gravel aquifer was deposited within the past million years.

The sand and gravel outwash plains now form some of the best aquifers in Wisconsin. Many of the irrigated agricultural lands in central, southern and northwestern Wisconsin use the glacial out-

wash aquifer. Other glacial deposits are also useful aquifers, but in some places, large glacial lakes accumulated thick deposits of clay. These old lake beds of clay do not yield or transmit much water.

Because the top of the sand and gravel aquifer is also the land surface for most of Wisconsin, it is highly susceptible to human-induced and naturally occurring pollutants.

the fractured dolomite bedrock occurs at or near the land surface. In those areas (such as parts of Door, Kewaunee and Manitowoc counties), there is little soil to filter pollutants carried or leached by precipitation. Little or no filtration takes place once the water reaches large fractures in the dolomite. This has resulted in some groundwater quality problems, such as bacterial contamination from human and animal wastes. Special care

is necessary to prevent pollution.

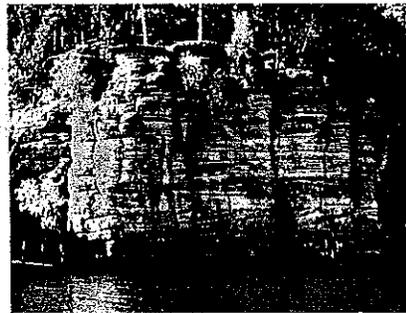
The Maquoketa shale layer beneath the dolomite was formed from clay that doesn't transmit water easily. Therefore, it is important not as a major water source, but as a barrier or shield between the eastern dolomite aquifer and the sandstone and dolomite aquifer.



KEN BRADBURY

to the east, south and west, away from north central Wisconsin, becoming much thicker and extending to greater depths below the land surface in the southern part of the state.

The rock formations that make up the sandstone and dolomite aquifer were deposited between 425 and 600 million years ago. The sandstone and



KEN BRADBURY

dolomite aquifer is the principal bedrock aquifer for the southern and western portions of the state. In eastern Wisconsin, most users of substantial quantities of groundwater, such as cities and industries, tap this deep aquifer to obtain a sufficient amount of water.

iron and now form iron ores, were deposited in ancient oceans; volcanoes spewed forth ash and lava; mountains were built and destroyed, and molten rocks from the earth's core flowed up through cracks in the upper crust.

The rocks that remain today have a granite-type crystalline structure. These are the "basement" rocks that underlie the entire state. In the north central region, they are the only rocks

occurring beneath the sand and gravel aquifer.

The cracks and fractures storing and transmitting water in these dense rocks are not spaced uniformly. Some areas contain numerous fractures while others contain very few. To obtain water, a well must intersect some of these cracks; the amount of water available to a well can vary within a single home site. The crystalline bedrock aquifer often cannot

provide adequate quantities of water for larger municipalities, large dairy herds, or industries.

Many wells in the crystalline bedrock aquifer have provided good water. However, most of these wells do not penetrate deeply into the rock. Water samples from deep mineral exploration holes near Crandon and deep iron mines near Hurley have yielded brackish water. ☪

# Threats to groundwater

**Y**ou name it — gasoline, fertilizer, paint thinner, antibiotics — if it's used or abused by humans and dissolves in water or soaks through soil, it may show up in Wisconsin's groundwater. New concerns about groundwater are coming to the attention of local citizens and state government. These emerging issues include the potential for pharmaceuticals, pathogens and viruses to contaminate public or private wells. A new area of research ex-

amines the combined effects of many contaminants that can occur in an aquifer. For example: What are the health effects of drinking water with very low levels of both pesticides and nitrate?

Activities in urban areas that pose significant threats to groundwater quality include industrial and municipal waste disposal, road salting, and petroleum and hazardous material storage.

In rural areas, different threats to groundwater quality exist; animal

waste, **onsite sewage systems**, fertilizers and pesticides are the primary pollution sources.

The "Groundwater and land use in the water cycle" poster on pages 16 and 17 shows how activities on the land interact with the water cycle. Refer to the poster to see how what we do on the ground affects groundwater.

## Air pollution is water pollution, too

Particles clouding the air from car exhaust, smokestacks and dust from city streets or farm fields can contribute to groundwater contamination. These particles of hydrocarbons, pesticides and heavy metals settle on the ground, are washed into the soil by rain, and eventually trickle into aquifers. Although a rain shower may disperse the particles from the air, the rains can carry the pollutants down into the ground as the water hits land.

## Fertilizer and manure storage and application

Protecting water quality and farm profits is a balancing act the UW-Extension's Nutrient and Pest Management Program is trying to perfect. To produce good yields, farmers need to apply nitrogen, phosphorus and other **nutrients** to their crops. If farmers don't account for the nutrients contained in the manure they spread on their fields, crops may be over-fertilized. Excess nitrate plants can't use will leach into groundwater and excess phosphorus will run off into lakes, streams and wetlands.

Proper measuring of nitrogen and phosphorus in manure saves farmers the cost of purchasing extra commercial fertilizer — and also protects groundwater.

Farmers also must be careful about



As subdivisions replace cropland, commercial lawn fertilizer use in these areas may threaten groundwater.

A DROP OF KNOWLEDGE!

**GROUNDWATER MYTH!**

#3 GROUNDWATER FLOWS IN UNDERGROUND CAVERNS AND RIVERS.

**IN FACT:**  
GROUNDWATER FLOWS THROUGH **CRACKS AND PORES** BETWEEN SOIL AND ROCK PARTICLES!

where and when they spread manure. Spring snowmelt or excessive rainfall can lead to fish kills and contamination of drinking water wells due to bacteria in manure that has run off from farm fields.

As subdivisions replace farm fields in rural areas, lawns replace crops. Overuse of commercial lawn fertilizer is an additional source of nitrate to groundwater.

### Nitrate: a widespread contaminant

Department of Natural Resources scientists looked at nitrate contamination in groundwater and were concerned with some findings. Nitrate occurs in groundwater in every Wisconsin county; both rural and urban populations are exposed. Solving this problem means controlling all sources of nitrate to the environment.

According to a DNR survey, Wisconsin communities have spent more than 24 million dollars to bring nitrate levels down to acceptable levels in municipal wells. That cost has been spread out among 22 municipalities with a combined population of 150,000 or more.

On the private well side, present data indicate that more than 10 percent of the private well samples analyzed for nitrate statewide show groundwater contamination above the federal drinking water and state groundwater standard.

Infants under six months and pregnant women should not drink water with nitrate levels above 10 parts per million — the health-based federal and state standard. Mixing baby formula with high-nitrate water threatens infants under the age of six months, because their stomach acid isn't strong enough to kill certain types of bacteria capable of converting nitrate to harmful nitrite. Nitrite binds hemoglobin in the blood, preventing oxygen from getting to the rest of the body; the baby may lose its healthy color and turn blue. Methemoglobinemia, or "blue baby syndrome" can cause suffocation. Using water with low levels of nitrate can prevent the condition.



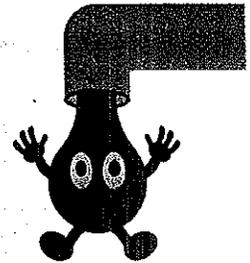
A DROP  
OF  
KNOWLEDGE!

## GROUNDWATER MYTH!

**#4** GROUNDWATER DRAWN FROM HOUSEHOLD WELLS  
HAS BEEN UNDERGROUND THOUSANDS OF YEARS.

### IN FACT:

TYPICAL PRIVATE DRINKING WATER WELLS IN WISCONSIN  
YIELD GROUNDWATER A FEW YEARS TO A FEW DECADES OLD!



Other health effects linked to nitrate in drinking water include certain types of cancer, thyroid problems and diabetes.

### Use and misuse of pesticides

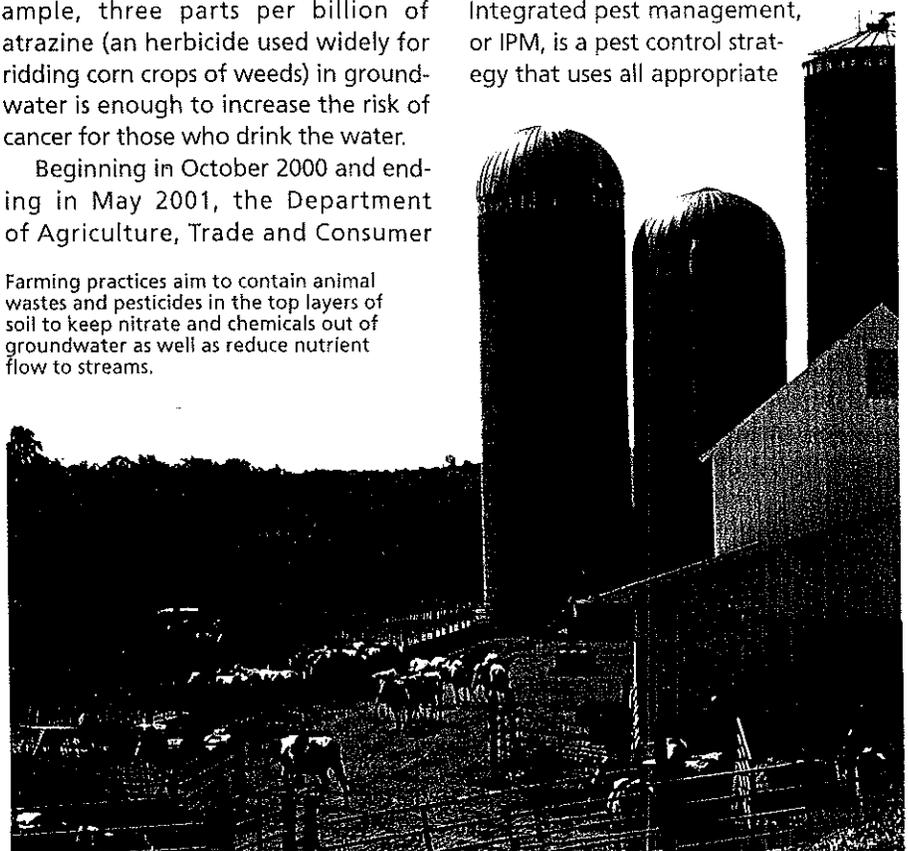
All types of pesticides (insecticides, herbicides and fungicides) have been used in Wisconsin agriculture for a long time. These pesticides can reach groundwater when spilled at storage, mixing and loading sites, or when over-applied to fields. "Empty" pesticide containers not properly disposed of are another source of trouble. Just a little spill of most pesticides can have a big impact on groundwater quality. For example, three parts per billion of atrazine (an herbicide used widely for ridding corn crops of weeds) in groundwater is enough to increase the risk of cancer for those who drink the water.

Beginning in October 2000 and ending in May 2001, the Department of Agriculture, Trade and Consumer

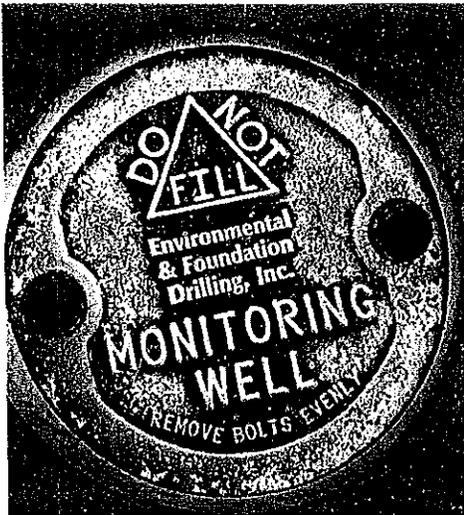
Farming practices aim to contain animal wastes and pesticides in the top layers of soil to keep nitrate and chemicals out of groundwater as well as reduce nutrient flow to streams.

Protection (DATCP) collected and tested 336 samples from rural private drinking water wells to determine the impact of agricultural pesticides on groundwater resources. DATCP analyzed the samples for commonly used herbicides. Results from the study showed over 35 percent of wells tested contained detectable levels of herbicides or their metabolites (compounds created when herbicides and other chemicals deteriorate in soils).

Protecting groundwater from pesticide contamination while maintaining farm profitability isn't easy — too much pesticide and the environment suffers; too little and crop yield goes down. Integrated pest management, or IPM, is a pest control strategy that uses all appropriate



ROBERT QUEEN



Monitoring is one way to identify groundwater threats.



Recycling efforts and properly constructed landfills are preventing much of the groundwater contamination that was seen 35 years ago at landfills.

control methods (chemical and non-chemical) to keep pest populations below economically damaging levels while minimizing harm to the environment. Here's how it works: farmers "scout" fields for weeds and pests. After identifying what is present, the farmer purchases and applies the minimum amount of herbicides and insecticides only in the areas where weeds and bugs are a problem. Farmers using IPM find they spend less on pesticides. It's a bargain for the environment, too.

#### - Landfills

Thanks to recycling efforts since 1995, each year we divert about 40 percent of the Wisconsin-generated solid waste from Wisconsin's landfills. The wastes we can't divert are disposed of in properly sited, designed, constructed and maintained landfills, which prevent **leachate** (the foul liquid that forms when water percolates through solid waste) from polluting groundwater. There are 72 highly engineered licensed landfills accepting solid waste in Wisconsin that do a good job of protecting groundwater.

We weren't always so fortunate. In the early 1970s about 2,000 dumps were identified by the DNR. Those located near navigable waters, within floodplains, wetlands or critical habitat were ordered closed. Remaining land-

fills posing a threat to the environment due to hydrogeologic setting or poor operation were required to monitor groundwater and surface water. The monitoring data indicated some landfills and open dumps were causing groundwater pollution.

Based on the data and current state and federal regulations, all landfills are now required to have a composite liner system (a plastic membrane on top of four feet of compacted clay) and a leachate collection system to keep liquid waste out of the groundwater. Municipal dumps not meeting these design standards were closed prior to 1993.

#### Wastewater

Wastewater generated by municipalities, industries and farms may be treated or stored in ponds or lagoons. Many small communities operate lagoon systems for treating sanitary sewage through bacterial degradation of organic material in the wastewater. A manure lagoon on a dairy farm can hold waste until conditions are right for field application.

Lagoons are sealed with compacted clay or plastic liners. Nevertheless, burrowing animals or soil movement can cause leaks. Routine inspections and maintenance are necessary to keep lagoons operating properly and to prevent contamination of groundwater.

Some industries dispose of their wastewater by applying it to farm fields or to land specifically operated as a disposal system. Most municipalities and some industries also apply **sludge** produced in their treatment systems to cropland as a nutrient and soil conditioner. The waste is applied according to how much water, solids and nutrients soil and crops can absorb. If the system isn't managed properly, and too much waste and water are applied to the land, or if the operator fails to adjust the amount applied to account for rainfall, groundwater and wells can be contaminated or the material may run off to surface waters.

#### Onsite sewage systems

There are more than 750,000 **onsite sewage systems** (private onsite wastewater treatment systems) in Wisconsin — serving approximately 30 percent of all households in the state. Most of these systems are located in unincorporated areas. Here's how onsite sewage systems work: wastewater flows from the house to a settling tank where solids settle out. The liquid continues out to an absorption field consisting of a series of perforated pipes that drain away from the house. The liquid is then absorbed into the soil. Bacteria in the settling tank break down solid waste, leaving a sludge that needs to be removed periodically

by a licensed septage hauler or "honey wagon."

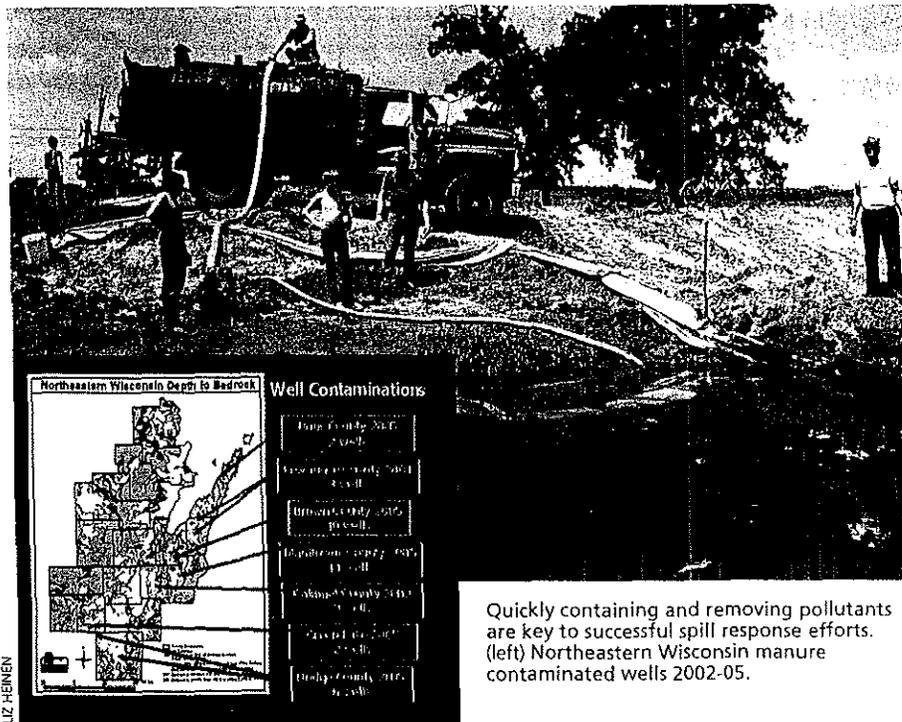
When systems don't work properly, bacteria, nitrate, viruses, detergents, household chemicals and chloride may contaminate groundwater, nearby wells and surface water. Even properly installed systems may pollute groundwater if they are not located, used and maintained correctly. (For tips on maintaining onsite sewage systems, see page 27.)

### Spills and illegal dumping of industrial and commercial chemicals

When paint thinners, degreasers, pesticides, dry cleaning chemicals, used oil, fertilizers, manure and a host of other hazardous materials trickle into the groundwater, they create a potential danger to the public and the environment.

Accidents happen — over 1,000 spills of toxic or hazardous materials are reported each year in Wisconsin. **Volatile organic compounds (VOCs)** such as petroleum products account for many of the spills in the state. Topping the list is diesel fuel. Other substances such as pesticides, paint and ammonia, make up the rest. Most spills occur at industrial facilities or during transport of hazardous substances. Response efforts focus on containing and removing the hazardous material to a proper disposal facility. This protects groundwater and surface waters.

An undetermined number of spills go



Quickly containing and removing pollutants are key to successful spill response efforts. (left) Northeastern Wisconsin manure contaminated wells 2002-05.

unreported, their presence a secret until area wells become polluted. Although there are strict regulations governing transport, storage and disposal of toxic and hazardous wastes, illegal dumping continues. Problems from past practices that occurred before regulations were in place surface periodically.

The threat to groundwater from these toxic products is real. That's why state and federal resources are devoted to finding these sites and cleaning them up. Many programs exist to clean up sites, from the federal Superfund program to address the worst sites in the nation, to the state cleanup program that includes spill response, leaking

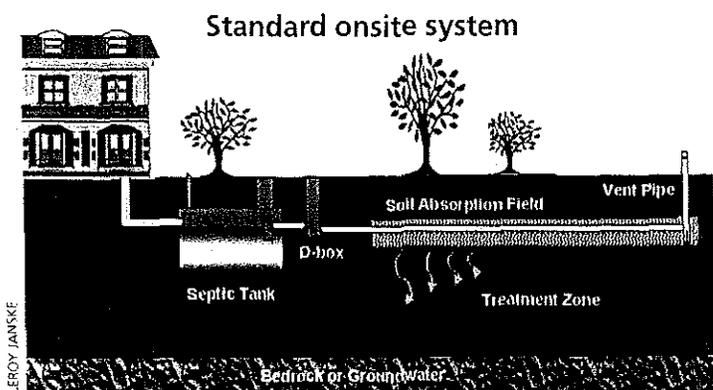
### Leaking underground storage tanks

underground storage tanks, the state Superfund program, and a focus on cleaning up "brownfields" (properties that have been abandoned or are underutilized because of actual or perceived contamination).

People in the environmental cleanup business call them LUSTs; for all of us, it spells trouble. Over the years, many old leaking underground storage tanks that used to hold gasoline, diesel and fuel oil have slowly corroded and released their contents into the soil and groundwater. About 18,000 of Wisconsin's older tank systems have leaked as rust and other factors took a toll on the tanks and dispensing lines. Even small leaks caused significant groundwater contamination; it takes only a little gasoline in water to make it undrinkable. Property owners and their environmental consultants have cleaned up contamination at over 16,000 sites during the past 20 years. New regulations require existing tank systems to be upgraded. This will help prevent future problems.

### Unused wells

What happens to the old well can determine how the new well functions. If old wells are not filled properly with such impermeable materials as cement or bentonite clay, they provide a direct channel for pollutants from the surface



Have your onsite sewage system inspected once a year and go easy on the system by minimizing water use.

to groundwater and other nearby wells. Thousands of old wells no longer used but still open at the soil surface threaten Wisconsin's groundwater. Whenever you see an old windmill in the country, it's likely there's an unused well underneath. Licensed well drillers and pump installers are routinely hired to properly abandon or fill old wells.

Drainage wells draw water off a section of wet ground by piercing a clay layer and allowing surface water to run directly into groundwater. Drainage wells have been prohibited in Wisconsin since 1936, but they do turn up occasionally.

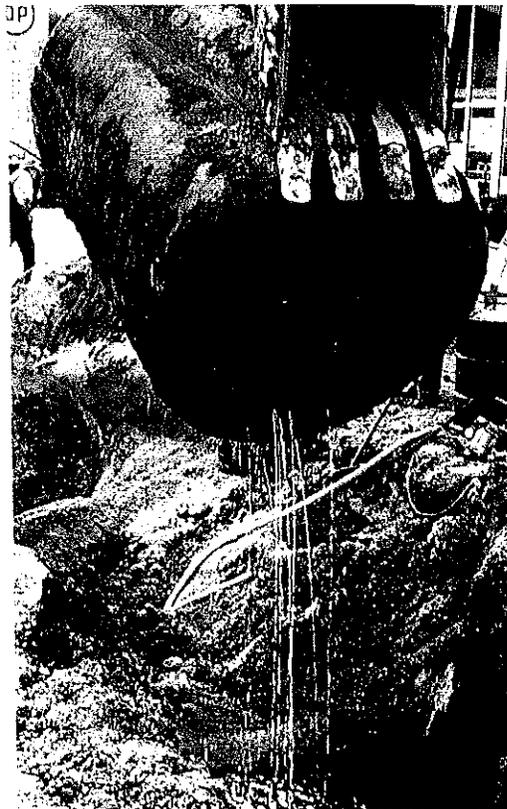
### Stormwater

When development occurs, recharge to groundwater can be short-circuited. Rainfall, instead of infiltrating, runs off pavement and collects in lakes, rivers and streams. Stream levels become more variable or "flashy," floods and channel erosion are more common, and groundwater recharge decreases. To put the hydrologic cycle right and prevent stream banks from washing out, Wisconsin requires new developments to infiltrate most of the stormwater falling on their sites.

Because stormwater from roofs, driveways, parking lots and streets contains contaminants such as gasoline, metals and bacteria, it must be cleaned up or pretreated before it is put back in the ground using engineered stormwater infiltration devices.

### Sources of natural contamination

Minerals found naturally in soils and rocks dissolve in groundwater, giving it a particular taste, odor or color. Some elements, such as calcium and magnesium, are beneficial to health. Radium, radon gas, uranium, arsenic, barium, fluoride, lead, zinc, iron, manganese and sulfur are undesirable ingredients found in Wisconsin groundwater. The levels of the contaminants depend on their concentrations in the aquifer and



An aggressive program aims to locate, replace or remove buried tanks that can leak stored fuels. Few tanks leak this badly, but even small amounts of gasoline make water unfit for use in residences, businesses and for animals. Cleanups are expensive.

the amount of time the water or air has been in contact with them. Radioactivity in groundwater from naturally occurring uranium, radium and radon is a concern in Wisconsin. Radioactive contaminants expose those drinking the water to the risk of cancer. Public water systems are required to test groundwater for radioactivity. Recent sampling has detected **radionuclides** in some Wisconsin groundwater. **Gross alpha activity** and radium also have been found in Wisconsin water supplies. The EPA has drinking water standards for radium and radon.

Most natural contaminants aren't harmful; the problem is aesthetics rather than safety. Iron and manganese are found throughout the state. They stain plumbing and laundry, and can give drinking water an unpleasant taste and odor.

Excess fluoride, sulfur, lead and arsenic are less common and more localized. Changes in the aquifer system,

such as declining water levels, can cause chemical reactions that release contaminants into groundwater. In northeastern and western Wisconsin declining water levels have caused the release of arsenic and heavy metals. Arsenic is a known carcinogen and has been found at very high levels (up to 15,000 parts per billion). Special well construction methods have proven effective in avoiding the problem, but add greatly to the cost of getting a water supply. In some parts of Wisconsin the groundwater is naturally acidic and can corrode pipes and plumbing, leading to elevated levels of lead and copper in drinking water. Well owners should test their water periodically to assure the water quality is acceptable.

### Groundwater cleanup

Groundwater contamination can be linked to land use. What goes on the ground can seep through the soil and turn up in drinking water, lakes, rivers, streams and wetlands. Tracking down and stopping sources of pollution is a lengthy and expensive process. It's usually impossible to completely remove all traces of a pollutant. Conducting a partial cleanup of an aquifer to a usable condition can cost a substantial amount of money.

Who pays the enormous cost of groundwater cleanup? The owner or facility operator causing the pollution should shoulder the cost. But what happens when the owner is bankrupt, out of business or dead? Taxpayers must step in. Federal and state money is used for cleaning up sites and enforcing laws governing waste disposal and hazardous material spills.

When it comes to groundwater, prevention is the best strategy. This means looking at the many ways we pollute groundwater and finding methods to keep those pollutants at bay. Landfills and wastewater lagoons need to be sited, designed and operated to prevent **infiltration** to groundwater. Pesticides must be applied according to need

and label instructions, and fertilizers and manure should be applied in carefully calibrated amounts to enhance crops without damaging the environment. With vigilance and care, we can protect our buried treasure.

### Groundwater quantity — enough for all

With 1.2 million billion gallons of groundwater, the Mississippi River and two Great Lakes, there is no other state that comes close to having the water resources we have in Wisconsin. Yet Wisconsin has a growing thirst for groundwater. There are areas in the state where streams aren't running and **springs** aren't flowing because the groundwater that feeds them is being pumped dry. In a growing number of places we are pumping groundwater faster than it can be replenished.

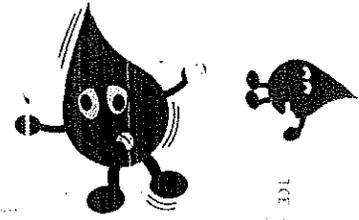
In the past century, groundwater has been drawn down several hundred feet around Waukesha and Brown counties. In water-rich Dane County, groundwater levels have dropped 60



**#5** GROUNDWATER IS **ALWAYS** PURE BECAUSE SOIL FILTERS OUT ALL IMPURITIES.

#### IN FACT:

HARMFUL BACTERIA IN WATER **CAN** BE FILTERED OUT BY SOIL, BUT MANY CHEMICAL POLLUTANTS ARE **NOT CHANGED** AND **REMAIN** IN THE WATER!



feet and are expected to drop more as the population continues to grow. These long-term drops in groundwater levels affect fish, wildlife and people from farmers to factory owners. Local scarcity sometimes pits communities against one another and the natural resources we all enjoy.

When a proposed water bottling plant in Adams County was opposed by citizen groups in 1999, the interest of policymakers and the public in water quantity issues bubbled to the surface. It became clear that state laws didn't address the effect of high-capacity wells

on nearby springs, wetlands or trout streams. The Big Springs case made people much more aware of the connection between groundwater, surface water and human activities.

### The Great Lakes Charter

The Great Lakes constitute the largest volume of unfrozen fresh surface water in the world — about 5,440 cubic miles. There has been a great push in recent years to protect these waters. Much of the effort has been focused on updating the Great Lakes Charter, an agreement signed in 1985 by the eight Great Lakes governors and the premiers of Ontario and Quebec outlining principles for managing Great Lakes water resources.

A 1998 proposal to export bulk quantities of Lake Superior water to Asia raised concerns that existing agreements were inadequate to protect these waters. It spurred action in 2000-2001 to develop an annex to the charter, which would strengthen it by establishing clear procedures for deciding whether to approve any proposed withdrawal of Great Lakes waters.

On December 13, 2005 the eight states and two Canadian provinces announced the Great Lakes Water Management Strategy, called Annex 2001. The agreement to manage water quantity in the Great Lakes basin and, with just a few limited exceptions, ban diversions of Great Lakes basin water, is the first multi-jurisdictional agreement of this magnitude in the world. All 10 governments have agreed to collectively manage water

*continued on page 18*



(left) Portions of the Little Plover River, a Class 1 trout stream, dried up during the summer of 2005 likely due to increased water use and a lack of rain.

(right) The effect on wildlife and fish will be felt for a long time.

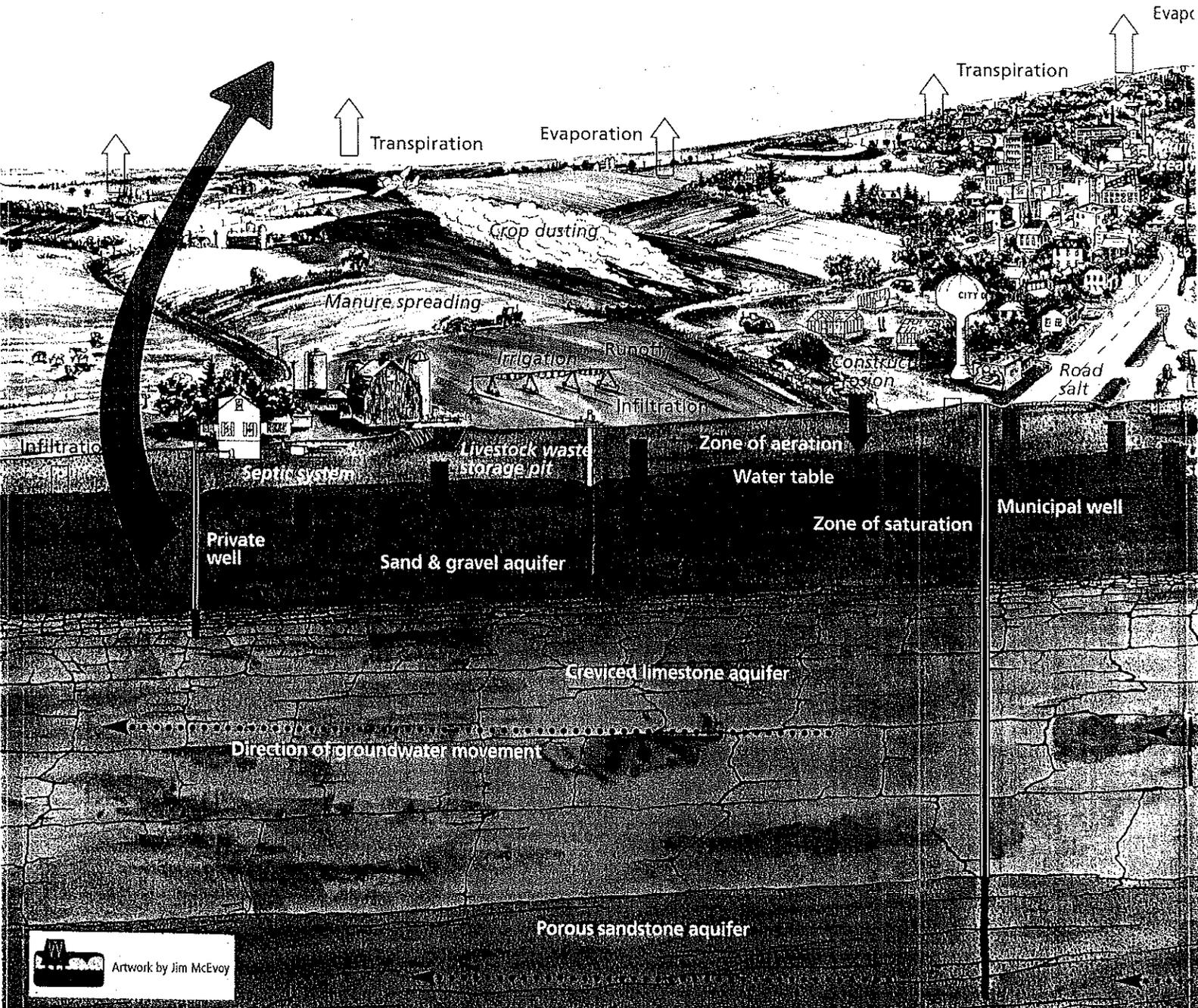


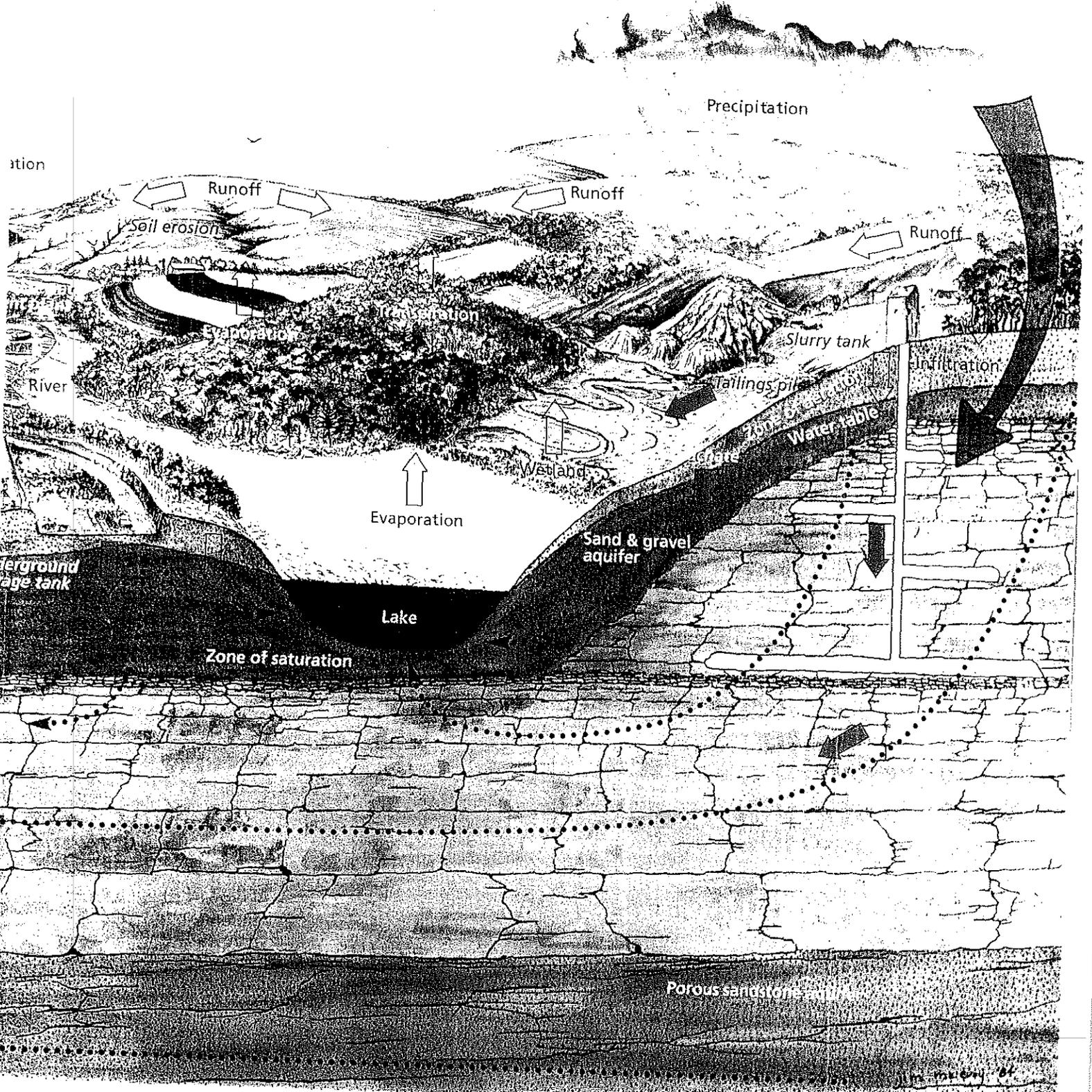
# Groundwater and land use in the water cycle

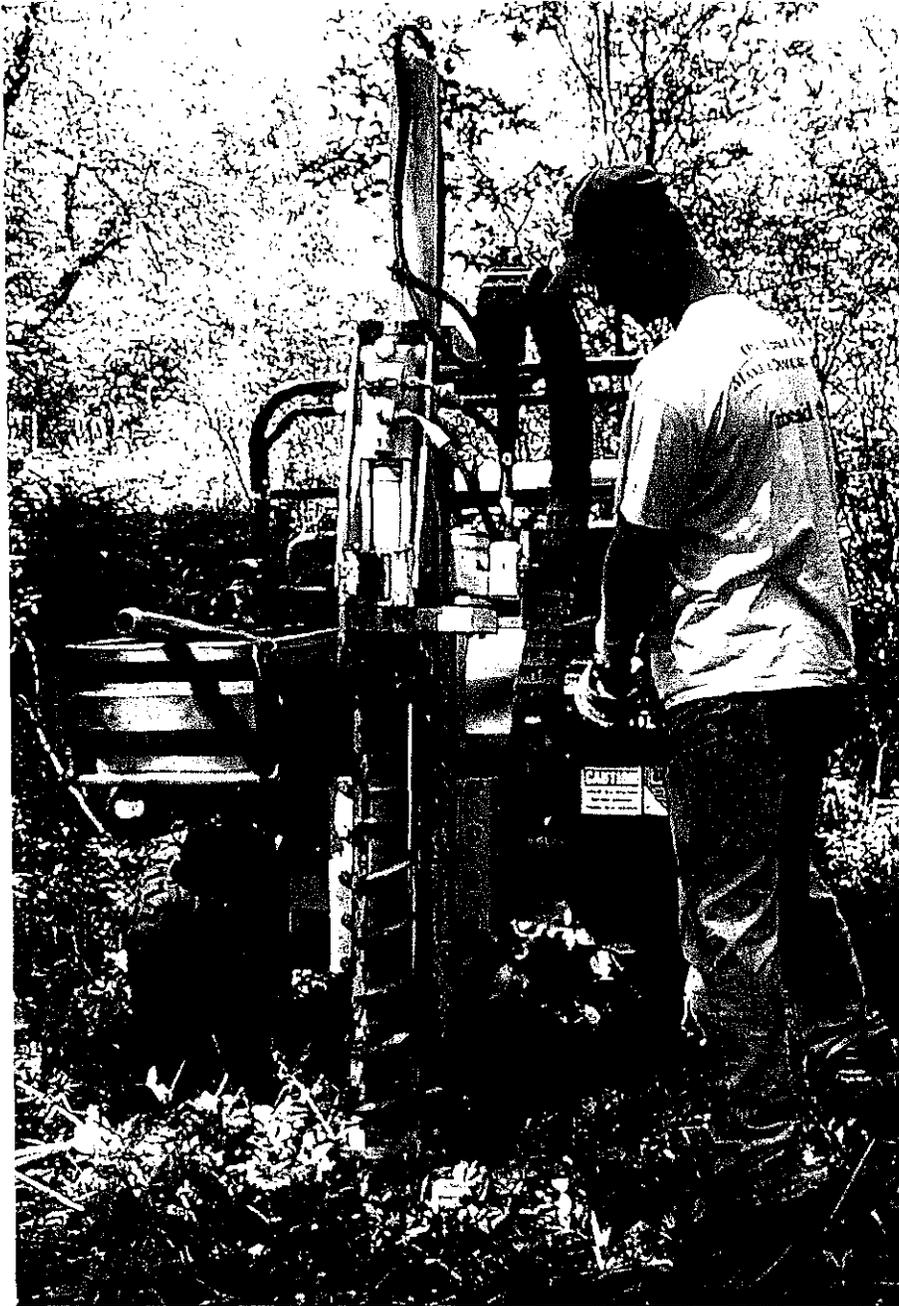
←..... Direction of groundwater movement

← Human induced impacts on groundwater

← Natural processes







For each new well drilled, a report detailing soil types, depths to bedrock and groundwater elevation is sent to the DNR. This information helps map subsurface geology and groundwater movement.

*continued from page 15*

usage according to the shared goals expressed in this agreement. The fundamental principle is that the most significant fresh water resource in the Western Hemisphere must be treated as one ecosystem. Procedures also address pumping from wells outside the basin that alter groundwater flow and capture groundwater originating within the basin.

The United States Geological Survey

is exploring the connection between groundwater and the Great Lakes in southeastern Wisconsin.

The distribution and the amount of water pumped from shallow and deep rock formations in southeastern Wisconsin has changed significantly over time. Groundwater that once flowed toward Lake Michigan is now intercepted by pumping and diverted west, where it is discharged after use to sur-

face waters flowing into the Mississippi River Basin. This may reduce inflows to the Great Lakes.

Groundwater is important to ecosystems in the Great Lakes Region because it is, in effect, a large, subsurface reservoir from which water is released slowly to provide a reliable minimum level of water flow to streams, lakes, and wetlands that feed into the Great Lakes. Groundwater discharge to streams generally provides good quality water, which promotes habitat for aquatic animals and sustains aquatic plants during periods of low precipitation.

### Quality is quantity

It isn't just the amount of water at stake, but the quality, too. In southeastern Wisconsin, the resulting drop in the groundwater level means water is now drawn from deeper rock layers that have naturally occurring radium. The concentration of radium in drinking water is high, and the water must be treated to protect the health of citizens. The cost of treatment is borne by the ratepayers.

We're beginning to realize that stewardship of groundwater involves more than just keeping it clean. We have to conserve. The Groundwater Protection Act, passed in 2003, attempts to control well location and pumping rates to protect trout streams and other sensitive surface water bodies in the state. Regional efforts to assess and manage drinking water supplies are underway in southeastern Wisconsin, where use has resulted in the most severe drop in groundwater levels.

Our great-grandparents may have used hand pumps and buckets, but they knew how deep their wells were and they thought about how to protect their drinking water. Today, community wells are located far from our homes, and we take it for granted that water will pour out of the tap when we turn it on. It's time to ask ourselves, can we have it all — green lawns, swimming pools and quality springs, streams and drinking water? 

USGS PHOTO

# Protecting the resource

## Wisconsin's groundwater law

**G**roundwater protection emerged as a major concern in the late 1970s as interest groups — spurred on by events like Love Canal in New York and the detection of the pesticide aldicarb in some Wisconsin private wells — debated how to protect groundwater in an industrial and agricultural society.

On May 4, 1984, Chapter 160 of the Wisconsin Statutes was signed into law. Dubbed the "groundwater law," Chapter 160 has been called the most comprehensive regulatory program for groundwater in the country. All state agencies involved in groundwater protection must adhere to numerical standards that define the level at which regulatory agencies must act to clean up pollutants in groundwater. These standards are defined not only by public health, but also by the effect a pollutant can have on the environment and public welfare.

One of the most important features of Wisconsin's groundwater law is something that is not in it — aquifer classification. Aquifer classification involves looking at the use, value or vulnerability of each aquifer and allowing some to be "written off" as industrial aquifers not fit for human consumption. Wisconsin said "no" to aquifer classification. The philosophical underpinning of Wisconsin's groundwater law is the belief that our groundwater is capable of being used for citizens to drink, and must be protected to assure that it can be.

### The Groundwater Coordinating Council (GCC)

When you think about the diverse

activities and events affecting groundwater, it's no surprise the responsibility for managing our buried treasure is delegated to many governmental agencies. Cooperation is key — and the GCC is the group turning the key. Since 1984, the GCC has served as a model for interagency coordination among state government officials, the governor, and local and federal governments.

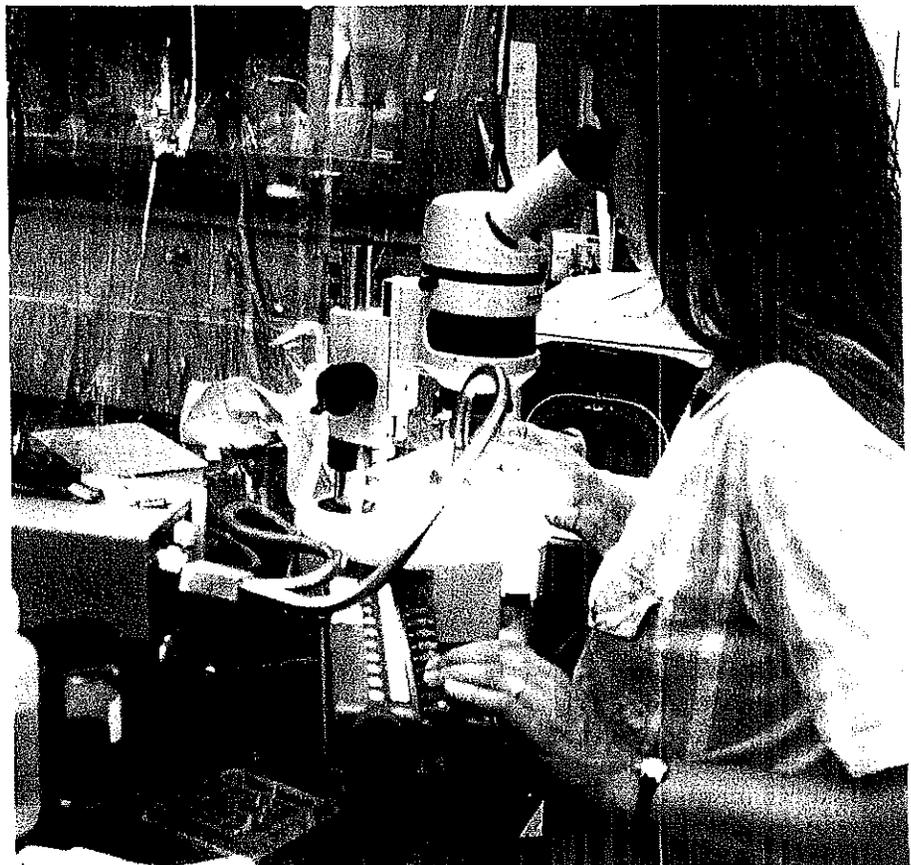
Representatives from the Departments of Natural Resources; Commerce; Agriculture, Trade and Consumer Protection; Health and Family Services; Transportation; the University

of Wisconsin System; Wisconsin Geological and Natural History Survey and the governor's office serve on the council. The GCC advises and assists state agencies in coordinating non-regulatory programs and sharing groundwater information. Increasing public knowledge of the groundwater resource through public outreach efforts and educational materials is an important GCC function.

### Department of Natural Resources (DNR)

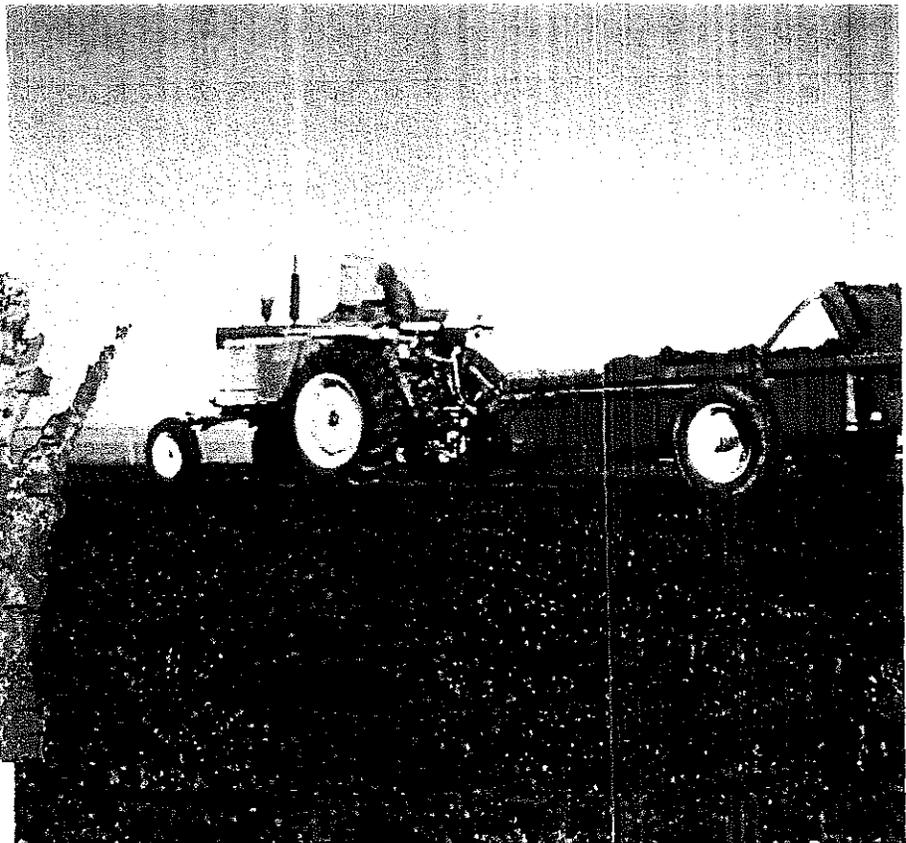
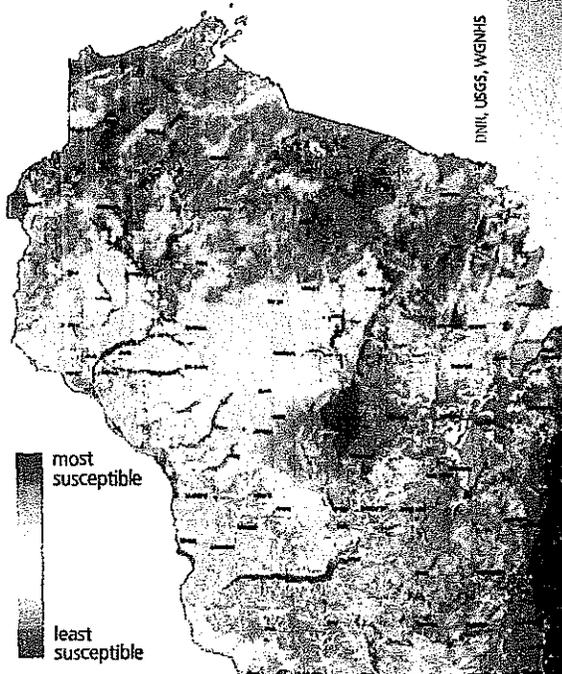
It's only natural that a resource like

Trained lab technicians analyze groundwater for bacteria and chemicals.



DNR PHOTO

773  
Groundwater contamination  
susceptibility in Wisconsin



DNR PHOTO

Soil, rock and groundwater characteristics were used to make this map. Other important factors needed to determine groundwater susceptibility include land use, groundwater flow and location of nearby lakes, streams and wetlands.

University of Wisconsin-Extension and DATCP provide farms with information and skills training necessary to maintain farm profitability with an eye on protecting the environment.

groundwater receives a lot of attention from the Department of Natural Resources. From insuring the water you drink is clean to making sure new landfills are properly sited and constructed, DNR staff is there. DNR's groundwater activities include protecting the resource, cleaning it up and making sure public health and environmental standards are set and met.

Protecting groundwater means preventing what goes on the ground from going into groundwater. By looking at soil and rock types, thickness of soil and rock layers, and depth to groundwater, DNR hydrogeologists, engineers and specialists can make decisions about where waste can be spread, or if a landfill can be safely installed at a particular site.

But looking at the natural environment isn't enough to predict how contaminants will move in the subsurface. The map of groundwater

contamination susceptibility in Wisconsin shown above is only one piece of a very complex groundwater protection puzzle. Land use, groundwater recharge and proximity to surface water are also important considerations when trying to site landfills or large farm operations.

One way to help protect public health is to protect the area around water supply wells from sources of contamination. Wellhead protection programs require municipalities to restrict land use around new public water supply wells and encourage planning around older wells. Under the DNR's Source Water Assessment Program, land areas that contribute water to public wells were identified, potential contaminant sources were inventoried, and the susceptibility for each public water supply was evaluated. The assessments assist water system operators in preparing wellhead protection plans.

New rules for siting large livestock operations, stormwater infiltration devices and farm nutrient management require separation distances between contamination sources affecting private and public wells and direct conduits to groundwater.

In addition, starting in 2010, Wisconsin's smart growth laws require that local government programs and actions affecting land use must be guided by and consistent with a locally adopted comprehensive plan to address community water supplies.

At sites with contaminated groundwater, the responsible party must find and remove the source of pollution and determine how far contamination has spread. Groundwater monitoring wells are sunk to collect samples for chemical analysis. When the contamination boundaries are known, the difficult job of cleaning up the groundwater begins. Some sites take years and millions of dollars to clean



DNR PHOTO

Groundwater research verified how quickly nearby contaminants washed pollution through a sinkhole into groundwater and seeped out to a discharge area. Pollution spreads wide, deep and quickly where the rock is fractured near the surface.

up. In the case of groundwater, a drop of prevention is truly worth a gallon of cure.

### Wisconsin Geological and Natural History Survey (WGNHS)

Since 1854, the WGNHS has cataloged Wisconsin's geology, **hydrogeology**, soils, biology and other natural resources. The state survey is the principal source for maps and records about Wisconsin groundwater and related geology. It supplies counties and regional planning agencies with information to make land use and wellhead protection decisions. Research conducted at the survey helps state agencies more effectively manage Wisconsin's groundwater. A collection of well cuttings and rock samples from about 300 wells per year

are housed and described by the survey — "hard" evidence of what's hidden below ground. This collection from 44,000 wells has been cataloged in a database and can be viewed at the survey's Research Collections and Education Center in Mount Horeb. County and regional studies of geology and groundwater are produced for use by anyone interested in the **hydrology** of a specific area.

### Department of Transportation (DOT)

Salt keeps Wisconsin's highways safe but can be a source of groundwater pollution. Because salt is bad for the environment and the roads, DOT is always looking for alternatives and ways to minimize salt use. Temperature sensors in pavement and remote weather stations along state high-

ways help keep county highway crews prepared to do battle with winter storms and predict when pavement conditions will require applications of chemical agents or salt.

The Department of Transportation has construction standards for storing road salt to contain runoff that could contaminate groundwater. DOT works with DNR and Commerce staff to clean up groundwater pollution from petroleum storage tanks and other hazardous waste sites along DOT rights-of-way, and where new roads and bridges are planned. DOT also tests wayside wells for thirsty travelers.

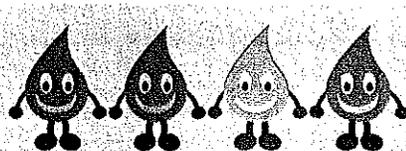
### Department of Health and Family Services (DHFS)

Who do you call to find out if pollutants in your well or drinking water supply are a health risk to you and your family? Start with your local health department. If they don't have the answer, the health experts at the DHFS can help you. The DHFS provides health information and advice on contaminants to individuals, and to state, county and local government agencies. When groundwater pollutants affect a community, DHFS staffers work with residents and participate in public meetings to let citizens know the risks associated with contaminants in the water supply.



**#6 IF WELL WATER IS STAINED — IT MUST BE POLLUTED.**

**IN FACT:**  
STAINED WATER DOESN'T NECESSARILY MEAN THAT IT'S UNSAFE TO DRINK!



WE COME IN MANY COLORS — LIKE PEOPLE!



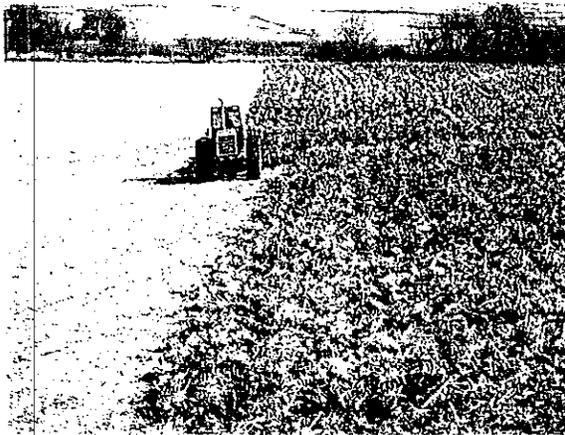


ROBERT QUEEN

Manure control in barnyards, careful fertilizer and pesticide applications, and tilling methods that minimize exposed soil can reduce chemical, nutrient and bacterial flow from farms to groundwater.

They advise how to best protect families and drinking water.

DHFS protects groundwater and the people who drink it by recommending standards to DNR for substances in groundwater that can cause health problems. DHFS conducts studies on the harmful effects of chemicals to determine "how



ROBERT QUEEN

much is too much." It also works with DATCP to determine how new pesticides will break down in groundwater and what health risks are associated with these compounds.

### Department of Commerce (Commerce)

Commerce ensures underground and above-ground storage tanks don't leak. The agency keeps records on over 72,000 tanks used to store gasoline, fuel oil and other products. The Petroleum Environmental Cleanup Fund or PECFA, is used to reimburse owners for the cost of removing older tanks and cleaning up petroleum contaminated sites. Commerce regulates installation, maintenance and abandonment of new tanks.

Commerce helps individuals, businesses, local development organizations and municipalities revive abandoned industrial sites or "brownfields" by providing grant money for site assessment and cleanup. Since the program's 1997 inception, 1,240 acres have been revitalized. This translates into about 4,600 new jobs at over 100 different locations throughout the state.

Commerce regulates onsite sewage treatment systems and stormwater infiltration practices as part of the plumbing code. Restrictions on where and how onsite sewage systems are installed protect private and public wells and groundwater from contamination.

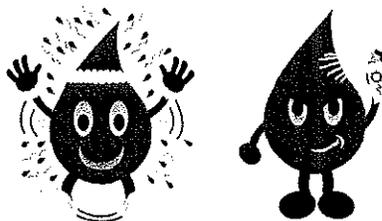
### Department of Agriculture, Trade and Consumer Protection (DATCP)

Pesticides, fertilizers and nutrients can leach to groundwater, causing human health and environmental risks. DATCP is responsible for regulating most aspects of agrichemical application, storage and cleanup in Wisconsin. To promote the proper handling, storage and safe use of farm chemicals, pesticide applicators and sellers must complete a certification program and be licensed by DATCP. Field staff regularly inspect if storage and



#7 IF WATER TASTES GOOD — IT'S SAFE TO DRINK.

**IN FACT:**  
YOU CAN'T JUDGE GROUNDWATER BY ITS TASTE OR SMELL **ALONE!**  
A SUDDEN CHANGE IN FLAVOR OR ODOR SHOULD BE INVESTIGATED.



mixing facilities comply with groundwater protection regulations. If a spill occurs, money and staff are available to help with the cleanup. The Nutrient Management Program helps prevent groundwater pollution by providing funding to counties to help farmers write nutrient management plans. The Clean Sweep program provides farmers and homeowners with safe options to dispose of pesticides and other hazardous chemicals for free. Businesses pay a portion of disposal costs for these substances.

### University of Wisconsin-Extension

Wise groundwater use is a priority for the University of Wisconsin-Extension. Traditionally, extension agents and specialists provided farm families with agricultural tools, information and skills training. Today their role has evolved into promoting community development, maintaining farm profitability while protecting the environ-

ment, and conserving natural resources. Extension educators provide outreach to citizens, farmers, school children and public officials on water testing, water treatment devices, wise land use policy such as wellhead protection, and other groundwater topics. With offices located in each county, outreach activities can be tailored to local needs. Basin educators, located in each of the state's major river basins, provide land and water resources outreach to local communities. Extension promotes and assists private and public partnerships to conserve and protect our water resources.

The Nutrient and Pest Management Program's crop plots on working farms promote the careful use of manure and pesticides. The Farm\*A\*Syst program helps farmers identify and correct risks to groundwater around farmsteads. Community Drinking Water Programs help private well owners to identify individual water quality concerns and community-wide groundwater issues.

### Educational institutions

From university classes on hydrogeology to state fair displays, education is the most important tool we can use to safeguard groundwater. Colleges and universities offer courses that prepare students for careers in hydrogeology, wastewater management, soil science and other disciplines vital to groundwater protection. They also conduct research on groundwater development, movement and cleanup technologies. Vocational and technical colleges offer associate degrees in fields related to agriculture and water resources management. Environmentally safe methods of farming are taught in UW agricultural "short courses."

### United States Geological Survey — Water Resources Division (USGS)

The USGS Water Division's job is to keep tabs on groundwater quantity in Wisconsin. Starting in 1946 with just



According to the U.S. Department of Agriculture, Wisconsin has over 390,000 acres of irrigated farmland.



KEN BRADBURY

(above) Research can benefit both surface waters and groundwater. (below) State well codes dictate how to drill and install wells to protect both water supply and groundwater.



BOB HENNING

Well water should be tested periodically for signs of bacteria, nitrate and any chemicals that may be used in your area.



ROBERT QUEEN

a few wells, the USGS, with the Wisconsin Geological and Natural History Survey, now collects water level measurements in over 170 Wisconsin wells. Some of the wells are measured daily using electronic recorders; others are measured weekly, monthly or quarterly. The data serves as a starting point for evaluating the effect new wells and land development will have on groundwater levels, wetlands, streams and lakes. For example, a study in the Great Lakes Basin showed groundwater that once flowed toward Lake Michigan is now pumped, used and discharged as treated wastewater to surface waters within the Mississippi Basin.

This may affect surface water flow and fish habitat in tributaries feeding Lake Michigan.

### Wisconsin State Laboratory of Hygiene (SLH)

The Wisconsin Laboratory of Hygiene is the main environmental testing laboratory for the DNR, DHFS and other state agencies. (See pages 28 and 30 for information on well testing.) The Laboratory performs a variety of chemical and biological drinking water tests, ranging from exotic pathogenic bacteria to potentially cancer-causing chemical contaminants. In addition to extensive testing of Wisconsin's public water supplies, the laboratory also offers private well owners basic drinking water tests such as an analysis for *E. coli*. The presence of *E. coli* indicates a water supply may be contaminated with fecal material and thus presents a health threat. Local commercial laboratories can also provide some well water tests, and the Laboratory of Hygiene partners with them so high-quality testing is readily available throughout the state. ♻️

# How to protect the groundwater you drink and use

## It's your turn

**Y**ou've read about what government and industry are doing to guard groundwater. Now, here's what you can do to help.

### Examine your own habits

Everyday activities affect groundwater quality. Think about the ways you use water at home. If you've always considered pure, clean water to be a cheap, unlimited resource, chances are you're accustomed to wasting water and haven't been concerned about what you pour down the drain.

Common sense goes a long way toward keeping Wisconsin's groundwater clean and plentiful. Here are some ways to cut back on water use and protect groundwater:

### Conservation is wise use

**Use water-saving devices and appliances:** Since 1992, new toilets manufactured in the U.S. use only 1.6 gallons of water — much less than the six gallons each flush used to consume. If you have an older toilet, toilet dams or inserts placed in the toilet tank retain water during flushing and can save up to three gallons per flush. A plastic bottle weighted with washed pebbles makes a good insert. Low-flow faucet aerators (for either inside- or outside-threaded faucets) mix water with air and can reduce the amount of water flowing from your sinks.

**Look for and fix leaks:** A dripping faucet can waste 20 or more gallons of

water a day; a leaking toilet, several thousand gallons a year. An inexpensive washer is usually all you need to fix a leaky faucet. Adjusting or replacing the inexpensive float arm or plunger ball can often stop toilet leaks.

**Drinking water:** Keep a pitcher of drinking water in the refrigerator to quench your thirst without running the tap.

**Bathing and showering:** A water-saving showerhead can cut the amount of water used to about three gallons per minute without sacrificing the feeling of a good drenching. Turn off the water while soaping up during a show-

er to save extra gallons. New water-saving showerheads come with a button to shut off the flow without changing the mix of hot and cold water. Bathers should put the stopper in the drain before running the water, then mix cold and hot for the right temperature. Turn off the tap while shaving or brushing your teeth.

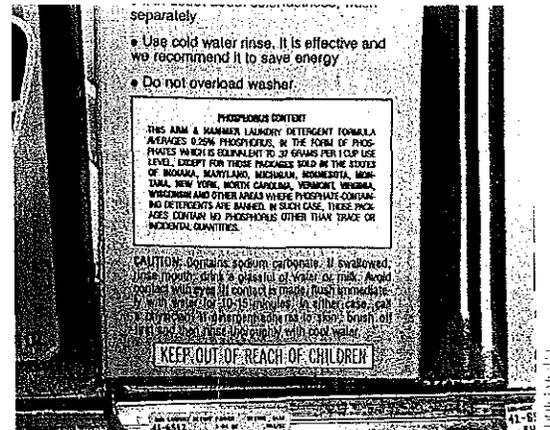
**Dish washing:** If you wash dishes by hand, don't leave the water running while washing them. Make sure the dishwasher is full before you turn it on; it takes as much water and energy to wash a half-load as it does to wash a full load. And scrape dishes



DAVE JOHNSON



TRACEY TEDECKI



Homeowners can protect groundwater too. Take unwanted cleaners, paints and pesticides to Clean Sweep hazardous waste collection sites.

rather than rinse before loading the dishwasher.

**Laundry:** Always set the fill level to match the size load you are washing. Remember: Full loads save water because fewer loads are necessary. Front-loading washers use less detergent, electricity and water.

**Lawn care:** A rain barrel is a great way to save on water and it's not chlorinated, fluoridated or loaded with dissolved salt, so it's better for your grass and plants. Consider reducing the size of your lawn by planting trees, shrubs and ground covers. Rain gardens are attractive, low maintenance, and reduce runoff to lakes and streams.

## Waste minimization

**Household toxic wastes:** Don't use household drains as ashtrays, wastebaskets or garbage disposals! Toilets (and kitchen sinks, garage drains and basement washtubs) are not places to discard varnish, paint stripper, fats, oil, antifreeze, leftover crabgrass killer or any other household chemicals. Just because it's down the drain doesn't mean it's gone! These products may end up in your water supply, especially if you have an onsite sewage system. Store your toxic products in tightly sealed containers in a safe, dry spot, share them with others who can use them, or bring them to Clean Sweep

events in your community; call your County Extension office or DATCP for details.

**Lawns:** Reduce or eliminate the use of lawn pesticides and fertilizers. A significant amount of these chemicals can leach into groundwater. Test your soil first to determine if it needs additional nutrients. If you do apply fertilizer, do it in the first week of May or after September 15.

**Recycle!** Reuse or recycle plastic bags and containers, aluminum cans, tin cans, glass, cardboard, newspaper, paper bags and other paper products. Don't dump waste oil down the drain

or on the ground — bring it to community collection tanks where it will be picked up and reprocessed. Recycling conserves landfill space. Less garbage in the landfill means less harmful leachate that could contaminate groundwater.

**Biodegradable soaps and cleansers:** Go easy on groundwater! Use nontoxic and biodegradable soaps and household cleansers. Or try environmentally friendly alternatives: Baking soda on a damp cloth to scrub sinks, appliances and toilet bowls; a mixture of white vinegar and water for cleaning ceramic tile, doors, windows and other glass surfaces; pure soap flakes and borax for washing clothes.

**Dish washing:** Use the minimum amount of detergent needed to clean plates, glasses and silverware satisfactorily. Choose a non-phosphate automatic dishwashing detergent.

**Garbage disposals:** They're noisy, use a lot of water and electricity, and increase the amount of waste in the water going to the wastewater treatment plant or your sewage system. Compost your kitchen waste and use it to mulch yard plants and hold moisture in the soil. For more ideas, look for the pamphlet "Better Homes and Groundwater" (publication number DG-070-2004) on the DNR website at: [dnr.wi.gov/org/water/dwg/gw/](http://dnr.wi.gov/org/water/dwg/gw/) and select "publications."



ROBERT QUEEN

Pesticides and fertilizers can leach to groundwater and cause health and environmental risks.

## Take care of your onsite sewage system

Even a properly sited, permitted, constructed and maintained onsite sewage system can pollute groundwater, especially if the soil is highly permeable or the water table is close to the surface. You can keep your system in good working order by following these four tips:

**1. Be cautious about what you put in.** Ordinary amounts of bleaches, lye, soaps and detergents will not harm the system, but household chemicals like paint thinner, drain cleaner, solvents, gasoline, oil and pesticides should NEVER go into an onsite sewage system. Once released in the absorption field, these toxic products can leach into groundwater.

Never flush bones, coffee grounds, vegetable peelings, fruit rinds, disposable diapers, sanitary napkins, tampons, bath oils, cigarette butts or other materials that do not break

down easily into a septic tank. Avoid dumping grease down the drain. It can build up in the tank and clog the inlet or the soil absorption field.

**2. Have your onsite sewage system inspected once a year.** A licensed septage hauler can measure the level of scum and sludge that has built up. The tank should be pumped when the sludge and scum occupy one-third of the tank's liquid capacity. NEVER go into a sewage tank — it may be full of toxic gases. Hire only licensed septic tank haulers to clean out your tank. They should pump through the manhole, inspect inlet and outlet baffles for damage, and service any outlet filters that may be installed. County sanitarians will have the names of licensed septage haulers in your area.

**3. There are no known chemicals, yeasts, bacterial preparations, enzymes or other additives for sewage tanks that will eliminate the need for periodic cleaning.**

**4. Go easy on your system.** Don't do more than three loads of laundry per day (a dishwasher cycle equals one load). Minimize garbage disposal use.

## Properly locate and construct wells

Wells can be safe, dependable sources of water if sited wisely and built correctly. Here are five points to remember:

**1. Ask questions if you plan to drill a new well or intend to purchase property with an existing well.** Talk to your neighbors: Do they have any problems with their wells? How deep are wells in the area? Were there contaminated wells in the area? How was the contamination taken care of? How was the land where you want to drill the well used in the past? What is its **Wisconsin Unique Well Number**?

Talk to local government officials: What laws govern private water supplies? Are housing densities low enough to ensure enough water for everyone's needs? Are there zoning restrictions limiting certain types of land use? What current land and water uses — irrigation, a quarry — in the area might affect your water quality or quantity?

**2. Consult the Wisconsin Well Code.** Established in 1936, the Wisconsin Well Code is administered by the Department of Natural Resources, which sets standards for well construc-



ROBERT QUEEN

Teach children early to build lifelong habits that protect resources. (left) A school project shows how food wastes, leaves and grass settle down into rich compost. (below left) A lot of household grime can be cleaned up with less toxic products.



A DROP OF KNOWLEDGE!

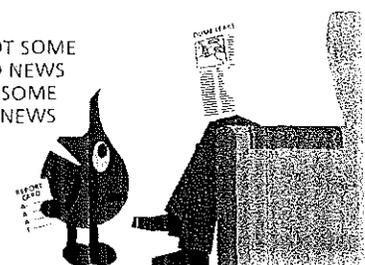
## GROUNDWATER MYTH!

#8 ONE SIMPLE TEST CAN DETERMINE THAT MY WELL WATER IS SAFE.

### IN FACT:

WELLS SHOULD BE TESTED REGULARLY FOR BACTERIA & NITRATE. BUT — THERE ARE MANY CHEMICALS THAT CAN ENTER GROUNDWATER THAT WON'T SHOW UP ON A ROUTINE TEST!

I'VE GOT SOME GOOD NEWS AND SOME BAD NEWS

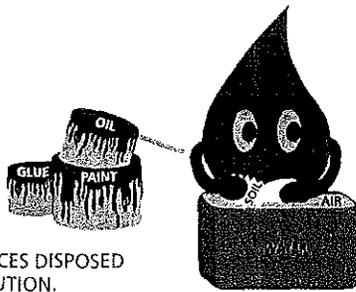




#9 POURING A **SMALL AMOUNT** OF WASTE ON THE GROUND WON'T CAUSE A PROBLEM.

**IN FACT:**

**EVEN SMALL AMOUNTS** OF HAZARDOUS SUBSTANCES DISPOSED OF **IMPROPERLY** CAN CAUSE GROUNDWATER POLLUTION.

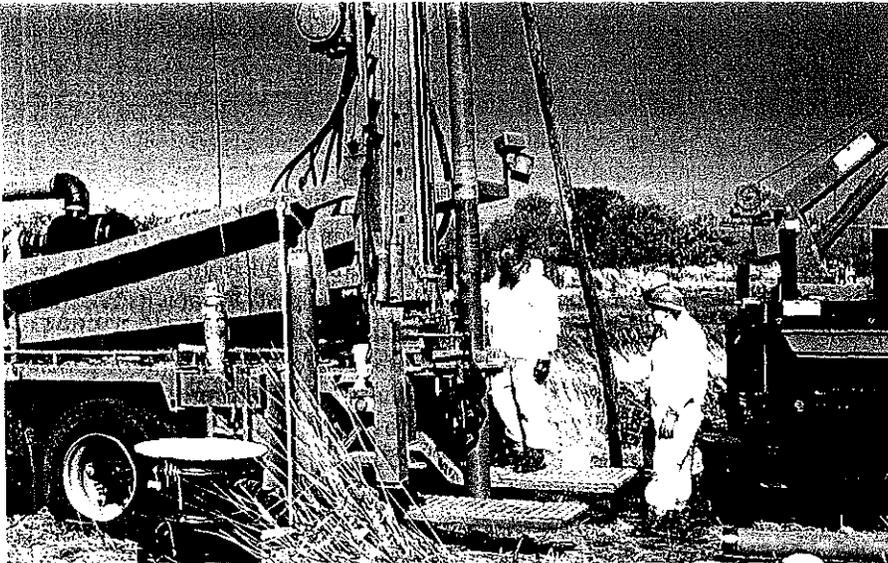


lists the work performed and materials used; and the unique well number assigned to your well so the DNR can keep a record over time of your well water quality. This is important information to have if your well is ever contaminated. Reports collected over time in an area give researchers an idea of what's going on underground.

A pump installer, if different from the driller, must disinfect the well and collect a water sample to check for bacteria.

**4. How often should I have my well tested?** Annually test your well for bacteria and nitrate, and again at any time a change in odor, taste, color or clarity causes you to suspect contamination. Check for nitrate when infants or pregnant women use the water. (See page 30, "How safe is my drinking water?")

**5. How do I fill in an old unused well?** Fill and seal unused wells with concrete or bentonite, a type of clay. Licensed well drillers or pump installers can help you close off the old well to prevent groundwater pollution. For a copy of the pamphlet "Well Abandonment" (publication number DG-016-2001) go to [dnr.wi.gov/org/water/dwg/gw/](http://dnr.wi.gov/org/water/dwg/gw/) and select "publications."



DNR maintains a list of licensed well drillers and pump installers.

tion. The code lists the distances required between the well and sewage drain fields or dry wells, sewer lines, farm feedlots, animal yards, manure pits, buried fuel tanks, fertilizer and pesticide storage sites, lakes, streams, sludge disposal and other potential contamination sources. Wells should always be located up the groundwater gradient and as far from these potential sources of contamination as possible.

**3. Hire reputable, experienced, licensed installers.** Only people licensed with the Department of Natural Resources should drill wells. Only people holding DNR pump installer licenses may install pumps. No license is required if you construct your own well or install your own pump. However, state law requires that the work be done according to state well code.

DNR maintains a list of licensed well drillers and pump installers (see it on-

line at [dnr.wi.gov/permitprimer/water/pumps/](http://dnr.wi.gov/permitprimer/water/pumps/)). Be cautious of very low bids that appear, in comparison to others, to have a low per bag grout cost, or no grout listed. Make sure the successful bidder knows that notification is required as part of the contract to drill the well. Ask to be notified before grouting, and be at the site when the well is grouted. While the grouting is taking place, watch to ensure the cement is pumped into the space between the casing and the drill hole, with the grout filled from the bottom of the casing.

The well driller is responsible for flushing the well, test pumping it, disinfecting it, collecting a water sample for bacteriological tests, sending a well constructor's report to the Department of Natural Resources, and providing the owner with a copy. This document contains a record of the soil and rock layers penetrated by the well;

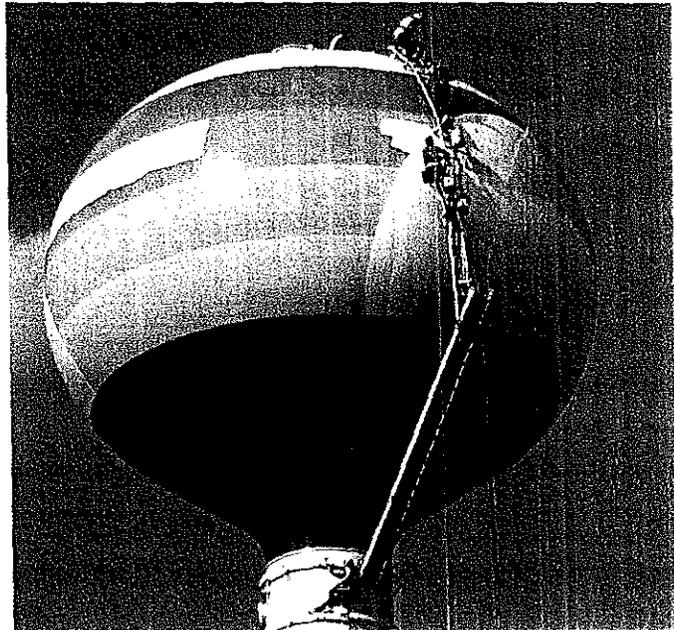
### What else can you do?

**Report illegal or abandoned waste sites.** Call (800) 943-0003.

**Keep up with local land use and waste disposal issues.** Housing, commercial development, highway construction and landfills may have an adverse effect on groundwater quality if not carefully planned and constructed. City, town or county governments may need to institute zoning regulations or prohibit or restrict activities that could endanger groundwater. Find out what the land use issues are in your community and encourage your neighbors to do the same. Attend community meetings and let your elected officials and utility operators know provisions to protect groundwater must be the first step in any local land use or waste disposal proposal. ☺

# Where can I get answers to my questions about groundwater?

1. The DNR website at [dnr.wi.gov/org/water/dwg/gw/](http://dnr.wi.gov/org/water/dwg/gw/) provides answers to many groundwater questions. Need more information? Contact the DNR regional office or service center nearest you. Visit [dnr.wi.gov/org/caer/cs/ServiceCenter/locations.htm](http://dnr.wi.gov/org/caer/cs/ServiceCenter/locations.htm) for a complete list.
2. The Wisconsin Geological and Natural History Survey has maps, well construction reports and other information on aquifers and geology. For a list of WGNHS publications, write Wisconsin Geological and Natural History Survey, 3817 Mineral Point Rd., Madison, WI 53705-5121. (608) 262-1705. Visit the survey's website at [www.uwex.edu/wgnhs/](http://www.uwex.edu/wgnhs/)
3. Your county University of Wisconsin-Extension office can help plan safe, functional farmyards and rural homes. Call or write your extension office for booklets on safe drinking water, groundwater protection, best management practices for pesticide and fertilizer use and other topics. Look for the address and phone number under the "county" listing in the phone book white pages, or visit [www.uwex.edu/](http://www.uwex.edu/)
4. The Department of Commerce has the details on proper onsite sewage system operation. Write Department of Commerce, Division of Safety and Buildings, 201 W.

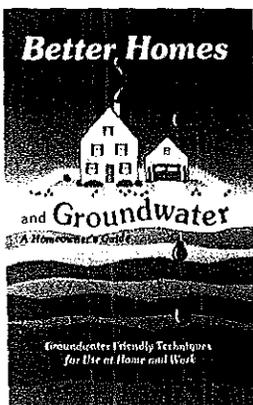


ROBERT QUEEN

Public water system owners face many distinct challenges in managing a public water supply, among them, providing adequate supplies to all users, preventing contamination, and planning for a system's future needs.

- Washington Ave., P.O. Box 7969, Madison, WI 53707-7969 and ask for publication SBD-7009, "Is the grass greener over your septic system?" Visit their website at [www.commerce.state.wi.us/](http://www.commerce.state.wi.us/)
5. The Department of Agriculture, Trade and Consumer Protection offers information on best management practices and Clean Sweep Program for farms and atrazine prohibition areas. Write DATCP, 2811 Agriculture Dr., Madison, WI 53708-8911. (608) 224-5002. On the web: [datcp.state.wi.us/index.jsp](http://datcp.state.wi.us/index.jsp)
  6. The Central Wisconsin Groundwater Center is a clearinghouse for information on groundwater issues statewide, with a strong focus on Wisconsin's Central Sands area. The center main-

tains a database of private wells tested through the UW-Stevens Point Water and Environmental Analysis Laboratory, conducts applied research, and offers educational materials and programs. Write CWGC, College of Natural Resources Room 224, University of Wisconsin-Stevens Point, Stevens Point, WI 54481-3897. (715) 346-4270. Visit the center's website at [www.uwsp.edu/cnr/gndwater](http://www.uwsp.edu/cnr/gndwater) 



## Better homes and groundwater

To request a copy of "Better Homes and Groundwater: A Homeowner's Guide," a booklet which provides groundwater friendly techniques for use at home and work, look online at the DNR website at: [dnr.wi.gov/org/water/dwg/gw/](http://dnr.wi.gov/org/water/dwg/gw/) and select "publications" or call 608-266-6669 and ask for publication number PUB-DG-070-2004.

Visit the DNR website at [dnr.wi.gov](http://dnr.wi.gov) for more information about drinking and groundwater protection; choose "drinking and groundwater" from the drop-down program menu. Also check the UW-Extension website at [commerce.uwex.edu](http://commerce.uwex.edu) and click on "water quality" under the natural resources drop-down menu.

# How safe is my drinking water?



ROBERT O'LEEN

**M**any Wisconsinites, urban and rural, are concerned about the quality of the water they drink, with good reason. Threats to a safe water supply exist everywhere, the result of our daily activities. How do you know if your water is safe to drink?

If your water is supplied by a community public water system, your water utility will mail a **Consumer Confidence Report** to you each fall. The report will include information on the source of the utility's drinking water, the treatment used to purify water, any contaminants that have been found in drinking water, and the potential health effects of those contaminants. Reports will also identify where additional information about the water supply can be found and how citizens can become involved in protecting water sources. Utilities must annually provide updated reports for their consumers.

Private well owners should have their wells tested periodically. Private laboratories do tests for chemical con-

taminants, such as volatile organic compounds or pesticides. Check the Yellow Pages under "laboratories" or "water analysis" or check the website [dnr.wi.gov/org/es/science/lc/INFO/Lablists.htm](http://dnr.wi.gov/org/es/science/lc/INFO/Lablists.htm) for a certified lab in your area. Cost ranges from \$30 to \$1,000 depending on the number and type of chemicals analyzed and the test methods.

For a small fee, the State Laboratory of Hygiene will test your drinking water for several pollutants including bacteria, nitrate or fluoride. For a test kit, call the lab at (800) 442-4618 or write the State Laboratory of Hygiene, Environmental Health Division, 2601 Agriculture Dr., P.O. Box 7996, Madison, WI 53707-7996. Private labs will also do these tests.

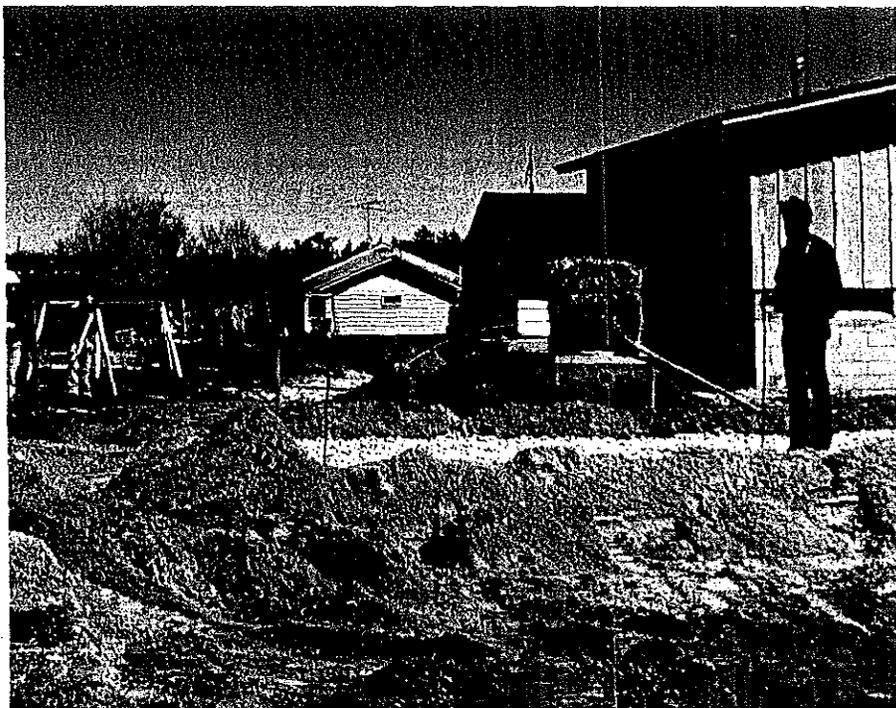
Wells can be disinfected by displacing all the water in the well with a mix-

ture of bleach (containing at least five percent chlorine) and water or by dropping chlorine tablets or powder down the well. Contact the DNR Bureau of Drinking Water and Groundwater, at P.O. Box 7921, Madison, WI 53707-7921 or call (608) 266-6669 for literature on private well operation.

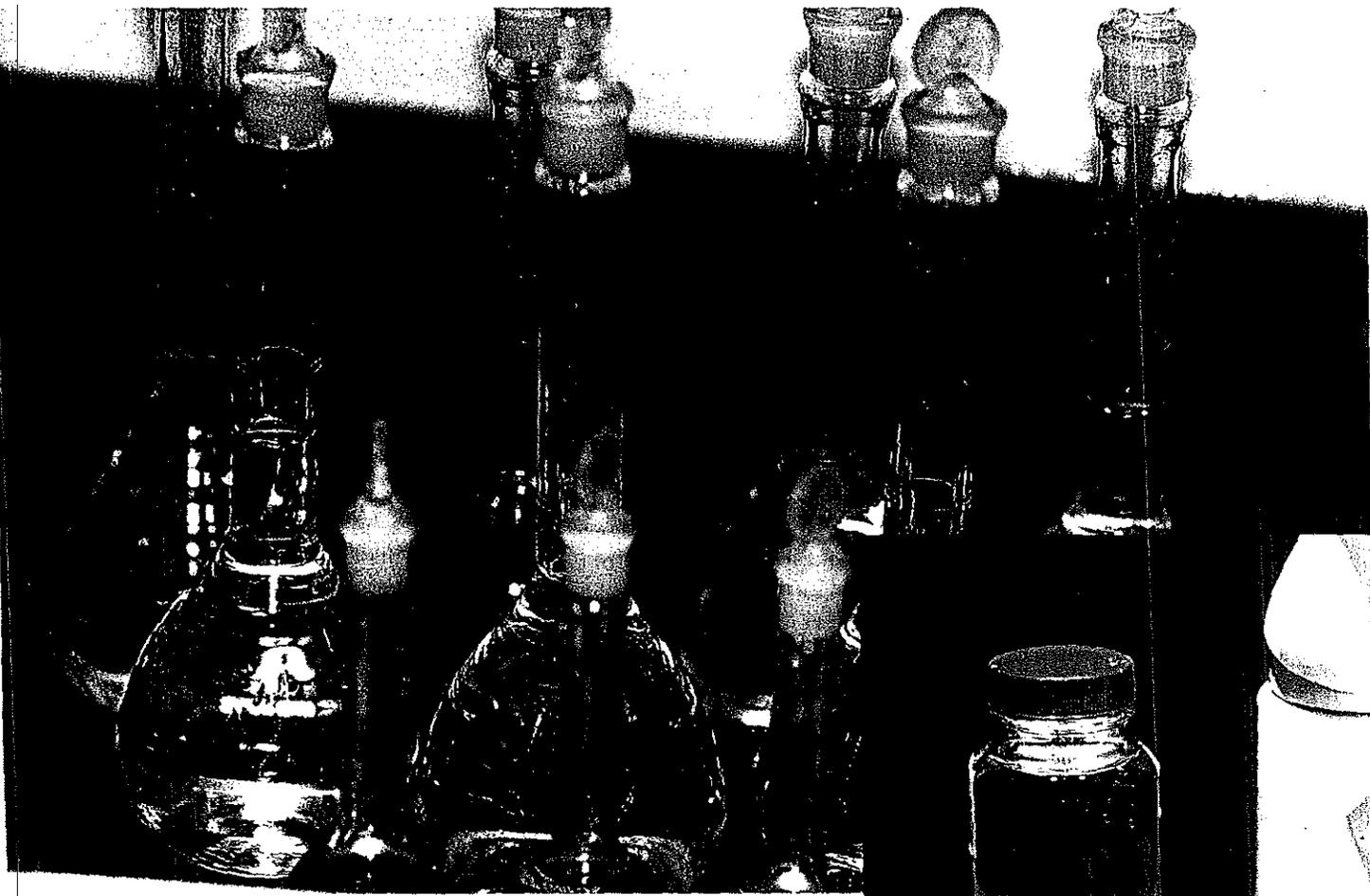
If high nitrate is the problem, the well construction and location should be checked.

Wells can sometimes be deepened to get past contamination. Inadequate well installations may be upgraded. Wells located in pits, for example can be extended above ground and the pit filled in. These are costly options, however; it's best to have the work done properly in the beginning to avoid problems later. Your DNR private water supply specialist can give you advice on obtaining a safe

Installing a sewage drainage field.



DNR PHOTO



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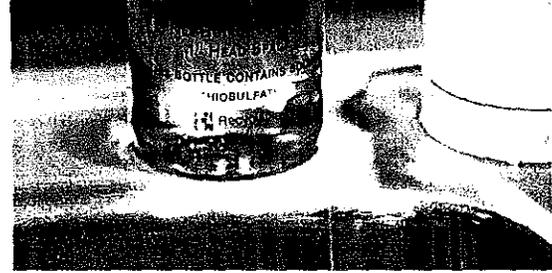
Both private labs and the State Lab of Hygiene analyze well water samples.

drinking water supply.

If your water utility or a lab test alerts you to the presence of high levels of chemicals in your drinking water, you may be advised to drink bottled water or drill a new well. But what about low levels of contaminants? Will small quantities of

benzene, a major component of gasoline, or perchloroethylene, a chemical used in dry-cleaning solvents, make your water undrinkable?

The answer is, No. That's not to say, however, that the water is totally safe



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to drink. For instance, the Environmental Protection Agency estimates that one part per billion of perchloroethylene in drinking water could lead to one or two additional cases of cancer in a population of one million people who drink such water over a 70-year lifetime.

Drinking water contamination, even at very low levels, should not be taken lightly, nor should the risks be exaggerated. To keep the risk of contamination as low as possible, public agencies and private citizens must continue to make tough decisions on what's worth the risk and what's not. ☺

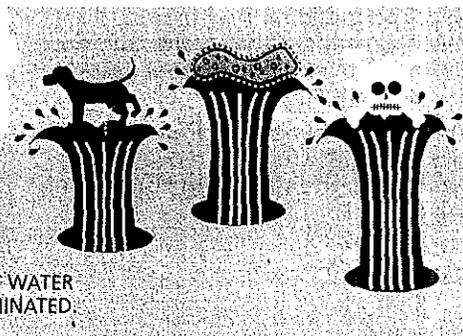


A DROP OF KNOWLEDGE!

GROUNDWATER MYTH!

#10 ARTESIAN WATER IS THE PUREST WATER AVAILABLE.

IN FACT: ARTESIAN SUPPLY IS NO GUARANTEE THAT WATER IS SAFE! ARTESIAN WATER CAN BE CONTAMINATED.



# groundwater glossary

**Aquifer:** A rock or soil layer capable of storing, transmitting and yielding water to wells.

**Baseflow:** That part of stream discharge from groundwater seeping into the stream.

**Consumer Confidence Report:** A report, required under the amendments to the Safe Drinking Water Act, which lists contaminants found in community public well water systems, water treatment methods, devices used and potential health effects.

**Discharge area:** An area in which groundwater reaches the surface. Examples are springs, seeps, lakes or rivers, or by evaporation and transpiration.

**Dolomite:** Calcium magnesium carbonate, a common rock-forming mineral. Many rocks in Wisconsin referred to as limestone are actually dolomite.

**Evaporation:** The process by which water is changed from a liquid into vapor.

**Geology:** The science dealing with the origin, history, materials and structure of the earth, together with the forces and processes operating to produce change within and on the earth.

**Glacial drift:** Sediment transported or deposited by glaciers or the water melting from a glacier.

**Gross alpha activity:** Decay of radionuclides in natural deposits. Can be either radium or uranium.

**Groundwater:** Water beneath the surface of the ground in a saturated zone.



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**Hydrogeology:** The study of groundwater and its relationship to the geologic environment.

**Hydrologic cycle:** The complete cycle through which water passes from the atmosphere to the earth and back to the atmosphere.

**Hydrology:** The science encompassing the behavior of water as it occurs in the atmosphere, on the land surface and underground.

**Impermeable:** Having a texture that does not permit water to move through quickly.

**Infiltration:** The movement of water into and through a soil.

**Leachate:** A liquid formed by water percolating through soluble waste material. Leachate from a landfill has a high content of organic substances and dissolved minerals.

**Limestone:** A sedimentary rock consisting chiefly of the mineral calcite (calcium carbonate).

**Municipal well:** A well, owned and operated by a municipality, serving more than 25 people for at least 60 days of the year.

**Nutrients:** Compounds of nitrogen, phosphorus and potassium that promote plant growth.

**Onsite sewage system:** Used to treat household sewage and wastewater by allowing the solids to decompose and settle in a tank, then letting the liquid be absorbed by the soil in a drainage field.

**Permeability:** The capacity of rock or soil to transmit a fluid, usually water.

**Pesticides:** A general term for insecticides, herbicides and fungicides.

**Private well:** A well serving one home maintained by the owner.

**Radionuclides:** Any manmade or natural element that emits radiation in the form of alpha or beta particles or as gamma rays.

**Recharge area:** An area in which water infiltrates and moves downward into the saturated zone of an aquifer.

**Runoff:** Precipitation not absorbed by the soil.

**Saturated zone:** The part of a water-bearing layer of rock or soil in which all spaces, large or small, are filled with water.

**Sludge:** Sediment remaining after wastewater has been treated.

**Spring:** A flow or natural discharge of groundwater at the surface.

**Transpiration:** The process by which plants give off water vapor through their leaves.

**Volatile Organic Compounds:** A group of common industrial and household chemicals that evaporate or volatilize when exposed to air. Includes gasoline and solvents.

**Water table:** The level below which the soil or rock is saturated with water, sometimes referred to as the upper surface of the saturated zone.

**Watershed:** The land area from which surface runoff drains into a stream system.



DNR PHOTO

**Well:** A vertical excavation that taps an underground liquid-bearing rock formation. In Wisconsin, wells are drilled to obtain water, to monitor the quality of groundwater, or to determine the depth of the water table.

**Wisconsin Unique Well Number:** A number assigned to individual wells, which allows state agencies and the public to track groundwater quality through time. New wells drilled since January 1, 1988 are assigned unique well numbers.

Results of water quality tests done by the State Laboratory of Hygiene are automatically reported to DNR for filing. You can find your Unique Well Number close to the sampling faucet on the water pipe entering the building from the well or on the main electrical fuse box.

### What should I do if my water is high in nitrate?

If the nitrate-nitrogen concentration of your water exceeds the 10-milligram per liter standard, the following actions are recommended:

- Avoid drinking the water during pregnancy and do not give the water to infants less than 6 months of age or use the water to prepare infant formula.
- The Wisconsin Division of Public Health recommends that people of all ages avoid long-term consumption of water that has a nitrate level greater than 10 ppm.
- Do not attempt to remove the nitrate by boiling the water. This will only increase the nitrate concentration.
- Seek medical help immediately if the skin color of an infant appears bluish or gray. Sometimes color change is first noticed around the mouth, or on the hands and feet.
- Protect your water supply from nitrate contamination by reducing fertilizer you use, improving manure-handling methods, maintaining your septic system and pumping septic tanks regularly to prevent overflow.
- A safer, longer-term remedy may be to drill a new well.
- Treatment devices approved by the Department of Commerce.

### Where can I get more information?

Licensed well drillers can help you determine whether drilling a well with more casing can reduce the nitrate levels in your water. Check your local phone directory under "Water Well Drilling & Service."

The Wisconsin Department of Health Services (DHS), Division of Public Health can give you more information on the potential health effects of nitrate exposure. Call (608) 266-0923 or visit the DHS website at [dhs.wisconsin.gov/eh/water](http://dhs.wisconsin.gov/eh/water).

The Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) can give you more information on locating potential nitrate sources. Call (608) 224-4502 or visit the DATCP website at [datcp.state.wi.us](http://datcp.state.wi.us)



A list of certified labs is available from DNR online at [dnr.wi.gov/org/es/science/lc/](http://dnr.wi.gov/org/es/science/lc/) under the category "Certified Lab Lists." You may also find laboratories listed in your local telephone book under "Laboratories-Testing."

DNR has more information about drinking water on its website at [dnr.wi.gov](http://dnr.wi.gov). Choose "Drinking Water & Groundwater" from the drop-down program menu, and select from a variety of listed topics. Find out how to deal with water quality problems by searching for "What's Wrong with My Water" on the DNR website.

The University of Wisconsin-Cooperative Extension has many publications related to drinking water and water quality available on its website. Go to [learningstore.uwex.edu/Drinking-Water-C120.aspx](http://learningstore.uwex.edu/Drinking-Water-C120.aspx).

The Department of Commerce has information on water treatment devices and approvals on its website.

- [commerce.wi.gov/SB/SB-PlumbingWatTreatRevQA.html](http://commerce.wi.gov/SB/SB-PlumbingWatTreatRevQA.html)
- [commerce.wi.gov/SB/docs/SB-PlumbingProdRevCommInfo0310.pdf](http://commerce.wi.gov/SB/docs/SB-PlumbingProdRevCommInfo0310.pdf)
- [commerce.wi.gov/SB/docs/SB-PlumbingWtrTrtReqList.pdf](http://commerce.wi.gov/SB/docs/SB-PlumbingWtrTrtReqList.pdf)

### Department of Natural Resources Offices



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

Northern Region  
810 W. Maple Street  
Spooner, WI 54801  
(715) 635-2101

107 Sulliff Avenue  
Rhinelander, WI 54501  
(715) 365-8900

Northeast Region  
2984 Shawano Avenue  
Green Bay, WI 54313-6727  
(920)662-5100

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

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

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

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 the Interior, Washington, D.C. 20240.

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



PUB-DG-001 2010



# Nitrate In Drinking Water

This brochure explains how nitrate can enter drinking water supplies, the health effects of nitrate exposure, when to test a private well, and things you can do to reduce the nitrate level in your drinking water. The brochure also provides sources of information and assistance that may be useful to private well owners.

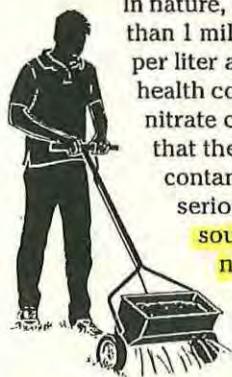
The Wisconsin Department of Natural Resources Bureau of Drinking Water and Groundwater would like to thank the Groundwater Coordinating Council (GCC) Education Sub-Committee for its part in the development and editing of this publication. For more information on the GCC, its member organizations and programming, please visit [wisconsin.gov](http://wisconsin.gov). Choose "Government," "State Agencies," followed by "List of Agencies" then select "Groundwater Coordinating Council."

Wisconsin Department of Natural Resources  
Bureau of Drinking Water & Groundwater

## What is nitrate?

Nitrate ( $\text{NO}_3^-$ ) is a compound made up of nitrogen and oxygen. It is formed when nitrogen from ammonia or other sources combines with oxygen in water. Nitrate is naturally found in plants and in vegetables at varying concentrations. It is often in groundwater depending on the amount of fertilizer and manure applied to crop fields. According to the U.S. Environmental Protection Agency, most adults who are eating a balanced diet may consume 10-25 milligrams of nitrate-nitrogen per day in their food. Most of this nitrate comes from leafy vegetables like lettuce, cabbage, celery, spinach, and cured meats. Additional exposure to nitrate from contaminated drinking water may pose a significant health risk.

## How does nitrate enter groundwater?

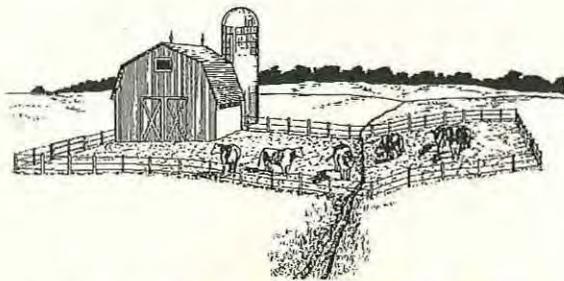


In nature, water usually contains less than 1 milligram of nitrate-nitrogen per liter and is not considered a health concern. Significantly higher nitrate concentrations can indicate that the drinking water has been contaminated and may pose a serious health concern. Common sources of nitrate include nitrogen fertilizers, manure, septic systems, municipal sewage treatment systems, and decaying plant debris. Nitrate dissolves easily in

water and does not adsorb onto the soil. It can easily be carried into the groundwater by rainwater and melting snow as they percolate through the soil and bedrock into the underlying aquifer.

## Is my well at risk?

The only way to know if your drinking water contains excessive nitrate is to have a water sample analyzed by a certified laboratory. There are also several things you can check to determine your well's vulnerability to nitrate contamination.



- Well Location. Nitrate-contaminated wells are often located near farm fields, barnyards, feedlots, septic tanks, municipal wastewater treatment systems or "sludge" spreading sites.
- Well casing depth and construction. Since nitrate enters the aquifer from the ground surface, wells that have shallow casing are more likely to be affected than deeper cased wells.
- Geology. Areas with highly porous, sandy soils, fractured bedrock, natural caves and sinkholes, and shallow depths to groundwater are especially vulnerable to contamination. Areas with highly exposed creviced bedrock or specific geologic conditions known as "karst" limestone geology, present in much of Door County for example, may also be vulnerable to nitrate contamination.

## What are the health risks of consuming water with high concentrations of nitrate?

State and Federal laws set the maximum allowable level of nitrate-nitrogen in public drinking water at 10 milligrams per liter (10 parts per million). The Wisconsin Division of Public Health recommends that people of all ages avoid long-term consumption of water that has a nitrate level greater than 10 ppm.

Nitrate-contaminated water should never be fed to an infant under 6 months of age. In young infants, ingestion of nitrate can reduce the blood's ability to carry oxygen. In severe cases it can cause a condition that doctors call methemoglobinemia. The condition is also called "blue baby syndrome"

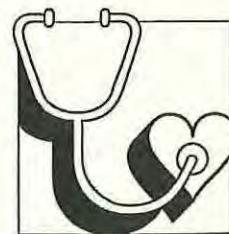
because the infant's skin appears blue-gray or lavender in color. This skin color change is caused by a lack of oxygen in the blood.



All infants less than 6 months of age are at risk of nitrate toxicity, but premature babies and babies with other health problems are more sensitive than healthy infants. An infant suffering from "blue baby syndrome" needs immediate medical care because the condition can lead to coma and death if it is not treated promptly.

When nursing mothers ingest water containing elevated concentrations of nitrate, the amount of nitrate in breast milk may increase slightly. Although no confirmed cases of "blue baby syndrome" have been associated with nitrate in breast milk, it may be advisable for nursing women to avoid drinking water that contains more than 10 milligrams of nitrate per liter of water.

Some scientific studies have also found evidence suggesting that women who drink nitrate-contaminated water during pregnancy are more likely to have babies with birth defects. This may be because nitrate ingested by the mother may also lower the amount of oxygen available to the fetus.



Some researchers suspect that consuming nitrate-contaminated water may increase the risk of thyroid disease, diabetes, and certain types of cancer. People who have heart or lung disease, certain inherited enzyme defects

or cancer may be more sensitive to the toxic effects of nitrate than healthy individuals.

Wells contaminated with high nitrate levels are more likely to be contaminated with agricultural pesticides. If your water is contaminated with nitrate, you may want to have the water tested for pesticides, especially if your well is near farm fields.

## How do I know if my water is safe to drink?

### Public Water Systems

All public water systems are required to notify consumers if any regulated contaminant, including nitrate, exceeds the maximum contaminant level (MCL) that is set by the federal Safe Drinking Water Act. Municipal systems (such as city, town, or sanitary districts) and Other-Than-Municipal (OTM) systems (such as mobile home parks or condominium associations) are required to report any detection of a regulated contaminant that occurred in the previous year in their annual Consumer Confidence Report (CCR). If you would like to view your community's CCR, contact your local water supplier or visit the Wisconsin Department of Natural Resources (DNR) website at [dnr.wi.gov](http://dnr.wi.gov). Choose "Drinking Water & Groundwater" from the drop-down "Program" menu. Choose "Water Quality Databases" in the left-hand column. Next choose "Public Water Systems" under the "Drinking and Groundwater System" heading. A search can then be made by city or individual system.



Treatment methods are available that can reduce the levels of nitrate in the drinking water supply, but some methods may be more appropriate or cost-effective than others. In many cases the best option for a community is to drill a new well.

### Residential Well Owners

The only way to know if your drinking water contains nitrate is to have a water sample from your private well tested by a certified laboratory. A list of certified labs is available from the Department of Natural Resources (DNR) or online at [dnr.wi.gov/org/es/science/lc](http://dnr.wi.gov/org/es/science/lc). A nitrate test is recommended for all newly constructed private wells and wells that have not been tested during the past 5 years. Testing is also recommended for well water used by pregnant women and is essential for a well that serves infants under 6 months of age. Wells with nitrate concentrations between 5 and 10 milligrams per liter should be tested annually. Additional testing may also be useful if there are any known sources of nitrate or if high nitrate concentrations are found in neighboring wells.

# Summary of Concerns and Reports to be given before 9/21/12

In the town of Saratoga, there is no other water source. See area map showing suburban and rural residential area.

- 1a. Saratoga Well Survey Map – sand driven depths  
 Saratoga Family Ages –  
 Saratoga Area Information print out showing number of households immediately abutting 1 mile and 2 mile  
 Saratoga population approx. 5,300  
 Rome population approx. 7,000  
 Wisconsin Rapids population approx. 18,377

Submitted by  
 

This will be a financial hardship to many area residents (Federal Takings Law)  
 Violating Civil Rights (English Common Law)  
 Missouri won \$4 million in damages from Premium Standard CAFO

- 1b. Soil Maps – “Easily Compromised”  
 Background – Wood Co. Land Preservation – DNR lists 7 + 10 mile exceptional overburdened waterways/resource waters – 10 mile watershed has 40 plus high capacity wells already – how much more can it take?  
 (Rural Forest Preservation 5/4/07)  
 Soil compositions and sustainability – we are the most susceptible area in the Wisconsin (Protecting Groundwater in Wisconsin Through Comprehensive Planning, P. 2 of 8 maps)  
 We have had two floods – 1973 and 1993, with \$2.5 million in damage on the 7 mile creek – 1 tornado in 2011

- 1c. Wetlands – Potential damage to navigatable waterways

Loss of aesthetic value

- 2a. The new CAFO will remove all existing forest lands, causing a loss of rural preservation, impacting hunting, fishing, ATV trails, snow mobiling, hence a total change from rural recreation.
- 2b. The soil composition in Saratoga is sand with high water levels. There is no solid consistency for that much cement, or any type of lagoons. The lagoons pose a change in land usage, and there is real concern that they could leak with a chance of soil contamination.
- 2c. 703 Flood Plain Fringes – Wood Co. flood plan zoning ordinance for Wood Co. This area has been deemed part of a flood plain.
- 2d. Soil excavation and disturbances. Lists of endangered species includes slender glass lizard, red-necked grebe, northern blue butterfly, St. Croix snaketail dragonfly, extra-striped snaketail dragonfly, warpaint emerald dragonfly, hines emerald dragonfly, spaherdock darner dragonfly, pygmy snaketail dragonfly Demand a research project into effects of changing managed forest habitats to agriculture. Require Wysocki to reestablish destroyed habitats.

- 3a. Manure digesters only can remove certain things. There is concern about contamination from pathogens, pesticides, antibiotics and heavy metal contaminants. (OPITS and other CAFO Problems, Van der Geest)
- 3b. Nitrogen and phosphorus contamination. Damage to Lake Petenwell – this has been studied for years. Rome wells compromised from nitrates.

Pertaining to the guidelines from the Clean Air and Water Acts

- 3c. Saratoga residents have the right to demand public notice of when fields will be sprayed with manure.
- 3d. Need to know what can be expected from runoff before digester is put in. What contaminants from birthing and bedding sands?

Saratoga residents demand air quality study

- 4a. Air Quality. Public notice of aerial spraying of pesticides (Clean Air/Water Act limiting phosphorus emissions)
- 4b. Fugitive Dust. From the Particulate Matter articles, this operation would be considered too close to landowners, as guidelines state that residences should be no closer than 5 miles for large particulate matter, and no closer than 60 miles for fine particulate matter.
- 4c. Hazardous pollutants: ammonia, hydrogen sulfide. Need for hazmat trained rescue and fire squad to deal with volatile organic compounds.

Erosion and wear concerns

- 5a. There will be a need to erect snow fencing as there will be no more trees to serve as drift barriers.
- 5b. Need for further road repairs due to heavy milk trucks in an estimated amount of 20+ per day, traveling 19 miles on Class B Roads.

Water Resources

- 6a. Nitrate and phosphorous runoff contaminating Wisconsin River, Petenwell, 3 Lakes area in Town of Rome, 7-, 10-, and 14-mile creeks as well as other water resources. According to article from WDNR, the current water quality of 7- and 10-mile creeks is exceptional.

Health Concerns

- 7a. American Public Health Association and Centers for Disease Control recommended a moratorium against new CAFOs in 2003. (When it Hits the Farm: Pathogens Human and Bovine Sources, Mark Borschardt)

Wood Co. Land Management History:

- 1973 – Flood
- 1993 – Flood with \$2.5 million damages
- 1997 – Fire with 200 acres burned near Akron Ave.
- 2011 – Tornado

Trout Streams – flow charts, water temp -

Parallel Hydrology of Little Plover River which is now headed for a dry up due to heavy irrigation.

Health issues – E. Coli, Giardia, Cryptosporidium

This is according to the CDC and Marshfield Clinic current studies

APHA, 2003 – Older moratorium calling for no new CAFOs until studies prove safe

Get costs of water well fixes – hardships for home owners

With this contamination, cannot drink water, brush teeth, wash hands, dishes, or bathe safely

Nitrates – reverse osmosis → *costs for Removal of E Coli in Private Wells*

Monitoring well *costs*

PCB contamination before regulation – 1970s and 1980s – Pre Bio Green  
According to LeAnn Hinke, DNR *has the reports*

*/ Daracuse mound - area camping stalled due to PCB*

Heavy metal contaminants likely still in soil

Dioxin contamination (including the previous contamination from PCBs) falls into the classification of persistent organic pollutants (POPs), which means that even if they are regulated at some point, they stick around in the water and soil for 100 years

Air quality, ag management, runoff leeching – water levels - tower

Government tax dollars funding this milking of American public "

Wysockis co-authored legislation - *June 5-2009 - article from*

Senator Scott Fitzpatrick stopped one near his home  
*CAFO*

*Black River Falls Distinguished Agriculturalist*

Court cases – violations and health issues

OPITS – Van der Geest

## The Questions Rural Communities Should Ask About CAFOs <sup>[1]</sup>

John Ikerd <sup>[2]</sup>

This paper is a statement of *my truth* concerning the impacts of large-scale confinement animal feeding operations (CAFOs) on rural communities. Over the past ten years, I have met with rural people concerned about CAFOs in more than a dozen states and in three provinces of Canada. To prepare for these meetings, I have reviewed research data from a wide variety of sources and have listened to arguments from those on both sides of the issue, including those living downwind and downstream from CAFOs. *My truth* is based on everything I have learned from this decade of experience.

If your truth is different from mine, that's okay with me. Issues this controversial invariably reflect legitimate concerns on both sides and none of us should be so egotistical as to believe that only we know the truth of such things. What's most important is that we each have sound reasons for believing what we believe to be true. And, "because someone else wrote it or said it," is not a sound reason for believing anything. I write and speak my truth with conviction because I know it is based on sound scientific data and on actual experiences of real people in real communities.

The Internet provides convenient access to a wealth of scientific data and real stories of real people relevant to the CAFO issue. The *Grace Factory Farm Project*: <http://factoryfarm.org/>, *Families Against Rural Messes*: <http://www.farmweb.org/>, and the *Sierra Club Factory Farms Project*: <http://www.sierraclub.org/factoryfarms/> provide good places to start a web search. Each of these sites links

to dozens of related websites. Books, such as *Pigs, Profits, and Rural Communities*, <sup>[3]</sup> *Raising a Stink*, <sup>[4]</sup> and *The Meat We Eat* <sup>[5]</sup> also provide valuable insights into various aspects of the CAFO issue. Those who want facts about CAFOs can find facts.

Obviously, each community I have visited is different, but they all have many similarities. For example, the strategies of those promoting CAFOs are essentially the same in all communities. The agribusiness corporations promote CAFOs as a logical rural economic development strategy, as the future of animal agriculture, and the only means of maintaining a viable agriculture sector in rural communities. In reality, however, the corporations are just looking for some place, any place, where they can dispose of mountains of livestock manure, so they can reap large profits for their stockholders. The questions that rural people are asking, and should ask, about the impacts of CAFOs on their community also are nearly always the same. They want to know whether any potential economic benefits of CAFOs are worth the ecological and social costs.

*Are CAFOs a logical rural economic development strategy?* Different studies have addressed this issue in different ways, with different results. However, the truth, *my truth*, can be found by looking at communities where CAFOs have been embraced, or at least accepted, as a prominent strategy for rural economic development. Community leaders have been promised that CAFOs will add to local employment and the local tax base. They are told that dollars spent locally for buildings, equipment, feed, and feeder livestock will multiply as they ripple through the community, resulting in additional expenditures for groceries, clothes, housing, automobiles, healthcare, and other consumer necessities. Increased property tax collections are purported to pay for better local schools, roads, and other public services. However, the actual economic impacts invariably are quite different from those promised.

The truth is in results, not in promises. After several decades of large-scale contract poultry and beef production and more than a decade of widespread contract CAFO hog production, *not a single community where CAFOs represent a significant segment of the local economy is looked upon today as a model of*

*economic success or prosperity.* Admittedly, corporations tend to locate CAFOs in areas that are economically depressed; they target communities that are desperate for economic development. But CAFOs have consistently failed to bring about significant improvements in unemployment or overall economic well-being of local residents.

First, corporate contractors buy very few of their building materials, equipment, feed, or feeder animals in the local community. It's invariably cheaper to bring them in from other places, and corporations buy from the cheapest source. In addition, many of those who ultimately are employed in confinement operations, feed mills, and slaughter plants turn out to be immigrants to the communities, not local residents. The jobs typically are low-paying jobs with few if any medical benefits. Thus, the additional needs for public services typically outweigh any economic contribution of added employment. In contract feeding operations, for example, the University of Missouri estimates total labor costs for a 600-sow hog operation would support eight full-time employees earning about \$15,000 per year, or about \$7.50 per hour. While this may sound like decent jobs in some rural communities, these kinds of jobs cannot provide the foundation for an economically viable rural community.

Perhaps the most compelling arguments against relying on CAFOs as a source of rural economic development is that communities in which CAFOs become prominent typically are unable to attract any other type of economic development. People simply do not want to live and work in a community that other people consider to be "polluted." By virtually every measure, poverty levels rise, not fall, after a community becomes identified as "CAFO friendly." And once made, a decision to rely on CAFOs for economic development may be very difficult to reverse.

*Will CAFOs save the agricultural sector of the local economy?* Rural community leaders are told that CAFOs are the animal agriculture of the future. So if they discourage CAFOs from coming into their communities, they will be denying local livestock and poultry farmers their only realistic opportunity to survive. Nearby communities will welcome CAFOs, they are told, and the surrounding communities that discourage CAFOs will still have to deal with environmental and social consequences without receiving any of the economic benefits. Proponents argue that being "unfriendly to CAFOs," is being "unfriendly to farming."

Again, the truth is quite different from the hype. First, today's CAFOs are a continuation of a long-term trend toward the industrialization of agriculture. U.S. farms have been becoming more specialized, more homogeneous, larger in size, and fewer in number since the 1930s. Today, contract production, controlled by multinational corporations, is allowing agricultural operations to grow far larger than was previously possible for individual farmers or even family corporations. Continuing this trend, through corporately controlled CAFOs, will result in even fewer people controlling agriculture and even fewer real farmers. CAFOs may employ a few local *farm workers*, but all of the important decisions, and profits, will be made by people in corporate headquarters, not by farmers. CAFOs will not save farmers or local farm economies.

The hog industry provides strong supporting evidence. Every state in which hog CAFOs have become prominent has experienced a significant decrease in numbers of hog farmers, not an increase. North Carolina, where hog CAFOs first became prominent, experienced a doubling of hog production and a halving of the number of hog farmers in the seven-years between 1986 and 1993. Between 1985 and 2003, the number of hog farmers in the U.S. fell by more than 80%, to less than one-fifth of pre-CAFOs numbers. Industrial operations gain their efficiency by reducing management and labor costs per unit of output. It should come as no surprise that the industrialization of agriculture, which is what CAFOs are all about, results in fewer farmers.

Each person employed in hog CAFOs in one community destroys the opportunities anywhere from one-and-a-half to three real hog farmers elsewhere, depending on the situation. The number of hogs produced nationally has increased very little throughout the transition to CAFO production. Since it takes fewer people to produce a given number of hogs under the contract CAFO system, there is room for fewer real

hog farmers in the marketplace. And, it's not simply a matter of survival of the fittest or the lowest cost producers. Contractors have the economic power to buy their way into the market, by offering favorable terms to initial contract producers. Once they have sufficient supplies of animals under contract to influence the market, they begin use their power to squeeze out the independent producers, by manipulating live prices. They don't care how low live hog prices go because they make up any losses in larger profit margins for their processing and marketing activities.

Over the longer term, even the corporate contract operations will be forced to leave rural communities in the U.S. and Canada. Labor and investment costs are far lower in other countries of the world where the giant multinational corporations operate today, and environmental concerns and constraints are far less in those "less-developed" countries. People of many other countries of the world are even more desperate for economic opportunities than are people in rural America. Eventually, the contract CAFO operations will leave North America, leaving rural communities with the mess to be cleaned up.

*Are there any logical alternatives to CAFOs?* Farmers are told that large-scale confinement animal feeding is an inevitable aspect of the future of agriculture. If they want stay in farming, they are told, they are going to have to become part of the new global agricultural supply chain, by becoming a contract producer for one of the multi-national agribusiness corporations. Even if they would prefer to continue farming as independent producers, there are simply no logical alternatives to large-scale, contract production.

Again, the reality is quite different. A variety of new farming opportunities are emerging in response to growing environmental and social concerns associated with the industrialization of agriculture. For example, the market for organic foods has been growing at a rate of more than 20% per year over the past 15 years, doubling every three to four years. This growing preference for organic is not simply a reflection of consumers trying to avoid pesticide and agrichemical residues in their foods. They are concerned about a wide range of issues, including the impacts of their food choices on farmers, farm workers, and stewardship of land and water resources. Recent surveys indicate that around three-fourths of American consumers have a strong preference for locally grown foods preferably grown on small family farms. They want to know where their food comes, how it is produced, and who produced it. Many Americans have simply lost confidence in the integrity of the corporations and the government agencies with whom the integrity of the food system has been entrusted. Increasingly, they are buying food they can trust by buying it from people they trust.

This new sustainable/local food movement, not CAFOs, is the American farmer's best hope for the future. Among the most profitable of the new sustainable/local alternatives are grass-based, free-range, and pastured livestock and poultry. Pastured and free-range poultry production became popular because of growing concerns about health and food safety and about inhumane growing conditions in industrial poultry production. Grass-based livestock operations initially gained popularity because of low investment requirements and low cost of production. However, it has become increasingly popular because of growing evidence of important health benefits in grass-fed products compared with products from animals fed in confinement. Pastured and free-range livestock production also allows producers to avoid hormones and antibiotic concerns and to meet the humane standards of production demanded by an increasing number of consumers. Producing hogs on deep bedding in hoop houses provides another viable alternative to the slatted floors, cramped crates, and manure lagoons of CAFOs. Studies at Iowa State University have shown that hogs can be produced in hoop houses just as efficiently as in CAFOs; they just require better management and more hog farmers. Why not support more better hog farmers?

<http://www.agmrc.org/agmrc/commodity/livestock/pork/productionresearcheconomicsprofit.htm>

The markets for sustainable/local meats and milk are growing far faster than are the numbers of farmers willing to produce for these new markets. The number of farmers markets – where meat, cheese, and eggs are taking their place along side local produce – has more than doubled in the past ten years. Many food buying clubs now offer their subscribers animal products along with vegetables and berries. Sustainable livestock and poultry producers also have opportunities to market through national organizations such as

Organic Valley (<http://organicvalley.coop/>) and Niman Ranch (<http://www.nimanranch.com/>) or to form their own cooperative organizations, such as Country Natural Beef of Oregon (<http://www.oregoncountrybeef.com/index.html>) and Good Natured Family Farms of Kansas (<http://www.goodnatured.net/>). There are a growing number of profitable and sustainable alternatives for farmers. CAFOs represent the agriculture of the past, not the agriculture of the future.

*Doesn't the nation need CAFOs to ensure affordable prices?* The proponents argue that CAFOs are needed to provide the large quantities of meat, milk, and eggs needed to keep prices affordable in the supermarkets. They claim alternative niche markets will work for only a few farmers and a few affluent consumers, but only large-scale, confinement production can meet the needs of mainstream American consumers and a growing global market for animal products.

Again, the evidence indicates otherwise. The increases in per capita supplies and declines in prices experienced as poultry operations moved to contract confinement feeding has not been realized for beef and pork. Increasing consumption of beef in the 1970s was largely a function of increases in demand for hamburger beef – McDonalds, Burger King, and Wendy's – rather than increased demand for the grain-fed beef coming out of large feedlots. And beef prices didn't fall, but rose, throughout this period of strong demand. Per capita pork consumption has been virtually flat for the past fifty years, in spite of the transformation of production from family hog farms to large contract CAFOs during the 1990s. Prices of pork and beef declined somewhat in the 1980's and 1990's (after adjusting for inflation) but this was a period of weak consumer demand, arising from health concerns linked to red meat consumption. With the recent resurgence in red meat demand, linked to the highly popular Atkins diet, deflated prices of beef and pork have started to climb. The facts: CAFOs have not reduced prices for red meats.

Deflated prices for live hogs and live cattle at the farm level have declined over the past several decades, but these declines have not been reflected in lower retail meat prices. Part of the decline in live prices reflects the lack of competitiveness in the few remaining public markets for livestock, as the vast majority of total livestock supplies are now procured through private corporate contracts. Many mid-sized independent livestock producers still achieve cost of production as low or lower than costs in CAFOs, but prices received by independent producers are depressed by their lack of access to competitive markets. Any potential savings in the transition to CAFOs have been lost due to larger spreads between live animal prices and retail meat prices, with both consumers and producers making larger contributions to corporate profits.

*Why have some rural communities accepted CAFOs?* The proponents ask why CAFOs have become so prominent, if they do nothing for rural economic development, if local farmers have better alternatives, and if they are not needed to produce meat, milk, and eggs at reasonable prices. My answer, *my truth*, is that the people of rural areas, including farmers, are being misled by the agricultural establishment, which includes the large agricultural colleges, federal and state departments of agriculture, corporate agribusinesses, large agri-cooperatives, major commodity associations, and some general farm organizations, such as the Farm Bureau Federation.

These institutions and organizations have been promoting industrialization for decades as a means of making agriculture more economically efficient. They have forgotten that the initial reason for efficiency was to benefit farmers, consumers, rural residents, and society in general. They have simply ignored growing evidence that rising social and ecological costs now outweigh any potential economic benefits from further industrialization. They have built their organizations and professional reputations promoting factory farming and are unwilling to risk the loss of prestige, power, or profits by admitting that agricultural industrialization no longer benefits anyone other than themselves and a few large corporate investors.

A quick examination of the types of rural economic development opportunities being touted by the so-called development experts reveals some valuable insights into the general assessment of the current economic value of rural areas. Many rural communities, desperate for jobs, are encouraged to compete for prisons. If they can't get a prison, they can settle for a landfill, so they can bury trash from some distant

urban center. If they can't get a landfill deal, they can probably get a toxic waste incinerator. And if all else fails, they can always roll out the welcome mat for confinement animal feeding operations. The corporate world sees rural areas as empty spaces where they can dump their wastes, so they can continue to profit from their environmentally and socially degrading business activities. The profits remain with investors in the urban area, while rural people are paid a few dollars to dispose of their human, material, and animal wastes.

This is not a rural vs. urban conflict. Urban people are simply trying to protect their environment, and they have more economic and political power than do rural people. The corporations are simply dumping their garbage and their animal manure in those places where people are most desperate for employment and economic opportunity, and where governments are least willing to accept their responsibility to protect people from exploitation.

As rural areas become polluted and degraded by exploitation, their most precious rural resource, the next generation, is leaving for the cities, where they have better opportunities. In fact, rural parents routinely advise their children to go away to college and get a good education so they won't have to return to the rural community or the farm to live. Increasingly, even rural people realize there is no future in turning their communities into dumping grounds for the rest of society. They just don't know what else to do. But, the agricultural establishment and others in respected positions of influence and authority keep telling them that they have no other choice.

*Since CAFOs are profitable, aren't they inevitable?* The proponents argue that CAFOs obviously are profitable for someone, and if something is profitable then someone is going to do it, regardless of what other people may think. CAFOs are inevitable, they say; we simply cannot do anything to stop them. The element of truth in this argument is that if something is profitable then someone will *want* to do it. However, *wanting* to something is different from being *allowed* to do something. Contrary to popular belief, society does not have to allow something just because someone thinks it would be profitable. For example, robbery obviously is considered profitable by robbers; that's why they do it. But society does not *allow* people to rob and we put those who insist on robbing in prison. A civilized society doesn't allow things that are detrimental to the common good, even if those things might be profitable for individuals.

It is yet to be determined, at least in a court of law, that CAFOs are *inherently* detrimental to the common good. Thus, individual states and communities cannot outlaw CAFOs in their areas of jurisdiction. State and local governments, however, do have the authority to regulate the location and operations of CAFOs, through zoning and health ordinances. The Missouri Court of Appeals, for example, ruled that CAFOs represent a potential risk to public health and upheld the rights of Missouri counties to regulate the location and operation of CAFOs, through local health ordinances. The Court opinion states that counties have "the power to make additional health ordinances to enhance the public health and to prevent the entrance of

[6] dangerous diseases into the county." The issue of whether CAFOs present potential health risks to rural residents has been resolved; they do. In some states, including Iowa, state laws have been passed which preempt the rights of county and local governments from implementing zoning or health regulations more restrictive than state laws. Regardless of the law, the rights of rural residents to protect themselves from the health and environmental risks associated with CAFOs arise from our fundamental, common sense rights to self-defense and self-determination. State and local governments have a responsibility to protect the health and well-being of their citizens. When states fail to act, local governments or health agencies must.

Current interstate commerce laws have caused many people to believe that economic interests must always take priority over all other interests. Admittedly, anything that interferes with interstate commerce, such as restricting specific types of business activities that are not restricted in other states, generally has been ruled to be unconstitutional. However, the "commerce clause" of the U.S. Constitution simply gives the United States Congress the power "To regulate Commerce with foreign Nations, and among the several States, and with the Indian Tribes." (Article I, Section 8, Clause 3). State and local governments cannot enact laws that

give priority to people over commerce, only because the right to do so is reserved for the U.S. Congress. However, the Supreme Court has ruled that such state and local laws can be made valid if they are approved by the U.S. Congress. The U.S. Congress also appears to have the authority to allow state and local governments to give priority to public interests over economic interests, if they choose to use their constitutional authority to do so. Perhaps it's time to call on the U.S. Congress to give priority to the interests of people over profits, not just in the case of CAFOs, but in all similar cases.

*Why is the agricultural establishment trying to limit local control?* The agricultural establishment has worked diligently over the years to limit the ability of state and local governments to regulate CAFOs. They first supported national initiatives to limit the ability of states to adopt environmental regulations for CAFOs more stringent than federal regulations. Failing in this, thus far, they have promoted initiatives at the state level to make state regulations no more stringent than federal CAFO regulations, which have been watered down through corporate influence in Washington. More recently, they are using their influence with state legislators in attempts to prevent counties from passing local health ordinances affecting CAFOs, in states where they still have the right to do so. In addition, they have supported strong state "right to farm" laws, which prevents local governments from passing any regulations restricting farming practices.

The agricultural establishment historically has opposed centralization of authority and has been a strong advocate of state and local control. So why are they now opposing local control? First, they have much more political power at federal and state levels of government than they have at county or local community levels. The agricultural establishment virtually dictates all policy administered by USDA and essentially has veto power over agricultural legislation at the state level, through their influence on agricultural legislative committees. Second, rural people at the grass roots level are becoming much better informed on the negative health and environmental consequences of CAFOs, and thus, more local people are becoming more concerned. Today, a massive amount of relevant information is readily available to anyone with a computer and a phone line. Finally, rural people are learning how to organize quickly and to mount effective opposition to CAFOs, or to any other threat to their health or environmental well-being. People who have fought CAFOs in one community willingly share their experiences and strategies with those currently fighting the battle in other communities.

If any good is to come out of the current CAFO controversies, it may well be that the future leadership of rural America is being developed among those who become politically empowered through their experiences in opposing CAFOs. Once people proclaim their basic democratic rights of self-defense and self-determination, they become less intimidated by economic and political power. Local control is a cornerstone of democracy.

*Why are CAFOs so disruptive to rural communities?* Proponents and opponents of CAFOs agree on at least one thing: CAFOs create major disruptions to the community life of rural people. In one community, I was told that everyone in the county was identified as being either for or against CAFOs. No conversation was said to take place on the county courthouse square that did not include a discussion of CAFOs. Communities that were once effective in their community and economic development efforts have been paralyzed by this internal dissention. It's becomes difficult, if not impossible, to gain public support for schools, health care, roads, and other public services because anything proposed by those on one side of the CAFOs issue is opposed by those on the other. The people of every "CAFO community" I have visited have validated this fact: CAFOs destroy the social fabric of rural communities.

I have never experienced any other issue that is so divisive in more than 35 years of working with farmers and others in rural communities. I eventually concluded, *my truth*, the CAFO controversy violates an important rural ethic. Rural people accept the fact that some members of their communities succeed, while others do not. So, the resentment is not of people wanting to make money. People may be a bit jealous, but if their lives are not made worse by someone else's success, they accept it. However, the CAFO issue is different. The people who live downwind or downstream from a CAFO know first-hand that their health and overall quality of life is being threatened by their neighbor's desire to make money. People know that

property located near CAFOs has been devalued, even if no one currently lives there. They understand that economic opportunities for their community are limited because they live in a “CAFO friendly” community. When CAFOs threaten a new community, local people oppose them because they fear the same fate. Apparently, it is a violation of an important rural ethic for one person to benefit at the expense of his or her neighbors. Rural people take such violations very seriously.

*Do local ordinances restricting CAFOs violate private property rights?* Proponents often claim an inherent right to build and operate CAFOs as a basic right of private property. They claim they have a right to use their land in any way they see fit. Local governments that restrict the conditions under which they are allowed to construct or operate CAFOs are accused of “takings,” meaning the taking away the value of private property without compensation. However, something cannot be *taken* away if it never existed in the first place.

The right to private property has never included the right to use property in a way that devalues the properties of one’s neighbors or diminishes the overall quality of life in the community. CAFOs clearly have the capability of doing both. All land was initially in the commons; there was no private property. Initially, a person could only take land out of the commons if there was as much and as good land left for anyone else who might want to use it. One person’s opportunity to claim private property could not diminish the opportunities of others to do likewise. This same principle has guided private property laws from the very beginning.

Zoning laws are clearly constitutional, and all zoning laws restrict the use of private property. I own three acres in a residential subdivision outside of Columbia, MO. I can’t subdivide my lot into three one-acre lots, can’t start a business on my property, and can’t let my sewage run into the creek behind my property, no matter how profitable it might be for me to do so. Restrictive zoning and covenants restrict my land use, and I wouldn’t have it any other way. Those same zoning and covenants prevent my neighbors from doing anything that diminishes my property value or my quality of life. Such laws are not only constitutional they are also both reasonable and necessary in a civilized society where people live in close proximity. Farmers could use their land any way they choose when they lived on a sparsely populated frontier because there was no one else around to be adversely affected. Farmers still have the same property rights but they no longer live on the frontier.

Those who claim an absolute “right to farm” are misinterpreting their rights in much the same way as those who claim absolute private property rights. The “right to farm” logically refers to farming as it existed at the time such rights were granted, with allowances for reasonable changes in farming methods and practices over time. The “right to farm” was never intended to include the “right to operate an animal factory.” A CAFO is not a farm; it is a factory. Admittedly, all farms *smell* but CAFOs *stink*, the difference being the stink of a large CAFO not only creates a nuisance for miles around, but also presents significant risks to human health. All farms have wastes that can pollute streams, but many large CAFOs generate more biological waste than do small cities. Rights to farm were never intended to include factory farms.

In addition, the right to farm was meant to apply to *farmers*. Those who do the work in contract confinement operations are not farmers; they would be more accurately referred to as building superintendents. They make sure the automatic feeding and watering systems are working, keep the ventilation fans running, call the corporate veterinarian when animals get sick, and dispose of the animals that inevitably die. Corporations design the buildings, own the animals, provide the feed, decide when to deliver and market the animals, and in general, make all of the important decisions. These corporations obviously are not farmers. Actually, most so-called contract producers are simply investors; they own the buildings but hire someone at minimum wage to work in the buildings. Most contract producers are little more than local front men for the corporations who make it easier for outside investors to be granted the “right to pollute.” They have no inherent “right to farm.”

*Are health and environmental restrictions on CAFOs undemocratic?* I have been called a communist and

accused of being undemocratic because I have openly supported government restrictions of CAFOs. The feeling seems to be that it's undemocratic for anyone to support any law or regulation that might limit anyone's ability to maximize profits, regardless of the reason for doing so. However, nothing is less democratic, *my truth*, than denying anyone a voice in shaping public policies, regardless of the economic consequences of such policies. One of the fundamental principles of the democratic belief system is that everyone has an equal right to participate in making the rules by which all in that society are to abide. One of the most fundamental responsibilities of citizenship is to work collectively, through government, for protection of the common good, including the public health and environmental well-being. Individuals who claim the right to participate in the public processes of making rules that protect the public health, environment, and quality of life are exercising their basic democratic rights and responsibilities.

In summary, many rural communities today are being asked to sacrifice the future so a few local investors and outside corporate investors can benefit economically from large-scale, confinement animal feeding operations. The most valuable assets many of these rural communities possess are their natural environment and their strong sense of community. Rural communities are still viewed by many people as good places to live and raise families. Most are still places with clean air, clean water, open spaces, scenic landscapes, and opportunities for peace, quiet, and privacy. Most are still places where people have a sense of belonging, friendly places where people know and care about each other, where crime rates are low and a strong sense of safety and security still exists. Such attributes are becoming increasingly scarce in America, and thus, are becoming increasingly valuable. It would take a six-figure salary for a city dweller to buy the quality of life that comes with living in a healthy rural community. And some aspects of rural life are truly "priceless." These precious quality of life attributes represent the future of rural areas, and they are all lost when a community becomes known as "CAFO friendly."

Rural communities are being systematically abused by a corporatist economy. Our rural areas are being turned into dumping grounds. The abuse is not the fault of urban people, who naturally want to protect their already-polluted natural environment. Current environmental and health regulations are simply inadequate to protect rural areas, as attested to by the repeated and persistently negative health and environmental impacts suffered by rural residents where CAFOs currently operate under those regulations. Rural people must be empowered to stand up for their democratic rights of self-defense and self-determination, to decide for themselves, locally, what needs to be done to protect their health and environment.

Once rural people have reclaimed their right to a healthy and clean environment, they can begin the task of rebuilding an economic, social, and ecological foundation needed for sustainable community development. The future of rural America is in the land and the imagination, creativity, and work ethic of the people of rural communities, not in the cunning and conniving of outside corporate investors. Now is the time to start reinvesting in a new approach to agriculture and a new approach to rural community development, not a time to exploit both land and people for the sake of short run profits. The future of rural communities can be bright, for those who have the wisdom and the courage to claim it.

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[3]

Kendall Thu and Paul Durrenberger, editors, *Pigs, Profits, and Rural Communities* (Albany, NY: State University of New York Press), 1998.

[4]

Carolyn Johnsen, *Raising a Stink: The Struggle over Factory Hog Farms in Nebraska* (Lincoln, NE: University of Nebraska Press), 2003.

[5]

Ken Midkiff, *The Meat We Eat: How Corporate Farming Has Endangered America's Food Supply* (New York: St. Martin's

Press), 2004.

[6]

The “slip opinion” of the Missouri Court of Appeals, Western District on this website has been confirmed, and several Missouri counties have passed health ordinances similar to Linn County’s without further court challenges. However, persistent attempts have since been made to pass state legislation to prevent such health ordinances.

<http://www.courts.mo.gov/courts/pubopinions.nsf/ccd96539c3fb13ce8625661f004bc7da/77622665a691a1ad862568310070e743?OpenDocument&Highlight=0,borron%20>.

## **Synopsis of CAFO's and How They Affect Our Community Health:**

Please note that the information regarding the health impact a CAFO (Confined Animal Farm Operation) proposes to a single as well as multiple neighboring communities is consistently developing as supporting resident complaints are being brought to the attention of officials. Additional research items pertaining to health will be included along with all supporting documentation with the group in September.

According to the Wisconsin Department of Health, Healthiest Wisconsin 2020's bold vision of "Everyone Living Better, Longer reflects the plan's twin goals: improve health across the life span, and eliminate health disparities and achieve health equity. The Plan's mission is to assure conditions in which people can be healthy, and members of healthy, safe, and resilient families and communities." A CAFO in the area would greatly diminish this objective not only for Saratoga but neighboring communities as well.

Research has shown that many "false promises" are made by the facility during developmental phase. Nearly every false promise about state of the art technology and good stewardship made to the communities has been broken. (packet 1)

"Odor violations have prompted citizens in Illinois to rename the state to Illinois, Land of Stinkin'. Throughout the past three years, citizens opposing this and other livestock factories have been the targets of vandalism, trespassing, and up the ultimate intimidation- death threats over the opposition to livestock factories in Illinois." Reports show this has already begun in the Golden Sands area. (packet 1)

"Both manure and animal carcasses contain pathogens (disease-causing organisms) which can impact human health, other livestock, aquatic life, and wildlife when introduced into the environment. Several pathogenic organisms found in manure can infect humans." (packet 2 discusses these pathogens and will be covered in depth in September.)

Waterborne Cryptosporidium Outbreaks are costly. In 1993 the outbreak in Milwaukee, Wisconsin the total cost associated with this outbreak was \$96.2 million dollars. (packet 4)

An increase in fly populations is a serious problem for the neighbors. Flies can transport many potentially deadly diseases including meningitis, typhoid, anthrax, cholera and are a vector for Cryptosporidium (a parasitic diarrheal disease.) (packet 1)

Children are more vulnerable to the hydrogen sulfide since they breathe more rapidly than adults, and spend an average of 50% more time outdoors than adults and are engaged in more strenuous activities that increase inhalation and exposure to pollutants. (packet 1)

Findings of antibiotics (commonly used in CAFOs) in the water raise a red flag. It is the

real danger that waters laced with these drugs can breed super bugs which will be resistant to antibiotics that are commonly used to treat human illnesses. (packet 1)

U.S. Geological Survey's Iowa City office reported that in 1999 check of 30 Iowa streams turned up antibiotics and other unnamed substances. (packet 1)

Some neighbors have been forced to tear out both carpeting and draperies that routinely absorb the stink. Carpets and drapes act like a "sink" and absorb the Volatile Organic Compounds (VOCs) which are released hours after the winds shift. (packet 1)

Neighbors policing Inwood Dairy from their own property discovered the applicators applying waste past the designated setbacks. These neighbors now have a severely polluted well contaminated with high levels of fecal coli form and E coli bacteria. As warned by the local health department, they are unable to drink or take baths from their OWN and ONLY water supply. (packet 1)

In a 1995 survey 58 Renville County residents that lived within a 5 mile radius of a factory report health problems similar to hydrogen sulfide poisoning. The Minnesota Pollution Control Agency (MPCA) confirmed through a testing program that half of the livestock factories tested were exceeding the state standard for hydrogen sulfide-some by up to 50 times. This toxic gas can also be expected to violate MN state standards as far as 5 miles from the facilities according to the MPCA. New studies show that this gas is a potent neurotoxin and even low ambient levels can cause irreversible brain and nervous system damage. (packet 1)

The release of these two gases (Hydrogen Sulfide and Ammonia) can occur at a variety of operation stages of the CAFO. Since both are the result of the breakdown of animal waste, release may occur during the generation, collection, storage and land application of the manure generated from the operation. (packet 9)

Particulate matter from the dairy would likely come from the housing barns, food storage areas, dry manure storage and liquid manure systems. Secondary PM may also be formed in the atmosphere from the reaction of released gases, particularly ammonia. Bioaerosols are another potential concern as manure contains many harmful pathogens such as bacteria, viruses and parasites or microbial byproducts. Airborne pathogens may originate anywhere in the manure handling systems, but the biggest risk would come from the center pivot spraying. (packet 9)

Despite the inability to paint a clear picture of public health implications it is reasonable, based on the sheer volume of emissions anticipated, to conclude there is a potential for a negative health impact on residents who may spend significant time near the CAFO. This is especially true for high-risk groups, such as the elderly, young children and people with respiratory conditions like asthma. The potential negative impact along with the uncertainty of exposure rates leaves the hazardous emission mitigation strategies on the design and operation of the CAFO critical when assessing potential emissions. (packet 9)

Citizens in the surrounding community exposed to undesirable levels of noise may experience a decline in mental health due to the stress that can accompany excessive noise. As expected in the construction of a facility of this magnitude excessive noise will be generated as the RPD is built. (packet 9)

The facility itself, which will be in operation 24-hours a day, will be an additional consistent source of noise much different from the prior land use. The animals, machinery and vehicular traffic will contribute to the noise exposure to employees onsite and residents offsite. (packet 9)

from: 8/23/12 Scoping Meeting

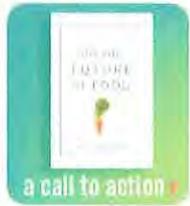
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## the issues water pollution

Industrial agriculture is one of the leading causes of water pollution in the United States today. In the 2000 National Water Quality Inventory conducted by the Environmental Protection Agency (EPA), agricultural activity was identified as a source of pollution for 48% of stream and river water,<sup>i</sup> and for 41% of lake water.<sup>ii</sup>

Water pollution from industrial farms not only damages the environment and kills wildlife, but it can also sicken and kill people. And since these farms exercise little restraint when it comes to water usage, they tend to waste large quantities of water, even when neighboring communities are experiencing water shortages. Because small, sustainable farms are more integrated with their surrounding communities, they pay closer attention to the ways that they use water and how their practices affect local water supplies.



### Sources of Pollutants

Most water pollution from industrial farms results from the storage and disposal of animal **waste**. Industrial livestock farms store manure and other farm wastes in gigantic tanks known as "lagoons" which can hold millions of gallons of manure and urine. Unfortunately, these lagoons often leak and—during large storms—they may rupture or simply overflow. When this happens, the environmental damage can be devastating, as raw manure is up to 160 times more toxic than raw municipal sewage.<sup>iii</sup> Leaking lagoons also release **antibiotic** residues and harmful bacteria that can leach into water supplies.

In order to dispose of manure after it's been stored in lagoons, industrial farms spray the waste onto farm fields as fertilizer. Unfortunately, these farms produce far more waste than can be applied to fields, and once the saturation point has been reached, the waste runs off into nearby water systems. The most common form of water pollution in the United States is excess levels of nitrogen or phosphorous, both of which are largely caused by fertilizer runoff.<sup>iv</sup> When manure is spread on fields as a fertilizer, it can also introduce some of the more toxic substances present in livestock excretions, such as pharmaceuticals<sup>v</sup> or

By polluting the nation's waterways, a single factory farm has the ability to negatively affect whole regions, as was the case when manure spilled from a ruptured tank on a 3,000-head dairy farm in upstate New York in August 2005. Three million gallons of cow manure poured into the Black River, polluting an area one-fourth the size of the Exxon Valdez spill.<sup>vii</sup> The New York State Department of Environmental Conservation cited the farm for numerous environmental and permit violations, and estimated that this spill killed around 200,000 to 250,000 fish.<sup>viii</sup>

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- [Precautionary Principle](#)

roads to help

who to call to Over Spray

bacteria.<sup>vi</sup> Water pollution from manure as well as synthetic fertilizers can lead to serious environmental damage and harm human health.

### Types and Effects of Pollutants

Agricultural water pollution can have variety of negative effects. Not only do substantial environmental problems result, but many of the pollutants produced by farms (minerals, chemicals and pathogens, to name a few) can make water unsafe for human consumption.

### Nutrients

Nutrients, such as nitrogen and phosphorous, are the minerals in fertilizer that promote plant growth. But due to the over-fertilization of cropland, far more nitrogen and phosphorous are applied to fields than are removed by crops.<sup>ix</sup> Excess nutrients in water cause harmful plant growth—commonly referred to as "algal bloom," which can cause fish kills.<sup>x</sup>

### Ammonia and Nitrates

Livestock manure is high in ammonia concentrations,<sup>xiv</sup> and dissolved ammonia in water is not only highly toxic to fish,<sup>xvi</sup> but can also be converted to dangerous nitrates.<sup>xvi</sup> Elevated nitrate levels in drinking water are highly poisonous to humans, causing potentially fatal oxygen levels in babies (known as "blue-baby syndrome"), spontaneous abortions, and possibly cancer.<sup>xvii</sup> In a sample of wells surveyed by the US Geological Survey from 1993 to 2000, 2 percent of public-supply and 9 percent of the domestic wells more common in rural areas were found to have nitrate concentrations higher than the EPA's maximum allowable level.<sup>xix</sup> The EPA estimates that about 1.3 million households in counties with industrial livestock facilities get their water from wells with dangerously high nitrate levels.<sup>xix</sup>

### Pathogens and other microorganisms

Manure contains a high level of pathogens (disease-causing microorganisms). When the waste is applied to fields, those pathogens can be transferred to local water supplies during a run off from either irrigation or rainfall.<sup>xx</sup> The impact of pathogens from manure is severe: according to the Centers for Disease Control, in every waterborne disease outbreak in the United States from 1986 to 1998 where the pathogen could be identified, it most likely originated in livestock.<sup>xxi</sup>

Some other waterborne microorganisms do not originate on farms, but develop as a result of eutrophication caused by high nutrient levels. *Pfiesteria piscicida*, for example, thrives in many areas where algal blooms grow, and causes lesions in fish and large-scale fish kills.<sup>xxii</sup> It can also cause a range of symptoms in humans, including respiratory and eye irritation, gastrointestinal problems, fatigue, as well as skin problems and cognitive symptoms such as memory loss and confusion.<sup>xxiii</sup>

### Antibiotics and Hormones

Antibiotics and artificial growth hormones are commonly used on industrial farms, either injected directly into the livestock or added to their feed.. Large amounts of both substances end up being excreted by animals and can thus pollute water along with everything else in livestock waste. Some hormones can remain functional in manure up to 270 days after excretion, and there have been many documented cases of hormones discovered miles downstream of farms.<sup>xxiv</sup> Although it is unclear whether these hormone concentrations can be high enough to affect humans, they have been shown to compromise the reproductive processes of fish.<sup>xxv</sup>

An estimated 75% of all antibiotics administered to livestock are excreted,<sup>xxvi</sup> and for certain common antibiotics that figure can be as high as 90%.<sup>xxvii</sup> The overuse of antibiotics for



### "Nitrogen and Dead Zones"

Excess nutrients in bodies of water can contribute to the excessive growth of plant life, a process known as "eutrophication," which, in turn, can make water "hypoxic," or low in oxygen.<sup>xi</sup> The effects of eutrophication can be vast. According to the USDA, "as much as 15 percent of the nitrogen fertilizer applied to cropland in the Mississippi River Basin makes its way to the Gulf of Mexico."<sup>xii</sup> This pollution is one of the leading causes of the so-called Gulf "Dead Zone," an oxygen-deprived area as large as 8,000 square miles—almost the size of New Jersey—in which no fish can survive.<sup>xiii</sup>

livestock contributes to the development of antimicrobial-resistant bacteria, and some studies suggest that growth of these resistant bacteria may be promoted in waterways with high levels of antibiotics.<sup>xxvii</sup> Numerous studies have demonstrated that waterways are a prominent means of transmitting these dangerous types of bacteria to humans.<sup>xxix</sup>

### Heavy Metals and Salts

Some heavy metals, such as copper and zinc, are essential nutrients for animal growth—especially for cattle, swine, and poultry.<sup>xxx</sup> However, such elements are often present in animal feed in concentrations far higher than necessary for animal health, along with other heavy metals such as chromium, lead, arsenic and cadmium.<sup>xxxi</sup> Farm animals excrete excess heavy metals in their manure—which in turn gets spread as fertilizer, leading to soil and water pollution. The health hazards resulting from exposure to heavy metals in water include kidney problems from cadmium; nervous system disorders, kidney problems and headaches from lead; and both cardiovascular and nervous system problems from arsenic, which is also known to cause cancer.<sup>xxxii</sup>

Many salts are also present in large quantities in manure, including sodium, calcium, magnesium, potassium, chloride, sulfate, bicarbonate, carbonate, and nitrate.<sup>xxxiii</sup> When introduced to the environment, these salts increase the salinity of waterways, leading to changes in aquatic ecosystems and making water brackish, and therefore unfit for drinking.<sup>xxxiv</sup>

### Organic Matter and Other Solids

In addition to the biodegradable organic matter naturally present in manure, animal bedding, wasted feed, soil, dust, hair and feathers are often mixed with manure in storage and can end up in waterways.<sup>xxxv</sup> The decomposition of organic matter can cause increased levels of bacteria, which in turn reduces oxygen levels in water and kills fish.<sup>xxxvi</sup> This decomposition can also negatively affect the color, taste, and smell of water.<sup>xxxvii</sup>

### Water Usage and Conservation

Agriculture uses a staggering amount of water on an annual basis. In 2000, 41% of all freshwater used by humans in the United States was used for agriculture.<sup>xlii</sup> Perhaps even more notable is that agriculture accounted for more than 80% of US “consumptive use” of water—that share of water which is not returned quickly to the environment.<sup>xliii</sup>

Water overuse is particularly a problem on industrial farms that do not tailor their farming practices on a case by case basis. For example, a dairy that uses an automatic “flushing” system to clean out its animal houses uses an average of 150 gallons of water per cow per day, compared to an average of 5-10 gallons used by farms that monitor their water use in order to conserve it.<sup>xliv</sup> Not only does water overuse hurt the environment, it's also expensive. One estimate from the USDA concludes that increasing water use efficiency on irrigated farms by just 10% could save almost \$200 million per year solely due to the associated savings in fuel costs.<sup>xlv</sup>

### What You Can Do

Small, sustainable farms conserve water and apply waste and fertilizer to fields responsibly, minimizing their impact on local water systems. By supporting small farms such as these, you can help to promote healthier waterways while showing that you do not support the environmental recklessness practiced by industrial farms.

- Visit the [Eat Well Guide](#) to find a farm, store or restaurant near you offering sustainably-raised meat and dairy products. Just enter your zip code!
- Know your farmer. Visit your local farmers' market or join a CSA (community supported agriculture group) and start buying from a farm directly. Ask questions and get to know

### Wells and Groundwater

Although much of the water used in the U.S. is obtained from surface water sources, many families continue to use wells to draw water from the ground.<sup>xxxviii</sup> In fact, groundwater is the source of drinking water for 46% of the U.S. population and for 99% of the population living in rural areas.<sup>xli</sup>

While public drinking water systems are regulated by the EPA, private drinking water wells are not regulated, and are not required to meet EPA clean water standards.<sup>xli</sup> Furthermore, unlike public water systems, private wells aren't required to undergo routine testing by experts. As a result, families that rely

your food and how it is produced. Check out Sustainable Table's [Shop Sustainable](#) page to learn more.

upon private drinking water wells are especially vulnerable to the harmful effects of water pollution from factory farms. In U.S. counties that have industrial farms, approximately 13.5 million households depend on domestic drinking water wells.<sup>xii</sup>

### Did You Know?



The EPA considers agriculture to be "the most widespread source of impairment in the nation's assessed lake acres."<sup>xlvi</sup>

- In the US, 40% of rivers, lakes, and coastal waters are so contaminated that they are unfit for humans to fish in, swim in, or drink.<sup>xlvii</sup>
- An Ohio study revealed that 67 percent of water taken near poultry farms and 31 percent of water near swine farms contained antibiotics.<sup>xlix</sup>

### For More Information

- GRACE Factory Farm Project  
Visit the [photo gallery](#) to see what manure lagoons, sprayers and waste spills look like.
- Concentrating on Clean Water: The Challenge of Concentrated Animal Feeding Operations. [Executive Summary](#) and the [Full Report](#). Produced for the Iowa Policy Project, this comprehensive report provides an outstanding overview of the adverse impacts of factory farms on water quality.
- [Cesspools of Shame: How Factory Farm Lagoons and Sprayfields Threaten Environmental and Public Health](#)  
This NRDC report focuses on the human health hazards created by irresponsible waste disposal practices utilized on industrial farms. The report includes detailed information about the health threats posed by water pollutants from factory farms.
- [EPA Eutrophication website](#)  
This EPA website includes basic background information about eutrophication, an environmental problem caused in part by nutrient pollution from industrial farms.
- ["Pfiesteria: Harmful Algal Blooms as Indicators of Human: Ecosystem Interactions"](#)  
Published in the scientific journal, *Environmental Research*, this article describes *Pfiesteria piscicida*, a toxic alga associated with water pollution from factory farms.

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Dear Russ Anderson

7/14/

I'm writing this letter in concern for our health in Wood County, (Wis. Rapids)

Wysocki Produce & Dairy farm purchased 6,000 acres, wants to cut all the trees off and also put a dairy farm of 3,500 cattle on. Drill huge wells, which will take our water level down, pollute the air, raise our taxes, purchase their merchandise from out of our area, with low paying wages for employment and destroy our home land. Their acreage is less than 1 mile from my home.

The 10 mile creek runs full length in the middle of this property, 7 mile creek on the edge of it and 14 mile creek not so far from it.

Huge farms have already come into a 20 to 24 mile radius. Nekeosa <sup>west</sup> at 7 miles, Plover (Stevens Point) <sup>north</sup> 18-20 miles, Plainfield <sup>east</sup> at 20 miles. And I did hear they want Big flats at 20 miles <sup>south</sup> (don't know if its for sure at Big flats) maybe in future.

If there is anyway you could help us in Saratoga township in Wood County at Wisconsin Rapids; Please let us know.

On Thursday the 19<sup>th</sup> there is a meeting at the Performing Arts Center (Pack) at 6pm. The company and Saratoga town Board will be there.

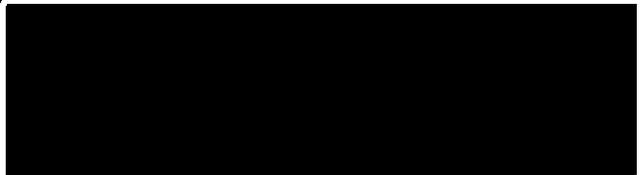
Supervisor at Town Hall

is Dan Forbes 715-325-7130

another Supervisor John Frank 715-325-2656

Clerk Heidi Kawleski 715-325-5204

Please help us.



Please send me a reply also.

Wis. Rapids, Wis.  
54494