Wisconsin Ground Water Association Newsletter

INSIDE THIS ISSUE:

President's Message

On this beautiful autumn day I am reflecting on the changes that have occurred for WGWA since I was first elected President-elect in 1999 and went on to serve as President in 2001 and again this year.

With the able assistance and heavy lifting of Boyd Possin, WGWA is now a clearinghouse of information related to groundwater. Our newsletter is now transmitted electronically to most members, and *WGWA Notes* keep groundwater professionals up to date on items of interest on a timely basis.

The WGWA website (www.wgwa.org) is a useful reference and professionally maintained by Joan Viney. It is a good source of information not only about WGWA but we have added a job search section. If you haven't gone to the WGWA web site recently go and see what is new.

I am pleased that WGWA has forged alliances with other water and environmental organizations. We have held joint technical conferences with the Wisconsin Section of AWRA and helped organize the successful Where the Waters Meet Conference. The Where the Waters Meet Conference was a joint effort of the Wisconsin Association of Lakes, River Alliance of Wisconsin, the Wisconsin Wetlands Association and WGWA. Just last month we had a successful joint field trip to the Devil's Lake area with the Wisconsin Section of AIPG.

As busy people with full lives outside of work, time for professional meetings or field trips is limited. It is imperative that organizations provide interesting and fun activities if they expect members and potential members to participate. I am pleased that the activities that WGWA has helped organize in the last few years have been well attended.

WGWA has reinvigorated the committees that had been dormant in recent years. Brian Hahn has taken the lead on Education Committee with a focus on connecting WGWA with colleges and universities in Wisconsin. Lee Trotta has taken over the editorial reins of the WGWA newsletter, which had been so ably handled by Wayne Hutchinson for several years. Thank you Wayne for all your contributions to WGWA. Along with Lee, Janis Kesy has taken the lead on WGWA's involvement with Groundwater Guardians.

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The newsletter is published four times per year. If you have any suggestions or submissions, please contact us at: Wisconsin Ground Water Association, c/o Marilyn Weiss, WGWA Treasurer, P.O. Box 8593, Madison, Wisconsin 53708-8593. Email: wgwainfo@wgwa.org; Web site: http://www.wgwa.org. The deadline for submissions to the winter newsletter is January 16, 2004.

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Looking ahead to 2004, the annual WGWA meeting will dovetail again with the Where the Waters Meet Conference in Green Bay. The WGWA conference is scheduled for Friday, April 16th, with the Where the Waters Meet conference conducted the day before. Please mark your calendars. We again plan on offering significant cash prizes for winning college student papers/ posters.

WGWA is helping to organize the Groundwater Festival, a one-day event scheduled for April 23rd at the Waukesha County Expo Center. Last year 500 5th graders from around the state attended the event in Stevens Point. This year the attendance is expected to be even greater. We hope WGWA members will volunteer to help lead sessions to share their knowledge and interest in groundwater with young people. Look for more information on this in *WGWA Notes* coming your way.

All of these activities indicate that WGWA is a vibrant meaningful organization. I have enjoyed my time on the Board of WGWA and look forward to continued involvement, if at a slightly lower level!

Remember this is YOUR organization. Make it work for YOU. Come on YOUR field trip. Attend YOUR area meetings. Volunteer to assist on YOUR committees. If you do that, then ALL of us, not to mention the groundwater profession, will be the better for it!

Margy Blanchard
President, WGWA

"Out of Boundaries"

Welcome to a new WGWA newsletter feature. If you have been getting a little tired of the usual articles about too-familiar Wisconsin problems, we think this feature might provide some relief, as well as an opportunity for more members to participate in the newsletter. The purpose of "Out of Boundaries" is to spotlight some of the types of issues or projects that WGWA members may be working on that are not typically found in Wisconsin. Therefore, we are looking for contributions from members for future newsletters. The articles can be on environmental/ground water issues that are seldom or never seen in Wisconsin. Potential topics may include karst hydrogeology, coastal salt water intrusion, ground water and earthquakes, or the joys of finding UXO (unexploded ordinance). Alternatively, the articles could be about types of issues found in Wisconsin but in unusual settings. These could include addressing industrial contamination on a massive scale in Eastern Europe or locating ground water supplies in the Third World. Articles can be a general overview of a particular subject or describe a particular project that you worked on.

The articles do not have to be professional technical papers. Articles should be approximately 1,500 words in length. The article should of course contain proper citations or web links to sources. And since geologists only like to read things with lots of pictures, illustrations are good. Please submit articles or ideas for articles you may be interested in writing to Lee Trotta at lctrotta53072@yahoo.com .

Field Trip Photos *by Boyd Possin*

Precambian ripple marks

The Holy of Holies—Van Hise Rock

Acid Mine Drainage – A Non-Wisconsin Problem

Source: http://www.dep.state.pa.us/dep/deputate/minres/bamr/amd/science_of_amd.htm

Introduction

In spite of mining's long history in Wisconsin, acid mine drainage (AMD) has largely been a hypothetical concern associated with recently completed and proposed mining projects. However, in large areas of the eastern and western United States AMD is a serious problem that threatens surface water and ground water resources, ecosystems, and even air quality. This article provides an overview of the problem of AMD, which is also referred to as acid-rock drainage, and how it is addressed.

How is AMD produced?

AMD is produced by naturally occurring reactions that result when human activities disturb the equilibrium between sulfide mineral deposits and their environment. The generation of AMD requires the presence of three elements: sulfur-bearing minerals (usually pyrite), water, and oxygen. While the reactions can be fairly complex, AMD essentially results from the production of sulfuric acid through the oxidation of sulfide minerals. Certain strains of bacteria can greatly accelerate the reactions that produce AMD, as well as increase its acidity. AMD with a pH below 1 has been documented in association with active microbial activity (see UC Berkley). It has been suggested that without microbial activity, AMD generation would not be much of a problem.

Source: http://www.miningwatch.org/emcbc/primer/acid_mine_drainage.htm

While AMD is by far the most common type of mine drainage, other types of mine drainage may be neutral or alkaline. However, like AMD, they are characterized by high concentrations of dissolved metals and/or sulfate. In addition, AMD is not necessarily defined by a low pH since metals can be a source of H^+ ions.

Mining activities may bring the three essential elements into contact with one another leading to the generation of AMD. Mine openings and pits can provide pathways for water and oxygen to reach in situ, sulfide-containing materials. The generation of waste rock can create piles of crushed, sulfide-containing materials with high permeabilities allowing a constant flow of oxygen and water through the material.

What are the principal problems associated with AMD?

AMD can cause a host of environmental problems. The best known problem is degradation of surface water. Within some regions of the country AMD is the principle source of surface water pollution. Although AMD-impacted surface water brings to mind orange-colored streams (as shown in the accompanying photograph), even clear water can be impacted by AMD. Some pristine-looking water bodies that have been impacted by AMD exhibit pHs below 3. Commonly, AMD leads to the acidification of surface water bodies and the release of high concentrations of dissolved metals. The most common dissolved metals are iron and manganese, although aluminum-rich AMD can occur. In addition, AMD may contain lower, but harmful concentrations of more toxic metals such as copper, lead, and mercury. AMD impacts may damage or destroy natural habitats, degrade or ruin surface water bodies used for water supply, and corrode the concrete and metals in structures in contact with the surface water.

In addition, AMD frequently travels through the subsurface where it can affect ground water. It may damage or ruin aquifers as drinking water sources and damage or destroy water supply wells and pumps.

Finally, AMD can leave high metals concentrations in sediments that may dry out and become sources of contaminated, air-borne dust or pose other direct contact risks.

How do you investigate AMD?

Investigating AMD involves characterizing its nature, source(s), travel pathways, receptors and impacts. The simplest and most common approach is to measure pH in surface water bodies and collect surface samples for laboratory metals analyses. It is also important to identify background pH. In the Eastern United States the pH of normal precipitation is less than 5 due to the effects of acid rain (see USGS). In addition, accurate characterization of the impact of AMD requires careful measurement of discharge and flow rates to determine the quantity of acidic water and metals being discharged.

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Ideally, this information should be conducted over an extended time period to characterize temporal variations in AMD concentrations and quantities.

The characterization of AMD subsurface pathways and impacts utilizes common environmental investigation techniques; such as the installation and sampling of monitoring wells and the identification and sampling of ground water seeps. The installation of specially constructed monitoring wells may be necessary to assess the volume and flow of water in abandoned mines. Tracer tests are used to identify subsurface infiltration and discharge points for AMD, and to map out subsurface pathways.

Soil and sediment sampling and laboratory analyses is conducted to assess deposition of metals in soils and sediments that may later act as sources of water or air-borne contamination

A variety of remote sensing and geophysical investigation techniques have been employed to identify and characterize AMD. Air-borne remote sensing techniques, such as imaging spectroscopy, can sometimes be used to identify and map AMD impacted surface water and soils, or to identify the surface materials that are most likely to be sources of AMD-generating minerals. Geophysical techniques may be used to directly locate AMD in the subsurface, or may be used to located and map abandoned mines that are acting as sources and/or conduits for AMD flow. No single geophysical technique is consistently effective. Numerous techniques have been used including resistivity, electrical, seismic, gravity, and ground-penetrating radar.

What can you do about AMD?

Remediating AMD is frequently a difficult and expensive effort. Because AMD is a long term problem that may take thousands of years to disappear if left unchecked, remediation by natural attenuation is seldom a viable option. Therefore, some form of designed remediation or mitigation is required to address an AMD problem. In some old mining areas, such as parts of the coal fields of the Eastern United States, sources of AMD are so ubiquitous that AMD is essentially a non-point source problem. In these cases, AMD mitigation may have to be addressed on a watershed basis. Unfortunately, in some situations it may be almost impossible to address.

AMD remediation methods are classified as active or passive. Active, or chemical, remedial methods were the first employed, and have been used for decades. They involve the continuous addition of one or more chemicals, such as crushed limestone, soda ash, or ammonia, to neutralize the AMD and to precipitate the metals. This approach tends to be expensive and labor intensive. Not only must a supply of chemicals be maintained, but the system requires frequent monitoring and maintenance to ensure the appropriate chemical conditions are being maintained.

In recent years, passive remedial methods have become increasingly emphasized because they can greatly reduce, or even eliminate, long term operation and maintenance. Many passive remediation methods are based on allowing the AMD to flow through a constructed system that is designed to neutralize acidity and remove metals using naturally occurring chemical and biological reactions. It typically relies on directing the AMD through a neutralizing material, such as limestone, or a specially designed wetland. Other passive measures may involve simply removing one or more of the elements required for AMD generation. This includes, diverting water away from materials with AMD generating potential, permanently flooding them to exclude oxygen, or removing the sulfide-bearing material. Recently, there have been attempts to use bioremediation to counter or eliminate the activity of the AMD forming microbes.

Current mining operations are Federally required to take steps to prevent AMD generation. Prevention consists of either eliminating one of the elements required for AMD generation, or providing sufficient neutralizing materials to counteract AMD generation. One technique called acid-base accounting attempts to estimate the potential volume of AMD that may be generated from a proposed mining operation and the quantity of neutralizing materials required to neutralize it. Other techniques involve minimizing the exposure the AMD generating rock materials to air or water. Tailings piles may be capped and water flows diverted from tailings piles or mines to minimize contact with water. Alternatively, tailings piles and mines may be flooded to exclude contact with air as part of site restoration.

Where do you typically find AMD?

AMD is primarily associated with coal and sulfide ore mining. AMD is a common problem in the coal-mining regions of the Eastern United States due to their relatively high sulfur contents. Because of the widespread nature of coal deposits and mining operations, potential sources of AMD generation are often spread over large areas so that it is often a non-point source problem. Even areas that people commonly expect to be clean, such as national forests, may be heavily impacted by AMD. The production of acidic water and high iron and manganese concentrations are the primary impacts associated with AMD in coal mining areas. The production of more toxic metals is usually less of a problem.

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AMD associated with sulfide ore mining is generally found in the Western United States, although it also occurs in the Eastern United States; typically in the Appalachian Mountains. Because sulfide ore mining focuses on mineral deposits that are more isolated than coal deposits, the associated AMD typically occurs as a point-source problem. Metals contamination, particularly toxic metals contamination, is more commonly a problem with sulfide ore mining related AMD. Acidification is also a common problem.

Why is AMD not a problem in Wisconsin?

With its long metallic mining history why is AMD not a problem in Wisconsin? The answer to this largely lies in the nature of the mineral deposits that have been mined in Wisconsin. The sulfide lead-zinc deposits of southwestern Wisconsin are hosted in carbonate rocks, which act as a natural buffer for any AMD that may be generated. The iron ore deposits of eastern and northern Wisconsin occur as oxide ores rather than the sulfide-type ores that are likely to generate AMD.

The recently mined copper-sulfide deposit near Ladysmith was restored in a manner to minimize the generation of AMD. Tailings and overburden were mixed with crushed limestone calculated to neutralize potential acid generation, and then returned to the mine pit in the order in which they were removed. In addition, ground water is being allowed to return to its normal level. This means the mine and tailings will be flooded eliminating one of the elements required for AMD generation (oxygen).

AMD generation potential has been and will be an important issue with any future metallic mining project in Wisconsin. The recently cancelled mining project near Crandon had included proposed plans for minimizing potential AMD generation. The plans included removing the pyrite from the tailings, mixing it with cement, and then using it to backfill the mine. The remaining tailings were to have no AMD generating potential and were to be placed in a specially designed and maintained landfill.

Obviously any plans to prevent AMD generation are subject to failure. However, given the difficulty of obtaining approval for mining in Wisconsin, AMD generation in Wisconsin may always remain a hypothetical concern.

Troy Thompson
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Calendar of Events

What: WGWA Southern Area Breakfast Meeting; Open Discussion
When: Monday, December 1, 2003; 7:00 AM - 8:15 AM
Where: Sunprint Cafe, Odana Road and Whitney Way, Madison
Cost: Free (Breakfast cost is on you)
Contact: John Tweddale, BT^2, Inc.; phone: 608-224-2830; FAX: 608-224-2839; EMAIL: jtweddale@bt2inc.com

What: "Where the Waters Meet," the 2004 joint meeting of the River Alliance of Wisconsin, the Wisconsin Association of Lakes, the Wisconsin Ground Water Association, and the Wisconsin Wetlands Association. he meeting is currently in the initial; planning stages, but the theme seems to be crystallizing around how the individual can get him or herself empowered to effect change in the water resources arena.
When: Thursday, April 14, 2004
Where: KI Convention Center, Green Bay, Wisconsin
Cost: (to be determined)
Contact: Boyd Possin at boydpossin@wgwa.org

What: Information Management Technology Conference & Expo
When: April 18-21, 2004
Where: Baltimore, MD
Cost: (to be determined)
Contact: check AWWA website www.awwa.org/ AWWA 800-926-7337

WWA Holds 82nd Annual Meeting & Water Utility Expo on September 24-26

Wednesday started with committee meetings. I serve on the Image and Public Relations Committee for WWA. Today's committee topics included preparing to run the Taste Test Contest and planning a WWA brochure.

At the opening session of the convention, the keynote speaker was Dennis E. Mannering, CSP. Dennis is the author of a book "Attitudes are Contagious" on developing proper attitudes. The Mayo Clinic & Johns Hopkins University studies say we can all live longer by reframing our attitude ala Pollyanna. We'll also get better service by being a better customer. The desirable characteristics for a proper attitude include: 1. forgiveness, 2. sense of humor, 3. optimism, 4. set goals & have a purpose, 5. do volunteer work, 6. locate in FL, MT, or AZ.

I then attended several of the concurrent technical sessions (Vulnerability Assessments by Jerry Groth-Strand, Importance of Public Perception by Karl Robe-K. James & Co. and Don Ashbaugh-Oak Creek, Emergency Response Plans by Norm Arendt-SEH, and Water Chemistry by Mike Oneby-EarthTech) while meeting and conversing with engineers, vendors, and utility management. Our WGWA readers might be interested in an excerpt from the talk on Public Perception by Karl Robe that addresses handling "hostile questions". We've all either been in contentious meetings with clients or would like to be prepared when it happens. Karl's advice is to remain calm, tell the truth, don't speculate (if you don't know – say so), disagree respectfully, and never repeat someone else's negative point.

During the afternoon, the WWA held its 16th Annual Water Taste Test Contest on the main stage of the Exhibit Hall. The contestants included New London, Rice Lake, Chippewa Falls, Cuba City, Kenosha, Pardeeville, Middleton, Clintonville, and Shawano. The judges were Dr. Bob Bradley and Dr. Bob Lindsey of the UW Food and Science Dept. and Jack Albrechtson of WWA. Judging was based on flavor, turbidity, and color criteria in a 100-point system. Sample #8 was chosen as best and that winner will be announced at Thursday's banquet.

Throughout the afternoon between technical sessions, I visited many of the 99 vendor booths, which included a fair representation of consulting firms.

On Thursday, the talks included several on radium in groundwater. DNR recommends pilot studies to verify how well treatment technology will work. Design considerations evaluate competing ions, interference, seasonal quality variability, PH considerations, material degradation, treatment optimization, monitoring of radium surrogates, operational controls, and waste characterization.

I will summarize another interesting talk given by Pat Carnahan of Triad Engineering on the City of Milwaukee Water Works Filter Maintenance and Inspection Program. The City of Milwaukee Water Works gravity filtration systems at both the Howard Avenue and Linnwood Purification Plants have been extensively rehabilitated over the last decade. Filter system modifications have included mechanical improvements to the underdrain, media, surface wash systems along with operational improvements that include polymer addition and performance monitoring with individual particle count measurements and process control automation. In addition to these physical and operational improvements, the introduction of ozone as a primary disinfectant and the elimination of a chlorine residual entering the filters resulted in a change in biological activity within the filter bed systems. The filters have been running as biologically active units for approximately two years with activity levels varying seasonally with the Lake Michigan water temperature.

In light of the recent modifications to the filtration and the relatively high importance of filtration within the overall treatment process, the City has formalized its ongoing program to inspect and evaluate the condition of each of their 40 filters. The City's Maintenance and Inspection Program is based in part on AWWA Research Foundation guidelines and the AWWA Filter Evaluation Procedures for Granular Media Manual. The City's program is observing and documenting the physical and operational characteristics for each filter to establish baselines for comparing filters within and between the City's two water purification plants. The current program has an approximate bi-annual filter inspection schedule for comparing each filter's parameters with its baseline values. Major elements of the Filter Maintenance and Inspection Program include:

- Summarizing Filter Operating Data
- A physical inspection of filter structure and equipment
- Filter mudball, media interface and media depth inspections
- Filter coring with media parameter testing (E.S., U.C. and specific gravity)
- Filter bed expansion observation
- Surface wash observation
- Backwash turbidity analyses

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- Media floc retention analysis
- Media microbiological testing

The inspections and process evaluations performed to date have been very useful in identifying maintenance areas, media characteristics and water quality process trends for further consideration. The investment in labor and laboratory analyses have produced detailed, well organized documentation for use in tracking and helping to optimize individual filter performance.

When the talks were finished, all looked forward to the banquet. The winner of the Taste Test Contest was announced as Rice Lake Water Utility. Other award winners included -

Fuller Award --------- Jim Chaffee
Leon Smith Award ------ Marty Glodosky
Meritorious Service Award ----- Pat Francis
Small System Excellence Award ----- Mayville
Golden Drop Award ----------Alan Bares
Service to the Water Industry Awards ----------
Badger Meter Co.
Oconomowoc Utilities

More Field Trip Photos

Note the ripple marks rising up the vertically tilted Precambrian surface behind John Tweddale.
Photo by David Nemetz.

After trip banquet and the Geology group
Photos by Lee Trotta

Review of Fall Field Trip

Registration
Photo by Boyd Possin

We couldn't have picked a better day for a field trip. The weather was perfect, the route was classic, the leaders were expert, and the food was excellent! The registration at Devil's Lake State Park brought together young and old with an interest in geology. When the bus arrived our leaders, Robert Dott and John Attig, quickly packed the 47 of us into a motor coach which, not coincidentally, just happened to have 47 seats, and our adventure began.

We headed south towards Badger Army Ammunition Plant with in-depth commentary from the front of the bus on every meander of the Johnstown moraine and outcrop of quartzite. The trip through the Plant was like stepping back into World War II, passing buildings formerly used to make nitroglycerin and rocket propellant. The first stop was at the reservoir on the north side of the plant where layers of conglomerate and glacially-plucked boulders could be seen. One of the trip participants, longtime WGWA member and legendary well driller, Ed Huntoon, had been there in 1942 to help build the plant with the Civilian Conservation Corps, and regaled us with stories of those long ago times.

Heading back to the bus after last stop
Photo by Mary Vice

At Natural Bridge State Park
Photo by Boyd Possin

Next we headed for Natural Bridge State Park. There the history of the natural bridge and its associated shelter was laid out for us like a Mark Twain story. (Great place for a beer party… ahem, or so I've been told!)

Ableman's Gorge at Rock Springs was a wonder from one end to the other. We got off the bus at an artesian well, now owned by Crystal Springs Water. Trekking up to the old quartzite quarry, we saw a sheer face of Precambrian ripple marks extending vertically nearly 200 feet above our heads. Following Professor Dott down the path strewn with colorful autumn leaves, he led us to breccia zones and important contacts. Finally we arrived at the "Holy of Holies" - Van Hise Rock. There the entire history of University geologic research was laid out for us and tied in a neat package to Van Hise Rock. Further exploration along a railroad track brought to light the Cambrian/Precambrian unconformity and conglomerate on the NE bluff.

When we returned to Devil's Lake State Park, the history of the park, itself, was discussed, after which we disembarked to a delicious dinner of barbeque ribs and chicken. Plenty of warm conversation over dinner with old friends and hiking buddies was the perfect end to the evening.

Dr. Dott locates the natural bridge within the Baraboo district map".

Photo by Mr. Nemetz

Special Well Casing Depth Area; Town of Fulton, Rock County

A "Special Well Casing Pipe Depth Area" is herewith established for the area described below and is effective as of August 15, 2003. Within this area new wells must be constructed to more stringent casing depth and grouting specifications as indicated below.

This area includes an area of about 1.25 square miles located just southeast of the City of Edgerton in the Town of Fulton, Rock County. This area is located in proximity to landfills once used by a sand & gravel firm and an industrial firm. The establishment of this "Special Casing Depth Area" is based on the number and percentage of wells within this area that produce water with high concentrations of volatile organic compounds, especially trichloroethylene (TCE), a common solvent. This "Special Casing Depth Area" is established under the Department's authority provided by Section NR 812.12(3), Wisc. Admin. Code (State Private Well Construction & Pump Installation Code).

LOCATION

This "Special Well Casing Pipe Depth Area" includes an area bounded on the north by Highway 59; on the northeast by Rock River Road, West Watts Springs Road, East Watts Springs Road & the Rock River; on the south also by the Rock River; and on the west by Saunders Creek, extending north back to Highway 59.
This area is described in detail as follows: That portion of Section 3 lying south of Highway 59 and west of North Rock River Road; that portion of Section 10 lying east of Saunders Creek, south of Highway 59 and west of North Rock River Road; that portion of Section 11 lying west of the Rock River, south of West Watts Springs Road & east of East Watts Springs Road to its northeasterly extension and, from that point straight east to the Rock River; that portion of Section 14 lying west and north of the Rock River; and that portion of Section 15 lying north of the Rock River and east of Saunders Creek; T4N, R12E, Town of Fulton, Rock County.

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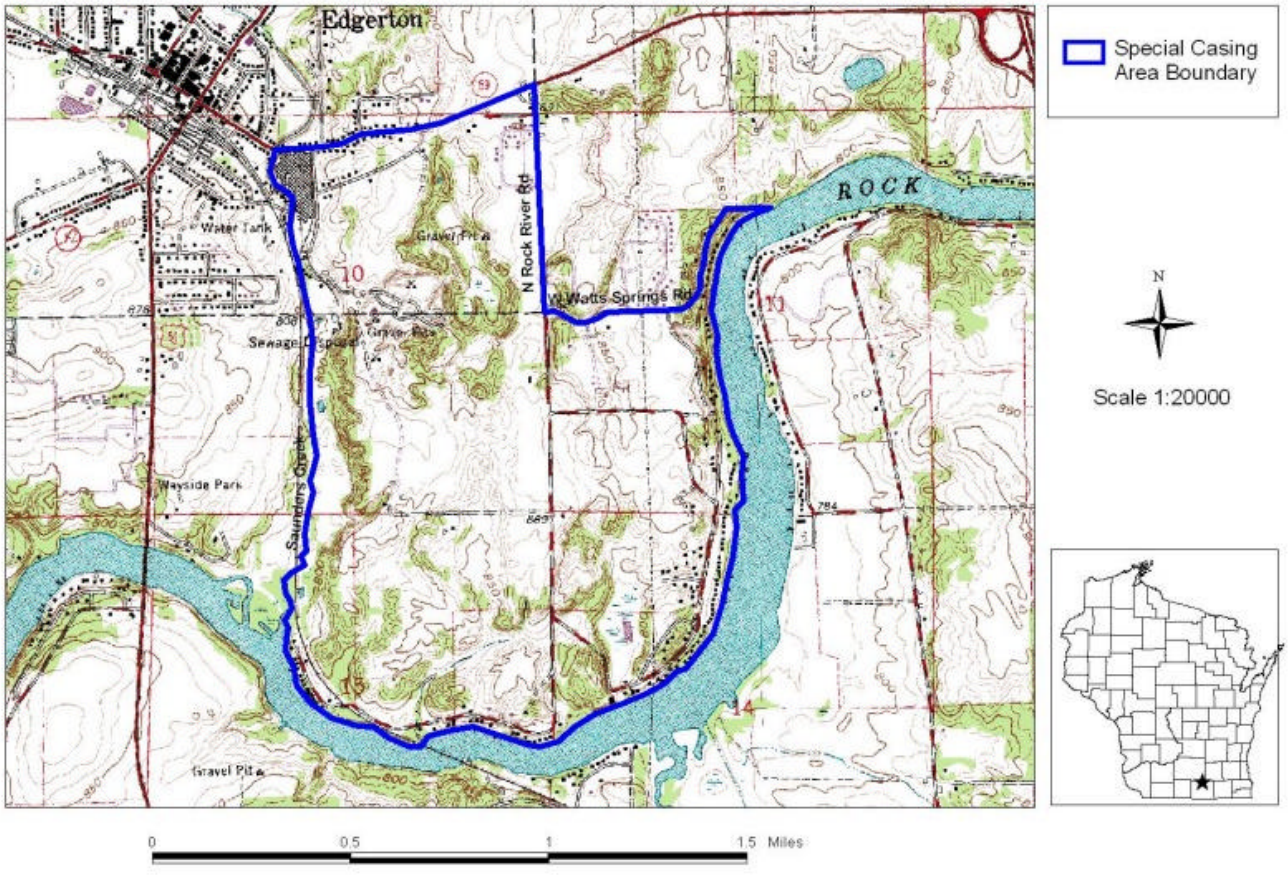
Special Well Casing Depth Area

Town of Fulton, Rock County



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CONTAMINANTS

Volatile organic compounds, especially trichloroethylene (TCE).

WELL CASING PIPE DEPTH SETTING REQUIREMENTS

Within this "Special Casing Pipe Depth Area" new and reconstructed private wells shall be installed with **grouted casing extending at least 30 feet into bedrock and to a depth of at least 225 feet.**

WELL CONSTRUCTION SPECIFICATIONS AND METHODS

Within this 'Special Well Casing Depth Area' private wells may be constructed with percussion or rotary construction methods as specified in NR 812, Wisconsin Administrative Code, but subject to the following additional conditions:

1. An upper-enlarged drillhole (UED) shall be constructed. For a 6-inch diameter well, the UED shall have a diameter of at least 8 ¾ inches. For larger diameter wells, the UED shall be at least two inches larger than the nominal diameter of the permanent well casing pipe.

2. The annular space shall be sealed with neat cement grout using either the 'Bradenhead' or the 'Grout Shoe' grouting method according to the requirements of s. NR 812.20, Wis. Admin. Code.

3. The cement grout shall be ordered from a commercial concrete company and shall have a density of at least 15.2 lbs./ gallon, but preferably have a density of 15.6 lbs./gal. The density shall be measured using a 'mud balance'.

4. The grout slurry shall be adequately screened in order to remove any aggregate before it enters the grout pump hopper.

5. At completion of the grouting procedure the grout shall flow out the top of the annular space with the same density as the grout being pumped from the hopper and have a density of at least 15.2 lbs./gal.

6. The grout shall be allowed to set for at least 24 hours before an open drillhole is constructed below the casing further into the bedrock formation.

JUSTIFICATION FOR ESTABLISHING THIS "SPECIAL CASING DEPTH AREA"

Justification for establishing this "Special Casing Depth Area" is as follows:

1. This area is situated directly downgradient from leachate emanating from several landfills located in the northwest quadrant of this area.

2. Within this area several wells are contaminated with VOCs, primarily TCE. The concentrations of TCE are above the health NR 140 Groundwater Enforcement Standard of 5 micrograms per liter (µg/l.). One well located about 1,300 feet southeast of the main landfill has casing extending down to near the top of the bedrock. A sample of water from this well had a TCE concentration of 36 µg/l.

3. Extending casing to a depth of at least 225 feet below the ground surface and 30 feet into the bedrock will place the grouted casing some distance into either the Prairie du Chien Dolomite or the Cambrian Sandstone. In either case, the groundwater within the bedrock at these depths should be free of VOC contamination.

Glacially plucked boulder at Badger Ammunition Plant
Photo by Lee Trotta

More Field Trip Photos

Bob Dott defining a contact at Ableman's Gorge
Photo by Lee Trotta

Groundwater in the Great Lakes Basin: How is it Managed?

Inspired by recent diversion requests, including one from the NOVA Corporation in 1998 to ship Lake Superior water by tanker to Asia, the states and Canadian provinces surrounding the Great Lakes determined consistent policy was needed to evaluate withdrawals (surface and groundwater) from the basin. Annex 2001 to the Great Lakes Charter, is the foundation for providing states and provinces a method for governing decisions on new water users and water withdrawals. Over the next year, the Great Lakes Governors and the Premiers of Canada, with input from multiple stakeholders, will develop a set of binding agreements for reviewing withdrawals and diversions from the Basin. Traditionally, the surface water boundary has been used to evaluate which communities/organizations are within the Great Lakes basin. Annex 2001 also regulates groundwater tributary to the Great Lakes. A composite of groundwater information on a basin-wide scale is generally not available and the localized data indicate groundwater divides are less documented than surface water divides, may not correspond to surface water divides, and can shift in time depending on stresses to the system. Consequently, the Governors and Premiers are faced with the question of how to manage Great Lakes groundwater when groundwater divides are often beyond the surface water divide and how would this influence communities near surface water or groundwater divides.

An expert workshop[1] was recently held by the Program on Water Issues at the Munk Centre for International Studies at the University of Toronto to focus on groundwater and its management within the Great Lakes basin. A "catalyst" document[2] was used as a foundation for exchange between an invitation-only, multi-stakeholder group, many of which serve on the Annex 2001 advisory group to the Great Lakes Governors and Premiers. WGWA observed and attended the workshop. Workshop participants and observers, generally agreed with the discussion document which included a summary of applicable regulations and available technical information; a vision for groundwater management; and principles to attain basin-wide management. The vision was broadly supported and includes:

"Citizens of the Great Lakes Basin -- individuals, organizations, industries and their governments – understand the value of groundwater and its vital contribution to the economy and the health of the Great Lakes ecosystem, and, empowered by governments, make responsible decisions about groundwater, sustaining the resource for the benefit of current and future generations."

The document, once finalized, is hoped to serve as background information for policy makers in the US and Canada. The need for collaborative input to policies, and subsequent management, from a local, regional, national, and bi-national level was recommended. Some of the key barriers identified at the workshop for managing groundwater within the Great Lakes basin includes availability and exchange of basin-wide data; implementing conservation when the "general" public views the basin as having an unlimited supply of water; and determining the decision makers.

Specifically, Waukesha, Wisconsin was discussed in that it is unclear as to who would make a decision on whether such a community could withdraw Lake Michigan water because the City lies outside of the surface water divide (Figure 1). However, regional groundwater modeling of southeast Wisconsin indicates Waukesha is located within the basin's groundwater divide[3]. In mid-November, the model will be included on a website funded by the Great Lakes Protection Fund which documents the USGS evaluations of the interactions between groundwater and surface water in the Great Lakes basin[4].

With increasing groundwater withdrawals in Waukesha and other communities in the Milwaukee, Fox Cities, and Green Bay areas, water quality continues to decrease with some constituents (e.g. radium, gross alpha, and dissolved solids) exceeding EPA's established drinking water concentrations. Many of these communities are looking for alternative water sources, including potentially using Lake Michigan water.

The Great Lakes Protection Fund recently solicited research efforts to understand potential Annex 2001 implementation issues. Several Annex 2001 case studies evaluated how surface water and groundwater users can meet the four principles of Annex 2001. One of these case studies focused upon Waukesha Wisconsin[5]. A summary of the Annex directives includes:

- preventing or minimizing basin water loss
- having no significant adverse individual or cumulative impacts
- providing an improvement to the ecosystem
- complying with other laws

Minimizing basin water losses might include the use of return flow and/or use of water conservation measures. As evidenced by the Waukesha Case Study, stakeholders are keenly interested in meeting this objective,

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but were open to considering a range in alternatives. Resource improvements to waters and dependent ecosystems of the Great Lakes, was also a key element of the Waukesha Case Study. Several types of improvements were identified such as stream and wetland restoration, headwaters and habitat preservation, and water quality improvements. Groundwater pumping cessation from communities within the Great Lakes basin, would provide improvements to the basin as well. A key idea from the case study indicated a single proposed direct lake withdrawal would likely have immeasurable habitat influence, but that a measurable habitat improvement could be provided to potentially offset any collective effect of multiple withdrawals.

The Council of Great Lakes Governors is in the process of drafting Annex 2001 policy guidelines with a public draft expected by early next year. A tiered system is being considered for withdrawal requests. In general, the larger the withdrawal request the more extensive the application, approval process, and required ecosystem improvement.

Further discussion on groundwater management within the Great Lakes basin is expected as Annex 2001 guidelines are finalized by middle of next year and as Waukesha and other communities within the groundwater divide (but outside the surface water divide) search for other water supplies. Accordingly, the Program on Water Issues at the Munk Centre for International Studies at the University of Toronto is planning another meeting to discuss future groundwater management and governance in the basin.

CH2M HILL. Making a Decision on Improvement: An Annex 2001 Case Study Demonstration Involving Waukesha Water Supply. August 2003.

Kathi Ried can be contacted at CH2M HILL, 135 South 84th Street, Suite 325, Milwaukee, WI 53214, 414-847-0464, kried@ch2m.com.

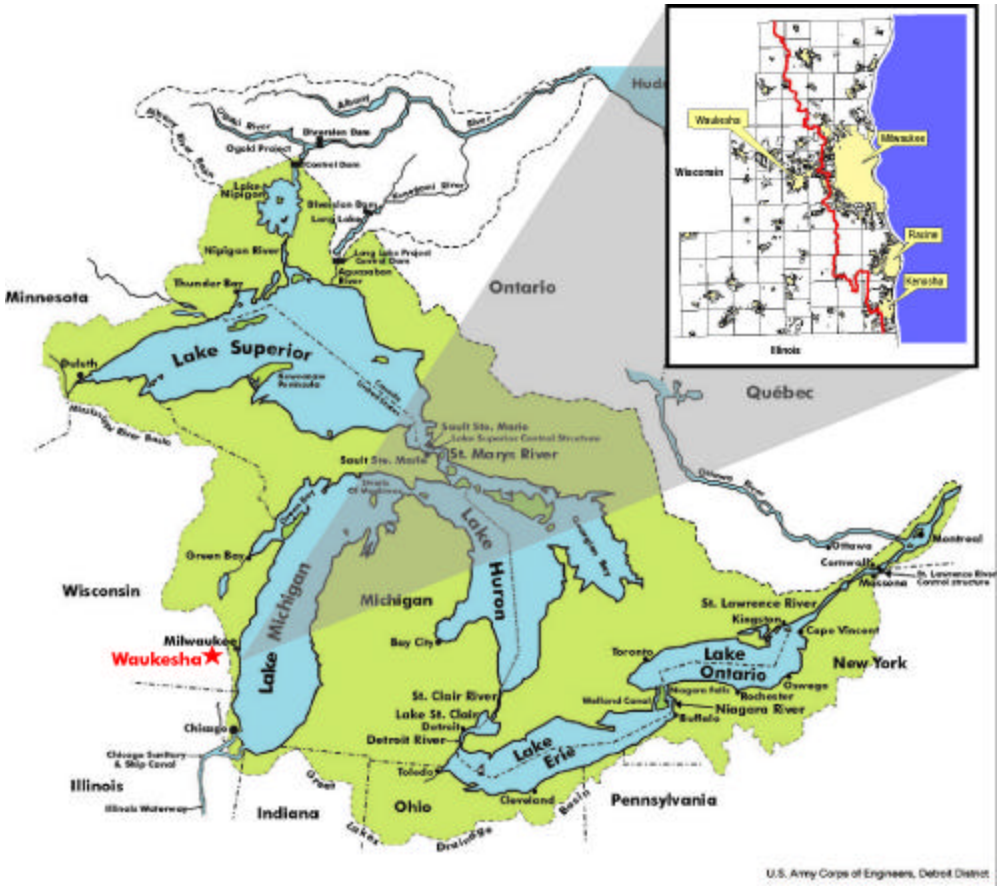
[1]Workshop on: Managing Groundwater Resources in the Great Lakes Basin, University of Toronto, Munk Centre for International Studies, Program on Water Issues. Toronto, Canada, September 15 and 16, 2003

[2]Gerald Galloway and Ralph Pentland. Managing Groundwater Resources in the Great Lakes Basin: Securing our Future, Draft Vision and Principles, Working Paper #2, August 2003.

[3]Great Lakes Withdrawal Forum, Kenosha, Wisconsin, October 15, 2003. Modeling was performed by the U.S. Geological Survey, Wisconsin Geologic and Natural History Survey, and Southeastern Wisconsin Regional Planning Commission.

[4]The website will be accessible from a link on the Wisconsin USGS District homepage at http://wi.water.usgs.gov/

[5]CH2M HILL. Making a Decision on Improvement: An Annex 2001 Case Study Demonstration Involving Waukesha Water Supply. August 2003.



Great Lakes Withdrawal Forum: "Connecting the Big Picture to the Local Problems"

If Kathi Ried's preceding article sparked your interest, this one will give you something to sink your teeth into. This October 15th event, co-sponsored in Kenosha's beautiful Kemper Center by WWA, AWRA-Wisconsin Section, and West Shore Water Producers, provided a series of excellent presentations by those most knowledgeable about the details of water withdrawal in the Great Lakes Basin. David Lewis (see photo) of the Kenosha Water Utility provided facilities arrangements. Opening remarks and introductions were made by **Mike Rau** of WE Energies Water Services. Mike fostered the notion that technical people should be leading this issue, not the politicians. Panel discussions on the schedule are meant to allow audience input.

Bob Biebel – Chief Environmental Engineer for SEWRPC – described the SE Wisconsin drinking water situation. There are 9 surface-water systems with use decreasing vs 50 ground-water systems with use increasing. 22 of the 53 radium violators are in SE Wisconsin. This is a deep aquifer problem. USGS monitoring wells show a 4+ ft/yr water level decline. The shallow aquifer is only in danger if a switch is made from deep aquifer supplies. Six systems have an arsenic problem.

Lake Michigan provides an ample source with substantial treatment plant capacity (an excess of 230 mgd), but has regulatory restrictions. The SE Wis. Regional Groundwater Model showed the pumping center shifting to Waukesha after Milwaukee went to a surface-water supply after 1990. There has been a reverse of deep flow. This flow changed from going to under the lake to coming from under the lake. The ground-water divide has also moved in response to pumping.

Some communities have dealt with the radium issue with well construction work. SEWRPC released a proposal to prepare a Regional Water Supply System Plan. Work should begin right after January 1, 2004. There is also a Tri-State initiative (led by Sarah Neuremberg of NIPC) in IL, IN, and WI which has already set goals and established subcommittees to achieve them.

Dan Injerd – IL DNR "How Illinois manages Water Resources in a Metropolitan Area"
Sixty-five percent of the people in Illinois live in 7% of the land in NE Illinois. This presentation focused on the Chicago Diversion over the last 8-10 years. A 1967 Decree amended in 1980 limits diversion from Lake Michigan at Chicago. Droughts heightened worries about running out of water around 1985. A 1996 Memo of Understanding kept the settlement out of court and limits the diversion to only 2.1 mgd.

The deep aquifer has been overpumped (~180 mgd) in the past, but now is pumped at close to its sustained yield (65 mgd). New water allocations must reduce pumpage from the deep aquifer. To meet forecasted growth, NE IL will need an additional 225 mgd.

When the average annual Chicago Diversion amounts to more than its allocated 2.1 mgd, it builds up a debt. The diversion debt built up in the 90s is being paid back slowly. These water diversions are used for domestic (54%), navigation & water quality (~20%), and stormwater runoff (~20%). Illinois agrees to pay off its water debt by 2019. New lake diversions must be 1) cost effective, 2) reduce deep aquifer use, 3) require water conservation. In granting diversions, the DNR's goal is to recognize diversity in size and economy of public water systems. Tools like "water demand forecasting" are employed, using population, household size, employment, and historic use as variables. The water demand in 1988 was 830 mgd while in 2003 was 600 mgd due to conservation efforts. Enforcement of the rule that unaccounted-for flow shall not exceed 8% of a system's total pumpage has brought the regional average from 10% in 1979 to ~4% in 2000. The sluice gates at the harbor were repaired in 1998 and diversion went down dramatically – only 2312 cfs in 2003. The State's water debt is now only 584 cfs, helped by low Lake Michigan levels lately.

Judy Beck – USEPA "Lake Michigan Watershed Academy"
Ecosystem planning to manage Lake Michigan includes States, Provinces, and Indian Tribes. Lake Michigan is the only U.S.-owned Great Lake. We're overdrawn on our natural budget. Regional dialogue on vision & goals must get down to local decisionmakers, therefore the Watershed Academy was formed. The goal is to reduce lake stressors driven by land use through peer-to-peer relationships. They monitor the status of fish edibility, drinking water, swimmability, habitats, public access, sustainable activities, exotics pollution pathways, stew-

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ardship, collaborative ecosystem management, and information on an annual scorecard.

David Naftzger – acting Executive Director of the Council of Great Lakes Governors "Great Lakes Water Restoration, Protection, and Management"
David went over the legal framework guiding Great Lakes management. A 1909 Treaty created the International Joint Commission (IJC). The 1985 Great Lakes Charter said no State or Province would approve new diversion/consumptive use >5 mgd without prior notice and consent. The 1986 Water Resources Development Act (WRDA) required approval of all 8 governors for diversion from the Great Lakes. This Act may not apply to basin ground water and does not apply a threshold (i.e., triggered by first drop).

Large withdrawal proposals since this legislation include those for Pleasant Prairie, WI, Lowell, IN, Mud Creek, MI, Akron, OH, and the Nova Group (a Sioux St. Marie idea to tank water to the Far East in quantities under the legal limit). It has become obvious that there are some flaws in existing legislation. In any attempt to update the rules, Governors and Premiers want to retain authority. On June 18, 2001, a Great Lakes Charter Annex was formulated which calls for a management regime in place by June 2004 that gives a scientific basis for decisions. In the scramble to get this accomplished, it is apparent that the quality of data for basing scientific decisions varies widely across the region. Minnesota has an excellent jurisdiction system and other legal entities do not. Advisors in this effort include Kerry from AWRA and Jim Nicholas of the USGS. New legislation will be needed in the States and Provinces to implement the agreement.

Chuck Ladine – Wisconsin DNR (substituting for Bruce Baker) "What is the Great Lakes Charter Annex 2001?"
Pleasant Prairie had radium in their groundwater and nearby Kenosha had a bountiful surface-water supply. DNR started a notification process and many views were received. Passage of WRDA stopped the consensus process of the 1985 Charter and allowed tanker export. Public outcry was enormous. Now a Basin-support system replaces a State-support system. We need agreement on standards and a way to get away from the current "veto" situation. We hope for a series of withdrawal thresholds in which the State has jurisdiction below 3 mgd. As planned, regulation will be shared and the process will be rigorous. Data management will be more important.

Jeff Edstrom – Cadmus Group "Understanding Improvement under the Great Lakes Charter Annex"
Jeff looked at case studies in Oak Creek, WI, and Akron, OH. The Annex goals are to protect the resource, be durable, and be simple. Under the Annex, each approved diversion will require compensatory improvement. He showed example improvement activities listed on matrices for specific goals. The level of recompense depends on how much water is diverted, the source, the consumption, and the discharge point. One can calculate a withdrawal index from the above data. This effort scales the relative impact.

An example calculation would plug the following factors into a formula. Source: lake = 1, tributary = 2, groundwater = 3. Discharge: In-basin = 1, return = 2, out-basin = 3. Withdrawal is entered in mgd. Consumption is entered as a percent. These numbers are not very scientific, but provide a methodology for comparing potential improvements with the withdrawal downside. The ultimate recipient of the water is responsible for the improvements. We need effective mechanisms to ensure improvement implementation.

Mark Mittag – CH2M Hill "Great Lakes Water Use Following the Ecosystem Improvement Principles of Annex 2001"
Annex 2001 defines waters of the Great Lakes Basin as the Great Lakes and all streams, rivers, lakes, connecting channels, and other bodies of water, including tributary groundwater, within the Great Lakes Basin. It defines an improvement as additional beneficial, restorative effects to the physical, chemical, and biological integrity of the Waters and Water-Dependent Natural Resources of the Basin. Mark went over a Waukesha case study of suitable improvements to the basin. The USGS, CH2M Hill, Reukert & Mielke, Policy Solutions, and city officials participated in the study looking for a win/win situation. It was determined that stopping groundwater pumping equals an improvement (flow reversal, rebound in cone of depression, etc.). However, guidelines say one must be able to measure the improvement in ecosystem function with an index of biotic integrity or quality index (e.g., dam removal, shoreland restoration). Due to the difficulty in quickly measuring improvements due to stoppage of groundwater pumping, Waukesha will do a stream restoration project for their "measurable" improvement.

PANEL DISCUSSION "Regional Water Planning". Panelists = Jim Engelhardt (Bonestroo, Rosene, Anderlik & Assoc.)-moderator, Sarah Neuremberg (Il Reg Planning Comm.), Judy Beck (EPA), Dan (AWWA-IL), David Naftzger (Grt Lks Council of Govs)
Sarah:The Tri-State organizations try to plan transportation, water, and land use efforts together. Indiana, however, is pulling back from such water supply issues due to budget.
Judy: Where does the water from Lake Michigan go? What Vulnerability Assessments miss is paving over of recharge areas. The Lake Michigan Watershed Academy serves as a tool to convene people. It's goal is

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common monitoring and reporting standards.
Dan: Long-term water supply issues must be investigated. Our comments can influence the structure of the agreement through AWWA. A barrier to fair a diversion agreement is the veto policy. The IJC authorized a huge diversion from Lake Superior for Lake Michigan level adjustments and for hydropower.
David: Regional partnerships are key. Improvement implementation could lend itself to political pork barrel trades, which may be unduly burdensome to cities having radium problems.
Ed (audience member from Springfield, IL): Illinois mayors want to be able to drill a well when they want. There is no comprehensive groundwater management authority in the State.
Lee (audience member from Brookfield, WI): The disparity of groundwater management efforts among States and Provinces adjoining the Great Lakes is what will hinder fair application of the Annex formula. Minnesota's withdrawal permit system provides the best data in part because I was the administrator of that program for 10 years. I even helped design the Great Lakes Water Use Data Base for the IJC. Those States/Provinces that refuse to meet minimum data standards should expect to take their lumps in the final equation. This threat could stimulate better monitoring programs.

PANEL DISCUSSION "Case Studies – Waukesha, Indiana, New Berlin". Panelists = Greg Harrington (UW-Madison)-moderator, Jeff Edstrom (Cadmus Group), Peter Johnson (Council of Great Lakes Governors), Steve Schultz (Reukert-Mielke), Dan Duchniak (Waukesha Water Utility)
Dan: Not only is access to surface water an Annex issue in Waukesha, even a western well supply may need a permit.
Jeff: Described the Lowel, IN, case.
Steve: New Berlin, WI, straddles the divide 50/50. They have 10 wells and 6 are in deep sandstone with radium problems. We recommended the Lake Michigan source through the City of Milwaukee. The plan was approved earlier this year by Milwaukee for the portion beyond the divide. We've asked the State to allow the supply of both sides in a plan to withdraw 3.3 mgd and return 3.5 mgd to the Milwaukee Metropolitan Sewerage District. The DNR has deferred that decision to the Governors. If a diversion goes out and then back into a basin, it still counts as a diversion by Federal definition (if not State). The compliance plan due in December for the 6 wells in radium violation will include diversion. The cost difference between a new surface-water supply and a new ground-water supply is minimal, but the quality of Milwaukee water is better and it requires less treatment. Brookfield, WI, is also on the boundary, but their sewers go to the Fox River.
Dan: At Waukesha, the consent order for compliance is due by December 8, 2006. We propose leaving non-compliant wells in standby mode until a new water supply is developed (either Great Lakes or western well). The water quality is deteriorating too fast to consider water treatment. The current groundwater supply is tributary to Lake Michigan.
Peter: Governors may stick with the surface-water divide for implementation because the ground-water divide changes with pumpage. Thorough ground-water mapping is not planned.
Dan Fienstein (audience member from USGS-Madison): The ground water at Waukesha is not technically Lake water, but storage from deep aquifers.
Peter: In the Sporhausy vs Nebraska case, Mr. Sporhausy pumped water across the State line into his farm in Colorado. The ruling said that such diversion can't be stopped for commercial reasons, only environmental. Therefore, we can't turn water into a commodity and issue credits to one system tradeable to another system (as suggested by one audience member).

At the end, **SUMMARIES** were given of each panel discussion for the benefit of the larger group. The only panel discussion I had missed was on "Groundwater/ Surfacewater Issues". Linda Mohr (CH2M Hill), the moderator, indicated the most important finding was that there were no tools for implementation of Best Management Practices regarding this interaction. Slides used in most of the day's presentations will be placed on the WWA website www.wiawwa.org.

Another Field Trip Photo

Pure spring water at Abelman's Gorge
Photo by Boyd Possin

National Rural Water Association
Offers Risk Assessment Training and Certification

Security has been a major focus for the water industry since September 11 and the National Rural Water Association is a forerunner in developing security solutions.

Dave Lawrence with the Wisconsin Rural Water Association is just one of many water professionals who has risen to the call of protecting our Nations water resources by participating in the NRWA's security training assessment course, "Risk Assessment Methodologies for Water Utilities (RAM-WSM)," produced by Sandia National Laboratories.

The NRWA security training initiative comes at a time of increased awareness and concern about the safety of water supplies in our rural communities.

Dave Lawrence was one of fifty two rural water professionals representing thirty five states participating in this most recent risk assessment seminar held in Austin, Texas. This training focuses on measuring the liabilities and consequences of security threats and; in turn, implementing cost effective procedures to minimize risks.

Participating utility professionals received certification in risk assessment showing their: ability to set goals to achieve effective security systems, skill to identify essential assets for producing safe drinking water, capability for implementing a risk-based model for prioritizing assets needing protection and creating an action plan for immediate implementation.

While designed for the water supply community RAM-WSM, contains sensitive information and is not available to the general public.

This training provides NRWA's state associations with the same credentials as any other organization or firm who may respond to RFPs on conducting security vulnerability assessments. Through this network of certified professionals, the rural water industry continues to show its dedication to America.

Additionally, NRWA provides water utilities with security assessment tools including but not limited to: an online Security Vulnerability Assessment Engine which has been determined by EPA to address all six of the elements common to a comprehensive Vulnerability Assessment, an Emergency Response Template; Security Vulnerability Self Assessment for Systems Below 3,300; Security Vulnerability Self Assessment for Systems Between 3,300 -10,000; A Utility Guide For Security Decision Making; and a Public Relations Campaign focusing on tampering with drinking water supplies is not fun and games but a federal offense.

The December workshop was attended by a national audience made up of members of the National Rural Water Association and its state affiliates including: Alabama, Arizona, Arkansas, California, Colorado, Florida, Georgia, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine/Atlantic States, Michigan, Mississippi, Missouri, Montana, Nevada, New York, North Carolina, North Dakota, Northeast Rural Water Association, Oklahoma, Oregon, Pennsylvania, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, Wisconsin, and Wyoming.

Contact Person- Ken Blomberg
Phone- 715-344-7778

Changing Landscapes 2: Anticipating the Effects of Local Decisions

Decision Support Tools Evaluation Workshop
University of Wisconsin-Madison Pyle Center
January 22-23, 2004

The Wisconsin DNR and its partner organizations again seek your input. Due to overwhelming interest and strong pressure to capitalize on the original outcomes, a second *Changing Landscapes* workshop will be held this winter in Madison, Wisconsin. ***Changing Landscapes 2: Anticipating the Effects of Local Decisions*** is a two-day workshop where we ask you to help us review and evaluate decision support and impact assessment tools.

➡ This is a great opportunity for planning practitioners, agency staff, Extension agents, nonprofit leaders, resource professionals and others who assist citizen planners and local decision makers regarding land use issues.

➡ Come experience a variety of tools that can be used to strengthen the planning process and everyday land use decisions.

➡ Come learn about these important tools from the people actually creating this new technology. They want to hear from you!

The two days will consist of demonstrations of selected tools with opportunities for questions, idea-sharing, and hands-on interaction. You will then have the opportunity to tell us what you think. Do you understand the tool? Is the tool useful? This evaluation exercise will help the DNR boil-down these products into a useful toolbox that can be shown around the state to decision-makers and citizen planners.

Don't miss your chance to help the DNR and other technical assistance providers evaluate the usefulness of these tools. Attendees will leave the workshop with knowledge to strengthen local efforts to support sound land use decisions and protect our state's natural resources. Through discussion, demonstration and practice, learn how science and technology can be used to actively influence the public policy process.

Changing Landscapes 2 will take place on January 22 and 23 at the University of Wisconsin-Madison's Pyle Center.

You can find registration and more information online at http://www.dnr.state.wi.us/org/es/science/landuse/Changing_Landscapes/index.htm. Registration is limited and closes on January 15. Enrollment for the first *Changing Landscapes* filled within a week so be sure and register early.

This workshop is co-sponsored by: the Wisconsin Department of Natural Resources, Wisconsin Department of Transportation, Wisconsin Department of Agriculture, Trade and Consumer Protection, UW-Extension, UW Land Information and Computer Graphics Facility, UW-Madison Department of Urban and Regional Planning, 1000 Friends of Wisconsin, Rock River Coalition, Gathering Waters Conservancy, Wisconsin Chapter of the American Planning Association, UW Stevens Point Center for Land Use Education, and Wisconsin Realtors Association.

For more information, contact Matthew Murrell at (608) 267-0579 or Dana Lucero at (608) 266-5227.

Tricks and Traps on Copying and Pasting from Adobe Acrobat PDF Files

From time to time, all of us use one version or another of Adobe Acrobat to read "PDF" files, typically on the Internet. If one works in the regulatory business, for example, virtually all statutes, regulations, and administrative codes are available in PDF format.

PDF files have one enormous advantage over standard word processing files, such as those produced by MS Word, or WordPerfect. While a word processing file will often change its appearance and pagination in a Windows environment as a function of whatever printer is selected and whatever fonts are installed on the system, a PDF file looks and prints exactly the same way on each and every system, regardless of the printer, and regardless of the fonts that are installed on the system. That's because PDF files carry their own formatting structure that is printer independent, and have font codes embedded in them which are independent of system fonts.

Yet, a PDF file is a genuine text file, not a graphics file. That is, a PDF file is not a "picture" of text, such as a scanned bitmap image. Rather, it is a text file, so that, unlike a graphic file, individual words, lines, sentences, paragraphs, or even whole document, can be copied into the Windows clipboard, and pasted, as text, into other Windows applications.

This comes in handy, for example, when one wants to cite a piece of code or statute in a word processing document. Certainly it is easier to select, copy, and paste the passage from a PDF file, than it is to retype it by hand!

Selecting Text

The first order of business is learning how to select text you want to copy while viewing it in and Adobe Acrobat application, such as Acrobat Reader. The image below is the menu area at the top of my version of Acrobat (the full version which has many more options than does Acrobat Reader). The top of your Acrobat screen may look quite different from this one, but you will nevertheless have the button that is circled:

This is the text selection button. Click it, and your cursor will change shape, from a hand to an I-beam. You then are free to select away, as you would in any application, by holding down the left mouse button while dragging the cursor over the passage you want to select.

Once the passage is selected, you will right click on it, and select "Copy" from the drop-down menu. This places a copy of the selection into the Windows Clipboard.

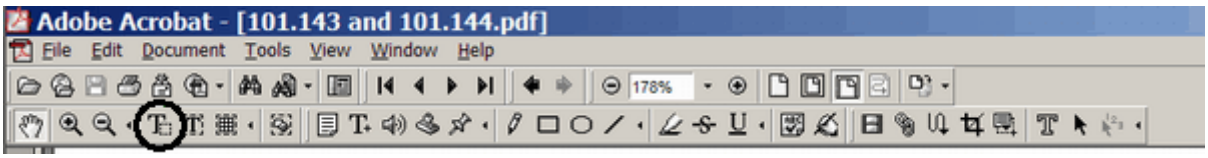
TRICK: A special case arises when you want to select text that is in a multi-column format, as are many documents (including code and statues). In this case, you should hold down the control (Ctrl) key before you click the left mouse button. You then click and hold the left mouse button in the upper left hand corner of the block of text to be selected, and drag a text selection box down and to the right, until the block of text is outlined. Once you have the box sized properly, let go the muse button and the text will be selected. Then right click on it and copy to the Clipboard. Piece o' cake!

Pasting Text

Presumably you will want to paste the selected text into a word processor or an e-mail package. of you execute a sample paste command, you will get the text alright, but you will also get all of the text attributes (things like the PDF file's font type and size, bolding, underling, line spacing, etc.), which, more often than not, you do not want! In that event, you need to use the "Paste Special" command. You'll find it on the Edit menu of almost any Windows application. In a word processor, such as MS Word of WordPerfect, you'll want to choose it, and then choose the "Unformatted Text" option. You can then change the font type, size, etc., to whatever you want.

TRAP: Another thing to know is the annoying fact that every line in a pasted block of PDF text ends up being a separate paragraph! Therefore, if you want a paragraph to behave like a paragraph, you'll have to go to the end of each line, hit the space bar once, and then hit the delete key. For short blocks of text this is not too onerous, but for longer ones it can get tedious. I'm a WordPerfect junkie, so I've developed a macro which does this for me, almost instantly. I don't know MS Word well enough to make a similar macro, but I bet there is a way.

Boyd N. Possin, P. G.



WGWA Board Meeting, October 22, 2003 (Conference Call)

Persons present: Margy Blanchard, Boyd Possin, Marilyn Weiss (left at 7:30 p.m.), Tom Riewe, Janis Kesy, Lee Trotta (left at 7:00 p.m.), Dave Nemetz, Becky Caudill, Joan Viney (left at 6:50 p.m.), Kathy Reid (joined at 7:10 p.m.) (via phone)

I. Call to order about 6:30 pm.

II. Last meeting minutes (July 3, 2003)- Minutes approved. Minutes are posted on website.

III. Treasurer's Report – Account currently $ 15,595.38. $3,565 spent on schools/donations. $7,235 received in membership dues this year.

IV. Membership Report – As of October 22, 2003 - 327 paid members. Eleven student members. Sixty-three new members. Corporate members – 180. There were a number of corporate memberships that dropped.

V. Website – discussion on member only section. Password protection removal. Discussion on need for password. Boyd motioned to eliminate password, rename member only section to newsletter section and additional section for Board meeting notes. Marilyn seconded the motion. Plan to monitor what happens to the membership with website change.

VI. Reports from Lee Trotta:

Newsletter status – currently have more articles for this edition than needed. Targeting a mid-November publication.

Groundwater Festival – Set date of April 23, 2004 at Waukesha County Expo Center. Both indoor and outdoor space available. Smaller group of planners than last year – WGWA, Pier WI Group and UW-Waukesha. Need to start soliciting contributions and fund raising. Last year WGWA contributed $2000 to the festival and an additional $315 to pay for the bus for a school in Madison. WGWA will consider contributing for 2004. Would like to have WGWA members participate at the event.

GG Committee – Meetings on the third Thursday of the month. Group consists of Lee, Janis, John Janssen and Doug Cherkauer. Planning of GW festival – beyond money the festival needs WGWA volunteers to participate in activities.

VII. Old Business

- Education Committee – Brian Hahn was not available to provide an update.
- "Where the Waters Meet" – April 2004 (April 15) conference planning moving forward. Need to find an example person or organization to demonstrate citizen (non-professional) involvement in groundwater issue. Boyd to send a WGWA note seeking a person or organization.
- WGWA conference – April 16, 2004 Holiday Inn, Green Bay. Need to send out a call for papers. Would like original papers from students as well.
- 2004 Officer Elections – Dave Nemetz has agreed to run for president-elect. Marilyn Weiss has agreed to run for treasurer again. Dave will need to provide a paragraph of introduction for himself. Ballots to go out late November via email or hard copy if no email address. Ballots due back December 19, 2003.
- Becky Caudill – at large board member to fill slot to be vacated as of January 1, 2004. Marilyn made motion to approve Becky. Boyd seconded.

VIII. Kathy Ried gave a report on her trip to the University of Toronto, to attend on behalf of WGWA Great Lakes Basin Workshop. Excellent workshop regarding managing of groundwater with in the Great Lakes Basin. How to handle future request for groundwater within the Great Lakes Basin. Participants included US and Canadian advisory group. Approximately 30 participants. Twenty-four observers from invited organizations. Kathy will have an article in the newsletter summarizing the workshop.

IX. Next board meeting January 7, 2004.

X. Meeting adjourned about 7:45 p.m.

News from the Treasurer

Marilyn M. Weiss

ACCOUNT SUMMARY (April 1 - June 30, 2003)

BEGINNING BALANCE July 1, 2003			**$17,578.42**
	DEPOSITS	**WITHDRAWALS**	**BALANCE**
MEMBERSHIP			
2003 Membership Dues/Refunds	60.00		
2004 Membership Dues/Refunds	30.00		
Mailings			
Subtotal	90.00	0.00	17,668.42
2003 CONFERENCE			
Registrants / Deposit / Refunds			
Miscellaneous Costs			
Subtotal	0.00	0.00	17,668.42
JULY HAZWASTE CONFERENCE			
Subtotal	960.00	798.80	17,829.62
PG EXAM STUDY GROUP	0.00	157.50	17,672.12
NEWSLETTERS			
Newsletter 2		400.00	
Newsletter 3			
Subtotal	0.00	400.00	17,272.12
WEB SITE	90.00	0.00	17,362.12
MISCELLANEOUS			
Board Meetings		210.45	
Bank Charges			
Office Supplies			
Post Office Box		48.00	
Scholarships / Donation		500.00	
Miscellaneous		276.48	
Subtotal	0.00	1,034.93	16,327.19
	DEPOSITS	**WITHDRAWALS**	**BALANCE**
ENDING BALANCE June 30, 2003	**$1,140.00**	**$2,391.23**	**$16,327.19**

The 2003 Board, Committee, and Area Coordinators

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bhahn@bhassoc.com

Groundwater Guardian Committee
Lee Trotta
18905 Wilderness Court, Unit D
Brookfield, WI 53045
Phone: 262.641.9341
lctrotta53072@yahoo.com

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Area Coordinators

We are looking for coordinators in many of the following areas. If you are interested, please contact Boyd Possin.

Western Area
(LaCrosse, Black River Falls, Eau Claire, Chippewa Falls, surrounding area)
Position Open.

Southern Area
(Madison and surrounding area)
John Tweddale
BT^2
Phone: 608-224-2830 and 608-224-2839
jtweddale@bt2inc.com

North Central Area
(Stevens Point, Wisconsin Rapids, Wausau, Rhinelander, surrounding area)

Tod Roush
Maxim Technologies
Phone: 715.845.4100; Fax: 715.842.0381
troush@maximusa.com

Mark Strobel
Earth Tech, Inc.
Phone: 715-342-3022; Fax: 715-341-7390
mark.strobel@earthtech.com

Northeast Area
(Green Bay, Appleton, Oshkosh, Fond du Lac, surrounding area)
Position Open.

Southeast Area
(Milwaukee, Sheboygan, Racine, Kenosha, surrounding area)

Scott Brockway
Tetra Tech EM
Phone: 262.821.5894 X232; Fax: 262.821.5946
brockws@ttemi.com

Judy Fassbender
Applied Environmental Solutions, Inc.
Phone: 414-507-5571; Fax: 262.560.1963
gofish@globaldialog.com

Join the Wisconsin Ground Water Association Today!

WISCONSIN GROUND WATER ASSOCIATION MEMBERSHIP APPLICATION/RENEWAL FORM

Please take a few moments and become a member of, or renew your membership in, WGWA. Annual dues are $15 for students, $30 for individuals, and $25 per person for corporate memberships of six or more. Dues are payable to "WGWA." Complete the following form and send, with check, to:

Wisconsin Ground Water Association
P.O. Box 8593
Madison, WI 53708-8593

Individual Membership: Regular Member:____$30 Student Member:____$15
Name:_____ Title: _____
Firm/Agency: _____
Mailing Address:_____
City, State, ZIP Code: _____
Telephone Number:_____ Fax: _____
E-Mail:_____

Are you interested in participating in any WGWA Committees?

___ Newsletter ___ Membership ____ Web Site ___ Legislation ___ Program & Education
___ Please check if you do not wish to be listed in a WGWA membership directory.
___ Please check if you don't have e-mail access and need to receive the *WGWA Newsletter* via regular mail.

Corporate Membership Discount (six or more individuals): ____$25/individual
Firm:_____
Mailing Address:_____
City, State, ZIP Code: _____
Telephone Number:_____ Fax: _____
Corporate Individuals (include each individual's e-mail address, if available. Attached additional page if necessary):

Name Title E-Mail
1.) _____
2.) _____
3.) _____
4.) _____
5.) _____
6.) _____

___ Check here if your company does not wish to be listed in a WGWA membership directory.
___ Check here if you don't have e-mail, and need to receive the *WGWA Newsletter* via regular mail.