



# Wisconsin Ground Water Association Newsletter

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## President's Message

The New Year has gotten off to a good start for WGWA. This begins my second term as President, after taking last year off to be Past President and President Elect! Boyd Possin takes a year off this year to be Past President before stepping up to be President again next year. His involvement in WGWA has been marked by increased communication thanks to *WGWA Notes*. I am pleased to report that the recent WGWA elections resulted in new board members Janis Kesy was elected secretary. I want to thank Kristen Gunderson for her years of able service as WGWA secretary. Brian Hahn has joined the WGWA Board as an At Large Board member. Brian replaces Jeff Hosler who provided good insights during his tenure as an At Large Board member. Brian has volunteered to take the lead on the Education Committee.

One of WGWA missions is to foster education and understanding of ground-water issues. Unfortunately WGWA's Education Committee has been dormant for several years. Brian plans on increasing WGWA's visibility on college and university campuses this year. Wisconsin is home to many fine colleges and universities where students and faculty are doing fascinating research that those of us working in hydrogeology want to hear about. Contact Brian if you would like to participate on the education committee.

Lee Trotta has volunteered to take the lead in WGWA's role as a Ground-water Guardian (GG) Affiliate, assisting Wisconsin's eight existing GG groups. GG activities in Wisconsin are closely related to the education activities, but GG groups generally focus on grades K-12 in their communities, while WGWA's education committee will be focusing on connecting with college-level hydrogeology activities. For example, on Friday and Saturday, May 9 and 10, WGWA is working as a co-sponsor with the GG groups and UW Stevens Point, to put on the Annual Ground-Water Festi-

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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](mailto:wgwainfo@wgwa.org); Web site: <http://www.wgwa.org>. The deadline for submissions to the spring newsletter is June 16, 2003

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val. This will be a fun-packed two-day event offering hands-on activities, presentations, and exhibit booths at the University of Wisconsin-Stevens Point. Friday will be a "School Day" for Wisconsin 5th and 6th grade students and their teachers, and Saturday will be open to the general public. Contact Lee if you would like to assist the GG Affiliate Committee with this or related GG activities.

In addition to the Ground-Water Festival, several other activities, presently in the planning stage, we think you will find of interest.

WGWA will be participating in the Geology Day at the state capitol in Madison on March 19 that is being organized by the Wisconsin Chapter of AIPG. Lee Trotta is taking the lead on organizing WGWA's booth. Contact Lee if you would like to help.

We are in the midst of planning our spring conference on April 9 at the KI Convention Center in Green Bay. We have received many good abstracts, so, for the first time in years, we'll be having multiple sessions to handle all the good presentations! The conference registration form will be mailed to you by early March, and Boyd promises to follow it up with copious *WGWA Notes* to keep it on your mind!

This is the second year in a row our annual technical meeting is in the spring rather than in the fall. The WGWA Board has come to the conclusion that our members (and potential members) are more likely to attend our technical meeting if it is combined with other events or sponsoring organizations. Last year we had a successful meeting with AWRA

This year we have joined forces with three other water resources organizations in Wisconsin to put on the "Where the Waters Meet" Conference. Please see the conference registration form on our web page ([www.wgwa.org](http://www.wgwa.org)). This meeting will be on April 10, also at the KI Convention Center in Green Bay. This joint meeting of WGWA, the River Alliance of Wisconsin, the Wisconsin Wetlands Asso-

ciation, and the Wisconsin Association of Lakes, will be yet another new venture for WGWA. Consistent with the true spirit of the on-going interdisciplinary Waters of Wisconsin initiative, there is every indication that this may be the first of many such annual joint meetings. So plan on coming to the WGWA meeting and stay for the Where the Waters Meet Conference. The Wisconsin Association of Lakes Annual Meeting follows on April 11 and 12.

We are also beginning to plan our second annual two-day fall field trip to be held in late September. We are having discussions with the Wisconsin AIPG Section, the Minnesota Groundwater Association and the Minnesota AIPG Section to combine our common interest in having an interesting and fun trip to see some geology/hydrogeology. Look for more information on this trip as we pull it together

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

**Margy Blanchard; WGWA President**



## WGWA Board Meeting, January 13, 2003 (Conference Call)

Persons present: Margy Blanchard\*, Boyd Possin\*, Lee Trotta\*, Tom Riewe\*, Kevin Olson\*, Brian Hahn\*, Janis Kesy\*, Joan Viney\*, (\* via phone)

1. Call to order about 6:00 pm.
2. Last meeting minutes (October 28, 2002)- Minutes had been approved previously and posted on the website.
3. Treasurer's Report – Started 2002 with \$10,995.56 in account. Ended 2002 with \$14,510.87 in account.
4. Membership Report – As of January 10, 2003 - 65 members have currently paid for 2003, 39 of which are corporate individuals from 6 companies. Need more members. Boyd is mailing renewal forms to companies that have not renewed. Currently no student members, no members from DCOM and small number of members from DNR.
5. Old Business
  - Groundwater Guardian (GG) Affiliate – Focus is on K-12 education on groundwater issues. Seven affiliate groups in WI. Boyd submitted an application with the ROS (Results Oriented Services) to GG for WGWA to become an official affiliate. WGWA will be the eighth group in the state. Lee Trotta volunteered to be committee chair for the GG Committee. Committee members: Janis Kesy, two other possible members are Doug Cherkauer and John Jansen. GG is involved with the 1<sup>st</sup> Annual Groundwater Festival being planned by GG. Janis is attending Groundwater Festival planning meeting on January 15, 2003.
  - Education Committee – venue to focus on University/College education. Promote student chapters of WGWA. There are a dozen campuses in WI that offers ground-
6. New Business
  - water classes. Brain Hahn volunteered to chair Education Committee. Margy offered to help Brian with contacts. Boyd will send out University contact information.
  - Boyd indicated that the dial up conference call service is available for the committees to use. Contact Boyd for specifics.
  - Progress report on April 2003 Conference: One abstract received and one abstract promised. Contact professor to get their students to submit papers. Abstracts due February 7, 2003. Margy is trying to find a keynote speaker.
7. Next Board Meeting – February 24, 2003 6 PM.
8. Meeting adjourned about 7:15 PM.

# MODEL SPEAK

## A Perspective on the Deep Tunnel

### I. Introduction

The article for this newsletter is a summary of a pollutant loading case study for the Milwaukee Metropolitan Sewerage District's (MMSD's) Inline Storage System (ISS), better known as the Deep Tunnel. The ISS consists of large-diameter (17 to 32 feet) tunnels that are approximately 275 to 300 feet below ground surface (in dolomitic limestone) and aligned along the flow paths of the Menomonee, Milwaukee, and Kinnickinnic Rivers, and Lincoln Creek. Although the Deep Tunnel is somewhat outside this feature's ground-water modeling subject area, it has been the topic of much discussion and concern for a number of years.

The MMSD operates and maintains a network of sanitary sewers – the Metropolitan Interceptor Sewer (MIS) system. The purpose of the MIS system is to intercept wastewater from local sanitary and combined sewer systems within the MMSD service area (MMSD, 1998). Wastewater within the MIS system is subsequently conveyed to either Jones Island or South Shore for treatment. The MIS is divided into seven subsystems for flow monitoring, analysis, and control purposes. To optimize the MIS system and wastewater treatment plant capacities, flow in some of the subsystems can be diverted to other subsystems or to the Deep Tunnel (ISS).

Overflows are caused by the large amount of rainwater that enters the sanitary sewer system. Excess stormwater and sewage can be stored in the Deep Tunnel system (up to 450,000,000 gallons) until the treatment plants are ready to accept it. Prior to the Deep Tunnel, there were between 40 and 60 overflows per year into local rivers, streams, and Lake Michigan (MMSD, 2002). Since the Deep Tunnel started operation in 1994, there have been 13 overflows through 1999, or about two overflows per year. An overflow typically consists of heavily diluted wastewater, which the Wisconsin Department of Natural Resources estimates is up to 99% rainwater.

### II. Case Study Objectives

The MMSD retained Triad Engineering Incorporated (Triad) to perform a study of the annual pollutant loadings to the waterways in the MMSD service area. The evaluation had two primary focuses:

- To develop a relative estimate of annual pollutant loadings to the local waterways from various sources; and
- To estimate the effect that the Inline Storage System (Deep Tunnel) has had on annual pollutant loadings to the local waterways.

The waterways studied were those that discharge to the Milwaukee Harbor and near shore Lake Michigan (Milwaukee River, Menomonee River, Kinnickinnic River and Oak Creek). The pollutants reviewed for this study were five-day biochemical oxygen demand (BOD<sub>5</sub>), total suspended solids (TSS), phosphorous, ammonia (reported as nitrogen), and fecal coliform. The following sources of pollutants were quantified for the study: upstream Milwaukee River, storm water runoff, local community bypasses, MMSD separate sewer overflows (SSO) and combined sewer overflows (CSO), erosion, direct atmospheric deposition, direct precipitation, and wastewater treatment plant discharges. Due to the lack of published data, the study did not consider direct deposition of fecal material from domestic animals, wildlife, and waterfowl such as seagulls and geese. Although considered relatively small, the study did not assess pollutant loadings from benthic releases due to the difficulty in creating reliable loading estimates specifically from biological activity.

The study documented the development of a relative estimate of the annual pollutant loadings to the Milwaukee Harbor from various sources. In

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addition, Triad estimated pollutant loadings outside and inside MMSD's combined sewer service area. Two separate annual loadings were estimated: (1) Pre-Tunnel (for four years before the implementation of the Deep Tunnel [1990-1993]) and (2) Post-Tunnel (the six years following the implementation of the Deep Tunnel [1994-1999]). Finally, an evaluation and comparison was made of estimated annual loadings to the rivers (including the upstream portion of the Milwaukee River) and to Lake Michigan during the two periods studied (Pre-Tunnel and Post-Tunnel). A focused evaluation was also made on the rivers within the MMSD service area that flow to the Milwaukee Harbor (excluding the upstream portion of the Milwaukee River, Oak Creek, and other direct loads to Lake Michigan).

### III. Data Considerations

The loadings evaluated in the study were relative estimates that were calculated based on available flow and pollutant concentration data and appropriate assumptions. While a significant volume of data were collated and utilized for this study, in many cases the data were highly variable. This variability is inherent in all environmental samples because the mediums sampled are subject to a large number of continually changing variables. For example, the pollutant concentration in a sample of a CSO during a storm event will vary depending upon factors such as weather, precipitation patterns, sanitary sewerage discharges, storm water inflow, and infiltration into the sewer. These factors will also vary from storm to storm. Consequently, loading estimates cannot be more precise or more accurate than the data upon which they are based. While the loadings presented in the study are not to be viewed as exact numbers, they provide a reasonable approximation of relative loadings.

### IV. Study Results

The key observations from the study were as follows:

The overall total upstream and downstream annual mass loadings for each pollutant (including effluent to the lake from South Shore, Jones Island, and South Milwaukee wastewater treatment plants) decreased in the Post-Tunnel period as follows:

<b>Pollutant</b>	<b>Decrease from Pre-Tunnel Time Period</b>
BOD5	43%
TSS	21%
Phosphorus	26%
Ammonia	36%
Fecal Coliform	81%

- Reductions in measured annual pollutant loadings from the rivers within the MMSD service area to the harbor from a combination of SSO and CSO were at least 93% following the construction of the Deep Tunnel;
- With the reductions in annual pollutant loadings from SSO and CSO (following the construction of the Deep Tunnel), storm water runoff has now become the major source of pollutant loading to the rivers within the MMSD service area. The annual pollutant loadings from a combination of the SSO and CSO in the Post-Tunnel time period were 6% or less of the total annual pollutant loadings to the harbor for BOD, TSS, and phosphorous, and 24% or less for ammonia and fecal coliform. (Note: If upstream Milwaukee River loadings were considered, the

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observed relative percentages of the contribution of pollutant loadings from SSO and CSO would be reduced further);

## V. Final Comments

Triad's study found that total pollutant loadings decreased for all pollutants during the Post-Tunnel period. The evaluation also indicated the positive impact that the Deep Tunnel has had on reducing the pollutant loadings to the waters of the Milwaukee area. The combination of a reduction in pollutant concentration and overflow volumes resulted in significant reductions of SSO pollutant and CSO pollutant loadings to the local waterways.

The study provided estimates of annual mass pollutant loadings to the waterways. It was not a study objective to determine the instream water quality impacts for the two periods evaluated. However, the study can be utilized as a starting point for possible future work involving the review of instream water quality data and modeling to correlate estimated loadings to instream water quality concentrations. The inherent limitations in the data should encourage further research, but should not discount or limit interpretations of the trends and relative magnitudes of the loading estimates.

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The editorial board is soliciting WGWA and non-WGWA members to provide modeling articles and reviews for Model Speak. To submit articles or provide suggestions for articles you would like to see, please contact Deborah Kerr ([dkerr@deltaenv.com](mailto:dkerr@deltaenv.com)) at Delta Environmental (262-789-0254).



# NITROGEN IN WISCONSIN'S SOIL AND GROUND WATER

Considering that nitrogen comprises 75% of the atmosphere, you wouldn't expect it to matter much in soil and ground water. Sometimes the most common compounds are among the most challenging, however. This paper provides some background information about the occurrence of nitrogen in soil and ground water, and discusses cleanup goals for Wisconsin's soil and ground water.

Under natural conditions, nitrogen compounds enter soil from decaying plant material, humus, and other organic matter. Shaw (1994) estimated that more than one million tons of nitrogen is deposited onto Wisconsin land each year from human sources, and about ten percent of that amount leaches into ground water. Of the ground-water portion, about ninety percent is believed to originate from agriculture, nine percent from septic systems, and one percent from other sources. Most of the nitrogen in ground water originates from non-point sources because of excessive and poorly timed application of fertilizer, causing elevated nitrogen levels throughout agricultural areas. However, the highest concentrations in ground water tend to occur at point sources, including fertilizer handling facilities, landfills, and food processing plants.

In Wisconsin, the Department of Agriculture, Trade, and Consumer Protection (DATCP) and Department of Natural Resources (DNR) have developed new regulations (ATCP 50 and NR 151) to help reduce ground-water contamination from non-point sources by encouraging farmers to modify their fertilizer application procedures. The DATCP regulates point-source releases according to NR 700 through the Agricultural Chemical Cleanup Program (ACCP), and the DNR regulates releases from non-agricultural sources.

## *Nitrogen Species and Their Transformation*

In a natural setting, most of the nitrogen in soil occurs in organic forms. Organic nitrogen can be transformed into ammonia (NH<sub>3</sub>), ammonium (NH<sub>4</sub><sup>+</sup>), and CO<sub>2</sub> by a process called mineraliza-

tion. Fertilizer products include both organic nitrogen and inorganic forms of nitrogen, the latter primarily including ammonia, ammonium, and nitrate (NO<sub>3</sub>). Some of the most common fertilizer products include urea (solid), ammonium-nitrate solution (liquid), and anhydrous ammonia (gas). In an aqueous solution, ammonia acts as a base, acquiring hydrogen ions from water to yield ammonium and hydroxide ions.



The proportions of ammonia and ammonium in an aqueous solution are pH and temperature dependent. For example, in a solution with neutral pH and a typical ground-water temperature of 10°C, more than 99% of the ammoniated nitrogen occurs in the ionized form (NH<sub>4</sub><sup>+</sup>).

With normal fertilizer use, pH is rapidly neutralized in soil and ground water, so ammonia reverts to ammonium soon after it is applied. However, if large volumes are released, the pH of soil and ground water may remain high enough in the source zone so that significant proportions of ammoniated nitrogen remain in the un-ionized (NH<sub>3</sub>) form. At Wisconsin fertilizer release sites, we have measured the pH in ground water as high as 10, in which case, about 65% of the ammoniated nitrogen occurred in the un-ionized form (NH<sub>3</sub>).

In the vadose zone, ammonium is converted to nitrate by aerobic microbial reactions, a two-step process called nitrification. In some cases, ammonia/ammonium are transported downward to the saturated zone before nitrification occurs. Once ammonia and/or ammonium reach the saturated zone, nitrification is limited by the dissolved oxygen concentration. It is common to see depressed dissolved oxygen concentrations in a nitrogen plume, which reflects continuing nitrification. Sub-surface nitrate is reduced to molecular nitrogen by an anaerobic process referred to as denitrification. This occurs primarily under reducing conditions below the water table, where nitrate is catalyzed by heterotrophic bacteria.

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An excellent source of additional information about nitrogen chemistry and transformations is provided by the *Nitrogen Cycles Project* at the Illinois State Water Survey (<http://www.sws.uiuc.edu/nitro/>).

### **Subsurface Mobility**

Un-ionized ammonia (NH<sub>3</sub>) is hydrophilic, and undergoes little retardation as it is transported by ground water. In most cases, however, transport away from a release point is accompanied by dispersion and pH neutralization. As a result, the ionized form (NH<sub>4</sub><sup>+</sup>) is the primary ammoniated species that is usually detected downgradient from a release site.

I have found twelve published soil:water partitioning coefficients (K<sub>d</sub>) for ammonium (Desimone and Howes, 1998; Lotse and others, 1992; Bouldin and others, 1991; Ceazan and others, 1989; Clothier and others, 1988; Jardine and others, 1988; Preul and Schroepfer, 1968). Most of the values were derived from linear sorption isotherms obtained with aqueous ammonium concentrations in the range of 0 to 50 milligrams/liter (mg/L). The K<sub>d</sub> values range from 0.6 to 7 liters/kilogram (L/kg) and have a median value of 3 L/kg. Values at the low end of the range correspond to coarse-grained sediment and values at the high end of the range correspond to fine-grained sediment. For perspective, Table 1 compares the median soil:water partitioning coefficient for ammonium with values for some common organic compounds. The coefficients for organic compounds were derived using the organic carbon-water partition coefficients (K<sub>oc</sub>) given by Appelo and Postma (1994) and an assumed organic content (f<sub>oc</sub>) of 0.1%, which is a typical value in soil below a depth of about 5 feet.

Table 1 also shows retardation factors (R) and relative velocities (1/R) based on the relation (Appelo and Postma, 1994):

$$R = v/v_R = 1 + (\rho/\eta) K_d \quad (2)$$

Where:  $v$  = mean ground-water velocity.  
 $v_R$  = mean velocity of retarded solute.  
 $\rho$  = sediment bulk density (here assumed to be 1.5 g/cm<sup>3</sup>).  
 $\eta$  = porosity (here assumed to be 0.43).

The f<sub>oc</sub>,  $\rho$ , and  $\eta$  values cited above equal the default values cited in the DNR's guidance for deriving soil cleanup levels for PAHs (RR-519-97). Based on these values and the median K<sub>d</sub>, ammonium is transported at about 10% of the ground-water flow rate, which is considerably slower than all of the compounds listed except for anthracene (Table 1). When the full range of published ammonium K<sub>d</sub> values is considered, the relative velocity ranges from 4% to 32% of the ground-water flow rate, for fine-grained and coarse-grained soil, respectively.

The nitrate anion is generally assumed to be non-reactive, and is sometimes used as a conservative tracer to measure advection rates in the laboratory and in the field. At neutral pH, nitrate anion exchange is generally believed to be insignificant, but it may be significant in ground water with a pH of 6 or less (Preul and Schroepfer, 1968). At most fertilizer release sites the pH of the ground water is alkaline, which supports an assumption of negligible anion retention.

### **Ground Water and Soil Standards**

Nitrate in water can cause anoxia in infants (methemoglobinemia) and there are recent and limited data linking nitrate with several types of cancer (Weyer and others, 2001). Wisconsin ground-water standards, codified in NR 140, specifies a nitrate-as-N enforcement standard (ES) of 10 milligrams/liter (mg/L) based on noncarcinogenic effects, and preventive action level (PAL) of 2 mg/L. In nonagricultural parts of the state, nitrate concentrations in ground water are usually less than 1 mg/L, and in agricultural areas they are generally between 1 and 10 mg/L. In 2000 and 2001 the DATCP sampled 336 privately owned supply wells throughout the state and found that nitrate concentrations exceeded the ES in 14% of them.

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The same proportion was detected during a survey conducted in the mid-1990s (J. Postle, DATCP, personal communication).

There is currently no PAL or ES for ammonia. In late 1998 the DNR proposed an ES of 9.7 mg/L for total ammonia ( $\text{NH}_3 + \text{NH}_4^+$ ), and a PAL of 2 mg/L. The proposal was based on concerns about  $\text{NH}_3$  toxicity, not on the potential biogeochemical transformations of ammonia to nitrate. The proposal was shelved in 2000, due in part to concerns expressed by industry and the agricultural community.

The DNR has not promulgated residual contaminant levels (RCLs) for nitrogen in soil. However, it is interesting to apply the DNR's RCL guidance to nitrate and ammonia for the migration-to-ground-water pathway. One perspective is given by the DNR's algorithm for generic RCLs (RR-519-97), which is similar to that for the U.S. EPA soil screening levels (SSLs). Table 2 shows nitrate RCLs that are calculated using the DNR's version of the SSL algorithm, assuming that nitrate is non-reactive ( $K_d = 0$ ), and assuming default values for other soil characteristics such as porosity and bulk density. If the target ground-water concentration is the PAL (2 mg/L), as an RCL calculation normally requires, the nitrate RCL would equal 3 mg/kg. If the target ground-water concentration equals the ES (10 mg/L), the RCL would equal 17 mg/kg. Calculated RCLs for ammonium are also shown in Table 2, assuming that the  $K_d = 3$  L/kg and using default values for other soil characteristics.

Table 2 also shows nitrate RCLs calculated from assumptions for the synthetic precipitation leaching procedure (SPLP), recognizing that in actual practice the DNR requires that RCLs be based on leaching test results, not calculations (RR-523-97). With the SPLP method, 100 g of soil is leached in 2 L of water.

The RCL is expressed as:

$$\text{RCL} = (\text{PAL}) C_s / C_l \quad (3)$$

Where:  $C_s$  = soil concentration (mg/kg)

$C_l$  = test-leachate concentration (mg/L)

For conservative chemicals such as nitrate, the 20X dilution factor that is inherent in the SPLP method results in nitrate RCLs that are about ten times greater than those calculated by the SSL method (Table 2).

The wide range of values that are derived by these methods emphasizes the difficulty that regulatory agencies have in establishing nitrogen RCLs for the migration-to-ground-water pathway. For example, the nitrate RCL that is based on the PAL and the SSL method

(3 mg/kg, Table 2) is much less than the concentrations that usually occur throughout fertilizer distribution facilities and beneath most agricultural fields at the time of fertilizer application. Even an SPLP-based value of 40 mg/kg is much less than what is considered to be practicable for the remediation of fertilizer distribution sites. On the other hand, ammonium RCLs based on the SSL method (Table 2) are achievable in most cases, but may not adequately account for the eventual transformation of ammonium to nitrate (nitrification).

In the ACCP, the DATCP addresses this issue by enforcing a soil cleanup goal for *total mineral nitrogen*, which is assumed to be the sum of the nitrate and ammonium concentrations. The DATCP's default cleanup goal of 100 mg/kg for total mineral nitrogen strikes a balance between practicability issues and concern about potential nitrification. The balance is achieved by linking the cleanup goal to annual application rates of ni-

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trogen fertilizer to crops, assuming that fertilizer is applied to the upper six inches of soil. A soil concentration of 100 mg/kg corresponds to an annual application rate of 218 pounds/acre, which is at the high end of the range of nitrogen application rates onto cornfields in Wisconsin and throughout the Midwest. In some cases, the DATCP allows higher cleanup goals for total nitrogen in soil, especially when there is demonstrated to be a low risk to ground water or when cleanup costs would otherwise be excessive.

The DATCP default cleanup goal for total nitrogen is among the most protective in the Midwest for the migration-to-ground-water pathway. For example, the Minnesota Department of Agriculture (MDA) has established a default cleanup goal of 150 to 200 mg/kg, but it only applies to nitrate, not to total nitrogen. Like the DATCP, the MDA cleanup goal takes into account annual fertilizer application rates. The Illinois EPA Tier 1 standard for nitrate (not total nitrogen) is based on the SPLP leaching test, and so implies a cleanup goal of 200 mg/kg, as discussed previously. The Iowa DNR also has a nitrate standard based on SPLP tests.

Unfortunately, none of the state cleanup goals can fully account for the transformations of nitrogen species and the different mobility of those species in soil and ground water. So although nitrate and ammonia are chemically simple and have relatively low human toxicity, they present a major challenge to both regulators and the regulated community.

*Thanks to William Roy and Jeff Ackermann for their review and comment.*

**Bob Brod; Hyde Environmental**

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**TABLE 1**  
**Distribution Coefficients and Retardation Factors**

	<b>K<sub>d</sub></b> <b>(L/kg)</b>	<b>R</b>	<b>1/R</b>
Ammonium (NH <sub>4</sub> <sup>+</sup> )	3	11	0.1
Benzene	0.06	1.2	0.8
1,1,1-Trichloroethane	0.2	2	0.6
Atrazine	0.2	2	0.6
Anthracene	16	56	0.02

K<sub>d</sub>: Soil/Water Distribution Coefficient  
R: Retardation Factor

**TABLE 2**  
**Calculated Nitrate and Ammonium RCLs**

	Assumed Ground Water Standard* (mg/L)	Calculated Nitrate RCL (mg/kg)	Calculated Ammonium RCL (mg/kg)
SSL Algorithm	2	3	930
	10	17	4,500
SPLP	2	40	--
	10	200	--

\*Nitrate PAL = 2 mg/L; ES = 10 mg/L.

\*Proposed ammonia PAL = 2 mg/L; ES = 9.7 mg/L.

# ENVIRONMENT WATER QUALITY

*(Note: The following is taken from SB 44, the bill containing Governor Doyle's Executive Budget proposal, introduced in the Wisconsin legislature on February 19, 2003)*

Under the Clean Water Fund Program, Wisconsin makes loans at subsidized interest rates for projects to control water pollution, including sewage treatment plants. This bill sets the present value of the Clean Water Fund Program subsidies that may be provided during the 2003–05 biennium at \$92,400,000. The bill also increases the revenue bonding authority for the Clean Water Fund Program by \$259,670,000.

Under the Safe Drinking Water Loan Program, Wisconsin makes loans at subsidized interest rates to local governmental units for projects to construct or modify public water systems. This bill sets the present value of the Safe Drinking Water Loan Program subsidies that may be provided during the 2003–05 biennium at \$12,800,000.

Under current law, DNR provides financial assistance for measures to reduce water pollution from nonpoint (diffuse) sources. This bill increases the general obligation bonding authority for nonpoint source financial assistance by \$9,546,800.

Under current law, DNR also provides financial assistance for the management of urban storm water runoff and for flood control projects. This bill increases the general obligation bonding authority for these programs by \$4,700,000.

## HAZARDOUS SUBSTANCES AND ENVIRONMENTAL CLEANUP

Under the Brownfields Grant Program, the Department of Commerce awards grants for the redevelopment of brownfields and remediation activities associated with that redevelopment. Brownfields

are abandoned, idle, or underused industrial or commercial facilities or sites the expansion or redevelopment of which is adversely affected by actual or perceived environmental contamination. Also under current law, DNR awards grants to local governmental units for investigating environmental contamination; to municipalities for conducting cleanups of brownfields; and to local governmental units for brownfields remediation projects that have long-term public benefits, including the preservation of green space.

This bill eliminates the Brownfields Grant Program administered by the Department of Commerce and the grant programs related to brownfields administered by DNR. The bill establishes a new Brownfields Grant Program, under which DNR awards grants to local governmental units and private entities to determine the existence and extent of environmental contamination in brownfields and to remove or contain environmental contamination and restore the environment at brownfields.

Under current law, the Department of Commerce administers a program (commonly called PECFA) to reimburse owners of petroleum product storage tanks for a portion of the costs of cleaning up discharges from those tanks. This bill increases the revenue bonding authority for PECFA by \$115,000,000.

Under the Land Recycling Loan Program, Wisconsin makes loans to political subdivisions for projects to remedy environmental contamination at sites owned by the political subdivisions where the environmental contamination has affected, or threatens to affect, groundwater or surface water. The loans are subsidized, so that recipients are not required to pay interest. This bill sets the present value of the Land Recycling Loan Program subsidies that may be provided during the 2003–05 biennium at \$12,000,000.

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Current law authorizes DNR to conduct or fund activities to remedy environmental contamination in some situations. This bill increases the authorized general obligation bonding authority to finance those activities by \$6,000,000.

### OTHER ENVIRONMENT

Current law authorizes DNR to establish fees for inspecting nonresidential asbestos demolition and renovation projects that DNR regulates. The fees may not exceed \$210 per project. This bill increases the maximum fees to \$450 or \$750, depending on the size of the project. The bill also authorizes DNR to charge separately for the costs it incurs for laboratory testing for these projects.

Under current law, the Waste Facility Siting Board (WFSB) oversees negotiations and arbitration between local governments and persons who want to establish or expand landfills. This bill eliminates the authority of WFSB to appoint an executive director. The bill requires the Division of Hearings and Appeals, attached to DOA for administrative purposes, to provide staff to assist WFSB in performing its duties.



## AREA MEETING NOTES

WGWA members employed their ice-driving skills and determination to attend the Southern Area breakfast meeting on February 3, 2003, at the Sunprint Cafe in Madison. We discussed the Annual Meeting planned for April 9, 2003, at the KI Convention Center in Green Bay, and the April 10 "Where the Waters Meet" conference co-sponsored by WGWA, the River Alliance of Wisconsin, the Wisconsin Wetlands Association, and the Wisconsin Association of Lakes. Margy Blanchard reported that Bob Pearson is hoping to set up a Fall 2003 WGWA field trip to the karst areas of southwest Wisconsin and southeast Minnesota, possibly in conjunction with the Minnesota Ground Water Association.

Other topics of discussion included the 2003 move of some WDNR staff and files from the Fitchburg office during remodeling, and the effect of the state budget deficit on staffing and programs.

We hope you can join us for breakfast and open discussion at the next WGWA Southern Area meeting, scheduled from 7 to 8:15 AM on Monday, April 7, 2003, at the Sunprint Cafe (Odana Road at Whitney Way). Please contact John Tweddale by email ([jtweeddale@bt2inc.com](mailto:jtweeddale@bt2inc.com)) or phone (608-224-2830) if you have questions.



*An acre-foot of water is enough to flood the infield at Coors Field to a depth of 5.4 feet*



## The 2002 Board, Committee, and Area Coordinators

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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<sup>2</sup>

Phone: 608-224-2830 and 608-224-2839

[jtweddale@bt2inc.com](mailto:jtweddale@bt2inc.com)

### North Central Area

(Stevens Point, Wisconsin Rapids, Wausau, Rhineland, surrounding area)

Tod Roush

Maxim Technologies

Phone: 715.845.4100; Fax: 715.842.0381

[troush@maximusa.com](mailto:troush@maximusa.com)

Mark Strobel

Earth Tech, Inc.

Phone: 715-342-3022; Fax: 715-341-7390

[mark.strobel@earthtech.com](mailto: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](mailto:brockws@ttemi.com)

Judy Fassbender

Applied Environmental Solutions, Inc.

Phone: 414-507-5571; Fax: 262.560.1963

[gofish@globaldialog.com](mailto: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.