WISCONSIN GROUNDWATER COORDINATING COUNCIL

REPORT TO THE LEGISLATURE

August 1993

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GROUNDWATER
Wisconsin's
buried treasure

State of Wisconsin \ GROUNDWATER COORDINATING COUNCIL

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August, 1993

In Reply Refer To: 3230

To: The Citizens of Wisconsin
The Honorable Governor Tommy G. Thompson
Senate Environment and Energy Committee
Assembly Environmental Resources Committee
Assembly Natural Resources Committee
Secretary Charles H. Thompson - Department of Transportation
Secretary Carol N. Skornicka - Department of Industry, Labor and Human Relations
Secretary Alan T. Tracy - Department of Agriculture, Trade and Consumer Protection
Secretary Gerald Whitburn - Department of Health and Social Services
Secretary George E. Meyer - Department of Natural Resources
President Katharine Lyall - University of Wisconsin System
State Geologist James Robertson - Geological and Natural History Survey

This is the 1993 Groundwater Coordinating Council (GCC) Report to the Legislature. The Council was formed in 1984 to help state agencies coordinate non-regulatory activities and exchange information on groundwater.

Your support has made possible these successes! The Council has served as a model for interagency coordination and cooperation among state government officials, the Governor, and now local government. It has achieved the distinction of being one of the few groups in the nation to effectively coordinate groundwater activities in their state from an advisory position.

The groundwater accomplishments by your state agencies during the past year have been:

- Reduction in the use of atrazine due to creation of additional management areas and prohibition areas based on atrazine findings.
- Development of comprehensive draft regulations covering remedial responses to environmental contamination.
- Adoption and implementation by the GCC of action recommendations to improve coordination and communication on groundwater management issues.
- Creation of a Local Government Subcommittee of the GCC to provide improved state-local coordination on groundwater management issues.
- Dissemination of groundwater information and education to various audiences.
- Provision of improved access to the DNR's groundwater information network and development of a more uniform system for data collection, sharing and management among state agencies.

We hope you, your staff and the public will find this report a useful reference in protecting Wisconsin's valuable groundwater resource. If you need any further discussion on this subject please call me at 608-266-1099.

Sincerely,

Lyman F. Wible

Lyman F. Wible, Chair
Groundwater Coordinating Council

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EXECUTIVE SUMMARY

This is the Report to the Legislature by the Groundwater Coordinating Council (GCC) as required by s. 15.347, Wisconsin Statutes. The report describes the condition of the groundwater resource, its management and summarizes the Coordinating Council's activities for fiscal year 1993.

In 1984, the Legislature enacted Wisconsin Act 410 with the intention of improving the management of the state's groundwater. The GCC is directed by s. 160.50, Wis. Stats., to "serve as a means of increasing the efficiency and facilitating the effective functioning of state agencies in activities related to groundwater management. The Groundwater Coordinating Council shall advise and assist state agencies in the coordination of nonregulatory programs and the exchange of information related to groundwater, including, but not limited to, agency budgets for groundwater programs, groundwater monitoring, data management, public information and education, laboratory analysis and facilities, research activities and the appropriation and allocation of state funds for research."

Membership of the GCC includes the Secretaries of the Departments of Natural Resources (DNR); Industry, Labor and Human Relations (DILHR); Agriculture, Trade and Consumer Protection (DATCP); Health and Social Services (DHSS); Transportation (DOT); the President of the University of Wisconsin System (UWS); the State Geologist; and a representative of the Governor. Members are listed on the inside of the front cover.

Since its last report, the Groundwater Coordinating Council has accomplished the following:

1. The GCC formed the Local Government Subcommittee for the GCC to address concerns of the local units of government. The first meeting was held on February 8, 1993.

2 The GCC approved the popularized version of the fiscal year (FY) 1992 Report to the Legislature which was distributed earlier this year.

3. The Groundwater Coordinating Council and the University of Wisconsin System Groundwater Research Advisory Council continued coordination of the annual solicitation for groundwater research and monitoring proposals among state agencies. Twenty eight projects were funded in FY 93 by one or more of the following agencies: UWS, DATCP, DNR and DILHR. The projects funded are listed in Table 1. The locations of the field sites for the projects are shown in Figure 2. A joint solicitation for groundwater-related monitoring and research project proposals for funding in FY 94 was distributed in November, 1992. A copy of the joint solicitation is contained in the appendix to this report. A total of 43 project proposals were received. Sixteen new projects were selected by the UWS, DNR or DATCP for funding in FY 94 in addition to 15 projects which will carry over into the new fiscal year. The FY 94 groundwater monitoring and research projects and their funding

agency are listed in Table 2. The GCC endorsed the UWS groundwater research plan for FY 94 as required by s. 160.50(1m), Wis. Stats.

4. The GCC has continued to work with representatives of federal agencies to promote communication and coordination of federal and state groundwater activities. Representatives from the U. S. Soil Conservation Service (SCS), U. S. Agricultural Stabilization and Conservation Service (ASCS) and the U. S. Geological Survey (USGS) attend GCC meetings and serve as ex officio subcommittee members.

INTRODUCTION

PURPOSE

The Groundwater Coordinating Council is required by s. 15.347, Wis. Stats., to prepare a report which "summarizes the operations and activities of the council ..., describes the state of the groundwater resource and its management and sets forth the recommendations of the council. The annual report shall include a description of the current groundwater quality of the state, an assessment of groundwater management programs, information on the implementation of ch. 160, Wis. Stats., and a list and description of current and anticipated groundwater problems." This report is due each August. The purpose of this report is to fulfill this requirement for fiscal year 1993.

The following section, "Summary of Agency Activities" describes groundwater management programs and implementation of ch. 160, Wis. Stats., by the individual state agencies. "Groundwater Monitoring and Research" provides information on monitoring and research activities to address groundwater issues in Wisconsin and describes the condition of the groundwater resource. The activities of the Groundwater Coordinating Council and its subcommittees are described under "Coordination Activities" and in the minutes which are contained in the appendix to this report. The recommendations of the Council are contained in "Directions for Future Groundwater Protection."

SUMMARY OF WISCONSIN'S GROUNDWATER LEGISLATION

Wisconsin has a long history of groundwater protection. The culmination of this effort has been the adoption and implementation of 1983 Wisconsin Act 410, Wisconsin's comprehensive Groundwater Protection Act which was signed into law on May 4, 1984. This law greatly expanded Wisconsin's legal, organizational and financial capacity for controlling groundwater pollution. The Groundwater Protection Act created chapter 160, Wisconsin Statutes, which serves as the backbone of Wisconsin's program. Chapter 160, Wis. Stats., provides a multi-agency comprehensive regulatory approach, using two-tiered numerical standards, based on the premise that all groundwater aquifers in Wisconsin are entitled to equal protection. There are a number of major components to Wisconsin's groundwater protection program:

1) Standards. Under chapter 160, Wis. Stats., the Department of Natural Resources (DNR) is required to establish state groundwater quality standards based on advice from the Department of Health and Social Services. Standard setting is a continuing process based upon a priority list established by the DNR in conjunction with other state agencies. The state groundwater standards are contained in chapter NR 140, Wisconsin Administrative Code.

2) Regulatory Programs. Once standards are established, all state agencies must manage their regulatory programs to comply. Each state regulatory agency must have

rules to assure that the groundwater standards are met and to require appropriate responses when the standards are not met. The state regulatory agencies are the Department of Natural Resources (solid and hazardous waste, industrial and municipal wastewater, spills); the Department of Industry, Labor and Human Relations (private sewage systems, petroleum product storage tanks); the Department of Agriculture, Trade and Consumer Protection (pesticide use and storage and fertilizer storage); and the Department of Transportation (salt storage). The implementation of the groundwater standards by the state agencies is described under "Summary of Agency Activities".

3) Aquifer Classification. One of the most important features of Wisconsin's groundwater law is something that is not in it. At the same time Wisconsin was debating the groundwater protection legislation, the U. S. Environmental Protection Agency (EPA) tried to develop a nationwide groundwater approach. A keystone of EPA's proposal was aquifer classification -- a scheme whereby each aquifer would be classified according to its use, value or vulnerability and then would be protected to that classification. This entailed the "writing off" of certain aquifers as industrial aquifers not entitled to protection and never again usable for human water supply. Wisconsin said "no" to aquifer classification. The philosophical underpinning of Wisconsin's groundwater law is the belief that all groundwater in Wisconsin is capable of being used for people to drink and must be protected to assure that it can be.

4) Monitoring and Data Management. At the time the groundwater legislation was created, there was concern that Wisconsin needed a groundwater monitoring program to determine whether the groundwater standards were being met. Therefore, a groundwater monitoring program was created under s. 160.27, Wis. Stats. Money from the Groundwater Account of the Environmental Fund has been used for problem assessment monitoring, regulatory monitoring, at-risk monitoring and management practice monitoring as well as establishment of a data management system for collection and management of the groundwater data. See the "Groundwater Monitoring and Research" discussion in this report for further information.

5) Research. Although all state agencies must comply with the groundwater standards, the processes by which groundwater becomes contaminated, the technology for clean-up, the mechanisms to prevent contamination and the environmental and health effects of the contamination are often not well understood. In addition the basic data on geology, soils, and groundwater hydrology is often not available. The University of Wisconsin System (UWS) and the state agencies have recognized that additional efforts in these research areas are badly needed. The Governor and the Legislature included a new groundwater research appropriation for the UWS beginning with the 1989-1991 biennial budget. During the past year, the UWS and the Departments of Agriculture, Trade and Consumer Protection, Industry Labor and Human Relations, and Natural Resources participated in a joint solicitation for groundwater-related

research and monitoring proposals for funding during fiscal year 1993. See the "Groundwater Monitoring and Research" discussion for more details.

6) Coordination. In establishing the groundwater law, the Legislature recognized that management of the state's groundwater resources was a responsibility divided among a number of state agencies. Therefore, the Groundwater Coordinating Council was created to advise and assist state agencies in the coordination of non-regulatory programs and the exchange of information related to groundwater. The Coordinating Council has been meeting since 1984. See the "Coordination Activities" discussion in this report.

7) Local Groundwater Management. The Groundwater Protection Act clarified the powers and responsibilities of local governments to protect groundwater in partnership and consistent with state law.

   a. Zoning authority for cities, villages, towns and counties was expanded to "encourage the protection of groundwater."

   b. Counties can adopt ordinances regulating disposal of septage on land (consistent with DNR requirements); cities, villages or towns may do so if the county does not.

   c. Counties can regulate (under DNR supervision) well construction and pump installation for certain private wells.

   d. Property assessors must consider the time and expense of repairing or replacing a contaminated well or water supply when assessing the market value of real property; they must consider the "environmental impairment" of the property value due to presence of a solid or hazardous waste disposal facility.

The following report is intended to update the Legislature and Governor on the status of the state's groundwater program and the activities of the Groundwater Coordinating Council.

SUMMARY OF AGENCY ACTIVITIES

The following summary describes the groundwater management efforts undertaken by the member agencies of the Groundwater Coordinating Council during the past year. As these summaries show, Wisconsin continues to have a strong commitment to protection of the groundwater resource.

DEPARTMENT OF NATURAL RESOURCES

The Department of Natural Resources (DNR) has statutory authority as the central unit of state government to protect, maintain and improve groundwater within the state (s. 144.025(1), Wis. Stats.). The DNR establishes the groundwater quality standards for the state under authority of s. 144.025(2)(b) and ch. 160, Wis. Stats. In addition to the establishment of groundwater quality standards, DNR has specific regulatory programs.

DNR regulatory programs to protect groundwater fall into one of three categories: water supply, wastewater and solid and hazardous waste management. In addition, the Groundwater Management Section (GMS) assists in coordinating groundwater activities within the DNR, as well as with other state agencies. The GMS is responsible for adoption of groundwater standards contained in ch. NR 140, Wis. Adm. Code, development of an annual groundwater monitoring plan, coordination of the joint solicitation, review and management of groundwater monitoring projects and maintenance of a data management system for groundwater data.

In February of 1993, public hearings were held on proposed amendments to ch. NR 140, Wis. Adm. Code, which contains groundwater quality standards. Based on recommendations from the Department of Health and Social Services, the DNR recommended adoption of standards for 13 new substances and revision to the standard for 22 substances. Standards are proposed for polychlorinated biphenyls (PCBs) which were the subject of a DNR technical advisory committee. The proposed amendments will be presented to the DNR Natural Resources Board for final adoption in August, 1993.

The Bureau of Solid and Hazardous Waste Management continued to meet with two external technical advisory committees (TAC). The Hazardous Waste Management Section TAC continued to work with the DNR to determine if modifications to the chapter NR 600, Wis. Adm. Code, rule series (CNR 600-685) were needed. Revisions to the codes are well on their way and the DNR expects to request Public Hearing Authorization in FY 94. Included in that rule work will be changes to ch. NR 635 Wis. Adm. Code which covers groundwater and leachate monitoring standards.

The Emergency and Remedial Response (ERR) section, with the help of their TAC continued to develop a series of administrative codes (NR 700-736) covering remedial responses to environmental contamination. The rules also will provide comprehensive

regulations to address soil contamination. Two key elements of the rule are: (1) soil standards based upon protection of groundwater, per ch. NR 140, Wis. Adm. Code, and (2) a standard remedy selection process. The latter is key to clearly defining how ch. NR 140, Wis. Adm. Code, groundwater standards will be used in remediating contaminated groundwater. The ERR section received approval from the Natural Resources Board to hold public hearings on the comprehensive clean-up rule series, ch. NR 700, Wis. Adm. Code. Six public hearings on the proposed rules were held during spring of FY 93. The ERR section plans to request Natural Resources Board adoption of the rule series at the September 1993 meeting.

The ERR section, with assistance from the Groundwater section and Legal Services has nearly completed the ch. NR 140, Wis. Adm. Code guidance as it applies to groundwater clean-ups. It is expected that this guidance will be distributed by August 1993.

The ERR section, as part of its responsibility to administer the State's Environmental Fund to cleanup severe contamination problems, initiated or continued action at locations where groundwater contamination is known or expected. $3,760,000 was spent during the FY 92-93 biennium to address groundwater contamination at existing project sites.

The DNR continued its groundwater monitoring program which includes problem assessment monitoring, at-risk well monitoring, management practice monitoring and regulatory monitoring. During fiscal year 1993, approximately $299,900 were awarded to 12 projects for the management practice monitoring program. The 12 projects were selected during the joint solicitation process described under "Groundwater Monitoring and Research" in this report.

During fiscal year 1994, approximately $262,600 will be awarded to 14 projects for the management practice monitoring program (see Table 2). Five projects will be new studies selected during the joint solicitation process.

The Municipal Wastewater Section (MWWS) is continuing to assist communities considering land treatment as an option for disposal of treated wastewater. New municipal wastewater permits reflect the more stringent effluent limits for nitrogen and chloride contained in ch. NR 206, Wis. Adm. Code. A concerted effort is also being made to evaluate and require upgrading of groundwater monitoring systems in place at existing permitted facilities. Research is presently being conducted to develop new methods of improving the effectiveness of community rapid infiltration systems.

The Industrial Wastewater Section (IWWS) continues to issue WPDES permits to facilities which land apply industrial waste waters, sludges and/or food processing by-products, which may ultimately impact the groundwater. These facilities are required to submit management plans to ensure that the wastes are applied in a safe manner. Groundwater monitoring is also required at all large land application and wastewater storage sites. Analytical results of groundwater samples are reviewed for compliance with ch. NR 140, Wis. Adm. Code, on

a continual basis as submitted. The IWWS has also been continuing its evaluation of all industrial wastewater storage lagoons and large vegetable by-product storage structures. Per ch. NR 213, Wis. Adm. Code, approximately 200 facilities were required to conduct such evaluations, most of which were initiated in 1991 - 92. Several studies are now reaching completion, resulting in the upgrading of many lagoons. Facilities with lagoons found to be adversely impacting the environment, including waters of the state, are required to meet the standards of ch. NR 213, Wis. Adm. Code, no later than July 1, 1995, or as specified by a WPDES permit.

During FY 93, private wells in four new priority watersheds were sampled for nitrate and triazine pesticides (of which atrazine is the most common) as part of the joint DNR-DATCP nonpoint source program. Sampling was offered to well owners free of charge and on a voluntary basis. All wells sampled were assigned a unique well number and inventoried. The primary sampling objective was to provide private well owners with information and education on well testing and groundwater. A secondary objective of sampling was to look at the quality of drinking water in the selected priority watersheds. A total of 3,543 nitrate and 1,793 triazine analyses have been performed since 1990. Results show that nitrate + nitrite exceeded the preventive action limit (PAL) in 60% and the enforcement standard (ES) in 14.7% of the wells sampled. The atrazine PAL was exceeded in 13% and the ES exceeded in 2% of the wells sampled using the triazine screen.

During FY 93, the Bureau of Water Supply initiated several groundwater monitoring projects aimed at determining the impact of surface activities on groundwater. These included: lead and arsenic sampling at two locations in the Southeast District, strontium and lithium sampling at several sites in the Southeast District, radon sampling of public water supply wells in the Lake Michigan District, and a continuation of an investigation of the impact of ginseng farming on groundwater in the North Central District.

The DNR is currently working on a plan for a wellhead protection program. Amendments to the Safe Drinking Water Act (SDWA) of 1986 established the first nationwide program to protect groundwater used for public water supplies from a wide range of potential contamination sources through the establishment of a state wellhead protection program. The DNR submitted a wellhead protection program plan to the EPA for approval in 1993. The program's foundation is firmly established in the DNR's environmentally protective administrative codes. These codes protect the environment by land use restrictions or by spatial separation of various activities. Building onto this foundation, the proposed program is voluntary in nature. Public water supplies are encouraged to be proactively protective of their water supply resources (i.e. groundwater or surface water). The development of this type of program is an important step in providing additional protection of the state's public water supplies.

For more information, contact Mr. Kevin Kessler, DNR, P.O. Box 7921, Madison , WI 53707-7921; phone 608-267-9350.

DEPARTMENT OF AGRICULTURE, TRADE AND CONSUMER PROTECTION

Protection of Wisconsin's groundwater is of the highest priority for the Department of Agriculture, Trade and Consumer Protection (DATCP). DATCP's major activities in this area include management of pesticides, research, and funding local soil and water resource management projects.

Under the Wisconsin Groundwater Law, DATCP is responsible for managing pesticides and pesticide practices to assure that established groundwater standards for contaminants are not exceeded. This can include prohibition of certain activities including pesticide use. The agency has a further objective to manage practices to "minimize" groundwater contamination to the extent "technically and economically feasible". Pesticide practices regulated by DATCP include storage, handling, use and disposal. DATCP also regulates the storage of bulk quantities of fertilizer.

Enforcement standards have been established in Wisconsin for several known and potential groundwater contaminants including 30 pesticides. Standards for additional pesticides have been proposed. In response to concerns about atrazine contamination, DATCP amended administrative rule ch. ATCP 30 in 1992 to manage the use of atrazine in an effort to reduce or eliminate the potential for further groundwater impacts. Annual rule revisions are anticipated to respond to additional groundwater detects. Rule revisions for 1993 reduced statewide application rates of atrazine and increased the number of prohibition areas. These amendments were enacted to address groundwater findings available as of April 1992. The rule amendments for 1993 took into account the revised atrazine standard and additional atrazine findings. Information suggests that atrazine use has declined as a result of the atrazine management rule and concern about groundwater contamination.

According to the EPA pesticides strategy document, when EPA determines that a pesticide presents a significant risk of leaching to groundwater in a state, it may either cancel the registration of that compound or allow the state to prepare a "State Management Plan" (SMP) describing how the state will manage the pesticide to protect groundwater.

DATCP and DNR staff cooperatively drafted Wisconsin's SMP for protection of groundwater from pesticides. The draft SMP was submitted to the EPA to facilitate finalization of their SMP final submittal criteria. Our state plan was reviewed by the EPA's Headquarters Regional Review Team (HRRT) and undoubtedly will be used as a model for other state SMPs.

Based in part on studies of the extent of soil and groundwater contamination at pesticide mixing and loading facilities, DATCP has proposed a "Clean-up Program" to address these contamination problems. DATCP's 1993 proposal , Assembly Bill 177, would create a 4 million dollar program funded with increased agrichemical fees and general purpose revenue. This bill if passed would create a program to investigate, remediate and provide reimbursements to persons who have cleaned up contamination.

DATCP and DNR have begun a cooperative venture to investigate the extent of alachlor and its metabolites in Wisconsin's groundwater. The pesticides occurrence will be investigated by using an immunoassay kit. The bulk of the project is scheduled for completion in FY 94.

DATCP continues to contribute to the development of DNR rules (NR 700 series) that will establish soil cleanup standards.

DATCP solely funded one pesticide research project at a cost of $22,000 during FY 93 and cooperatively funded 3 projects with the University of Wisconsin system (see Table 1). The projects to be funded or co-funded by DATCP in FY 94 are listed in Table 2. Approximately $135,000 is available each year through fees from pesticide manufacturers as a result of the pesticide law.

DATCP, through it's soil and water resource management program, provides funding primarily to counties to assist in the protection of these resources. An increasing portion of this funding is dedicated to the development and implementation of better nutrient and pesticide management practices. $176,000 has been provided to develop and demonstrate better management practices for nutrients and pesticides. This funding level is expected to increase. Funding has been provided for the following projects: development of a county wide geographic information system (GIS) to evaluate hydrogeologic factors and landuse practices with potential for groundwater contamination in Dane county; development of a groundwater management plan in Burnett county; implementation of nutrient management practices on selected farms in Buffalo, Chippewa, Manitowoc, and Marathon counties; and, an economic analysis of nutrient and pesticide management practices conducted by the University of Wisconsin Extension - Nutrient and Pest Management (UWEX-NPM) Program.

DATCP provided $401,000 to fund projects in 13 counties for collection and disposal of waste pesticides and containers. More than 82,000 pounds of these wastes were collected from farm sites, thereby reducing the potential for inadvertent environmental damage. DATCP is requesting additional proposals from counties for the 1993 fiscal year. Approximately, $500,000 will be available during FY 93 for these projects.

DATCP has completed the development of a database of pesticide detections in groundwater. This provides DATCP with up-to-date, accurate information to use in the annual revision of ATCP 30 and in responding to detections of other pesticides.

For further information, contact Mr. Nicholas Neher, DATCP, 801 W. Badger Road, Madison, Wisconsin, 53708-8911; phone: 608-266-7130.

DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS

Private Sewage Systems

The Department of Industry, Labor & Human Relations (DILHR) continues to develop private sewage system regulations that will be embodied in chapter (ch.) ILHR 83, Wis. Adm. Code. In doing so, DILHR is expressing its view on the role of private sewage regulations as they relate to land use management. The private sewage system code is a technical plumbing code, not a land use management tool. Land use management must be conducted in the context of land use planning.

DILHR recognizes that the availability of wastewater management systems is just one of many factors affecting rural development. Other factors include the presence of roads, availability of electricity, and designation as a wetland, to name three. No one factor is controlling; all contribute to the decision whether to develop a parcel.

DILHR's approach is to unencumber the land use planning process so that owners, local elected officials, and planners can focus on their particular roles. Because the plumbing code focuses strictly on technical plumbing issues, owners should be free to select among plumbing options appropriate for specific soil and site limitations. Elected officials must be free to exercise land use planning tools to choose among wastewater management options that include sewers or onsite wastewater treatment, and planners must be able to manage urban growth based on data and without artificial limits imposed by a plumbing code.

DILHR is pursuing its vision in the structure of ch. ILHR 83, Wis. Adm. Code. DILHR intends for the code to be performance based; that is, the private sewage system code will focus on the quality of the end products and allow designers and owners options to meet these quality standards. There is a trade-off, however, in return for this flexibility, owners will be required to enter into contracts with management entities to ensure the long-term maintenance of their private sewage systems as specified by DILHR.

Moreover, the range of options would be tied to specific soil and site conditions and desire of the owner. Alternatives producing a higher quality effluent would be subject to fewer soil and site restrictions. Owners selecting more traditional designs would be subject to traditional soil and site restrictions.

To further its goal of identifying affordable and available nitrogen-removal private sewage system designs, DILHR continues its research at the Black River Falls Correctional Institute. In conjunction with a private consultant and the University of Wisconsin-Small Scale Waste Management Project, DILHR is testing three alternative designs. Preliminary results indicate that the designs achieve nitrogen removal. There have been some design and operation problems, but the identification of such problems is a legitimate research function. Eliminating these problems will result in more reliable alternative designs DILHR can distribute for consideration its regulated community.

DILHR is also continuing its cooperative efforts with the Department of Natural Resources in examining the feasibility of a decentralized wastewater management system for Washington Island. The pilot project, which uses nitrogen-removal private sewage systems that are under municipal management, may be a model other communities can consider if the project is successful. As with the Black River Falls experiment, there have been some operational and management problems, but the Town of Washington and regulatory agencies are learning much about the operation and management of advanced wastewater treatment systems.

Petroleum Storage Tanks

Through the Bureau of Petroleum Inspection and Fire Protection, DILHR continues the implementation of the Flammable and Combustible Liquids code, ch. ILHR 10, Wis. Adm. Code. In fiscal year 1993, the main program objectives continue to be verifying that tank owners are meeting their leak detection responsibilities and increasing the number of annual inspections conducted at facilities having tank systems.

Owners meeting their leak detection responsibilities are identified through a use permit system and on-site inspections. The number of individuals who are in compliance with the leak detection requirements of the state and federal code has increased significantly because of this effort.

The focus on annual inspections has involved establishing a network of local inspectors and inspection of retail service stations by the Bureau's petroleum inspectors. The petroleum inspectors are now inspecting retail sites for both product quality and compliance with the groundwater protection provisions of ch. ILHR 10. The number of retail sites inspected by this network comprise approximately 45 percent of the federally regulated underground storage tanks (USTs) found in Wisconsin.

The inspection of non-retail sites is intended to be conducted by local program operators who contract with DILHR to perform inspections. This network continues to grow and provide service throughout the state. In fiscal year 1993, there has been growth in the rural areas, which are difficult to cover.

The Petroleum Environmental Clean-up Fund Act (PECFA) program, which has been in operation since 1988, implemented a number of significant changes in fiscal year 1993. The majority of the changes implemented, during the fiscal year, were aimed at improving the control of costs. These cost control strategies were accomplished through the creation of a new administrative rule, ch. ILHR 47, covering the program.

The main elements of the new administrative rule include:

1. Requiring owners to compare proposals before hiring a consultant.

2. Limiting consultants only to providing consulting services when they have been hired to remediate a site.

3. Requiring that non-consulting services be contracted through a competitive bid process.

4. Establishing the maximum award that will be paid for a site investigation unless Departmental approval is obtained for additional costs.

5. Requiring consultants and consulting firms to register with the department and meet certain standards to perform work under the PECFA program.

6. Financial audits to verify program costs claimed by owners.

Chapter ILHR 47, Wis. Adm. Code, is currently an emergency rule in effect until January 1, 1994. DILHR has completed the public hearings for the permanent rule and anticipates submitting the proposed permanent rule to the Legislature later this year.

For more information, contact Mr. Bennette Burks, DILHR, P. O. Box 7969, Madison, Wisconsin 53707-7969; phone: 608-266-0056, FAX 608-267-0592

DEPARTMENT OF HEALTH AND SOCIAL SERVICES

Chapter 160, Wis. Stats., directs the Department of Health and Social Services (DHSS) to prepare draft groundwater standards for substances of health concern and specifies the protocol for developing the recommended standards. Groundwater standards recommendations are developed by DHSS for the substances at the top of a prioritized list identified by the DNR. DHSS sends the recommendations to the DNR which then proceeds through the rule-making process to amend ch. NR 140, Wis. Adm. Code. The DHSS prepared and sent to the DNR draft recommendations for groundwater standards for 13 new substances and revised standards for 22 substances which were the subject of public hearings in February. DHSS is working on additional recommendations for new and revised groundwater standards which will be sent to the DNR this summer.

The DHSS also distributed money to local public health agencies this past year for water-quality analyses conducted by the State Laboratory of Hygiene (SLOH). The DHSS covered the costs of sampling materials and analytical expenses at the SLOH, and assisted in the interpretation of the results. The projects focused on human health issues of local concern, including groundwater monitoring. This is the third year that funding has been available. It is hoped that this effort can be incorporated into the annual joint solicitation by the UWS, DNR, DILHR and DATCP.

DHSS staff review advisory letters sent to well owners by DNR representatives. DHSS often provides additional advice and health risk information to owners of wells which are seriously contaminated with toxic substances such as benzene. These letters explain the health effects of the specific contaminant and advise the homeowner regarding continued use of the water for bathing, laundry, etc.

The Department of Health and Social Services also investigates cases of water-related illness. Investigations conducted during the past year involved drinking water exposures to nitrate, copper and arsenic.

DHSS staff are listed on literature distributed by other agencies as resources for health risk information and handle several telephone calls each week answering questions about the health risks associated with consumption and household use of contaminated water. DHSS staff frequently present health-risk information at public meetings. DHSS also prepares and distributes a wide variety of informational materials intended to help the public understand the health impacts of chemical exposure.

For more information, contact Dr. Henry Anderson, DHSS, P. O. Box 309, Madison, Wisconsin, 53701-0309; phone: 608-266-1253.

GEOLOGICAL AND NATURAL HISTORY SURVEY

The Geological and Natural History Survey (GNHS) performs basic and applied groundwater research and provides technical assistance, maps, and other information and education to aid in the management of groundwater resources. The GNHS groundwater program is complemented by geology, soils, and climate programs that provide maps and research-based information essential to the understanding of groundwater occurrence, quality and movement. Survey personnel are presently preparing groundwater-related maps (such as water-table or aquifer maps) at a scale of 1:100,000 for the following counties: Racine, Kenosha, Grant, Waukesha, Dane, Ozaukee, Washington, Fond du Lac, La Crosse, Clark, Buffalo, Trempealeau, Pepin, Eau Claire, Wood, Polk, Burnett, St. Croix, Taylor, Oconto, and Lincoln.

In FY 1993, the GNHS responded to an increased number of requests for information and assistance from other local, state, and federal agencies, consultants, students, and the public. These requests ranged from the simple, "What will I find underground if I dig or drill here?", to the more complex, such as questions about groundwater flow and contaminant transport in areas of agricultural chemical use.

The public information, records, and research results that the GNHS stores and disseminates save the considerable expense of gathering the same geologic or groundwater information several times for different purposes, or "re-discovering" the same information over time. To help this service, the GNHS continues to review, sort and catalog about 12,000 well

construction reports per year (in cooperation with the Department of Natural Resources), measure monthly groundwater levels in a monitoring network of 210 wells (in cooperation with the U. S. Geological Survey), collect and describe geologic samples from 300 wells per year, and collect and analyze approximately 600 groundwater samples per year for nitrate, chloride and several other basic parameters.

Research projects that have been completed this year or are in progress include the following:

1. Groundwater flow and quality in fractured dolomite in Door County.
2. Hydrogeologic and engineering properties of glacial materials.
3. Groundwater recharge in Central Wisconsin.
4. Age, origin and movement of groundwater in low-permeability materials.
5. Pesticides in groundwater near grade-A dairy farms in Western Dane County.
6. Detailed water-table map of upper Black Earth Creek and northern Dane County.
7. Impact of a barnyard run-off site on groundwater quality in Door County.
8. Delineation of hydrogeologic units throughout Wisconsin.
9. Extent of atrazine contamination in the Lower Wisconsin River valley.
10. Soils, geologic and hydrogeologic setting for atrazine movement in Dane County.
11. Evaluation of NURE hydrogeochemical data for use in Wisconsin groundwater studies.
12. Distribution of radionuclides in Wisconsin groundwater.
13. Delineation of potentiometric divide in the sandstone aquifer between the Wolf River and the Lower Fox River basins.
14. Delineation and characterization of the Platteville/Galena aquifer in southern Wisconsin.
15. Hydrogeology and groundwater use and quality of the Fox Cities area; and
16. Preliminary comparison of a discrete fracture model with a continuum model for groundwater movement for fractured dolomite.

For more information, contact Mr. Ron Hennings, WGNHS, 3817 Mineral Point Road, Madison, Wisconsin, 53705-5100; phone: 608-263-7395.

DEPARTMENT OF TRANSPORTATION

The Department of Transportation (DOT) regulates the storage of highway salt under ss. 85.17 and 85.18, Wis. Stats., for the purpose of protecting the waters of the state from harm due to contamination by dissolved chlorides.

Highway salt is stored at various sites by suppliers, counties, cities, villages and private companies. Annual inspections and reports are made of salt storage sites to insure that the piles are covered by buildings, structures, or other impermeable coverings as required by Chapter Trans 277, Wis. Adm. Code.

Current policy in the State Highway Maintenance Manual restricts the spreading of deicer salts to a maximum of 300 pounds per lane mile per application. Electronic controls for salt spreader trucks are being tested which give a more positive verification of the coverage. In addition, electronic controls will also record the exact amount spread at each location along the highway for better review and check.

A consultant has been engaged to review inspection practices and develop an inspection methodology to be used. Training of inspectors to insure the administrative rule is being effectively implemented is planned for FY 94.

County snow-plow operators are given training and review of proper snowplowing and salt spreading techniques each fall. Counties furnish weekly reports of salt usage which are compiled for better regulation and control.

Over the past 20 years, studies have been conducted to monitor road salt and the impact on surface runoff, vegetation and soils by DOT's Geotechnical Engineering Unit. In the past 8 years, investigations were expanded to groundwater with a more recent emphasis on wetlands. Sampling has been done in several areas of the state to reduce variability due to climatic and geological factors.

As part of its road construction program, DOT performs an estimated 500 environmental assessments annually in its right of way where potential sources of contamination are identified. DOT works with the DNR on 50 to 100 sites per year where tank removal or other remedial action is necessary to accomplish highway improvement.

During the past two years, DOT has engaged in a cooperative study with the U. S. Geological Survey to investigate groundwater relationships with respect to wetland creation and restoration projects. These projects are required as compensatory mitigation under section 404 of the Clean Water Act. The groundwater studies are intended to increase the certainty of establishing wetland hydrology.

For more information, contact Ms. Carol Cutshall, DOT, P. O. Box 7911, Madison, Wisconsin 53707-7911; phone: 608-266-9626.

UNIVERSITY OF WISCONSIN SYSTEM

The University of Wisconsin System (UWS) has research, teaching and information/education responsibilities. These three missions are well integrated through the cooperation and joint appointments of teaching, research and extension personnel who work on groundwater issues.

Research - During FY 1993 the UWS has directed a wide-ranging program of priority groundwater research consisting of thirteen projects. These projects include both short-term

and long-term studies, and may be either of a fundamental or an applied nature. These projects provide a balanced program of laboratory, field and computer-simulation work aimed at determining whether laboratory experiments can be used to reliably predict conditions in the natural environment. Among the categories of groundwater problems which have been investigated are:

a. Contaminant transport in soils and their dispersion in aquifers.
b. Occurrence and sources of pesticides and their metabolites in groundwater.
c. Improved management of agricultural chemicals, particularly pesticides and nitrates.
d. Hydrogeologic field measurements and computer simulations.
e. New and improved technologies for remediation of contaminated waters.
f. Management of food processing waste to protect groundwater quality.
g. Impact of municipal construction projects on water bodies.

The thirteen projects funded in these categories provided training in several disciplines for many students, including postdoctoral research associates, graduate student research assistants, and undergraduate students. A complete list of the funded research projects and their respective principal investigators may be found in Table 1 and Table 2.

Teaching - The UWS institutions continue to offer courses and/or programs at the undergraduate and/or graduate level focusing on groundwater resources. In addition, several campuses offer credit, field-oriented water curriculum courses for middle school and high school teachers during the summer sessions.

Information/Education - The UW System institutions and county-based staff continue involvement in groundwater education activities. In cooperation with other state and federal agencies, groups and individuals, innovative problem-solving educational programs on groundwater resources are provided to the State's citizens through publications, meetings, teleconferences, satellite, water testing and other forms of assistance. Activities of several specific programs follow.

The UWS farmstead assessment system (Farm*A*Syst) helps farmers (and rural non-farm residents) assess the relationship of their farmstead structures, management practices and site characteristics to groundwater pollution potential. The system has been applied in depth in seven Wisconsin counties, integrated into at least 3 Wisconsin Priority Watershed projects and is under consideration as a major part of the educational plan for other projects. A pollution prevention delivery system based on Farm*A*Syst is being developed in cooperation with farm supply groups and other agribusinesses. Project evaluation shows Farm*A*Syst to be an effective, voluntary program which increases knowledge and, most importantly, leads to changes in practices. The expanded, national project is already working with one Canadian province and 44 states which are interested in adapting this system. The National Comprehensive Groundwater Protection Guidance document encourages states to

develop a cooperative Farm*A*Syst program. This is an EPA - Soil Conservation Service - Cooperative Extension Service cooperative project.

The U.S. Department of Agriculture (USDA) Water Quality Demonstration Project in the East River Watershed (Green Bay) is increasing adoption of research-based practices for cost-effective protection of water quality. This year's educational emphasis has been on nutrient and pest management, manure handling, private well protection, milkhouse waste reduction and disposal of hazardous chemicals. Use of specific crediting of nutrients from applied manure has resulted in the reduction in use of 76,000 pounds of phosphorus and 430,000 pounds of nitrogen on corn fields, resulting in economic savings of approximately $25 per acre.

The USDA Hydrologic Unit (Stevens Point, Whiting and Plover Wellhead Protection) project in Portage county applies innovative, research-based practices to maintain or improve the communities' well-water supply. Agricultural practices, such as irrigation water management and reducing fertilizer and pesticide use, complement an urban groundwater protection component in the project's educational and technical assistance efforts. Seventeen farmers participated in the first of a three-year program that comprehensively manages crop nutrients and pests, resulting in reduction of fertilizer and pesticide applications. Farmers in the project reduced inputs of nitrogen fertilizers, a source of nitrate contamination, by 28,000 pounds.

The UW Nutrient and Pest Management (NPM) program is engaged in fifty on-farm demonstration and field day activities to disseminate information on best management practices (BMPs) around the state. The program is working toward whole-farm integrated management systems. This year NPM contacted all of the farmer directors of Wisconsin agricultural supply cooperatives to provide them with additional information on agricultural practices and water quality.

The UWS cooperates with other state agencies involved in the Non-point Source Water Pollution Abatement program (Priority Watershed Program). This program works to improve water quality by providing education and/or technical assistance, and financial assistance through cost-sharing for BMPs to improve water quality in over sixty watersheds. Groundwater quality has been an increasing focus of this program with two watershed projects specifically targeting this resource as its primary goal. The Area Water Quality Education Specialists work with County Extension Agents and Land Conservation Staff in educating both rural and urban residents. A common element to the program strategies used, in these projects, is well water testing and groundwater education. Additionally, this educational program includes drinking water fact sheets, groundwater newsletter articles and, in some instances, specific watershed studies that address unique water quality problems (e.g., elevated levels of arsenic in drinking water samples from Door County).

To address issues related to water resources, Cooperative Extension formed the Extension Water Resources Coordinating Council (EWRCC). The EWRCC has conducted several projects aimed at:

1) maintaining an inventory of water-related programs and research,

2) enhancing internal communication,

3) assisting in priority-setting,

4) facilitating external coordination, and

5) fostering water resources education which integrates county and state staff expertise.

In the past year, the EWRCC has supplied informational resources for those providing groundwater programming. These inventories have included:

1) a listing of committees, councils and advisory groups which have work tasks related to water resources,

2) a national directory of electronic bulletin boards and databases that provide information about water resources topics, and

3) a directory of newsletter and periodic bulletins which contain water-related information.

The EWRCC has also initiated a monthly newsletter called Keeping Current which provides information about water-related issues to more than 1000 agency personnel in Wisconsin.

The mission of the Central Wisconsin Groundwater Center (CWGC) is to provide groundwater education and technical assistance to the citizens and governments of Wisconsin. The Center frequently works through county Extension faculty in program delivery.

Two of the Center's prime tools are private well testing and drinking water education programs conducted in conjunction with the UW-SP Environmental Task Force (ETF) laboratory. Last year, 3,000 households utilized services to have their well water tested. Of these, 7% exceeded the nitrate enforcement standard of 10 mg/l N, 37% had slightly to severely corrosive water, and 52% contained elevated chloride. Nitrate-N enforcement standards were exceeded by more than 18% of samples in some counties.

The Center is actively involved in promoting wellhead protection, and assists communities in developing wellhead protection strategies. The Center is collaborating with the

Department of Natural Resources in researching nonpoint pollution control in sandy agricultural areas.

Other educational programs include teacher training, a "Home Water Safety Campaign", and fielding questions from citizens. The Center answers, on the average, two questions per day from citizens, who are generally referred by county Extension agents.

For more information, contact Dr. Earl Peace, UW System, 1220 Linden Drive, Madison, WI 53706; phone 608/262-5851. The following is a list of selected groundwater-related documents published by the UWS during FY 93 and information on their availability.

LISTING OF GROUNDWATER-RELATED PUBLICATIONS IN FISCAL YEAR 1993

Published by the Wisconsin Geological and Natural History Survey and available from WGNHS Map and Publications Office, 3817 Mineral Point Road, Madison, WI 53795.

Groundwater flow systems and recharge in the Buena Vista basin, Portage and Wood Counties, Wisconsin: 31 pp. report.

Historical monthly precipitation database: Documentation for version 1.0; 12 pg report with diskette.

Generalized water-table elevation map of Eau Claire County, Wisconsin: two-color map (scale 1:100,000).

Precipitation summary for 1992: 4 pp. brochure.

Evaluation of NURE hydrochemical data for use in Wisconsin groundwater studies: 57 pg report plus diskette.

Generalized water-table elevation map of Pepin County, Wisconsin: two-color map (scale 1:100,000).

Published by the UW System*

The Bottom Line: An Economic Summary of Nutrient and Pest Management Practices, 1992. Available from UW Extension Publications, 30 N. Murray Street, Madison, WI 53715.

East River Water Quality Demonstration Project Handbook, 1992. Available from the East River Water Quality Demonstration Project, 1221 Bellevue Street, Suite 103, Green Bay, WI 54302.

Hickey, W.J., Harrison, E.A., and Bahr, J.M. 1992. Laboratory evaluation of potential for *in situ* bioremediation of trichloroethylene in a cold water sand aquifer. Subsurface Restoration Conference, Dallas, Texas. 2 pp. Available from W.J. Hickey, Department of Soil Science, University of Wisconsin - Madison, 1525 Observatory Drive, Madison, WI 53706.

Harvey, R.G. and Wagner, C.R. 1992. A simple technique for predicting future weed problems. Nutrient and Pest Management (NPM) Program, Cooperative Extension Division, University of Wisconsin Extension. 6 pp. Available from the UW Department of Agronomy (608-262-1390) or the NPM office (608-262-5200).

G3558-1 Keeping Your Home Water Supply Safe. Overview of differences in personal responsibilities when on private as opposed to public water supply; folder to keep the other fact sheets in.

G3558-2 Evaluating the Condition of Your Private Water Supply. Discusses need to test water, which tests to run, importance of well location and proper well construction; gives alternatives for unsafe supplies.

G3558-3 Evaluating the Condition of Your Public Water Supply. Explains regulation, periodic testing, and treatment of public water supplies; discusses possible need for lead testing; lists actions people can take to ensure the safety of public water supplies.

G3558-4 Interpreting Drinking Water Test Results. Helps identify which tests to run; gives interpretation of common water analyses, including acceptable results, sources and corrective actions.

G3558-5 Choosing a Water Treatment Device. Lists devices which remove common contaminants; explains DILHR and DNR approval process for devices; provides consumer checklist for comparing feature of devices.

1992-93 Resource Guide: The Nutrient and Pest Management (NPM) Program. Available from NPM, 1575 Linden Drive, Madison, WI 53706.

Balancing Water Quality and Farm Profit: 1992 Nutrient and Pest Management On-Farm Demonstrations. Northwest Region (A3542-1) Southwest (A3542-2), Southcentral Region (A3542-3), Southeast Region (A3542-4).

*G- series bulletins are available from UW-Extension Publications, 30 N. Murray St., Madison, WI 53715.

GROUNDWATER MONITORING AND RESEARCH

CONDITION OF THE RESOURCE - GROUNDWATER QUALITY

As part of 1983 Wisconsin Act 410, the Groundwater Account of the Environmental Fund was created to support groundwater monitoring by state agencies to determine the extent of groundwater contamination in Wisconsin and identify the sources of contamination. Groundwater monitoring has found that the primary contaminants of concern are volatile organic chemicals (VOCs), pesticides and nitrates. Each is discussed below.

Volatile Organic Chemicals - VOCs volatilize under normal temperatures and pressures. Examples of VOCs include gasoline and industrial solvents, paints, paint thinners, drain cleaners, air fresheners and household products (such as spot and stain removers). Many VOCs are suspected carcinogens when exposure is long term. In the short term, high concentrations of VOCs can cause nausea, dizziness, tremors or other health problems.

To date, the DNR has sampled over 6,000 wells for VOCs. Fifty nine different VOCs have been found in Wisconsin groundwater. Trichloroethylene is the VOC which has been found most often in Wisconsin's groundwater.

Wisconsin has 115 active licensed solid waste landfills of which 105 are required to monitor groundwater. Two studies conducted over four years revealed that out of 51 total landfills, including industrial and municipal landfills (both engineered and unengineered), 27 (53%) had VOC contamination in groundwater. However, VOC contamination occurred in groundwater at 21 (81%) of the 26 unengineered municipal solid waste landfills included in the two studies. While 20 different VOCs were detected overall, 1,1-Dichloroethane was the most commonly occurring VOC at all solid waste landfills. The two DNR publications: "Volatile Organic Compounds in Groundwater and Leachate at Wisconsin Landfills," dated February, 1988, and "VOC Contamination at Selected Landfills - Sampling Results and Policy Implications" dated June 1989 further describe the research results.

Wisconsin requires underground storage tanks to be registered if their capacity is greater than or equal to 60 gallons. This registration program has identified 146,142 tanks as of November 1992 in the state, of which 67,842 are regulated by the federal underground storage tank program and 40,050 are currently in use. As of December 20, 1988 approximately 17,500 underground storage tanks have been removed, and approximately 3,200 have been removed since October 1, 1991. Currently there have been 1,115 underground storage tank clean-ups completed and 6,105 clean-ups are currently active. The contaminants most commonly associated with leaking underground petroleum storage tanks are benzene, xylene, toluene and ethyl benzene. Sampling data from the State Laboratory of Hygiene (SLOH) for the period of December 1989 through November 1992, shows that benzene has been detected in 212 wells. 141 wells have had benzene detects exceeding the enforcement standard (ES) of 5 micrograms/liter (ug/l).

Section 144.76, Wis. Stats, the Hazardous Substance Spill Law, became effective in 1978. This law requires those who spill hazardous substances to report spills and to take actions

necessary to restore the environment. The number of reported spills has increased from 360 in 1978 to 1,063 in 1989, 1,100 in 1990, and 1,324 in 1991. Petroleum products comprise 65 percent of all reported spills in Wisconsin.

Another VOC source is hazardous waste storage and handling facilities. VOCs can disperse quickly in groundwater and often spread over large distances. When various VOC sources are present in an area, it is difficult to identify the specific source of contamination.

Pesticides - Pesticides can reach groundwater as a result of normal application practices (nonpoint sources) or as a result of spills, waste disposal and improper storage practices (point sources). Pesticides were first determined to be a problem in Wisconsin when aldicarb was detected in groundwater near Stevens Point in 1980. Aldicarb use was discontinued in 1990 due to the issue of food safety, the findings of aldicarb in groundwater and the implementation of a rule regulating the use of aldicarb by the DATCP.

Aldicarb persists in the groundwater of the Central Sands although the number of wells impacted is beginning to decline. Historical data from the DNR's Groundwater Information Network database indicate that 1,896 wells have been tested for aldicarb with 480 wells having detectable levels of aldicarb at one time or another. 194 of the wells with aldicarb detects exceeded the enforcement standard with 381 exceeding the preventive action limit.

The pesticide sampling program was expanded in 1983 to sample for various pesticides, in addition to aldicarb, used in Wisconsin. Groundwater quality standards have been adopted to include 30 pesticides to date.

A significant problem identified through pesticide sampling is groundwater contamination related to the handling and storage of pesticides. To date, over 30 sites in Wisconsin have been identified where the improper handling of pesticides may have contributed or caused groundwater contamination problems found near the facilities. Due to the number of handling facilities at which groundwater contamination has been detected, the DNR and DATCP initiated a project to determine how widespread the problem is by investigating 27 randomly selected pesticide mixing/loading sites across the state. Results indicate soil and groundwater contamination is common at agri-chemical facilities in Wisconsin. Soils at 25 of the 27 sites contained pesticides. Groundwater samples from 15 sites contained pesticides and 9 had pesticide levels in groundwater above the state's enforcement standards. Nitrates were found in groundwater at 15 of the sites and seven of these had nitrate levels above the ES of 10 milligrams/liter (mg/l).

DATCP has initiated several studies to investigate pesticides in groundwater. Beginning in 1985, using DNR management practice monitoring monies, DATCP installed monitoring wells at a number of farm fields in susceptible geologic environments to determine the impact of pesticide use on groundwater. To date, the herbicide atrazine has been found at 25 of 35 sites and the herbicide alachlor (trade name Lasso) has been found at 7 of 23 sites.

DATCP randomly sampled well water on 534 Grade A dairy farms between August, 1988 and February, 1989 to determine the extent of pesticide contamination. Grade A dairy

farms were sampled taking into account ease of access and regulatory authority considerations. Water samples were analyzed for 44 pesticides and nitrates. A total of 71 wells (13%) contained one or more pesticides. Atrazine was found alone or in combination in 66 wells (12%). In 39 of these 66 wells (59%), the concentration of atrazine was above its preventive action limit (PAL) of 0.35 micrograms per liter (ug/l), and in 3 of these it was over its ES of 3.5 ug/l. Alachlor exceeded its enforcement standard of 0.5 ug/l in all 5 wells where it was found.

Two studies were initiated as a follow-up to the Grade A dairy survey. In the first study, Department of Natural Resources staff resampled 69 of the 71 wells which showed detectable concentrations of one or more pesticides as well as nearby wells to determine the extent of pesticide occurrence associated with the original detects. Of the 69 resampled wells, 57 had detections of one or more pesticides. Atrazine was found in 50 wells by itself and in 6 wells with one or more other pesticides. Atrazine concentrations exceeded the enforcement standard in 2 wells. A total of 212 adjacent wells were sampled. One or more pesticides were detected in 63 of these wells. Atrazine was detected by itself in 57 wells and in combination with one or more other pesticides in 6 wells. One well had atrazine concentrations above the enforcement standard.

A second study initiated by DATCP was a rural well sampling program to get a better understanding of pesticides and nitrates in groundwater in rural portions of Wisconsin. Immunoassay testing was used to screen for atrazine and similar triazine herbicides. Approximately 2,200 rural wells were sampled at a cost of $16 to each homeowner. Sixteen percent (351 of 2,187) of the well tests contained detectable concentrations of triazine-class compounds. Atrazine is the most widely used triazine herbicide in Wisconsin. Six percent (127) of the wells had triazine concentrations over the atrazine PAL and less than 1% (11) had triazine concentrations above the atrazine ES.

A groundwater standard for total chlorinated atrazine residues to include parent atrazine and metabolites of health concern was adopted in February of 1992. The new enforcement standard is 3.0 ug/l for the sum of atrazine and its three chlorinated metabolites (deethylatrazine, deisopropylatrazine and diaminoatrazine). The new PAL is 0.3 ug/l.

As part of the Rural Well Survey, CIBA-GEIGY Corporation received a split sample from each of the 236 follow-up wells that had a value at or above 0.35 ug/l from the triazine test. CIBA-GEIGY analyzed these samples for parent atrazine and all the chlorinated metabolites, deethylatrazine (DEA), deisopropylatrazine (DIA), and diaminoatrazine (DAA). Results from this phase of the Rural Well Survey were received by DATCP in March of 1992. These are the first data on the presence of diaminoatrazine in Wisconsin groundwater. Eighty-five percent (200 of 236) of the wells contained atrazine, 88% (208 of 236) contained DEA, 61% (143 of 236) contained DIA, and, surprisingly, 83% (195 of 236) contained DAA. Average concentrations (including non-detects) were 0.90, 0.71, 0.27, and 0.86 ug/l for atrazine, DEA, DIA, and DAA, respectively.

The addition of the diaminoatrazine metabolite to the total chlorinated residues from the 236 samples analyzed by CIBA-GEIGY increased the number of samples at or above the PAL (0.30 ug/l) from 197 to 208. More importantly, the number at or above the ES (3.0

ug/l) increased from 45 to 71. Comparing these to the 2187 samples screened in the Rural Well Survey, 9.5% (208 of 2187) exceed the PAL and 3.2% exceed the ES. It is interesting to note that the Grade A survey estimated that between 5 and 9% of wells on Grade A dairy farms contain parent atrazine at or above the PAL for parent atrazine (0.35 ug/l) which was in place in 1988.

Any well with a concentration of triazines above the PAL or nitrates above 10 milligrams/liter (mg/l) was resampled by the DNR and analyzed by the DATCP for a more complete list of pesticides. A total of 452 follow-up samples were collected. 220 of the 452 contained a detectable pesticide; in 215 cases, it was atrazine.

Triazine Screening - Triazines are a class of herbicide compounds which include atrazine and simazine. Beginning in January of 1991 the Wisconsin State Laboratory of Hygiene (SLOH) initiated a testing program for the public based on the immunoassay screening test for triazine based compounds. This program is available to the public via an 800 telephone number. Since the start of this program, approximately 5,800 groundwater samples have be analyzed.

Triazine screen sampling data from the SLOH, since the program began in 1991 indicates that approximately 18.3% of the samples have exceeded the PAL for atrazine of 0.3 ppb, and approximately 2.4% have exceeded the ES of 3.0 ppb for atrazine. These numbers are used only for reference since the test screens for compounds other than atrazine specifically.

One drawback of the triazine immunoassay test kit, currently in use by the SLOH, is that it can detect only one of the three atrazine metabolite in the total atrazine standard, deethylatrazine. The other two metabolites, deisopropylatrazine and diaminoatrazine are not detected in this screen. In addition, atrazine and related triazine compounds are reactive to different degrees in the test. Combinations of triazine compounds can result in cross-reactivity between compounds causing the least detectable dose of each compound to increase.

Nitrate - Nitrate-nitrogen is the most commonly found groundwater contaminant, and frequently exceeds the state drinking water standard and enforcement standard of 10 milligrams/liter (mg/l) nitrate + nitrite. (Nitrate + nitrite nitrogen will hence-forth be referred to as nitrate) Consumption of water containing high concentrations of nitrate can induce methemoglobinemia or "blue baby syndrome," a condition in which hemoglobin is oxidized to a form which is unable to carry oxygen to the body's tissues in infants under six months. Serious poisonings in infants has occurred following ingestion of water containing nitrate concentrations as low as 50 mg/l, just 5 times the current standard. Fatal poisonings usually involve ingestion of water containing 100-150 mg/l nitrate. The effects of ingesting lower concentrations are not known, but some experts believe this could cause a chronic oxygen shortage, which could injure an infant's nervous system. Nitrate is not usually harmful to adults or older children.

Nitrate can enter groundwater from many sources, including nitrogen based fertilizers, animal waste storage and feedlots, municipal and industrial wastewater and sludge disposal,

refuse disposal areas, and private sewage systems. Approximately 10% of the private wells in the state are estimated to contain nitrate-nitrogen above the ES.

This number was confirmed by the nitrate sampling that was done in conjunction with the DATCP Grade A farm well survey. The sampling found nitrate-nitrogen concentrations above the PAL of 2 mg/l in 255 wells (48%) and over the ES of 10 mg/l in 55 (10%) of these wells. The April, 1989 DATCP report "Grade A Dairy Farm Water Well Survey" provides a summary of this pesticide and nitrate sampling effort. Of the 2,187 wells in the Rural Well Survey, 355 (16%) exceeded 10 mg/l nitrate nitrogen.

This study and other statewide studies have shown nitrate contamination above the drinking water standard in 10% of the state's domestic wells overall. At that rate 70,000 of Wisconsin's 700,000 wells exceed the standard of 10 mg/1 of nitrate -nitrogen. Groundwater sample data from the SLOH for the past three years has indicated that approximately 55% of the samples have exceeded the PAL of 2.0 mg/l and approximately 18% have exceeded the ES of 10.0 mg/l for nitrate nitrogen.

Concentrations of nitrate are not uniform across the state. Some undeveloped areas have low levels of nitrate in groundwater, whereas up to 50% of rural wells in some agricultural areas of southern Wisconsin exceed the enforcement standard for nitrates. County groundwater assessments conducted by the Wisconsin Geological and Natural History Survey have found counties ranging from 2% in Burnett county to 16% in Pepin, of the samples tested for private water supply wells had nitrate above the groundwater enforcement standard. Most of the differences across the state can be related to variations in nitrogen loading and to differences in soil, geology and groundwater conditions across the state.

Due to the concern over nitrate, the Groundwater Coordinating Council (GCC) endorsed a resolution in 1989 recommending that newly constructed water supply wells be tested for nitrate in addition to coliform bacteria.

Natural Groundwater Quality - Natural groundwater quality varies greatly throughout Wisconsin. Undesirable constituents commonly found in Wisconsin groundwater include arsenic, and radioactive compounds, iron, manganese, chloride, and sulfate. High levels of iron have been detected throughout the state. High levels of manganese, arsenic and sulfates are less commonly found and are more localized in extent.

Naturally occurring radioactivity in groundwater, including uranium, radium and radon, have become a concern in Wisconsin in recent years. The state has initiated programs to test groundwater for radioactivity. Recent sampling has identified radionuclides in groundwater in north-central Wisconsin. High levels of radium have also been found in water supplies in eastern Wisconsin.

Biological Hazards - The Department of Natural Resources is aware of several areas in Wisconsin where biological contamination of the aquifer is common place. Biological agents include bacteria, virus and parasites. These agents can cause acute illness which could result in serious illness for some groups of people.

Approximately 10 - 13% of water samples test positive for coliform bacteria, an indicator species of other biological agents. The Department recommends that well owners test for biological quality annually or when there is a change in taste, color or odor of the water.

CONDITION OF THE RESOURCE - GROUNDWATER QUANTITY

Wisconsin is favored with thick sequences of permeable deposits across most of the state forming four major aquifers that yield water to wells:

1) sand and gravel aquifer,

2) eastern dolomite aquifer,

3) sandstone aquifer, and

4) crystalline bedrock aquifer.

Groundwater is plentiful and of good quality in most of the state except in a part of north-central Wisconsin underlain by poorly productive, fractured crystalline rocks (see figure 1). In this area, yields of groundwater during dry seasons are too low in some places to sustain large water supplies. However, yields adequate for domestic wells can usually be found.

Groundwater supplies more than 70 percent of Wisconsin population, and it is a primary source of water for agriculture and sole source of private water supplies. The overall supply of groundwater is more than adequate to meet the growing demand in the foreseeable future. More than one million billion gallons of water is estimated to be stored underground in Wisconsin. At current pumping rates for private, municipal, industrial and agricultural uses, groundwater in storage would last more than 5,000 years without replenishment. However, replenishment of groundwater occurs constantly.

For all practical purposes, the total amount of water available in Wisconsin remains essentially the same as it was more than one hundred years ago. Groundwater is being constantly replenished by precipitation, which brings annually about 31 inches of water to the surface area of the state. Of this amount, almost 10 inches enters streams and eventually flows out of the state. The rest returns to the atmosphere by evaporation and transpiration. Of this 10 inches per year, or 30 billion gallons of water per day, that flows out of Wisconsin, between 15 and 20 billion gallons is contributed by groundwater. The rest returns to the atmosphere by evaporation and transpiration.

The occurrence and availability of groundwater differs considerably from area to area, depending on the character and thickness of water-bearing rocks and their connection with underlying and overlying rocks, soil and surface water. The rate of groundwater recharge varies correspondingly, from close to zero in parts of eastern Wisconsin, where there are mainly impermeable soils, to perhaps as much as 50 percent of annual precipitation in the central portions of the state where sandy glacial deposits cover the surface and allow good access of rain water to groundwater.

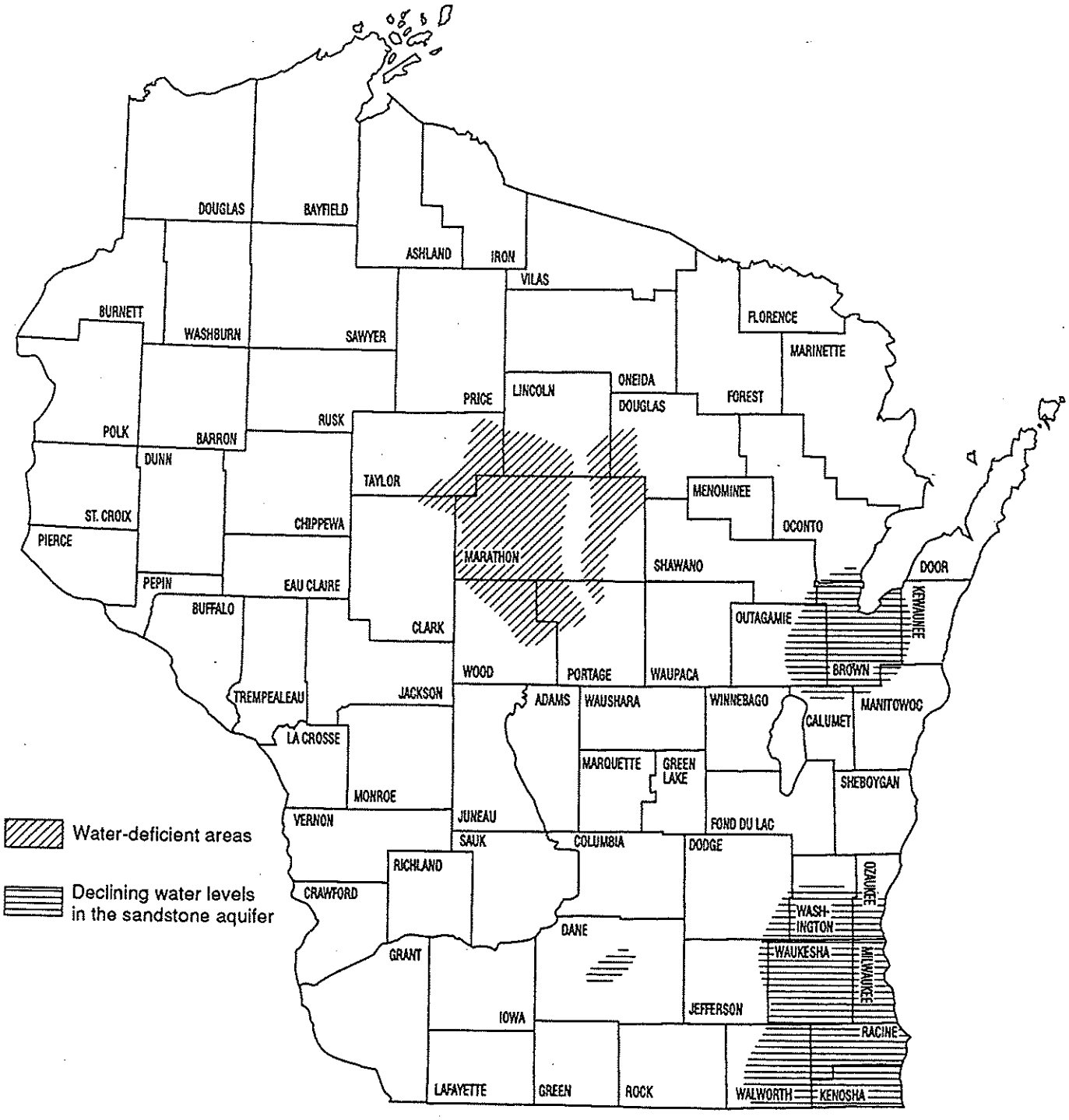

Figure 1. Map showing generalized areas of water-deficiency and declining water levels (Source: WGNHS files)

If we assume that, on average, about 15 percent of annual precipitation reaches the water table, approximately 14 billion gallons of water is recharged to groundwater every day. This is enough to fill Lake Winnebago 600 times each year. Estimated daily use of groundwater in Wisconsin is about 600 million gallons, which represents only 4 percent of daily groundwater recharge.

Despite this general abundance of groundwater, water levels are declining slowly in local areas of concentrated pumping, primarily in southeastern Wisconsin and the lower Fox River valley (see Figure 1). Fortunately, the declines thus far have been primarily in artisan pressure, resulting in increased costs of pumping but not in dewatering of aquifers. Management options to maintain an adequate groundwater supply are being considered in most of these areas.

Effective management of groundwater in Wisconsin requires up-to-date information on groundwater levels and their fluctuations and trends. The GNHS and USGS initiated a statewide water-level observation network in 1946. Water-level measurements are checked and entered into a computer data base. Statewide summaries of groundwater level trends are published annually or biannually. During 1992, systematic observations of water levels were made on 194 wells.

A computer program for retrieval of water-level data was developed and a Groundwater Data County Series was initiated in 1990. Groundwater data are summarized a single information sheet. The first side of the information sheet contains station history, which includes well number and location, well construction and observation information, and length of record. The second side of the information sheet contains the water-level record including average monthly and annual levels and maximum and minimum levels for each year on record. Groundwater data sheets are available on request from the GNHS or USGS.

During the drought of 1988-89 Wisconsin residents were concerned about the possibility of diminishing groundwater supplies. As a result of this drought, water levels in many Wisconsin wells were lowered, primarily in southern and eastern Wisconsin. Although water levels generally began to recover during 1990-91, the effect of the 1988-89 drought persisted in some wells, especially in he southern and eastern parts of the state, well into 1992. Then in the summer of 1993 an opposite problem has emerged in some parts of the state. As a result of sharply rising groundwater levels, flooding of basements and low-lying farm fields has occurred. These two periods graphically illustrate the fact that groundwater levels are constantly fluctuating and experience natural alternation of periods of high and low levels. The average length of these "cycles" is around seven years.

More attention is being paid to the connection between ground and surface water. In 1991, the GNHS began a study of the interrelationship of ground and surface water in the Black Earth Creek basin, which is now being extended it to all of Dane County. The purpose of the study is to investigate the effects of groundwater withdrawals on surface water. For example, how much does the pumping of groundwater reduce the base flow in Black Earth Creek or inflow to the Lake Wingra wetlands? Results of the study will be applicable to similar drainage basins in Wisconsin.

COORDINATION OF GROUNDWATER MONITORING AND RESEARCH

Four state agencies have approximately $825,000 available each year for groundwater-related monitoring or research. The purposes and sources of money include:

1. DNR Management Practice Monitoring - The Department of Natural Resources has approximately $350,000 available each year to support groundwater monitoring studies evaluating existing design and/or management practices associated with potential sources of groundwater contamination. The intent of these studies is to reduce the impacts of potential sources of contamination by changing the way land activities which may impact groundwater are conducted.

2. DATCP Pesticide Research - Since 1989, the Department of Agriculture, Trade and Consumer Protection has had approximately $125,000 available annually through fees from pesticide manufacturers as a result of the pesticide law to fund research on pesticide issues of regulatory importance.

3. UWS Groundwater Research - $300,000 is available annually for groundwater research administered by the University of Wisconsin System (UWS).

4. DILHR Private Sewage System Research - The Department of Industry, Labor and Human Relations received an appropriation of $50,000 for four years, beginning in 1990, to fund research on alternatives to current private sewage system technology. The research, which will include groundwater monitoring, focuses on designs, products, and management practices that minimize nitrate contributions from private sewage systems.

In order to provide consistency and coordination among the four state agencies (DATCP, DNR, DILHR and UWS) in funding groundwater monitoring and research to meet state agency needs, there have been discussions among the involved agencies through the GCC for some time. At the request of the GCC, the UWS in 1988 created a Groundwater Research Advisory Council (GRAC) to establish a long-range groundwater research plan and develop a groundwater research decision item narrative (DIN) for inclusion in the University's biennial budget. The GRAC consists of university, state agency and public representatives.

Based on discussions with the GCC, the GRAC prepared a groundwater research DIN for inclusion in the University's 1989-1991 biennial budget request. The GCC endorsed the DIN at its October 14, 1988 meeting. The DIN was included in the governor's budget and was approved by the Legislature at a level of $500,000 for the 1989-1991 biennium for groundwater research. This amount was increased to $600,000 for the 1991-1993 biennial budget. Statutory language requires that there be agreement between the UWS and the GCC on the use of the UWS research funds before the funds can be released by the Department of Administration.

To expedite this agreement, a Memorandum of Understanding (MOU) was signed in 1989 by representatives of the GCC, the GRAC and the UWS on use of the UWS groundwater

research funds. The MOU spells out the procedures for establishing priorities and selection of projects for funding of UW groundwater research. The MOU recognizes that the GCC has a substantive role in establishing research priorities and an advisory role in project selection to minimize overlap and duplication.

The UWS funded 19 groundwater research proposals during FY 90 & 91 with concurrence from the GCC. The results of the first studies that were funded by the UWS were published in October, 1991 by the UW Water Resources Center in a report titled, "UWS Groundwater Research Program, Summary of 21 Projects".

During the summer of 1990, the GRAC and GCC developed and endorsed a plan to coordinate the solicitation of projects for funding in FY 92 and future years. The mechanism provides for only one submittal of project proposals, rather than four as has been the case. The intent of the plan is to determine the most appropriate funding source for funding a particular project.

Summarization of agencies efforts promoted through the joint solicitation is as follows:

Additional Funding Information

1. DNR - The DNR has been funding groundwater management practice monitoring projects since FY 86. The money has come from the Groundwater Account of the Environmental Fund (which is funded by various fees). Through FY 93, the DNR will have spent approximately $2.5 million on 98 monitoring projects. One project has been co-funded with DATCP.

2. UWS - The UWS has received funding as part of the base UWS budget since FY 90 for groundwater research. They received $200,000 in FY 90 and $300,000 annually since then. Through FY 93, the UWS will have spent $1.1 million on 38 groundwater research projects. Three of the 38 projects have been co-funded with DATCP.

3. DATCP - DATCP has received approximately $125,000 per year since FY 90 for pesticide research. The money comes from fees paid by pesticide manufacturers to sell their products in Wisconsin. Through FY 93, DATCP will have spent about $500,000 on 11 pesticide projects. Three were co-funded with the UWS and 1 was co-funded with the DNR.

4. DILHR - DILHR received a special GPR appropriation of $50,000 for 4 years (s. 145.20(5), Stats., beginning with FY 90 to fund research on alternatives to current private sewage system technology. That appropriation ends at the end of FY 93; DILHR is seeking an appropriation to continue this research. Through FY 93, DILHR will have spent $200,000 on three projects.

Approximately $4.3 million has been spent through FY 93 on 146 different projects dealing with groundwater or related topics.

FY 93 Monitoring Projects - Joint Solicitation

The joint solicitation for FY 93 was sent out November 30, 1991. A total of 27 project proposals were submitted in response to the joint solicitation. To assist in the review process, a joint meeting of the Monitoring & Data Management and Research Subcommittees of the Groundwater Coordinating Council was held on February 25, 1992 to review and rank the projects submitted for funding. As a result of that meeting and review of the proposals by DNR staff, 5 new projects were selected for funding in FY 93; one of those is being co-funded with the DATCP. Eight on-going projects were carried over into FY 1993.

In addition to the projects funded by the DNR, the UW System fully funded 11 projects and co-funded three projects with DATCP. DILHR and DATCP each fully funded one project in FY 93. A total of 28 projects were funded through the joint solicitation at a cost of approximately $776,000 (see Table 1).

FY 94 Monitoring Projects - Joint Solicitation

A joint solicitation for project proposals by the UW System, DNR, DATCP and DILHR was sent out on November 30, 1992 for funding in FY 94. The deadline for proposals was January 15, 1993. The joint solicitation contains a listing of the priorities for each of the agencies. The priority needs for the DNR's management practice monitoring program for FY 1994 were identified by the Monitoring & Data Management and Research Subcommittees of the Groundwater Coordinating Council. The two subcommittees met in early March to rank the 43 proposals submitted. A summary of the projects funded in FY 94 is listed in table 2.

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

The Wisconsin Department of Natural Resources (DNR) has the responsibility of groundwater protection in the Division for Environmental Quality. The collection and coordination of groundwater data exchange within the DNR and with outside agencies has been increasingly important as an issue. The DNR is currently in the middle of a renewed effort to coordinate the collection and retrieval of all groundwater data, as a result of DNR funding, inter-agency responsibilities, and cooperative agreements.

The DNR currently has a computer system called the Groundwater Information Network (GIN). The GIN computer system is in the process of being migrated from the state regional computing facilities to the DNR's VAX network. The new system, the Groundwater Retrieval Network (GRN), will focus on data integrity and ease of use for the end users. The database will include a mechanism for creating and updating a statewide coverage of well locations in a geographic information system (GIS). An ARC/INFO (industry standard GIS software) layer will provide graphical depictions of well locations and associated database information. The initial project portion of the system is in the final stages of programming and testing.

In order to provide access to the system for other state agencies, computer hardware and software was provided last fiscal year to the Departments of Agriculture, Trade and Consumer Protection, Industry, Labor and Human Relations, and Health and Social Services; the Wisconsin Geological and Natural History Survey and the Central Wisconsin Groundwater Center. This year documentation and training will be provided for using the new GRN system. The sharing and exchange of information between agencies dealing with groundwater should be greatly enhanced by the completion of the GRN system.

DEPARTMENT OF AGRICULTURE, TRADE AND CONSUMER PROTECTION

DATCP needs up-to-date, reliable data on pesticide contamination of groundwater. These data are used to develop substance specific rules on pesticide use, such as DATCP's "Atrazine Rule" (Chapter ATCP 30, Wis. Adm. Code), to respond to citizen requests on groundwater quality data for specific locations, and to initiate timely investigations of pesticide contamination of groundwater. DATCP ensures the quality of its database by carefully checking and cross-referencing manual (e.g., paper lab slips) and computerized data received from DNR and other sources. DATCP feels that this is necessary because the data are used for regulatory purposes.

The DATCP groundwater database currently contains locational information for over 11,000 wells and over 20,000 sample analysis results. These data represent samples analyzed by DATCP, the State Laboratory of Hygiene, and other public and private laboratories. Currently, the groundwater database operates in a multiuser environment under Paradox 3.5. All members of the groundwater unit access the database via Pathworks operating on the Department's VAX computer. DATCP plans to convert the database application to Paradox 4.0 by the end of 1993. In addition, additional links between the groundwater database and the Department's pesticide tracking system will be developed in late 1993 or early 1994.

DATCP is already utilizing GIS tools for analysis of groundwater data and generation of maps for public hearings and other uses. For example, a pcARC/INFO data layer containing well locations and

associated database information is being used to generate maps of atrazine and other pesticide detections statewide for the Atrazine Rule.

WISCONSIN GEOLOGICAL AND NATURAL HISTORY SURVEY

The University of Wisconsin-Extension Geological and Natural History Survey has responsibility for geologic mapping, collection and analysis of basic data, and survey and research on Wisconsin's groundwater resources. Products from the Survey geologic mapping program support land-use planning and groundwater quality management and protection. County-wide inventories of groundwater resources are supported through cooperative agreements with county governments. Through analysis and integration of data from subsurface records and water quality sampling programs, these studies develop water table elevation maps and other products, providing planners and educators with a good foundation of information for groundwater quality management and protection. Detailed research and monitoring of groundwater movement and quality are undertaken on a project basis. Maps, publications, and presentations are developed for groundwater education and outreach.

Computerized groundwater databases have generally been developed on a project basis to support on-going research and inventory efforts. Many of these data have been incorporated into the ARC/INFO geographic information system. The Survey is beginning a new initiative to better integrate our data holdings, which are currently on a variety of personal computers, media and software systems. This effort will improve access and use of our existing and future groundwater and geologic data.

DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS

DILHR has embarked on an information technology (IT) initiative, the purpose of which is to integrate data the division has. With regard to groundwater protection, the Department will, at the completion of this project, be able to identify sites that have underground petroleum storage tanks and private sewage systems. Sanitary permits, groundwater monitoring data, and underground storage tank information will be located in combined databases, the result will be groundwater quality data and information on activities that may affect groundwater quality.

DEPARTMENT OF HEALTH AND SOCIAL SERVICES

DHSS does not maintain a centralized database on groundwater data. The Department relies on other state agencies for computerized groundwater information. The Department maintains labslip samples data in project specific files.

UNIVERSITY OF WISCONSIN SYSTEM

The Central Wisconsin Groundwater Center maintains a database of private well testing data from the Environmental Task Force Regional Lab, UW-SP, and Drinking Water Education Programs

conducted through the Center. There are currently over 137,000, individual test results for approximately 22,800 samples covering the entire state. Chemistry data includes pH, conductivity, alkalinity, total hardness, nitrate-nitrite, chloride, saturation index and coliform bacteria. The database primarily covers the period 1985 to the present. The database is PC based and can be easily queried to be a significant source of information for local communities and groundwater managers. Twenty-eight counties are represented by 100 or more samples in the databases, and 11 counties are represented by 500 or more samples.

DEPARTMENT OF TRANSPORTATION

The Wisconsin Department of Transportation (DOT) maintains records of hazardous materials investigations associated with highway projects. Records of hazardous materials encountered during these investigations, including any groundwater contamination, are kept on file in the Hazardous Materials section of the Office of Environmental Analysis.

Groundwater monitoring is conducted in association with several DOT wetland mitigation projects. The records of this monitoring effort contain information on groundwater elevation and horizontal and vertical groundwater gradients as it relates to a wetland restoration or creation project.

COORDINATION ACTIVITIES

GROUNDWATER COORDINATING COUNCIL

The Groundwater Law, 1983 Wisconsin Act 410, established the Wisconsin Groundwater Coordinating Council to advise and assist state agencies in coordinating nonregulatory programs and exchanging groundwater information. The Groundwater Coordinating Council (GCC) consists of the heads of all state agencies with some responsibility for groundwater management plus a Governor's representative. The state agencies include the Departments of Natural Resources; Industry, Labor and Human Relations; Health and Social Services; Agriculture, Trade and Consumer Protection; Transportation; State Geologist (Geological and Natural History Survey) and the University of Wisconsin System (UWS). The GCC had four meetings during the past year and met once via teleconference. The meeting minutes are included in the appendix.

Much of the focus of the GCC's activities during the past year continued to be in response to the nine action recommendations ,Table 3, resulting from the conference held in Stevens Point in March of 1991 titled, "Working Together to Manage Wisconsin's Groundwater - Next Steps". The conference was organized by Professors Steve Born and Doug Yanggen of the UW Extension to assess the groundwater management experience in Wisconsin and make recommendations for improving management of this valuable resource. The conference, which was endorsed by the GCC, brought together over 100 representatives of state and local governments and other interests. A large number of recommendations were made in several workshops which were held as part of the conference. The action recommendations in Table 3 were adopted by the GCC in February, 1992.

Work was completed or is continuing on all nine action recommendations. Members of the Monitoring & Data Management Subcommittee met to discuss the development of an information clearinghouse for groundwater databases. A limited term employee (LTE) was assigned to contact each agency's designated contact for their information (action recommendation 1). The issue of a standard geolocation coordinate system for groundwater data was raised and will be addresses by the Monitoring & Data Management Subcommittee in FY 94. (recommendation 2). The issue of data confidentiality was discussed in depth with the conclusion being that existing state statutes have adequately defined the data issue (recommendation 3). Figure 2 shows the locations of groundwater monitoring and research projects for FY 1993 (recommendation 4). The formation and first meeting of the local government subcommittee was held on February 8, 1993 (recommendation 5). A letter has been sent (dated July 8, 1992) to Department of Administration requesting funding for a pilot program for wellhead protection programs at the local level. The governor did not include any funding in the FY 1994 state budget (recommendation 6). Preparation of a popularized version of this Report to the Legislature for wider distribution was approved, published and sent out earlier this year (recommendation 7). Coordination of Clean Sweep efforts was discussed an more attention to the coordination between the state and counties will be given in the future (recommendation 8). The GCC endorsed and sent to the UW a resolution supporting increased risk assessment outreach and educational programming by the University of Wisconsin Extension. A letter has been received from the UW indicating that they are in the process of implementing the resolution (recommendation 9).

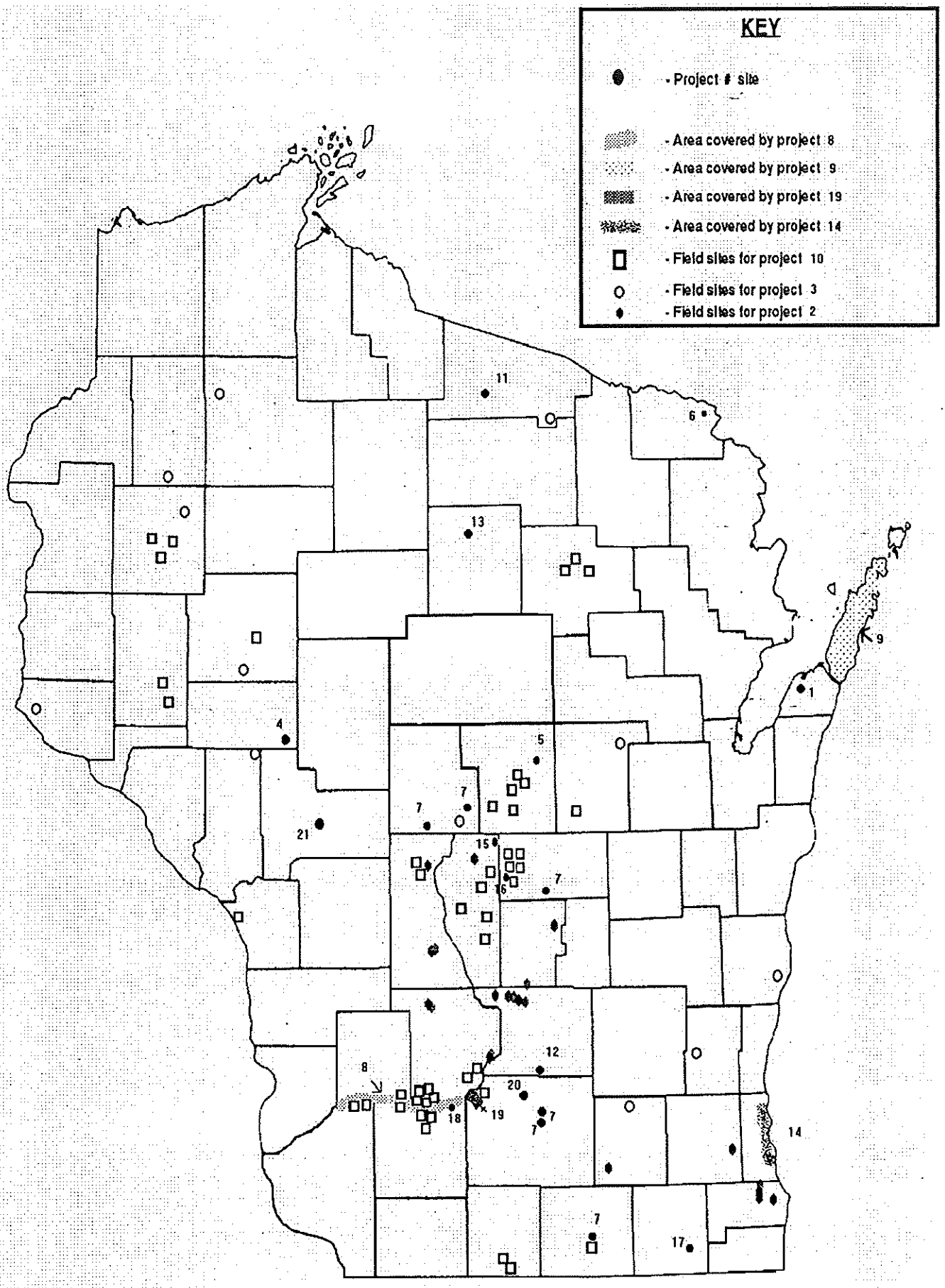

Figure 2 - Location of groundwater monitoring or research studies for F.Y. 1993

The GCC approved the 1994 fiscal year joint solicitation package for groundwater research and monitoring to meet state needs described in the previous section. The package is contained in the appendix. On April 13, 1993 the GCC met by teleconference and unanimously approved the proposed UWS groundwater research plan. The UWS will fund 6 continuing and 7 new projects in fiscal year 1994. $8,000 was set aside by the UWS to cover the costs of distributing the results of the research more widely.

The GCC continued to promote communication, coordination, and cooperation between the state agencies through its quarterly meetings. The GCC received briefings on subcommittee activities, the Dane County Regional Hydrologic Study, the Comprehensive State Groundwater Protection Plan, wellhead protection, a funding proposal for an agrichemical fund, the atrazine rule, the ch. NR 700, Wis. Adm. Code rule series, atrazine management strategies survey results, amendments to ch. NR 140, Wis. Adm. Code, DATCP activities, the Garfoot Creek study, the agricultural BMP study in southwest Wisconsin, and the status of Chapter ILHR 83, Wis. Adm. Code.

The GCC continued to maintain dialogue on groundwater issues with federal agencies. Representatives from the Soil Conservation Service (SCS), Agricultural Stabilization and Conservation Service (ASCS) and the U. S. Geological Survey (USGS) have attended Council meetings and are ex officio subcommittee members.

The subcommittee reports which follow summarize the actions taken by each subcommittee.

SUBCOMMITTEE ACTIVITIES

Research and Monitoring & Data Management Subcommittees - The two subcommittees reviewed the priorities for the DNR's groundwater management practice monitoring program for fiscal year 1994. The revised priorities were then included in the joint solicitation distributed by the UWS, DNR, DILHR and DATCP in November, 1992.

The two subcommittees met again in early March to review the proposals which had been received as part of the joint solicitation. Subcommittee members made recommendations which were used by the three agencies in deciding which groundwater-related proposals to fund for fiscal year 1994.

The Monitoring and Data Management Subcommittee began working on the establishment of a groundwater information clearinghouse of databases. An LTE has been hired to conduct interviews with the designated agency representatives. A final report is anticipated in the fall.

Planning and Mapping Subcommittee - Members of the subcommittee have continued to work on a review and evaluation of groundwater vulnerability mapping practices in the United States. A field verification study of several different mapping techniques is in progress in Dane County. The subcommittee hopes that the results of this study and the nation-wide data will provide sufficient information to hold several educational meetings to provide training in how to interpret and use groundwater vulnerability maps.

Education Subcommittee - The Information and Education Subcommittee met four times during the past year. The focus of its activities was encouraging agencies to coordinate production of written education materials and to reach consensus on recommendations made in these materials. The DNR publication on water testing recommendations was reviewed by the subcommittee and distributed at the State Fair in August. Materials and education needs about radon and nitrate were also reviewed.

The subcommittee also completed several projects requested by the Council. A Popular Summary of the Report to the Legislature was produced and incorporated a map of research projects funded by the Joint Solicitation. The Summary was distributed to Extension agents, county code administrators, legislative aides, agricultural teachers, regional planning commissions and others. The Popular Summary was also reprinted in DILHR'S Plumbing Codes Report, which is distributed to over 11,000 plumbers, plumbing designers, soil testers, plumbing inspectors, engineers, and architects.

For FY 94 the subcommittee will focus on facilitating the coordination of information and education materials on nitrate. The materials will focus on health implications and nitrate and agricultural use. In addition, to focusing on nitrates the subcommittee will continue its review of the radon issue. The subcommittee will also assess the needs and the viable alternatives for groundwater educator workshops.

Local Government Subcommittee - After discussions with representatives of local units of government and organizations representing local units of government, the GCC authorized formation of a local government subcommittee at its November meeting. The subcommittee was formed in January, 1993 and held its first meeting February 8, 1993. The focus of the first meeting was wellhead protection.

The second meeting of the Local Government Subcommittee (LGS) was held on June 2. In accordance with the charge to the LGS from the GCC, the group discussed a number of issues that were of concern to the local units of government in Wisconsin. Of particular concern is how to effectively manage the handling and disposal of septic tank and holding tank septage. A working group was formed to develop a pilot project proposal that would allow a county to effectively track the pumping and disposal of the septage within that county. Once the proposal is finalized, a method of funding needs to be located. The LGS feels that a program of this type could be instrumental in determining how to deal with this problem for the long run.

The LGS will continue to discuss issues of concern to the local units of government and develop recommendations to be presented to the GCC for future action.

DIRECTIONS FOR FUTURE GROUNDWATER PROTECTION

PRIORITY ISSUES THAT NEED TO BE ADDRESSED

The Groundwater Coordinating Council has been focusing on two high priority issues. One is the need for better communication between local and state government on groundwater related issues. This need was identified during the Conference on Working Together to Manage Wisconsin's Groundwater - Next Steps? which was held in March of 1991 for state and local officials. The Coordinating Council has begun addressing this issue by forming a local government subcommittee to the GCC which began meeting in February.

Another priority issue is the need for a statewide database and a central data catalog or clearinghouse. The GCC work is progressing on an inventory of groundwater databases. There needs to be better efforts at collecting data and making it available in a uniform format. The DNR is currently in the middle of a renewed effort to coordinate the collection and retrieval of all groundwater data, through the redesign of the DNR's groundwater computer system and the previous purchase of computers for several state agencies. It is hoped that this effort will eventually allow more convenient electronic access to DNR data by state and local government agencies.

An important issue in FY 94 will be the development of a Comprehensive State Groundwater Protection Program Plan for Wisconsin. A draft profile of Wisconsin's existing program has been completed. Work will be needed on 2 additional documents:

1. an assessment of existing programs in comparison with EPA's core program criteria and

2. a vision statement of what will be done in the future to develop a fully integrating groundwater program.

Wisconsin's program plan will be a model for other states.

RESEARCH/MONITORING NEEDS

The Groundwater Coordinating Council has identified two topics as high priorities for the joint solicitation for groundwater-related monitoring and research for fiscal year 1995. The first is land use management and its impact on the groundwater resource. This would include evaluation of impacts on both groundwater quality and quantity. This issue crosses agency lines and promises to be an important issue for years to come.

The second high priority research topic is alternatives to on-site septic systems. As described under "Summary of Agency Responsibilities," there are currently no proven designs or installations of septic systems that consistently meet the state groundwater standards. Although both the DNR and DILHR have funded monitoring projects in this area, additional work is needed to find solutions to this problem.

There has been considerable interest in providing summaries of the results of groundwater related monitoring and research to interested audiences. Plans are being made to identify target audiences and prepare summaries of the completed studies which have been funded through the joint solicitation process.

Table 1 - Groundwater Projects Funded Through
the Joint Solicitation for FY 1993

Projects funded by the DNR

Evaluation of Five Groundwater Susceptibility Assessment Systems in Dane County, Wisconsin. Bohn, Muldoon, Madison, Bradbury, Zaporozec and Postle. $37,570

1. Tracer Study for Characterization of Groundwater Movement and Contaminant Transport in Fractured Dolomite. Bradbury and Muldoon. $19,400

2. Long-Term Transformations and Fate of Nitrogen with Mound Type Soil Absorption Systems for Septic Tank Effluent. Harkin, Duffy, Rockweiler and MacCubbin. $24,363

Urban Stormwater Infiltration: Assessment and Enhancement of Pollutant Removal. Armstrong. $22,100

3. A Further Study of Organics at Wisconsin Municipal Solid Waste Landfills. Connelly. $29,932

4. *Remediation of Soils Contaminated by Leaking Underground Storage Tanks by Vapor Extraction and in situ Biostimulation. Hickey and Bubenzer. $35,437

5. *Evaluation of Denitrification Systems for Improving Groundwater Quality from On-site Waste Disposal Systems. Shaw, Schmidt and Kaminski. $20,236

6. *Municipal Wastewater Absorption Pond Renovation for Enhanced Nitrogen Removal. Gilbert and Oman. $11,800

7. *Investigation of Potential Groundwater Impacts at Demolition Landfills, Deer Pits and Yard Waste Compost Sites. Connelly. $40,397

8. *Spatial Attributes of the Soil-Landscape Groundwater System of the Lower Wisconsin River Valley. McSweeney, Madison, Attig and Bohn. $20,533

9. *GIS Mapping of Groundwater Contaminant Sources Quality and Contamination Susceptibility for Door County. Stoll. $26,369

10. *Pesticide Impacts on Groundwater. Postle. $11,800

Projects funded by the UWS

11. Trace Metal Transport Affected by Groundwater/Stream Interactions. Bahr. $17,000

12. Management of Sweet Corn Processing Wastes to Protect Groundwater Quality. Bundy. $19,000

13. Variability of Hydraulic Conductivity in Supraglacial Sediments. Mickelson. $28,000

Ultrasonic Verification Technique for Evaluating Well Seals. Edil and Benson. $20,000

14. Impact of Tunnel Dewatering on Surface Water Bodies in Milwaukee County. Cherkauer. $28,000

*Use of Tire Chips to Attenuate VOCs. Edil and Park. $23,000

*Role of Mobile Colloids in Groundwater Contaminant Transport. Armstrong. $27,665

15. *Effects of Transient, Cross-stratification Flow on Contaminant Dispersion. Bahr. $13,000

16. *Living Mulch Systems for Nitrate Trapping in Vegetable Production. Harrison. $26,000

*Geographical Information System for Subsurface Characterization. Bosscher, Adams and Joeres. $24,000

17. Field Evaluation of Near Source Transport of Contaminants in Heterogeneous Media. Hoopes. $26,000

Projects funded jointly by UWS and DATCP

18. *Herbicide and Nitrate Movement in a Sandy Soil in the Lower Wisconsin River Valley. Lowery, McSweeney and Stoltenberg. $45,000

19. *Estimating the Spatial Distribution of Groundwater Recharge Rates Using Hydrologic, Hydrogeologic and Geochemical Methods. Potter, Bowser and Bradbury. $37,365

20. *Distribution, Transport and Fate of Major Herbicides and Their Metabolites. Chesters and Harkin. $68,675

Project funded by DATCP

Atrazine Management and Weed Control Strategies in Wisconsin Corn Production. Nowak $22,000

Project funded by DILHR

21. *Nitrogen Removal from Domestic Wastewater in Unsewered Areas. Otis, Boyle and Converse. $93,000

Projects preceded by an * are projects which were also funded in FY 1992.

Table 2 - Groundwater Projects To be Funded Through
the Joint Solicitation for FY 1994

Continuing projects to be funded by the DNR in FY 94

A Further Study of Organics at Wisconsin Municipal Solid Waste Landfills by Jack Connelly, $24,040.

Long-term Transformations and Fate of Nitrogen with Mound Type Soil Absorption Systems for Septic Tank Effluent by John Harkin, $34,057.

Evaluation of Five Groundwater Susceptibility Assessment Systems in Dane County, Wisconsin by Mike Bohn, $16,224.

Tracer Study for Characterization of Groundwater Movement and Contaminant Transport in Fractured Dolomite by Ken Bradbury, $10,050.

Urban Stormwater Infiltration: Assessment and Enhancement of Pollutant Removal by David Armstrong, $31,500.

A Study of the Response of Nitrate and Pesticide Concentrations to Agricultural BMPs in Sandy Corn Fields, Fred Madison, $2,896.80.

DATCP Pesticide Field Study by Jeff Postle, $11,259.00.

Investigation of Potential Groundwater Impacts at Demolition Landfills, Deer Pits and Yard Waste Compost Sites. Connelly. $5,970

The total cost for continuing projects is $135,996.80.

New projects to be funded by the DNR

The Further Incidence of Native Arsenic in Eastern Wisconsin Water Supply Wells; Marinette, Oconto, Shawano and Brown Counties, by Richard Stoll, $20,532.

Evaluation of NR 140 Groundwater Standards Compliance , NR 103 Wetlands Water Quality Standards Compliance, and Groundwater Monitoring Requirements for Zone-of-Saturation Design Landfills in Wisconsin by Paul Huebner, $11,440.

Integrated Computerized Mapping of Point Source Contaminants and Physical Environmental Characteristics to Protect and Manage Groundwater Quality by Richard Stoll, $29,940.

An Investigation of Field-Filtering and Low-Flow Pumping When Sampling for Metals by Jack Connelly, $24,896.

Factors Effecting the Determination of Radon in Groundwater by William Sonzogni, $9,600.

Optimization of Two Recirculating Sand Filters for Nitrogen and Organic Chemical Removal from Domestic Wastewater, by Byron Shaw, $30,179.

The total cost for new projects is $156,977, including the co-funded project listed below. The total budget for new and continuing projects is $292,973.80.

Continuing projects to be funded by the UWS

Trace Metal Transport Affected by Groundwater/Stream Interactions by Jean Bahr, $17,730.

Management of Sweet Corn Processing Wastes to Protect Groundwater Quality by Larry Bundy, $17,320.

Variability of Hydraulic Conductivity in Supraglacial Sediments by David Mickelson, $28,900.

Field Evaluation of Near Source Transport of Contaminants in Heterogeneous Media by John Hoopes, $38,300.

Ultrasonic Verification Technique for Evaluating Well Seals by Tuncer Edil, $21,590.

Impact of Tunnel Dewatering on Surface Water Bodies in Milwaukee County by Doug Cherkauer, $27,900.

The cost for continuing projects is $151,740.

New projects to be funded by the UWS

Mineral Phase Sorption of Selected Agrichemicals to Wisconsin Soils by Tim Grundl, $20,000.

Stratigraphy, Sedimentology, and Porosity Distribution of the Silurian Rocks of the Door Peninsula, Wisconsin by Mark Harris, $16,810.

Using 'PREDICT' to Reduce Herbicide Usage and Improve Groundwater Quality by Robert Gordon Harvey, $15,000.

Photocatalytic Degradation of Volatile Organic Carbon by Marc Anderson, $32,000.

Comparative Evaluation of Biostimulation Approaches for Enhancing in Situ TCE Degradation in Contaminated Aquifers by William Hickey, $24,570.

Improved Design of Pump and Treat Systems for Heterogeneous Aquifers by Jean Bahr, $21,840.

The cost for new projects to be funded by UWS is $140,260, including the co-funded project listed below. The total cost for new and continuing projects to be funded by UWS in FY 94 is $292,000.

New projects to be funded by DATCP

Leaching Potential of Imazethapyr and Nicosulfuron Herbicides in Sparta Sand by Birl Lowery, $18,680.

Cover Crops to Limit Herbicide Use on Sweet Corn by Astrid Newenhouse, $24,000.

The Use of Peat as a Adsorptive Medium for Remediation of Pesticide Contaminated Groundwater by James Wiersma, $14,300.

The cost for new projects to be funded by DATCP is $121,980, including co-funded projects listed below. There are no continuing projects.

New project to be co-funded by DATCP and UWS

Herbicide Contamination of Soil and Groundwater at a Mixing and Loading Site by Gordon Chesters, $55,040.

New project to be co-funded by DATCP and DNR

Ground-Water Hydrology of an Agricultural Watershed by Kenneth Potter, $50,179.

Continuing project to be funded by DILHR

Nitrogen Removal from Domestic Wastewater in Unsewered Areas by Richard Otis, James Converse, et. al. $63,100.

Table 3 - Action Recommendations for the
Groundwater Coordinating Council for 1992

The following recommendations for action by the Wisconsin Groundwater Coordinating Council (GCC) are based on: a) the outcomes of a major GCC endorsed conference/workshop in March 1991; b) intra-agency review of actionable recommendations stemming from this event, as well as an assessment of internally recognized needs; and c) an inter-agency "brain-storming" session to look broadly at issues raised which are pertinent to the continuing success and improvement of the state's groundwater management programs. These recommendations were approved by the GCC at its February 14, 1992 meeting. The focus of these recommendations is non-regulatory and within the scope of the GCC mission.

1. The GCC will take the lead in the establishment of an information clearinghouse on groundwater databases. The clearinghouse would provide information for each database with regard to what's contained, where it's located, how it's accessed, etc., and would foster more uniform data collection. The clearinghouse should include both computerized and non-computerized databases. If additional funding is necessary to support such a clearinghouse, GCC will pursue funding through the legislative and agency budgetary processes. The GCC also supports promoting access to the groundwater data by other "customers" at the state and local level; a user needs survey may be a useful first step in ascertaining how/if to proceed further. The Monitoring and Data Management Subcommittee will work with the Education Subcommittee and develop a plan for establishing such a clearinghouse arrangement by August 14, 1992.

2. Groundwater management requires accurate spatially-referenced data. The GCC will work aggressively with state agencies and others to move towards compatible geolocated databases. The Monitoring and Data Management Subcommittee will prepare a briefing for the GCC by May 8 on the present status of standardized geolocation of data by state agencies, problems and obstacles to fully establish such a data-collection system, and recommendations on how to achieve this objective. The Subcommittee will work with the Wisconsin Land Information Board.

3. Landowners and other private entities appear to be very concerned about the confidentiality of groundwater data collected from their properties, particularly regarding fiscal and regulatory implications possibly associated with such information. The GCC supports review of the issue of how to gather and use groundwater data without jeopardizing the confidentiality of well owners. The Monitoring and Data Management Subcommittee will schedule a discussion/workshop this summer of agencies and other interested parties, including the Public Intervenor, to review this issue. An examination of how analogous databases (e. g. Storet, lead contamination, National Pesticide Study, etc.,) deal with this issue might be instructive. This activity should receive a high-priority because the confidentiality issue could be a serious impediment to groundwater protection in the long run.

4. To actively support groundwater education efforts throughout the state, the GCC supports preparation of a statewide map or maps showing the location of groundwater monitoring and research projects in the state. The Planning and Mapping Subcommittee will prepare at least one map that will be included in the 1992 Report to the Legislature and be distributed for educational purposes through the Education Subcommittee.

5. The GCC will create a Local Government Subcommittee to address issues of local concern and provide input to the GCC from a local perspective. The establishment of such a subcommittee acknowledges the key role of local governments in land use decisions, and therefore, groundwater management. GCC representatives will consult with associations representing local government and prepare a recommendation regarding formation of a GCC Local Government Subcommittee for consideration by the GCC at its next meeting. Early agenda items for the new subcommittee would include the development of pilot wellhead protection options (see 6) for consideration by the GCC and Legislature, state delegation of groundwater management-related authorities to local governments, and suggestions regarding improved state-local coordination on groundwater management issues.

6. The GCC supports the development of legislation to establish a financial incentive-based pilot program for wellhead protection area programs and other innovative groundwater management initiatives involving local governments. Funding options considered should include a small matching-grant program to stimulate local governmental activity in groundwater management. This issue will be referred to the Local Government Subcommittee once it is established.

7. The GCC recognizes the desirability and need for broader distribution of key findings from its Report to the Legislature. Interested audiences should have ready access to the annual assessment of groundwater conditions and problems and the status/effectiveness of management actions. To accomplish this, the Education Subcommittee will develop and distribute popularized brief summaries (perhaps in some kind of "report card" format) of the Report to the Legislature to a wider community of interests. The formats will be reviewed by the GCC at its August meeting. Regular timely distribution of such information could significantly enhance public awareness of groundwater issues. The distribution to a wider audience should be a marginal cost relative to the benefits of information dissemination.

8. The GCC supports and will facilitate the organization of a "Clean Sweep" workshop for state and local officials and groups that have been involved in Clean Sweep programs. A focused policy-oriented workshop would provide an opportunity to learn what works, identify problems, and work to improve effectiveness and better coordination of future efforts. As noted at the March 1991 Groundwater Management Conference, significant resources are going into a variety of Clean Sweep programs around the state. A careful examination and sharing of experience to date should provide guidance with regard to better achieving the pollution source management, educational, and stewardship objectives of these activities. Staff from the Departments of Natural Resources and Agriculture Trade and Consumer Protection will meet with other appropriate individuals to set up such a workshop. Funding will be sought to organize such an undertaking, with the expectation that programmatic and legislative recommendations will be the result.

9. The GCC supports UW Extension efforts to undertake risk assessment outreach and educational programming. The significant research capacity and knowledge base of university units concerned with groundwater management, public health, environmental toxicology and risk assessment need to be translated into public educational programs in this high-priority area. Critical and costly societal decisions will continue to be made to protect groundwater, and an informed public in this complex and controversial area is essential to good decision-making. The GCC encourages the University of Wisconsin to

actively pursue staffing for this critical educational need, recognizing the severe fiscal and staffing limitations that presently exist. A GCC resolution to the Board of Regents regarding this issue will be considered at the next GCC meeting.

These action recommendations were approved by the Wisconsin Groundwater Coordinating Council on February 14, 1992.

WISCONSIN GROUNDWATER COORDINATING COUNCIL

REPORT TO THE LEGISLATURE

APPENDIX

Wisconsin Groundwater Coordinating Council
Meeting Minutes
August 14, 1992

Members Present: Kevin Kessler for Lyman Wible (DNR); Ron Hennings (WGNHS); Bennette Burks for Michael Corry (DILHR); Jack Metcalf (Governor's Representative); Jim Vanden Brook for Nick Neher (DATCP); Carol Cutshall (DOT); Henry Anderson (DHSS) and Al Beaver (UW System).

Others Present: Rahim Oghalai and David Lindorff (DNR); Jim Kaap (SCS); Steve Born and Jim Peterson (UW Extension); Gary LeMasters (DATCP); Lynda Knobeloch (DHSS); Susan Butler (ASCS); Bob Sather and Jerry Chasteen (Council of Regional Planning Organizations); Ray Schmidt (Wisconsin County Code Administrators); Jill Jonas (Wisconsin Rural Water Association); Richard Stadelman (Wisconsin Towns Association); and Ed Huck (Wisconsin Alliance of Cities).

The meeting was held in the Board Conference Room at the office of the Wisconsin Department of Agriculture, Trade and Consumer Protection, 801 W. Badger Road, Madison, beginning at 12:00 pm.

1. **Introductions**

   Introductions were made. Kevin Kessler welcomed the guests who came to discuss creation of a Local Government Subcommittee.

2. **Agenda Review and Changes**

   No changes were made.

3. **Approval of Minutes**

   The minutes of the June 12, 1992 Groundwater Coordinating Council (GCC) meeting were approved as written.

4. **Subcommittee Reports**

   a. Education Subcommittee - Jim Peterson of the UW Extension reported that the Education Subcommittee met July 8 to discuss three of the GCC action recommendations - establishment of a data clearinghouse for groundwater databases, preparation of a map of joint solicitation projects and publishing popularized summaries of the 1992 Report to the Legislature. At the meeting, it was learned that the Monitoring and Data Management Subcommittee is taking the lead on a data clearinghouse, the map of project locations will be completed by the DNR and WGNHS and the DNR will prepare popularized summaries, at least this year. The next meeting of the Subcommittee will be in September.

   b. Monitoring and Data Management - Kevin Kessler (DNR) reported that the Subcommittee met in July to discuss two of the GCC action recommendations - establishment of an information clearinghouse for groundwater databases and confidentiality of groundwater quality data. After some discussion, the

Subcommittee agreed that confidentiality wasn't the issue. Rather, people are afraid of their liability for investigation or cleanup if their well is contaminated. A pamphlet is being prepared to provide homeowners with information to make an educated decision on whether to have their well tested. There is no easy solution.

The Subcommittee also talked about establishment of an information clearinghouse and agreed that there should be at least a listing of contacts for the various databases. However, there are no volunteers to work on this issue.

5. **Report to the Legislature**

The Council reviewed the final draft Report to the Legislature which is due in August. Several agencies provided inserts or corrections. Language was provided to address the comments made by Tom Dawson and Kathy Falk of the Public Intervenor's Office in an August 6 memo.

Mr. Al Beaver (UWS) suggested that each of the agency summaries contain a contact for further information. The Council agreed that this should be done. Each agency agreed to give David Lindorff an agency contact within one week.

Mr. Beaver also suggested that 3 UW publications be included in the appendix to the Report to the Legislature. After some discussion, the Council agreed that each agency would provide David Lindorff with a list of publications that would be included with the Report to the Legislature. No other changes were suggested.

6. **Possible Creation of a Local Government Subcommittee**

David Lindorff (DNR) and Steve Born (UW) provided background on the development of an action recommendation by the GCC to create a Local Government Subcommittee in 1992. In response to the recommendation, the DNR invited representatives from 7 organizations to attend this meeting. Kevin Kessler discussed the purpose of the GCC and invited comments by those representing local units of government on possible objectives and tasks for such a subcommittee. Among the issues raised were inter-governmental coordination, access to groundwater information, better clean sweep coordination, education, research and county delegation assistance.

After extensive discussion, it became apparent that further dialogue was needed before a decision could be made regarding creation of a Local Government Subcommittee. The Council agreed that a meeting of local government agencies and interested state agency representatives would be held before the next GCC meeting to discuss the objectives and priorities for such a subcommittee. A report will be made to the GCC at its next meeting.

7. **Dane County Regional Hydrologic Study**

Rahim Oghalai (DNR) summarized the plans for a Dane County Regional Hydrologic Study which was initiated earlier this year. This four-year study will identify the existing and potential future impacts of urban development, groundwater withdrawals and inter-basin water diversions on Dane County's groundwater and surface water resources. This will be a cooperative effort between the Dane County Regional Planning Commission, the DNR, and WGNHS, the U. S. Geological Survey, and local management agencies.

8. **Comprehensive State Groundwater Protection Plans**

Kevin Kessler described the U. S. EPA efforts to have states prepare comprehensive state groundwater protection programs (CSGWPPs) to implement the EPAs groundwater strategy issued in July 1991. The strategy emphasizes a more comprehensive approach to groundwater protection and a joint partnership between the EPA and states in groundwater protection. Kevin handed out a draft CSGWPP Guidance Document which has been circulated to the states for comment. Comments on the Guidance are due September first. The incentive to prepare a CSGWPP is the withholding of federal 106 grant money in the absence of an approved plan. The Council agreed to share agency comments with the other agencies as much as possible.

9. **Wellhead protection and well abandonment video**

Two videos were shown. One is a wellhead protection public service announcement which was shown on several TV stations around the state earlier this summer. Several organizations assisted in the production and cost of airing the announcement.

The other video, "How to Fill and Seal a Well", was produced cooperatively by the DNR and the U. S. Department of Agriculture (SCS and Cooperative Extension Service).

10. **Next Meeting**

The meeting adjourned at 3:10. The next meeting of the Groundwater Coordinating Council will be held November 13 in the conference room at the DNR Area Office in Dodgeville beginning at noon.

Respectfully submitted,

David E. Lindorff
Groundwater Management Section
Department of Natural Resources

Wisconsin Groundwater Coordinating Council
Meeting Minutes
November 13, 1992

Members Present: Lyman Wible (DNR); Ron Hennings (WGNHS); Bennette Burks for Michael Corry (DILHR); Jack Metcalf (Governor's Representative); Nick Neher (DATCP); Henry Anderson (DHSS) and Al Beaver (UW System).

Others Present: Kevin Kessler and David Lindorff (DNR); Jim Peterson (UW Extension); The meeting was held in the Conference Room at the Department of Natural Resources Area office in Dodgeville, beginning at 1:00 pm.

1. Agenda Review and Changes

   Nick Neher indicated that he was willing to talk about the atrazine rule if there was time.

2. Approval of Minutes

   The minutes of the August 14, 1992 Groundwater Coordinating Council (GCC) meeting were approved as written.

3. Subcommittee Reports

   a. Education Subcommittee - Jim Peterson of UW Extension reported that the Education Subcommittee met in September and began work on preparation of a popularized summary of the 1992 Report to the Legislature. A first draft has just been prepared with help from staff at UW Extension. The Subcommittee also discussed a nitrate health incident in Trempealeau County. Lynda Knobeloch of the Department of Health and Social Services is preparing a summary of the incident to distribute to all doctors in Wisconsin. The DNR Bureau of Water Supply printed a brochure titled, "Tests for Drinking Water from Private Wells" which the Subcommittee worked on. Jim indicated this was produced through the cooperative effort of a number of agencies. The next meeting of the Subcommittee will be in January.

   Jack Metcalf indicated that M & I Bank will not approve a loan for property transfer unless there has been a well test and a perc test. This indicates that the message of protecting groundwater is being heard.

   b. Local Government Subcommittee - Kevin Kessler (DNR) reported that state agency staff met with representatives of several local government organizations on November 4 to discuss the formation of a GCC Local Government Subcommittee (LGS). Kevin indicated that there wasn't overwhelming support for such a subcommittee by the local government representatives. After extensive discussion, a consensus was reached that a subcommittee could be established to focus on specific issues, with membership to come from technical staff at the local level rather than the local government organizations or politicians. It was agreed that the first issue could be wellhead protection. The local government organizations indicated that membership may change depending on the issue being addressed.

The GCC discussed formation of a LGS at some length. Based on the meeting results, it was unclear whether a LGS would be helpful in providing better communication and coordination between state agencies and local governments. The GCC voted unanimously to create a LGS that would address wellhead protection as its first priority. The local government organizations will be asked to submit nominees. The GCC agreed that it would evaluate the effectiveness of the LGS next year and decide whether to continue the subcommittee.

4. **Joint Solicitation Package**

David Lindorff (DNR) reviewed the draft joint solicitation package which has been prepared jointly by the UW System and the Departments of Agriculture, Trade and Consumer Protection, Natural Resources and Industry, Labor and Human Relations. Approximately $510,000 will be available to fund new projects in fiscal year 1994. With the exception of editorial comments on the cover letter, the joint solicitation package was approved as written.

5. **Status of 1992 Action Recommendations**

David Lindorff provided an update of the action recommendations approved by the GCC at its February 14, 1992 memo. The status is summarized below.

a. Establishment of an information clearinghouse on groundwater databases. The Monitoring and Data Management Subcommittee met in July and agreed that a directory of groundwater databases should be prepared. No one has begun work on such a directory yet.

b. Standardization of geolocational information for groundwater databases. The Monitoring and Data Management Subcommittee has discussed this issue and has not come to a consensus on this issue. Ron Hennings (Wisconsin Geological and Natural History Survey) indicated that, although the Wisconsin Land Information Board is involved in this issue, it will be awhile before they address it. Therefore, the GCC has the opportunity to take the lead. Lyman Wible (DNR) suggested that more specific work tasks be developed for the first two action recommendations so progress can be made.

c. Address the issue of confidentiality of groundwater data collected by state agencies. The Monitoring and Data Management Subcommittee talked about this issue and decided that the issue is really one of liability for homeowners. People are afraid of their liability for investigation or cleanup if their well is contaminated. There is no easy solution to this dilemma. The consensus of the meeting was that this was not of significant importance to warrant trying to change the open records law to address this issue.

d. Preparation of a map showing the locations of groundwater monitoring and research projects in the state for the Report to the Legislature. This was completed.

e. Creation of a Local Government Subcommittee. A Local Government Subcommittee was created as discussed above.

f. Development of legislation to establish a financial incentive-based pilot program for wellhead protection area programs. The LGS will address this issue. A letter was sent this summer from Lyman Wible to Secretary of Administration Klauser on behalf of the GCC requesting funding for such an effort.

g. Publication of summaries of the GCC Report to the Legislature. The Education Subcommittee is working on this as described above.

h. Organization of a "Clean Sweep" workshop. DNR, DATCP and UW Extension staff met this summer to discuss coordination. It was felt that a workshop wasn't appropriate at this time.

i. Encourage UW Extension efforts to undertake risk assessment outreach and educational programming. The GCC endorsed and sent to the UW System a resolution supporting UW Extension efforts in risk assessment and risk management programming. Letters have been received from both the UW System and Extension indicating a willingness to consider further action in this area.

6. **Wellhead Protection**

Kevin Kessler (DNR) indicated that the DNR has been working for some time on development of a wellhead protection (WHP) plan for Wisconsin in conjunction with other agencies. Kevin handed out copies of a draft plan which has been prepared for submittal to the Environmental Protection Agency (EPA) later this year. The DNR also held public hearings November 10 and 12 in Madison and Wausau to provide information to the public on Wisconsin's proposed WHP plan. Over 100 people attended the two hearings. The Department received very positive feedback from the hearings.

7. **Funding Proposal for Agrichemical Management Fund**

Nick Neher (Department of Agriculture, Trade and Consumer Protection) summarized the discussions that have taken place to identify funds for creation of a fund for cleanups at pesticide mixing and loading facilities. This would be similar to the PECFA fund for underground storage tank cleanups. The DNR and DATCP budgets differ on the source of funding for this program. The two agencies will meet with the Department of Administration next week.

8. **Proposed Meeting Schedule for 1993**

The proposed meeting schedule for 1993 was approved. The GCC will meet February 12 at the DNR, May 14 in Dodgeville, August 13 at the Geological and Natural History and November 12 at DATCP.

The GCC agreed to include time at future meetings for presentations on topics of interest. Possible topics include a history of atrazine monitoring by DATCP, the results of the Peter Novak survey of farmers regarding atrazine use practices, and the status of aldicarb contamination in the Central Sands.

9. **Atrazine Rule**

Nick Neher summarized the amendments to the atrazine rule, Ag 30, which were approved by the DATCP Board. The amendments would establish a statewide maximum application rate for atrazine of 0.75 pounds per acre for coarse soils and 1 pound per acre per year for medium- to fine-grained soils. The rule also creates a total of 54 atrazine prohibition areas throughout the state, including much of Dane County.

10. **Next Meeting**

The meeting adjourned at 3:20. The next meeting of the Groundwater Coordinating Council will be February 12 in the GEF 2 Building, 101 S. Webster Street, Madison beginning at noon.

Respectfully submitted,

David E. Lindorff
Groundwater Management Section
Department of Natural Resources

Wisconsin Groundwater Coordinating Council
Meeting Minutes
February 12, 1993

Members Present: Lyman Wible (DNR); Ron Hennings representing James Robertson (WGNHS); Bennette Burks for Marvin Roshell (DILHR); Nick Neher (DATCP); Henry Anderson (DHSS); Earl Peace for Al Beaver (UW System) and Carol Cutshall (DOT).

Others Present: Kevin Kessler, Mike Lemcke, Mark Giesfeldt and David Lindorff (DNR); Chuck Warzecha (DHSS); Tom Dawson (Public Intervenor); Peter Nowak (UW); and Jim Kaap, Barb Nigh and Sheryl Paczwa (SCS).

The meeting was held in room 511, Gef 2 Building, 101 S. Webster Street, Madison, beginning at 12 noon.

1. **Introductions**

   Introductions were made.

2. **Agenda Review and Changes**

   Kevin Kessler's presentation on the Comprehensive State Groundwater Protection Program was moved ahead of the subcommittee status reports at the request of Jim Kaap. Nick Neher indicated he would talk briefly about atrazine after Peter Nowak's presentation.

3. **Approval of Minutes**

   The minutes of the November 13, 1992 Groundwater Coordinating Council (GCC) meeting were approved as written.

4. **Comprehensive State Ground Water Protection Programs**

   Kevin Kessler (DNR) handed out information regarding the development of a Comprehensive State Groundwater Protection Program (CSGWPP) for Wisconsin. Wisconsin has agreed to prepare a model CSGWPP that could be used by other states. An organizational meeting will be held March 5 to provide an overview of the process. Other information including EPA's final guidance will be sent out prior to the meeting. Kevin expressed a desire to include the GCC in the approval process because of the coordinative nature of the CSGWPP. It was noted that at least some of the plan may be beyond the scope of the GCC because of the regulatory responsibilities of the state agencies.

5. **Proposed NR 700 Series**

   Mark Giesfeldt (DNR) distributed two handouts related to the proposed series of administrative codes dealing with the cleanup process. It is the intent of the NR 700 administrative code series to provide consistency in the procedures to be followed in dealing with contamination cases, but maintain flexibility to handle the site specific circumstances.

Mark indicated that he and his staff have worked with an external advisory committee to resolve issues relating to the 19 separate codes. The Emergency and Remedial Response (ERR) program is nearing completion of a series of workshops with targeted audiences. Hearings on the proposed rules will be held in May. Proposed administrative code NR 706 is proceeding separately from the rest of the series because of an unresolved issue of limits for reportable quantities.

Proposed chapter NR 720 deals with soil standards which are tied to the groundwater standards in NR 140. The ERR program has used soil modelling to develop the soil standards to protect the groundwater pathway. Council members expressed their appreciation to Mark and his staff for their hard work on this important issue.

6. **Atrazine Management Strategies Survey Results**

Prof. Peter Nowak (UW Department of Rural Sociology) presented a summary of work he is finishing looking at farmer's use patterns and attitudes regarding pesticide use, especially atrazine. Prof. Nowak focussed his efforts on 19 atrazine management areas (AMAs) which have been established by the Department of Agriculture, Trade and Consumer Protection (DATCP) due to detections of atrazine in groundwater. Atrazine use is restricted in these areas. He also surveyed control areas where there are no restrictions near each AMA.

The study found that atrazine is used by about 48% of farmers in the AMAs compared to about 60% in control areas. In addition, the application rate among those who used atrazine was lower in the AMAs than in the control areas. So the atrazine restrictions have made a difference in atrazine use. The results indicate that farmers tend to use another herbicide in place of atrazine rather than using less or no herbicides. Farmers generally believe their groundwater quality is fine.

7. **Subcommittee Reports**

a. Education Subcommittee - Mike Lemcke (DNR) reported that the Education Subcommittee has prepared a final draft popularized summary of the 1992 GCC Report to the Legislature. The draft was sent out to GCC members with the meeting agenda. Mike asked that any comments be sent to him within a week. The Education Subcommittee hopes to publish this soon and distribute it to teachers, researchers, county code administrators, extension agents and regional planning commissions.

At its January meeting, the Subcommittee also discussed a nitrate health incident in Trempealeau County. Lynda Knobeloch of the Department of Health and Social Services (DHSS) believes there may be some interactive effects with copper or other substance that produced blue baby symptoms since the nitrate concentration did not exceed the drinking water standard of 10 milligrams/liter. DHSS is working cooperatively with the DNR to produce a new document on nitrate in groundwater. This will be reviewed by the Education Subcommittee.

b. Monitoring and Data Management Subcommittee - Mike Lemcke indicated that the Subcommittee is working on 2 issues. An LTE is working on documenting groundwater data bases. Interviews will be set up with all state agencies to gather

this information. The Subcommittee hopes to put together a publication summarizing all groundwater data bases within the next four months.

The Subcommittee also intends to work further on the action recommendation to establish statewide standards for geolocators after completion of the data base survey.

c. Local Government Subcommittee - Kevin Kessler reported on the first meeting of the Local Government Subcommittee (LGS) which was held February 8th. The meeting brought together representatives from local units of government and state agencies to talk about efforts in wellhead protection (WHP). The meeting did not produce a consensus on the direction of the LGS. Kevin indicated that DNR staff will work on a mission statement and attempt to provide direction for the next meeting; it may be too early to tell if the LGS will work in the long run. Nick Neher (DATCP) thought the LGS would be useful to improve the lines of communication between state and local units of government.

d. Joint Solicitation Process - Dave Lindorff (DNR) provided an update on the status of the joint solicitation process for new groundwater monitoring or research projects for FY 94. A total of 43 proposals were received by the January deadline. The proposals have been distributed for review. The Research and Monitoring & Data Management Subcommittees will meet jointly on March 2nd to review and rate the proposals. Dave will schedule a GCC conference call in early to mid-April to approve the groundwater research program for the UW System as part of this process. Nick Neher suggested that an effort be made to publicize this effort once the projects have been selected.

8. **Proposed Amendments of NR 140**

Dave Lindorff provided a handout and briefly summarized proposed amendments to administrative code NR 140 which will be the subject of two public hearings later this month. The amendments would add groundwater standard for 13 new substances, modify the standards for 22 substances, modify the preventive action limits for six substances and clarify rule language. Kevin Kessler indicated that the proposed standards for PCBs, toluene and xylene may be controversial. Nick Neher suggested that there may be confusion regarding whether the alachlor groundwater standards apply to metabolites in addition to parent product. Earl Peace (UW) said it wasn't clear whether the chromium standard was for total or hexavalent chromium.

9. **Next Meeting**

The meeting adjourned at 2:40 pm. The next meeting of the Groundwater Coordinating Council will be May 14 at the DNR Area Office in Dodgeville beginning at noon.

Respectfully submitted,

David E. Lindorff
Groundwater Management Section
Department of Natural Resources

Wisconsin Groundwater Coordinating Council
Teleconference Meeting Minutes
April 13, 1993

Members Present: Lyman Wible (DNR); James Robertson (WGNHS); Marvin Roshell (DILHR); Nicholas Neher (DATCP); Henry Anderson (DHSS); and Jack Metcalf (Governor's Representative).

Others Present: David Lindorff (DNR), Gordon Chesters and George Blondin (UW), and Bennette Burks (DILHR).

The only agenda item for the teleconference was to review the proposed University of Wisconsin System (UWS) groundwater research plan for fiscal year 1994 which begins July 1, 1993. Gordon Chesters (UW) provided an overview of the process that was followed in selecting the projects for UWS funding.

Dr. Chesters indicated that six projects which are being funded this year will carry over to FY 94. The total cost for those 6 projects in FY 94 will be $151,740 as shown on the attachment.

Forty three proposals were received through the joint solicitation by the University of Wisconsin System (UWS) and the Departments of Natural Resources (DNR) and Agriculture, Trade and Consumer Protection (DATCP) to select new projects for funding in FY 94. The UWS proposals were reviewed by the Research & Monitoring and Data Management Subcommittees of the Groundwater Coordinating Council (GCC), outside reviewers and the UWS Groundwater Research Advisory Council (GRAC). He indicated that the reviewers were from Wisconsin, other states and other countries. Dr. Chesters indicated that the UWS would fund seven new projects at a cost of $140,260 (see attachment). Based on discussions with DNR and DATCP, Dr. Chesters indicated that several other proposals which rated high for UWS funding would likely be funded by either DNR or DATCP.

Dr. Chesters further reported that he had set aside $8,000 to cover the costs of distributing the results of the joint research more widely. He is hoping to work with DNR and DATCP to have a pool of money to publish a number of copies of each final report as well as summaries which could be distributed to various audiences.

Lyman Wible (DNR) congratulated Dr. Chesters on the diversity of outside reviewers and indicated that he felt that effort strengthened the review process. Both Mr. Wible and Nick Neher supported the idea of publicizing the results of the research and promoting the joint solicitation process. The GCC endorsed issuance of a press release, perhaps for Earth Day, to promote the coordination and cooperation we have achieved through the joint solicitation process to fund monitoring or research on groundwater and related topics.

The GCC unanimously endorsed the recommended UWS groundwater research plan outlined by Dr. Chesters and the transmittal of that endorsement to the Department of Administration for release of funds. Letters of endorsement will be sent to the UWS and the Department of Administration.

The meeting was adjourned at 12:38.

Respectfully submitted,

David Lindorff, Hydrogeologist Supervisor
Groundwater Management Section
Wisconsin Department of Natural Resources

Wisconsin Groundwater Coordinating Council
Meeting Minutes
May 14, 1993

Members Present: Lyman Wible (DNR), James Robertson (WGNHS), Bennette Burks for Marvin Roshell (DILHR), Nick Neher (DATCP), Henry Anderson (DHSS), Earl Peace for Al Beaver (UW System), Jack Metcalf (Governor's Representative) and Chuck Maier for Carol Cutshall (DOT).

Others Present: David Lindorff (DNR); Kim Cates, Ron Hennings, and Ken Bradbury (WGNHS); Ken Potter (UW); and Jill Jonas and Gary Lueck (Wis. Rural Water Association).

The meeting was held in the conference room of the DNR Dodgeville Area Office in Dodgeville, beginning at 12 noon.

1. **Introductions**

   Introductions were made. Lyman Wible welcomed James Robertson to the Groundwater Coordinating Council (GCC).

2. **Agenda Review and Changes**

   No changes to the agenda were made.

3. **Approval of Minutes**

   The minutes of the February 12, 1993 GCC meeting and April 13, 1993 teleconference were approved as written. Jack Metcalf expressed his pleasure with how much was accomplished at the teleconference. He particularly liked Gordon Chester's idea of publishing summaries of completed projects.

4. **Subcommittee Reports**

   a. Education Subcommittee - Ron Hennings handed out copies of the popularized summary of the 1992 GCC Report to the Legislature. This summary has been sent to a variety of audiences, including ag agents, county code administrators, regional planning commissions, researchers and UW Extension staff. It will also be included with the UW Extension publication, "Keeping Current" which will be sent out next month. Bennette Burks asked for a copy of the summary on white paper so DILHR could sent it out with the "Plumbing Codes Report". Bennette said the report goes out to about 11,000 individuals. GCC members also suggested exploring inclusion in the Natural Resources magazine or distributing it to teachers.

   b. Monitoring and Data Management Subcommittee - David Lindorff reported that the Subcommittee is working on a directory of groundwater data bases. Interviews with all state agencies to gather this information are nearly complete. The directory should be finished by this fall.

c. Joint Solicitation Process - Dave Lindorff provided an update on the status of the joint solicitation process and handed out a list of the projects to be funded in FY 1994. A total of 14 continuing and 16 new projects will be funded. Letters are being sent to Department of Administration Secretary Klauser and UW System Vice President Stephen Portch regarding the release of funds for the UW System.

Mr. Lindorff discussed the proposal by Gordon Chesters to publish summaries of the final reports from projects funded through the joint solicitation. The GCC directed the Research Subcommittee to meet with Dr. Chesters to discuss this issue and come back with options for the GCC to consider. Perhaps a pilot study could be developed for one year. We need to look carefully at who the audiences of the summaries would be. It was suggested that the format DNR requires for a summary of completed projects be used for preparing the summaries.

Lyman Wible read the draft press release that has been prepared by the DNR for the joint solicitation. A number of suggestions were made for improving the press release.

5. **Status of DATCP Activities**

Nick Neher handed out a summary document on DATCP's atrazine rule for 1993. The rule has been simplified for 1993; the atrazine use rates have been reduced statewide and there are more atrazine prohibition areas than previously. The rule has worked well so far; there has been excellent cooperation from the farmers. The Atrazine Technical Advisory Committee is looking at how to evaluate the effectiveness of the rule as requested by the Legislature.

There has also been discussion at DATCP regarding the state's preemption on pesticide issues. There is no preemption legislation in Wisconsin at the present time. Local units of government are interested in authority to regulate pesticide use.

Mr. Neher also indicated that DATCP and the DNR have been working together on a proposal for a clean-up fund for pesticide mixing and handling facilities. There is a proposal in the budget and a similar bill that has been introduced by Representative Baldus. Efforts are being made to reconcile the two proposals. The clean-up fund would contain $2.7 million annually, $700,000 for staff and $2 million for cleanup. Attached to these minutes are a letter and memo from the secretaries of DATCP and DNR regarding this effort.

6. **Hydrologic Study of Garfoot Creek Watershed**

Ken Bradbury and Ken Potter described their research on recharge in the Garfoot Creek watershed, which is a part of the Black Earth Creek watershed. The study area is in the driftless area of southwestern Wisconsin and is underlain by fractured dolomite. They used a variety of techniques to determine the recharge patterns to groundwater within the Garfoot Creek watershed. They looked at both surface water and groundwater flow. They found that there was high recharge on the wooded uplands and wooded hillslopes. There was low recharge on cropped uplands and negligible recharge in the valley bottoms.

They also detected both local and regional groundwater flow. They concluded that it is important to consider the effect of development on groundwater recharge.

7. **Agriculture BMP Study in Southwest Wisconsin**

Kim Cates summarized two studies she and Fred Madison (WGNHS) have done in the lower Wisconsin River Valley (LWRV). They sampled 78 private wells in the LWRV. Thirty of the wells had atrazine detects, ten greater than the preventive action limit for atrazine of 0.3 micrograms/liter (ug/l). Early samples were only for parent atrazine, but later samples also included analyses for atrazine metabolites.

Kim and Fred also have been studying best management practices for atrazine at a field site near Muscoda. They worked with a farmer who applied 1/2 and 1 pound per acre of atrazine to particular portions of his fields for two years. No atrazine had been used on these fields for ten years prior to the study. It took 9 months for atrazine metabolites to show up in the monitoring wells and a year for parent atrazine to be detected. Now use of atrazine has been stopped, and atrazine concentrations are declining. Fred and Kim will continue to monitor to see how long it takes for the atrazine and metabolites to disappear.

8. **Outline for the FY 93 GCC Report to the Legislature**

David Lindorff asked for comments on the draft outline for the GCC Report to the Legislature which is due in August. Suggestions included grouping projects for funding by topic rather than by agency, preparation of agency summaries by each agency and a discussion of monitoring/research results under Groundwater Monitoring and Research. The GCC also decided to include a list of publications, but each agency can decide which of their publications to include.

9. **Status of ILHR 83**

Bennette Burks distributed a handout and briefly described the status of septic system rules being developed by DILHR. While the existing rule (ILHR 83) is very prescriptive, the proposed amendments would be performance based to meet the groundwater standards. Manufacturers would have to demonstrate that proposed systems will work before they could be approved for use in Wisconsin. Two research projects are currently underway to investigate alternatives to conventional septic systems - one at Black River Falls and one on Washington Island. Bennette indicated that research to date suggests that there are systems that can meet groundwater standards at times and can come close to meeting the standards all the time. Proper maintenance of the systems appears to be very important to maximize performance. DILHR is exploring the possibility of using money from the Wisconsin Fund to install experimental systems for testing.

10. **Comprehensive State Groundwater Protection Program (CSGWPP)**

David Lindorff reported on CSGWPP activities since the meeting with EPA and the consultant in March. Work is nearly completed on a draft state profile of Wisconsin's groundwater protection program. The profile should be available for review in June. The GCC will be asked to endorse the state profile in August. The DNR and the consultant will also be working on an assessment of the state's program with respect to USEPA

criteria and a vision statement of what will be done to establish a "fully-integrating" groundwater protection program. Drafts of these two documents will be available for review later this summer.

11. **Next Meeting**

Several ideas were made for agenda topics for the next GCC meeting. The meeting adjourned at 2:55 pm. The next meeting of the Groundwater Coordinating Council will be August 13 in the conference room of the Wisconsin Geological and Natural History Survey, 3817 Mineral Point Road, Madison beginning at noon.

Respectfully submitted,

David E. Lindorff
Groundwater Management Section
Department of Natural Resources

Joint Solicitation of Groundwater and
Related Research/Monitoring Proposals

November 1992

The University of Wisconsin System (UWS), Wisconsin Department of Natural Resources (WDNR), Wisconsin Department of Agriculture, Trade and Consumer Protection (WDATCP) and Wisconsin Department of Industry, Labor and Human Relations (WDILHR) are participating in a joint solicitation of research/monitoring proposals dealing with groundwater and pesticides. Funding will be available for fiscal year (FY) 94 beginning July 1, 1993. The reasons for this solicitation to be made jointly are to:

- Facilitate proposal writing.
- Streamline the review process.
- Curtail duplication.
- Improve coordination among agencies and researchers.
- Enhance communication between the agencies and between principal investigators.

Joint-funding of some projects may be appropriate, but it is not the purpose of this solicitation to jointly fund all projects. Each agency has its own designated mission and priorities. Contributors to this solicitation and their roles are:

- University of Wisconsin System (UWS) through its Water Resources Center (WRC). The WRC, with oversight from the UWS Groundwater Research Advisory Committee, has approximately $125,000 available in FY 94 to fund new projects. The remainder of the UWS groundwater research funds have been committed to ongoing projects for FY 1994. The funds are restricted for use by faculty within the UWS. Projects of fundamental and applied research will be supported on all matters relating to groundwater including natural science, engineering, social science and law. Projects will be considered for long- and short-term support, but each project will be approved for a MAXIMUM of 2 years during any solicitation cycle.

- The Wisconsin Department of Natural Resources has approximately $250,000 available in FY 94 to fund new groundwater monitoring projects. About $100,000 has been allocated for ongoing monitoring projects. Proposals must be for groundwater monitoring or related activities. WDNR is also helping WDILHR fund projects that focus on the performance of currently-approved onsite wastewater treatment (private sewage) systems. The research will establish and improve management practices which will allow the state to meet the groundwater quality standards enumerated in NR 140, Wisconsin Administrative Code. Although no restrictions are placed on who may apply for these funds, preference will be given to UWS and state agency contractors. Contracts will be approved on an annual basis, and no out-of-state submittals will be accepted.

- The Wisconsin Department of Agriculture, Trade and Consumer Protection will administer $135,000 of research funds for FY94 as part of this joint solicitation. Investigators should take note that the focus of the WDATCP program is on pesticide research which includes but is not limited to groundwater issues. Proposals may be submitted by any college or university, research foundation or individual having a demonstrated capacity in pesticide or other applicable research.

- The Wisconsin Department of Industry, Labor and Human Relations currently does not have research funds for FY 94 to support research on alternatives to current onsite wastewater treatment systems. Proposals are still solicited, however, because the agency is attempting to secure funds.

Please read the solicitation carefully; it contains a description of the priorities for each agency program and other pertinent information. Capital items may not be purchased with these funds, and faculty salaries plus fringe benefits will be limited to a maximum of 10% of an individual grant (for a $50,000 grant, a maximum of $5,000 can be allotted to faculty salaries and fringe benefits). The Department of Natural Resources may consider for funding, on a case-by-case basis, a proposal for which the faculty salaries plus fringe benefits exceed 10% of the grant amount.

A cover page and proposal format have been agreed upon and they are contained in this package. Although all proposals received will be distributed to each agency, each investigator is asked to identify the agency whose mission and priorities best match the project.

Attached is the description of each agency's guidelines, the outline for a cover page, and a detailed format for the proposal. Proposal narratives should be no longer than 10 double-spaced, single-sided pages.

The deadline for submittal of proposals is January 15, 1993. There will be a minimum of two reviews of each proposal, one of which will be from out-of-state. Funding decisions will be made in April 1993, if possible.

If you have any questions please call the following contacts at the individual agencies.

George Blondin	262-3470	University of Wisconsin-Madison
David Lindorff	266-9265	Wisconsin Department of Natural Resources
Jeffrey Postle	266-9959	Wisconsin Department of Agriculture, Trade and Consumer Protection
Bennette Burks	266-0056	Wisconsin Department of Industry, Labor and Human Relations

Please submit the original and three copies of each separate proposal to:

Mr. David Lindorff
Bureau of Water Resources Management
Wisconsin Department of Natural Resources
P.O. Box 7921
Madison, WI 53707

PROPOSAL FORMAT (Original and three copies)

Deadline for Submission: January 15, 1993

A. Cover Page--Sample copy is appended.

B. Project Summary (not to exceed 2 double-spaced pages)

1. Specific groundwater or related problem addressed by research/monitoring proposal.
2. What will findings contribute to problem solution?
3. Project objectives.
4. Project approach to achieve objectives.
5. Users of project findings.

C. Proposal Narrative (begin on new page, not to exceed 10 double-spaced pages)

1. Objectives.
2. Background information describing prior research/monitoring relevant to objectives; references to ongoing projects and how they relate to proposed investigation; information gaps which will be filled by the proposed project.
3. Project plan outlining experimental design and schedule.
4. Methods detailed enough to convince the reviewer that the investigators are up-to-date on modern techniques; a general statement alluding to techniques is not acceptable.
5. Relevance to groundwater and related problems.

D. Principal Investigators

Include 2-page resume (including recent publications) of each investigator and state the time each will spend on the project. A recent reprint or offprint of a key publication should be submitted when available. If any project personnel will receive training, state its nature.

E. Budget using order shown in sample form

1. Salaries and wages, including percentage of grant to be used for faculty salaries.
2. Fringe benefits, including percentage of grant to be used for faculty salaries.
3. Supplies--list office, laboratory, computer and field supplies separately. Fabrication of equipment should be listed as separate item.
4. Travel to support field operations only. Travel to meetings is excluded because of the limited funding.
5. Publication costs.
6. Total direct costs.

SAMPLE COVER PAGE

Project Title

PRINCIPAL INVESTIGATOR:

Name Title and Affiliation Address Telephone

CO-PRINCIPAL INVESTIGATOR(S):

Name Title and Affiliation Address Telephone

Location of Research

Desired Start-up Date and Duration of Project:

Amounts Requested	FIRST YEAR	SECOND YEAR	TOTAL
	_____	_____	_____

Agency(ies) to which this proposal is targeted:

_____	_____	_____	_____
UWS	WDNR	WDATCP	WDILHR

If proposal is appropriate for more than one agency rank highest 1 to lowest 4.

Date of Submittal

SAMPLE BUDGET PAGE

Budget Period from July 1, 1993 to June 30, 1994

(Make a separate page for each year of support)

1. Salaries and Wages — Time, % — Cost, $

   Name and title if known

   a.

   b.

   c.

   d.

   % of grant to be used for faculty salaries =
   + fringe benefits

2. Fringe Benefits

   % of which salaries

3. Supplies

   a. Office

   b. Laboratory

   c. Field

   d. Computer

   e. Fabrication of equipment

4. Travel only for support of field operations

   Detail transport, meals, hotels and number of persons involved.

5. Publication Costs.

6. Total Direct Costs

7. On a separate sheet, indicate the level of current or pending support.

   See attached example.

UNIVERSITY OF WISCONSIN SYSTEM (UWS) PROJECTS FUNDED THROUGH THE GROUNDWATER RESEARCH ADVISORY COUNCIL

As part of the joint solicitation for groundwater and related research monitoring proposals, the UWS seeks projects of a fundamental or applied nature on any aspect of groundwater research either in the natural sciences, engineering, social sciences or law.

Application Requirements: Most often the principal investigator will be a faculty member on any campus in the University of Wisconsin System. However, academic staff who have achieved nomination to PI status by endorsement of the relevant academic dean may serve in this capacity.

Budgetary Considerations: About $125,000 will be available for new grants in FY 94. Projects will not be approved in any one budget cycle for a period of more than 2 years, although a continuation project will be considered for funding in a subsequent solicitation. No capital equipment (more than $1,000/item) will be purchased. Travel for attendance at scientific meetings will not be accepted. Faculty salaries and fringe benefits to be paid from any project will not exceed 10% of the total individual grant.

Priorities: Presented in no particular order of importance.

- Chemical and biological degradation of pollutants in surface soils, subsoils and groundwater, including identification of degradation products.
- Transport of pollutants in soil and groundwater, including elucidation of soil and hydrologic factors controlling movement, and development of predictive models.
- Impact of waste management practices on groundwater contamination.
- Impact of agricultural management practices on groundwater contamination.
- Characterization of geologic factors affecting groundwater movement.
- Examination of the economic impact of groundwater contamination.
- Evaluation of policy alternatives for controlling contamination.

Proposal Format: Is fully outlined in the joint solicitation.

Review: Each project will receive at least two reviews one of which will be from out-of-state.

Current and Pending Support Where Applicable (SAMPLE)

Support Agency of Investigator	Time, %	Project Title	Amount, $/Year	Starting and Expiration Date
		Principal Investigator (Name)		
		CURRENT		
		PENDING		
		Co-Principal Investigators (Name)		
		CURRENT		
		PENDING		

DEPARTMENT OF AGRICULTURE, TRADE AND CONSUMER PROTECTION

PESTICIDE RESEARCH PROGRAM

RESEARCH GRANTS PROGRAM FOR SOLICITATION OF APPLICATIONS

Applications are invited for competitive grant awards focusing on the regulatory issues associated with pesticide use and control. This program is administered by the Agricultural Resource Management Division of the Department of Agriculture, Trade and Consumer Protection. Under this program, the Department may award grants not to exceed three years for the support of research projects to advance the program priorities outlined below. Proposals may be submitted by any college or university, research foundation or individual having a demonstrated capacity in pesticide or other applicable research. $135,000 will be available for fiscal year 1994 for new pesticide research.

DATCP RESEARCH PRIORITIES FOR 1993/1994

High Priorities

1) **Evaluation of the Environmental Fate and Remediation Alternatives for Contaminated Soil and Water at Pesticide Mixing/Loading Sites.**

   Projects should investigate the degradation and movement of pesticides at spill sites, develop criteria on the need for and appropriate extent of remedial actions, and evaluate various methods for remediation of contaminated soil and water.

2) **Refinement of Application Methods for Metham Sodium Soil Fumigants to Reduce Environmental and Public Health Problems.**

   Research should focus on how different application methods and environmental conditions affect the potential for volatilization or leaching of metham sodium or the breakdown product MITC.

3) **Evaluation of Factors Influencing the Patterns of Groundwater Contamination by Pesticides and Pesticide Metabolites in Wisconsin.**

   This topic involves examining factors which influence pesticide leaching to determine areas of the state that are susceptible to groundwater contamination by specific pesticides.

4) **Use Related Monitoring of Pesticides and Pesticide Metabolites in Groundwater.**

   Projects should assess groundwater contamination by field application of pesticides in key environmental settings such as fractured bedrock areas.

Additional Priorities

5) **Identification of the Sources of Pesticide Contamination in Groundwater in Rural Wisconsin.**

Methods should be developed and investigations conducted at a selected number of contaminated rural well sites to determine if contamination is due to field use (nonpoint source) or spills or mishandling (point source) of pesticides.

6) **Evaluation of the Economic Feasibility of Various Chemical and Non-Chemical Weed Control Practices.**

Projects should develop a methodology for evaluating the economic feasibility of modifying weed control practices and apply it to examples where practices are changed to reduce impacts on groundwater.

7) **Pesticide Use Surveys.**

Projects should provide detailed pesticide use surveys that compliment other data gathering efforts, such as ground and surface water monitoring, to improve the understanding of pesticide related issues and problems.

8) **Evaluation of the Effect of Irrigation Management on Pesticide Contamination in Groundwater.**

Projects should evaluate current irrigation management practices and assess their effects on pesticide leaching.

9) **Identify Pesticide Use Practices on Commercial Cranberry Marshes which will Minimize the Potential for Pesticide Discharges to Surface Water.**

Projects on this topic may evaluate the environmental impacts of specific pesticide use practices at cranberry marshes and make recommendations on how practices can be modified to reduce adverse impacts.

DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS

RESEARCH OBJECTIVES

The Department of Industry, Labor and Human Relations (DILHR) is currently conducting research focused on alternate onsite sewage system designs, products, and management practices that can be incorporated into the administrative rules regulating onsite sewage systems. These designs, products, or management practices must be:

- Directed towards minimizing nitrate loadings to protect groundwater and surface water quality;

- Result in onsite sewage treatment that is consistent with the provisions of the Groundwater Protection Law, particularly as it relates to the nitrate standard;

- Be affordable by the average owner of an onsite sewage system; and

- Be practical for the climate and soils of Wisconsin.

Application Requirements: Anyone may apply for research funds. Applicants will be required to demonstrate education, training, and experience consistent with research objectives.

Budgetary Constraints: The Department of Industry, Labor and Human Relations does not have dedicated research funds for FY 94. The agency is attempting to secure funds. Proposals are still solicited, however, because the agency may receive funding for a research program, or the agency may be able to locate other sources to fund projects.

Proposal Format: The proposal format is outlined in the joint solicitation.

Review: Each project will be reviewed individually.

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

GROUNDWATER MANAGEMENT PRACTICE MONITORING PROGRAM

Management practice monitoring is defined as groundwater monitoring or support activities associated with groundwater monitoring, such as laboratory technique development or geologic resource description, for establishing or improving management practices necessary to meet the state groundwater quality standards of NR 140, Wis. Adm. Code.

Applicant Requirements

Any individual, government body or private concern can submit project proposals; however, preference will be given to University of Wisconsin System and state agency contractors. No submittals will be accepted from out of state.

Budget Considerations

Monitoring proposals will be considered for a maximum of two years. Projects costing less than $25,000 annually will be given greater consideration. Management practice monitoring projects are funded solely by state funds; there are no federal funds involved. Budget items to be identified should include such things as personnel costs, supplies, equipment, necessary travel, and other appropriate items. The management practice monitoring funds cannot support capital equipment or indirect costs.

A number of projects which are being funded in fiscal year (FY) 1993 will continue into FY 1994. As a result, about $100,000 will be set aside to fund continuing projects. Approximately $250,000 will be available to fund new monitoring projects in FY 94.

In preparing the budget be aware of the following contractual requirements.

Contractual Requirements

All monitoring wells installed shall meet Department regulations and approved procedures for installation, construction and documentation (Chap. NR 141, Wis. Adm. Code.)

For each new monitoring well, a well construction report shall be submitted on a form (Form 4400-113A) or in a computer format supplied by the Department.

For all groundwater sample points (monitoring wells, piezometers, and private water supplies), an inventory form supplied by the Department shall be completed and submitted. The inventory information may also supplied in a computer format.

For any water supply well that is sampled, the contractor shall determine if a well construction report was prepared. A copy of the well construction report, if available, shall be attached to the inventory form.

All groundwater quality monitoring data shall be collected on forms or in a computer format provided by the Department and shall be reported to the Department within two (2) weeks after the data has been received by the contractor. Computerized data shall be verified by the contractor.

All groundwater samples shall be analyzed by a laboratory certified in Wisconsin for that purpose under Chapter NR 149, Wis. Adm. Code.

The contractor shall request labels with Wisconsin Unique Well Numbers from the Department for wells constructed and/or sampled to allow identification of wells. Wells shall be labeled to allow identification.

Abandonment of monitoring wells shall be the responsibility of the contractor. Wells shall be abandoned in accordance with Department regulations (Chap. NR 141, Wis. Adm. Code) and approved procedures upon completion of the project, unless alternative prior arrangements have been made with the Department.

Review of Proposals

All proposals will be reviewed by DNR staff, the Monitoring and Data Management and the Research Subcommittees of the Groundwater Coordinating Council. Projects given high rankings will be those that address identified priority concerns and appear to have a high probability of successfully obtaining their stated goal.

The project must involve either groundwater monitoring or activities conducted to support groundwater monitoring. Support functions can include, among other things, laboratory analysis technique development, well drilling and construction methodology development and definition of geologic and hydrogeologic conditions for groundwater management purposes.

It is also important that the proposal address a priority monitoring topic as listed below. Other considerations include project cost, proposed timeline, whether the proposed project methodology will meet the objectives stated, whether the resources requested are adequate to carry out the project, and whether the project investigators have the abilities to complete the proposed project.

In making final funding decisions, the DNR's Groundwater Management Section will formulate its recommendations based on the input from all project reviewers. The Bureau Director of the DNR's Bureau of Water Resources Management will make the final funding decisions.

Priority Monitoring Topics

For state fiscal year 1994, the following priority topics for groundwater management practice monitoring have been selected based on input from a number of state agency staff and university researchers. This list of priority needs is not in any specific order.

1. Nutrient management. Examples: monitoring fertilizer (either chemical fertilizer or manure) applied to the land surface which reaches groundwater and the factors that affect the amount of leaching that occurs; monitoring to correlate groundwater quality with the extent of land owner implementation of best management practices in environmentally sensitive areas; monitoring to evaluate the impacts of animal waste management practices including barnyards, storage design and operation and manure application on groundwater quality; monitoring to distinguish nitrate contamination caused by chemical fertilizer application from nitrate contamination from other waste sources.

2. Pesticide management. Examples: monitoring to determine if changes in pesticide application procedures and/or tillage practices have significant potential for reducing

pesticide impacts on groundwater, especially projects focusing on atrazine, alachlor (lasso) and metolachlor (dual) and the potential reduced groundwater impact from pesticide use under low input agricultural practices; monitoring to identify the soil and geologic conditions under which pesticides contamination is likely to occur, particularly fractured bedrock conditions plus loam and clay soils; evaluation of the extent of groundwater contamination from agricultural and nonagricultural pesticide use and handling in various geologic settings; contamination potential and possible health impacts of pesticide metabolites; monitoring at pesticide loading facilities to evaluate the effectiveness of the facility to protect the surrounding soils and groundwater from contamination; development of laboratory procedures for analyzing metabolite concentrations in water and soil.

3. Landfill regulation. Evaluation of current or innovative landfill design, operation or monitoring criteria in relation to compliance with groundwater quality standards.

4. Groundwater remediation. Examples: monitoring of vapor extraction systems to determine their effectiveness in removing volatile organic compounds from various depths and soil types; evaluation of landspreading and other methods for treating pesticides; comparison of microbial populations and activity in contaminated and uncontaminated soils; monitoring various types of bioremediation methods in soil and/or groundwater to determine how effective they are in Wisconsin.

5. On site wastewater disposal. Monitoring to evaluate the extent to which current and alternative on site wastewater (private sewage) systems comply with state groundwater quality standards. Examples: Identification and quantification of contaminants in groundwater resulting from wastewater disposal through private sewage systems; determination of the extent to which current septic system technology prevents wastewater contaminants from complying with groundwater quality standards in various hydrogeologic settings or varying operating conditions; determination of the performance of new or innovative alternatives to current technology, design criteria or management practices with respect to groundwater quality; field monitoring studies to separate the impacts of septic systems from those from other sources, such as current and previous agricultural practices, lawn fertilizer use, road salt use and nearby commercial operations.

6. Urban nonpoint pollution. Examples: evaluation of infiltration trenches, infiltration basins and grass swales; determination of the constituents of urban discharge runoff water; monitoring in areas of continuous use of fertilizer and pesticide, such as at golf courses or cemeteries.

7. Wastewater land disposal. Monitoring of different types of wastewater land disposal systems to evaluate and, if necessary, revise their design standards.

8. Synthetic Organic chemicals. Evaluation of the extent of groundwater contamination from organic chemicals in various geologic and land use settings.

9. Naturally occurring substances. Evaluation of the distribution and seasonal fluctuation of naturally occurring substances such as radionuclides, arsenic, sulfates or saline waters.

10. New technology. Development of new laboratory or field technology (or new applications of existing technologies) for determining the characteristics of groundwater and geologic formations for management purposes.

11. Data management. Development of improved methods for managing groundwater monitoring data. Examples: interpretation techniques for comparing groundwater quality data to groundwater standards; methodologies to make groundwater quality or contaminant source data more readily available.

12. Resource definition. Resource definition studies to better describe the geologic and groundwater properties in the state for management purposes.

13. Wellhead protection. Evaluation of techniques used to delineate wellhead protection areas in various geologic settings.

14. Vulnerability information verification. Studies to verify or test the validity of various groundwater vulnerability assessment systems.

15. Evaluation of health effects of groundwater contaminants. Investigate reproductive, immunologic and neurologic effects of groundwater contaminants and interactive or synergistic effects of substances which are frequently found together in groundwater.

16. Groundwater - surface water connection. Monitoring of surface and groundwater flow to determine hydrologic connections and pathways between them to assess the potential movement and fate of contaminants from one hydrologic regime to another.