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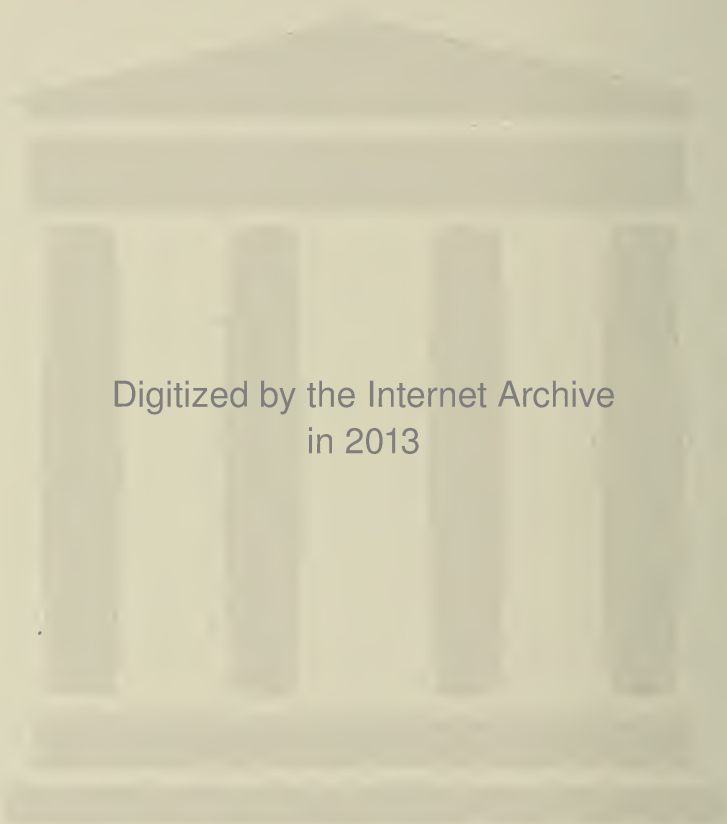
Annual Report 1999

A Division of the Illinois DNR



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Waste Management and Research Center

Annual Report

Fiscal Year 1999
(July 1, 1998 - June 30, 1999)

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Introduction

Mission Statement:
WMRC combines research and education; information collection, analysis and dissemination; and direct technical assistance in order to provide industry, agriculture, and communities with methods to reduce waste at the source and to recycle those wastes that cannot be reduced.

Welcome to the ***WMRC Annual Report***. For those of you who've read our previous annual reports, you'll note that there is a change in the format. This typifies what is happening both at WMRC, within government and industry today. This format is designed to provide the same information presented previously, but in a condensed, interesting and easy to read format. I hope you'll like this change. More importantly, I hope you'll gain information about our accomplishments during fiscal year 1999 (7/98 – 6/99). It was a year of change – let me point out some of the major changes and activities which were important to the Center program:

1. **Laboratory Operations:** WMRC was able in 1999 to replace one of the older workhorse instruments, our Inductively Coupled Plasma Mass Spectrometer. This instrument allows more productivity, greater instrument sensitivity, and at the same time allows some metal compound analysis. This is particularly important in environmental work where the form of the metal can react differently in nature and pose different risks.

2. **Information Services:** The most significant change was the loss of our program manager, Jackie Peden, through early retirement. We miss Jackie and her steady capable leadership. Change in this program is taking place rapidly and mimics that in general commerce. The Internet has become a major if not the major medium of information distribution. The Center is seeing and preparing for these changes in the many websites we develop and support and in this program.

3. **Pollution Prevention Technical Assistance:** This core program continues to expand, particularly with the opening of a Southern Illinois office in Alton. In Northeastern Illinois WMRC launched one of its most ambitious programs with the ADOP^{2}T program for the metal finishing industry. This is a collaborative program with a trade association, state development and envi-

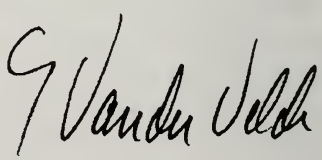
ronmental agencies, a regional business association, the Small Business Administration, utility companies, the Metropolitan Water Reclamation District, and a range of other entities with support from the USEPA. This project will make significant impact through its 31 demonstration projects at selected metal finishing companies and should result in accelerated adoption of innovative technologies.

4. **Research**: Added into the mix of our research projects is a competitively won research project, granted by The United Auto Workers and Chrysler/Dialmer on metalworking fluids. This is a unique project which will research the use of innovative technology to reduce and remove bacteria from these fluids as they are used and thereby prevent worker exposure while at the same time prolonging the fluid life and preventing waste generation.

5. **Natural Resource Trustee:** Three staff were added and this program is now fully functional with the first natural resource damage settlements in the final stages of negotiation. A cooperative mechanism has been developed in our work with the Illinois Environmental Protection Agency, and we developed and hosted the first annual multi-state and federal trustee workshop in the Midwest.

These are only some of the interesting projects and efforts WMRC has undertaken this year. Others include mercury reduction from hospital waste streams, hosting legislators and elected officials at our facility, development of innovative technologies for restoration of the sediment laden Illinois River....I trust you'll read our report from cover to cover to learn more about our great year.

There has been significant change taking place at WMRC, we see that change continuing in the world around us and here at the Center. We look forward to another exciting year in which we can change for the better and can build on our accomplishments to better serve our clients. We would be pleased to hear from you, to hear your suggestions for improvement, your positive experiences with us, and your ideas for collaboration.



Key Events

WMRC staff are involved in a myriad of activities throughout the year covering a broad range of issues, meetings, research and service to our constituencies. Listed below are a few of the events that marked this fiscal year.

- Dr. George VanderVelde becomes WMRC's Director
- DNR Science Showcase at the University of Illinois' Illini Union
- 12th Annual Governor's Pollution Prevention Award Ceremony, Schaumburg
- Program Advisory Panel Meeting
- WMRC Seminar Series included presentations on pollution prevention for metal working fluids; resource recovery methods from chrome plating solutions; and, accessing environmental data sets using GIS
- Legislative visits to WMRC by Lt. Gov. Woods and 3 state senators and 3 state representatives hosted by Rep. Rick Winkel and Sen. Stanley Weaver
- Pollution prevention staff conducted a series of 14 seminars to educate Illinois business owners and state officials of the requirements for Risk Management Planning under Section 112(r) of the Clean Air Act Amendments

Pollution Prevention Program

WMRC's P2 Program worked on over 31 pollution prevention research projects during FY99

WMRC's Pollution Prevention (P2) Program provides direct technical assistance to industry, education programs, and research support to promote waste reduction. For waste that can't be reduced, recycling and improved waste management strategies are encouraged. The program encourages companies to closely examine how materials flow through their facilities, to pinpoint where and why wastes are generated, and to identify technologies, equipment, and/or new operating practices that reduce these wastes. Pollution prevention is a win-win program, wherein businesses and government cut costs and increase efficiency and competitiveness while concurrently protecting the environment.

The P2 Program focuses on three areas: 1) performing cutting-edge research on newly developed P2 technologies, 2) creating awareness that P2 practices and technologies exist, and 3) providing implementation assistance to help organizations adopt the practices.

Projects

ADOP²T

In Spring 1999, WMRC began a program with the Chicago Metal Finishers Institute (CMFI), Municipal Water Reclamation District of Greater Chicago (MWRDGC), Department of Commerce and Community Affairs (DCCA), and the Small Business Administration (SBA) to assist Chicago area metal finishers in their efforts to evaluate and adopt innovative P2 technologies. This project—ADOP²T—Accelerated Diffusion of P2 Technologies, consists of a series of demonstrations and pilot trials of equipoment in actual metal finishing shops. A total of 12 metal finishers have volunteered to participate in the program with 32 projects to evaluate 8 separate technologies scheduled for FY00. WMRC has received financial support for this project from U.S. EPA's Design for the Environment Program and EPA Region V.

Environmental Assessment and Assistance for Manufacturers

funded by Illinois Manufacturing Extension Center (IMEC) and the Illinois Department of Commerce and Community Affairs, $85,000

The Environmental Assessment and Assistance for Manufacturers initiative, a joint IMEC and DCCA funded program, continues to be a successful partnership. WMRC's engineers and scientists, working in conjunction with IMEC's project managers, provided environmental assistance to 68 firms during this fiscal year. Typical assistance included 52 assessments, 19 technical proposals, and 48 direct technical assistance actions. Notable projects included B-Line Systems' ultrafiltration of roller mill coolant, Forsheda Engineered Seals' filtration and ozonation of phosphoric acid and zinc phosphate, J&M Plating's acid recovery through diffusion dialysis, and the Rock Island Arsenal's electroplating bath life extension.

In a related effort, WMRC and DCCA participated in the CleanTech99 International Cleaning Technology Exposition held in Rosemont, IL. WMRC exposition activities included information on new environmental programs and hand-ons technology demonstrations of diffusion dialysis acid recovery, hydrocloning of wastewater solids, and ultrafiltration of oily wastewater. The WMRC booth was visited by several hundred participants.

Risk Management Program Assistance for Illinois Companies

funded by Illinois Emergency Management Association, $30,000

P2 Program personnel conducted a series of 14 seminars to educate Illinois business owners and state officials of the requirements for Risk Management Planning under Section 112(r) of the Clean Air Act Amendments. This section required Illinois businesses who use certain hazardous chemicals such as ammonia and chlorine to prepare plans to prevent possible releases, to predict the size and possible consequences of such releases, and to properly respond to releases if they do occur.

The seminar outlined the requirements of the law, methods for calculating the size of plumes resulting from chemical releases, free and inexpensive resources to assist businesses in plan preparation, and approaches to improving overall manufacturing process safety. P2 Program personnel also assisted several companies directly with prepartion of risk management plans.

Implementation of Pollution Prevention Strategies at Illinois Department of Militiary Affairs Facilities

funded by the Illinois Department of Military Affairs (DMA), $75,000.

Ultrafiltration (UF) of Aqueous Parts Washer Solution: The DMA entered into a pilot project with WMRC to test the feasability of using a UF unit to reclaim spent parts washer solution. The project was carried out for six months. This pilot required a change to a recyclable detergent and also tested the use of a portable UF system so that more than one parts washer could be serviced by the same UF. The pilot was a success and is being incorporated by DMA.

Ultrasonic Automated Weapons Cleaner System: The DMA also pilot tested an automated weapons cleaning system. The system requirements were that it had to be able to clean the weapons as well as they are cleaned by soldiers; perform this function fast enough to provide more time to unit commanders, and be durable. The system developed by WMRC incorporated an ultrasonic cleaning bath with an aqueous recyclable detergent. The designed system could clean up to 10 weapons at a time with a cleaning duration of 4 minutes. This is an ongoing project, but the initial results are very promising. WMRC is now gathering hardware to assemble a prototype.

Reducing Mercury Releases Through Pollution Prevention in Health Care Facilities

funded by U.S. EPA's Great Lakes National Program Office (GLNPO), $78,000

This collaborative program between IEPA and WMRC focuses on reducing releases from health care facilities through adoption of pollution prevention techniques.

Emphasis is on mercury-containing products and waste streams which are disposed of by incineration. From the inception of the project to the present, 20 hospitals throughout Illinois have undergone pollution prevention assessments.

A Materials Management/Purchasing Approach to Reducing Great Lakes Contaminants from Medical Waste

funded by the Great Lakes Protection Fund, $29,800.

WMRC serves as a subcontractor to the Minnesota Office of Environmental Assistance on this project. Our role is to assist in developing a materials management/purchasing tool, enlist two health care facilities in Illinois to test the tool, and provide technical assistance to the two health care facilities during the testing of the tool. To date, the tool has been developed, two Illinois hospitals have agreed to test it, and initial stages of tool implementation are underway.

Lawndale Pollution Prevention and Brownfields Initiative

U.S. EPA's Environmental Justice Through Pollution Prevention Grant Program, $36,000

WMRC serves as a subcontractor to the Lawndale Business and Local Development Corporation on this project. The goal of this project is to reduce environmental and human health risks to the local community by the reduction of industrial wastes and their emissions through pollution prevention. Thirteen companies have had pollution prevention assessments performed. Pollution prevention technology demonstrations were preformed and technical assistance provided to interested companies.

Greater Chicago Pollution Prevention Program (GCP3)

funded by U.S. EPA Region V, $60,000

The GCP3 is a cooperative effort between federal, state, and local government, community and business organizations, and industry to promote pollution prevention within the Chicago area. In its sixth year, the project partners

have revised and finalized a strategy for promoting and measuring pollution prevention efforts initiated by the GCP3. Providing direct pollution prevention technical assistance continues to be a major focus with over 45 new companies receiving on-site assistance this year. A recent emphasis has been on working with the electroplating sector to support the Metal Finishing Strategic Goals Program and promote adoption of innovative pollution prevention technologies.

Pollution Prevention Incentives for States (PPIS)

funded by Illinois EPA, $20,000

WMRC serves as a subcontractor to IEPA on this project. The objective of the PPIS project during the last fiscal year was to integrate pollution prevention into business outreach programs in the Chicago area. Outside referrals resulted in over 20 on-site pollution prevention assessments including approximately 10 referrals from the North Business Industrial Council (NORBIC). All types of industry sectors were assisted, including metal finishing, electroplating, chemicals, printing and electronics. WMRC staff also provided referrals to IEPA for summer intern placement into area businesses and provided assistance to interns as needed.

Illinois Great Printers Project

WMRC has continued to work with the Printing Industries of Illinois/Indiana, Illinois EPA, Illinois DCCA in order to promote the Illinois Great Printers Project and provide pollution prevention and compliance assistance outreach to Illinois printers. As of August 1999, approximately 50 Illinois printing companies had been designated as Illinois Great Printers, 64 companies have committed to participating in the program, and another 52 companies have expressed interest in participating.

Printers National Environmental Assistance Center

funded, in part, by U.S. EPA Office of Enforcement and Compliance Assurance

The Printers' National Environmental Assistance Center

(PNEAC) provides compliance assistance and pollution prevention information to a variety of audiences, including printers, technical assistance providers, regulatory agencies, and trade associations. The project features industry and environmental experts as project partners. WMRC is the prime contractor, with primary subcontractors at the University of Wisconsin and the Graphic Arts Technical Foundation/Printing Industries of America. The partners conduct training for printers and technical assistance providers and operate a toll-free telephone number which features technical assistance and scores of fax-on-demand documents. The project also boasts an increasingly popular website (www.pneac.org), which offers a wealth of information and services. In addition, the website hosts "Ask PNEAC," a form that allows users to receive technical or compliance assistance by exchanging e-mail with industry experts.

In one of its many training endeavors, PNEAC staff partnered with the state of Florida in conducting training sessions for technical assistance providers and printers, traveling to four Florida cities to deliver comprehensive, multi-media environmental compliance and pollution prevention presentations to nearly 200 attendees. Also, in what has become an annual PNEAC training achievement, in December 1998 the Center broadcast its third, live satellite videoconference, "Using Screen Printing Technologies for Business and Environmental Success." This interactive videoconference was presented at over 160 downlink sites across the U.S. and Canada and attended by over 1,000 participants. As further testament to PNEAC's increasing popularity, in the period from July 1998 to June 1999, the numbers of unique visitors to its website tripled, from 2,000 per month to over 6,000.

Research Investigations

Development of Biosorbent Technology for Army Industrial Waste Streams

The objective of this research investigation was to develop and test the viability and cost effectiveness of a new generation of chitosan biosorbents to treat heavy metal and explosives containing waste streams from Army

facilities. Chitosan is obtained from physicochemical processing of shells of shrimp, crab, other crustaceans and some fungi. The biosorbents are prepared by coating on to a ceramic material. Batch equilibrium adsorption studies were conducted at 25°C with aqueous solution of Ni^{2+}, Cr^{3+}, Cr^{6+} metals and 2,4-dinitrotoluene. Preliminary results show that the biosorbent has high adsorption capacity for the hexavalent chromium. Testing with other metals and continuous flow adsorption and regeneration studies are being proposed. The outcome of this project will be useful in treating metal and specific organic contaminated wastewater from metal plating and finishing facilities.

Acid Recovery and Metals Removal from Spent Pickling Acid

A pilot diffusion dialysis test was conducted at a wire coating facility in eastern Illinois to recover hydrochloric acid and remove iron from spent hydrochloric acid pickling bath. The facility uses nearly 60,000 gallons/year of hydrochloric acid in their process for surface cleaning the steel wire prior to coating the wire with aluminum. During the pickling process minerals such as iron, nickel and chromium build up in the bath resulting in loss of pickling efficiency. The pilot system was able to recover 64% of hydrochloric acid from the spent bath while separating nearly 86% of the iron. A maximum payback period of 3 years and 10 months is estimated based on the cost savings from recovered acid, reduced use of neutralizing soda ash, reduced disposal and utility costs and the cost of a diffusion dialysis system. Payback period would be reduced if the positive benefits of enhanced quality, and decreased down time and reduction in risks associated with health and safety of acid handling are included.

Microorganism and Turbidity Reduction through Ceramic Microfiltration for Small Water Utilities

Microfiltration technology is rapidly gaining acceptance as a reliable means of reducing turbidity and microorganism levels in surface waters. It is considered especially suitable for small water utilities due to relative ease of operation and insensitivity to wide fluctuations in source water quality.

Polymeric microfilters have largely been the system of choice due to their lower costs. Ceramic microfilters, a

relatively recent entry in the marketplace, offer the possibility of longer life, higher pressure capability, and exceptional chemical resistance especially to common oxidants such as chlorine but have been perceived as too expensive. Recent advances in manufacturing methods have lowered the cost barrier and made their utilization possible. Very little information on the performance of these membranes under field conditions is available.

Engineers at WMRC have conducted a year-long study on the effectiveness of alumina membranes of 0.2 μm pore-size in reducing turbidity and microorganisms using water from Lake Paradise in Mattoon, IL. Results from these tests suggest that the membranes perform very well in consistently producing water of turbidity lower than 0.1 NTU and very low particle count. Four log reductions of Coliforms were obtained and 1-5 log reductions of HPC were obtained during winter months in the absence of any chlorine addition. In the summer months, when properly sanitized, no passage of Coliforms or Heterotrophs was observed.

The productivity of the filters was adversely impacted by the solids present naturally in the water. In the absence of any pre-treatment, a high-energy consumption per gallon of filtered water was necessary to maintain filter productivity. The use of pre-treatments such as coagulation helped alleviate such reductions in productivity. Preliminary investigations into the mechanism of flux decline suggest that interaction effects between the organics and the natural particulate in the system might be the dominant cause for the loss of productivity. More detailed investigations into the mechanisms of productivity decline and control strategies are being planned in the coming months.

Recycling of Metalworking Fluids

It is estimated that approximately 1-2 billion gallons of effluent are generated from the use of metalworking fluids during machining. Microbial degradation of the fluids and associated maintenance costs, disposal costs associated with high BOD, and adverse health effects associated with the exposure to metalworking fluids have prompted increased attention to alternative methods of managing these fluids.

Microfiltration technology was identified as having the requisite characteristics of selective removal of contaminants while allowing the functional fluids to pass through for reuse. Initial trials with synthetic fluids at an aluminum grinding facility was very successful in reducing disposal costs and allowing recycle of expensive raw material. Subsequent research focused on expanding this to cover other categories of metalworking fluids such as semi-synthetics and soluble oils. Bench scale data and limited pilot data on the microfiltration of semi-synthetics have been collected on one fluid currently used at Caterpillar Inc. The results suggest that while the technology has potential to removing bacterial and other contamination and allows recycle of the fluids, considerable optimization especially in the area of pre-treatment is required for economic viability. Research is under way to evaluate alternative pre-treatment strategies.

Technical Assistance Outreach Activities

Allubra Foundry, Inc.

Allubra foundry manufactures brass, aluminum and bronze parts using sand castings. The company has 40 employees and was established in 1957. WMRC is part of a team of six organizations that formed the Metal Casting Coalition, whose goal is to assist foundries to reduce waste, energy costs, and improve the manufacturing processes. This was the first company to go through the assessment process. Each manufacturing area in the company was observed and ideas/observations were noted for possible improvement. The initial report was compiled and sent out for feedback. The final report will be issued in Fall 1999.

Environmental Compliance Assistance

WMRC assisted two companies in submitting annual reports on their pollution prevention activities to Citizens for a Better Environment (CBE). These reports were required by court settlements during action brought by CBE. Both companies have completed significant pollution prevention activities such as:

- Providing hazardous material handling training for

employees.

- Installing an evaporator, which disposes of 600-700 gallons of wastewater per day.
- Improved the quality & quantity of good water coming from their membrane filtration system.
- Began the process to become QS 9000 certified.
- Rebuilt their heat-treating furnace to improve the environmental controls and provide more constant products.
- Set-up a statistical quality control program to reduce the number of rejected parts.

The partial list of the above implemented examples of pollution prevention ideas show what companies can accomplish to reduce the impact of manufacturing on the environment.

Spectrulite Consortium

Spectrulite Consortium is a company that extrudes aluminum and magnesium. They were having a problem disposing of oily waste water. WMRC entered into an agreement to perform an ultrafiltration pilot project. The pilot was very successful in separating water from the oily waste water. While the pilot was being performed, the company identified several other oily process fluids that were also successfully separated.

Glister-Mary Lee Corporation

Glister-Mary Lee Corporation manufactures pasta. They were having difficulty in keeping BOD rates with the levels allowed by their sanitary waste permit. WMRC entered into a pilot project that used a hydroclone to remove pasta particles from their equipment washing waste stream. This process reduced the amount of pasta that was allowed to enter the sanitary sewer and therefore reduced the level of BOD to within their permit guidelines. Glister-Mary Lee Corporation has purchased a hydroclone and has incorporated it into their equipment washing process.

Gerlin Inc.

Gerlin Inc., manufactures stainless steel pipe fittings and

flanges. Gerlin maintains a 1,500 gallon pickling bath using nitric acid and ammonium bifluoride. The bath becomes depleted in 6-8 weeks and is recharged seven times per year. Gerlin's waste disposal costs $18,000 per year and fresh chemicals make-up costs $13,000 per year.

WMRC engineers developed a pilot project using diffusion dialysis acid recovery technology to assist Gerlin. The diffusion dialysis unit recovered 86% of the nitric acid and 30% of the ammonium bifluoride. The unit also rejected 88% of the iron, 89% of the chromium, and 80% of the nickel.

Implementation of diffusion dialysis will increase Gerlin's productivity as a result of reduced down time, reduced pickling time and reduced rework. These factors were foremost in the company's decision to implement the technology. Additionally, implementing diffusion dialysis will reduce pickling bath discharges from seven times per year to twice per year, providing a savings of more than $10,000 per year.

Sterling Laboratories

Sterling Laboratories is a job shop electroplater specializing in gold, nickel, silver, tin, copper and zinc finishes. Sterling has the capability of doing both barrel and rack plating and can provide a variety of chromate finishes.

In addition to paying over $20,000 annually for metals discharged to the sewer, Sterling had to contend with repeated sewer discharge violations. WMRC recommended that Sterling add a chrome reduction step in its wastewater treatment process. After WMRC provided some basic design criteria, Sterling's personnel gathered the necessary equipment, ran piping as needed and purchased the necessary chemicals. After implementing this and some other changes recommended by WMRC, Sterling was able to discharge wastewater that was consistently below the contaminant limits of the local POTW. WMRC is now working with Sterling to reduce its overall water usage and resulting wastewater treatment costs, while still adhering to discharge limits.

All-Brite Anodizing Co.

All-Brite Anodizing is a job shop aluminum anodizing service. Although All-Brite was consistently meeting all local POTW discharge requirements, they wanted to reduce water usage and also lower their compliance and operations costs. WMRC agreed to investigate ways to remove contaminants from All-Brite's nickel tank and reduce the frequency of dumping the nickel tank.

WMRC recommended that All-Brite use a combination of de-ionized (DI) water, filtration and a daily "additive" at the nickel seal tank to extend the life of the tank's contents. After implementation, the life of the nickel seal bath has been extended from one week to two weeks.

Based on results to date, by simply dumping the nickel bath every other week instead of every week, All-Brite will save at minimum $3,200 annually in make-up chemistry for the nickel seal tank. Based on capital expenditures of $1,800 and annual operating costs of $500 for DI water and $320 for additive, the project pays for itself in less than one year. WMRC is currently working to reduce water usage and improve the wastewater treatment system at All-Brite.

B-Line Systems, Inc.

B-Line Systems, Inc. manufactures metal support systems used in electrical and mechanical systems for conduit, process piping, wiring and other equipment.

B-Line's initial interest in membrane filtration was to reduce their wastewater disposal. In its present operation, B-Line was disposing of 30,000 gallons of oily wastewater per year at a cost of $18,600 annually.

A demonstration project using a tubular ultrafiltration system successfully separated 90% of the tramp oil from the wastewater and recovered greater than 65% of the synthetic roller mill coolant.

Implementation of membrane filtration technology in B-Line's roller mill and press operations will save the company approximately $46,000 per year. The payback on the project is expected to be less that seven months.

R.B. White

WMRC conducted a project to minimize materials utilization in a powder coating system by maximizing first pass transfer efficiency for R.B. White, a metal finisher in Normal, IL. This resulted in the formulation of some general guidelines on improving this particular process and a guidebook for powder coaters on conducting their own process optimizations was developed. These materials are currently being prepared for publication.

NTN Bearing Corporation

At the request of NTN's USA Environmental Committee, WMRC developed a manual for corporate wide implementation of pollution prevention and environmental management to be used in their seven U.S. plants. The manual provides NTN environmental specialists with information on conducting an environmental assessment and address such issues as process mapping, source reduction, and various environmental issues particular to NTN Bearing. The manual is written in a checklist type format to prompt the NTN environmental specialists to seek out answers to questions arising from an internal audit. The manual was written under a contract to NTN USA.

Alternative Cleaners Technology Laboratory

WMRC's Alternative Cleaning Technology Laboratory has become a recognized test facility for the demonstration of safe cleaning techniques, employing aqueous cleaners where hazardous organic solvents were previously used. This year, four companies asked for assistance to help them better deal with their cleaning technologies. For one company, Adams Elevator, tests determined an alternative solvent for their existing cleaning process. Accurate Dispersions was another company that the ACTL helped to select an aqueous-based alternative cleaning solvent to clean cured and uncured paints off their floors and equipment. While the company did not adopt this cleaner as they felt it was not effective, they have provided funding to the ACTL to formulate a new cleaner for their use. The Graymills Corporation has provided funding for the lab to independently test environmentally benign cleaners and to provide information to them on cleaning technologies. Finally, Craftsman Plating and Tinning Corporation funded WMRC to

assist them with finding alternative cleaning technologies to replace their current process. The new technology was demonstrated to them, but they chose to retain their existing process.

Green Chemistry

WMRC Pollution Prevention staff proposed and developed a course in Green Chemistry that was taught during the Spring 1999 semester at the University of Illinois. Development and teaching were funded by the School of Chemical Sciences and the Environmental Council. Thirty-three students enrolled and completed the course. The Chemistry Department committed to reoffer the course each Spring in subsequent years. The course has evovled into an intranet, interactive course and in Spring 2000, will be offered simultaneously on three campuses.

12th Annual Governor's Pollution Prevention Awards

The Governor's Pollution Prevention Award ceremony was held October 29th in Schaumburg. This year's ceremony honored 13 award winners and 13 certificate winners. The program was expanded from past years by the addition of talks and poster presentations by past winners on their pollution prevention efforts. Al Grosboll presented the awards for Gov. Jim Edgar.

Information Services Program

The focus for WMRC's Information Services Program (ISP) is resource development, collection, and distribution of pollution prevention and waste management information. The printed resources of the Center are contained in its library and clearinghouse which ISP staff continue to develop and maintain. The program is also responsible for the production of presentation and promotional materials for WMRC as well as meeting coordination for internal functions and assisting partner organizations. Over the last several years, ISP staff have spearheaded the efforts to obtain a number of federal grants to develop information resources and distribute them in both print and electronic formats. Highlights of ISP activies are provided below.

Twelfth Annual Governor's Pollution Prevention Award Winners

Caterpillar Inc.—Decatur facility
Navistar International
Borg-Warner Automotive
Ethyl Petroleum Additives, Inc.
Honeywell MICRO SWITCH
Dow Chemical Company
Specialty Screw Corporation
Commonwealth Edison
ITT McDonnell & Miller
Stepan Company
Safer Pest Control Project & Henry Horner Residents Committee

WMRC Salutes...

ITT McDonnell & Miller,
a 1998 Governor's Pollution Prevention Award Winner...
This company's outstanding pollution prevention efforts were also recognized at the national level, by receiving the President's Council on Sustainable Development and Renew America's National Pollution Prevention Award.

Coordinating Executive Director and Clearinghouse Services for the Great Lakes Regional Pollution Prevention Information Exchange

The Great Lakes Regional Pollution Prevention Roundtable (GLRPPR) has for many years provided a forum for environmental professionals from states in the Great Lakes Region to share information about the pollution prevention activities of their organization. WMRC has just completed the fourth year as executive director of this group. Over the past year activities have included a Buffalo, NY conference in August and a Chicago meeting in March. These meetings brought together about 200 people from the Great Lakes Region to discuss topics such as regulatory integration, local government pollution prevention, and mercury and persistant bioaccumulative toxins (PBT) elimination processes.

The group is also in the process of drafting a new organizational plan and charter. The past plan and charter were adopted in 1994-1995 and represented the organizational needs at that time. The revised plan and charter will focus on current needs, which include program development in the Great Lakes and increased issue discussion. Membership will also be formalized in the plan so that individuals who join the organization will have an increased sense of belonging and an increased voice in the processes and procedures of the organization. GLRPPR's reach will also be expanded in the plan to include more industry representatives and non-traditional pollution prevention personnel. The plan is still in draft form, but will be adopted January 1, 2000.

Other actives undertaken during this year include a transition of executive director from Jacqueline Peden to Lisa Merrifield, preparation of four LINK newsletters, maintenance of the GLRPPR web page, maintenance of list servers, and representation at related meetings.

The Great Lakes Regional P2 Information Clearinghouse: A Link in the National Information Network

The National Information Network, known as P2Rx, is a group of 9 regional information centers around the country all tasked with providing accurate and timely pollution prevention information to technical assistance and other environmental professionals around the country. The Great Lakes Regional Pollution Prevention Roundtable is one member in this network. Over the past year two meetings have been held, both in Seattle, WA, to discuss efforts that can be made by the group to enhance P2 information resources through our joint efforts. Projects that have been undertaken include developing a process for setting standards on procedural issues within our groups, working with other regions to enhance services to the regional states and networking to learn about activities in other regions.

In addition to attending meetings, the grant required evaluation of the TECHINFO and VENDINFO databases. The evaluation concluded that national database were no longer the most effective means for distributing informa-

tion. The P2Tech national list server is also maintained through this grant as are collection of resources for the printing industry and sustainable development and maintenance of a Great Lakes Resource Guide that includes web resources and contacts in the region.

WMRC Library Statistics	
Books added:	361
Periodicals added:	12
Articles added:	923
Reference requests:	471

Communications and Presentation

In moves aimed at strengthening WMRC's position as a cutting edge, fast-reacting organization, upgraded presentation equipment and a small-room video conferencing system were purchased.

LCD Projectors and Laptop Presentation Systems

The addition of LCD projectors and laptops in the Champaign, Chicago and Springfield offices offers all staff access to the latest and most effective presentation tools. This equipment has nearly eliminated the production of traditional materials such as overhead transparencies and 35mm slides.

WMRC presentations, now in electronic form, are no longer static or dated, but offer a dynamic dimension that results in high audience impact and provides up-to-the-minute information. Cost savings resulting from the decline in slide and overhead production have already paid for the Champaign system and are expected to cover the costs of the other two within the next two years. Given a useful life-expectancy of no less than five years for each system, these units should prove to be sound financial investments as well as valuable communication tools.

Polycomm Video Conferencing Unit

With four offices throughout the state, WMRC is establishing a wide regional presence and offering expanded access and services to our clients. The establishment of a Champaign-based video conferencing system is a crucial step in establishing a unified, real-time presence anywhere in Illinois. We have a vision of all of our remote offices linked instantly through both our video and our computer network backbone. We are proceeding with a plan to

provide instant and shared access of all WMRC resources, regardless of the size or location of the first contact point. WMRC is still exploring the full range of potential uses of this equipment. Current uses are primarily limited to "face-to-face" meetings across the state. Potential applications under exploration include remote training and troubleshooting for both our own staff, and for our clients. Equipment costs have dropped by over 70% in the past few years and we expect the number of video-enabled operations will grow dramatically in the near future. With this growth will come even greater opportunities to turn this technology into another competitive WMRC and DNR advantage.

Research and Laboratory Services Program

WMRC's Research and Laboratory Services Program carries two major responsibilities. It provides the infrastructure for the Center's research funding efforts by soliciting proposals each year, orchestrating a thorough proposal review process, then managing those projects that receive funding. The program also provides a laboratory that supports the analytical needs of the Center, the Center's funded researchers, and others in the public and private environmental research community.

Research

Our spending authority for research for the year was $604,200 with $185,000 budgeted from General Revenue Funds (GRF) and the balance from the Hazardous Waste Research Fund (HWRF). In addition, the Program provides research project management support to capital funds provided through IDNR to investigate hazardous waste problems on departmental lands. The Center spent about $102,000 of the GRF authorization and about $400,000 of the HWRF authorization on direct funding of projects. An additional $145,000 was spent from IDNR capital funds for projects investigating the contaminated site in the Donnelly DePue Wildlife Management Area. About $280,000 was spent on projects that started in FY99, and the balance on projects initiated in previous FYs.

New Projects Funded

A list of all research and related projects that were initiated in FY99 is provided below. The title of the project, the

principal investigators and their affiliation, the funds requested for each project, the source of those funds, and the project duration are listed.

•*DePue Wildlife Management Area Biological Site Characterization: Segment II - Levels and Effects of Selected Metals in Small Mammals*; Jeffrey Levengood and Edward Heske, Illinois State Natural History Survey; September 8, 1998 - March 31, 2000; Total Request: $54,320; Fund: IDNR Capital Funds

•*Atrazine Removal Using Aquatic Plants: A Kinetic Approach*; Richard Larson and Gerald Sims, University of Illinois, Natural Resources and Environmental Science; November 15, 1998 - June 30, 2000; Total Request: $98,606; Fund: HWRF

•*Comparison of Methods for the Determination of Anaerobic Herbicide Fate in Flooded Soil*; Jennifer Crawford, Lutgarde Raskin, and F. William Simmons, University of Illinois, Civil and Environmental Engineering; January 1, 1999 - June 30, 2000; Total Request: $50,178; Fund: HWRF

•*Pollution Prevention Products for Illinois Dry Cleaners: Testing and Recommendations of Chemicals for Wet Cleaning*; Anthony Star, Center for Neighborhood Technologies; March 1, 1999 - June 30, 2000; Total Request: $35,942; Fund: HWRF

•*Chemical Management: Overcoming Barriers to Diffusion*; Thomas Bierma and Frank Waterstraat, Illinois State University, Department of Health Sciences; January 7, 1999 - June 30, 2000;Total Request: $59,752; Fund: HWRF

•*Microlubrication in Metal Machining Operations*; Thomas McClure, Institute for Advanced Manufacturing Sciences, Inc.; February 19, 1999 - June 30, 2000; Total Request: $75,000; Fund: HWRF

•*Transport of Herbicides in the Upper Embarras River Watershed*; Mark David, Lowell Gentry, and Richard Cooke, University of Illinois, Natural Resources and

Environmental Science; February 1, 1999 - June 30, 2000; Total Request: $147,634; Fund: HWRF

DePue Wildlife Management Area Biological Site Characterization: Segment III - Levels and Effects of Selected Metals in Raccoons; Jeffrey Levengood, Illinois State Natural History Survey; February 1, 1999 - March 31, 2000; Total Request: $60,581; Fund: IDNR Capital Funds

•*Measurement of Biomarkers for Environmental Estrogen Exposure in Raccoons;* Elizabeth Jeffery, University of Illinois, Food Science and Human Nutrition; April 1, 1999 - June 30, 2000; Total Request: $10,102; Fund: HWRF/ GRF

•*Historic Soil Samples*; Michelle Wander and Ted Peck, University of Illinois, Natural Resources and Environmental Science; May 15, 1999 - June 30, 1999; Total Request: $5,500; Fund: HWRF

•*Accelerated Pollution Prevention Diffusion in Industrial Sectors*; Frank Altmayer, Scientific Control Laboratories; February 11, 1999 - June 30, 2000; Total Request: $10,000; Fund: HWRF

•*Improving Efficiency of an Iron Phosphating Bath; and a Powder Coating System*; Todd Rusk, University of Illinois graduate student in Mechanical Engineering; March 1, 1999 - February 29, 2000; Total Request: $23,290; Fund: GRF

Continuing Projects

Five projects initiated in FY97 or FY98 continued through the fiscal year. All but one of these projects focused on some aspect of the site investigation that IDNR is conducting at the Donnelly-DePue Wildlife Management Area near DePue, IL. These projects are listed below.

•*Removal of Metallic Impurities in Chromium Plating Solutions by Electrocoagulation*; Shashi Lalvani, Southern Illinois University, Department of Mechanical Engineering and Energy Processes; June 4, 1997 - June 30, 2000; Total Request $171,389; Fund: GRF

•*Cadmium and Zinc Distribution and Speciation in the DePUe Wildlife Management Area*; Paul Anderson, Illinois Institute of Technology, Department of Chemical and Environmental Engineering; June 4, 1997 - June 30, 2000; Total Request: $196,758; Fund: GRF

•*An Assessment of Metals Distribution and Transport in Ground Water Beneath the Diked Sediment Disposal Area*, DePue Wildlife Management Area, Illinois; H. Allen Wehrmann, Walton Kelly, Thomas Holm, Anne Erdmann, and Keith Carr, Illinois State Water and Geological Surveys; September 3, 1997 - June 30, 2000;Total Request: $203,185; Fund: DNR Cap

•*Investigation of Metal Distributions and Sedimentation Patterns in DePue and Turner Lakes*; Richard Cahill and William Bogner, Illinois State Geological Survey; March 4, 1998 - September 30, 1999; Total Request: $58,607; Fund: DNR Cap

•*Remediation of Metal-Contaminated Sediments with Soluble Phosphate and Phosphate Rock*; Thomas Holm, Illinois State Water Survey; June 19, 1998 - November 30, 1999; Total Request: $68,608; Fund: HWRF

Projects Completed/Reports

Seven projects were completed this year. These are identified below along with the status of the final report, where appropriate. The NORBIC project provided supplemental assistance to their Environmental Technologies Program. This program parallels WMRC's interests in fostering the incorporation of new technologies by industry so the supplemental support was deemed an appropriate use of WMRC research funds. No final report was required. For the Wander and Peck project WMRC provided some funds to help secure the historical soils collection at the University of Illinois; no final report was required. The final report for the Schreiner and Associates project was never delivered. Final payment on the contract was withheld.

•*Development of a Sensitive Bioassay to Detect Exposure to Environmental Estrogens*; Elizabeth Jeffery, Department of Food Science and Human

Nutrition; April 2, 1999; Final report ready for printing

•*Novel Technology for Resource Recovery and Pollution Prevention in the Chrome Plating Industry*; Alex Schreiner and Associates, Inc.; December 31, 1998; No report submitted

•*Analytical Speciation of Zinc and Cadmium in the Sediments of Lake DePue*; Jean-Francois Gaillard, Department of Civil Engineering; May 14, 1999; In internal review

•*DePue Wildlife Management Area Biological Site Characterization: Segment I - Levels of Selected Metals in Seeds and Duck Tissues.* Pat W. Brown and Jeffrey Levengood, Illinois State Natural History Survey; June 30, 1998; This report on the DePue contamination site contains sensitive material on IDNR's site investigation. The report is being reviewed in Springfield, but will not likely be published in the immediate future.

•*Historic Soil Samples*; Michelle Wander and Ted Peck, University of Illinois, Natural Resources and Environmental Science; June 30, 1999; No final report required

•*Decatur/Danville Nitrate/Pesticide Removal Project*; Illinois Power - Dale Holtzscher, March 31, 1999; WMRC reviewing final report content to decide whether to publish.

•*Flux Decline Issues in Membrane Filtration of Synthetic Metalworking Fluids*; Richard DeVor and Shiv Kapoor; June 30, 1999; In internal review

•*NORBIC Environmental Technologies Program*; North Business & Industry Council; June 30, 1999; No final report required

FY00 Research Solicitation

Proposals were solicited in January 1999, for research projects to be considered for funding in FY00. The proposal solicitation identified several areas of interest to the Center, IDNR, and the State of Illinois. These areas were: (1) Evaluation of Remediation Technologies for Contaminated Sites in Illinois; (2) Ecological Risk Assess-

ment Information Technology; (3) Metals in the Environment; (4) Contamination Levels in Illinois Soils; (5) Solid and Industrial Waste Management; and, (6) Pollution Prevention, with specific attention to electroplating technology development, metalworking fluids waste minimization and barriers to implementing chemical management programs.

A total of 26 proposals were received. Proposals were first reviewed internally by a minimum of two WMRC staff to provide a first cut evaluation of the quality and appropriateness of the proposals. Seventeen proposals were judged to have sufficient merit to justify external review. Two to four experts were sought for external review of each of these proposals. A total of 55 external reviewers with expertise in the topic area of the proposals, were identified. Fifty-two external reviews, or 95%, were returned. All of the reviews will be used in selecting proposals for FY00 funding.

Potential Directions

Under guidance of the Center's new director, future research solicitations will likely focus on one or two primary themes. Current plans for the FY00 solicitation call for a focus on smart growth issues.

Laboratory

WMRC's analytical laboratory is staffed with staffed with seven full-time analytical chemists. Additional student help is added as needed in response to larger projects. The laboratory provides full-service research support, from help in the development of proposals to consultation on data interpretation. Laboratory staff often share authorship on publications resulting from analytical assistance provided by the Center.

The laboratory supports clients from diverse organizations. The Center's P2 Program brings a variety of industrial clients to the laboratory through its technical assistance efforts. Many of our other clients are from the state scientific surveys and the University of Illinois at Urbana-Champaign. A list of clients served during the year is presented below:

Laboratory Support Clients for FY99

University of Illinois
Robert Hudson/Natural Resources and Environmental Science
Mark Rood/Civil and Environmental Engineering
Larry Hansen/Veterinary Medicine - Rat Serum PCBs
Larry Hansen/Veterinary Medicine - PCBs in Bees
Abbott Power Plant
Val Beasley/Veterinary Medicine - Dessen Pond
Val Beasley/Veterinary Medicine - North American Amphibians
Val Beasley/Veterinary Medicine - Panama Amphibians
Erik Weiner, Nuclear Engineering
Michael Cole/Natural Resources and Environmental Science
Mark David/Natural Resources and Environmental Science
Dan Broder/Chemical and Life Sciences
Gabe Ogbozor/Agricultural Experiment Station

Other Illinois Universities
Paul Anderson/Illinois Institute of Technology

Illinois Scientific Surveys
Melissa Chou/ISGS
Curtis & Smothers / ISWS
Jeff Levengood/INHS
Mike Machesky / ISWS
Tom Holm / ISWS
Ed Zaborski/INHS

Industry
Batavia Ink
Precoat Metals
Energy Dynamics Inc.
Ace Plating
Export Packaging Co.
Montgomery Kone
B-Line Systems
Remline
Gilster Mary Lee
Gatto Plating
RB White
Vapor Corporation
Twinplex Manufacturing
Gerlin, Inc.

WMRC Pollution Prevention Program
MWF Recycling Project
Montana Project
CERL Biosorbents Project
Diffusion Dialysis Project
Electrocoagulation

Government
Great Lakes Naval Air Station
CERL: RDX Project, Bioreactor Project, Diaminotoluene degradation
IDNR: Millhurst Fen, DePue

Equipment Acquisitions

The laboratory offers some special analytical capabilities that are unique to IDNR and the scientific surveys. In particular we have developed capabilities in doing very low-level metals measurements in small samples, a useful application to the ecotoxicological studies that are of increasing interest to the Department and the State. We also specialize in analysis of surfactants and explosive compounds. Our sophisticated gas chromatography/mass spectrometric equipment can be applied to investigative and confirmatory analyses of a wide variety of organic contaminants.

We strive each year to upgrade our analytical capabilities through replacement of older instrumentation and acquisition of new equipment. During the year we were able to make several important equipment purchases. These are listed below:

Inductively Coupled Plasma/Mass Spectrometer - This instrument replaces our existing system and offers capabilities for the analysis of more elements at lower levels. Applications anticipated include ecotoxicological studies and clean water measurements (rain and ground waters).

Atomic Fluorescence Mercury Analyzer - This instrument is an addition to our capabilities. It permits the analysis for mercury at very low concentrations. Mercury has re-emerged as a focal concern of both state and federal governments. This instrument should allow us to support low-level environmental mercury projects at the Surveys and the UI.

HPLC Fluorescence Detector - This detector replaces our aging unit on our high performance liquid chromatographic. The detector increases our measurement sensitivity and provides an improved interface for data processing. It is applied to various projects where low level detection is applicable.

Combination Electrolytic Conductivity/Photo-ionization Detector - This detector replaces a defunct detector on one gas chromatograph. The detector is used to measure low levels of volatile organic contaminants and will support various routine applications.

Contractual Projects

The laboratory has been collaborating with Dr. Neal Adrian at the US Army Construction Engineering Research Laboratory (CERL) in Champaign for several years. Dr. Adrian's research focus is on the biological degradation of explosive compounds, such as TNT and RDX, that are of importance to the military. During FY99, WMRC engaged in two research contracts with CERL to provide analytical and logistical support to those research efforts. These contracts, at a total cost of $80,200, continue through calendar year 1999.

DePue Support Efforts

Donnelly-DePue site investigation projects were a primary focus for the laboratory during the fiscal year. Analytical support, primarily for metals analysis, was provided to five different projects ongoing at the site. In addition, program staff contributed time to assisting the field collection efforts on several of these projects. WMRC submitted a proposal to IDNR to seek compensation from Capital funds for WMRC's analytical and logistical support of the DePue and other IDNR site investigations.

Future Directions

The laboratory will continue to try to improve the quality and timeliness of its analytical services. An increasing sample load from several initiatives and projects within the Pollution Prevention Program is envisioned. The laboratory also hopes to expand its support of the contaminated lands investigations that the Center directs for the Department. New capabilities within the metals group will be marketed to the research community in Champaign and elsewhere. We see an increasing role for our laboratory in the growing science of ecotoxicology. Finally, we hope to fill our senior GC/MS chemist position in the coming year. This person will bring some new interests and ideas to the group that will be marketed to our clients.

Administrative Services Program

The Administrative Services Program runs the day-to-day activities of WMRC covering fiscal, personnel, and data management responsibilities. Several of the activities of this program are highlighted below.

Geographic Information Systems Program

The Center's Geographic Information Systems Program completed a number of projects during the year including the development of ecView, an application developed for DNR Office of Realty and Environmental Planning, Division of Natural Resource Review and Coordination. ecView stands for environment concern View, and is being used for land planning and management purposes. It is an application created using GIS software ArcView, and provides a way for staff to examine environmental information geographically. This was the second year of development in this ongoing project.

GIS at WMRC continues to provide valuable information and data in area assessment reports for Ecosystem Partnerships organized under the auspices of DNR, as part of the Critical Trend Assessment Program (CTAP). CTAP is an on-going effort to assess ecological conditions in Illinois and provides information for ecosystem-based management, and provides scientific support to Conservation 2000, a comprehensive, 6 year, $100 million initiative which is addressing the natural resource needs of Illinois.

Involvement in other Center projects includes mapping the DePue Wildlife Managment Area, providing internal support to the P2 Program and the World Wide Web site.

Staff Development Training

Staff training plays a vital role in developing human capital that contributes to WMRC's role as a service provider of information and technology. Working cooperatively with the UI Staff Development Office staff, four primary areas of training needs were identified as a good starting point to an on-going program: 1) personal profile identification; 2) teamwork development; 3) communication skills enhancement; and 4) balancing (home and work) skills. Due to budgetary constraints, only the first training session was

held this fiscal year. The next two training sessions will be conducted the following fiscal year. The training is conducted in-house by professional training consultants referred by the UI Staff Development Office. In addition to general development training, specific job skill training is necessary for various staff members to carry out their job duties. Training offered this fiscal year include:

- Fundamentals of Supervision (managers)
- Analytical Training on new instruments and software (laboratory staff)
- Laboratory Safety
- Ecological Risk Assessment (research program staff)
- Analysis of Pesticides (laboratory staff)
- Hazardous Waste Workers Training (laboratory and P2 staff)
- Personal Profile Identification (all staff)

Lotus Notes Update/Conversion

The Centers purchase request procedure was computerized with Lotus Notes. This purchase request system allows anyone at the center to submit request and track purchases through approvals, purchasing and receiving.

Natural Resource Trustee Program

As the newest of the WMRC Programs, the Natural Resource Trustee Program (NRTP) involves two primary areas of responsibility. It provides management and technical support for IDNR on properties that are known or are suspected of being contaminated by oil or hazardous wastes, that IDNR either owns or manages. The NRTP has been involved in 8 projects this year involving the characterization of prospective land purchases, to existing IDNR property that was found to be contaminated that required some sort of remediation. The second area of responsibility involves the development and implementation of the Natural Resource Damage Assessment process, of which Director Manning acts as the designated Natural Resource Trustee. This process is a federally mandated program that provides for restoration of natural resources, from air to groundwater, flora and fauna, that resulted from releases of oil and hazardous wastes. The NRTP is currently involved in 13 active Natural Resource Damage projects.

IDNR Contaminated Properties

As described above, the NRTP has been involved in 8 projects this year that involve either contaminated or potentially contaminated property either owned or evaluated for purchase by IDNR. Examples of projects within this program area are provided below.

Illinois Beach State Park, Lake County, Illinois

The NRTP initiated a sand screening feasibility study on a asbestos containing dredge sand stockpile located immediately south of North Point Marina. As a result of NRTP efforts, this study was designed to address/resolve regulatory waste pile concerns raised by the Illinois EPA as well as to support IDNR future beach nourishment efforts. The NRTP is working with adjacent property owners to develop treatment methodologies for their asbestos containing sand, with the goal of ultimately returning the treated sand back to the Park to address beach erosion concerns.

Hamm's Holiday Harbor, Peoria, Illinois

Ninety acres of bottomland hardwood forest were damaged nearly 10 years ago by the landowner without a permit from the U.S. Corps of Engineers and USEPA. IDNR was the recipient of settlement negotiations of the 90 acres and associated management funds. The NRTP was requested to conduct an environmental audit of the property prior to IDNR taking ownership.

DePue Wildlife Management Area

Site characterization continues with the assistance of various members within the Illinois Scientific Survey's. The NRTP has submitted the site wide Quality Assurance Project Plan to the Illinois EPA for their review and comment. Data from previous investigations are starting to become available of review and interpretation.

Natural Resource Damage Assessments

In addition to developing assessments that evaluate injury to various natural resources from oil or hazardous wastes, the NRTP has concentrated on developing various educational opportunities that are helping to build the basic program framework. In June, the WMRC sponsored a Natural Resource Trustee Regional Roundtable

("Roundtable") at Illinois Beach State Park. The Roundtable was designed to bring together Natural Resource Trustee representatives from states that surround Illinois along with federal natural resource damage program staff. The Roundtable was well received with nearly 50 state and federal representatives in attendance.

As previously mentioned, the NRTP has 13 active natural resource damage assessment projects. A sample of these assessment projects are described below.

Lakehead Pipeline/Kendall County
In July and August 1998, directional drilling caused releases of bentonite drilling mud into Millhurst Fen. Nearly one acre of fen was "smothered" during the release. As a result of the efforts between the NRTP and Lakehead, a compensation settlement package is being finalized that will result in the donation of nearly 20 acres of high quality fen, sedge meadow wetland, upland prairie and forest to IDNR for dedication as a nature preserve. Funding will also be provided to IDNR for invasive species control and environmental education in the area.

Marathon Pipeline/Southern Illinois
The NRTP is presently working with Marathon Pipeline and other state agencies to resolve multiple historic oil transmission line releases that have occurred throughout southern Illinois. Typically, the NRTP responds to natural resources damage issues and approaches the responsible party for primary and compensatory restoration. This project is precedent setting in that the responsible party has come forward beforehand and requested NRTP assistance to address natural resource damage concerns and reaches a settlement.

Williams Pipeline/Logan County – In March 1997, Williams Pipeline experienced a petroleum product release of approximately 10,000 gallons. The release affected an estimated 21.2 acres of flood plain habitat. As a result of NRTP negotiations, the present proposed settlement includes compensation for natural resource damages, restoration monitoring, environmental education, primary and compensatory restoration, and cost recovery.

Lawrencville Texaco/Lawrence County

In June of 1999, the USEPA and the IEPA signed an Administrative Order by Consent with Texaco to conduct remedial activities at their Lawrencville, Illinois refinery. The site has been proposed for inclusion on the Federal Superfund list of hazardous waste sites. NRTP efforts have resulted in the early integration of NRDA into the Superfund process, which is a new concept in the regulatory arena. This project represents the first site in the United States where Natural Resource Trustees have been partners in a remedial project.

Dredge Technology and Sediment Use Project

WMRC's John Marlin is heading this DNR effort which involves numerous divisions including the Surveys. It is part of an overall effort to restore the Illinois River. During the past year numerous meetings and presentations have addressed this issue. Some highlights follow.

Nine hundred pounds of sediment were collected from the river bottom by hand in April. It was dried and used to grow five species of plants in pots in a Natural History Survey greenhouse. Results indicate no noticeable difference in germination, wet weight and dry weight of plants grown in sediment and Champaign County top soil. Most test groups showed no significant statistical difference. Fresh sediment initially dries into very hard material resembling plaster. However, after weathering and exposure to air and bacteria, it quickly takes on normal soil characteristics. A university of Illinois soil lab is evaluating soil formed by similar sediment placed in fields many years ago.Tomatoes grown in sediment will be tested for heavy metal uptake. The results of these tests will help determine uses for sediment.

The project funded a conceptual evaluation of using conveyor belt technology to move fresh sediment from the river to placement sites. The firm of Roberts and Schaefer concluded that conventional conveyor equipment can be adapted to function on the river with sediment. The advantage of using a conveyor is that the sediment could be moved at *in-situ* moisture content and retain some of its consistency. This would allow it to be more readily dewatered and stacked.

Work continued on other aspects of the project including development of a hydrodynamic model, evaluation of populations of benthic organisms, physical and chemical properties of sediments, and various dredging and excavating technologies.

Several tours of backwaters were conducted this year. Guests included Congressman Ray LaHood of Peoria;

Maj. Philip Gen. Anderson, head of the Corps of Engineers Mississippi Valley Division; Col. James Mudd, Rock Island District Engineer; several state and local legislators and a large number of technical and administrative persons from state and local government.

Publications

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Barnes, Laura L. (1999). "Another Winner's Circle of Environmental Web Sites." Presented at the Special Libraries Association Annual Conference, June 7, 1999, Minneapolis, MN.

Lindsey, T.C., (1999). "Accelerated Diffusion of P2 Technologies (ADOP^{2}T)" *Pollution Prevention Review*, 9(2), 33 – 37.

Lindsey, T.C., (1998). "Utilization of Publicly Owned Treatment Works to Promote Pollution Prevention," *Journal of Cleaner Production*. Volume 6 Number 3-4, 261 – 268.

Miller, G. and W. Pferdehirt (1999). "Information Delivery Lessons From the Trenches: The Printers' National Environmental Assistance Center" *Prevention First*. Volume 1, Number 1. National Pollution Prevention Roundtable, Washington, D.C.

Nelson, W.M. "Life Cycle Assessment Comes to Life" (1998) *Precision Cleaning*, June 1998, 12-15.

Nelson, W.M. "Art in Science: Utility of Solvents in Green Chemistry" in Green Chemistry, Frontiers in Benign Chemical Synthesis and Processing Oxford University Press, 1998.

Nelson, W.M. "Green Chemistry: Finding Environmentally Safe Solvents for Traditional Solvent Use" 9th Annual Pollution Prevention Conference, Oak Lawn Illinois, October 6, 1998.

Rajagopalan, N., T. Lindsey, and J. Sparks. (1998). "Recycling of Aqueous Cleaning Solutions with Membrane Filtration: Issues and Practice." *Parts Finishing*. (Accepted for publication - scheduled for fall edition).

Rajagopalan, N. T. Lindsey, and J. Sparks (1999) "Recycling Aqueous Solutions: Using Membrane Filtration to Recycle Aqueous Cleaning Solutions", *Products Finishing*, July.

Appendix A

WMRC Staff as of June 30, 1999

ADMINISTRATION
George VanderVelde, Director
Gary Miller, Assistant Director
Steve Davis, Remediation Manager (Springfield)
Katie Day, Human Resources & Admin. Services Manager
Judy Day, Receptionist/Office Assistant
Michael Henry, Remediation/Restoration Project Manager (Springfield)
Tracie Klecz, Receptionist/Office Assistant
Betty Kluckman, Secretary (Springfield)
Tenna Knox, Administrative Assistant
John Marlin, Assistant to the Director
Cindy Melchi, Human Resources/Office Assistant
Chris Murphy-Lucas, Business and Finance Manager
Denise Stoeckel, Natural Resources Restoration Specialist (Springfield)
Cheryl Van Ness, Fiscal Assistant

RESEARCH & LABORATORY SERVICES PROGRAM
Marvin Piwoni, Lab Services Manager
Teresa Chow, Sr. Analytical Chemist
Jack Cochran, Sr. Organic/Analytical Chemist
Brad Daniels, Analytical Support Chemist
David Green, Analytical Chemist
Julie Hafermann, Research Specialist
Yakov Lazovsky, Glassware Washer/Lab Tech
Dan McGinness, Gas Chromotographer
Catherine Ng, Academic Hourly
Charles Chris Rohl, Facilities & Safety Coordinator
John Scott, Academic Hourly
Jonathan Talbott, Sr. Analytical/Metals Chemist
Luann Wiedenmann, Inorganic Preparations Chemist
Monte Wilcoxon, Quality Assurance Specialist

DATA MANAGEMENT/COMPUTER SERVICES GROUP
Randy Wahlfeldt, Computing Services Administrator/Manager
Pam Splittstoesser, Network Administrator
George Krumins, Database Management Assistant

POLLUTION PREVENTION PROGRAM
Tim Lindsey, Pollution Prevention Program Manager
Ken Barnes, Environmental Engineer

Veera Boddu, Process Engineer
Jeanne Brantigan, Undergraduate Hourly
Dan Kraybill, Environmental Engineer
Bill Nelson, Process Evaluation Specialist
Joe Pickowitz, Pollution Prevention Technologist
Shaoying Qi, Academic Hourly
Kishore Rajagopalan, Environmental Engineer
Todd Rusk, Techincal Assistance Specialist
Todd Schumacher, Project Management Assistant
Mike Springman, Environmental Specialist (Springfield)
Valerie Tkachenko, Undergraduate Hourly
Nitida Wongthipkongka, Undergraduate Hourly

INFORMATION SERVICES PROGRAM
Jackie Peden, Manager, Information Services Program
Laura Barnes, Librarian/Clearinghouse Specialist
Carla Blue, Events Coordinator
Sandra Broda, Information Specialist
Laurie Case, Communications Specialist
Chris Harris, Media Specialist
Lisa Merrifield, Technical Information Specialist
Priscilla Smiley, Assistant Librarian
Juna Snow, Academic Hourly
Andrea Will, Undergraduate Hourly

CHICAGO OFFICE
Malcolm Boyle, Sr. Engineer/Office Manager
Jerry Brown, Manufacturing Process Engineer
Georgene Frego, Secretary
Chris Hayes, P2 Technologist and Process Engineer
Clifford Jahp, Environmental Engineer
Deb Kramer, Process Improvement Specialist
Doug Neidigh, Technical Assistance Specialist

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