Protecting Minnesota's Waters



A Strategy for the Wise Use of Pesticides and Nutrients

December 1988

prepared by

EQB Water Resources Committee

Preface

This document was prepared by the Environmental Quality Board (EQB) Water Resources Committee (WRC) as part of its ongoing efforts to ensure that the state's water resources continue to serve the present and future needs of Minnesotans. It represents the combined efforts of the WRC and WRC Technical Committee. The strategy could not have been prepared without the valuable input provided by the Minnesota Extension Service, University of Minnesota Center of Agricultural Impacts on Water Quality, US Department of Agriculture Soil Conservation Service, Minnesota Plant Food and Chemicals Association, and other organizations and individuals who participated in public meetings and provided comments.

Special thanks is extended to the EQB Advisory Committee on Ground Water Protection for their review and evaluation of the policy directions for the strategy and of the options the state should pursue in addressing contamination associated with the use of pesticides and nutrients. Their insights and unanimous recommendations have guided the development of this strategy and are reflected throughout the document.

Minnesota Environmental Quality Board

Adoption of the Strategy for the Wise Use of Pesticides and Nutrients

Whereas, Minnesotans have a right to clean, safe water and a responsibility to conduct their activities in a manner that will prevent contamination of water resources; and

Whereas, pesticides and nutrients are relied upon for agriculture, for control of nuisance and health-threatening pests, and for control of weeds and growth of landscape vegetation; and

Whereas, pesticides and nutrients have been found in water resources; and

Whereas, the protection of water resources from contamination due to the use of pesticides and nutrients can best be achieved by an approach which stresses prevention; and

Whereas, the *"Strategy for the Wise Use of Pesticides and Nutrients"* was developed by the Environmental Quality Board Water Resources Committee and is based upon the advice of an interagency technical committee, the recommendations of the Environmental Quality Board's Advisory Committee on Ground Water Protection, and the comments received during the public review period; and

Whereas, the *"Strategy for the Wise Use of Pesticides and Nutrients"* builds upon the *"Minnesota Ground Water Protection Strategy"* adopted by the Environmental Quality Board in August 1988; and

Whereas, the Water Resources Committee recommends adoption of the *"Strategy for the Wise Use of Pesticides and Nutrients"* as approved by the Committee on November 3, 1988;

Now Therefore Be It Resolved that the Environmental Quality Board adopts the *"Strategy for the Wise Use of Pesticides and Nutrients"*, as recommended, to serve as the framework to guide actions taken to protect Minnesota's water resources from contamination due to the use of pesticides and nutrients.

Passed by a vote of 8-0 with Brand, Buchwald, Ditmore, Dunn, Nichols, Perpich, Tonra and Willet voting aye on November 17, 1988.

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Protecting Minnesota's Waters

A Strategy for the Wise Use of Pesticides and Nutrients

EXECUTIVE SUMMARY

Pesticides and nutrients are widely used throughout society for the control of plant and animal pests and promotion of healthly vegetative growth. The benefits of their use are evident in agricultural production, landscape management, noxious weed control and health protection. These same substances, however, have the potential to contaminate water resources if they are not managed wisely.

Contamination of surface and ground waters resulting from the use of pesticides and nutrients has been observed throughout the United States and in Minnesota. Sources of contamination include spills and leaks, mishandling during application, improper disposal, and use particularly in vulnerable areas. Once contaminated, waters can be difficult and costly to cleanup, making prevention of contamination the most prudent course of action.

Minnesota has a strong history of environmental protection, and has many authorities and programs which serve to prevent contamination of our water resources. These include the pesticide control, safe drinking water, and water pollution control laws and programs. These authorities provide the framework for the state's efforts to address pesticide and nutrient contamination.

As part of its continuing efforts to evaluate state water resources problems and develop policies for dealing with those problems, the Environmental Quality Board (EQB) has prepared a strategy outlining the actions which should be taken to protect water resources from pesticide and nutrient contamination. The ultimate goal of the strategy is to safeguard the health of Minnesotans and protect water resources from pesticide and nutrient contamination, while maintaining a strong economy.

Policy Directions

The policy directions were developed to define the course of action to be taken to achieve the strategy goals. These policies call for an integrated approach, recognizing that education, research, monitoring, incentives, regulation and coordination are all necessary, and for reliance on existing authorities and programs. They

further emphasize the role of individual behavior and actions in resource protection and the need to focus on overall resource sustainability. Finally, they establish prevention of contamination as the cornerstone of the state's efforts, and nondegradation as the state's long-term water resource protection goal toward which program, research and other efforts would be geared.

Initiatives

Specific methods and approaches to be taken to promote the wise use of pesticides and nutrients and protect water resources have been structured around three initiatives.

Information, education and incentives.
Wise use of pesticides and nutrients can best be achieved by ensuring that individuals are provided with the necessary education and information to make informed management decisions and to understand the consequences of mismanagement. Specific recommendations include: 1) establishing a water resources education advisory committee to coordinate the development and dissemination of educational materials; 2) Improving and expanding public information and education efforts and training programs; 3) expanding the use of demonstration projects; and, 4) developing financial incentives.

Resource evaluation and research.
Additional efforts are needed to improve our knowledge of pesticide and nutrient contamination problems, prevention practices and alternative management approaches, and, therefore, our ability to prevent contamination and advise individuals on wise management. Efforts recommended include: 1) developing and implementing a coordinated monitoring plan to better characterize contamination problems; 2) establishing an interagency and academic technical committee to identify research needs, examine practices and disseminate research results; 3.)increasing efforts to identify best management practices; and, 4) continuing research efforts.

Preventive planning and regulatory efforts.
Existing authorities and programs directly or indirectly influence the use of pesticides and nutrients and the prevention or mitigation of impacts on water resources. Wise use and prevention of contamination can be fostered through better coordination, application and modification of these efforts. Specific recommendations include: 1) adopting a nondegradation goal and numerical limits and factoring these into existing programs; 2) expanding drinking water protection efforts, including enforcement of the water well construction code; 3) developing a state pesticide management plan to guide prevention efforts and delineate actions to be taken when contamination occurs; 4) integrating pest and nutrient management into existing efforts, including government uses of pesticides and nutrients; and, 5) enhancing control efforts in such areas as the application of fertilizers through irrigation systems and the disposal of wastes.

Funding

Expanding our efforts to prevent contamination of water resources and promote the wise use of pesticides and nutrients requires increased resources and stable funding. Enforcement efforts related to the state Pesticide Control Law are currently supported by fees, and should continue to be so supported.

Funding for overall, nonregulatory efforts such as education, research and monitoring should be broad based, since all users of water, pesticides and nutrients benefit. General fund dollars derived from income and sales taxes, including a possible tax on pesticides and nutrients, should be considered for these purposes. Moneys from dedicated funds should also be pursued.

Finally, methods of funding cleanup and pesticide and container disposal should be developed.

Preamble

Water resources are precious and vital to Minnesota's high quality of life and sense of place or identity. The name Minnesota evokes images of abundant streams and lakes and the host of recreational and aesthetic opportunities they provide. These surface water resources are integrally entwined with our abundant ground water resources, which provide drinking water to three quarters of Minnesota's citizens and inflow to our streams and lakes. Together, our surface and ground waters supply us with the water for drinking, swimming, fishing, farming, boating, and industrial processing that we have come to expect.

To fulfill our needs and expectations, our waters must be of high quality. One threat to this quality comes from the widespread use of pesticides and nutrients. Contamination with pesticides and nutrients can impair the uses of our waters and render them unsafe for human consumption. Contamination can also lead to such problems as habitat destruction, overenrichment of lakes, and fish kills. Once contaminated, waters can be difficult and costly to clean up, requiring long-term commitments of resources and disrupting both the environment and human lives.

Minnesotans, however, have come to rely upon these same pesticides and nutrients to maintain agriculture, to control nuisance and health-threatening pests, and to control weeds and promote growth of landscape vegetation. Agriculture and related industries, together with the rural communities which they support, are also key to the state's economic vitality, quality of life and sense of place. Any efforts to influence the use of pesticides or nutrients must be compatible with the well-being of the state's agriculture.

The state has an obligation to ensure that Minnesota's waters are adequate for the economic well-being of future generations, and that they continue to provide for the high quality of life we have come to expect. The state recognizes that its ability to act is greatly influenced by federal actions, including federal farm policies and programs and environmental protection action or inaction. However, we can not afford to rely totally on federal actions, and must reserve the right to both act in the face of federal inaction and be more stringent in our actions when necessary for the good of the state.

Minnesotans have a right to clean, safe water. They also have the responsibility to conduct their activities in a manner that will prevent contamination of water resources. Preserving our quality of life and water resources is the responsibility of all Minnesotans.

The purpose of this document is to set forth a course of action for preventing contamination of water resources due to the use of pesticides and nutrients which will preserve and enhance both our waters and our economy.

Introduction

Pesticides and nutrients are used widely in today's society. They are used on cropland and rangeland, on residential lawns, golf courses and parks, on highway and utility rights-of-way, and on nurseries and gardens. To a large extent, we have come to rely on pesticides and nutrients to maintain our agriculture as a major economic factor, to control nuisance and health-threatening pests and organisms, to control noxious weeds, and for cosmetic control of weeds and growth of landscaping vegetation.

Nationally, it is estimated that we are using three times more pesticides today then we did in 1964, with agricultural uses accounting for 79 percent of all uses. The Minnesota Crop and Livestock Reporting Service conducted surveys of pesticide use in Minnesota from 1969 to 1984. Thes surveys, which did not cover non-farm uses, showed that in 1960, about 72 percent of the corn acreage harvested was treated for weed control, while in 1984, about 97 percent was treated. They further estimated that pesticides were applied at least once to over 16 million acres of cropland.

Urban and other non-farm uses of pesticides are not well documented. Resources for the Future, a Washington D.C.-based research group, developed estimates of pesticides use nationwide for agricultural and selected nonagricultural uses, specifically urban applicators and nurseries. They estimated that 40-45 million pounds of pesticides were applied annually in Minnesota. Applications to field corn and soybeans dominate the national totals.

Minnesota fertilizer use has likewise increased, according to information compiled by the Minnesota Department of Agriculture from sales records. Nitrogen fertilizer use increased from approximately 50,000 tons in 1960 to 850,000 tons in 1985. This increase can be attributed in small part to a 13 percent increase in cropland over the same period, as well as to emphasis on higher yielding, and, therefore, more nutrient-demanding, crop varieties.

The Problem

While the societal benefits of pesticide and nutrient use are many, some of these same chemicals are now being detected in surface and ground waters, posing a potential threat to the use and health of our water resources. Pesticides vary considerably in their toxic effects on humans and and other non-target organisms, and have the potential to cause chronic health effects including cancer and birth defects. Some can cause these

effects when levels in drinking water are in the parts per billion range. Phosphorus can lead to increased algal populations and weed growth in surface waters, and nitrate in drinking water can cause methemoglobinemia or "blue baby syndrome" in infants, and may be associated with other human and livestock health effects. Further chronic health effects and effects of mixtures of substances are still to be ascertained.

Water resources can become contaminated at any point in the life cycle of a pesticide, including manufacturing, distribution, storage, use and disposal. Contamination can result from spills and leaks at manufacturing or bulk storage and handling facilities, from mishandling during application, and from improper disposal of waste products and unrinsed containers.

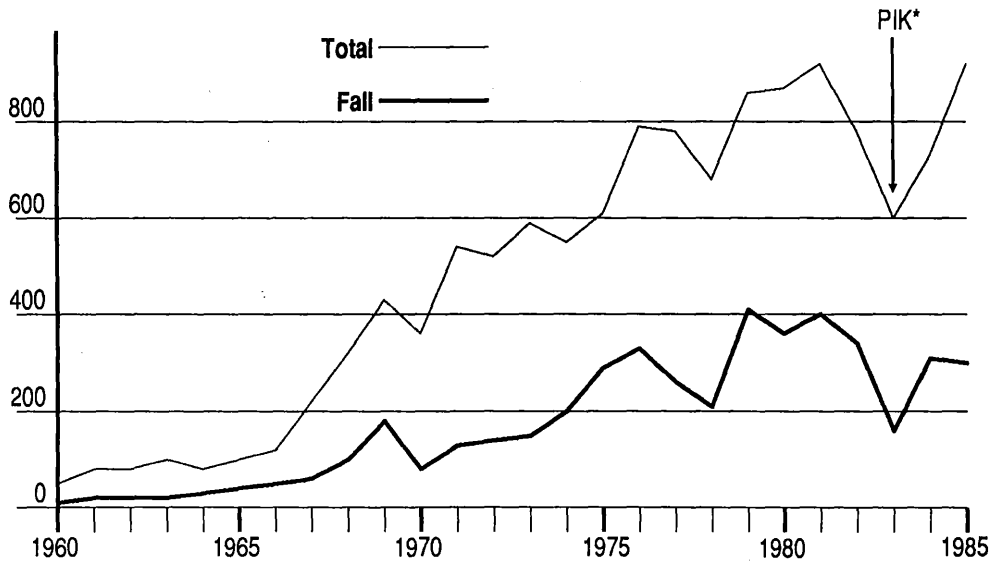
Contamination may also result from normal pesticide use. Specific properties of a pesticide, together with the specific characteristics or vulnerability of the site at which it is used, determine how easily it can be transported to ground water. For some pesticides and sites the potential is quite low, while for others it is quite high. In addition, pesticides can be transported by surface runoff into streams and lakes, and into ground water through sinkholes and improperly abandoned or constructed wells.

Surface or ground water contamination can likewise result from the use of nutrients, including fertilizers and animal wastes. In addition to site vulnerability, surface runoff transport and other factors associated with pesticide contamination, the time and rate of application are probably the most important determinants. Studies in Minnesota by the Minnesota Pollution Control Agency and University of Minnesota have clearly shown that nitrate losses increase as fertilizer application rates exceed the amount that the crop can use.

The extent of pesticide and fertilizer contamination of surface and ground waters in the nation and state is not well defined. Prior to the late 1970's, it was generally believed that ground waters were protected from pesticide contamination. Consequently, pesticide monitoring was minimal, and was focused on surface water and

Annual Nitrogen Use in Minnesota

In thousands of tons



*PIK - Payment in Kind

Potential Sources of Pesticide and Nutrient Contamination of Water Resources

	Manufacturers/ Formulators	Dealer	User
Spills and Leaks			
Storage Areas	✔	✔	✔
Storage Tanks/Pipelines	✔	✔	✔
Loading/Unloading	✔	✔	✔
Transport Accidents	✔	✔	✔
Disposal			
Process Waste	✔		
Off-specification material	✔		
Cancelled Products	✔	✔	✔
Containers	✔	✔	✔
Rinsate			✔
Land Application			
Leaching and Runoff			✔
Backflow to Irrigation Wells			✔
Run-in to Wells, Sinkholes			✔
Mixing/Loading Areas			✔
Feedlots			✔

urban drinking water supplies.

Pesticide monitoring capabilities and efforts have increased in recent years, but have focused on a limited number of pesticides in specific geographic areas. The U.S.Environmental Protection Agency reported that by 1986, 19 different pesticides had been detected in ground water in 24 states, with the contamination most probably resulting from agricultural application rather than spills or other handling problems. Included in the 24 are Minnesota, Iowa and Wisconsin.

Between July 1985 and June 1987 a cooperative Minnesota Department of Health (MDH) and Department of Agriculture (MDA) survey was conducted in an effort to develop baseline information on the extent of agricultural pesticide contamination in the state's ground water. Over 700 wells were tested, including observation wells located near farm fields and public and private drinking water wells. Wells were generally chosen in places where local hydrogeology made the ground water especially susceptible to contamination.

Pesticides were detected in 39 percent of all wells and 28.5 percent of the public drinking water wells tested, generally at levels below current guidelines for drinking water. Long-term health implication of ingesting low levels of pesticides are not known. Sixteen drinking water wells, however, did have pesticide levels higher than the limits currently recommended by the Department of Health.

Pesticides were most commonly found in wells in parts of the state considered to be hydrogeologically vulnerable to contamination. These were wells completed in: 1) the karst formations in southeastern Minnesota; 2) the shallow, outwash sand and gravel aquifers in central Minnesota; and, 3) the shallow, alluvial sand and gravel aquii fers in southwestern Minnesota. These efforts provide a "snap shot" of our pesticides in ground water situation, and must be expanded and combined with surface water efforts to provide a full picture of the impacts on Minnesota's waters. In addition, urban and other non-farm use areas must be evaluated.

Nitrate contamination has also been observed. In the above survey, MDH and MDA found that 42 percent of 199 private drinking water wells

Occurrence of Pesticides

MDH/MDA Water Well Pesticide Surveys

Pesticide	Wells with Detections*	Maximum Concentration (parts perbillion)	Recommended Drinking Water Limit (parts per billion)
atrazine	266	42.40	3.0
alachlor	40	9.76	6.0
2,4-D	13	5.70	70.0
metribuzin	8	1.05	175.0
metolachlor	8	2.40	10.0
dicamba	7	2.10	9.0
picloram	7	0.63	490.0
propachlor	6	0.52	92.0
cyanazine	5	2.90	9.0
pentachlorophenol	3	0.64	220.0
aldicarb	2	30.60	9.0
MCPA	2	2.20	3.6
2,4,5-TP	2	0.26	10.0
EPTC	1	0.33	35.0
simazine	1	2.58	35.0
2,4,5-T	1	0.21	21.0

*One or more pesticides were detected in 281 (39%) of the 725 wells sampled

and 7.1 percent of 395 public water supply wells had nitrate concentrations in excess of drinking water standards (10ppm). Data from Winona and Olmsted counties indicate that nitrate contamination is increasing in deeper aquifers.

Nitrate contamination is not new to Minnesota, and was observed in an investigation of water supplies which were reported to be, or suspected of being, involved in cases of methemoglobinemia in the late 1940's. The investigation followed indications that the condition was widespread in certain rural parts of the United States. None of the wells investigated had nitrate concentrations below the current drinking water standard, and none of the wells was both constructed and located satisfactorily, as judged by Minnesota Health Department standards. Problems included locating too close to barnyards and cesspools. In these investigations, a comparison of rural school wells and similarly constructed nearby farm wells indicated that nitrate content of school well water was less than that of farm wells, further highlighting the importance of location. At this same time in the late 1940's, 3.1 percent of the 514 municipal supplies in the state were found to contain 10ppm or more of nitrate.

The Minnesota Pollution Control Agency, using data collected primarily by the PCA and U.S. Geological Survey between 1978 and 1986, compared ground water quality in surficial sand aquifers in limited, moderate and intense agricultural counties. Analysis showed elevated levels of nitrate in the moderate and intense agricultural areas, as compared to the limited agricultural areas.

Additional studies by the USGS have also explored influences of land use practices on ground water quality in surficial sand aquifers in several Minnesota counties. In one study, they found that: 1) nitrite plus nitrate nitrogen levels had increased in local agricultural areas when comparing 1978 and 1979 data with that from the mid to late 1960's; 2) high concentrations of agricultural chemicals were found following major recharge events; and 3) concentrations of nitrite plus nitrate nitrogen increased significantly downgradient from major agriculture and irrigation areas. In other studies, USGS found concencentrations of nitrate to be higher in irrigated and

between what we eat, drink and breathe and our health. Finally, we have gained a better understanding of the interrelationship of organisms within a community and how impacts on one member can impact the whole.

State and federal laws and programs have developed and expanded along with our identification and understanding of contamination problems. They began as efforts to address overall nuisanc sance and sanitation, and have evolved to form the basis of our efforts to ensure that our waters are suitable for aquatic habitat, recreation, and consumption. These current programs provide an excellent framework for increased efforts to protect water resources from contamination caused by the use of pesticides and nutrients. Our efforts to address these impacts have evolved along with our overall water resource protection efforts.

Federal Efforts

Federal efforts to address water resource contamination issues began primarily in the early 1970's. This period saw the passage of three major pieces of legislation that form the basis for our efforts to protect water resources from pesticide and nutrient impacts: the Federal Water Pollution Control Act (Clean Water Act), the Safe Drinking Water Act, and the amendments to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Solid and hazardous waste efforts were also advanced by the end of the decade with passage of the Resource Conservation and Recovery Act covering the tracking of hazardous wastes from cradle to grave and solid waste disposal requirements, and the Comprehensive Environmental Response, Compensation and Liability Act (Superfund) dealing with releases of hazardous wastes.

The primary agency for pesticide management and regulation of water quality impacts of pesticides and nutrients at the federal level is the US Environmental Protection Agency (EPA). Pesticides are regulated by EPA through the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). First enacted in 1947 to primarily deal with issues of interstate commerce, it was amended in 1972 to include issues related to potential chronic health effects, adverse ecological effects and environmental fate. More recently, EPA has begun to address ground water concerns and to evaluate the potential of pesticides to leach.

The act covers classification, registration, sale, use and disposal of pesticides, and provides that pesticides must be registered and must have labels detailing how the product may be used. It also establishes certification requirements for persons desiring to use pesticides.

Through FIFRA, EPA must evaluate pesticides to determine if benefits of use outweigh risks. Many pesticides in use today, however, were in use prior to the current FIFRA requirements. These must be reevaluated to determine necessary restrictions. The process is slow, however, and products may continue to be used during this reevaluation.

Pesticides and nutrients are also regulated by EPA through the Safe Drinking Water Act, which provides for regulation of public drinking water supplies and requires monitoring of those supplies to ensure compliance. The act was passed in 1974, to replace a previous program governing standards for water use in interstate commerce. Surveys in the early 1970's had shown that many water supplies were not meeting these standards.

Through the Safe Drinking Water Act, EPA sets drinking water standards and requires specific treatment technologies. Currently, there are standards for only six pesticides; however, 1986 amendments to the act require the regulation of an increased number of parameters by 1989, including over 20 pesticides. EPA also establishes health advisories under authority of the act, and has done so for over 62 pesticides. The amend-

ments further call for development of wellhead protection areas around wells in public drinking water systems.

Regulation is also afforded through the Clean Water Act, which covers such areas as water quality standards, feedlot regulation and the control of point and nonpoint sources of pollution, such as agricultural runoff. While amended in 1977 to cover nonpoint source pollution control and the development of strategies for ground water protection, the main emphasis was on surface water and control of point sources of pollution through permit and grant programs.

Progress toward the act's goal of restoring and maintaining the chemical, physical and biological integrity of the nation's waters has been significant. In Minnesota, control of point source discharges has led to major water quality improvements in streams and lakes. However, there is a growing recognition that further improvements and attainment of the goals will require control of nonpoint sources. Amendments to the act in 1987 call for the development of nonpoint source management programs to address surface and ground water.

EPA efforts to address issues of pesticide and nutrient contamination have also extended to development of strategy and guidance documents. These have included: 1) *"Protecting Ground Water: Pesticides and Agricultural Practices"*, which presents an evaluation of impacts of various agronomic, irrigation and pesticide application practices; and, 2) *"Agricultural Chemicals in Ground Water: Proposed Pesticide Strategy"*, which presents EPA's approach for addressing the pesticides in ground water concern. EPA intends to develop a proposed approach for addressing fertilizer and ground water concerns in the near future.

The US Department of Agriculture is also involved in pesticide and nutrient management, and offers educational programs and financial and technical assistance for nonpoint source pollution control. Past environmental protection efforts within USDA have emphasized erosion control and soil conservation. However, water quality has been recognized as a priority issue and is becoming an integral part of ongoing efforts.

USDA research efforts, and cooperative efforts with state extension services and universities, provide on-site evaluation of management practices, the results of which are conveyed through publications and field days. Water quality is also becoming more integral to these efforts. State extension services are also instrumental in developing materials for use in pesticide applicator training sessions.

State Efforts

Environmental protection is a long-standing trad tion in Minnesota. The state's first law to prevent pollution of rivers and other sources of water supply was enacted in 1885, and the first law to require dischargers to obtain permits was enacted in 1945. These efforts, which focused on surface waters and point sources of pollution, were augmented over the years as new information on threats to our water resources became evident.

Recognition of problems and potential impacts has led to creation of the Pollution Control Agency in 1967, passage of the water well construction contractor licensing law in 1971, passage of the pesticide control law in 1976, and passage of the safe drinking water act in 1977, to name but a few We now have laws, programs, rules or guidelines that cover many of the threats to our waters.

There are four principal agencies in the state involved in protecting our waters from pesticide and nutrient contamination: the Departments of Agriculture (MDA), Health (MDH), and Natural Resources (DNR), and the Pollution Control Agency (PCA). These agencies are responsible for implementing state legislation and also take

The Programs

Pesticide management and regulation of water quality impacts of pesticides and nutrients resides primarily with four state agencies.

Minnesota Department of Agriculture
- Lead agency for regulation of pesticides
- Regulates distribution, use, storage, handling and disposal of pesticides, rinsates and containers
- Administers certification, licensing and training programs
- Can deny, cancel or restrict the use of a pesticide
- Regulates the registration, storage and handling of fertilizers

Minnesota Department of Health
- Regulates public drinking water supplies
- Administers the state's well construction/abandonment requirements
- Issues drinking water standards
- Develops health advisories where no standards exist

Minnesota Department of Natural Resources
- Approves registration of aquatic pesticides
- Issues permits for use of pesticides in public waters

Minnesota Pollution Control Agency
- Overall regulation of surface and ground water quality
- Classifies waters and sets standards
- Regulates feedlots, disposal of wastes, storage facilities and nonpoint source pollution

an active role in the implementation and enforcement of federal legislation.

MDA is the lead agency for regulation of pesticides in Minnesota. It has authority through delegation from EPA under FIFRA and through the state Pesticide Control Law. MDA is responsible for the regulation of the distribution, use, storage, handling and disposal of pesticides, rinsates and containers. It administers the state's certification licensing and training programs and has the authority to deny, cancel or restrict the use of products. The Minnesota Extension Service, through an interagency agreement, assists MDA in carrying out the certification and training program.

Amendments to the state Pesticide Control Law in 1987 significantly enhanced MDA's enforcement abilities and expanded its ground water protection responsibilities. The amendments further established a pesticide regulatory account and imposed fee increases to ensure that funding for administration and enforcement of the law was adequate. The law prohibits pesticide use that will cause unreasonable adverse impacts on the environment.

DNR becomes involved when pesticides are applied to public waters. DNR maintains a list of aquatic herbicides and algicides that it approves of, and issues permits for the use of pesticides in public waters. MDA provides financial support to DNR for its enforcement efforts, and DNR assists MDA with training and testing of aquatic pesticide applicators. DNR is also responsible for the state's efforts to control the proliferation of purple loosestrife.

MDA also has authority to regulate the registration, storage and handling of fertilizers. This includes the requirement that commercial applicators maintain records of amounts applied. No agency has authority over the rate of application of fertilizers. Application rates for animal wastes are only regulated in connection with PCA feedlot permits. Manure management plans are required with these permits, and must provide for the application of manure at agronomic rates.

MDH has authority under the federal and state safe drinking water acts to regulate public drinking water supplies for protection of public health This includes adoption of drinking water standards and protection relative to pesticide and

nutrient contamination. MDH also is responsible for enforcement of the state's water well construction and abandonment code and develops health advisories for contaminants in situations where no standards exist.

PCA's authorities derive through the federal Clean Water Act and state statutes, and cover broad overall regulation of surface and ground water quality. Its authorities include classifying waters and setting standards for all parameters, and extend to regulation of discharges from municipal and industrial facilities, feedlots, disposal and management of solid and hazardous wastes, storage facilities and nonpoint source pollution control.

Current PCA rules regarding ground water stress nondegradation, or prevention of contamination. The rule allows for such activities as the use of septic systems and agricultural chemicals and fertilizers, provided that such use does not pose a significant pollution problem. Current rules governing all waters of the state also stress nondegradation and prevention of significant degradation from all sources of pollution.

PCA is also responsible for preparing the state's ground water protection strategy and nonpoint source management plan. They administer the state's Clean Water Partnership program which, together with the cost-share programs of the Board of Water and Soil Resources, provide funding to address nonpoint source problems.

Relationship of Strategy to Other Efforts

This strategy and its policies and recommendations are directed toward the wise use of pesticides and nutrients. While necessary, these policies and recommendations are not adequate in and of themselves to ensure that our water resources are protected. They must be coupled with other state, federal and local efforts to control sources of water pollution. These include efforts related to septic systems, municipal and industrial discharges, waste disposal, and even air emissions that lead to deposition of pollutant on our land and in our waters. These other efforts must be continued and enhanced as well.

The strategy builds upon past state water planning efforts, including EQB's *"Protecting Minnesota's Waters: An Agenda for Action in the 1987-1989 Biennium"*. It is part of EQB's continuing efforts to evaluate state water resources problems and develop policies for dealing with those problems.

The strategy was developed in conjunction with development of the state's *"Ground Water Protection Strategy"* and *"Nonpoint Source Pollution Management Program"* and is intended to expand upon the recommendations of those efforts in the area of pesticide and nutrient use. The state's strategies and water resources programs and efforts will continue to be reevaluated through the interagency and citizen forum provided by the EQB in order to ensure that they continue to address Minnesota's current and future needs.

The Strategy

Goal of the Strategy

To safeguard public health and protect water resources from pesticide and nutrient contamination, while maintaining a strong economy.

Policy Directions

In considering how to address problems associated with the contamination of Minnesota's water resources due to the use of pesticides and nutrients, the Environmental Quality Board Water Resources Committee proposes nine basic policies. These policies define the course of action to be taken to achieve the overall goal of protecting Minnesota's water resources from pesticide and nutrient contamination. These policies built upon the framework established in the *"Minnesota Ground Water Protection Strategy"*.

1 ***An integrated approach must be pursued.*** No single effort or initiative can be expected to alone achieve the desired results. Education, research, monitoring, incentives, regulation and coordination are all vital parts.

2 ***Individual behavior and actions must be modified.*** Changing the ways in which pests and nutrients are managed requires changing individual behavior and actions. These modifications in turn require that individuals have the necessary information to make wise management decisions. Individuals must be better educated in the consequences of use and misuse of pesticides and nutrients, and alternatives to existing approaches. In addition, motivations and incentives should be provided as a means for changing behavior and actions and encouraging the use of best management practices.

3 ***Land stewardship and resources sustainability must be emphasized.*** Pest control and nutrient management decisions can have an influence on water resources that extends beyond the geographical and temporal framework in which the decisions are made. The citizens of Minnesota have a responsibility to be good custodians of the state's water resources and to ensure that actions taken today do not jeopardize the health and welfare of future Minnesotans. Education and policy efforts should, therefore, stress an overall land stewardship ethic, and emphasize water and soil resource sustainability and short- and long-term profitability. Education and policy efforts should also be directed toward the promotion of sustainable agriculture. Research efforts should emphasize alternative pest control strategies and optimizing pesticide and nutrient use.

4 ***Prevention must be the cornerstone.*** The cleanup of water contaminated by pesticides and nutrients can be costly and technically complex, and with respect to widespread contamination of ground water, may be economically and technologically infeasible. In addition, provision of alternative water supplies or treatment, where cleanup is not feasible, is also costly and may be impractical where contamination is widespread. Consequently, contamination of water resources by pesticides and nutrients must be prevented to the maximum extent possible.

5 ***Nondegradation must be the goal.*** Nondegradation, meaning prevention of further contamination and appropriate action to improve water quality in areas already impacted, must be the long-term water resources protection policy goal of the state in dealing with potential sources of contamination. Having nondegradation as the policy goal of the state means that impacts should be prevented to the maximum extent practicable even in situations where waters have already been impacted by human activities. Preventive measures or practices which are practicable are those that are capable of being put into practice taking into account the means which are at hand and conditions as they are. All programs, research and other efforts must be geared toward attainment of this goal. This will lead to the development of better and better practices, taking us evercloser to the nondegradation goal. We should be striving to keep the pesticides and nutrients we use on target and out of our waters.

Synthetic pesticides are not a naturally occurring constituent in waters. In addition, while nitrates are found naturally in waters, elevated levels can be induced by human activities. The presence of pesticides in surface or ground waters or of nitrates beyond natural background levels is considered to have lowered or degraded the quality of those waters.

6 ***Degradation must be met with action.*** Due to the potential problems of environmental and health risks, and the difficulties associated with cleanup, instances of degradation can not be disregarded. All instances of degradation must be met with actions to prevent further degradation which are appropriate or suitable for the particular situation. In some cases, such as low levels of contamination, suitable action may consist of increased monitoring and education. Depending on the particular situation, actions may include investigations, evaluations, education, enforcement actions, land use and land management changes, active cleanup, and/or environmental correction or restoration.

7 ***Actions must be geared toward environmental and health protection.*** The particular actions appropriate in instances of degradation must be determined, and priorities for taking action must be established. State priorities for action and the levels of cleanup required must be based on acute and long-term or chronic health risks, environmental protection and maintenance of other beneficial water resource uses.

8 ***Numerical limits must be adopted.*** Numerical limits are needed for these situations where some contamination currently cannot be avoided in order to ensure that pollutants do not endanger Minnesota's environment or the health of its citizens. These limits would provide a consistent upper cap on the allowable impacts of practices or activities, and would serve as a goal for cleanup and remedial actions. The state should develop numerical limits which are protective of health and the environment, and should use available information, such as the goals and standards established by the federal government, to the maximum extent possible in such development.

9 ***Existing framework should be retained.*** Minnesota has a strong history of environmental protection, and has developed excellent agencies and programs to protect our water resources. We should build upon this existing framework of agencies and programs when

increasing our efforts to protect water resources from contamination caused by the use of pesticides and nutrients.

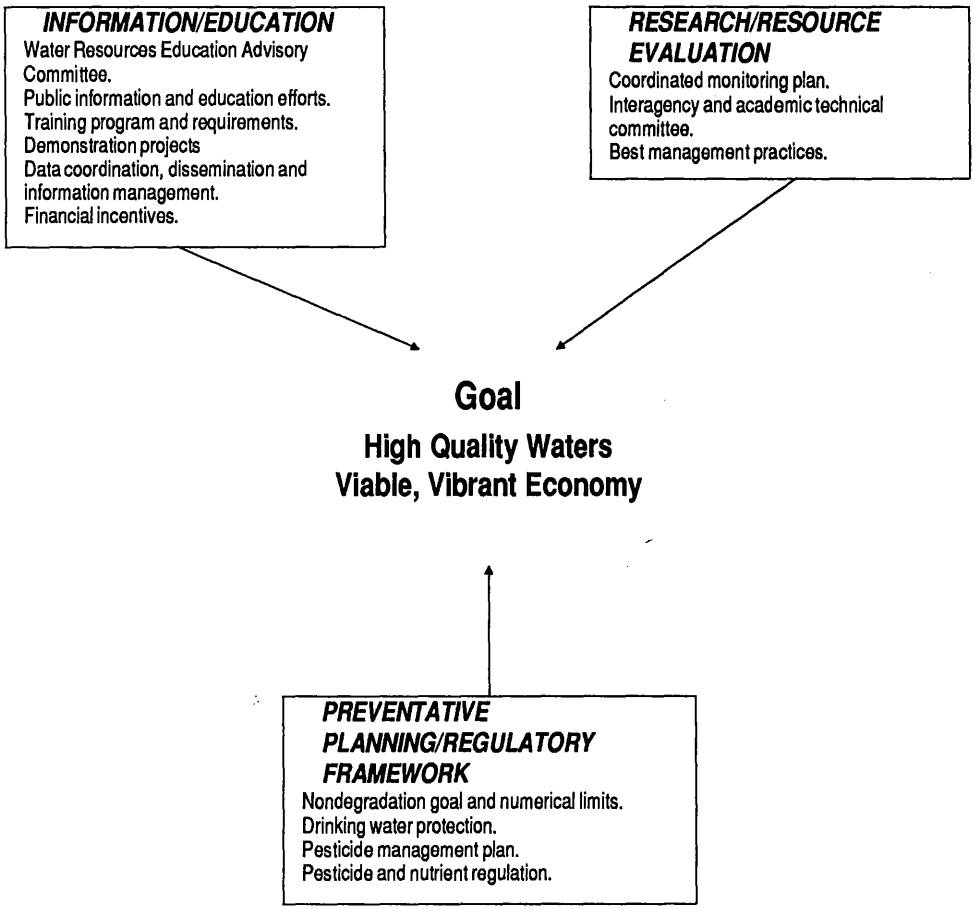
Specific methods and approaches to be taken in protecting water resources from contamination by the use of pesticides and nutrients have been structured around three initiatives:

I To provide the public, decision-makers, regulators and the regulated community with necessary information, education, and incentives.

II To enhance the current body of knowledge of pesticide and nutrient contamination problems, prevention practices and alternative management approaches.

III To enhance preventive planning, corrective actions, and regulatory efforts.

Preventing Pesticide and Nutrient Contamination



Initiative I

To provide the public, decision-makers, regulators and the regulated community with necessary information, education and incentives.

The USEPA has suggested in its 1988 report entitled *"Protecting Ground Water: Pesticides and Agricultural Practices"*, that ground water can be protected from pesticide contamination through measures aimed at: 1) preventing spills or eliminating pathways of contaminant entry into ground water; 2) avoiding application when conditions are most likely to promote leaching; 3) using products with less potential to leach; and, 4) reducing the quantities of pesticides used. Measures include: careful timing of application relative to climate, crop economic thresholds and pest cycles; crop rotation; proper maintenance and calibration of application equipment; and, mechanical cultivation. These sorts of measures, and corollary measures for addressing surface water and nutrient contamination issues, to a large extent rely upon voluntary actions of individuals.

Wise, responsible and reduced usage of pesticides and supplemental nutrients can best be achieved by ensuring that individuals are provided with the necessary education and information to make informed management decisions and to understand the consequences of mismanagement. Overall environmental and stewardship education and information is necessary, as well as specific efforts geared toward sustainable agriculture, pest control and nutrient management. In addition, incentives can be a useful tool to promote and reinforce desired behavioral changes.

Overall Environmental Protection Recommendations

Environmental protection requires voluntary actions by individuals. Such voluntary actions, however, can only be expected if individuals understand the consequences of their actions and the importance of environmental protection to the future quality of life and economic vitality of Minnesota. Efforts to foster environmental awareness and stewardship of the land and resources will have positive impacts on preventing pesticide and nutrient contamination problems, as well as overall environmental benefits.

Support and expansion of the recommendation of the *"Minnesota Ground Water Protection Strategy"* and *"EQB Task Force on Environmental Education"* dealing with environmental education will serve to foster this overall awareness.

Recommendations

1 The Legislature should enact a Statement of Policy establishing information and education as a vital component of overall environmental protection, and commit funding to environmental stewardship and ground water information and education programs.

2 The Minnesota Environmental Education Board (MEEB) should establish a Water Resources Education Advisory Committee to coordinate the development and dissemination of environmental education information. This would include efforts related to ground water, pesticides, nutrients and overall environmental stewardship. The committee should be broadly based and should provide for input from state agencies, MnExt, the University of Minnesota and other educational institutions, and private and public specialists in education, information and technical fields. The committee's activities should be coordinated with those of the Environmental Quality Board (EQB), and should be performed consistent with EQB priorities and policies.

Specific tasks should include: 1) identifying informational needs; 2) seeking ways to obtain information; 3) ensuring that environmental/ health aspects of pest and nutrient management are integrated into educational programs; 4) ensuring that research is factored into educational materials quickly; and, 5) recommending deletion of obsolete materials.

3 The Water Resources Education Advisory Committee should develop and disseminate curriculum and in-service training for teachers at both the primary and secondary education level.

4 Education/training sessions should be conducted for all agencies' staffs on overall state and federal pollution control regulations. These should be offered on a regular basis as part of the state's training efforts, and should be part of the orientation program for new employees. Department of Employee Relations should work with appropriate state agencies to prepare these sessions.

Pesticide and Nutrient Management Recommendations

Issue

Improve and expand public educational and informational efforts. State agencies (including MDA, Pollution Control Agency (PCA), and Minnesota Department of Health (MDH)), federal agencies, local agencies (including counties and soil and water conservation districts), and the Minnesota Extension Service (MnExt) are actively involved in training efforts within the state. MnExt is the primary source of information and training for the public on pest control and nutrient management. By building upon and coordinating the work of these agencies we can improve and focus our efforts.

Recommendations

General Public Education and Information. Pesticides and nutrients are widely used throughout Minnesota on such areas as farms, lawns, lakeshore property, parks, forests, and highway and other rights-of-way. Broad-based general educational efforts are required in order to reach all potential users. Educational efforts should promote overall stewardship and sustainable agriculture; should focus on reducing and optimizing fertilizer and pesticide use and on alternatives; and should be updated regularly to reflect the most recent research and practice identification efforts. MDA, MDH and MnExt, in cooperation with the MEEB Environmental Education Committee, should expand general information and education efforts on fertilizer use and pest control. They should:

1 Develop general public information/education materials on safety precautions, overall environmental concerns, integrated pest management, and alternatives for such uses as advertising in farm journals, TV spots, billboards and pamphlets in stores.

2 Develop educational and informational materials, to be available for free at dealerships and stores and for display, to help users understand label restrictions and be aware of safety and environmental concerns and precautions, including information on products that have not been fully tested under current FIFRA requirements.

3 Increase risk communication efforts by developing materials to inform the public of the risk of exposure, comparative risks and risk avoidance techniques.

4 Foster development of courses and course materials on pest and nutrient management through such avenues as UM Continuing Education, Department of Conferences and Professional Development, and community colleges.

General education should also be fostered through continued legislative encouragement for establishment of the Sustainable Agriculture Chair or a Sustainable Agriculture Center at the University of Minnesota, and urging for the integration of sustainable agriculture principles throughout the university system, including MnExt and Experiment Stations.

Target Group/Issue Specific Education and Information. Significant responsibility rests with the user of a pesticide or nutrient in determining when, where and how to use a particular product, and how and where to dispose of any waste products and containers. The U.S. Environmental Protection Agency (EPA), in its *"Agricultural Chemicals in Ground Water: Proposed Pesticide Strategy"*, has suggested that as more restrictions on use of pesticides are developed relative to hydrogeologic sensitivity, users will be relied upon to determine when these restrictions apply. Any assistance that can be provided to users in making such decisions should benefit both the individual and the public at large. The following efforts should be undertaken in cooperation with the MEEB Water Resources Education Advisory Committee:

1 ***Develop and expand information systems and programs to assist pesticide and nutrient users.*** Efforts should be expanded to ensure that accurate and consistant information is available at the local level on recommended application rates and possible environmental impacts. This specifically includes:

A) Implementation of the soil laboratory certification program by MDA;
B) Requiring that information on the harmful results of mismanagement or overuse be included with all soil test results;
C) Encouraging completion and implementation of a system for providing landowners with pesticide and nutrient recommendations and information on hydrogeologic sensitivity through SCS and SWCD offices. SCS is currently developing a procedure through UM that will allow landowners to receive MnExt pesticide and nutrient recommendation through SCS and SWCD offices. This procedure should be completed and implemented.

In addition, the procedure should be expanded into an overall information system to provide landowners with information on hydrogeologic sensitivity. The system would assist landowners in determining if particular future product label restrictions, such as depth to water, apply to their situation, and in selecting best management practices.

The system should include such information as soils, depth to water, depth to bedrock, and presence of sinkhole and wells. It should be based

on integrated, automated data bases, and be compatible with existing data management systems. Methods of involving dealers and private organizations in such a system should also be explored. The effort should be cooperative and draw on PCA sensitivity assessments, UM and MGS hydrogeologic efforts, SCS systems development, and ARS modeling efforts. SPA should be involved in system design to ensure overall compatibility with existing data management systems.

System development should be pursued in priority areas identified through the state nonpoint source pollution control plan and pesticide management plan, and in conjunction with demonstration farms or watersheds.

2 ***Intensify promotion of soil and manure testing.*** The Minnesota Department of Agriculture (MDA) and MnExt should prepare promotional materials and conduct promotional campaigns to show the importance of soil and manure testing and encourage it as a routine practice. Campaigns should be conducted in conjunction with agricultural field days and county fairs and should be targeted to priority areas, as delineated in the pesticide management plan and nonpoint source pollution control plan, and to demonstration project areas. Effort should include providing information on the environmental and economic costs of having used amounts above recommended levels and providing tests at reduced rates.

3 ***Expand pest survey.*** Surveys undertaken by MDA and MnExt to determine the levels of pest populations and dissemination of information so that actions to control pests are taken at appropriate times are integral to an effective integrated pest management (IPM) program. While these efforts received increased funding through the '88 legislative session, consistant sustained funding is required. Necessary efforts should be delineated in the state IPM Approach, recommended in Initiative III, and should be coordinated and integrated with efforts of private pest consultants.

4 ***Develop informational brochures on disposal and handling.*** MDA, PCA and MnExt should cooperatively develop brochures for the various container types covering the regulations and procedures which apply to pesticide and container storage, handling and disposal, and the options users have in complying with those regulations. Emphasis should be placed on the environmental and economic problems associated with current pesticide and container disposal practices, and should include information on storage to prevent waste generation and contamination, disposal practices on private land, and triple rinsing. Brochures should be made available to pesticide users at time of sale and through MnExt offices. Brochures should also be distributed to landfill owners to increase awareness of triple rinse and disposal requirements.

5 ***Develop brochures for homeowner and urban users.*** MnExt, in cooperation with MDA and DNR, should develop informational materials directed specifically at homeowner and urban users of pesticides and fertilizers. Materials should emphasize safety, disposal, alternatives, and potential environmental impacts, including lake eutrophication. Materials should be made available to municipalities for distribution through water bills and other local mailings, and to state and local agencies.

6 ***Develop informational materials on alternatives and sustainable agriculture.*** MnExt should develop additional materials on alternatives for agricultural, home and other uses of pesticides. These should include organic agriculture, gardening and landscape maintenance, and sustainable agricultural systems. Materials should be updated regularly based on research results.

7 ***Develop a water quality assessment system.*** Efforts are currently underway within the PCA, USDA and MnExt to evaluate or devise ways to evaluate the water quality impacts of management practices. The Center for Agricultural Impacts on Water Quality should promote and coordinate these efforts to finalize and implement a water quality assessment system for evaluating practices. The system should be based on existing models and should be used by SCS and SWCD personnel in developing conservation plans, evaluating practices, and working with landowners to upgrade conservation plans. Emphasis should be placed on application in priority areas and demonstration projects.

Issue

Expand and enhance training programs and requirements. Training programs are established by MDA, in cooperation with MnExt, to ensure that users of pesticides in the state maintain a sufficient level of competency and ability to use pesticides properly and safely. Commercial applicators of pesticides, dealers of bulk and restricted use pesticides and other applicators of restricted use pesticides are required to attend these training courses, or to demonstrate competency through examination. Training courses and examinations are not required for users of general use pesticides. These training programs offer an important opportunity to educate users of pesticides on the latest information on risks and environmental impacts.

In addition, the numerous rules and programs that impact or influence pest and nutrient management are contained within different agencies and different divisions within agencies. In order to serve the public and promote sound management, agencies' staffs must be informed on overall rules, programs and findings.

MDA and MnExt training efforts should be coordinated with the MEEB Water Resources Education Advisory Committee.

Recommendations

1 ***Enhance and expand training and certification requirements.*** MDA, through its ongoing responsibility, should improve the content requirements of applicator and dealer training courses. Improvements should be developed in cooperation with MnExt, PCA, MDH and other appropriate agencies, and should emphasize environmental and health aspects of pesticide use and alternatives, including information on products that have not been fully tested under current FIFRA requirements.

Possible improvements to consider should include: 1) providing for regional differentiation of training courses; 2) more rigorous testing; 3) developing ground water training modules focusing on vulnerable sites; 4) pesticide and fertilizer application through irrigation systems; and, 5) increasing emphasis on integrated pest management, disposal and storage.

Voluntary training courses and workshops should also be developed for individuals not requiring certification.

2 ***Enhance cooperative workshops.*** MDA and MnExt should enhance their cooperative workshops and training programs for pesticide users and dealers by involving other state, local and federal agencies, crop consultants, and the chemical industry in course design.

3 ***Conduct inter-agency workshops.*** The MDA and MnExt, in cooperation with other appropriate agencies, should sponsor joint training workshops throughout the state on pest and nutrient management to ensure that staff from all relevant agencies are providing the most up-to-date information to clients.

Issue

Institute and expand on the use of demonstration projects as a direct method to promote

change. Demonstration projects provide an important addition to general educational efforts. They provide the means for the individual to personally gain from the experiences of others, thus eliminating some of the reluctance toward adoption of new practices. Due to the diverse physical and environmental character of the state, results of projects from one area cannot always be transfered to other parts of the state. Consequently, projects are needed in many different locations. Current demonstration efforts of MnExt, USDA-ARS and others have proved beneficial, and should form the basis for expanded efforts. Efforts here should be tied to the current grant program for sustainable agriculture discussed under financial incentives.

Recommendations

1 ***Establish demonstration farms and demonstration watersheds.*** The Board of Water and Soil Resources (BWSR) and MDA, in cooperation with the University of Minnesota and the MEEB Water Resources Education Advisory Committee, should promote the establishment and publicizing of farm-based and watershed-based demonstration projects on best management practices for water resource protection including practices for optimizing chemical use, reduced chemical use, alternatives to chemical use or added nutrients and sustainable agriculture. These must be coordinated with the demonstration project efforts of MnExt, ARS and PCA Clean Water Partnership, and must draw upon their expertise for project design and evaluation and communication of results.

Demonstration farms and watersheds should: 1) be pursued first in the priority areas identified through the state nonpoint source pollution control plan and pesticide management plan; 2) stress the overall environmental and economic costs and benefits; and, 3) be based upon comprehensive soil and water conservation farm plans.

As part of the educational efforts carried on in conjunction with demonstration farms and watersheds, the state should pursue subsidizing well-water analyses for area residents. This would be used to make residents more aware of how their practices may be impacting their own wells. Tests should be conducted at state certified laboratories.

2 ***Expand research-based demonstration plots.*** The Center for Agricultural Impacts on Water Quality, in cooperation with other departments of the University of Minnesota, USDA-SEA, MDA and other appropriate agencies, should expand research-based plot studies to document risks and benefits of different approaches to pest and nutrient management. Efforts should be pursued at established experiment stations and research sites, and results should be routinely conveyed to the public.

3 ***Establish ties between demonstration projects.*** Demonstration projects are currently being conducted by several private organizations as well as state and federal agencies. In addition, projects are ongoing in other states that could provide beneficial information for Minnesota. BWSR and MDA, in cooperation with MnExt, should work to establish ties between private and public demonstration projects and between Minnesota projects and those of neighboring states in order to derive the maximum benefit. These efforts should also be tied with recommended efforts to coordinate research.

Issue

Promote better data coordination, dissemination and information management. Data of value in pest and nutrient management are gathered by various state, federal and local agencies as well as through research efforts. Management efforts within Minnesota could benefit by improving access to these data and by coordinating efforts prior to monitoring to promote efficiency and ensure compatibility of techniques.

Recommendations

1 ***Develop a data management system.*** The Environmental Quality Board (EQB), through the Systems for Water Information Management Committee, should continue to facilitate development of interagency data management systems for handling water quality data including data on the occurrences of pesticides in water resources. The system should include federal, state, local and university efforts and address accessibility to all parties. The system must be tied with overall data management systems through EQB, as recommended in the *"Minnesota Ground Water Protection Strategy"*.

2 ***Evaluate data systems.*** Different computerized data systems are used by the various agencies that gather and maintain information that could be used for pest and nutrient management. This includes information on soils, hydrogeology, and land use and management. In order for this information to be readily available, the data systems must be compatible. SPA should evaluate the computerized data systems in use by federal, state and local governments and make recommendations regarding uniformity.

3 ***Promote information repository.*** Efforts are being conducted at the federal level and in other states that could provide data of use to Minnesota in its pest and nutrient management efforts. Keeping abreast of these efforts, however, is difficult and time consuming. SPA should explore the possibility of EPA serving as a repository for and distributor of this information. Local repositories are also needed and ties of local information/data to the rest of the system.

An information repository on education materials, resources and speakers is also needed. Development of such a system should be explored by the MEEB Water Resources Education Advisory Committee.

Issue

Develop financial incentives. Pest and nutrient management activites primarily involve actions of individuals on private land. One way to influence these actions is through providing cost-sharing, loans or other financial incentives. These incentives are provided to ease the transition to new management practices, and to encourage or reinforce appropriate activities.

Incentives and financial assistance are also needed for proper well abandonment and are addressed in the *"Minnesota Ground Water Protection Strategy"*. Efforts in this area will benefit pesticide and nutrient contamination efforts.

Recommendations

The state should encourage sound pest and nutrient management, including manure management and protection of water sources through direct cost-sharing with landowners/users for water resource protection best management practices. Such cost-sharing should be concentrated in and coupled with demonstration farms and watersheds and priority areas, as identified through the nonpoint source pollution control plan and pesticide management plan. Specifically, the state should:

1 Retire areas for water quality purposes through purchase or long-term easements. This should be pursued by adding ground water protection as an eligibility consideration under the Re-Invest in Minnesota Program.

2 Develop pest and nutrient management and ground water protection practices for use in state erosion and water quality cost-sharing programs, including the Clean Water Partnership. These should include consideration of startup cost-sharing for adoption of integrated pest management (IPM) practices for use in the state's programs (similar to startup cost-sharing for establishment of conservation tillage).

Cost-sharing would cover such activities as scouting for pests. Practices should be developed and revised to reflect the latest research findings on water quality protection.

3 Continue grant and loan programs for sustainable agriculture with an overall environmental protection emphasis. Current programs funded in the 1988 legislative session for MDA and the Agricultural Utilization Research Institute should be continued. Interest-share loan programs should also be considered for necessary equipment purchases.

In addition, the state should encourage the establishment of cost-sharing similar to those mentioned above within existing federal Agricultural Stabilization and Conservation Service cost-share programs.

Initiative II

To enhance the current body of knowledge of pesticide and nutrient contamination problems, prevention practices and alternative management approaches.

Current efforts to prevent contamination are hampered by information gaps. These include lack of information on the extent, nature and magnitude of contamination problems, lack of accurate data on pesticide use, and needs in the area of basic research on the actions of contaminants in the environment. In addition, further identification is needed of management practices that both achieve pest and nutrient management and environmental protection goals.

Overall Environmental Protection Recommendations

Research and monitoring are currently being conducted by numerous educational and governmental entities. While the focus and intent of these efforts may often be different, all parties could gain by coordinating efforts, having better access to each other's results and exchanging information on areas within their respective disciplines regarding future needs. Recommendations of the *"Minnesota Ground Water Protection Strategy"* address this need.

Recommendations

1 ***Develop and implement a coordinated statewide monitoring plan.*** The EQB should coordinate development of a statewide interagency ground water monitoring plan, with biennial reports on the nature and quality of ground water in the state and recommendations for modification of the monitoring plan.

2 ***Establish an interagency and academic technical committee.*** EQB should establish an ongoing inter-agency and academic committee to identify research priorities; to examine practices and needs for state regulatory programs; and to disseminate research results through existing channels such as Minnesota Extension and MDA certification and training programs. This effort should be coordinated with and provide input to the efforts of the university, such as those of the Water Resources Research Center, Limnological Research Center, and Center for Agricultural Impacts on Water Quality, and research funding entities, such as the Legislative Commission on Minnesota Resources (LCMR) and dedicated research funds.

The committee should also work to foster

coordination of research efforts between neighboring states, and discussion and exchange of research ideas and findings. The committee should be combined with the Ground Water Technical Committee recommended in the Ground Water Protection Strategy.

3 Accelerate resource evaluation efforts. Aquifer studies are needed to accelerate delineation of aquifers and to determine aquifer characteristics. This information is vital to such efforts as pollution investigations and cleanups, design of monitoring systems, tailoring of pesticide training to local conditions and making land use decisions.

Pesticide and Nutrient Management Recommendations

Issue

Monitoring. Information from monitoring efforts forms the basis for our understanding of the scope of water resources problems and trends in those problems. The soundness of decisions and actions and the degree to which public health and water resources are protected are directly related to the soundness of the data used. Although various state and local agencies monitor for pesticides and nutrients, the monitoring is limited. Minnesota has no interagency, coordinated monitoring program which tests for pesticides, pesticide breakdown products, and nutrients on a regular basis. Efforts must be increased and coordinated if sound information for decision making is to be obtained.

Recommendations

1 ***Develop and implement a coordinated monitoring program.*** As part of the efforts to develop an overall ground water monitoring plan, the EQB should facilitate development of a coordinated inter-agency monitoring program which tests for pesticides, pesticide breakdown products and nutrients on a regular basis. At a minimum, the following major monitoring programs should be considered:

A) Ambient ground and surface water monitoring for pesticides should be conducted to establish water quality baselines and trends.

B) Public drinking water systems should be monitored for pesticides and pesticide breakdown products on a regular basis.

C) Selected private drinking water wells should be monitored for pesticides and pesticide breakdown products. While fiscal resources are not available to sample all of the estimated 300,000-400,000 private wells in the state, private wells located near known or suspected pesticide contamination sites should be sampled. In addition, certain private wells should be selected for sampling based on representative conditions, such as source aquifer, well depth/construction, soils or hydrogeological conditions, area pesticide use, land use, geographic location, intended water use, etc. Some private wells should also be randomly selected and sampled.

D) Soil and ground-water monitoring efforts should be increased near bulk pesticide storage and handling facilities, especially those facilities with historically poor handling practices which are located in hydrogeologically sensitive areas. Partial responsibility for this monitoring should be born by the facility.

E) Intensive, area-specific pesticide monitoring should be conducted with special emphasis on hydrogeologically vulnerable areas with potential contaminant sources. Joint industry/state pesticide monitoring studies should also be pursued.

F) Fish tissue, aquatic impacts, soil and unsaturated zone monitoring should be conducted for commonly used pesticides in Minnesota.

G) Monitoring of water quality in areas of state uses of pesticides, including highway, forest, and park applications.

2 ***Develop laboratory procedures.*** Analyzing for pesticides can be difficult, due to the procedures involved and the dilute nature of the sample, and can yield erroneous results. Public and private laboratory capabilities must be improved for detecting trace amounts of commonly used pesticides and their breakdown products. MDH and MDA should work jointly with the University of Minnesota to develop standard laboratory procedures for use in Minnesota through the MDH Laboratory Certification Program.

3 ***Enhance pesticide use information.*** Pesticide use surveys were conducted in Minnesota from 1962 through 1984 by the Minnesota Agricultural Statistics Service. These surveys yielded crop-specific acreage treated with major pesticides on a statewide basis. No county or sub-county data is or was available, and no quantification of urban use has been made. Accurate pesticide use information is needed to effectively and efficiently target water quality monitoring efforts.

MDA should pursue the gathering of accurate pesticide use information through a statistically designed pesticide use survey aimed at major crops and substate units. Additional more detailed surveys may be necessary in priority areas. Such a survey must be conducted on established intervals and must be coupled with separate efforts to gather information on urban uses and speciality crop uses. In addition, state government uses should be routinely compiled. Data management systems should be compatible with existing state systems so that information is readily available for other state agency and local water planning efforts.

Issue

Increase efforts to identify best management practices. Efforts to identify alternatives to current pest and nutrient management practice must be increased in order to promote preventative actions and minimize disruption if practice modifications are necessitated by contamination. Our goals should be to identify economically feasible management practices which: 1) maximize efficiency of uptake and use; 2) minimize leaching, runoff and water quality impacts; and, 3) employ nonchemical approaches. Efforts here to evaluate and identify management practices must be coupled with the recommended basic research including that related to site vulnerability, transport and fate of pesticides and breakdown products, and effectiveness of management practices for ground and surface water quality protection. Further, the practices should be evaluated in conjunction with the recommended demonstration projects, so that they are tailored to local conditions. Research on alternatives should be encouraged within the university system and U.S. Department of Agriculture, and should be an integral part of MDA and PCA efforts to identify management practices to prevent contamination. In addition, evaluation of existing practices is needed in order to ensure that they are compatible with ground water protection.

Recommendations

1 ***Support biological control and establish biological control agents.*** The state, through MDA, should continue the long-term process of establishing effective biological control agents. Biological control can offer an alternative means of pest control. MDA is currently developing a biological pest control program, with the assistance of the University of Minnesota and a grant from the Legislative Commission on Minnesota Resources; however, continued funding is necessary. The state should provide consistant, sustained support for establishment of the biological pest control organism laboratory and program, in order to increase our pest control options. This effort must include evaluation of impacts of control on the food chain and of costs.

2 ***Enhance IPM research.*** Additional research on integrated pest management techniques is needed, specifically with regard to Minnesota applications. These include research on alternative management strategies relative to weed threshold levels, cultural weed controls, effective green manure crops for Minnesota, and efficient crop rotations.

3 ***Increase research on alternatives.*** Increased emphasis should be directed toward chemical free farming, reduced chemical farming, and alternatives to current uses and use patterns for pesticides and nutrients. Research goals should be oriented toward maximizing profits versus yields and protecting resources. The research needs identified in the 1980 USDA *"Report and Recommendations on Organic Farming"* should be reviewed and pursued as appropriate.

4 ***Evaluate existing practices.*** Some existing practices were not developed with pesticide use and water quality impacts in mind. These practices should be evaluated to ensure that impacts on water resources are positive or neutral. The state should neither fund nor promote practices with negative water resources impacts. Application rates for pesticides and fertilizers through irrigation systems should also be reviewed, as should rinsate recycling systems and other spill prevention techniques.

Issue

Continue and enhance research efforts. Many questions remain to be answered concerning the actions of pesticides and nutrients in the environment. Further research in the area of basic environmental processes is needed in order to develop wise, informed management recommendations.

Recommendations

1 ***Conduct needed research.*** Basic research is needed to resolve questions related to:

A) The transport and fate of pesticides and nitrate-nitrogen in the environment, including transport processes in soil and nonaquifers;
B) Formation, transport, and health/environmental effects of breakdown products;
C) Cumulative and synergistic health/environmental effects;
D) Pesticide and breakdown product leaching characteristics and mechanisms;
E) Aquatic impacts;
F) Site vulnerability;
G) Effectiveness of management practices for ground and surface water quality protection;
H) Refinement of pest damage thresholds; and,
I) Development of more accurate techniques for assessing nitrogen content of soils.

2 ***Increase funding and water quality assessments.*** State agricultural research funding should be increased to ensure that the research priorities and needs of the state are met. The state should encourage the incorporation of water quality components in appropriate research and require that a water quality impact assessment be incorporated into each research project which receives state funding, as appropriate.

Initiative III

To enhance preventive planning, corrective actions and regulatory efforts.

Pesticide and nutrient contamination of water resources is regulated through the provisions of the state Pesticide Control Law and other state laws dealing with waste disposal, storage, pollution control, and water use. In addition, numerous state, federal and local programs directly or indirectly impact pesticide and nutrient contamination. Our ability to manage pesticide and nutrient use and prevent or mitigate impacts on water resources could be greatly enhanced through better coordination and direction of existing programs, application and modification of existing statutes and rules, and more aggressive enforcement and implementation efforts. In addition, existing statutes and rules should be reviewed regularly in order to identify those that have become outdated and to recommend changes.

Overall Environmental Protection Recommendations

In addition to efforts directed specifically at pest and nutrient management, pesticide and nutrient contamination of water resources can be prevented or minimized through overall environmental protection efforts and the ground water protection efforts recommended in the state's *"Ground Water Protection Strategy"*. Specific recommendations include:

Recommendations

Goals and Priorities for Water Quality Protection

Pesticide and nutrient contamination issues can be addressed through overall efforts to achieve the nondegradation goal for our water resources and enforce standards and guidelines in dealing with existing and proposed pollution sources and contamination. Specific recommendations of the *"Ground Water Protection Strategy"* should be supported and expanded as they relate to pesticide and nutrient contamination issues, and existing rules governing the protection of the quality and purity of the waters of the state should be enforced.

1 Adopt a nondegradation goal for prevention of pesticide and nutrient contamination. Nondegradation, meaning the prevention of further contamination, should be the policy goal of the state in dealing with potential sources of pesticide and nutrient contamination. This means that impacts should be prevented to the

maximum extent practicable. While further contamination cannot currently be prevented in all situations of pesticide and nutrient use today, having nondegradation as the state's goal will provide the impetus for the continued development and refinement of management practices which protect water resources. All state efforts, including research, management practice development and programs should be geared toward this goal. As we strive to develop and implement ever better management practices that both protect our water resources and achieve our pest control and nutrient management needs, we will come ever closer to achieving our nondegradation goal.

2 Adopt health and environmental protection numerical limits. Numerical limits are needed to serve as the upper limit on the allowable impacts of practices in those situations where impacts cannot currently be avoided. Practices which cause impacts greater than the numerical limits would not be allowed. Limits are also needed to serve as goals for cleanup actions. The PCA should establish criteria which would be used to develop ground water numerical limits, and adopt specific numerical limits as appropriate. Limits should be based on impacts to human health, aquatic life and wildlife, and should be incorporated into existing programs. Information already available, including federal drinking water standards and health advisories, should be used to the maximum extent possible in determining numerical limits. These limits, together with the standards and criteria developed for human health, aquatic life and wildlife protection in surface waters, should be used to define "unreasonable adverse effect on the environment" in the state's Pesticide Control Law.

Drinking Water Protection

Ground water serves as a drinking water source for the majority of Minnesotans. However, if not properly constructed, these same wells that extract ground water can provide pathways for pollutants on the surface of the land to enter our aquifers. They can also allow for the transport for pollutants between aquifers. Enhancement of efforts to ensure that wells are constructed, maintained, and abandoned properly, will help keep all pollutants out of our aquifers, including pesticides and nutrients. Protecting the land areas where surface infiltration provides the recharge waters for our aquifers is also important.

1 Water Supply Planning - MDH should develop a state Wellhead Protection program, where the recharge areas of public water supply wells are delineated and special protective land use restrictions enacted.

2 Enforcement of Water Well Contruction Code - Enforcement should be enhanced through increasing MDH enforcement staff and regulatory authorities, and through delegation agreements with interested counties.

3 Sealing of Unused Wells - A program for inventorying and sealing unused, unsealed wells should be developed to demonstrate the effectiveness of a county government program.

4 Wells and Property Transfers - Registration on the property deed of all drilled wells should be required at the time of property transfer.

5 Local Assumption of the Water Well Construction Program - Counties should be encouraged to adopt water well programs.

Development of Local Programs

Protection and prevention efforts often involve land use controls and individual actions that can most effectively be addressed at the local level. The state should promote local control efforts, including local water planning, wellhead protection, feedlot regulation, and water well code

enforcement. Local units of government also have a significant role in such areas as education, promotion of alternative management practices, evaluation and modification of their own activities and programs to incorporate ground water concerns, monitoring, and data automation, and should be encouraged in pursuing these efforts. The BWSR should establish a grant mechanism through the counties which would help local governments develop and implement environmental programs to address problem areas identified in the comprehensive local water planning process.

Such local efforts must conform to state guidelines and regulations, and not duplicate existing fee structures. In addition, state review and monitoring of such efforts will be necessary to ensure adequacy and conformity.

Pesticide and Nutrient Management Recommendations

Issue

Develop a state pesticide management plan. In order to be used within Minnesota, a pesticide must be registered with the Environmental Protection Agency (EPA) and the state Department of Agriculture (MDA). Through the state Pesticide Control Law, MDA has the authority to approve, deny, cancel or impose state use restrictions on a pesticide. In addition, MDA may specifically take actions necessary to prevent pesticide contamination of ground water.

EPA has suggested, in its *"Agricultural Chemicals in Ground Water: Proposed Pesticide Strategy"*, that states take a more active role in determining necessary actions to protect ground water from pesticide contamination through development of state management plans. EPA has further suggested the possibility of federally imposed state product bans for states deciding not to prepare such plans. The plan would guide Minnesota's efforts in preventing and responding to pesticide contamination, including those relating to the development and imposition of Minnesota use restrictions.

Recommendations

1 ***MDA should develop a State Pesticide Management Plan.*** MDA should develop a management plan for the protection of surface and ground water which is both prevention oriented, delineating what to do to foster nondegradation, and action oriented, delineating what to do when problems or issues arise. The plan should be framed around the concept of nondegradation and the policies and direction of this strategy, and should include:

A) Designating special protection areas where more stringent protection measures are required. Areas should be designated based on PCA's delineation of hydrogeologic sensitivity and nonpoint source problem areas, MDH's delineation of wellhead protection areas, and levels of pesticides detected in water.

The plan should specify actions to be taken within the special protection areas by federal, state and local entities. These should include increased educational efforts, increased compliance inspections, including of private applicators' storage and disposal operations and application equipment, identification of necessary buffer zones for protection of water resources and the public, and increased enforcement efforts.

B) Initiating specific management plans for a pesticide following detection. Criteria for triggering a response should be developed that distinguish between sporadic detections and patterns. Actions taken should be commensurate with the severity of the problem.

C) Delineating the roles of federal, state and local governments. The roles of government entities and ties with other programs should be delineated, including the role of SCS and

SWCD's in applying farm planning standards. In addition, MDA should facilitate more effective working relationships between state resource agencies and local units by developing model state-local delegation agreements covering pesticide management.

2 ***Plan development should be coordinated through the EQB.*** The plan must be developed through the Environmental Quality Board (EQB) to ensure an interagency and interprogram focus and coordination with other state plans, particularly the state *"Ground Water Protection Strategy"*, state Nonpoint Source Pollution Control Plan and this strategy. In addition, environmental organizations, farm groups and industry should be involved in plan development.

Issue

Integrate pest and nutrient management and overall land stewardship and sustainable agriculture principles into existing government programs and planning efforts.

Many state, federal and local programs directly or indirectly impact the way pests and nutrients are managed. In order to ensure that the impacts of these programs are positive for pest control, nutrient management and water quality, the programs should be evaluated and modified as necessary. Programs should foster overall resource sustainability and land stewardship, to ensure that Minnesota's land and water resources continue to provide for a high quality of life and economic vitality.

Wise, responsible and reduced usage of pesticides and supplemental nutrients can be promoted by fostering the use of integrated pest management and integrated farm management or sustainable agriculture, together with the best management practices for water quality protection identified through our research efforts. With integrated pest management, ecological principles are combined with management techniques and biological and chemical control methods to maintain pest populations at tolerable levels. The IPM approach could potentially be applied to all pest control situations, from the city lawn to the northern forest. With integrated farm management or sustainable agriculture, long range, comprehensive planning is used in order to promote the viability of the entire farm system and its supporting community.

Recommendations

1 ***Foster overall land stewardship approach in government efforts.*** Programs and priorities at all levels have often been geared toward specific short-term problems or issues. The land stewardship approach, on the other hand, stresses long-term and overall impacts, cherishing our land and resources, and striving to leave them in a better condition for future generations. This approach is necessary for sound pest and nutrient management, and should be fostered by government. State agencies and local units of government should adopt an overall land stewardship approach in applicable plans, including the Pesticide Management Plan, the state Nonpoint Source Pollution Control Plan, and comprehensive local water plans.

The state should ensure that pest and nutrient management are built into new and ongoing programs, such as the Clean Water Partnership, the Community Health Services program, the Soil Loss Limits program, the Board of Water and Soil Resources (BWSR) Cost-Sharing Program, the feedlot control program, and the Wellhead Protection program. It should further ensure that research results identifing improved practices are regularly factored into all efforts.

Finally, government entities, such as highway and parks departments, universities, and state facility maintenance departments, should adopt Integrated Pest Management in their management programs, and should explore and adopt planting regimes that minimize the need for

pesticides.

2 ***Support continued development and implementation of the Nonpoint Source Pollution Control Plan.*** Development of a Nonpoint Source Pollution Control Plan is mandated by both the federal Clean Water Act and state statute. This plan is intended to identify priority areas and guide the efforts of federal, state and local agencies in preventing and correcting nonpoint source pollution problems. The EQB member agencies should work together with the PCA to ensure that the plan: 1) promotes the recommendations of this strategy and the *"Ground Water Protection Strategy"*; 2) is consistent with overall state policy and the State Pesticide Management Plan recommended to be prepared by the MDA; and 3) is used for program development, priority setting and local level plan development. In addition, the state should continue to support development, refinement and implementation of the plan.

3 ***Better integrate principles into SWCD plans.*** SWCD's should ensure that the policies and recommendations of this strategy, the *"Ground Water Protection Strategy"*, the Pesticide Management Plan and Nonpoint Source Pollution Control Plan are factored into their annual and long-range plans. Plans should contain a strategy to protect water resources from pesticide and nutrient impacts, should be based on sustainability principles and should be keyed to ground and surface watersheds or systems within the district.

4 ***Continue development of comprehensive local water plans.*** Comprehensive local water plans can be a valuable tool in delineating problems and priorities, and directing resources. Local governments should be encouraged to continue developing plan elements and updates necessary to:

A) Reflect and incorporate appropriate elements of the state's Nonpoint Source Pollution Control Plan and Pesticide Management Plan.

B) Guide soil and water conservation districts in setting priorities for cost-sharing and other resource protection programs.

C) Provide background information to help guide ASCS County Committee cost-share priorities.

D) Guide the development of MnExt county program plans.

5 ***Encourage USDA to adopt an overall sustainability focus.*** The state should encourage USDA to evaluate all of its programs with respect to: 1) impacts on water quality, pest and nutrient management, sustainable agriculture, and integrated pest management (IPM); and, 2) need for modifications, including adoption of pest and nutrient management practices. Best management practices for pest and nutrient management and water quality protection should be regularly evaluated and revised to reflect current research results. The state should work with USDA, private groups and our Congressional delegation to foster changes to federal farm legislation and programs to deemphasize production and promote sustainable principles.

6 ***Develop state IPM approach and state support for IPM efforts.*** Efforts to promote integrated pest management (IPM) are underway within MDA, MnExt, other agencies and the private sector. These efforts, however, are not guided by an overall state approach and therefore have not always received the priority warranted. MDA, in cooperation with EQB and the university, should develop an overall state approach or memoranda of understanding for the promotion of IPM which would delineate the roles of the state, the university, the extension service and the private sector; establish information and data exchange and integration systems; define a procedure for identifying research needs and reviewing and preparing informational materials; outline educational needs; and, include procedures for factoring IPM into all government uses of pesticides. Establishment of a state

certification program for crop consultants should also be considered.

Issue

Enhance state pesticide and nutrient control efforts. In most instances, existing state statutes provide the framework for pesticide and nutrient contamination control efforts. There are situations, however, where authorities are lacking or unclear, or program support is inadequate. Specific needs relate to irrigation regulatory programs, container and product disposal, spills, and aquatic nuisance control.

Recommendations

1 ***Expand and enhance irrigation regulatory programs.*** State law establishes authority for developing requirements for application of pesticides through irrigation systems, including the requirement of obtaining a permit from MDA. Such a permitting program does not exist for controlling the application of fertilizers through irrigation systems, even though this practice is more widespread and requires similar precautionary measures. The Department of Natural Resources (DNR) issues permits for the appropriation of water for irrigation and must consider in that process the impacts of the use of the water. To address these areas:

A) MDA should be authorized to develop requirements to control fertilizer applications through irrigation systems. This should be undertaken in cooperation with farm chemical industry, commodity grower's groups and irrigators association. Requirements should be distinct from those governing pesticide application through irrigation systems, and should be geared toward best management practices for protecting the environment.

B) DNR should develop agreements/procedures with MDA, PCA and MDH for reviewing, revoking and denying appropriations permits and requiring monitoring where ground water contamination is present or is a concern.

2 ***Improve container/product disposal practices and compliance.*** Options for managing the disposal of unused, unwanted or banned pesticides and empty containers are limited, difficult, and in some cases expensive. Disposal is governed by both waste and pesticide management rules, and liability is a major concern. Traditional disposal options which are widely used, such as burying at the farm site, disposal at sanitary landfills, and open burning, are becoming prohibited or unavailable.

Currently, the state is addressing some of these issues through PCA's Waste Pesticide Collection Pilot Project. Container issues are also being studied by MDA through an EPA grant. Based on results of these efforts to date, disposal practices and compliance for non-household waste pesticides and containers should be improved through:

A) Clean sweep program. Banned and canceled products, which are estimated by PCA to constitute 25 percent of current waste or about 133,000 gallons, should be collected through "clean sweep" programs.

B) Alternative disposal options. In order to deal with the remaining waste, alternative disposal options should be researched to determine the most promising options for the state. Options should then be field tested to determine limitations and necessary enhancements for full application.

C) Manufacturer return. Waste pesticides and container disposal problems could be greatly reduced through the use of either bulk or returnable containers with one-way valves, whereby the unused products are returned to dealers. Such an approach would minimize waste generation, take advantage of existing distribution systems, and require that users pay only for the amount of product actually needed. This should be pursued through

consideration of financial incentives in the form of a tax on pesticide products sold in non-returnable containers. The state should also consider prohibiting the sale of products in non-returnable containers by a specific date in the future.

D) Incentives for proper disposal. Other incentives for pesticide users to properly dispose of their wastes and containers should be pursued, particularly in priority or sensitive areas. These include: increasing enforcement of existing storage and disposal regulations; increasing research into practical waste reduction activities and providing tech-nical assistance on waste minimization; and, developing more effective education programs on the importance and specifics of proper disposal.

E) Container pickup. A pilot pesticide container pickup and recycling program should be initiated in cooperation with the agricultural chemical industry in order to identify the best container management option for Minnesota.

3 Enhance spills prevention and response efforts. The impact of pesticide and nutrient spills can be significant due to the volumes, types and concentrations of chemicals involved. Cleanup can be difficult, particularly in situations where leaks have gone undetected for long periods and in hydrogeologically sensitive areas, making prevention and early detection the most viable course of action. This objective can be met in the following ways:

A) MDA and PCA should evaluate the spills log to ascertain the causes of spills and develop better prevention programs.

B) MDA should increase surveillance/enforcement efforts at bulk storage facilities, including increasing inspection and developing procedures and criteria for determining when further requirements such as monitoring should be imposed.

4 Better ensure that aquatic nuisance control activities do not result in undesirable consequences. Pesticides are used in the management of the aquatic environment, most notably to control mosquitoes, blackflies and nuisance growths of aquatic plants. Use of herbicides to control aquatic plants in public waters is regulated through a DNR permit program in addition to the labeling and use requirements imposed by MDA. In recent years, the number of permit applications has increased to the point where timely review is difficult. Information on pesticide sales suggests that use without permits may be occurring. The permit fees have increased to the point where they may encourage illegal activity. This is particularly of concern in situations where the waters to which pesticides are applied are used for body contact recreation or for providing fish for consumption.

Mosquito and blackfly control is carried out on public waters primarily by the Metropolitan Mosquito Control District. There is increasing interest in nuisance insect control on public waters, primarily by resorts and local units of government.

A) Improve enforcement of permit requirements. DNR enforcement efforts must be improved in order to ensure that individuals are not applying pesticides to public waters without permits and that the necessary state review of permits takes place. This should be accomplished by increasing the level of effort and staffing assigned to the aquatic nuisance control program to ensure that all permits receive adequate review, on-site inspections and enforcement. In addition, information on requirements for permits should be posted and made available at places of sale and distributed with mail order products. The feasibility of requiring signatures by purchasers of aquatic herbicides should be investigated.

B) Clarify statutory language concerning state control over nuisance insect control operations. These control operations should be

subjected to adequate state agency review in order to ensure that overall state environmental and health protection goals are achieved. The Attorney General should review existing statutory language covering control activities and make recommendations for changes to clarify state review and/or permit requirements, especially on public waters.

Specific pesticides are approved by the EPA for use in managing the aquatic environment, most notably to control mosquitos and blackflies, and nuisance growths of aquatic plants. The use of these chemicals in public waters of Minnesota is regulated by the DNR through a permit program as set forth in Minnesota Statutes Section 84.092, Subd. 1, Part 3. Additionally, Section 18.121, Subd. 2 states that the commissioner shall approve or modify mosquito abatement plans to protect public water, animals and natural resources. It is unclear whether the statute authorizing the Metropolitan Mosquito Control District (MMCD) under Chapter 399 (repealed in 1975 and now found in Sections 473.701 to 473.71) supercedes or was intended to supercede review as put forth in Section 18.121.

The scope of section 84.092, Subd. 1, Part 3 is also subject to interpretation. Permits are clearly required for the control of nuisance aquatic plants, however, only an experimental permit has been issued to the MMCD for the control of blackflies in streams and rivers, and currently no permits are issued for mosquito control, the majority of which occurs in public waters.

A memorandum of understanding between MMCD and DNR is currently under development to address these concerns. Without clear permitting or review authority for the use of pesticides in public waters, state agencies cannot regulate or monitor the use of these chemicals.

C) *Better integrate aquatic plant and algae controls into overall lake management.* Addressing such control in the absence of overall lake management can result in solutions to one set of problems that actually cause additional problems. In addition, aquatic plant problems may be due to influxes of nutrients from the lake's watershed, and thus would return if the influxes themselves are not addressed. Evaluating a lake's needs based on overall management objectives and problem assessments would alleviate these concerns.

The legislature should establish the goal of requiring that control efforts be part of an overall comprehensive lake management plan. Such plans must take into account overall management objectives for the lake as well as problems within the watershed that preclude achievement of those objectives. Plans must be prepared by the DNR and should be consistent with comprehensive local water plans. DNR must provide for input of affected local units of government and interested parties in plan development. Specific requirements for comprehensive lake plans and the time frame for implementation should be established by DNR through the EQB Comprehensive Lake Management Policy to be completed in 1989. Control activities on lakes for which plans have not been developed would not be affected by this requirement.

Funding

Implementation of the recommendations of this strategy will require funding at both the state and local level. The precise amount of funding required will be dependent upon the level of program effort desired and the speed with which we wish to pursue the recommendations. For example, numerous recommendations could be pursued: 1) in designated high priority areas only; 2) uniformly statewide; or, 3) statewide with added emphasis in priority areas.

In addition, funding of the recommendations in the overall *"Minnesota Ground Water Protection Strategy"* are necessary for full realization of our protection goals for pesticide and nutrient use.

Regardless of the level of funding and effort desired, the following approaches to funding, which are based on the recommendations of the EQB Advisory Committee on Ground Water Protection, are recommended:

Stable program funding must be provided for monitoring, incentives, education, information, enforcement, and research. Past funding for environmental programs, including those associated with pesticides and nutrients, has been subject to instability. This has hampered efforts to evaluate and track problems, to provide adequate enforcement and education, and to maintain research efforts. If the state's pest and nutrient management efforts are to be improved, stable funding must be obtained.

The establishment of dedicated accounts for these efforts should be considered. This should include consideration of an overall water resources fund for specific program efforts, with allotments from the fund being made by the Legislature on a biennial basis.

Pesticide regulatory controls and enforcement efforts should be supported by fees. Fees and penalties associated with product registration and applicator and dealer licenses are currently levied through state Pesticide Control Law and credited to a pesticide regulatory account. Funds from this account are then made available for administration and enforcement of this law. This includes water quality monitoring to assist in enforcement and to assess the adequacy of regulations. This system of supporting the regulatory function through fees imposed on the regulated community should be continued. As increased funds are needed, changes in fee structures should be considered, such as basing fees on the amount of product sold.

Funding sources for overall, nonregulatoy efforts should be broad-based. Every user of water should pay the costs of general, statewide resource efforts, such as coordination, education, monitoring and research, since every user benefits. Taxes or broad-based fees should be used as the main source of funds for these efforts.

Fees further serve to influence behavior and underscore the relationship between specific activities and problems or benefits. Currently, pesticides and fertilizers used for producing products for retail are exempt from state sales tax. One option is to partially or totally eliminate this exemption so that all users of these products, urban and rural alike, contribute to overall efforts and are made aware of the connection between the use of such products and potential problems. A pollution control tax or fee that could be noted on products is another option.

Methods for funding cleanup efforts should be developed. The costs of cleanup of contamination and provision of alternative water supplies can be substantial, and in many cases may be higher than the person who was responsible for causing the contamination is able to pay. In addition, insurance coverage for pollution liability is virtually nonexistent for those businesses engaged in storing, handling or using pesticides and fertilizers. In other cases, persons responsible for the contamination may not be readily identifiable. This would particularly be the case with widespread contamination resulting from general use of pesticides and nutrients. Consequently, methods for dealing with the funding of cleanup and other remedial efforts and for enhancing insurablity must be identified in order to protect the state's water resources. Methods to be evaluated should include: 1) a pesticide superfund; and, 2) a reduced liability cleanup program similar to the Underground Storage Tank program.

Funding for pesticide and container disposal should be developed. Appropriate sources of funding for the clean sweep program, research efforts on alternative disposal options and the pilot container pickup/recycling program must be identified. In addition, funding needs and appropriate sources of funding for ongoing container and pesticide disposal efforts, including at the household level, should be identified.

Legislative Actions and Concepts

Implementation of this *"Strategy for the Wise Use of Pesticides and Nutrients"* will require actions on the part of the legislature, governmental units and agencies, industry, and individuals. While actions in some areas require new authorities, implementation primarily requires the commitment of resources and changes in our approach to both our water and land and our use of pesticides and nutrients.

Overall Environmental Protection Recommendations

The recommendations and legislative actions of this strategy are intended to complement and build upon those of the *"Minnesota Ground Water Protection Strategy"*. In many cases, implementation of the ground water recommendations is crucial to the success of any efforts to protect water resources from pesticide and nutrient contamination. Critical legislative actions include:

1 ***Prevention of Contamination*** - The legislature should: 1) adopt nondegradation as the water resource protection policy goal of the state in the regulation of all potential sources of contamination; 2) support the promulgation of criteria for the development of numerical limits to serve as the upper limit for activities and a goal for cleanups; and, 3) acknowledge the need for applying special protection measures in sensitive areas and authorize the development of criteria defining sensitivity.

2 ***Drinking Water Protection*** - The legislature should: 1) direct MDH and DNR to work more closely with public water utilities in water supply planning; 2) direct MDH to develop guidelines for wellhead protection; 3) require registration of all domestic wells at the time of property transfer; 4) develop a program to demonstrate the effectiveness of counties in dealing with the issue of unused, unsealed wells; and, 5) increase MDH staff and regulatory authorities for water well code enforcement.

3 ***Ground Water Information and Education*** - The legislature should enact a statement of policy establishing information and education as vital components in water resource protection programs, and should fund: 1) MEEB for overall coordination of water resource education efforts and development and dissemination of

curricula; 2) state agencies for dissemination of information on programs and resources; 3) Mn-Ext for specific information for target groups on impacts of activities and alternative practices; and, 4) EQB for information exchange and training for decision-makers.

4 ***Enhancement of Local Government Participation*** - The legislature should: 1) establish a grant program to help local governments develop and implement environmental programs and local water plans; 2) encourage counties to assume responsibility for the water well construction program through assumption of state permit fees; and, 3) provide state agencies with funds necessary for the technical assistance staff to aid local governments.

5 ***Water Resource Evaluation, Monitoring and Research*** - The legislature should increase funding for: 1) accelerated delineation of aquifers and determination of aquifer characteristics; 2) baseline monitoring to determine existing, background ground water conditions; and, 3) EQB establishment and administration of an interagency and academic technical committee. The legislature should further require that data be managed electronically in a format compatible with other state data collections and that the EQB Water Resources Committee coordinate preparation of the statewide interagency monitoring plan and biennial publication of results.

Pesticide and Nutrient Management Recommendations

In addition to the legislative action for overall environmental protection, specific legislative actions are needed related to pesticides and nutrients in order to implement this strategy. They include:

1 ***Statement of Legislative Intent*** - The legislature should endorse the policy directions of this strategy as the appropriate direction for Minnesota to take in protecting water resources from contamination due to the use of pesticides and nutrients.

2 ***Information, Education and Incentives*** - The legislature should provide increased funding for: 1) expanded general information and education efforts on fertilizer use and pest control and impacts on water resources; 2) informational materials on disposal, handling, home and urban uses, alternative management practices, and sustainable agriculture; and, 3) workshops and other training opportunities for users. Stable funding for surveys of pest populations should also be provided.

The legislature should also provide funding for development and expansion of information systems and programs for pesticide and nutrient users, to ensure that accurate and consistant information is available at the local level on recommended application rates and possible environmental impacts. Funding should also be provided for the continued development of data management systems.

The legislature should provide increased funding for demonstration projects, including farm, watershed and plot studies on best management practices for reduced chemical use, alternatives and sustainable agriculture.

Finally, the legislature should provide increase funding for incentives and cost-share efforts. This should include continuation of grants and loans for sustainable agriculture; adding funds for cost-sharing for pesticide and nutrient management and ground water protection practices to existing erosion and water quality cost-share programs, and providing funds and eligibility for ground water protection under the Re-Invest in Minnesota Program.

3 ***Resource Evaluation and Research*** - The legislature should provide funding for regularized surveys of pesticide use in the state, and

require that these be conducted and the results compiled, together with information on state government uses.

The legislature should further provide funding for monitoring of pesticides and nutrients in the environment, and ensure that the necessary funds are available for the development of standard laboratory procedures for sample analysis.

The legislature should also provide funding for: 1) continued biological control efforts and establishment of biological control agents; 2) research on integrated pest management and alternatives to current pesticide use practices; 3) evaluation of existing practices; and, 4) basic research efforts.

4 ***Preventive Planning and Regulatory Efforts*** - The legislature should require and fund preparation of a State Pesticide Management Plan to guide state efforts in preventing and responding to contamination. The legislature should further require that a state approach to the promotion of integrated pest management be developed, and support implementation of the approach.

The legislature should urge adoption of an overall land stewardship approach in all government efforts and programs, and require the use of integrated pest management and planting regimes that minimize the need for pesticides and nutrients by state government. The legislature should further urge the federal government and congress to incorporate resource sustainability and protection into federal farm programs and amendments to the federal farm bill.

The legislature should authorize: 1) eslablishment of a program to regulate the use of fertilizers in irrigation systems; and, 2) a waste pesticide "clean sweep" program, incentives for use of returnable containers,and development of alternatives for waste pesticide management. Finally, the legislature should clarify the statutory intent regarding aquatic nuisance control permitting requirements, increase funding for overall aquatic nuisance control enforcement efforts, and establish the goal of having all lake management activities be guided by comprehensive plans.

5 ***Funding Mechanisms*** - The legislature should ensure that stable funding mechanisms are provided for strategy implementation. They should reaffirm the use of fees to support administration and enforcement of the Pesticide Control Law, and should ensure that all persons who benefit from the use of pesticides and nutrients contribute to the costs of protection efforts by considering taxes or fees on products and non-returnable containers. Finally, they should consider funding mechanisms for cleanup efforts and disposal of waste products and containers.

Appendix A: Abbreviations and Definitions

ASCS	USDA Agricultural Stabilization and Conservation Service
BWSR	Minnesota Board of Water and Soil Resources
EQB	Minnesota Environmental Quality Board
EPA	U.S. Environmental Protection Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
IPM	Intergrated Pest Management
LCMR	Legislative Commission on Minnesota Resources
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
DNR	Minnesota Department of Natural Resources
MnExt	Minnesota Extension Service
MPCA	Minnesota Pollution Control Agency
SCS	USDA Soil Conservation Service
SWCD	Soil and Water Conservation District
USDA	United States Department of Agriculture

Integrated Pest Management

Integrated pest management, or "IPM," means use of a combination of approaches, incorporating the judicious application of ecological principles, management techniques, cultural and biological controls and chemical methods, to keeping pests below levels where they do economic damage to crops.

IPM is an approach which emphasizes use of natural pest controls. It stresses finding and

taking advantage of the weak links in life cycles of pests. It utilizes man-initiated actions only when it is likely that a pest population will causeeconomic losses. This requires regular field scouting of pests, maintaining conditions which are unfavorable to pests, and routine analyzing of potential pest problems, based on knowledge of each pest and its natural enemies.

Pesticides may be used in IPM, but only after systematic monitoring of pests and consideration of other control factors indicate a need. The point is not to completely eliminate pests, but rather to keep them below the threshhold where they do economic damage.

Sustainable Agriculture

Sustainable agriculture is agriculture designed to be self-reliant, resource-conserving and productive in both the short and long term. To be sustainable, agriculture must be ecologically sound and economically viable, taking into account hidden costs such as those associated with ground water contamination. It also must recognize social values like the need for fair wages, a safe working and home environment, and stewardship of the land. Sustainable agriculture must be tailored to each locality.

Land Stewardship

An approach to the management of our lands which recognizes that the same land that is now in one person's care will soon pass on to the care of others, and that the present owner, therefore, has a responsibility to society for the way the land is used and the care it receives. This approach acknowledges the need to leave land in as good or better condition as when received, and to manage land in such a way as to assure that it will continue to provide benefits over the long run.

Appendix B: Bibliography

1. American Farm Bureau Federation, National Agricultural Aviation Association, National Agricultural Chemicals Association, USDA Extension Service, *"Protecting Our Groundwater: A Grower's Guide"*.
2. The Association of Ground Water Scientists and Engineers. *"Agricultural Impacts on Ground Water - A Conference"*, Des Moines, Iowa. March 21-23, 1988.
3. Bosch, H.M., Rosenfield, A.B., Huston, Roberta, Shipman, H.R., Woodward, F.L., *"Methemoglobinemia and Minnesota Well Supplies"*, Journal of American Water Works Association. Vol. 42, No. 2, February 1950.
4. The Bureau of National Affiars, Inc., *"Pesticides: State and Federal Regulations"*, (49 BSP-75), Rockville, Maryland. 1987.
5. The Center for New Democratic Processes, *"Final Report of the Citizens Panel on Agriculture and Water Quality"*, Minneapolis, Minnesota, January 1985.
6. Environmental and Energy Study Institute, *"A Congressional Agenda to Prevent Groundwater Contamination: Building Capacity to Meet Protection Needs"*, Washington, D.C. October 23, 1986.
7. Fleming, Malcolm H., *"Agricultural Chemicals in Groundwater: Preventing Contamination by Removing Barriers Against Input Farm Management"*, December 1987.
8. Gianessi, Leonard P., *"A National Pesticide Usage Data Base"*, Resources for the Future, Renewable Resources Division. Washington, D.C. February 1986.
9. Gianessi, Leonard P., *"Patterns of Pesticide Use in the United States: Results from the RFF National Pesticide Use Inventory"*, Resources for the Future, Renewable Resources Division. Washington, D.C. August 5, 1987.
10. Gianessi, Leonard P., *"Text of Briefing on National Pesticide Usage"*, Resources for the Future, Renewable Resources Division. Washington, D.C. August 5, 1987.
11. Gianessi, Leonard P., Puffer, Cynthia A., *"Use of Pesticides on Cropland in Two Minnesota Counties"*, Resources for the Future, Renewable Resources Division. Washington, D.C. February 1987.
12. Gips, Terry, *"Breaking the Pesticide Habit: Alternatives to 12 Hazardous Pesticides"*, International Alliance for Sustainable Agriculture. No. 1987-1, June 1987.

13. Health & Environment Digest, Health and Environment Network, *"Nitrate: Rerun of an Old Horror"*, Vol. 1, No. 12, January 1988.

14. Kinsinger, Anne E., *"Project on Agricultural Conservation and Tax Policy: A Fund For Sustainable Agriculture"*, Natural Resources Defense Council, Washington, D.C. October 1987.

15. Klaseus, Tomas, Greg Buzicky, Ed Schneider, John Hines, *"Minnesota Pesticide Monitoring Surveys"*, Proceedings of the Agricultural Impacts on Ground Water Conference. Des Moines, Iowa. March 21-23, 1988.

16. Liebhardt, William C., Culik, Martin, *"How to Save $42 an Acre"*, The New Farm 1986.

17. Lundberg, Marilyn, *"Manufactured Chemicals and Ground Water Quality"*, Minnesota State Planning Agency. February 1987.

18. Malzer, G.L., Seeley, M.W., Anderson, J.L., *"Nitrogen Loss Potential and Nitrogen Fertilizer Management of Minnesota Soils"*, Minnesota Report 186-1983 Minnesota Agricultural Experiment Station. 1983.

19. Minnesota Department of Agriculture, *"Strategies for Minnesota Agriculture"*, March 1987.

20. Minnesota Department of Agriculture, Agronomy Services Division, *"Minnesota Empty Pesticide Container Disposal Report"*, March 1988.

21. Minnesota Departments of Health and Agriculture, *"Pesticides and Groundwater: Surveys of Selected Minnesota Wells"*, February 1988.

22. Minnesota Departments of Health and Agriculture and The Freshwater Foundation for The Health and Environment Network, *"Pesticides and Groundwater: A Health Concern for the Midwest"*, Navarre, Minnesota. 1986.

23. Minnesota Environmental Quality Board, *"Proceedings of the 1986 Environmental Congress"*, St. Paul, Minnesota. December 2-3, 1986.

24. Minnesota Environmental Quality Board, *"Report of the Environmental Quality Board Advisory Committee on Ground Water Protection"*, June 1988.

25. Minnesota Environmental Quality Board Water Resources Committee, *"Compilation of Comments Received on the Water Resources Strategy for the Control of Pests and Management of Nutrients, Public Review Draft, the Options"*, June 1988.

26. Minnesota Environmental Quality Board Water Resources Committee, *"Pest and Nutrient Management and Water Resources: Federal and State Authorities"*, December 1987.

27. Minnesota Environmental Quality Board Water Resources Committee, *"Pest and Nutrient Management and Water Resources: Programs of Other States"*, September 1, 1987.

28. Minnesota Environmental Quality Board Water Resources Committee, *"Water Resources Strategy for the Control of Pests and Management of Nutrients, Public Review Draft, the Options"*, March 1988.

29. Minnesota Extension Service, *"Private Pesticide Applicator's Training Manual"*, St. Paul, Minnesota.

30. Minnesota Extension Service, *"Understanding Nitrogen and Agricultural Chemicals in the Environment"*, (AG-BU-3166), St. Paul, Minnesota. 1987.

31. Minnesota Pollution Control Agency, *"Minnesota Ground Water Protection Strategy"*. July 1988.

32. Minnesota Pollution Control Agency, *"Minnesota Water Quality: Water Years 1986-87"*, St. Paul, Minnesota. May 1988.

Appendix C: Strategy Development Process

This *"Strategy for the Wise Use of Pesticides and Nutrients"* is the result of a one and one-half year planning effort of the Environmental Quality Board (EQB) Water Resources Committee (WRC). Input was provided by numerous agencies and individuals in its development.

The EQB Water Resources Committee

In November 1985, the Environmental Quality Board (EQB) established the EQB Water Resources Committee (WRC) to examine state water resources issues and develop a comprehensive state water resources strategy to safeguard the public health and preserve the quality of life for present and future generations. As part of that process, WRC developed a twelve-point water program, "Protecting Minnesota's Waters", containing recommendations for actions needed in the period from 1987 to 1989. These recommendations acknowledged the need for continued interagency efforts to address issues associated with protecting water resources from all toxic substances, including pesticides and nutrients.

Following from these recommendations and amid emerging reports on the occurrence of pesticides and nitrates in ground and surface waters in Minnesota, the WRC resolved to lead an interagency effort to develop a strategy to ensure that pesticides and nutrients are used in a manner that safeguards Minnesota's water resources.

Developing the Strategy

WRC's approach in developing a water resources strategy for the wise use of pesticides and nutrients has thus far involved five main steps:

1 Identifying and evaluating current state and federal responsibilities and authorities related to pesticides and nutrients;

2 Evaluating other states' efforts to deal with pesticide and nutrient contamination issues;

3 Delineating the major pesticide and nutrient contamination and management issues facing Minnesota;

4 Developing possible options available for addressing the major issues, and the basic policies to direct the strategy; and,

5 Developing a proposed strategy, based on the input received on the options.

The WRC Technical Committee, an interagency technical advisory committee comprised of representatives of key state agencies, assisted WRC in carrying out these steps. Work products of these efforts included two reports (*"Pest and Nutrient Management and Water Resources: Federal and State Authorities"* and *"Pest and Nutrient Management and Water Resources: Programs of Other States"*), a paper identifying twelve issue areas requiring further exploration, and individual papers delineating the options available to address the problems associated with the twelve identified issue areas.

The twelve issue areas identified for further exploration were: education/ information, integrated pest management/biological control, irrigation, local restrictions/local controls, spills, environmental review, coordination/integration, risk assessment/standards, monitoring, fate/practice impacts, aquatic environment use, container and unused/unwanted products.

In March 1988, a report describing the identified options was completed. The purpose of the report, "Water Resources Strategy for the Control of Pests and Management of Nutrients: Public Review Draft, the Options" (options report), was to solicit public input in selecting options for the strategy. The comment period on the report ran through the end of May.

Based on the comments received and subsequent discussions at WRC, WRC Technical Committee, and EQB meetings in June, July and August, the proposed strategy was prepared. The proposed strategy was distributed for public review in September, and was considered by WRC in November. WRC approved the strategy, with amendments based on comments received, and recommended adoption by EQB. The strategy was adopted by EQB in November 1988 to serve as a guide for the development of state programs and proposed legislation.

Public Involvement

Steps taken to involve the public in development of the strategy included: 1) creating of a special interests mailing list; 2) holding public meetings throughout the state; and, 3) forming a special Advisory Committee on Ground Water Protection. In addition, press releases and notices concerning the strategy and options report were issued to newspapers throughout the state and placed in the "EQB Monitor".

A list of over ninety interested parties was created, with the assistance of the Minnesota Department of Agriculture. The individuals and organizations on this list were solicited for ideas on the issues to be explored and received notices of the public meetings, availability of draft documents, and review periods.

Public meetings were held in cooperation with the PCA in April 1988 in eight cities: Rochester, Mankato, Marshall, Morris, Grand Rapids, Detroit Lakes, St. Cloud and St. Paul. The purpose of the meetings was to give the public an opportunity to hear about the strategy development efforts, to voice opinions and concerns, and to obtain a copy of the options report. Over 600 people attended these meetings.

In addition to the comments received at the public meetings, WRC received recommendations and comments on the options identified from 35 individuals or organizations. These included comments from environmental groups, governmental entities and a compilation of comments jointly submitted by sixteen agricultural organizations. WRC also received over 400 general letters from citizens urging continuation of

efforts to protect ground water from contamination and comments from 12 individuals or organizations on the proposed strategy.

EQB Advisory Committee on Ground Water Protection

The EQB appointed an Advisory Committee on Ground Water Protection in January 1988 to review the draft *"Ground Water Protection Strategy"* and the pesticide and nutrient management options report, and advise EQB on adequacy, policy choices and directions. The committee was composed of a diverse membership representing farmers, industry, local governments, researchers, and citizen groups.

The committee adopted unanimous recommendations, which were presented to EQB in June. The committee's deliberations and recommendations have been instrumental in shaping the proposed *"Strategy for the Wise Use of Pesticides and Nutrients"*. Their recommendations are contained in *"Report of the Environmental Quality Board Advisory Committee on Ground Water Protection"*, and are summarized in a memorandum to EQB contained in this appendix.

Environmental Congresses

Finally, the proposed strategy was one of the subjects of discussion at a series of Environmental Congresses held by EQB in September and October in five Minnesota cities. These congresses gave the public a further opportunity to comment on approaches to protecting the state's water resources, and helped to shape the final strategy and legislative directions

June 16, 1988
To: Environmental Quality Board

Fr: EQB Advisory Committee on Ground Water Protection

Re: Committee Report

The Report of the EQB Advisory Committee on Ground Water Protection is attached. Our Committee recognizes the importance of the Ground Water Protection Strategy and the Strategy for the Control of Pests and the Management of Nutrients and offers its support for passage of the legislative package needed to carry them out.

We would like to highlight our major recommendations. The Committee:

- Strongly supports implementing these strategies. Members are concerned about problems resulting from the control of pests and management of nutrients, as well as contamination from other sources, such as improperly constructed wells or leaking storage tanks.
- Recommends that there be a preamble to the two strategies that provides a context for the two strategies. In addition, this preamble should provide highlights of both strategies, and convey a sense of urgency for implemention.
- Recommends that prevention of further contamination be the cornerstone of Minnesota's ground water protection efforts. In addition, cleanup of appropriate areas should continue to be an important part of Minnesota's efforts.
- Supports Minnesota having nondegradation (meaning prevention of further contamination) for a goal in order to have continued movement toward improvement of ground water quality.
- Supports Minnesota revising and updating the current framework that establishes the degree of actions required. This framework would include numerical limits, or a process for developing them, as a way of gaging the severity of contamination, identifying appropriate preventive actions, and defining clean-up requirements.
- Recommends applying water quality protection to all ground water. It does not support "writing off" any aquifers. Special protection should also be given in areas sensitive to ground water contamination.
- Recommends that the strategies need to be carried out as a whole, since no single effort, whether it be education, research, monitoring, incentives, coordination, or regulation can alone achieve the desired results.
- Recommends the creation of a Joint Legislative Commission on Water. This Commission would create a focus at the legislature for water issues and programs and complement the coordinating function of the Environmental Quality Board. This Commission could also evaluate the present state structure for its effectiveness in carrying out the strategies.

- Recommends that the Environmental Quality Board (EQB) continues its strong role relating to water issues. The EQB should also take a lead role in ensuring that state programs, rules, and other activities recommended in the strategies are communicated to local government.
- Recommends that the state significantly increase funding for local water management activities, since local government has an essential role in protecting ground water.
- Recommends that the funding needed to carry out the strategies be a combination of broad based (all potential beneficiaries) and those related to specific impacts on water. Every user of water should pay the costs of general, statewide functions, such as coordinating, education, and research. Special taxes or fees should be used to underscore the relationship between specific activities and problems or benefits.
- Recommends the state obtain information to characterize aquifers in terms of quantity and quality. To do this, the state must establish clear goals for information needs that outline the purpose, scope, value, and coordination efforts.
- Recommends that state ensure water resources data compatibility between agencies and with local government. It should have clear goals that outline the purpose, scope, value, and coordination efforts of its monitoring programs. Water testing should be required at real estate transfers.
- Recommends that in considering the Strategy for the Control of Pests and Management of Nutrients, the state must recognize the significant role the federal farm programs play in shaping agriculture practices, and work to impact the direction of the new federal farm program as it is drafted in 1989 or 1990.
- Recommends a research project to better evaluate the number of abandoned wells, the priorities for sealing, and the methods and process for sealing.

The enclosed Committee Report contains more information about each recommendation as well as a number of specific recommendations about portions of the strategies.

Appendix D: EQB and Committee Composition

EQB Advisory Committee on Ground Water Protection Members

Thomas Anding, Committee Chair
Center for Urban and Regional Affairs
University of Minnesota

Calvin Alexander Jr.
Department of Geology and Geophysics,
University of Minnesota

Jack Anderson
Irrigators Association of Minnesota

Stephen Bloom
Martin County Coordinator

William Bryson
Freeborn Soil and Water Conservation District
Supervisor

Marianne Curry
Minnesota Chamber of Commerce and Industry

Dick Eischens
New Prague Farmer

Terry Gips
International Alliance for Sustainable
Agriculture

Verne Jacobsen
North Central Section,
American Water Works Association

Diane Jensen
Clean Water Action Project

Linda Lehman
Minnesota Ground Water Association

Christine Olsenius
Freshwater Foundation

Richard Post
Kandiyohi County Commissioner, member of
the Association of Minnesota Counties Physical
Development Committee

Newell Searle
Cargill, Minnesota Business Partnership

Lois Yellowthunder
Citizens League

Committee Administrator

Marilyn Lundberg
State Planning Agency

EQB Water Resources Committee Members and Alternates

Martha Brand
Chair
Water Resources Committee
Leonard, Street & Deinard

Robert Dunn
Vice Chair
Water Resources Committee

Joe Alexander
Commissioner
Department of Natural Resources

Ron Nargang
Director
Waters Division,
Department of Natural Resources

Sister Mary Madonna Ashton
Commissioner
Department of Health

Michael Finn
Assistant Commissioner
Department of Health

Jim Nichols
Commissioner
Department of Agriculture

Bill Bulger
Director
Agronomy Division,
Department of Agriculture

Gerald Willet
Commissioner
Minnesota Pollution Control Agency

Mike Robertson
Deputy Commissioner
Minnesota Pollution Control Agency

Donald Ogaard
Chair
Board of Water and Soil Resources

Loni Kemp
Board of Water and Soil Resources

Dr. Donald McNaught
Director
Sea Grant Program, University of Minnesota

Dr. Patrick Brezonik
Director
Water Resources Research Center

EQB Members

Jack Ditmore
EQB Chair
Governor's Representative

Joe Alexander
Commissioner
Department of Natural Resources

Leonard Levine
Commissioner
Department of Transportation

Lani Kawamura
Commissioner
State Planning Agency

Gerald Willet
Commissioner
Pollution Control Agency

James Nichols
Commissioner
Department of Agriculture

Sister Mary Madonna Ashton
Commissioner
Department of Health

Anton Perpich
Commissioner
Department of Public Service

Donald Ogaard
Board of Water and Soil Resources

Dr. Edward Buchwald
Citizen Member

Martha Brand
Citizen Member
Leonard, Street & Deinard

Barbara Hughes
Citizen Member
American Lung Association of Ramsey County

Robert Dunn
Citizen Member

Robert Tonra
Citizen Member

EQB WRC Technical Committee Members

John Wells
Chair
State Planning Agency, Environmental Division

Roman Kanivetski
Minnesota Geological Survey

Gary Englund
Minnesota Department of Health

Frank Pafko
Department of Transportation

Marcel Jouseau
Metropolitan Council

Joe Gibson
Department of Natural Resources

Mel Sinn
Board of Water & Soil Resources

Paul Burns
Department of Agriculture

Susanne Maeder
Planning Information Center

Linda Bruemmer
Pollution Control Agency