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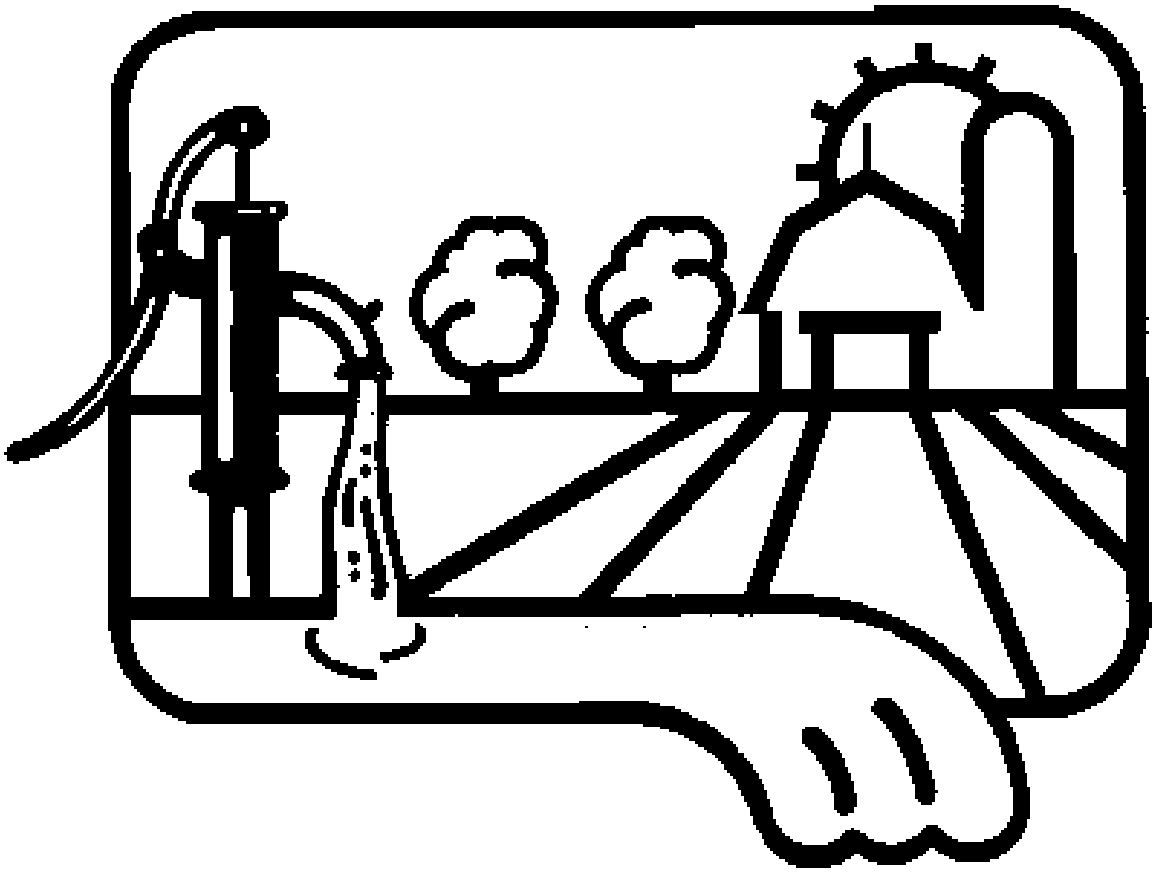

STATE OF MAINE

GENERIC STATE MANAGEMENT PLAN FOR PESTICIDES AND GROUND WATER

1994

Revised
January 1998 and December 2006

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Revised
January 1998 and December 2006

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ACKNOWLEDGMENTS

The Maine Board of Pesticides Control and its staff thank the following individuals for offering their assistance, expertise, and patience in completing and revising this plan.

2006 Revisions

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James Dill, University of Maine Cooperative Extension
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John Fogler, Dairy Farmer
Steve Goodwin, Maine Vegetable-Small Fruit Growers Association
Carl Haag, S.D. Warren Co.

William Johnson, Maine Pomological Society
Chris Jones, Soil Conservation Service
David Lavway, Maine Potato Board
Dr. Jeff McBurnie, University of Maine, College of Applied Science and Agriculture
Ed McLaughlin, Maine Blueberry Commission
Peter Mosher, Maine Department of Agriculture, Food, and Rural Resources
Craig Neil, Maine Geological Survey
Charles Ravis, Augusta Country Club, MGCSA
Nancy Ross, Maine Organic Farmers and Growers Association
Tim Zorach, Maine Audubon Society

Others who have contributed to this plan or previous drafts

Paul Dutram, Maine Department of Environmental Protection
Bill Ferdinand, Maine State Planning Office
John Harker, Maine Department of Agriculture, Food, and Rural Resources
Thom Harnett, Office of the Attorney General
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John Jemison, University of Maine Cooperative Extension, Core Member of the Pesticide SMP Advisory Committee
Jeff Jenks, Maine Department of Human Services, Drinking Water Control Program
Rick Kersbergen, University of Maine Cooperative Extension
Rob Koethe, U.S. EPA, Region I
Esther Lacognata, Maine Department of Agriculture, Food, and Rural Resources
Edward Lavery, U.S. EPA Region I
Russell Libby, Maine Department of Agriculture, Food, and Rural Resources and Maine Organic Farmers and Gardeners Association
Terry Mingo, Maine Department of Human Services, Drinking Water Control Program
Michele Notarianni, U.S. EPA, Region I
Steve Pinette, Maine Department of Environmental Protection
Tony Pisanelli, U.S. EPA, Region I
David Poe, Soil Conservation Service
David Rocque, Soil and Water Conservation Commission
Andrews Tolman, Robert G. Gerber, Inc., Core Member of the Pesticide SMP Advisory Committee
Andrew Triolo, U.S. EPA, Region I
Tom Weddle, Maine Geological Survey

CONCURRENCE SIGNATURES

The following agency representatives have read the *Maine Generic State Management Plan for Pesticides and Ground Water* and concur with their agency's responsibilities as stated in the plan.

_____	_____
Maine Dept. of Agriculture	Maine Dept. of Environmental Protection
_____	_____
Maine Dept. of Human Services	University of Maine Cooperative Extension
_____	
U.S. Environmental Protection Agency	

STATE LIAISON

The purpose of a state liaison is to have a single contact point responsible for the transmittal and receipt of official correspondence and information. The single contact point for all formal communications concerning the State Management Plan process between the U.S. Environmental Protection Agency and the State of Maine shall be:

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INTRODUCTION

Ground water is an essential resource to Maine's citizens. Over half of the U. S. population relies on ground water for drinking water, and in rural Maine, ground water is the dominant source of drinking water. Because pesticides and other agricultural chemicals have been found in wells in many states, including Maine, the U.S. Environmental Protection Agency (EPA) developed a *Pesticides And Ground-Water Strategy* to prevent unacceptable contamination of ground water resources from the normal, registered use of pesticides. Part of this strategy includes the recommendation that states develop state management plans (SMPs). The *Maine Generic State Management Plan (SMP) for Pesticides and Ground Water* is the foundation on which pesticide-specific state management plans (Pesticide SMPs) are built.

The Maine Board of Pesticides Control (BPC) collaborated with other state agencies to develop a strategy for preventing ground water contamination by pesticides. The first Generic SMP was completed in July 1994. Following the adoption of the *Hexazinone State Management Plan for the Protection of Ground Water* (July 1996), the Board noted a number of deficiencies in the original Generic Plan. The original committee which worked on the Generic SMP was re-formed in January 1997 and the revised *Maine Generic State Management Plan for Pesticides and Ground Water* was adopted by the Board on January 30, 1998. This plan was revised again in 2006.

Plan in Brief

The *Generic State Management Plan for Pesticides and Ground Water* outlines the government agencies involved with ground water resource protection, describes their roles within the planning process, and describes how overlapping authorities will be coordinated. To ensure compliance with Pesticide SMPs, agency enforcement roles are set forth.

The basis for ground water assessment and protection planning is formed through the characterization of Maine's ground water resources and the description of pesticide use patterns. Emphasis is placed on contamination prevention measures, such as best management practices, user education and technical assistance. If these measures are not successful, the BPC may consider other means to control pesticide use. To help determine what controls are needed and to allow for public participation, the BPC will create a unique Pesticide SMP Advisory Committee for each Pesticide SMP it chooses to write. This committee will respond to EPA or BPC mandates by developing pesticide-specific management plans. The response and regulatory framework shows how the BPC will define and respond to contamination situations based both upon a contaminant's percent of an established health standard and upon the percentage of sites sampled with the presence of a contaminant.

A two-phase ground water monitoring program is described in this plan; the program goal being assessment of potential contamination problems and once a pesticide is detected, assessment of the extent of the problems. Pesticide management practices are then implemented in response to identified contamination trends.

SECTION I
BACKGROUND

Ground water is an important national resource which provides about one-fourth of all water used in the United States. Nearly half of the U.S. population relies on ground water for drinking water, and in rural areas, ground water may be the only, or at least the dominant, source of drinking water.[1] In Maine, approximately 90% of public water suppliers obtain some or all of their supply from ground water.[2]

In the past, most people believed that ground water was protected from contamination by soil and rock formations.[3] This belief changed in the 1970s when agricultural chemicals were found in wells in several states. Monitoring surveys flourished throughout the 1980s and demonstrated the impact of pesticides on ground water quality. Since the 1970's, public agencies have been attempting to devise a comprehensive and rational strategy which both serves the needs of pesticide users while addressing environmental concerns. In December 1987, the U.S. Environmental Protection Agency (EPA) proposed such a strategy in *"Agricultural Chemicals in Ground-Water: Proposed Pesticide Strategy."*

Agricultural Chemicals in Ground-Water: Proposed Pesticide Strategy

The strategy initially proposed by EPA consisted primarily of an environmental goal, a contamination prevention policy and program, and a response policy and program. While EPA asserted that it would continue to take uniform action nationwide on pesticide use and disposal practices, the Agency encouraged the development of strong state roles in the local management of pesticide use to protect ground water. State Management Plans (SMPs) were identified as the preferred vehicle by EPA because states, which are closer to local conditions, could better evaluate and respond to local variations in use and vulnerability. The EPA believed that SMPs would be an effective way to provide adequate protection of ground water resources without restricting pesticide use unnecessarily.

The incentive for states to prepare these plans came from the federal pesticide registration process. The future use of registered pesticides, identified by EPA as a threat to ground water, would depend on the presence and adequacy of a state's management plan. In some situations, EPA would require a state-specific label or supplemental labeling with SMP-prescribed, pesticide management measures. In other cases, EPA would take steps, including statewide

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1 [1]U.S. Environmental Protection Agency, "Agricultural Chemicals in Ground Water: Proposed Pesticide Strategy", December 1987, pp. 13.

2 [2]Personal conversation with Jeff Folger, Maine Department of Human Services, Drinking Water Control Program, January 3, 1997.

3 [3]U.S. Environmental Protection Agency, op.cit., pp. 21.

cancellation, to control the use of a pesticide that poses a significant ground water threat if there was no adequate SMP that could reasonably be expected to prevent or reduce the threat of unacceptable contamination.[4] The possibility of special state management measures in lieu of EPA cancellation has been the driving force behind SMP development nationwide.

Pesticides And Ground-Water Strategy

After nearly four years, EPA published the final *Pesticides And Ground-Water Strategy* in October 1991. The final strategy reflected many of the comments received from the industry, environmental groups, and the states and incorporated EPA's new statement of principles for programs dealing with ground water. Increased emphasis on prevention of ground water contamination is at the heart of these new principles. That commitment is demonstrated in the stated goal of the *Pesticides And Ground-Water Strategy*, which is "to prevent contamination of ground water resources that presents an unreasonable risk of adverse effects to human health and the environment resulting from the normal, registered use of pesticides."[5]

As in the proposed strategy, the centerpiece of the final strategy is the development and implementation of SMPs for specific pesticides of concern. EPA would now apply Pesticide SMPs as a label requirement so that a product can be legally used only in states with an approved plan. And, unlike the proposed strategy, the final *Pesticides And Ground-Water Strategy* encompassed not only agricultural pesticides, but all pesticide products which may pose a threat to ground water from outdoor uses.

EPA also went on to define two types of state management plans: Generic SMPs and Pesticide SMPs. Generic SMPs provide basic information in twelve identified areas regardless of a specific pesticide. Pesticide SMPs contain all the information appropriate to a Generic SMP plus all the information specific to an identified pesticide. A Generic SMP is used to put in place the resources and coordinating mechanisms that will be required to develop and implement a Pesticide SMP. By designing a voluntary Generic SMP, the State can facilitate the timely and cost-effective developments of Pesticide SMPs as the need arises.

Subsequent national and regional guidance documents looked to these state management plans to complement and enhance other state ground water protection programs, such as the comprehensive state ground water protection program, the nonpoint source pollution strategy, coastal zone pollution management program, and wellhead protection program. In all, keys to the success of any state management plan will be 1) the authority and ability to implement ground water contamination prevention measures, 2) the authority to implement some type of remediation in the event of contamination, and 3) the authority and resources to conduct a monitoring program to evaluate the effectiveness of both prevention and restoration measures.

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4 [4]Ibid., pp. 108.

5 [5]U.S. Environmental Protection Agency, *Pesticides and Ground-Water Strategy,* October 1991, pp. 11.

History of the Maine Generic State Management Plan for Pesticides and Ground Water

Maine has long taken the initiative and addressed the problems of pesticide use and ground water contamination before they threatened the livelihood and lifestyle of Maine, its citizens, and its environment. Since 1988, the Board of Pesticides Control (BPC) has collaborated with representatives of the Department of Agriculture, Maine Geological Survey, Department of Environmental Protection, and Department of Human Services to develop the state's strategy for preventing ground water contamination by pesticides. In 1990, the BPC hired a full-time planner to coordinate the elements of the strategy and to write the plan.

Two draft plans were completed by the spring of 1991. The second draft plan (April 1991) received wide public comment. Several public meetings were held in agricultural areas in the state to gather input. The BPC, reacting to the comments received, authorized the formation of a planning committee that would better represent the diverse interests of the agricultural community. With the publication of the final strategy, that group was expanded to include non-agricultural pesticide users as well. Building upon the existing drafts, a proposed plan was released in August of 1993 and subjected to another round of hearings and comments. The first *Maine Generic State Management Plan for Pesticides and Ground Water* was formally adopted by the BPC at their regular monthly meeting in June 1994.

Immediately following its adoption, Maine's Generic SMP was put to the test with a pesticide of local concern: hexazinone. Following detections of this herbicide in ground water samples, including wells serving two elementary schools, the blueberry industry, sole users of hexazinone-products in Maine, met with the BPC in early 1994 to discuss an action plan. Simultaneously, a citizen-initiated petition drive was underway to ban the use of all formulations of the herbicide. Hearings on the petition were held by the BPC in July 1994. After considering all the testimony, the BPC decided to retain use of hexazinone in Maine but, following the process outlined in the Generic SMP, directed the formation of a Pesticide SMP Advisory Committee to develop management options for hexazinone.

The process of creating the *Hexazinone State Management Plan for the Protection of Ground Water* (July 1996) gave the BPC first-hand experience in developing a Pesticide SMP and brought to light some inadequacies and obstacles not foreseen when the Generic SMP was written. Also, the BPC was committed to a biennial review of the Generic SMP in the 1994 document. In January 1997, the original Ground Water Planning Committee, the group of agricultural and nonagricultural pesticide users in Maine, was invited to participate in a revision of the Generic SMP. The 1997 revisions reflected what was learned about pesticides and ground water planning during previous years. This plan was again updated in 2006, as seen here.

SECTION II
STATE PHILOSOPHY AND APPROACH TO PESTICIDE MANAGEMENT FOR GROUND WATER PROTECTION

Maine's approach to pesticide management for ground water protection is one which emphasizes prevention of ground water contamination, defined in relation to 1) health-based reference points or 2) other EPA established water quality standards and aquatic life criteria, particularly where ground water is closely connected to surface water ecological systems. The Maine Ground Water Management Strategy recognizes that cleanup of contaminated ground water may be impractical for both technical and financial reasons, so prevention is the only practical course.

All ground water in Maine is currently classified as a present or future source of public drinking water. While this classification system necessitates equal protection of all ground water resources statewide, additional protection effort will be given to priority waters identified by the Maine Department of Environmental Protection, currently identified as wellhead protection areas and ground water supplying base-flow to Class AA and Class A watersheds. However, the BPC, lead agency for the development and implementation of this plan and Pesticide SMPs, wishes to remain flexible in its allocation of prevention, monitoring, and response resources in order to fulfill its more specific mandate for protection of public health and the environment from the adverse effects of pesticide use.

This Generic SMP is both a planning tool in Pesticide SMP development and a guidance document for the BPC when dealing with other pesticide-in-ground-water issues. This dual use allows for a uniform approach to pesticide and ground water management regardless of pesticide or current management strategy.

The BPC remains committed to maintaining registration of vital pesticide products. Pesticides which are identified by EPA as worthy of a Pesticide SMP will be considered for plan development on a case-by-case basis in Maine. The value to their user communities and evident or potential environmental and public health impacts will be considered when prevention and response mechanisms are tailored to the identified pesticides. For pesticides where cost, pest control or environmental benefits may not be realized by developing a Pesticide SMP, the BPC retains the option of not developing one. Instead, the BPC may prohibit future sale and use of that pesticide in Maine. Conversely, beyond what pesticide-specific plans are encouraged by EPA, the state may chose to address pesticides of local concern in a manner similar to that established in this plan.

SECTION III
COOPERATING AGENCIES

States, not the federal or local governments, have the central role in developing and implementing state management plans. This requires states to have the requisite legal authorities and to coordinate existing programs. Cooperation must be developed among a variety of federal, state, county, and local agencies to achieve effective implementation.

Listed below are the government agencies involved with pesticides, ground water, and implementation of Generic and Pesticide SMPs. A review of applicable statutory authorities is included as well as a description of their existing ground water protection or pesticide control programs. The agencies are divided into three groups: (1) agencies with Pesticide SMP implementation roles; (2) agencies with technical assistance roles; and (3) agencies with ground water protection programs, but no direct implementation or technical assistance roles.

Agencies with Pesticide SMP Implementation Roles

U.S. Environmental Protection Agency (EPA)

The EPA is responsible for regulating pesticide use, for protecting the quality of the nation's ground and surface water, and for regulating the storage, disposal, and response to releases of pesticides. EPA used the legal authorities and mandates of several federal acts in creating 1991's *Pesticides And Ground-Water Strategy* and developing 1996's proposed State Management Plan rule.

A. Legal Authorities Necessary to Implement SMPs

7 U.S.C. §136 et seq.
The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
FIFRA regulates the registration and use of pesticides. FIFRA allows EPA to address ground water concerns about pesticides on a national level and through cooperative agreements with the states.

33 U.S.C. §466 et seq.
Clean Water Act (CWA)
The CWA was established to protect the integrity of this nation's surface and ground waters. Grants to protect ground water are awarded to states for development and implementation of state wellhead protection programs, for development of statewide ground water protection strategies, and for nonpoint source pollution programs.

42 U.S.C. §300f et seq.
The Safe Drinking Water Act (SDWA)
The SDWA is designed to ensure the safety of public drinking water supplies. The Act requires EPA to establish both national drinking water quality standards (MCLs) and monitoring requirements for suppliers of public water. 1986 Amendments to the SDWA authorize states to establish Wellhead Protection Programs for the protection of public drinking water wells and to authorize the designation of sole source aquifers by EPA. 1996 Amendments introduce source water protection as a goal. This plan incorporates drinking water standards in its policy for responding to contamination (See Section VIII, "Response Framework".)

42 U.S.C. §6901 et seq.
The Resource Conservation and Recovery Act (RCRA)
RCRA regulates the disposal of hazardous wastes which include pesticides or pesticide-contaminated material deemed no longer useful.

42 U.S.C. §9601 et seq.
The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
CERCLA established a trust fund to finance responses to non-routine releases of hazardous substances. CERCLA also allows for assessment and recovery of damages from liable parties. For pesticide spills or illegal applications which may cause ground water contamination, this statute is important. CERCLA is also the only law which provides for the "temporary provision of an alternate water supply" under such circumstances.

B. Existing Programs

There are several offices in EPA Headquarters which oversee the above programs. The Office of Pesticide Programs (OPP) administers FIFRA, while the Office of Water (OW) administers the SDWA. Other divisions of EPA are also responsible for administration of other ground water protection strategies and pollution prevention programs. The *Pesticides and Ground-Water Strategy* (October 1991) and proposed State Management Plan rule (June 1996) draw from these regulatory authorities and lay the foundation for this management plan.

C. Role in this Plan

1. EPA may finalize the proposed State Management Plan rule and identify those pesticides whose future use will be subject to the requirements of an SMP.

2. EPA will review this Generic SMP and approve Pesticide SMPs, when submitted.

2. EPA should continue to provide technical support and guidance documents to the states on implementation of the state management plans.

3. EPA should continue to provide assistance to states to establish Comprehensive State Ground Water Protection Programs consistent with the State Management Plan approach and implement multi-year program plans which build upon and further integrate state ground water protection strategies, wellhead protection programs, nonpoint source programs, and other ground water related programs.

4. EPA should continue to evaluate the environmental fate of pesticides and to regulate products, via the registration process, which pose a ground water threat, on a national basis.

5. EPA should continue to provide financial assistance to develop or maintain state management plans and pesticide specific plans.

6. Quality assurance/ Quality control (QA/QC) document approval.

<u>Maine Department of Agriculture, Food, and Rural Resources, Board of Pesticides Control</u>

The Board of Pesticides Control (BPC) was established to protect the public health and safety of Maine's citizens and to protect the public interest in the soils, water, forests, wildlife, agriculture, and other resources of the state by assuring scientific and proper use of pesticides. The Board and its staff are charged with registration of pesticide products, licensing of applicators, and enforcement to ensure that pesticides are properly used.

A. Legal Authorities Necessary to Implement SMPs

7 M.R.S.A. §606(2)(F)
Prohibited Acts; Unlawful alteration, misuse, divulging of formulae, transportation, disposal and noncompliance
Section (F) is the basis for enforcement by the Board in that it prohibits any person from applying pesticides in a manner inconsistent with pesticide rules and regulations.

7 M.R.S.A. §607-A(2)(C)&(3)
Review or reregistration; Review process and Effect of review on reregistration
Section (2)(C) states that the BPC, in conjunction with the Department of Environmental Protection, Department of Inland Fisheries and Wildlife, Department of Human Services, and the Department of Conservation, shall review registration of pesticides by conducting a water residue survey, inclusive of wells and surface water, to determine the kinds and amount of pesticides present. If the review indicates a negative environmental impact, then the BPC shall "require implementation of...safeguards prior to reregistration."

7 M.R.S.A. §609
Refusal to register, cancellation, suspension, legal recourse
This section gives the Board the power to change or cancel the registration of a pesticide via the rulemaking process when the Board determines that a pesticide or its labeling does not comply with the rules or regulations of this chapter.

7 M.R.S.A. §610(2)
Determination; rules and regulations; restricted use pesticides; uniformity
Section (2) gives the BPC broad authority to promulgate rules in conformance with their statutory authority.
7 M.R.S.A. §611(3)
Enforcement; Repeated violations
Section (3) allows the Board to identify persons who repeatedly violate pesticide use laws and recommend them to the Maine Attorney General for action. This section also discusses enforcement procedures.

7 M.R.S.A. §616-A
Penalties
This section provides for penalties for civil violations of not more than $1,500 for the first violation and $4,000 for each subsequent violation within a four-year period. For private applicators, penalties may not exceed $500 for a first violation or $1,000 for any subsequent violation within a four-year period for violations of record keeping or the return and disposal of pesticide containers.

7 M.R.S.A. §620
Cooperation
This section is Maine's planning authority for this state management plan. It allows for grants, cooperative agreements, and the preparation and submittal of plans to EPA under state statute and FIFRA.

22 M.R.S.A. §1471-D(8)(A)-(I)
Certification and licenses; revocation
This section provides the conditions under which a pesticide applicator may be found in violation or license may be revoked. They include having used a pesticide "in a careless, negligent or faulty manner or in a manner which is potentially harmful to the public health, safety or welfare of the environment."

22 M.R.S.A. §1471-H
Inspection
This section is the basis for this strategy's ground water monitoring program. It provides for inspection of "any public or private premises" for the purpose of inspecting equipment, storage areas, and "sampling pesticide residues on crops, foliage, soil, water or elsewhere in the environment."

22 M.R.S.A. §1471-M(4)
Designation of critical areas
Section (4) allows the Board to designate critical areas "where pesticide use ... present[s] an unreasonable threat to [the] quality of the water supply."

B. Existing Programs

The Board of Pesticides Control has a number of existing programs which protect the integrity of Maine's ground water resources. Among the programs are pesticide registration, applicator certification and licensing, returnable container regulations, and obsolete pesticide disposal.

Registration of Pesticides

The BPC has formal authority to regulate pesticide use through the state registration process. All pesticides sold or used in the state of Maine must be registered by both the EPA and the BPC and carry one of three use classifications: general use, restricted use, or state limited use. General use pesticides are commonly found in hardware, department, and farm stores. They may be bought and used by the general public on their own property without training or certification. Restricted use pesticides may be sold only by licensed pesticide dealers and may be purchased and used only by licensed pesticide applicators. State limited use pesticides may be used only under a special permit granted by the BPC. Tied to permission to use such limited use pesticides may be reasonable terms and conditions, otherwise known as "management practices," which are designed to protect the health, safety, and general welfare of the environment and public health above and beyond the label guidelines. This management plan

addresses the importance of restricted use and limited use classifications as part of the overall prevention strategy in subsequent chapters.

Applicator Certification and Licensing

To ensure that pesticides are used properly, the BPC has adopted rules related to the certification and licensing of pesticide applicators. Persons must be licensed to (1) use or supervise the use of any restricted or limited use pesticide or (2) make custom applications of general use pesticides, or (3) apply a pesticide in connection with their duties as an official or employee of federal, state, or local government. To become licensed in Maine, individuals must first earn *certification*, a credential which shows proficiency in pest management, pesticide use, and safety. Questions concerning ground water vulnerability and pesticide leaching potential were added in 1990 to the core exam for certification. Once certified, an applicator applies for a license appropriate to his/her intentions and is required to attend recertification programs to maintain licensure. For more on certification, see Section VI, "Prevention Strategies."

Returnable Pesticide Container Regulations

In response to environmental concerns about the proliferation of empty pesticide container dumps on the edges of fields and to prevent the possibility of point source pollution of ground and surface waters from the improper disposal of these containers, the BPC has been charged with regulating the return and disposal of limited and restricted use pesticide containers. In 1984, the BPC adopted regulations which (1) established a deposit collected pending the return of all glass, metal, or plastic restricted and limited use pesticide containers over one-half pint in size, (2) required stickers to be affixed on all such containers at the time of sale, (3) required triple rinsing or the equivalent of containers prior to their return, and (4) specified places where rinsed containers may be returned for refund of deposit in addition to the dealer location. These regulations cover both instate and out-of-state purchases to ensure that waste rinsate concentrations are minimized and that containers are disposed of in an environmentally sound manner.

Obsolete Pesticide Disposal Program

Disposal of banned and unusable pesticides has been a problem in Maine and throughout the country since EPA began to take certain pesticides off the market in the early 1970s. The BPC has endeavored to assist conscientious citizens in disposing of unusable pesticides at no charge to them. This activity began in 1972 when a convoy of DOT trucks was organized to haul the remains of a pesticide manufacturing plant to Massachusetts for safe storage in a naval center and later disposal.

In the early years, the BPC had a five ton truck and its employees went to farms and homes to collect pesticides whenever a citizen called. The chemicals were then stored until funds were available to hire a contractor to dispose of them at licensed out-of-state facilities. The largest effort occurred in 1989 when there was a one-time

legislative appropriation of $100,000 that resulted in the disposal of 22 tons of primarily agricultural products.

Since 1996, the BPC has used special general fund appropriations and federal grants to conduct programs to collect and properly dispose of obsolete pesticides. Each year a hazardous materials contractor is hired to be present for one day at each of four regional sites. Homeowners, non-corporate farmers and greenhouse operators can participate free of charge and must submit an inventory form in advance to the BPC. When the week of collections is scheduled, shipping papers are mailed to each participant listing the pesticides they may bring in on the specified date. The program is limited to obsolete pesticides, defined as banned pesticides, and products that have become caked, frozen or are liquids more than 10 years old. Pesticides that can be used legally are generally not accepted although chlorpyrifos products with residential uses were accepted starting in the year 2000.

A total of 143,990 pounds of chemicals, from more than 866 individuals, have been delivered to a local hazardous waste contractor through these efforts, the latest in 2004. Another two collections are planned for 2007. In addition, two special projects have been conducted to transport 2,4,5-T and dinoseb to out-of-state facilities under federal disposal programs required by EPA suspension orders.

C. Role in this Plan

1. The BPC will be the lead agency for developing, enforcing, and implementing state management plans, acting as the liaison between EPA and state agencies for this program.

2. The BPC will continue to regulate pesticides to minimize the potential for ground water contamination.

3. The BPC will continue to provide ground water education for pesticide applicators through its certification programs and to work cooperatively with other state agencies in educating licensed and non-licensed applicators.

4. The BPC will oversee the development and implementation of a ground water monitoring program for pesticides, as specified in this plan and in Pesticide SMPs.

5. The BPC will assist pesticide users, to the best of its ability, to properly dispose of contaminated material resulting from pesticide spills and obsolete, canceled and unusable pesticides.

6. The BPC will respond to contamination problems and will assist in identifying and enforcing means to mitigate the problem.

Maine Department of Agriculture, Food and Rural Resources, Division of Animal Health and Industry

The Division of Animal Health and Industry is responsible for responding to complaints or problems involving agriculture, including those of surface and ground water pollution.

A. Legal Authorities Necessary to Implement SMPs

17 M.R.S.A. §2805
Farms or farm operations not a nuisance
An updated version of the "Right-to-Farm" Law, this statute authorizes the commissioner of Department of Agriculture, Food and Rural Resources to investigate all complaints involving a farm or farm operations, including complaints involving ground and surface water pollution. If the commissioner believes the subsequent problem to be a nuisance, there are a number of steps, including finally referral of the matter to the Office of the Attorney General, to assure that the farm or farm operation adopts best management practices. This section also establishes an Agricultural Complaint Response Fund to investigate complaints and to abate conditions potentially resulting from farms or farm operations.

B. Existing Programs

When a ground water problem from agriculture arises, the Division of Animal Health and Industry, working with other appropriate state and federal agencies, makes site-specific recommendations that should be adopted by the farmer to solve the problem. If formal enforcement is necessary to achieve adoption of the solution, the Division of Animal Health and Industry refers the matter to the appropriate agency, including the Maine Department of Environmental Protection or the Office of the Attorney General.

The Division of Animal Health and Industry is currently working with other state and federal agencies in implementing the Agricultural Nonpoint Source Strategy, the Department of Agriculture's contribution to the state's overall NPS strategy. Included are Best Management Practices (BMPs) to control sediment, nutrient, manure, and pesticide nonpoint source pollution. The strategy has both regulatory and non-regulatory components, with emphasis on voluntary programs such as research, targeted educational programs, technical assistance, and financial incentives.

C. Role in this Plan

1. The Division of Animal Health and Industry will coordinate development of crop- and/or pesticide-specific Best Management Practices with other state and federal agencies.

2. The Division of Animal Health and Industry and the BPC will coordinate resource grants and educational programs to maximize outreach efforts.
3. The Division of Animal Health and Industry will notify the BPC of all complaints involving pesticides and ground water.

4. The Division of Animal Health and Industry and the BPC will coordinate on-site investigation of pesticide complaints.

5. The Division of Animal Health and Industry and the BPC will coordinate enforcement for adoption of BMPs according to the scenarios outlined in Section VIII of this strategy.

Maine Department of Environmental Protection (DEP)

The Maine Department of Environmental Protection is responsible for protecting the state's natural resources. In particular, two of the Department's three bureaus, the Bureau of Land and Water Quality (BLWQ) and the Bureau of Remediation and Waste Management (BRWM), have responsibilities related to this plan. The BLWQ has the responsibility of maintaining standards for the protection of Maine's surface and ground waters. The BRWM oversees hazardous material and waste regulations in the state.

A. Legal Authorities Necessary to Implement SMPs

38 M.R.S.A. §410-H through §410-K
Nonpoint Source Pollution Program
These sections establish the state's nonpoint source pollution program by defining what nonpoint source pollution is, by defining best management practice guidelines, and by designating lead agencies for implementation of components of the state program. The Department of Agriculture, Food and Rural Resources is designated the lead agency to implement the *Strategy For Managing Nonpoint Source Pollution from Agricultural Sources and Best Management Systems Guidelines,* (October 1991), a plan to reduce and prevent nonpoint source pollution from agricultural activities.

38 M.R.S.A. §413
Waste discharge licenses
This section prohibits the direct or indirect discharge of any pollutant to water without first obtaining a discharge license. Two types of aquatic pesticide permits are exempted, including application of aquatic pesticides by the Department of Inland Fisheries and Wildlife and the treatment of public water supplies with copper sulfate or its compounds where swimming and fishing are not allowed.

38 M.R.S.A. §465-C
Standards of classification of ground water
Maine has adopted two standards for classification of ground water. The first, Class GW-A, is of the quality that it can be used for public drinking water supplies. The second, Class GW-B, is for all other supplies not suitable for public drinking water.

38 M.R.S.A. §470
Classification of ground water
This section classifies all ground water in Maine as Class GW-A. Also, this section gives the Maine Legislature the final authority on ground water classification.

38 M.R.S.A. §571
Corrupting Waters Forbidden
This section makes it a Class A, Criminal offense to intentionally corrupt a private or public water supply. (Note: The word ground water is not used; "well" and "spring" are used.)

38 M.R.S.A., Chapter 13
Hazardous Matter, Substance, and Waste Statutes
This chapter contains all the state statutes related to the proper transportation, storage, and disposal of material deemed hazardous matter, hazardous substances, and hazardous wastes. The section also discusses emergency response to spills, the identification of responsible parties, and remedial actions. Chapter 13, in essence, is the state's companion statute to CERCLA and RCRA and will guide response actions to pesticide disposal and spill cleanup.

B. Existing Programs

Critical to the process of controlling ground water contamination by pesticides is the development of nonpoint source (NPS) pollution control measures. In November 1989, Maine DEP finalized the state's *Nonpoint Source Pollution Management Plan*. The NPS Plan recognizes that land users can control nonpoint source pollution by the development and implementation of Best Management Practices (BMPs). Several task forces developed BMPs, including an agricultural task force (see "Department of Agriculture, Food, and Rural Resources, Office of Agricultural, Natural and Rural Resources" above).

C. Role in this Plan

1. Maine DEP will continue to provide expertise in the development and implementation of state management plans to ensure that they remain consistent with current ground water regulations and Comprehensive State Ground Water Protection Planning.

2. Maine DEP will be the lead agency in pesticide spill response and ground water remediation as a result of such spills.

3. Maine DEP will evaluate ground water resources for classification purposes and ensure that pesticide use does not violate the existing ground water classification and protections for that water body and/or watershed.

Maine Department of Human Services, Bureau of Health

The Bureau of Health, Drinking Water Program is responsible for maintaining the integrity of public water systems and protecting them from contaminants which may adversely affect human health. The Maine Health and Environmental Testing Laboratory, one of the laboratories used for ground water sample analyses, is a division of the Bureau of Health.

A. Legal Authorities Necessary to Implement SMPs

22 M.R.S.A. §2608
Information on private water supply contamination; interagency cooperation
The Department of Human Services will provide information and consultation to private citizens who report contaminated wells or request information on potential contamination of a site. They are to work with the Maine Department of Environmental Protection to determine an appropriate response to the contamination, including investigation of the site and ground water remediation.

22 M.R.S.A. §2611, et seq.
Safe Drinking Water Act
This act is the state companion to the Federal Safe Drinking Water Act. It protects all types of public water supplies in the state as well as authorizes the Department of Human Services to promulgate and enforce primary and secondary drinking water standards. Selected sections are listed below.

22 M.R.S.A. §2611
Drinking water regulations
This section gives the Department of Human Services authority to promulgate and enforce primary and secondary drinking water standards. Their scope of authority includes identification of contaminants and establishment of maximum contaminant levels.

22 M.R.S.A. §2612
Approval of construction or alteration, training, inspection, regulations and records; Operation and maintenance of public water systems
This section gives the Department of Human Services the authority to review and approve all new sources of public drinking water as well as require public drinking water systems to submit samples for water quality monitoring. Frequency of sampling has been subsequently established by rule.

22 M.R.S.A. §2614
Imminent hazards to public health
When an imminent hazard exists, the Commissioner of Human Services may issue an emergency order to the supplier of public drinking water to take action in one or more areas: 1) prohibit distribution and supply, 2) repair/install purification equipment, 3) notify users of the imminent hazard, or 4) analyze the water further to discover the extent of the hazard. This section provides the only well-closing authority available to the Generic SMP and applies only to public drinking water supplies.

B. Existing Programs

The Bureau of Health is mandated to promulgate and enforce primary and secondary drinking water standards for public water supplies. These standards may be no less stringent than the most recent National Primary Drinking Water Regulations. The Bureau of Health has also established non-enforceable guidelines, known as Maximum Exposure Guidelines (MEGs), for a variety of drinking water contaminants (See Section VIII, "Response Framework").

Since 1977, the Bureau of Health has been required to review and approve all new sources of public drinking water. The Bureau of Health, Drinking Water Program is the lead agency for the Wellhead Protection Program and will continue to work with municipalities in the identification and protection of wellhead protection zones and public drinking water supplies. The Drinking Water Program will also be the lead agency for the Source Water Assessment Program as required by 1996 amendments to the federal Safe Drinking Water Act.

Wellhead Protection Program

Public water supplies have been identified as an important municipal and state resource. The 1986 amendments to the Safe Drinking Water Act recognized the need to provide extra protection to these important resources and mandated the establishment of Wellhead Protection Programs (WHPPs) to provide guidance to municipalities, water utilities, and districts to prevent contamination of public drinking water wells and their ground water recharge areas. At its simplest, a wellhead protection plan consists of an inventory of potential sources of ground water contaminants and a point-and-circle delineation of wellhead protection areas. Wellhead protection planning is voluntary in Maine, but it has been used as an incentive for waivers from the Phase II and Phase V monitoring requirements.

C. Role in this Plan

1. The Bureau of Health will notify the BPC of pesticide residues detected in public water supplies and the location of the affected wells.

2. The Bureau of Health will notify the BPC of pesticide residue detections in private wells and the location of the affected wells.

3. The Bureau of Health will work with the BPC Toxicologist in the development of MEGs and health advisory levels for those pesticides for which no MCL or MEG has been established.

4. The Bureau of Health and the BPC will continue to work together in the issuance of waivers from Phase II and Phase V monitoring requirements.

University of Maine Cooperative Extension (UMCE)

The University of Maine Cooperative Extension, a division of the U.S. Department of Agriculture, has sixteen regional offices in Maine organized roughly along county lines.

A. Legal Authorities Necessary to Implement SMPs

None.

B. Existing Programs

The UMCE offers a variety of educational and training programs designed to safeguard surface and ground water quality from pesticides and nutrients. The Pesticide Applicator Training (PAT) Program run by the UMCE is a key element of Maine's applicator certification and licensing program. New pesticide applicator training materials, as well as drift management materials, have been developed which include modules on ground water protection, nonpoint source pollution, and water quality. Working in conjunction with other state and federal agencies, the UMCE published *"Best Management Practices for Agricultural Producers: Protecting Ground Water From Nutrients and Pesticides"* in 1989. UMCE Crop and Water Quality Specialists also research pesticides and their movement to ground and surface waters. This new information is being incorporated into training and recertification programs.

C. Role in this Plan

1. The UMCE will utilize its existing educational and outreach programs to inform growers and applicators about water quality protection and the requirements of state management plans.

2. The UMCE will continue outreach programs which inform growers about BMPs and other ground water protection measures.

3. As new materials are developed by the UMCE, information on water quality protection and the intent and requirements of state management plans will be incorporated.

Agencies with Technical Assistance Roles

U.S. Department of Agriculture (USDA)

The USDA, through its various divisions, provides both technical assistance to individual landowners and a range of incentives that can affect the way landowners choose to manage their land and water resources. USDA divisions in Maine include the University of Maine Cooperative Extension (UMCE), Natural Resources Conservation Service (NRCS), Farm Services Agency (FSA), and Agricultural Research Service (ARS).

The NRCS and UMCE offer education and technical assistance to private landowners to solve natural resource management problems. (For a further discussion UMCE's of implementation role, see "University of Maine Cooperative Extension" earlier in this section.) NRCS provides free services, including assistance with planning, preserving, and improving water quality. ASCS provides cost-share programs for landowners to implement soil and water conservation plans. USDA has also funded a nonpoint source, hydrologic unit program in Maine.

U.S. Department of the Interior (DOI)

The U.S. Geological Survey (USGS), a division of the DOI, has the principal role for gathering hydrogeologic information on, and assessing the quality of, the nation's aquifers. Through cooperative programs with states, the USGS compiles information for planning, developing, and managing the nation's water resources. USGS topographic maps are used in the design of Maine's ground water monitoring program (See Section VII, "Ground Water Monitoring).

Maine Department of Conservation, Maine Geological Survey (MGS)

Maine Geological Survey undertook the three-year program, *"Pilot Study: Pesticides in Ground Water*," in the 1980's. MGS is tasked with the collection and analysis of information relating to the nature, extent, and quality of aquifers and aquifer recharge areas in Maine . MGS serves as a primary source of information and expertise on ground water resources and monitoring. Data concerning water resources are mapped and made available to requesting agencies.

University of Maine, Maine Agricultural Experiment Station (MAES)

The Maine Agricultural Experiment Station is charged with serving the land grant research mission of the University of Maine.[6] Through basic and applied research programs, MAES scientists work to provide solutions to problems being encountered by the State's agriculture, forestry and aquaculture enterprises, as well as rural communities in general. MAES' research mission is clearly stated in its motto: RESEARCH FOR MAINE AND ITS PEOPLE.

MAES has several ongoing research projects which study fate and transport of pollutants such as agricultural chemicals and waste materials through soil and water systems, investigate means of reducing the need for chemical applications, and refine methods of analyzing contaminant concentrations in water, soil, and food. MAES researchers also serve the public interest through involvement as technical consultants. Although MAES has no direct role in the

[6] MAES Faculty Handbook, 1988.

implementation of this plan, it will continue to conduct research which may facilitate implementation and management of this plan.

Maine Soil and Water Conservation Districts

Maine's sixteen Soil and Water Conservation Districts (SWCDs) provide technical assistance along with educational programs, focusing on such topics as soil erosion prevention, flood control, water quality, and water conservation. The Districts provide further technical assistance under the guidance of NRCS to individual citizens in planning and installing conservation practices. The Districts also initiate and conduct demonstration projects which encourage the adoption of conservation plans. The SWCDs maintain a variety of databases, including soil surveys, hydrologic data, and commodity information, all of which are important in evaluating the pesticide leaching potential within a given geographic area.

Regional Planning Councils

Maine's eleven Regional Planning Councils provide technical assistance to municipalities in implementing state and federal comprehensive planning requirements and in preparing municipal plans. Recent planning efforts of the councils have included programs on ground water management, with assistance projects ranging from ground water hazard identification maps to draft ordinances for the control of nonpoint source pollution. The councils will continue to be an important source of information to municipalities as ground water management and wellhead protection become integrated into municipal comprehensive planning efforts.

Other Agencies with Ground Water Programs

Executive Department, Maine State Planning Office

In 1985, the Maine Ground Water Standing Committee was created to coordinate the state's diverse ground water interests. The Committee, staffed by the Maine State Planning Office, was charged with assessing priorities and ensuring the implementation of the state's ground water management and protection programs. In June of 1989, the Maine Ground Water Standing Committee published the "Maine Ground Water Management Strategy," a comprehensive look at the threats to Maine ground water with a multi-point policy statement on how ground water could best be protected. The Strategy states as its Primary Goal:

> "....to protect, conserve, and manage Maine's ground water re- sources to protect the public health, safety, and general welfare; to meet future water supply needs; and to sustain economic growth."[7]

To achieve this goal, seven broad-based policies, listed in Figure III-A, were established to guide state, regional, and local planners in the protection of ground water. These policies have served as the foundation of many of the premises and guidelines used in this plan. Today, these policies are coordinated and integrated under the larger umbrella of the state's CSGWPP. The Ground Water Standing Committee was dissolved in 1991 and the responsibilities of the committee were transferred to the Land and Water Resource Council, Water Resources Committee, which now oversees ground water policy development and provides a common contact point for the various agencies involved with ground water matters.

In 1992, the State Planning Office once again became involved with ground water protection when it was designated as the lead coordinating agency for preparing the Maine Coastal Nonpoint Source Program. The Coastal Zone Amendments and Reauthorization Act of 1990[8] required all coastal states to prepare a Coastal Nonpoint Pollution Control Program which is submitted to both EPA and the National Oceanic and Atmospheric Administration (NOAA). Each state Coastal Nonpoint Pollution Control Program must, as a minimum, provide for the implementation of enforceable management measures to control identified sources of nonpoint pollution in conformity with guidance issued by EPA and NOAA. The Coastal Nonpoint Pollution Control Plan was submitted to EPA and NOAA in 1995. This program is integrated with both the statewide Nonpoint Source Management Plan and the various reports prepared under the Clean Water Act, at least as far as they relate to coastal waters.

Since 1996, the State Planning Office has also provided assistance to individual communities in Maine with the development of comprehensive management plans that address, among other things, the protection of existing and future drinking water resources. These water resources may include ground water and/or recharge areas.

Under the guidelines developed to implement Maine's Comprehensive Planning Program, communities may designate ground water resources *significant* to the community. Significant ground water resources may be those under a densely developed section of the community utilizing private wells or ground water selected for a future public water supply. The comprehensive management plan should then identify whether the significant ground water resource will be protected by exclusionary methods or through strict control of potential sources of contamination.

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2 [7] Dutram, Paul W., et al., "Maine Groundwater Management Strategy," Maine Groundwater Standing Committee, June 1989, pp. 6.

3 [8] 16 USC 1455(b).

MAINE GROUND WATER POLICIES

Policy 1 *There shall be no discharges of pollutants to ground water unless land use activities which have the potential to discharge pollutants to the soil conform to state and local regulations which address the attenuative capacity of local geological deposits to provide protection for ground water quality.*

Policy 2 *When ground water is polluted, sources of pollution shall be removed or contained so that the restoration of ground water quality to drinking water standards or better may proceed by natural processes, or by the application of technology when physically and economically feasible.*

Policy 3 *No development or use of land shall unreasonably cause or exacerbate salt water intrusion, or changes in historic ground water flow patterns and water table height.*

Policy 4 *The State Ground Water Classification System, with assessments of current and future ground water use, should be used by State agencies, municipalities, and water districts in protecting ground water systems.*

Policy 5 *It is the responsibility of municipalities to require the appropriate siting of new facilities and activities and performance standards for all facilities and activities not regulated by the State that may pose a threat to local ground waters in order to minimize damage.*

Policy 6 *Ground water and surface water are components of a single hydrologic system. Neither one should degrade the quality classification of the other.*

Policy 7 *Public water supplies, because they serve many people and businesses from single sources, are important municipal and State resources. Municipalities and water utilities should cooperate in the identification and protection of existing and future well head and recharge areas.*

Figure III-A: Maine Ground Water Policies[9]

4[9] Dutram, Paul W., et al., op. cit., pp. 6-7.

Municipalities

Under the constitution of the state of Maine, municipalities have broad "home-rule" powers to enact ordinances, including police power and land use ordinances. Under FIFRA, the authority to regulate pesticides is specifically delegated to the states, but not to local governments. The right of municipalities to regulate pesticides and application practices has been a controversial issue, being settled finally by both state and federal supreme court decisions.

In 1983, the town of Lebanon, Maine passed an ordinance prohibiting any commercial, non-agricultural use of herbicides in its town unless approved by a town meeting vote. In 1986, Lebanon denied Central Maine Power's request to spray its electrical rights-of-way and the case was brought to court. In 1990, the Maine Supreme Court finally upheld the town ordinance and firmly established the right of municipalities in Maine to regulate pesticides.[10] It was not until June 1991, that the U.S. Supreme Court also upheld a municipality's right to regulate pesticides beyond FIFRA.[11]

Meanwhile, in 1988, the Maine Legislature had passed a law requiring municipalities in Maine with pesticide ordinances to file them with the BPC in order for them to be deemed valid. Thirteen municipalities have filed copies of their ordinances with the BPC. The ordinances vary from bans on herbicide use on road sides to comprehensive pesticide prohibitions, including one which protects aquifers within two municipal-designated districts. The latter also requires an applicator to notify the code enforcement officer 60 days in advance of any plan to apply a restricted use pesticide within one of the districts. Although municipalities have no direct responsibilities under this plan, municipal comprehensive planning efforts, combined with ordinance powers, will play an important role in future land use patterns and pesticide regulation in Maine.

(See Section IIIA from Tammys stuff to compare to section III above)

SECTION IV
NATURAL RESOURCE CHARACTERIZATION AND BASIS FOR ASSESSMENT AND PLANNING

This section of the plan describes, in brief, Maine's ground water resources and soil characteristics and describes the BPC's basis for assessment and planning as it relates to pesticides and ground water management.

5[10] Central Maine Power v. The Town of Lebanon, 571 A.2d 1199 (Me. 1990)
6[11] Wisconsin Public Intervenor v. Ralph Mortimer, 115L Ed. 2d. 253, 111 S Ct. 2476.

Natural Resource Characterization: Ground Water

General Geology of Maine's Ground Water Sources

Maine obtains useful supplies of ground water from two sources of very different geologic origin: unconsolidated surface sediments deposited by glaciers over the last 25,000 years and underlying consolidated bedrock formations that began forming hundreds of millions of years ago.

The bedrock that forms the foundation of Maine was created by the same geologic processes active in the world today, including sedimentation, volcanic activity, intrusion of molten rock, metamorphism, and weathering and erosion. Regardless of their diverse origins, these bedrock formations have very similar ground water-bearing characteristics because crustal deformation has left them brittle and fractured.

Unconsolidated sediments that overlie the bedrock formations are largely products of continental glaciers that once spread across Maine and New England as far south as Long Island, New York. Much of what is seen today was deposited during the last 25,000 years by the most recent period of glaciation that ended in Maine around 10,000 years ago. Advance of the mile thick ice across the land left widespread deposits of mixed clay, silt, sand, cobbles, and boulders called till. The ice sheet's melting left more restricted deposits of sand and gravel, found primarily in valleys and low-lying areas, which are important sources of ground water today.

As the climate warmed and the ice sheet melted away, the weight of the ice had so depressed the Earth's crust in Maine's coastal region that the ocean flooded the area. Eventually, the land surface rebounded faster than the ocean flooding, and the sea level retreated back to a level approximately 180 feet below present sea level. Subsequently, sea level rose towards its present day shoreline. Throughout this area of temporary marine transgression, glacio-marine silt and clay deposits now cover the glacial till as well as sand and gravel deposits. Although clay and silt are not a source of abundant ground water in Maine, they are important because their low permeability has a strong influence on the occurrence and quality of ground water in the underlying sand and gravel and bedrock aquifers.

Geologic Maps

USGS topographic, 7.5 minute maps, available through the Maine Geological Survey (MGS), show elevation, culture, and drainage. These maps are used as the base maps for various studies, including the development of the BPC's assessment monitoring program as described in Section VII. MGS also has available reconnaissance and detailed surficial and bedrock geologic maps. These maps show sand, gravel, and other unconsolidated materials which overlie the bedrock in Maine and the nature of the underlying bedrock, respectively. They can be used for detailed geologic studies and planning for siting studies.

Ground Water Maps

Significant sand and gravel aquifer maps and reports are currently available from the Maine Geological Survey. These maps show the locations of sand and gravel aquifers which provide a yield of greater than 10-gallons per minute to a properly installed well. They can be used as a basis for detailed hydrogeological siting studies and planning and for providing information on aquifer favorability.

Ground Water Classification in Maine

Ground water in Maine is divided into two classification categories: GW-A, ground water of a quality that can be used for public water supplies, and GW-B, all other supplies not suitable for public drinking water. Maine's legislature, which has the role of formally classifying ground water, has classified all ground water in the state of Maine as GW-A. While this classification system does not recognize that all ground water is not of equal value and that it is not desirable to restrict land use activities equally throughout the state, GW-A, expressed as a goal for all ground water, prevents the further degradation of waters by prohibiting discharges which would cause ground water to violate established standards.

The Maine Department of Environmental Protection has attempted to identify ground waters which have higher value based in part on their current or future use. These waters are known as "priority waters" and fall into two broad categories: (1) wellhead protection areas and (2) ground water which is hydrologically connected to surface water in Class AA and Class A watersheds. Where these areas overlap pesticide use sites, the BPC will consider if additional protections are needed when writing a Pesticide SMP.

Natural Resource Characterization: Soils

Formation of Maine Soils

As mentioned previously, Maine soils began to form when the last glacier deposited its rock and soil materials either as glacial till or as water-sorted sediments along glacial streams, rivers, lakes, or the ocean. During the period of temporary marine transgression, higher ridges protruded above the ocean surface as islands, while the areas covered by sea water received a blanket of fine ground water-deposited sediments. The result of this inundation is a complex pattern of soils, derived from glacial till, fine sediments, sands and gravels, along the Maine coast and inland to the elevation of the limit of the marine transgression.

Soils currently recognized in Maine formed as a result of various weathering processes which are an interaction of climate, time, topography, and vegetation on parent material. The diversity of Maine soils reflects not only the various parent materials but also the weathering of the parent material and their position in the landscape.

Relevance of Soils to Pesticide Application

The ability of the soil to treat or attenuate potential contaminants associated with pesticides or any other chemical depends on many factors, including its texture, structure,

consistency, drainage class, organic matter content, and depth to bedrock or hardpan. In general, the soils best suited to protect ground water from contamination are those which have these features:

- fine texture,
- good soil structure,
- friable,
- well drained,
- relatively high organic matter contents, and
- relatively greater depth to bedrock or hardpans.

It is important to understand soil characteristics and their limitations. It may be possible to modify some characteristics so that the soils offer a better buffer for ground water, such as altering the drainage by diverting surface water away from a field or altering organic content by adding organic matter to coarse textured soils.

Soil Maps

The easiest way to learn about the soil characteristics of a given site is to refer to soil maps prepared by the Natural Resources Conservation Service (NRCS). These maps are published in books, or online at http://www.soils.usda.gov/survey/, and include a detailed description of the soil and soil characteristics. These books, called Soil Surveys, are completed for many counties in Maine and include most of the organized areas. If a soil survey is not published for a county, contact the local Soil and Water Conservation District office for soils information. The NRCS, housed in District offices, may be in the process of preparing soil maps for that area.

It is important to keep in mind that NRCS soils maps are sometimes useful for large-scale pesticide users, but for smaller farmers or homeowners, these maps are not site specific enough. For instance, many areas soil mapped by NRCS use map units of 15 - 40 acres in size. Any soil area smaller than that minimum size is lumped into the larger map unit and considered an inclusion. Even the higher detail NRCS soil maps have minimum map unit sizes of about 3 acres. That means a 2-acre garden, lawn, etc. may be on completely different soils than the soil map indicates. Even for the bigger user, the map unit may be an association with 3 named soils. One needs to be able to determine the soil where a pesticide use is to occur. Ideally, a pesticide user should have a high intensity soil survey made by a Maine Certified Soil Scientist to provide site specific information, especially for sensitive areas such as over potential aquifers.

Basis for Assessment and Planning

Because all ground water in Maine is classified as suitable for public drinking water, theoretically, all ground water should receive equal protection. The designation of priority waters provides a basis for resource prioritization, however, the majority of Maine agriculture lies outside these areas. Rather than prioritizing protection efforts on the ground water resource, the BPC has instead formed its basis for assessment and planning on vulnerability by focusing on

(1) ground water monitoring data and (2) commodities or pesticide use sites where pesticides with a high potential to leach are used.

Ground water monitoring projects by the BPC have provided a wealth of information about ground water quality and site characteristics which may lead to contamination. The BPC, utilizing small, well-designed studies, has been able to identify locations in the state where ground water quality has been impaired through use of a specific pesticide. However, ground water monitoring is expensive and ongoing projects are difficult to maintain. Also, because of the limited scope of many of these studies, statewide generalizations can seldom be made. See Section VII, "Ground Water Monitoring," for a further discussion of the role of monitoring.

Computer models have also been tried in Maine with varying success. In 1989, the MGS, U.S. EPA, Region I, and the BPC initiated the *Maine Agricultural Chemical - Ground Water Mapping Pilot Project.* The primary objective of this project was to test vulnerability systems, in this case Agricultural DRASTIC, for predicting ground water contamination in an intensely farmed region in northeastern Aroostook County. A secondary objective was to assess the usefulness of geographic information systems (GIS) in pesticides-in-ground-water studies.

In conclusion, the study provided no support for using the Agricultural DRASTIC methodology in developing a county-wide or regional pesticide/ground water quality management plan on the computed relative vulnerability of ground water. GIS proved to be an extremely useful tool for the organization and integration of mapped and tabular data. However, the effectiveness of GIS was limited due to the long time period necessary to gather and enter map data into the system. Once more map data are available, using GIS for sensitivity and vulnerability assessments will be more cost- and time-effective.[12]

The most useful computer model available for assessing vulnerability is the National Pesticide/Soil Database and User Decision Support System for Risk Assessment of Ground and Surface Water Contamination, better known as NPURG. NPURG gives the user the opportunity to quickly evaluate the relative leaching and surface loss potentials for multiple pesticides on one or more specific soil types.

NPURG has been made available free of charge to landowners through county Cooperative Extension and Soil and Water Conservation District offices in Maine. The DHS, Drinking Water Program is currently using NPURG to identify those pesticides with a low leaching potential in order to provide waivers to public water systems for Phase II and Phase V monitoring requirements. Until better models or more cost effective means are identified, the BPC will continue using NPURG as a planning tool in vulnerability assessments. For a further description of NPURG, selected sections of the users manual and sample data sheets can be found in Appendix B.

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1 [12] Williams, John S., Nancy A. Beardsley, et al., "Assessment of Ground Water Contamination Vulnerability from Agricultural Chemical Use in Northern Maine: The Maine Agricultural Chemical - Ground Water Mapping Pilot Project" (Final Draft Report), January 1992, pp. 1-2, 6.

SECTION V
PESTICIDE USE IN MAINE

Maine Agriculture and Land Use

The story of Maine agriculture in the past, the present, and the future is one of adaptation to the changing world around us. Maine has changed from a state where more than half the households were farm-based, to one where about 7,200 farms in Maine produce more food than the state consumes in total. Unlike the isolated conditions of a hundred years ago, Maine products now compete in markets around the world.

Since 1840, the U.S. Department of Commerce, Bureau of the Census, has been conducting a national agricultural census. The census now is conducted on a 5-year cycle, collecting data for years ending in 2 and 7. The agricultural census is the leading source of consistent, comparable, statistical information about the nation's agricultural production at the county, state, and national levels.

According to the last available census (2002), farms control approximately 1.3 million acres of land in Maine. The average farm in Maine is approximately 190 acres. About 94% of the farms in Maine are owned by individuals or families, but only slightly less than half of the operators describe their principal occupation as farming. Clearly, the Maine farm today represents a unique scenario, blending the tradition of the family farm with contemporary rural economic conditions.

Farm acres in Maine are divided primarily among woodland (51.2%) and cropland (39.1%), with the remaining acres divided between pastureland, rangeland, and other land. Although not the leading money crop, hay, including alfalfa and grass silage, dominates Maine cropland with over 209,955 acres. Potatoes follow second with over 64,000 acres concentrated primarily in Maine's northern Aroostook County. Wild blueberries continue to be eastern Maine's primary commodity with approximately 86.8% of Maine's bearing acres in Washington and Hancock counties. Figure V-A lists some of those crops in Maine grown on over 1,000 acres and the counties with significant acreage.

In additional to the traditional farm settings, Maine has approximately seventeen million acres of commercial forest lands. Approximately half of these lands are owned by the state's seventeen industrial timber/paper companies. Herbicides are used in management practices designed to control competition and increase yields of desired species. Such practices include initial site preparation, softwood release, and precommercial thinning, with a majority of the herbicide use for softwood release. In 1996, approximately 47,500 acres of forest land were treated with herbicides, less than one percent of total commercial forest land.[13]

1[13]Compilation of 1996 Notices of Aerial Pesticide Application, Board of Pesticides Control

CROPLAND AND COMMODITY ACREAGE

Item		2002 acres
Land in farms		1,369,768
Total woodland		702,555
Total cropland		536,839
Hay-alfalfa, other tame, small grain, wild, grass, silage, green chop, etc.	(Maine)	209,955
	(Arrostook County)	33,073
	(Kennebec County)	27,980
	(Somerset County)	23,152
	(Penobscot County)	24,130
Fall potatoes	(Maine)	64,474
	(Aroostook County)	59,418
	(Penobscot County)	3,011
	(Oxford County)	1,384
Corn for silage or green chop	(Maine)	24,351
	(Androscoggin County)	2,759
	(Kennebec County)	4,044
	(Penobscot County)	6,811
	(Somerset County)	4,029
	(Waldo County)	3,314
	(York County)	6,759
Wild blueberries*		
	(Maine)	23,000
	(Washington County)	16,844
	(Hancock County)	3,126
	(Waldo County)	1,494
Apples	(Maine)	3,891
	(Androscoggin County)	955
	(York County)	414
	(Oxford County)	657
Sweet corn	(Maine)	1,970
	(Androscoggin County)	254
	(York County)	(D)
	(Cumberland County)	240
Dry Beans	(Maine)	367

* Maine has between 50,000 to 60,000 acres of wild blueberries with approximately half of the acres bearing fruit on any given year.

(D) Withheld to avoid disclosure of data for individual farms.

Figure V-A: Cropland and Commodity Acreage

Agricultural Chemical Use In Maine

There are a number of reporting and survey mechanisms in existence which contribute to understanding the sales and use of Maine's approximately 6500 registered pesticide products. Sales data combined with spray and crop recommendations begin to create general geographic patterns. This section of the management plan describes the reporting and survey methods currently being utilized in Maine, summarizing the most recently available data.

U.S. Department of Commerce, Census of Agriculture

Although the Census of Agriculture primarily deals with livestock and crop production data, it also yields statistics related to agricultural chemical use. Figure V-B summarizes the data gathered on agricultural chemical use from the 1992 Census of Agriculture. Specific county breakdowns are given in the census, but not by pesticide.

Pesticide Sales Database

Since 1977, annual restricted and limited use sales reports have been required as part of the licensing procedure in Maine for restricted use pesticide dealers. Unfortunately, resources have not always been available to provide proper maintenance and management of the data, and early efforts at compiling the sales data were sporadic at best.

In 1990, this data compilation process was further complicated by the addition of general use pesticide sales data. Responding to concerns about lawn care and structural pesticides and their use, the Maine legislature instituted general use pesticide dealer licenses in 1989. Annually, these dealers must report on the sales of general use pesticides sold in packages of one quart or greater or five pounds or greater. There are over 600 licensed general use pesticide dealers in Maine, and the data which they generate are voluminous.

The most recently available compilation effort was undertaken with the 1995 sales data. The list of products reported was screened and narrowed for those products used in agriculture. A preliminary tabulation of active ingredients and their percentages within the formulations were researched and added to the database. The results for those active ingredients sold in amounts over 1,000 pounds are in Appendix C, "1995 Agricultural Pesticide Sales Data."

AGRICULTURAL CHEMICALS USED, INCLUDING FERTILIZER AND LIME IN 1992[14]

2[14]Ibid., pp. 21.

Item	1992
Total farms in Maine (number)	5,776
Land in farms (acres)	1,258,297
Any chemicals, fertilizer, or lime used (farms)	3,631
Commercial fertilizer (farms)	3,181
(acres on which used)	257,402
Sprays, dusts, granules, fumigants, etc., to control	
Insects on hay and other crops (farms)	1,692
(acres on which used)	133,702
Nematodes in crops (farms)	143
(acres on which used)	13,401
Diseases in crops and orchards (farms)	885
(acres on which used)	87,945
Weeds, grass, or brush in crops and pasture (farms)	1,482
(acres on which used)	146,504
Chemicals used for defoliation or for growth control of crops or thinning of fruit (farms)	560
(acres on which used)	61,640

Figure V-B: Agricultural Chemicals Used, Including Fertilizer and Lime

In 1997 the Maine Legislature enacted two laws which will significantly change how sales data is both collected and tabulated. The first requires the BPC to begin annual tabulations of both the pesticide sales data and commercial applicator annual summary reports. This bill, originally intending to establish specific pesticide use reduction goals for the State, was modified in workshop sessions to require the compilation of this baseline data. However, unlike recent tabulations, the sales data will be tabulated only according to trade name and EPA Registration number, not active ingredient.

The second law enacted shifted the burden of general use pesticide sales reporting from individual licensed dealers to wholesalers. With 600 licensed general use pesticide dealers in Maine, both the number of reports and the variation within those reports made compilation difficult. The BPC estimates that there may be as few as 50 wholesalers who distribute general use pesticides in Maine. This smaller number will eventually lead to a better trained, reporting group and eliminate many data errors up front. In the near future, however, the BPC anticipates a small decline in data quality while wholesalers are being identified and informed of their new reporting requirements. Sales reports from restricted use pesticide dealers remained unchanged.

Applicator Record Keeping and the 1990 Farm Bill

In Maine, nearly all certified applicators are required to keep and to maintain application records, although only commercial applicators are required to report on pesticide use to the BPC (See below -- Commercial Applicator Annual Summary Reports). Certified private applicators, until 1993, were required to keep records only for outdoor applications with powered equipment. These records are not submitted to the BPC, although they are available for inspection by the BPC staff.

The 1990 Farm Bill included a provision requiring that all agricultural users of restricted use pesticides maintain records of their use. A Federal Register notice, published May 12, 1992, listed the proposed elements for each record. They include:

- The brand name or product name, formulation, and the EPA registration number of the product applied;
- The total amount and rate of application;
- The address or location, the size of area treated, the target pest, and the crop, commodity, or stored product to which the restricted use pesticide was applied;
- The month, day, and year on which the application occurred; and
- The name, address, and certification number of the certified applicator who applied or who supervised the application.

The record keeping provision includes a requirement that USDA and EPA survey restricted use pesticide records annually to develop a comprehensive report on pesticide use to Congress. While this will allow the Federal government a better opportunity to estimate pesticide use regionally and nationally, the 1990 Farm Bill, as with Maine law, does not provide for the gathering of statewide, site-specific data, a key piece of information in ground water vulnerability assessments.

Non-agricultural Pesticide Use

Agriculture, although the largest sector of pesticide use in the state, is by no means the only contributor to outdoor pesticide use. Outdoor applications of pesticides occur to:

- Lawns and golf courses,
- Ornamental trees and shrubs,
- Utility and railroad rights-of-way,
- Roadsides, and
- Homes and industrial buildings.

The following sections characterize several nonagricultural sites of primary importance in Maine.

Roadsides and Rights-of-way

Roadside vegetation management is conducted primarily by the Maine Department of Transportation (MDOT) and the Maine Turnpike Authority, although some cities and towns also undertake limited projects. In 1996, MDOT used herbicide applications on slightly over 9,100 miles of roadside to control vegetation under guardrails and larger species which could interfere with highway safety.[15]

Vegetation control is also conducted along utility, railroad, and timberland access rights-of way. Most utility companies combine handcutting and backpack herbicide applications on a three- to four-year rotation to control tree growth.[16] Larger trees, over eight to ten feet tall, are mechanically cut. The stumps of those species capable of resprouting are treated with a herbicide. Central Maine Power, Maine's largest electric utility, uses these practices to control vegetation along it's 2,200 miles of transmission lines.[17] Herbicides are also used along Maine's railroads. In 1995, over 5,400 acres adjacent to railroad tracks were sprayed to control vegetation.[18]

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3 [15]Maine Department of Transportation 1996 Commercial Applicator Annual Summary Report, Board of Pesticides Control.

4 [16]Cline, Michael L., et. at., "Pesticide Reduction: A Blueprint for Action," Maine Audubon Society, June 1990, pp. 23-25.

5[17]Commission to Study the Use of Herbicides, op. cit., pp. 31.

6 [18]RWC, Inc. 1995 Commercial Applicator Annual Summary Report and Variance Request Permit, Board of Pesticides Control.

Lawns and Golf Courses

According to 1988 EPA estimates, products used to control turf pests in lawns, parks, gardens, and golf courses constitute a large and growing market. Generally known as lawn care pesticides, their sales nationally have increased to over $700 million annually and result in sixty-seven million pounds of active ingredient being applied. EPA estimates that professional lawn care companies, treating mostly residential lawns, do a $1.5 billion annual business.[19]

In Maine, there are over 750 individuals licensed to control turf pests, including commercial lawn care applicators and golf course superintendents. In 1989, licensed pesticide dealers sold approximately 450,000 pounds of granular lawn care formulation for use by commercial applicators and homeowners on residential and commercial sites in Maine. By 1995, total pounds of granular formulations sold had risen to over 750,000 pounds.

Commercial Applicator Annual Summary Reports

The best means available to estimate non-agricultural pesticide use are commercial applicator summary reports. Annually, companies must file a report summarizing their pesticide applications. For a number of years, the University of Maine Cooperative Extension assumed management responsibilities for these data which they used in preparing pesticide recommendations. Beginning in 1998, the BPC will be responsible for compiling these data and reporting annually to the Maine Legislature.

Household Pesticide Use

Very little is known about homeowner pesticide use in Maine or nationwide. Maine's pesticides sales database is limited because only products in packages greater than one quart or five pounds need be reported. This leaves many household pesticides unreported.

In March 1988, EPA contracted Research Triangle Institute to design and conduct the National Home and Garden Pesticide Use Survey (NHGPUS). The NHGPUS was a one-time, cross-sectional survey of the use of pesticides in and around homes in the United States. Data were collected on a list of items, including which pesticides were used and what they were used for. The NHGPUS found an average of 3.84 (+/- 0.5) pesticide products per household, estimating the total number of pesticide products in storage at residences nationwide at nearly 325,000,000.[20]

In 1993 the BPC surveyed more than 1,000 people attending two of Maine's largest garden shows about their pesticide-use habits. Three hundred revealed they were either certified applicators or persons who refrain from pesticide use. Of the remaining 724 participants (considered *at-home applicators*), 85 percent acknowledged they use pesticides around the home

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7 [19]U.S. General Accounting Office. "Lawn Care pesticides: Risks Remain Uncertain While Prohibited Safety Claims Continue," (GAO/RCED-90-134), March 1990, pp.8.

8 [20]U.S. Environmental Protection Agency, "National Home and Garden Pesticide use Survey," April 1992, pp. 1-2, 6.

and garden. An astounding 15 percent of these at-home applicators, after reporting they do not use any pesticides, proceeded to supply information on the frequency and types of pesticides they regularly applied. Further, less than half of the at-home applicators surveyed, whether aware or oblivious of their use of pesticides, acknowledged they wear personal protective equipment (gloves, goggles, mask) when making an application.[21]

Based on surveys such as those described, the potential impact of homeowner pesticide use on ground water quality cannot be overlooked. Pesticide use and disposal practices by homeowners remains relatively unchecked by regulatory officials until a complaint is received or a problem investigated, and quantitatively determining their impact on ground water quality is nearly impossible. Section VI, "Prevention Strategies and Information Dissemination," discusses avenues available to educate homeowners about proper pesticide use and ground water protection.

SECTION VI
PREVENTION STRATEGIES AND INFORMATION DISSEMINATION

As stated in Section II, Maine's management plan for pesticides in ground water emphasizes prevention over post-contamination remediation. This section of the plan describes the education and pesticide control strategies that will be used to prevent contamination and the means which will be used to inform pesticide users about the requirements of Pesticide SMPs.

Best Management Practices

Regardless of how a pesticide is regulated or managed, the user will continue to be in the unique position of directly controlling the use of pesticides in the field. Thus, the user has the responsibility to seek better understanding of ground water concerns. At a minimum, as required by federal and state law, a user must follow the instructions found on the label of each pesticide product and, when required, be trained and certified in the proper use of the pesticide.[22] In addition to what is required by law, there may be certain methods, measures or practices that the user can perform to help prevent, reduce, or correct ground water contamination. These methods or measures are known as Best Management Practices (BMPs).

Rarely will the use of a single pesticide BMP be sufficient to adequately address a particular ground water concern. More frequently, a number of BMPs, individually selected to

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9 [21]Maine Board of Pesticides Control, “BPC Widens Focus on At-Home Applicators; Homeowners are Maine’s Largest and Least Accountable Users of Pesticides,” *BPC Communicator*, Vol. 8, No. 1, April 22, 1997, pp. 1.

1 [22]U.S. Environmental Protection Agency, op. cit., pp. 109.

fit the unique characteristics of each site and operation, will be required. These groups of BMPs are referred to as a Best Management System (BMS).[23]

The *Maine Nonpoint Source Pollution Management Plan* (Maine Dept. of Environmental Protection, November 1989) identified several major source categories in which strategies could be developed to control nonpoint source (NPS) pollution. These included agriculture, silviculture, and transportation facilities and support. Several task forces were formed to develop and, subsequently, implement the BMPs identified for each source category. In October 1991, the Maine Agriculture Nonpoint Source (NPS) Task Force completed worked on *Strategy for Managing Nonpoint Source Pollution from Agricultural Sources.* This document described, in general terms, pesticide BMPs and encouraged their adoption.

A 1996 study conducted by the University of Maine evaluated grower adoption rates for these pesticide BMPs. In the study potato producers' use of BMPs in four areas -- sediment, pesticides, nutrients and manure -- was evaluated. The overall adoption rates for most of the pesticide BMPs were extremely positive. Four of the 13 possible BMPs -- becoming a certified applicator, safely disposing of extra spray, reading and following label directions, and avoiding drift -- had a 100% adoption rate. The study also found that if growers were familiar with the term BMP, they were more likely to select a less leachable pesticide.[24]

Since 1991, specific BMPs for the use of the herbicides atrazine and hexazinone have been developed by subcommittees of the Maine Agriculture NPS Task Force. The BPC will continue to work with these groups to develop pesticide-specific BMPs and to educate users about them.

Education of Users

Pesticides user education remains at the forefront of any ground water protection strategy. There are numerous avenues available to educate the wide variety of pesticide users in the State -- from utilization of radio, television, and newspapers to educate the public about its role in groundwater protection to site-specific technical assistance programs for farmers that directly address pesticide use patterns in relation to soil and cropping practices. The first part of this section addresses some of the education tools currently available and some which, hopefully, will be available in the future. Any of these education means can be tailored to a specific pesticide. Their unique role in Pesticide SMPs will be detailed when these plans are developed.

Certification and Training

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2 [23]Maine Agriculture NPS Task Force, "Strategy for Managing Nonpoint Source Pollution from Agricultural Sources," October 1991, pp. 9.

3 [24]Jemison, Jr., J.M., M.H. Wiedenhoeft, and E.B.Mallory, "Best Management Practices Evaluation Project: Potato Industry, " Proceedings of Water Pollution/Agriculture Conference: What Farmers Need to Know About Water Pollution, Augusta, Maine, April 2, 1997. A copy of the report is attached in Appendix I.

The cornerstone of educational efforts in ground water protection is applicator recognition of the contributing factors to contamination. The primary avenue in achieving this is through certification of applicators (see Section III, "Cooperating Agencies" for a description of certification and licensing). Since the Fall of 1989, a section called "Pesticides and the Environment" has been included in the core *Pesticide Education Manual*, developed by Pennsylvania State University and adapted for use in Maine by the University of Maine Cooperative Extension and the Maine Board of Pesticides Control. "Pesticides and the Environment" covers topics such as pesticide fate in the environment, and reducing hazards to ground water. Ground water-related questions are included in the core exam as well.

Ground water protection is a regular component of recertification efforts in Maine. There have been numerous presentations on the protection of ground water including presentations given at the annual Agricultural Trades Show and potato and blueberry seminars. As Pesticide SMPs are implemented, additional training classes on the requirements of such state management plans have been and will continue to be offered to assist applicators in meeting the mandates. The BPC will work with affected commodity groups and trade associations to ensure that Pesticide SMP training is offered to their memberships.

Outreach Efforts

However, not every pesticide user in Maine uses restricted or limited use pesticides. Hundreds of thousands of pounds of general use pesticides are used each year in Maine, therefore efforts to reach general use consumers and applicators are an important intervention step. Listed below are some of the avenues available to inform licensed applicators and other pesticide users about the Generic SMP, Pesticide SMPs and ground water protection measures.

Newsletters and Mailings

The Board of Pesticides Control periodically produces a newsletter, *The BPC Buzz*, for the regulated pesticide community, media, environmental groups, and other interested parties. *The BPC Buzz* can service outreach efforts on a regular, per- issue basis, apprising its readership, primarily applicators, with the general goals of the Generic SMP, as well as with specific announcements of federal regulations and product reregistrations. The newsletter is especially useful for explaining the rationale behind pesticide regulations.

Commodity-specific newsletters are also published and distributed by UMCE. The potato newsletter, *Spudlines*, is published three to four times a year and has a circulation of 700-800. *Pest Alert* is published weekly during the summer for commercial potato growers, and also has a circulation of 700-800. UMCE also publishes *The Orchard Newsletter, Vegetable and Berry News,* and *Wild Blueberry News.* The now defunct *Cows and Crops,* the newsletter for dairy, had addressed BMPs, atrazine use, and ground water protection on several occasions. Cooperative Extension regional offices also publish monthly newsletters that address specific regional concerns and keep their readers informed about changes in state and federal regulations. Beyond newsletters,

UMCE continually reaches users by providing updates to their brochures and conducts specific mailings on items of urgency and importance to applicators and users in Maine.

In addition to newsletters published by the BPC and UMCE, many of the agricultural and pesticide user associations in Maine publish newsletters for their constituents. The Pomological Society, Maine Potato Board, Northeast Weed Science Society, and Forest Products Council are just some in Maine and New England that have their own newsletters. The BPC has the capability to use these additional trade-specific publications to inform their readers about regulatory changes in their field, although direct mailings have proven to be more effective in reaching individual members. As Pesticide SMPs are implemented, if warrented, the BPC will be able to address specific commodity concerns through these association's newsletters and direct mail pieces.

Talks to Civic and Growers Groups

Other avenues of public education are talks to civic and growers groups. The BPC Director addresses regulators, environmental groups, and growers on a host of topics. BPC's water quality specialist gives presentations to growers and watershed management groups, and BPC's pesticide toxicologist gives presentations before growers groups, agriculture educators and university-level students. Any of these avenues may afford an entree to the discussion of state management plans.

UMCE Specialists are available to speak to interested groups on a variety of either crop-specific or pest-specific problems. Pesticide dealers in Maine often host growers' meetings, inviting a member of the BPC or UMCE staff to address the group about a particular topic. Also, ten Cooperative Extension regional offices in Maine offer Master Gardener Programs for homeowners and small commercial growers. Even though these classes are not part of the certification program, pesticide use is discussed with participants and applicable state and federal laws are explained. The BPC certification specialist does a pesticide awareness program for master gardeners that includes a section on ground water protection.

Public Service Announcements (PSAs)

Public service announcements (PSAs) can be used to educate the general public about proper pesticide use and ground water protection. In 1992, UMCE sponsored a series of drinking water protection PSAs on television stations in Maine. These focused primarily on identification of sources of contamination. The BPC has developed a pesticide label comprehension PSA with the Maine Broadcasting System which ran as part of their "Color Me Green" campaign during the summer of 1993.

Informational Brochures

The BPC and UMCE currently publish a variety of brochures that address crop, pest, ground water, and safety-related topics. Aside from being available through the mail from any of their offices, UMCE field representatives and BPC pesticide inspectors

carry this literature with them for distribution and discuss these issues with applicators, dealers, and growers during visitations and inspections. This one-to-one contact is important; the opportunity to explain recommendations and to leave instructions in the hands of the farmer, applicator, or dealer is often more effective than other training or education methods. For single copies of any of the materials listed below, readers are encouraged to contact the BPC at (207)287-2731 or the UMCE at (800)287-0279 or, outside Maine, at (207)581-3880.

Cooperative Extension Weed and Pest Control Guides

UMCE, in cooperation with extension offices in other New England states, has published a variety of commodity-specific weed and pest control guides. These guides serve as an invaluable source of information to farmers and applicators on their choice of an appropriate pesticide. The characteristics of specific pesticides are discussed and recommendations for their use to control certain commodity problems are given. In the early 1990's guides began to address ground water protection and the factors which contribute to leaching: soil, pesticide, and water table characteristics. NPURG ratings on the leachability of pesticides are now common place in most guides. Guides for potatoes, corn and forage crops, commercial vegetable production, small fruit, nursery crops, turf, problem weeds and brush, and Christmas trees are currently available. The BPC anticipates working with UMCE to develop editions which highlight the requirements of Pesticide SMPs and remind users of any special use restrictions in Maine.

"Best Management Practices for Maine Agricultural Producers"

An early and substantial effort to produce ground water protection publications lead in 1989 to UMCE's *"Best Management Practices for Maine Agricultural Producers: Protecting Ground Water from Nutrients and Pesticides"* (not to be confused with BMPs as described earlier in this section). Its readable text, timely recommendations and easy-to-understand worksheets have been valuable in the initial training of farmers and applicators about the factors involved in pesticide contamination of ground water. It has been distributed widely and over 400 individuals are on UMCE's mailing list for updates to the manual.

In addition to the above publications, a Drift Management Resource Notebook and Pesticide Applicator Log Book have also been developed and distributed by UMCE. Numerous state training programs have been held for producers to assist them in complying with drift management and record keeping regulations.

"Before You Use Pesticides"

Homeowners have historically been the most difficult group to reach with educational materials about pesticides and ground water. In 1991, the BPC published *"Before You Use Pesticides,"* which features a signature character who sets a lighter tone for discussing concerns about homeowner use of pesticides. Topics include subjects viewed by EPA and BPC surveys as least understood by the home users of pesticides.

Label comprehension, the difference between a pest and pest infestation, risks and benefits to pesticide use, storage and disposal, spill control, and proper disposal of obsolete pesticides are just some of the topics discussed.

"Ground-Water Facts for Maine Residents"

The Maine Department of Environmental Protection, Bureau of Land and Water Quality has produced a brochure for the general public which describes what ground water is, threats to ground water, and steps the average citizen can take to protect it. This brochure is distributed by the BPC at its informational booths and to callers with pesticides and ground water questions. A companion brochure, *"Ground-Water Facts for Municipal Officials"* is also available and distributed to community planners with wellhead protection issues.

Farm*A*Syst

The Farmstead Assessment System, better known as Farm*A*Syst, is a series of twelve worksheets that help farm owners assess how effectively farmstead practices protect their drinking water. The worksheets provide farm owners with a numerical score on different farmstead practices which might be affecting their well water. The numerical score then allows farm owners to look at each potential source of contamination in light of particular site conditions, to compare potential sources to see where improvements are needed most, and to determine where to spend time and money most effectively to protect the ground water that supplies drinking water wells. With each worksheet is a fact sheet that contains suggestions about things which can be done to modify farmstead practices and places to go for additional information and help. While field practices also have the potential to contaminate ground water, the Farm*A*Syst series is not designed to address this concern. The specific focus of Farm*A*Syst is the potential impact of farmstead practices and structures on drinking water supplies.

Farm*A*Syst was developed by the University of Wisconsin, Cooperative Extension; Minnesota Extension Service; and the U.S. Environmental Protection Agency, Region V. Because of differences in Maine geology and farming practices, the University of Maine Cooperative Extension assembled a work group, consisting of representatives from DAFRR, BPC, NRCS, MGS, and DEP, to review the worksheets and fact sheets and to make them applicable to Maine conditions and regulations. The Maine edition was completed in 1994 and is being used by Cooperative Extension in one-on-one grower education efforts.

Technical Assistance and Research

Technical Assistance

A variety of technical assistance programs and specialists are available to pesticide applicators and landowners who wish to minimize pesticide use and protect their ground water resources. Long before this plan was conceived, many efforts were being made in instructing farmers and applicators in their role in preserving natural resources for future agricultural and nonagricultural uses.

University of Maine Cooperative Extension

The UMCE provides technical assistance and educational programs to growers in the areas of crop production, pest control, and water quality. Extension specialists are available for a variety of commodities, including potatoes, tree and small fruit, horticulture, forestry, and agricultural engineering. The UMCE Pest Management Office is staffed by an Insect Diagnostician, a Plant Disease Diagnostician, and a Pest Management Specialist; all of whom help growers to identify and treat pest problems. In 1991, the UMCE added a Water Quality Specialist to their staff to educate landowners and the general public on surface and ground water protection. A substantial number of educators have also been trained in WIN-PST, the Windows Pesticide Screening Tool developed and supported by the USDA-NRCS National Water and Climate Center. WIN-PST is one of the few vulnerability assessment programs available and assists land users in choosing the pesticide, based on their soil type, which will be least likely to leach. (For more information about WIN-PST, see Appendix B.)

USDA Natural Resources Conservation Service (NRCS)

In addition to WIN-PST, the Natural Resources Conservation Service provides technical assistance to land users in the areas of erosion control, water quality, crop management, soil management, environmental assessments, and other special programs. In Maine, NRCS is staffed with an Agronomist, a Biologist, an Economist, a Water Resources Specialist, a Forester, a Plant Materials Specialist, a Geologist, and other soil and engineering specialists. Additional technical specialists at the regional and national NRCS offices are also available to Maine upon request. NRCS assists land users in developing site-specific plans and carries out soil surveys, national resource inventories, and river basin and watershed programs. Its Resource Conservation and Development program is focused on solving community or group problems. NRCS maintains a detailed set of standards and specifications in each of the sixteen field offices called, *"Field Office Technical Guide."* These guides describe how agricultural, erosion, and water quality practices should be installed and how these practices should fit together into systems for solving total-farm problems.

Soil and Water Conservation Districts

Maine's sixteen Soil and Water Conservation Districts (SWCDs) are subdivisions of state government, created to provide for the conservation of our state's soil and water resources. Governed by a five-member board of supervisors, elected or appointed from constituents living within each district's boundary, SWCDs utilize a unique combination of federal, state, and local resources to carry out their mission.

It is through district offices that NRCS technical staff assist land occupiers, a cooperative effort to solve local soil and water conservation problems. SWCDs can also employ their own technical and/or administrative staff to work in concert with NRCS staff, when necessary, to meet local needs. Federal and state research funds are often funneled to SWCDs because of their strategic locations, technical capability, and close working relationships with cooperating agencies and land occupiers within district boundaries. Examples include Washington County's Integrated Crop Management (ICM) Program, designed to minimize the use of pesticides on blueberries. Another county office, Hancock County, has conducted a study of Velpar (hexazinone) transport in blueberry field soils.

UMCE Research and Assistance Projects

Numerous research projects currently are being conducted in Maine by the UMCE. A Hydrologic Unit Project at the Fish River Lakes in Aroostook County, Maine, is providing detailed technical assistance to farmers in pest and soil management. Other projects include a hydrologic unit project in the Meduxnekeag River/Houlton, Maine, area and a demonstration project for the use of organic wastes in Androscoggin County, Maine.

The UMCE is also conducting a number of integrated pest management (IPM) programs for Maine crops such as potatoes, broccoli, sweet corn, blueberries, apples, and small fruit. Integrated crop management (ICM) projects are also being conducted on many farms in Maine. ICM is a cost-share program through FSA with the goal of obtaining a 20% reduction in pesticide and nutrient application over three years.

Pesticide Control Measures

Many of the prevention measures mentioned in the previous sections are ongoing programs. In some instances, current efforts and programs may not be sufficient to prevent ground water contamination and more stringent measures may be needed as part of a Pesticide SMP. The regulatory alternative to best management practices, education, and technical assistance is a multi-tier approach to pesticide control measures. Which measures are chosen as part of a Pesticide SMP will depend, in large part, on the decisions made by the Pesticide SMP Advisory Committee.

Pesticide SMP Advisory Committee

The Pesticide SMP Advisory Committee will assist and advise the BPC on technical decisions related to the development of Pesticide SMPs. The committee will be composed of permanent members (known as "Core" members) and individuals with knowledge specific to the Pesticide SMP under development. A policy statement describing the membership and duties of the Pesticide SMP Advisory Committee can be found in Appendix D.

When considering appropriate prevention measures, a Pesticide SMP Advisory Committee will consider the following information:

- the scope of crop and non-crop uses in Maine,
- current application practices in Maine,
- chemical characteristics of the pesticide,
- economic impact on user community(ies),
- available sales and use data in Maine,
- availability of efficacious chemical and non-chemical alternatives,
- environmental impact on Maine's ecosystem,
- practicality of changes in application practices,
- potential health impacts and the product's toxicity,
- geographic specificity of use which may yield identifiable geologic characteristics, and
- past ground water monitoring data or the practicality of monitoring when no data exist.

Pesticide Control Measures

Below is a description of all available pesticide control measures. These options may be used individually or under the larger umbrella of a Pesticide SMP as depicted in Figure VI-A. All options, except adoption of a Pesticide SMP (which is considered a policy adoption by the Board), require rulemaking under the Maine Administrative Procedures Act; therefore, there will be an opportunity for public input at all of these levels.

Pesticide State Management Plan (SMP)

Although required for continued use of pesticides identified by EPA, the state may choose to write a Pesticide SMP for products which present a threat to ground water in Maine. A Pesticide SMP details how the resources, prevention and response measures, as generally described in this Generic SMP, would be utilized to protect ground water from a specific pesticide. A Pesticide SMP may or may not be regulatory in nature; it may simply be used as the coordinating mechanism for resources and programs. Maine's experience with hexazinone, however, showed that a Pesticide SMP may have both regulatory and non-regulatory components which work together to protect ground waters. The regulatory components of a Pesticide SMP are described in detail below.

Restricted Use Classification

One of the first regulatory avenues the BPC can utilize in the control of pesticides of state concern is reclassification onto Maine's Restricted Use List. When a pesticide is registered as restricted use in Maine, it can be sold only by appropriately licensed dealers and be bought only by applicators licensed to apply restricted use products. In this way, the BPC can be assured that users of such pesticides have been trained in proper application techniques and that applicators have an understanding of the factors that contribute to ground water contamination.

Pesticides which are identified by EPA as requiring a Pesticide SMP will be classified as Federally Restricted Use, therefore these products will be automatically added to the Maine's State Restricted Use list. The Ground Water Planning Committee, the group responsible for this Generic SMP, continues to work on criteria to classify a pesticide as restricted use based on ground water concerns in Maine.

Special Restriction of Pesticide Use

The BPC may also promulgate rules to impose special restrictions on pesticide use. These "special restrictions" would prescribe management practices, such as mandatory setback areas from wells or surface waters, without site-specific considerations. In 1981, the BPC set a precedent for such actions by adopting 01-026 CMR Chapter 41, "Special Restrictions on Pesticide Use - Captan," which required prior notification of application. In 1984, another Special Restriction was promulgated requiring setbacks from potable water sources for aldicarb (Temik). The benefits of this action were twofold: 1) it went beyond the label requirements in providing protection of wellheads and sources of drinking water, yet 2) it allowed continued use by applicators with minimal regulation or change in application practices. In 1996, special restrictions designed to protection ground water were adopted for the herbicide, hexazinone. Today, three special restrictions on pesticide use are found in 01-026 CMR Chapter 41 of the BPC's rules (Appendix J).

State Limited Use Classification

A more site-specific means available to the BPC is the control of highly leachable pesticides through classification as Maine Limited Use pesticides. Once reclassified as a limited use pesticide, the product may then be sold to and used by only licensed persons holding a use permit granted by the Board of Pesticides Control. Permit forms and additional information requirements would be determined by the Board of Pesticides Control.

To expedite the permit process, the Board of Pesticides Control may delegate to the BPC staff their authority for granting limited use permits. The staff of the BPC, with the assistance of other state agencies or a preexisting Pesticide SMP Advisory Committee would review all permits and assess their potential impact upon ground water in the use area. Where there is an indication that the combination of site, soil, use pattern, and pesticide characteristics may create a high potential for pesticide leaching, certain management practices may be attached to the permit before issuance or the permit may be denied. For an applicator to purchase and use the pesticide, the measures detailed in the permit would have to be followed. Failure to follow them could result in revocation of the permit and possible enforcement action.

Should a pesticide present a clear and present threat to the ground water supply, the staff of the BPC may refer those applications to the Board for additional review. If the Board decides that any use of the pesticide in that given area is a significant threat to the

ground water, then the Board may reject the permit application, thus creating a localized moratorium. The petitioner may ask the Board to reconsider its decision at the next regular meeting. Further appeals must be made in accordance with Title 22, M.R.S.A. §1471-K, "Appeals."

Critical Areas

In 1975, the BPC was empowered by statutory authority to designate critical areas. These critical areas are to include, but not be limited to:

> "....areas where pesticide use would jeopardize endangered species or critical wildlife habitat, present an unreasonable threat to [the] quality of the water supply, be contrary to a master plan for the area where such area is held or managed by an agency of the State or Federal Government, or would otherwise result in unreasonable adverse effects on the public health, welfare or the environment of the area."[25]

In April of 1989, rules were adopted which established the criteria and procedures for designating critical areas. Section 3(D) of the rule allows for the designation of critical areas where, "without additional restrictions, [pesticide use] is likely to significantly risk the quality of surface and ground water supplies used for human consumption."[26] These additional restrictions are decided upon by the Board and may include prohibition of pesticide use. To date, two locations in Maine, the Deblois Fish Hatchery Critical Pesticide Control Area and the Dennys River Critical Pesticide Control Area, have been designated; neither case was designated because of an imminent threat to the ground water.

State Cancellation of Registration

The most restrictive action the BPC can take with respect to a pesticide is the cancellation or suspension of registration in Maine. This action has the equivalent result as the state refusing to develop a Pesticide SMP. For products which contribute to widespread contamination and with only few, if any, important uses in Maine, this may be considered a viable option. Certainly, it is to be considered in only a very few and very extreme cases.

Title 7, M.R.S.A., §609(2) generally describes the situations in which the state may refuse, cancel, or suspend registration. It says:

> "If the board determined that any federally registered pesticide...might cause unreasonable adverse effects on the environment, it may refuse to register the pesticide as required in

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4[25]Title 22, M.R.S.A., '1471-M(4).

5[26]01-026CMR Chapter 60, Sec. 3(D).

> section 607, or if the pesticide is registered under section 607, the registration may be canceled or suspended as provided in Section 1."[27]

Any cancellation or suspension is considered rulemaking and must be done in accordance with the Maine Administrative Procedures Act.

Pesticide SMP Information Dissemination

Because the user is ultimately responsible for management of pesticides, measures prescribed in a Pesticide SMP must be communicated to pesticides users as well as appropriate industry groups and regulatory officials. Because information dissemination is so closely related to education about prevention measures, it has been included as part of this section.

Workshops

Prior to the development of any Pesticide SMP, one or more workshops will be held (1) to make growers and users aware of the change in regulatory status of the product and (2) to gather grower and user input on issues affecting plan development. These workshops will be held in areas of the State where the pesticide in question is used and will be heavily publicized.

Recertification Meetings

As mentioned previously, recertification meetings will be used to convey ground water protection information to licensed applicators. Recertification meetings will be the primary means used to inform users about the requirements of Pesticide SMPs.

Mailings to Commodity Groups

Copies of Pesticide SMPs may be mailed to affected commodity organizations and user groups. Commodity publications will be used as an additional means of making users aware of their obligations under pesticide-specific management plans. The BPC currently maintains a database of commodity and user organizations and will update it on a regular basis.

Direct Mailing to Applicators

When the number of applicators affected by a Pesticide SMP is limited or the requirements of a Pesticide SMP are highly technical, the BPC will consider direct mailing of information to applicators in the affected user groups. In addition, *The BPC Communicator*, which is mailed to each applicator four times a year, will be used to inform them about the existence and requirements of state management plans.

Role of Other Groups in Informing Users

6[27]Title 7, M.R.S.A., '609, ''2.

The educational roles of the University of Maine Cooperative Extension, Natural Resources Conservation Service, and Soil and Water Conservation Districts have previously been outlined in this section and Sections III, "Cooperating Agencies." In addition to those groups, the BPC will work closely with commodity organizations and pesticide dealers.

Commodity Groups

The BPC encourages commodity and trade organizations to take the initiative in educating their members about the requirements of Pesticide SMPs. The BPC will work with these organizations and tailor recertification meetings to specific crop/use concerns. As mentioned previously throughout this plan, commodity and trade organizations will play a major role in Pesticide SMP development.

Pesticide Dealers

Pesticide dealers are in a unique position to provide one-on-one assistance to growers and users. In Maine, all persons who sell restricted or limited use pesticides must be licensed, therefore the BPC will educate dealers about the requirements of Pesticide SMPs and encourage them to then educate their patrons.

SECTION VII
GROUND WATER MONITORING

Ground water monitoring is defined as "the set of activities that provide chemical, physical, geological, biological, and other environmental data needed by environmental managers/decision-makers to assist in developing and implementing ground water protection policies and programs."[28] Maine's ground water monitoring program, subject to the limitations of the BPC's finite resources, consists of a baseline assessment component for determining the existence of contamination and a pesticide-specific component, within Pesticide SMPs, to define the extent of contamination and to measure the success or failure of prevention and response programs. In addition to data gathered by the BPC, this program attempts to incorporate data currently being gathered by other state agencies.

Assessment Monitoring

The last statewide assessment of pesticides in ground water occurred in 1994 with the BPC's *1994 Pesticides in Ground Water Monitoring Program*. It was designed to assess the occurrence of pesticides in private domestic wells which were within ¼ mile down gradient of active pesticide use sites. A description of the program and results are found in Appendix E.

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1 [28]U.S. Environmental Protection Agency, "Pesticide State Management Plan Guidance for Ground Water Protection" (Review Draft), July 1992, pp. 3-10 - 3-11.

In conclusion, the BPC learned that pesticide contamination of ground water occurs areas near active use sites, however at levels which do not currently present a health threat to the citizens of Maine when compared to health-based standards established by the U.S. Environmental Protection Agency and the Maine Department of Human Services. Nearly 25% of wells within ¼ mile, downgradient of a pesticide use site may have detectable amounts of one or more pesticides present. The likelihood of contamination varies across commodities, with wells near blueberry, corn and potato growing areas at higher risk. And, although rights-of-way were the only non-agricultural use sites included in the study, agricultural sites present the greatest probability of pesticide contamination of ground water because of both the nature and the quantity of pesticides used in crop production.[29]

The BPC plans, subject to funding, to replicate the 1994 study methodology on five- to seven-year intervals to determine ground water quality trends.

Pesticide-Specific Monitoring

Pesticide-specific monitoring has several uses. First, this monitoring can be used to assess whether specific contaminants detected in the Assessment Monitoring phase or during other routine ground water monitoring show widespread trends of concern. For example, follow-up monitoring was conducted for two pesticides, hexazinone and metalaxyl, after numerous detections during the 1994 study. A triple-data point sampling principle was used whereby positives of concern are evaluated by sampling two other sites in the same watershed with similar geological and pesticide use characteristics of the first site. If either of these additional sample points confirms the original concern, then the sampling effort may continue to expand using the same triple-data point sampling principle until the scope of the problem in adequately evaluated.

Second, pesticide-specific monitoring can be used to evaluate the effectiveness of pesticide management changes implemented in response to contamination trends already identified. This type of monitoring will most often be conducted under a Pesticide SMP and described in detail within one. The BPC may also initiate pesticide-specific monitoring without a Pesticide SMP as it gathers data on pesticides of state concern or prior to development of a pesticide-specific plan.

Incorporation of Other Monitoring Efforts

While the BPC will continue to recommend response actions based upon data collected only by the agency, many more ground water monitoring programs exist in the state, each providing a unique perspective on ground water quality. The BPC believes that all ground water

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2 [29]Maine Board of Pesticides Control, "1994 Pesticides in Ground Water Monitoring Program: Final Report," September 1995, pp.10.

monitoring data are useful. The BPC will solicit monitoring data from other sources and evaluate the usefulness of the data based upon the source, collection and analytical protocols.

Department of Human Services, Health and Environmental Testing Laboratory

Public Water Systems

Public water systems are required to regularly monitor their water for contaminants, including pesticides, under the Phase II and Phase V Safe Drinking Water Act monitoring requirements. Efforts will be made to ensure that pesticides detected in such routine monitoring activities will be reported to the BPC for follow-up investigation and determination of the source.

Private Wells

Water samples from private wells are occasionally sent to the Health and Environmental Testing Laboratory for analysis when the owner believes there is a possibility of pesticide contamination. Efforts also will be made to see that the location of samples showing contamination are reported to the BPC for further investigation and inclusion into the monitoring database. (See Section III, "Cooperating Agencies," Department of Human Services, Bureau of Health.)

Sample Analyses, QA/QC and Data Collection

The University of Maine Department of Food Science Laboratory will be the primary lab for sample analyses. As part of the Cooperative Agreement with EPA, the BPC maintains and regularly updates a quality assurance/quality control program with the Food Science Laboratory for the collection of samples related to pesticide enforcement activities. The current QA/QC program will be followed for the collection of all samples related to both Generic and Pesticide SMPs.

Where technologically possible, monitoring will be conducted using *immunoassay tests* to detect initial contamination. Until recently, full-scale monitoring programs would have been cost prohibitive, but the recent introduction of immunoassay tests for pesticides allows broad screening at 10-20 times less cost than conventional chromatography techniques, and they can be processed in as little as 90 minutes. Currently, immunoassay tests are available for such known contaminants as aldicarb, the triazines, carbofuran, hexazinone and alachlor, with many others under development. Gas chromatography/atomic emissions detection (GC/AED) analysis will continue to be conducted as a screen for other chemicals and as a confirmation of the reliability and accuracy of the immunoassay method.

EPA has encouraged states to adopt their Minimum Set of Data Elements for Ground Water Quality (MSDE). Although the BPC does not utilize monitoring wells, some construction and location data has been collected for all private domestic wells from which samples have been taken since 1994. In 1996, the BPC purchased hand-held, global positioning system (GPS) units

for field staff collecting samples. The BPC now maintains longitude, latitude, altitude and position accuracy data for all sites from which it collects samples.

SECTION VIII
RESPONSE FRAMEWORK

This section of the Generic SMP describes the response framework through which pesticide-specific response actions will occur. The need to prescribe response actions, implement prevention measures, and coordinate monitoring data requires a policy which simultaneously addresses many different fronts in the state's ground water protection strategy. This section outlines such policy and provides guidance for BPC decisions and recommendations in the development of Pesticide SMPs.

Reference Points

The U.S. EPA has adopted the use of Maximum Contaminant Levels (MCLs) as defined under the Safe Drinking Water Act as standards for determining unacceptable contamination of ground water. Where no MCL exists, EPA will use interim drinking water protection criteria as its reference point.[30]

In Maine, the Department of Human Services, Bureau of Health (BOH), has developed a series of Maximum Exposure Guidelines (MEG) which complement EPA's effort. For non-carcinogenic products, the MEG is based on the No Observable Effects Level (NOEL) for adverse effects in laboratory animals divided by appropriate safety factors. For carcinogens, the MEG is equivalent to the dose at which one would predict one additional cancer death per 100,000 individuals. Where no MCL exists or has yet to be adopted, the MEG will be used as the reference point for determining an appropriate response. If neither the MCL nor the MEG has been established, the BPC and BOH will work together to prepare an appropriate response to the contamination problem. Appendix F, "Pesticide Drinking Water Guidelines," lists those pesticides for which MCLs and/or MEGs have been established.

Very few currently registered pesticides have EPA-established aquatic life criteria, therefore it is not practical to routinely use these criteria as reference points. In areas where the ground water is hydrologically connected to Class AA and Class A surface waters and pesticides with established aquatic life criteria are used, these criteria may be used in determining appropriate response actions. Appendix G, "Maine Water Quality Criteria for Pesticides," lists those for which aquatic life criteria have been established.

1[30]U.S. Environmental Protection Agency, loc. cit.

Detection Level Action Guidelines

Detection level action guidelines are divided into two groups: (1) for individual wells/sites, the detection level action guidelines are based upon a percentage of the MCL or MEG; or (2) for multiple wells/sites, the detection level action guidelines are based upon the percent of sampled wells/sites with confirmed pesticide detections. Figure VIII-A outlines the detection levels and recommended response actions which will be evaluated for applicability and implemented when an action level is reached based on the average percent MCL or MEG. For situations where ground water monitoring in proximity to application sites results in multiple detections below 50 percent of the MCL or MEG, Figure VIII-B will be evaluated for applicability and actions implemented.

Action Level	Contaminant Concentration	Recommended Response
A	At or above the detection limit yet below 50% of the MCL or MEG	◆ Follow-up by BPC inspector (see following text after table) ◆ Review of use and application practices by Department of Agriculture, UMCE
B	Between 50% and 100% of the MCL or MEG	◆ Site investigation by NPS-Pesticide Response Team ◆ Additional monitoring within local area (see Section VII, “Ground Water Monitoring, Pesticide-Specific Monitoring.”) ◆ Mitigation of site-specific problem -or- modification in site-specific pesticide use practices through referral to Ag NPS Program, temporary pesticide control measure through emergency rulemaking or change in an existing limited use permit and/or Pesticide SMP
C	At or above 100% of	◆ Site investigation by

	the MCL or MEG	expanded NPS-Pesticide Response Team ◆ Expanded monitoring effort within local area (see Section VII, "Ground Water Monitoring, Pesticide-Specific Monitoring.") ◆ Mitigation of site-specific problem -or- further modification in site-specific pesticide use practices (as described above)

Figure VIII-A: Detection Level Action Guidelines for Single Well/Site

Action Level	Percent of Sampled Wells/Sites with Confirmed Detections[31]	Recommended Response
A	At or below 10% of sampled wells/sites	◆ Additional monitoring within local area (see Section VII, "Ground Water Monitoring, Pesticide-Specific Monitoring.") ◆ Review use, application practices and other available monitoring data by Department of Agriculture, UMCE, pesticide user groups ◆ Investigate and define geology/hydrology of sites with confirmed detections
B	Between 11% and 25% of sampled wells/sites	◆ BPC may request user group intervention ◆ Modification of pesticide use practices through review and/or revision of IPM strategies for pesticide's target pests (UMCE); review, revise and/or develop BMPs for specific pesticide (Agriculture NPS Task Force subcommittee); review

2 [31]Samples collected and analyses performed pursuant to BPC monitoring plan and established EPA protocols.

		and/or revise existing Pesticide SMP (BPC) ◆ Assess IPM and BMP education needs and implement (See Section VI, "Prevention Strategies and Information Dissemination.")
C	At or above 25% of sampled wells/sites	◆ BPC forms Pesticide State Management Plan (SMP) Advisory Committee to review and/or develop Pesticide SMP

Figure VIII-B: Detection Level Action Guidelines for Multiple Wells/Sites

Two situations present unique challenges when determining appropriate response actions are:

- pesticides which have a MCL or MEG below 10 parts per billion (ppb), and

- multiple detections of a material at concentrations below 50% of the MCL or MEG.

Pesticides which have a MCL or MEG below 10 part per billion (ppb) present a challenge because the statistically sound detection limit of laboratory analysis for many of these materials is often near or above the established MCL or MEG. Since a small change in the detected concentration, such as 1 ppb, could mean the difference between confirmed detection and detection above the MCL, it may be prudent to take preventative action sooner than in other cases. For pesticides with an MCL or MEG below 10 ppb, response action may be accelerated to compensate for the potential threat to human health.

Also, situations where pesticides are detected in multiple wells/sites at concentrations below 50% of their MCL or MEG should not be overlooked. Low level detections in multiple wells/sites are an opportunity to determine and implement appropriate actions to protect ground water resources in a given area.

Since recommended responses contained in Figure VIII-B require actions to be taken at low percentages of wells/sites detections, valid data must be gathered to define multiple detection situations. A statistically sound sampling method for sampling in proximity to use sites must be employed. For the

purposes of defining situations of multiple detections of a specific material, data from BPC monitoring programs will be used. BPC data is preferred because the EPA requires a Quality Assurance Project Plan (QAPP) for data collected under state management plans and few, if any, agencies beyond the BPC collect data using a QAPP. In cases where data is obtained by monitoring conducted by other entities, the integrity of the data will be evaluated and the Board may recommend the user groups lead response actions.

Response to Contamination

Once pesticides are detected in ground water at a concentration corresponding to or exceeding the action levels shown in Figure VIII-A and Figure VIII-B, an appropriate response should be made to prevent further degradation of the ground water. The general descriptions below provide a probable course of action. Each of the elements described in Figure VIII-A and Figure VIII-B will need to be expanded upon and tailored to the products identified for Pesticide SMPs.

Notification of Well Owners/Users

All private domestic well owners/users who submit to water sampling during the course of an investigation or routine monitoring program will receive notification of results in writing from the BPC. For wells with detectable concentrations of pesticides, this notification will include summary of the health effects associated with the contaminant prepared by the BPC Toxicologist. The BPC Toxicologist will also be available to answer questions from the public regarding the health effects of pesticides in drinking water. Notification of public well users is handled by the Department of Human Services, Drinking Water Control Program by the protocol described in the Safe Drinking Water Act .

Follow-up by the BPC

For site-specific issues, an initial response may include a visit to the land user by a BPC inspector for an evaluation of the pesticide application and storage practices. The BPC inspector may be able to identify a point-source pollution problem or identify some particular use practice which may be the contributing factor. Appropriate educational materials may be sent to the land user or distributed at the time of the inspection to encourage further protection and to prevent further degradation.

Site Investigation

For single-site or multiple-site contamination, the investigation may be turned over to the state's Agricultural Nonpoint Source Pollution (Ag NPS) Program and their NPS-Pesticides Response Team. Investigation would involve an on-site visit by the team, incorporating, at minimum, persons with knowledge of pesticides and expertise in ground water. Agencies involved with the NPS-Pesticides Response Team include, among others, Cooperative Extension, Natural Resources Conservation Service, the Department of Agriculture, the Department of Environmental Protection, and the Board of Pesticides Control. Site-specific situations determine the appropriate persons to be included on the Response Team.

The NPS-Pesticides Response Team would review use and application practices and attempt to further isolate the source of contamination. If the land user has a Best Management System, the team would attempt to determine which of the individual BMPs are being utilized. If no BMPs are being utilized, then some may be recommended to the land user. The team will report their findings and site recommendations to the BPC.

Presently, there is no corresponding non-agricultural response unit. In cases where contamination is detected at non-agricultural sites, the BPC and staff will work closely with the landowner and trade association to find a resolution to the situation.

Mitigation of Site-specific Problem

Site investigation may reveal that the pollutants are coming from a point source, such as a pesticide spill in a storage area. The BPC will work with the land user to eliminate and/or reduce the flow of pollutants from the point source and ensure that the proper authorities are notified. The site will be referred to the Maine DEP for remediation and clean-up, if necessary.

Modification of Current Prevention Strategy

The BPC will meet to review available monitoring data and the findings and recommendations of the BPC inspector and/or the NPS-Pesticides Response Team (or similar group). When applicable, the BPC may seek some type of pesticide use modification. The BPC has several avenues available to affect use modification.

Referral to the Agriculture NPS Task Force

It has been recognized that the BPC has little site-specific control over general and restricted use pesticides beyond what ground water protection measures may be on the pesticide label. The adoption of BMPs by the land user is essentially the only means available (without additional regulation) for protecting ground water in areas where restricted and general use pesticides are used.

To affect use modification of a general or restricted use pesticide, the BPC will rely on the Agriculture NPS Task Force and its subcommittees for two items: (1) the development and/or review BMPs for individual pesticides and (2) on a case-by-case basis, the voluntary adoption of site-specific BMPs. Voluntary adoption of site-specific BMPs is sought, but an avenue of legal enforcement, thought the Agriculture NPS Strategy, is available should BMPs not be adopted. Land users and applicators will receive regular inspections by the BPC and/or NPS inspection staff to provide assistance and to ensure compliance. Continued ground water monitoring until resolution of the problem will evaluate the effectiveness of the BMPs.

This program does not expressly cover non-agricultural uses of pesticides. Where non-agricultural uses are involved, the BPC will work with affected landowners in the state to adopt management practices which may mitigate ground water contamination. Most likely, though, some type of special restriction on pesticide use may have to be adopted for particular non-agricultural use(s).

Temporary Pesticide Control Measures

Should voluntary cooperation be ineffective or the degree of contamination, single or multiple sites, be such that immediate action is needed in cases of contamination through legal use, then the BPC may initiate emergency rulemaking to reclassify the pesticide as State Limited Use or to impose special restrictions for a maximum of ninety (90) days. At the end of ninety (90) days, pending no further rulemaking, the pesticide reverts back to its original classification without special restrictions.

Revision of Existing Limited Use Permits or Pesticide SMP

If the pesticide is currently managed in a Pesticide SMP or a State Limited Use Pesticide, then the BPC, with the assistance of the Pesticide SMP Advisory Committee, may revise the prescribed management practices stipulated in the Pesticide SMP or on the permit. Additional restrictions as part of a Pesticide SMP may require rule making under the Maine Administrative Procedures Act (MAPA). For holders of limited use permits, restrictions may be imposed without the process of the MAPA. In this situation, the land user may appeal the additional requirements at the next regular meeting of the BPC. Further appeals may be made in accordance with Title 22, MRSA, §1471-K, "Appeals."

Development or Revision of Pesticide SMP

While other actions in this section may have a more immediate impact, the long-term solution to ground water protection for some chemicals involves the development and/or revisions to a Pesticide SMP. A Pesticide SMP Advisory Committee may recommend permanent changes to the existing Pesticide SMP when it has been shown to be inadequate to protect ground water. In the absence of a Pesticide SMP, the BPC may call for a Committee and charge them with considering the development of one so as to put into place a statewide prevention strategy to prevent further contamination.

Alternative Drinking Water for Private Domestic Well Users

The BPC has been relatively successful at working with registrants to provide alternative water supplies and/or filters when contamination above health-based standards has been detected. The BPC hopes to continue to work with registrants in this stewardship capacity, however, the BPC recognizes that this may not always be possible.

The BPC has discussed in detail options which would provide affected homeowners with safe drinking water. One such option includes the establishment of an alternative drinking water fund. Under it, owners of private domestic wells which have been contaminated due to proximity to a pesticide use area would petition the BPC for funding to supply alternative drinking water or to remedy wells with filtration systems. Because of the necessity to provide potable water in an expeditious manner, the Director of the BPC would be able to authorize allocations in a set limited amount. Long-term remediation would be taken up by the BPC. Unfortunately, this program may require a substantial amount of funding, the source of which has not been identified.

Impact on Land Users

It may be determined that ground water contamination can only be prevented by an outright moratorium on pesticide use within a specific area. Alternatives to using a given pesticide, although some may be more costly or less effective, will have to be developed. In some cases, no alternatives may be found, and the land user may be restricted to non-chemical pest control means.

The Agricultural NPS Strategy recognizes the financial impact the BMP implementation could have on farmers. In the strategy, two types of financial assistance are recommended: 1) cost sharing, to lessen the financial burdens of some mechanical or labor intensive BMPs, and 2) direct compensation for lost production and decreased land values when farm land is removed from production. However, the Board has already determined that the availability of compensation programs will not be a pre-condition for declaring a use moratorium, and a lack of money for such programs will not impede the implementation of this plan.

SECTION IX

ENFORCEMENT

Agency Roles in Enforcement

To ensure that requirements of Pesticide SMPs are followed, enforcement action may be necessary to achieve compliance. The BPC is the lead agency for label and Pesticide SMP requirement enforcement.

The BPC will monitor compliance with and enforce ground water protection labeling as part of its use, marketplace, and dealer inspections. The BPC will focus use inspections on those commodities and growers who use pesticides which require a state management plan. Marketplace and dealer inspections will focus on products which require a Pesticide SMP as part of the labeling. Applicators who violate the label or other State or Federal statutes related to this plan will be subject to enforcement action as outlined in the BPC's enforcement protocol (attached in Appendix H).

The BPC has considered enforcement authorities available under other State and Federal statutes and will attempt to coordinate enforcement activities with EPA and other State agencies, as appropriate, to make full use of those statutes. The Department of Environmental Protection, the state's lead agency for ground water protection, will be notified of all action taken by the BPC. Enforcement for nonpoint source pollution violations may be referred to either the Department of Agriculture, Food, and Rural Resources or the Department of Environmental Protection. Legal authorities necessary for proper enforcement have been outlined in Section III, "Cooperating Agencies."

Penalties

In 1990, the legislature increased penalties for violating BPC regulations. For any person who commits a civil violation, the maximum fine is $1,500 for the first violation and $4,000 for each subsequent violation within a four-year period. For private applicators, the penalty may not exceed $500 for a first violation or $1,000 for any subsequent violation within a four-year period related only to violations of record keeping or the return and disposal of pesticide containers. For the first time in 1990, a criminal violation section was added to the BPC penalty regulations. It provides for a "fine not to exceed $7,500 and...imprisonment not to exceed 30 days, or both, for each violation" for an applicator who "intentionally or knowingly violates" pesticide laws.[32]

1 [32]Title 7, M.R.S.A., '616-A.

SECTION X
PUBLIC PARTICIPATION

One of the EPA requirements for this plan is that the public be given ample opportunity to provide input and comment on the methods chosen to prevent contamination and the proposed regulatory framework. This section describes the provisions being made to involve the public in Generic and Pesticide SMP development.

Generic SMP Development

On September 14, 1993, the Board of Pesticides Control (BPC) mailed 148 copies of the *Maine Generic State Management Plan for Pesticides and Ground Water - Proposed Plan* to Ground Water Planning Committee members and others who, during the previous three years, had expressed an interest in the development of the plan. This began a three-month, public comment period that invited review and critique of the plan. Following a news brief in the October 1993 *BPC Communicator*, fifteen additional copies were mailed out upon request while numerous individuals stopped by to pick up a copy at the BPC Augusta office. In all, a total of 240 copies of the plan were distributed.

Three public informational gathering meetings were then scheduled at locations around the state. A press release advising of the availability of the plan and public meeting schedule was mailed to all the major newspapers. Public meetings were held in Machias on November 4, 1993 (one in attendance), in Presque Isle on November 9 (fourteen in attendance) and Lewiston on November 16 (two in attendance). In general, those present at the meetings asked questions about the proposed plan and other topics while only one individual offered a couple of minor comments. Two articles concerning the meetings and the plan appeared in the *Bangor Daily News* in late October and early November.

Following this and future revisions of the Generic SMP, the BPC is planning to hold one, public informational gathering meeting (location to be determined) and accept comments on the revised plan for 60 days. Again, the availability of a revised plan will be heavily publicized and single copies will be free of charge to interested individuals.

Pesticide SMP Development

The route for public participation following Pesticide SMP development depends primarily on the proposed requirements. If proposals in the plan require the BPC to seek additional legal authorities, then the BPC will provide for public comment through rulemaking, following the guidelines in the Maine Administrative Procedures Act (MAPA).[33] The MAPA provides for ample public comment, including input from both public hearings and written comments. If the Pesticide SMP proposals do not require the BPC to seek additional authorities,

[33] 5 M.R.S.A., Chapter 375, Subchapter II.

then a public participation program, similar to that conducted for Generic SMPs, will be followed.

SECTION XI
RECORD KEEPING, REVIEW, AND REPORTING

The best test of a plan is its day-to-day use. Documenting the plan's progress not only provides a source of data to share with EPA and other cooperating agencies, but also provides a basis with which to assess implementation and effectiveness. Incorporating what is learned back into the plan makes it a living document, not an inanimate object carved in stone. This section of the plan outlines the BPC's commitment to keep records, report results to the EPA or appropriate agencies, and to use that information in the review of Generic and Pesticide SMPs.

Records and Reporting

The BPC will maintain all records relating to the development and implementation of either a Generic or a Pesticide SMP for a minimum of four years. The information maintained will include:

- results from ground water sampling and monitoring;
- the number of persons reached by outreach and education efforts;
- the number of, and a summary of, inspections performed to determine compliance with ground water labeling or Pesticide SMP provisions, including a determination of whether provisions were being followed;
- the number of, and a narrative summary of, completed enforcement actions related to non-compliance with ground water labeling or Pesticide SMP provisions;
- a summary of significant findings;
- an assessment of whether use of specific pesticide(s) has substantially changed over a given period;
- identification of any special issues within the state regarding either the Generic or any Pesticide SMPs;
- identification of needed modifications to either the Generic or Pesticide SMPs;
- a description of available projected resources for the next year;
- a description of any response actions taken for detections of specific pesticides.

The BPC will make available to EPA and others, upon request and appropriate allowance of time, any and all records related to the development and implementation of state management plans.

Plan Review and Update

Every four years, the BPC will give thorough reconsideration to the strategies and implementation items listed in the Generic SMP. In its review of the Generic SMP, the BPC will consider, in addition to many of the items listed above, the following items:

- Does the plan still reflect the current state philosophy on ground water management?
- Are the roles of the Cooperating Agencies still the same?
- Are there new or modified Prevention Strategies that need to be incorporated?

The BPC will also consider comments from the public on the future direction of the Generic SMP and incorporate comments on its performance into a quadrennial republication.

Each Pesticide SMP Advisory Committee will biannually review its respective plan. This will include an assessment of the adequacy of the plan and a discussion as to whether the plan is actually serving to protect the ground water resources. Considering many of the points listed above, each committee may then recommend changes for the BPC to consider. Biannual updates will also be published for inclusion.

APPENDIX A
ACRONYMS

Below is a list of acronyms found within this management strategy. Bureaus, divisions, and agencies include their respective departments in parentheses.

ARS	Agricultural Research Service (USDA)
BOH	Bureau of Health (DHS)
BLWQ	Bureau of Water Quality Control (DEP)
BMP	Best Management Practice
BMS	Best Management System
BPC	Board of Pesticides Control (DAFRR)
BRWM	Bureau of Remediation and Waste Management (DEP)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CES	Cooperative Extension Service (USDA)
CFR	Code of Federal Regulations
CMR	Code of Maine Regulations
CPP	Comprehensive Planning Program
CWA	Clean Water Act

DAFRR	Maine Department of Agriculture, Food, and Rural Resources
DECD	Maine Department of Economic and Community Development
DEP	Maine Department of Environmental Protection
DHE	Division of Health Engineering (DHS)
DHS	Maine Department of Human Services
DOC	Maine Department of Conservation
DOI	U.S. Department of the Interior
DOT	Maine Department of Transportation
DRASTIC	Depth of water, recharge, aquifer media, soil media, topography, impact of unsaturated zone, conductivity of the aquifer Computer Modeling Program
DWC	Drinking Water Control (DHS)
EPA	U.S. Environmental Protection Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FSA	Farm Services Agency (USDA)
Generic SMP	Generic State Management Plan
GIS	Geographic Information System
H&ETL	Health & Environmental Testing Laboratory (DHS)
ICM	Integrated Crop Management
IPM	Integrated Pest Management
MAES	Maine Agricultural Experiment Station
MAPA	Maine Administrative Procedures Act
MCL	EPA Established Maximum Contaminant Level
MEG	Maine Exposure Guideline
MGS	Maine Geological Survey (DOC)
MRSA	Maine Revised Statutes Annotated
MSDE	Minimum Set of Data Elements for Ground Water Quality
NOEL	No Observable Effects Level
NPS	Nonpoint Source
NRCS	Natural Resources Conservation Service (USDA)
OCP	Office of Comprehensive Planning (DECD)
ODW	Office of Drinking Water (EPA)
OPP	Office of Pesticide Programs (EPA)
Pesticide SMP	Pesticide-specific State Management Plan
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act

RPC	Regional Planning Council
SDWA	Safe Drinking Water Act
SMP	State Management Plan
SPO	Maine State Planning Office
SWCD	Soil and Water Conservation District
UM	University of Maine
UMCE	University of Maine Cooperative Extension
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey (DOI)
WHPA	Wellhead Protection Area
WHPP	Wellhead Protection Program
WIN-PST	Windows pesticide screening tool for protection of GW (USDA)

APPENDIX B
WIN.PST

USDA-NRCS National Water and Climate Center's Windows Pesticide Screening Tool (WIN-PST), formerly called The National Pesticides/Soils Database and User Support System for Risk Assessment of Ground and Surface Water Contamination (NPURG) – provides leachability ratings of active ingredients as "high", "intermediate", "low" or "very low."

APPENDIX C
MAINE AGRICULTURAL PESTICIDE SALES DATA

1995 AGRICULTURAL PESTICIDE SALES DATA
(active ingredients with sales over 1,000 pounds)

Active Ingredients	Total Sales (pounds, active ingredient)
Chlorothalonil	374,190
Mancozeb	289,661
Maneb	229,344
Sulfuric Acid[34]	139,907
Glyphosate	112,334
Atrazine	76,223
Aliphatic Petroleum	63,729

1 [34]Sulfuric acid is reported as gallons sold in Maine. No calculation based on pounds of active ingredient was performed.

Captan	50,782
Maleic Hydrazide	44,898
Metribuzin	42,890
Metolachlor	41, 459
Diquat	41, 174
Methamidophos	33,832
Phosmet	33,636
Hexazinone	28,779
Disulfoton	27,719
Copper	26,912
Copper Hydroxide	23,623
Napropamide	23,438
Pendimethalin	23,282
Chlorpyrifos	22,150
Linuron	17,587
Azinphos-Methyl	16,831
EPTC	16,295
Endosulfan	15,443
Carbaryl	12,539
Metiram	12,328
2,4-D	12,257
MCPA	11,114
Chlorpropham	11,018
Metalaxyl	10,936
Imidacloprid	10,422
Bacillus Thuringiensis[35]	9,232
Simazine	8,664
Ethoprop	8,370
Cyanazine	7,862
Parathion	7,800
Paraquat	6,418
Propargite	5,901
Alachlor	5,895
Triclopyr	5,212
Piperonyl Butoxide (PBO)	4,720
Benomyl	4,669
Thiophanate-Methyl	4,661
Copper Oxychloride	4,440
Triforine	4,248
Dicamba	3,905
Formentanate Hydrochloride	3,478
Methoxychlor	3,463
Methyomyl	3,422
Malathion	2,893

2[35]Bacillus Thuringiensis, or *Bt*, is reported as gallons sold in Maine.

Triphenyltin Hydroxide	2,832
Dimethenamid	2,700
Metam-Sodium	2,639
Cryolite	2,602
Sulfur	2,532
Permethrin	2,515
Diazinon	2,362
Fonofos	2,240
DCPA	2,133
Dodine	2,061
Propamocarb	1,961
Oxamyl	1,904
Bentazon	1,715
Trifluralin	1,710
Acetochlor	1,520
Isofenphos	1,453
Triadimefon	1,445
Endothall	1,432
Sethoxydim	1,432
Thiocarb	1,416
PCNB	1,281
Ziram	1,125
Fenvalerate	1,046

2003 AGRICULTURAL PESTICIDE SALES DATA (active ingredients with sales over 1,000 pounds)	pounds of AI sold	Rounded pounds of AI sold
MANCOZEB	431611.66	431611.66
SULFURIC ACID	293752.08	293752.08
CHLOROTHALONIL	185996.1575	185996.16
PETROLEUM OIL	61308.5	61308.50
MALEIC HYDRAZIDE	44995	44995.00
DIQUAT	34655	34655.00
ATRAZINE	32853.325	32853.33
METIRAM	30532.8	30532.80
CAPTAN	24989.5	24989.50
GLYPHOSATE	23975.7	23975.70
METRIBUZIN	23939.7	23939.70
SULFUR	23922	23922.00
PHOSMET	17063.45	17063.45
PENDIMETHALIN	16295.4	16295.40
HEXAZINONE	14740	14740.00
2,4-D	14450.787	14450.79
METHAMIDOPHOS	14280	14280.00
MCPA	12340.5	12340.50

2003 AGRICULTURAL PESTICIDE SALES DATA (active ingredients with sales over 1,000 pounds)	pounds of AI sold	Rounded pounds of AI sold
S-METOLACHLOR	12125.79	12125.79
COPPER HYDROXIDE	10977.312	10977.31
NAPROPAMIDE	10770	10770.00
CHLORPYRIFOS	9787.25	9787.25
MEFENOXAM	9294.57	9294.57
IMIDACLOPRID	9195.93	9195.93
ETHOPROP	8946.5	8946.50
LINURON	8866.25	8866.25
KAOLIN	7101.25	7101.25
PENTACHLORONITROBENZENE	7060	7060.00
CHLORPROPHAM	7048.49622	7048.50
THIOPHANATE-METHYL	6541.07	6541.07
PARAQUAT	6517.5	6517.50
METAM-SODIUM	6326.1	6326.10
TRIPHENYLTIN	5142.048	5142.05
CYFLUTHRIN	4341.78	4341.78
CYMOXANIL	3818.4	3818.40
PROPICONAZOLE	3360.5568	3360.56
THIABENDAZOLE	3329.2	3329.20
DIURON	3236.4	3236.40
CARBARYL	2974	2974.00
METHOMYL	2742.675	2742.68
SIMAZINE	2519.91	2519.91
DIAZINON	2400.26	2400.26
DISULFOTON	2201	2201.00
TETRACHLOROISOPTHALONITRILE	2002.5	2002.50
GLUFOSINATE-AMMONIUM	1967	1967.00
AZOXYSTROBIN	1917.48	1917.48
AZINPHOS-METHYL	1815	1815.00
MCPP	1728.6122	1728.61
ESFENVALERATE	1689.41	1689.41
BUTANOIC ACID	1685	1685.00
COPPER OXYCHLORIDE	1630.64	1630.64
FENVALERATE	1590.6	1590.60
PCNB	1585	1585.00
FLUTOLANIL	1557.75	1557.75
FOSETYL-AL	1520.8	1520.80
TERBACIL	1512	1512.00
SETHOXYDIM	1482.25	1482.25
CARBOFURAN	1360	1360.00
ENDOSULFAN	1295	1295.00

2003 AGRICULTURAL PESTICIDE SALES DATA (active ingredients with sales over 1,000 pounds)	pounds of AI sold	Rounded pounds of AI sold
BT	1186.74	1186.74
ENDOTHALL	1036.75	1036.75
VINCLOZOLIN	1012	1012.00
LAMBDA-CYHALOTHRIN	984.85	984.85

APPENDIX D
PESTICIDE STATE MANAGEMENT PLAN (PESTICIDE SMP) ADVISORY COMMITTEE

Background

The *Pesticides and Ground-Water Strategy* (October 1991) states that EPA may choose to require pesticide-specific state management plans (Pesticide SMPs) for pesticides of national ground water concern. Furthermore, the Board of Pesticides Control may choose to plan for pesticides not recognized by EPA which present unique groundwater concerns for the State of Maine. For these reasons, the Board recognizes its need for experts who can assist and advise them on technical decisions related to the development of Pesticide SMPs, and therefore, establishes a volunteer Pesticide SMP Advisory Committee.

Membership

A Pesticide SMP Advisory Committee will be composed of both Core and Pesticide-specific members. A member of the Board, in most cases a member which represents the public, will also chair the committee. The BPC Toxicologist and other necessary staff will serve in an advisory capacity. Other Core members will be persons from the following technical fields with prior knowledge or experience with pesticide issues:

- a hydrogeologist[36],
- a soil scientist[37], and
- a water quality scientist.

The Board will solicit and review resumes for Core membership and will formally appoint these members at their regular public meetings.

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[36] A hydrogeologist is defined as a specialist in the occurrence and movement of ground water.

[37] A soil scientist is defined as a person certified as a soil scientist by the Maine Board of Certification for Geologists and Soil Scientists who has expertise in soil taxonomy, morphology, and mapping.

Pesticide-specific members will provide expertise in evaluation of pesticide use practices on the environment, production, and pest management. These members will be representatives of commodity and user groups in Maine related to the pesticide in question and additional technical experts, such as, but not limited to, a wildlife biologist, an ecologist, experts provided by the registrant, or an economist. In addition, citizens or representatives of citizens whose drinking water supply may have been affected by the pesticide or who live in areas where the pesticide is used will be asked to join the committee. Pesticide-specific members will vary depending on the pesticide in question, making each Pesticide SMP Advisory Committee a unique collection of individuals.

When agricultural issues are involved, a member of the Department of Agriculture will be called upon to assist with the coordination of issues related to Best Management Practices. In addition, commodity specialists with IPM or pest management experience for each potentially affected commodity will also be included. Other pesticide-specific members with needed expertise will be invited to participate either by the BPC or by a Pesticide SMP Advisory Committee.

Duties

A Pesticide SMP Advisory Committee's primary duty is to respond to a mandate from either EPA or the BPC to develop a pesticide-specific state management plan. A Pesticide SMP Advisory Committee's first duty is to determine whether the value of a pesticide product to Maine users warrants development of a Pesticide SMP. Should a product warrant development of a Pesticide SMP, the Committee will develop the plan and submit it to the BPC. The Committee may not be able to reach a full consensus on all issues involved with a Pesticide SMP. Therefore, a plan may be presented to the Board with options where the opinions vary, and it will remain the responsibility of the BPC to select the option which is feels is most suitable. The Committee will assist the BPC with the public comment and/or hearing process as necessitated by the Pesticide SMP. Should the Committee decide not to develop a Pesticide SMP, they will then prepare their reasons for such a decision and submit them to the BPC for opportunity for public input. A graphical depiction of this process is located in Figure D-1.

When considering appropriate prevention and response measures, a Pesticide SMP Advisory Committee will consider the following information:

- the scope of crop and non-crop uses in Maine,
- current application practices in Maine,
- chemical characteristics of the pesticide,
- economic impact on user community(ies),
- available sales and use data in Maine,
- availability of efficacious chemical and non-chemical alternatives,
- environmental impact on Maine's ecosystem,
- practicality of changes in application practices,
- potential health impacts and the product's toxicity,

- geographic specificity of use which may yield identifiable geologic characteristics, and
- past groundwater monitoring data or the practicality of monitoring when no data exist.

Each Pesticide SMP Advisory Committee will biannually review its respective Pesticide SMP, as new information necessitates a re-evaluation of the prevention and response strategies adopted in the Pesticide SMP. Each Committee may then recommend changes to the BPC.

Term

Core members of the Pesticide SMP Advisory Committee will be appointed by the BPC for three (3) years of service. Pesticide-specific members will not be members in standing and will be called upon, as needed, in the development of Pesticide SMPs.

Meetings

An entire Pesticide SMP Advisory Committee, both Core and Pesticide-specific members, will meet as EPA requires Pesticide SMPs or at the specific request of the BPC.

Compensation

The Pesticide SMP Advisory Committee is voluntary and no compensation for services is available. However, all reasonable travel expenses will be reimbursed, subject to the approval of the staff director, in a manner consistent with State travel.

[Editor's Note: Complete copies of this report may be obtained from the Board of Pesticides Control offices. No appendices are attached here.]

APPENDIX E. 2005 PESTICIDES AND GROUND WATER MONITORING PROGRAM

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APPENDIX

1. SUMMARY

The results of Maine's statewide pesticides and ground water monitoring program indicate that pesticide contamination of drinking water in private wells sometimes occurs at levels below established health advisory levels in areas near active pesticide use sites. However, the frequency of positive detections is low.

This monitoring program is repeated every five to seven years by the Maine Board of Pesticides Control (BPC) during the winter when the ground water table is lowest. The first monitoring survey was conducted in 1994 and the percentage of private drinking water wells with detections of a pesticide was 24% (31 of 129). The percentage of positive detections in the second survey, conducted in 1999, dropped to 9% (17 of 194). In addition, samples collected in 1999 from wells located adjacent to cornfields contained no detectable levels of pesticides, as compared to 14% in 1994, and there were fewer samples from wells located adjacent to potato and blueberry fields with detectable levels of pesticides. The number of different pesticides detected also decreased from ten in 1994 to four in 1999.

In 2005, 11% of the sampled wells were found to have low levels of a pesticide or pesticides (14 of 127) or 10% of the samples, since some wells were sampled twice if two different crops were near. Eight different pesticides were detected. As with the 1994 and 1999 surveys, hexazinone continues to be the most commonly found pesticide active ingredient (AI) in sampled drinking water wells.

2. STUDY OBJECTIVE

The objective of these studies is to assess the occurrence of pesticides in private drinking water wells located within ¼ mile down gradient of an active agricultural pesticide use site. Section VII, Ground Water Monitoring, of the January 1998 State of Maine Generic State Management Plan for Pesticides and Ground Water requires that statewide ground water monitoring be conducted every five to seven years to assess ground water quality trends. The 2005 Pesticides and Ground Water Monitoring Program was conducted in accordance with that plan.

3. STUDY DESIGN

3.1 Selection of Pesticides, Crops, and Crop Locations

The following data sources were used to determine what pesticide active ingredients and the associated crops would be targeted for 2005 sampling and the number of samples to collect near each commodity.

- 2003 Pesticide Dealer Reports – provided estimates of pounds of pesticide active ingredients (AIs) sold in Maine for agriculture;
- USDA-NRCS National Water and Climate Center's Windows Pesticide Screening Tool (WIN-PST), formerly called The National Pesticides/Soils Database and User Support System for Risk Assessment of Ground and Surface Water Contamination

(NPURG) – provided leachability ratings of active ingredients as "high", "intermediate", "low" or "very low"; and

- University of Maine Cooperative Extension Crop Specialists – provided expertise in determining what products and what relative amounts are used on particular crops.

Evaluation of the data gathered from the above sources resulted in the following sample allocations among pesticide use sites:

Use Site	Approx. Pounds of Leachable AIs sold in 2003[1]	Percent of Total AI	# of Samples (guide)	# of Samples Actual[2]
Potatoes	119,524	53.70%	78.4	67
Corn (forage and sweet)	49,611	22.30%	32.6	34
Blueberries	20,738	9.30%	13.6	11
Small Grains	25,691	11.50%	16.8	17
Orchard	845	0.38%	0.55	3
Christmas Trees	2,197	0.99%	1.45	2
Strawberries	3,877	1.74%	2.5	3
	Total: 222,483		**146[3]**	**137**

[1] Only "high" and "intermediate" leachers were tallied in this table. Some AIs were also included as part of this study if they had a "low" leachability rating coupled with high quantity sales.

[2] For quality assurance reasons, more than one sample was collected each from the christmas tree and orchard categories.

[3] Total number of samples collected was determined through the use of statistical analysis. The formula used is included in the Appendix as Figure 1.

Individual USGS 7.5-minute topographical maps containing known pesticide use sites previously identified by each of the five BPC field inspectors were randomly selected as areas for sampling. Each topographical map was numbered and entered into a database with the corresponding use site(s) associated with that map. A random number generator was then used to select map numbers containing the individual use sites. For example, the maps that had small grains grown within their boundaries were pooled together, then 17 of those map numbers were randomly chosen, with duplicates allowed.

If more than one field of the target crop existed on the randomly chosen topographical map, a numbered 10x10 grid was placed over the map and a random number list generated for each map directed the sampler to subsections of the map to further randomize the process. If there were no candidate use sites within the subsection, another subsection corresponding to the next number on the random list was searched for a candidate site. If there was more than one candidate use site within the subsection, the sampler assigned a number to each site and selected the sample site using a secondary random number table. A flow chart and accompanying standard operating procedure (SOP) for selecting a sample site are included in the Appendix as Figure 2. Figure 3 in the Appendix shows the sample distribution throughout the state.

3.2 Well Selection, Criteria, and Sampling

3.2.1 Random Selection of Wells

If more than one well was available for sampling, that met the criteria below, the wells were numbered and a random number table was used to select the well. This process prevented the sampler from introducing bias such as choosing the well closest to the field or farthest from the field. In many cases use of the random number table at this point was not necessary as it was difficult to find people home during the day to allow for sampling and that was a limiting factor.

3.2.2 Well Criteria

Once a specific sampling location was selected, the property was assessed to determine if the drinking water supply for that site met the following criteria:

- Private Residence (not a school, hospital, etc.) with people currently living there;
- Within ¼ mile of the target crop site (which must have had the target crop grown on it within the last year);
- Downgradient of or at equal elevation with the crop site;
- No filters or water treatment systems; and
- No water bodies (streams, ponds, rivers, etc.) between the crop site and the residence.

3.2.3 Sampling Methodology

Samples were collected from domestic water supplies (private residences) during the months of January, February and March. Residents were questioned as to any filtration systems on their water system, such as carbon (charcoal) filters, water softeners, reverse-osmosis filters, etc. If there were no filters, samples were collected from any cold-water tap. The cold water was allowed to run for 5 – 10 minutes to ensure that the water was collected from the well and not the pressure tank. If there were filters on the system, the sample was collected from a tap before the filter, such as from an outside tap.

Samples were collected in one-liter amber glass bottles, certified as pre-cleaned for collection of pesticide samples, with Teflon-lined caps. New latex gloves were donned at each sample site and worn during the collection process. Samples were kept under BPC custody in iced coolers or in a refrigerator until delivery to the analytical laboratory. Chain of Custody forms were filled out prior to leaving the sample site. Figure 4 in the Appendix is an example of the form used and shows the data collected at the time of sampling. The standard operating procedure (SOP) used to collect the sample and complete the Chain of Custody is also included as part of Figure 5.

3.3 Analytical Methodology

The University of Maine Food Chemical Safety Laboratory (UMFCSL) analyzed most of the samples collected during this study. The State's Health and Environmental Testing Laboratory (HETL) and APT Laboratory in Pennsylvania were also used. Samples were analyzed for the active ingredients that tend to be used on the crop located within ¼ mile of the sample collection site. The following table provides pertinent information relative to sample analysis.

Crop	Analyte	Leachablity[1]	Method[2]	MDL (ppb)[3]	Trade Name
Potatoes	Chlorothalonil	Low	SPE/GCMS	0.1	Bravo
	Endosulfan	Low	SPE/GCMS	0.1	Thiodan
	Ethoprop	High	SPE/GCMS	0.1	Mocap
	Metalaxyl	High	SPE/HPLC	1.0	Ridomil
	Metribuzin	High	SPE/GCMS	0.05	Sencor, Lexone
	Linuron	Intermediate	SPE/HPLC/PDA	2.0	Lorox
Forage/ Sweet Corn	Acetochlor	Intermediate	SPE/GCMS	0.05	Harness, Surpass
	Alachlor	Intermediate	SPE/GCMS	0.05	Lasso
	Atrazine	High	SPE/GCMS	0.05	AAtrex
	Chlorpyrifos	Low	SPE/GCMS	0.05	Lorsban
	Simazine	High	SPE/GCMS	0.1	Princep
	Dicamba	High	515.2/552	0.5	Banvel
	Methomyl	High	SPE/HPLC-PDA	2.0	Lannate
	Metolachlor	High	SPE/GCMS	0.05	Dual
	Atrazine metabolites	High	SPE/GCMS	2.0	metabolites
	2,4-D	Intermediate	515.2/552	3.0	
	Bentazon	High	515.3	5.0	Basagran
	Pendimethalin	Low	SPE/GCMS	2.0	Prowl
Blueberries	Chlorothalonil	Low	SPE/GCMS	0.1	Bravo
	Hexazinone	High	SPE/GCMS	0.1	Velpar, Pronone
	Hexazinone Metabolite B	N/A	SPE/GCMS	0.2	metabolite
	Fenbuconazole	Low	SPE/GCMS	0.1	Indar
	Phosmet	Low	SPE/GCMS	0.1	Imidan
	Propiconazole	Intermediate	SPE/GCMS	0.1	Orbit
	Captan	Low	SPE/GCMS	0.1	Captan
	Diuron	Intermediate	SPE/HPLC/PDA	1.0	Karmex
	Terbacil	High	SPE/GCMS	0.1	Sinbar
Small Grains	MCPA	High	LLE/GCMS	0.2	Rhomene
	Dicamba	High	LLE/GCMS	2.0	
	2,4-D	Intermediate	LLE/GCMS	0.2	
	Mecoprop	High	LLE/GCMS	0.2	
Orchard	2,4-D	Intermediate	LLE/GCMS	0.2	
	Captan	Low	SPE/GCMS	0.1	Captan
	Phosmet	Low	SPE/GCMS	0.1	Imidan
	Simazine	High	SPE/GCMS	0.1	Princep
Christmas Trees	Diazinon	Low	SPE/GCMS	0.05	Diazinon
	Metolachlor	High	SPE/GCMS	0.1	
	Simazine	High	SPE/GCMS	0.1	Princep
Strawberries	Terbacil	High	SPE/GCMS	0.1	Sinbar
	Dacthal	High	515.2	0.1	Dacthal
	Captan	Low	SPE/GCMS	0.1	Captan

	Napropamide	Intermediate	SPE/GCMS	0.1	Devrinol

[1] Leachability based on rating by WIN-PST.

[2] SPE/GCMS = solid phase extraction/gas chromatography with mass spec
SPE/HPLC/PDA = SPE/high performance liquid chromatography with photodiode array detector
LLE/GCMS = Liquid/Liquid extraction (with methylene chloride)/ GCMS

[3] ppb = parts per billion = (ug/L)

3.4 Quality Assurance/Quality Control

Field blanks, split samples, and duplicate samples were analyzed as part of this study for quality control purposes. Sample collectors prepared sample blanks (for a total of six blanks) using distilled water. Six duplicates were collected and three corn samples were split between HETL and UMFCSL. The samples were handled and labeled as if they were private well samples. All quality control samples were mixed in randomly with the private well samples to ensure that the laboratory did not treat QC samples differently. QA/QC results were all acceptable.

In addition to BPC QA/QC, all three laboratories maintain their own quality assurance/quality control (QA/QC) plans.

4. RESULTS

4.1 General

Of the 137 samples collected from 127 private drinking water wells (some wells were sampled for both small grain pesticides and potato pesticides counting as two samples from one well), 13 samples had detectable levels of one pesticide and one sample had a detectable level of two pesticides. At least one pesticide was detected in 14 of 127 wells. **Of all of the wells, 11% had positive detections, and 10% of the samples had positive detections.** There were no detections above any published EPA maximum contaminate levels (MCL), EPA health advisory levels (HAL), or Maine's maximum exposure guidelines (MEG).

There are basically two types of health based acceptable levels for pesticides in drinking water; these are the standards (EPA's MCLs) and the guidelines (EPA's HALs and Maine's MEGs). MEGs are set by the Environmental Toxicology program in the Maine Centers for Disease Control (MeCDC). MCLs are enforceable for public water systems, as defined by the Safe Drinking Water Act, and in setting them, the best available technology to achieve the level has to be considered. The MCLs and the guidelines (HALs and MEGs) are all used for guidance in private well situations.

The following table breaks down positive detections by use group:

Commodity Group	Number of samples collected	Samples with Positive Detections	
		Number	Percent
Potatoes	67	2	3.0%
Corn	34	4	11.8%
Blueberries	11	6	54.5%
Small Grains	17	1	5.9%
Orchards	3	0	0.0%
Christmas Trees	2	0	0.0%
Strawberries	3	1	33.3%
Totals:	**137**	**14**	**10.2%**

A total of eight different pesticide active ingredients were detected. The following table details results by active ingredient:

Use Site	Pesticides Analyzed	Trade Name	Range of Sample Concentrations (ppb)
Potatoes	Chlorothalonil	Bravo	**0.25 (1 sample)**
	Endosulfan	Thiodan	All ND (Non-Detect)
	Ethoprop	Mocap	All ND
	Metalaxyl	Ridomil	**1.61 (1 sample)**
	Metribuzin	Sencor, Lexone	All ND
	Linuron	Lorox	All ND
Corn (forage and sweet)	Acetochlor	Harness, Surpass	**0.10 – 0.12 (2 samples)**
	Alachlor	Lasso	All ND
	Atrazine	AAtrex	**0.24 – 0.42 (2 samples)**
	Bentazon	Basagran	All ND
	Chlorpyrifos	Lorsban	All ND
	Simazine	Princep	All ND
	Dicamba	Banvel	All ND
	Methomyl	Lannate	All ND
	Metolachlor	Dual	**0.07 (1 sample)**
	Atrazine metabolites		All ND
	2,4-D	Weedar64(and others)	All ND
	Pendimethalin	Prowl	All ND
Blueberries	Chlorothalonil	Bravo	All ND
	Hexazinone	Velpar, Pronone	**0.13 – 3.52 (6 samples)**

	Hexazinone Metabolite B	metabolite	**0.94 (1 sample)**
	Fenbuconazole	Indar	All ND
	Phosmet	Imidan	All ND
	Propiconazole	Orbit	All ND
	Captan	Captan	All ND
	Diuron	Karmex	All ND
	Terbacil	Sinbar	All ND
Small Grains	MCPA	Rhomene	All ND
	Dicamba		All ND
	2,4-D	Weedar64(and others)	**0.41 (1 sample)**
	Mecoprop		All ND
Orchard	2,4-D		All ND
	Captan	Captan	All ND
	Phosmet	Imidan	All ND
	Simazine	Princep	All ND
Christmas Trees	Diazinon	Diazinon	All ND
	Metolachlor		All ND
	Simazine	Princep	All ND
Strawberries	Terbacil	Sinbar	All ND
	Dacthal	Dacthal	**3.56 (1 sample)**
	Captan	Captan	All ND
	Napropamide	Devrinol	All ND

4.2 Results by Active Ingredient

4.2.1 Chlorothalonil

All 67 samples from wells near potato fields were analyzed for chlorothalonil, and one sample showed a detectable level (0.25 ppb). EPA's health advisory level (HAL) for chlorothalonil in drinking water is 150 ppb. The two year old, 200 feet deep, drilled well was located approximately 200 feet downgradient of the closest field. In accordance with the recommended response outlined in Section VIII - Response Framework of the BPC's Generic State Management Plan for Pesticides and Ground Water, BPC spoke with the farmer and reviewed his use and application practices. Chlorothalonil was used during the summer of 2005 after our sample was taken, but had not been used for at least seven years previous to our sample collection, and there are no other farmers nearby. This positive detection may have been a lab error.

4.2.2 Metalaxyl

Because metalaxyl analysis requires the laboratory to use a different method from the one for most of the rest of the potato pesticide active ingredients, and therefore charge more money, only five samples were analyzed. One sample from a dug well approximately 140 feet from a potato field contained 1.61 ppb metalaxyl. The depth of the well is unknown. Since the level detected in

this survey was less than Maine's MEG of 420 ppb, and since metalaxyl is seldom used on potatoes due to resistance, a determination was made that no further investigation was necessary.

4.2.3. Acetochlor

All 34 samples from wells near corn fields were analyzed for acetochlor. Two of the samples were found to have positive detections of 0.10 ppb and 0.12 ppb. The MEG for acetochlor in drinking water is 20 ppb. One of the samples was collected from a 55 year old drilled well of unknown depth, approximately 500 feet from the corn field. The farmer has not had a spill, and only used Harness once, following the label. The land has recently been sold for development. The other sample was collected in a different town from a 13 year old, 90 feet deep drilled well. This well was approximately 900 feet from the corn field. It was difficult to track down the various farmers in the area, but it appears that it has been at least a number of years since this product may have been used. One of the farmers is now an organic grower, and another is moving toward selling off land for development.

The manufacturer, Monsanto, paid for these two wells to be resampled the following winter. Their results were non detect.

4.2.4. Atrazine

All 34 samples from wells near corn fields were also analyzed for atrazine. Atrazine was found in two wells at 0.24 ppb and 0.42 ppb. The maximum contaminant level (MCL) is 3 ppb. The first well is a 214 feet deep, 52 year old, drilled well. Metolachlor was also found in this sample (see below). The farmer for this field said he did have a spill of herbicide in the late 70's or early 80's that he thinks was atrazine. Atrazine has been detected at this site in the past. He has used a product called Bicep that contains both atrazine and metolachlor in recent years and that might have been applied heavily at the edges of the field as the sprayer was turning around. The spray was stopped during turnarounds but the boom emptied possibly causing more chemical release than normal in those areas. Roundup, which is not considered to be a leacher, is now being used on this field instead of atrazine and metolachlor. The second well with 0.42 ppb atrazine is located in a different town and is a 20 years old, drilled well approximately 150 feet deep, and approximately 300 feet from the corn field. The farmer has decided that corn will no longer be grown in this location in the future.

4.2.5 Metolachlor

Metolachlor was also assayed in all 34 samples taken near corn and it was found in one well at 0.07 ppb. EPA's HAL is 100 ppb. This was the same well where atrazine was found (see first well in the atrazine section above).

4.2.6 Hexazinone

Hexazinone has been detected in Maine's ground water for over 20 years. The fact that it was detected in 54.5% of the samples collected for blueberry pesticide analysis was not unexpected.

The levels detected were well below the EPA HAL of 400 ppb, and further investigation, related to this study, was not warranted. Refer to other BPC reports on hexazinone for more information.

4.2.7 2,4-D

2,4-D was looked for in all 17 samples collected near small grains. It was detected once at 0.41 ppb. EPA's MCL is 70 ppb. The well is approximately 100 feet downgradient from the field. Other information about the well is unknown. It was discovered that the farmer has not used pesticides in recent years, and the homeowner was questioned about using a pesticide on their lawn or garden.

4.2.8 Dacthal

Samples for Dacthal analysis had to be sent to APT Laboratories in Pennsylvania. Due to the extra cost, only two samples were analyzed and one had a positive detection of 3.56 ppb. The analytical method looked for the sum of parent Dacthal plus metabolites. It is likely that the 3.56 ppb is mostly metabolites that pose little hazard in drinking water at that level. The farmer said Dacthal was used near the tested well in 2004. He said there was no spill. It is assumed that this product was used normally as it is frequently found in ground water in Rhode Island after normal use there.

4.3 Site Factors and Frequency of Detections

Information about well depth and distance to active pesticide use site was collected during this assessment. The following tables summarize that information. Numbers listed in non-bold font indicate all sites sampled. Numbers listed in bold parentheses indicate the number of sites with detectable levels of at least one pesticide active ingredient.

Use Site	**Well Depth (feet)**					
	< 100	100- 199	200 – 299	300 – 399	> 400	Unknown
Potatoes	15	16	5 **(1)**	3	--	28 **(1)**
Sweet/Forage Corn	10 **(1)**	8 **(1)**	4 **(1)**	1	--	11 **(1)**
Blueberries	4 **(2)**	2 **(1)**	1	--	--	4 **(3)**
Small Grains	4	5	--	--	--	8 **(1)**
Orchard	--	1	--	--	--	2
Christmas Trees	2	--	--	--	--	--
Strawberries	--	2 **(1)**	--	--	--	1

Use Site	**Well Construction**				
	Drilled	Dug	Driven Point	Spring	Unknown
Potatoes	57 **(1)**	5 **(1)**	1	2	2
Sweet/Forage Corn	23 **(4)**	3	--	3	5
Blueberries	11 **(6)**	--	--	--	--
Small Grains	13	--	--	--	4 **(1)**

Orchard	3	--	--	--	--
Christmas Trees	2	--	--	--	--
Strawberries	3 **(1)**	--	--	--	--

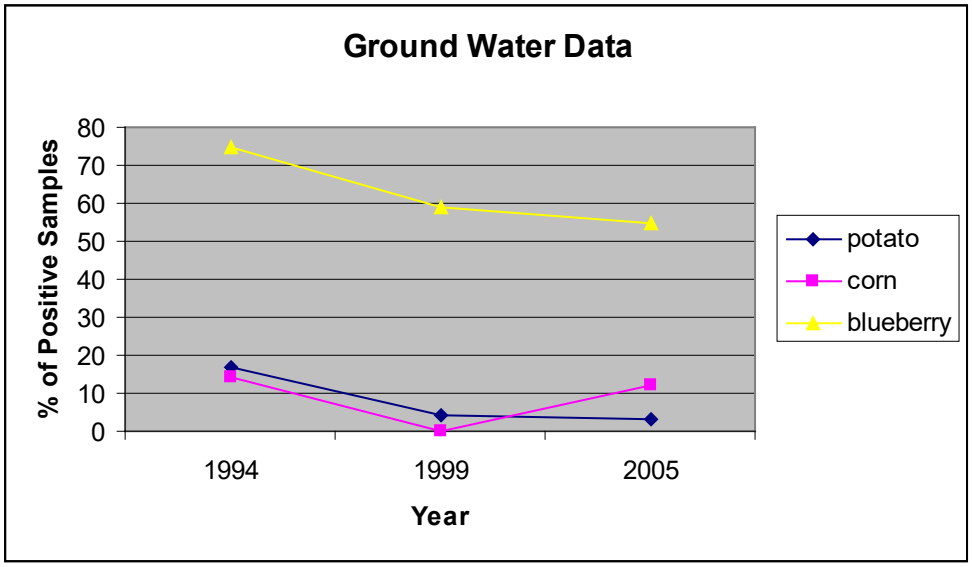
Use Site	Distance from Active Use Site (feet)			
	< 100	100 – 499	500 – 999	1000 – 1500
Potatoes	14	40 **(2)**	8	5
Sweet/Forage Corn	2 **(1)**	16 **(1)**	12 **(2)**	4
Blueberries	3 **(1)**	5 **(4)**	1	2 **(1)**
Small Grains	6	9 **(1)**	--	2
Orchard	1	1	--	1
Christmas Trees	1	1	--	--
Strawberries	1	1 **(1)**	1	--

4.4 Comparison of 1994, 1999 and 2005 Data

The following tables and graph compare the results of the initial ground water study conducted in 1994 to the one in 1999 and this assessment:

Commodity Group	Number of samples collected			Number of Samples with Positive Detections			Percent of Samples with Positive Detections		
	1994	1999	2005	1994	1999	2005	1994	1999	2005
Potatoes	47	102	67	8	4	2	17%	4%	3%
Corn	49	51	34	7	0	4	14%	0%	12%
Blueberries	20	22	11	15	13	6	75%	59%	55%
Small Grains	3	9	17	0	0	1	0%	0%	6%
Orchards	1	5	3	1	0	0	100%	0%	0%
Christmas Trees	5	4	2	0	0	0	0%	0%	0%
Strawberries	0	3	3	--	0	1	--	0%	33%
Rights-of-Way	3	0	0	0	--	--	0%	--	--
Market Garden	1	0	0	0	--	--	0%	--	--
Totals:	**129**	**197**	**137**	**31**	**17**	**14**	**24%**	**9%**	**10%**

No detections were above HAL/MEG/MCL for any of the three years except for diazinon found near an orchard in 1994. Diazinon was not used on the orchard but was applied by the well owner around the well to control ants.


Ground Water Data
% of Positive Samples
80
70
60
50
40
30
20
10
0
1994
1999
2005
Year
potato
corn
blueberry

Use Site	Pesticide AIs Analyzed	Range of Sample Concentrations (ppb)		
		2005	**1999**	**1994**
Potatoes	Atrazine	*--(not sampled)*	--	**0.13**
	Chlorothalonil	**0.25**	All ND	--
	Disulfoton	--	All ND	--
	Endosulfan	All ND	**0.13**	All ND
	EPTC	--	All ND	--
	Ethoprop	All ND	All ND	**0.08**
	Imidacloprid	--	All ND	--
	Linuron	All ND	--	--
	Maleic Hydrazide	--	All ND	--
	Metalaxyl	**1.61**	All ND	**0.63 – 6.51 (6 samples)**
	Metribuzin	All ND	**0.10 - 0.60 (4 samples)**	All ND
	Propamocarb	--	All ND	--
Corn	2,4-D	All ND	--	--
	Acetochlor	**0.10 – 0.12 (2 samples)**	All ND	**--**
	Alachlor	All ND	All ND	**1.70**
	Atrazine	**0.24 – 0.42 (2 samples**	All ND	**0.10 – 1.90 (6 samples)**
	Bentazon	All ND	All ND	--
	Chlorpyrifos	All ND	All ND	--
	Cyanazine	--	All ND	--
	Dicamba	All ND	All ND	--
	Dinoseb	--	*No use on Corn*	**3.50 (point source)**
	Methomyl	All ND	All ND	--
	Metolachlor	**0.07**	All ND	**0.30 – 10.20 (2 samples)**
	Pendamethalin	All ND	All ND	**--**
	Simazine	All ND	--	--
Blueberries	Azinphos-Methyl	--	All ND	--
	Chlorothalonil	All ND	**--**	**--**
	Fenbuconazole	All ND	**--**	**--**
	Total Hexazinone	**0.13 – 4.46 (6 samples)**	**0.22 - 1.97 (13 samples)**	**0.09 – 5.97 (15 samples)**
	Phosmet	All ND	All ND	--
	Propiconizole	All ND	**0.18**	*Not used in 1994*
	Captan	All ND	**--**	--
	Diuron	All ND	**--**	--
	Terbacil	All ND	All ND	--
Small Grains	**2,4-D**	**0.41**	--	--
	Dicamba	All ND	--	--
	MCPA	All ND	All ND	--
	Mecoprop	All ND	--	--

Orchard	2,4-D	All ND	--	**--**
	Captan	All ND	--	**--**
	Diazinon	--	*Not an orchard pesticide*	**7.35 (point source)**
	Fenarimol	--	All ND	--
	Oxamyl	--	All ND	--
	Phosmet	All ND	--	--
	Simazine	All ND	All ND	--
Christmas Trees	Diazinon	All ND	All ND	--
	Metolachlor	All ND	--	--
	Simazine	All ND	All ND	--
Strawberries	Captan	All ND	--	--
	Carbofuran	--	All ND	--
	Dacthal	**3.56**	--	--
	Metalaxyl	--	All ND	--
	Napropamide	All ND	All ND	--
	Terbacil	All ND	--	--

5 CONCLUSIONS

The percentage of samples collected from private drinking water wells with detectable levels of pesticide active ingredients decreased from 24% in 1994 to 9% in 1999. In 2005 10% of the samples collected contained one or more pesticides. The number of different pesticides detected decreased from ten in 1994 to four in 1999, but increased in 2005 to eight pesticides. Slight changes in the laboratory method detection limits over the years influence these numbers, as does varying weather patterns. Hexazinone continues to be the most commonly found active ingredient in Maine drinking water wells.

Overall, the results of this survey show that pesticides continue to be detected in drinking water wells located within ¼ mile of active pesticide use sites. However, the frequency of detections in Maine appears lower than the national average, and positive detections have been below any MCLs, HALs, and MEGs. Developing and using agricultural best management practices will hopefully continue to keep the frequency and levels of detections low.

APPENDIX

Figure 1. Statistical Formula for Sample Size

DETERMINATION OF SAMPLE SIZE

In determining the number of groundwater sample units needed for this monitoring program, the following formula[38] was used:

$$n = \frac{P(1-P)}{\frac{A^2}{Z^2} + \frac{P(1-P)}{N}}$$

Where:

- n = sample size required
- N = size of the population samples are being taken from (i.e., the total number of wells)
- P = estimated percentage of the population possessing the attribute of interest (i.e., percentage of population with detectable levels of pesticides)
- A = Accuracy desired, expressed as a decimal (i.e., ..0.01, 0.03, 0.05, etc.)
- Z = number of standard deviation units corresponding to the desired confidence interval (see table below)

Z values:

Confidence Interval (CI)	**Z**
99%	2.5758
95%	1.9600
90%	1.6449
85%	1.4395
80%	1.2816

According to University of Maine Cooperative Extension crop specialists there are about 2,271 farms growing the crops focused on for this survey in Maine. According to the 2003 NASS, the average size of each farm is 190 acres, which, if the farm were square, would make a 2,880 ft x 2,880 ft farm:

[38] *Air University Sampling and Surveying Handbook,* April 1996 Internet edition, www.au.af.mil/au/hq/selc/smpIntro.htm, downloaded 12/4/98

We then make an assumption that wells on only one side of the farm would be downgradient (one side would be upgradient, and two sides would be at the same elevation). Allowing for four properties along that downgradient side, that would make:

4 “high risk” properties per farm * 2271 farms of interest in Maine = 9,084 “high risk” properties in Maine.

The 1994 Pesticides in Ground Water study determined that 24% of “high risk” wells had detectable levels of pesticides, and the 1999 found 9%. The average of 24% and 9% is 16.5%.

We have decided that our accuracy desired will be ±5%, and our confidence level will be 90%. By plugging in our knowns into our sample size equation, we get:

N = 9,084
P = 0.165
A = 0.05
Z = 90% = 1.6449

So:

n = 145.79 samples

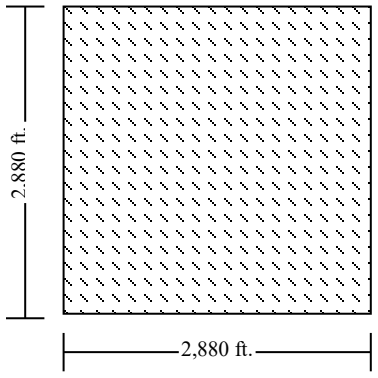


Figure 2. A flow chart and accompanying standard operating procedure (SOP) for selecting a sample site

SOP for Ground Water Sampling Site Selection
Related to Maine's "Generic State Management Plan for Pesticides and Ground Water"

Prepared by: Julie Chizmas

Revised by: _____ Date: _____
Heather Jackson

Reviewed by: _____ Date:_____
Henry Jennings

Approved by: _____ Date:_____
Robert Batteese

STATE OF MAINE
BOARD OF PESTICIDES CONTROL

SOP for Ground Water Sampling Site Selection
Related to Maine's "Generic State Management Plan for Pesticides and Ground Water"

1. Select a Quad/Crop combination from the Sampling Quads list that was prepared in Augusta.

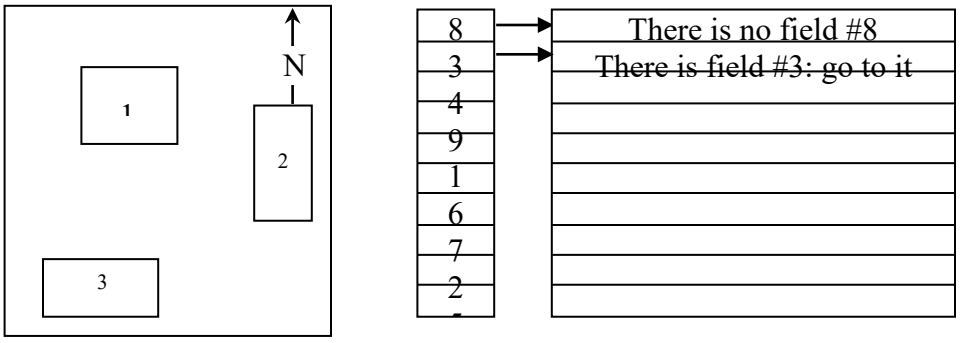
2. Place mylar overlay over quad.

3. Select a new Primary Random Number list (the one with 100 numbers on it).

4. Starting with the first random number (top left hand corner), check the corresponding cell on the quad to see if the crop is potentially present with residences close by.

5. Keep working through the random numbers from top to bottom until you identify a good target cell. At this point you'll need to drive to the target location.

6. If, once you get to the target location, you find that there is more than one field with your target crop in that cell, number the potential fields from north to south and/or east to west. Then go to your secondary random number list and go through the numbers in one column until you select a field:



7. Once at the target location, look for properties meeting the following criteria:

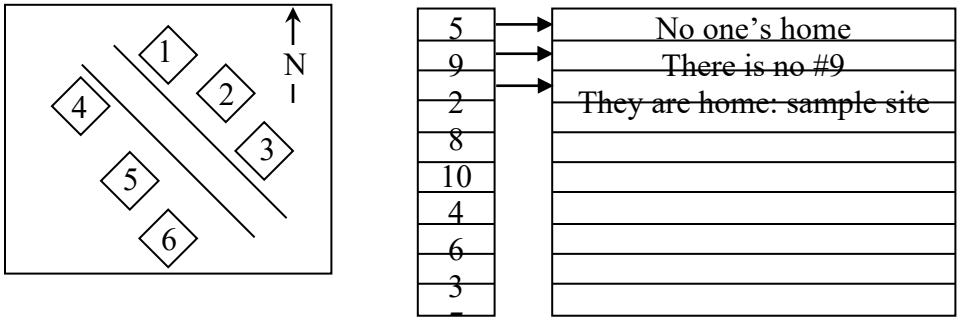
A. Private Residence (not a school, hospital, etc.) with people currently living there;

B. Within ¼ mile of the target crop site (which must have had the target crop grown on it within the last year);

C. Down gradient or level with the crop site; and

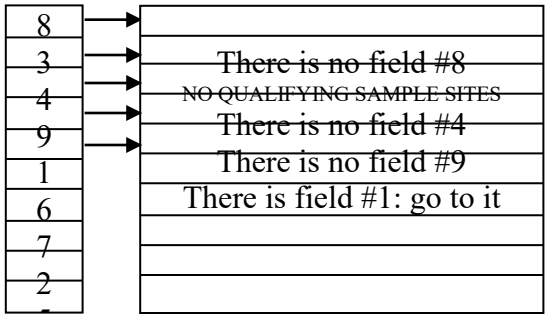
D. No water bodies (streams, ponds, rivers, etc.) between the crop site and the residence.

8. If more than one well meets the ¼ mi. criteria, number the potential houses from north to south and/or east to west (depending on road direction). Then go to your secondary random number list and go through the numbers in one column until you select a sample site:



NOTE: If you used the secondary random number list to choose a field, then use the next column of numbers to choose a sample site; do not use the same list as you used for field selection.

9. If none of the qualified wells work out for sampling, and there was more than one field with the crop of interest in the cell, then go to the next field on the list you used to randomly determine the first field picked and start over with Step 7 to find a qualifying sample site:



10. If none of the qualified wells work out for sampling, and there was only one field with the crop of interest in that cell, then go back to Step 5 to find another promising target cell.

11. After you have collected the sample from the site, CROSS OUT THE PRIMARY RANDOM NUMBER LIST YOU USED TO FIND THE CELL ON THE QUAD. Do not re-use those lists for locating other samples. If you have to collect more than one sample from one quad, you must use a different primary random number list.

Figure 3. Sample Distribution throughout Maine

County	Number of Samples Collected
Androscoggin	6
Aroostook	69
Cumberland	1
Franklin	1
Hancock	0
Kennebec	8
Knox	2
Lincoln	4
Oxford	7
Penobscot	7
Piscataquis	13
Sagadahoc	1
Somerset	3
Waldo	3
Washington	6
York	6

Figure 4. Sample Data Collection Sheet

Well ID: _____
USGS Map #: _____
Grid #: _____

2005 WATER SAMPLE INFORMATION SHEET

Maine Board of Pesticides Control
28 State House Station
Augusta, Maine 04333-0028
(207) 287-2731

SECTION 1: CROP

- ☐ Potatoes
- ☐ Small Grains
- ☐ Forage Corn
- ☐ Orchard
- ☐ Sweet Corn
- ☐ Christmas Trees
- ☐ Blueberries
- ☐ Strawberries

SECTION 2: ANALYSIS

Check more than one box if applicable.

- ☐ Group 1
- ☐ Group 2
- ☐ Group 6
- ☐ Group 8
- ☐ Group 9
- ☐ Group 11
- ☐ HETL

SECTION 3: WELL IDENTIFICATION

Name: _____

Address: _____

_____, ME _____

Phone: _____

Directions to the Residence: _____

_____

_____

Well Location: _____

_____

SECTION 4: WELL USE AND CONSTRUCTION INFORMATION

Well Use: ☐ Private ☐ Other _____ Approximate Age of Well: _____ yrs.

Well Construction: ☐ Dug ☐ Drilled ☐ Spring ☐ Driven ☐ Other _____ ☐ **Unknown**

Well Depth at Completion: *exactly* _____ ft. ☐ **Unknown** Depth of Casing: *exactly* _____ ft. ☐ **Unknown**

Is the Well Screened? ☐ No ☐ Yes -- Screened Intervals: Top: ____ ft. Bottom: ____ ft. ☐ **Unknown**
Top: ____ ft. Bottom: ____ ft.

SECTION 5: SAMPLE INFORMATION

SAMPLE ID: _____ Sample Date: _____ Sample Time: _____ AM PM

SECTION 6: WELL LOCATION

Latitude: N ___ ___ ° ___ ___ . ___ ___ ___ ' Time: ___ ___ : ___ ___ : ___ ___ AM PM

Longitude: W ___ ___ ___ ° ___ ___ . ___ ___ ___ ' EPE: _____ ft.

**Altitude will be determined at BPC office using info above and topographic map.*

Distance from well to crop: _____ ft. Elevation of well with respect to crop: ☐ Downgradient ☐ Equal Elevation

SECTION 7: COMMENTS

SECTION 8: SAMPLE AUTHORIZATION

The undersigned hereby voluntarily consents to the collection of well water samples from the property described in the above Sections for the purpose of gathering information in connection with the statutory responsibilities of the Maine Board of Pesticides Control.

Well Owner/User: _____ Title: _____

Sampled By: _____ Date: _____

Relinquished by:	Date/Time:	Received by:	Date/Time:
Relinquished by:	**Date/Time:**	**Received by:**	**Date/Time:**
Relinquished by:	**Date/Time:**	**Received by:**	**Date/Time:**

White Copy = BPC Office Yellow Copy = Laboratory Pink copy = Well Owner/User or Agent

Figure 5. Ground Water Sampling Standard Operating Procedure (SOP)

1. A site location and a site ID (or well ID) are chosen at the Augusta office after the appropriate planning procedures have been followed (see Experimental Design section in "Quality Assurance Project Plan for Maine Board of Pesticides Control Water Quality Program and Related Laboratory Work"). Samples are to be collected from private domestic water supplies that are within ¼ mile down gradient from, or of equal elevation with, a pesticide use site.
2. Residents must be questioned as to any filtration systems on their water system, such as carbon (charcoal) filters, water softeners, reverse-osmosis filters, etc. If there are no filters, then samples may be collected from any cold-water tap (please remove the aerator, if possible). Cold water must be run for 5 – 10 minutes to ensure that a sample from the well is obtained as opposed to one that's been sitting in the pressure tank. If there are filters on the system, the sample must be collected from a tap before the filter (an outside tap is usually a safe choice); the water should still be run for 5 – 10 minutes prior to collection.
3. Samples are to be collected in 1-Liter amber glass bottles with teflon-lined caps, certified as precleaned for the collection of pesticide samples. Latex or nitrile gloves must be worn when collecting the sample; a fresh pair of gloves is needed at each site. For the best adhesion, labels should be placed on the bottles prior to filling the bottle with water. Fill sample bottles completely. Bottles must be labeled with sample ID, date of collection, sample collector initials, analysis to be performed, and sample location (town). Caps must be also labeled with the sample ID. Keep in mind that the "Site ID" or "Well ID" will be determined later.
4. Samples are placed in a cooler with ice packs or in a refrigerator to ensure that samples are kept in the dark and as close to 4°C as possible.
5. Make sure site information is recorded and signed by the property resident before leaving the site. Site information of interest, also available on a form, includes the following:

Well ID - This is a unique, 8-digit number assigned by the BPC Augusta office for each site that is sampled. Please do not write anything on the Well ID line.

USGS Map #: Please write the number of the 7.5-minute topographic map in which the site is located. The number of each topographic map you are given will be on the back of the map.

Grid Number: The number on the mylar overlay in which the site is located (for stratified random sampling projects).

SECTION 1 and 2: CROP/ANALYSIS

Crop/Analysis: Please check which crop is near the well. If there is more than one commodity within ¼ mile of the well, please list only the primary one, and list others in SECTION 7: COMMENTS. If there is a special pesticide use on a nearby commodity, please make a note of it in the COMMENTS section.

SECTION 3: WELL IDENTIFICATION

Name and Mailing Address: This is for the name and mailing address of the person to whom the analytical results are to be sent (usually the homeowner or renter). If, in the case of a rental situation, the results are to be sent to the landlord/owner, put the landlord/owner's name and mailing address here. Please note in SECTION 7: COMMENTS if the results are being sent to someone other than the well user.

Directions to the residence: Please write the route or road on which the site is located and the municipality in which the site is located, if different from that indicated in the mailing address. Use SECTION 7: COMMENTS if additional space is required.

Well Location: Please write the general location of the well, like in the basement, behind the house, etc.

SECTION 4: WELL USE AND CONSTRUCTION INFORMATION

Well Use: Please check the applicable box. All the wells tested in this survey should be private (used only by the homeowners/renters). If the well is not public, please check "Other", and write what it is used for.

Approximate Age of Well: Please give the age of the well, in years.

Well Construction: Check the applicable box or fill in "Other". If the well user doesn't know, check "Unknown".

Well Depth at Completion: Enter the exact depth in feet of the well only if the exact depth is known; estimates are not allowed. If unknown, please check the "Unknown" box.

Depth of Casing: Enter the exact depth in feet of the casing only if the exact depth is known; estimates are not allowed. If unknown, check the "Unknown" box.

Is the Well Screened? A screened well is one with openings or perforations in the casing at specified depths so that ground water is only drawn only from that depth. Most drinking water wells in Maine are **not** screened. Wells that may be screened are driven point wells through sand and gravel aquifers and drilled wells that are drilled only into the overburden and not to the bedrock. If the well is screened, please try to find out the screening intervals.

SECTION 5: SAMPLE INFORMATION

SAMPLE ID: This is the standard, 11-digit, alphanumeric code used by the inspection staff during sampling events: YYMMDDabcXX.

Sample Date: The date the sample was collected.

Sample Time: The time the sample was collected. If military time is not used, please circle AM or PM.

SECTION 6: WELL LOCATION

Latitude: Write the GPS reading, as it reads on the display.

Longitude: Write the GPS reading, as it reads on the display.

Time: The time displayed on the GPS unit when the latitude and longitude were marked.

EPE: The Estimated Position Error, as it reads on the GPS display.

Note: Due to past issues with the GPS altitude readings, the well altitude will be determined at the BPC office using topographical maps and the given latitude and longitude.

Distance from Well to Crop: Write the estimated distance (in feet) from the crop listed in Section 1 to the well.

Elevation of Well with Respect to the Crop: Please check whether the well is down gradient from the commodity, or at the same elevation as the commodity.

SECTION 7: COMMENTS

In addition to using this space as previously indicated, please record any additional observations or comments, such as the phone number to the residence sampled.

SECTION 8: SAMPLE AUTHORIZATION

Please have the well owner/user read the authorization statement and sign were indicated. A title is not needed unless the person who is signing is an employee or agent, such as a babysitter or farm hand. The sampler should also sign were indicated and date the document.

CHAIN-OF-CUSTODY

Please use the shaded area at the bottom of the Water Sample Information Sheet to track the transfer and receipt of samples.

WATER SAMPLE INFORMATION SHEET DISTRIBUTION

White Copy	=	BPC Office
Yellow Copy	=	Laboratory
Pink Copy	=	Well owner/user or agent

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6. Deliver samples to the University of Maine at Orono Food Chemical Safety Laboratory (or other lab) as soon as possible and no later than three days after collection. Samples can be delivered to the Food Chemical Safety Laboratory on

Monday, Tuesday, Wednesday, and Thursday. If a Friday delivery is required, deliver no later than noon. Do not deliver samples on Saturday or Sunday. Other laboratories may have different schedules.

APPENDIX F
PESTICIDE DRINKING WATER GUIDELINES
(all units are parts per billion)

Common Name	MEG[39]	MCL[40]
Aciflurofen	10	
Alachlor	2	2
Aldicarb	2	7[41]
Aldicarb sulfone		7[3]
Aldicarb sulfoxide		7[3]
Ametryn	60	
Amiben	105	
Ammonium Suflamate	1500	
Atrazine	3	3
Azinphos-Methyl	25	
Baygon	3	
Bentazon	17.5	
Bromacil	25	
Butachlor	20	
Butylate	360	

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1 [39]"Summary of State and Federal Drinking water Guidelines," Maine Department of Human Services, Bureau of Health, Environmental Toxicology Program, revised September 1992.

2 The Maximum Exposure Guidelines (MEGs) are health-based guidelines intended to help risk managers, homeowners, and others make decisions regarding the suitability for human consumption of drinking water contaminated by chemicals.

3 The MEG for a carcinogenic compound in drinking water is the concentration of that compound in drinking water that is expected to result in a mizimum lifetime cancer risk of one additional cancer case per 100,000 individuals. The MEG for a non-carcinogenic compound in drinking water is the concentration of that compound in drinking water below which no adverse health effects are expected to occur over a lifetime of exposure.

4 This MEG list has not been promulgated by rule-making and therefore the MEGs are not legally enforceable drinking water "standards." The MEGs represent the Bureau of Health's most recent recommendations for maximum levels of contaminants in drinking water. (Dr. Robert A. Frakes, State Toxicologist, October 1992.)

5 [40]"Drinking Wate regulations and health Advisories," Office of Water, U.S. Environmental Protection Agency, Washington, D.C., October 1996.

6 [41]MCL is currently in draft status.

Common Name	MEG[39]	MCL[40]
Captan	100	
Carbaryl	164	
Carbofuran	40	40
Carboxin	700	
Chlordane	0.27	2
Chlorothalonil	15	
chlorpyrifos	20	
Cyanazine	1	
2,4-D	70	70
Dacthal	3500	
Dalapon	200	200
DDT	0.83	
Diazinon	0.63	
Dibromochloropropane	0.2	0.2
Dicamba	200	
1,2-Dichloropropane	5	5
1,3-Dichloropropene	2	
Dieldrin	0.02	
Dimethrin	2100	
Dinitrophenol	31	
Dinoseb	2	7
Diphenamid	200	
Diphenylamine	175	
Diquat	20	20
Disulfoton	0.3	
Diuron	14	
Endosulfan	42	
Endothall	140	100
Endrin	2	2
Ethylene dibromide (EDB)	0.005	0.05
Ethylenethiourea (ETU)	3	
Fenamiphos	1.8	
Fluometuron	90	
Folpet	320	
Fonofos	14	
Glyphosate	700	700
Heptachlor	0.08	0.4
Heptachlor epoxide	0.04	0.2
Hexachlorophene	2	
Hexazinone	210	
Lindane (BHC)	0.2	0.2
Malathion	40	
Maleic Hydrazide	3500	
Maneb/Mancozeb/Zineb	10	
MCPA	2.5	

Common Name	MEG[39]	MCL[40]
Methomyl	50	
Methoxychlor	100	40
Methyl parathion	2	
Metolachlor	100	
Metribuzin	175	
Oxamyl	175	200
PCNB	71	
Paraquat	30	
Parathion	8.6	
Pentachlorophenol	1	1
Phorate	0.2	
Picloram	300	500
Prometon	100	
Pronamide	50	
Propachlor	92	
Propanil	40	
Propazine	14	
Propham	120	
Propiconazole	9	
Resorcinol	140	
Rotenone	4	
Simazine	4	4
Tebuthiuron	500	
Terbacil	90	
Terbufos	0.9	
Thiram	10	
Toxaphene	0.3	3
Trifluralin	2	
Ziram/Ferbam	25	

APPENDIX G
MAINE WATER QUALITY CRITERIA FOR PESTICIDES[42]

	Aquatic Life (Fg/l)				Human Health (Fg/l)	
Chemical Name	cmcfresh	cccfresh	cmcsalt	cmcfresh	hh wo	hh o
B-Lindane					0.0137	0.046
Chlorpyrifos	0.083	0.041	0.011	0.0056		
Demeton		0.1		0.1		
Guthion		0.01		0.01		

1 [42]Maine Department of Environmental Protection, "Maine Water Quality Criteria for Toxic Pollutants," 1995.

Malathion		0.1	0.1	
Methoxychlor		0.03	0.03	40
Parathion	0.065	0.013		

cmc = contaminant maximum concentration
ccc = contaminant chronic concentration
hh wo = human health water and organism
hh o = human health organism

APPENDIX H
BOARD OF PESTICIDES CONTROL
ENFORCEMENT PROTOCOL

ADOPTED 9/19/84
AMENDED 9/7/90
AMENDED 6/3/1998

The Board adopts the following enforcement protocol to be utilized in routine enforcement matters arising under the Board's statutes and regulations.[43]

1. Persons wishing to report potential violations should refer such matters, as soon and in as much detail as possible, to the Board's staff. Where such reports are submitted by telephone, the Board requests that confirmation be made in writing. As a general rule, where requested by the individual making the report, the Board shall keep the identity of that person confidential, except as the Attorney General may advise in a particular case that such information is subject to public disclosure under the Maine Freedom of Access Law.

2. As soon as practicable after receipt of a report of a potential violation, the Board's staff shall investigate. The precise method and extent of investigation shall be at the discretion of the staff, considering the potential severity of the violation and its consequences, the potential the violation may have for damage to the environment or human health, and other matters which may place demands upon staff resources at the time.

3. Following staff investigation, if the staff determines that a violation has occurred of sufficient consequence to warrant further action, the Board staff may proceed as follows:

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1 [43]In emergency or other unusual situations, the Board and/or its staff may depart from this protocol, in a manner consistent with State law, when necessary to the handling of particular enforcement actions.

a. In matters not involving substantial threats to the environment or public health, the Board's staff may discuss terms of resolution with the Attorney General's office and then with the violator without first reporting the matter to the Board. This procedure may only be used in cases which there is no dispute of material facts or law, and the violator freely admits the violation(s) of law and acknowledges a willingness to pay a fine and resolve the matter. The terms of any negotiated proposed resolution shall be subject to the Board's subsequent review and approval, as provides in section 6b.
b. In matters involving substantial threats to the environment or the public health or in which there is dispute over the material facts or law, the Board's staff shall bring the matter to the attention of the Board. The staff shall prepare a written report summarizing the details of the matter. Copies of the report shall be mailed to the alleged violator and any complainants so they may make comments. The report and any comments will then be distributed to the Board prior to their next available meeting. The staff will also notify the alleged violator and other involved parties about the date and location of the meeting at which the alleged violation will be considered by the Board.

4. At the Board meeting, the Board shall hear from its staff and, if requested, from the alleged violator(s) and/or their attorneys, as well as from other interested members of the public, to the extent reasonable under the circumstances and in a manner which the Board's chairman shall direct. Ordinarily, such a meeting will not be conducted as a formal adjudicatory hearing. Before making a decision regarding any action(s) which it may wish to take in response to an alleged violation, the Board may choose to go into executive session to discuss with its counsel the various enforcement options available to it and other related matters which are not subject to public disclosure under the Freedom of Access Law. However, all Board decisions shall be made on the public record and not in executive session.

5. Following receipt of the staff report and other information presented to it and completion of whatever further inquiry or deliberations the Board may wish to undertake, the Board shall make a decision regarding which course(s) of action, as described in Section 6, it deems appropriate in response to the alleged violation. Any such decision will ordinarily be based upon the Board's judgment as to whether a violation of its statutes or regulations appears to have occurred which is of sufficient consequence to warrant an enforcement action, but shall not require that the Board be satisfied to a legal certainty that the alleged violator is guilty of a particularly defined violation. In disputed matters, the ultimate decision as to whether a violation is factually and legally proven rests with the courts.

6. If the Board makes the determination that a violation appears to have occurred which warrants an enforcement action, the Board may choose among one or more of the following courses of action:

a. In matters involving substantial violations of law and/or matters resulting in substantial environmental degradation, the Board may refer the matter directly to the Attorney General for the initiation of enforcement proceedings deemed appropriate by the Attorney General. Also, with regard to more routine violations with respect to which the Board finds sufficient legal and/or factual dispute so that it is unlikely that an amicable administrative resolution can be reached, the Board may choose to refer the matter directly to the Attorney General.

b. On matters warranting enforcement action of a relatively routine nature, the Board may authorize and direct its staff to enter into negotiations with the alleged violator(s) with a view to arriving at an administrative consent agreement containing terms (including admissions, fines and/or other remedial actions) which are satisfactory to the Board, to the Attorney General and to the alleged violator(s). The Board will not ordinarily determine in the first instance the precise terms which should be required for settlement but may indicate to the staff its perception of the relative severity of the violation. In formulating a settlement proposal, the staff shall take into consideration all of the surrounding circumstances, including the relative severity of the violation, the violations record and other relevant history of the alleged violator(s), corrective actions volunteered by the alleged violator(s) and the potential impact upon the environment of the violation. The staff shall consult with the Attorney General's office before proposing terms of settlement to the alleged violator(s). Following successful negotiation of an administrative consent agreement with the alleged violator(s), the staff shall report back to the Board the terms of such agreement for the Board's review and, if it concurs, ratification. All administrative consent agreements shall become final only with the Board's and the Attorney General's approval.

c. In the event that an administrative consent agreement cannot be arrived at as provided in paragraph b., the staff shall report the matter back to the Board for further action by it. Such action may include referral to the Attorney General for appropriate action.

d. In addition, in appropriate cases, the Board may act to suspend the license of a certified applicator as provided in its statute, may act to refuse to renew the license of a certified applicator and/or may request that the Attorney General initiate proceedings in the Administrative Court to revoke or suspend the license of any such applicator. Where provided for by its statute, the Board shall give the licensee involved the opportunity for a hearing before the Board in connection with decisions by it to refuse to renew a license or to suspend such license.

7. Whereas the Board is establishing this protocol in order to clarify and facilitate its proceedings for the handling by it and its staff of enforcement matters, the

Board recognizes that the Attorney General, as chief law enforcement officer of the State, may independently initiate or pursue enforcement matters as he deems in the best interests of the State and appropriate under the circumstances.

APPENDIX J
(other BPC rules may be found at http://www.state.me.us/agriculture/pesticides/laws/regs.htm)

01 DEPARTMENT OF AGRICULTURE, FOOD AND RURAL RESOURCES

026 BOARD OF PESTICIDES CONTROL

Chapter 41: SPECIAL RESTRICTIONS ON PESTICIDE USE

SUMMARY: This chapter describes special limitations placed upon the use of (1) aldicarb (Temik 15G) in proximity to potable water bodies; (2) trichlorfon (Dylox); (3) hexazinone (Velpar, Pronone) and (4) aquatic herbicides in the State of Maine.

Section 1. ALDICARB (TEMIK®)

The registration of aldicarb (Temik 15G) is subject to the following buffer zone requirements:

A. Aldicarb (Temik 15G) shall not be applied within 50 feet of any potable water source if that water source has been tested and found to have an aldicarb concentration in the range of one to ten parts per billion (ppb). The 50 foot buffer would be mandatory for one year with a required retesting of the water at the end of the period.

B. Aldicarb (Temik 15G) shall not be applied within 100 feet of any potable water source if that water source has been tested and found to have an aldicarb concentration in excess of 10 ppb. The 100 foot buffer would be mandatory for one year with a required retesting of the water at the end of this period.

Section 2. TRICHLORFON (DYLOX)

The registration of trichlorfon (Dylox) is subject to the following regulations:

A. Limited Use List

Any formulation containing trichlorfon (Dylox) is classified as a limited use pesticide.

B. Notice

Any person who applies trichlorfon (Dylox) by aircraft or air-carrier application equipment or who contracts or arranges for such applications of trichlorfon (Dylox) shall provide notice in conformity with this regulation.

I. Notice shall be given to:

a. All persons who maintain a home or fruit or vegetable garden on property which abuts the application site; or

b. To the public.

II. Notice pursuant to B(I)a shall be given in writing at least twenty-four (24) hours and not more than two months prior to application.

III. Notice pursuant to B(I)b shall be given by publication in a newspaper of general circulation in the area of the state affected at least twenty-four (24) hours and not more than two months prior to application.

IV. Notice shall be in the form provided by the Board and will contain at minimum:

a. The name of the chemical to be applied;

b. The boundaries of the application site;

c. The name and address of the person supplying notice;

d. Any medical or environmental warnings contained on the product labeling plus, if it is not already included on the label, a sentence stating that the compound has demonstrated some mutagenic effects in bacterial cell cultures; and

e. Instructions directing those persons notified to contact the person supplying notice if they wish to obtain information regarding precise time of application.

V. Arrangements for more specific notice pursuant to Section B(IV)e shall be made by the individual parties involved.

C. Permits

A permit to use such limited use pesticide may be issued by the Board when it finds that the criteria of Chapter 40, Section 2(c) are satisfied. The Board may impose reasonable conditions on such permits as it deems necessary to protect the health, safety and general welfare of the environment and the people of the State of Maine. Conditions may include, without limitation, requirements for demonstrating that the pest infestation will cause substantial economic harm if it goes untreated by the limited use pesticide, for posting areas to be treated and for observing no-spray buffers.

Section 3. HEXAZINONE (VELPAR, PRONONE)

The registration of hexazinone is subject to the following limitations and conditions.

A. Prohibition of Certain Air-Carrier Application Equipment

It shall be unlawful to apply any liquid pesticide mixture containing the active ingredient hexazinone with any application equipment that utilizes a mechanically generated airstream to propel the spray droplets unless the airstream is directed downward.

B. Licenses Required

I. No person shall purchase, use or supervise the use of any pesticide containing the active ingredient hexazinone unless they have obtained a private or commercial pesticide applicators license from the Board.

II. No person shall:

a. Distribute any pesticide containing the active ingredient hexazinone without a restricted use pesticide dealer's license from the Board; or

b. Distribute any pesticide containing the active ingredient hexazinone to any person who is not licensed as a private or commercial pesticide applicator by the Board.

C. Records and Reporting

Dealers distributing pesticides containing the active ingredient hexazinone shall keep records of such sales and provide reports to the Board as described in Chapter 50, "Record Keeping and Reporting Requirements."

Section 4. AQUATIC HERBICIDES

The registration of pesticides for which there is an aquatic herbicide use on the product label shall be subject to the following limitations and conditions.

A. Board Publication of List

The Board of Pesticides Control will publish by May 23, 2003 and by March 15th of each year thereafter a list of herbicide products registered in Maine for which the manufacturer has verified that there is an aquatic use on the pesticide label. Based on available information, the Board may exempt from this list pesticides that it determines are not for use in the control of aquatic vegetation. Pesticides labeled solely for use in aquariums and antifouling paints, are specifically exempt from this list.

B. Licenses Required

I. No person shall purchase, use or supervise the use of any aquatic herbicides identified on the Board's annual listing unless they have obtained a private or commercial pesticide applicator's license from the Board.

II. No person shall:

a. Distribute any aquatic herbicides identified on the Board's annual listing without a restricted use pesticide dealer's license from the Board; or

b. Distribute any aquatic herbicides identified on the Board's annual listing to any person who is not licensed as a private or commercial applicator by the Board.

C. Disclosure

The Board will make a disclosure form available to dealers distributing any aquatic herbicides identified on the Board's annual listing. The Board requests that dealers present to customers the disclosure form that advises purchasers that an aquatic discharge license must be obtained from the Maine Department of Environmental Protection before any application may be made to any surface waters of the State as defined in 38 M.R.S.A. Section 361-A(7) including any private ponds that may flow into such a body of water at any time of year.

D. Records and Reporting

Dealers distributing any aquatic herbicides identified on the Board's annual listing shall keep records of such sales and provide reports to the Board as described for restricted use pesticides in Chapter 50, "Record Keeping and Reporting Requirements."

STATUTORY AUTHORITY: 5 M.R.S.A. § 8051 *et seq*.
7 M.R.S.A. §§ 601-610;
22 M.R.S.A. §§ 1471-A, 1471-B, 1471-C, 1471-D, 1471-M.

EFFECTIVE DATE:
March 8, 1981 (Captan)

AMENDED:
May 7, 1981 (Trichlorfon)
January 2, 1984 (Aldicarb)
May 8, 1988 (Trichlorfon)
August 5, 1990 (Captan)
August 17, 1996 (Hexazinone)
October 2, 1996

EFFECTIVE DATE (ELECTRONIC CONVERSION):
March 1, 1997

AMENDED:
May 7, 1997 - Section 3(B)(II)

CONVERTED TO MS WORD:
March 11, 2003

AMENDED:
May 12, 2003 - Section 4 added

NON-SUBSTANTIVE CORRECTIONS:
June 24, 2003 - summary only

AMENDED:
February 2, 2004 - Section 4, 1st paragraph and sub-section A, filing 2004-31

APPENDIX K
SUMMARY OF COMMENTS

On September 25, 1997, copies of the proposed revised *Maine Generic State Management Plan for Pesticides and Ground Water* were distributed to Ground Water Planning Committee members, Hexazinone SMP Advisory Committee members, Board members, staff and other interested parties with a memo announcing the commencement of a 60-day comment period. A notice was also included in the Fall *BPC Communicator*, and, for the first time, information about plan availability was placed on the Internet at the BPC's home page. Several additional requests for plans were received and, in total, approximately 90 copies of the plan were distributed.

A public information gathering meeting was held on October 24 in Houlton. Aside from a few introductory remarks by a BPC staff member, only one other person spoke at the meeting. That person, a member of the Ground Water Planning Committee, expressed support for the plan and process used to create it.

Three sets of written comments were received prior to the November 26 deadline. One set of comments was from another Ground Water Planning Committee member and generally expressed support for the revised Generic SMP. Another set of comments was from a former member of the Hexazinone SMP Advisory Committee who expressed harsh words about the plan and process and the Board's ability to adequately protect ground water.

The final set of comments was received from a member of the Hexazinone SMP Advisory Committee who questioned why the relative magnitude of detections as a percent of the MCL or MEG had not been considered when calculating the percentage of sampled wells or sites with confirmed detections in Figure VIII-B (pp. 55). He reasoned that as technology allows lower detection levels and as the percentage of sites with detections may therefore increase, would these percentages stay meaningful? The Ground Water Planning Committee wrestled greatly over this detail during the plan revision process. Because prevention is the overriding goal of the Generic SMP, the Committee decided ultimately that any detection was meaningful. Even at small percentages of the MCL or MEG, the group felt steps, as simple as user awareness and education, could be initiated to prevent the potential for a more serious contamination problem.