

PENNSYLVANIA WELLHEAD PROTECTION PROGRAM

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EXECUTIVE SUMMARY

As required under the federal Safe Drinking Water Act, the Commonwealth of Pennsylvania, through the Bureau of Water Supply Management of the Department of Environmental Protection (DEP), has developed a Wellhead Protection Program to protect ground-water sources used by public water systems from contamination that may have an adverse effect on public health. Participation in the program is voluntary and builds upon the basic requirements for water purveyors to obtain the best available source and to take the appropriate actions to protect the source, thereby ensuring a continual and safe water supply. The Wellhead Protection Program will suffice for the ground-water component of the Source Water Assessment Program which is also required to be developed under the Safe Drinking Water Act.

The responsibility for wellhead protection in Pennsylvania is shared between the State, local governments and water suppliers. Water purveyors are responsible for assuring the continuous supply of potable water to the consumer. The Commonwealth has primary responsibility for regulating public water systems and most discharges of potential contaminants along with providing coordination on ground-water protection programs. The authority to regulate land use in Pennsylvania, however, is seated at the municipal level. Recognizing the need to balance the interests of all stakeholders, the Wellhead Protection Program emphasizes technical, educational and financial assistance to facilitate local wellhead protection program development and implementation. Activities undertaken to develop and promote the program include various outreach efforts, offering of incentive grants, formulating a wellhead protection area delineation strategy and the establishment of regulations.

The focal point of a local wellhead protection program is the wellhead protection area delineation as depicted on a map. The Pennsylvania Safe Drinking Water Regulations define a three-tiered wellhead protection area. Zone I is the innermost protective zone which ranges from a 100 to 400 feet radius depending on source and aquifer characteristics. A calculated fixed radius method is used to determine Zone I which for new wells must be owned or controlled by the water supplier. Zone II is the capture zone which by default is a ½ mile radius around the source unless a rigorous hydrogeologic delineation is performed. Zone III is the area beyond Zone II that contributes recharge to the aquifer within the capture zone. Collectively, Zones II and III constitute the contributing area of a well. Cooperative studies conducted by the U.S. Geological Survey (Risser and Madden, 1994; Risser and Barton, 1995) have yielded a strategy that involves the formulation of a conceptual ground-water flow model, selection of a delineation method consistent with the conceptual model and stepwise refinement for rigorous wellhead protection area delineation in the diverse hydrogeologic settings of Pennsylvania. The level of delineation used in a local program is intended to be commensurate with the intended management approach for the wellhead protection area.

Water purveyors are responsible for the inventory of potential sources of contamination in the wellhead protection area although information from DEP sanitary surveys and geographic information system analysis will assist in this endeavor. Water suppliers and municipalities have a variety of options available for wellhead protection area management while DEP will ensure coordination of environmental protection programs. Existing emergency response plans for community water systems can be enhanced to address contingency planning in the event of an environmental threat to a ground-water source, and the concept of planning and protecting new sources is being promoted through grants, technical assistance and regulation. Key to local program development is public education and participation since local stakeholders are in the best position to decide how to protect their water supply. DEP will approve local programs that meet the basic elements established by regulation.

The Bureau of Water Supply Management has provided technical, educational and financial assistance to promote the development and implementation of local wellhead protection programs. The Bureau has supported rigorous delineation of Zones II and III through past grant projects and has delineated these zones in cooperation with the Pennsylvania Rural Water Association's wellhead protection assistance activities. Various incentive grants to seed local wellhead protection development have been offered by DEP. Since 1993, 16 counties have been funded under the County Water Supply Planning/Wellhead Protection Grant Program to develop county-wide water supply planning in conjunction with pilot wellhead protection activities. Outreach efforts including formal presentations, regional roundtables with water suppliers and co-promotional events with other organizations involved with ground-water protection will continue, especially as wellhead protection is integrated with the Source Water Assessment Program.

Ample opportunity for public participation in the development of the State program and the evaluation of local pilot programs has resulted in a realistic, but effective, approach to wellhead protection. The growing success of wellhead protection in Pennsylvania is due to the recognition of the common sense and importance of pollution prevention in protecting public health and reducing the cost of Safe Drinking Water Act compliance. This is demonstrated by the 156 communities in the Commonwealth that are already developing or implementing voluntary local wellhead protection programs.

INTRODUCTION

Wellhead protection (WHP) is defined in section 1428 of the federal Safe Drinking Water Act (SDWA) as a comprehensive program to protect wellhead protection areas from man-induced contaminants which have an adverse effect on the health of persons. A wellhead protection area (WHPA) is "*...the surface and sub-surface*

area surrounding a water well or wellfield , supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield." The act requires the State Wellhead Protection Program (WHPP) to include seven elements: identify roles and responsibilities, delineate wellhead protection areas, identify sources of contamination, develop management approaches, develop contingency plans, plan for new wells, and ensure public participation in the plan. In addition, the SDWA recognizes an approved State WHPP as fulfilling the requirements for ground-water sources under the Source Water Assessment Program.

The SDWA requires States to submit a Wellhead Protection Program to EPA for review and approval. To date, EPA has approved 47 State programs as well as programs for two U.S. territories. The Commonwealth of Pennsylvania has been actively developing a State program based on technical assistance, education and incentives for development of voluntary local WHP programs. As the forerunner of source water protection, WHP efforts have evolved proven techniques to realize the public health and economic benefits of the prevention of pollution over contamination, treatment and remediation. Consequently, a State WHPP will serve as the cornerstone of the Source Water Assessment Program for public drinking water sources which is also required under the SDWA.

The State WHPP builds upon the basic requirements for water purveyors to obtain the best available source and to take the appropriate actions to protect that source thereby ensuring a continual and safe water supply. The underlying concept of the WHPP is not new as most environmental protection programs recognize the importance of safeguarding existing and future sources of drinking water. The WHPP will also support and complement current initiatives such as pollution prevention, waste minimization, compliance assistance and public participation. As of this writing, over 150 public water systems (PWSs) and many more municipalities are developing or implementing local WHP programs in Pennsylvania. The growing success of wellhead protection in Pennsylvania is because of the recognition of the common sense and importance of pollution prevention in protecting public health and safety, and reducing the cost of compliance with the SDWA. [Appendix B](#) lists the Pennsylvania PWSs that are developing local WHP programs.

The Pennsylvania Department of Environmental Protection (DEP) has primacy for the SDWA in the State and is the primacy agency for the State WHPP. Responsibility for administering the primacy program and for developing the WHPP in Pennsylvania rests with the Division of Drinking Water Management (DWM) in the Bureau of Water Supply Management (BWSM). An implemented local WHP program will serve to protect the useful life of a water supply well or spring thereby giving full return on the investment, preventing the need for capital to construct a new source or provide treatment, preventing additional operating and maintenance costs for added treatment, and preventing costly ground-water remediation. A State WHP program allows Pennsylvania to extend to approved local WHP programs an opportunity to reduce certain monitoring requirements and to take advantage of potential future alternatives to treatment for compliance with some maximum contaminant levels (MCLs). Implementation of an approved local WHP program (as described in Appendix A, Minimum Elements for Local WHP Programs) may enable a water supplier to be eligible for a waiver of synthetic organic chemical monitoring requirements if DEP determines the chosen WHP area management measures are adequate to protect the water supply source. An approved State WHPP will also allow the Commonwealth to assist communities and define minimum elements for local WHP throughout Pennsylvania.

Much of the authority and responsibility to protect public health and safety through protection of the water supply source is already in place in Pennsylvania. Not all, but many of the WHP management approaches for a comprehensive local WHP program would require local government action, cooperation or support. In Pennsylvania, there are nearly 2600 municipalities and only about half of these municipalities have passed zoning ordinances for their jurisdictions.

However, the Municipal Planning Code and a local government's powers to protect public health and safety provides authority for local governments to plan and to act to protect water supplies and the environment. Therefore, local governments are in the best position to implement these protection measures.

There are some compelling public health and economic reasons for addressing WHP in Pennsylvania. Only about 17% of the total population served by community water systems (CWSs) in Pennsylvania is served by systems using ground water as a primary source. This is because of the large urban and suburban populations served by CWSs using surface-water sources. However, 80% of the CWSs in the state use ground water as a primary source of supply. During the last decade, at least 75 CWSs serving over 760,000 customers have experienced significant man-induced ground-water contamination affecting their water supply sources. This represents at least 39% of the population served by CWSs using ground-water sources. Additionally, a minimum of 650 PWSs have added treatment to address ground-water contamination and protect public health. In fiscal year 1994, 1,319 PWSs using ground-water sources have exceeded an MCL for a man-made contaminant. In cases where the cost of addressing such contamination events has been estimated, replacement of the source or treatment has ranged from a few thousand dollars to over a million dollars. The cost of ground-water cleanup under long-term remediation scenarios can also cost up to several million dollars (Ainsworth et al., 1995; Emery and Garrett, 1993; US EPA, 1996). The potential sources of ground-water contamination include underground storage tanks, septic systems, landfills, impoundments, mining and land application of fertilizers and pesticides.

Pennsylvania's WHPP is based on the State Safe Drinking Water Regulations directing public water suppliers to find the best source available and take those measures necessary to protect that source to provide a continual and safe water supply. The Pennsylvania Safe Drinking Water Regulations (25 Pa. Code Chapter 109) establish definitions of wellhead protection and wellhead protection areas, set permitting and operation requirements for ground-water sources, and establish elements necessary for State approval of local WHP programs. Appendix A discusses local WHP program approval.

In addition, the Department of Environmental Protection is applying the principles of a Comprehensive State Ground Water Protection Program (CSGWPP) to coordinate point and non-point source pollution prevention programs with the WHPP. Finally, water suppliers and local municipalities are being encouraged and supported in developing local WHP programs through a limited program of grants, access to loan funds during well construction, technical assistance, educational programs and consultation.

ROLES AND RESPONSIBILITIES

The primary responsibilities for development and implementation of the WHPP in Pennsylvania is shared between the State, local governments and the PWS. DEP through the BWSM-DWM has primary responsibility for regulating PWSs. DEP has primary authority to regulate most point and non-point source discharges of potential contaminants (see Table 1) along with providing coordination on ground-water issues under the CSGWPP. The role of the State is to provide technical support and guidance to the local governments and the water supply purveyor for the development and implementation of local WHP programs, and to coordinate environmental protection programs with approved WHP programs. Both government levels may have direct control over potential contaminants, and should be consistent in their administration of these sources and should adhere to the concepts of WHP. In the case of the State government, it has control over many potential contaminants applied or collected on or beside Pennsylvania highways, on State Parks and State Forest lands, on lands associated with State facilities and on construction and remediation projects conducted by or under contract by the State.

Table 1 - [Agencies with Primary Ground-Water Protection Roles](#)

To address the issues of numerous municipal governments and multiple jurisdiction for a WHP area, the BWSM has promoted and supported the development of county WHP plans. Beginning in 1993 through the present, the BWSM has awarded grants to 16 counties under the County Water Supply Planning/WHP Grant Program for the preparation of water supply and wellhead protection plans. The county plans provide a multiple jurisdictional structure for WHP area delineation, management approaches, contingency planning, new well development and program implementation. Wellhead protection is included as part of water supply planning which may include regionalization and other remedies for small water systems. This approach assists in contingency planning as well since all emergencies are coordinated by the County Emergency Management office. This grant program is pending revisions that will split it into two separate grants. Funding for county-wide water supply planning will continue, but funding for WHP activities will shift toward local program implementation.

DEP will approve local WHP programs which meet the basic elements described in Appendix A. The Division of Drinking Water Management will provide data on State or federally regulated potential sources of ground-water contamination and will advise on approaches for WHP area delineation, conducting contaminant source inventories, public education programs and management approaches for local WHP programs. Existing federal guidelines and recommendations will be utilized and State guidance will be developed only if a need arises.

Public water suppliers and local governments will have access to regional DEP staff with expertise on regional environmental protection or pollution prevention program implementation and technical aspects of WHPA delineation. The DWM will have a point of contact role for coordination of environmental protection programs with WHP at the state level. The DWM is responsible for developing and maintaining a geographic information system (GIS) of water supply locations and WHP areas. These coverages will be accessible to all DEP programs and the public by Arcview in the regional and district offices, and eventually on DEP's Internet website.

The DWM will take a proactive role in promoting WHP. Priority CWSs will be identified by the DWM for assistance in local WHP development based on community dependence on ground water and proximity of potential contaminant sources to ground-water sources. In addition, the Safe Drinking Water Program will delineate WHP areas for small water systems upon request.

Water suppliers are responsible for meeting all applicable rules and regulations under the SDWA. Accordingly, the PWS will be responsible for the delineation of the WHPA, water quality and quantity monitoring of the source(s) and providing any additional technical information regarding the well(s) or wellfield that the local government needs for the WHP program. Any special monitoring needed for control of the WHP program which is not associated with a specific source or conducted to meet other federal, state or local requirements will be conducted by the CWS. The CWS is required under Chapter 109 of DEP's regulations to conduct annual sanitary surveys around its water source(s) to determine potential sources of contamination. Therefore, the water supplier will be conducting or updating pollutant source inventories with assistance from the local municipalities through the local WHP program.

Although a local WHP program will be a joint effort between local governments, the CWSs, citizens groups, the commercial sector, and a host of agencies, submittal of the WHPA delineation, source inventories and annual reporting of the status of the WHPA to the State will be primarily the responsibility of the water supplier as part of the sanitary survey.

Management approaches for protective measures, implementation and monitoring of the control measures, and contingency plans of the local WHP program will be the responsibility of the CWS and the local government served by the supply. However, in many cases there will be multiple jurisdictions with land use authority within a WHPA. Some of the municipalities may not even receive any of their water supply from the well or wellfield being protected. Under these conditions, agreements between the affected municipalities should be executed addressing responsibilities and management approaches for the WHP program. The level, type and number of governments involved will be dependent on the location of the WHPA and the relationships that have been formed to coordinate land-use decision making. When a WHPA overlies more than one municipality, a coordinating government or authority will need to be designated to develop and monitor the management approaches for the WHP program(s). These designees may be a planning commission, county government or an authority; however, all involved municipalities will need to recognize and support the role of the designated body in its management of the WHPA(s). In addition to traditional state-municipal interaction, coordination between DEP and municipalities on WHP issues will be accomplished via the regional Local Government Liaison (LGL) who interacts with local government officials on environmental concerns. The LGL can also provide assistance in addressing multi-jurisdictional issues.

Specific responsibilities under the WHPP are listed in Table 2, [Principal Agencies and Tasks](#).

DELINEATION

The focal point of a local WHP program is the WHPA delineation and the resulting map. On October 8, 1994, revisions to 25 Pa. Code Chapter 109.1 of DEP's rules and regulations defined a three-tiered WHP area approach for wells, springs and infiltration galleries. The first area (Zone I) is a 100 to 400 feet calculated radius based on site specific source and aquifer characteristics. An assistance document for compliance with this regulation has been completed by DWM. The second area (Zone II) is the capture zone of the source which is a ½ mile radius unless a more rigorous delineation is conducted. The third area (Zone III) is the land area beyond Zone II that contributes recharge to the aquifer within the first two areas via surface water or ground water. Collectively, Zones II and III constitute the contributing area of a well.

WHPA delineation should be commensurate with the intended level of WHPA management. Since local WHP programs should be developed in conjunction with DEP input with the goal of obtaining DEP approval, the suitability of the default WHPA (a ½ mile radius) would be evaluated on a case-by-case basis. A sophisticated management strategy will typically necessitate a rigorous delineation. The delineation of a more rigorous WHPA for an existing PWS source will be the responsibility of the water purveyor, the local municipalities and/or the planning agencies with jurisdiction over the source. The delineation must be performed by a registered professional geologist using EPA-accepted methods. The philosophy of WHPA delineation is to produce a map outlining an estimate of the land area through which infiltrating water will have an impact on the quality and quantity of ground water delivered to the CWS well. Any challenges of this estimate will be required to provide more precise hydrogeologic methods and/or data to better refine the WHPA delineation. The ultimate goal would be the development of a delineation of the actual or true contributing area of the well that accounts for all hydrologic and hydrogeologic conditions.

The first question to be answered is: which delineation methodology should be applied to provide a reasonably conservative estimate of the WHPA that is relatively certain to include the actual land area which contributes to the quality and quantity of the ground water reaching the well? The preliminary decision requires compiling information about the source aquifer and estimating the resources intended to be dedicated to the effort. The selection of a methodology for the WHPA delineation is not trivial and will require thoughtful consideration given the various hydrogeologic conditions found in Pennsylvania.

Available geologic and hydrogeologic data for CWS wells is being collated by the BWSM staff during the present round of sanitary surveys at CWSs and will be incorporated into the program's Pennsylvania Drinking Water Information System (PADWIS) database. The database allows BWSM staff to determine the location and number of CWS wells developed in the different hydrogeologic settings of Pennsylvania along with other characteristics of the wells or springs.

The United States Geological Survey (USGS) is completing a joint study with DWM to evaluate the WHPA delineation methods described in EPA's guidelines (US EPA, 1987) as applied to Pennsylvania's various hydrogeologic settings. The first report addresses methodologies for the unconsolidated aquifers of the glacial outwash and the river valley deposits and is titled *Evaluation of Methods for Delineating Areas that Contribute Water to Wells Completed in Valley-Fill Aquifers in Pennsylvania* (Risser and Madden, 1994; USGS Open File Report 92-635). The second report addresses methodologies for fractured bedrock settings and is titled *A Strategy for Delineating the Area of Ground Water Contribution to Wells Completed in Fractured Bedrock Aquifers in Pennsylvania* (Risser and Barton, 1995; USGS Water-Resources Investigations Report 95-4033). Subsequent reports will address specific studies of fractured bedrock aquifer behavior as applied to various WHP area delineation methods in siliciclastic, crystalline and carbonate aquifers. The joint studies completed to date have yielded a strategy for rigorous WHPA delineation that involves the integration of site-specific data (hydrogeologic framework, boundary conditions and internal hydraulic properties) to formulate a conceptual ground-water flow model followed by the selection of a delineation method consistent with the conceptual model and subsequent stepwise refinement based on data availability (Risser and Madden, 1994; Risser and Barton, 1995).

DEP and those performing WHPA delineations will use the USGS studies in conjunction with existing EPA guidelines to determine the appropriate methodology for rigorous WHPA delineation. The WHPA delineation methodology will be chosen based on the hydrogeologic setting of the ground-water source, and the advantages and effort needed to apply the different delineation methods to that setting. This approach will allow selecting a delineation method which is best suited to the available or needed data, available expertise and the level of effort to be dedicated to the WHPA delineation. As part of the process of approving local programs, DEP will review and approve the delineation based on this approach.

In most cases, time-of-travel must be considered to develop monitoring programs and emergency responses, as well as to guide management approaches. The use of other criteria such as flow boundaries or drawdown in a local WHP program may also be selected for use with emergency response programs and to guide management programs when appropriate.

Both existing and new wells will be delineated using the criteria and methodology discussed herein with the exception that community water system wells permitted prior to October 1995 should already have an isolation distance (i.e., Zone I) of 100 feet as specified in the *Public Water Supply Manual*. Although water suppliers are required to delineate Zone I WHP areas for new wells as part of the permitting process, they will also be encouraged to delineate Zones II and III for these wells during permitting since an aquifer test and accompanying hydrogeologic report are required. Review and approval of local WHP programs by DEP will ensure the adequacy of delineations for new and existing wells.

Because the program is voluntary, the number of rigorous WHPA delineations completed by individual water systems will likely depend on the availability of state funding under the upcoming local WHP program implementation grants and other resources. DWM will maintain a GIS coverage of WHP areas that will include the default or interim WHP areas as defined by regulation, rigorously delineated WHP areas and WHP areas as adopted by a local WHP program.

IDENTIFICATION OF POTENTIAL SOURCES OF CONTAMINATION

The identification of potential sources of contamination in a WHPA will require the review and compilation of available source data at the state and local level in addition to conducting field surveys. The DWM will provide the coordination necessary to assist a local WHP program with identifying potential sources of contamination under State jurisdiction for a WHPA. Community water suppliers are required under the Pennsylvania Safe Drinking Water Regulations (25 Pa. Code § 109.705) to conduct an annual sanitary survey/inspection of their catchment basin or WHPA. Additionally, full inspections including a sanitary survey would be completed by DEP every 3-5 years for most public water systems. The sanitary surveys conducted by the CWS purveyor and DEP field staff provide a limited evaluation of the potential sources of contamination. During DEP's sanitary survey, the potential contaminant source inventory will be evaluated to determine if the inventory needs to be enhanced. Windshield surveys, on-site interviews and data gathering at potential source of contamination will be the final refinement of the data searches. The source inventories will generally be conducted in conjunction with delineation efforts although most inventories will not be able to be completed until the boundaries of the WHPA are established.

The conduct of these surveys at the various levels of refinement and purpose will need to be guided to obtain adequate information for use in the WHP program. The State will investigate the development of guidances for these surveys if existing EPA guidelines prove to be insufficient. An initial, general list of potential sources of ground-water contamination commonly found in Pennsylvania is shown in Table 3.

The DWM will continue to work with the other state and federal programs to identify potential sources of contamination. As available from these sources, GIS analysis will be used to identify those activities and facilities near the identified WHP area. Reports and maps will then be provided to the local WHP program or the CWS. Likewise, information on potential sources of contamination for WHP areas provided by local WHP programs and PWSs will be maintained as GIS data. In addition to the annual sanitary surveys and the periodic full inspections, information on contaminant sources may also be updated during environmental program coordination on permitting issues and from annual reports submitted by approved local WHP programs.

Table 3 - [Potential Sources of Ground-Water Contamination](#)

MANAGEMENT APPROACHES

It is recognized that the local governments and/or the water supply purveyors have the necessary authority and information to develop the needed programs which are reflective of the local community's needs and concerns. Therefore, the management approaches for local WHP program will be the responsibility of the local governments (or designee) and the water purveyor. DEP will coordinate the state and federal environmental protection programs in accordance with its mandate and in conjunction with the submitted WHPP.

Local water supply purveyors and local governments both have a variety of management options that can be applied to a WHPA. New ground-water source location, ground-water quality monitoring of the WHPA, WHPA sanitary surveys, land acquisition, training programs and public education programs are some of the management options available to the water supply purveyor. Obviously, the water supply purveyor will be leading the way for WHP and must teach by example. Activities conducted at the well site must exemplify the concept of resource protection. Community water systems are required under 25 Pa. Code Chapter 109.603 to protect the Zone I of a new source by complete control over any activity that would pose a threat to the potability of the ground-water source. Furthermore, the CWS may not allow any activity in Zone I which may

cause contamination of the ground-water source unless it is directly related to production of drinking water. Local governments have an array of tools at their disposal to accomplish resource protection including land acquisition, zoning ordinances and other regulations, public education, transfer of development rights and tax incentives. Water suppliers and local governments each have sources of funding available to them to support the implementation of management techniques; however, competing needs and economic realities will in many cases limit this support. The general management approaches for a local WHP program are listed in Table 4.

Both technical and financial resources will be important if the WHPP is going to be widely accepted and applied. The BWSM has awarded 16 grants to county governments to develop water supply and wellhead protection plans to structure and assist local governments and public water systems in developing local WHP programs. In addition, the results of these and other projects will be studied to evaluate the development of local programs and to develop guidance for establishing and implementing management programs at the local level in Pennsylvania. About a dozen communities in Pennsylvania already have WHP ordinances in place and many more have passed resolutions for the protection of their WHP areas.

Management approaches to protect the WHPA will in most cases require measures to control both regulated and non-regulated sources of potential contaminants. Most sources regulated at either the state or federal level can still be enhanced at the local level to better protect the sensitive resource in respect to local conditions or needs. New management programs or enhancements to existing control programs will be primarily developed as part of local WHP programs which will fill in identified "regulatory gaps" and will be based on local land-use issues. This approach can be applied to both regulated and non-regulated sources and will require close cooperation between the regulators, the regulated community and the local government responsible for the management approaches to protect the WHPA. Additionally, environmental program coordination on permitting issues and implementation of the Comprehensive State Ground Water Protection Program will help to augment protection approaches at the state and federal level. Also, programs such as those offered by DEP's Office of Pollution Prevention and Compliance Assistance may provide opportunities to support the local WHP programs by assisting industries located in the WHP to reduce potential contaminants.

WHP management across municipal boundaries can be coordinated through the regional Local Government Liaison who interacts with local government officials on environmental issues. Coordination of management across state boundaries, if necessary, will occur by DEP interaction with the appropriate counterpart in the other state and will be handled on a case-by-case basis.

Tables 4a and 4b - [WHPA Management Approaches](#)

CONTINGENCY PLANNING

Under the Pennsylvania Safe Drinking Water regulations, community water suppliers are required to develop an emergency response plan and to provide a minimum of one day of reserve capacity in the event of source contamination and outage. The *Public Water Supply Manual, Part VI – Emergency Response* provides guidance on the development of the emergency response plan and addresses contamination of supply, alternate water source inventories, emergency prioritization of water use and an example of a simplified emergency response plan. Provisions for ensuring the adequacy of the plan to address contingency planning in WHP are found in Appendix A.

The coordination and assistance provided by DEP in the event of an emergency is described in the DEP Emergency Operations Plan. This plan documents DEP's generic responsibilities in emergency situations and addresses the short-term response and assistance to be coordinated by the Pennsylvania Emergency

Management Agency (PEMA) to anticipated emergencies. The long-term response to a contamination incident is determined by the water system's compliance with the SDWA. An enhancement that DWM will be studying for the WHPP is a requirement to consider the contingency of source abandonment. This would have the water supply purveyor prioritize the available water resource inventory for possible development as the primary source for the system.

Local WHP programs must coordinate with the County Emergency Management Office and PEMA. All emergency situations that would impact and release contaminants to the WHPA must be defined by the CWS, emergency management officials and the responsible parties of any potential sources of contamination in the WHPA. A particularly useful source of information for this would be local fire companies and/or emergency response agencies that are part of a community's emergency network established by Title III of the Superfund Amendments and Reauthorization Act (SARA) to plan for and respond to emergency releases of hazardous substances. Response plans to mitigate the emergency in the WHPA need to stress protection of the ground water from contamination by released substances. These situations may include transportation accidents, tank ruptures and spills.

To assist in the coordinating activities, a GIS database of WHP areas and CWS facilities will be developed and maintained by DWM. This GIS database will be made available to PEMA, DEP and local governments on databases for Arcview. In addition, this information will be provided on DEP's website. To further the reporting of spills and the promotion of WHP, a water supply protection sign has been approved by the Pennsylvania Department of Transportation for posting on WHPA boundaries. These signs may be ordered by a local WHP program with the approval of DEP.

NEW WELL SITING

The loss of proposed well sites for CWS expansion due to a lack of planning has been a catalyst for several communities to explore developing WHP programs. Planning, construction and management of water systems is an important issue which is being supported at this time in Pennsylvania by the Pennsylvania Infrastructure Investment Authority, known as PENNVEST. The DWM is promoting planning and protection of future and contingent sources through grants, technical assistance, policy and regulation.

Permitting requirements in 25 Pa. Code Chapter 109 require a water supplier to locate the best available source, locate that source away from potential source of contamination and take measures to protect that source. Regulations passed October 8, 1994 require the delineation of the Zone 1 WHP area and sets requirements for new or expanding CWSs to protect this area by requiring the purveyor to own or control the area to prohibit any activity that may contaminate the ground-water source. The regulations also set an interim ½ mile radius for the WHP area in lieu of a rigorous delineation; however, no WHP plans are required for this area. Formal recognition of the WHP area would occur if the water supplier opts to develop a local WHP program that meets DEP's minimum elements for WHP (Appendix A).

PUBLIC PARTICIPATION

The public in Pennsylvania has been exposed to the concept of WHP since the fall of 1988 when a series of workshops was sponsored by the League of Women Voters. Since then, numerous presentations have been made to Pennsylvania's drinking water industry, environmental protection groups, municipal government associations, other government agencies and various interested parties. The recent development and passage of the wellhead protection amendments to the Safe Drinking Water Regulations involved a rigorous review and comment procedure including publication and production of formal comment and response documents. The

DWM works closely with the Small Water Systems Technical Assistance Center Board (TAC Board) which was established under Act 5-1992, The Small Water System Assistance Act. The TAC Board reviews and comments on many of the WHPP initiatives and regulations. Any additional regulatory authority sought would be required to satisfy all State requirements for public comment.

Given the voluntary nature of the WHPP, it was recognized that promotion and acceptance of the WHP concept would be crucial to the success of the program. Consequently, broad-spectrum public participation activities were accomplished via regional roundtables with water suppliers, utilization of the DEP website and other departmental communication forums including presentations to the appropriate advisory committees, industry and governmental organizations as well as co-promotional events with other groups involved with ground-water protection efforts. Formal presentations on the WHPP were provided to DEP's TAC Board, Water Subcommittee of the Air and Water Quality Technical Advisory Committee (now known as the Water Resources Advisory Committee) and Agricultural Advisory Board, along with the Pennsylvania Association of Conservation Districts. The WHPP was publicized via official notification in the *Pennsylvania Bulletin* on October 11, 1997 (27 PaB. 5311), and public comments were requested. A series of public meetings to discuss the WHPP was also held in late October 1997. Although minimal comments were received, a comment and response document was prepared as a result of this process.

For approval by the Department, an acceptable local WHP program is required to involve adequate public input and solicitation for support. Education will be a key to this type of participation. If the public and local officials have some understanding of the adverse health and economic consequences of a contaminated ground-water supply, they will be in a better position to decide how to protect their water supply. The DWM has provided educational packages for training and presentations by Water Supply Management regional staff to local water suppliers, local government and the public. The DWM will continue to work closely with the Water Resources Education Network, the Pennsylvania Rural Water Association and others in promoting WHP through education and public participation, especially as the WHPP is integrated with the Source Water Assessment Program.

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APPENDIX A- MINIMUM ELEMENTS FOR LOCAL WHP PROGRAMS (February 2000)

This section describes the minimum elements necessary for a local wellhead protection (WHP) program to receive DEP approval. Local WHP program plans will be reviewed and approved by regional Water Supply Management staff. If necessary, coordination with other programs could be accomplished in a manner similar to that for permit coordination. Essentially, the plan should not only detail the provisions of the local program including a schedule for implementation, but should also demonstrate the commitment needed to support the on-going efforts necessary for a successful local WHP program. Therefore, the plan should not only describe how sources will be protected but also document the resources necessary to implement the plan, thus linking implementation and management to finances.

Each plan should have a table of contents, an introduction that includes the goal or purpose of the plan along with a general description of the area (demographics, topography, local/regional hydrogeologic setting, source characteristics, etc.), concise narrative descriptions for each of the following sections plus any other relevant supporting information. Each plan must have a WHP area delineation map using an appropriate base map with a scale ranging from 1:400 to 1:24,000 that accurately and legibly depicts source locations, WHP area boundaries and potential contaminant sources (preferably a USGS 7.5' quad or GIS-generated map with adequate cultural features/landmarks). The map must also have a bar scale and north arrow.

A local WHP plan must contain the following minimum elements in order to be considered for DEP approval:

1. Steering Committee & Public Participation

This section of the plan will document the formation and meetings of the local WHP steering committee along with provisions for public involvement. The committee chairperson, the chairperson's telephone number, members, a description of roles and responsibilities of the committee and dates/locations of meetings must be listed. Ideally, meeting locations should vary if possible and a tour/inspection of the wellfield/well sites should be conducted. The narrative must also demonstrate that adequate opportunities for public participation were in place at the beginning of and throughout the project (copies of public notices such as flyers, newspaper notices, etc.). This section should also document all public education activities and describe how the final plan will be accessible to the public (on file at municipal government office or public water system office, libraries,

etc.).

2. WHP Area Delineation

This narrative must completely describe the methodology used, justification for methodology, and who performed the delineation. For delineations in carbonate and fractured bedrock aquifers that utilize the ½ mile radius as the default WHPA, the justification must demonstrate that it is adequately protective. Rigorous delineation methods must be performed by or under the supervision of a Registered Professional Geologist. This section must also include a description of the local hydrogeologic setting and a formulation of a *conceptual* ground-water flow model. Relevant hydrogeologic data with sources/references, supporting calculations and any other information necessary for the reviewer to reproduce the steps involved in delineating the WHP area must be provided. The level of delineation will be commensurate with the type of management option to be utilized.

3. Contaminant Source Inventory

A description of the methods used to conduct an inventory of existing and potential sources of contamination must be provided in this narrative. Documentation of field verification of computerized database searches and actual inspection of the WHP area must be provided. Contaminant source locations must be plotted on the accompanying WHP area map(s) and keyed into a table listing the facility name, owner, type of contaminant and a relative prioritization of risk (low, moderate, high) from the source. (DEP can assist with assessing relative risk if requested). This section must also include documentation that these sources are targeted for or were provided specific education regarding potential risks to the water supply.

4. WHP Area Management and Commitment

This section will provide a description of current land use and describe the management method(s) appropriate for the delineated WHP area. What is the cost to do the activities and where will resources come from?

Commitment may be demonstrated by:

- a.) In-kind services
- b.) Dedicated funding (water rate)
- c.) Tax/fee dedicated to WHP
- d.) General revenue
- e.) Other acceptable means

A table listing management options for each identified threat along with a schedule for implementation must also be provided.

5. Contingency Planning

This section will contain a Revised Emergency Response Plan that includes realization of potential threats through spills and any other unintended releases and describes coordination with water supplier, municipalities and local emergency management agency to address contingencies commensurate with risks for each identified threat. Provisions for alternate water supply must be described such as arrangements for bulk hauling or sources of interconnection.

6. New Sources

This section addresses adequate planning for new wells including careful consideration of potential sites, existing land use, predicted Zone I area, how to obtain access and rights to areas if necessary and how the areas will be protected.

Those water systems capable of satisfactorily addressing each of the above elements will be considered approved under §109.713 and would be issued an approval letter. Additionally, an annual report/update will be required that describes changes in WHP area boundaries, land use, potential threats and contingency planning. Specific requirements may also be contained in DEP's approval letter. For those systems that do not initially address the minimum elements adequately, a review letter will be issued pointing out what needs to be strengthened in order to receive approval.

APPENDIX B- LIST OF PUBLIC WATER SYSTEMS INVOLVED IN LOCAL WHP PROGRAMS (February 2000)