Potomac River Basin Drinking Water Source Protection Partnership Strategic Plan

Adopted August 9, 2005

Executive Summary

The Potomac River Basin is home to approximately 5.35 million people who rely on the basin's rivers and ground water for drinking water supply. Activities upstream of water supply intakes or in ground-water recharge areas can introduce contaminants to the water source. In order to address drinking water quality concerns arising in source water areas, drinking water utilities and their governmental counterparts have banded together to create the Potomac River Basin Drinking Water Source Protection Partnership (Partnership). By relying not only on the treatment plant, but also on multiple barriers to contamination created by watershed protection efforts, the Partnership seeks to enhance drinking water quality and to minimize risks to public health.

The Partnership has identified several issues of importance and has formed workgroups focused on pathogens, emerging contaminants, disinfectant byproduct precursors, urban issues, agricultural issues, and development of an early warning and emergency response system. Each of the workgroups has identified objectives, activities, and milestones for its focus topic.

The Pathogens Workgroup will provide the Partnership with information on pathogens which may affect the raw water supplied by the Potomac River and its tributaries. The workgroup will seek to understand the sources of pathogens in the Potomac watershed and methods for controlling their introduction into the water supply. The workgroup will try to create alliances with other stakeholders in developing a plan to reduce pathogen loads in the river.

The role of the Emerging Contaminants Workgroup is to support the Partnership by tracking and reporting on findings of research and monitoring of persistent and newly identified threats posed to the Potomac River drinking water supply. An initial focus of the workgroup shall be on endocrine disrupting chemicals (EDCs). The workgroup's short-term goals include defining and prioritizing EDCs based on a review of current knowledge and consultation with experts, assessing potential sources for the priority EDCs in the Potomac River, and identifying appropriate best management practices for their control. The workgroup's long-term goal is to enhance, through monitoring of ongoing research by others, the Partnership's and local stakeholders' understanding of EDCs identity, sources, distribution, possible human and ecological health effects, treatability, and management practices to limit their proliferation in the environment

The Early Warning and Emergency Response Workgroup is intended to better prepare the Partnership's member utilities to respond in the event of a spill or other incident that affects their water supplies. The workgroup will evaluate the need for an early warning monitoring system for the Potomac River and its tributaries and help to coordinate the

development of needed components of such a system. The workgroup will also assist in the development of an emergency response plan to improve communication among all affected utilities in the event of a water supply emergency.

The Disinfectant By-Product (DBP) workgroup is intended to develop better information for Partnership utilities to address disinfection by-product issues from a source water protection approach. This workgroup shall focus on prioritizing and conducting research to assess the relative contribution of different watershed sources (i.e., land-based/allochthonous vs. in-river/autochthonous) of natural organic matter/DBP precursors to treated/distributed water DBP levels. The goal of this workgroup is to focus source water protection efforts on those sources most significant to DBP levels in treated/distributed water and to identify the most feasible and cost effective source water protection measures. The initial steps include identifying priority research and partners as well as preparing technical proposals and obtaining funding. The research findings will then be used to identify the significant contributing sources in the watershed and to assess whether source water protection measures targeted at these sources would be feasible and cost-effective. This workgroup will develop recommendations for source protection measures to address regional utility DBP issues.

The Urban Issues Workgroup is intended to position the Partnership to better communicate drinking water needs in the Potomac River Basin to the agencies who oversee implementation of urban stormwater management programs. This workgroup shall focus on urban stormwater including urban runoff, combined sewer overflows, and sanitary sewer overflows associated with storm activity. The goal of this workgroup is to promote implementation of better stormwater management to protect drinking water in the Potomac. The initial steps include gathering information on urban land use trends and on current stormwater management practices throughout the basin. After this has been completed, priority communities will be identified and a dialogue started with those communities. This workgroup will develop a list of recommended urban stormwater practices to be used for advocacy throughout the watershed.

By carrying out these workgroup activities, a more thorough understanding of potential contaminant sources will be developed, prioritization of protection areas will be established, and watershed protection activities that are most likely to positively impact drinking water quality will be identified. As funding becomes available, these watershed protection activities will be implemented.

I. Problem Statement

The Potomac River and its tributaries drain approximately 14,670 square miles in four states (Maryland, Pennsylvania, Virginia, and West Virginia) and the District of Columbia. The river, its tributaries, and the ground water stored in Potomac Basin aquifers provide drinking water to approximately 5.35 million basin residents (2000 Census).

Drinking water treatment plants for public water supply systems meet United States Environmental Protection Agency (EPA) safe drinking water standards by implementing various treatment technologies. However, activities in upstream areas or in ground-water recharge areas can introduce contaminants to the water source that increase treatment costs, reduce treatment efficiency, or create taste and odor problems. In an extreme case, a contamination event can damage plant facilities, force a temporary plant shutdown, or require residents to boil drinking water. In order to address drinking water quality concerns arising in source water areas, drinking water utilities and their governmental counterparts have banded together to create the Potomac River Basin Drinking Water Source Protection Partnership (Partnership). By relying not only on the treatment plant, but also on multiple barriers to contamination created by watershed protection efforts, the Partnership seeks to enhance drinking water quality and to minimize risks to public health.

A pristine natural watershed will generally present the fewest potential problems to water supplies. However, even natural forests can contribute organic matter that affects drinking water treatment. Agricultural activities have the potential to threaten water supplies through pesticide or herbicide residue in runoff, sediment production, or the introduction of pathogens from animal operations. Urban areas can also contribute contaminants through storm runoff that is tainted with chemicals that are washed from roads and parking lots. Pathogens from combined sewer overflows or wastewater treatment plant malfunctions are another concern. Rapid development can produce high sediment loads if care is not taken in the construction process, and the increase in urbanization can exacerbate stormwater runoff issues from urban areas. Additionally, a range of other potential contaminants, such as ingested pharmaceuticals, may not be removed by standard treatment processes.

All of these potential sources of contamination exist in the Potomac River basin. The basin's current land use includes about 58% forest cover, 32% agricultural lands, and 5% developed lands, with open water, wetlands, and barren lands making up the remaining 5% of the watershed[*]. In addition, rapid urbanization is taking place in some areas, with some of the fastest growing counties in the United States located within the Potomac Basin. While potential sources of contamination exist throughout the basin, these issues can be addressed through enhanced source water protection activities. The specific protection measures selected should mitigate issues that have the greatest impact on human health. The Partnership was created to prioritize and address these impacts and to carry forward on action to safeguard water supplies for drinking water quality.

II. Mission Statement

To serve as a cooperative and voluntary partnership working towards the goal of improved source water protection of the Potomac River in recognition of the vital role of the river in supplying drinking water to millions of people within the Potomac watershed and in support of the multi-barrier approach to safeguarding the drinking water supply for public health.

[*] Land use percentages are derived from statistics provided by the Chesapeake Bay Program.

III. Partnership Objectives

- Identify regional priorities for source water protection efforts.
- Coordinate, where appropriate, source water and drinking water protection efforts to benefit multiple water systems.
- Establish and maintain a coordinated dialogue between water suppliers and government agencies involved in drinking water source protection within the Potomac River Watershed.
- Establish and maintain a coordinated dialogue between the Partnership agencies and other groups working towards watershed protection within the Potomac River Watershed.
- Promote information sharing among groups working on, and affected by, safe drinking water issues.
- Enhance coordinated approaches to water supply protection measures in the Potomac basin, especially for boundary waters and for project planning that impacts interstate waterways.
- Develop new initiatives within the drinking water community and with partners that will fill program voids ensuring higher quality drinking water supplies.

IV. Partnership Priorities

After a review of the source water assessments of its member water utilities, the Partnership established a list of important contaminants and important project areas. The Partnership anticipates a need to reevaluate priorities on a periodic basis to ensure that they remain consistent with the Partnership's knowledge of watershed activities and their impacts on the water supply.

The initial emphasis will be on the following two issues:

- Pathogens
- Emerging contaminants

The following were identified as other issues of importance:

- DBP precursors
- Sediment
- Ammonia/de-icing agents

Workgroups have been formed to investigate issues related to pathogens, emerging contaminants, and DBP precursors. Sediment and ammonia/de-icing agents will be considered by separate workgroups on agricultural issues and urban issues.

The Partnership has also identified the following initial project issues:

- Spill prevention and emergency response
- Monitoring and data sharing
- Outreach
- Further research to understand contaminants and their sources

An early warning and emergency response workgroup is working to address spill prevention, emergency response, monitoring, and data sharing, while agricultural and urban issues workgroups were created to meet outreach and research needs. The contaminant workgroups will also seek to better understand contaminant sources.

V. Partnership Workgroups

As discussed in the previous section, workgroups were created to study important issues and project areas in greater depth. Workgroups have identified objectives, activities, and measures of success for the priority issues, as outlined below. The Agricultural Issues Workgroup will develop its objectives, activities, and measures of success as soon as practicable.

A. Pathogens Workgroup

This workgroup will provide the Partnership with information on pathogens which may affect the raw water supplied by the Potomac River and its tributaries. The workgroup will seek to understand the sources of pathogens in the Potomac watershed and methods for controlling their introduction into the water supply. The workgroup will try to create alliances with other stakeholders in developing a plan to reduce pathogen loads in the river.

Workgroup Objectives

A1) Develop an understanding of the possible sources of *Cryptosporidium* in the Potomac watershed, especially *Cryptosporidium parvum*.
A2) Evaluate the available methods for identifying and characterizing the actual sources of *Cryptosporidium i*n the Potomac watershed.
A3) Compile information on pathogens data in the Potomac basin including identification of watersheds that contribute significant loadings of *Cryptosporidium* to the main stem of the river (upstream of Little Falls).
A4) Develop a strategy to incorporate stakeholders and communities in a plan to reduce pathogens in the Potomac River, including the agricultural community.

Workgroup Activities

Short term:

- Conduct GIS mapping of intake locations and possible sources of pathogen contamination including combined sewer overflows, wastewater treatment plants, and agricultural operations from existing databases.
- Review current field studies on *Cryptosporidium* sources. Investigate the best available methods for source identification.
- Conduct workshop on pathogens, focusing on *Cryptosporidium*.

Long term:

- Develop proposal for more detailed study of areas that are likely sources of pathogens.
- Contact stakeholder communities to develop a plan to reduce pathogens in the Potomac River.

Workgroup Measures of Success:

- Conduct pathogens workshop.
- Create database and mapping of potential pathogen sources.
- Identify best candidate methods for field and laboratory studies to characterize pathogen sources, and in particular, sources of *Cryptosporidium*.
- Develop scope of work for future research.

B. Emerging Contaminants Workgroup

The role of the Emerging Contaminants Workgroup is to support the Partnership by tracking and reporting on findings of research and monitoring of persistent and newly identified threats posed to the Potomac River drinking water supply. An initial focus of the workgroup shall be on endocrine disrupting chemicals(EDCs). The workgroup's short-term goals include defining and prioritizing EDCs based on a review of current knowledge and consultation with experts, assessing potential sources for the priority EDCs in the Potomac River, and identifying appropriate best management practices for their control. The workgroup's long-term goal is to enhance, through monitoring of ongoing research by others, the Partnership's and local stakeholders' understanding of EDCs identity, sources, distribution, possible human and ecological health effects, treatability, and management practices to limit their proliferation in the environment

Workgroup Objectives

B1) Define and prioritize emerging contaminants; modify and amend as new data are reported. Focus initially on contaminants that are or have

potential to be endocrine disrupting and that have already been observed in rivers or ground water used for water supply.

B2) Monitor research on detection methods, surrogate indicators, human and ecological/environmental health effects, and epidemiological/toxicological studies.

B3) Identify potential sources (point source and non-point source) of identified priority emerging contaminants.

B4) Identify patterns of contaminant distribution and persistence, especially downstream of identified point sources.

B5) Provide information to the Partnership on any observed effects in river biota in the areas of contamination.

B6) Identify control measures and best management practices to reduce or minimize proliferation of emerging contaminants in the Potomac River.

B7) Develop a communication strategy to educate stakeholders on control measures and best management practices.

Workgroup Activities

Short term:

- Identify and contact interested agencies and individuals to facilitate non-duplicative coordination of efforts and communication of unpublished research; survey interested parties to assess what resources are already available.
- Develop a GIS of potential contaminant source locations.
- Conduct workshop on issues relating to emerging contaminants that are relevant to the Potomac Basin.

Long term:

- Track ongoing research to identify and detect priority emerging contaminants, and track ongoing research on human and ecological/environmental health effects of exposure to specific substances; track progress in understanding which substances are responsible for observed wildlife effects.
- Prepare a brief annual literature survey summary/newsletter to track the state of research; when feasible, attend local and national conferences, symposia and seminars on relevant topics.
- Approximately every 5 years sponsor a seminar or workshop on current research.
- Identify funding sources and resources needed to support monitoring.
- Provide information on the effectiveness of biological indicators for potential harmful effects of human consumption of source water.

Workgroup Measures of Success

- Listing of identified priority emerging contaminants to be monitored.
- Preliminary GIS layer(s) showing potential sources (point and non-point).
- Initial literature survey of research progress.
- Conduct emerging contaminants workshop.

C. Disinfectant By-Product (DBP) Precursors Workgroup

This workgroup is intended to develop better information for Partnership utilities to address disinfection byproducts issues from a source water protection approach. This workgroup shall focus on prioritizing and conducting research to assess the relative contribution of different watershed sources (i.e., land-based/allochthonous vs. in-river/autochthonous) of natural organic matter/DBP precursors to treated/distributed water DBP levels. The goal of this workgroup is to focus source water protection efforts on those sources most significant to DBP levels in treated/distributed water and to identify the most feasible and cost effective source water protection measures. The initial steps include identifying priority research and partners as well as preparing technical proposals and obtaining funding. The research findings will then be used to identify the significant contributing sources in the watershed and to assess whether source water protection measures targeted at these sources would be feasible and cost-effective. This workgroup will develop recommendations for source protection measures to address regional utility DBP issues.

Workgroup Objectives

C1) Identify significance and nature of DBP concerns for specific Potomac River water utilities and, if possible, prioritize sources of DBP precursors.
C2) Identify priority research regarding relative source contributions of DBP precursors (*i.e.*, how much of the DBPs in treated water can be attributed to allochthonous/land vs. autochthonous/algae sources).
C3) Obtain funding to perform priority research on relative source contributions of DBP precursors in the Potomac.
C4) Recommend measures for source water protection activities.

Workgroup Activities

Short term:

- Perform literature review and develop draft scope of work for priority research regarding relative source contributions of DBP precursors.
- Identify potential research partners and funding sources (grants, in-kind services, etc.).
- Coordinate efforts with on-going research work for Washington Aqueduct Division of the U.S. Army Corps of Engineers.
- Obtain information from state agencies to identify which systems on the Potomac may have DBP issues.

Long term:

- Oversee and coordinate research efforts on successful grants.
- Continue to collect information from related research efforts for other sources as appropriate.

- Identify primary targets for source protection based on research findings.

Workgroup Measures of Success

- Identify DBP issues.
- Identify priority research in detailed scope of work.
- Development of grant and funding applications.

D. Early Warning Monitoring/Emergency Response Workgroup

This workgroup is intended to better prepare the Partnership's member utilities to respond in the event of a spill or other incident that affects their water supplies. The workgroup will evaluate the need for an early warning monitoring system for the Potomac River and its tributaries and help to coordinate the development of needed components of such a system. The workgroup will also assist in the development of an emergency response plan to improve communication among all affected utilities in the event of a water supply emergency.

Workgroup Objectives

D1) Ensure that an emergency communications system and protocol reflecting the specific needs of the water supply community is in place and understood.
D2) Investigate the feasibility of establishing an enhanced monitoring system and a data sharing network.
D3) Establish liaison with petroleum pipeline industry and identify needs to develop liaisons with other industries.

Workgroup Activities

Short term:

- The Metropolitan Washington Council of Governments (MWCOG) has developed the Regional Incident Communication and Coordination System (RICCS) to facilitate communications in the event of emergencies. RICCS allows registered users to notify others of significant events through a centralized system that delivers messages to email addresses, cell-phones, and pagers. For most types of emergencies, the RICCS system is confined to the immediate Washington, D.C. metropolitan area (D.C. metro area) that includes MWCOG's member jurisdictions. However, because of the upstream-downstream connection of the Potomac River and its tributaries as the area's water supply source, the DWSP Partnership will work with MWCOG to enroll Partnership members in the RICCS water group regardless of their location.
- The Partnership will create a one-page summary of emergency communications procedures for distribution to water utilities. The protocol will reflect the emergency plan developed for the DC metro area

by MWCOG, with any needed modifications to accommodate the larger coverage of the Partnership.

Long term:

- An enhanced water quality monitoring system can provide early warning of contamination events before the materials reach water supply intakes. The Partnership will investigate the feasibility of developing an enhanced monitoring system.
- Water utilities already collect a great deal of water quality data as part of their normal operations. Sharing of this data amongst the many utilities sharing the Potomac River and its tributaries as their source can benefit operations. The Partnership will investigate the feasibility of developing a real-time data sharing network amongst the water utilities of the Partnership. Monitoring data from the United States Geological Survey (USGS) gages can also be included in this network to complete the early warning monitoring system.
- Establish contacts with petroleum pipeline industry and other industries as needed.

Workgroup Measures of Success

- Increase participation of upstream water utilities in the RICCS system.
- Distribute concise emergency communication procedures.
- Provide status report to the Partnership on the feasibility of developing an early warning monitoring system and data sharing network.
- Establish contact with petroleum industry.

E. Urban Issues Workgroup

This workgroup is intended to position the Partnership to better communicate drinking water needs in the Potomac River Basin to the agencies who oversee implementation of urban stormwater management programs. These agencies may include state agencies, local jurisdictions, or regional planning districts or planning commissions. This workgroup shall focus on urban stormwater including urban runoff, combined sewer overflows, and sanitary sewer overflows associated with storm activity. The goal of this workgroup is to promote implementation of better stormwater management to protect drinking water in the Potomac. The initial steps include gathering information on urban land use trends and on current stormwater management practices throughout the basin. After this has been completed, priority communities will be identified and a dialogue started with those communities. This workgroup will develop a list of recommended urban stormwater practices to be used for advocacy throughout the watershed.

Workgroup Objectives

E1) Improve communication between appropriate urban stormwater agencies to both educate Partnership members on urban stormwater issues in the Potomac River Basin and to educate agencies on drinking water concerns.

E2) Advocate for implementation of management practices that will better protect drinking water in the Potomac River Basin.
E3) Support relevant agencies in obtaining funding to implement projects where applicable.

Workgroup Activities

Short term:

- Investigate and report on projected trends of urban areas in Potomac River Basin. Obtain currently available information on projected land use, specifically focusing on urban and suburban areas.
- Characterize currently established stormwater management requirements in the Potomac River Basin. Obtain information from state stormwater agencies to characterize how stormwater is managed within various areas of the Potomac River Basin.
- Prioritize communities with which to begin dialogue. A small number of communities should be identified as priorities, based on proximity, density, potential for protection, or other parameters.
- Investigate best management practices regarding use of deicing chemicals. Appropriate agencies will be contacted to determine what kinds of chemicals are used, whether there are alternatives that may reduce the risks to water supplies, and whether there are best management practices that can be applied to improve water quality.

Long-Term:

- Meet with priority jurisdictions to begin dialogue and exchange information. The purpose of the initial meetings will be to inform the jurisdictions about the Partnership goals, and educate the Partnership members on stormwater issues for those communities.
- Develop recommendations for urban stormwater management in coordination with state agency stormwater staff.
- Advocate for implementation of recommended stormwater practices.

Workgroup Measures of Success

- Provide presentation to Partnership on trends and priorities.
- Develop recommendations for stormwater management practices.

F. Agricultural Issues Workgroup (reserved)

VI. Summary of Partnership Activities:

Potomac Source Water Protection: Action Items				
Task/Project	**Timeline**	**Deliverables**	**Objective met**	**Additional resources required***
A. Pathogens workgroup				
GIS mapping of possible pathogen sources	Winter 2005	GIS coverages and analysis	A1	Yes
Review field studies and source identification methods	Winter 2005	Report on field studies and methods	A2	No
Develop proposal for detailed study	Long term	Proposal submitted to seek funds	A3	Yes
Develop contacts with stakeholders	Long term	Established relationships	A4	No
Conduct workshop	June 2005	Workshop.	A5	Yes ($5,000)
B. Emerging Contaminants				
Identify partners	Winter 2005		B2	No
Develop GIS of source locations	Winter 2005	GIS database and mapping	B3	Yes
Monitor research	Long term	Annual summaries	B1, B2, B6	No
Prepare summary of research	Long term	Annual summaries	B1, B2, B6	No
Identify funding and resources needed to support monitoring	Long term	Scope of work	B3	Yes

Provide information on usefulness of biological indicators	Long term	Report to Partnership	B5	No
Conduct workshop.	Fall 2005	Workshop	B7	Yes ($10,000)
C. Disinfectant Byproduct Precursors				
Draft scope of work	Winter 2005	Scope of work, with DBP issues identified	C2	No
Identify research partners and funding sources	Winter 2005	Development of grant and funding applications	C3	Yes
Coordinate with on-going research	Long term		C1, C2, C3	No
Identify systems with potential DBP issues	Long term		C1	No
Oversee successful grants	Long term		C3	Yes
Collect information from outside research	Long term			No
Identify targets for source protection	Long term		C1, C4	No
D. Early Warning Workgroup				
Increase RICCS participation	Winter 2005	Increased participation of upstream utilities	D1	No
Summarize emergency communications procedures	Summer 2005	Distribution of concise procedures	D1	No
Develop proposal for enhanced monitoring for early warning	Long term	Proposal submitted to seek funds	D2	Yes
Develop proposal for data sharing network	Long term	Proposal submitted to seek funds	D2	Yes

Establish petroleum industry and other contacts	Winter 2005	Established contacts	D3	No
E. Urban Issues				
Investigate trends in urban areas	Winter 2005	Report to Partnership	E1	No
Characterize stormwater management practices	Winter 2005	Report to Partnership	E1	No
Investigate BMPs for chemical deicing	Spring 2006	Report to Partnership	E1	No
Prioritize communities	Winter 2005	Report to Partnership	E1	No
Meet with priority jurisdictions	Long term	Meetings held	E1	No
Develop list of recommended stormwater practices	Long term	List	E2	No
Advocate for implementation of recommendations	Long term		E2	No

* Partnership staff will conduct most of the work identified in this strategy, including development of funding proposals. However, additional funding will be required to carry out proposed activities which are more resource intensive. Amounts shown in parenthesis are pending through grants.

VII. Strategy Implementation and Future Needs

Many of the activities identified in this strategy document can be achieved through the internal staffing and resources of the Partnership's member organizations. However, additional funding can help these efforts to progress more quickly and a number of projects will require additional funding (as noted in the summary activity table). In particular, substantive research efforts to pinpoint sources of contamination will require significant resources. The development of an early warning system will also require additional funding. Once developed, the early warning system will provide a framework for data sharing that can be used for any future monitoring efforts. The Partnership will consider and pursue funding opportunities to support proposed projects and future Partnership demands through grants or other means as appropriate.

The specific activities identified by each of the workgroups meets a specific objective of that workgroup. These activities also assist the Partnership in meeting its overall objectives by enhancing communication and improving coordination among interested parties. Progress in meeting the objectives identified in this document will be evaluated on an annual basis. As needed, objectives, activities, and measures of success will be updated to reflect past accomplishments, changing watershed conditions, and the evolving priorities of the Partnership.