7.1 Recommendations For Source Water Management and Protection

The Potomac River has proven itself a good source of drinking water for the District of Columbia. The purpose of this source water assessment is to determine the sources of potential pollutants that might impair the quality of Potomac River's waters, in order to better protect D. C.'s water supply.

The contributing watershed above D. C.'s intakes is large--over 11,000 square miles in the states of Maryland, Virginia, Pennsylvania, and West Virginia. Over half the watershed is forest, but about a third is used for pasture, cropland, or other agricultural operations. Beef, dairy cattle, and poultry are raised in large numbers in concentrated animal operations throughout the watershed.

About two million people live in the watershed and approximately half of that population live in the fast-growing suburbs west and northwest of Washington, much of the rest in small cities and towns along the Potomac and Shenandoah Rivers. There is relatively little industry or manufacturing that impacts water quality, but the watershed is crisscrossed by oil and gas pipelines and major transportation corridors.

Given the character of the Potomac River Basin upstream of the Washington Aqueduct intakes, the most likely sources of potential pollutants to the intakes are toxic chemical spills, agricultural activities, and inadequate wastewater treatment. Table 7.1 lists the pollutants to which D. C.'s source water is most susceptible and their sources. Specific recommendations for each type of source are described below.

Table 7.1 Potential Pollutants of the DC Water Supply and their Primary Sources

Potential Pollutant	Primary Sources	Cause for Concern
Sediment	Crop production	1. Increased water treatment costs. 2. Lowers effectiveness of treatment of other constituents.
Nitrogen and Phosphorus	Crop production Livestock waste Wastewater treatment	1. Increased algal growth and associated taste and odor problems. 2. Production of THMs and other toxic by-products of the water treatment process from organic material associated with nitrogen and phosphorus loads.
Pathogens	Livestock waste Wastewater treatment	1. Waterborne illnesses caused by bacterial, viruses, and protozoa.
Toxic Chemicals	Spills from transport of material by truck, rail or pipeline	1. Temporary shutdown of water supply. 2. Contamination of water supply.

7.1.1 Toxic Chemical Spills

Given the rural character of most of the watershed and regulatory oversight of known dischargers, D.C.'s source water is not chronically susceptible to chemicals associated with commercial and industrial activities. D.C.'s source water is susceptible, however, to the accidental or illegal discharge of material into the Potomac River and its tributaries. The threat of these spills comes primarily through the transport of chemicals by truck, rail, or pipeline through the basin, and secondarily through spills or discharges associated with small suburban generators, such as dry cleaners or service stations, of the heavily suburbanized zone within 24 hour travel time of the intakes. Such spills have occurred on the Potomac, impacting water supplies. A break in the Colonial Pipeline in March 1993 released 400,000 gallons of oil into Sugarland Run, a tributary which drains into the Potomac [REDACTED] above a water supply intake for the Fairfax County Water Authority. High flows quickly moved the spill past the Washington Aqueduct intakes, although the FCWA Potomac intake was closed for several days.
Currently D.C. has an emergency response plan for dealing with water supply problems within the confines of the district, but it does not address problems that may arise from its source water above the [REDACTED] intakes. Since D.C.'s source water comes from outside its boundaries, it is imperative that a plan be devised to deal with accidental or intentional spills that may occur above the intakes at the Washington Aqueduct.
The focus of the plan would be on the development and implementation of a emergency spill response network with member jurisdictions and devising methods to deal with different types of spills, both large quantity single event spills as well as continuous small quantity generating sites within the basin. The plan would also detail actions to be taken in the event the intakes have to be shut down or in the event of a total loss of supply due to contamination. A key component for a successful spill response plan would be the development of a real-time monitoring system to detect a variety of contaminants that may enter the Potomac River and its tributaries.

7.1.2 Recommendations

First, it is recommended that a cooperative mechanism should be established between the basin states and the District of Columbia to deal with these types of events. This mechanism could take the form of a basin-wide emergency spill response plan. The plan could be carried out through the use of an interstate agency or commission whose job or purpose would be to act as intermediary in establishing the network as well as being a central repository for GIS and modeling data to support the response system. With this cooperative framework in place and the citizens of DC be more assured in the quality of the water that is delivered at the tap.
Secondly, a real-time early warning monitoring system should developed based on data analysis from the source water assessment. The system would be set up to test for specific contaminants based on geographically related activities. The system would

also be arranged to provide protection to all the water service areas that draw water from the Potomac River above Great Falls. Strategic placement of the sensors would provide the means to respond in a timely fashion and give the water utilities and it's customers added assurance that their water is safe and of a high quality.

7.1.2 Wastewater Treatment

Permitted discharge rates from wastewater treatment plants above the intakes average about 93 MGD. There are over 600,000 people using septic systems in the basin. The primary purpose of wastewater treatment plants and septic systems is to reduce the threat of waterborne illnesses by eliminating pathogens from the wastewater stream. When they function well, they are an essential element in the public health system. But they do not always function well. Septic system failures can lead to wastewater entering into nearby rivers and streams. Cumberland and other towns along the North Branch have combined sewer systems which discharge millions of gallons of untreated waste into the river each year. Wastewater treatment systems suffer from sanitary sewer overflows, spills, and plant shutdowns which release untreated sewage into the basin's streams and rivers. This was vividly demonstrated by shutdown of the Hagerstown wastewater treatment February of 2002. The plant was forced to shut down its secondary treatment operations after industrial solvents killed the bacteria in the treatment process.

Untreated or partially treated wastewater contributes to the susceptibility of D.C.'s source water to pathogen contamination. It is the primary potential source of waterborne viruses. Small cities, towns, and rural communities in the basin upstream of the Washington metropolitan area often do not have the resources to address the possibility for treatment failures like sanitary sewer overflows or to inspect, maintain, and replace septic systems. The estimated cost for mitigating CSOs at Cumberland is 30 million dollars.

As the population of the basin grows, the volume of wastewater treated will also increase. The increase in wastewater flows may increase the risks of spills or sewer overflows in small treatment plants. Phosphorus loads are predicted to increase by 10% over the next ten years primarily due to an increase flows from wastewater treatment plants.

The following steps are recommended to reduce the susceptibility of D. C.'s source water to pollution from wastewater treatment systems and failing septic systems:

- Accelerate the effort to significantly reduce CSOs from Cumberland and other Allegany County sewer systems;

- Identify sewer systems with significant sanitary sewer overflows and provide assistance to mitigate SSOs.

- Reduce phosphorus loads from wastewater treatment plants serving growing populations; and

- Provide assistance to rural communities to identify and repair failing septic systems.

7.1.3 Agriculture

Sediment and nutrient losses in runoff from cropland and pasture are the major nonpoint source constituents in D.C.'s source water. Runoff from pasture, cropland, and feedlots, as well as the presence of cattle in streams, are the largest potential sources of many pathogens, such as *giardia lamblia* and *cryptosporidium*.

Under the auspices of the Chesapeake Bay Program, a significant effort is underway to reduce nutrient and sediment loads entering the Chesapeake Bay from the Potomac River Basin. The District of Columbia is a partner in that effort with the neighboring states of Maryland, Pennsylvania, and Virginia. West Virginia, while not officially a member of the Bay Program, is participating in the effort to reduce nutrient and sediment loads in the Potomac Basin. Each of the basin states has committed itself to promoting the adoption of agricultural BMPs such as nutrient management, soil conservation, riparian buffers, and animal waste management. Many of the sources of agricultural nutrient and sediment loads were also potential sources of pathogens, and the measures used to reduce nutrient and sediment loads could also help to reduce the threat of pathogen contamination of D. C.'s raw water from agricultural sources. Source water protection should be integrated into Bay Program's nutrient and sediment reduction strategies, and in particular, that the ability of agricultural BMPs to reduce the possibility of pathogen contamination of the source water should be recognized. The Potomac River is the source of drinking water not only for the District of Columbia, but for the residents of Northern Virginia and suburban Maryland as well as many communities upstream. Regional and interstate cooperation will be necessary to protect drinking water supplies, but the benefits will also be widespread.

Although the source water assessment has shown that pesticides were not a critical threat to D. C.'s source water, additional monitoring during the spring and early summer, when pesticides are most widely applied, would help eliminate the risk that sustained pesticide concentrations above the levels critical for human health are entering the water supply.

7.2 Integrating Source Water Protection into Environmental Protection

The Potomac River is a source of drinking water not just for the District of Columbia, but for millions of residents of suburban Maryland and Virginia who are customers of WSSC and FCWA, and for residents of many smaller communities upstream throughout the basin. There exists a common interest for the states in the basin to work together with the District of Columbia to protect the quality of source water from the Potomac and its tributaries. Since many of the factors which effect source water quality also have other environmental impacts, it would be cost-effective to integrate source water protection into other cooperative efforts on regional environmental issues, like the Chesapeake Bay Program. Cooperation among the basin states and among WAD, WSSC, FCWA and other water utilities is the most effective way to preserve the Potomac River as a reliable source of safe drinking water for years to come.