4.1 Potential Point Source Pollution Sites and Contaminant Inventory

An inventory and analysis of potential point source contaminants for a source water is one of four major tasks required by the EPA SWA guidelines. Availability of these data to a community water supply can provide valuable information for decision-making processes. Knowledge of a contaminant's location in relation to a water supply can be used in the evaluation of the overall risk to a water supply or can be used in the event of an accidental or intentional spill.

For the DC source water assessment, analysis of the entire source watershed for the non-tidal Potomac River was completed and used to determine what potential contaminant sources could impact DC's public drinking water system. The susceptibility analysis included the delineation of time of travel boundaries upstream of the Great Falls intake. A GIS application was developed which used these time of travel boundaries to analyze the potential contaminant sources (PCSs) for their potential to threaten the public water supply.

4.1.1 Sources of Contaminants

A point source can be described as a fixed site or facility that either discharges a product to a receiving water body or has materials on site that are considered hazardous and have the potential for release to a receiving water body. Types of facilities or activities that could be included in these categories include drinking water treatment plants (WTPs), waste water treatment plants (WWTPs), combined sewer overflows (CSOs), and industrial facilities that discharge into receiving waters. Because of the very nature of their activities, WTPs and WWTPs are considered to be of a somewhat higher risk because of their proximity to a receiving water and because they are potential sources of either pathogens or by-products of treatment. Also, industrial facility dischargers (IFDs) that are located adjacent to or near a receiving water have a higher potential risk for contaminating a water supply through accidental spills. Appendix B provides a detailed listing of the types of contaminants that may be associated with different business activities.

Another critical potential source of contamination includes locations where roads, railroads or pipelines cross a stream or river. Considering the extensive network of roads that intersect streams and rivers within the basin, these sites are of particular concern because of their potential as sites for accidental or intentional release of hazardous materials. GIS analysis was used to identify and map these potential spill points (Figure E.2.3).

4.1.2 Data Sources

An inventory of potential point sources of contaminants within the Potomac basin has been compiled from existing databases and entered into a master database. Sources of these data include Federal and State agencies and consist of discharge and release inventories, hazardous waste sites, landfills, underground storage tanks (USTs), underground injection wells (UICs) and other activities identified

through local field surveys. The main Federal resources for these data include the National Pollution Discharge Elimination System (NPDES), Toxic Release Inventory (TRI), Permit Compliance System (PCS), Resource Conservation and Recovery Information System (RCRIS), and the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS). In addition, windshield surveys were performed by West Virginia and Virginia and provided data on small quantity generators or activities that used small amounts of hazardous substances in their operations. Table 4.1 lists the source information for the master database.

Table 4.1 Database acronyms

Database Source or Type
CERCLIS - Comprehensive Environmental Response, Compensation, and Liability Information System (Superfund)
IFD – Industrial Facilities Discharge
MINES – USGS mineral database
NPDES - National Pollutant Discharge Elimination System
RCRIS - Resource Conservation and Recovery Information System
TRI – Toxic Release Inventory
WTP – Water Treatment Plant
WWTP – Waste Water Treatment Plant
CFO – Commercial Facility Operations
IFO – Industrial Facility Operations
Harris - Harris Industrial Database
UIC Class V – Underground Injection Wells

4.2 Geographic Information Systems

As with most source water assessments throughout the United States, a geographic information system (GIS) was used as a multi-purpose tool to map, model and spatially analyze the large amounts of data that were collected. The District used ESRI's ArcView 8.3 software to compare, categorize and rank locational and site-specific information on facilities within the basin. Because the DC SWA is a first step in watershed protection and provides only a snapshot of current activities, it will be necessary to re-examine the basin as new data becomes available. An application was created to facilitate this process and analyze these new data on a regular basis. Use of this tool will be of value to the District as it progresses into the next phase of watershed protection.

4.2.1 Search and Query Application

The DC SWA GIS application was created on an ESRI ArcGIS 8.3 framework, using standard Visual Basic –Application (VBA) coding. Most of the application is

form and macro driven, meaning buttons and button combinations on user forms activate internal programming to perform desired functions.

The application contains a variety of base map data layers, from county and state lines to stream reaches and roadways. Introducing the potential contaminant sources to the base layers creates an interactive map and provides the user the ability to perform spatial analysis for sites throughout the basin. The Search and Query application allows the user to perform surveys of contaminants in the time of travel segments based on ranking. Simple surveys can be performed using a one-click tool set or for more complex surveys a user-defined query can be performed with additional ArcView tools. A manual for the use and operation of the GIS Search and Query Application can be found in Appendix C.

4.3 PCS Ranking Criteria

Due to the large number of facilities and sites within the basin, a ranking process was developed to allow for identification of PCSs, and to assess the potential risk of each site to the water supply. A time of travel analysis was used as a method for parsing the facility database. Travel times were calculated for three different flow velocities, those experienced at the 10th percentile, 50th percentile, and 90th percentile flow levels. The 10th percentile flow is a relatively low flow that is exceeded 90% of the time. The 50th percentile flow, or median flow, is the flow that is exceeded 50% of the time. The 90th percentile flow is a relatively high flow that is exceeded only 10% of the time. Travel times of 10 and 24 hours at the three flow velocities on the mainstem of the Potomac were used to delineate the time of travel boundaries shown in Figure 4-1.

Facilities falling inside the 10 hr-10th percentile boundary were considered to have a higher potential for contamination to the source waters. A rank of “medium” was assigned to facilities that fell outside the 10 hr -10th percentile boundary but within the 24hr - 90th percentile boundary. Facilities that were outside the 24hr – 90th percentile boundary were ranked as having a low potential for contamination.

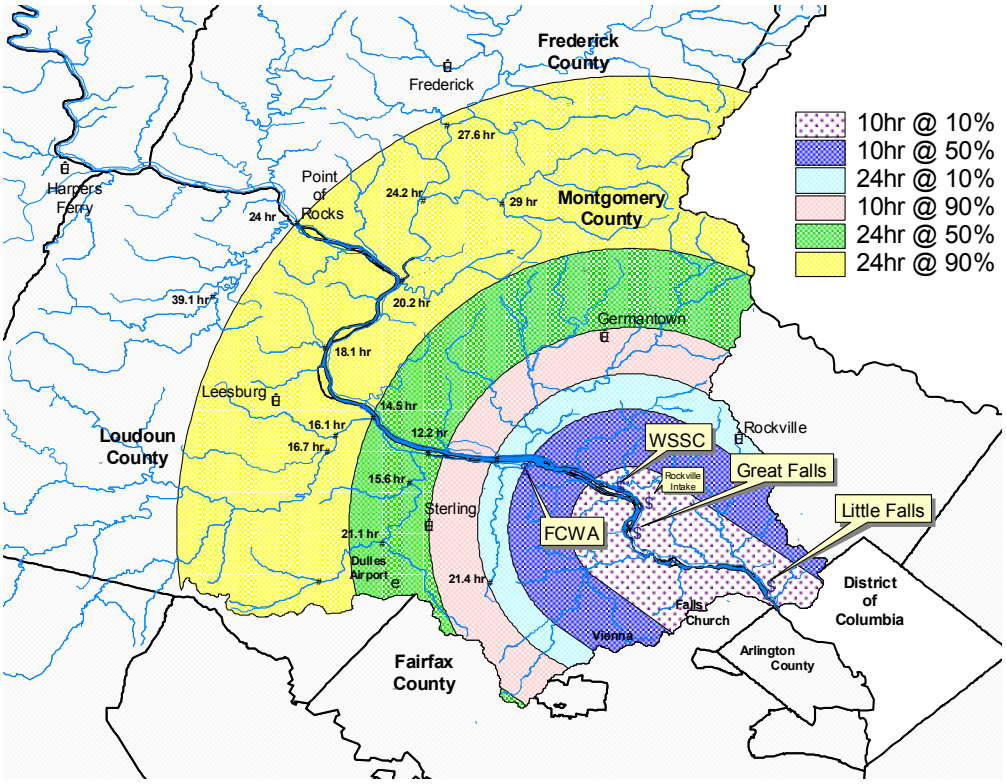

Figure 4-1. Estimated time of travel boundaries used for the susceptibility analysis.

4.4 Analysis Results

GIS analysis of the PCSs was performed using the above time-of-travel ranking criteria. Table 4.2 details the types and rankings of the facilities located in each jurisdiction. Of the 8,025 facilities or types of activities identified in the Potomac basin upstream of Washington, D.C, 6,377 had a low ranking as a PCS, 1,165 had a medium ranking, and 477 ranked as high for the potential to impact the source waters.

Within the federal databases, Maryland showed a total of 1,420 activities or facilities in the Potomac basin, of which 406 were considered medium to high risk as potential sources of contamination. The federal databases listed 1,288 facilities or activities in Virginia, of which 278 ranked medium to high as potential sources of contamination. Of the facilities identified in Virginia's detailed state database, 958 out of 3,785 facilities or activities were considered to have medium to high potential for source water contamination based on their proximity to the Great Falls water supply intake. All of West Virginia's and Pennsylvania's facilities or activities are well outside the time of travel boundaries and far enough upstream that they are considered low risks as potential sources of contamination.

Table 4.2 also shows the PCSs by activity type.

Waste water treatment plants (WWTPs), combined sewer overflows (CSOs), and large agricultural operations requiring NPDES permits (NPDES Ag Operations) may be of particular concern as potential sites for fecal contamination. Figure E.2.1 maps these categories of PCSs. Petroleum contamination may also present particular concern, and the locations of petroleum pipelines, tank farms, and above ground storage tanks (ASTs) are shown in Figure E.2.2.

Table 4.2 Types of activities and susceptibility ranking

Federal Data													
States	**MD**			**MD Totals**	**PA**	**PA Totals**	**VA**			**VA Totals**	**WV**	**WV Totals**	**Basin Totals**
Activity/Ranking	HIGH	MEDIUM	LOW		LOW		HIGH	MEDIUM	LOW		LOW		
CERCLIS	2		3	5	1	1	1		4	5			11
IFD	6	21	234	261	57	57	1	6	110	117	187	187	622
MINES	21	11	137	169	88	88			39	39	93	93	389
NPDES	11	31	208	251	75	75	5	27	427	460	116	116	902
RCRIS	132	156	348	636	215	215	125	99	300	524	99	99	1479
TRIS	1	9	42	52	26	26	2	6	90	98	25	25	201
WTP/WWTP	4		42	46	20	20	2	4	35	41	15	15	122
Federal Totals	177	229	1014	1420	482	482	136	142	1005	1288	535	535	3726
State Data													
Activity/Ranking	HIGH	MEDIUM	LOW		LOW		HIGH	MEDIUM	LOW	**VA Totals**	LOW	**WV Totals**	
Airports									8	8			8
CFOs							130	512	443	1085			1085
Harris							34	281	555	870			870
IFOs									1744	1744			1744
Landfills								1	10	11			11
Tirepiles									28	28			28
UIC ClassV									39	39			39
Agriculture											117	117	117
Commercial											256	256	256
Industrial											48	48	48
Municipal											75	75	75
Residential											18	18	18
State Totals							164	794	2827	3785	514	514	4299