

APPENDIX 1

MARYLAND DEPARTMENT OF THE ENVIRONMENT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM MUNICIPAL SEPARATE STORM SEWER SYSTEM DISCHARGE PERMIT APPLICATION SUMMARY

BALTIMORE CITY

PART I. STATEMENT OF AUTHORITY

A. United States Environmental Protection Agency

Section 402 of the Clean Water Act (CWA) prohibits the discharge of any pollutant to waters of the United States from a point source, unless that discharge is authorized by a National Pollutant Discharge Elimination System (NPDES) permit. Under the provisions of the NPDES regulations, stormwater discharges from municipal separate storm sewer systems are considered point sources that require an NPDES permit.

B. State of Maryland

The Maryland Department of the Environment (MDE) has been granted authority by the United States Environmental Protection Agency (EPA) to issue NPDES permits in accordance with statutory requirements promulgated by the CWA. The Environment Article, Title 9, Subtitle 3, Part IV, Annotated Code of Maryland requires a discharge permit for any activity that could cause or increase the discharge of pollutants into waters of the State. Additionally, Code of Maryland Regulations (COMAR) 26.08.04 requires MDE to administer the NPDES program as part of the State's own discharge permit system. These regulations also define municipal separate storm sewer systems as point sources of pollution subject to NPDES permit requirements.

C. Permittee Responsibilities

Section 402(p) of the CWA, as amended by the Water Quality Act of 1987, requires NPDES permits for stormwater discharges from large municipal separate storm sewer systems. A large municipal separate storm sewer system is defined in the CWA as serving a population of 250,000 or more. Baltimore City, according to the United States Department of Commerce's 1990 Census, has a total population of 736,014 and is therefore considered a large municipality. As a result, the City was required to submit a two-part NPDES permit application. Baltimore City has submitted an NPDES stormwater application that was prepared to satisfy the EPA's regulations for permitting

stormwater discharges from municipal separate storm sewer systems. Appendix 1 summarizes the City's NPDES stormwater application. NPDES regulations require permit conditions that effectively prohibit non-stormwater discharges and reduce the discharge of pollutants to the "maximum extent practicable." Specific permit conditions are outlined in Permit # MS-BC-93-002 and Appendix 2. Appendix 3 outline's MDE's long-term monitoring database and a spreadsheet for the reporting and tracking of NPDES data is included as Appendix 4. Additionally, NPDES regulatory requirements can be found in Appendix 5.

PART II. BACKGROUND

A. Problems Associated with Stormwater Pollutants

Pollutants in stormwater discharges from many sources are largely uncontrolled. The *National Water Quality Inventory, 1990 Report* to Congress provides a general assessment of water quality based on biennial reports submitted by the States under Section 305(b) of the CWA. This report indicates that roughly 30% of identified cases of water quality impairment are attributable to stormwater discharges. During rain events that produce runoff, numerous pollutants including sediment, nutrients, bacteria, oil, metals, and pesticides are washed into storm sewer systems from diffuse sources such as construction sites, residential neighborhoods, commercial areas, parking lots, roads, and industrial facilities. Additionally, illegal dumping, sanitary sewer system leaks, and illicit connections to storm sewer systems can be significant sources of pollutants. Some of the more serious effects to receiving waters are the contamination of drinking water supplies, restrictions on water contact recreation, loss of wildlife habitat, decreases in the number and variety of aquatic organisms, and fish kills.

B. History of NPDES Stormwater Program

Efforts to improve water quality under the NPDES program have traditionally focused on reducing pollutants in point source discharges from industrial facilities and municipal sewage treatment plants. In response to the need for controlling stormwater discharges, Congress amended the CWA in 1987 requiring the EPA to establish NPDES requirements for stormwater discharges. In November 1990, EPA issued final stormwater regulations for eleven categories of industry and certain municipal separate storm sewer systems. As part of the municipal stormwater program, jurisdictions in Maryland operating large municipal storm sewer systems must submit a two-part application to MDE outlining programs for monitoring and controlling stormwater discharges. Required information includes Legal Authority, Source Identification, Discharge Characterization, Management Programs, Assessment of Controls, and Fiscal Resources.

C. Maryland's Perspective

Maryland's efforts to reduce stormwater pollution have focused on protecting and restoring the water quality of Chesapeake Bay. The Maryland General Assembly passed the Erosion and Sediment Control Law in 1970 to control runoff from construction sites and in 1982 passed the Stormwater Management Act which requires that appropriate Best Management Practices (BMP) be used for new development in order to maintain, as nearly as possible, the pre-development runoff conditions. Additionally, the Chesapeake Bay Program, a cooperative effort among the major Bay states and the federal government, has elevated the importance of stormwater management programs in Maryland by establishing a 40% nutrient reduction goal to the Chesapeake Bay and, more recently, by focusing cleanup efforts on the Bay's tributaries. Although Maryland's existing programs will aid local jurisdictions in satisfying NPDES stormwater requirements, additional stormwater control measures will be needed for full compliance with the federal program.

PART III. APPLICATION SUMMARY

A. Jurisdiction Description

1. Physical Data

Baltimore City is Maryland's largest city and is located at the head of navigable waters of the Patapsco River. Its central location within the State and close proximity to the Chesapeake Bay and Atlantic Ocean has made Baltimore a major shipping port and influenced its growth and land use. Immediately adjacent to the Patapsco River, land use is predominantly industrial, however, gentrification has resulted in the conversion of numerous warehouses and waterside piers into commercial and residential uses. Radiating out in all directions from the port are extensive commercial areas and residential neighborhoods. The resulting physical landscape is primarily urban with high percentages of imperviousness. The City encompasses 87.02 square miles and, according to the 1990 Census, its population is 736,014. From 1990 to 2000, projections from Maryland Office Planning (MdOP) show that the City's population is expected to decline annually by 2% and the projected population in five years is 724,321.

2. Hydrologic Information

Baltimore City is divided nearly in half into two physiographic regions by the Fall Line. To the west and north of the Fall Line is the Piedmont Plateau while the Atlantic Coastal Plain lies to the south and east. The City's stormwater drains from the hills of the Piedmont Plateau to the lower elevations of the Atlantic Coastal Plain. Stormwater is discharged to four major receiving waters, the Gwynns Falls, the Jones Falls, the Herring Run, and the Patapsco River. As the City has developed, many of its stream systems have been enclosed by storm drains, culverts, and tunnels.

Climate conditions are summarized in a 1986 *Jones Falls Urban Runoff Project* (JFNURP) report and are based on data gathered at a National Weather Service station in Baltimore City. The City's climate is generally one of warm summers and mild winters. The coldest period is usually in late January and early February and the warmest is in the last half of July and early August. Weather systems move generally from west to east. Monthly precipitation in Baltimore City is distributed relatively evenly throughout the year. The average yearly precipitation is 42 inches. Long duration storms may occur predominantly during the cold season, December through March. Average precipitation intensities, however, are highest in June, July, August, and September (0.08 to 0.13 in/hr), whereas the lower intensity storms usually occur in December through April (0.03 to 0.05 in/hr).

According to the City's 1992 *Floodplain Management Plan*, floods in Baltimore date back over 200 years and are most common along the low lying areas immediately adjacent to the four major stream systems and in tidally influenced areas of the Patapsco River. In 1786, 1837, and 1868, flood waters caused the Jones Falls to rise 10 to 20 feet above normal, washing out bridges, damaging homes, factories and shops, and killing at least 70 people. On August 4, 1911, the Herring Run flooded "...sending horses, streetcars, and people downstream." In 1933, an unnamed hurricane caused tides at Fort McHenry to rise 8.33 feet, inundating the downtown area. Damages were estimated to be \$5 million from flooded homes, wharves, warehouses, shops, lumber yards, and factories. More recent floods include those from Hurricanes Connie and Diane in 1955, a severe rainstorm in 1971, Tropical Storm Agnes in 1972, Hurricane Eloise in 1975 and Hurricane David in 1979. Reported damages from Tropical Storm Agnes were \$33.9 million and \$10.8 million for Hurricane Eloise. Several studies have shown that Baltimore City's receiving water quality has been negatively impacted by stormwater runoff. MDE's 1988 *305(b) Water Quality Assessment Report* indicated that urban runoff in Baltimore City is a significant source of sediment, bacteria, pesticides, nutrients, and thermal pollution to surface waters impacting aquatic life and limiting water contact recreation. According to a 1984 U.S. Geological Survey (USGS) and Nationwide Urban Runoff Program (NURP) report conducted in Baltimore City, urban stormwater runoff contributes more than 60% of total nitrogen, phosphorus, and organic carbon, more than 70% of chemical oxygen demand (COD), and more than 80% of total suspended solids, lead, and zinc to receiving waters.

B. Programmatic Components

The NPDES stormwater permit application process for municipal separate storm sewer systems is specified in 40 CFR 122.26(d). The two-part application process was devised to provide a basis for reducing and eliminating pollutants in stormwater discharges from large municipal separate storm sewer systems. Part 1 of the application process requires applicants to submit information regarding existing programs and legal authority, identify sources of pollutants, field screen major outfalls to detect illicit connections, and propose strategies to characterize

discharges. The Part 2 application process requires the demonstration of adequate legal authority, additional information on pollutant source identification, characterization of discharges, a proposed stormwater management program, an estimate of the effectiveness of stormwater controls, and a fiscal analysis. The following sections (1 through 6) provide a summary of Baltimore City's application.

1. Legal Authority

A summary of Baltimore City's NPDES stormwater application submittal, specific to the regulatory requirements for adequate legal authority, is as follows:

§122.26(d)(2)(i)"(A) Control...the contribution of pollutants...associated with industrial activity...;"

Baltimore City intends to control the contribution of pollutants discharged from industrial activities through the enforcement of existing City Code. Article 25 and Article 28 of the Baltimore City Code provide the authority to control and regulate the use of the City's storm sewers. Article 25, Section 2 prohibits obstruction or damage to the storm sewers and Section 3 provides authority to the Director of Public Works to issue stormwater discharge permits. Similarly, Article 28, Section 60 provides the Director of Public Works the authority to issue permits relating to the discharge of pollutants to the City's storm sewer. Enforcement of these sections of the Baltimore City Code should adequately control the quality of stormwater that is discharged to the City's storm sewer system from industrial activities.

Additionally, Article 32 and Article 26 of the Baltimore City Code contains erosion and sediment control and stormwater management regulations. Enforcement of the regulations contained in Article 32 and Article 26 of the Baltimore City Code should adequately control the quantity and quality of stormwater that is discharged to the City's storm sewer system from construction activities and new development.

§122.26(d)(2)(i)"(B) Prohibit...illicit discharges..."

Article 25, Section 3 of the Baltimore City Code provides the Director of Public Works the authority to prohibit illicit connections to the City's storm sewer. Enforcement of the regulations contained in Article 25, Section 3 of the Baltimore City Code should adequately prohibit illicit discharges to Baltimore City's storm sewer system.

§122.26(d)(2)(i)"(C) Control...spills, dumping or disposal of materials other than storm water;"

Article 25, Section 6 of the Baltimore City Code provides the Director of Public Works the authority to apply restrictions on users of the storm sewers in order to control the spilling, dumping, or disposal of material other than stormwater into the storm sewers. Enforcement of the regulations contained in Article 25, Section 6 of the Baltimore City Code should adequately control spills, dumping, or disposal of materials other than stormwater to the City's storm sewer system.

§122.26(d)(2)(i)"(D) Control...pollutants from one portion of the municipal system to another portion of the municipal system;"

Anne Arundel County and Baltimore County will be issued individual NPDES municipal separate storm sewer discharge permits for their respective storm sewer systems. These permits will be used to address inter-jurisdictional issues between the Counties and the City. Additionally, MDE will issue general permits for State and federal properties which will address issues between these entities and the City.

§122.26(d)(2)(i)"(E) Require compliance..."

Article 25, Sections 2, 3, 5, 6, 8, 9, 11, and Article 28, Sections 57-67 of the Baltimore City Code authorize the City to secure compliance with its storm sewer regulations. The City secures compliance with its storm sewer regulations by prohibiting pollutant discharges; imposing discharge limitations; inspecting and monitoring discharges to the storm sewers; and requiring the submittal of discharge reports. Administrative and judicial procedures that use injunctions and terminate service are used to ensure compliance with the City's storm sewer regulations.

§122.26(d)(2)(i)"(F) Carry out all inspection, surveillance, and monitoring procedures..."

Article 28, Section 60(b) of the Baltimore City Code provides the Director of Public Works the authority to require installation of inspection and flow sampling equipment to monitor discharges to its storm sewer system. This authority also includes the determination of sampling locations, frequency and method of sampling, number and types of tests, and reporting schedules.

Summary

Baltimore City's ordinances regarding its storm sewer system should provide the City with adequate legal authority to control storm sewer discharges in accordance with 40 CFR 122.26(d)(2)(i). Additionally, Baltimore City's application provided an attorney certified note stating that the City has the authority to control stormwater pursuant to 40 CFR 122.26(d).

2. Source Identification

A summary of Baltimore City's NPDES stormwater application submittal, specific to the regulatory requirements for source identification, is as follows:

§122.26(d)(1)(iii)(A) A description of the historic use of ordinances..."

In order to control pollutant discharges to publicly owned treatment works, Baltimore City uses *Ordinance Number 775, Sewers -- Pretreatment*. This Ordinance has been enacted "for the purpose of providing protection against obstruction or damage to the sanitary and/or storm sewers; regulating the tapping, opening, repairing, or altering of sanitary and/or storm drains; providing for handling of unused connections; providing procedures by which the City may terminate and/or suspend service; providing for control and use of the sanitary and storm sewers; providing for the control and pretreatment of industrial wastewater..." Additionally, this Ordinance gives the City authority to levy surcharges on large discharges, enforce provisions of the Ordinance, and initiate penalties in cases of violation.

§122.26(d)(1)(iii)(B) A USGS 7.5 minute topographic map..."

Baltimore City submitted 1:6000 and 1:24000 scale base maps derived from USGS 7.5 minute topographic maps. Source identification information was mapped, using Geographic Information System (GIS) technology, onto transparent mylar overlays.

§122.26(d)(1)(iii)(B)(1) The location of known municipal storm sewer system outfalls..."

Baltimore City used its 1:6000 scale storm drain maps to create mylar overlays showing all known outfalls to waters of the United States. The City located 344 "major" outfalls.

§122.26(d)(1)(iii)(B)(2) A description of the land use activities...population densities...average runoff coefficient..."

Baltimore City obtained land use data from the MdOP. These data were digitized on mylar overlays. Land use designations include low, medium, and high density residential, commercial, industrial, institutional, extractive, open-urban, deciduous forests, evergreen forests, mixed forests, brush, water, wetlands, and bare ground. Additionally, runoff coefficients were calculated for each land use type. Population data were given for each drainage area associated with the City's 344 "major" outfalls.

§122.26(d)(1)(iii)(B)(3) The location...of each currently operating or closed municipal landfill..."

Baltimore City mapped and described all known landfills. Only one, the Quarantine Road Landfill, is still active. The other five are either capped or are in the process of being capped. Twenty-six other minor landfills dating back to the 1930's have been

identified and mapped as well. A majority of these were used as ash dumps to dispose of ashes from coal burning furnaces.

§122.26(d)(1)(iii)(B)"(4) The location and permit number of any known discharge...that has been issued a NPDES permit;"

Baltimore City obtained information on industrial NPDES permits from MDE's industrial permitting program and mapped these facilities on mylar overlays. There are 184 NPDES surface water permits and 68 NPDES stormwater permits in Baltimore City.

§122.26(d)(1)(iii)(B)"(5) The location of major structural controls..."

Baltimore City provided the location of 90 stormwater management structures that have been identified. Eighty (89%) of these facilities are privately owned. Additional information on BMP type, critical area status, quality/quantity control, ownership status, volume, design storms, drainage areas, and land use was submitted with the City's application.

§122.26(d)(1)(iii)(B)"(6) The identification of publicly owned parks..."

Baltimore City included an inventory of 314 publicly owned properties which was generated by accessing the records of the Baltimore City Real Estate Office. Potential areas available for stormwater retrofits were mapped on mylar overlays.

§122.26(d)(2)"(ii)...an inventory, organized by watershed... of each facility associated with industrial activity..."

Baltimore City accessed numerous sources of information to create an industrial activity inventory organized by watershed including NPDES industrial stormwater permits, NPDES surface water permits, municipal sanitary permits, Maryland Department of Employment and Economic Development (DEED) inventory of industries, City use of fertilizer, pesticides, and herbicides, and data on underground and above ground oil storage tanks, gas stations, lawn care facilities, and sanitary overflows. This information has been stored in databases and coded so that it may be plotted on mylar overlays.

Summary

The data and maps provided in Baltimore City's application are sufficient to satisfy the NPDES requirements according to 40 CFR 122.26(d). The City's NPDES municipal separate storm sewer system permit will direct it to gather and record any new source identification information as it becomes available.

3. Discharge Characterization

A summary of Baltimore City's NPDES stormwater application submittal, specific to the regulatory requirements for discharge characterization, is as follows.

§122.26(d)(1)(iv)"(A) Monthly mean rain and snow fall estimates..."

Rainfall estimates have been calculated from precipitation data gathered from 1948-75 at a National Weather Service Precipitation gauge (#180470) in Baltimore City. Estimates submitted to MDE include the mean, coefficient of variation, median, and percentiles for: monthly volume, intensity, duration, and time between storm midpoints.

§122.26(d)(1)(iv)"(B) Existing quantitative data..."

Baltimore City submitted two reports which address the water quality of discharges from its storm sewer system. First, a study conducted by the Regional Planning Council (RPC) in 1977 addressed sources of micro-organisms in urban runoff. Second, the JFNURP study conducted by the RPC and USGS indicated that urban runoff contributes more than 60% of total nitrogen, phosphorus, and organic carbon, more than 70% of chemical oxygen demand (COD), and more than 80% of total suspended solids, lead, and zinc to the Jones Falls.

§122.26(d)(1)(iv)"(C) A list of water bodies that receive discharges..."

Major receiving waters in Baltimore City listed in EPA's 319(a) report include Gwynns Falls, Jones Falls, Herring Run, and the Patapsco River. Urban runoff has been implicated as the principle source of pollution in these water bodies.

§122.26(d)(1)(iv)"(D) Results of a field screening analysis for illicit connections..."

Baltimore City used Lamotte Chemical storm drain test kits to field screen all 344 of its major storm sewer system outfalls. Eighty-five percent of these outfalls exhibited dry weather flow. Data on pollutants and concentrations were recorded on the database provided by MDE. The City's GIS was used to develop drainage area maps which identify those drainage areas which contribute the greatest amount of pollutants to the City's storm sewer system. These maps will be used for the targeting of the City's management programs.

§122.26(d)(1)(iv)"(E) ...the location of outfalls or field screening points appropriate for representative data collection..."

Baltimore City proposed five monitoring sites for representative data collection. The selection of these sites was based on the review of land use maps, safety precautions, traffic patterns, accessibility, and ease of sampling. The five monitoring sites selected include a medium residential site at Homeland and Springlake, a high density residential

site at Shannon Drive and Elmore, a commercial site on Kopper's Avenue, and two industrial sites, one on Patapsco Avenue and the other at Wicomico and Monroe Streets. Upon field visits by City and MDE officials, evaluations were made regarding representability of land use and amenability to wet weather sampling. As a result of the field assessment, the City's characterization plan was approved by MDE.

§122.26(d)(2)(iii)"(A) Quantitative data from...between five and ten outfalls representative of commercial, industrial, and residential..."

Baltimore City selected 5 representative outfalls for monitoring which were field verified and approved by MDE. NPDES regulations require 3 storm events to be tested at each site. Baltimore City submitted monitoring data for 3 storm events at its high density residential site, 2 storm events at one of its industrial sites, and 1 storm event at its medium density residential site. All monitoring data from these storm events were submitted on MDE's formatted disk. The City stated that as additional storms are monitored, the results will be forwarded to MDE.

§122.26(d)(2)(iii)"(B) Estimates of annual pollutant loads...and the event mean concentration..."

To derive event mean concentration (EMC) estimates for BOD5, COD, TSS, dissolved solids, total nitrogen, total ammonia plus organic nitrogen, total phosphorus, dissolved phosphorus, cadmium, copper, lead, and zinc, Baltimore City used default values referenced in MDE's NPDES stormwater guidance document, NURP data listed in Schueler (1987), JFNURP data (Martin, 1986), and EPA stormwater permit guidance. As additional stormwater monitoring data are gathered from the City's monitoring plan, EMC estimates will be refined. Annual pollutant load estimates were made using Schueler's "simple method" for each of the City's 344 major outfalls. Additional calculations were done to estimate the annual pollutant load for the cumulative discharge of all 344 major outfalls.

§122.26(d)(2)(iii)"(C) A proposed schedule to provide estimates...of the seasonal pollutant load..."

To calculate seasonal pollutant load estimates, Baltimore City multiplied annual pollutant load estimates by the ratio of the monthly historic rainfall amounts to the total rainfall.

§122.26(d)(2)(iii)"(D) A proposed monitoring program...for the term of the permit..."

Baltimore City's stormwater monitoring program consists of two components. One consists of an in-stream ambient station designed for obtaining water quality data for a large urban watershed to assess management programs over long periods of time. The other consists of storm drain outfall monitoring stations set up in sub-watersheds, upstream from the ambient station, which are designed to evaluate the effectiveness of specific management practices on stormwater runoff.

The City has proposed an in-stream monitoring station located in the Stoney Run near Johns Hopkins University. This stream was selected for monitoring because it contains several sub-watersheds which are comprised of homogeneous residential, commercial, and institutional land uses. The City plans to monitor three sub-watersheds and assess management programs such as street sweeping, inlet cleaning, peat-sand infiltration devices, and public education. Additionally, the Stoney Run site was used for NURP data collection in 1982 and, as a result, dry weather flow and stormwater runoff data already exists. Baltimore City proposes to test eight to twelve storm events per year. Baseflow samples will be collected biweekly. The City will use discrete samples for data collection and analysis, and has proposed to monitor 25 parameters.

Summary

Baltimore City has yet to complete its requisite sampling of three storm-events at each of its five monitoring sites. Additionally, the City's proposal for a long-term monitoring program does not include the monitoring of an industrial site. Permit conditions will require the City to monitor and submit any outstanding data and select an industrial site as part of its long-term monitoring program.

4. Management Programs

A summary of Baltimore City's NPDES stormwater application submittal, specific to the regulatory requirements for management programs, is as follows:

§122.26(d)(2)(iv) "(A) A description of structural and source control measures ..."

As a result of current State laws for erosion and sediment control and stormwater management, Baltimore City already has in place various programs to control stormwater pollution. These programs will be augmented to satisfy the requirements of the NPDES stormwater program. The City's proposals for new control strategies will be based on GIS databases, watershed walks/surveys, and management program pilot studies. Information gathered from these sources will enable City planners to prioritize and target major sources of stormwater pollution and implement appropriate, cost effective control strategies. These programs will then be expanded and systematically implemented City-wide. Baltimore City's submittal for each specific regulatory requirement is described below.

§122.26(d)(2)(iv)(A) "(1) A description of maintenance activities...for structural controls...;"

Baltimore City is required by the Environment Article, Title 4, Subtitle 2, Annotated Code of Maryland, to inspect stormwater management facilities once every three years. Additionally, the City is required to perform, or cause to be performed, maintenance on existing stormwater management facilities. Baltimore City's application identified 90

stormwater management structures, of which, 80 are privately owned. These structures are inspected on an annual basis as specified in maintenance agreements between the City and owners. The Environmental Services Division (ESD) currently has one staff position to inspect stormwater management structures. If a maintenance problem is detected, the owner is responsible for correcting the problem. If problems are not rectified, the City can perform the required maintenance and fine the owners for the cost or impose a lien on the property.

The City's Department of Public Works (DPW), Stormwater Management Section, is developing a maintenance schedule for routine inspection and maintenance of all stormwater management facilities. Additionally, a recent reorganization in the Stormwater Management Section will increase staffing levels. Stormwater management facilities and maintenance data will be included in the City's GIS.

§122.26(d)(2)(iv)(A) "(2) A description of planning procedures...to reduce...pollutants...from areas of new development and significant redevelopment...;"

Developers applying for building permits in Baltimore City are required to submit detailed plans describing their proposed project. Before permits are issued, the plans are reviewed by the offices of Planning and Zoning, Utility Engineering, and the ESD for compliance with minimum building requirements. The ESD administers the City's Stormwater Management Program and evaluates the proposed project for water quality impact. As part of this program, any person who disturbs over 5,000 square feet of land area must provide plans for appropriate stormwater management measures. The plans require that predevelopment discharges be maintained after development. The order of preference for stormwater management practices are; 1) infiltration of runoff on-site; 2) flow attenuation by use of open vegetated swales and natural depressions; 3) stormwater retention structures; and 4) stormwater detention structures.

Baltimore City has developed stormwater management practices for significant redevelopment in the Critical Area as part of the City's Critical Area Program. However, for areas outside the Critical Area, no management programs for significant redevelopment have been proposed.

The ESD identified the wide spread practice of removing old paint from brick facades as potentially harmful to water quality. Caustic paint softeners and high pressure water sprayers are used to remove exterior paint and the wastewater generated flows directly into the City's storm sewer system and contains high concentrations of lead, mercury, zinc, and suspended solids. Beginning in 1992, the Housing and Community Development office (HCD) began distributing notices to each contractor receiving a permit for brick cleaning. The notice outlines the process required to properly contain and dispose of brick cleaning wastewater. The City met with MDE's Office of the Attorney General to coordinate enforcement actions under the Resource Conservation and Recovery Act (RECRA) and lead abatement regulations. Enforcement activities are ongoing independent of the stormwater permit process.

§122.26(d)(2)(iv)(A) "(3) A description of practices for operating and maintaining public streets...;"

The City's Department of Transportation (DOT) used 6,926 tons of salt in 1992 for deicing roads. The salt is stored in protective salt domes located at 1801 E. Oliver Street, 2601 Falls Road, 101 N. Dickman Street, 6709 Pulaski Highway, Lewin Avenue, York Road, and Gable Avenue. The City uses herbicides for road-side maintenance. The DOT has two certified herbicide applicators who apply 45 pounds of Dyclomec Granular, 45 gallons of Roundup, 15.5 gallons of Limit, 10 gallons of Weedon DPC, 9 pounds of Oust Granular, and 7 gallons of Surflan during the summer months. The herbicides are stored at 6400 Pulaski Highway. Information on storage and use have been geo-coded into the City's GIS. The DOT does not apply any pesticides.

The City proposes to inspect all salt and herbicide storage sites annually for proper housekeeping. The City's monitoring programs will assess the impacts of salt use after snow events and herbicide use during the summer months. Using the City's GIS, the location of herbicide and salt applications will be compared to the result of water quality data. Additionally, the City believes that watershed walks/surveys by City personnel and volunteers from environmental organizations may yield information regarding salt and herbicide use. From this information, recommendations can be made for improvements in deicing protocol and vegetation control.

The DOT was recently reorganized and is now the Bureau of Highways under the DPW. Within DPW, the ESD is now responsible for the administration of the City's erosion and sediment control program for road construction activities. The City's application stated that the ESD has yet to evaluate the Bureau of Highways sediment control practices.

§122.26(d)(2)(iv)(A) "(4) A description of procedures to assure that flood management projects assess the impacts on the water quality...;"

The City's application states that all new flood control structures will provide water quality control. Currently, the only flood control/water quality structure being planned is a facility in Brooklyn Park which will be partially funded through the State's Stormwater Pollution Cost Share Program.

The City's Water Quality Management Office (WQMO) screens sites for potential water quality retrofits and applies for funds from EPA's Chesapeake Bay Implementation Grant (CBIG), the State's Stormwater Pollution Cost Share Program, and the Small Creeks and Estuaries Program. More recently, retrofit projects have been included in the City's Capital Planning Program. The WQMO has completed two projects, three others are in the design phase, and one is proposed.

The City proposes to use its GIS system to aid in screening possible sites for retrofits. Cost/benefit analyses will be conducted by estimating pollutant load reductions in

relation to the costs associated with design and construction of retrofit facilities. Cost/benefit analyses for other management strategies such as illicit connection programs, sanitary sewer repairs, and educational programs will be conducted as well. Potential retrofit sites can be compared with these alternative management strategies and ranked for effective allocation of limited funds. This approach will take several years to implement because information from the City's monitoring programs will be needed for these cost/benefit analyses. The City proposes to develop a GIS database identifying industries within the City's flood plain and a list of potential pollutants from each facility. Data will be coordinated with the City's flood response/ALERT system. Industries in the flood plain will be notified when severe storms create the potential for flooding. Industries can then take appropriate preventive actions.

§122.26(d)(2)(iv)(A) "(5) A description of a program to monitor pollutants from operating or closed municipal landfills...;"

The Quarantine Road landfill is the City's only operating municipal landfill. Soil is used daily or, more frequently if needed, to cover waste. The site has six cells which are lined with two feet of clay. Leachate is collected in a holding pond and transported by truck to the Patapsco Waste Water Treatment Plant. The site has several observation and monitoring wells.

The City submitted a Notice of Intent (NOI) to have the Quarantine Road landfill and several inactive landfills including the Reedbird, Pennington Avenue, Bowleys Lane, Woodberry Quarry, and Monument Street landfills to be covered by the State's General Permit for industrial stormwater discharges.

§122.26(d)(2)(iv)(A) "(6) A description of a program to reduce...pollutants... associated with the application of pesticides...;"

The City has proposed a comprehensive program for identifying pesticide, herbicide, and fertilizer use, and possible areas of misuse. The City has begun to inventory all major pesticide users, public and private, including the City school system, Recreation and Parks, Health Department, Municipal Golf Courses, Bureau of Highways, lawn care companies, private schools, and homeowners. Information is being geo-coded into the City's GIS for comparison with water quality data to determine effects of pesticide applications. A pesticide and fertilizer task force is being set up to discuss options for reducing pesticide, herbicide, and fertilizer use. This task force will assess the potential water quality benefits of implementing Integrated Pest Management (IPM). Additionally, the City is working with MDE on a *Residential Pesticide Usage and Levels in Urban Surface Waters* study. Surveys were completed by city residents in three watersheds draining to water quality monitoring stations. From this information, the City and MDE will develop a public education program.

§122.26(d)(2)(iv) "(B) A description of a program...to detect and remove...illicit discharges...The program shall include:"

§122.26(d)(2)(iv)(B) "(1) A description of a program...to prevent illicit discharges...;"

The City intends to utilize the inspection and monitoring capabilities of its industrial pretreatment staff for inspecting potential illicit discharges to the City's storm sewer system. The industrial pretreatment program maintains files on approximately 5,000 commercial and industrial properties of which 1,500 are permitted to discharge wastewater to the City's sanitary sewer system. Fifty-four are considered Significant Industrial Users (SIU) and are subject to annual inspections. The City believes that these 54 industries are a priority for illicit connection inspections because they manufacture and handle "priority pollutants." These 54 SIUs will be inspected annually, and the remaining 5,000 commercial and industrial facilities will be inspected over a five year period based on watershed priorities derived from GIS analysis.

§122.26(d)(2)(iv)(B) "(2) A description of...on-going field screening activities...;"

The City has proposed a program for dry weather screening of outfalls (DWO) for the term of its permit. The City will field screen 20 outfalls with known illicit connections biweekly and take monthly diurnal composites. Forty outfalls which are suspected of having illicit connections will be screened bimonthly with quarterly diurnal composites and the 300 remaining outfalls will be screened annually with biannual diurnal composites. These field screening results will be used in conjunction with the City's GIS system to prioritize watersheds requiring further field investigations to find and eliminate illicit connections.

§122.26(d)(2)(iv)(B) "(3) A description of procedures...to investigate portions of the separate storm sewer system...;"

The City will implement its Pollutant Source Tracking (PST) program for storm drain systems that have been identified by the DWO screening results as exhibiting potential illicit connections. When a portion of the system has been selected for investigation, testing for additional parameters will be conducted. The City's GIS will then be used in conjunction with these results to aid in identifying potential sources of the illicit connections. If the pollutant source is not obvious from these tests, sampling of the drainage area will be conducted systematically, starting at the downstream end of the watershed and proceeding in an upstream direction. The City believes the PST program will be very time consuming and has proposed to undertake a feasibility study to determine how these procedures can be effectively implemented.

In the spring of 1993, the City initiated a contract to inspect 991,600 linear feet of its storm drain system for illicit discharges. Any illicit connections found will have samples tested by the City's water quality laboratory. Resulting illicit connection locations will be entered into the City's GIS. Field teams will use GIS watershed/water quality information to trace the source of the connection. This study will be phased over a three year period.

§122.26(d)(2)(iv)(B) "(4) A description of procedures to prevent, contain, and respond to spills...;"

The City formed the Mayor's Hazardous Material Advisory Council to develop a cooperative plan for the handling, transportation, and spill response activities among City, State, federal, and private organizations. The plan is designed to augment other emergency operation plans such as those prepared by civil defense agencies, fire and police departments, and emergency medical services. The plan includes a flow chart that quickly shows the various roles and levels of cooperation by several different agencies that respond to hazardous materials incidents. The basic tenets of the plan are quick response, communications, cooperation, and community awareness. At a minimum, the Council conducts drills annually. Responses are critiqued and improvements are integrated into the original plan. Additionally, the City's industrial pretreatment regulations require permitted industries to develop solvent management and spill prevention plans which protect both the sanitary sewer and storm sewer systems.

§122.26(d)(2)(iv)(B) "(5) A description of a program to promote...public reporting of...illicit discharges...;"

Watershed surveys conducted by Save Our Streams (SOS) and Friends of Leakin Park will help to educate the public in the identification of illicit connections. However, the City's application states that because of the dangerous nature of illicit connection detection programs, the public will not be encouraged to participate.

§122.26(d)(2)(iv)(B) "(6) A description of educational activities...;"

The DPW is in the process of planning a public information strategy for educating citizens about dumping of hazardous materials into storm drains. A series of one page fact sheets will be distributed throughout the City in quarterly water and wastewater bills. These fact sheets will address the proper disposal of waste oil and other hazardous materials and the proper application of fertilizer and pesticides. The City has also initiated an anti-litter campaign, "Its Your City, Don't Trash It," which will be used to educate people on the effects of stormwater pollution.

§122.26(d)(2)(iv)(B) "(7) A description of controls to limit infiltration of seepage...;"

Baltimore City's Sanitary Sewer Exfiltration and Overflow program searches for sources of sanitary sewer leakage from pipelines and underdrains adjacent to streams. Because sanitary sewage contains high levels of total coliform, fecal coliform, and ammonia, these parameters will be used as indicators of sanitary sewage pollution in streams. By sampling sequentially in an upstream direction, sources can be located so that remedial measures can be taken. This program will also prioritize problems so that the most severe ones will be corrected first.

Structural improvements including sewerage unsewered areas, supplementing overloaded lines, and the replacement and repair of damaged lines are scheduled for completion in 50 years. Currently, there are 66 known sanitary overflows that the City plans to test in order to develop a priority list for repairs. Ten, 4 person crews from the Waste Water Management Section of the Utility Maintenance Division perform 65 maintenance activities each month.

Municipal infrastructure construction including road construction and repairs to sanitary sewer lines can cause an increase in pollutants to receiving waters. The City has implemented procedures for mitigating these pollutants, however, information on infrastructure repairs will be geo-coded on GIS in order to account for possible increases in pollutants.

§122.26(d)(2)(iv) "(C) A description of a program to monitor and control pollutants...from municipal landfills...The program shall:"

§122.26(d)(2)(iv)(C) "(1) Identify priorities and procedures for inspections...;"

Baltimore City will rely upon the existing State NPDES industrial discharge program for inspecting and controlling industrial stormwater discharges. The City has submitted NOI's to comply with the State's program for all current and former municipal landfills.

§122.26(d)(2)(iv)(C) "(2) Describe a monitoring program...."

All facilities will be required to follow MDE's industrial monitoring requirements as set forth in the State's general permit for industrial stormwater discharges.

§122.26(d)(2)(iv) "(D) A description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites...which shall include:"

§122.26(d)(2)(iv)(D) "(1) A description of procedures for site planning...;"

Baltimore City has been delegated erosion and sediment control enforcement authority since 1985, and the State's most recent review has granted Baltimore City erosion and sediment control authority until June 30, 1995. Erosion and sediment control and stormwater management plan review and site inspections are performed by the City's ESD.

Baltimore City will use its GIS system to develop a database for recording erosion and sediment control practices. The City plans to use these data and GIS water quality data to assess the effectiveness of this program and for developing watershed management plans.

§122.26(d)(2)(iv)(D) "(2) A description of requirements for non-structural and structural best management practices;"

Baltimore City requires that disturbances greater than 5,000 square feet or 100 cubic yards have approved erosion and sediment control plans prior to development. For construction activity in the Critical Area, plans are required for any disturbance greater than 1,000 square feet.

§122.26(d)(2)(iv)(D) "(3) A description of procedures for inspecting sites...;"

Erosion and sediment control inspections are performed at construction sites once every two weeks as required by State law to ensure that sites are in compliance with approved erosion and sediment control plans.

§122.26(d)(2)(iv)(D) "(4) A description of appropriate educational and training measures for construction site operators."

Maryland law requires persons in charge of the on-site clearing and grading operations or sediment control to obtain "responsible personnel" certification by completing an approved training class. The City currently relies on the State's program for the certification of construction personnel.

Summary

Baltimore City has made proposals for each of the management requirements of the NPDES stormwater program. Permit conditions will establish schedules for the implementation of these programs.

5. Program Funding

A summary of Baltimore City's NPDES application submittal, specific to the regulatory requirements for program funding, is as follows:

§122.26(d)(2) "(vi) For each fiscal year to be covered by the permit, a fiscal analysis... shall include a description of the source of funds...to meet the necessary expenditures..."

Baltimore City submitted its *1992 Operating Plan: Board of Estimates Recommendations*, which describes the funding of existing stormwater management programs that address the NPDES requirements. These programs include solid waste collection and disposal, stormwater management, sanitary sewer repairs, and other environmental services. Funding for these programs is ongoing and comes from General, Motor Vehicle, and Waste Water Utility funds. In fiscal 1992, a total of \$88,060,612 was budgeted for these programs.

Baltimore City has proposed new programs as a result of the NPDES stormwater requirements. Funding for these proposals will be generated by increasing storm drain discharge, erosion and sediment control, and stormwater management permit and plan

review fees. Additional monies will come from an increase in the Motor Vehicle and Waste Water Utility funds. Baltimore City's application included tables describing each new program, staffing, and funding. The City estimates these programs will cost \$1,273,638 in the first year of its NPDES stormwater permit and increase to \$1,377,133 in five years.

Summary

Baltimore City's program funding should be adequate to implement the NPDES stormwater program. Permit conditions will stipulate that Baltimore City estimate costs of its stormwater programs and maintain adequate funding to implement these programs.

6. Assessment of Controls

A summary of Baltimore City's NPDES application submittal, specific to the regulatory requirements for assessment of controls, is as follows:

§122.26(d)(2) "(v) Estimated reductions in loadings...expected as a result of the... management program..."

Baltimore City's NPDES municipal separate storm sewer system permit application did not include estimates of expected reductions in pollutant loads as a result of its proposed management programs. In order to estimate these reductions during the permit term, the City proposes using direct and indirect measurement techniques. As a direct measurement, the City will use known BMP pollutant removal capabilities in conjunction with growth projections to estimate pollutant reductions. Retrofits will be assessed using known BMP removal capabilities as well. For other management programs, analyses of pilot programs and corresponding stormwater monitoring data will yield information that will be used for estimating pollutant reductions. Indirect measurements for assessment of the City's management programs will include: the review of stormwater management maintenance logs; inventories of salt and herbicide use; recording the number of illicit connections reported and eliminated; and the use of follow-up surveys to determine the effectiveness of watershed surveys and public education campaigns. Additionally, the City is assessing the feasibility of using bio-assessment techniques to gauge the effectiveness of its erosion and sediment control program.

Summary

Baltimore City's NPDES municipal separate storm sewer system permit will require the City to provide MDE with annual assessments of reductions expected as a result of stormwater management programs.

