

**MARYLAND DEPARTMENT OF THE ENVIRONMENT**  
**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM**  
**MUNICIPAL SEPARATE STORM SEWER SYSTEM DISCHARGE PERMIT**

**PART I. IDENTIFICATION**

**A. Permit Number:** MS-BC-93-002

**B. Permit Area**

This permit covers stormwater discharges from the municipal separate storm sewer system in Baltimore City, Maryland.

**C. Effective Date:** November 17, 1993

**D. Expiration Date:** November 17, 1998

**PART II. STANDARD PERMIT CONDITIONS**

**A. Legal Authority**

1. Baltimore City shall maintain adequate legal authority, in accordance with National Pollutant Discharge Elimination System (NPDES) regulations, 40 Code of Federal Regulations (CFR) 122.26(d)(2)(i), throughout the term of this permit. In the event that any provision of its legal authority is found to be invalid, the City shall make the necessary changes to maintain adequate legal authority.

**B. Source Identification**

1. Baltimore City shall compile and submit any new source identification information including the identification and mapping of storm sewer system outfalls, land use activities, population estimates, runoff coefficients, major structural controls, landfills and controls, publicly owned lands, NPDES dischargers, and industries organized by watershed and Standard Industrial Classification (SIC) codes in the annual reports to the Maryland Department of the Environment (MDE) pursuant to Part IV "ANNUAL PROGRESS REPORTS" of this permit.

**C. Discharge Characterization**

1. By 5/17/94, Baltimore City shall submit storm event monitoring data and analysis to MDE for the remaining storm events at each of its five representative outfalls.
2. By 5/17/94, Baltimore City shall propose sampling sites for its long-term monitoring program. These sites shall include at least one residential site, one commercial site, and one industrial site. An in-stream ambient station shall be proposed downstream of each site.

3. Within 6 months of MDE's approval of Baltimore City's proposed long-term monitoring sites, the City shall commence sampling at an approved outfall and its appropriate in-stream monitoring station.
4. Sampling at the remaining outfalls and in-stream stations shall begin on a schedule of one outfall and its associated in-stream station every six months until sampling is being performed at all approved sites.
5. Baltimore City shall complete the following minimum requirements:
  - a) A total of 12 storm events shall be monitored per year with at least 3 occurring per quarter. Quarters shall be based on calendar year. If extended dry weather periods occur, baseflow samples shall be taken at least once per month. If no flow is observed at the outfall during periods of dry weather, samples shall be taken at the in-stream monitoring stations only.
  - b) Three discrete samples shall be taken for stormwater flow at both outfall and in-stream monitoring stations. Samples submitted for analysis shall be representative of the approximate flow at the following three intervals along the hydrograph: the midpoint of the rising limb, the peak, and the midpoint of the falling limb.
  - c) Flow rates shall be recorded at points when discrete samples are taken.
  - d) Collected samples shall be submitted to an Environmental Protection Agency (EPA) certified laboratory for analysis according to methods listed under 40 CFR Part 136 and analyzed for the following parameters:
 

BOD <sub>5</sub>	Fecal Coliform	TSS
TKN	Nitrate plus Nitrite	
Total Phosphorus	Cadmium	
Copper	Lead	
Zinc	Oil and Grease	
pH	Water Temperature	
6. For each storm event, a description of any equipment problems and weather conditions such as duration and intensity shall be recorded.
7. Reporting Frequency and Requirements
  - a) Laboratory results shall be recorded on MDE's long-term monitoring database (Appendix 3) and submitted with annual reports.
  - b) Annual and seasonal pollutant load estimates, using data collected as a result of long-term monitoring, shall be submitted with annual reports.
  - c) Pollutant loads shall be estimated for all identified municipal storm sewer outfalls.
  - d) By 11/17/97, Baltimore City shall use monitoring data from existing in-stream

monitoring stations to further refine pollutant load estimates.

e) By 11/17/97, Baltimore City shall assess its monitoring program and outline potential alternative sampling sites and procedures.

**D. Management Programs**

1. Baltimore City shall maintain an acceptable stormwater management program in accordance with the Environment Article, Title 4, Subtitle 2, Annotated Code of Maryland.
2. Baltimore City shall conduct preventative maintenance inspections of all stormwater management facilities at least on a triennial basis. Inspections, necessary corrective action, and enforcement actions shall be documented and summarized in annual reports.
3. By 5/17/94, Baltimore City shall submit the 1992 stormwater management data form distributed by MDE. Baltimore City shall submit information regarding stormwater management on the latest version of MDE's stormwater management spreadsheet (Appendix 4) in annual reports.
4. By 11/17/94, Baltimore City shall develop and implement stormwater management procedures for significant redevelopment in areas other than the Critical Area.
5. By 5/17/94, Baltimore City shall implement its proposed Watershed Survey Program for the identification of stormwater pollutants. By 5/17/96, Baltimore City shall complete watershed surveys for all storm sewer outfall drainage areas in the City.
6. By 5/17/94, Baltimore City shall submit an implementation schedule for its proposed pilot stormwater management studies for residential, commercial, and industrial land uses. These pilot studies shall be coordinated with Baltimore City's long-term monitoring program. Beginning in 1995, Baltimore City shall include analyses of pilot studies in its annual reports including proposals for the expansion of successful pilot studies.
7. By 5/17/94, Baltimore City shall implement its Brick Cleaning and Waste Water Program including procedures for inspection and enforcement.
8. By 5/17/95, Baltimore City shall implement its proposed programs for the control of pesticide, herbicide, and fertilizer use. These programs shall include the inspection of storage areas, the assessment of monitoring and GIS data, the development of a pesticide task force, the assessment of Integrated Pest Management (IPM) techniques, and working with MDE on its "Residential Pesticide Usage and Levels in Urban Surface Waters" study.
9. By 5/17/95, Baltimore City shall perform an assessment regarding the effects of road maintenance activities including street sweeping, litter control, deicing procedures, and the application of herbicides for vegetation control on stormwater discharges. This assessment shall include an analysis of alternative practices for reducing pollutants associated with road maintenance activities. By 11/17/95, Baltimore City shall incorporate effective alternative practices in its road maintenance procedures for reducing

pollutants.

10. Baltimore City shall perform cost/benefit analyses of potential retrofit sites and alternative source control measures and develop a priority list for implementation. These analyses and an implementation schedule shall be included in its 1996 annual report.
11. By 11/17/94, Baltimore City shall implement its proposed educational program for reducing stormwater pollutants. Educational materials shall include information on illicit discharges and reporting, reducing fertilizer and pesticide use, and the proper disposal of household wastes. Additionally, the City shall integrate educational efforts with local volunteer groups.
12. By 11/17/94, Baltimore City shall implement all components of its illicit connection detection and pollutant source tracking programs in a pilot study area and propose a schedule for expanding its programs jurisdiction-wide. This program will include an inspection program by its industrial pretreatment staff for illicit connections, Dry Weather Outfall (DWO) field screening, Pollutant Source Tracking (PST) feasibility study, and a storm drain facility study. Field screening results shall be submitted on MDE's Part 1 field screening database as part of its annual reports submittal. Any industrial dischargers that are discovered as a result of the City's program shall be required to obtain an NPDES permit from MDE.
13. Baltimore City shall maintain an acceptable erosion and sediment control program in accordance with the Environment Article, Title 4, Subtitle 1, Annotated Code of Maryland.
14. By 11/17/94, Baltimore City shall develop and implement "responsible personnel" certification classes to educate construction site operators regarding erosion and sediment control requirements.
15. By 11/17/95, Baltimore City shall conduct a pilot study for assessing the effects of sanitary sewer system leaks on stormwater discharges and provide a schedule for expanding its assessment program system-wide. As maintenance problems are discovered, they will be forwarded to the City's sewer maintenance section for correction. As sanitary sewer system leaks are diagnosed, Baltimore City shall propose a schedule for correcting them in the following year's capital improvement program.

**E. Program Funding**

1. By 11/17/94, Baltimore City shall submit a fiscal analysis of the capital, operation, and maintenance expenditures necessary to comply with all conditions of this permit.
2. Baltimore City shall maintain adequate program funding to comply with all conditions of this permit.

**F. Assessment of Controls**

1. Annually, Baltimore City shall submit estimates of expected pollutant load reductions as

a result of its proposed management programs.

### **PART III. SPECIAL PROGRAMMATIC CONDITIONS**

Since the signing of the Chesapeake Bay Agreement in 1983, Maryland has been working toward meeting the goal of reducing by 40% the discharge of nutrients to the Chesapeake Bay by the year 2000. To achieve this nutrient goal, MDE has developed strategies to improve the water quality in the tributaries that drain to the Bay. MDE has subdivided the Bay watershed into ten major tributaries which have each been assigned a 40% nutrient reduction goal. Characterizations of specific tributaries have been made in terms of land use, nutrient loads, and water quality. Additionally, strategy options have been developed based on identified problems in order to guide the restoration effort in each individual tributary.

Baltimore City lies within one of the Chesapeake Bay's ten major tributaries that being the Patapsco/Back. This NPDES permit requires Baltimore City to assist with the implementation of the strategy designed to meet the nutrient reduction goals in the Patapsco/Back tributary. The specific permit conditions presented below will promote a watershed based approach to controlling the contribution of pollutants from stormwater runoff. Coordination between and among other jurisdictions is a major requirement and the identification of those appropriate jurisdictions will occur jointly with MDE. Additionally, deadlines, priorities, and scheduling to satisfy specific conditions will be determined in conjunction with MDE. In any case, progress toward meeting these conditions shall be reported to MDE.

#### **A. Programmatic Coordination**

1. Baltimore City shall coordinate water quality restoration and protection efforts in watersheds shared with other jurisdictions. These efforts shall include:
  - a) the exchange of information on restoration/protection program effectiveness;
  - b) the definition of watershed management measures to support restoration/protection efforts;
  - c) the identification of appropriate watershed boundaries for planning and program development efforts; and
  - d) the coordination of planning and zoning activities to support the goals of watershed management.

#### **B. Data Management**

1. Baltimore City shall develop standards for record keeping and databases to meet the standard permit conditions in Part II of this permit. These standards shall be developed in concert with other appropriate jurisdictions and include:
  - a) management practice databases and GIS compatibility among jurisdictions for base maps, pollutant source area locations, stormwater management facility location and description, and land use and zoning designations;

- b) comparable population estimates and growth projections; and
- c) consistent land use and runoff coefficients.

**C. Discharge Characterization**

1. Baltimore City shall develop standards for discharge characterization. These standards shall be developed in concert with other appropriate jurisdictions and include:
  - a) coordination of long term monitoring site selection among other appropriate jurisdictions;
  - b) standards for field and laboratory methods;
  - c) standards for monitoring databases; and
  - d) standards for annual and seasonal pollutant load estimates.

**D. Management Programs**

1. Baltimore City shall develop management program standards. These standards shall be developed in concert with other appropriate jurisdictions and include:
  - a) acceptable preventative maintenance procedures;
  - b) watershed management plans and retrofit assessments;
  - c) development and implementation of public information and educational programs; and
  - d) watershed inventories, illicit discharge inspection programs, and water quality enforcement.

**E. Assessment of Controls and Annual Progress Reporting**

1. Baltimore City shall develop standards for loading reduction estimates, annual progress reports, and stormwater management program effectiveness.
2. Along with other jurisdictions, Baltimore City shall evaluate the cumulative impact of its stormwater management waiver policy with regard to receiving water quality.

**PART IV. ANNUAL PROGRESS REPORTS**

Annual progress reports required under 40 CFR 122.42(c) will facilitate the long-term assessment of Baltimore City's NPDES stormwater program. According to EPA guidance, these reports shall be based on assessment techniques proposed by jurisdictions in Part 2 NPDES applications. These reports shall include:

*¶122.42(c) "(1) The status of implementing the components of the storm water management program that are established as permit conditions;"*

*¶122.42(c) "(2) Proposed changes to the storm water management programs that are established as permit conditions...;"*

*¶122.42(c) "(3) Revisions, if necessary, to the assessment of controls and the fiscal analysis reported in the permit application...;"*

*¶122.42(c) "(4) A summary of data, including monitoring data, that is accumulated throughout the reporting year;"*

*¶122.42(c) "(5) Annual expenditures and budget for year following each annual report;"*

*¶122.42(c) "(6) A summary describing the number and nature of enforcement actions, inspections, and public education programs;"*

*¶122.42(c) "(7) Identification of water quality improvements or degradation;"*

MDE has developed a spreadsheet (Appendix 4) for the reporting and tracking of NPDES data. This spreadsheet lists components of Baltimore City's NPDES stormwater program along with appropriate reporting parameters. Annual progress reports, including MDE's spreadsheet, shall be submitted to MDE by the anniversary date of permit issuance for each year of the permit term.

## **PART V. ENFORCEMENT AND PENALTIES**

### **A. Program Review and Evaluation**

In order to assess the effectiveness of the permittee's NPDES program for eliminating non-stormwater discharges and reducing the discharge of pollutants to the maximum extent possible, MDE will review and evaluate program implementation, annual reports, and periodic data submittals on an annual basis. Procedures for the review of local erosion and sediment control and stormwater management programs exist in Maryland's Sediment Control and Stormwater Management Laws. Additional periodic reviews and evaluations will be conducted to determine compliance with the permit conditions. Continuation or reissuance of this permit beyond November 17, 1998 will be subject to MDE's review and evaluation of Baltimore City's compliance and implementation of the conditions of this permit.

### **B. Discharge Prohibitions and Receiving Water Limitations**

The permittee shall effectively prohibit non-stormwater discharges through its municipal separate storm sewer system. NPDES permitted non-stormwater discharges are exempt from this prohibition. Discharges from the following will not be considered a source of pollutants when properly managed: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated ground water infiltration to separate storm sewers; uncontaminated pumped ground water; discharges from potable water sources; foundation drains; air conditioning condensation; irrigation waters; springs; footing drains; lawn watering; individual residential car washing; flows from riparian habitats and wetlands; dechlorinated swimming pool discharges; street wash water; and fire fighting activities. The

discharge of stormwater containing pollutants which have not been reduced to the maximum extent practicable is prohibited.

The permittee shall not cause the contamination or other alteration of the physical, chemical, or biological properties of any waters of the State, including a change in temperature, taste, color, turbidity, or odor of the waters or the discharge or deposit of any organic matter, harmful organism, or liquid, gaseous, solid, radioactive, or other substance into any waters of the State, that will render the waters harmful to:

- (1) Public health, safety, or welfare;
- (2) Domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial use;
- (3) Livestock, wild animals, or birds; or
- (4) Fish or other aquatic life.

**C. Duty to Mitigate**

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

**D. Duty to Comply**

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and is grounds for enforcement action; permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. The permittee shall comply at all times with the provisions of the Environment Article, Title 4, Subtitles 1, 2, and 4; Title 7, Subtitle 2; and Title 9, Subtitle 3 of the Annotated Code of Maryland.

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by the permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

**E. Sanctions**

**1. Penalties Under the CWA - Civil and Criminal**

The CWA provides that any person who violates any permit condition is subject to a civil penalty not to exceed \$25,000 per day for each violation. Any person who negligently violates any permit condition is subject to criminal penalties of \$2,500 to \$25,000 per day of violation, or

imprisonment of not more than 1 year, or both. Any person who knowingly violates any permit condition is subject to criminal penalties of \$5,000 to \$50,000 per day of violation, or imprisonment for not more than 3 years, or both.

## **2. Penalties Under the State's Environment Article - Civil and Criminal**

Nothing in this permit shall be construed to preclude the institution of any legal action nor relieve the permittee from civil or criminal responsibilities and/or penalties for noncompliance with Title 4, Title 7, and Title 9 of the Environment Article, Annotated Code of Maryland, or any federal, local, or other State law or regulation.

The Environment Article, §9-342, Annotated Code of Maryland, provides that any person who violates a permit condition is subject to a civil penalty up to \$1,000 for each violation, but not exceeding \$50,000 total. The Environment Article, §9-343, Annotated Code of Maryland, provides that any person who willfully or negligently violates a permit condition is subject to a criminal penalty not exceeding \$25,000 or imprisonment not exceeding 1 year, or both.

The Environment Article, §9-343, Annotated Code of Maryland, provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than six months per violation, or both.

The Environment Article, §9-343, Annotated Code of Maryland, provides that any person who knowingly makes any false statement, representation, or certification in any records or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than six months per violation, or both.

## **F. Permit Revocation and Modification**

### **1. Permit Actions**

This permit may be modified, revoked, or terminated for cause. The filing of a request by the permittee for a permit modification, or a notification of planned changes or anticipated noncompliance does not stay any permit condition. A permit may be modified by the Department upon written request by the permittee and after notice and opportunity for a public hearing in accordance with and for the reasons set forth in the Code of Maryland Regulations (COMAR) 26.08.04.10 C.

After notice and opportunity for a hearing and in accordance with COMAR 26.08.04.10., the Department may modify, suspend, or revoke and reissue this permit in whole or in part during its term for causes including, but not limited, to the following:

- a) Violation of any terms or conditions of this permit;

- b) Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;
- c) A change in any condition that requires either a temporary reduction or elimination of the authorized discharge; or
- d) A determination that the permitted discharge poses a threat to human health or welfare or to the environment and can only be regulated to acceptable levels by permit modification or termination.

**2. Duty to Provide Information**

The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit; or to determine compliance with this permit. The permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit.

**G. Property Rights**

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, State, or local law or regulations.

**H. Severability**

The provisions of this permit are severable. If any provision of this permit shall be held invalid for any reason, the remaining provisions shall remain in full force and effect. If the application of any provision of this permit to any circumstance is held invalid, its application to other circumstances shall not be affected.

**I. Signature of Authorized Administrator and Jurisdiction**

All applications, reports, or information submitted to the Department shall be signed as required by COMAR 26.08.04.01 D. As in the case of municipal or other public facilities, signatories shall be either a principal executive officer, ranking elected official, or other duly authorized employee.

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J.L. Hearn, Director  
Water Management Administration

\_\_\_\_\_

Date



# **APPENDIX 1**

**DISCHARGE PERMIT APPLICATION SUMMARY**



## 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

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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 Elmora, 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.

# APPENDIX 2

PERMIT CONDITIONS



## APPENDIX 2

NPDES Permit Conditions and Compliance Schedule -- Baltimore City			
Standard Permit Conditions	Permit Condition		Due Date
A. Legal Authority	1.	Baltimore City shall maintain adequate legal authority, in accordance with NPDES regulations 40 CFR 122.26(d), throughout the term of this permit. In the event that any provision of its legal authority is found to be invalid, the City shall make the necessary changes to maintain adequate legal authority.	Ongoing
B. Source Identification	1.	Baltimore City shall compile and submit any new source identification information including the identification and mapping of storm sewer system outfalls, private storm sewer systems, land use activities, population estimates, runoff coefficients, major structural controls, landfills and controls, publicly owned lands, NPDES dischargers, and industries organized by watershed and SIC code in the annual reports to MDE pursuant to Part V of this permit.	Annually
C. Discharge Characterization	1.	Baltimore City shall submit storm event monitoring data and analysis to MDE for the remaining storm events at each of its five representative outfalls.	5/17/94
	2.	Baltimore City shall propose sampling sites for its long-term monitoring program. These sites shall include at least one residential site, one commercial site, and one industrial site. An in-stream ambient station shall be proposed downstream of each site.	5/17/94
	3.	Within 6 months of MDE's approval of Baltimore City's long-term monitoring sites, the City shall commence sampling at outfall x and its appropriate in-stream monitoring station.	Contingent on MDE Approval
	4.	Sampling at the remaining outfalls and in-stream stations shall begin on a schedule of one outfall and its associated in-stream station every six months until all monitoring sites and in-stream stations are being monitored.	Contingent on MDE Approval
	5.	Baltimore City shall complete the following minimum requirements:	Ongoing
	a)	A total of 12 storm events shall be monitored per year with at least 3 occurring per quarter. Quarters shall be based on calendar year. If extended dry weather periods occur, baseflow samples shall be taken at least once per month. If no flow is observed at the outfall during periods of dry weather, samples shall be taken at the in-stream monitoring stations only.	Monthly
	b)	Three discrete samples shall be taken for stormwater flow at both outfall and in-stream monitoring stations. Samples submitted for analysis shall be representative of the approximate flow at the following three intervals	Monthly

NPDES Permit Conditions and Compliance Schedule -- Baltimore City			
		along the hydrograph: the midpoint of the rising limb, the peak, and the midpoint of the falling limb.	
	c)	Flow rates shall be recorded at points when discrete samples are taken.	Each Sample
	d)	Collected samples shall be submitted to an EPA certified laboratory for analysis according to methods listed under 40 CFR Part 136 and analyzed for the following parameters: BOD5, Fecal Coliform, TKN, Nitrate plus Nitrite, Total Phosphorus, Cadmium, Copper, Lead, Zinc, Oil and Grease, pH, and Water Temperature and TSS.	Each Sample
	6.	For each storm event, a description of equipment problems and weather conditions such as duration and intensity shall be recorded.	Each Sample
Standard Permit Conditions	Permit Condition		Due Date
(Discharge Char. - cont.)	7.	Reporting Frequency and Requirements:	
	a)	Laboratory results shall be recorded on MDE's long-term monitoring database and submitted along with annual reports.	Annually
	b)	Annual and seasonal pollutant load estimates along with an analysis of pollutant load trends shall be submitted with annual reports.	Annually
	c)	Pollutant loads shall be estimated for all storm sewer outfalls.	Annually
	d)	Baltimore City shall utilize monitoring data from existing in-stream monitoring stations to further refine pollutant load estimates.	11/17/97
	e)	Baltimore City shall assess its monitoring program and outline potential alternative sampling sites and procedures.	11/17/94
D. Management Programs	1.	Baltimore City shall maintain an acceptable stormwater management program in accordance with the Environment Article, Title 4, Subtitle 2, Annotated Code of Maryland.	Ongoing
	2.	Baltimore City shall conduct preventive maintenance inspections of all stormwater management facilities at least on a triennial basis. Inspections, necessary corrective action, and enforcement actions shall be documented and summarized in annual reports.	Annually
	3.	Baltimore City shall submit the 1992 stormwater management data form distributed by MDE.	5/17/94

NPDES Permit Conditions and Compliance Schedule -- Baltimore City			
		For each year of the permit, Baltimore City shall submit information regarding stormwater management on MDE's stormwater management spreadsheet (Appendix 3) along with annual reports.	Annually
	4.	Baltimore City shall develop and implement stormwater management procedures for significant redevelopment in areas other than the Critical Area.	11/17/94
	5.	Baltimore City shall implement its proposed Watershed Survey Program for the identification of stormwater pollutants.	5/17/94
		Baltimore City shall complete watershed surveys for all storm sewer outfall drainage areas in the City.	5/17/96
	6.	Baltimore City shall submit an implementation schedule for its proposed pilot stormwater management studies for residential, commercial, and industrial land uses.	11/17/94
		Baltimore City shall include analyses of pilot studies in annual reports, including proposals for the expansion of successful pilot studies.	11/17/95 Annually
	7.	Baltimore City shall implement its Brick Cleaning and Waste Water Program including procedures for inspection and enforcement.	5/17/94
	<b>Standard Permit Condition</b>	<b>Permit Condition</b>	
(Management Prog. - cont.)	8.	Baltimore City shall implement its proposed programs for the control of pesticide, herbicide, and fertilizer use. These programs shall include the use of GIS and monitoring data for assessment purposes, the development of a pesticide task force for assessing IPM techniques and developing strategies for limiting pesticide use, and working with MDE on its "Residential Pesticide Usage and Levels of Urban Surface Waters" study.	
	9.	Baltimore City shall perform an assessment regarding the effects of road maintenance activities including street sweeping, litter control, deicing procedures, and herbicide use for vegetation control, on stormwater discharges. This assessment shall include an analysis of alternative practices for reducing pollutants associated with road maintenance activities.	5/17/95
		Baltimore City shall incorporate effective alternative practices for reducing pollutants in its road maintenance procedures.	11/17/95

NPDES Permit Conditions and Compliance Schedule -- Baltimore City			
	10.	Baltimore City shall perform cost/benefit analyses of potential retrofit sites and alternative source control measures and develop a priority list for implementation.	11/17/96
		These analyses and an implementation schedule shall be included in its 1996 annual report.	11/17/96
	11.	Baltimore City shall implement its proposed educational program for reducing stormwater pollutants. Educational materials shall include information on illicit discharges and reporting, and the reduction of fertilizer and pesticide use, the proper disposal of household wastes. Additionally, the City shall integrate educational initiatives with local volunteer groups.	11/17/94
	12.	Baltimore City shall implement all components of its illicit connection detection and pollutant source tracking programs in a pilot study area and propose an implementation schedule for jurisdiction-wide expansion. This program will include an inspection program by its industrial pretreatment staff for illicit connections, DWO field screening, PST feasibility study, and a storm drain facility study. Field screening results shall be submitted on MDE's Part I dry weather field screening database as part of its annual reports submittal. Any industrial dischargers that are discovered as a result of the City's program shall be required to obtain an NPDES permit from MDE.	11/17/94
	13.	Baltimore City shall maintain an acceptable erosion and sediment control program in accordance with the Environment Article, Title 4, Subtitle 1, Annotated Code of Maryland.	Ongoing
	14.	Baltimore City shall develop and implement "responsible personnel" certification classes to educate construction site operators regarding erosion and sediment control.	11/17/94
	15.	Baltimore City shall conduct a pilot study for assessing the effects of sanitary sewer system leaks on stormwater discharges and provide a schedule for expanding its assessment program system-wide. As maintenance problems are discovered, they will be forwarded to the City's sewer maintenance section for correction. As sanitary sewer system leaks are diagnosed, Baltimore City shall propose a schedule for correcting them in the following year's capital improvement program.	5/17/95
E. Program Funding	1.	Baltimore City shall submit a fiscal analysis of the capital, operation, and maintenance expenditures necessary to comply with all conditions of this permit.	11/17/94
	2.	Baltimore City shall maintain adequate program funding to comply with all conditions of this permit.	Ongoing
<b>Special Conditions</b>	<b>Permit Condition</b>		<b>Due Date</b>
Assessment of Controls	1.	Baltimore City shall submit estimates of expected pollutant load reductions as a result of its proposed management programs.	

NPDES Permit Conditions and Compliance Schedule -- Baltimore City			
A. Programmatic Coordination	1.	Baltimore City shall coordinate water quality restoration and protection efforts in watersheds shared with other jurisdictions. These efforts shall include:	
	a)	the exchange of information on restoration/ protection program effectiveness;	
	d)	the definition of watershed management measures to support restoration/protection efforts;	
	c)	the identification of appropriate watershed boundaries for planning and program development efforts; and	
	d)	the coordination of planning and zoning activities to support the goals of watershed management.	
B. Data Management	1.	Baltimore City shall develop standards for record keeping and databases to meet the standard permit conditions in Part II of this permit. These standards shall be developed in concert with other appropriate jurisdictions and include:	
	a)	management practice databases and GIS compatibility among jurisdictions for base maps, pollutant source area locations, stormwater management facility location and description, and land use and zoning designations;	
	b)	comparable population estimates and growth projections; and	
	c)	consistent land use and runoff coefficients.	
C. Discharge Characterization	1.	Baltimore City shall develop standards for discharge characterization. These standards shall be developed in concert with other appropriate jurisdictions and include:	
	a)	coordination of long term monitoring site selection among other jurisdictions;	
	b)	standards for field and laboratory methods;	
	c)	standards for monitoring databases; and	
	d)	standards for annual and seasonal pollutant load estimates.	
D. Management Programs	1.	Baltimore City shall develop management program standards. These standards shall be developed in concert with other appropriate jurisdictions and include:	

NPDES Permit Conditions and Compliance Schedule -- Baltimore City			
	a)	acceptable preventative maintenance procedures;	
<b>Special Conditions</b>	<b>Permit Condition</b>		<b>Due Date</b>
(Management Prog. - cont.)	b)	watershed management plans and retrofit assessments;	
	c)	development and implementation of public information and educational programs; and	
	d)	watershed inventories, illicit discharge inspection programs, and water quality enforcement.	
E. Assessment of Controls and Annual Progress Reporting	1.	Baltimore City shall develop standards for loading reduction estimates, annual progress reports, and stormwater management program effectiveness.	
	2.	Along with other jurisdictions, Baltimore City shall evaluate the cumulative impact of its stormwater management waiver policy with regard to receiving water quality.	



# **APPENDIX 3**

**LONG-TERM MONITORING DATABASE**



### APPENDIX 3

The following is information regarding the long-term monitoring database. The database has been modified from the Part 2 monitoring database to include more site information for each storm event sampled.

#### **FIELD NAME DESCRIPTION**

JURIS	Jurisdiction name
WATSHED	Watershed name
DATE	Date
TIME	Time of Day
INST	Instream or Outfall Station Sample?
LAT	Latitude of monitoring location
LONG	Longitude of monitoring location
STAT	Storm flow or base flow sampled?
DEPTH	Rainfall amount during sampled period
DURAT	Duration of Storm Event
INTENS	Intensity of Storm Event
BOD	Biological Oxygen Demand
TKN	Total Kjeldahl Nitrogen
PHOSPH	Total Phosphorus
COPPER	Copper
ZINC	Zinc
PH	pH
COLIF	Fecal Coliform
NITRATE	Nitrate plus Nitrite
CADMIUM	Cadmium
LEAD	Lead
O&G	Oil and Grease
WATEMP	Water Temperature in Celsius
TSS	Total Suspended Solids



# **APPENDIX 4**

**STORMWATER MANAGEMENT SPREADSHEET  
for  
ANNUAL REPORTING**



## APPENDIX 4

The following are hard copies of IMPROV spreadsheets that have been constructed to store annual reporting data. The IMPROV software is an advanced version of Lotus 1-2-3 and is compatible with older Lotus software. The following data will be recorded by watershed.

**Baltimore City, Maryland**  
**Permit Number: MS-BC-93-002**  
**Effective Date: November 17, 1993**  
**Permit Duration: 5 years**

B. Source Identification				
Criteria\Watershed	Jones Fall	Patapsco	Gwynns Falls	Herring Run
major outfalls				
minor outfalls				
commercial landuse %				
industrial landuse %				
residential landuse %				
population				
watershed acreage				
NPDES permitted facilities				

D. Management Programs - Illicit Connection Detection				
Criteria/Watershed	Jones Falls	Patapsco	Gwynns Falls	Herring Run
1Visual screening				
Chemical screening				
Permits granted				
Permits denied				
Complaints				
Dry weather flow - yes				
Sources identified				
Sources removed				

Enforcement actions				
Fines issued				
Money collected				
Program funding				

<b>D. Management Programs - Stormwater Management</b>				
<b>Criteria \ Watershed</b>	<b>Jones Falls</b>	<b>Patapsco</b>	<b>Gwynns Falls</b>	<b>Herring Run</b>
Building permits issued				
Grading permits issued				
SWM exempt projects				
SWM project plans reviewed				
Plans reviewed				
SWM waivers requested				
Waivers denied				
Waivers granted (Qn)				
Waivers granted (Ql)				
Total (Qn+Ql)				
Fees-in-lieu approved				
Total \$ collected				
Plan approvals				
SWM facil. required on plans				
Infiltration facilities				
Retention ponds				
Detention ponds				
Extended detention ponds				
Vegetated swales				
Wetlands/shallow marshes				
Oil/grit separators				
Other				

Total facilities				
Total # facilities completed				
Acres land developed				
Acres land served by SWM				
Facilities under construction				
Retrofits				
Const. inspections completed				
NOVs/SWOs issued				
Private facilities inspected				
Maint. agreements enforced				
Public facilities inspected				
Complaints				

<b>D. Management Programs - Miscellaneous</b>				
<b>Criteria\Watershed</b>	<b>Jones Falls</b>	<b>Patapsco</b>	<b>Gwynns Falls</b>	<b>Herring Run</b>
Gallons oil recycled				
Gallons antifreeze recycled				
Tons recycled material				
Recycling pamphlets distrib.				
Pest./herb. pamphlets distrib.				
Miles street sweeping				
Total street miles				
Feet storm drains cleaned				
Total length of storm drain system				
Tons sand/salt applied				
Spill responses				

Reporting on a watershed basis does not apply to the following information. Rather, this information will be recorded for each year of the permit term.

<b>C. Discharge Characterization</b>						
<b>Criteria/Permit Year</b>	<b>Permit Year 1</b>	<b>Permit Year 2</b>	<b>Permit Year 3</b>	<b>Permit Year 4</b>	<b>Permit Year 5</b>	<b>Total</b>
Is database completed?						
Added pollutant monitored #1						
Added pollutant monitored #2						
Added pollutant monitored #3						
Added pollutant monitored #4						
Added pollutant monitored #5						
Monitoring program costs						

<b>F. Fiscal Analyses</b>						
<b>Criteria/Permit Year</b>	<b>Permit Year 1</b>	<b>Permit Year 2</b>	<b>Permit Year 3</b>	<b>Permit Year 4</b>	<b>Permit Year 5</b>	<b>TOTAL</b>
NPDES budget						
NPDES staff #						
GIS budget						
GIS staff #						
Is a stormwater utility being proposed?						
Anticipated utility revenue						
Actual utility revenue generated						

# **APPENDIX 5**

**NPDES REGULATORY REQUIREMENTS**



## APPENDIX 5 SPECIFIC CWA REGULATORY REQUIREMENTS

### 1. **Legal Authority**

The specific regulatory requirements contained in 40 CFR 122.26(d) for adequate legal authority are as follows:

*¶122.26(d)(2)(i) "(A) Control through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from sites of industrial activity;"*

*¶122.26(d)(2)(i) "(B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer;"*

*¶122.26(d)(2)(i) "(C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water;"*

*¶122.26(d)(2)(i) "(D) Control through interagency agreements among coapplicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system;"*

*¶122.26(d)(2)(i) "(E) Require compliance with conditions in ordinances, permits, contracts or orders; and"*

*¶122.26(d)(2)(i) "(F) Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."*

### 2. **Source Identification**

The specific regulatory requirements contained in 40 CFR 122.26(d) for source identification are as follows:

*¶122.26(d)(1)(iii) "(A) A description of the historic use of ordinances, guidance or other controls which limited the discharge of non-storm water discharges to any Publicly Owned Treatment Works serving the same area as the municipal separate storm sewer system..."*

*¶122.26(d)(1)(iii) "(B) A USGS [United States Geological Survey] 7.5 minute topographic map (or equivalent topographic map with a scale between 1:10,000 and 1:24,000 if cost effective) extending one mile beyond the service boundaries of the municipal storm sewer system ..."*

*¶122.26(d)(1)(iii)(B) "(1) The location of known municipal storm sewer system outfalls discharging to waters of the United States;"*

*¶122.26(d)(1)(iii)(B) "(2) A description of the land use activities...accompanied with estimates of population densities and projected growth for a ten year period within the drainage area served by the separate storm sewer. For each land use type, an estimate of an average runoff coefficient..."*

*¶122.26(d)(1)(iii)(B) "(3) The location and description of the activities of the facility of each currently operating or closed municipal landfill or other treatment, storage or disposal facility for municipal waste;"*

*¶122.26(d)(1)(iii)(B) "(4) The location and permit number of any known discharge to the municipal separate storm sewer that has been issued a NPDES permit;"*

*¶122.26(d)(1)(iii)(B) "(5) The location of major structural controls for storm water discharge..."*

*¶122.26(d)(1)(iii)(B) "(6) The identification of publicly owned parks, recreational areas, and other open lands."*

*¶122.26(d)(2) "(ii) [A]n inventory, organized by watershed of the name and address, and a description (such as SIC [Standard Industrial Codes] codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity..."*

### **3. Discharge Characterization**

NPDES stormwater regulations divide discharge characterization into two parts. The specific regulatory requirements contained in Part 1, described in 40 CFR *¶*122.26(d)(1)(iv), include providing the following information in an effort to characterize storm sewer discharges:

*¶122.26(d)(1)(iv) "(A) Monthly mean rain and snow fall estimates...and the monthly average number of storm events."*

*¶122.26(d)(1)(iv) "(B) Existing quantitative data describing the volume and quality of discharges from the municipal storm sewer, including a description of the outfalls sampled, sampling procedures and analytical methods used."*

*¶122.26(d)(1)(iv) "(C) A list of water bodies that receive discharges from the municipal separate storm sewer system...and a brief description of known water quality impacts...the description of impacts shall include a description of whether the water bodies receiving such discharges have been: [(1)] Assessed and reported in section 305(b) reports...[(2)] listed under section 304(l)...[(3)] listed in State Nonpoint Source Assessments required by section 319(a)...[(4)] identified and classified according to eutrophic condition of publicly owned lakes listed in State reports required under Section 314(a)..."*

*¶122.26(d)(1)(iv) "(D) Results of a field screening analysis for illicit connections and illegal dumping for...major outfalls...A screening analysis shall include a narrative description...of visual observations*

*made during dry weather periods. If any flow is observed, two grab samples shall be collected during a 24 hour period...For all such samples, a narrative description of the color, odor, turbidity, the presence of an oil sheen shall be provided...In addition, a narrative description of the results of a field analysis using suitable methods to estimate pH, total chlorine, total copper, total phenol, and detergents...shall be provided..."*

*□122.26(d)(1)(iv) "(E)...the location of outfalls or field screening points appropriate for representative data collection..." required in Part 2.*

Part 2 of the NPDES regulations, described in 40 CFR □122.26(d)(2)(iii), requires that applicants sample stormwater discharges from the municipal separate storm sewer system. Applicants must propose between five and ten outfalls representative of commercial, residential, and industrial land uses for stormwater monitoring. This will include a description of why the outfall or field screening point is representative, the seasons during which sampling is intended, and a description of the sampling equipment. The specific regulatory requirements for Part 2 NPDES permit applications include the following:

*□122.26(d)(2)(iii) "(A)...Quantitative data from...between five and ten outfalls or field screening points as representative of the commercial, residential, and industrial land use...[(1)] For each outfall...samples shall be collected of storm water discharges from three storm events occurring at least one month apart...[(3)] quantitative data shall be provided for: the organic pollutants listed in Table II; the pollutants listed in Table III (toxic metals, cyanide, and total phenols) of appendix D of 40 CFR part 122, and for the following pollutants: Total suspended solids (TSS), Total dissolved solids (TDS), COD, BOD<sub>5</sub>, Oil and grease, Fecal coliform, Fecal streptococcus, pH, Total Kjeldahl nitrogen, Nitrate plus nitrite, Dissolved phosphorus, Total ammonia plus organic nitrogen, Total phosphorus..."*

*□122.26(d)(2)(iii) "(B) Estimates of the annual pollutant load...and the event mean concentration of the cumulative discharges to waters of the United States from all identified municipal outfalls during a storm event..."*

*□122.26(d)(2)(iii) "(C) A proposed schedule to provide estimates for each major outfall...of the seasonal pollutant load and of the event mean concentration of a representative storm for any constituent detected in any sample..."*

*□122.26(d)(2)(iii) "(D) A proposed monitoring program for representative data collection for the term of the permit that describes the locations of outfalls or field screening points to be sampled...why the location is representative, the frequency of sampling, parameters to be sampled, and a description of sampling equipment."*

#### **4. Management Programs**

The specific regulatory requirements contained in 40 CFR □122.26(d) for management programs are as follows:

*□122.26(d)(2)(iv) "(A) A description of structural and source control measures to reduce pollutants...from commercial and residential areas...accompanied with an estimate of the expected reduction of pollutant*

loads and a proposed schedule for implementing such controls. At a minimum, the description shall include:"

¶122.26(d)(2)(iv)(A) "(1) A description of maintenance activities and a maintenance schedule for structural controls...;"

¶122.26(d)(2)(iv)(A) "(2) A description of planning procedures...to develop, implement, and enforce controls to reduce the discharge of pollutants...from areas of new development and significant redevelopment...;"

¶122.26(d)(2)(iv)(A) "(3) A description of practices for operating and maintaining public streets, roads and highways...including deicing activities;"

¶122.26(d)(2)(iv)(A) "(4) A description of procedures to assure that flood management projects assess the impacts on the water quality...and that existing structural flood control devices have been evaluated to determine if retrofitting...is feasible;"

¶122.26(d)(2)(iv)(A) "(5) A description of a program to monitor pollutants from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste...;"

¶122.26(d)(2)(iv)(A) "(6) A description of a program to reduce...pollutants... associated with the application of pesticides, herbicides, and fertilizer..."

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

¶122.26(d)(2)(iv)(B) "(1) A description of a program...to prevent illicit discharges...the description shall address all types of illicit discharges...;"

¶122.26(d)(2)(iv)(B) "(2) A description of procedures to conduct on-going field screening activities...;"

¶122.26(d)(2)(iv)(B) "(3) A description of procedures...to investigate portions of the separate storm sewer system that...indicate illicit discharges or other sources of non-stormwater...;"

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

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

¶122.26(d)(2)(iv)(B) "(6) A description of educational activities, public information activities...to facilitate the proper management and disposal of used oil and toxic materials; and"

*¶122.26(d)(2)(iv)(B) "(7) A description of controls to limit infiltration of seepage from municipal sanitary sewers...;"*

*¶122.26(d)(2)(iv) "(C) A description of a program to monitor and control pollutants...from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities...The program shall:"*

*¶122.26(d)(2)(iv)(C) "(1) Identify priorities and procedures for inspections and establishing...control measures for such discharges;"*

*¶122.26(d)(2)(iv)(C) "(2) Describe a monitoring program...including the submission of quantitative data on...oil and grease, COD, pH, BOD5, TSS, total phosphorus, total Kjeldahl nitrogen, nitrate plus nitrite nitrogen, and any discharges required under 40 CFR 122.21(g)(7)(iii) and (iv)."*

*¶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 which incorporate consideration of potential water quality impacts;"*

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

*¶122.26(d)(2)(iv)(D) "(3) A description of procedures for inspecting sites and enforcing control measures...;"*

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

## **5. Program Funding**

The specific regulatory requirement contained in 40 CFR 122.26(d) for program funding is as follows:

*¶122.26(d)(2) "(vi) For each fiscal year to be covered by the permit, a fiscal analysis of the necessary capital and operation and maintenance expenditures necessary to accomplish the activities of the programs under paragraphs (d)(2)(iii) and (iv) of this section. Such analysis shall include a description of the source of funds that are proposed to meet the necessary expenditures, including legal restrictions on the use of such funds."*

## 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.

