

**Maryland Department of the Environment
Water Management Administration
National Pollutant Discharge Elimination System
Municipal Separate Storm Sewer System Discharge Permit
99-DP-3317 (MD0068314)**

Review of Baltimore County's 2005 Annual Report

Baltimore County was issued a National Pollutant Discharge Elimination System (NPDES) permit 99-DP-3317 (MD0068314) on June 15, 2000. This permit lasts for 5 years and requires the County to prohibit non-stormwater discharges and reduce stormwater pollutants through its storm sewer system to the maximum extent practicable. Each year, Baltimore County produces an annual report for assessing the progress of its stormwater management programs. This review by the Maryland Department of the Environment (MDE) provides the County with NPDES permit compliance status and general guidance for its next generation permit.

Legal Authority

Baltimore County continues to maintain the necessary legal authority to control pollutants discharged from its municipal separate storm sewer system in compliance with the Clean Water Act's NPDES program. In support of this requirement, legal certification has been provided by the County Attorney's Office. If any legal powers prove inadequate for complying with the regulations in 40 Code of Federal Regulations 122.26(d)(2)(i), the County should make those changes necessary to maintain adequate legal authority.

Source Identification

Baltimore County's Department of Environmental Protection and Resource Management (DEPRM) is the lead agency for administering the NPDES stormwater program. DEPRM has compiled extensive data (major and minor outfalls, stormwater management facilities, 2 foot topographic contour maps, impervious cover, and aerial photos) for the County's storm sewer system on a geographic information system (GIS). These data are used for the routine maintenance of the County's stormwater management program and for watershed characterization and restoration. The County's source identification work is in compliance with NPDES permit requirements.

Discharge Characterization

Baltimore County performs a comprehensive suite of monitoring programs that are designed to gauge the condition of its water resources and the effectiveness of stormwater management programs. Significant monitoring elements implemented by the County include long-term chemical, biological, and physical characterization monitoring of the Spring Branch; *2000 Maryland Stormwater Design Manual* monitoring in the Windlass Run; watershed management plan monitoring; and specific best management practice (BMP) monitoring. The current status of these program components are discussed below.

Baltimore County selected the Spring Branch for NPDES long-term characterization monitoring. The stream's watershed is mostly composed of a medium density suburban neighborhood, built before Maryland's stormwater management law. The Spring Branch showed significant biological, chemical, and physical impairment. In response, the County constructed a stormwater management pond to control the quantity and quality of runoff and a stream restoration project to prevent further stream channel erosion. Monitoring before, during, and after these restoration efforts is being used to gauge the success of these capital expenditures.

For several years, Baltimore County has had difficulty meeting annual permit requirements for the chemical monitoring of 12 storms and/or baseflow events. Also, biological data collected were often not identified making analysis problematic. This year's annual report submittal by the County shows marked improvement. Eight storm flows and 3 baseflows were monitored. Also,

The backlog of macroinvertebrates from previous years have been identified. Physical data have been collected and analyzed as well. While the data show some stream adjustments, it appears that the restoration project has stabilized the physical dynamics of the Spring Branch.

Some analysis of the biological data from 2001 through 2003 has taken place and shows a general trend downward. Some of these results may be attributable to drought and other weather conditions. A more meaningful analysis would include comparisons with data going back to 1993 gathered before, during, and immediately after the stream restoration and BMP construction periods. For chemical data, event mean concentrations were developed for the 2004 monitoring season, yet, they were not entered into the State's database and no long-term trend analysis was made. MDE still believes that the County has a unique opportunity to gauge the effectiveness of a stream restoration project from a holistic perspective, using all of the biological, chemical, and physical data collected from the Spring Branch. Further effort is warranted in this watershed before the County transitions its efforts to the Scotts Level Branch for NPDES monitoring.

Baltimore County has been monitoring the Windlass Run to gauge the effectiveness of the *2000 Maryland Stormwater Design Manual*. The Windlass Run is a 2,000 acre watershed that is only 3% impervious. Industrial zoning and the construction of a major road will eventually cause more than 20% of the watershed to become impervious. Annual monitoring procedures include 6 stream cross-sections, a slope/profile measurement, and a Wolman pebble count. Four years of physical monitoring show a stream system that is very stable. While not necessarily required by NPDES permit conditions, Baltimore County is conducting chemistry and biological sampling in the Windlass Run as well.

County-wide monitoring of biological, physical, and chemical stream attributes are being pursued to track the implementation of watershed management plans. For baseflow chemical monitoring, approximately 50 sites in the Patapsco/Back River watershed and another 50 sites in the Gunpowder/Deer Creek watershed are monitored six to eight times in alternating years. For chemical trend analysis, 9 USGS gauging stations on three major tributaries will be monitored for both baseflow and storm events. For tidal waters, seven sites are being monitored 15 times a

year. A suite of conventional stormwater pollutants are analyzed at all of these sites for determining means, frequency distribution, standard deviation, correlation to impervious cover, and trends.

Baltimore County monitors the physical attributes of all stream restoration projects in order to assess their effectiveness and the implementation of watershed management plans. For 2004, the County submitted stream monitoring reports for the White Marsh, Long Quarter, Ben's Run, Towson Run, and East Beaverdam. These assessments include data on cross-section, longitudinal profiles, Wolman pebble counts, and other morphological and habitat features deemed necessary to gauge project effectiveness. Often, to save on monitoring resources, quick and efficient monitoring techniques are used by field teams who will be able to "cruise" a stream and evaluate conditions and collect evidence of change. Before and after pictures, cross-section comparisons, and observation comment charts are used to assess stream conditions. Most problems encountered after the implementation of restoration projects have been shifting rocks, bank scour, deposition of sediments in the channel, and some erosion to channel areas not modified by the project. While most of these incidents are minor, long-term monitoring will be essential to determine how these restoration activities hold up over time.

The County uses the Maryland Biological Stream Survey (MBSS) protocols for biological monitoring. In support of the MBSS, 100 randomly selected sites in the Patapsco/Back River watershed will be monitored in odd years and another 100 in the Gunpowder/Deer Creek watershed will be monitored on even years. Additionally, more specific biological data are being gathered at each stream restoration project in the County and at several high quality reference sites. With this annual report, many more samples are being identified making analysis possible. In 2003, the Patapsco/Back River watershed was monitored and results indicate that 2 sites were good, 22 sites were fair, 55 sites were poor, and 21 sites were very poor. In 2004, the Gunpowder/Deer Creek watershed was monitored and results indicate that 37 sites were good, 27 sites were fair, 27 sites were poor, and 28 sites were very poor. These results will be valuable as baseline conditions for gauging watershed restoration implementation throughout the County.

In summary, Baltimore County has initiated an ambitious monitoring program for supporting watershed restoration plans and prioritizing capital improvement projects. These efforts have been successful and show that the County can administer effective monitoring programs for improving water quality. The County has been gathering monitoring data in the Spring Branch since 1993. No long-term trend analysis of the data from beginning to end has occurred. Additional analysis is warranted for this project because so much is being invested in Baltimore County and across the State to implement stream restoration projects with very little research on their effectiveness.

Management Program

Baltimore County is required to implement a stormwater management program designed to control stormwater discharges to the maximum extent practicable. The County's stormwater

management program encompasses numerous elements including erosion and sediment control, post-construction runoff management, controlling pollutants associated with road maintenance activities, public education and outreach, and illicit discharge detection and elimination. Additionally, in targeted watersheds, Baltimore County is required to implement watershed restoration for 10% of the County's total impervious surface cover. A summary of these program elements is provided below.

Baltimore County's erosion and sediment control program is administered by DEPRM's Inspection and Enforcement Section. In 2004, 180 grading plans were approved for 1,017 acres of earth disturbance. The County conducted 13,050 inspections that resulted in 1,681 enforcement actions last year. Additionally, the County now submits quarterly records of grading permits so that MDE may enforce NPDES construction permits. DEPRM continues to offer erosion and sediment control responsible personnel training classes. In 2004, classes were held on January 13, February 4, and February 24 for a total of 100 participants. The names of participants are kept on a database and submitted to MDE regularly. Baltimore County has a strong erosion and sediment control program that continues to meet all State and NPDES permit requirements.

For post-construction runoff management, Baltimore County is required to maintain a stormwater management program in accordance with State regulations. In 2004, 1,424 plans were reviewed for stormwater management. Of these, 282 were approved, 1,056 were denied, and 86 are still pending. Variances in Baltimore County are only allowed when site conditions make it infeasible to provide stormwater management. A fee-in-lieu and a suitable mitigation site are required when variances are allowed. In 2004, \$689,192 was accepted for fee-in-lieu projects.

In 2004, DEPRM conducted 92 as-built inspections, 78 one year inspections, and 275 three-year maintenance inspections of the 1,458 facilities (538 public and 920 private) within the County. While it is apparent that as-built and one-year inspections are keeping pace with development, three-year maintenance inspections are lacking. Lack of inspections has been noted as a program deficiency for several years. DEPRM has requested and received funding in the County's fiscal year 2006 budget to add three positions for meeting all inspection obligations. MDE commends these efforts by the County so that facilities built for improving water quality can be maintained. Future annual reports should document program progress.

Baltimore County's permit requires that pollutants associated with road maintenance activities be reduced. An integral component of this effort is the Vac-Con program that removed 2,067 cubic yards of material from the County's storm drain system in 2004. This is nearly double the amount cleaned from its system in 2003. Since the program's inception in 1993, more than 23,000 cubic yards of material have been cleared from the County's storm drain system. In 2004, and overall since 1991, the County's street sweeping program removed 1,985 and 43,205 tons of material, respectively. The County is conducting a study with Baltimore City, the Center for Watershed Protection, and the University of Maryland Baltimore County to determine the

amount of pollutants associated with the material removed. Once completed, the results will allow the County to estimate pollutants removed in association with these management programs.

Baltimore County has fully developed and implemented its educational programs for reducing the use of pesticides, herbicides, and fertilizers; controlling stormwater pollutants; and disposing of toxic wastes. The County's primary environmental education focus is pollution prevention. By partnering with existing programs, some of which include Tree-Mendous Maryland, Maryland Green Schools, Maryland Association for Environmental and Outdoor Education (MAEOE), and local Boy Scout and Girl Scout dens, the County is greatly expanding its outreach and effectiveness. Additionally, by working with local environmental groups, providing watershed association action grants, and hosting the State of Our Watersheds conference, Baltimore County is able to channel citizen environmental concern into volunteer action.

Baltimore County's primary outreach presentation package, "Let's be Partners," is multi-faceted and flexible so that its message can be adapted to a variety of educational settings. A shift in the program's focus in 2004 allowed for even greater outreach and expansion. For example, instead of conducting presentations to individuals, an emphasis was made to train teachers and other community leaders, who can then spread the message more efficiently. In 2004, 174 presentations were made to 309,030 participants including school children, homeowners, community groups, watershed coalitions, and businesses. Additionally, 35,320 pieces of literature were distributed in the County covering topics such as cleaning up pet waste, the beneficial use of grass clippings, the proper application of fertilizers, and how to reduce pollutant runoff.

Baltimore County has begun a new program that takes a critical look at grounds keeping activities on high school, college, and institutional campuses. Several projects have been introduced recently to encourage public participation. The Security Boulevard/Woodlawn High School initiative encourages students to participate in designing a landscaping plan for a bioretention facility recently constructed by DEPRM on high school property. The Jones Falls Institutional Stewardship program is targeting numerous school and institution campuses, which make up as much as 20% of the Jones Falls watershed, for environmental enhancement work. Some of the practices being recommended include native plant landscaping, integrated pest management, and removing excess impervious surfaces.

Baltimore County keeps its citizens well informed regarding recycling through an internet web page, electronic newsletter, cable television broadcasts, and lobby displays. Solid waste recycled in the County has increased from 120,200 tons in 1991 to more than 450,000 tons in 2004. Household hazardous waste recycled has gone from 108,859 gallons in 1999 to more than 138,000 in 2004. The amount of recycled solid and hazardous waste material continues to increase annually by 10% to 20%. The County is commended for its promotion of effective environmental education and recycling programs.

Baltimore County continues to keep statistics on fertilizer, pesticide, and deicing material use for managing public golf courses, roads, utilities, colleges, and park lands. As expected, the greatest use of fertilizers and pesticides in the County is for the maintenance of golf courses. Other large contributors include the County's Recreation and Parks division, schools, and the Bureau of Highways. Virtually all of the County's deicing material was used by the Bureau of Highways for clearing roads during winter storms. The establishment of an NPDES stormwater committee of County property administrators supports the ongoing efforts to reduce these chemicals. These efforts are in compliance with NPDES permit requirements.

Baltimore County has developed an illicit connection detection program that prioritizes major stormwater outfalls for screening based on prior results and citizen complaints. In 2004, Baltimore County inspected 155 outfalls with chemical test kits. Visual and olfactory assessments were performed as well. For the 155 outfalls screened, 299 problems were observed. Of these, 37 were discovered as a result of chemical testing and 262 problems were identified through visual observation and consisted of structural failures, sedimentation, and trash.

Baltimore County DEPRM works closely with the Health Department in responding to possible illicit connection complaints. Tips received from citizens followed by a prompt response from County staff proves to be more effective in discovering illicit connections than random outfall screening. In 2004, approximately 435 complaints were investigated as possible illicit connections. A majority of these revealed sewage problems, both from sanitary sewers and failed septic systems. Other common problems included discharges associated with automotive care and industrial discharges. DEPRM and the County Health Department share resources, data, and procedures for the investigation of problems, which has resulted in a commendable 82% resolution rate.

Comprehensive management plans are now complete for the Bird River, Back River, Jones Falls, Loch Raven, Lower Gunpowder Falls, Patapsco River, Middle River, Baltimore Harbor, Little Gunpowder Falls, and the Gwynns Falls watershed. The County's four remaining watersheds do not require management plans due to predominantly rural land use. Each watershed plan is developed using a similar framework. This framework includes stormwater modeling, stream stability assessments, identification and ranking of water quality problems, development of management strategies, and the prioritization of projects for action.

The implementation of watershed management plans is summarized in Baltimore County's annual report. For each watershed management plan a tally of "Completed Projects," "Projects Under Design," and "Proposed Projects" are recorded with other important information such as facility type, drainage area, cost, date of completion, and annual pollutant removal rates. These spreadsheets are a convenient way to keep track of how Baltimore County is meeting its 10% impervious cover restoration requirements.

Analysis indicates that 3,100 acres of imperviousness needs to be restored to meet NPDES permit obligations. The County has been aggressive in pursuing BMP retrofits and stream restoration projects that have provided control for 2,465 acres of impervious surfaces. Projects in progress and planned for the future will control the remaining acreage of the County's imperviousness required for restoration. Implementing restoration work takes years of planning, financial support, and follow-through. Baltimore County is commended for its commitment to meeting these goals and significantly improving water quality for the citizens of Baltimore County and Maryland.

Under its reissued NPDES stormwater permit, Baltimore County is required to propose and begin implementing restoration activities for an additional 10% of its impervious surfaces. While capital improvement projects will continue to be used to meet this goal, non-structural BMPs, which are currently not being accounted for, are being proposed as well to attain restoration goals. Examples include operational programs like street sweeping, storm drain cleaning, and stream side tree plantings. Reasonable conversion formulas will need to be developed for non-traditional BMPs. Fortunately, the County is monitoring these softer approaches. Once pollutant reductions associated with these management practices are better known, comparison with traditional BMP data will help in developing appropriate quantification.

In summary, Baltimore County continues to implement effective County-wide stormwater management programs and targeted watershed restoration efforts to meet NPDES requirements. Of particular quality are the County's watershed assessment reports, restoration projects, and comprehensive environmental outreach programs. While the County's BMP inspection and maintenance program has lacked the same sense of priority in recent years, DEPRM is hiring 3 new staff to inspect and enforce maintenance requirements. This is strong evidence that the County is committed to improving this program element.

Assessment of Controls

Baltimore County continues to gather monitoring data and refine pollutant load estimates and reductions associated with stormwater management strategies. Where sufficient monitoring data exist for stormwater BMP facilities and capital improvement projects, the County has estimated pollutant loads. Using monitoring data estimates and GIS map delineations, mass pollutant loading amounts have been developed. Most watersheds show nutrients being reduced by 1 to 5%, metals from 5 to 10%, and sediments from 10 to 35%. These estimates are conservative because some reductions are not counted. For example, no nutrient reductions were attributed to street sweeping and storm drain cleaning. Currently, the County and Baltimore City are working on a study to determine these values. Also, no credit has been given for eliminating illicit connections nor from the influence of education and outreach to citizens.

Program Funding

Baltimore County's fiscal analysis is succinct and satisfies NPDES permit conditions. The

annual operating budget for NPDES programs will grow from \$5,866,159 in 2005 to a projected \$7,422,139 in 2011. Several new positions have been added to increase stormwater management BMP inspections, plan review, pollution prevention activities, and provide GIS support which account for growth in the operational budget. Baltimore County's capital budget is allotted in two year cycles and \$15,565,000 is budgeted for 2005, \$10,195,000 for 2006 and 2007, \$8,885,000 for 2008 and 2009, and \$9,385,000 for 2010 and 2011. Future budget years do not necessarily account for grants and loans the County may receive for capital projects, so final budget numbers are likely be greater than listed.

Summary

Baltimore County continues to implement successful capital and County-wide programs for reducing stormwater pollutants in accordance with NPDES requirements. By bringing together numerous components such as pollutant source identification, monitoring, and watershed assessments, the County has established a sound framework for the successful implementation of stormwater management programs and capital improvement projects. These activities fulfill Baltimore County's NPDES municipal separate storm sewer system permit obligations.