

Program Evaluation Report

City of Phoenix, Storm Water Management Program (NPDES Permit No. AZS000003)

Executive Summary

Tetra Tech, Inc., with oversight from EPA Region 9 and the Arizona Department of Environmental Quality, conducted an evaluation of the City of Phoenix's Storm Water Management Program (SWMP) on October 2-4, 2001. The program evaluation team evaluated the city's compliance with the NPDES permit requirements and verified implementation of the 36 storm water pollution control measures, or best management practices (BMPs), listed in the city's program manual.

This program evaluation report identifies program deficiencies and positive attributes only. This report is not a formal finding of violation. Program deficiencies may, in some cases, represent permit violations. No specific permit violations were clearly identified. The program deficiencies identified are areas of significant concern for successful program implementation. Positive attributes are indications of the city's overall progress in implementing a multifaceted program to address storm water discharges.

The following program deficiencies were identified:

- SWMP (and permit) do not include measurable elements to quantify and track progress.
- Storm Water Section lacks resources to meet permit requirements in a timely manner.
- Lack of BMPs for routine and emergency road and infrastructure projects.
- Failure to file a Notice Of Intent (NOI) for the 19th Avenue road project (101 Loop to Deer Valley).
- Lack of ongoing maintenance of erosion and sediment controls at construction sites.
- City inspectors' lack of knowledge of EPA's storm water general permit conditions.
- Failure to eliminate illicit discharges in a timely manner.
- Lack of criteria by which to determine whether "conditional" non-storm water discharges are sources of pollutants.
- Lack of cost-recovery mechanism for non-storm water releases to the storm drain system.
- Limited interdepartmental coordination.
- Public survey results showing decreasing storm water awareness.
- Limited monitoring data.

Several elements of the city's program were particularly notable:

- Separate Storm Water Section dedicated to NPDES permit compliance.
- Targeted public education materials.
- Development Services Department's permit database (KEVA system).
- Environmental indicators that could be used to evaluate the effectiveness of the program.
- Well-organized and clear annual reports.

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1.0 Introduction

1.1 Purpose of Program Evaluation

The primary goal of the evaluation was to determine the city of Phoenix's overall success in meeting the conditions and requirements contained in NPDES Permit No. AZS000003. Secondary goals included the following:

- Identify and document effective elements of existing Phase I programs that could benefit other Phase I and Phase II municipalities;
- Determine how the city measures the effectiveness of individual program elements;
- Acquire data to assist in reissuing the permit;
- Identify methods to improve the cost accounting and the report preparation and submittal aspects of municipal programs; and
- Review the overall effectiveness of the city's program.

40 CFR 122.41(i) and Part II.9 of the city's NPDES permit provide the authority to conduct the program evaluation.

1.2 Permit History

EPA NPDES Permit No. AZS000003 was issued on February 14, 1997, with an effective date of March 19, 1997. The permit will expire on March 19, 2002. This is the first NPDES permit issued to the City of Phoenix under the storm water Phase I regulations. The city submitted an application package for NPDES permit renewal to EPA Region 9 on September 14, 2001.

1.3 Logistics and Evaluation Preparation

Before initiating the on-site evaluation, Tetra Tech, Inc., conducted a review of available program materials. The goals for the file review were (1) to gain greater knowledge of the existing program, permit requirements, and past activities, and (2) to prepare for on-site activities. The following materials were reviewed:

- Original Part 2 NPDES application;
- NPDES Permit No. AZS000003;
- City of Phoenix Storm Water Management Program (SWMP) dated Sept. 30, 1996;
- Annual report for the year ending June 30, 2000;
- City web sites;
- EPA Region 9 file correspondence with the city; and
- September 2001 NPDES permit renewal application package.

The authority, scope, and schedule for the evaluation were communicated to the city by written notice on September 13, 2001. On October 2-4, 2001, Tetra Tech, Inc., with oversight from EPA Region 9 and the Arizona Department of Environmental Quality (ADEQ), conducted the evaluation of the City of Phoenix's Storm Water Management Program. The program evaluation schedule was as follows:

Tuesday, October 2	Wednesday, October 3	Thursday, October 4
Kickoff Program Management, Legal Authority, Institutional Arrangements Monitoring, Indicators, Annual Reports, Fiscal Resources.	New Development and Redevelopment, Construction, Public Information.	Public Agency Activities, Industrial Site Visits, Illicit Connections, Illicit Discharges.

The program evaluation was performed by two teams. One team reviewed permit requirements and the city’s progress in meeting those requirements. The other team conducted field reviews of the programs used to implement the 36 BMPs contained in the city’s program manual. More than 25 persons representing five city departments were interviewed as part of the evaluation.

Upon completion of the on-site and field reviews, the evaluation team held an exit interview with city representatives to discuss preliminary findings. As indicated during the exit interview, the findings were to be considered preliminary pending further review by EPA and ADEQ.

1.4 Program Areas Evaluated

The following program areas were evaluated as part of the evaluation:

- Program management;
- Public information/participation;
- Municipal maintenance activities;
- New development and redevelopment;
- Construction;
- Industrial/commercial facilities;
- Illicit discharges and improper disposal;
- Program evaluation; and
- Monitoring and reporting.

1.5 Program Areas Not Evaluated

The following program areas were not evaluated in detail as part of the evaluation:

- Monitoring program details (e.g., sample location, types, frequency, parameters, etc.);
- Monitoring reports (e.g., analytical methods, QA/QC or interpretations);
- Statistical basis and meteorological data for representative storm event determinations;
- Legal authority. (EPA had reviewed the legal authority when the permit was initially issued);

- NPDES permit renewal package submitted by the city to EPA Region 9 on September 14, 2001;
- Practices of the Water Department and the Department of Personal Safety (because of time constraints). The Water Department conducts water and sanitary sewer line installations and repairs and operates the city's wastewater treatment plants. The Personal Safety Department responds to spill events and other accidents that could introduce pollutants into the storm drain system; and
- The city's inspection reports, plan review reports, and other files. The evaluation team did not conduct a detailed file review to verify that programs were being implemented as described. Rather, observations by the evaluation team and statements from city representatives were used to formulate an assessment of each program element. A detailed post- evaluation file review may be included in a subsequent program evaluation.

1.6 Program Areas for Additional Review

The evaluation team recommends the following areas for additional review:

- A review of the statistical basis and analyses of past meteorological data for representative storm events to determine independently the number of qualifying representative storm events in the past 5 years and determine whether the city's current definition of a qualifying storm event is consistent with this independent analysis;
- An in-depth review of the monitoring program, monitoring results, identification of pollutants of concern, and the city's current and future plans for addressing identified pollutants of concern;
- A review of collected screening data for dry-weather flows and the city's prioritization of outfalls for dry-weather flow elimination;
- A more in-depth assessment of the maintenance of erosion and sediment controls at representative construction sites to determine whether the evaluation findings are typical or atypical;
- A comparison of applicable business listings with the city's planned inspection schedule for industrial and commercial facilities; and
- A review of the Water and Personal Safety Departments' operational practices related to storm water controls. These departments were not included in this evaluation, and their practices might have direct impacts on storm water quality.

2.0 Evaluation of Specific Program Elements

Each of the program areas reviewed during the evaluation is discussed in the sections that follow.

This program evaluation report identifies program deficiencies and positive attributes only. This report is not a formal finding of violation. Program deficiencies may, in some cases, represent

permit violations. No specific permit violations were clearly identified. Program deficiencies are areas of concern that could significantly affect program effectiveness. Positive attributes are indications of the city's overall progress in implementing a multifaceted program to address storm water discharges. The evaluation team identified only positive attributes that were innovative (i.e., beyond minimum requirements).

As indicated in Section 1.0, the evaluation team did not evaluate all components of the city's program. Therefore, the city should not consider the enclosed list of program deficiencies, or the program evaluation report itself, as a comprehensive evaluation of individual program elements.

2.1 Evaluation of Program Management Element

Program Deficiency: Lack of Measurable Elements in SWMP and Permit

The SWMP (and the NPDES permit) do not contain measurable elements necessary to quantify and track progress. Two specific examples observed during the evaluation include the inspections of industrial facilities and the inspections of storm drains for illicit discharges. For example, the city inspects industrial facilities to ensure compliance with the city's Chapter 32C storm water ordinance and currently conducts an average of only two industrial inspections per week. Based on the city's assumption that about 5,000 industrial/commercial facilities are located within the city limits, at the current pace it would take 50 years to visit all facilities. The city should set specific annual goals for industrial inspections such that all facilities will be inspected within a reasonable time frame (e.g., 5 years). While the city also has a program to periodically inspect and sample storm drains for illicit discharges, no time frame has been established for elimination of the more than 60 discharges that have been identified to date. In addition, placement of Pollution Awareness Markers (PAMs) has occurred at a very slow pace (when time allows). The lack of such goals and related schedules is preventing the city from implementing important program elements in a timely manner.

Program Deficiency: Storm Water Section, Lack of Resources

The Storm Water Section of the Engineering and Architectural Services Department is the city department responsible for implementing many of the permit requirements and BMPs. Although Section staff are knowledgeable and dedicated, they lack the personnel and other resources necessary to effectively meet all permit elements in a timely manner. Specific deficiencies were noted in the implementation of programs to identify and eliminate dry weather flows, place PAMs on catch basins, inspect all prioritized industrial/commercial facilities in the city within a reasonable time frame, and public education efforts (see examples cited in the finding above).

Positive Attribute: Street Transportation Department's Storm Water Section

The Storm Water Section, consisting of seven staff, was created in response to the NPDES permit requirements. The Section's sole responsibility is to ensure compliance with specific permit requirements. Having a dedicated Storm Water Section is unique among municipal storm water programs, which tend to integrate storm water programs into existing departments with other responsibilities. Specific benefits of this organizational structure include the following:

- *Dedicated responsibilities.* The Section centralizes many of the program responsibilities under one city department. The responsibilities of the staff include industrial inspection,

illicit discharge detection and elimination, dry-weather discharge monitoring, and public education and outreach. The Section also manages the storm water hotline, which allows the public to report illicit dumping to storm drains and obtain information on the city's storm water management program.

- *Staff capabilities and training.* The staff rotate through different job responsibilities every 3 months to ensure they are cross-trained in all aspects of storm water management. Most of the staff previously worked in the city's Industrial Pretreatment Program and are therefore familiar with conducting industrial inspections and protecting water quality.
- *Financial Accounting and Reporting.* Financial budgeting and reporting are streamlined because the Section's budget is represented as a single line item.

2.2 Evaluation of Public Information/Participation Program Element

Positive Attribute: Targeted Public Education Materials

The Storm Water Section has developed a wide variety of public education materials regarding storm water management. One targeted set of materials is a series of activity books for schoolchildren featuring Storm Drain Dan, a storm drain mascot designed to help children identify sources of pollution. The activity books are produced in both English and Spanish.

The Storm Water Section has also modified its public education program in response to a biannual survey of the public's knowledge of storm water protection. As an example, a storm water advertisement was played at local movie theaters specifically targeting young adult and teenage audiences. The survey indicated that these audiences had not been effectively addressed by previous outreach programs.

2.3 Evaluation of Municipal Maintenance Activities Program Element

Program Deficiency: Lack of BMPs for Routine and Emergency Projects

The city has not developed BMPs to minimize pollutant loadings to storm drains from both routine and emergency road and infrastructure maintenance projects. According to city representatives, wastewaters from street washing following minor construction projects, saw cutting cleanups, and periodic trench pump-outs are often discharged directly to the storm drain system. The city needs to identify applicable maintenance activities and then develop and implement standardized BMPs for field crews that minimize pollutant discharges. Field crews need to be trained in the application of these BMPs.

2.4 Evaluation of New Development and Redevelopment Program Element

Positive Attribute: Development Services Permit Database (KEVA system)

The Development Services Department has developed a database system (KEVA) to track reviews of plans, permits, and inspections of development and construction projects. The KEVA system is available to the public on the city's web site and allows developers, homeowners, and the public to track the progress of local building projects. Comments from plan reviewers, as

well as inspector's notes, are available for viewing on-line. While the city acknowledges that the user interface of the web site could be improved, the city generally views the system as a successful and efficient method for systematically providing information to interested parties. This information includes documentation that proper storm water management and control practices are being used.

2.5 Evaluation of Construction Program Element

Program Deficiency: Failure to File an NOI for a Public Construction Project

The evaluation team's in-field review determined that the city had failed to submit a Notice of Intent under the EPA NPDES General Construction Permit for its road construction project along 19th Avenue from the 101 Loop to Deer Valley Street. City representatives indicated that before initiating public construction projects, the applicable city department and its contractor(s) review the job specifications and complete a pre-job checklist to ensure that appropriate storm water controls are in place and applicable permits are obtained. However, both the city construction inspector and the contractor (Blucor Contracting) indicated that the NOI filing was inadvertently missed during the pre-job checklist/review. Both representatives assured the evaluation team that there was a Storm Water Pollution Prevention Plan (SWPPP) for the site and that BMPs were being implemented per the SWPPP's requirements. Although the evaluation team observed BMPs being implemented, the SWPPP was apparently at the contractor's offices and not available for on-site review.

The city needs to evaluate the effectiveness and implementation of the pre-job checklist to ensure that NOIs are filed for all applicable projects. Procedures need be established to verify that an NOI has been filed before earthwork activities begin. Additionally, for all construction projects, SWPPPs need to be maintained at job sites so that on-site workers are familiar with prescribed BMPs.

Program Deficiency: Lack of Ongoing Maintenance of Erosion and Sediment Controls

While on-site observations at nine municipal construction sites indicated that some form of erosion and sediment controls had been installed at all sites, ongoing maintenance of these controls was lacking. Examples include the following: (1) two unprotected culverts leading directly to Skunk Wash at the Tramonto development site; (2) fallen silt fencing at Anthem Commerce Park; and (3) poorly maintained and inadequately sized stabilized construction entrances at most sites.

In addition, some of the controls routinely listed in the applicable Storm Water Management Plans (SWMPs), such as concrete washout areas and truck wash-down areas, were not being implemented at individual construction sites. The city does not mandate that controls be implemented exactly per the SWMPs. City representatives indicated that the SWMPs are "working documents" and the developer may modify the control requirements without the city's review and additional approval.

The city needs to review its procedures for reviewing and enforcing the adequacy of erosion and sediment controls. Developers should be accountable for implementing and maintaining the controls listed in the SWMPs and SWPPPs and/or demonstrating that alternative controls provide

comparable storm water management. City construction inspectors need to more aggressively document the implementation and effectiveness of such controls.

2.6 Evaluation of Industrial/Commercial Facilities Program Element

Program Deficiency: Lack of Knowledge of EPA Storm Water General Permit Conditions

Appendix 1.I.b) and c) of the city's NPDES permit requires the city to report noncompliance to ADEQ and EPA when the city observes significant deficiencies (based on the city's judgment) in SWPPPs or their implementation at specific sites. To make such determinations, city inspectors must fully understand the conditions of EPA's industrial and construction storm water general permits. Observations made throughout the evaluation and discussions with city construction and industrial inspectors indicated that city personnel currently lack an adequate understanding of the permit requirements.

Both construction and industrial inspectors need to be trained on the requirements of the respective EPA storm water permit conditions, including applicability and SWPPP requirements. City inspectors specifically need to be knowledgeable of new provisions related to no exposure determinations for industrial sites. This is important for light industrial facilities that will now be required either to obtain permit coverage or to provide a no exposure certification. Additional confusion relates to the city's requirement that developers/owners prepare a "Storm Water Management Plan," which is not equivalent to EPA's requirement to develop a "SWPPP" for construction and industrial sites. Some permittees incorrectly assume that the SWMP fulfills both the city's and EPA's requirements. The city needs to be proactive in informing permittees of the separate requirements of each program and of evaluating compliance with all requirements.

2.7 Evaluation of Illicit Discharges and Improper Disposal Program Element

Program Deficiency: Failure to Eliminate Illicit Discharges

Appendix 1.I.a) of the NPDES permit requires the city to implement an ongoing program to reevaluate major outfalls for illicit discharges and to "eliminate illicit discharges which are located." The permit requires each major outfall to be screened at least once during the 5-year term of the permit, with at least 20 percent of the outfalls screened each year.

Of the approximately 260 major outfalls identified in the storm drain system, city representatives indicated that about 60 of these major outfalls have dry-weather discharges and that fewer than five had been eliminated since permit issuance. The Storm Water Section inspects these discharges on a periodic basis, records visual observations, and collects and analyzes discharge samples to determine the presence of pollutants. Discharge volumes range from very low flows to more than 1 million gallons per day. The source(s) of the flows have yet to be identified, although the city suggested that one source might be interconnections with freshwater canals.

The city does not have a schedule for eliminating illicit discharges and indicated that efforts to eliminate discharges is significantly hampered by surveillance equipment that is frequently out of service, outdated storm sewer maps, and an insufficient number of field staff.

The information provided in the annual report is incomplete in that it does not document the specific occurrence of dry-weather flows or the city's progress in eliminating them. The city needs to establish criteria by which to identify, characterize, and prioritize dry weather discharges; determine the source(s); and develop a schedule for their timely elimination. Progress toward meeting these goals should be included in annual reports.

Program Deficiency: Lack of Criteria for “Conditional” Non-Storm Water Discharges

The NPDES permit requires the city to prohibit non-storm water discharges into the storm drain system. While the permit allows certain “conditional” non-storm water discharges, these discharges must be prohibited when “the permittee determines that the discharges are a source of pollutants.” The city has not yet developed criteria by which to determine when “conditional” discharges are sources of pollutants. Firefighting wash water, irrigation return water, canal water, and street wash water have historically been discharged to the storm drain system by the city and others. The city needs to develop and implement criteria to determine when such conditional discharges are sources of pollutants (and should be prohibited). The city should also identify BMPs to minimize pollutant loadings.

Program Deficiency: Lack of Cost-Recovery Mechanism for Releases to the Storm Drain System

While not a permit requirement, the city could benefit by developing a cost-recovery mechanism to collect fees for damages caused by illegal discharges (non-storm water, spills, etc.) to the storm drain system or receiving waters. The city often incurs the costs for response to, assessment of, and potential repair and/or remediation of such discharges and their impacts. Other cities have developed cost-recovery mechanisms and have emergency response funds available to cover initial costs until monies can be recovered from the responsible parties. Such funds allow for comprehensive responses with minimal concern for short-term expenditures. The city should consider implementing similar cost-recovery mechanisms.

2.8 Evaluation of City's Program Assessment Element

Program Deficiency: Limited Interdepartmental Coordination

The NPDES Section has overall responsibility for citywide program coordination. However, there is no structured or regular communication between the NPDES Section and other city departments also responsible for implementing the SWMP requirements. In addition, although significant effort has been expended to develop pollutant loading estimates for the annual reports, it does not appear that these data are being used to assess overall BMP performance and modify program elements or BMPs, where appropriate.

The NPDES Section should more proactively manage the program by periodically meeting and communicating with other city departments, evaluating and refining storm water program components and BMPs, and suggesting program modifications where appropriate. The NPDES Section should use the indicators described in Section 2.9 (or other quantitative measures) to evaluate the overall success of the program.

Program Deficiency: Decreasing Public Awareness

The city has been conducting surveys of public awareness of storm water pollution since 1995. These surveys collect valuable information that allows the Storm Water Section staff to target public outreach efforts. However, recent results of the city's biannual public survey are not encouraging. In the latest survey, consistent with previous surveys, three-quarters of the responding residents did not know where storm water goes. In addition, only 14 percent of residents reported recycling of household chemicals, automotive fluids, and lawn and garden chemicals while 24 percent reported improper disposal in the garbage. Storm water awareness among the public has generally remained the same or decreased since 1995. The city needs to investigate the causes of these survey results and, where appropriate, modify or increase the scope of its public outreach programs.

Positive Attribute: Environmental Indicators Program

The city has developed a set of indicators to evaluate the effectiveness of its storm water management program. They are based on a 1996 Center for Watershed Protection's report titled *Environmental Indicators to Assess Storm Water Control Programs and Practices*. The indicators used by the city include:

- Programmatic indicators
 - Identifying and correcting illicit connections
 - Installing, inspecting, and maintaining BMPs
 - Monitoring, permitting, and compliance
- Social indicators
 - Study of what residents know about storm drains and pollution
 - Awareness of where storm water goes
 - Seriousness of storm drain pollution problem
 - Knowledge of contributors to storm drain problem
 - Personal methods of waste disposal
 - Reporting illegal dumping
 - Waste disposal information sources
- Water quality indicators
 - Annual pollutant loads and concentrations

These indicators represent a good start at a method to track progress. The city is measuring the indicators annually to demonstrate trends in the program. The results should then be used by the city to consider program modifications, where appropriate.

2.9 Evaluation of Monitoring and Reporting Program Element

Program Deficiency: Limited Monitoring Data

The city of Phoenix receives a mean annual precipitation of approximately 7 inches. With this limited amount of rainfall, there are very few opportunities to collect meaningful storm event samples. Therefore, it is difficult to determine whether the city is complying with the permit requirement to ensure "timely compliance with applicable water quality standards." The city has further limited their opportunities for collecting storm event samples by narrowly defining representative storm events. As a result samples were obtained for only two representative

events during the past 2 years. The two samples were collected from different sampling locations during the same storm event. The city, under an agreement with the Flood Control District of Maricopa County, actively maintains seven outfall-monitoring stations, but most of these stations have yet to be used.

Although the arid climate contributes to the lack of monitoring data, the city's definition of a representative storm event is also a factor. The city has proposed in its 2001 Annual Report to modify the definition of a representative storm event to increase the number of storm water sampling events. This change is strongly encouraged; however, an independent statistical analysis should be conducted to determine whether the city's new definition of a representative storm event is consistent with definitions of other Phase I permittees.

Positive Attribute: Annual Report Organization

Permit section I.C requires the submission of an annual report by September 30 of each year. The permit requires that the annual report include the implementation status of SWMP components, an assessment of BMP effectiveness, data limitations, proposed SWMP changes, and annual expenditures.

The city's current annual report segregates the required information into monitoring locations, outfall-specific monitoring data, pollutant loading estimates, assessment of program impacts, proposed changes, status of implementing individual program components, summary of enforcement actions, public education programs, and annual expenditures. Additionally, many of the BMP assessments provide comparative data for the past two fiscal years. Overall, the report format is well organized, making the report easy to read and making it easy to find specific information.