ABSTRACT

The Water Environment Federation (WEF), under a Water Quality Cooperative Agreement with the U.S. Environmental Protection Agency, is developing a WEF guidance document focused on effective practices for managing peak wet weather flows at municipal wastewater treatment facilities. The guidance document is intended to address several wastewater industry informational deficiencies about wet weather and related technological solutions. The Guidance Practices section of the document provides a clear and common understanding of what may constitute “generally accepted practices” and long-term criteria. The section presents protocols for selecting wet weather management practices from the universe of available traditional and evolving technologies. The practices are organized by process Planning, Managing, and Operating and Maintaining. The guidance presents principles and examples applying the principals to select practices appropriate to specific wet weather management cases.

KEYWORDS

Wet weather, conveyance, treatment, practices, performance, CSO, SSO, LTCP, CMOM

INTRODUCTION

The Water Environment Federation (WEF), under a Water Quality Cooperative Agreement with the U.S. Environmental Protection Agency, is developing a WEF guidance document focused on effective practices for managing peak wet weather flows at municipal wastewater treatment facilities. The wastewater industry has long been researching, documenting, and planning for wet weather flows for municipal wastewater collection and treatment facilities. Available literature on relevant topics has multiplied since promulgation of the federal CSO Control Policy and the commissioning of the urban wet weather advisory structure under the Federal Advisory Committee Act (Urban Wet Weather FACA). With this document, WEF documents the state-of-practice with respect to wastewater conveyance and treatment system planning, design, construction, and operation for peak wet weather flows.

The guidance document is intended to address several wastewater industry informational deficiencies about wet weather and related technological solutions. It will provide methods for utilities to become proactive in moving forward in planning for wet weather flows and to be a resource that would encourage the pursuit of a process or technology that might have been previously shunned.
Guidance Organization

The guidance is presented in three sections: Introduction, Guiding Principles for Wet Weather Management, and Guidance Practices. The Introduction presents background information, the purpose of the guidance, this description of the outline, and a glossary of terms and a table of acronyms and abbreviations used throughout the guidance. The Guiding Principles section includes a description of a Wet Weather Management Framework, Performance Objectives Based on Risk, and Principles of Wet Weather Management. The final section, Guidance Practices, describes generally accepted practices and long-term design criteria that were compiled by gathering information from wet weather management practitioners. Guidance Practices are organized by planning, managing, and operating and maintaining, all key components of overall management activities.

Methodology

The guidance was developed by gathering information from wet weather practitioners to compile documented collection and treatment practices, experiences, and requirements for managing wet weather flows. WEF gathered information from its membership and others in the form of a resource template that compiled practices that have shown a proven success in addressing wet weather issues. The practices were defined as implemented activities or programs that directly or indirectly lead to sewer overflow reductions or that have increased wet weather flows through conveyance or treatment systems. Practices were also compiled that include activities that would support wet weather management under a CMOM program. Workshops and interviews gathered additional information, feedback, and comments on document drafts. The wet weather management practices were compiled into a comprehensive annotated bibliography, from which the guidance was then constructed.

Guidance Practices

The Guidance Practices provides a clear and common understanding of what may constitute “generally accepted practices.” The Guidance Practices section presents protocols for selecting wet weather management practices from the universe of available traditional and evolving technologies. To maintain consistency with how information was gathered, the practices are organized with a particular hierarchy: by process (Planning, Managing, and Operating and Maintaining), then by System (Conveyance and Treatment separately or comprehensively together), then by protocol step. For each protocol step, the guidance presents principles and examples applying the principals to select practices appropriate to specific wet weather management cases.

Planning

Planning is the prologue to the endeavor of achieving stated organizational goals or those imposed by some other authority. To be successful, planning should be achieved efficiently and in a logical order. Without planning, the expended work will fall short of or entirely miss the stated goals. Adhering to a good planning process minimizes the amount of rework required to ultimately achieve the stated goals.
Planning, in the context of wet weather, focuses on several important process steps that in the past were shunned or not understood. The process steps involve:

- Integrating conveyance and treatment in terms of flow interdependence and cost effective alternatives analysis;
- Involving staff across work units and stakeholders outside the utility in the planning process; and,
- Selecting alternatives that have considered and represent the level of risk the utility and community is willing to accept once the work is completed and implemented.

Many of the planning practices contributed by wastewater industry representatives for the guidance highlight the importance of incorporating advances in technology and management tools to help solve complex problems. For instance, hydraulic modeling and performance measurement processes help build decision confidence.

The guidance document has divided the planning process into three minor processes, which are:

- Characterizing the current situation;
- Determining future needs; and,
- Appraising the possible methods or approaches to meet and support these needs.

The identified practices reveal that the planning process is also a matter of educating, informing, and negotiating among stakeholders, and discussing technically achievable solutions and their financial and performance consequences. Often what appears to be the most technically and financially attractive solution is not immediately recognized or even selected in a final plan.

Good planning practices for wet weather will bring together affected stakeholders to determine how they want to prioritize their limited resources among levels of service, the environment, and public health concerns. These concerns vary from community to community and from system to system. The guidance helps stakeholders be aware of how others have approached the planning process and evaluated the particular challenges that wet weather presents.

**Managing**

Management practices typically umbrellas all utility organizational units and processes. However, the guidance document also focuses on “minor processes” of design, construction, and fiscal management. The “minor processes” are very broad but descriptions of the practices are limited to those that relate to managing the issues that arise or evolve around wet weather conditions and activities, particularly wet weather flow issues.

Clearly defined goals enable the development of objectives that result in facility sizing, operational standards, and performance targets that meet the established goals. However, clear planning and implementation goals do not mean management can successfully achieve them. For instance, even with a comprehensive plan and representative goals, management must have proper organizational leadership and funding support to implement the work. Management must be able to anticipate problems, identify the risks, and implement preventive and/or reactive responses to emergencies or system failures linked to wet weather events.
The Management practices present what lessons have been learned in the industry that accomplishes a utility’s performance objectives.

**Operating and Maintaining**

The importance of properly operating and maintaining wastewater systems to prevent or minimize overflows and sewer backups has been recognized in permits, regulatory practice, and guidance. Most dry weather overflows and a significant number of wet weather overflows can be avoided by effective system operation and maintenance (O&M). Formal or informal “self audits” using CMOM is an effective means of documenting current system conditions, O&M practices, and identifying gaps where improvements in system operation can be made. Operating and Maintaining practices are organized into two primary processes: monitoring and reporting, and performance assurance.

Monitoring and reporting requirements for specific wet weather conditions are now included in most permits and enforcement actions. Requirements may be site- and parameter-specific, appearing inconsistent but presumably adapted to the conditions and concerns appropriate for the individual systems. Since all CSOs may be permitted discharges, while regulatory treatment of SSOs varies, there are differences in how CSOs and SSOs are reported. POTWs must meet monitoring and reporting requirements in their permits and should evaluate the feasibility and cost of additional monitoring if needed to improve system performance. The guidance describes practices that assure that consistent and reliable data on overflows and related performance factors can be obtained.

Even if not required by a permit, special attention must be given to operating and maintaining equipment and standard operating procedures to assure optimum performance in wet weather flow conditions when some or all of the conveyance system and treatment plant may be stressed by high flows. Documentation of wet weather O&M performance assurance methods is becoming a standard requirement through CMOM and other regulatory requirements. The guidance describes O&M practices that assure optimum performance and beneficial documentation.

The O&M practices described in guidance also highlight federal, state, and non-government organization documents that provide guidance on effective O&M components, as well as practices that are implementable and beneficial for accomplishing a utility’s performance objectives.