Draft Guidance on Preparing a Utility Analysis

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United States
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Acronyms and Abbreviations

BOD .... biochemical oxygen demand

CEPT .... chemically enhanced primary treatment

CFR .... *Code of Federal Regulations*

CMOM....................... capacity, management, operations and maintenance

CSO........................... combined sewer overflows

EPA .... U.S. Environmental Protection Agency

I/I .... infiltration and inflow

IFAS .... integrated fixed-film activated sludge

LTCP.......................... long-term control plan

MBBR........................ moving bed biofilm reactors

MBR.......................... membrane bioreactor

MLSS......................... mixed liquor suspended solids

NPDES....................... National Pollutant Discharge Elimination System

POTW .... publicly owned treatment works

RAS .... return activated sludge

SRF............................ State Revolving Fund

SSES .... Sanitary Sewer Evaluation Survey

SSO .... sanitary sewer overflow

TSS............................ total suspended solids

Contents

I. Introduction

The purpose of this document is to provide guidance to permittees that are identifying and evaluating feasible alternatives to peak wet-weather diversions at a treatment plant. This document considers the development of a comprehensive Utility Analysis of feasible alternatives to the diversions that may be submitted to the NPDES authority.

While EPA does not intend that all Utility Analysis be formatted in a certain way or contain the same information or analysis, the Agency believes that the common components of a comprehensive Utility Analysis can be identified. This document is organized to reflect the following components of a Utility Analysis:

- Description of existing treatment plant and collection system.
- Characterization of existing flows
- Projected future flows
- Indentifying and Evaluating Potential Measures to Reduce Diversions
- Ability to Pay / Financial Capability Assessment
- Summary of Public Participation
- Selection of Recommended Measures for Implementation
- Proposed Monitoring Protocol
- Proposed Plan for Public Notice of Diversion

Appendix A is a completeness checklist that is intended to complement the guidance and support permit writers in evaluating the completeness and comprehensiveness of a Utility Analysis. The goal of the checklist is to assist permit writers in efforts to assess and document whether the permit and administrative record provides a complete, comprehensive and transparent record of permit development.

a. Background

Many municipal sewage treatment plant experience high peak influent flows during significant wet-weather events that exceed the treatment capacity of existing secondary treatment units. In such situations, wet-weather flows are sometimes diverted around secondary treatment units. The diverted flows are then either discharged directly to receiving waters or recombined with the flows from the secondary treatment units before discharge. The U.S. Environmental Protection Agency (EPA) interprets existing regulations, specifically, the *bypass* regulation at Title 40 of the *Code of Federal Regulations* (CFR) section 122.41(m), to apply in both circumstances.

EPA's National Pollutant Discharge Elimination System (NPDES) regulations prohibit bypass—defined as the intentional diversion of waste streams from any portion of the treatment facility—except in very limited circumstances. Section 122.41(m)(4)(i) prohibits bypass, and EPA or the NPDES authority may take enforcement action against a permittee for bypass, unless:

(A) The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(B) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime; and

(C) The permittee submitted required notices.

Under section 122.41(m)(4)(ii), the Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that the bypass will meet the criteria listed in subsection (m)(4)(i). An approved anticipated bypass is a recognition that the permitting authority has considered the adverse impacts of the bypass and has determined that the bypass would or does meet the criteria of 40 CFR 122.41(m)(4)(i)(A), (B) and (C) and will not take enforcement action against a permittee for the bypass. Compliance with 40 CFR 122.41(m)(4)(i), in and of itself, would not shield a permittee from citizen suits for conducting a prohibited bypass. *Southern Ohio Coal Company v. Office of Surface Mining, Reclamation and Enforcement*, 20 F.3d 1418, 1427 (6^{th} Cir. 1994).

b. Draft Peak Flows Policy

On December 22, 2005, EPA requested public comments on a draft policy (hereafter called the draft peak flows policy) regarding peak wet-weather discharges from publicly owned treatment works (POTW) treatment plants serving separate sanitary sewer collection systems. The 2005 draft peak flows policy would clarify that the bypass provision applies to wet-weather diversions around secondary treatment units at POTW treatment plants serving separate sanitary sewers that are recombined prior to discharge. It also includes an interpretation that under limited circumstances in which anticipated bypasses meet the requirements of 40 CFT 122.41(m), including implementation of feasible alternatives, bypasses could be approved in a permit under 40 CFR 122.41(m)(4)(ii).

The December 22, 2005, draft policy would apply only to peak wet-weather diversions around secondary treatment units that occur at POTW treatment plants that serve separate sanitary sewer systems. (EPA previously explained the processes by which wet-weather diversions can be approved in NPDES permits for POTW treatment plants serving combined sewer systems in the 1994 *Combined Sewer Overflow Policy*, (CSO Control Policy) 59 *Federal Register* (FR) 18,693-18,694 (April 19, 1994).) The 2005 draft peak flows policy describes the circumstances under which anticipated bypasses that reflect the full implementation of feasible alternatives would be approved for the purposes of section 122.41(m)(4)(ii) in the limited context of this policy.

The draft peak flows policy does not change EPA's interpretation of the bypass regulation as applied in *United States v. City of Toledo, Ohio*, 63 F.Supp.2d 834 (N.D. Ohio 1999). Thus, POTW treatment plants that fail to move forward to meet their obligations under this policy remain subject to the full scope of enforcement remedies for any violations. Furthermore, nothing in the draft policy provides a basis to reopen existing enforcement remedies (e.g., orders, decrees, or agreements) that address measures to reduce or eliminate peak flow wet-weather diversions.

EPA strongly discourages reliance on peak wet-weather flow diversions around secondary treatment units as a long-term, wet-weather management approach at a POTW treatment plant serving separate sanitary sewer conveyance systems. Such diversions should be minimized to the extent feasible. EPA anticipates that, over time, the need to undertake peak wet-weather flow diversions at POTW treatment plants serving separate sanitary sewer conveyance systems can be eliminated from most systems in a variety of ways, such as by enhancing and/or expanding storage and treatment capacity and reducing sources of peak wet-weather flow volume. EPA expects that aggressive efforts by POTW treatment plants in consultation with NPDES authorities can lead to dramatic reductions in the volume and duration of peak wet-weather flows; in most cases completely phase out diversions; and improve the treatment and quality of peak wet-weather flow discharges. EPA also believes that involving the general public will improve the assessment of various options to minimize peak wet-weather flow diversions.

The 2005 draft peak flows policy is limited in scope; it applies only (1) to peak flow wet-weather diversions, (2) from POTW plants, (3) that serve separate sewer collection systems, and (4) that recombine the diverted peak flows prior to discharge. The draft policy describes the circumstances under which anticipated bypasses at these plants could be either approved or denied as a result of the NPDES permitting process. The draft policy identifies the content of an appropriate Utility Analysis that POTWs should submit with their permit applications to facilitate development of appropriate permit conditions. The draft policy outlines the decision process involved in reviewing a Utility Analysis and determining whether approval of peak wet-weather flow diversions is appropriate.

The 2005 draft peak flows policy explains how the NPDES authority should determine whether anticipated peak wet-weather flow diversions, at POTW treatment plants serving separate sanitary sewer collection systems, which are recombined with flow from the secondary treatment units prior to discharge, should be approved or denied under 40 CFR 122.41(m)(4)(ii). Under the draft policy, if the NPDES authority determines, on the basis of a Utility Analysis and any other available information, that the criteria of section 122.41(m)(4)(i) will be met and, if the permit includes any more stringent limits necessary to meet water quality standards (including when an anticipated bypasses occurs (i.e., to take into account its adverse effects)), the NPDES authority may provide for approval of anticipated bypass of peak wet-weather flow diversions around secondary treatment units.

The 2005 draft peak flows policy:

- Explains how EPA intends to apply the bypass regulation, specifically, 40 CFR 122.41(m)(4), to peak wet-weather flow diversions around secondary treatment units at POTW treatment plants serving separate sanitary sewer systems where the diverted flow is recombined with flow from the secondary treatment units prior to discharge;

- Describes a Utility Analysis and relevant steps of the permit review process;
- Identifies a framework within the permit process through which the criteria of the bypass rule can be evaluated for determining whether anticipated peak wet-weather flow diversions to which this policy applies could be approved as anticipated bypasses;
- Promotes use of measures to provide the highest possible treatment to the greatest possible peak wet-weather flow; and
- Promotes reporting and public notification of peak wet-weather diversion events.

The draft policy is limited in scope. The draft policy:

- Does not apply to discharges or overflows prior to the headworks of a POTW treatment plant; or to dry-weather diversions; or to diversions around primary or diversions that are not recombined with flow from the secondary treatment units prior to discharge; or to treatment plants (municipal or industrial) other than those serving separate sanitary sewer collection systems; and
- Does not address diversions around tertiary treatment units that are separate from secondary treatment units.

A combination of approaches can be used to achieve the goals of the 2005 draft peak flows policy. These approaches include the following:

- Ensuring full utilization of available secondary treatment capacity;
- Reducing infiltration and inflow (I/I);
- Maximizing the use of the collection system for storage;
- Providing off-line storage; and
- Enhancing and/or expanding secondary treatment capacity.

In cases where these approaches, alone or in combination, are not sufficient to enable a POTW treatment plant to process its peak wet-weather flows through its secondary treatment units, a POTW treatment plant might have no feasible alternative to peak wet-weather flow diversions around secondary treatment units. However, EPA believes the use of diversions around secondary treatment units at POTW treatment plants serving separate sanitary sewer systems to manage peak wet-weather flows is not necessary in many cases and cannot be approved for diversions where feasible alternatives are identified through the Utility Analysis or if the other elements of the bypass regulation are not met. If feasible alternatives to avoid all anticipated bypasses are available during the permit term, such that there will be no need for diversions by or before the end of the permit term, approval in the permit under section 122.41(m)(4)(ii) would not be appropriate; rather, the permit would address only the requirements to implement the alternatives, including a schedule with specific dates for implementing, as quickly as feasible, the technologies, upgrades and approaches identified and estimates of the associated flow volumes. This implementation schedule would be considered a permit condition as opposed to a schedule of compliance under 40 CFR 122.47.

The 2005 draft peak flows policy provides that, at the time of application for an NPDES permit for POTW treatment plants seeking approval of peak wet-weather diversions at a treatment plant as an anticipated bypass, the plant should submit a comprehensive analysis (Utility Analysis) to the NPDES authority that does the following:

a. Documents current treatment plant design capacity for all treatment units, the maximum flow that can be processed through those units, and the feasibility of increasing such treatment capacity and related costs;

b. Estimates the frequency, duration, and volume of current wet-weather diversions, and evaluates alternatives to reduce the frequency, duration, and volume of such occurrences and related costs;

c. Estimates future peak wet-weather flows on the basis of information such as predicted climatic conditions, anticipated dry-weather flows, projected treatment plant and collection system changes (e.g., upgrades, extensions, deterioration), and evaluates options for reducing diversions on the basis of these variables;

d. Assesses existing storage within the collection system or on-site and options for enhanced utilization or expansion (taking into account physical and technological considerations) of storage to reduce the frequency, duration, and volume of peak wet-weather diversions, and the related costs;

e. Assesses other ways to reduce peak wet-weather flow volumes, such as limiting collection system extensions and slug loadings from indirect dischargers, or water conservation or green infrastructure techniques;

f. Evaluates technologies, such as supplemental biological treatment, physical/chemical treatment, (e.g., ballasted flocculation, deep-bed filtration, or membrane technology) that are or could be used to provide additional treatment to peak wet-weather flows or peak wet-weather diversions at the POTW treatment plant and the costs of implementing those technologies;

g. Evaluates the extent to which the permittee is maximizing its ability to reduce I/I throughout the entire collection system (i.e., not only the portions operated by the utility, but also portions operated by any municipal satellite community), including the use of existing legal authorities, potential improvements in the timing or quality of such efforts, and options for obtaining or expanding legal authorities to reduce I/I from satellite collection systems;

h. Evaluates peak flow reductions obtainable through implementation of existing capacity, management, operations, and maintenance (CMOM) programs and potential improvements in the timing or enhancement of those programs and the related costs; or, if no such program exists, reductions obtainable through the development and implementation of a CMOM program and the related costs;

i. Assesses the community's ability to fund the peak wet-weather flow improvements discussed in the Utility Analysis, taking into consideration current sewer rates; planned rate increases; other potential sources of federal, state, or local funds; and the costs, schedules, anticipated financial impacts to the community of other planned water and wastewater expenditures and other relevant factors affecting the utility's rate base, using as a guide EPA's *Combined Sewer Overflows—Guidance for Financial Capability Assessment and Schedule Development* (USEPA 1997);

j. Proposes a protocol for monitoring the total volume diverted, and the duration of each peak wet-weather diversion event, and a protocol monitoring of the recombined flow at least once daily during diversions for all parameters for which the POTW treatment plant has daily effluent limitations or other requirements (e.g., monitoring only requirements) and representative monitoring for other monitoring requirements of the permit; and

k. Projects the POTW treatment plant effluent improvements and other improvements in the collection system and treatment plant performance that could be expected if the technologies, practices or other measures discussed in the Utility Analysis are implemented.

c. CSO-Related Bypasses

EPA has provided guidance on the planning, selection, and implementation of controls to meet technology- and water quality-based requirements for CSOs under the NPDES program in the *National CSO Control Strategy*, 54 FR 37370 (September 8, 1989), and the *CSO Control Policy*, 59 FR 18688 (April 19, 1994). The 1994 CSO Control Policy provides comprehensive guidance for developing site-specific NPDES permit requirements for combined sewer systems to address wet-weather CSO discharges from designed overflow points. The Wet Weather Water Quality Act of 2000 amended the Clean Water Act (CWA) to provide that each permit, order, or decree issued after December 15, 2000, for a discharge from a municipal combined sewer must conform to the CSO Control Policy. 33 United States Code section 1342(q)(1).

Under the CSO Control Policy, permittees with combined sewer systems were to immediately undertake a process to accurately characterize their sewer systems, to demonstrate implementation of nine minimum controls identified in the policy, and to develop and implement a long-term CSO control plan that would ultimately provide for compliance with the requirements of the CWA. See 59 FR 18688 (April 19, 1994). The CSO Control Policy identifies EPA's major objectives for long-term control plans (LTCP).

When developing the CSO Control Policy, EPA recognized that some POTW treatment plants might have primary treatment capacity in excess of their biological treatment capacity. See 59 FR 18693, col. 2. The policy indicates that one effective strategy to abate pollution resulting from CSOs is to maximize the delivery of flows during wet weather to the POTW treatment plant for treatment. This strategy can maximize the use of available POTW facilities for wet-weather flows and ensure that combined sewer flows receive at least primary treatment prior to discharge. In addition, this strategy might enable the permittee to eliminate or minimize overflows to sensitive areas. In recognition of the significant water quality benefits of maximizing flow to the POTW treatment plant, the CSO Control Policy includes it as a minimum element of an LTCP.

To further the objective of maximizing treatment at the POTW treatment plant, the CSO Control Policy provides guidance on the use of an NPDES permit to recognize approval of anticipated bypasses where the criteria of the bypass provision for such approvals are met. The CSO Control Policy clarifies that it is the responsibility of the permittee to document, on a case-by-case basis, compliance with 40 CFR 122.41(m) to have an anticipated bypass approved in a permit. The policy indicates that for some CSO-related permits, the study of feasible alternatives in the LTCP, along with other information in the permit record, may provide sufficient support for approval of a CSO-related bypass in the permit and to define the specific parameters under which a bypass can be approved. The policy provides that where a permit includes an approval of a CSO-related bypass, the permit would define the specific wet-weather conditions under which a CSO-related bypass would be allowed and would also specify what treatment, monitoring, and effluent limitations would apply to the bypass flow.

The policy provides that permits with approved bypasses should also make it clear that all wet-weather flows passing the headworks of the POTW treatment plant will receive at least primary clarification, solids and floatables removal and disposal, and disinfection where necessary, and any other treatment that can reasonably be provided.

The CSO Control Policy anticipates that POTW operators will document in their LTCP, or other documentation, the evaluation of the analysis of feasible alternatives to the diversions. However, where the analysis of feasible alternatives in the LTCP is incomplete or a facility needs to update its feasibility analysis before permit reissuance, this guidance document, read in conjunction with the CSO Control Policy, might provide some technical assistance.

II. Description of the Existing Treatment Plant and Collection System

A Utility Analysis and permit application should provide a description of the existing treatment plant and collection system. The description of the treatment plant should include:

- A brief summary narrative of the facility;
- Process flow diagrams;
- A description of design capacities for key unit operations; and
- A summary of efforts to characterize the actual capacity of unit operations where diversions have occurred.

a. Summary Narrative

The summary narrative of the facility should provide a brief overview of the existing POTW treatment plant. It should describe the facility location, size, property boundaries, level and type of treatment provided and a brief history of major construction at the plant. This information could include the initial construction date and major expansions or upgrades.

b. Process Flow Diagrams

Schematics showing the process flows during dry- and wet-weather conditions should be included. A description of the possible flow paths and an indication of when the various flow paths are used should accompany the process flow diagram(s). At a minimum, a description of the normal dry-weather and wet-weather flow paths should be provided.

c. Approved Design Capacities of Treatment Units

Section 1.a of the December 22, 2005, draft peak flows policy, provides in part that the Utility Analysis should document current treatment plant design capacity for all treatment units. A summary of the design capacities for all of the treatment units at the treatment plant should be included. These processes could include the following:

- Preliminary treatment
- Equalization
- Primary treatment
- Secondary treatment
- Tertiary Treatment
- Disinfection

This information should include the number of units, tank volumes, basis of tank sizing, and rated capacity. The firm capacity (with the largest unit out of service) and total installed capacity for each process should be identified. The hydraulic capacity of each process should also be discussed, which will require a review of the channels, piping, and pumping systems connecting the treatment processes.

The design capacities can be included on the process flow diagrams to show the maximum flows through each flow path.

d. Determination of Actual Capacities of Treatment Units

Section 1.a of the December 22, 2005, draft peak flows policy, provides in part that a Utility Analysis should document the maximum flow that can be processed through various unit processes. Treatment units where diversions associated with limited capacity should be identified. The actual capacity of such treatment units with limited capacity should be evaluated. The basis of design is often conservative in terms of process capacities, so the plant might have additional treatment capacity available beyond that indicated in the basis of design. Conversely, changes in design standards used by regulatory authorities, operation of the process, or the length of service for a given process could decrease the capacity below that stated in the basis of design.

An evaluation of the actual capacity of the treatment units can be performed by reviewing operational data from peak wet-weather events and comparing this information to that contained in the basis of design, especially during wet-weather conditions, which are drastically different from dry-weather flow in terms of both hydraulic and organic loadings. In addition, stress testing can be conducted to identify the peak flows that can be treated under dry or wet-weather conditions for selected treatment processes. A review of the wet-weather capacities for each process can identify the limiting process. The total installed capacity, rather than the firm capacity, should be used in this analysis as long as the utility can provide justification. For example, the equalization basins have no moving parts and the entire volume should be used for the installed capacity. Another example would be the use of the secondary process to treat the diluted wastewater, as long as the flow can be transported through the process and the oxygen supply capability meets the demand. The utility can then evaluate alternatives to increase the capacity of the bottleneck process through additional modeling and demonstration. The evaluation can help determine the feasibility of avoiding diversions and the plant improvements that would be necessary for this goal to be achieved.

Because the information gained from stress testing is likely to be used to attempt to re-rate the capacities of some or all of the process units, EPA suggests that a plan be developed and shared with the NPDES permitting authority and other applicable state or federal authorities that would be involved in the approval of capacity changes. The results of the stress testing can be used to modify the maximum flows through a given unit operation.

e. Overview of the Collection System

The description of flows in the collection system should be prefaced with a brief overview of the collection system that includes:

- A general description of the size of the collection system and population served;
- Identification of major sewersheds within the collection system;
- Identification of all municipal satellite collection systems in the collection system;
- The number and location of pump stations.

Appropriate maps should be used in this description.

III. Flow Characterization

Characterization of dry-weather and peak wet-weather flows reaching the treatment plant and at key locations in the collection system is a major goal of the Utility Analysis. The applicant should provide detailed information to characterize the following:

- Dry-weather flows at the treatment plant
- Peak wet-weather flows reaching the treatment plant
- Bypasses at the treatment plant
- Overflows in the collection system

This portion of the analysis should describe:

- existing flows at the treatment facility;
- the history of diversions at the treatment plant;
- existing wet weather flows at critical locations in the collection system; and
- the history of wet weather sanitary sewer overflows in the collection system.

a. Treatment Plant Flows

One important objective of the Utility Analysis is to characterize wet- and dry-weather flows at the treatment plant. This is reflected in Section 1.b of the December 22, 2005, draft peak flows policy, which in part provides that the Utility Analysis should provide estimates of the frequency, duration, and volume of current wet-weather diversions. The NPDES permit application regulations require that an applicant provide the design flow rate of the treatment plant (i.e., the wastewater flow rate that the plant was built to handle), along with the average daily flow rate and maximum daily flow rate for each of the past 3 years. The Utility Analysis should provide additional information on flow rates, particularly those related to peak flow conditions.

The location and method used to monitor flow should be briefly described. The Utility Analysis should describe the various measures and terms used as different definitions for flows are sometimes used industry-wide.

If significant changes in flow rates have occurred in recent years, an explanation for the change should be included. For example, flow rate changes associated with I/I elimination projects, expansion of service areas, and capacity increases should be identified.

b. Description of Diversions

Information should be provided for any process bypass that has occurred at the plant including the following:

- Date of bypass event
- Process(es) bypassed
- Amount of precipitation and snowmelt, if applicable, associated with wet-weather diversion
- Volume of flow diversion
- Duration of the diversion
- Cause of bypass (e.g., wet weather, mechanical failure, power loss)

A discussion of the secondary treatment processes and the precipitation events that have resulted in flows greater than the available capacity should be included. The seasons when diversions are most likely to occur should also be discussed. The average frequency, duration, and volume of the diversions should be included. In addition, the range of values observed at the plant for these parameters should also be presented.

c. Collection System Flows

The Utility Analysis should identify sewersheds with high levels of I/I. For sewersheds that have been identified as having high levels of I/I, the Utility Analysis should provide a brief description of studies that have been conducted to identify and quantify sources of I/I within the sewershed and identify and quantify wet weather SSOs. The summary should include a description of when the studies were conducted, provide an overview of methods used and summarize major results of the studies and the corrective actions that were taken in response to the findings.

The peak capacity of major interceptors and main trunk lines feeding into the treatment plant should be identified, at a minimum. The capacities for each pump station should also be included, and any deficiencies noted.

Sewerage authorities can accept flow from tributary customers and might not have comprehensive information regarding the tributary customer system behavior and overflows. In all cases, the data should be characterized to clarify whether the entire system to the POTW is being characterized, or if the characterization is limited to that portion of the system that is under the jurisdiction of the POTW authority.

e. Description of Wet Weather Sanitary Sewer Overflows

The following information should be tabulated for each wet-weather sanitary sewer overflows (SSOs) that have occurred in the collection system in at least the last five years:

- Date of overflow event

- Location of overflows by sewershed
- Estimated volume of overflow
- Rainfall/ snowmelt volume associated with the event
- Duration of overflow event
- Cause of overflow, if known (i.e., I/I)
- Methodology used for identifying the frequency, volume, and duration of wet-weather overflows (e.g., installed monitoring equipment, operator observations, public complaints)
- Steps taken to reduce, eliminate, and prevent recurrence of the overflow

Data should allow for an understanding of how varying precipitation conditions affect system behavior and help to clarify year-to-year variability in system behavior relative to frequency, duration, and amount of rain or snowmelt that occurs. The collection system might respond differently depending on the amount of rain received and the period between precipitation events. If the precipitation data for the SSOs are not available at the plant, a nearby airport might have precipitation records. Local monitoring station data should be used if available, when reporting a specific wet-weather event, because precipitation distribution can vary widely for a given area. When making projections of future flows, an assumption should be made that wet-weather SSO discharges are eliminated with overflow volumes either directed to the plant or eliminated from the system.

f. Summarize Performance (Success/Limitations) of Past I/I Efforts

A description of prior projects to characterize and control wet-weather flows should be identified. This could include such projects as Sanitary Sewer Evaluation Survey (SSES) studies and subsequent corrective actions, increased transport capacity to address limited capacities, construction of sanitary equalization basins in the collection system or private property I/I elimination programs. Completion dates of these projects and impacts of these projects on the overflow history as contained in the previous item should be described in a narrative.

In addition, collection system rehabilitation efforts that improve system reliability and transport capacity should be described. This information should include planned efforts and recently completed rehabilitation. Information from past studies, such as those required under the Clean Water Act Construction Grants program to assure proper and efficient operation and maintenance of treatment works and their associated collection systems should be considered, if available. These provisions required the development of operation and maintenance manuals, emergency operating programs, personnel training, adequate budget, and operational reports. In addition, past trends of collection system rehabilitation should be considered, including a summary of completed projects performed in accordance with an SSES.

Ensuring that the system has adequate capacity, and providing proper management, operation and maintenance, can reduce the occurrence of collection system failures. Effective utility management can therefore be described in terms of CMOM and is necessary to maintain the capacity of the collection system, to reduce the occurrence of temporary problem situations such as blockages, to protect the structural integrity and capacity of the system, and to anticipate potential problems and take preventive measures. An ancillary effect of a CMOM program controlling remote overflows might be more flow reaching the treatment plant. This is reflected in Section 1.h of the December 22, 2005, draft peak flows policy, which states, in part, that the utility should evaluate peak flow reductions obtainable through implementation of existing CMOM programs and potential improvements in the timing or enhancement of those programs and the related costs; or, if no such program exists, reductions obtainable through the development and implementation of a CMOM program and the related costs.

IV. Projected Peak Wet-Weather Flows

An objective of the Utility Analysis is to provide estimates of future peak wet-weather flows. This is reflected in Section 1.c of the December 22, 2005, draft peak flows policy which, in part provides that the Utility Analysis should provide estimates of future peak wet-weather flows on the basis of information such as predicted climatic conditions, anticipated dry-weather flows, projected treatment plant and collection system changes (e.g., upgrades, extensions, deterioration).

Projections of future flows within the collection system and entering the treatment plant are to be included as part of the Utility Analysis. Plans to expand the service area geographically or consolidate existing treatment plants should be described. Information on population projections within the service area should be included. Data from National Weather Service Stations can be used to develop long-term weather predictions that could affect future flows. The anticipated effect of the service area expansion, population projections, and future climate predictions on average and peak flows should be described. In addition, an analysis of water use trends within the utility's service area for the past several years should be included. Results of such an analysis could be quantitative or qualitative.

The applicant should describe efforts to replace or rehabilitate the system, including projections on how such activities could increase or decrease flows to the plant. A description and schedule for rehabilitation projects at the treatment plant and in the collection system should be provided. The schedule for I/I removal should also be included. The impact of these improvements on the average and wet weather treatment plant flows should be summarized. Although I/I removal projects often decrease the amount of flow that enters the treatment plant, rehabilitation within the collection system could increase the amount of flow needing treatment. The current I/I projections should also be summarized.

V. Identifying and Evaluating Potential Measures to Reduce Diversions

The Utility Analysis should identify and evaluate a comprehensive set of potential alternatives that would reduce or eliminate wet-weather diversions at the treatment plant. Possible measures that should be evaluated can be grouped into the following general categories:

- Operational changes at the treatment plant
- Structural modifications at the treatment plant
- Collection system improvements
- Additional alternatives
- Treatment of diverted flows
- Consideration of emergency back-up equipment

For each alternative identified and evaluated in the Utility Analysis, the following information should be included (to the degree applicable):

- For structural modifications (such as storage or expansion of treatment units), sizing of the equipment or process or a description of the level of effort associated with incorporating the alternative into the existing treatment plant.
- Anticipated performance of the equipment during the diversion of flow.
- Projected plant effluent expected if the alternative is implemented.
- Operational requirements for the process and additional labor hours required annually.
- The capital and operational costs associated with the process. Order of magnitude capital costs might be sufficient for initial screening of options. For example, if a connection to the collection system of the nearest treatment plant does not exist, providing a rough estimate of the piping required might be sufficient.
- Non-monetary factors that might affect the evaluation. Examples might include siting requirements in terms of land availability, topography and the ability to provide sufficient biomass for secondary treatment systems that will be used only during wet-weather events.

a. Operational Measures during Wet-weather flows

Developing an alternate or wet weather mode of operation can minimize or prevent bypasses. The wet weather mode of operation will be specific to the facility in terms of the flow patterns and the process parameters. Some common practices are described below.

Maximum Units in Operation

Maximizing the number of treatment units available during wet-weather events can increase plant capacity. When a wet-weather event is anticipated, all primary clarifiers, aeration basins, secondary clarifiers, tertiary treatment units, and disinfection units should be placed in service. This might require that routine maintenance be scheduled for periods when wet-weather events are less likely to occur. Unscheduled repairs should be performed as expeditiously as possible, particularly when wet-weather events are likely to occur. These actions can help keep the maximum number of treatment units available for use during wet-weather events. If an emergency repair is required during a wet-weather event, the ability to allow wastewater to flow through the unit should be considered, to provide hydraulic capacity even though treatment would be limited.

Buffer Flow

To increase the likelihood of providing treatment for the peak flows (or providing as much treatment as possible during the peak flow period), it is recommended that a small buffer capacity be maintained, on the order of 5 to 10 percent of the design peak flow when wet-weather events are anticipated. As the plant influent increases with the wet weather progression, this buffer flow would be reduced gradually down to zero, and thus maintain stability of the biomass in the secondary system.

Existing Equalization Basins

Existing equalization basins that are typically used to store the diurnal fluctuations in flow should be emptied when wet-weather events are anticipated. This will allow the entire basin volume to be available to store wet-weather flows.

Protection of Biomass Inventory for Activated Sludge

Loss of the biomass (i.e., washout of the mixed liquor suspended solids [MLSS]) from the aeration system is another operational challenge that should be addressed during wet-weather events. Biomass can be lost when high flows cause the mixed liquor to overwhelm the secondary clarifiers and results in the biomass being discharged through the outfall or captured in the tertiary treatment system without a method of returning the mixed liquor to the aeration tank(s).

An operational strategy that can reduce the loss of biomass is to reduce the return activated sludge (RAS) rate from the secondary clarifiers to the head of the aeration basin during a wet-weather event. This would cause the biomass to accumulate in the secondary clarifiers. To use this strategy, the secondary clarifiers should have sufficient capacity to treat the anticipated peak wet-weather flows. There is a risk that the sludge blanket could rise too high and be resuspended, possibly releasing mixed liquor over the weirs. The operational changes that can be made also include reducing aeration in certain parts of the aeration basin during peak hours (WEF 2006).

Good Settling Biomass

Maintaining a mixed liquor that settles quickly can improve the performance of the secondary clarifiers. If settling is a problem during dry-weather operation, it will be even more difficult to maintain biomass during wet weather periods. There are many causes for poor settling (Jenkins et al. 2003). One possible cause is a young sludge age. A young sludge might not settle properly, which can be prevented by reducing the wasting rate in the secondary clarifier. However, a wasting rate that is too low could lead to anoxic conditions in the sludge blanket in the secondary clarifier, which could lead to sludge bulking, when the release of nitrogen gas brings settled sludge to the surface of the clarifier. The proper sludge age and wasting rates must be determined by each plant. Increasing the settling velocity of the biomass can increase the efficiency of the secondary clarifiers during wet-weather events. The guidelines for surface overflow rates and solids loading rates were based on assuming an average settling velocity for the particles anticipated to be in the biomass. If the settling velocity is increased, compared to dry-weather operation, a portion of the effect of higher flows can be diminished. The settling velocity can be increased by forming larger, denser, and thus heavier particles. All other causes and cures should be pursued to maintain well settling biomass at the facility.

Chemical Addition during the Wet-Weather Period

The mixed liquor settling velocity can be increased by feeding or increasing the feed rate of metal salts (such as ferric chloride or alum) in the aeration basin or immediately upstream of the secondary clarifiers. This strategy would be most effective when biochemical oxygen demand (BOD) and total suspended solids (TSS) concentrations are relatively high, early in a wet-weather event. Dilute flows that often occur later in the wet-weather event might not have a sufficient density of particles to form a floc large enough to settle even with the addition of metal salts.

Minimal Sludge Blanket in the Secondary Clarifiers

Minimizing the sludge blanket (the amount of sludge stored in the bottom of the secondary clarifier) when wet-weather events are anticipated can decrease the likelihood of biomass loss over the weirs. During high flows, the solids that were previously settled in the secondary clarifiers could be resuspended and lost over the weir. Therefore, returning the sludge to the aeration basin will prevent the resuspension and possible biomass loss.

Management of Recycle Flows

To reduce the hydraulic loading rate during the peak wet-weather flows, the return of in-plant recycle flows from tertiary filters or sludge handling processes should be delayed until flows begin to subside. This can be carried out manually by the plant personnel or by automatic control measures at the facility.

b. Structural Modifications at the Treatment Plant

Equalization Basin

Additional storage during wet-weather events can be provided at the treatment plant (additional storage in the collection system is discussed below). Existing storage units could be expanded, or new storage units could be constructed. Equalization basin(s) can be provided at the treatment plant.

Existing storage or equalization tanks could be expanded by building additional compartments adjacent to the existing tanks. If space is not available adjacent to the existing tanks, new storage or equalization could be provided at an available location within the system. Constructing the tanks at a separate location from the existing tanks might require pumping to avoid hydraulic problems depending on the topography of the treatment plant site. Staff at sites with more elevation changes will have to evaluate the placement of the tank(s) more carefully. Placing a tank that is not adjacent to the collection system or in between the processes at the plant could require additional piping and pumping, which would increase the costs associated with this alternative.

Implement a Step-Feed Activated Sludge Process

Decreasing the MLSS concentration entering the secondary clarifiers will result in a lower suspended solids loading rate, which will improve the performance in the secondary clarifiers during wet-weather events. Using a step-feed approach maintains biomass inventory in the aeration basin and decreases the solids loading rate to the secondary clarifiers. In a step-feed system, the primary effluent can enter the secondary process at the head of the aeration basin or at intermediary points within the aeration basin. During wet-weather flows, a majority of the flow would enter the aeration basin in the downstream feed locations. All the RAS would be pumped to the head of the aeration basin. The result is a higher mixed liquor concentration in the head of the aeration basin, with lower concentrations in the middle of the basin. The lowest MLSS concentrations would be found at the end of the aeration basin, which would then be settled in the secondary clarifiers.

Many secondary treatment processes can be adapted to a step-feed system via the addition of piping. A similar process could be used for an oxidation ditch system with concentric rings, which are used in smaller treatment plants. The applicability of oxidation ditches might be limited, as primary clarifiers are typically not constructed upstream of the process. Any diversions around the oxidation ditch would likely require a separate treatment process to meet NPDES permit limits. One possible strategy would be to operate the outer ring as a separate unit that is isolated from the middle and inner rings. No mixed liquor from the outer ring would be discharged to the secondary clarifiers during the wet-weather event. RAS would be pumped to the outer ring of the oxidation ditch. The middle and inner rings would receive flow during the wet-weather event. In this way, the biomass is preserved in the outer ring of the oxidation ditch, which can be distributed to the middle and inner rings after the wet-weather event has ended.

Tank for Storage of Biomass

A separate storage tank could be built near the aeration basins and secondary clarifiers that could be used to store the biomass during wet-weather events. The primary effluent would be fed to the head of the aeration basin, as under the normal dry-weather operation. A line could be provided to the new storage tank to allow primary effluent containing higher BOD and TSS concentrations to be stored for later treatment. The RAS would be split between the aeration basin and the new storage tank. Once the peak wet-weather flows have passed, the wastewater in the storage tank could be directed to the secondary clarifiers and all RAS could be returned to the aeration basins. The storage tank could be flushed and placed on standby until the next wet-weather event.

Increase Capacity of Individual Treatment Units

The review of the design and actual capacities of the treatment plant processes might have identified treatment or hydraulic bottlenecks. By adding additional treatment units for selected processes or upgrading transfer capacities, additional flow could be treated and might result in fewer diversions.

If the actual capacity of a treatment process is less than the design capacity, the piping between the previous process and the process in question should be reviewed. This could involve a hydraulic analysis of the design or an inspection of the pipe to see if sediments or a blockage has developed during the operation of the plant.

The amount of capacity that will be gained by the planned improvements should be stated, and any changes to the process flow diagram should be explained.

c. Collection System Improvements to Reduce Flows during Wet-Weather Events

Section 1.g of the December 22, 2005, draft peak flows policy, states in part, that utilities should evaluate the extent to which the permittee is maximizing its ability to reduce I/I throughout the entire collection system (i.e., not only the portions operated by the utility, but also portions operated by any municipal satellite community), including the use of existing legal authorities, potential improvements in the timing or quality of such efforts, and options for obtaining or expanding legal authorities to reduce I/I from satellite collection systems.

Increased Transport Capacity

To reduce SSOs in the collection system, the transport capacity can be increased. The actual capacity of a given pipe might be less than the design capacity because of the accumulation of sediment or other materials, such as oil and grease. A maintenance program to clean sections of the collection system that are subject to sedimentation could provide a relatively low-cost process to increase the transport capacity of wet-weather flows. In situations where the design capacity is insufficient to transport the wet-weather flows, replacing a section of pipe with a larger diameter than the existing pipe, installing a parallel pipe, or increasing the pump station capacity should be considered to alleviate the capacity problem. Increased maintenance or expanding the capacity of the collection system could reduce the number of overflows at the designated location, but plant personnel should take care to ensure that the downstream sections of the collection system can accommodate the additional flows. In addition, the changes would result in greater flows entering the treatment plant. The ability of the plant to treat these additional flows should be described in the Utility Analysis.

Remote Storage

Equalization or storage basins or tunnels for wet-weather flow in the collection system should be considered. Storage in the collection system can have added the added benefit of being a component in a comprehensive effort to control of sanitary system overflows. Once flows decreased in the collection system, the water in the storage unit could be released at a rate selected during the design.

Flow Reductions Accomplished by Reducing I/I

A description of the efforts to quantify the I/I entering the collection system should be included. The information could include individual studies that have been performed or a summary of a SSES, if one has been completed recently (i.e., within the past five years). The completed and planned I/I removal projects should be listed, including the amount of wet-weather flow that will be removed by each project. A review of the alternatives that were considered and the justification for the selected projects should also be provided. If an SSES was completed, the executive summary of the document should be included as an attachment to the Utility Analysis.

If the party preparing the Utility Analysis does not control the entire service area for the treatment plant, a description of the agreements in place that establish how the collection system is operated and controlled should be provided. For example, a description of any intergovernmental agreements in place that require ordinances to be adopted by the member communities within the service area or give regulatory authority to certain parties should be described. Information on I/I reductions in the entire service area should be provided.

I/I can originate from individual residences and businesses, which would then enter the sanitary collection system through the individual building laterals. These I/I sources might include footing drain connections from older homes or aging pipes. If an SSES was conducted, estimates on the number of houses that could have footing drain connections to the sanitary sewer might have been calculated. In addition, tests could have been done at selected residences to predict whether I/I was entering through the building laterals because of the pipe being compromised by tree roots or decay due to age. A summary of this information should be included in the Utility Analysis, if available.

Green Infrastructure

Green infrastructure practices should be evaluated for use in conjunction with I/I reduction efforts. It might be possible to use green infrastructure practices to remove stormwater flows from the sanitary collection system, such as footing drain, downspout, and roof drain disconnections. Green infrastructure projects can include constructing green roofs, rain gardens or larger bioretention facilities, and vegetated swales. These approaches can also be used in conjunction with other methods to capture stormwater, such as rain barrels. Rather than transferring these sources to the stormwater collection system, a green infrastructure practice could allow the water to slowly infiltrate and regenerate groundwater resources. However, when implementing any stormwater storage practice, personnel should ensure that it is not resulting in locally elevated groundwater tables that drain to public or private sewers through cracks or joints.

Flow Reductions by Controlling Slug Loadings during Wet Weather

Section 1.e of the December 22, 2005, draft peak flows policy, suggests in part, assessing other ways to reduce peak wet-weather flow volumes, such as limiting slug loadings from indirect dischargers. When SSOs or diversions occur, wastewater is discharged that has not received treatment (in the case of SSOs) or limited treatment (when a portion of the flow does not receive secondary treatment). During wet-weather events, it is helpful to minimize nondomestic discharges to the extent possible, to decrease the likelihood of toxic pollutants being discharged to the environment. Continuous commercial and industrial discharges are difficult to minimize or eliminate during wet-weather events, but those businesses that discharge slug loadings or batches might be able to hold their discharges until after the wet-weather event has concluded. A review of the companies included in the industrial pretreatment program could identify the batch dischargers. A review of the slug discharge plans submitted to the treatment plant could identify additional businesses to approach for minimizing or eliminating discharges during wet-weather events.

The treatment plant should discuss the feasibility of minimizing or eliminating the batch and slug discharges during wet-weather events with each individual industry. Agreements reached could be incorporated into the industrial user discharge permits and or slug control plans. These agreements might not be able to eliminate batch and slug discharges during wet-weather events that occur for an extended period of time. Removing the nondomestic discharge from the initial wet-weather flows that can include higher BOD and TSS concentrations and delaying them to the more dilute flows later in a wet-weather event can decrease the impact of toxic pollutants on the environment.

Any agreements that have been reached or are being explored concerning storage of batch and slug discharges should be included in the Utility Analysis.

d. Additional Alternatives

Routing Flows to a Different Wastewater Treatment Plant

The possibility of transferring wet-weather flows to an alternate secondary treatment plant that might have available capacity should be evaluated. If this is a feasible alternative, a discussion of how the transfer of wastewater would occur should be included. Items to be considered include at what flows would the transfer begin and end, would a gate be operated manually or automatically. A brief discussion of the peak flow capacities of the alternate treatment plant to be used should also be included. If the treatment plants are not operated by the same entity, a description of the agreement that should be developed should also be included.

Sewer Moratorium

Section 1.e of the December 22, 2005, draft peak flows policy, suggests in part, assessing other ways to reduce peak wet-weather flow volumes, such as limiting collection system extensions. The feasibility of instituting a moratorium on accepting additional flows in the sanitary collection system should be included in the Utility Analysis. Information that could be included in the discussion is any developments that have been promised sewer capacity and the legal and economic consequences of instituting a building moratorium. The economic analysis could include the amount of undeveloped land or land to be redeveloped that exists in the service area.

e. Treatment of Diverted Flows

A comprehensive Utility Analysis should assess technologies, such as supplemental biological treatment, physical/chemical treatment (e.g., ballasted flocculation, deep bed filtration, or membrane technology) that are or could be used to provide additional treatment to peak wet-weather flows or peak wet-weather diversions at the POTW treatment plant.

Under the bypass regulation, a bypass occurs when there is intentional diversion of peak flows from the secondary treatment units, regardless of whether the diverted flows are treated. If the diverted flow is routed to a treatment unit that is itself a secondary treatment unit, it is not a bypass. The term *secondary treatment unit* refers to a treatment process that meets the effluent imitations in the secondary treatment regulations. See 40 CFR Part 133. If the diverted flows meet the effluent limits in the secondary treatment regulations before mixing or recombination with other flows, the routing scenario does not represent a bypass. The treatment unit(s) in that scenario would represent a parallel treatment facility. In contrast, in situations where flows are diverted around secondary treatment units and receive treatment that is not designed and demonstrated to meet limits based on the secondary treatment regulations, the diversion is a bypass.

Providing Secondary Treatment for Diverted Flows

Section 1.f of the December 22, 2005, draft peak flows policy says in part, that utilities should evaluate technologies (such as supplemental biological treatment, physical chemical treatment, ballasted flocculation, deep bed filtration, or membrane technology) that are or could be used to provide additional treatment to peak wet-weather flows or peak wet-weather diversions at the POTW treatment plant and the costs of implementing those technologies. An evaluation of options that would provide treatment that meets the regulatory definition of secondary treatment at 40 CFR Part 133 for all or a larger portion of the diverted flow than under current operations should be conducted.

Where available land is an issue, considering secondary treatment processes that require less space than the existing technology can be examined. Because these technologies can require less space than the existing secondary treatment system, an evaluation of replacing the existing secondary treatment system with one of these technologies could also be performed. However, the conversion of the secondary treatment system would have to be carefully planned to ensure that sufficient capacity exists to provide treatment during construction.

One possible secondary treatment technology to be considered where land is limited is membrane bioreactors (MBRs), which use microfiltration membranes to separate the biomass from the secondary effluent, which are much more compact than secondary clarifiers (WEF 2005). In addition, because the system relies on filtration, rather than settling rates, the MLSS concentration can be much higher in an MBR than a conventional aeration basin. MBRs are often limited to a hydraulic capacity of twice the average flow and are expensive. An advantage to the MBR process is that they are easier to operate temporarily for the peak flow periods as an extension of the existing biological process compared to other secondary processes (USEPA 2007). The integrated fixed-film activated sludge (IFAS) process and moving bed biofilm Reactors (MBBRs) could also be considered for treating the diversion flows. The IFAS process uses fixed-film treatment in combination with an activated sludge basin. The biomass in an IFAS tank will be larger than in an aeration tank of the same size because of the added growth on the fixed-film media. As with a conventional secondary process, an RAS line returns solids settled in the secondary clarifier. An MBBR is designed to rely solely on the fixed-film growth that occurs on the floating media. In addition, all sludge is wasted from the secondary clarifiers without requiring recycle to the treatment tank. Both the IFAS and MBBR treatment systems are less susceptible to a loss of solids during peak flows because of the biomass located on the fixed-film media and, thus, can be an economical alternative for temporary treatment of peak flows as an extension of the existing processes.

Providing Treatment that Does Not Meet Secondary Treatment Standards: Physical and Chemical Treatment

Chemical addition can be used to remove TSS and the insoluble fraction of BOD. Chemical addition should be followed by a clarifier or other quiescent zone to allow for settling. One example of chemical addition during wet-weather treatment is chemically enhanced primary treatment (CEPT), which involves feeding relatively large quantities of a metal salt such as ferric chloride or alum to the primary clarifiers. Under dry-weather conditions, a metal salt can be added to the primary clarifiers to decrease the solids and BOD entering the aeration basin. Feeding too much chemical might cause operational problems if there is insufficient phosphorus available in the aeration basin to allow BOD removal. However, during wet-weather events, the treatment plant personnel might want to precipitate and settle as much of the BOD and TSS in the primary effluent as possible, which can be accomplished by increasing the feed rate of the metal salt. Implementing CEPT would be especially important at plants that operate primary and secondary treatment processes in parallel during wet-weather events.

Filtration, including deep bed filters, could be used to remove solids and particulate BOD from the diverted flow. The quality of the effluent from a filter system can be enhanced by chemical addition. Sufficient mixing should be provided between chemical addition and filtration to allow larger particles to form that can be trapped in the filters.

Ballasted flocculation can also be used to treat diverted flows through chemical addition and a media on which the floc can form. These flocs will settle faster than a conventional process. The media is separated from the settled floc and returned to the process. Two examples of processes using ballasted flocculation are Actiflo and DensaDeg. (see www.epa.gov/owm/xxxx) An emerging technology is the CoMag process, which uses magnetic particles as the ballast. A coagulant is added, followed by the magnetic particles and a polymer. Solids are settled in a solids contact clarifier. A magnetic separator captures any magnetic particles that did not settle in the clarifier. The magnetic particles are separated from the solids and returned to the process, and the solids are wasted from the system.

f. Emergency Back-Up Equipment

Replacement Parts and Redundant Capabilities

Common replacement parts should be kept on hand at the POTW treatment plant in accordance with the recommendations contained in the operation and maintenance manual. In particular, pumps that do not a standby or back-up pump installed are required to have a spare pump on-site that can be quickly installed in an emergency. Inadequate pumping capacity can lead to decreased hydraulic and treatment capacity downstream, which could lead to overflows and diversions if a pump should fail before or during a wet-weather event.

Emergency Back-up Power Systems

The loss of power at a treatment plant can lead to flow diversions and bypasses. Back-up power system should be evaluated for typical power loss scenarios, as well as severe wet-weather situations such as tornados and hurricanes. It is recommended that the treatment plant have a fixed, on-site, back-up power generators with an emergency fuel supply. The generator should be properly sized with sufficient output to maintain proper operations during power losses. Aeration equipment is not required to be powered by the generator, unless the POTW has a history of experiencing long power outages that longer than 4 hours. If power outages longer than 4 hours are typical, the generator should provide power for minimum aeration of the activated sludge basins. Disinfection and dechlorination should be provided during all power outages if it is needed to meet NPDES permit limits. If the plant does not have an emergency back-up power system, the cost of such a system should be evaluated.

VI. Ability to Pay / Financial Capability Assessment

A financial assessment of the water and wastewater system should be included in conjunction with the Utility Analysis. This is reflected in Section 1.i of the December 22, 2005, draft peak flows policy, which in part provides that the Utility Analysis should assess the community's ability to fund the peak wet-weather flow improvements discussed in the Utility Analysis, taking into consideration current sewer rates; planned rate increases; and the costs, schedules, anticipated financial impacts to the community of other planned water and wastewater expenditures, and other relevant factors impacting the utility's rate base using as a guide EPA's CSO Guidance for Financial Capability Assessment and Schedule Development, EPA 832-B-97-004.

a. Review of Current Potable and Wastewater Costs

The costs associated with the water treatment system and the current water rates should be provided. A comparison of the treatment costs and amount collected from the water rates should be included. In addition, the costs associated with the wastewater system and the current wastewater rates should be stated, as well as the total amount collected from the wastewater rates. The costs associated with storm water management measures used to improve water quality and any associated storm water rates can be included as wastewater costs and rates. Information on any funds that are targeted for future wastewater improvements would also be useful if included in the Utility Analysis.

Any large projects that are planned for water or wastewater treatment plant improvements outside of this Utility Analysis should be briefly described, as well as the money budgeted for the improvement. If any rate increases are scheduled, the information should also be included in this section.

b. Financial Capability Assessment

Utilities should use the *Combined Sewer Overflows—Guidance for Financial Capability Assessment and Schedule Development* (USEPA 1997). This document provides a planning tool for evaluating the financial resources a community has available to implement projected wastewater controls and to assist in the development of implementation schedules. It describes a procedure that results in a community cost burden ranking (high, medium, or low) that supports the development of a rational schedule for implementing wastewater projects.

The first goal of the guidance is to introduce and explain the planning tool, which is a two-phased approach for assessing a community's financial capability to implement controls using indicators identified in the guidance. In the first phase, a residential indicator is calculated that characterizes the financial impact of wastewater controls on individual households using the annual wastewater collection and treatment costs as a percentage of median household income. In the second phase, a composite community financial capability score is calculated using a variety of indicators that measure a community's debt, socioeconomic, and financial conditions (e.g., bond rating, unemployment rate, property tax collection rate). Data from the two phases are then compared to a financial capability matrix to arrive at an overall assessment ranking of a community's ability to finance and construct wastewater controls.

The final section of the document focuses on the schedule development process and presents details of how environmental and financial considerations appropriately influence schedule development. The principles of considering wastewater treatment costs as a percentage of median household income for assessing and ranking a community's ability to afford and finance future wastewater controls can be applied to controls necessary to reduce peak wet-weather diversions under this policy.

VII. Summary of Public Participation

The public should be provided the opportunity to review and discuss the alternatives included in the Utility Analysis. Typical administrative procedures for the municipality should be followed. This could include having the engineering firm that is helping prepare the Utility Analysis make presentations and provide updates during municipal board or council meetings. Depending on the complexity of the alternatives involved and the project impact on wastewater and sewer rates, a special meeting or series of meetings in the community might be warranted. The information shared with the public should include the alternatives considered, brief summaries of the design associated with feasible alternatives, and the impact that alternatives under consideration would have on wastewater and sewer rates.

VIII. Selection of Recommended Measures for Implementation

The alternatives that the applicant recommends to implement should be summarized in this section along with a description of the criteria used to select recommended measures and process for applying the criteria. The alternatives may include a combination of construction projects and operational changes in the collection system and treatment plant. A description of the proposed operation of the treatment plant during wet-weather events should be included. In addition, a proposed financial plan and proposed schedule should be provided.

a. Financial Plan

A discussion of the capital funding options considered should be included in the Utility Analysis. Alternative funding options, such as privatization of the wastewater system can be explored.

The municipality should have a revenue system in place to pay for any increased operation and maintenance costs associated with the alternatives to be implemented. In addition, funding to pay any interest on the bonds or loans used to fund the projects may be necessary. A proposed schedule for rate increases should be developed and included in the Utility Analysis. The current wastewater and sewer rates should be restated.

A summary of the selected financial option(s) should be provided. A schedule for the application of any funding that has not already been obtained should be included.

b. Proposed Implementation Schedule

The proposed schedule for implementing each selected alternative should be provided. For projects that are planned to be completed in the near future, a more detailed breakdown of milestones should be provided.

c. Estimate of Projected Frequency, Duration, and Volume of Diversions

Section 1.k of the December 22, 2005, draft peak flows policy provides, in part, the utility analysis should provide projections of the POTW treatment plant effluent improvements and other improvements in collection system and treatment plant performance that could be expected if the technologies, practices or other measures discussed in the Utility Analysis are implemented. Information on the impact on the diversion flows for each measure to be implemented should be provided.

The basis for the future wet-weather flows should include the projections for population and service area expansion from Section III.b of this guidance, projected treatment plant capacity after completion of the improvements, and projected I/I upon completion of reduction efforts. The anticipated frequency, duration, and volume of future diversions after the improvements are completed should be provided. In addition, the projections of the final effluent quality during wet-weather flows should be included.

d. Demonstration of No Additional Feasible Alternatives Beyond the Recommended Measures

POTW treatment plant operators seeking approval of peak wet-weather diversions at a treatment plant as an anticipated bypass should demonstrate to the NPDES permitting authority there are no additional feasible alternatives beyond the measures recommended herein to peak wet-weather diversions at the time of their NPDES permit application or NPDES permit renewal. This could typically be done by showing that implementing additional controls would create a high financial impact or are otherwise infeasible.

IX. Proposed Monitoring Protocol

Section 1.j of the December 22, 2005, draft peak flows policy provides, in part, that the utility should propose a protocol for monitoring the recombined flow at least once daily during diversions for all parameters for which the POTW treatment plant has daily effluent limitations or other requirements (e.g., monitoring only requirements) and ensure that appropriate representative monitoring for other monitoring requirements of the permit, the total volume diverted, and the duration of the peak wet-weather diversion event are tracked.

The utility should project the POTW treatment plant effluent improvements and other improvements in collection system and treatment plant performance that could be expected if the technologies, practices or other measures discussed in the Utility Analysis are implemented. Future data needs should also be identified.

Utilities should ensure that functional flow metering equipment is in place for determining the volumes and rates of flow through the full secondary treatment process and during the potential diversion flow routes. In addition, access for sampling to assess the process performance of individual units during peak wet-weather conditions should be provided.

X. Proposed Plan for Public Notice of Diversion

POTW treatment plants should provide a plan that describes the framework for how and when the public and other entities would be notified of bypasses that exceed any effluent limitation in the permit or that may endanger health due to a likelihood of human exposure. The plan should be developed in consultation with appropriate authorities at the local, county, and/or state level, and describe how, appropriate local, county and/or State agencies, such as downstream drinking water facilities and public health agencies, as well as the public would be notified of bypasses that exceed any effluent limitation in the permit or that may endanger health due to a likelihood of human exposure the public. The plan should who will be notified and the specific type of information that would be reported. The plan should include a description of lines of communication and the identities of responsible officials.

The proposed framework would not need to dictate the specific procedures or the specific information that would be provided through public notification; rather, indicate how the POTW treatment plant operators will establish and update, in consultation with appropriate local, county and/or State agencies, case-by-case notification procedures that would depend on the nature and duration of the diversion and the responsibilities of different local entities.

The framework should describe the criteria to be used to evaluate if a given bypass event may endanger health due to a likelihood of human exposure. The criteria would reflect the uses of potentially affected waters as well as other relevant factors. The development of these criteria should be coordinated with the NPDES authority, local health officials, drinking water suppliers, and other key potentially affected entities.

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Appendix A: Peak Wet-Weather Flows Utility Analysis Completeness Checklist

The December 22, 2005, draft peak flows policy provides that permittees that are seeking approval of peak wet weather diversions as an anticipated bypass at a POTW treatment plant serving a sanitary sewer collection system should submit, along with their permit application, a comprehensive utility analysis (UA) to the NPDES authority. The UA, permit application and other information in the permit record is intended to support an authority's determination as to whether or not there is a feasible alternative to peak wet weather diversions at a POTW treatment plant serving a separate sanitary sewer collection system. This Checklist is to assist NPDES authorities in a completeness review of a UA to evaluate if the permittee has provided information in a format that is understandable and consistent with the December 22, 2005, draft peak flows policy. The goal of the checklists is to assess and document whether the permit and administrative record provide a complete, comprehensive, and transparent record of permit development. As such, the checklist responses are not intended to judge the "correctness" or "incorrectness" of permit limits and conditions. Rather, the checklists are intended to guide a comprehensive evaluation of the NPDES permit development process by a knowledgeable EPA or state NPDES permit reviewer.

Assessment criteria presented in this document are not binding; the permitting authority may consider other approaches consistent with the bypass regulation at 40 CFR 122.41(m). When an NPDES authority assesses the merits of a UA, it should make each assessment on a case-by-case basis and will be guided by the applicable requirements of the bypass regulations, taking into account information related to the particular situation. EPA may change the elements of this assessment in the future.

Permittee:

Permit Number:

Reviewer(s):

Documents Reviewed:

Date Review Completed:

	Evaluation Criteria	Yes	No	N/A	UA Page#	Comments
I. Existing Flow Information						
Flows at the Plant						
1A	Base Flows – Does section A.6 of Form 2A provide data on the annual average daily flow rate at the plant for the previous three years?					
1B	Does the utility analysis provide additional data to adequately characterize base flows at the plant?					
2A	Peak Flows - Does section A.6 of Form 2A provide the maximum daily flow rate received at the plant for the previous three years?					
2B	Peak Flows – Does the Utility Analysis provide additional data on peak flows received at the plant?					
2C	Does the peak flow data provided in Form 2A adequately describe peak flow conditions during sustained periods of wet weather?					
3	Does the Utility Analysis provide a summary of long-term rainfall records					
4	Does the permittee present sufficient data for an adequate range of storms and other conditions (such as the occurrence of wet weather SSOs in the collection system, antecedent soil conditions, etc.) to demonstrate an adequate understanding of the relationship between rainfall conditions and influent flow rates at the plant?					
5	Does the permitte identify all locations where diversions have occurred (e.g., prior to primary, around secondary, around tertiary) during the					

Evaluation Criteria		Yes	No	N/A	UA Page#	Comments
	previous three years?					
6	Does the applicant provide information on the frequency and duration of diversions occurring in the previous three years?					
7	Does the applicant provide estimates of the volume of diversions at the plant occurring in the previous three years?					
Flows in the Collection System						
8	Does the Utility Analysis identify dates when wet weather induced SSOs occur in the collection system?					
9	Does the permittee present sufficient data for an adequate range of storms and other conditions to demonstrate an adequate understanding of the relationship between rainfall conditions and SSO volumes in the collection system?					
10	Does the permit applicant provide summaries of studies involving flow monitoring that have been conducted to evaluate rates and sources of I/I in the collection system?					
11	Has the applicant identified all municipal satellite collection systems in the collection system? (see section A.4 of Form 2A).					
12	Does the permit applicant provide flow monitoring data or data from pump stations to estimate the I/I levels contributed by each municipal satellite collection system?					
13	Does the applicant provide a summary of the results of past and on-going efforts to reduce I/I?					
14	Has the applicant adequately described its existing legal authority (or lack of authority)					

Evaluation Criteria		Yes	No	N/A	UA Page#	Comments
	to reduce I/I from municipal satellite collection systems?					
15	Has the applicant adequately described its existing legal authority (or lack of authority) to reduce I/I from private building laterals?					
II. Information Regarding the Existing Treatment Plant						
16	Does the permittee provide a process flow diagram or other information that adequately describes the *treatment process for average daily flows* (those associated with during dry-weather conditions)?					
17	Are design capacities provided for each component of the treatment plant?					
	i. Preliminary treatment					
	ii. Storage					
	iii. Primary clarification					
	iv. Secondary treatment units					
	v. Secondary clarification					
	vi. Disinfection					
	vii. Outfall					
18 A	Did the applicant indicate that stress testing has been conducted to identify the maximum wet weather capacity of capacity limited treatment processes?					
18 B	Is a summary of the results of any stress testing for capacity-limited treatment process components provided?					
19	Does the permittee provide a process flow diagram or other information that adequately describes the treatment process used when wet weather diversions are occurring?					
18	Is a clear description provided of where in the process peak flow diversions occur, where they are routed and which					

	Evaluation Criteria	Yes	No	N/A	UA Page#	Comments
	treatment units are routed around?					
19	Is a clear description provided of the flow rate that triggers the onset of peak flow diversions?					
20	Is the treatment process for peak wet weather flows clearly defined?					
21	Does section A.8.d of Form 2A (or the Utility Analysis) indicate whether the treatment works discharge or transports treated or untreated wastewaters to another treatment works?					
III. Estimates of Future Diversions						
22	Does the UA provide estimates of future peak wet weather diversions?					
23	What information used to estimate future peak weather diversions is provided in the UA?					
	i. Population growth estimates					
	ii. Estimates of current wet weather SSOs (that may require additional flows to the treatment plant)					
	iii. Projected collection system changes (improvements or deterioration)					
	iv. Projected treatment plant improvements					
	v. Any projected reductions in treatment plant capacity					
	vi. Projected changes in weather patterns					
24	Is the model used to predict future diversions described in the UA?					
IV. Potential Measures to Reduce Diversions						
25	Attachment 1 provides a table that can be used to track potential measures discussed					

	Evaluation Criteria	Yes	No	N/A	UA Page#	Comments
	in the Utility Analysis and the type of information provided for each alternative.					
27	Does the Utility Analysis describe the process by which by which alternatives were developed?					
V. Ability to Pay / Financial Capability						
The Costs of Providing Potable Water						
28	Has the applicant provided information on current costs of providing potable water to the community, including annual operations and maintenance expenses and annual debt service?					
29	Has the applicant provided estimates of planned water expenditures that will significantly increase the cost of providing potable water to the community?					
Wastewater Costs						
30	Has the applicant provided information on current costs of providing wastewater collection and treatment to the community, including annual operations and maintenance expenses and annual debt service?					
31	Has the applicant provided estimates of planned wastewater expenditures other than those associated with reducing wet weather diversions that will significantly increase the cost of providing wastewater collection and treatment to the community?					
32	Has the applicant provided adequate estimates of the costs of implementing recommended measures to reduce wet weather diversions?					
33	Has the applicant provide adequate information on the					

Evaluation Criteria		Yes	No	N/A	UA Page#	Comments
	following financial indicators:					
	i Current annual sewer rates					
	ii Estimated costs per household of implemented recommended measures					
	iii Unemployment rate					
	iv Median household income					
	v Property tax revenue collection rate					
34	Has the applicant identified plans to increase wastewater rates and use other sources of revenue to fund the improvements recommended in the utility analysis?					
35	Has the applicant provided a description, including a schedule, of plans to increase wastewater rates or otherwise raise revenue to fund the improvements recommended in the UA?					
VI. Selection of Feasible Alternatives						
36	Does the Utility Analysis described the approach used to screen and narrow the list of alternatives and list the screening criteria?					
37	Does the Utility Analysis explain the reasons for selecting recommended alternatives?					
38	Does the Utility Analysis project the performance of the treatment plant and collection system after the recommended alternatives are implemented (e.g., improvements to the treatment plant effluent, projected average annual number of diversions, improvements in the collection system)?					
39	Does the proposed schedule for implementing feasible measures provide adequate					

Evaluation Criteria		Yes	No	N/A	UA Page#	Comments
	detail and clarity?					
40	Does the applicant indicate how EPA's "CSO Guidance for Financial Capability Assessment and Schedule Development" was considered in the development of the proposed schedule?					
VII. Projected Effluent Quality						
41	Does the application provide data or other information that indicates that the blended effluent will meet permit limitations, including WQBELs, under *existing conditions?*					
42	Does the application provide data or other information that indicates that the blended effluent will meet permit limitations, including WQBELs, under *various alternatives?*					
VIII. Proposed Monitoring Protocol						
43	Has the applicant proposed a protocol for monitoring the recombined flow at least once daily during diversions for all parameters for which the POTW treatment plant has daily effluent limitations?					
44	Does the proposed monitoring protocol provide for appropriate representative monitoring for the total volume diverted and the duration of the diversion event?					

Attachment 1: Utility Alternatives Table

A = Potential Alternative	B	C	D	E	F	G
Changes in wet weather operations at the plant: reduced residence times at key unit operations						
Changes in wet weather operations at the plant: Changes in flow configuration						
Changes in wet weather operations at the plant: Other						
Increased structural capacity of individual treatment units						
Increasing capacity of existing storage units						
Providing additional storage units						
Flow reductions: I/I measures in portions of the collection system operated by the permittee						
Flow reductions: I/I measures in portions of the collection system operated by the municipal satellite collection systems						
Flow reductions: I/I measures in portions of the collection system operated by the permittee						
Flow reductions: I/I measures for building laterals						
Flow reductions: Control of slug loadings during wet weather						
Flow reductions: Routing flows to a different treatment plant.						
Sewer moratorium						
Treatment of diverted flows (e.g., supplemental biological treatment, physical chemical treatment, ballasted flocculation, deep bed filtration, membrane technology)						

A = Potential Alternative

B = Was this alternative identified in the UA?

C = Does the UA provide cost estimates for this alternative?

D = Does the UA propose a schedule for implementation?

E = Does the UA provide estimates of the reduction in the number and volume of diversions expected after the alternative is implemented?

F. Does the UA project the improvement in treatment plant effluent expected after the alternative is implemented?

G. Does the UA recommend this alternative as a ‘feasible alternative’?