Blending Policy and Draft Utility Analysis Document

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SYMBIONT

Requirements for POTW Discharge with Separate Sanitary Sewer Systems

- Provide secondary treatment
- Meet effluent limits
- All system discharges
  (SSOs not permitted)
- 30 mg/L BOD5
- 30 mg/L TSS

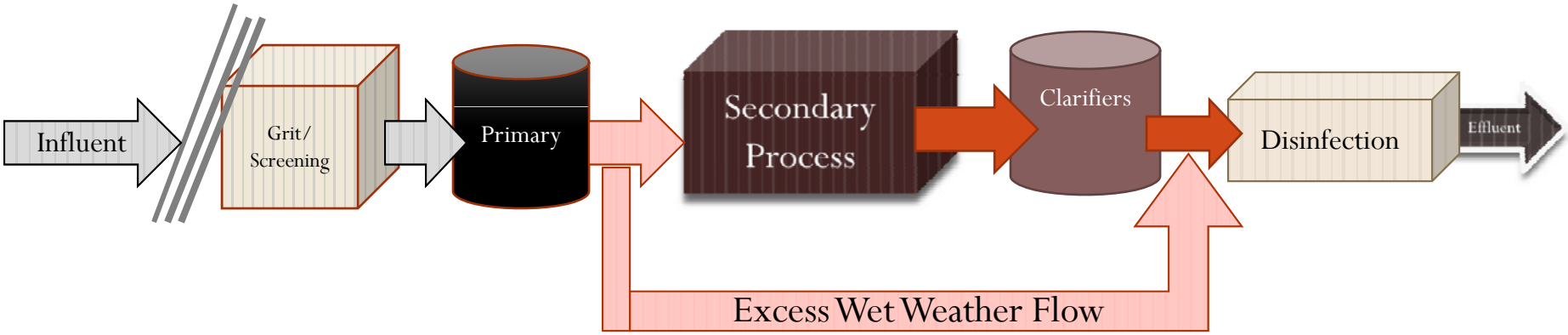
Peak Wet Weather Flows: Separate Sanitary Sewer Systems

- Some POTWs experience excessive peaking factors with wet weather events
- Individual or combined precipitation events
- Adverse effect on biological processes
- Infiltration/inflow reduction programs have not eliminated excessive peak flows at many POTWs
- Continuous maintenance/CMOM
- Private property issues
- Blending peak wet weather flows is a tecnique to maximize treatment and protect public health

40 CFR section 122.41(m)

- m) *Bypass* —(1) *Definitions.* (i) ***Bypass* means the intentional diversion of waste streams from any portion of a treatment facility.**
- (ii) *Severe property damage* means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
- **(2) *Bypass not exceeding limitations.* The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs (m)(3) and (m)(4) of this section.**
- (3) *Notice* —(i) *Anticipated bypass.* If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.
- (ii) *Unanticipated bypass.* The permittee shall submit notice of an unanticipated bypass as required in paragraph (l)(6) of this section (24-hour notice).
- (4) *Prohibition of bypass.* (i) Bypass is prohibited, and the Director may take enforcement action against a permittee for bypass, unless:
- (A) 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. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
- (C) The permittee submitted notices as required under paragraph (m)(3) of this section.
- (ii) The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in paragraph (m)(4)(i) of this section.

Blending



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Example NPDES Permit with Blending

Discharge Number and Name: 001 - Combined Final Effluent Channel Outfall

Load limits computed based on a design average flow (DAF) of 15.94 MGD (design maximum flow (DMF) of 40.25 MGD).

Excess flow facilities (if applicable) shall not be utilized until the main treatment facility is receiving its maximum practical flow.

From the effective date of this Permit until the expiration date, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

	LOAD LIMITS lbs/day DAF (DMF)*			CONCENTRATION LIMITS MG/L				
Parameter	Monthly Average	Weekly Average	Daily Maximum	Monthly Average	Weekly Average	Daily Maximum	Sample Frequency	Sample Type
Flow (MGD)							Continuous	
$CBOD_5$**	1329 (3357)		2659 (6714)	10		20	2 Days/Week	Composite
Suspended Solids	1595 (4028)		3191 (8056)	12		24	2 Days/Week	Composite
Dissolved Oxygen*****							2 Days/Week	Grab
pH	Shall be in the range of 6 to 9 Standard Units						2 Days/Week	Grab
Fecal Coliform***	Monthly Average shall not exceed 400 per 100 mL (May through October)						2 Days/Week	Grab
Chlorine Residual****						0.05	2 Days/Week	Grab
Ammonia Nitrogen as (N)								
April-May/Sept.-Oct.	239 (604)	--	1064 (2685)	1.8	--	8.0	2 Days/Week	Composite
June-August	239 (604)	--	1064 (2685)	1.8	--	8.0	2 Days/Week	Composite
Nov.-Feb.	532 (1343)	--	1064 (2685)	4.0	--	8.0	2 Days/Week	Composite
March	359 (906)	904 (2283)	1064 (2685)	2.7	6.8	8.0	2 Days/Week	Composite

Example NPDES Permit with Blending (cont.)

Discharge Number and Name: A01 Excess Flow - Combined Final Effluent Channel Outfall
(When Total Daily Flow exceeds 40.25 MGD*)

These flow facilities shall not be utilized until the main treatment facility is receiving its maximum practical flow.

From the effective date of this Permit until the expiration date, the effluent of the above discharge(s) shall be monitored and limited at all times as follows:

		CONCENTRATION LIMITS mg/L		
Parameter		Monthly Average	Sample Frequency	Sample Type
Total Flow (MG)	See Below	Continuous	Daily When Discharging	Continuous
BOD_5		30	Daily When Discharging	Grab
Suspended Solids		30	Daily When Discharging	Grab
Fecal Coliform**	Monthly Average Shall Not Exceed 400 per 100 mL Daily Maximum Shall Not Exceed 800 per 100 mL		Daily When Discharging	Grab
pH	Shall be in the range of 6 to 9 Standard Units		Daily When Discharging	Grab
Chlorine Residual		0.75	Daily When Discharging	Grab

Total flow in million gallons shall be reported on the Discharge Monitoring Report (DMR) in the quantity maximum column.

Report the number of days of discharge in the comments section of the DMR.

Fecal Coliform shall be reported on the DMR as daily maximum.

Chlorine Residual shall be reported on the DMR as a monthly average concentration.

pH shall be reported on the DMR as a minimum and a maximum.

BOD_5 and Suspended Solids shall be reported on the DMR as a monthly average concentration.

*A separate Discharge Monitoring Report (DMR) shall be submitted including only those days on which total daily flow exceeds 40.25 MGD. The dates on which this condition occurs shall be listed on that DMR.

**Fecal Coliform shall be reported on the discharge Monitoring Report (DMR) as Monthly average. Sampling not needed to be performed on the weekends when excess flow occurs.

Example Performance

- Average flow – 17 MGD
- Blending occurs when total daily flow exceeds 40.25 MGD
- 20 - 40 blending events annually
  - 24 - 48 hours
  - Variable from year to year
  - Dependent on precipitation and antecedent moisture

2005 Draft Blending Policy

- USEPA requested comments on the draft peak flows policy in December, 2005
  - Bypass provisions apply to diversions around secondary treatment
    - Separate sanitary sewer systems only
    - Combined systems subject to 1994 CSO policy
      - Wet weather diversions/separate treatment allowed
      - Primary plus disinfection
  - Applies to:
    - Peak flow wet weather diversions following primary treatment
    - From POTWs serving sanitary sewers
    - Recombined flows prior to discharge
    - Does not address diversions around tertiary treatment units

2005 Draft Blending Policy (cont.)

- EPA believes that:
  - Diversions around secondary processes not necessary in many cases
  - Not approvable where feasible alternatives are available through Utility Analysis or if other provisions of the bypass regulation not met

USEPA Approaches to Achieve 2005 Policy Goals

- Full utilization of available secondary capacity
- Reduce I/I
- Maximize use of collection system for storage
- Provide off-line storage
- Enhance / expand secondary treatment capacity

July 2005 Draft Utility Analysis

- Permit renewal requesting blending diversion would require a Utility Analysis with the following elements:
  - Documentation of the unit process design capacity
    - Feasibility of increasing capacity and costs
  - Current frequency, duration and volume of wet weather diversions
    - Alternatives to reduce frequency, duration and volume of wet-weather diversions and costs

July 2005 Draft Utility Analysis (cont.)

- Elements of Utility Analysis:
  - Future peak wet weather flows
    - Climate change, upgrades, service extensions,
    - Options to reduce diversions re these variables
  - Assess existing inline storage or offline
    - Enhanced operational utilization
    - Expansion and costs
  - Assess other controls
    - Limit new connections
    - Limit slug discharges from indirect dischargers

July 2005 Draft Utility Analysis (cont.)

- Elements of the Utility Analysis:
  - Evaluate other technologies for peak wet weather treatment/diversion treatment
    - Supplemental biological treatment
    - Physical/chemical treatment
    - Costs
  - Evaluation of the extent to which permittee is maximizing I/I reduction
    - Utility –owned sewers
    - Satellite systems
    - Expansion of legal authority (Private property?)

July 2005 Draft Utility Analysis (cont.)

- Elements of the Utility Analysis:
  - Peak flow reduction through CMOM
    - Scheduled improvements for established CMOM
    - Reductions obtainable through CMOM and costs
  - Funding capability
    - Sewer rates, planned rate increases
    - Other state, federal, or local funds
    - Other community costs
    - Use CSO LTCP Financial Capability Assessment Guidance
  - Monitoring plan for diverted flow
  - Projection of effluent improvement with collection system and treatment plant improvements

Summary of Draft Utility Analysis

- Emphasis on reducing or eliminating diversion and recombination
- Collection system and treatment plant improvements anticipated
- Recommended operational practices similar to CSO control technologies and CMOM evaluations
- Implementation schedule and cost similar to CSO LTCP financial capability evaluation
- Guidance not clear on alternate treatment technologies for diverted flow
  - EPA Regions have been interpreting these potential technologies differently
  - Physical/chemical options considered to not meet secondary treatment standards
- Implementation schedule required - length undefined
- Monitoring to determine effectiveness of improvements

Status of Blending Policy

- Draft policy was “stuck” at OMB - concerns about cost
- Draft Utility Analysis Guidance became available July 2009; numerous comments received
- USEPA is redrafting the UA Guidance
  - Less reference to 2005 Policy; more technical
  - Grounded in Bypass Regulation
  - Discusses alternatives as available
  - Refers to “WEF’s Guide to Managing Peak Wet Weather Flows in Municipal Wastewater Systems (Guide) (WEF, 2006)”regarding Best Management Practices for Wet Weather Control
  - More emphasis on affordability
- REVISED DRAFT UTILITY ANALYSIS GUIDANCE IS EXPECTED TO BE PUBLISHED FOR COMMENT IN THE FEDERAL REGISTER MID – FEBRUARY

Recent Studies -
Microbiological Risks with Blended Effluents

- "Characterizing the Quality of Effluent and Other Contributory Sources During Peak Wet Weather Events" Gray, Donald MD, et. al, Water Environment Research Foundation, 2010

- "Impact of Wet-Weather Peak Flow Blending on Disinfection and Treatment: A Case Study at Three Wastewater Treatment Plants" R. Boris Rukovets and Brian J. Mitchel, EPA/600/R-10/003, 2010

WERF Study

- Sampling during blending events at:
  - East Bay Municipal Utility District
  - City of San Francisco Southeast Water Pollution Control Plant
  - Milwaukee Metropolitan Sewerage District Jones Island Wastewater Treatment Plant
  - Cities of Eugene and Springfield Water Pollution Control Facility
- Hydrodynamic and water quality modeling of pathogens and quantitative microbial risk assessment

WERF Study (cont.)

- Purpose of Modeling
  - Relative impacts of blending practices re potentially elevated pathogen concentrations
  - Transport and distribution of pathogens in San Francisco Bay
  - Estimate of human health risk
- Alternative to Blending
- Guidance for evaluating blending impacts

Sample Results – EBMUD Blending Events

- No increase for *chryptosporidium*, enteric viruses, rotaviruses, pathogen indicator organisms (*E. coli*, *enterococcus*, male specific coliphage) for blending vs non-blending (peak secondary) events.
- Giardia and adenovirus present in greater numbers during blending events
- Norovirus inconclusive
- TSS and BOD_5 higher during blending events

Risk Assessment - EBMUD

- Giardia and adenovirus evaluated for three recreational exposure sites
- Less than one infection increase annually
  - 180 exposure events per day (conservatively high)
  - 30 events per year (highest in 8 years)
- Limitations
  - Sampling challenges during wet weather
  - Grab samples
  - Other sites may exhibit different presence and die off rates than the three sites examined

EPA Study

- Three New York City treatment facilities
- Combined system
- Diversion after primary treatment and recombination for disinfection
- Analyzed key pathogens, pathogen indicators, TSS, BOD
- Macerated samples to determine if organisms were masked within the solids

BOD and TSS Results

- Removal in primary treatment possibly limiting:
  - 28% & 23% BOD removal P1/P2
  - 31% & 49% for TSS P1/P2

	BOD		TSS	
	Ave mg/L	% reduction	Ave mg/L	% reduction
Plant 1	24	77%	29	81%
Plant 2	22	71%	20	89%

Pathogens in Blended Effluent

	Fecal coliform	Enterococcus
	MPN , cfu/100 ml	MPN, cfu/100 ml
Plant 1	4,900	17,000
Plant 2	19,000	14,000
Plant 3	520	870

Chryptosporidium detectable in 2 of 19 samples

Geometric mean of Giardia in low triple digits;

88% and 40% Giarida removal Plant 1 and 2

Enteric virus removal 98-99%; Reovirus, Norovirus and Hepatitis A not detected

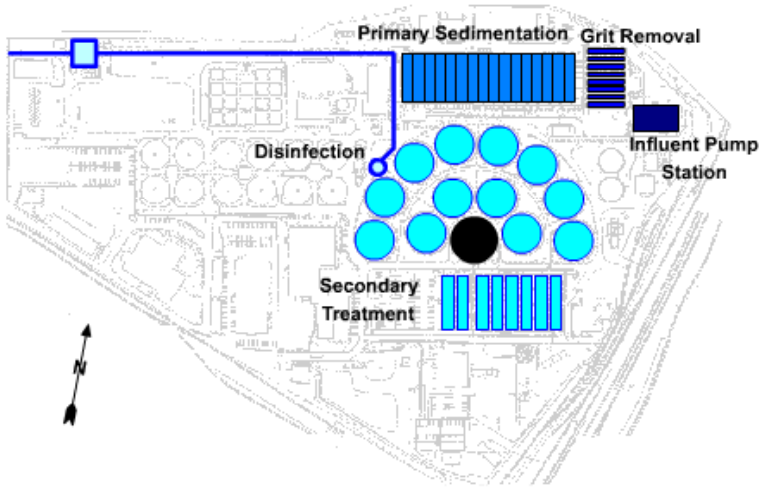
Maceration increased the Enterococcus concentration

No correlation between total residual chlorine and fecal coliform

Summary

- USEPA Blending Policy is intended to reduce and eventually eliminate blending at the POTW
- Utility Analysis is comprehensive study and long term plan to improve operations and expand treatment capability
- Improvements are expected in the collection system and at the POTW
- Evaluation of the blended effluent and the water quality impacts are site specific, but may indicate minimal risk
- Revised Utility Analysis Guidance is expected from USEPA in mid- February

Discussion



Liquid Treatment Process Layout