

## MARCH 25 MEETING

### STORMWATER MIXING ZONES

**Background:** Parametrix has performed a preliminary dilution analysis for proposed stormwater outfalls around STIA. Effluent mixing in streams is ordinarily evaluated at the 7Q10 and 30Q5 flows for chronic and acute zones, respectively. Although the 7Q10 and 30Q5 flows can be calculated from HSPF simulation results for receiving streams around STIA, stormwater discharge would be quite unlikely during those conditions. For instance, the probability of stormwater discharge from the proposed 3RWN outfall during either 7Q10 or 30Q5 Miller Creek flows is less than 0.000. This discussion focuses on a site-specific approach for performing the mixing zone analysis.

1. Alternate *critical condition* definition needed
  - a. Based on 3RWN analysis, probability of stormwater discharge during 7Q10 and 30Q5 streamflow conditions appears to be extremely low (i.e.  $P < 0.000$  for 3RWN) (see Figure)
2. Positive correlation between stormwater and receiving water discharge suggested the statistical assessment
  - a. Both dependent on rainfall events
  - b. Extensive (hourly discharge over 47 years) HSPF simulation results available
3. Recommend design condition based on higher probability discharge combinations
  - a. Represent rainfall events of interest
  - b. Narrower (and relatively low, therefore, conservative) range of dilution factors
4. Reasonable dilution would occur within a reasonable downstream distance during the conditions (rainfall events) of interest
  - a. For 3RWN, dilution would be about 14- to 24-fold at about 15 to 20 m downstream distance
  - b. 3RWN fairly representative for Miller Creek outfalls
  - c. Maximum allowable downstream distance under regulations is about 91 m for chronic
5. Some numerical criteria would not be met
  - a. Complete mixing (mixed w/entire streamflow, no further dilution possible) will be needed to attain reasonable dilutions (14- to 24-fold dilution for 3RWN is based on complete mixing)
  - b. Complete mixing would exceed the 25% of width (chronic and acute zones) and percent-of-flow (25% chronic, 2.5% acute) criteria
6. Ordinary numerical criteria may not be applicable for the proposed outfalls
  - a. A site-specific approach is proposed
  - b. WAC 173-201A-100 provides for exceptions under some circumstances (see Table)

WAC 173-201A-100 numerical criteria and provisions for exceptions

Numerical Criteria		Provisions for Exception	
Paragraph	Summary of Requirements	Paragraph	Summary of Requirement
(3)	Critical discharge conditions must be considered (ordinarily a design storm, 7Q10 for chronic, 30Q5 for acute)		No exception in principle, 7Q10 and 30Q5 flows inapplicable, site-specific critical conditions are proposed
(7)(a)	In streams, the zone in which chronic criteria may be exceeded cannot: <ul style="list-style-type: none"> <li>(i) extend more than 300 feet downstream or 100 feet upstream from the discharge point;</li> <li>(ii) utilize more than twenty-five percent of the flow; or</li> <li>(iii) occupy more than twenty-five percent of the width.</li> </ul>	(10)(b)	Stormwater discharges not containing "process wastewater" may be exempted from the requirements of (7), (8), and (9) if: <ul style="list-style-type: none"> <li>(i) best management practices have been applied;</li> <li>(ii) the requirements of (4) (no damage and so forth) would be met; and</li> <li>(iii) the mixing zone would not create a barrier to passing organisms.</li> </ul>
(8)(a)	In streams, the zone in which acute criteria may be exceeded cannot: <ul style="list-style-type: none"> <li>(i) extend beyond ten percent of chronic zone distances;</li> <li>(ii) utilize more than two and one-half percent of the flow; or</li> <li>(iii) occupy more than twenty five percent of the width.</li> </ul>	(12)	Exceedances of the requirements of (7), (8), and (9) may be considered if: <ul style="list-style-type: none"> <li>(c) where removal of the discharge would be the only other option, receiving water flow augmentation volume would provide a greater benefit than removal; or</li> <li>(d) the exceedances are needed to accommodate important economic or social development.</li> </ul>
		(13)	Before exceedances of the requirements of (7), (8), and (9) will be allowed: <ul style="list-style-type: none"> <li>(a) AKART must be applied;</li> <li>(b) economically achievable siting, managerial, and technical options must be utilized; and</li> <li>(c) the mixing zone would have to comply with the requirements of (4) (no damage and so forth).</li> </ul>