

**ACWA Stormwater Committee
Phase 1 Permit Renewal Coordination Subcommittee
(Phase 1 Committee)
Trend Analysis Sub-subcommittee**

October 26, 2007

Attendees

Krista Reininga, URS	Steve Anderson, Clean Water Services
Frank Wildensee, City of Portland	Sean Duyck, Clean Water Services
Jan Miller, Clean Water Services	Terese Walsh, City of Eugene (Phone)
Raj Kapur, Clean Water Services	

This group met to develop a trending proposal for the Phase 1 Committee to review at the next Phase 1 Committee meeting on November 15, 2007. After our discussions at the meeting, we will likely share it with DEQ during the second half of the meeting.

Trending is called out in the permits in MS4 Permit Renewal Submittal Schl B(2)(c)(vi)

An evaluation of overall program effectiveness, including non-structural BMP activities. This analysis will include an analysis of monitoring and other data, including a water quality trend analysis and a discussion of likely or potential factors for the presence of observed trends in water quality.

Historical Perspective:

In 2004 when the 2006 SWMPs were being developed, there was an ACWA stormwater monitoring subcommittee that met to make recommendations on monitoring and data evaluation. It proposed the inclusion of receiving stream (ambient) data in the stormwater permit and suggested evaluating the receiving stream data for trends rather than trying to detect trends in the stormwater data.

Trending Subcommittee Recommendations

The subcommittee recognizes that not all jurisdictions will have sufficient data to do statistically valid trend analyses. Each jurisdiction may have reasons for doing more trending than is suggested below. The following is an overview of the topics that we discussed and our minimum recommendations for the jurisdictions that do have sufficient data to do trend analyses:

Item	Discussion / Recommendation
Parameters	<p>Select key parameters from the required list in table B-2</p> <p>Committee recommends that all permittees do TSS, Total Phosphorus, Copper (Total Recoverable, and Soluble), Zinc (Total Recoverable and Soluble), and <i>E.coli</i></p> <p>Additional parameters would be discretionary</p>
Sites	<p>Receiving Stream (Ambient) sites All on Table B-1 or selected sites. If selected sites, include the rationale for selecting them.</p>
Season	<p>Because these are stormwater issues: Wet (winter) (November to April)</p> <p>Additional evaluations, dry (summer) or yearly, are discretionary</p>
Date Range	<p>Try to go back to a period of time before you initiated your stormwater management program.</p> <p>Document the period of time used.</p>
Presentation	<p>Use a table to show positive, negative, or no trend for all the sites and parameters analyzed.</p> <p>If possible use graphs to highlight key trends, especially those that are part of the <i>discussion of likely or potential factors for the presence of observed trends in water quality</i> (from permit renewal requirement).</p>
Statistical Tests	<p>Nonparametric, Mann-Kendall</p> <p>Ideally this test will be done on at least 5 years of data and at least 30 data points</p> <p>If less time or data, may want to note that there may not be enough data to show a trend</p> <p>Seasonal Kendall can be used on monthly</p>

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	<p>data that covers at least 10 years. This can increase the probability of detecting a trend that was present but obscured by seasonal variability.</p> <p>The season would be monthly data</p>
Pre-processing of the data	<p>If the monitoring frequency is variable over the time period that is being evaluated, you need to pre-process the data down to the lowest frequency.</p> <p>Recommend using medians</p> <p>Committee will investigate the ability to use a more random method such as the most-middle data point of the month.</p>
Values below the detection level	<p>Committee has no recommendation at this time.</p> <p>Options are:</p> <ul style="list-style-type: none"> • Not use the data • Set the value at the detection level • Set the value at half the detection level • Use complex statistics to estimate the true value <p>If it is a big issue, the committee will evaluate it in the future.</p> <p>Committee urges extreme caution if trying to do a trend on a set of data, if there has been a significant change in the detection level and it includes non-detect values.</p>
Flow Adjustments	<p>This is discretionary</p> <p>If flow data is available this is a very good option.</p> <p>If not, rainfall can be a surrogate for flow but it isn't always easy to figure out how to pre-process the rainfall data</p>
Determination of Statistical Significance	<p>Recommend the α level of 0.05. This means there is only a 5% chance that the trend observed was not real (or that there is</p>

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	a 95% chance that the trend is real). This will make discussing the causes of the trends easier (... <i>discussion of likely or potential factors for the presence of observed trends in water quality</i>).
Discussion of Trends	When discussing trends, relate them to stormwater activities that may have impacted the trends and to the environmental significance of the trend (i.e. where is the data and trend relative to water quality criteria or TMDL levels)