PUGET SOUND MONITORING CONSORTIUM
TECHNICAL ADVISORY COMMITTEE

PROPOSED PILOT PROJECT #2:

Understanding Stormwater Suspended Particulate Matter Sampling Techniques

The NPDES Phase I permit requires monitoring of sediments from stormwater monitoring sites using sediment-traps. Traditional designed sediment traps sample stormwater suspended particulate matter from a discrete point in the water column. The sampling method is simply a sample bottle with a nozzle angled 45 degrees upward against flow. Issues with the sampling method include:

It takes up to six months to gain sufficient solids volume for analysis.
A discrete mid-point, vertical sample from a stormwater pipe does not sample bedload. Results are mainly used for source tracing and may not be appropriate for developing pollutant loadings.

A study designed to evaluate the relationship (a solids balance) between co-located whole-water samplers and traditional sediment traps would enable us to assess what fraction of solids the sediment trap represents in the whole water sample. In addition, we could test if a redesigned sediment trap that fits into the base of a stormwater pipe is a better sampling device. Advantages of a redesigned sediment trap (that works) would include: sampling bedload, sampling settling and suspended solids (i.e., sediment associated contaminants); and the ability to target a single storm or first flush event versus leaving the device out for six months.

The results of this study will allow us to better assess the sediment-trap devices, their use in stormwater monitoring and source control, and what the results represent and their appropriate uses (i.e., source control, loading estimates, etc.).

Coordinating the scoping of this potential pilot project: Dana de Leon and Chris Burke, Tacoma
Also helping to scope this potential project: David Batts, WSDOT; Bob Cusimano, Ecology; Julie Lowe, Ecology; Andy Rheaume, Seattle; Rod Swanson, Clark County; Kathy Thornburgh, Snohomish County; and Richard Tveten, WSDOT

1. What problem(s) is being addressed by the proposal, and what would be the expected outcome(s) of the project?

The NPDES Phase I permit requires annual monitoring of sediments from stormwater monitoring sites using sediment-traps. Traditional designed sediment traps collect stormwater suspended particulate matter from a discrete point in the water column over a 3 to 6 month period. A redesigned sediment trap may provide a quicker method for sampling, that is days to a few weeks There is a current lack of understanding about

what these sediment sample represents within the stormwater discharge and their appropriate use based on what they do represents.

The results of this study will allow us to better assess the sediment-trap devices, their use in stormwater monitoring and source control, and what the results represent and their appropriate uses (i.e., source control, loading estimates, etc.). In addition, we can evaluate:

- a design-function comparison of the 2 types of sediment traps (Is there a way to create a sampling device that can attempt to capture whole sediment transport of the conveyance (suspended and "bedload"). This could be used as a reference and then other methods/traps can be measured against this to determine effectiveness/representativeness.)
- how we can relate past results to new
- relationships with continuous sediment particle distribution and whole water to get at the overall representativeness.

This project will address this problem by:

a. Providing a method to identify contaminants in stormwater sediments.

b. Evaluating the relationships between land-use, and stormwater sediments chemical concentrations.

c. Providing a better information basis for planning and executing successful programs to reduce contaminants in stormwater.

d. Improving the focus and cost-effectiveness of subsequent investigations, direct source control efforts, and make revisions to stormwater program elements (e.g. treatment facilities that remove stormwater sediments).

e. Allow for more representative loading estimates of sediment/chemical transport from conveyance systems.

2. What is the current status of the situation? In other words, is anything underway today to address or resolve the problem or are the "tools" needed to address it in place? Has there been some success, or is the problem getting worse?

The NPDES Phase I Permit requires a single stormwater sediment sample collected annually from each of the three land uses: residential, commercial and industrial. However, interpretation and use of the sediment results are not clearly defined in the permit. Its possible that sediment sample findings could grossly underestimate or overestimate pollutant loadings from conveyance sediment if data is used or interpreted as representative of loading. Additionally, conveyance characteristics have a heavy impact on sample composition (grain size distribution) and the current sediment trap design shouldn't be accepted as a one size fits all device.

3. Who should participate in the project, and why?

NPDES Permitted Municipalities and Ecology can use the results of this study to target source control efforts and adapted management feed back into Stormwater Management programs and the NPDES Permit. The results of this study will allow us to better assess the sediment-trap devices, their use in stormwater monitoring and source control, and what the results represent and their appropriate uses (i.e., source control, loading estimates, etc.).

This will provide Permittees and Ecology another "tool" for stormwater monitoring and source tracing.

4. What process or steps would be needed to address the problem and achieve the expected outcomes?

What are the steps to achieve the desired outcomes?

- QAPP development
- Coordination with project participants
- Monitoring
- Data analysis
- Report preparation and recommendations

Key components of the proposed program are:

- Co-locate traditional and low profile sediment-trap designs and an ISCO sampler at each location – residential, commercial and industrial land use sites
- Collect flow proportional Whole-water samples for base and storm events
- Collect one wet season sediment sample using the traditional traps
- Collect biweekly/monthly sediment samples using low profile traps with frequency dependent on site characteristics (how fast it fills up)
- continuous sediment particle distribution
- Analytical chemistry conducted with each event

Data analysis includes:

- a design-function comparison.
- how we can relate past results to new according to a method change (and is a standard approach).
- Evaluation of relationships between land-use
- Evaluation of relationships with continuous sediment particle distribution and whole water to get at the overall representativeness,

5. **What would be the approximate cost of the project? What portion of the costs would be paid out of the funding Department of Ecology received to launch this program? What portion if any, would be paid by others?**

	ISCO Purchase 1st year	Labor	Lab	Overall Total	w/o NPDES Outfall Monitoring
Per station per event	$5,000 (one time purchase)				
6 Storm, 4 base & flow sampling		$ 7,600	$15,000		$12,800
Sediment Trap: 1 old, 12 new		$ 3,400	$23,400		$24,800
Total 1 stations		$13,000	$38,400		$37,800
Total 3 stations	$15,000	$39,000	$115,200		$112,200
QAPP		$14,000			$14,000
Data analysis/ management		$21,000			$21,000
Report		$14,000			$14,000
Total – 3 sites		**$88,000**	**$115,200**	**$207,200**	**$161,200**

The project costs are based on 6 month deployment at 3 sites: residential, commercial and industrial with co-located whole water sampler (6 storm, 4 base and continuous flow monitoring), traditional sediment trap and low profile sediment trap (biweekly sample collection). Project costs may very depending on the final study design.

No participants have committed to fund all or a portion of this project. Phase I NPDES Permittees will be collecting several stormwater samples and one sediment sample at each of three land use.

Each Phase I permittee could participate by collocating the low profile sediment trap at one or more outfall monitoring sites. If Phase Is provide monitoring labor and costs, a combination of participants' and Ecology's funding could be used for analytical and toxicity testing, QAPP development, data management/analysis and/or final report preparation.

6. **How would this project address interests, needs and concerns of rural communities?**

This project will provide standard techniques to evaluate stormwater sediment contaminants and their sources in rural areas. Phase I Counties are required to sample stormwater sediments. This study would assist the counties in appropriate use and interpretation of the sediment data.

7. **How would the project meet the criteria agreed to by the Committee in October? Those criteria are: a) Builds the credibility of the program. b) Tests working relationships. c) Provides credible and meaningful information that addresses the framework questions. d) Encourages leveraging of resources. e) Is voluntary ("a coalition of the willing") and attracts additional participants over time. f) Is simple. g) Can get going in less than one year.**

   a) This project will help build the credibility of the monitoring group by providing high quality data about stormwater sediments from different land uses and what the

results represent and their appropriate uses (i.e., source control, loading estimates, etc.).

b) Phase I permittee collaboration builds upon basic permit requirements to create a more useful study.
c) The results of this study will be shared with all those interested in managing stormwater thereby eliminating the need for other groups to conduct their own study.
d) See b
e) This project is beyond the basic permit requirements and participation would be voluntary.
f) The project has a clear objective and establishes new methods and tools for source control and gathering information to better manage stormwater.
g) The City of Tacoma will work with other municipalities and interested groups to develop this project and share the results. The proposed project could be conducted by the City of Tacoma and other Phase Is using existing staff and can begin this year once funding is received.