

PUGET SOUND MONITORING CONSORTIUM
TECHNICAL ADVISORY COMMITTEE

PROPOSED PILOT PROJECT #1:

**Development of Standardized Operating Procedures (SOP)
and Quality Assurance Project Plans (QAPPs) for Stormwater**

Scientists, managers and stakeholders within Puget Sound region would greatly benefit from creation of standardized SOPs and QAPPs for use in monitoring programs. Through standardization, data utility may be maximized to ensure clear interpretation and comparability of results. In turn, this will help Puget Sound managers develop a regional evaluation of stormwater, including (but not limited to),

1. Pollutant runoff relative to spatial (majority land use), temporal (antecedent, storm events, season, water year) and hydrological (rainfall duration/intensity) mechanisms,
2. Source control and management practices through effectiveness monitoring,
3. Long-term trends in stormwater quality.

A SOP is a set of written instructions that document a routine or repetitive activity followed by an organization (EPA 2007). The Quality Assurance Project Plan (QAPP) describes necessary quality assurance, quality control, and other technical activities that must be implemented to ensure that the results of the work performed will satisfy stated performance criteria. A series of SOPs often forms the backbone of a QAPP.

Data from a number of projects may be pooled for assessment of a large ecosystem. By increasing the comparability of data between studies, you create a common dataset and increase the statistical robustness, accuracy, and predictive capabilities of the data analysis results.

This project addresses a gap in Puget Sound regional standardization efforts (none consider stormwater), and coordination (few are inclusive of all data generating entities). Additionally, the project addresses several key issues under discussion for the Puget Sound Partnership Action Agenda including,

1. What is the current status of Puget Sound's health and what are the biggest threats to it (*what is the threat from stormwater*)?
2. What actions must be taken that will move us from where we are today to a healthy Puget Sound by 2020 (*effectiveness monitoring of stormwater source control and best management practices*)?
3. Where should we start (*any effort begins with assessment of existing data and generating data to fulfill gaps of knowledge*)?

Although this project is initially targeted for stormwater, it may be expanded to ensure harmonization with other monitoring platforms (receiving waters, etc), or narrowly focused for a specific question (e.g., what sample container material is appropriate for all parameters taken from an automated stormwater sampler?).

A procedures standardization exercise like this was completed for marine SOPs through development of the Puget Sound Estuary Protocols (PSEP)

<http://www.psat.wa.gov/Publications/protocols/protocol.html> (1986-1998). The process yielded excellent results, as many of the methods are currently in use today.

Coordinating the scoping of this potential pilot project: Chris Burke and Dana De Leon, Tacoma.

Also helping to scope this potential project: David Batts, WSDOT; Bob Cusimano, Ecology; Heather Kibbey and John Collins, Pierce County; Julie Lowe, Ecology; Jim Simmonds, Dean Wilson and Luanne Coachman, King County; Rod Swanson, Clark County; Kathy Thornburgh, Snohomish County; and Richard Tveten and Doug Navetski, WSDOT

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

Even under the strictest sampling protocol, data generated from stormwater sampling is highly variable. As a result, it is difficult to meaningfully describe spatial/temporal conditions and trends, effectiveness of management actions, and target source contributions. The difficulty of data assessment is compounded when dissimilar field and laboratory methods contribute to variability.

This project will reduce (and estimate) variability associated with sampling and analysis by project participants though:

Procedural

- Scope and agree upon a core set of field and laboratory standard operating procedures to be used by entities within the region.
- Scope and agree upon key quality assurance/control protocols and performance restrictions governing usability of data.
- Define additional projects which support standardized SOP/QAPP (interlaboratory calibration studies, field method and performance audits, etc).
- Develop regional monitoring SOP/QAPP as a living document to be refined as procedures, performance and data gaps are evaluated.

Performance

- Describe initial variability and bias associated with method SOPs.
- Assess regional quality control performance data submitted by all monitoring groups for precision, accuracy and bias.
- Recommend procedural and performance refinements to increase precision and accuracy, and lower bias of data generating entities.

The anticipated result is estimation and limitation of data variability due to monitoring methods. The emphasis on quality assurance and control supports stakeholder trust of monitoring, decisions resulting from monitoring data and facilitates working relationships between scientists, regulators, permittees, industry and public interest groups. Cost effectiveness is maximized as resources are directed to a common stormwater monitoring approach.

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?

This project addresses a gap in Puget Sound regional standardization efforts (none address stormwater monitoring), and coordination (few are inclusive of all data generating entities).

Existing regional efforts and participants include,

1. Washington State Department of Ecology. Internal effort. Currently producing standard operating procedures for use in monitoring studies, <http://www.ecy.wa.gov/programs/eap/quality.html>, and requires a Quality Assurance Project Plans for all monitoring (internal and external-grants), including the Phase I and II NPDES stormwater permits (Ecology 2007a, b, respectively).
2. Washington State Forum on Monitoring Salmon Recovery and Watershed Health. Federal, state and regional resource and recovery boards. <http://www.rco.wa.gov/monitoring/default.htm>
3. Pacific Northwest Aquatic Monitoring Partnership. Federal, State, Native American, and Columbia River utilities. <http://www.pnamp.org/web/Content.cfm?SectionID=8>
4. Puget Sound Ambient Monitoring Program. Federal, State and King County Department of Natural Resources. <http://www.psat.wa.gov/Programs/PSAMP.htm>

A standardization exercise similar to this proposal was completed for marine SOPs and resulted in the Puget Sound Estuary Protocols (PSEP)

<http://www.psat.wa.gov/Publications/protocols/protocol.html> (1986-1998). This is a publication of PSAMP, an excellent example of the standardization process, and many of the methods are still in use today.

Currently, several cities and counties are collaborating on stormwater SOPs under the Washington State Department of Ecology, Phase I Municipal Stormwater NPDES Permit. The permittees have made progress, yet face time and regulatory constraints which prevent attainment of the greatest benefits from this approach. Continuing and expanding the efforts of the existing collaboration group would,

- Expand scope of SOP/QAPP beyond regulatory permit requirements for creation of a holistic stormwater monitoring approach. Depending on the final scope, this may expand to include (but not limited to),
 - Detailed SOP production of major factors influencing stormwater monitoring.
 - Incorporate SOPs for stormwater Best Management Practice evaluations (i.e. reference sites, site suitability, accept/reject BMP, evaluate unique characteristics, etc.)
 - Incorporate SOPs for waters receiving storm discharge (receiving waters).
- Promote SOP/QAPP collaboration as an ongoing quality control effort.
- Provide opportunity to solicit participation from all monitoring entities including Federal, State, County, City, academic, consulting, industry and non-profit groups. This will be a unique effort to bring together both the regulators and the regulated.
- Provide opportunity to communicate efforts to citizens.

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

Any and all stormwater data generating groups should be invited. Additional participants may be included depending on the final scope of the project. The ultimate goal is the generation of accurate, precise and comparable stormwater data for use in environmental decision making. The

greater number of comparable analysis points, the more robust the data set supporting management actions. At a minimum, NPDES permitted municipalities, Ecology and EPA should participate to establish a credible and comparable data assessment, readily utilizable by our regulating agencies.

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

Immediate

- Solicitation of stormwater monitors, regulators and scientists, leading to
- Establishment of stormwater SOP and QAPP forum.
- Creation of forum governance.
- Establishment of collaborative goals and objectives for standardized SOPs and QAPPs.
- Establishment of comprehensive list of stormwater SOPs and QAPP criteria.
- Reduce list to key SOP and QAPP criteria.
- Set tasks to be completed by subgroups.
- Complete and circulate draft documents for review.
- Revise drafts based on discussion.
- Post and circulate SOP and QAPP deliverables.

Ongoing

- Submission of annual quality assurance and control data.
- Identify and execute projects to promote data accuracy, precision and comparability.
- Discuss project success, propose refinements and discuss tasks to continue promotion of comparable and credible stormwater sampling and analysis.

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?

Project costs include time of participants, meeting location/travel, website to communicate project objectives, and studies or exercises to investigate data precision, accuracy and bias including (but not limited to):

- Training,
- Auditing - Field and Laboratory (may be more intensive or specific than Ecology or NELAP),
- Field quality control sampling,
- Field method comparisons (sediment traps, etc.),
- Laboratory inter-calibration.

The effort may be designed to be as inexpensive as possible, requesting submission of quality control data produced within NPDES permit requirements, data analysis by project participants, and generation of core SOP/QAPPs. The cost of this level of study would be \$10,000/yr for basic website, database and organization. Time contribution of participants has not been quantified.

Project costs will be a function of the final scope, number of participants, and intensity of studies. Beyond the coordination scope, additional elements may be added and cost ranges include:

Training	\$10,000	to > 50,000
Auditing	\$10,000	to > 50,000
Field Quality Control	\$10,000	to > 50,000
Field Method Comparisons	\$15,000	to > 50,000
Laboratory inter-calibration	\$50,000	to > 130,000

If this project is selected, a more refined cost estimate will be generated according to participation and desires of the monitoring consortium. The majority of time costs would be paid by project participants, laboratory costs to be paid by participants and the Department of Ecology.

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

All communities produce stormwater and the NPDES phase II regulation extends to the more rural areas of Washington State. Rural communities are often subject to forest, agricultural and industrial monitoring and best management practice evaluations which may use the same or similar SOPs as established through a standardized/regional monitoring QAPP. Many of our rural communities currently monitor stormwater; urban partners gain knowledge of rural monitoring influences and may, in-turn, communicate urban-specific considerations. From a regional prospective, all stormwater monitoring data in the Puget Sound basin will be used in protection and restoration decision making. The rural communities hold an equal stake in generation of credible and comparable data as their urban partners.

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 promoting the generation of higher quality data that is comparable and has an estimable variability and bias.
- b) Standardization of SOPs and QAPPs requires participation of multiple entities; otherwise the value of the documents is restricted to a single organization – which is the status of the situation today.
- c) The results of this study provide a baseline for communities in creation of their specific stormwater monitoring, quality assurance and control protocol.
- d) It is in the vested interest of monitoring entities to participate, as results of the project may be held as a standard for a monitoring program (grant, contract or other) in the future. Having comparable data across regions will add value to data gathered with limited additional costs to participants.
- e) This project is beyond the basic permit requirements and participation would be voluntary.
- f) The project has a clear objective and scope will be refined by project participants.
- g) The Phase I Monitoring Collaborative is currently underway; this project would expand project participation and scope to yield results beneficial to the regional monitoring community.

References:

EPA 2007. Guidance for Preparing Standard Operating Procedures (SOPs): EPA QA/G6. EPA/600/B-07/001, April 2007. <http://www.epa.gov/QUALITY/qs-docs/g6-final.pdf>

Ecology 2007a. Phase I Municipal Stormwater Permit. National Pollutant Discharge Elimination System and State Waste Discharge General Permit for discharges from Large and Medium Municipal Separate Storm Sewer Systems. Washington State Department of Ecology. January 17, 2007.

http://www.ecy.wa.gov/programs/wq/stormwater/municipal/phase_I_permit/phase_i_wwa-0107/ph_i_permit-final.pdf

Ecology 2007b. Western Washington Phase II Municipal Stormwater Permit. National Pollutant Discharge Elimination System and State Waste Discharge General Permit for discharges from Small Municipal Separate Storm Sewers in Western Washington. Washington State Department of Ecology. January 17, 2007.

http://www.ecy.wa.gov/programs/wq/stormwater/municipal/phase_II_ww/phase_ii_wwa-0107/wwa_ph_ii_permit-final.pdf