



DEPARTMENT OF
ECOLOGY
State of Washington

Quality Report to Management July 2012 through June 2015

**Washington State
Department of Ecology**

September 2016

Publication No. 16-03-018

Publication and Contact Information

This report is available on the Department of Ecology's website at <https://fortress.wa.gov/ecy/publications/summarypages/1603018.html>.

Website

Ecology's Quality Assurance website: <http://www.ecy.wa.gov/programs/eap/quality.html>

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Quality Report to Management July 2012 through June 2015

Washington State Department of Ecology

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Purpose of This Document

The Washington State Department of Ecology (Ecology) is required to produce this quality system report, as specified in Ecology's *Quality Management Plan*. The Plan requires periodic reporting to Ecology management to include evaluating Ecology's quality system, identifying quality system issues, and presenting recommendations for quality system improvements.

The "quality system" is a structured and documented management system that provides the framework for (1) planning, implementing, documenting, and assessing environmental data operations, and (2) carrying out required quality assurance and quality control activities.

The quality system encompasses both management and technical activities. This report documents these activities from July 2012 through August 2015.

This report contains information on several aspects of the quality system, including:

- Development and approval of Quality Assurance Project Plans (QAPPs).
- Documentation of standard operating procedures (SOPs).
- Quality system initiatives undertaken by Ecology.
- Issues encountered while implementing the *Quality Management Plan*.
- Recommendations for changes in the quality system and *Quality Management Plan*.
- Reports on current quality system activities from all Ecology environmental programs.

The intended audience for this report is Ecology's director and deputy director, Ecology's executive management team, and other interested parties.

The Quality System at Ecology

Quality System Structure

The Washington State Department of Ecology (Ecology) develops this *Quality Report to Management* as a cornerstone of its participation in the U.S. Environmental Protection Agency (EPA) quality system. Ecology's quality system is defined in the agency's *Quality Management Plan* (Ecology, 2010 and 2015, this document) and is formally established in Ecology Policy 22-01 (Ecology, 2006). The *Quality Management Plan* is based largely on requirements set out by the EPA in their Requirements for Quality Management Plans (EPA, 2001, 2006). The *Quality Management Plan* requires the periodic publication of this document.

The Ecology Quality Assurance (QA) Officer, who is designated by the Ecology Director, coordinates and manages QA activities throughout the agency and also is the chief QA liaison for extra-agency QA activities. The QA Officer is responsible for the preparation of this document and the periodic *Quality Management Plan*. Currently, the QA Officer is based in the Environmental Assessment Program.

All Ecology environmental programs have designated one or more QA Coordinators, who have a maximum commitment of 0.25 FTE/program. The program QA Coordinators oversee QA and quality control (QC) activities within their respective programs and have a wide range of potential responsibilities, which are defined in this document. The QA Coordinators also contribute to the *Quality Management Plan*.

Manchester Environmental Laboratory (MEL) has an integral role in the quality system at Ecology. MEL is the in-house laboratory and provides lab services for general chemistry, metals, organic chemistry, and microbiology. Laboratory QA practices are discussed in the *Quality Management Plan* and are formally described in the MEL *Quality Assurance Manual* (Ecology, 2014, internal publication).

The Laboratory Accreditation Unit (LAU) provides accreditation services to help establish and document laboratory proficiency for the reporting of data to Ecology. Accreditation requirements for data produced by and submitted to Ecology are detailed in Ecology Policy 22-02 (Ecology, 2008a). LAU maintains a procedural manual (Ecology, 2010) and several standard operating procedures (SOPs) (Ecology, 2015) documenting the QA practices and procedures of the unit.

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Quality-Related Initiatives and Issues

2012 EPA Audit Recommendations and Responses

EPA performed a Quality System Review of Ecology's operations in March 2012. Although the audit resulted in no negative findings, EPA provided several recommendations and observations.

EPA's recommendations included:

- **Agency-wide SOPs (when appropriate)**

Response: Some progress has been made on this issue. The Water Resources Program and the Environmental Assessment Program (EAP) are working on cross-program SOPs for several techniques. The Water Quality Program has adopted EAP SOPs for bacteria sampling.

- **Field audits**

Response: The National Estuary Program (NEP) is performing field audits. The EAP Ambient Monitoring Program also conducts side-by-side field audits to ascertain expertise of both partners and Ecology staff. The Toxics Cleanup Program is developing an SOP for field audits of contractor activities and has performed their first field audit this year.

- **Audit for Manchester Environmental Laboratory (MEL)**

Response: The MEL audit occurred in 2012. No negative findings were noted.

- *Quality Management Plans* for NEP Lead Organizations (WDOH, PSP, WDFW¹)

Response: WDOH and PSP developed Quality Management Plans. WDFW has not completed a Quality Management Plan.

- **Program for SOP review and recertification**

Response: An SOP recertification program has been developed and implemented. Approximately 50 SOPs will be reviewed and recertified during 2015.

Ecology SOP Project

The Ecology standard operating procedure (SOP) project began in January 2006, when the "SOP for Field SOPs" was developed and introduced to EAP headquarters (HQ) staff. At that time, a program policy was also prepared to document SOP development, revision, and archival processes.

There are currently over 260 approved SOPs in Ecology, some of which are posted at the Ecology QA website (www.ecy.wa.gov/programs/eap/quality.html). They were mostly developed by EAP. Additional SOPs have been written by the Air Quality Program, Spills

¹ WA Dept. of Health, Puget Sound Partnership, WA Dept. of Fish & Wildlife
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Program, Hazardous Waste and Toxics Reduction Program, Industrial Section, the Shorelands and Environmental Assistance Program, Waste 2 Resources Program, Water Quality Program, and Water Resources Program.

Formal SOP Recertification Process

In 2012, EPA requested that Ecology develop a recertification process for all approved SOPs. This has been done, and Ecology now recertifies SOPs on a three-year cycle. Recertification status is available for EPA field SOPs, and Ecology is planning to incorporate all Programs into a formal tracking system for SOP status, training, and staff competency certification.

EPA Policy on Laboratory and Field Competency

This new EPA Policy (EPA, 2011, EPA 2012b) will be a major focus over the next few years. Ecology still needs to implement a program to demonstrate competency for Ecology field samplers and also organizations performing sampling and/or data generation for Ecology through contracts grants and/or loans. Ecology has modified the QAPP format to include information on sampler qualifications and training. The existence of SOPs for all filed data and sample generating activities is key to demonstration of competency. Similarly, training on those documents must be documented.

Ecology Quality Assurance Website

The Ecology QA website can be found at www.ecy.wa.gov/programs/lep/quality.html. This website was implemented in June 2006.

This website currently contains program and agency SOPs, QAPP guidance, QA policy, and other important quality information. Over 80 Ecology field, field analytical, stormwater, spills-related, and lab accreditation SOPs are posted here.

In 2011, NEP-related QAPP development templates, checklists, and other documents were posted at this website. These are in support of Ecology's role of providing QA oversight for Puget Sound NEP grants.

Water Quality Program grantees and loan recipients are also provided Ecology QAPP templates, review checklists, and guidance at the QA website.

Revision of Ecology's Guidelines for Writing Quality Assurance Project Plans

A new Ecology QAPP template containing guidance language and also new agency QAPP review checklists have been developed and are in use. The new template was required by Ecology for use by National Estuary Program (NEP) grantees in 2011, and at least 33 regional organizations have adopted the Ecology format. Eight major ones are listed below. See Appendix E of this document for a more complete listing.

- King County
- Pierce County
- Snohomish County
- Kitsap County
- City of Tacoma
- University of Washington
- Washington Department of Fish and Wildlife
- Washington Department of Natural Resources

Additionally, the new format and content requirements have been required for use for Water Quality Program grantees. Ecology is preparing a formal replacement of the 2004 QAPP Handbook to include these new documents and discuss their implementation.

Other historical QA issues still requiring work include training resources, formal SOP recertification process, and field sampling proficiency and competency.

Timely Completion and Approval of QAPPs before Sampling

This continues to be a problem for Ecology. Complex EPA-funded projects with multiple stakeholders are commonly the projects that miss the final QAPP completion deadlines. It is very difficult to incorporate multiple sets of comments, complete and approve these complex QAPPs, and also meet project sampling constraints. Additionally, two projects in an EA Program regional office recently were completed before QAPP approval. Other projects required issuance (first ever) of a Stop Work Order, because QAPPs were not completed before sampling began.

EPA QAPP Guidance Revisions

The anticipated EPA QAPP guidance has not been finalized. There is no current timetable for approval and release. See EPA 2012a, EPA 2012c, and EPA 2012d for more information on recent changes in the EPA quality system documentation.

Quality Assurance Training Resources

This continues to be an issue for the agency. Ecology continues to need a full-time equivalent (FTE) for an EA Program QA/Training Coordinator/Auditor. Little progress has been made on this important issue.

Independence of Ecology's Quality System from Operational Influence

The current reporting arrangement for the Ecology QA Officer is to the EA Program Manager, with a "dotted line" report to the Deputy Director. Because the EA Program Manager is in charge of all program operations, including sampling, field measurements, and laboratory measurements, it could be viewed by external auditors that there is a potential conflict of interest in this reporting arrangement. This is because the QA Officer often makes decisions that directly affect operations, causing work to be delayed because of QA deficiencies. This condition sets the natural and inherent tension between QA and operations.

With this current reporting arrangement the QA Officer can be "leaned on" to approve a QAPP, or be pressured into other decision-making, due to operational or program management considerations. Many organizations have the QA Officer reporting directly to the top level of the organization to reduce the potential of this occurrence. Operational pressure for the QA Officer to approve quality-related documents has occurred on occasion.

My recommendation to EAP and upper management is to consider changing the reporting arrangement for the QA Officer to a direct report of the Deputy Director with a "dotted line" to the EA Program Manager. This would provide a more defensible degree of separation between operations and QA at Ecology. Additionally EAP should re-establish an EAP QA Coordinator position, at least 0.5 FTE, to handle EAP internal document review and audit functions.

A separate document will be prepared for the Deputy Director on the current status of this matter.

Inter-Program Quality System Implementation at Ecology

Over the past three years, the Ecology QA Program has improved inter-program consistency and uniformity within the agency. The QA Coordinators group was invigorated with several new and qualified members. Also, Spills, NWP, HWTR, WQP, and Manchester Environmental Laboratory all developed new SOPs on various topics.

Ongoing work on these issues continues through the QA Coordinators group (see Appendix B). However, improvement still needs to occur in the areas of QAPP and SOP format and content standardization, and inter-program communication and cooperation. Ecology policies 22-01 and 22-02 need changes to help ensure Ecology produces standardized quality assurance documents with required content.

Finally, to help improve communication between QA staff and Water Quality Program grantees, it is recommended that the WQ Financial Assistance section also provide a QA coordinator for the QA coordinators group.

“Supervisor Approval and First Sampling Date” Form QA Issues

This EA Program form is designed to allow sampling when (1) all QA issues with a QAPP have been resolved and (2) sampling must occur before the approval signatures have been gathered. However, in some cases, the form has been used, and either:

- All work on the QAPP ceased, and the project was completed without a completed QAPP.
- The QAPP continued to have QA issues that were not resolved.

This misuse of the form is unacceptable, and the issue is currently being addressed. The QA Officer’s signature has been added to the form. This will provide appropriate notification to the QA Officer and allow him/her to determine whether the project is ready for field work.

Quality Assurance Oversight of EPA National Estuary Program (NEP) Projects

This section describes the quality system Ecology is implementing to ensure good outcomes for projects funded by the EPA National Estuary Program (NEP). It summarizes activities and accomplishments as well as difficulties and solutions, and it recommends system modifications and new initiatives for the future.

Background and Quality System

In 2010, Congress appropriated funding for use over a period of approximately 6 years to help protect and restore the Puget Sound ecosystem². EPA's model for administering the program has been to pass the majority of the funds, now totaling over \$130M, to Lead Organizations³ (LOs) and then track the effectiveness of its use. The LOs, in turn, developed multi-year strategies consistent with the Puget Sound Partnership's Action Agenda and near-term actions (NTAs).

To address these strategies, LOs have collaboratively chosen projects and funded them through competitive grants, direct awards, and interagency agreements. These projects must comply with EPA's quality requirements (e.g., EPA, 2001a, 2001b). However, Ecology, by virtue of its EPA-approved *Quality Management Plan* (Ecology, 2010), has been delegated responsibility for implementing a centralized quality system applicable to nearly all NEP-funded activities and projects⁴.

Ecology's quality system, as it applies to NEP-funded activities, mirrors what is described in its approved *Quality Management Plan*. However, an addendum to the *Quality Management Plan* (Ecology, 2011) identifies a new NEP Quality Coordinator in Ecology's Environmental Assessment Program (EAP). Responsibilities include determining whether projects will generate new environmental data or involve analyzing existing environmental data. For projects that meet either of these criteria, the NEP Quality Coordinator provides guidance on drafting a QAPP and, once submitted, reviews and recommends its approval by Ecology's QA Officer. For projects that do not generate new or analysis of existing data, the NEP Quality Coordinator facilitates approval of a QAPP Waiver Form.

² Funding over six years may exceed \$190 million.

³ The state Departments of Fish and Wildlife and Natural Resources (WDFW and WDNR) are the LOs for *Marine and Nearshore Protection and Restoration*. The state Departments of Ecology and Commerce are the LOs for *Watershed Protection and Restoration*. Ecology is the LO for *Toxics and Nutrients Prevention, Reduction and Control*. The state Departments of Health (DOH) and Ecology are the LOs for *Pathogen Prevention, Reduction and Control*. The Puget Sound Partnership (PSP) is the LO for *Managing Action Agenda Implementation and Outreach and Stewardship*. The Northwest Indian Fisheries Commission (NWIFC) is the LO for *Tribal Capacity and Implementation*.

⁴ EPA Region 10 is responsible for ensuring that NWIFC-managed projects comply with its quality requirements.

While projects are underway, the NEP Quality Coordinator may conduct audits and/or site visits to determine if activities and procedures are consistent with the description in the QAPP (or waiver/contract). The NEP Quality Coordinator also documents problems that arise while planning or conducting a project in the form of a Corrective and Preventive Action Notice. As QAPP projects approach completion, the NEP Quality Coordinator reviews the draft project report, primarily with an eye toward QAPP consistency. Finally, the NEP Quality Coordinator conducts QA-related training as needed.

Activities and Accomplishments

From mid-October 2011 through June 2015 (approximately 44 months) the NEP Quality Coordinator:

- Developed positive working relationships and maintained communications with key NEP contacts (e.g., LO coordinators and core groups, grant and contract managers, technical staff).
- Met or consulted by phone with project managers preparing waivers and QAPPs.
- Became familiar with and/or reviewed scopes of work and/or plans for more than 250 projects.
- Recommended approval of waivers for 164 projects.
- Recommended approval of 116 QAPPs.
- Developed an audit form and conducted 21 in-field or conference/webinar audits.
- Found approximately 25 projects noncompliant with QA requirements (most nonconformance minor).
- Prepared and placed 9 Corrective and Preventive Action Notices in NEP project files (discussed 7 others with responsible parties and formally issued 2).
- Reviewed and commented on 69 draft project reports.
- Provided quality-related training via:
 - NEP QA web site
 - In person workshops or webinars (Ecology and WDFW grant recipients; for Ecology staff)

Difficulties Encountered and Solutions Proposed (2012-2015)

The following table lists some of the difficulties while providing quality oversight for NEP-funded projects related to the protection and restoration of Puget Sound:

Difficulty	Solution
Determining need for preparing a QAPP (difficult for some types of projects)	<ul style="list-style-type: none"> • Searched for QAPPs describing similar activities • Sought advice and/or concurrence from the Ecology or EPA QA Officer
Determining appropriate level of detail for a QAPP – the “graded approach” requires judgment	Based decisions/comments on project impact, complexity, budget, and QAPPs for similar projects
Projects proposing to use laboratories not accredited for certain methods	Required accreditation or waived requirement due to nature of analysis (e.g., accredited by FDA)
Ecology and EPA Region 10 staff disagreeing about appropriate QAPP guidance for projects proposing to conduct Microbial Source Tracking (MST)	Negotiated consensus guidance
Project beginning activities prior to QAPP approval	<ul style="list-style-type: none"> • Updated NEP QA web site and conducted training • Prepared Corrective and Preventive Action Notices as needed (see above) • Stopped work (only a few projects)
Determining appropriate guidance for content of QAPPs that describe analysis of existing environmental data and/or that describe environmental modeling activities	<ul style="list-style-type: none"> • Reviewed EPA requirements / guidance documents • Discussed same with project managers (one-on-one) • Initiated lengthy process for clarifying guidance
Determining data entry requirements associated with NEP projects	<ul style="list-style-type: none"> • Discussed issue with EPA and Ecology staff • EPA project officers for each LO make final decisions
Finding enough resources/time for various activities (e.g., uploading audit findings to a single central location; preparing CPANs documenting minor problems; updating relevant QA guidance; conducting certain needed QA training)	NEP Quality Coordinator can request Ecology manager to delegate review of NEP QAPPs to other Environmental Assessment Program staff

CPANs: Corrective/Preventive Action Notices.

NEP System Modifications and New Initiatives

Recommendations include:

- Wrap-up activities leading to approval of remaining (Round 5-6) project waivers and QAPPs.
- Plan for time required to comment on draft reports for remaining NEP QAPP projects.
- Continue implementing a centralized QA oversight function for activities and projects conducted under the new, evolving EPA funding model.
 - Identify “primary provider” - Ecology’s NEP Quality Coordinator or alternative?
 - Include NWIFC projects?
- Conduct additional training sessions for NEP funding recipients.
 - General, e.g., quality systems and how to prepare a QAPP.
 - Specific, e.g., QAPP content for GIS or modeling projects.
- Continue to streamline the QAPP review and approval process.
- Help Ecology’s QA Officer revise the agency’s *Quality Management Plan* and QAPP guidance, especially guidance for preparing QAPPs that describe modeling and/or data analysis.
- Help Ecology’s QA Officer develop and implement a new certification program for field staff.
- Increase the annual number of project audits (in-field and/or alternative types).
- Evaluate quality systems in place at other state agencies and, as needed, help develop EPA-approvable *Quality Management Plans* for the same.

References

Ecology, 2010. Quality Management Plan. Publication No. 10-03-056, October 2010.
<https://fortress.wa.gov/ecy/publications/SummaryPages/1003056.html>

Ecology, 2011. Quality Management Plan – Addendum: National Estuary Program Grant Processes and Quality Assurance Oversight. October, 2011.

EPA, 2001a. EPA Requirements for Quality Management Plans, QA/R-2. Publication EPA/240/B-01/002, March 2001.

EPA, 2001b. EPA Requirements for Quality Assurance Project Plans, QA/R-5. Publication EPA/240/B-01/003, March 2001.

Quality System Reports by Ecology Programs 2012-2015

1. Air Quality Program

Description of the Quality System for the Air Quality Program

The Washington State Ambient Air Monitoring Network (Washington Network) monitors the air for pollution. The majority of monitoring is aimed at characterizing the criteria pollutants as identified in the federal Clean Air Act. These pollutants are:

- Carbon Monoxide (CO)
- Lead
- Ozone (O₃)
- Nitrogen Dioxide (NO₂)
- Sulfur Dioxide (SO₂)
- PM_{2.5} (airborne particles 2.5 microns and smaller)
- PM₁₀ (airborne particles 10 microns and smaller)

Of these criteria pollutants, PM_{2.5} and ozone are understood to represent the biggest risk to public health in Washington and therefore comprise the bulk of the network. In addition to the criteria pollutants, other Washington Network monitoring includes toxic air pollutants and PM_{2.5} chemical speciation as well as meteorological parameters (PSD-quality).

The Air Quality Program's quality system for the Washington Network is designed to adhere to the specifications in 40 CFR Part 58, Appendix A, and follow guidance outlined in EPA's *Quality Assurance Handbook* so that ambient air pollution data collected in the network is comparable with that collected by other organizations around the country and is of sufficient quality for use in decision making. The QA regulations, set forth in 40 CFR Part 58, Appendix A, have been developed to ensure that ambient air monitoring programs are well planned so that it is known what data quality is needed, that checks are included to assess data quality, and corrective actions are in place to improve quality systems when needed.

There are 2.75 FTE QA staff (which includes the program's QA Coordinator) in the Air Quality Program that carry out the following activities:

- Writing/revising the Washington Network Quality Assurance Plan.
- Writing/revising standard operating procedures.
- Writing Quality Assurance Project Plans (QAPPs).
- Review and approval authority of QAPPs from other entities within the network.
- Identifying appropriate Measurement Quality Objectives for monitoring projects.
- Conducting performance audits on network monitors.
- Verifying QC activities of field operators.
- Reviewing and validating monitored data to ensure it is of acceptable quality.
- Certification of laboratory and field audit standards.

- Assessing data quality via quarterly and annual Data Quality Assessment Reports that are submitted to Air Quality Program management and EPA.

QAPPs

The Air Quality Program's current Quality Assurance Plan, revised in 2015, details the quality system for the Washington Network and is located here:

<https://fortress.wa.gov/ecy/publications/SummaryPages/99201.html>

Other project-specific QAPPs:

- Air Toxics Monitoring QAPP (revised 2013) found here:
<https://fortress.wa.gov/ecy/publications/SummaryPages/0402018.html>
- Kennewick Ozone Survey QAPP (2014)
- Sunnyside PM_{2.5} QAPP (2014)

SOPs

The Air Quality Program has instrument-specific procedures for nearly every aspect of monitoring carried out within the Washington Network. There are current SOPs for the monitoring efforts that comprise the vast majority of our monitoring efforts (nephelometer, PM_{2.5}, and ozone). The Air Quality Program does not have specific SOPs for its PM_{2.5} Chemical Speciation Network monitoring. However, the PM_{2.5} Chemical Speciation Network is a national program, and there is an EPA SOP which Ecology plans to modify as needed, and eventually adopt, dependent on available resources.

In the period following the last *Quality Report to Management*, the following has been revised:

- PM_{2.5} Sequential Sampler Procedure (2013)

The following procedures were completed in 2015:

- PM_{2.5} Tapered Element Oscillating Microbalance with Filter Dynamic Measurement System Operating Procedure M903 Nephelometer Procedure

A complete list of the Air Quality Program's SOPs is at:

www.ecy.wa.gov/programs/air/other/Air_Monitoring_Procedures.htm

Audits

The Air Quality Program QA staff conducts performance audits on air monitors/sensors located at sites throughout the Washington Network. For criteria pollutants, at a minimum, Ecology follows the required frequency for conducting audits on Federal Reference Method (FRM) and Federal Equivalent Method (FEM) monitors as described in 40 CFR 58, Appendix A.

The audit frequency is as follows:

- FRM/FEM particulate (PM_{2.5} and PM₁₀) instruments: Twice per year
- For gaseous pollutant monitors (CO, NO₂, O₃, SO₂): Once per year
- PSD Meteorological parameters (wind speed, wind direction, ambient temp): Once per year

QA Anomalies and/or Corrective Actions

All QC/QA problems and corrective actions are identified in the quarterly and annual Data Quality Assessment Reports. Data that does not meet Measurement Quality Objectives is invalidated and not sent to EPA.

Program Training on QA-Related Topics

There have been many changes in the Air Quality Program's QA group since the last *Quality Report to Management* in 2012. Due to a retirement, a new QA Coordinator (who was formerly QA line staff) was hired, and three new staff members replaced existing staff who left for other jobs within the program/agency or separated from state service. These changes necessitated training for the new QA staff to ensure that the quality system continued to be effectively carried out. Among the training for the new QA staff were the following Air Pollution Training Institute courses:

- APTI SI:471 – General Quality Assurance Considerations for Ambient Air Monitoring (online course)
- APTI SI:409 – Basic Air Pollution Meteorology (online course)
- APTI 464 – Analytical Methods for Air Quality Standards (if available)

In addition, two of the new QA staff attended the 2014 National Air Monitoring Conference.

The following training was provided to station operators:

- Spring 2013 – Tribal nephelometer operator training.
- 2013/2014 – Two webinars to train operators how to use new Envirodata Ultimate data logger software.

We plan to offer statewide training, following the completion of the new and revised SOPs. This training is expected to occur within the next two years (see below).

Future QA Initiatives

- Hold statewide QA/QC training on revised/new operating procedures for M903 nephelometer and 8500 FDMS TEOM.
- Write SOP for BAM 1020 PM_{2.5} FEM.
- Revise the Ecotech nephelometer SOP.
- Revise the NO₂ SOP.
- Write a trace gas (CO, NO_y, SO₂) SOP
- Revise meteorological SOP to reflect new ultrasonic anemometers.
- Revise ozone SOP.
- Review/modify as needed/adopt EPA PM_{2.5} Chemical Speciation Network SOPs.
- Review other procedures as resources allow.

2. Environmental Assessment Program – General

Description of Quality Structure

The quality structure in the Environmental Assessment (EA) Program is determined by its role in the overall quality structure of the agency, which is described in Ecology's 2015 *Quality Management Plan* (<https://fortress.wa.gov/ecy/publications/SummaryPages/1503030.html>).

The Ecology QA Officer is located in the EA Program, so the EA Program plays a key role in implementing the agency's quality system. The agency Director is responsible for designating the QA Officer, and the QA Officer reports to both the EA Program Manager and the Deputy Director.

With respect to the quality structure, a key responsibility of the QA Officer is to inform management of QA/QC issues and problems. Other key responsibilities related to the quality structure include:

- Act as the liaison between Ecology and other agencies on QA/QC matters.
- Provide technical support to all Ecology programs by working with Ecology's QA Coordinators.

There are four QA Coordinators in the EA Program:

- QA Coordinator for Manchester Environmental Laboratory (MEL).
- QA Coordinator to handle Laboratory Accreditation Unit (LAU) issues.
- QA Coordinator to handle sampling and streamflow aspects of QA.
- Quality Coordinator for all aspects of NEP-related QA.

The QA Officer acts as point of contact within the EA Program for data quality issues and is the final signature authority on EA Program QAPPs, SOPs, and QA policies.

The EA Program Manager is responsible for:

- Allocating the resources to implement the QA Policy and the *Quality Management Plan*.
- Implementing Ecology's QA Policy (Executive Policy 22-01) and *Quality Management Plan*
- Delegating responsibilities for implementing a quality system at appropriate levels of the organization.

Other EA Program employees with QA/QC responsibilities described in the *Quality Management Plan* include project managers, project leads, field staff, MEL director, MEL staff, and LAU staff.

FTEs Designated to Quality

The QA Officer and MEL's QA Coordinator are full-time positions, so two FTEs are designated to these key QA positions. There are six FTE staff positions in the Laboratory Accreditation Unit dedicated to QA/QC. Other EA Program managers and staff also have QA/QC responsibilities, although the total FTEs dedicated to QA/QC issues in the program are difficult to quantify.

Staff Quality Responsibilities

The EA Program staff with quality responsibilities include project managers, project leads, field staff, MEL staff, and LAU staff. The specific responsibilities are given in Ecology's *Quality Management Plan*. For project managers and project leads, key responsibilities include preparing and implementing QAPPs as well as assessing and reporting the quality of data obtained. Field staff are responsible for ensuring that samples are properly collected according to the QAPP and the SOPs and that all field data are recorded.

MEL staff are responsible for analyzing environmental and QC samples according to the specifications in associated QAPPs and relevant SOPs.

LAU staff are responsible for administering the Environmental Laboratory Accreditation Program (ELAP). This program (1) assesses the capabilities of laboratories to accurately analyze environmental samples and (2) determines if the laboratories should be granted accreditation.

EPA Triennial Review of Ecology's Quality System

The Quality System Review conducted by EPA during March 5-7, 2012 resulted in no negative findings, recommendations, or observations regarding Ecology's quality system. This is a highly favorable outcome, and the agency is to be commended for its compliance with the EPA quality system. The next EPA system audit will occur during EPA Fiscal Year 2016.

Existing QAPPs and SOPs

QAPPs

From July 1, 2012 to June 30, 2015, the EA Program posted 57 QAPPs and 29 QAPP addenda. Listing of QAPPs generated by the EA Program since 1994 is available at: [fortress.wa.gov/ecy/publications/UIPages/PublicationList.aspx?IndexTypeName=Topic&NameValue=Quality Assurance Project Plans \(QAPPs\)&DocumentTypeName=Publication](http://fortress.wa.gov/ecy/publications/UIPages/PublicationList.aspx?IndexTypeName=Topic&NameValue=Quality Assurance Project Plans (QAPPs)&DocumentTypeName=Publication).

From 1994 to August 2015, Ecology (EAP) generated over 293 QAPPs for internal projects.

SOPs

As of June 30, 2015, Ecology has prepared over 260 SOPs that are in final (approved) status.

Other EAP/Ecology Quality Documentation

A revised *Quality Management Plan*

(<https://fortress.wa.gov/ecy/publications/summarypages/1503030.html>) is being published in October 2015. This is the agency plan to implement, document, and assess the effectiveness of the quality system supporting environmental data operations.

An addendum to the 2010 *Quality Management Plan* was produced in 2011, documenting how Ecology is supporting NEP grant programs. Ecology is providing NEP QA oversight for several state agencies including WDNR, WDFW, WDOH, and PSP.

3. Environmental Assessment Program – Laboratory Accreditation Unit

Environmental Assessment Program – Laboratory Accreditation Unit

Alan Rue is the QA Coordinator for the Lab Accreditation Unit (LAU).

Accredited Laboratories

The LAU currently accredits 473 environmental laboratories.

- 371 are located in Washington State
- 102 are located outside of Washington
- 118 are certified for drinking water parameters
- 190 are municipal dischargers
- 53 are industrial dischargers
- 162 are commercial laboratories
- 58 are in other categories (academic, tribal, state, federal)

From July 1, 2012 to June 30, 2015, LAU staff conducted on-site audits of 120 accredited laboratories.

Accreditation of Manchester Environmental Laboratory (MEL)

The last audit of MEL conducted by LAU staff was in December 2012. The next audit is planned for 2016.

MEL maintains accreditation for general chemistry, trace metals, organics, and microbiology procedures in non-potable water and solids. The lab routinely receives satisfactory ratings on semi-annual proficiency testing (PT) sample results required for accreditation.

ELAP Certification of Ecology Drinking Water Program

EPA Region 10 Drinking Water Certification Officers (DWCOs) observed LAU DWCOs auditing ALS Environmental - Kelso, a commercial laboratory, in November 2013. Reports of their observations were provided in February 2014. Each LAU DWCO was evaluated separately, and all received favorable evaluations with some helpful suggestions.

The LAU completed EPA's Annual Drinking Water Certification Questionnaires in 2013, 2014, and 2015.

Auditor Training

- September 2013 – Dennis Julvezan and Alan Rue participated in a four-day Drinking Water Certification Officer course at EPA in Edison, New Jersey.
- April 2013 – Aimee Bennett participated in a four-day Cryptosporidium Lab Certification course at EPA in Cincinnati.
- March 2014 – All auditors participated in a one-day University of Washington Lab Best Practices course.
- April 2014 – Dennis Julvezan, Rosana Santos, and Aimee Bennett participated in a two-day Lab Safety course.
- January 2015 – Kamilee Ginder spent a week performing organics analyses at MEL.
- March 2015 – Alan Rue, Aimee Bennett, Dennis Julvezan, Kamilee Ginder, and Rosana Santos participated in a two-day Investigator training course.
- March 2015 – Alan Rue, Aimee Bennett, Dennis Julvezan, Kamilee Ginder, and Rosana Santos participated in the Proposed EPA Method Update Rule webinar.

Meetings with Oversight Agencies

In April 2015, LAU staff met with EPA Region 10 staff and Washington State Department of Health (WDOH) staff on the Drinking Water Laboratory Certification Program. WDOH discussed their proposed Lab Reporting Rule, which includes new State Reporting Limits (SRLs). LAU staff provided consultation and comments on the new SRLs.

Current Lab Accreditation SOPs

	Title
LAU001	Accreditation of Environmental Laboratories
LAU002	On-Site Audits of Environmental Laboratories
LAU003	Renewal Applications

4. Environmental Assessment Program – Manchester Environmental Laboratory

Overview of the Quality System

The goal of Ecology's Manchester Environmental Laboratory (MEL) is to support the agency by producing reliable, scientifically valid, and legally defensible data so informed decisions can be made regarding the health and safety of our environment.

An effective QA program is essential for the credibility of any data-gathering effort from sample collection to data interpretation. Sample collection and data interpretation are functions organizationally separate from the laboratory and are therefore not covered by this report. Other quality management documents cover those functions.

It is MEL's policy that for activities conducted at MEL, QA shall be maintained at a level that will ensure that all environmental data generated and processed are scientifically valid and legally defensible, and are of acceptable precision and bias, representativeness, completeness, and comparability. To that end, the quality management steps and procedures are used throughout the entire analytical process, from receiving the sample to reporting the data.

Accuracy

Data will meet quantitative measurement quality objectives (MQOs) for precision and minimization of bias described in the SOP for each analytical procedure. MQOs are defined in Ecology's *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies* (Lombard and Kirchmer, 2004).

Representativeness

The degree to which analytical data represent the environment from which the sample is taken depends on factors involved in sampling, transportation, and analysis. The laboratory may be responsible for all of these factors for some studies, and for analysis only for others. MEL follows the following practices to assure data are representative:

- Supply clean sample containers of the appropriate type with preservatives when required by the associated QAPPs.
- When necessary, homogenize samples prior to taking aliquots for analysis.
- Use appropriate digestion procedures.
- Control laboratory contamination.
- Assure that reported data are correctly associated with the corresponding sample received by the laboratory.

Completeness

MEL endeavors to provide accurate, representative, and defensible data for 100% of the tests requested by the data user.

Comparability

Comparability is a measure of the confidence with which one data set or method can be compared to another.

Legal Defensibility

To be able to defend data in a court of law, records are kept to demonstrate that samples were not tampered with after being received in the laboratory. Proper use of chain-of-custody procedures and proper security are followed while the samples are in the laboratory. The data are recorded, handled, and reported in such a way that prevents tampering. Observations are recorded in indelible ink. Good laboratory practices are followed by using the Laboratory Information Management System (LIMS) to record data and generate reports.

MEL's quality management program has the following requirements to ensure that an effective laboratory QA is maintained:

- All environmental data are of the right type and quantity for their intended use. Generation of data that do not meet data quality objectives is minimized. The data quality information acquired with all environmental data are kept on file at the laboratory, or in state archives, for ten years.
- QA activities are carried out in the most cost-effective fashion possible, without compromising data quality objectives.
- Facilities, equipment, and services that directly or indirectly impact data quality or integrity are routinely inspected and maintained, where appropriate. Each laboratory unit has a facilities plan identifying the responsible parties for conducting routine inspections and the methods for documenting these activities.
- Data processing is documented, reviewed, and revised as required by Ecology and EPA mandates and guidelines. Data are validated according to specific criteria, which follow EPA guidelines and regulations.
- QC limits for data generation and evaluation processes are monitored by the analysts performing that process. If data falls outside acceptable QC limits, corrective action necessary to bring the process back into control is performed, or the data are qualified as appropriate. If the analyst has a question about implementation of corrective action, that question is brought to the attention of the appropriate supervisor. If necessary, resolution of the QC problem may be sought from the laboratory QA Coordinator and/or laboratory management.
- QC is a part of every process involved in the generation of laboratory data. QC limits for a specific process of data generation are set by EPA guidelines or historical MEL data generated by the same or a similar process. These limits may originate from, but are not

limited to, EPA regulations, EPA approved methods, and method performance data in support of laboratory SOPs.

- All laboratory activities are covered by standard operating procedures (SOPs), which are reviewed and revised or recertified every 3 years.

Performance-Based Measurement Systems (PBMS)

On October 6, 1997, EPA provided public notification (62 FR 52098) of a plan to implement PBMS for “*environmental monitoring in all of its media programs to the extent feasible.*” EPA Page 24 defined PBMS as “*a set of processes wherein the data quality needs, mandates or limitations of a program or project are specified, and serve as criteria for selecting appropriate methods to meet those needs in a cost-effective manner.*” The notice indicated that the regulated community would be able to select any appropriate analytical test method for use in complying with EPA’s regulations. It further indicated that implementation of PBMS would improve data quality and encourage the advancement of analytical technologies.

Modifications to MEL methods are considered acceptable if they meet the criteria described below:

- Legal standing – Data generated in compliance with the PBMS framework must have the same legal standing as data generated using a promulgated EPA method.
- Scientifically sound and relevant validation process – Both the method validation and the PBMS documentation requirements should be based on principles that are widely accepted in the scientific community and on the intended use of the data.
- Clearly articulated and appropriate performance criteria – Performance criteria are the sensitivity, selectivity, and accuracy of the data.
- Documentation – Must be sufficient for independent verification (i.e., auditing) and reproduction by another laboratory which is skilled in the art.
- Careful implementation – Implementation of PBMS should consider how requirements of project officers will be affected.

Alternate determinative techniques or changes that degrade method performance are not allowed. If an analytical technique other than the techniques specified in the method is used, that technique must have a specificity equal to or better than the specificity of the techniques in the referenced method for the analytes of interest.

Each time a method is modified, the laboratory is required to repeat the procedures for Initial Demonstration of Capability (IDC). In addition, each analyst must demonstrate the ability to generate acceptable results by performing an IDC before analyzing samples for a parameter. Analysts must also perform annual demonstrations of capability by satisfactorily analyzing performance evaluation samples.

A Method Detection Limit (MDL) determination is performed for each new method and periodically as required by the method for the analyte of interest.

Quality-Related Training

All new MEL staff receives a standard orientation that includes review of all quality documents and pertinent SOPs. In addition, all analysts must perform an IDC and perform satisfactorily (within specified QC limits) on an unknown sample for each parameter they work with. Certain methods have the additional requirement that a MDL determination be performed by each new analyst.

The MEL QA Coordinator attended the annual EPA Region 6 Quality Conference in August 2014.

QAPPs

The MEL director has approval authority for all QAPPs that require laboratory services. Input is solicited from MEL's QA Coordinator and from the organic and inorganic chemistry supervisors.

Methods Audited at MEL, 2012-2015

- Microbiology
- Mercury by EPA Method 1631E
- Alkalinity
- Anions (Cl, Fl, SO₄, NO₃, Br, Br-LL) by EPA Method 300.0
- Sample Coordination (sample log-in and data mailing)

SOPs Implemented Since July 2012

MEL developed the following new SOPs since the 2012 *Quality Report to Management*:

Number	Title
720031	Synthetic Precipitation Leaching Procedure for Metals; EPA SW-846 Method 1312.
720032	Low Level Mercury by EPA Method 1631E.
720033	Cryomill Preparation of Samples.
720034	ICP Mass Spectrometer analysis by EPA 200.8/SW-846 Method 6020A using the Agilent 7900.
730120	Micro-Acetonitrile Back Extraction Cleanup for Diuron and Dichlobenil.
730121	Data Qualification of Organic Sample Results.
730122	Extraction of BNAs, PBDEs and Flame Retardants in Consumer Products by Microwave Assisted Extraction, SW-846 Method 3546.
730123	Analysis of Flame Retardants and Polybrominated Diphenyl Ethers (PBDE) in Consumer Products by EPA SW-846 Method 8270D.
730124	Extraction of Pesticides from Solid and Semisolid Matrices by AOAC Method 2007.01 (QuEChERS).
730125	Extraction and Analysis of Glyphosate by EPA SW-846 Method 8321B.
770038	Chemical Inventory Procedures.

SW-846 = EPA's "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods".

Major Quality Problems and Corrective Actions

Problem: Samples analyzed over holding time.

Cause: Samples arrive at laboratory with less than half of the holding time left, and sometimes with only a few hours or less left.

Problem: Samples arrive at laboratory over temperature limits.

Cause: Sample coolers not adequately filled with ice before shipping to lab.

Corrective actions: Remind clients of the importance of prompt delivery after sample collection and of using adequate ice to maintain temperature during transport.

MEL's Accreditation Status

Since July 2012, MEL has maintained accreditation for all parameters requested as required by the *Quality Management Plan* and Ecology Executive Policy 1-22.

MEL was audited by LAU in December 2012.

5. Hazardous Waste and Toxics Reduction Program

Quality System Background and Summary Information

In support of the goals of the Resource Conservation and Recovery Act (RCRA) Compliance Program, compliance monitoring is performed on an annual or on “as needed” basis on all facilities that generate dangerous waste. Gathering data for compliance monitoring is done through facility inspections. Under RCRA, the primary type of inspection conducted by the Washington State Department of Ecology (Ecology) is the compliance evaluation inspection (CEI). During a CEI, samples may be collected for analysis to:

- Characterize a chemical waste.
- Verify the constituents of a hazardous waste.
- Gather data to support an enforcement action when significant RCRA violations are known, suspected, or revealed.

Sampling activities include sampling and analysis of various media. If legal proceedings ensue, the sample analysis results could be used as evidence.

It is Ecology and EPA policy to have an approved Quality Assurance Project Plan (QAPP) for all agency-sponsored and RCRA Performance Partnership Agreement sampling events. Ecology’s *Quality Management Plan*, Policy 22-01 requires the development of a QAPP for all projects generating environmental data, and documentation of all field analytical and laboratory work using approved standard operating procedures (SOPs). The plan describes the objectives of the sampling and the procedures to follow to achieve those objectives. The program QAPP serves as the Hazardous Waste and Toxics Reduction (HWTR) generic QAPP.

The objectives of the HWTR Program QAPP are to:

- Provide a generic boilerplate QAPP using a specific sampling event example that can be adapted for most site-specific sampling.
- Be used by compliance inspectors during HWTR sampling events and other project-based sampling events.
- Assist and provide project officers, field personnel, and compliance inspectors with SOPs for collecting samples. Assist inspectors and project officers in proper sample documentation, selection of suitable analytical test methodologies, and provide basic data validation procedures.

Fifteen QAPPs were completed for the planned sampling events during this report period. The amount of specific detail required in each QAPP varies by site and project. Sampling or projects of limited scope may require minimal information in the QAPP, while projects of significant endeavor or duration may require detailed information. An expanded QAPP may be required for complex sampling projects to ensure field investigation and laboratory analyses are properly planned and conducted to achieve the project objective. The program Quality Assurance (QA) Coordinator assists inspectors in sampling and writing QAPPs for complex sampling events beyond the requirement of the program generic QAPP. QAPPs ensure compliance with specific data quality objectives (DQOs).

Compliance Sampling Events

The HWTR Program conducts few sampling events. Sampling within the program typically falls into two categories:

- Samples of opportunity
- Pre-planned sampling event

Compliance sampling happens only when a compliance inspector has concerns about a generator's waste management activities. The inspector can take samples immediately without any pre-planning (samples of opportunity), or plan a sampling event for later (pre-planned sampling), or a combination of both. Historically, few quality assurance/quality control (QA/QC) documentations are generated for samplings of opportunity.

Familiarizing compliance inspectors with the benefits of pre-planning in recent years has been quite successful. To that end, a generic QAPP was created that includes a Samples of Opportunity QAPP template that can be modified for site-specific sampling events.

The HWTR Program occasionally conducts sampling to obtain data for programmatic activities and/or possible regulation changes. This type of sampling is done very infrequently.

As an indication of the amount of sampling done within the program, HWTR's last biennium sampling budget (7/1/13-6/30/15) was about \$308,000, which includes a budgeted amount for product testing. This number reflects an increase in the program's sampling budget for the 13-15 biennium. However, as inspectors are trained on better sampling techniques and becoming more accustomed to the benefits of pre-planning and using a QAPP, HWTR is experiencing an improvement in data quality used by the program.

Training will be provided for Corrective Action staff in the current biennium (July 2016) on data review and validation, based on EPA Functional National Guidelines for Organic and Inorganic Data review.

Fourteen sampling events were conducted from June 2012 to June 2015. The following table lists sampling conducted by Ecology's HWTR regional offices. Samplings for product testing analysis are not included in this list of sampling events.

Sampling Events Conducted by HWTR Staff in Regional Offices, June 2012 to June 2015

Ecology Regional Offices	Sampling Events	QAPP
NWRO	7	Yes
NWP	1	No
CRO	1	Yes
SWRO	5	Yes
ERO	0	--

Specific Quality Report to Management QA Responses

FTEs designated to quality

The HWTR Program has not allocated specific percentages of FTEs to QA/QC activities other than work done by the program's QA Coordinator. Twenty percent of this individual's FTE is dedicated to QA/QC activities including training, QAPP review and preparation, providing QA/QC advice and recommendations, and making the creation of QAPPs a routine and beneficial practice among compliance inspectors. In addition, the program included a commitment to QA/QC activities in the HWTR *Inspector's Manual* (which outlines inspector requirements and training) and expects staff to provide, where appropriate, QAPPs for their sampling events.

Specific staff quality responsibilities

As indicated above, the only specific staff responsibilities in the HWTR Program are assigned to the program QC Coordinator. Because of the recent increase in the number of samplings done by the HWTR-HQ Section for product testing and the review of externally generated data, QA/QC responsibilities also increased and are now included in staff's job duties.

QAPP and/or SOPs

The HWTR Program has developed a generic QAPP that can be adapted for site-specific sampling, for use by compliance inspectors during HWTR sampling events and for HWTR-HQ based projects. The following specific SOPs were developed for specific sampling events as part of the current program QAPP:

- Documentation of field activities and field report
- Parts-washer sampling
- Tank sampling
- Antifreeze sampling

The following SOPs will be included in the next QAPP update (2016-biennium):

- Soil and sediment sampling
- Field pH sampling

Compliance sampling site-specific approved QAPP

Fifteen QAPPs/SOPs were approved for compliance sampling events from June 2012 through June 2015, including:

- PM Testing SAP
- Gilbert Dental
- Graymont
- Washington Tree Services
- ICS Sampling
- Liberty Lake Source Tracking
- Outfall Sampling
- Argent Chemical
- Pacific Truck Center

- Riverside Sediment
- Spokane River
- Waste Management
- CAI ERTs Sampling Plan
- Permafix NW SAP
- Rogers Rubber

The HWTR Program is in the process of updating its generic QAPP. The current QAPP grew out of a major sampling training for all HWTR compliance inspectors. The training included information on the different types of QA/QC samples, as well as the importance and benefits of a QAPP. As part of the QAPP update, pre-planning activities were streamlined to minimize impact to staff's workload while working to overcome staff resistance to perceived QA/QC complexity.

Program-specific quality documentation

The HWTR Program compliance unit conducted fewer sampling events in this reporting period (June 2012 - June 30, 2015), and no additional quality needs have been identified. However, there is a need for quality documentation of externally received data, and data generated from product testing, to ensure that specific data quality objectives (DQOs) are met. It is equally important that the specific data quality documentation is legally defensible.

Staff Training on Quality

The HWTR Program conducts QA and sampling trainings to improve (1) staff familiarity with sampling and (2) quality of the data obtained during sampling events. The following training was completed by regulatory compliance staff and other Ecology staff.

HWTR Inspector's Training Workshop, October 10-11, 2012

This training was organized for HWTR Program staff. Program staff from across the state, along with other Ecology staff, attended the two-day training in Olympia, WA. The training was specific to dangerous waste sampling requirements. Topics included:

- Waste Analysis Plan
- Waste Designation Overview
- Development of Quality Assurance Project Plans
- Chemical Test Methods For Designating Dangerous Waste
- Interpreting Laboratory Report and Data Quality Evaluations

Trainees were introduced to different types of waste designation procedures. This training included how to conduct a book designation as required by the Washington State dangerous waste regulations (Chapter 173-303 WAC). The training was part of an exercise to assist new compliance staff in determining if samples would book designate, based on information available from the generator and specific toxicity databases.

The importance of QA planning and sampling techniques was an integral part of the training. Trainees were able to practice how to evaluate and interpret laboratory reports. Presentations from this training are available by request.

HWTR Inspector Hands-on Sampling Training, October 2013

- October 2, 2013 at the Center for Urban Waters in Tacoma, WA
- October 9, 2013 at the Department of Energy's Hammer Training Facility in Richland, WA

Staff from HWTR's Northwest and Southwest Regional Offices attended the hands-on training in Tacoma with staff from the Center for Urban Waters. Staff from HWTR's Eastern and Central Regional Offices and staff from the Nuclear Waste Program Hanford Richland Office attended the training held at the Hammer Training Facility in Richland.

The training provided hands-on demonstrations in the use of various sampling equipment and sampling methodology. There was also a review of SOP and QAPP development, and an update on the new EPA Sampler Certification and Competency requirement. The presentations from this training are available by request.

HWTR Inspector's Training Workshop, October 14-15, 2014

This was a joint training with EPA Region 4, HWTR Program staff, and Test America Laboratory in Tacoma. HWTR staff from across the state, along with other Ecology staff, attended the training. EPA trainers demonstrated how sampling equipment is used and provided hands-on practice for the most commonly used sampling equipment. Interpreting and evaluating data quality of laboratory results were presented by Test America. Case studies and the HWTR QAPP were discussed.

Refresher Training

As part of ongoing professional development, compliance and other HWTR Program staff attend outside agency training as required, such as:

- EPA Basic Inspector Training
- EPA Region 10 Inspector Workshop
- EPA Chemistry for Environmental Professionals
- EPA Chemistry for Environmental Professionals, Fundamentals and Applied
- University of Washington, Northwest Center for Occupational Health and Safety: Hazardous Material Evaluation
- National Environmental Management Academy, Environmental Enforcement and Inspector Training
- Professional Association Workshops such as Society for Environmental Toxicology and Chemistry, and American Chemical Society.

These trainings comply with EPA Competency Requirement and Certification.

Sampling assistance: the HWTR QA Coordinator works with staff to discuss possible compliance sampling. By working with staff on a one-on-one basis, they become more comfortable with the QA/QC process. Most of the sampling events conducted within this reporting period had written QAPPs prior to conducting the sampling events. Compliance Inspectors have shown increased reliance in the use of the QAPP as a standard sampling requirement.

Additional QA Activities

Apart from Ecology's Manchester Environmental Laboratory (MEL), the HWTR Program has contract agreements with eight certified private laboratories to conduct analyses on samples received from Ecology compliance and HWTR-HQ staff.

Program staff also assisted local and county government in conducting sampling events and review of QAPPs.

Additional subject-specific QAPPs were developed by HWTR for the Children's Safe Product Act (CSPA) analysis of products for specific chemicals of high concern to children.

Headquarter (HQ) Project QAPPs

HWTR Program HQ project QAPPs are subject to review and approval of the program QA Coordinator. All project work conducted by HWTR-HQ met the program and agency QA/QC requirements, and no sampling occurred without an approved SOP and QAPP. Below are the lists of HWTR-HQ approved QAPPs.

HWTR-HQ Approved QAPPs

- [Quality Assurance Project Plan: Poly- and Perfluoroalkyl Substances in Consumer Goods in Washington State](#) (HWTR)
- [Quality Assurance Project Plan: Phthalates and Metals in Packaging from Consumer and Children's Products](#) (HWTR/W2R)
- [Quality Assurance Project Plan: Parabens and Metals in Children's Cosmetic and Personal Care Products](#) (HWTR/W2R)
- [Quality Assurance Project Plan: Flame Retardants in General Consumer and Children's Products](#) (HWTR/W2R)
- [Quality Assurance Project Plan: for PCBs in General Consumer Products](#) (HWTR)
- [Addendum #1 to QAPP: Phthalates and Metals in Children's Products](#) (HWTR/W2R)
- [Addendum #1 to QAPP: Parabens and Metals in Children's Cosmetic and Personal Care Products](#) (HWTR/W2R)
- [Quality Assurance Project Plan: Formaldehyde, Volatile Organic Compounds and Metals in Children's Products](#) (HWTR/W2R)
- [Addendum #1 to QAPP: Flame Retardants in General Consumer and Children's Products](#) (HWTR/W2R)
- [Addendum #1 to Quality Assurance Project Plan - PCBs in General Consumer Products](#) (HWTR)

Published Subject-Specific Project Reports

- [Flame Retardants - A Report to the Legislature](#) (HWTR/W2R/EAP)
- [Polychlorinated Biphenyls \(PCBs\) in General Consumer Products](#) (HWTR)
- [Flame Retardants in General Consumer and Children's Products](#) (HWTR)
- [Product Sampling Procedure](#) (HWTR)
- [Phthalates in Children's Products and Consumer and Children's Packaging](#) (HWTR)
- [Parabens in Children's Products](#) (HWTR)
- [Formaldehyde and 15 Volatile Organic Chemicals in Children's Products](#) (HWTR)
- [Metals in Children's and Consumer Products and Packaging](#) (to be published soon)

Program QAPP and SOP Update

The next revision of the HWTR Program QAPP will include a reference to the program generic standard operating procedure (SOP) for product testing projects. The SOP will be written to allow flexibility of specific sample preparation to meet data quality objectives (DQOs) while maintaining a level of consistency in the basic elements of the SOP.

The update to the HWTR Program QAPP will also include procedures for RCRA corrective action project data review and validation for externally received data or validated laboratory analytical data.

6. Nuclear Waste Program

Overview of the Nuclear Waste Program (NWP) quality system

The NWP quality system is a team of scientists comprised of four chemists with many years of relevant laboratory experience, including wastewater laboratory accreditation, QA management of a Hanford site lab, instrumental analyses at Hanford site labs dealing with radiochemical contaminated matrices, and certifications in EPA data validation. Prior experience includes preparing sampling and analysis plans for the purpose of Hanford waste site characterization, and practical experience completing statistical analysis of environmental data. The NWP chemists work closely with Washington State Department of Health (WDOH) Office of Radiation Protection, EPA Region 10, and other programs within Ecology on QA issues at the Hanford site. The NWP biennial plan contains the chemistry implementation plan where QA is described.

QA Coordinator – Roles and Responsibilities

- Coordinates for EPA QA audit of Ecology. (2009 documentary audit of the NWP, which was conducted by EPA Region 10 staff.)
- Serves as point of contact for dissemination of information from Ecology's QA Officer regarding new QA initiatives, applicable training opportunities, etc., to NWP chemistry team.
- Represents NWP at agency-wide QA Coordinators meetings.
- Performs other duties as spelled out in the agency *Quality Management Plan* and the *NWP Hanford Site-wide Chemistry Implementation Plan*.

QAPPs Developed or Approved

- Sampling and Analysis Plan for the Washington State Department of Ecology Comparison of Discrete and Multi-Increment Sampling for Site Characterization and Cleanup.
- Columbia River Irrigation Sampling Sites.
- Hanford Analytical Services QA Requirements.
- Central Waste Complex Inspection.
- Nuclear Waste Program Waste Analysis Plan Guidance/Checklist.

SOPs

- Collecting Environmental Samples at the Hanford Nuclear Reservation
- Instructions for Conducting the Chemistry Review of Work Instructions for the Verification Sampling of Hanford Waste Sites

Quality-Related Training

Program training included:

- EPA 7-Step Data Quality Objectives Process
- EPA Quality Management Conference
- Multi-Increment Sampling Course
- Non-detects Data Analysis
- Visual Sample Plan Computer Code

Current QA Activities

- Hanford Site-wide permit for the Waste Analysis Plan/Sampling and Analysis Plan (WAP/SAP) QA/QC.
- QA Sections 6.5 and 7.8 of the Hanford Federal Facility Agreement
- Hanford Analytical Services Quality Requirements Document update final revision 4 finalized.
- Quality Assurance Task Force for radiochemical laboratories under WDOH and Ecology regulatory authority.
- MQOs for field use of As/Pb XRF analysis for Hanford Orchard sites operable unit closure.
- Data generation review, verification, validation, for fate and transport modeling, USDOE Performance Assessments and Environmental Risk Assessments
- Quality Assurance program assessments of Hanford Mixed Waste Laboratories.
- Taking split samples at CERCLA and RCRA closure remediation sites for final closeout confirmation.
- Maintaining contracts and assessing the performance of ALS Environmental and Test America Richland mixed waste analytical laboratories.
- Continued involvement with HWTR Inspector Hands-on Sampling Training for EPA certification.

Quality Issues

- Sampling and analysis of tank waste prior to transfer to waste treatment plant.
- Future assessment of Hanford site laboratories.
- Field Screening versus Laboratory QA/QC.
- DOECAP (Department of Energy Consolidated Audit Program) tracking.
- DOECAP links to the USDOE Mixed Analyte Performance Evaluation Program (MAPEP).
- Assure QA of fate and transport modeling used for the Integrated Disposal Facility and the Tank Farm Performance Assessments are of equal or better quality than the Tank Closure Waste Management Environmental Impact Assessment.

7. Shorelands and Environmental Assistance Program

The Shorelands and Environmental Assistance (SEA) Program uses a diverse range of activities to implement its mission to work in partnership with communities to support healthy watersheds and promote statewide environmental interests. The SEA Program follows the criteria for “best available science” as defined in WAC 365-195-905 when developing technical and regulatory guidance and tools.

The SEA Program QA Coordinator position has been held by three different staff members since the last report to management. Amy Yahnke was designated as the new QA Coordinator in April 2015.

QA Training Activities

SEA has no training activities for quality assessment at a program level.

Current Program QAPPs

SEA has no program QAPPs. Project-based QAPPs are developed as needed. Projects with Environmental Assessment Program (EAP)-approved QAPPs are indicated in the list of SOPs below.

Updated List of SOPs/Guidance Documents, QAPPs, and Associated Training

The following are currently in development:

- ‘Ordinary High Water Mark’ (OHWM) Determinations: A combined streams, marine, and lakes manual will include OHWM determination SOPs. Target date for completion is September 30, 2015, depending on resource availability. The SOPs will be for work done or funded by Ecology only. Ecology provides OHWM training through the Coastal Training Program.
- Beach Morphology Monitoring: SOP-oriented peer-reviewed literature exists that documents methods. SOPs are written for some individual tasks (i.e., planning, equipment setup, collection, processing), and we are working on a general SOP as well as more detailed SOPs for other specific tasks. SOP is currently in draft form. Target completion date is November 2015.
- Boat-based Beach and Bluff Mapping: EAP-approved QAPP exists for EPA-funded project on mobile LiDAR for boat-based mapping. SOPs are under development as the methods for collection and processing are finalized. To be completed no earlier than March 2016.
- Multi-beam Sonar Surveying: SOPs for near-shore morphology surveys are under development as methods for collection and processing are finalized. To be completed no earlier than November 2016.

- **Watershed Characterization:** A QAPP was not required when this project started. Documentation for this project includes reports for the assessment of water flow and water quality (*Puget Sound Characterization. Volume 1*), habitat (*Puget Sound Watershed Characterization Project Volume 2*), and a user's guide (*Volume 3: User's Guide for the Puget Sound Watershed Characterization*). Volume 1 includes an appendix describing geospatial methods that is currently in development and is expected to be complete November 2015. Volume 2 was prepared by Washington Department of Fish and Wildlife and includes details for the habitat assessment methods. Volume 3 provides guidance for use of the watershed characterization tool. The documents and data are maintained on Ecology's external website: <http://www.ecy.wa.gov/services/gis/data/inlandWaters/pugetsound/characterization.htm>.
- **Characterizing Wetland Buffers:** Work for this project was done under an EAP-approved QAPP with funding from an EPA Wetland Program Development Grant (WPDG; CD-00J47401-0). The final report was submitted to EPA in December 2013. The public report is currently in draft form and will be completed based on resource availability. No target date has been set for completion.

The following are completed:

- **Wetland Delineations:** This is a federally developed SOP maintained by the U.S. Army Corp of Engineers. Ecology does not disseminate it. See: <http://www.ecy.wa.gov/programs/sea/wetlands/delineation.html>
- **Wetlands Rating Systems:** Ecology developed two systems that assess wetland functions to inform regulation of wetland impacts, one for Eastern and one for Western Washington. Ecology provides training to users of the rating systems through the Coastal Training Program and by arrangement. The rating systems have been revised or updated approximately every 10 years to incorporate the most current best available science. The most recent update was completed in 2014. The rating systems and lists of people trained in the rating systems for Eastern and Western Washington are maintained on SEA's external website: <http://www.ecy.wa.gov/programs/sea/wetlands/ratingsystems/index.html>
- **Wetlands Credit/Debit Systems:** Ecology developed two systems to guide activities related to compensatory mitigation for wetland impacts, one for Eastern and one for Western Washington. Development of the credit/debit systems was based on the wetlands rating systems, and an outgrowth of a need for in-lieu fee programs to account for wetland functions. Ecology provides training to users of the credit/debit systems through the Coastal Training Program and by arrangement. The credit/debit systems and lists of people trained in the credit/debit systems for Eastern and Western Washington are maintained on SEA's external website: <http://www.ecy.wa.gov/mitigation/creditdebit-comments.html>
- **Padilla Bay Weather and Water Quality Data:** The National Estuarine Research Reserve System (NERRS) and NOAA developed SOPs and QA procedures. All reserves are funded and required to follow these protocols, which are periodically updated to improve data quality. In addition, Padilla Bay staff attend training in South Carolina with other NERRS

staff every second year or every year, depending on the number of updates and changes to protocols.

- Padilla Bay Chlorophyll: EAP developed and approved SOPs as part of the laboratory certification process. Chlorophyll is measured as part of the NERRS system-wide monitoring program and needs to follow the NERRS protocols.
- Modeled Wetland Inventory: Work for this project is done under an EAP-approved QAPP with initial funding from EPA Grant #PC-00J283-01. Data are maintained on Ecology's external website at <http://www.ecy.wa.gov/services/gis/data/biota/wetlands.htm>. Documentation of the project is maintained on Ecology's external website at <http://www.ecy.wa.gov/programs/sea/wetlands/StatusAndTrends.html>.
- Monitoring Wetlands Mitigation Compliance: This program started in 2007 with funding from EPA (#WL-96015101). An EAP-approved QAPP was established, and SOPs are included in *Appendix B - Procedures for Visiting Wetland Compensatory Mitigation Sites*. The compliance team meets as needed to discuss technical and policy issues, as well as follow-up and compliance protocols. Datasheets and procedural checklists are used to ensure consistent collection and recording of compliance information. Over time these datasheets and checklists have evolved as the program has become more established. Because of that, staff have indicated a need to update the original SOPs. Compliance information, including numeric and qualitative ratings of regulatory compliance and ecological success, may be used to analyze the success of wetland mitigation in the future. Staff will update the SOP documentation as time allows over the next 2 years.
- Channel Migration Zones: Work was done under an EAP-approved QAPP for this project with NEP grant funding from the EPA. Project ended in 2014.
- Dredge and Fill Materials: The SEA Program works with the U.S. Army Corps of Engineers to implement testing requirements of dredge and fill materials associated with Clean Water Act Section 404 permits. QA is maintained by the Corps for those activities.

Audits Conducted

The 2012 triennial Quality Systems Review was completed by EPA. EPA listed no observations or recommendations specific to the SEA Program.

QA Anomalies and/or Corrective Actions

QA Coordinator open for 1 year.

Planned QA Activities

EPA recently notified the SEA Program that it will receive a WPDG to improve wetland identification using a semi-automated remote sensing approach. Development of the QAPP for this project was included in the grant application scope of work and is scheduled for completion in October 2015.

8. Spills Program

Program Coordinator

Dale Davis is the QA Coordinator of the Spill Prevention, Preparedness, and Response Program (Spills Program). He also acts as the program Sampling Specialist. The primary objective for both positions is improvement of sampling data quality. The person in this position is responsible for developing all Spills Program specific sampling policies, procedures, guidelines, forms, and other related tools. The QA Coordinator also develops and conducts sampling training for program staff, ensures that sampling related tools are made available to staff, and acts as the lead Sampling Specialist during spill responses.

QA Section included in Biennial Program Plan

A program QA Plan is included as part of the program's biennial planning and is posted on the Spills Program intranet site (Section VIII).

Present Status of Plan Implementation

Spills are emergencies, and advanced planning is necessarily limited. In light of this, the Spills Program has developed policies and procedures, in cooperation with NOAA, the U.S. Coast Guard, and EPA, that ensure that high quality samples and data are collected in a manner that is legally defensible.

Program staff use a *Sampling Plan Template* to develop a plan for any sampling associated with an incident. The template prompts the user to define the sampling objective(s), to sketch out the area impacted by the spill, and also to identify sampling sites, the number and type of samples to be collected, and the appropriate containers. The template also refers the user to *Sampling Guidelines* that have been developed specifically for collection of samples associated with spills, primarily oil spills. A *Sampling Documentation Form* is available to record sampling related information.

Once samples have been collected, Spills Program staff are encouraged to use an *Oil Spill Chain-of-Custody/Request for Analysis Form* developed specifically for oil spill related samples. Guidelines on the back of the form help the user select the appropriate analyses and also provide associated information such as sample size and container.

For larger spills, a Sampling Specialist develops a *Comprehensive Sampling Plan* that coordinates all sampling activities associated with the incident. Again, a template is used, but the information included in the template is much more detailed and includes QA guidelines.

Comprehensive sampling plans, called *Ephemeral Data Collection Plans*, are being developed for large oil facilities located near water bodies. These plans are similar to a QAPP and are designed to direct sampling in the early hours of an oil spill in a specific location until another plan can be developed that is specific to the incident. The plans are developed in association with representatives from the facilities and identify sampling sites, types and numbers of samples

to collect, sampling procedures, analytical methods, and the laboratory that will analyze the samples. The plans are designed to satisfy Natural Resource Damage Assessment (NRDA) needs.

State, federal, and oil corporation NRDA representatives meet regularly as an informal group called the *Joint Assessment Team* (JAT). This group developed a comprehensive guidance document for cooperative NRDA that includes guidelines for developing a sampling plan with similar components of the Ephemeral Data Collection Plans. If there is an oil spill, the document identifies nationally recognized and accepted procedures that would be used by Spills Program staff and others to develop and implement a NRDA.

All forms, guidelines, and procedures are available to Spills Program staff at X:\Spills_Program\TRAP or on SharePoint at <http://teams/sites/SPPR/response/trap/default.aspx>

A “Sampling QA/QC” chapter for the *Spills Program Policy and Procedure Manual* has been prepared and added to the program policy manual as Chapter 15.

SOPs

The following seven SOPs were developed for most sampling that would be associated with spill responses:

- SPL001-Collecting oil spill source samples
- SPL002-Collecting oil spill HCID samples
- SPL003-Collecting oil spill water samples
- SPL004-Collecting oil spill intertidal sediment samples
- SPL005-Collecting oil spill shellfish tissue samples
- SPL006-Collecting soil or sediment samples for gasoline spills
- SPL007-Collecting samples from fish kills

QA/QC Training for Spills Program Staff

All program staff are required to complete DrillTrac training associated with various positions within the Incident Command System (ICS). Sampling training is one of the required elements of DrillTrac. All program staff that may collect samples are required to take basic sampling training that includes information necessary to collect qualitative samples associated with oil spills. Program Sampling Specialists and staff that are on the Trustee Resource Assessment and Protection (TRAP) team are required to take intermediate sampling training that adds to the basic training by providing information necessary to collect quantitative samples. All full-time and after-hours spill responders attend a Spill Response Training Workshop annually that includes four hours of classroom and hands-on field sampling training.

A select group of people are required to take advanced sampling training. Staff at the advanced level fill the Sampling Specialist position within the ICS and develop comprehensive sampling plans, direct sampling teams, and coordinate laboratory analyses. Training and refreshers are conducted on an as-needed basis, typically every two to three years or as required when new staff are added to the program.

Training Provided by Spills Program Staff

The basic and intermediate sampling training described above is provided by Spills Program staff. Advanced sampling training is obtained through workshops where participants are specialists within the oil spill industry/community, and discussions result in consensus on various sampling issues.

Technical Assistance and QA/QC Support Provided to Spills Program Staff

The sampling training described above includes sections on developing sampling plans and specific QA/QC requirements. Program staff are instructed to contact either Dale Davis (Program QA Coordinator) or Don Noviello (WDFW oil spill NRDA Sampling Specialist) with *any* questions regarding sampling (one is always available 24/7 by pager). Staff are also encouraged to contact Manchester Environmental Laboratory (MEL) with questions related to oil spill sampling and analysis.

Significant QA/QC Problems Encountered, along with Corrective Actions Taken or Recommended

After significant spills, program staff involved in the response attend a debriefing to discuss lessons learned, where sampling related issues are reviewed. Any problems identified are immediately corrected. In addition, debriefs often result in procedural improvements, such as the Early Assessment Team concept, that help to ensure that data collected are of the highest quality possible. No significant problems have been encountered.

QA/QC Tasks Planned or Needed for the Spills Program

Continue full implementation of Ecology's quality system in the coming biennium.

9. Toxics Cleanup Program

Description of FTEs designated to Quality Structure

Fu-Shin Lee is the Toxics Cleanup Program (TCP) QA coordinator and a staff member of the Aquatic Lands Cleanup Unit in Headquarters (HQ). There are at least 3 FTE TCP staff time in the Toxics Cleanup Program to carry out the following activities:

- Participated in development of the Sampling Analysis Plan (SAP) / Quality Assurance Project Plan (QAPP) for site investigation
- Identified the data gap and ensured appropriate methods used to meet the data quality objectives
- Reviewed and approved SAP / QAPP
- Conducted field sampling audits
- Reviewed and verified the data reports

Existing QA Guidance

- FINAL Sediment Cleanup Users Manual II (SCUM II), March 2015 (12-09-057)
- Puget Sound Estuary Protocols, March 2015 (15-09-046)
- Bellingham Bay Regional Background Sediment Characterization, February 2015 (15-09-44)
- Ecology Establishing Regional Background, January 2015 (13-09-051)
- Port Gardner Bay Regional Background Sediment Characterization: Final Data Evaluation and Summary Report, December 2014 (14-09-339)
- Wood Waste Cleanup: Identifying, Assessing, and Remediating Wood Waste in Marine and Freshwater Environments, September 2013 (09-09-044)
- Sediment Management Standards, Chapter 173-204 WAC, February 2013 (13-09-047)
- Concise Explanatory Statement, Chapter 173-204 WAC Sediment Management Standards: Summary of Rule Making and Response to Comments, February 2013 (13-09-044)
- Sediment Management Standards – Environmental Impact Statement, February 2013 (12-09-054)
- Final Cost-Benefit and Least Burdensome Alternative Analyses: Chapter 173-204 WAC Sediment Management Standards, February 2013 (13-09-046)
- Sediment Management Standards – Small Business Economic Impact Statement, August 2012 (12-09-052)
- Sediment Management Standards – Preliminary Cost-Benefit and Least Burdensome Alternative Analyses, August 2012 (12-09-051)
- Fish Consumption Rates Technical Support Document – Version 2.0 FINAL, January 2013 (12-09-058) <https://fortress.wa.gov/ecy/publications/publications/1209058.pdf>
- Draft for Public Comment: Model Remedies for Sites with Petroleum Contaminated Soils, April 2015 (15-09-043)

- Puget Sound Dredged Disposal Analysis Guidance Manual - Data Quality Evaluation for Proposed Dredged Material Disposal Projects (QA-1), June 1989
- Data Validation Guidance Manual for Selected Sediment Variables (QA-2), June 1989 Draft
- Model Toxics Control Act Regulation and Statute, 2013 (94-06)
- Focus on Changes to MTCA: Implementing 2013 Changes to Model Toxics Control Act, August 2013 (12-09-054)
- Chapter 173-360 WAC Underground Storage Tank Regulations, May 2013 (12-09-242)
- Rule Proposal Notice – Underground Storage Tank Regulations, March 2012 (12-09-045)
- Preliminary Cost-Benefit and Least Burdensome Alternative Analyses: Chapter 173-360 WAC Underground Storage Tank Regulations, March 2012 (12-09-043)
- Small Business Economic Impact for Chapter 173-360 WAC, Underground Storage Tank Regulations, March 2012 (12-09-044)
- Guidance for Remediation of Petroleum Contaminated Sites. September 2011, to be updated July or so 2015
- Underground Storage Tank – Site Check/Site Assessment Checklist, March 2015 (ECY 010-158)
- Guidance for Site Checks and Site Assessments for Underground Storage Tanks, May 2003
- Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, October 2009. Use updated Vapor Intrusion (VI) Tables incorporated in CLARC and on the VI web page instead of screening levels published in the original guidance. Plan to use EPA June 2015 VI Guides to help to update and finalize the draft guidance. The timing for completing the guidance depends on available resources and Program priorities.
- Analytical Methods for Petroleum Hydrocarbons, June 1997
- Guidance on Remediation of Petroleum Contaminated Groundwater by Natural Attenuation
- Tools for Calculating Cleanup Levels
- Natural Background – Soil Metals Concentrations in Washington State, October 1994
- Guidance on Sampling and Data Analysis Methods, January 1995
- Statistical Guidance for Ecology Site managers, August 1992
- Site Hazard Assessment Guidance and Procedures for Washington Ranking Method, April 1992
- Brownfields Resource Guide, September 2009
- Chapter 173-322A WAC, Remedial Action Grants and Loans, August 2014
- Guidelines for Property Cleanups under the Voluntary Cleanup Program, July 2008
- Integrated Site Information System User Manual
- TCP Safety Plan, January 2005
- Updated Guidelines for Property Cleanups under the Voluntary Cleanup Program (#08-09-044) and VCP Staff User Manual to be completed by July 2015

Staff Training

- Integrated Site Information System (ISIS) training is continuously offered on an as needed basis. Both individual and group training sessions are offered.
- MyEIM cheat sheets were drafted and tested to help the users to use MyEIM search, analysis and mapping tools more easily, and help data review.
- Model Toxics Control Act (MTCA) Site Management 101 – TCP is continuously providing training to new and experienced site managers. The training provides an overview of MTCA and how to calculate cleanup levels under MTCA.
- The TCP staff continuously attended the seminars, webinars, conferences, and class room training classes offered by the Ecology, Northwest Environmental Education Center, and EPA, other government agencies, Interstate Technology & Regulatory Council (ITRC) and consultants, such as Light Non-aqueous Phase Liquids: Science, Management, and technology, Remedy Selection for Contaminated Sediments, etc.
- Provided SCUM II training to the project managers.

Current QA Activities

- Review and approval of contractor-prepared Sampling Analysis Plan (SAP) or QA Project Plans (QAPP) by the designated site specific technical support specialist and site manager.
- MyEIM cheat sheets were drafted and tested to help the users to use MyEIM search, analysis and mapping tools more easily, and help data review.
- Participated in the EIM taxonomy group to make the taxonomy data submittal, edit and search more user friendly.
- Completed updates to the Integrated Site Information System (ISIS) to include added new ‘Document Review Tracker’ module which tracks information regarding review times of key documents as well as suggestions for improving document review processes. In March 2015, the Program began work on ‘ISIS-3’. The focus of the project is to update the application to meet current business needs and to develop new interfaces to make ISIS data entry more streamlined. The TCP is committed to taking steps to improve data quality and business practices by updating databases and the program’s information systems.
- In 2014, completed redevelopment of the ‘[TCP Web Reporting Portal](#)’, which is a publicly available web site which allows for querying core information contained in the ISIS and UST information systems.
- EIM data entry training to the internal staff and external data submitters was continuously offered by the TCP funded data coordinators.
- Completed redevelopment of the Underground Storage Tank (UST) Information and Department of Revenue Information Exchange (DORIE) the fall of 2012.
- Washington Tank Operator Training (WATOT) will be completed the fall of 2015. The program will allow the UST owner/operators to develop an Operations and Maintenance Plan for their facility as well as complete remedial training related to the management of the UST installation.

- Redeveloped and expanded the Soil Safety Tracking System (SSTS), into a new system which includes EPA data from nearly 4,000 properties in the Tacoma Smelter Plume (TSP). The new Area wide Remediation Environmental Information System (AREIS) includes a new publicly accessible portal, which allows residents to access information and documents related to their property. In 2013, AREIS was expanded to include a new communications module which is used to track communications with residents. AREIS was also expanded to manage residential cleanups in the Everett Smelter Plume.
- Upgraded the Source Control Management (SCM) system to better facilitate data management related to source control activities on the Lower Duwamish Waterway (LDW) superfund site. The new LDW system also includes integration with the Document Storage and Retrieval System (DSARS) which now stores over 8,000 LDW documents.
- In May 2015, completed development of a new mobile application for UST inspectors. The 'UST Inspection Checklist' application allows UST inspectors to collect all inspection information in the field using a portable tablet device and then upload the inspection information when they return to the office. This eliminates the need to return to the office and complete data entry into the UST database. It also allows inspectors to have instant access to guidance and reference documents as well as up to date information from the UST database. The plan is to complete training for the core team of lead inspectors this summer, then train the remaining 12 UST inspectors in September.
- Continuously updating TCP's information systems to include: ISIS, MyEIM, Generated Site Pages (GSP), Area wide Remediation Environmental Information System (AREIS), Lower Duwamish Waterway (LDW) system, and Underground Storage Tank (UST) system, Washington Tank Operator Training (WATOT) and Data Storage and Retrieval System (DSARS). The TCP IT Team conducts periodic user acceptance test workshops and beta testing sessions whenever these tools are updated.
- MyEIM bioassay and chemistry analytical tools were improved and updated in May 2014.
- MyEIM poster was presented in the June 2015 TCP workshop to highlight MyEIM key features, quick start searches in the Search Templates, and when to use MyEIM during the data generation and review process.
- The EIM data entry templates were updated in 2013 to add Result QA Level in the EIM Result template and Bioassay QA Level in the Bioassay template to note the chemistry and bioassay data validation level. EPA data verification and validation level, Stage 1 - 4, were to the data dictionary of Result QA Level field.
- Worked with the Ecology QA officer to finalize the field audit check list, and did the field sampling audits.
- MyEIM 101 training for data verification and site scoping to TCP project managers, sediment specialists, data coordinator, and technical support staff to be provided in April and May 2016.

Quality Issues

- The EIM data coordinator, project manager and site specific technical support specialist performed the data quality check to ensure that the sampling date, analytical method, sample source, appropriate unit, measurement basis, locations, the number of samples and result parameters, and all used to calculate derived variables (e.g., dioxin TEQ, cPAH TEQ, PCB as

sum of Aroclors, etc.) were submitted per QAPP. When the data errors or data anomalies were found, the EIM data coordinator informed the data submitter and the project manager. The data submitter would correct and resubmit the data. If there are minor errors, the data coordinator would correct them upon agreement by the EIM data quality coordinator. The EIM data quality coordinator oversees the agency EIM data quality.

- Continuously work with the IT staffs and users to improve MyEIM search, mapping and analysis tools as the bugs were reported.
- Worked closely with the project manager and field lead staffs to perform field sampling audit to minimize sampling errors.

Planned QA/QC Activities

- Continuously work with agency QA officer and EIM data quality coordinators to resolve the EIM data quality issues encountered during data submittal and review.
- Continuously update the program QA guidance as needed from the MTCA rule revision effort.
- MyEIM search, mapping and analysis tools will be redeveloped in 2016.
- MyEIM training will be provided as the major milestone of MyEIM updates are accomplished.
- SCUM II will continuously be updated as needed.

10. Waste 2 Resources Program

The Waste 2 Resources (W2R) Program interacts with the quality system in several areas including:

- Industrial Section permitting, compliance monitoring, and enforcement activities.
- Reducing Toxic Threats Section compliance, enforcement, and product testing activities.
- Statewide Resources Section waste characterization activities.

On July 1, 2015, the Reducing Toxic Threats Section was transferred from the W2R Program to the Hazardous Waste and Toxics Reduction (HWTR) Program. Information contained within this report reflects the work performed before the transfer.

Description of Industrial Section Quality Systems

The Industrial Section is focused on three major industries of Washington State: aluminum smelters, oil refineries, and pulp and paper mills. The section also works with several smaller facilities which support the primary industries and several large industries outside the primary industry groups. The section's staff is trained to handle the complexities of these industries and is responsible for environmental permitting, site inspections, and compliance issues. The section regulates air, water, hazardous waste, and cleanup management activities for these industries.

Industrial Section QAPPs

As part of its compliance assurance activities, the Industrial Section conducts National Pollutant Discharge Elimination System (NPDES) water inspections with sampling. Compliance inspections include sampling of wastewater effluent, wastewater influent, sanitary wastewater influent, sanitary wastewater effluent, and stormwater discharges. Analytes are site-specific and are dependent on the type of industrial facility (e.g., pulp and paper, refinery, chemical manufacturing). QAPPs are developed for each compliance sampling inspection to ensure data validity and enforceability.

The Industrial Section also is responsible for review and tracking of extensive self-monitoring data from permittees. The section receives monthly reports under both the Air Operating Permit program and the NPDES/State Waste Discharge program. The section is responsible for review, data entry, compliance evaluation, and reporting to EPA under Ecology's Performance Partnership Agreement. The section also receives reviews and tracks ad hoc studies that are required under these permits (e.g., receiving water studies, outfall modeling reports).

Over the past year, the Industrial Section has continued developing standard operating procedures (SOPs) to clarify expectations for staff and ensure that our data review and tracking obligations to EPA and Ecology's programs are met in a timely and complete way. Through clear definition of roles, responsibilities, and expectations, these SOPs will (1) increase the quality of data that goes into our databases and (2) improve our implementation of the State's delegated programs. Thus far, the section has created/updated SOPs for:

- Water Discharge Monitoring Report Review.
- Air Monthly Report Review/Compliance Monitoring Spreadsheet Tracking.

- Water Discharge Permitting Process from Application to Issuance.
- Enforcement procedures.
- Air permitting from application to issuance.
- Inspections and reporting.

The section will continue to create and update its SOPs on a triennial basis.

Training on QA-Related Topics

The W2R QA Coordinator is housed in the Industrial Section. The new QA Coordinator attended and received a certificate of completion for an EPA sponsored *Hazardous Waste and Environmental Sampling* training on October 14 and 15, 2015. Additional training opportunities will continue to be identified for QA staff.

Description of Reducing Toxic Threats (RTT) Section Quality System

The Reducing Toxic Threats (RTT) Section is responsible for compliance and enforcement for a number of laws related to the chemical content of consumer products. These include:

- Children's Safe Product Act (Ch. 70.240 RCW – Children's Safe Product Act)
- BPA Ban (Ch. 70.280 RCW – Bisphenol a — restrictions on sale)
- PBDE Ban (Ch. 70.76 RCW – Polybrominated diphenyl ethers — flame retardants)

In addition, the RTT Section coordinates with HWTR in enforcing the Toxics in Packaging law (Ch. 70.95G RCW – Packages containing metals) and the Mercury law (Chapter 70.95M RCW – Mercury). The RTT Enforcement Coordinator, Hazardous Waste and Toxics Reduction (HWTR) Program staff, and Environmental Assessment Program (EAP) staff collaborate on enforcement projects under these laws.

RTT Section QAPPs

RTT staff (in conjunction with the HWTR Program and EAP) have written and published QAPPs for work to analyze children's products and packaging for chemicals of concern. Review and approval for these QAPPs was conducted by (as applicable) the Southwest Regional Office HWTR Program QA Coordinator, the EAP QA Coordinator, the Ecology QA Officer, appropriate section/unit managers, and sampling leads:

- Quality Assurance Project Plan: Poly- and Perfluoroalkyl Substances in Consumer Goods in Washington State 15-04-009 February 2015.
- Quality Assurance Project Plan: Chemicals of High Concern to Children in Children's Clothing, Footwear, and Accessories 14-03-125 December 2014.
- Quality Assurance Project Plan: Parabens and Metals in Children's Cosmetic and Personal Care Products, Addendum No. 1, 12-07-021a October 2014.
 - Quality Assurance Project Plan: Parabens and Metals in Children's Cosmetic and Personal Care Products 12-07-021 February 2012.

- Quality Assurance Project Plan: Phthalates and Metals in Children’s Products, Addendum No. 1, 12-07-023a October 2014.
 - Quality Assurance Project Plan: Phthalates and Metals in Children’s Products 12-07-023 March 2012.
- Quality Assurance Project Plan: PCBs in General Consumer Products, Addendum No. 1, 13-04-088a July 2014.
 - Quality Assurance Project Plan: PCBs in General Consumer Products 13-04-088 April 2013.
- Quality Assurance Project Plan: Flame Retardants in General Consumer and Children’s Products, Addendum No. 1, 12-07-025a March 2014.
 - Quality Assurance Project Plan: Flame Retardants in General Consumer and Children’s Products 12-07-025 August 2012.
- Quality Assurance Project Plan: Phthalates and Metals in Tier 3 Children’s Products 13-03-108 April 2013.
- Quality Assurance Project Plan: Evaluation of Bisphenol A in Products Regulated by the State of Washington 12-03-106 June 2012.
- Quality Assurance Project Plan: Phthalates and Metals in Packaging from Consumer and Children’s Products 12-07-022 February 2012.
- Quality Assurance Project Plan: Formaldehyde, Volatile Organic Compounds and Metals in Children’s Products 12-07-024 May 2012.

RTT Section SOPs

The HWTR Program has published an SOP (Ecology Publication No. 14-04-013) for the product testing performed by the RTT Section. The SOP was last updated in April 2014 and is currently undergoing further revisions and updates.

Description of Statewide Resources Section (SRS) Quality Systems

The Statewide Resources Section (SRS) is responsible for policy, rulemaking, and data collection and analysis activities regarding the management of solid waste, biosolids, organics, mercury lights, electronics, and other recyclable materials.

Although the SRS has performed non-regular sampling related to specific odor-related incidents at composting facilities and solid waste sludge at a land application facility, regular sampling is not performed by SRS staff. Local jurisdictional health districts are the regulatory agencies which deal directly with most SRS facilities. Ecology does have jurisdiction over conditionally exempt solid waste facilities, but regular inspections and sampling events are not conducted at these facilities due to limited resources and the sheer number of exempt solid waste facilities.

RCW 70.95 requires Ecology to conduct periodic characterizations of the state’s municipal solid waste (MSW). The state plan for solid and hazardous wastes recommends that waste characterization studies be done every 4-5 years due to growing population.

11. Water Quality Program

Description of Water Quality Program (WQP) Quality System

Water Quality Policy 1-11 is the guiding policy that Ecology uses to assess water quality data, determine if water bodies are polluted, and decide if further action is needed. This policy also explains data submittal and the data quality necessary for inclusion in a Water Quality Assessment. The policy is comprised of two chapters:

Chapter 1: [Assessment of Water Quality for the Clean Water Act Sections 303\(d\) and 305\(b\) Integrated Report](#) was [revised](#) in July 2012. This chapter directs the development of Water Quality Assessments for fresh waters. The assessments determine attainment with [WAC 173-201A](#) (Surface Water Quality Standards) and [WAC 173-204](#) (Sediment Management Standards). Chapter 1 also describes standards for data quality.

Chapter 2: [Ensuring Credible Data for Water Quality Management](#) was established in September 2006 and describes the QA measures that help ensure the credibility of data and other information used in agency actions responding to the quality of state surface waters. Agency actions include:

- Determinations of whether a water body is supporting its designated use, such as the 303(d) and 305(b) assessment processes.
- Establishment of a total maximum daily load (TMDL) and the associated load allocations and wasteload allocations.
- Revisions to the water quality standards.

This chapter is required by the Water Quality Data Act codified in RCW 90.48.570 through 90.48.590 in 2004.

Quality Assurance Project Plans (QAPPs)

The agency's list of published QAPPs includes water quality monitoring projects such as PCBs in the Spokane River and Wenatchee River and fecal coliforms in the Palouse River. These QAPPs are available at:

[https://fortress.wa.gov/ecy/publications/UIPages/PublicationList.aspx?IndexTypeName=Topic&NameValue=Quality%20Assurance%20Project%20Plans%20\(QAPPs\)&DocumentTypeName=Publication](https://fortress.wa.gov/ecy/publications/UIPages/PublicationList.aspx?IndexTypeName=Topic&NameValue=Quality%20Assurance%20Project%20Plans%20(QAPPs)&DocumentTypeName=Publication)

QAPPs are required for studies conducted by permittees in response to WQP permit requirements or orders. These QAPPs are usually reviewed and approved by the regional offices. Permittee QAPPs for water quality monitoring can be found in PARIS (<http://ecydbleywqdp1/wq/f?p=106:1:7941303561016012>) within the list of submitted documents for each permittee.

Standard Operating Procedures (SOPs)

The WQP has three SOPs listed on the *Quality Assurance at Ecology* webpage: <http://www.ecy.wa.gov/programs/eap/quality.html>. These SOPs are for sampling stormwater by automated or grab samples and for sampling stormwater suspended particulate matter with in-line passive samplers.

The WQP maintains permits, manuals, and guidance documents for all aspects of stormwater management including stormwater sampling plans, low impact development, and runoff control from log yards, airports, and highways. These documents are made publically available at: <http://www.ecy.wa.gov/programs/wq/stormwater/tech.html>. All of the documents are revised, reviewed, and reissued by the WQP at regular intervals.

The WQP also maintains manuals and guidance documents for point source wastewater discharge permit issuance and implementation. These documents are made available at: <http://www.ecy.wa.gov/programs/wq/permits/guidance.html>. The most comprehensive document is the *Permit Writers Manual* which describes the process and contents of wastewater discharge permits. Other documents include: criteria for sewage works design, sampling procedures for trace metals, review criteria for wastewater toxicity tests, QAPP templates for temperature studies, guidance for mixing zone studies, and more. These documents are updated as needed and receive internal and external review of each revision.

QA Problems and Issues

The WQP has a new QA Coordinator who is not yet aware of any problems or issues.

Program Training on QA-Related Topics

The WQP maintains QA documents to guide staff in implementing QA activities. The WQP also has a QA Coordinator who is in touch with Environmental Assessment Program (EAP) staff and provides technical assistance to WQP staff. WQP staff attend QA training when available.

QA Initiatives

- The WQP has a QA Coordinator tracking the quality activities within the program. The main goal of the QA Coordinator is implementing the Credible Data Policy.
- Every monitoring project must be described in a QAPP usually developed by the project lead. The QAPPs follow the same format and address the same QA principles as those QAPPs developed by staff in EAP. All WQP developed projects that include collection of environmental data are conducted according to a QAPP.
- QAPPs developed by municipal stormwater permittees for permit compliance are reviewed for approval by designated Stormwater QA staff. A guidance document for preparation of QAPPs by stormwater permittees was issued in 2008 to narrow the scope of the QAPPs and improve the efficiency of QAPP review and approval. Unlike wastewater discharge

monitoring, the municipal stormwater permits rely on site-specific ambient monitoring projects.

- The Financial Assistance Section awards grants and low interest loans for projects intended to improve water quality. Monitoring of water quality is usually required to gauge the effectiveness of the project. QAPPs developed by recipients in response to grant and loan requirements are reviewed for approval by EAP staff through the joint EAP/WQP Procedure 2-03.
- Water quality data are stored in the agency Environmental Information Management (EIM) database, and data from grant and loan recipients and data submitted to Ecology for the biennial Water Quality Assessment are managed by the WQP EIM Coordinator. The coordinator works with regional permit managers and data submitters and screens data for validity and intended use. Monitoring must be in accordance with a QAPP.
- The WQP's WET Coordinator reviews all whole effluent toxicity (WET) test reports to make sure that WET tests were conducted in accordance with approved toxicity test methods and results met test acceptability criteria. WET test results are also examined for a meaningful concentration-response relationship so that anomalous results can be excluded from regulatory decisions. Ecology Publication WQ-R-95-80, *Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria*, describes expectations for WET testing and reporting.
- The Water Quality Assessment Coordinator verifies that information in the biennial report to EPA on the status of the state's waters is adequate for its purpose. The station sample locations and water segment boundaries are verified through the use of geographic system coordinates. Environmental data entered into EIM by the WQP EIM Coordinator must meet data acceptance protocols, and decisions on the status of water bodies are verified through internal QC checks and public review.
- A Water Quality Assessment is conducted biennially for submission to EPA under sections 303(d) and 305(b) of the Clean Water Act. This assessment must also meet the requirements of the state's *Water Quality Data Act*. The assessment uses the Watershed Assessment Tracking System (WATS) database to document decisions and ensure the data used has the highest quality assurances from the EIM database.
- The Permitting and Reporting Information System (PARIS) database was created in 2011. PARIS contains information on water quality permits, inspections, enforcement actions, and discharge monitoring data. Both NPDES and State Waste Discharge permits are included in the database. PARIS contains information on permit management, including permit lists and facility information, discharge monitoring reports (DMRs), water quality permit limits, enforcement actions, and other information. As discussed above, PARIS contains QAPPs prepared by permittees for monitoring activities or studies.
- The WQP initiated the use of the integrated WQWebDMR/PARIS applications in April 2010. There are validation steps in WQWebDMR to increase the quality of the data. Some facilities enter their own data within WQWebDMR, and during the submittal process the system validates the data and provides the facilities an opportunity to correct data entry errors. Ecology permit managers and enforcement officers continue to review the DMRs for individual permits on a routine basis and look for data entry and calculation errors. If the

DMR has an incorrect calculation, Ecology sends it back to the discharger with a request for correction. These automated improvements to permit data entry have increase the quality and efficiency of Ecology's permit management.

- All draft wastewater discharge permits are reviewed for policy conformance and technical accuracy by the Permit Quality Coordinator. The Permit Quality Coordinator provides comments to the permit author and feedback to program management regarding policy and process issues.

FTEs Designated to Quality in the Water Quality Program

Approximately four FTEs are estimated to be involved in WQP quality functions including EIM work, WET testing, QA Coordinator, Permit Quality Coordinator, permit writers group, IT support, and regional QAPP work. Because QA activities are diffused throughout the WQP, any estimate of overall staff time must be considered approximate.

12. Water Resources Program

Description of Program's Quality System

The Water Resources Program (WRP) collects:

- Stream flow data.
- Depth-to-water measurements in wells.
- Other miscellaneous empirical measurements.

Data are collected by WRP regional and headquarters staff. Staff use established protocols that achieve (1) data quality objectives for water right decision making, (2) enforcement and permitting of water rights, and (3) support of instream flow rulemaking. WRP is currently in the process of certifying those procedures via an intra-agency agreement with Ecology's Environmental Assessment Program (EAP).

QAPP Development and QAPPs in Place

When WRP requires data collection by a water right applicant through a preliminary permit, we typically require the applicant to prepare a QAPP as part of their work plan and scope of work that technical staff review and approve. This is also the case if we provide grant money for an investigation that includes data collection.

QAPPs in place:

- Spokane Valley-Rathdrum Prairie Aquifer Study (2005).
- Six Minute Study, Spokane Valley-Rathdrum Prairie Aquifer Study (2005).

SOP Development and SOPs in Place

SOPs are used extensively in WRP field data collection processes.

- Use of Submersible Pressure Transducers In Water-Resources Investigations (USGS, 2004).
- Standard Operating Procedure for Obtaining Static Water Level Measurements in ERO (Ecology, 2015).
- Ecology ERO Datalogger Protocol, Solinst/Schlumberger Dataloggers (Ecology, 2007).

WRP staff are working with EAP staff to review and revise SOPs, as necessary.

References and Readings

APHA, 2005. Standard Methods for the Analysis of Water and Wastewater, 21st Edition. Joint publication of the American Public Health Association, American Water Works Association, and Water Environment Federation. www.standardmethods.org

APHA, 2012. Standard Methods for the Analysis of Water and Wastewater, 22nd Edition. Joint publication of the American Public Health Association, American Water Works Association, and Water Environment Federation. www.standardmethods.org

ASQ/ANSI E4-2014. Quality management systems for environmental information and technology programs - Requirements with guidance for use. American Society for Quality/American National Standards Institute. www.ansi.org

Ecology, 1983. Quality Management Plan. Washington State Department of Ecology, Olympia, WA. <https://fortress.wa.gov/ecy/publications/SummaryPages/8303001.html>

Ecology, 2001. Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies. Washington State Department of Ecology, Olympia, WA. Publication No. 01-03-003. <https://fortress.wa.gov/ecy/publications/SummaryPages/0103003.html>

Ecology, 2004. Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies. Washington State Department of Ecology, Olympia, WA. Publication No. 04-03-030.html. <https://fortress.wa.gov/ecy/publications/SummaryPages/0403030.html>

Ecology, 2005. Quality Management Plan, 2005. Washington State Department of Ecology, Olympia, WA. Publication No. 05-03-031. <https://fortress.wa.gov/ecy/publications/SummaryPages/0503031.html>

Ecology, 2006. Executive Policy 22-01, Establishing Quality Assurance. Washington State Department of Ecology, Olympia, WA. <http://www.ecy.wa.gov/programs/eap/qa/docs/pol22-01.pdf>

Ecology, 2008a. Executive Policy 22-02, Requiring Use of Accredited Environmental Laboratories. Washington State Department of Ecology, Olympia, WA. <http://www.ecy.wa.gov/programs/eap/qa/docs/pol22-02.pdf>

Ecology, 2008b. Lab Users Manual. Manchester Environmental Laboratory. Washington State Department of Ecology, Olympia, WA.

Ecology, 2009. Quality Report to Management, November 2006 through June 2009: Quality System Structure, Activities, and Assessment. Washington State Department of Ecology, Olympia, WA. Publication No. 10-03-009. <https://fortress.wa.gov/ecy/publications/SummaryPages/1003009.html>

Ecology, 2010a. Quality Management Plan, 2010. Washington State Department of Ecology, Olympia, WA. Publication No. 10-03-056.

<https://fortress.wa.gov/ecy/publications/SummaryPages/1003056.html>

Ecology, 2010b. Laboratory Accreditation Procedural Manual. Washington State Department of Ecology, Manchester, WA. Publication No. 10-03-048.html

<https://fortress.wa.gov/ecy/publications/SummaryPages/1003048.html>

Ecology, 2012. Quality Report to Management, July 2009 through June 2012. Washington State Department of Ecology, Olympia, WA. Publication No. 12-03-043.

<https://fortress.wa.gov/ecy/publications/SummaryPages/1203043.html>

Ecology, 2014. Manchester Environmental Laboratory Quality Assurance Manual. Washington State Department of Ecology, Olympia, WA.

Ecology, 2015a. Quality Management Plan, 2015. Washington State Department of Ecology, Olympia, WA. Publication No. 15-03-030.

<https://fortress.wa.gov/ecy/publications/SummaryPages/1503030.html>

Ecology, 2015b. Quality Report to Management (*this document*), July 2012 through June 2015. Washington State Department of Ecology, Olympia, WA. Publication No. 15-03-031.

<https://fortress.wa.gov/ecy/publications/SummaryPages/1503031.html>

Ecology, 2015c. Quality Assurance Webpages. Washington State Department of Ecology, Olympia, WA. <http://www.ecy.wa.gov/programs/eap/quality.html>

EPA. 2000a. Policy and Program Requirements for the Mandatory Agency-wide Quality System. EPA Order Classification No. CIO 2105.0 (formerly 5360.1A2). May 2000.

<http://www.epa.gov/quality/qs-docs/policies/21050.pdf>

EPA. 2000b. EPA Quality Manual for Environmental Programs. Section 1.3.1. EPA Classification No. CIO 2105-P-01-0 (formerly 5360.A1). May 2000.

<http://www.epa.gov/quality/qs-docs/policies/2105P010.pdf>

EPA, 2001. EPA QA/R-2. EPA Requirements for Quality Management Plans.

U.S. Environmental Protection Agency. <http://www.epa.gov/quality/qs-docs/r2-final.pdf>

Re-issued by EPA in 2006 without changes.

EPA, 2002a. Guidance for Quality Assurance Project Plans (QA/G-5). U.S. Environmental Protection Agency. <http://www.epa.gov/quality/qs-docs/g5-final.pdf>

EPA. 2002b. Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity, of Information Disseminated by the Environmental Protection Agency. Publication No. EPA/260R-02-008. October 2002; Last updated May 2005.

<http://epa.gov/quality/informationguidelines/index.html>

EPA, 2004. Science Policy Council Policy Directive on Assuring and Documenting the Competency of Agency Laboratories. EPA Agency Policy Directive approved February 2004. U.S. Environmental Protection Agency.

<http://www2.epa.gov/measurements/internal-measurement-competency-documents>

EPA, 2006a. Statistical Methods for Practitioners. U.S. Environmental Protection Agency.

www.epa.gov/quality/qs-docs/g9s-final.pdf

EPA, 2006b. Requirements for Quality Assurance Project Plans. U.S. Environmental Protection Agency. <http://www.epa.gov/quality/qs-docs/r5-final.pdf>

EPA, 2006c. Guidance on Systematic Planning using the Data Quality Objectives Process (QA/G-4). U.S. Environmental Protection Agency.

<http://www.epa.gov/quality/qs-docs/g4-final.pdf>

EPA, 2008a. EPA Quality Program Policy. EPA Order Classification No. CIO 2106.0. October 2008; last reviewed October 2011. U.S. Environmental Protection Agency.

<http://www.epa.gov/quality/qs-docs/policies/21060.pdf>

EPA, 2008b. EPA Procedure for Quality Policy. EPA Classification No. CIO 2106-P-01.0. October 2008; last reviewed October 2011. U.S. Environmental Protection Agency.

<http://www.epa.gov/quality/qs-docs/policies/2106p01.pdf>

EPA, 2011. U.S. EPA Policy to Assure Competency of Organizations Generating Environmental Measurement Data under Agency Funded Acquisitions. Agency Policy Directive FEM-2011-01. March 28, 2011. <http://www2.epa.gov/measurements/documents-about-measurement-competency-under-acquisition-agreements>

EPA, 2012a. Handbook for Preparing Quality Assurance Project Plans (12/2012-draft). USEPA 2012. U.S. Environmental Protection Agency Guidance on Quality Assurance Project Plans. CIO 2106-G-05 QAPP. U.S. Environmental Protection Agency, Washington D.C. December 2012.

<https://www.federalregister.gov/articles/2012/12/26/2012-31096/office-of-environmental-information-announcement-of-availability-and-comment-period-for-the-draft>

EPA, 2012b. Policy to Assure the Competency of Organizations Generating Environmental Measurement Data under Agency-Funded Assistance Agreements. Agency Policy Directive Number FEM-2012-02. Revision 1. Approved March 13, 2013.

<http://www2.epa.gov/measurements/documents-about-measurement-competency-under-assistance-agreements>

EPA, 2012c. Handbook for Preparing Quality Management Plans (12/2012). USEPA 2012. U.S. Environmental Protection Agency Guidance on Quality Management Plans. CIO 2106-G-02 QAPP. U.S. Environmental Protection Agency, Washington D.C. December 2012.

<https://www.federalregister.gov/articles/2012/12/26/2012-31096/office-of-environmental-information-announcement-of-availability-and-comment-period-for-the-draft>

EPA, 2012d. U.S. Environmental Protection Agency Quality Standard for Environmental Data Collection, Production and Use by non-EPA (External) Organizations. CIO 2106-S-02. U.S. Environmental Protection Agency, Washington D.C. December 2012.
<https://www.federalregister.gov/articles/2012/12/26/2012-31096/office-of-environmental-information-announcement-of-availability-and-comment-period-for-the-draft>

EPA, 2015. Quality Documentation Homepage. U.S. Environmental Protection Agency.
www.epa.gov/quality/qa_docs.html.

Information Quality Act, US Department of Treasury, 2001. Public Law 106-554, Section 515.
https://www.whitehouse.gov/omb/fedreg_reproducible

International Organization of Standards (ISO), 2015a. ISO 9001, Quality Management Systems
http://www.iso.org/iso/iso_9000

International Organization of Standards (ISO), 2015b. ISO 14001, Environmental Management Systems. <http://www.iso.org/iso/home/standards/management-standards/iso14000.htm>

USC, 1977. Federal Grant and Cooperative Agreement Act of 1977. United States Code.
<http://www.gpo.gov/fdsys/pkg/STATUTE-92/pdf/STATUTE-92-Pg3.pdf>

USC, 1995. Paperwork Reduction Act of 1995. United States Code.
<http://www.gpo.gov/fdsys/pkg/PLAW-104publ13/html/PLAW-104publ13.htm>

Appendices

Appendix A. Acronyms and Abbreviations

Following are definitions of acronyms and abbreviations used in this report.

Programs of the Department of Ecology

AQ	Air Quality
EA	Environmental Assessment (also, EAP)
EA-LAU	Lab Accreditation Unit (part of EA Program)
EA-MEL	Manchester Environmental Laboratory (part of EA Program)
HWTR	Hazardous Waste and Toxics Reduction
NW	Nuclear Waste
SEA	Shorelands and Environmental Assistance
Spills	Spill Prevention, Preparedness, and Response
TCP	Toxics Cleanup
W2R	Waste 2 Resources
WQ	Water Quality
WR	Water Resources

Regional Offices of the Department of Ecology

HQ	Headquarters, Olympia/Lacey
CRO	Central Regional Office, Union Gap
ERO	Eastern Regional Office, Spokane
NWRO	Northwest Regional Office, Bellevue
SWRO	Southwest Regional Office, Olympia /Lacey

Other Acronyms and Abbreviations

ASTM	American Society for Testing and Materials
CFR	Code of Federal Regulations
DWCO	Drinking Water Certification Officers
Ecology	Washington State Department of Ecology
EIM	Environmental Information Management system
ELAP	Environmental Laboratory Accreditation Program (for LAU)
EPA	U.S. Environmental Protection Agency
FTE	Full Time Equivalent
FY	Fiscal Year

GIS	Geographic Information System
IDC	Initial Demonstration of Capability
ISIS	Integrated Site Information System (TCP)
LIMS	Laboratory Information Management System (for MEL)
LO	Lead Organization
MDL	Method Detection Limit
MEL	Manchester Environmental Laboratory (part of EA Program)
NEP	National Estuary Program
NOAA	National Oceanic and Atmospheric Administration
NRDA	Natural Resource Damage Assessment
PBMS	Performance-Based Measurement Systems
PSP	Puget Sound Partnership
PT	Proficiency Testing
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCW	Revised Code of Washington
SAP	Sampling Analysis Plan
SOP	Standard Operating Procedure
TMDL	Total Maximum Daily Load (water cleanup plan)
USDOE	U.S. Department of Energy
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDOH	Washington State Department of Health
WET	Whole Effluent Toxicity
WPDG	Wetland Program Development Grant

Appendix B. Quality Designees for Ecology Programs

Program/ Manager	QA Coordinator	Location	Phone	Email
Air Quality/ Stuart Clark	Sean Lundblad	HQ	(360) 407-6843	sean.lundblad@ecy.wa.gov
Ecology QA Officer	Bill Kammin	HQ	(360) 407-6964	william.kammin@ecy.wa.gov
Env. Assessment/ Carol Smith	Brad Hopkins	HQ	(360) 407-6686	brad.hopkins@ecy.wa.gov
HWTR/ Darin Rice	Samuel Iwenofu	SWRO	(360) 407-6346	samuel.iwenofu@ecy.wa.gov
Laboratory (MEL)/ Joel Bird	Karin Feddersen	Manchester	(360) 871-8829	karin.feddersen@ecy.wa.gov
Lab Accreditation/ Alan Rue	Alan Rue	Manchester	(360) 871-8844	alan.rue@ecy.wa.gov
Nuclear Waste/ Jane Hedges	Jerry Yokel	Richland	(509) 372-7937	jerry.yokel@ecy.wa.gov
Shorelands/ Gordon White	Amy Yahnke	HQ	(360) 407-6527	amy.yahnke@ecy.wa.gov
Spills/ Dale Jensen	Dale Davis	HQ	(360) 407-6972	dale.davis@ecy.wa.gov
Toxics Cleanup/ Jim Pendowski	Fu-Shin Lee	HQ	(360) 407-6237	fu-shin.lee@ecy.wa.gov
Waste 2 Resources/ Laurie Davies	Shingo Yamazaki	HQ	(360) 407-7563	shingo.yamazaki@ecy.wa.gov
Water Quality/ Heather Bartlett	Randall Marshall	HQ	(360) 407-6445	randall.marshall@ecy.wa.gov
Water Resources/ Tom Loranger	Tom Culhane	HQ	(360) 407-7679	tom.culhane@ecy.wa.gov
NEP	Tom Gries	HQ	(360) 407-6327	tom.gries@ecy.wa.gov

Appendix C. Current Ecology SOPs (through July 2015)

1. Air Quality Program

SOP Title	Status
Aethalometer Operations	Final
Automated Method Data Documentation and Validation	Final
Carbon Dioxide Monitoring	Final
Nephelometer Operations	Final
Nitrogen Dioxide Monitoring	Final
Ozone Monitoring	Final
PM 10 Tapered Element Oscillation Microbalance	Final
PM 2.5 Single Channel Sampler Operations	Final
PM 2.5 Tapered Element Oscillation Microbalance	Final

2. Environmental Assessment Program – Field and Sampling

Index Number	SOP Title	Status
EAP001	Use of Semi-Permeable Membrane Devices	Final
EAP002	Determination of Total Dissolved Gas	Final
EAP003	Pesticide Sampling in Fresh Water	Final
EAP004	Weekly/Monthly Procedures - EAP Operations Center	Withdrawn
EAP005	New Employee Orientation - EAP Operations Center	Withdrawn
EAP006	Daily and Emergency Procedures - EAP Operations Center	Withdrawn
EAP007	Resecting Finfish Whole Body, Body Parts or Tissue Samples	Final
EAP008	Resecting DNA Samples and Aging for Finfish	Final
EAP009	Collection, Processing and Preservation of Finfish Samples	Final
EAP010	Field Measurement of Conductivity/Salinity	Withdrawn
EAP011	Instantaneous Measurement of Temperature in Water	Final
EAP012	Sampling Bacteria in Water	Withdrawn
EAP013	Determining Global Positioning System Coordinates	Final
EAP014	Surveying Morphology and Surface Flow of Headwaters Channels	Final
EAP015	Grab Sampling – Fresh Water	Final
EAP016	Freshwater Drift Collection, Processing and Analysis	Final
EAP017	Litterfall Collection, Processing, and Analysis	Final
EAP018	Turbidity Threshold Sampling	Final
EAP019	Estimating Stream Flows Using a Flume	Final
EAP020	Bedload Collection, Processing and Analysis	Final
EAP021	Estimating Large Woody Debris Loads Intersecting Headwaters	Final
EAP022	Estimating and Delineation of Headwaters Wetlands	Final
EAP023	Winkler Determination of Dissolved Oxygen	Final
EAP024	Estimating Streamflow	Final
EAP025	Seawater Sampling	Final
EAP026	Analysis of Chlorophyll a	Final

Index Number	SOP Title	Status
EAP027	Seawater Dissolved Oxygen Analysis (Dosimat)	Final
EAP028	Reagent Preparation	Final
EAP029	Metals Sampling	Final
EAP030	Fecal Coliform Sampling	Final
EAP031	Collection and Analysis of pH Samples	Final
EAP032	Collection and Analysis of Conductivity Samples	Final
EAP033	Hydrolab DataSonde and MiniSonde Multiprobes	Final
EAP034	Collection, Processing, and Analysis of Stream Samples	Final
EAP035	Measurement of Dissolved Oxygen in Surface Water	Withdrawn
EAP036	Benthic Flux Chambers	Final
EAP037	Time of Travel Dye Studies	Final
EAP038	Collection of Fresh Water Sediment Cores	Final
EAP039	Sampling Marine Sediment	Final
EAP040	Obtaining Fresh Water Sediment Samples	Final
EAP041	Collecting Freshwater Suspended Particulate Matter Samples Using In-Line Filtration	Final
EAP042	Stream Stage Height Determination	Final
EAP043	Benthic Infaunal Rescreening, Tracking, Sorting and Taxonomic Identification	Final
EAP044	Continuous temperature monitoring of fresh water rivers and streams conducted in a TMDL study	Final
EAP045	Hemispherical digital photography conducted for a temperature TMDL study	Final
EAP046	Analysis of hemispherical digital photography conducted for a temperature TMDL study	Final
EAP047	Channel geometry studies conducted for a temperature TMDL study	Needed
EAP048	Riparian vegetation surveys conducted for a temperature TMDL study	Needed
EAP049	Maintaining EAP's internet and intranet web sites	Final
EAP050	Marine Currents using ADCPs (Acoustic Doppler Current Profilers)	Final
EAP051	Field Service and Maintenance of Sea-Bird Electronics © (SBE) 16 and 16+ Mooring Stations	Final
EAP052	Manual Depth-to-Water Level Measurements	Final
EAP053	Groundwater Sampling	Cancelled
EAP054	Collecting Gaging Data from Campbell Scientific Instruments	Final
EAP055	Use of StreamPro Acoustic Doppler Current Profiler	Final
EAP056	Measuring and Calculating Stream Discharge	Final
EAP057	Conducting Stream Hydrology Site Visits	Final
EAP058	Operation of SonTek® FlowTracker® Handheld ADV®	Final
EAP059	Operation of Mechanical Velocity Indicators	Final
EAP061	Operation of In-stream Piezometers	Final
EAP062	Determining Channel Dimensions in Streams and Rivers for the Extensive Riparian Status and Trends Monitoring Program	Final
EAP063	Measuring Sediment Size and Channel Dimensions: 11-Count Method	Final
EAP064	Determining Canopy Closure using a Concave Spherical Densimeter – Model C	Final
EAP065	Counting Large Woody Debris for the Extensive Riparian Status and Trends Monitoring Program	Final

Index Number	SOP Title	Status
EAP066	Establishing Reach Length for the Extensive Riparian Status and Trends Monitoring Program	Final
EAP067	Visual Characterization of Riparian Vegetation	Final
EAP068	Assessing Storm Damage at a Riparian Status and Trends Monitoring Site	Final
EAP069	Not Assigned	
EAP070	Minimizing The Spread of Aquatic Invasive Species	Final
EAP071	Minimizing The Spread of Aquatic Invasive Species	Withdrawn
EAP072	Basic Use and Maintenance of Data Loggers and Peripheral Equipment	Final
EAP073	Collecting Freshwater Benthic Macroinvertebrate Data in Wadeable Streams and Rivers	Final
EAP074	Use of Submersible Pressure Transducers During Groundwater Studies	Final
EAP075	Measuring Vertically Averaged Salinity	Draft
EAP076	Operation of Laser Diffraction Instrument	Needed
EAP077	Purging and Sampling Water Supply Wells	Final
EAP078	Purging and Sampling Monitoring Wells	Final
EAP079	SPMD Data Reduction	Draft
EAP080	Continuous Temperature Monitoring of Freshwater Rivers and Streams	Final
EAP081	Procedures for Tagging Wells	Final
EAP082	Adjustment of Continuous Flow Records	Final
EAP083	Collection and Processing of Samples for Stable Isotope Analysis	Final
EAP084	Conducting Riparian and Stream Channel Surveys for TMDLs	Final
EAP085	Collection of Periphyton samples for TMDL projects	Final
EAP086	Marine Waters Sensor Performance Assessment – Lab Procedure	Final
EAP087	Marine Waters Sensor Performance Assessment – Field Procedure	Final
EAP088	Marine Waters Data Quality Control and Quality Assurance	Final
EAP089	Marine Waters Data Processing	Draft
EAP090	Decontamination of Sampling Equipment for Toxics Sampling	Final
EAP091	Determination of Optical Brighteners by Field Fluorometry	Final
EAP092	Sampling Bacteria for the BEACH Program	Final
EAP093	Treatment of Non-Detects	Draft
EAP094	Short-Term continuous Monitoring (< 1 year)	Final
EAP095	Collecting sample for the Watershed Health Monitoring Program	Provisional
EAP096	TBD	
EAP097	Longitudinal Stream, Depth Profiles	Final
EAP098	TBD	
EAP099	TBD	
EAP100	Sampling for metals in Monitoring Wells	Final

3. Environmental Assessment Program – Lab Accreditation Unit

Index Number	SOP Title	Status
LAU001	Assessment (Audit) of Environmental Laboratories	Final
LAU002	Accreditation of Environmental Laboratories	Final
LAU003	Renewal Applications	Final

4. Environmental Assessment Program – Manchester Environmental Laboratory (MEL)

Index Number	SOP Title
Microbiology	
710001	%KES Membrane Filter Technique, G. Jay Vasconcelos, EPA Region 10 Microbiologist, "The Detection and Significance of <u>Klebsiella</u> in Water", Modified
710005	Use of Autoclave for Sterilization
710013	Microbiology Dishwasher
710014	<u>Escherichia coli</u> Detection by Most Probable Number, EPA 1104
710015	<u>Escherichia coli</u> Detection Membrane Filter Technique, EPA 1105
710017	Enterococcus in Water by Most Probable Number, Standard Method 9230 B
710018	Fecal Coliforms Membrane Filter Technique, Standard Method 9222 D, Modified
710019	Fecal Coliforms by Most Probable Number, Standard Method 9221 E
710021	Fecal Coliforms in Water by Most Probable Number, Standard Method 9221 E
710022	Fecal Streptococcus Membrane Filter Technique, Standard Method 9230 C
710039	Total Coliforms Membrane Filter Technique, Standard Method 9222 B, Modified
710042	Total Coliforms in Water by Most Probable Number, Standard Method 9221 B, Modified
710073	Fecal Coliforms in Water by Most Probable Number Using A-1 Media, Standard Methods 9221 E-2
710075	Heterotrophic Plate Count & Nuisance Organisms Iron & Sulfate
710076	EPA Method 1600: Membrane Filter Test Method for Enterococci in Water
710079	Total Nonvolatile Solids (Fixed) and Volatile Solids ignited at 550°C, Standard Method 2540 E
710081	pH, Microbiology
710083	Membrane Filter Test Method for Escherichia coli in Water (mTEC2), EPA Method 1103.1
710084	Microbiology Quality Assurance Procedures
710089	COLILERT®-18 IDEXX
General and Physical Chemistry	
710002	Alkalinity, SM 2320B
710004	Ash Free Weight, SM 10300 C, Modified
710007	Biochemical Oxygen Demand Using the Dissolved Oxygen Probe EPA Method 415.1
710008	Fluoride/Chloride/Sulfate by Ion Chromatography, EPA Method 300.0

Index Number	SOP Title
710009	Conductivity, SM 2510B
710012	Fluorometric Determination of Chlorophyll <i>a</i> in Saltwater and Freshwater Samples, Standard Method 10200 H, Modified
710028	Total Organic Carbon and Dissolved Organic Carbon EPA Method 415.1 (Combustion and NDIR Detection)
710029	Ammonia (phenolate) Method by Colorimetric Flow Injection Analysis, Standard Methods 4500-NH ₃ H
710030	Nitrogen, Nitrate-Nitrite, SM 4500-NO ₃ I, Modified (Colorimetric, Automated, Cadmium Reduction)
710031	Nitrogen, Nitrite, SM 4500-NO ₃ I, Modified (Colorimetric, Automated)
710032	Oil and Grease EPA Method 1664: N-Hexane Extractable Material (HEM; Oil and Grease), by extraction and Gravimetry, Modified
710033	Orthophosphate in Waters by Colorimetric Flow Injection Analysis, SM 4500 P G
710034	pH (Electrometric), EPA Method 150.1
710038	Settleable Solids (Settleable Matter), SM 2540 F
710043	Total Dissolved Solids (Residue, Filterable), SM 2540 C
710045	Percent Total Solids, Percent Volatile Solids and Percent Nonvolatile (fixed) Solids in Solid and Semisolid Samples, SM 2540 G, Modified
710046	Total Non-Volatile Suspended Solids (Residue, Volatile), SM 2540 E, Modified
710047	Total Solids, SM 2540 B
710048	Total Nitrogen in Waters by Colorimetric Flow Injection Analysis, Standard Method 4500-N B.
710052	Total Suspended Solids (Residue, Non-Filterable), SM 2540 D, Modified
710054	Turbidity, SM 2130 B, Modified
710055	Ultimate Biochemical Oxygen Demand (UBOD)
710056	Analysis of Bulk Asbestos, <u>Federal Register</u> , 40 CFR 763, Appendix A to Subpart F, Modified
710057	Asbestos Fiber Counting by the NIOSH 7400 Method, Modified
710058	Gravimetric Analysis of High Volume Air Filters, <u>Federal Register</u> , 40 CFR 50, Appendix J, Modified
710068	Soil and Waste pH Electrometric SW846 Method 9045C
710070	Total Organic Carbon in Soil/Sediment, PSEP-TOC
710074	Low level Total Phosphorus by Manual Digestion and Lachat
710078	Gravimetric Analysis of PM _{2.5} Fine Particulate Air Filters, Federal Register, 40 CFR 50, Appendix L, Modified
710079	Total volatile and non-volatile solids, SM2540E
710080	Percent Total Solids for TOC PSEP samples at 70 °C and 104 °C
710085	Suspended Sediment Concentration; ASTM Method D3977-97 (re-approved 2002), Test Method B - Filtration
710086	Alkalinity in Seawater; Fisheries Research Board of Canada; Bulletin 167, Second Edition, I.4.I.2
710087	Ash Free Dry Weight in Macrophyton, SM 10300 C, Modified
710088	Conductivity in Seawater
Metals	

Index Number	SOP Title
720002	Metals Water Sample Preparation, EPA Method 200.2
720009	Determination of Mercury in Water by Cold Vapor Atomic Absorbance, U.S. EPA Methods 245.1, Modified and SW846 7470, Modified
720011	Metals Low Level Cold Vapor Mercury Analysis of Water Samples Using Bromine Oxidation, U.S. EPA Method 245.7, Modified
720012	Metals Sediment Sample Preparation by Hotblock Digestion, SW846 Method 3050B, Modified
720013	Metals Water Sample Preparation, EPA Method 3010A
720015	Sediment Preparation by Microwave Digestion, SW846 Method 3051
720016	Toxicity Characteristic Leaching Procedure for Metals SW846 Method 1311
720018	ICP Mass Spectrometer VG PQ ExCell, EPA Method 200.8
720021	Determination of Mercury by Cold Vapor Atomic Absorbance in Sediment, SW846 7471 Modified, and EPA Method 245.5, Modified
720022	Solid Preparation by Microwave Digestion, SW846 Method 3052
720024	Low Level Phosphorus by ICP-MS, EPA Method 200.8
720025	Metals Water Sample Preparation, EPA Method 3010A
720026	Metals Water and Aqueous Waste Sample Preparation for Analysis by ICP/MS, EPA SW-846 Method 3020
720027	Determination of Mercury by Cold Vapor Atomic Absorbance in Tissues by EPA SW-846 Method 7471B, Modified, and EPA Method 245.6, Modified
720028	Solid Sample Preparation for Phosphorus, Method 200.2
720029	ICP: 715-EIS, EPA Method 200.7
720030	Metal Analysis of Air Filters, <u>Federal Register</u> , 40 CFR 50, Appendix G, Modified
Organics	
730002	Analysis of Water/Soil/Sediment/Fish Tissue Samples for Organochlorine Pesticides and Polychlorinated Biphenyls by GC/ECD SW846, Methods 8081 and 8082
730005	Butyltin Analysis
730009	Determination of Percent Lipids in Tissue
730013	Analysis of Chlorinated Acid Herbicides from Soils and Sediments (EPA Method 8151B)
730021	Semivolatile Base/Neutral/Acid (BNA) Organic Compounds by Gas Chromatograph Mass Spectrometer (GC/MS): Capillary Column
730022	GC/MS Data Final Review
730028	Hydrocarbon Identification
730061	Volatile Organic Analysis - Method 8260A
730066	Analysis of WTPH-D _x Semivolatile Petroleum Products in Environmental Soil, Sediment and Water Extracts
730067	Analysis of NWTPH-G _x and BTEX Analysis Methods for Soil and Water
730070	Polynuclear Aromatic Hydrocarbons (PAH) by Gas Chromatography/Selective Ion Monitoring Mass Spectroscopy (GC/SIM-MS)
730072	Extraction of Fish Tissue for Semi-Volatile Analytes, including Pesticides, PCBs and BNAs by GC/ECD and/or GC/MS
730073	Fish Tissue Florisil Column and Acetonitrile Back Extraction Cleanup (Macro)

Index Number	SOP Title
730080	Extraction and GC/MS Analysis of 1-Naphthol and Carbaryl in Soil/Sediment
730081	Accelerated Solvent Extraction of Solid Samples
730082	Determining Flash Point by Pensky – Martens Closed Cup Tester
730083	Isotopic Dilution Polynuclear Aromatic Hydrocarbons (PAH) by Gas Chromatography/Selective Ion Monitoring Mass Spectrometry (GC/ID-SIM-MS)
730085	Extraction of PAH only, Pesticides and/or PCBs in Water
730087	Butyltin in Tissue Analysis
730088	Sulfur Removal by SW-846 Method 3660B
730091	Micro-Florisil® Column Cleanup
730092	Micro-Florisil® Cleanup for Phthalate Esters, by Method 3620B
730093	Acid-Base Partition Cleanup, by Method 3650B
730095	Herbicide Analysis by Gas Chromatography/Mass Spectrometry (GC/MS)
730096	PBDE Tissue Analysis by GC/MS/MS
730097	Analyzing Chlorinated, Organophosphorus, and Nitrogenous Pesticides by GC/MS, Method 8270
730098	Methoprene by GC/MS, USGS Method O-2134-01
730099	Solid Phase Extraction (SPE) of Semi-Volatile Petroleum Products (NWTPH-Dx) in Water by EPA SW-846 Method 3535
730100	Solid Phase Extraction (SPE) of Herbicides in Water by EPA SW-846 Method 3535
730101	Extraction of BNA's/Pesticides/PCB's/Op-Pesticides in Soils, Sediments and Sludges by Soxtherm, SW 846 Method 3541
730103	Micro-acetonitrile back extraction cleanup
730104	PBDE Analysis by GC/MS Selective ion Monitoring (SIM)
730105	Fish Tissue Florisil Column and Acetonitrile Back Extraction Cleanup (Micro)
730107	Solid Phase Extraction (SPE) of Pesticides in Water by EPA SW-846 Method 3535
730108	Solid Phase Extraction (SPE) of PBDEs in Water by EPA SW-846 Method 3535
730109	Alcohol Analysis, EPA SW-846 Method 8015C
730110	Soxtherm semivolatile tissue extraction
730111	Analyzing Chlorinated, Organophosphorous, and Nitrogenous Pesticides by GC/MS/MS, Method 8270D
730112	Solid Phase Extraction (SPE) of Polynuclear Aromatic Hydrocarbons (PAH) in Water by EPA SW-846 Method 3535A
730113	Polynuclear Aromatic Hydrocarbons (PAH) by Gas Chromatography/Selective Ion Monitoring Mass Spectrometry (GC/SIM-MS), Method 8270D
730114	Carbamate Analysis by LC/MS/MS Double Quadrupole, EPA Method 8321A Modified
730115	Carbamate Analysis by LC/MS/MS Triple Quadrupole, EPA Method 8321A Modified
730117	SPMD Spiking Instructions
730118	Herbicide extraction in soil
730119	Acid/Base Partitioning Cleanup for Herbicide Analysis by EPA SW-846 Method 3650B

Index Number	SOP Title
Sample and Data Management	
770001	Sample Check-In
770003	Purchasing Analytical Services
770005	Reviewing Contract Laboratory Data
770009	Filling Sample Container Orders
770014	Processing Purchases for Payment
770016	Radiation Screening of Samples Entering MEL
770017	Sample Data Filing System
770018	Documentation of Administrative Standard Operating Procedures
770019	Documentation of Analytical Standard Operating Procedures
770020	Use of the OHS Material Safety Data Sheets on CD-ROM Software
770023	Waste Collection, Storage and Pickup
770026	Sample Disposal
770029	Cleaning Sample Containers with a Laboratory-Grade Dishwasher
770030	Operation of Ecology Laboratory Balances
770031	Calibration of Temperature Probes and Thermometers
770032	Personnel Training
770033	Personnel Training in Peer Review of Data
770034	Maintenance of Adjustable Pipettes
770035	QA of Analytical Standards
770036	Radiation Protection Plan

SM = Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998.
Unless otherwise indicated, all lab SOPs are final.

5. Hazardous Waste and Toxics Reduction Program

The HWTR Program lists 4 SOPs in the HWTR section of this report.

6. Nuclear Waste Program

The NWP lists two SOPs in the NWP Program section of this report.

7. Shorelands and Environmental Assistance Program

The SEA Program lists nine SOPs in the SEA section of this report.

8. Spills Program

SOP Number	SOP Title	Status
SPL001	Collecting oil spill source samples	Final
SPL002	Collecting oil spill HCID samples	Final
SPL003	Collecting oil spill water samples	Final
SPL004	Collecting oil spill intertidal sediment samples	Final
SPL005	Collecting oil spill shellfish tissue samples	Final
SPL006	Collecting soil or sediment samples for gasoline spills	Final
SPL007	Collecting samples from fish kills	Final

9. Toxics Cleanup Program

An SOP for field audits of sampling events is in development.

10. Waste 2 Resources Program

The W2R Program lists six SOPs in the W2R section of this report2

11. Water Quality Program

SOP Number	SOP Title	Status
ECY001	Collecting Grab Samples from Stormwater Discharges	Final
ECY002	Automatic Sampling for Stormwater Discharges	Final
ECY003	Collecting Stormwater Sediments Using In-line Sediment Traps	Final
ECY004	Calculating Pollutant Loads for Stormwater Discharges	Withdrawn

12. Water Resources Program

SOPs are used extensively in field data collection processes in the Water Resources Program (WRP). These SOPs include:

- Use of Submersible Pressure Transducers in Water-Resources Investigations (USGS, 2004).
- Obtaining Static Water Level Measurements in ERO (Ecology, 2015).
- Ecology ERO Datalogger Protocol, Solinst/Schlumberger Dataloggers (Ecology, 2007).

WRP and Ecology's Environmental Assessment Program (EAP) are coordinating the adoption of EAP SOPs for formal use, after SOP redevelopment.

Appendix D. Ecology Quality Assurance Timeline

1979

EPA makes their QA requirements mandatory for "all EPA grants, contracts, cooperative agreements and interagency agreements that involve environmental measurements."

1983

Ecology prepares first *Quality Management Plan*.

1987

Cliff Kirchmer hired as MEL Quality Assurance Officer.

1988

Legislature enacts RCW for Lab Accreditation at request of WQ Program.

1988 – March

Quality Assurance Section formed with Cliff Kirchmer as section head

- Assigned to implement RCW.
- Moves to beautiful downtown Manchester.
- Hires Perry Brake.
- Writes WAC 173-50.

1988 – October

Element L-4 of Puget Sound Water *Quality Management Plan* requires QA plan for Ecology data activities.

1989 – February

Cliff Kirchmer hires Connie Schreiber for administrative support.

1989 - March

Cliff Kirchmer hires Stew Lombard to help him meet requirements of Lab Accreditation.

1989 – April

EPA informs Ecology they will not accept a project plan until it is approved by Ecology's QA Officer.

1989 – April-July

Cliff Kirchmer and Stew Lombard hold 27 meetings with 93 Ecology staff to evaluate QA effort and assess future needs.

1989 – August

Draft revision of 1983 *Quality Management Plan* sent to the Executive Management Team for review and approval.

1990

WAC 173-50 finalized and implemented.

- Designed to help labs achieve the capability to report accurate results.
- First lab accredited in January 1990.
- Ecology adopts Executive Policy 1-22, which requires use of accredited labs.

1991

- Cliff Kirchmer writes QAPP guidance document tailored to type and scale of Ecology projects.
- EPA's guidance was for bigger projects.

1992

EPA Region X QA Manager requests updated *Quality Management Plan* from Ecology.

1993 – February

Quality Management Plan still not approved by Ecology programs.

1993 – August

Ecology adopts Executive Policy 1-21 (now 22-01).

- Program managers designate QA Coordinators.
- QAPPs required for environmental studies.
- QAPPs approved per program manager before sampling and data collection begins.

1993 – December

Revised *Quality Management Plan* finally approved more than four years after submission to the Executive Management Team.

1995 – April

Submitted *Quality Report to Management*.

1997

Submitted *Quality Report to Management*.

1998

Cliff Kirchmer becomes full-time QA Officer and moves to HQ. Perry Brake replaces Cliff as Lab Accreditation section manager.

1999 – January

Quality Report to Management prepared.

2000 – June

Ecology revises *Quality Management Plan*.

2000 – August

EPA Region X approves *Quality Management Plan*.

2001

First revision of QAPP guidance, in response to EPA's revised guidance (QAIG5)

2002 – November

WAC 173-50 revised to include Drinking Water Certification.

2003 – May

Fourth *Quality Report to Management* issued.

2003 – November

EPA Region X conducts first Ecology Quality System Review.

- EPA found no major deficiencies.
- *Quality Report to Management* was an excellent assessment of Ecology's quality system.
- The recommendations in that report should be implemented.

2004

Cliff Kirchmer and Stew Lombard revised the QAPP guidance.

2005

- *Quality Management Plan* revised.
- Bill Kammin designated Ecology QA Officer by Ecology Director Jay Manning.
- Fifth *Quality Report to Management* completed and issued to management.

2006

- EA Program SOP Policy established. Work on sampling and field analytical SOPs begins.
- Perry Brake retires, and Stew Lombard becomes Lab Accreditation Unit supervisor.
- State-wide QA training presented by Bill Kammin and friends.
- Sixth *Quality Report to Management* completed and issued to management.
- Quality System Review conducted by EPA; no findings noted by EPA.

2007

Cliff Kirchmer retires.

2008

- LAU now accredits 450 labs.
- EA Program and Application and Data Services give presentation on QA and Data Management at the EPA Quality Conference in Seattle, April 2008.
- EA Program HQ now has over 50 SOPs.

2009

- EPA conducts triennial Quality System Review in March 2009. No findings, observations, or recommendations noted by EPA.
- Seventh *Quality Report to Management* finalized and issued to management.

2010

- New QA glossary completed and published in 2010 *Quality Management Plan*.
- EAP SOP policy revised.
- EAP QAPP policy revised.
- EAP method change/implementation policy revised.
- Ecology *Quality Management Plan* approved by EPA (5-year cycle).

2011

- National Estuary Program (NEP) addendum developed for the Ecology *Quality Management Plan*.
- NEP Quality Coordinator hired.
- NEP field audits implemented.
- NEP quality website developed.

2012

- Eighth *Quality Report to Management* finalized and issued to management.
- SOP policy revised.
- QAPP policies revised.
- EPA conducts triennial Quality System Review in September 2012. No findings noted by EPA.

2013

- Presentation on QA to Western States Project.
- Ecology field activity inventory completed.
- 50-state survey on QAPP formats completed.

2014

- New Ecology QAPP format, content requirements, and template introduced in March.
- QAPP format and content requirements finalized in June.
- QA modeling dialogue begins.
- Bill Kammin, Ecology QA Officer, receives life-saving kidney transplant.

2015

- Fourth *Quality Management Plan* completed, submitted by Ecology management, and posted to the web.

2016

- Ninth *Quality Report to Management* (this document) completed, submitted to Ecology management, and posted to the web.

Appendix E. NEP Grantees Using Ecology QAPP Format

1. City of Olympia
2. City of Tacoma (with Robinson Noble)
3. Coastal Geological Services, Inc.
4. Coastal Watershed Institute
5. Friends of the San Juans
6. Island County Public Health
7. King County Department of Natural Resources and Parks
8. Kitsap County Public Health (for the Hood Canal Coordinating Council)
9. Natural Resources Consultants, Inc. & Northwest Straits Foundation
10. Adaptation International for North Olympic Peninsula Resource Conservation
11. Pacific Northwest National Laboratory
12. Puget Sound Partnership
13. Puget Sound Clean Air Authority
14. Puget Sound Institute
15. Seattle Public Utilities
16. Skagit River System Cooperative (with UW & NOAA)
17. Snohomish County Public Works
18. South Puget Sound Salmon Enhancement Group
19. Tacoma-Pierce County Health Department
20. The Nature Conservancy
21. Thurston County Public Health and Social Services
22. Tulalip Tribes Natural and Cultural Resources Department
23. University of Washington Applied Physics Laboratory
24. University of Washington & NOAA
25. Washington Department of Agriculture
26. Washington Department of Ecology
27. Washington Department of Fish and Wildlife (with NOAA& PNNL)
28. Washington Department of Health
29. Washington Department of Natural Resources
30. Washington Environmental Council
31. Washington Sea Grant
32. Washington State University Extension & Herrera Environmental Consultants
33. Wild Fish Conservancy

Appendix F. Polly Zehm, Ecology Deputy Director, Responses to *Quality Report to Management Issues*

Topic	Page #	Comment	Opportunities for Resolution
WDFW has not completed QMP (for Puget Sound NEP-funded work)	9	Staff at WDFW with responsibility for this has changed.	Tom Gries, NEP QA Coordinator for state agencies, has engaged with staff now charged with this responsibility to alert them to this shortcoming and provide TA. --June 2016 --
Field sampling and data generation competency for Ecology staff and grant/loan recipients	10-11	Capacity is a challenge for training and coordination. We need to focus on this in current fiscal year and next biennium.	Explore securing AmeriCorps Individual Placement with appropriate qualifications for 1-2 years? Otherwise will need to consider using vendor if there continues to be very little EPA capacity to provide training. Consider using QA Coordinator team members on rotating basis to help with coordination?
QAPP guideline revisions and approval process for completed QAPPs	10-11	Need to update guidance. Review and approval processes needs to be mapped out to clarify and improve efficiency. This will help ensure QAPPs are completed before activities begin.	
Independence of QA Officer – concern noted that position imbedded in an environmental program	11	I do not support moving the QA Officer position into Program A in the budget or changing reporting relationship. I do not believe a conflict of interest exists or that there has been pressure applied to QA Officer to alter his professional opinion.	I have instituted regular meetings, one-on-one with QA Officer, so issues can be raised as they arise and to increase my involvement in QA.