



DEPARTMENT OF  
**ECOLOGY**  
State of Washington

## **Quality Report to Management July 2018 through June 2021**

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**Washington State  
Department of Ecology**

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# **Quality Report to Management July 2018 through June 2021**

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## Purpose of This Document

The Washington State Department of Ecology (Ecology) implements a structured quality system that provides a framework for:

- Planning, conducting, documenting, and assessing operations that generate new, or use existing, environmental data.
- Carrying out required quality assurance (QA) and quality control (QC) activities.

Ecology's quality system encompasses both management and technical activities, and is fully described in the agency's EPA-approved *Quality Management Plan* (QMP).

Ecology's current QMP (Ecology 2020), which is based on EPA's *Requirements for Quality Management Plans* (EPA, 2001a), requires Ecology's Quality Assurance Officer (QAO) to produce a *Quality Report to Management* (QRM) every three years. The QRM evaluates the agency's quality system, identifies issues that need to be addressed, and makes recommendations for quality system improvements.

This report to Ecology management documents various aspects of the current quality system, as well as QA/QC-related activities, from July 1, 2018 through June 30, 2021, including:

- Developing and approving Quality Assurance Project Plans (QAPPs).
- Documenting Standard Operating Procedures (SOPs).
- Undertaking quality system initiatives.
- Addressing any issues associated with implementing the QMP.
- Recommending changes to the quality system and QMP.
- Reporting current quality system activities from all 12 of Ecology's environmental programs.

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

# Ecology's Quality System

## Structure and Organization

Because Ecology receives substantial funding from the EPA, the agency participates in EPA's overarching quality system. As such, the agency established its own quality system in Executive Policy 22-01 (Ecology, 2006), a description of which is contained in its most recent EPA-approved QMP (Ecology, 2020).

Ecology's Director has sole authority to designate the agency's QA Officer (QAO).

The primary roles of the QAO are to:

- Oversee implementation of the QMP, managing and coordinating QA activities throughout the agency.
- Work collaboratively with the program Quality Assurance Coordinators (QACs) to ensure a robust agency quality system.

Other QAO responsibilities include:

- Leading Ecology's response to periodic EPA reviews of the agency's quality system.
- Updating the QMP every five years.
- Preparing the QRM every three years (this document).
- Approving Quality Assurance Project Plans (QAPPs).
- Providing QA guidance to the QACs and other Ecology staff.
- Acting as chief liaison for most extra-agency QA activities <sup>1</sup>.

The QAO reports directly to the manager of the Environmental Assessment Program (EAP) and to Ecology's Deputy Director through a dotted line reporting structure.

The QAO delegates responsibility for ensuring quality within each of Ecology's 12 environmental programs, in part, to one or more program QACs. Ecology recommends that each program assign up to 0.25 FTE for QA-related activities within their program. The QACs have a range of responsibilities defined in the QMP, including contributing to this document.

Ecology's Manchester Environmental Laboratory (MEL) provides 'in-house' analysis of inorganic chemicals (e.g., nutrients, metals), organic contaminants, and microbiology parameters in many types of environmental samples. As such, MEL plays an integral role in the quality system at Ecology. Laboratory QA practices are described in a separate QMP (Ecology, 2020) and the MEL [Quality Assurance Manual](#) (Ecology, 2016). During the 2018-2021 reporting period, MEL maintained approximately 154 detailed Standard Operating Procedures (SOPs) available upon request. MEL's director reports to EAP's program manager.

Ecology's Laboratory Accreditation Unit (LAU) provides accreditation services to help establish and document laboratory proficiency for analysis and reporting of environmental data to Ecology. Accreditation requirements for data produced by, and submitted to, Ecology are summarized in Ecology Policy 22-02 (Ecology, 2008a). LAU maintains a [procedural manual](#) (Ecology, 2010) and several SOPs that document the QA practices and procedures of the unit. The LAU supervisor reports to the manager of the Statewide Coordination Section within EAP.

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<sup>1</sup> Ecology's National Estuary Program (NEP) Quality Assurance Coordinator (QAC) also provides advice and technical assistance on QA-related matter to many external grantees funded by EPA.

## Ecology Quality Assurance Website

In June 2006, Ecology created a [quality assurance website](#) intended to make the following accessible to the public: QA-related policies, the agency's QMP, QA guidance, SOPs, and other important quality information. This website enabled Ecology staff, as well as grantees and loan recipients, to download a QAPP template, review a QAPP checklist, and access QAPP-related guidance.

From 2011-2013, after assuming QA oversight of State-directed projects funded by EPA's National Estuary Program (NEP), Ecology's QA website expanded to include quality information relevant to NEP grant recipients (e.g., QA process diagram, QAPP Waiver form). In late 2017, the QA website underwent revisions to be consistent with an agency-wide web upgrade initiative.

Currently, Ecology's public QA website contains or has links to:

- EPA's QA requirements and guidance documents
- Ecology's QMPs and QRM
- Information for grantees, such as QA-related templates, checklists, forms, and SOPs

Additional QA resources are available to Ecology staff via an [internal SharePoint site](#):

- EAP procedures and guidance
- QAPP template and review checklist
- MEL Lab Manual, Users Guide. MEL Lab SOPs are available on the [MEL SharePoint site](#).
- Approximately 100 EAP SOPs for field methods and other activities
- Approximately 30 other SOPs prepared and used by staff in other Ecology programs
- QA training materials
- QAPP waivers, lab waivers, and internal QA memos
- Miscellaneous other QA-related information

## Quality Assurance Project Plans and SOPs

### QAPPs

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Ecology's QAPP template was developed for use by EAP staff. In late 2011, Ecology began requiring recipients of certain National Estuary Program (NEP) grants to use the template. In 2016, the QAO and NEP QAC used staff input to revise the QAPP template for use by all Ecology program staff as well as external parties. The new template featured instructions for internal and external authors, numbered headers, sections tailored to modeling projects, guidance on what content to include in each section, and a QAPP review checklist. The 2016 QAPP template was updated in 2019 to be compliant with American Disabilities Act (ADA) requirements and document accessibility best practices.

Currently, EAP staff, Water Quality Program (WQP) grant recipients, and NEP grant recipients are encouraged to use the updated version of the QAPP template available on Ecology's Quality Assurance website. The QAO strongly recommends all other Ecology staff to do so, also. Many external organizations have used Ecology's updated QAPP template (or earlier versions of it). The QAO envisions ongoing revisions to make the template useful to a wide variety of projects.

Prior to beginning Ecology-funded research, Ecology staff, or external grant recipients, must complete a QAPP approved by a member of Ecology QA staff. The QAO can make an exception



for a project that responds to a legitimate emergency or that assesses potential health risk (EPA, 2001 QA/R-5). In these cases, both the QAO and the appropriate supervisor sign an ‘Approval to Begin Work’ form. The QAO recommends all programs adopt a similar form to ensure that project work doesn’t commence before sampling.

In rare cases, the QAO may also grant ‘Approval to Begin Work’ for field activities if there is true urgency and the Project Managers sufficiently document the detailed field activities in advance. Once the form is signed, it is the Project Manager’s responsibility to ensure the QAPP is ready for approval within 4 weeks of the signature. Failure to do so will result in a stop work order.

The ‘Approval to Begin Work’ form has occasionally resulted in a project being completed without the QAPP ever having been finalized and approved. The QAO is currently formalizing a process and procedure to prevent this from happening in the future.

Projects with multiple objectives, multiple participants or stakeholders, a complex study design, or other technical challenges can be at risk of missing QAPP approval deadlines. This is because it is difficult to incorporate multiple sets of comments, complete and approve the QAPP, and also meet field sampling constraints. However, these projects do not fit into the categories of emergency, health risk, or true field urgency. If such projects proceed without an approved QAPP, the QAO will likely issue a stop work order.

## SOPs

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Ecology began to systematically develop standard operating procedures (SOPs) in 2006. EAP developed procedure 1-08 which outlines the SOP guidance for the agency.

Ecology currently has about 240 approved SOPs available on its QA website. Ecology staff review and recertify SOPs on a periodic cycle. EAP, including MEL, is the source of most SOPs. The Ecology programs in Table 1 have program-specific SOPs:

**Table 1. Program-specific SOPs.**

Program	Number of SOPs
1. Air Quality (AQP)	13
2. Environmental Assessment (EAP)	95
3. Environmental Assessment–Laboratory Accreditation Unit (LAU)	3
4. Environmental Assessment–Manchester Environmental Lab (MEL)	154
5. Hazardous Waste and Toxic Reduction (HWTR)	1
6. Nuclear Waste (NWP)	2
7. Shorelands and Environmental Assistance (SEA) and Office of Chehalis Basin (OCB)	3
8. Spill Prevention, Preparedness, and Response (Spills)	7
9. Toxics Cleanup (TCP)	1
10. Solid Waste Management (SWM)	3
11. Water Quality (WQP)	4
12. Water Resources (WRP) and Office of Columbia River (OCR)	9

## Formal SOP Recertification Process

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Ecology's QAO or the program QACs recertify SOPs on a three or five year pre-arranged cycle. The QAO alerts the program QACs in advance of due dates for recertification. The QAO still maintains and tracks all the agency SOPs on the QA SharePoint site.

## EPA Policy on Laboratory and Field Competency

During the next few years, a major focus of the QAO will be to institutionalize Ecology programs and procedures that fully address EPA's Competency Policy (EPA, 2011, EPA 2012b).

Currently, Ecology's LAU ensures competency of staff working in labs that submit environmental data to Ecology. In addition, some organizational groups within the Ecology conduct field training and/or oversight designed to ensure competency of staff that measure field conditions and collect field samples. Other organizational groups that conduct fieldwork have no such assurances in place. For many internal and external projects and activities, the only indications of field competency are claims made in Ecology-approved QAPPs about staff experience, training, and adherence to field SOPs.

Ecology currently lacks a comprehensive field certification program designed to demonstrate competency of all its field staff, let alone field staff working for external organizations that submit environmental data to Ecology as contract or grant deliverables. For this reason, the QAO plans to

- Evaluate elements of the limited field certification and training programs that do exist.
- Prepare a memorandum summarizing at least three feasible options for a comprehensive field method certification program plan.

The latter memorandum will be available for management discussion during the second half of calendar year 2022.

Ecology has modified the QAPP template to include information on sampler qualifications and training. The existence of SOPs for all field data and sample generating activities is key to demonstration of competency. The QAO and the QACs are currently working on an agency-wide training plan, which will promote, enforce, and document this training.

## Quality Assurance Training Resources

Improving QA training continues to be a priority for the agency. QA staff are tasked with duties that limit the amount and frequency of QA training that can realistically be expected to occur. The QAO and other agency QA staff are developing a comprehensive QA training plan for the agency, to be approved in 2023. Depending on the nature of this plan, Ecology may need an additional FTE to coordinate and deliver regular QA training that targets multiple audiences. Other related responsibilities may include implementing a field certification program and conducting more QA/QC audits of ongoing projects.

## **Independence of Ecology’s Quality System from Operational Influence**

As described earlier, Ecology’s current QMP indicates that the agency’s QAO reports to EAP’s program manager, with only a “dotted line” report to Ecology’s Deputy Director. The EAP manager is in charge of many program elements, including budgets and timelines for projects that make field measurements, collect environmental samples, and involve various lab analyses. External auditors have expressed some concern over potential conflict of interest. Thus, there exists an inherent tension between QA and operations. For example, the EAP manager could pressure the QAO to approve a deficient QAPP rather than delay start of a project, or to make other decisions not consistent with EPA QA requirements or guidance.

Many organizations have their QAO report directly to a top level of management to reduce potential for such conflict. Ecology QAOs past and current have also made this recommendation (e.g., have the QAO report directly to the Deputy Director, with a “dotted line” report to EAP’s program manager). This would provide a more defensible degree of separation between QA and operations. However, this recommendation has not been implemented because agency leadership perceives little potential for actual conflict. A conflict resolution procedure has been described in the QMP (2020).

## **Inter-Program Quality System Implementation at Ecology**

Over the past three years, Ecology has taken steps to improve the consistency and uniformity with which its QA system is implemented across programs. The agency’s QACs were invigorated by several new, highly qualified, members (see Appendix B). The QAO meets with this group of QACs approximately quarterly to share QA-related experiences, to discuss QA topics of concern, and to brainstorm ways to improve consistency of QA system implementation. However, improvement still needs to occur in the areas of QAPP and SOP format and content standardization, as well as inter-program communication and cooperation. Ecology policies 22-01 and 22-02 need major updates to ensure Ecology produces standardized QA documents with required content.

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

This section describes the quality system Ecology has implemented to ensure robust QA practices for projects funded by the EPA National Estuary Program (NEP). It summarizes activities and accomplishments as well as difficulties and solutions, and it recommends improvements and new initiatives for the future.

## Background and Quality System

In 2010, Congress appropriated funding for use over a period of about six years to help protect and restore the Puget Sound ecosystem. EPA's initial model for administering the program was to pass the majority of the funds to Lead Organizations<sup>2</sup> (LOs), which were later replaced with Strategic Initiative Leads<sup>3</sup> (SILs), and then track the effectiveness of its use. The LOs/SILs, in turn, develop multi-year strategies consistent with the Puget Sound Partnership's Action Agenda and near-term actions (NTAs), which drive their award selection decisions.

To address these strategies, LOs/SILs collaboratively choose projects and fund 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* (QMP; Ecology, 2020), has been delegated authority for implementing a centralized quality system applicable to nearly all NEP-funded activities and projects<sup>4</sup>.

The QA procedures implemented by Ecology to oversee NEP-funded activities mirrors Ecology's QMP, and the specifics of the NEP QA system are documented in an addendum to the QMP (Ecology, 2019). In summary, the NEP Quality Assurance Coordinator (QAC) resides in EAP and is responsible for determining whether projects will generate new environmental data or analyze existing environmental data. For projects that meet either of these criteria, the NEP QAC provides guidance on drafting a QAPP and reviews the QAPP, and recommends QAPP approval by Ecology's QAO.

NEP projects are encouraged to use a QAPP template (available on the NEP QA website) based on Ecology's EAP QAPP template. The NEP QAC works closely with NEP grant managers to identify which projects require a QAPP as early as possible. Discussing the QAPP requirement and offering QA resources to project managers early in the process helps ensure that a QAPP is

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<sup>2</sup> The state Departments of Fish and Wildlife (WDFW) and Natural Resources (WDNR) were the LOs for *Marine and Nearshore Protection and Restoration*. The state Departments of Ecology and Commerce were the LOs for *Watershed Protection and Restoration*. Ecology was the LO for *Toxics and Nutrients Prevention, Reduction and Control*. The state Departments of Health (DOH) and Ecology were the LOs for *Pathogen Prevention, Reduction and Control*. The Puget Sound Partnership (PSP) was 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*.

<sup>3</sup> Strategic Initiative Lead organizations (SILs) include WDFW (Habitat SIL), WDOH (Shellfish SIL), and Ecology (Stormwater SIL). Under the SIL model, Ecology NEP QA oversight also includes some projects managed by PSP.

<sup>4</sup> EPA Region 10 is responsible for ensuring that projects managed by NWIFC comply with EPA quality requirements.

completed before project work is scheduled to begin. For projects that do not generate new data or analyze existing data, the NEP QAC recommends approval of a QAPP waiver from the QAO.

While projects are underway, the NEP QAC may conduct audits and/or site visits to determine if activities and procedures are consistent with the approved project QAPP. The NEP QAC also documents problems that arise while planning or conducting a project in the form of a Corrective and Preventive Action Notice. The NEP QAC also provides review of project reports upon request. Finally, the NEP QAC conducts QA-related training as needed.

### **Activities and Accomplishments**

For the three-year period, July 1, 2018 through June 30, 2021, the NEP QAC:

- Maintained positive working relationships and communications with key NEP contacts (e.g., former LO and current SIL coordinators, grant and contract managers, technical staff).
- Consulted with project managers preparing QAPPs and QAPP waivers.
- Became familiar with and/or reviewed scopes of work and/or plans for at least 178 projects.
- Recommended approval of waivers for 101 projects.
- Recommended approval of 77 QAPPs and QAPP addenda.
- Reviewed and commented on draft project reports as requested by SIL grant managers.
- Revised the QAPP template provided to NEP grant recipients to address NEP-specific issues.
- Collaborated with the Shellfish SI to develop a guidance document about the application of bacteria water quality criteria (which were revised in 2020) to Pollution Identification and Correction (PIC) projects.
- Conducted a live virtual QA training for NEP grant recipients in March 2020.
- Updated the content of the NEP QA website, including links to resources from the virtual training in March 2020.

### **Difficulties Encountered and Solutions Proposed (2018-2021)**

Table 2 lists some of the difficulties encountered while providing quality oversight for NEP-funded projects related to the protection and restoration of Puget Sound. These are based on recommendations listed in the 2019 QRM and other issues identified in biannual NEP QA reports.

### **NEP System Modifications and New Initiatives**

Recommendations include:

- Continue to revise and deliver NEP QA training materials as needed to respond to the latest EPA and Ecology guidance.
- Continue regular check-ins with SILs to ensure prompt QAPP development and QAPP waiver decisions.
- Clarify whether there is a need for more project audits or similar project QA tracking.
- Ensure close tracking of projects using lab accreditation waivers after QAPP approval and enforce deadlines attached to waiver approvals.
- Clarify QA procedures and responsibilities of Ecology and PSP staff for PSP-managed NEP projects.

**Table 2. Difficulties encountered while providing quality oversight for NEP-funded projects related to the protection and restoration of Puget Sound.**

Difficulty	Solution
NEP funding recipients need QA training	<ul style="list-style-type: none"> <li>• Provided a live virtual training session for grant recipients, with a recording and slides available on the NEP QA website.</li> </ul>
QAPP review and approval process not adequately streamlined	<ul style="list-style-type: none"> <li>• Coordinated closely with SILs to review project QA needs early and often.</li> <li>• Coordinated with Shellfish SI to ensure efficient review of QAPPs by both Ecology and WDOH.</li> <li>• Replaced QAPP waiver form with email documentation of waiver decisions.</li> </ul>
The number of annual project audits needs to be increased	<ul style="list-style-type: none"> <li>• Discussed audits and potential alternative approaches to project QA tracking with SILs.</li> </ul>
Projects beginning activities prior to QAPP approval	<ul style="list-style-type: none"> <li>• Conducted training and updated online QA resources.</li> <li>• Engaged with project managers and SIL staff to identify causes and develop a path forward for affected projects.</li> <li>• Instructed project managers to include a disclaimer about data collected without an approved QAPP when reporting data.</li> <li>• In one case where project was completed before QAPP was finalized, QAO did not sign the QAPP.</li> </ul>
Determining data entry requirements associated with NEP projects	<ul style="list-style-type: none"> <li>• Discussed issue with SILs, EPA, and Ecology staff.</li> <li>• Drafted a guidance document to help grant recipients upload data to EPA's Water Quality Exchange (WQX) database.</li> </ul>
Turnover of NEP Quality Assurance Coordinator (QAC) position	<ul style="list-style-type: none"> <li>• QAO and current and former NEP QACs distributed workload of QAPP reviews and stakeholder communication during transition periods.</li> <li>• QAO delegated QAPP reviews to other EAP staff as needed.</li> </ul>
Overreliance on laboratory accreditation waivers by projects analyzing emerging contaminants	<ul style="list-style-type: none"> <li>• Increase emphasis on accreditation requirement in QA training and other communications with project staff and grant managers.</li> <li>• Coordinate closely with project grant managers and Ecology's Laboratory Accreditation Unit (LAU).</li> <li>• Set clear deadlines for accreditation progress and issue stop work orders if deadlines are not met.</li> <li>• Elevate issues to higher management levels to encourage better communication from project staff and future compliance.</li> </ul>
Ambiguity in the division of QA oversight between Ecology's NEP QAC and Puget Sound Partnership (PSP)	<ul style="list-style-type: none"> <li>• Discuss EPA's delegated QA authority with EPA and PSP contacts.</li> <li>• Develop a framework defining procedures for project QA review and responsible personnel at each agency.</li> </ul>

# Quality System Reports by Ecology Programs, 2018-2021

## 1. Air Quality Program (AQP)

### 1.1. Current QA system and activities

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The Washington State Ambient Air Monitoring Network (Washington Network) is designed to understand air pollution levels and characterize ambient air quality. The majority of Washington Network monitoring is for the criteria pollutants as identified in the federal Clean Air Act:

- Carbon Monoxide (CO)
- Lead
- Ozone (O<sub>3</sub>)
- Nitrogen Dioxide (NO<sub>2</sub>)
- Sulfur Dioxide (SO<sub>2</sub>)
- PM<sub>2.5</sub> (airborne particles 2.5 microns and smaller)
- PM<sub>10</sub> (airborne particles 10 microns and smaller)

Of these criteria pollutants, PM<sub>2.5</sub> and ozone are understood to represent the biggest risk to public health in Washington and therefore comprise the bulk of the Washington Network. In addition to the criteria pollutants, the AQP and its partners monitor the air for toxic pollutants, ozone precursor pollutants, PSD-quality meteorology<sup>5</sup>, and chemical components of PM<sub>2.5</sub>.

The quality assurance (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. The AQP's quality system for the Washington Network complies with the requirements of 40 CFR Part 58, Appendix A and with much of the guidance detailed in EPA's *Quality Assurance Handbooks*. Data collected within the Washington Network is comparable with that collected by other organizations around the country and is of sufficiently high quality for use in decision-making.

The AQP has about 3.25 FTE QA staff, including the program's QA Coordinator (QAC), who 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 Data and Measurement Quality Objectives for monitoring projects.
- Conducting performance assessments and systems audits on network monitors.
- Verifying quality control (QC) activities of field operators.
- Reviewing, validating monitored data to ensure quality is acceptable for intended uses.
- Certification of laboratory and field audit standards.

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<sup>5</sup> PSD = Prevention of Significant Deterioration  
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- Assessing data quality via quarterly and annual Data Quality Assessment Reports that are submitted to EPA and distributed to Washington Network managers and monitoring personnel.

## 1.2. QA training

All Ecology air monitoring and QA staff are classified at either the Environmental Specialist 4 or Natural Resource Scientist 3 level. In order to qualify for these positions, staff must have commensurate education and qualifications (typically a Bachelor’s degree or higher) to perform their work in air monitoring/QA at a highly technical level.

Since the beginning of 2019, several new staff have been hired in air monitoring and QA. New staff are required to complete an air monitoring / QA training plan. These plans may be tailored slightly depending on the specialty area for the position. Below is the example of one such plan for an air monitoring operator. Typically, plans must be completed within the first calendar year.

<b>TRAINING ELEMENTS</b> <b>On-The-Job Training and/or Field Experience:</b> <b>Activity To Be Performed/Learned</b>	<b>Date Completed</b>
Read and become familiar with Ecology’s Quality Assurance Plan and instrument standard operating procedures (SOPs)	
Read and become familiar with federal 40CFR Parts 58, appendices A, D, and E and Quality Assurance Handbooks volumes 2 and 4	
Job-shadow NWRO National Air Toxics Trends Site (NATTS) and Trace-gas operator. Accompany them on as many trips in the field as it takes to feel comfortable completing all of the following tasks: <ul style="list-style-type: none"> <li>• Perform at air toxics quality control (QC) checks (recommend X 4).</li> <li>• Perform manual nephelometer QC checks (recommend X 4).</li> <li>• Perform four ozone manual QC checks (recommend X4).</li> <li>• Collect, document, and ship NATTS air toxics samples (recommend X 4).</li> </ul>	
Work with NWRO NATTS and Trace-gas operator and other staff to learn these – your primary areas of responsibility: <ul style="list-style-type: none"> <li>• Visit the NWRO and CRO monitoring sites you will operate: Beacon Hill, Enumclaw, Wenatchee, and Ellensburg.</li> <li>• Do the following activities at the above locations and become proficient in these areas:</li> <li>• Perform meteorological QC checks</li> <li>• Perform manual nephelometer QC checks</li> <li>• Perform ozone manual QC checks</li> <li>• Perform filter-based PM<sub>2.5</sub> or PM<sub>10</sub> QC checks</li> <li>• Perform CO and NO<sub>2</sub> manual QC checks</li> <li>• Perform routine maintenance, clean parts, replace batteries and change filters.</li> <li>• Collect, document, and ship Federal Reference Method (FRM) PM<sub>2.5</sub> samples.</li> <li>• Collect, document, and ship speciation samples.</li> </ul>	



<p style="text-align: center;"><b>TRAINING ELEMENTS</b>  <b>On-The-Job Training and/or Field Experience:</b>  <b>Activity To Be Performed/Learned</b></p>	<p style="text-align: center;"><b>Date Completed</b></p>
<p>Job-shadow NWRO's Speciation and Near-road operator. Accompany them on as many trips into the field as it takes to become proficient in all of the following tasks:</p> <ul style="list-style-type: none"> <li>• Visit the NWRO monitoring sites they operate</li> <li>• Cross-train with them by doing the following activities: <ul style="list-style-type: none"> <li>○ Perform meteorological QC checks</li> <li>○ Perform nephelometer QC checks</li> <li>○ Perform PM<sub>2.5</sub> Chemical Speciation Network QC checks</li> <li>○ Perform ozone manual QC checks</li> <li>○ Perform filter-based PM<sub>2.5</sub> or PM<sub>10</sub> QC checks</li> <li>○ Perform CO and NO<sub>2</sub> manual QC checks</li> <li>○ Perform BAM 1020 QC checks and perform routine maintenance</li> <li>○ Collect, document, and ship at least four Federal Reference Method (FRM) PM<sub>2.5</sub> samples.</li> <li>○ Collect, document, and ship speciation samples</li> </ul> </li> </ul>	
<p>Job Shadowing the SWRO operator. Accompany them to the Tacoma-S. 36<sup>th</sup> St. site in Tacoma:</p> <ul style="list-style-type: none"> <li>• Cross-train with them by doing the following activities:</li> <li>• Perform BAM 1020 QC checks (recommend X 2).</li> <li>• Perform DART review</li> </ul>	
<p>Late spring/early summer, Job Shadow ERO PM<sub>2.5</sub> and ozone operator. Accompany them on trips into the field to complete the following tasks:</p> <ul style="list-style-type: none"> <li>• Accompany them to the following sites in the Central region: Wenatchee, Ellensburg</li> <li>• Cross-train with them by doing the following activities:</li> <li>• Perform meteorological QC checks</li> <li>• Perform manual nephelometer QC checks</li> </ul>	
<p>Coordinate with Calibration &amp; Repair lab staff for a day-long visit to the Calibration &amp; Repair lab: Train with them on:</p> <ul style="list-style-type: none"> <li>• M903 nephelometer operations, calibration, and maintenance</li> <li>• Beta Attenuation Monitor 1020 PM<sub>2.5</sub> monitor operations and maintenance</li> <li>• Ultrasonic meteorological sensor operation and recertification process</li> <li>• Flow and temperature standard verification processes <ul style="list-style-type: none"> <li>○ e. Ozone operations and maintenance (This will be a big part of what you'll be doing.)</li> <li>○ f. Multi-gas calibrator operations and maintenance</li> </ul> </li> </ul>	
<p>Train with Quality Assurance staff:  Meet with Quality Assurance Coordinator (QAC) to learn:</p> <ul style="list-style-type: none"> <li>• Quality system requirements overview</li> <li>• Documentation</li> <li>• Level 1 data review processes</li> </ul> <p>Coordinate with the QAC and QA staff to accompany them on audit trips. Include met, ozone, and BAM audits.</p> <ul style="list-style-type: none"> <li>• Two audit trips with QA staff conducting field audits</li> <li>• Learn the gaseous auditing process</li> <li>• Evaluate the two air monitoring sites for accordance with 40 CFR 58, Appendix E siting and adherence to federal regulations and monitoring objectives.</li> <li>• One audit trip with QA staff conducting field audits.</li> <li>• Evaluate the air monitoring site for accordance with 40 CFR 58, Appendix E siting and adherence to federal regulations and monitoring objectives.</li> </ul>	
<p>Coordinate with the SWRO &amp; Air Quality Operations Supervisor to meet with Telemetry Specialist and Air Quality System (AQS) Coordinator at HQ:</p> <ul style="list-style-type: none"> <li>• Learn what the Telemetry Specialist does for site communications and data polling, data logger configuration, modems and channel set up.</li> <li>• Learn what the AQS Coordinator does to submit data to EPA. Learn how to enter data in SIMS</li> </ul>	

<b>TRAINING ELEMENTS</b> <b>On-The-Job Training and/or Field Experience:</b> <b>Activity To Be Performed/Learned</b>	<b>Date Completed</b>
<ul style="list-style-type: none"> <li>• Use Excel, R, or other statistical software to analyze and visually present air quality data collected from NWRO.</li> </ul>	
Become proficient with the EnvistaARM software (your NWRO teammates can give you an introduction and the manual) <ul style="list-style-type: none"> <li>• Learn how to run a variety of reports to analyze and conduct level 1 data review</li> <li>• Station reports (1-hour and 1-minute)</li> <li>• Group reports (comparability of like-monitors)</li> <li>• Calibration reports</li> <li>• Log book reports</li> <li>• Diagnostics reports</li> <li>• Learn how to make new log book entries</li> </ul>	
Become proficient with Envidas Ultimate data loggers and software tools to: <ul style="list-style-type: none"> <li>• Review calibration results</li> <li>• Make logbook entries</li> <li>• Disable channels</li> <li>• Run reports for raw data and diagnostic data</li> <li>• Review configurations of data channels, calibration sequences, and diagnostic information</li> </ul>	

**Training Courses** *(These are supplemental, not required, and have no deadline)*

<b>Course Title</b>	<b>Date Completed</b>
SI:470 – General Quality Assurance Considerations for Ambient Air Monitoring	
APTI- SI:409 – Basic Air Pollution Meteorology	
Online Chemical Speciation Training – available through AMTIC	

**2019**

- Two air monitoring operators and one QA staff attended the 2019 American Association of Aerosol Research Annual Conference which included trainings specific to network monitoring technologies and pollutants of concern
- One QA specialist and one air monitoring operator attended the week long, hands-on, Teledyne – Air Pollution Instrumentation Level II Advanced Training
- One air monitoring and one QA specialist completed Ecology’s Visualizing and Analyzing Environmental Data with R course
- One air monitoring and one QA specialist completed Records & Information Management training
- All air monitoring and QA staff completed the Outdoor Heat Stress Training

**2020**

- All three QA, two air monitoring operators, one calibration and repair specialist, and our Air Quality System (AQS) Coordinator completed the updated, online version of the four day Air Pollution Training Institute SI-470 Quality Assurance for Air Pollution Measurement Systems course.
- Two air monitoring operators, one QA and one calibration & repair specialist attended the Pacific Northwest Regional Haze Workshop and the International Association of Wildland Fire 3rd International Smoke Symposium addressing wildfire smoke monitoring, sensors and associated data uses and limitations, and emerging technology.

- One calibration & repair and two QA specialists completed Records & Information Management training.
- All air monitoring and QA staff completed the Covid Safety and Outdoor Heat Stress Trainings.

## 2021

- Seven AQP staff attended the four-day EPA Photochemical Assessment Monitoring Stations Data Validation and Analysis training
- One air monitoring specialist completed the DOT Hazardous Materials Employee Training required for shipping compressed gas cylinders for the Photochemical Assessment Monitoring Program
- One air monitoring specialist completed a four day series of technical writing training courses
- One QA specialist completed Air Pollution Training Institute courses covering the EPA Air Operating Permit New Source Review Program and Sources of Air Pollution
- One calibration & repair and two air monitoring specialists and our AQS Coordinator completed Records & Information Management training
- All air monitoring and QA staff completed the Covid Safety and Outdoor Heat Stress Trainings

### 1.3. QAPPs

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AQP's [Quality Assurance Plan](#) describes the objectives of Washington's air monitoring network (Washington Network), associated QA and quality control (QC), and the procedures used for ambient air quality monitoring. There are two other QAPPs that were approved during this reporting period:

- [Air Toxics Monitoring QAPP](#), which describes routine monitoring for a limited list of toxic air pollutants.
- [Photochemical Assessment Monitoring Stations QAPP](#), which describes monitoring to improve understanding of the formation of ozone and its precursors.

The AQP QA Coordinator (QAC) has first-level approval authority of the Quality Assurance Plan and all project-specific air monitoring QAPPs that describe activities conducted within the Washington Network. The QAC typically approves one project-specific QAPP per year. During this reporting period, the QAC approved:

- The new *Quality Assurance Project Plan for the Photochemical Assessment Monitoring Stations (PAMS) Required Site Network for Speciated Volatile Organic Compounds, Carbonyls, and Meteorological Parameters Including Mixing Layer Height (2021)*.
- The revised *Washington Ambient Air Monitoring Network Quality Assurance Plan (2021)*.
- The *Air Toxics Monitoring Quality Assurance Project Plan (2020)*.

### 1.4. SOP status

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The AQP has established instrument-specific standard operating procedures for nearly all monitoring within the Washington Network. The EPA QAPP and SOPs are used for the PM<sub>2.5</sub> Chemical Speciation Network monitoring conducted within the Washington Network.

[Eleven SOPs](#) were revised and approved, one new SOP was approved and subsequently revoked, and two older SOPs were revoked, and two new SOPs are in development, in the period following the 2018 *Quality Report to Management*, current SOPs are included in Appendix B.

## 1.5. Audits

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The AQP QA staff conducts performance assessments (audits) on air monitors and meteorological 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<sub>2.5</sub> and PM<sub>10</sub>) instruments: Twice per year.
- For gaseous pollutant monitors (CO, NO<sub>2</sub>, O<sub>3</sub>, SO<sub>2</sub>): Once per year.
- PSD-quality meteorological parameters (wind speed and direction, ambient temp): Once per year.

## 1.6. QA anomalies and/or corrective actions

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All QC/QA problems and corrective actions are identified in the quarterly and annual Data Quality Assessment Reports that are shared with EPA Region 10 and all Washington Network partner entities so that improvements can be made. Data not meeting Measurement Quality Objectives is not sent to EPA.

## 1.7. Future QA initiatives

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- Hold another statewide monitoring operator training within the next three years.
- Finalize revisions to the Washington Network Quality Assurance Plan by the end of 2025.
- Finalize revisions to the Air Toxics Monitoring QAPP by spring 2026.
- Finalize revisions to the PAMS QAPP by spring 2026.
- Finalize new SOPs for the BAM-1022 particulate sampler and PAMS Gas Chromatograph by spring 2022.
- Implement new instrument and systems audit procedures for the PAMS program during the 2022 PAMS sampling season.
- Increase QA staff resources by 1.0 FTE by fall 2022 to support new PAMS and Climate Commitment Act required monitoring.
- All SOPs will have be current to within the last 3 years. At the time of this writing all SOPs meet our 3-year revision/recertification schedule.

## 2. Environmental Assessment Program (EAP)

### 2.1. Current QA system and activities

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Ecology's Quality Assurance Officer (QAO) is located in EAP, so EAP plays a key role in implementing the agency's quality system. The agency Director is responsible for designating the QAO, and the QAO reports to both EAP's program manager and Ecology's deputy director.

With respect to the quality structure, key responsibilities of the QAO include:

- Informing management of QA/QC issues and problems.
- Acting as the liaison between Ecology and other agencies on QA/QC matters.
- Providing technical support to all Ecology programs by working with Ecology's QA Coordinators (QACs).

EAP has six QACs:

- QAC for Manchester Environmental Laboratory (MEL) – 1 FTE
- QAC for Laboratory Accreditation Unit (LAU) – 1 FTE
- QAC for sampling and streamflow aspects of QA – 0.45 FTE
- Two QACs for SOP and QAPP review – 0.2 FTE
- QAC for all aspects of NEP-related QA – 1 FTE

The QAO acts as point of contact within EAP for data quality issues and is the final signature authority on EAP QAPPs and QA policies.

EAP's 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.

#### **Staff quality responsibilities**

EAP staff with QA responsibilities include project managers, project leads, field staff, MEL staff, and LAU staff. The specific responsibilities are given in Ecology's *Quality Management Plan*.

Project managers and project leads are responsible for 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 Ecology's Environmental Laboratory Accreditation Program (ELAP). This program (1) assesses the capabilities of labs to analyze environmental samples and (2) determines if the labs should be granted accreditation.

## 2.2. QA training

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EAP conducts annual training routinely at the start of field season. This training is mandatory for all field staff. The training includes but is not limited to:

- Heat Stress
- Invasive Species
- Relevant SOPs
- Safety

Some units within EAP also conduct and record an annual audit of their field staff. An assigned senior staff member routinely trains all new staff and then does annual recertification of the field staff. All the audit findings are documented by the unit.

EAP also conducts a series of seminars, which are primarily intended for EAP staff to have an opportunity to practice their presentations skills and share their work with colleagues and other Ecology staff. It is also an excellent opportunity to receive feedback before taking presentations to a broader audience. During the reporting period, EAP presented 36 seminars.

## 2.3. QAPPs

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From July 1, 2018 through June 30, 2021, EAP posted about 51 QAPPs, which included QAPP addenda.

A listing of QAPPs generated by EAP since 1994 is available at:

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

## 2.4. SOPs

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As of June 30, 2021, EAP has 95 SOPs (not including MEL and LAU SOPs). All of these are current. A list of these SOPs is available upon request.

### **Other EAP/Ecology quality documentation**

A revision of Ecology's 2020 *Quality Management Plan* will be published in 2025. This is the agency plan to implement, document, and assess the effectiveness of the quality system supporting environmental data operations.

## 2.5. Audits

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No audits were conducted during this reporting period.

## 2.6. QA anomalies and/or corrective actions

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No QA anomalies or corrective actions were reported during this reporting period.

## 2.7. Future QA initiatives

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- An agency wide QA workshop is planned for fall 2022. This workshop will be in response to Ecology's ongoing QA awareness commitment.
- All SOPs will continue to be current within the last 3 years.
- Five-year QAPP revision plan will be implemented.

## 3. Environmental Assessment Program – Laboratory Accreditation Unit (LAU)

### 3.1. Current QA system and activities

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#### Accredited laboratories

The LAU currently accredits 447 environmental laboratories, located in 26 states and 2 Canadian provinces.

- 140 Commercial
- 174 Wastewater Treatment
- 25 Water Reclamation
- 45 Industrial
- 7 Tribal
- 12 Public Health
- 8 Academic
- 9 Federal
- 27 Governmental (Non-Federal – City, County, State, Public Utility/Environmental)

From July 1, 2018 through June 30, 2021, LAU staff conducted audits of 54 accredited labs.

#### Accreditation of Manchester Environmental Laboratory (MEL)

LAU staff conducted its last comprehensive audit of MEL during May 2017. An audit was conducted for drinking water parameters only during 2020. The next comprehensive audit is due and will be scheduled as soon as possible.

MEL maintains accreditation for general chemistry, trace metals, organics, and microbiology procedures in non-potable water and solids. The lab is also accredited for two metals parameters in drinking water. 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 Seattle Public Utilities, a city government lab, in February 2017. Reports of their observations were provided in April 2017. 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 2018, 2019, and 2020.

### 3.2. QA training

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- March 2021 – Rebecca Wood completed the EPA Drinking Water Certification Officer Refresher Training-Chemistry (remote session).
- March 2022 – Kamilee Ginder completed the EPA Drinking Water Certification Officer Chemistry Refresher Training (remote session).
- June 30, 2020 – Microbiology auditor Aimee Bennett retired.
- February 16, 2021 – Ruth Powers-Piccone was hired as Microbiology Auditor.

- 2021 – Ruth attended the EPA Drinking Water Microbiology Certification Officer Seminar (remote session).
- 2021 – Ruth took Lab Refresher Training at the EPA Region 10 Laboratory with the EPA Microbiologist.
- 2021 – Ruth took Wastewater Testing and Regulations in the US provided by IDEXX (remote seminar).
- September 1, 2018 – Daniel Baker was hired as the General Chemistry Auditor.
- 2019 – Daniel Baker passed his EPA Drinking Water Certification Officer Inorganic Chemistry Exam.
- 2019 – Daniel Baker took the NELAC Technical Training Series Seminars through the NELAC Institute (remote sessions).
- April 2018 – Rosana McConkey attended Bioassay meeting and lecture at WA Department of Ecology.
- August 2018 – Rebecca Wood, Aimee Bennett, Kamilee Ginder, and Rosana McConkey attended an EPA seminar on Lab Fraud
- Meetings with Oversight Agencies, EPA and WDOH.
- 2022 – Ryan Zboralski attended the EPA Drinking Water Chemistry Certification Officer Seminar (remote session).

### 3.3. QAPPs

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Not applicable

### 3.4. SOP status

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The list of LAU SOPs is available upon request.

### 3.5. Audits

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From February 14-17, 2017, EPA Region 10 Certification Officers performed an onsite assessment of LAU for the certification of drinking water labs. The purpose of this review was to assess the State's compliance with the practices required under the Safe Drinking Water Act. The assessment included reviews of Washington's Principal State Laboratory Program, certification policies and procedures, records, responses to a questionnaire, and interviews with the auditors.

### 3.6. QA anomalies and/or corrective actions

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Findings included an audit backlog, which LAU is working to address.

### 3.7. Planned QA activities

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During the next reporting period, LAU plans to recertify an SOP dealing with Laboratory Accreditation Renewals.



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

### 4.1. Current QA system and activities

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The goal of Ecology's 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 and consumer products.

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 (1) scientifically valid and legally defensible, and (2) 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.

A summary of all the instrumentation and method development activities (for 7/1/2018 – 6/30/2021) is available upon request.

#### **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. MEL may be partially responsible for all of these factors for some studies, and for analysis only for other studies.

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 and extraction procedures.
- Control lab contamination.
- Assure that reported data are correctly associated with the corresponding sample received by MEL.

#### **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, in accordance with the agency's record retention policy, to demonstrate that samples were not tampered with after being received by MEL. Proper use of chain-of-custody procedures and proper security are followed while the samples are in the lab. The data are recorded, handled, and reported in such a way that prevents tampering. Observations are recorded in indelible ink. Good lab practices are followed by using the Laboratory Information Management System (LIMS) to record data and generate reports.

The guidelines outlined in MEL's *Quality Management Plan* are effectively met.

## 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.*" 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 lab 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, MEL 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 proficiency testing samples.

A Method Detection Limit (MDL) and/or a Lower Level of Quantitation (LLOQ) determination as required is performed for each new method and periodically as required by the method for the analyte of interest.

## 4.2. Quality-related training

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All new MEL staff receive 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. All analysts perform detection limit studies at the beginning of each year.

## 4.3. QAPPs

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MEL's director has approval authority for all QAPPs that require lab services. Input is solicited from MEL's QA Coordinator (QAC) and from the organic and inorganic chemistry supervisors. MEL staff reviewed and approved 71 QAPPs during this reporting period.

## 4.4. Audits

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No audits were performed during the reporting period.

## 4.5. SOPs

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A list of MEL SOPs during the reporting period is available upon request.

## 4.6. QA anomalies and/or corrective actions

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Problem: Samples analyzed over holding time.

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

Problem: Samples arriving at MEL are over temperature limits.

Cause: Sample coolers are 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 2018, MEL has maintained accreditation for all parameters (total of 543 analytes) requested as required by the *Quality Management Plan* and Ecology Executive Policy 22-02.

## 4.7. Planned QA activities – SOP updates

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A comprehensive internal audit is planned for fall 2022.

## 5. Hazardous Waste and Toxics Reduction Program (HWTR)

### 5.1. Current QA system and activities

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#### Background and summary

The HWTR program (HWTR) conducts a wide variety of projects, which include Corrective Action, Compliance, Pollution prevention and permitting. A majority of the efforts if quality assurance (QA) are directed towards corrective action work. In support of the Resource Conservation and Recovery Act (RCRA) Compliance Program's goals, compliance monitoring is performed on an annual or "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 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 an Ecology and EPA policy to have an approved Quality Assurance Project Plan (QAPP) for all agency-sponsored and RCRA Performance Partnership Agreement sampling events. The program QAPP serves as the HWTR programmatic QAPP template. We have started the QAPP update and solicited input and involvement from the cross-program RCRA sampling workgroup. HWTR delayed the update of the current program QAPP planned in the 2017–2019 biennium. However, we have now prioritized the update of the programmatic QAPP.

Corrective action (CA) sampling is conducted by a third-party or PLP consultant based on defined data quality objectives. The QAPP template is written to be adapted for site/facility specific dangerous waste designation sampling activities where Ecology is conducting the sampling event. When the QAPP is updated, it will include other work done by HWTR that will require a QAPP.

The objectives of the Programmatic QAPP are to:

- Provide a 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 Standard Operating Procedures (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.

Limited sampling events were conducted during this reporting period (July 1, 2018 - June 30, 2021) due to COVID-19 restrictions. HWTR Compliance Inspectors completed two QAPPs for planned sampling events, and one sample of opportunity QAPP for unplanned sampling events.

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 lab analyses are properly planned and conducted to achieve the project objective. The HWTR Quality Assurance Coordinator (QAC) assists inspectors in sampling and writing QAPPs for complex sampling events beyond the requirement of the program QAPP. QAPPs ensure compliance with specific data quality objectives (DQOs).

Corrective action (CA) sampling is conducted by a third-party or Potential Liable Party (PLP) consultant based on defined data quality objectives. It can be used for any dangerous waste designation sampling activity where Ecology is conducting the sampling event. When the QAPP is updated, it will include other work done by HWTR that will require a QAPP.

### **HWTR compliance sampling events**

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

- Samples of opportunity.
- Pre-planned sampling events.

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. Facility inspection reports are regionally stored and archived.

Familiarizing compliance inspectors with the benefits of pre-planning in recent years has been quite successful. To that end, the next update of the HWTR QAPP will include a revised Samples of Opportunity QAPP template that can be modified for site-specific sampling events.

HWTR occasionally conducts sampling to obtain data for programmatic activities and/or possible regulation changes. This type of sampling is done very infrequently, and none was conducted in this reporting period.

Statewide and regional sampling training have enhanced the inspectors' sampling techniques and the importance of pre-planning using a QAPP. As a result, we are experiencing an improvement in data quality used by the program. Sampling training (see section 1.2) conducted in October 2018 included a discussion when a sample of opportunity should be taken and when pre-planned sampling is required.

Trainings were not provided for the Corrective Action staff in this reporting period. Training on QA and on corrective action subject-specific topics will be provided for HWTR Corrective Action staff.

Three RCRA compliance-sampling events were conducted during this report period (July 1, 2018–June 30, 2021). The following table lists the sampling events conducted by HWTR's regional offices. Samplings for product testing analysis are not included in this list of sampling events.

## HWTR Sampling Events, 2018-2021

HQ and Regional Offices	Sample Events	QAPP
HQ	0	No
NWRO	2	Yes
SWRO	1	Yes
ERO	0	No
CRO	0	No

### Specific QA responses to *Quality Report to Management (QRM)*

Full-time employees are designated to quality in HWTR.

HWTR has allocated time from three full-time employees (FTEs) to QA/QC activities. The program's QA/QC Coordinator is dedicated to QA/QC and related activities including training, QAPP review and preparation, and providing QA/QC advice and recommendations. In the Northwest and Southwest Regional Offices, there are two 0.2 FTEs assigned to regional QAC work. This was a 2021 addition to the program's QA/QC capacity. As of May 2022, one of these positions is filled and one is out for recruitment.

As of July 2021, 20% of the program QAC time has been allocated to Agency QA activities. In addition, HWTR included a commitment to QA/QC activities in the current HWTR Inspector's Manual (which outlines inspector requirements and training) and expects staff to provide, where appropriate, QAPPs for their sampling events.

## 5.2. QA training

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### HWTR Inspector's Training (October 24-25, 2018)

HWTR provided well-received sampling training for RCRA Compliance Inspectors as required under the Ecology Quality Management Plan (QMP) and as part of the EPA Quality Assurance and Certification of Competency under the Competency Policy Forum on Environmental Measurement (FEM-2012-01).

EPA Region 4 and SGS AXYS Laboratory Canada participated in and presented during Ecology sampling training in October 2018 at Ecology headquarters in Olympia. Training attendees included staff from three Ecology programs, from EPA Region 10, and from the Oregon State Department of Environmental Quality (DEQ).

The sampling training is designed to:

- Update field practice of sampling techniques.
- Promote data quality review.
- Provide overview of waste analysis plans in permits.
- Maintain and develop [guidance documents and SOPs](#).<sup>[1]</sup>

Positive feedback was received for the training conducted, and attendees want to see the training conducted biannually. The recommendations from these training were to continue to refresh, update, and support sampling education and training.

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<sup>[1]</sup> <http://teams/sites/HWTR/inspectorsToolBox/samplingResources/Guidance%20Documents/Forms/AllItems.aspx>  
Quality Report to Management 2018-2021

In addition to an ongoing need to support inspector education, another development in the area of sampling and analysis is the update to Ecology's [Biological Testing Methods 80-12 for the Designation of Dangerous Waste](#)<sup>[2]</sup>, published in May 2021.

Due to COVID-19, we were unable to have another training in 2020 as we scheduled to have the training biannually. We have a cross-program sampling workgroup led by the HWTR QAC who deliberates on training needs. We are looking at holding a virtual/hybrid training the fall of 2022.

### **Refresher Training for HWTR Staff**

As part of ongoing professional development, compliance and other HWTR 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 QA Coordinator (QAC) works with staff to discuss possible compliance sampling.

### **5.3. QAPPs and SOPs**

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HWTR has developed a programmatic QAPP template that can be adapted for site-specific sampling, for use by compliance inspectors during HWTR sampling events; however, the next revision of the HWTR QAPP will incorporate by reference Ecology's EAP QAPP template and Product Testing Universal QAPPS for HWTR-HQ-based studies and investigation 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 draft SOPs will be included in the next HWTR QAPP revision:

- Soil and sediment sampling
- Field pH sampling

HWTR-HQ generated SOPs and joint program SOPs will be included in the next revision of the HWTR program QAPP.

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<sup>[2]</sup> <https://apps.ecology.wa.gov/publications/SummaryPages/8012.html>

## **Compliance sampling site-specific approved QAPP**

There QAPPs/SOP were approved for compliance sampling events from July 2019 through June 2021 including:

- Manke Lumber
- North Shore Maintenance
- Plantation Riffle Range

## **Other approved QAPPs and SOPs**

Four QAPPs submitted to HWTR were reviewed and approved for activities during July 2018 – June 2021, including one product testing QAPP generated by HWTR prior to the Product Testing program being transferred to EAP in July 2019:

- Two QAPPs for PFAS for monitoring in Lake Washington.
- One PFAS Biofilm QAPP.
- One QAPP for Consumer Product Testing.

Three QAPPs for characterization and toxicity of 6PPD-quinone were submitted in March 2021 for review and approval. These QAPPs are under review and have not been approved.

## **External-generated non-Ecology QAPPs and SAPs**

The respective site and/or project managers overseeing the site or facility, in conjunction with the program QAC, review and approve the project or facility Quality Assurance Project Plans (QAPPs) and Sampling and Analysis Plans (SAPs) submitted by external parties to HWTR for review. This is based on HWTR QA policy (2020), pending the training of regional QACs to review and approve externally generated CA QAPPs.

During this reporting period (July 1, 2018–June 30, 2021), five externally generated corrective action QAPPs, SAPs, and Remedial Investigation Work Plan (RIWP) were reviewed and approved. As part of the next QAPP revision, updates will include Standard Operating Procedures (SOPs) for Field Audits at HWTR Corrective Action Sites. QAPP review and the approval process will be streamlined to minimize impact to staff's workload.

The Field Corrective Action Site Audit SOP was approved in 2020. The purpose of this SOP is to provide procedures to conduct field audits on activities including field sampling and measurements, performed by external contractors following Ecology HWTR approved SAPs and/or QAPPs.

The field audit serves as an upfront QA/QC practice to ensure that any field activities leading to adverse data collection are prevented or identified and corrected promptly. A field audit is currently conducted through the completion of a field audit checklist form in the field by the contractor, and attested to by the Ecology HWTR audit staff.

## **Other program-specific quality documentation**

HWTR's program compliance unit conducted fewer sampling events in this reporting period, 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 are met. It is equally important that the specific data quality documentation is scientifically defensible.



## 5.4. Other QA activities

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Apart from the EPA-Manchester Laboratory, HWTR has entered into contract agreements with certified private laboratories and University Research Laboratories to conduct analyses on split samples from corrective action samplings events and on samples received from Ecology compliance and HWTR-HQ staff.

The HWTR QAC assisted and provided analytical chemistry and sampling expertise to other Ecology programs, and local and county government, in conducting sampling and analysis activities and review of QAPPs. The program QAC also coordinates with Ecology's Quality Assurance Officer (QAO) on agency-related QA issues and training, and works with Ecology's QAO to implement the agency's *Quality Management Plan* (QMP).

## 5.5. Audits

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One audit of Boeing Development Center RCRA Corrective Action Sites was conducted in March 2021.

## 5.6. QA anomalies and/or corrective actions

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Sample collection anomalies were noted and corrected.

## 5.7. Planned QA activities

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The HWTR QAPP will be updated in the current biennium. We have prioritized this work and started the process to update it. The update to the HWTR QAPP will include (1) Standard Operating Procedures (SOPs) for Field Audits at HWTR RCRA Corrective Action Sites, and (2) procedures for RCRA Corrective Action project data review and validation for externally received data or validated laboratory analytical data.

## 6. Nuclear Waste Program (NWP)

### 6.1. Overview of the quality system

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The NWP quality system is a team of scientists comprised of five chemists with many years of relevant laboratory experience, including wastewater lab 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. About 50% of the chemist's FTE is dedicated to data package review, modeling QA, statistical QA, Tank farm SAPS, RCRA corrective action, CERCLA cleanup, vitrification plant QA/QC, contracted lab audit, and work scope.

NWP has a total of 2.5 FTEs dedicated to QA. 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. NWP chemists work closely with the 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.

### 6.2. QA-related training

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Program training included:

- EPA Quality Management Conference (August 2018)

### 6.3. QAPPs developed or approved

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NWP chemists approve all QAPPs for this program. In addition, NWP chemists approve and review Hanford site contractor generated QAPPs. All the QAPPs approved in this reporting period (July 2018 – June 2021) are listed below.

Documents containing QA/QC requirements for sampling and analysis activities approved:

- Data Quality Objectives process for the 200-BP-5 Removal Action Work Plan
- 200-BP-5 Remedial Investigation Report
- 200-EA-1 Work Plan and Sampling and Analysis Plan
- Hexone Closure Plan (Addendum H) of the Hexone Storage & Treatment Facility and Sampling and Analysis Plan, Permit Rev. 9
- Sampling and Analysis Plan for the Removal of Action Wells in the 200-BP-5 Operable Unit
- Central Plateau Groundwater Tracer Study Sampling and Analysis Plan
- 200-BP-5 and 200-PO-1 Groundwater Operable Units Feasibility Study for Interim Action
- Appendix A of the Remedial Design/Remedial Action Work Plan for the 100-DR-1, 100-DR-2, 100-HR-1, 100-HR-2 and 100-HR-3 Operable Unit
- Well Installation Sampling and Analysis Plan for the 100-HR-3 Groundwater Operable Unit
- 200-ZP-1 OU Optimization Study Plan
- 100-NR-1 and 100-NR-2 Remedial Investigation/Feasibility Study
- Tri-Party Agreement Change Notice -1100 for 100-HR-3 Groundwater OU Well Installation Sampling and Analysis Plan, Addendum 1
- Double Shell Tank Waste Analysis Plan
- Field Sampling and Analysis Plan for Soil Samples in Support of Interim Measures at 241-U Tank Farm

- Technical Impracticability Documentation for Stronium-90 in the 100-NR-2 Groundwater Operable Unit
- 100-HR-3 Groundwater Operable Unit Well Installation Sampling and Analysis Plan Data Usability Assessment
- TPA Change Notice for 200-PO-1
- Sampling and Analysis Instruction During Installation of RCRA Monitoring Wells 699-43-44B, 699-43-44C, 699-43-43C, and 699-44-42B at the 216-B-6 Pond
- Single Shell Tank Closure Component Data Quality Objectives
- Sampling and Analysis Plan for the Single Shell Tank Closure Component
- AX-102 Tank Sampling and Analysis Plan
- Well Installation Sampling and Analysis Plan for 100-HR-3 Groundwater Operable Unit (
- Sampling and Analysis Instruction During Installation of RCRA Monitoring Wells 699-32-77B, 299-W26-15, 299-W26-16, and 299-W27-3 at the 216-S-10 Pond and Ditch
- Sampling and Analysis Instruction During Installation of RCRA Monitoring Wells 299-E-17-58 at the 216-A-36-B Crib
- Sampling and Analysis Instruction During Installation of Six RCRA Monitoring Wells at the 216-A-29 Ditch
- Confirmatory Sampling Instruction for the CTFN 2703-E Waste Site, 200-MG-1 OU
- Confirmatory Sampling Instruction for the 600-227 Waste Site, 200-MG-1 OU
- 200-IA-1 OU Waste Sites Focused Feasibility Study, Appendix A
- Solid Waste Operation Complex (SWOC)
  - 221-T Pad Closure Plan
  - 221-T Pad SAP
  - 221-T Railroad Closure Plan
  - 221-T Railroad SAP
  - 221-T Sand Filter Pad Closure Plan
  - 221-T Sand Filter Pad SAP
  - 277-T Building Closure Plan
  - 277-T Building SAP
  - 277-T Outdoor Storage Area Closure Plan
  - 277-T Outdoor Storage Area SAP
  - 2401-W Waste Storage Building Closure Plan
  - 2401-W Waste Storage Building SAP
- PUREX TK-P4 and TK-40 Class 3 Permit Modification for Closure Plan
- 6 Sitewide Permit Addenda with QAPPS:
  - WMA -1 GWMP
  - WMA-3 GWMP
  - WMA-4 GWMP
  - LLBG 31/34 GWMP
  - 222-S WAP
  - 325 WAP
  - 325 Closure plan and 222-S closure plan SAPs
- Integrated Disposal Facility: SAPs for Environmental Performance Demonstration Testing and Sitewide Permit.

- Rebound Studies Parent Sampling and Analysis Plan for the 100-HR-3 Operable Unit
- Groundwater Monitoring Plan for Single-Shell Tank Management Area S-SX
- Groundwater Monitoring Plan for the 216-A-29 Ditch
- Groundwater Monitoring Plan for the 100-H North Subarea Rebound Study
- Groundwater Monitoring Plan for the 216-A-37-1 Crib
- Groundwater Monitoring Plan for the 216-A-36B Crib
- Groundwater Monitoring Plan for the 216-S-10 Pond and Ditch
- Sampling and Analysis Instruction for 216-A-37-1 Crib
- Groundwater Monitoring Plan for the 216-B-3
- Sampling and Analysis Plan for Drilling Interim Remedial Action Wells in the 200-BP-5 and 200-PO-1 GW Operable Unit
- 200-BP-5/PO-1 Interim Action Remedial Design/Remedial Action Work Plan
- 200-IA-1 Operable Unit Focused Feasibility Study
- T-Plant Complex Cell 11L Closure Plan
- Perma-Fix Northwest
  - Closure Plan/SAP
  - WAP/SAP/QAP
- LERF/ETF Closure Plan Low-Level Burial Grounds Trenches 31-34-94, T-Plant Complex, and Central Waste Complex-Waste Receiving and Processing Facility Waste Analysis Plans
- LERF Groundwater Monitoring Plan

## 6.4.SOPs

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All SOPs approved during this reporting period are listed below. These SOPs will be reviewed and recertified every 3 years.

- Procedure for the NWP to utilize the services of ALS Laboratory Group via the Analytical Services Master Contract
- Hanford Analytical Services Quality Assurance Requirements Document, Volume 1, Administrative Requirements, Revision 5
- Hanford Analytical Services Quality Assurance Requirements Document, Volume 2, Sampling Technical Requirements, Revision 5
- Hanford Analytical Services Quality Assurance Requirements Document, Volume 3, Field Analytical Technical Requirements, Revision 5
- Hanford Analytical Services Quality Assurance Requirements Document, Volume 4, Laboratory Technical Requirements, Revision 5

## 6.5.Audits

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During this reporting period, some Ecology chemists toured the Hanford Vitrification Waste Treatment Plant (WTP) during the construction phase.

## 6.6.QA anomalies and/or corrective actions

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- Sampling and analysis of tank waste prior to transfer to WTP.
- Future assessment of Hanford site laboratories.
- Field Screening versus Laboratory QA/QC.

- Incorporation of Hanford Analytical Services Quality Assurance Requirements Document (HASQARD) auditing into the latest issued DoD/DOECAP QSM (Department of Defense/Department of Energy Consolidated Audit Program Quality Systems Management) .
- 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.
- Hanford Site Wide Permit Waste Analysis Plan (WAP) CAP (conceptual agreement plan) development including Ecology's Executive Policy 22-02.
- Establish and standardize practical quantification limits (PQLs) for groundwater monitoring SAPs.

## 6.7.Planned QA activities

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- Audit/Assessment of Pacific Northwest National Laboratory Hanford onsite laboratory.
- Assessment of Perma Fix QA/QC on sample and analysis of WTP ignitable waste.
- 216-BP-s pond wells Ecology split sampling and data analysis.

## 7. Shorelands and Environmental Assistance (SEA) Program and Office of Chehalis Basin (OCB)

### 7.1. Current QA system and activities

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The SEA Program (SEA) 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 program follows the criteria for “best available science” as defined in WAC 365-195-905 when developing technical and regulatory guidance and tools.

SEA dedicates 0.05 FTE to QA.

In 2017, the Legislature created the Office of Chehalis Basin (OCB), which became operational when the capital budget was passed in January 2018. The statutory charge for OCB is to “aggressively pursue implementation of an integrated strategy and administer funding for long-term flood damage reduction and aquatic species restoration in the Chehalis River basin” (the Chehalis Basin Strategy). As with the Office of Columbia River (OCR), the OCB is an independent office within Ecology, but OCB falls under the umbrella of SEA for some administrative purposes. Prior to 2018, development of the Chehalis Basin Strategy was funded through the Office of Financial Management (OFM). During the reporting period, OCB had assigned QA duties to one position but did not quantify FTEs for this task.

### 7.2. QA training

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SEA has no training activities for quality assessment at a program level. OCB had no QA training activities in the reporting period.

### 7.3. QAPPs and SOPs

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SEA currently has no programmatic QAPPs. Project-based QAPPs are developed as needed. During the reporting period, SEA approved one new EPA funded QAPP. Two QAPPs and one QAPP waiver were approved for external grantees. Projects with EAP-approved QAPPs are indicated in the list of SOPs section below.

#### **Updated list of SOPs/guidance documents, QAPPs, and associated training**

The following are completed:

- Improved wetland identification for conservation and regulatory priorities: Work for this project is being done under EPA Grant # CD01J09401. The goal is to improve wetland identification using a semi-automated remote sensing approach, followed by standard photo-interpretation to meet FGDC standards for inclusion in the National Wetland Inventory. The project includes collection of data for verification of wetland and upland locations that contribute to the semi-automated process. EAP-approved QAPPs exist for the semi-automated remote sensing and the photo-interpretation aspects of the project. An EAP-approved SOP (SEA001 – Field Verification of Remotely Sensed Wetland Maps – V 1.0) exists for the verification data collection.
- Characterizing Wetland Buffers: Work for this project was done with funding from an EPA Wetland Program Development Grant (WPDG; CD-00J47401-0) under an EAP-approved QAPP. The final report was submitted to EPA December 2013. The public report was

completed and published September 2017. See:

<https://apps.ecology.wa.gov/publications/SummaryPages/1706008.html>

- ‘Ordinary High Water Mark’ (OHWM) Determinations: Ecology developed a combined streams, marine, and lakes manual that includes OHWM determination SOPs (Ecology Publication 16-16-029). Completed and published October 2016. The document provides guidance to professionals making regulatory OHWM determinations (and for those reviewing determinations) to define the extent of the shoreline management area under the Shoreline Management Act.. Ecology provides OHWM training through the Coastal Training Program. See <https://apps.ecology.wa.gov/publications/summarypages/1606029.html>
- National Wetland Condition Assessment (NWCA): Part of the National Aquatic Resource Surveys conducted by EPA on a rotational basis every 5 years. Wetlands staff collected data for NWCA in 2011, 2016, and 2021 with funding from EPA. EPA generates and maintains SOPs and QAPPs for the project. All field and laboratory manuals, SOPs, and QA documentation are posted on EPA’s website for each survey year: <https://www.epa.gov/national-aquatic-resource-surveys/manuals-used-national-aquatic-resource-surveys##National%20Wetland%20Condition%20Assessment>
- Watershed Characterization: A QAPP was not required when this project started, but several QAPPs have now been prepared and approved by EAP for updates to the original broad scale models and the development and testing of new mid-scale models. Documentation for this project includes reports for the assessment of water flow and water quality (*Puget Sound Characterization. Volume 1*), habitat (*The Puget Sound Watershed Characterization Project Volume 2*), a user’s guide (*Volume 3: User’s Guide for the Puget Sound Watershed Characterization*), and development of a mid-scale tool (*Volume 4: Mid-Scale Assessment of Hydrologic Condition*). The latest version of Volume 1 (October 2016) includes Appendix D which describes geospatial methods. Volume 2 was prepared by Washington Department of Fish and Wildlife and includes details for the habitat assessment methods. Volume 3 provides guidance for the use of the watershed characterization tool. Volume 4 (2019) describes the first phase of developing a mid-scale tool known as the Hydrologic Condition Index for use throughout Puget Sound watersheds. The documents and data are maintained on Ecology’s external website at <https://ecology.wa.gov/Water-Shorelines/Puget-Sound/Watershed-characterization-project>.
- Wetland Delineations: The *Wetland Delineation Manual* (1987) is a federally developed SOP maintained by the U.S. Army Corp of Engineers. The Corps also published Regional Supplements that clarify and provide regional context to wetland delineation procedures. Two Regional Supplements apply to Washington, *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (2008) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (2010). These described the standard procedures adopted by Ecology for conducting wetland delineations in Washington. Ecology does not disseminate or maintain these SOPs. See: <https://ecology.wa.gov/Water-Shorelines/Wetlands/Tools-resources/Delineation-resources>
- 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 about every

10 years to incorporate the most current best available science. The most recent update was completed in 2014. We recently developed the Washington Tool for Online Rating (WATOR) to assist with wetland ratings by providing an online mapping tool for generating the figures required in the rating system and an electronic version of the rating form. The project was funded through an EPA grant and no QAPP was required. The tool is currently in a beta/test version. The rating systems and lists of people trained in the rating systems for Eastern and Western Washington are maintained on SEA's external website as:

<https://ecology.wa.gov/Water-Shorelines/Wetlands/Tools-resources/Rating-systems>

- 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 as:  
<https://ecology.wa.gov/Water-Shorelines/Wetlands/Tools-resources/Credit-debit-method>
- Padilla Bay Weather and Water Quality Data: The National Estuarine Research Reserve System (NERRS) and NOAA developed SOPs and QA procedures for this project. 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. As part of the water quality monitoring, they also collect TSS (total suspended solids) following national System Wide Monitoring Program protocols, and samples are collected for dissolved nutrients that are analyzed by the ocean chemistry department at the University of Washington following their EPA-based 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.
- Padilla Bay Long-term Eelgrass Monitoring: Eelgrass performance and growth metrics are monitored following a protocol established for NERRS.
- Padilla Bay Blue Carbon: As part of recent externally funded blue carbon work, they collect carbon content data on estuarine and marsh sediments. This is following protocols established by the Blue Carbon Initiative, as well as work by the Pacific Northwest Blue Carbon Project Team to refine these methods and improve the accuracy and reliability of these relatively new methods. The initiative protocol is here  
<http://www.cifor.org/library/5095/coastal-blue-carbon-methods-for-assessing-carbon-stocks-and-emissions-factors-in-mangroves-tidal-salt-marshes-and-seagrasses/>
- 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 <https://ecology.wa.gov/Research-Data/Data-resources/Geographic-Information-Systems-GIS/Data#w>.
  - Documentation of the project is maintained on Ecology's external website at <https://ecology.wa.gov/Water-Shorelines/Wetlands/Tools-resources>.



- Data can be viewed online at <https://waecy.maps.arcgis.com/apps/OnePane/basicviewer/index.html?appid=22edd2e4e7874badbef2a907a3cd4de6>.
- 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, and 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. This work continues to inform guidance documents.
- Dredge and Fill Materials: SEA works with the U.S. Army Corps of Engineers to implement testing requirements of dredge and fill materials associated with Clean Water Act (CWA) Section 404 permits. QA is maintained by the Corps for those activities.
- Respiration/Oxygen Consumption QAPP: Padilla Bay scientists worked with Ecology's modelling group on a QAPP to quantify respiration/oxygen consumption in the pelagic environment. These data will be used to generate rates to be included in the Salish Sea Water Quality model. The QAPP was approved and published in 2019: <https://apps.ecology.wa.gov/publications/documents/1903106.pdf>

OCB has no programmatic QAPPs. OCB approved 13 QAPPs and 4 waivers during this reporting cycle. The QAPPs were almost entirely for WDFW-led studies, with one NOAA study.

### **QAPPs**

- Native Fish Density and Occupancy (WDFW, 2020)
- Upper Extent of Salmonid Distribution (WDFW, 2020)
- Spawner Abundance – Chum Salmon (WDFW, 2020)
- Smolt Production [Fish-In Fish-Out] (WDFW, 2020)
- Spawner Abundance [Fish-In Fish-Out] (WDFW, 2020)
- Ecology of Non-Native Fishes (WDFW, 2020)
- Thermalscape (WDFW, 2021)
- Off-channel Experimental Reconnection Plan & Implementation (WDFW, 2021)
- Climate Change Culvert Modeling (WDFW, 2021)
- Chehalis Basin Habitat Surveys (WDFW, 2020)
- Beaver Dam Analogues (WDFW, 2021)
- Sediment Wedges (WDFW, 2021)
- Lifecycle Model (NOAA, 2021)

### **Waivers**

- Stream-associated Amphibians (WDFW, 2019)

- In-channel Amphibians (WDFW, 2019)
- Satsop Experimental Off-Channel (WDFW, 2019)
- Western Ridged Mussel (WDFW, 2019)

## 7.4.Audits

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There were no audits conducted during this reporting cycle.

## 7.5.QA anomalies and/or corrective actions

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No QA anomalies and/or corrective actions noted.

## 7.6.Planned QA activities

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The following QA documents are currently being developed:

- 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 both a general SOP as well as more detailed SOPs for other specific tasks. SOP is currently in draft form and will be completed as staff time allows.
- 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. SOPs will be completed as staff time allows. Final project report was published in September, 2018 and can be accessed here: <https://apps.ecology.wa.gov/publications/documents/1806008.pdf>
- Multi-beam Sonar Surveying: Draft SOPs for near-shore morphology surveys are under development as methods for collection and processing are finalized. SOPs will be completed as staff time allows.
- Beach Surface Sediment Sampling: Near complete SOP describes how to dry, sieve, and weigh sediment samples collected during beach monitoring surveys. SOP currently being revised.
- Wetland investigation QAPP: The wetlands section is developing a QAPP for staff investigating potential violations of the state Water Pollution Control Act (RCW 90.48). This QAPP will be based largely on a QAPP developed by EPA Region 10 staff for investigation of violations of the federal Clean Water Act in wetlands and other waters of the United States. Most of the SOPs used by wetlands staff are described in the Corps wetland delineation manual and regional supplements and the wetland rating system manual. The purpose of this QAPP is to provide guidance to staff on additional details of data collection on site and to serve as a one-stop reference for the resources and forms needed to conduct investigations.
- SEA's grants team is working to develop standardized QAPP materials to assist grantees with monitoring components in their proposals. SEA's QA Coordinator QAC has been working with the grants team and Ecology's QA Officer (QAO) to help the grants team recognize when QAPPs are needed and to process those as efficiently as possible. The grants which receive proposals that may require QAPPs, mini-QAPPs, or QAPP waivers are as follows:
  - [Flood Control Assistance Account Program](#)
  - [Floodplains by Design](#)
  - [Shoreline Management Program Competitive Grants](#)
  - [Coastal Protection Fund – Terry Husseman Account Grants](#)

OCB is not developing any SOPs at this time.

OCB anticipates reviewing one new QAPP in 2022, for a Hyporheic Zone Exchange project being led by the Chehalis Basin Flood Control Zone District and their consultant, Kleinschmidt. As WDFW implements their adaptive management plan for the Aquatic Species Restoration Plan, new studies that require QAPPs may arise.

## 8. Spill Prevention, Preparedness and Response Program (Spills)

### 8.1. Current QA system and activities

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#### QA Coordinator

The Spills Program has one QA Coordinator (QAC) who dedicates 10% of their time to QA/QC activities. The primary objective of this position is to improve sampling data quality within the Spills Program. The person in this position is a designated Sampling Specialist, and is responsible for developing all Spills Program specific sampling policies, procedures, guidelines, forms, and other related tools. The QAC 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 implementation

Oil and hazmat spills are emergencies, and advanced planning is necessarily limited. In light of this, the Spills Program does not typically generate Quality Assurance Project Plans (QAPPs). However, 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.

In some cases, specific cleanup endpoints may require a detailed sampling plan and QAPP. For example, due to the PCB constituent of the transformer oil in the February 2019 Olympia Brewery, the Spills Program developed its first QAPP for cleanup sampling related to the spill into the Deschutes River.

For the vast majority of spills, 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 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 oil spills, although the guidelines can be applied to spills of other materials. Included on the reverse side of the template is a *Sampling Documentation Form*, used to record and summarize sampling related information.

Once samples have been collected, Spills Program staff are expected 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. Sample size and container information is also listed on the above-mentioned Sampling Guidelines.

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.

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 natural resource damage assessments (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 on SharePoint at <http://teams/sites/SPPR/response/trap/SamplingDocuments/Forms/Folder.aspx>

## 8.2. QA training

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Spills Program staff provide basic and intermediate sampling training described in the previous section. 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. All full-time and after-hours spill responders receive annual basic sampling training that includes three hours of classroom and hands-on field exercises.

Oil spill response utilizes a standardized approach to command, control and coordination known as the Incident Command System (ICS). ICS allows responders from multiple agencies to work together effectively by providing a common hierarchy, language and structure. Sampling Specialist is a position within the ICS, and is responsible for developing comprehensive sampling plans, directing sampling teams, and coordinating lab analysis.

Sampling Specialists within the Spills Program receive intermediate sampling training that adds to the basic curriculum by providing information necessary to collect quantitative samples. Staff that are on the Trustee Resource Assessment and Protection (TRAP) team receive intermediate sampling training and are available via pager to fill the Sampling Specialist role during an incident.

Advanced training is also available to Sampling Specialists and is obtained by attending workshops where participants are specialists within the oil spill industry/community. At these workshops, various sampling issues are discussed with the goal of generating consensus. Intermediate and advanced 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.

## 8.3. QAPPs

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As stated above, spills are emergencies; therefore, advanced planning is necessarily limited. In light of this, the Spills Program does not typically generate Quality Assurance Project Plans (QAPPs). However, for cases where specific cleanup endpoints are required, the Spills QAC is responsible for generating a QAPP.

## 8.4. SOP status

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The Spills Program has 7 SOPs which are available upon request. These SOPs are incorporated into the Spills Program Core SOP for Quality Assurance, *CORE 15: Sampling QA/QC*. CORE 15 is located on SharePoint at:

<http://teams/sites/SPPR/SOPs/CORESOPs/Forms/CORE%20PDF.aspx>.

### **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. Spills staff are instructed to contact members of the TRAP team, including Geoff Baran (Program QAC), Alison Meyers (Sampling Specialist), and Don Noviello (WDFW oil spill 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.

## 8.5.Audits

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There have been no audits of the Ecology Spills Program Sampling Procedures during this time period.

## 8.6.QA anomalies and/or corrective actions

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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 that help to ensure that data collected are of the highest quality possible.

On February 25, 2019, the Spills Program responded to a spill of PCB-laden transformer oil into the Deschutes River in Olympia, WA. Due to the PCB constituent of the oil, a large environmental sampling effort was undertaken to measure the contamination and assess the cleanup efforts. Due to the resolution required to meet the cleanup level, the Spills Program created its first ever QAPP. The QAPP was completed in April 2020.

## 8.7.Planned QA activities

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

## 9. Solid Waste Management Program (SWM)

### 9.1. Current QA system and activities

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The SWM Program (SWM) interacts with the quality system in several areas including:

- Industrial Section permitting, compliance monitoring, and enforcement activities.
- Statewide Resources Section waste characterization activities.
- Regional Offices biosolids permitting and solid waste technical assistance/corrective action activities.

#### **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.

#### **Statewide Resources Section (SRS) quality systems**

The 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 ad-hoc sampling related to specific odor-related incidents at composting facilities and solid waste sludge at a land application facility, routine sampling is not performed by SRS staff. Local jurisdictional health authorities have primary regulatory responsibility for permitted solid waste facilities, and their interactions with program staff are most commonly through the regional offices. 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.

SRS has a major data task in the collection of annual reports from about 375 biosolids facilities. About half of these facilities generate data related to biosolids quality. Historically, data were submitted in hard copy reports. The program has transitioned to online data submittals as of 2018. The program has also transitioned to online data submittals for recyclers and composters. Additional solid waste reporting will transition to online reporting in the future.

#### **Regional Offices quality systems**

SWM's Regional Office staff are responsible for permitting, compliance monitoring, and enforcement of biosolids facilities with coverage under WAC 173-308. Ecology has direct responsibility for related activities in most counties of the state; limited local agreements are in place in some cases. Data are primarily collected by permittees or their representatives, and are assessed by Ecology. Timing of assessment and the nature of the data depends on the situation. About half the facilities in the state submit data with their annual reports, due by March 1 each

year. Data is submitted at other times of the year as well, when it is associated with projects such as lagoon cleanouts (biosolids characterization), or agronomic rate determinations (soil nitrogen). Typically, regional staff are the first contact for evaluation of project-specific data. That information often accompanies annual reports. Regions have access to annual report data and will evaluate information on specific facilities, as necessary. Regions rely on headquarters for annual data entry and overall assessment.

Regional Office staff are also responsible for a range of activities in the area of solid waste handling. Jurisdictional health departments (JHDs) have the primary authority for the permitting of solid waste handling facilities. Regional Office sections are charged with providing technical assistance to JHDs, facility owner/operators, and the public on solid waste permitting, facility design and operations, and compliance monitoring. Regional Office sections may also have the primary site management role for corrective actions being conducted under the Model Toxics Control Act at permitted solid waste facilities.

In either the technical assistance or site management role, Regional Office staff typically do not conduct sampling directly. Compliance monitoring sampling for solid waste facilities is usually conducted by the facility owner/operator or, in some atypical circumstances, by the permitting JHD.

## 9.2. QA training

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SWM staff did not receive specific QA training during the reporting period (July 2018-June 2021). Some implied QA instruction is acquired “On the Job” as Industrial Section Facility Engineers conduct inspections with sampling. QA procedures are followed for collecting, preserving, transporting, and chain of custody requirements.

## 9.3. QAPPs

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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. Approximately 23 QAPPs were used during the reporting period. Due to COVID, Industrial Section did not perform sampling inspections after March 2020; therefore, the Industrial Section did not use or approve any QAPPs during that time.

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).

The FTE dedicated to QA for SWM is about 5%.

During this reporting cycle, 23 water-sampling inspections with associated approved QAPPs were performed.



## **Regional Offices QAPPs**

Regional Office staff will usually provide review and comment on Sampling and Analysis Plans (SAPs) and/or QAPPs that have been prepared by owner/operators for compliance monitoring programs at solid waste facilities.

Similarly, Regional Office staff performing corrective action site management will review, comment on, and approve SAPs and QAPPs for sampling programs conducted by potentially liable parties. These sampling programs are designed to provide data for site characterization, remedy selection, and cleanup compliance monitoring.

Regional Office staff may also be involved in review, comment, and approval processes for Construction Quality Assurance plans (CQAP) and reports for biosolids facilities, or in the solid waste technical assistance and corrective action site management roles. Regional Office staff may perform field observations of sampling activities conducted by facilities to verify that the sampling is conducted in conformance with the applicable standard operating procedures, SAP, CQAP, or QAPP for the activity. Regional Office staff are also tasked to ensure that data generated for corrective actions and for compliance monitoring at biosolids and solid waste facilities is submitted to Ecology's Environmental Information Management (EIM) system in accordance with data submittal procedures established by EAP.

### **9.4.SOP status**

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During this reporting cycle 3 SOPs were recertified by SWM. These SOPs are:

- Wastewater Sampling SOP (Finalized/Approved)
- Water DMR SOP (Finalized/Approved)
- Monthly Air Report Review SOP (Finalized/Approved)

Additionally Industrial Section has developed 7 documents pertaining to other processes followed by the program. These documents are:

- ERTS SOP
- Asbestos Inspection SOP
- DW Inspection Report SOP
- Inspection Report SOP
- Odor Complaint SOP
- Water Inspection Process SOP (draft)

### **9.5.Audits**

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No audits conducted during the reporting period.

### **9.6.QA anomalies and/or corrective actions**

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No anomalies/corrective actions occurred.

### **9.7.Planned QA activities**

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QAPP and SOP recertifications are planned as their timeframes dictate.

## 10. Toxics Cleanup Program (TCP)

### 10.1. Current QA system and activities

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#### Description of FTEs designated to Quality Structure

The TCP program (TCP) has one person designated as the QA Coordinator (QAC) who is also a staff member of the Aquatic Lands Cleanup Unit in Headquarters (HQ). The previous QAC retired in March 2020, and the position was vacant from this point until June 2021.

The QAC is responsible for serving as a technical resource for program staff and reviewing SAPs/QAPPs, final reports, and data reports upon request. The QAC also conducts field sampling audits periodically and approves SAPs/QAPPs for EPA-funded projects (i.e. Brownfields). In addition to the QAC, there are at least 3.0 FTE of site manager staff time in the Toxics Cleanup Program that performed the following activities during the reporting period:

- Participated in development of Sampling and Analysis Plans (SAPs)/Quality Assurance Project Plans (QAPPs) for site investigation
- Identified data gaps at cleanup sites and ensured appropriate methods were used to meet project data quality objectives
- Reviewed and approved SAPs/QAPPs
- Reviewed and verified data reports

### 10.2. QA training

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- QA resources available on TCP's internal SharePoint site:
  - Cleanup Project Managers' (CPM) Toolkit: an outline of the cleanup process with key information and links to guidance documents and other resources, including a page on Data Quality Assurance; applicable to both formal and Voluntary Cleanup Program sites.
  - TCP Professional Development Hub: calendar of internal and external trainings, workshops, webinars, and conferences; archived training and meeting information; and other resources.
  - MyEIM 101 training resources: agenda, exercises, and cheat sheets from statewide MyEIM training held in April 2016.
  - TCP Resource Library: searchable repository of over 1,000 internal and external TCP documents, including tech memos, guidance documents, and other QA-related information.
- QA-related trainings regularly attended by TCP technical staff:
  - Site Management University (SMU): 4-day program-wide event intended to build technical skills, strengthen core knowledge, and share new cleanup approaches; archived recordings and presentation slides from the last SMU held in October 2020 are available on TCP's SharePoint site.
  - MTCA 101: comprehensive overview of the Model Toxics Control Act (MTCA), including information about sampling and analysis; available as both on-demand recordings and as a 2-day live training offered twice per year.
  - Providers who frequently offer live or on-demand technical trainings on topics including environmental sample collection, lab analysis, data analysis, and other TCP QA-related topics:
    - Interstate Technology & Regulatory Council (ITRC)
    - Northwest Environmental Training Center (NWETC)

- Northwest Environmental Management Academy (NEMA)
- EPA Cleanup Information (CLU-IN)

### 10.3. QAPPs, SOPs, QA guidance, and other publications

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About 358 SAPs/QAPPs were approved across TCP during the reporting period. Detailed descriptions are available upon request. TCP maintains one SOP, “TCP001: Standard Operating Procedure for Field Sampling and Measurement Audit.” Version 2 of this SOP was approved on March 18, 2020.

Guidance documents regarding TCP QA policies and procedures for cleanup project managers include:

- TCP001: Standard Operating Procedure for Field Sampling and Measurement Audit, version 2 (approved 3/18/20)
- TCP SAP/QAPP, Data Validation and EIM Data QA Fields Memo (published 9/25/19)
- TCP Field Sampling and Measurement Audit Checklist, version 2 (published 2/18/20)
- TCP Generic Detailed QAPP Checklist, version 2 (published 9/30/19)
- TCP EIM Data Entry Review Checklist, version 1.5 (published March 2021)
- Sediment Cleanup User’s Manual (SCUM) (revised every 2 years)
- Guidance on Sampling and Data Analysis Methods (published January 1995)
- Statistical Guidance for Ecology Site Managers (published August 1993)

TCP maintains multiple data analysis tools that support staff in analyzing cleanup site data and ensuring data submitted to Ecology meet program QA requirements. These tools, and associated guidance documents, include:

- Cleanup Levels and Risk Calculation (CLARC) spreadsheet (revised every 6 months): a compendium of technical information related to calculating cleanup levels under MTCA. Guidance is provided within the spreadsheet and on the CLARC website.
- MyEIM: an online search, mapping, and analysis tool for data in the EIM database. Guidance documents:
  - MyEIM Process for Checking Study Information, Chemistry Data, and Identifying PIHSs [Potential Indicator Hazardous Substances] (published April 2016)
  - MyEIM Process for Checking Bioassay Data (published April 2016)
  - MyEIM User Manual (published October 2015)
- MTCASGL Workbook for Calculating Cleanup Levels for Individual Hazardous Substances, version 11 (August 2006): a Microsoft Excel workbook for calculating cleanup levels for any contaminant. Guidance document:
  - User’s Guide for MTCATPH 11.1 & MTCASGL 11.0 (published December 2007)
- MTCATPH Workbook for Calculating Cleanup Levels for Petroleum Contaminated Sites, version 11.1 (June 2021): a Microsoft Excel workbook for calculating cleanup levels for petroleum mixtures. Guidance document:
  - User’s Guide for MTCATPH 11.1 & MTCASGL 11.0 (published December 2007)
- Natural Attenuation Analysis Tool Packages for Petroleum-Contaminated Ground Water, version 1.0 (published July 2005): a Microsoft Excel workbook for predicting when groundwater cleanup levels will be met. Guidance document:
  - User’s Manual: Natural Attenuation Analysis Tool Package for Petroleum-Contaminated Ground Water (published July 2005)

- MTCASat 97 Site Module (published 1998): a Microsoft Excel workbook for calculating site compliance with cleanup levels. Guidance is embedded within the workbook via the ‘Help’ button.
- MTCASat 97 Background Module (published 1998): a Microsoft Excel workbook for calculating background contaminant concentrations at a cleanup site. Guidance is embedded within the workbook via the ‘Help’ button.

## 10.4. Current QA activities

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Key QA-related activities in TCP during the current reporting period include:

- Revised multiple key TCP QA documents (listed above) and updated corresponding TCP SharePoint resources.
- Updated this chapter of the *Quality Report to Management*, in collaboration with the Ecology agency QAO.
- Contributed to the 2020 update to Ecology’s *Quality Management Plan*.
- Filled QAC position after a 15-month vacancy.
- In 2021, TCP contracted with EAP to study the effect of silica gel cleanup on diesel-range organics data generated by the NWTPH-Dx method. This analytical method is a workhorse for petroleum-contaminated site investigations and contains an optional sample cleanup step. This study will evaluate the impact of this cleanup step on data quality and comparability and may lead to updated guidance for labs and contractors submitting petroleum data to TCP.
- TCP prepared to re-launch the MyEIM application redevelopment effort, which was paused in 2019. MyEIM is a critical TCP web application that allows site managers to verify, analyze, and visualize cleanup site data held into Ecology’s EIM database. The application requires significant updates to its technical architecture and user interface. Led by TCP’s Information Communication Unit, TCP’s QAC, and a design team representing all Ecology regions, the redevelopment will formally launch in 2022.

## 10.5. Audits

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Did sediment, surface water and ground water sampling audit for Additional Upland Area Sulfide Sample Collection and Analysis at Weyerhaeuser Mill A Site, Everett on 9/7/2018, and finalized report on 10/25/2018.

## 10.6. QA anomalies and/or corrective actions

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No QA anomalies and/or corrective actions noted.

## 10.7. Planned QA activities

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In the next reporting period, anticipated QA activities in TCP include:

- Continue to work with site managers, the agency QAO, and EIM data coordinators to resolve data quality issues encountered during EIM data submittal and review.
- Continue to update program QA guidance as needed in response to MTCA and/or Sediment Management Standards rule revisions.
- Continue to update SCUM every two years.
- Redevelop the MyEIM application and provide updated MyEIM training for site managers.
- Revise and recertify SOP TCP001 and other program QA guidance documents as needed.

# 11. Water Quality Program (WQP)

## 11.1. Current QA system and activities

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Environmental measurement data collected by WQP staff, or those under direction of WQP staff (contractor, grantee, permittee), must follow established Ecology QA guidance per Agency Executive Policy 22-01. There are different established QA processes for the various activities in the program. Permit development, compliance evaluation, water quality assessments, grant funded studies, effectiveness studies, ambient water quality studies all for example follow distinct but similar processes to assure quality data is collected and stored. WQP Quality Assurance Coordinators (QACs) track the QA activities within the program. The main goal of the QACs is to assist the WQP in ensuring consistent application of QA principles in the program.

- WQP QACs provide QAPP review and have signature authority to approve QAPPs and SOPs in WQP. The workflow for QAPP approval in the WQP is divided by the nature of the activity. See QAPPs subheading below for more detail on the approval process.
- The Permit Writers Manual, Chapter 2.7 outlines the process for draft permits review for policy conformance and technical accuracy by the Permit Quality Lead. This review ensures conformance with federal and state regulations and policies spanning data quality, methodology, and decision-making. The Permit Quality Lead works with the permit authors and program management regarding policy and process issues.
- Water Quality Assessment is routinely prepared and sent to EPA under sections 303(d) and 305(b) of the Clean Water Act. Water Quality Policy 1-11 is the guiding policy that the program 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, such as the 303(d) and 305(b) assessment processes. Ecology went through an extensive public review of WQ Policy 1-11 and finalized policy revisions in October 2018. The assessment uses the Watershed Assessment Tracking System (WATS) database to document decisions based on data from Ecology's EIM system and the federal environmental data portal. Both data systems use data acceptance protocols to ensure the data are representative of the ambient water conditions. Environmental data entered into EIM by the WQP EIM Coordinator must meet data acceptance protocols, and decisions on the status of water bodies entered into WATS are verified through internal QC checks, internal staff review, tribal review, public review, and finally an EPA submittal review and approval.
- 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: <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources>. All of the documents are revised, reviewed, and reissued by the WQP at regular intervals.
- For other point source stormwater and wastewater discharge permit issuance and implementation activities, WQP maintains manuals and guidance documents are available at: <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance>. WQP maintains a variety of other manuals and guidance documents including but not limited to: criteria for sewage works design, sampling procedures for trace metals, review criteria for wastewater toxicity tests, QAPP templates for temperature and

BMP studies, guidance for mixing zone studies, and more. These documents are updated as needed and receive extensive review at each revision.

- The Permitting and Reporting Information System (PARIS - <https://apps.ecology.wa.gov/paris/PermitLookup.aspx>.) database contains water quality permits, inspections, enforcement actions, facility information, and discharge monitoring reports (DMRs). Both NPDES and State Waste Discharge permits are included in the database and information is loaded by both Ecology and permittees. Permit requirements, including studies, are tracked and maintained in PARIS within the list of documents submitted by each permittee. The final and approved QAPPs prepared by permittees for studies is loaded to PARIS.
- 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.
- WQP's WET Coordinator (also a QAC) 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 Technology Assessment Protocol – Ecology (TAPE) is a stormwater BMP reviews and certification program contracted externally and overseen by Ecology; <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Stormwater-permittee-guidance-resources/Emerging-stormwater-treatment-technologies>. Vendors, designers, or manufacturers submit proposals, QAPPs and eventually data to have their stormwater treatment technology reviewed and certified by the agency. The Board of External Reviewers reviews the QAPPs and the designee TAPE manager at UW provides QAPP approval.
- The Financial Assistance Section awards multiple grant types and low interest loans for projects intended to improve water quality. Sampling of water quality is rarely included in stormwater grant projects. Nonpoint projects and GRSS grants are the grant types that may include sampling at the recipient's request. If so, a QAPP is developed per grant and loan requirements and reviewed for approval by EAP staff through the joint EAP/WQP Procedure 2-03. Grant deliverables are stored in the EAGL (Ecology's Administration of Grants & Loans) database.
- The National Estuary Program (NEP) in Washington state is an EPA-funded program to improve Puget Sound water quality and habitat. It is operated by WQP and Environmental Assessment Program (EAP) staff at Ecology. Funded studies that collect monitoring data receive QAPP review from a dedicated NEP QA reviewer in the program. There is a formalized QA process at Ecology <https://ecology.wa.gov/About-us/How-we->

[operate/Scientific-services/Quality-assurance/Quality-assurance-for-NEP-grantees](#) for study grant recipients to follow.

- Stormwater Action Monitoring (SAM) program. SAM is the collaboratively supported monitoring program formed under the Phase I and II municipal stormwater and Washington State Department of Transportation municipal stormwater general permits. Ecology is the administrator of the program, and the SAM Coordinator provides QA review of all the studies.
- Environmental data (not BMP data) gathered by WQP are stored in the agency Environmental Information Management (EIM) database or the PARIS database. Data bound for EIM or submitted to Ecology for the biennial Water Quality Assessment are managed by WQP's EIM Coordinator. Each coordinator (PARIS or EIM) works with regional permit managers and data submitters and screens data for validity and intended use. If appropriate, BMP data is stored in the International BMP database.

### **FTEs designated to Quality Assurance**

Estimating FTEs conducting QA functions in the WQP is difficult due to the broad and distributed nature of the QA work. There are no dedicated staff with only QA job descriptions, but at least a dozen different staff ensuring conformance with our program procedures and functions related to QA, including QACs, Permit Quality Lead, multiple permit writers workgroups, WET testing expert, IT support, assessment workgroups, and EIM Coordinator, and regional QAPP review. Because QA activities are diffused throughout the WQP, any estimate of overall staff time must be considered approximate. Each bullet above has several staff with various percentages of their work assigned to review of WQP products, databases, and studies. WQP QACs participate in Ecology's QA workgroup to assist with coordination across the agency.

## **11.2. QA training**

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In addition to Ecology QA requirements and guidance documents, the WQP maintains certain program-specific QA documents and topic workgroups (about 25 working groups) to guide staff in implementing QA activities, e.g., Permit Writers Workgroup(s), TMDL, Water Quality Assessments, NEP, and Grants. Many of the working groups develop or implement training; some working groups meet monthly. For example, WQP's Financial Management Section (FMS) will provide training for new grant managers on all aspects of their job that will include ensuring QAPPs (if needed) get approval. In 2020, FMS implemented QA training for certain grant recipients. WQP staff attend QA training when available and provided by the QAO.

## **11.3. QAPPs**

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QAPPs describe a study question, objectives, and plan to gather data of the appropriate quality to meet the objective. Few QAPPs are authored by WQP staff. In the rare cases QAPPs are written by WQP for environmental and effectiveness studies, they are published following Ecology's publication process. QAPPs authored by permittees, grant recipients, or by legal order are not published by Ecology.

WQP activities that require development of a QAPP are studies, generally when environmental and technology evaluation data are being collected for decision making. Examples of studies that require QAPPs include TMDL development, nonpoint stormwater data collection, stormwater

discharge characterization and impacts studies, stormwater BMP treatment and effectiveness studies, evaluation of non-permitted parameters, and suitability of testing or treatment technologies for use in permits. WQP QAPPs are sometimes required via permits for new information – where a ‘study’ question is different than permit compliance. Permit development is rarely considered a ‘study’ and would follow the protocols detailed in the Permit Writers Manual. Inspection or sampling for permit compliance is not a study, so a QAPP is not needed. Most permit-required QAPPs are reviewed by project leads (may or may not be regional staff), in some cases their manager, and approved by WQP QACs (2 staff at HQ).

Studies that collect samples are required to develop QAPPs and get reviews and approval from QACs. QAPPs written by WQP or those under direction of WQ staff (contractor, grantee, permittee), follow the Ecology QAPP guidelines and template to conform with Agency Executive Policy 22-01. WQP’s QA SharePoint Page ([Quality Assurance - Home](#)) and WQP’s QA flow chart provide the resource and contacts for WQP staff needing to determine if a QAPP is needed for a project and what pathway to proceed with to ensure QA. In summary, the workflow for QAPP approval in WQP is divided by the nature of the activity:

- National Estuary Program (NEP) grant funded studies: QAPPs for NEP projects are reviewed and approved by the NEP coordinator who works in EAP.
- Financial Management Section HQ and Regions for grant funded studies: In 2004, the FMS developed a policy with EAP for review and approval of QAPPs developed for grant funded studies. See [EAP/WQP Policy 2-03](#). Relatively few of the grants are for ‘studies’ funded by FMS that require QAPPs.
- Watershed Management Section HQ and Regions for TMDLs: All TMDL studies developed by the WQP are reviewed by EAP, there are only a few WQP staff conducting this work themselves as most of this work is in EAP.
- Permit Development Section HQ and Regions: WQP QACs provide review and approval for QAPPs required by permits and those developed for SAM. All municipal stormwater general permit QAPPs are reviewed, this includes QAPPs for (SAM), Phase I and II permits, and WSDOT. All other QAPPs such as for nonpoint sampling, toxicity, and to determine effluent limits are also reviewed and approved by WQP QACs.

## 11.4. SOP status

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The WQP has four SOPs for sampling stormwater discharges. These are published on Ecology’s external website (under publications 18-10-023, 18-10-024, 18-10-025, 18-10-026) and are recertified with permit reissuance. These SOPs are for grab or automated sampling of stormwater, passive in-line sampling for stormwater solids, and calculating stormwater loads from discharges.

## 11.5. Audits

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Audits by 3<sup>rd</sup> parties of environmental data collected by WQP staff are rare, likely due to the limited amount of environmental data collected directly by staff. The WQP processes such as grant procedures, enforcement reviews, and permit programs occur routinely but are out of the scope of this document.



## 11.6. QA anomalies and/or corrective actions

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WQP's two QACs are not yet aware of any problems.

## 11.7. Planned QA activities

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All current activities (above section heading) are ongoing and will continue into the next reporting period. WQP QACs are working with managers and staff to capture in flow chart the existing QA procedures in the program. WQP Policy 2-01 on EIM procedures was updated in 2019 to better reflect roles and responsibilities.

## 12. Water Resources Program (WRP) and Office of Columbia River (OCR)

### 12.1. Current QA System and Activities

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WRP and OCR ensure data quality associated with several categories of work, including:

- Data collected directly by WRP and OCR.
- Data collected by recipients of grants issued by WRP and OCR.
- Data collected to support WRP and OCR permitting and/or enforcement of water rights.

The most common types of data collected by WRP/OCR are depth-to-water measurements in wells and streamflow. Grant-funded external projects may include *in situ* measurements and sampling for analysis of various water quality parameters. Groundwater data collected by WRP regional and headquarters staff follows established protocols designed to achieve documented quality objectives. In 2017, WRP published its Integrated Statewide Groundwater Monitoring Strategy. That strategy document includes a Groundwater Monitoring Quality Assurance Monitoring Plan (QAMP) as well as several interim SOPs (see list below). WRP conducted training session on how to implement the QAMP and the SOPs in September 2017 and September 2018.

Each year, WRP and OCR issue numerous grants, mostly to local governments and organizations. QA staff need to determine whether the funded projects will involve monitoring activities or collecting environmental samples. If a project will collect environmental measurements, with no water quality sampling, a Quality Assurance Project Plan (QAPP) may be developed using program-specific guidance (WRP Publication 17-11-013; <https://apps.ecology.wa.gov/publications/SummaryPages/1711013.html>). If a project will collect water quality samples then QAPPs are developed based on Ecology's Guidelines and Specifications for Preparing Quality Assurance Project Plans for Environmental Studies (EAP Publication 04-03-030; <https://apps.ecology.wa.gov/publications/SummaryPages/0403030.html>). Once the project is complete, WRP/OCR project managers and grantees must submit data to Ecology's Environmental Information Management system (EIM).

Data collected in support of the permitting of water rights is authorized and dictated through a preliminary permit specifying how fieldwork must be conducted. These documents are developed based on WRP regional templates for specific types of work (e.g. pumping and testing well). Additional may be collected by a water right permit holder as a condition of the permit (chloride sampling in coastal areas).

#### Status of WRP's quality system

WRP has one employee, with a position description that lumps QA activities in with other responsibilities related to overseeing a comprehensive groundwater monitoring strategy - 0.25% FTE. Within the OCR, the designated QAC's position description features 'up to 5% duties as assigned', including review and approval of QAPPs submitted to OCR by grantees and contractors.

WRP/OCR staff have historically reviewed and approved only a limited number of QAPPs each year. Staff has also found it difficult to apply existing agency QAPP guidance to typical WRP projects. However, the WRP has since developed program-specific QAPP guidance (WRP

Publication 17-11-013; <https://apps.ecology.wa.gov/publications/SummaryPages/1711013.html>) that is better suited to most projects being funded WRP/OCR.

The two programs combined expect to receive 10-15 QAPPs annually. All QAPPs will be peer-reviewed. QAPPs related to RCW 90.94 that are received by WRP will be reviewed by the WRP's QAC. All WRP QAPPs will be approved by the WRP QAC. QAPPs received by OCR will be reviewed and approved by OCR's QAC. The QAO may be asked to assist with QAPP review and/or approval. WRP also works in conjunction with the Water Quality Program (WQP) for Managed Aquifer Recharge (MAR) projects that are funded with Ecology grants and/or are water right application project. The WQP developed a QAPP specifically for MAR projects. WRP staff determine when a WQP MAR QAPP is required and direct the party to coordinate with the WQP for QAPP development. This may or may not happen in conjunction with the development of a WRP QAPP based on the project tasks and goals.

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## 12.2.QA training

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September 2018 - Grant manager training

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## 12.3.QAPPs

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The following QAPPs were reviewed and approved:

- WRP approved two QAPPs during this reporting period.
- OCR reviewed 18 QAPPs and two QAPP addendums during this reporting cycle.

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## 12.4.SOPs

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All SOPs were current during this reporting cycle.

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## 12.5.Audits

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No audits were conducted during the reporting period.

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## 12.6.QA anomalies and/or corrective actions

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None to report.

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## 12.7.Planned QA activities

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In 2019, WRP conducted a training session for all the Streamflow Restoration planners in the program. The focus of the training was to familiarize the planners with the agency QA mission, WRP-specific QAPP guidance and template, and the standard QAPP guidance for instances where water quality monitoring is needed.

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# Appendices

## Appendix A. Acronyms and Abbreviations

### Environmental Programs of the Department of Ecology (12 + OCB and OCR)

AQP	Air Quality
EAP	Environmental Assessment (also, EAP)
EAP-LAU	Lab Accreditation Unit (part of EAP)
EAP-MEL	Manchester Environmental Laboratory (part of EAP)
HWTR	Hazardous Waste and Toxics Reduction
NWP	Nuclear Waste
SEA	Shorelands and Environmental Assistance
OCB	Office of Chehalis Basin
Spills	Spill Prevention, Preparedness, and Response
TCP	Toxics Cleanup
SWM	Solid Waste Management
WQP	Water Quality
WRP	Water Resources
OCR	Office of Columbia River

### 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, Shoreline
SWRO	Southwest Regional Office, Olympia/Lacey

### Other Acronyms and Abbreviations

CFR	Code of Federal Regulations
DWCO	Drinking Water Certification Officers
Ecology	Washington State Department of Ecology
EIM	Environmental Information Management database
ELAP	Environmental Laboratory Accreditation Program (for LAU)
EPA	U.S. Environmental Protection Agency
FTE	Full Time Equivalent
FY	Fiscal Year
ISIS	Integrated Site Information System (TCP)
LIMS	Laboratory Information Management System (for MEL)
LO	Lead Organization
MDL	Method Detection Limit
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
SAPs	Sampling and Analysis Plans
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
WAP	Permit Waste Analysis Plan
WDFW	Washington Department of Fish and Wildlife
WDOH	Washington State Department of Health
WET	Whole Effluent Toxicity



## Appendix B. Ecology Quality Assurance Coordinators

	Agency Program	QA Coordinator	Location	Phone	Email
	Ecology	Arati Kaza	HQ	(360) 407-6964	<a href="mailto:arati.kaza@ecy.wa.gov">arati.kaza@ecy.wa.gov</a>
	NEP	Ken Nelson	HQ	(360) 522 2722	<a href="mailto:Knel461@ecy.wa.gov">Knel461@ecy.wa.gov</a>
1	AQP	Eric Beamesderfer	HQ	(360) 529-6494	<a href="mailto:eric.beamesderfer@ecy.wa.gov">eric.beamesderfer@ecy.wa.gov</a>
2	EAP	Dan Dugger Jenny Wolfe	HQ	(360) 407-6686 (360) 407-6772	<a href="mailto:dan.dugger@ecy.wa.gov">dan.dugger@ecy.wa.gov</a> <a href="mailto:jennifer.wolfe@ecy.wa.gov">jennifer.wolfe@ecy.wa.gov</a>
3	EAP/MEL	Christina Frans	Manchester	(360) 871-8829	<a href="mailto:christina.frans@ecy.wa.gov">christina.frans@ecy.wa.gov</a>
4	EAP/ LAU	Rebecca Woods	Manchester	(360) 871-8844	<a href="mailto:rebecca.wood@ecy.wa.gov">rebecca.wood@ecy.wa.gov</a>
5	HWTR	Samuel Iwenofu	HQ	(360) 407-6346	<a href="mailto:samuel.iwenofu@ecy.wa.gov">samuel.iwenofu@ecy.wa.gov</a>
6	NWP	Jerry Yokel	Richland	(509) 372-7937	<a href="mailto:jerry.yokel@ecy.wa.gov">jerry.yokel@ecy.wa.gov</a>
7	SEA OCB	Amy Yahnke Nat Kale	HQ HQ	(360) 407-6527 (360) 706-4277	<a href="mailto:amy.yahnke@ecy.wa.gov">amy.yahnke@ecy.wa.gov</a> <a href="mailto:nkal461@ecy.wa.gov">nkal461@ecy.wa.gov</a>
8	Spills	Geoff Baran	HQ	(360) 407-7114	<a href="mailto:geoff.baran@ecy.wa.gov">geoff.baran@ecy.wa.gov</a>
9	TCP	Britta Voss	HQ	(360) 280-4305	<a href="mailto:britta.voss@ecy.wa.gov">britta.voss@ecy.wa.gov</a>
10	SWM	Shingo Yamazaki	HQ	(360) 407-7563	<a href="mailto:shingo.yamazaki@ecy.wa.gov">shingo.yamazaki@ecy.wa.gov</a>
11	WQP	Chris Dudenhoefter Brandi Lubliner	HQ	(360) 407-6445 (360) 407-7140	<a href="mailto:chris.dudenhoefter@ecy.wa.gov">chris.dudenhoefter@ecy.wa.gov</a> <a href="mailto:brandi.lubliner@ecy.wa.gov">brandi.lubliner@ecy.wa.gov</a>
12	WRP OCR	Matt Rakow Scott Tarbutton	HQ ERO	(360) 407-7669 (509) 867-6534	<a href="mailto:matt.rakow@ecy.wa.gov">matt.rakow@ecy.wa.gov</a> <a href="mailto:scta461@ecy.wa.gov">scta461@ecy.wa.gov</a>

## Appendix C. Ecology Management Response to QRM Issues

Topic	Page No.	Comment	Opportunities for Resolution
Independence of QAO – concern noted that position imbedded in an environmental program	11	I do not support moving the QAO 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 QAO to alter his professional opinion.	I have instituted regular meetings, one on one with QAO, so issues can be raised as they arise and to increase my involvement in QA.