DEPARTMENT OF
ECOLOGY
State of Washington

Washington State Department of Ecology Quality Report to Management, November 2006 through June 2009

Quality System Structure, Activities, and Assessment

December 2009

Publication No. 10-03-009

Publication and Contact Information

This report is available on the Department of Ecology's website at
www.ecy.wa.gov/biblio/1003009.html

For more information contact:

Publications Coordinator
Environmental Assessment Program
P.O. Box 47600, Olympia, WA 98504-7600
Phone: (360) 407-6764

Washington State Department of Ecology - www.ecy.wa.gov/

o Headquarters, Olympia	(360) 407-6000
o Northwest Regional Office, Bellevue	(425) 649-7000
o Southwest Regional Office, Olympia	(360) 407-6300
o Central Regional Office, Yakima	(509) 575-2490
o Eastern Regional Office, Spokane	(509) 329-3400

Washington State Department of Ecology Quality Report to Management, November 2006 through June 2009

Quality System Structure, Activities, and Assessment

by
William Kammin, Quality Assurance Officer
and
Program Quality Assurance Coordinators
(see Appendix B)

Environmental Assessment Program
Washington State Department of Ecology
Olympia, Washington 98504-7710

Approvals

Signature[1]: _____ Date:_____

Rob Duff, Manager, Environmental Assessment Program
Washington State Department of Ecology

Signature: _____ Date:_____

Polly Zehm, Deputy Director
Washington State Department of Ecology

[1] Signatures are not available on the Internet version

Table of Contents

Page

Purpose of This Document....5

The Quality System at Ecology....7
- Governing quality assurance (QA) at Ecology....7
- Previous system audits and responses....7

Quality-Related Initiatives and Projects....9
- Standard operating procedures (SOP) project progress....9
- Stormwater SOP pilot project: working group....9
- QA related to the EIM database and data entry....9
- QA in grants and contracting....10
- QA for SEA Program: QA position....11
- QA for streamflow and water quality monitoring: side-by-side sampling....11
- Stormwater matrix laboratory inter-calibration study....11
- QA website....11

QA Issues and Recommendations....13
- Improving quality system implementation across programs....13
- Statistical treatment of non-detects....13
- Accrediting the Padilla Bay Laboratory....13
- Reviewing Organics data at MEL....13

Other Recommendations....14
- Completing SOPs before new field or laboratory processes are implemented....14
- Developing an SOP for data reduction for SPMDs....14
- Developing a general SOP or policy for handling of "derived" data....14
- Revising QA-related program policies....14

Ecology Program Quality System Reports....15
1. Air Quality Program....16
2. Environmental Assessment Program – General....17
3. Environmental Assessment Program – Laboratory Accreditation Unit....21
4. Environmental Assessment Program - Manchester Laboratory....23
5. Hazardous Waste and Toxics Reduction Program....27
6. Nuclear Waste Program....31
7. Shorelands and Environmental Assistance Program....32
8. Solid Waste and Financial Assistance Program....33
9. Spills Program....34
10. Toxics Cleanup Program....37
11. Water Quality Program....40
12. Water Resources Program....43

References....44

Appendices....45
- Appendix A. Acronyms and Abbreviations....47
- Appendix B. Program QA Coordinators....49

Appendix C. List of All Current Ecology SOPs 51
Appendix D. Ecology Internal and External Laboratory Audits 59
Appendix E. Revoking Accreditation of an Environmental Laboratory 87
Appendix F. Recent QA Training Provided at Ecology 88
Appendix G. History of QA at Ecology.....89
Appendix H: QA for Data Entry, Agreement, 2007 93
Appendix I: Side-by-Side Monitoring Fact Sheet 99
Appendix J: EPA Audits of Ecology's Quality System Report, April and June 2009.....101

Purpose of This Document

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

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

The quality system encompasses both management and technical activities. This report documents these activities from November 2006 through June 2009.

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

- Developing and approving Quality Assurance Project Plans.
- Documenting standard operating procedures.
- Quality system initiatives undertaken by Ecology.
- Issues encountered while implementing the *Quality Management Plan*.
- Recommendations for changes in the quality system and *Quality Management Plan*.
- Reports on current quality system activities from all Ecology environmental programs.

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

This page is purposely left blank

The Quality System at Ecology

Governing quality assurance (QA) at Ecology

Ecology's quality system is defined in the agency's *Quality Management Plan* (Ecology, 2004) and is formally established in Ecology policy 1-21 (Ecology, 2006). The *Quality Management Plan* is based largely on requirements set out by the U.S. Environmental Protection Agency (EPA) in their internal quality assurance system guidance (EPA. 2006a).

The Ecology QA Officer, who is designated by Ecology's Director, coordinates QA activities throughout the agency. The QA Officer also is the chief QA liaison for extra-agency QA activities. The QA Officer is based in the Environmental Assessment (EA) Program.

All Ecology programs have designated one or more QA Coordinators, who theoretically have a commitment of 0.25 FTE/program.

Manchester Environmental Laboratory (MEL) has an integral role in the quality system at Ecology. MEL is the in-house Ecology laboratory and provides lab services for general chemistry, metals, organic chemistry, and microbiology. Laboratory QA practices are discussed in Ecology's *Quality Management Plan* and are formally described in the MEL QA Manual (Ecology, 2007a).

Ecology's Laboratory Accreditation Unit (LAU) provides accreditation services to help establish and document laboratory proficiency for the reporting of data to Ecology. Accreditation requirements for data produced by and submitted to Ecology are detailed in Ecology policy 1-22 (Ecology, 2008a). The LAU maintains a procedural manual (Ecology, 2002) and several standard operating procedures (SOPs) (Ecology 2007b, 2007c, 2008b) documenting the QA practices and procedures of the unit.

Previous system audits and responses

Ecology has resolved several of the outstanding issues identified in the 2003 and 2006 Quality System Reviews, and the *2006 Quality Report to Management*. The resolved issues include:

- **MEL audit process** – This has been incorporated into the quality system activities as a routine occurrence. MEL is currently audited every three years by the LAU. Recent audits by LAU have indicted acceptable quality performance by MEL. The most recent MEL audit is included in this document (Appendix D).

- **Field, field analytical, and accreditation SOPs** – An EA Program policy on SOPs was developed and implemented in Fiscal Year (FY) 2006. The EA Program now has over 60 field-related and accreditation SOPs. Full build-out of the SOPs should occur in the 09-11 biennium.

- **Guidelines for writing QA Project Plans** – A major revision of this document occurred in FY 2004. It is scheduled for an update in calendar year 2010.

- **Coordination with EPA quality group** – Ecology is committed to working with EPA to implement quality activities that EPA recommends in the quality guidance documents that EPA has published (EPA, 2006a, b).

Other historical QA issues still requiring work include:

- **Agency data validation** – Ecology considers data validation to have three major components:
  - High level of data complexity.
  - Third-party (outside of Ecology) review.
  - The use of raw data to check for calculation and transcription error.

  Given these criteria, the EA Program and the Water Quality Program rarely perform full data validation. Rather, the review that MEL performs is considered a detailed verification. According to this definition, Ecology currently does not have the resources to perform full data validation. Ecology continues to refine the project assessment criteria in EIM to detail the various levels of review and validation established in both Ecology and partnering organizations.

  The Toxics Cleanup Program often contracts for the validation of data using external, third-party validators and the data validation levels published in the Model Toxics Control Act.

- **QA training resources** – This continues to be an issue for the agency. Ecology needs a full-time equivalent (FTE) for an EA Program QA/Training Coordinator. In 2006, QA training was completed only because Dr. Cliff Kirchmer was functioning as a full-time QA/Training Coordinator for the EA Program.

- **Completion of QA Project Plans before project field work begins** – This is much less of a problem than it has been historically, but large EPA-funded projects with multiple stakeholders are commonly the projects that miss the final QA Project Plan completion deadlines. It is very difficult to incorporate multiple sets of comments, complete and approve these complex QA Project Plans, and also meet project sampling constraints.

- **QA requirements for grants and loans** – There has been limited training offered to recipients of Ecology grants and loans. Training for external entities conducting water quality monitoring and EIM data entry occurs frequently. See the *QA in grants and contracting* section later in this report.

Quality-Related Initiatives and Projects

Standard operating procedures (SOP) project progress

The Ecology headquarters (HQ) SOP project began in January 2006, with the development of an EA Program policy defining processes and format regarding SOPs for field sampling, field analytical work, and lab accreditation. HQ and accreditation SOPs now number approximately 60, with another 10+ in current development. Under active development are SOPs related to groundwater sampling, habitat sampling, and streamflow measurement.

Most of the sampling SOPs cover stable field practices and are not expected to change. However, the SOP covering semi-permeable membrane devices (SPMDs) is in current redevelopment. This SOP has already been revised three times, and the current revision will separate field SPMD activities from data reduction activities. A separate SOP for SPMD data reduction will be prepared.

Many agency SOPs are posted at the QA website, www.ecy.wa.gov\programs\eap\quality.html.

Stormwater SOP pilot project: working group

A working group to develop needed SOPs for stormwater sampling was established during 2008. This group included representatives from state, county, and city government, and industry. The group worked on several projects, including:

- SOP for automated sampling by compositors.
- SOP for determination of pollutant loading.
- SOP for sediment sampling.
- SOP for stormwater grab sampling.
- Region-wide QA glossary.
- Database plan for lab QA parameters.

These projects were completed in July 2009. The SOPs are now posted on the Ecology QA website.

QA related to the EIM database and data entry

Ecology's Environmental Information Management (EIM) database is the agency repository for the great majority of environmental information generated by Ecology. The database was first conceived of in 1995, with an initial production release in 1998. The database has become a robust and powerful web-based, GIS-friendly reporting tool for analysis and production of reports and maps detailing environmental conditions throughout Washington State.

The EIM database implements several levels of QA. First, each project is evaluated and assigned a QA planning level. This is a numerical score representing the rigor of the quality planning process: from no QA Project Plan (a common occurrence in pre-1980 work) to an approved QA Project Plan implemented before any field work. There is also a QA assessment level, which evaluates the level of assessment finished projects attained: from no assessment to full verification, validation, and data usability determination.

Result qualifiers submitted by MEL are incorporated into the results stored in the EIM system. Contract data validated by MEL are assessed for usability and qualified as per EPA functional guidelines before submittal into EIM.

Data entry standardization is an important concern for EIM managers and staff. Trainings were conducted on the EIM system and data entry in 2006, 2007, 2008, and 2009. Additionally, an inter-program agreement was developed committing all EIM user programs to standardize data-entry processes. This agreement, signed by several Ecology programs in 2007, is provided as Appendix H.

QA in grants and contracting

QA requirements for Grants and Cooperative Agreements to State and Local Governments are contained in 40 CFR Part 31. QA requirements for State and Local Assistance are contained in 40 CFR Part 35. The following paragraphs describe how Ecology has been meeting those requirements.

The EPA Region 10 QA and Management Unit performs audits of approved state environmental programs. EPA headquarters is currently developing national guidance for when and how often state program performance audits/reviews should be done. Region 10 will follow this guidance in carrying out its performance audits of Ecology programs. The purpose of the audit will be to verify that Ecology's *Quality Management Plan* is being correctly implemented and that Ecology is meeting all other EPA QA requirements for grants, cooperative agreements, and assistance. Ecology's last audit in 2006 resulted in no findings by EPA, indicating that the Ecology quality system was being implemented in an acceptable manner.

Ecology has undertaken several activities to help assure quality in grants, cooperative agreements, and assistance. In 2006 Ecology conducted a statewide training for agency staff and grant recipients on quality requirements for grants and loan agreements. The Ecology QA Officer since then has continued to meet with both agency QA Coordinators and grant managers to detail and reinforce Ecology QA requirements and policies. This training is ongoing.

Ecology has also devoted significant resources to developing SOPs for field sampling and field analytical activities. This is an effort, in part, to help grant recipients and Ecology staff standardize these field activities so data generated across the state are comparable and usable for intended purposes.

Quality requirements have been added to boilerplate agency grant and loan agreements, including language requiring the preparation and approval of QA Project Plans before sampling begins, the use of accredited labs for all analytical testing, and data entry into EIM so that grant data are accessible to other agencies and the general public.

QA for SEA Program: QA position

As part of the 07-09 biennial budget development process, the continuing need for QA support for watershed grants was highlighted. An addition of one FTE for the SEA Program was proposed by Bill Kammin, QA Officer, to support QA planning. This was to be funded by dollars from the SEA watershed planning program. However, this addition was lost as a result of the state budget crisis of 2009. In the final analysis, the agency did recognize the QA shortfall in the SEA Program, which will be advanced again, hopefully in the near future.

QA for streamflow and water quality monitoring: side-by-side sampling

Ecology is implementing side-by-side sampling programs for both water quality and water quantity monitoring. These programs involve both Ecology and grantees sampling at the same site, at the same time, and comparing results. This gives the grantees immediate feedback on the quality of their measurements, and gives Ecology information on potential issues with grantee data. See Appendix I for more information on this.

Stormwater matrix laboratory inter-calibration study

A project to assess comparability of Puget Sound area labs for the analysis of the stormwater matrix was undertaken. The labs analyzed stormwater for lead, cadmium, copper, and mercury. King County was the grant recipient for this work, and coordinated the preparation of samples for distribution to the labs performing analytical work on the samples. This project was completed in July 2009.

QA website

The Ecology QA website can be found at www.ecy.wa.gov\programs\eap\quality.html. Since implementation in June 2006, this website currently supports over 7000 downloads/month of quality-related SOPs, QA Project Plan guidance, QA policy, and other important quality information. Over 60 Ecology field, field analytical, and lab accreditation SOPs are posted here. The stormwater pilot project plans to publish stormwater SOPs related to compositor sampling and other stormwater-specific sampling topics to this site during calendar year 2009.

This page is purposely left blank

QA Issues and Recommendations

Improving quality system implementation across programs

The Ecology QA Program has not reached required levels of inter-program consistency and uniformity within the agency. Areas still needing improvement are:

- Program QA Coordinator participation.
- Program SOPs.
- Program data review, verification, and/or validation.

The goal is to, whenever possible, standardize SOPs and other common processes across the agency.

Work on these issues will take place through the QA Coordinators group (see Appendix B).

Statistical treatment of non-detects

The statistical treatment of non-detects (results less than the detection or reporting limit) remains an issue. EPA has published guidance on this topic, which should be followed whenever the work is being performed in a regulatory context (EPA, 2006b).

Accrediting the Padilla Bay Laboratory

Both Ecology QA staff and Skagit County stakeholders see the need for the Padilla Bay Laboratory to be accredited for fecal coliform and turbidity analyses. This will be pursued in FY 2010.

Reviewing Organics data at MEL

Timeliness of organics data review has been an issue for at least ten years. Very few staff are qualified to perform this review, which frequently results in a substantial backlog of organics data projects waiting for review by the lab QA Coordinator. This will continue to be an issue until a strategy is devised to provide more resources for this activity. This issue will be raised before the EA Program Management Team for solution.

Other Recommendations

Completing SOPs before new field or laboratory processes are implemented

Completing SOPs before new field or lab processes are used has not always occurred in the past. Each program needs to develop SOPs for new field methods and processes before the techniques are implemented. A revision in the SOP policy will be the method used to document this as a formal requirement.

Developing an SOP for data reduction for SPMDs

Developing an SOP for semi-permeable membrane devices (SPMDs) is a project identified for completion during FY 2010. Keith Seiders and Patti Sandvik of the EA Program are the leads on the project.

Developing a general SOP or policy for handling of "derived" data

The question of "derived data" remains largely unaddressed. Several processes in EA Program incorporate post-analytical processing (derivation) of final results. These include:

- Blank correction.
- Calculation of streamflow.
- Normalization of total organic carbon data.
- Application of regression techniques to account for field instrument drift or instability.
- Other "adjustment" of data for bias.

The EA Program needs to establish policies on the generation, qualification, and use of derived data. A workgroup led by Will Kendra, Karol Erickson, and Bill Kammin has been established to address this issue.

Revising QA-related program policies

The EA program needs to make minor revisions to both the method change policy and the SOP policy. The method change policy will be morphed into a "method implementation" policy, applicable and required for both field and laboratory processes. Additionally, the EA Program needs to develop a formal process for periodic review of approved SOPs. This process will be formally defined and documented in the SOP policy, which offers up the need for review but does not establish periodicity or process. These will be calendar year 2010 projects.

Ecology Program Quality System Reports

1. Air Quality Program

The Air Quality (AQ) Program has a rigorous and well-defined QA program. The QA Coordinator for the program is Stan Rauh, who has wide-ranging experience in managing the AQ Program quality system. Their quality relationship with EPA predates the implementation of the Ecology quality system.

Training

Three AQ Program staff attended training sessions at the *27th Annual Conference on Managing Environmental Quality Systems*. Donovan Rafferty also presented at the Conference. QA staff has received extensive training over the years and typically attend every available training opportunity when the training is air-specific. The least senior QA staff member has a minimum of 7 years of experience with the most senior having 20+ years experience. The AQ Program management is very supportive of allowing staff to seek training anywhere it's available in the United States.

The AQ Program QA staff continues to provide one-on-one training to Ecology regional and HQ staff, as well as state, federal, tribal, and local air agency staff on numerous types of air monitoring equipment.

Quality Management Plan

The AQ Program operates under an approved comprehensive Air Monitoring Quality Assurance Plan and prepares SOPs that can be found at: www.ecy.wa.gov/programs/air/other/Air_Monitoring_Procedures.htm.

This overarching QA Project Plan has been approved by both EPA and Ecology management. It has been rewritten and was completed. Staff rewrote the Ozone Monitoring SOP and is currently rewriting the Nephelometer SOP. Quarterly and annual data QA reports are prepared and are available upon request.

Quality assessment activities

All QA/QC problems and corrective actions are identified in the Quarterly and Annual Data Quality Assessment Reports.

During 2007, the AQ Program operated 68 ambient air monitoring stations (108 parameters) as well as 10 Prevention of Significant Deterioration quality meteorological stations (33 parameters). Eighty-eight percent of the monitored parameters met the AQ Program's objectives for data quality.

In July 2007, EPA Region 10 performed Through-the-Probe audits, as part of the National Performance Evaluation Program, at 3 air monitoring sites which all passed.

The AQ Program is committed to a robust QA program and provides adequate resources to implement the program.

2. Environmental Assessment Program – General

Description of quality structure

The quality structure in the Environmental Assessment (EA) Program is determined by its role in the overall quality structure of the agency, which is described in the *Quality Management Plan* (www.ecy.wa.gov/biblio/0503031.html). See Appendix C of the Plan for an organization chart for the QA management structure. The Plan also includes descriptions of QA/QC responsibilities.

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

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

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

There are several QA Coordinators in the EA Program:

- QA Coordinator for Manchester Environmental Laboratory.
- QA Coordinator to handle statistics questions.
- QA Coordinator to handle sampling and streamflow aspects of QA.

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

The EA Program Manager is responsible for allocating the resources to implement the QA Policy and the *Quality Management Plan*, for ensuring that Ecology's QA Policy (Executive Policy 1-21) and *Quality Management Plan* are implemented, and for delegating responsibilities for implementing a quality system at appropriate levels of the organization.

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

FTEs designated to quality

The QA Officer and the Manchester Laboratory QA Coordinator are full-time positions, so two FTEs are designated to these key QA positions. There are seven FTE staff positions working in

the Laboratory Accreditation Unit dedicated to QA/QC. Other EA Program managers and staff also have QA/QC responsibilities, although the total FTEs dedicated to quality in the program are difficult to quantify.

Staff quality responsibilities

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

Manchester Laboratory staff is responsible for analyzing environmental and quality control (QC) samples according to the specifications in the QA Project Plan and the SOPs.

The Laboratory Accreditation Unit staff is responsible for administering the Environmental Laboratory Accreditation Program (ELAP). This program assesses the capabilities of laboratories to accurately analyze environmental samples, and determines if they should be granted accreditation.

EPA reviews of Ecology's quality system

In their Quality Systems Review of September 26-28, 2006, EPA assessors reviewed several documents related to laboratory accreditation, including their current procedural manual and accreditation plan. There were no deficiencies or observations related to these documents in their report.

The Quality System Review conducted by EPA March 23-25, 2009 resulted in no findings, recommendations, or negative observations regarding Ecology's quality system.

Special QA report on Ecology's Freshwater Monitoring Unit

The EA Program's Freshwater Monitoring Unit (FMU) is made up of two monitoring disciplines: streamflow monitoring and ambient water quality monitoring. Both of these efforts address QA/QC issues using four main elements:

1. Establishing a technical coordination team to formally address QA/QC issues.
2. Adhering to a written procedure manual or SOP.
3. Using a method for tracking calibration of field meters.
4. Using a process of maintaining consistency of field methods across all monitoring staff.

The water quality monitoring part of FMU also has a fifth element that evaluates the laboratory analysis component of their monitoring efforts.

To help maintain field sampling method consistency, both monitoring activities have recently updated key SOPs to ensure they reflect recent advancements in instrumentation and reflect FMU's growing understanding of potential sources of field measurement errors. These current SOPs, however, are only useful if they are adhered to by staff. To help assure that field staff are following the established SOP, FMU has an annual field method day and annual individual field audits. If discrepancies are found during these audits, they are forwarded to the individual staff or the EA Program's Technical Coordination Team for resolution.

During 2008-09, the ambient monitoring part of FMU has undertaken a major new initiative with the development of a pilot Side-by-Side Monitoring Program. Many entities measure water quality and streamflow on rivers and streams in Washington State. These include federal, state, and county agencies; irrigation and conservation districts; tribes; consultants; and volunteer organizations.

While many of these data collection efforts are conducted under some form of a formal QA Project Plan, data users often question whether the water quality and quantity data from one source are consistent with data from another source. By connecting these other water quality and streamflow monitoring efforts to Ecology's stream monitoring network, it is possible to draw a much more complete picture of statewide water quality and quantity conditions.

In order to link these monitoring efforts, it is recommended that all entities monitor at a few key sampling sites. These key sites can be used as a reference to combine water data for management decisions and assess any differences in measurement errors caused by the differing protocols used. More information about this Side-by-Side Monitoring Program is available at www.ecy.wa.gov/programs/eap/fw_riv/SxSIndex.html.

Existing QA Project Plans and SOPs

QA Project Plans: From November 2006 - June 2009, the EA Program/Ecology developed, approved, and implemented 65 QA Project Plans. A list of QA Project Plans generated by the EA Program since January 2000 is available at www.ecy.wa.gov/biblio/qapp.html.

SOPs: As of June 30, 2009, the EA Program headquarters has prepared 59 SOPs that are in final (approved) or provisional status. Several draft SOPs on various field activities are in preparation. Manchester Environmental Laboratory SOPs number 120+. There are four final SOPs for the Lab Accreditation Unit. This gives a total of over 183 SOPs developed by the EA Program.

Other program-specific quality documentation

The *Quality Assurance Monitoring Plan: Streamflow Gaging Network* (www.ecy.wa.gov/biblio/0503204.html) was published in 2005. This QA Monitoring Plan is similar to a QA Project Plan, except it is intended to be used for planning many projects of a similar nature, not just one.

A revised *Quality Management Plan* (www.ecy.wa.gov/biblio/0503031.html) was published in September 2005. This is the agency plan to implement, document, and assess the effectiveness of the quality system supporting environmental data operations.

Staff training on quality

The EA Program offered a one-day training course on Ecology's quality system for both the WQ Program and Toxics Cleanup Program (TCP). This course was prepared in response to:

1. A request from the WQ Program (Monitoring Request 06-32) to help meet the requirements of Credible Data policy, including the assessment of requirements of suitability for use in water quality data sets.
2. A request from the TCP for training in the use of Ecology's EIM database.

Course topics include an introduction to the Ecology Quality System, systematic planning, EIM requirements for grant and loan recipients, the EIM data submittal process, and the new EIM EnviroQual toolset. Additionally, agency grant managers were targeted for the QA portion of this training. The course was presented at Ecology's headquarters building, and also at Ecology's Central, Eastern, and Northwest Regional Offices.

Current QA activities

One of the priority QA activities was to prepare for EPA's most recent Quality System Review of Ecology, which occurred in March 2009. The QA Officer, with the assistance of the program QA Coordinators and the Manchester Laboratory QA Coordinator, was making preparations for the review, including this report on activities, since the last audit.

The EA Program has also supported the WQ Program's work on (1) implementing a policy for ensuring that credible data are used for assessing the quality of surface water, (2) serving on the advisory committee for the Water Quality Data Act, and (3) finalizing the draft Credible Data policy (WQP Policy 1-11).

The Laboratory Accreditation Unit completed the required on-site assessment of Manchester Laboratory on February 14, 2007, which is the third-year anniversary of the last assessment. Accredited laboratories must be given an on-site assessment every three years in order to meet accreditation requirements.

3. Environmental Assessment Program – Laboratory Accreditation Unit

Stew Lombard is the QA Coordinator for the Laboratory Accreditation Unit (LAU).

Policy 1-22

Ecology Executive Policy 1-22, Requiring Use of Accredited Environmental Laboratories, was revised January 28, 2008.

Accredited laboratories

The LAU currently accredits 453 environmental laboratories –

- 370 Located in Washington State
- 83 Located outside of Washington

- 102 Certified for drinking water parameters
- 227 Municipal dischargers
- 56 Industrial dischargers
- 138 Commercial laboratories
- 32 Other categories (Academic, Tribal, State, Federal)

From July 1, 2006 to June 30, 2008, LAU staff conducted on-site audits of 276 accredited laboratories.

Accreditation of Manchester Laboratory

LAU staff conducted a routine third-year audit of Manchester Laboratory on February 14, 2007, and the report of the audit was completed on April 3, 2007. The next audit is due in February 2010.

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

EPA Audits of the ELAP Drinking Water Certification

EPA Region 10 Drinking Water Certification Officers (DWCOs) observed LAU DWCOs auditing Aquatic Research, Inc., a commercial laboratory in Seattle in October 2006. EPA provided reports of their observations to LAU in May 2007. Each LAU DWCO was evaluated separately and all received mostly favorable evaluations with some helpful suggestions for improvement.

The LAU completed EPA's Annual Drinking Water Certification Questionnaires in 2007 and 2008.

Auditor training

- August 2006 - Alan Rue performed 40 hours of proficiency maintenance at Edge Analytical on their GC/EC instrument.
- March 2007 - All four DWCOs participated in 40 hours of hands-on training presented by EPA Region 10 at Manchester Laboratory.
- October 2007 - Dennis Julvezan participated in a four-day course on ICP-MS presented by Perkin-Elmer.
- December 2007 - Alan Rue performed 40 hours of proficiency maintenance at Edge Analytical on their GC instruments.
- January 2008 - Dennis Julvezan participated in a three-day assessor training program on detection of data fraud presented by The NELAC Institute.
- March 2008 - Stew Lombard performed 40 hours of proficiency maintenance at Edge Analytical conducting FIA and ISE analyses.

Meetings with oversight agencies

- August 2006 - LAU staff met with Washington State Department of Health (DOH) staff to resolve issues in the drinking water program. These included changes in scopes, detection limit reporting, our Memorandum of Understanding, and compliance reporting.
- May 2007 - LAU staff met with EPA Region 10 and DOH staff on the Drinking Water Laboratory Certification Program. Topics included the new EPA SOP Evaluation of State/Tribal Drinking Water Certification Programs, EA Program reorganization, EPA/Ecology co-audits of drinking water labs, auditor training, and qualifications for drinking water lab directors.
- December 2007 - LAU staff met with DOH staff to resolve issues in the drinking water program with audit findings, proficiency testing sample requirements, reporting levels, and compliance strategy.

SOPs completed by LAU

SOP #	Title
LAU001	Accreditation of Environmental Laboratories
LAU002	On-Site Audits of Environmental Laboratories
LAU003	Renewal Applications
LAU004	PS2 Backup and Compacting

4. Environmental Assessment Program - Manchester Laboratory

Overview of the quality system

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

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

It is MEL's policy that for activities conducted at MEL, QA shall be maintained at a level that will ensure that all environmental data generated and processed are scientifically valid and legally defensible, 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 sample receipt to data reporting.

Accuracy

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

Representativeness

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

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

Completeness

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

Comparability

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

Legal defensibility

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

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

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

Performance-Based Measurement Systems (PBMS)

On October 6, 1997, EPA provided public notification (62 FR 52098) of a plan to implement PBMS for "*environmental monitoring in all of its media programs to the extent feasible*." EPA

defined PBMS as "*a set of processes wherein the data quality needs, mandates or limitations of a program or project are specified, and serve as criteria for selecting appropriate methods to meet those needs in a cost-effective manner.*" The notice indicated that the regulated community would be able to select any appropriate analytical test method for use in complying with EPA's regulations. It further indicated that implementation of PBMS would improve data quality and encourage the advancement of analytical technologies.

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

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

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

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

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

Quality-related training

All new MEL staff 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. Certain methods have the additional requirement that a MDL determination be performed by each new analyst.

The MEL QA Coordinator attended the annual EPA Quality Conference in April 2008.

QA Project Plans developed or approved

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

New SOPs

The following new SOPs have been written since the 2006 Agency Report to Management:

Number	Title
710087	Ash Free Dry Weight in Macrophyton, SM* 10300 C, Modified.
710088	Conductivity in Seawater.
730109	Alcohol Analysis, EPA SW-846 Method 8015C.
730105	Fish Tissue Florisil Column and Acetonitrile Back Extraction Cleanup (Micro).
730106	Carbamate Analysis by EPA Method 8321A, Modified.
730107	Solid Phase Extraction (SPE) of Pesticides in Water by EPA SW-846 Method 3535.
730108	Solid Phase Extraction (SPE) of PBDEs in Water by EPA SW-846 Method 3535.
770030	Laboratory Balances in the General Chemistry Section.

*SM = Standard Method (APHA, 2005).

Major quality problems and corrective actions

Problems: Samples arriving warm (no ice in cooler); broken (due to inadequate packaging - glass bottles and no bubble wrap); in wrong containers (wrong type or quantity too small); with no signature on the chain-of-custody; mislabeled field identification and collection times; putting one bottle on each line of the laboratory analysis required (LAR) form.

Corrective actions: Training/SOPs needed for personnel who sample infrequently. At the very least, staff need to contact the lab *before* going into the field or call from the field.

MEL's accreditation status

Since February 2007, MEL has maintained accreditation for all parameters requested as required by the *Quality Management Plan* and Ecology Executive Policy 1-22.

In February 2007, LAU conducted an on-site assessment of laboratory systems and a QA audit. MEL analysts were noted to be knowledgeable, conscientious, and strongly committed to quality. MEL has implemented recommendations from LAU's final report. MEL also has reviewed and updated SOPs to comply with the recommendations.

5. Hazardous Waste and Toxics Reduction Program

Overview of data-generating events

The Hazardous Waste and Toxics Reduction (HWTR) Program conducts few sampling events that generate environmental data. Sampling within the program typically falls into two categories:

1. Compliance sampling, consisting of samples of opportunity and pre-planned sampling events.

   Compliance sampling occurs only when a compliance inspector has concerns about a generator's waste management activities. The inspector can take samples immediately without any pre-planning, return to the office, and plan a sampling event for a later occasion, or do a combination of the two activities.

   An example was a compliance inspection in 2006 at a regulated facility. The compliance inspector observed broken fluorescent tubes and white powder on the floor, which indicated a release of material from the tubes. The inspector returned to the office to plan a detailed sampling event at this facility. A QA Project Plan was prepared for the sampling event. Historically because of these types of opportunity sampling events conducted by the program, little QA/QC documentations were generated. Considerable success has occurred over recent years in familiarizing compliance inspectors with the benefits of pre-planning including the creation of a generic QA Project Plan boiler plate that can be modified for site-specific sampling events.

2. Data for programmatic activities and possible regulation change.

   The second type of sampling, obtaining data for programmatic activities and possible regulation changes, is done very infrequently. Since the last EPA audit, the HWTR Program has not conducted any of these types of sampling activities.

As an indication of the amount of sampling done within the HWTR Program, our yearly sampling budget is currently $65,000. This number reflects a long-term increase in programmatic sampling expenditures. However, as inspectors are being trained on better sampling techniques and are becoming more accustomed to the benefits of pre-planning and of what a QA Project Plan can provide, we are experiencing an increase in sampling and an improvement in data quality obtained for use by the program. Forty-five sampling events were conducted from 2006-2008.

The following table lists the sampling events conducted by regional offices.

Ecology Regional Office	Sampling Events (2006-2008)	QA Project Plans
NWRO	27	Yes
CRO	4	No
ERO	6	No
SWRO	8	Yes

Full-time equivalents (FTEs) designated to quality

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

Specific staff quality responsibilities

As indicated above, the only quality responsibilities in the HWTR Program are those assigned to the program's QA Coordinator. Because of the limited amount of sampling done by the program, QA/QC responsibilities are included in the staff's job duties but are not assigned a specific value.

QA Project Plans and SOPs

The HWTR Program has no specific QA/QC SOPs. However, the program has developed a generic boilerplate QA Project Plan that can be adopted for site-specific sampling for use by compliance inspectors during HWTR sampling events. This document grew out of a major training event at which all HWTR compliance inspectors from across the state were pulled together for sampling training. The training included information on the different types of QA/QC samples, and the importance and benefits to a QA Project Plan. The training attempted to streamline pre-planning activities to minimize impact to staff workload while working to overcome staff resistance to perceived QA/QC complexity.

Other program-specific quality documentation

As noted earlier, the HWTR Program conducts few sampling events, and no additional quality needs have been identified. Therefore, no additional quality documentation exists for the program.

Staff training on quality

The HWTR program conducts QA and sampling trainings, to improve staff familiarity with sampling and to improve the quality of data obtained during sampling events. Regulatory compliance staff completed following training:

- **Beginners Sampling Training (April 2007)**

  This training was organized for new Ecology regulatory compliance staff. New compliance inspectors from across the state, along with other program staff, were involved in a full-day introductory sampling and simulation training held at Ecology headquarters. The importance of QA/QC in sampling protocol and data management was an integral part of this training. Trainees were introduced to different types of sampling methods and the documentation of sampling events. Inspectors were informed about the different types of QA/QC samples and the benefits of pre-planning and writing a QA Project Plan as a tool to help in the pre-planning efforts. The presentations given during this training are available upon request.

- **Advanced Inspector Training (April 2008)**

  The HWTR Program offered a two-day advanced field sampling training to all compliance inspectors from across the state, along with other program staff commonly involved in sampling events. The training provided hands-on work with using air monitoring equipment as a tool for health and safety protection. The first day of the training was on the review of the health and safety plans, and how to use the air monitoring equipment. Field exercises on the equipment use and practice was conducted. The second day was on sampling review, pre-planning, and data management. The presentations given during this training are available upon request.

- **Training Refresher**

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

  - EPA Data Quality Objective Training.
  - Sampling for Defensible Environmental Decision Making.

- **Other training**

  Other training included how to conduct a book designation as required by the Washington Dangerous Waste Regulations (WAC 173-303). The training was part of a pre-planning exercise to assist compliance staff in determining if samples were needed based upon information available both from the generator and from specific toxicity databases. There was training on QA/QC, which included the review of data obtained from a sampling event. The intent was to refresh compliance staff with information presented at the previous training and to begin the process of educating staff on reviewing data results. Specific sampling results used by compliance staff in an enforcement and penalty case earlier in the year were used to provide staff with a concrete example. The data package also had several problems which made it perfect as a training aid.

- **Sampling assistance**

  As part of the duties of the QA/QC coordinator, the HWTR QA Coordinator works closely with staff discussing possible compliance sampling. By working with staff on a one-on-one basis, the QA Coordinator made them more comfortable with the QA/QC process. Most of the sampling events conducted within this reporting period had written QA Project Plans prior to conducting the sampling events. These demonstrated an increase in the staff's comfort level in the use of QA Project Plans as a standard sampling requirement.

Current QA activities

The HWTR Program has contract agreements with MEL and eight certified private laboratories to conduct environmental analyses on samples received from Ecology compliance staff. A QA generic draft boilerplate has been written for staff use; the boilerplate can be modified for site-specific sampling. No other QA/QC activities are planned within the program.

6. Nuclear Waste Program

Overview of the Nuclear Waste (NW) Program's quality system

The quality system is a chemistry team comprised of four chemists with years of applicable laboratory experience. Experience includes wastewater laboratory accreditation, QA management of one of the Hanford site labs, instrumental analyses at Hanford site labs dealing with radiochemical contaminated matrices, and certifications in EPA data validation. The NW Program biennial plan contains the chemistry implementation plan where QA is discussed.

QA Project Plans developed or approved

- Sampling and Analysis Plan for the Washington State Department of Ecology Comparison of Discrete and Multi-Increment Sampling for Site Characterization and Cleanup.
- Columbia River Irrigation Sampling Sites QA Project Plan.
- Remedial Investigation Workplan for Hanford Site Releases to the Columbia River.
- Hanford Analytical Services QA Requirements Document.

New SOP

Nuclear Waste Program Waste Analysis Plan Guidance/Checklist.

Quality-related training

EPA 7-step DQO process, EPA Quality Management Conference, Multi-increment sampling course, Non-detects and Data Analysis from Dennis Helsel, Visual Sample Plan.

Tools for implementing Ecology's quality system

- Hanford Site-wide permit for the Waste Analysis Plan/Sampling and Analysis Plan (WAP/SAP) QA/QC.
- Sections 6.5 and 7.8 of the Hanford Federal Facility Agreement and Consent Order 89-10 Rev. 6, 2003.

7. Shorelands and Environmental Assistance Program

Overview of the program's quality system

At present the Shorelands and Environmental Assistance (SEA) Program does not have a quality system, but the program is in the process of developing one. There is a standing committee that meets once a month to develop a matrix summarizing needs for quality, what type of projects need QA Project Plans, and the priorities for developing guidance and SOPs.

QA Project Plans developed or approved

- Watershed monitoring – 1
- Instream Flow - 9
- Water Quality monitoring - 2
- Well drilling - 1
- Monitoring wells – 1

Several other QA Project Plans are in the process of being developed for flood-related issues and coastal monitoring.

New SOPs

None completed; one under development.

Other program-specific quality documentation

Coastal Monitoring staff developed Federal Geographic Data Committee (FGDC) metadata for various data collected through their beach morphology monitoring program. The metadata describes collection methods and levels of accuracy.

Staff training on quality

One staff person in the SEA Program took a class on quality.

8. Solid Waste and Financial Assistance Program

The Solid Waste and Financial Assistance (SWFA) Program interacts with the quality system primarily through the Industrial Section, which focuses on three major industries of Washington State: aluminum smelters, oil refineries, and pulp and paper mills. The section's staff is trained to handle the complexities of these industries and is responsible for environmental permitting, site inspections, and compliance issues. They regulate air, water, hazardous waste, and cleanup management activities at pulp and paper mills and aluminum smelters. They also regulate water, hazardous waste, and cleanup management activities at state oil refineries.

Quality activities of the Industrial Section

The Industrial Section conducts Class II National Pollutant Discharge Elimination System (NPDES) water inspections with sampling and QA Project Plans for regulated facilities. Industrial Section staff prepare QA Project Plans for inspections of facilities they regulate.

The Industrial Section also reviews and uses boiler plate language for fact sheets and permits for facilities in the section’s renewal of NPDES permits.

9. Spills Program

Quality assurance coordinator

Dale Davis is the QA Coordinator of the Spill Prevention, Preparedness, and Response Program (Spills Program). He also acts as the program sampling specialist. The primary objective for both positions is improvement of sampling data quality. The person in this position develops all Spills Program specific sampling policies, procedures, guidelines, forms, and other related tools. This person 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.

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

Present status of QA Plan implementation

- Spills are emergencies and advanced planning is necessarily limited. In light of this, the Spills Program has developed policies and procedures (in cooperation with NOAA, the U.S. Coast Guard, and EPA) that ensure high-quality samples and data are collected in a manner that is legally defensible.
- Program staff use a sampling plan template to develop a plan for any sampling associated with an incident. The template prompts the user to define the sampling objective(s); sketch out the area impacted by the spill; and identify sampling sites, the number and type of samples to be collected, and the appropriate containers. The template also refers the user to sampling guidelines that have been developed specifically for collection of samples associated with spills (primarily oil spills). A sampling documentation form is available to record sampling-related information.
- Once samples have been collected, staff are encouraged to use an Oil Spill Chain-of-Custody/Request for Analysis Form developed specifically for oil spill-related samples. Guidelines on the back of the form help the user select the appropriate analyses and provide associated information such as sample size and container.
- For larger spills, a sampling specialist develops a comprehensive sampling plan that coordinates all sampling activities associated with the incident. Again, a template is used, but the information included in the template is much more detailed and includes QA guidelines.
- Comprehensive sampling plans, called Ephemeral Data Collection Plans, are being developed for large oil facilities located near waterbodies. These plans are similar to a QA Project Plan and are designed to direct sampling in the early hours of an oil spill in a specific location until another plan can be developed that is specific to the incident. The plans are developed in association with representatives from the facilities. The plans identify sampling sites, types, and numbers of samples to collect, sampling procedures, analytical methods, and the laboratory that will analyze the samples. The plans are designed to satisfy Natural Resource Damage Assessment (NRDA) needs.

- State, federal, and oil corporation NRDA representatives meet regularly as an informal group called the Joint Assessment Team. This group developed a comprehensive guidance document for cooperative NRDAs that include guidelines for developing a sampling plan with similar components of the Ephemeral Data Collection Plans. If there is an oil spill, the document identifies nationally recognized and accepted procedures that would be used by Spills Program staff and others to develop and implement a NRDA.
- All forms, guidelines, and procedures are available to Spills Program staff at X:\Spills_Program\TRAP
- A sampling QA\QC chapter for the Spills Program Policy and Procedure Manual has been prepared and added to the program policy manual as Chapter 15.

QA/QC training

- **Received by program staff**

  All Spills Program staff are required to complete DrillTrac training associated with various positions within the Incident Command System (ICS). Sampling training is one of the required elements of DrillTrac. All program staff are required to take basic sampling training, which includes information necessary to collect qualitative samples associated with oil spills. All full-time and after-hours spill responders attend a Spill Response Training Workshop annually that includes four hours of classroom and hands-on field sampling training.

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

- **Provided by program staff**

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

Technical assistance and QA/QC

- The sampling training described above includes sections on developing sampling plans and specific QA/QC requirements. Program staff are instructed to contact either Dale Davis (Spills Program QA Coordinator) or Dan Doty (Washington Department of Fish and Wildlife Oil Spill NRDA Sampling Specialist) with *any* questions regarding sampling. One of the two men is always available 24/7 by pager. Staff are also encouraged to contact MEL with questions related to oil spill sampling.

QA/QC issues

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

Planned QA/QC activities

- SOPs are being developed for all Spills Program field sampling procedures.
- Spills Program sampling results from MEL need to be entered into Ecology's EIM system.
- A general QA Project Plan needs to be prepared that would cover all emergency spill response sampling.

10. Toxics Cleanup Program

Description of quality structure - FTEs designated to quality

David Sternberg is the QA Coordinator for the Toxics Cleanup Program (TCP) and member of the Headquarters (HQ) Policy and Technical Unit. He heads a TCP team consisting of:

- HQ Aquatic Lands Cleanup Unit (ALCU) – Fu-Shin Lee.
- HQ Land Cleanup Unit (LCU) – Chung Ki Yee.
- Central Regional Office (CRO) – Valerie Drew.
- Eastern Regional Office (ERO) – Phil Leinart.
- Northwest Regional Office (NWRO) – Joe Hickey.
- Southwest Regional Office (SWRO) – Joyce Mercuri.

Specific staff QA responsibilities

Headquarters QA Coordinator

- Serves as focal point to disseminate information from Ecology's QA Officer regarding new QA initiatives (e.g., QA Project Plan template development), applicable training opportunities, etc., to TCP QA team.
- Represents TCP at agency-wide QA Coordinators meetings.
- Reviews and signs certain QA Project Plans that are produced for Ecology-funded projects (e.g., Brownfields Assessments).
- Performs other duties as spelled out in the agency *Quality Management Plan*.

Regional office responsibilities

QA responsibility is to review sampling and analysis plans (SAPs) or QA Project Plans that are produced in-house for Ecology-funded projects. Regional QA personnel keep staff informed of new initiatives or requirements for QA. They also serve as focal points for questions regarding Ecology's *Quality Management Plan*.

Existing QA Project Plans

- Sediment Sampling and Analysis Plan Appendix (SAPA).
- Puget Sound Dredged Disposal Analysis Guidance Manual - Data Quality Evaluation for Proposed Dredged Material Disposal Projects (QA-1).
- Data Validation Guidance Manual for Selected Sediment Variables (QA-2).

Staff training on quality

- Integrated Site Information System (ISIS) training is continuously offered on an as needed basis. Both individual and group training sessions are offered.
- MyEIM training has been provided multiple times within the 2006-09 reporting period.
- Model Toxics Control Act (MTCA) Site Management 101 – TCP is providing training to new and experienced site managers. The training provides an overview of QA principles including data quality and the selection of appropriate field methods.

Current QA activities

- Review of contractor-prepared QA Project Plans for Brownfield Site Assessments.
- Instrumental in updating MyEIM to ensure that data quality continues to meet high programmatic expectations.
- Policy 840 was established requiring data submittal into EIM.
- Initiating an update to the MTCA regulations that will include updating cleanup levels/toxicity regulations to reflect the current state of toxicological information.
- Drafting a Terrestrial Ecological Evaluation (TEE) guidance document to help ensure that TEEs are performed consistently across the state.
- Revamped the Voluntary Cleanup Program to ensure that cleanups protect human health and the environment. To help ensure cleanups are performed consistently across the state, boiler-plate forms were developed and published in a Guideline for Property Cleanups under the Voluntary Cleanup Program (Publication 08-09-044). This was finalized in July, 2008.
- Rewriting the ISIS to ensure that data and information related to cleanup sites are accurate and up-to-date. The TCP is committed to taking steps to improve data quality and business practices by updating databases and the program's information systems.

Quality issues

David Sternberg has taken over the QA Coordinator duties for TCP. Emphasis has been placed on ensuring that QA efforts meet the requirements of Ecology's *Quality Management Plan*. In accordance with the Plan, David Sternberg facilitated the review and approval of QA Project Plans for the Upper Columbia River and cleanup sites on the Spokane River. Each of these projects required the Ecology QA Officer's approval.

SOPs

TCP-sponsored research is being completed under an Inter-Agency Agreement with Western Washington University to evaluate photo-induced toxicity of contaminated groundwater. A technical memorandum or SOP may be developed based on the results of the research. TCP recognizes that the quality of toxicological information may be influenced by laboratory procedures. TCP is committed to ensuring that analytical procedures accurately reflect toxicity and risks associated with environmental contaminants.

11. Water Quality Program

"Quality is more than reviewing QA Project Plans and tracking performance measures. In our mission to protect and restore Washington's waters, we provide services based on laws and policies. We have flexibility in how we perform these services and one way we show our commitment to providing the best service is to build quality and improvement into our service delivery.

We should take the time to consider how we can deliver our products more effectively. I welcome suggestions for improvements that will increase our customer's satisfaction or at least their understanding of what we do. Improvement in the way we get things done should be a goal of everyone in our organization." Kelly Susewind, Water Quality Program Manager

The performance of our program is tracked by the Governor's office and through special Ecology agency performance objectives. The performance measure progress tracked for Ecology can be viewed at www.ecy.wa.gov/quality/business_plans/07_09/WQ.pdf and at www.ofm.wa.gov/budget/manage/perfrept/0507/461pm.pdf.

Description of quality structure, current QA activities, and specific staff quality responsibilities

The use and promotion of quality data and information is built into the procedures that accompany program functions. In addition to the routine inclusion of quality principles in staff operations, certain staff are assigned to QC review and QA development functions.

- The WQ Program has a QA Coordinator tracking the quality activities within the WQ Program with the assistance of designated quality representatives from each of seven sections. The main goal of the QA Coordinator and the sectional representatives is to implement the Credible Data Policy in all pertinent program activities.
- All draft wastewater discharge permits are reviewed for policy conformance and technical accuracy by the Permit QA Coordinator, who provides comments to the permit author and feedback to program management regarding policy and process issues. As the representative of permit business with information systems, the Permit QA Coordinator is in a pivotal position to facilitate the flow of permit information to the data systems.
- Internal QA Project Plans are reviewed for approval by designated QA Project Plan reviewers. All WQ Program-developed projects that include collection of environmental data are conducted according to a QA Project Plan that has been approved by a cross-program approval process.
- QA Project Plans developed by municipal stormwater permittees for permit compliance are reviewed for approval by designated stormwater QA staff. A guidance document for preparation of QA Project Plans by stormwater permittees was issued in 2008 to narrow the scope of the plans and improve the efficiency of QA Project Plan reviews and approvals. Unlike normal discharge monitoring, the municipal stormwater permits rely on site-specific monitoring projects.

- The Financial Assistance (FA) Section awards grants and low-interest loans for projects intended to improve water quality. Monitoring of water quality is usually required to gauge the effectiveness of the project. QA Project Plans developed by recipients because of grant and loan requirements are reviewed for approval by FA QA Project Plan reviewers.
- WQ Program data are stored in a central database. The data from grant and loan recipients are managed by the WQ Program EIM Coordinator who screens data for validity and intended use. Monitoring must be in accordance with a QA Project Plan approved by the grant and loan officer with technical assistance from the EA Program. The monitoring data are then input to the EIM database. The EIM Coordinator provides QA checks of data.
- The WQ Program 303d Coordinator sees that information used in the WQ assessment is suitable for its intended use. The station sample locations and water segment boundaries are verified through the use of GIS coordinates. The environmental data and resulting decisions are verified through internal QC checks and public review. Working daily on constant process improvement is never finished.

Description of standard business practices in place and under development

Standard business practices are the equivalent of SOPs for a program business function. These practices form the basis on which process improvements can be applied across the organization.

Information systems are designed and maintained by the Information Systems Unit at headquarters providing a structure for many standardized business practices.

- The Total Maximum Daily Load (TMDL) database is under development to eventually link with the Watershed Assessment Tracking System (WATS) database. Together, they will tell the whole story about how waters go from initial monitoring to 303d listings and TMDLs, or straight to independent cleanup and eventual listing as meeting water quality standards. The development of the database parallels the development of business practices associated with these activities.
- A WQ assessment is conducted biennially under a policy based on the Water Quality Data Act. The assessment brings all the elements of our QA system together as it uses the WATs database as the means to communicate and document the decisions made using data with the highest QA from Ecology's EIM database. All data used in WQ assessment updates and TMDLs are required to meet specific QA requirements.
- The Water Quality Permit Life Cycle System (WPLCS) database holds huge amounts of information on a wide variety of aspects of permit management. This includes permit lists and facility information, the discharge monitoring reports (DMRs), permit limit information, and a variety of other management information. This information and these data are publicly accessible so that their accuracy is important for evaluating compliance status and potential liability of permittees. Business practices are geared to promote data accuracy and timeliness in reports.
- Regional permitting units standardize the process of identifying, documenting, and issuing responses to non-compliance of wastewater discharge permits. The WPLCS data system generates a list of facilities that violate permit limits and the severity of the violations. After

verification from permit managers and the enforcement specialist, each facility is notified by mail of the recognized violation and the expected response. Responses are tracked and the history of compliance remains updated.

- The permit offices initiate practices to reduce false positive noncompliance. Some wastewater permittees submit an additional DMR form that has enough detailed information so that the initial data screener can identify where calculation errors have likely occurred. If the summary DMR has an incorrect calculation, it is sent back to the discharger with a request for correction.
- The permit offices also initiate a practice to promote compliance. They send out submittal reminders to permittees by e-mail to remind them they have a submittal due the following month.
- Our WQ Program management team meets regularly to share information and discuss program direction. Decisions on a course of action are the product of our management team. The decision-making process is under review, and a revision to the team charter is in progress that will document and provide more clarity to the process. Consideration is given to alternative means of decision-making including delegation of responsibility closer to the action level.
- The WQ Program is committed to learning from experience and constantly improving how to perform better. Near the conclusion of every major action such as high-profile TMDL projects, WQ assessment cycles, and contentious general permit issuance, the project leads will solicit and document "lessons to be learned" for institutional knowledge. These stories are circulated internally for consideration in future decision-making.

FTEs designated to quality in the program

Approximately four FTEs, an increase from three FTEs in 2007, are dedicated to quality functions. These functions include EIM work, Whole Effluent Toxicity (WET) testing, QA Coordinator, Permit Quality Coordinator permit writers group, information technology support, and regional QA Project Plan work. The increase is due to expanded use of QA Project Plans by permittees and draft permit quality review.

12. Water Resources Program

QA Coordinator

Ken Schuster, the statewide water metering coordinator, is the QA Coordinator for the Water Resources (WR) Program. The primary objective is ensuring that data on water metering is consistent, reliable, and useable in long-term management of water resources. This position is responsible for developing all specific water metering policies, procedures, guidelines, forms, and other related tools. This position also develops and conducts training of WR Program staff in assessing systems for selection of meters appropriate for individual systems. This position also acts as the lead metering specialist for the WR Program.

Present status of QA Project Plan development and implementation

- The QA Project Plan for water metering was scheduled to be completed by June 2009. Elements include training of meter vendors and installers, water users, and conservation district staff who work with the WR Program in cost-sharing of meter purchase and installation and field verification of meter installations.
- Four training sessions have been conducted as of June 2008.
- Meter installations are inspected to ensure that meters have been installed correctly and that owners know how to read the meters.
- Annual reports are being received each year and screened for quality.
- Metering staff meet quarterly as necessary to ensure coordination of effort between regions.
- The statewide water metering coordinator meets individually with each regional metering coordinator to develop annual plans and follow-up on planning to ensure consistency between the regions.
- A water metering application is being developed and integrated into the WR Information System, and the basic application has been deployed and is being used. Enhancements to ensure data quality will be written into an enhancement plan for reporting purposes.

References

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

Ecology, 2002. Laboratory Accreditation Procedural Manual. Washington State Department of Ecology, Olympia, WA. Publication No. 02-03-055. www.ecy.wa.gov/biblio/0203055.html.

Ecology, 2004. Quality Management Plan. Washington State Department of Ecology. Olympia, WA. Publication No. 05-03-031. www.ecy.wa.gov/biblio/0503031.html.

Ecology, 2006. Policy 1-21, Establishing Quality Assurance. Washington State Department of Ecology, Olympia, WA. www.ecy.wa.gov/programs/eap/qa/docs/policy_01-21.pdf.

Ecology, 2007a. Manchester Environmental Laboratory Quality Assurance Manual. Washington State Department of Ecology, Olympia, WA.

Ecology, 2007b. Standard Operating Procedure for Accreditation of Environmental Laboratories. Washington State Department of Ecology, Olympia, WA. www.ecy.wa.gov/programs/eap/qa/docs/ECY_EAP_SOP_LAU001LabAccreditation.pdf.

Ecology, 2007c. Standard Operating Procedure for On-site Audits of Environmental Laboratories. Washington State Department of Ecology, Olympia, WA. www.ecy.wa.gov/programs/eap/qa/docs/ECY_EAP_SOP_LAU002OnSiteAudits.pdf.

Ecology, 2008a. Policy 1-22, Requiring Use of Accredited Environmental Laboratories. Washington State Department of Ecology, Olympia, WA. www.ecy.wa.gov/programs/eap/qa/docs/policy_01-22.pdf.

Ecology, 2008b. Standard Operating Procedure for Renewal of Accreditation. Washington State Department of Ecology, Olympia, WA. www.ecy.wa.gov/programs/eap/qa/docs/ECY_EAP_SOP_LAU003LabAccredRenewals.pdf.

EPA, 2006a. Quality Documentation Homepage. U.S. Environmental Protection Agency. www.epa.gov/quality/qa_docs.html.

EPA, 2006b. Statistical Tools for Practitioners. U.S. Environmental Protection Agency. www.epa.gov/quality/qs-docs/g9s-final.pdf.

Lombard, S. and C. Kirchmer, 2004. Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies. Washington State Department of Ecology, Olympia, WA. Publication No. 04-03-030. www.ecy.wa.gov/biblio/0403030.html.

Appendices

This page is purposely left blank

Appendix A. Acronyms and Abbreviations

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

Programs of the Department of Ecology

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

Regional Offices of the Department of Ecology

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

Other Acronyms and Abbreviations

ADS	Applications and Data Services (Administrative Services)
ASTM	American Society for Testing and Materials
CFR	Code of Federal Regulations
DWCO	Drinking Water Certification Officers
Ecology	Washington State Department of Ecology
EIM	Environmental Information Management system
ELAP	Environmental Laboratory Accreditation Program (for LAU)
EPA	U.S. Environmental Protection Agency
FTE	Full Time Equivalent
FY	Fiscal Year
GIS	Geographic Information System
IDC	Initial Demonstration of Capability

ISIS	Integrated Site Information System (TCP)
LAU	Lab Accreditation Unit (part of EA Program)
LIMS	Laboratory Information Management System (for MEL)
MEL	Manchester Environmental Laboratory (part of EA Program)
NOAA	National Oceanic and Atmospheric Administration
NRDA	Natural Resource Damage Assessment
PBMS	Performance-Based Measurement Systems
PT	Proficiency Testing
QA	Quality Assurance
QC	Quality Control
RCW	Revised Code of Washington
SOP	Standard Operating Procedure
TMDL	Total Maximum Daily Load (water cleanup plan)
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WET	Whole Effluent Toxicity

Appendix B. Program QA Coordinators

	Program/ Program Manager	QA Coordinator	Location	Coordinator Phone	Coordinator E-mail
	Ecology QA Officer	*Bill Kammin*	*HQ*	*(360) 407-6964*	*wkam461@ecy.wa.gov*
1	Air Quality/ Stu Clark	Stan Rauh	NWRO	(425) 649-7115	srau461@ecy.wa.gov
2	EA – General/ Rob Duff	Brad Hopkins	HQ	(360) 407-6964	bhop461@ecy.wa.gov
3	EA – LAU/ Rob Duff	Stew Lombard	Manchester	(360) 895-6148	slom461@ecy.wa.gov
4	EA – MEL/ Rob Duff	Karin Feddersen	Manchester	(360) 871-8829	kfed461@ecy.wa.gov
5	HWTR/ K Seiler	Samuel Iwenofu	SWRO	(360) 407-6346	siwe461@ecy.wa.gov
6	Nuclear Waste/ Jane Hedges	Jerry Yokel	Richland	(509) 736-3009	jyok461@ecy.wa.gov
7	SEA/ Gordon White	Tom Hruby	HQ	(360) 407-7274	thru461@ecy.wa.gov
8	SWFA/ Laurie Davies	Marc Heffner	HQ	(360) 407-6773	mhef461@ecy.wa.gov
9	Spills/ Dale Jensen	Dale Davis	HQ	(360) 407-6972	dald461@ecy.wa.gov
10	Toxics/ Jim Pendowski	David Sternberg	HQ	(360) 407-7146	dast461@ecy.wa.gov
11	Water Quality/ Kelly Susewind	Mike Herold	HQ	(360) 407-6434	mher461@ecy.wa.gov
12	Water Resources / Ken Slattery	Ken Schuster	CRO	(509) 454-4263	ksch461@ecy.wa.gov

This page is purposely left blank

Appendix C. List of All Current Ecology SOPs

1. Air Quality Program

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

2. Environmental Assessment Program - General

Project Code	Index Number	SOP Title	Status	Author	Due date
	EAP001	Use of Semi-Permeable Membrane Devices	Final	Johnson	NA
	EAP002	Determination of Total Dissolved Gas	Final	Pickett	NA
	EAP003	Pesticide Sampling in Fresh Water	Final	Burke	NA
	EAP004	Weekly/Monthly Procedures - EAP Operations Center	Final	Strong	NA
	EAP005	New Employee Orientation - EAP Operations Center	Final	Strong	NA
	EAP006	Daily and Emergency Procedures - EAP Operations Center	Final	Strong	NA
	EAP007	Resecting Finfish Whole Body, Body Parts or Tissue Samples	Final	Sandvik	NA
	EAP008	Resecting DNA Samples and Aging for Finfish	Final	Sandvik	NA
	EAP009	Collection, Processing and Preservation of Finfish Samples	Final	Sandvik	NA
	EAP010	Field Measurement of Conductivity/Salinity	Provisional	Ahmed	NA
	EAP011	Instantaneous Measurement of Temperature in Water	Provisional	Nipp	NA
	EAP012	Sampling Bacteria in Water	Provisional	Mathieu	NA
	EAP013	Determining Global Positioning System Coordinates	Final	Janisch	NA
	EAP014	Surveying Morphology and Surface Flow of Headwaters Channels	Final	Janisch	NA
	EAP015	Grab Sampling – Fresh Water	Final	Joy	NA
	EAP016	Freshwater Drift Collection, Processing and Analysis	Final	Estrella	NA

Project Code	Index Number	SOP Title	Status	Author	Due date
	EAP017	Litterfall Collection, Processing, and Analysis	Final	Estrella	NA
	EAP018	Turbidity Threshold Sampling	Final	Estrella	NA
	EAP019	Estimating Stream Flows Using a Flume	Final	Estrella	NA
	EAP020	Bedload Collection, Processing and Analysis	Final	Estrella	NA
	EAP021	Estimating Large Woody Debris Loads Intersecting Headwaters	Final	Janisch	NA
	EAP022	Estimating and Delineation of Headwaters Wetlands	Final	Janisch	NA
	EAP023	Winkler Determination of Dissolved Oxygen	Provisional	Ward	NA
	EAP024	Estimating Streamflow	Provisional	Sullivan	NA
	EAP025	Seawater Sampling	Final	Stutes/Bos	NA
	EAP026	Analysis of Chlorophyll a	Final	Stutes/Bos	NA
	EAP027	Seawater Dissolved Oxygen Analysis (Dosimat)	Final	Stutes/Bos	NA
	EAP028	Reagent Preparation	Final	Stutes/Bos	NA
	EAP029	Metals Sampling	Final	Ward	NA
	EAP030	Fecal Coliform Sampling	Provisional	Ward	NA
	EAP031	Collection and Analysis of pH Samples	Provisional	Ward	NA
	EAP032	Collection and Analysis of Conductivity Samples	Provisional	Ward	NA
	EAP033	Hydrolab DataSonde and MiniSonde Multiprobes	Final	Swanson	NA
	EAP034	Collection, Processing, and Analysis of Stream Samples	Final	Ward	NA
	EAP035	Measurement of Dissolved Oxygen in Surface Water	Provisional	Mathieu	NA
	EAP036	Benthic Flux Chambers	Final	Roberts	NA
08-503	EAP037	Time of Travel Dye Studies	Final	Carroll	NA
08-504	EAP038	Collection of Fresh Water Sediment Cores	Final	Furl	NA
08-505	EAP039	Sampling Marine Sediment	Final	Aasen	NA
08-506	EAP040	Obtaining Fresh Water Sediment Samples	Final	Blakely	NA
08-507	EAP041	Collecting Freshwater Suspended Particulate matter samples using in-line filtration	Final	Meredith	NA
08-508	EAP042	Stream Stage Height Determination	Final	Shedd	NA
08-509	EAP043	Benthic Infaunal Rescreening, Tracking, Sorting and Taxonomic Identification	Final	Aasen	NA
04-502	EAP044	Continuous temperature monitoring of fresh water rivers and streams conducted in a TMDL study	Final	Stohr	NA
08-514	EAP045	Hemispherical digital photography conducted for a temperature TMDL study	Final	Stohr	NA
08-515	EAP046	Analysis of hemispherical digital photography conducted for a temperature TMDL study	Final	Stohr	NA
08-516	EAP047	Channel geometry studies conducted for a temperature TMDL study	Needed	Stohr	9/30/09
04-503	EAP048	Riparian vegetation surveys conducted for a temperature TMDL study	Needed	Stohr	9/30/09
	EAP049	Maintaining EAP's internet and intranet web	Final	Lord	NA

Project Code	Index Number	SOP Title	Status	Author	Due date
		sites			
	EAP050	Marine Currents using ADCPs SOP (Acoustic Doppler Current Profiler)	Needed	Albertson	11/30/08
	EAP051	Field Service and Maintenance of Sea-Bird Electronics © (SBE) 16 and 16+ Mooring Stations	Final	Holt/Jaeger	NA
	EAP052	Manual Depth-to-Water Level Measurements	Final	Marti	NA
	EAP053	Groundwater Sampling	Needed	Marti	10/31/09
	EAP054	Collecting Gaging Data from Campbell Scientific Instruments	Final	Watt	NA
	EAP055	Use of StreamPro Acoustic Doppler Current Profiler	Final	Shedd	NA
	EAP056	Measuring and Calculating Stream Discharge	Final	Shedd	xx
	EAP057	Conducting Stream Hydrology Site Visits	Final	Myers	NA
	EAP058	Operation of SonTek® FlowTracker® Handheld ADV®	Final	Burks	NA
	EAP059	Operation of Mechanical Velocity Indicators	Final	Holt	NA
	EAP061	Operation of In-stream Piezometers	Final	Sinclair	NA

3. Environmental Assessment Program – Lab Accreditation Unit

Project Code	Index Number	SOP Title	Status	Author	Due date
	LAU001	Assessment (Audit) of Environmental Laboratories	Final	Lombard	NA
	LAU002	Accreditation of Environmental Laboratories	Final	Lombard	NA
	LAU003	Generation and Mailing of Renewal Applications	Final	Schreiber	NA
	LAU004	PrintScopes Backup Procedures	Final	Lombard	NA
	LAU005	Revocation of Accreditation	Needed	Lombard	6/30/08

4. Environmental Assessment Program – Manchester Laboratory

Index Number	SOP Title
Microbiology	
710001	%KES Membrane Filter Technique, G. Jay Vasconcelos, EPA Region 10 Microbiologist, "The Detection and Significance of Klebsiella in Water", Modified
710005	Autoclave
710013	Microbiology Dishwasher
710014	Escherichia coli Detection by Most Probable Number, EPA 1104
710015	Escherichia coli Detection Membrane Filter Technique, EPA 1105

Index Number	SOP Title
710017	Enterococcus in Water by Most Probable Number, Standard Method 9230 B
710018	Fecal Coliforms Membrane Filter Technique, Standard Method 9222 D, Modified
710021	Fecal Coliforms in Water by Most Probable Number, Standard Method 9221 E
710022	Fecal Streptococcus Membrane Filter Technique, Standard Method 9230 C
710039	Total Coliforms Membrane Filter Technique, Standard Method 9222 B, Modified
710042	Total Coliforms in Water by Most Probable Number, Standard Method 9221 B, Modified
710073	Fecal Coliforms in Water by Most Probable Number Using A-1 Media, Standard Methods 9221 E-2
710075	Heterotrophic Plate Count & Nuisance Organisms Iron & Sulfate
710076	EPA Method 1600: Membrane Filter Test Method for Enterococci in Water
710079	Total Nonvolatile Solids (Fixed) and Volatile Solids ignited at 550^{O}C, Standard Method 2540 E
710081	pH for Microbiology section
710083	Membrane Filter Test Method for Escherichia coli in Water (mTEC2), EPA Method 1103.1
710084	Microbiology Quality Assurance Procedures
General and Physical Chemistry	
710002	Alkalinity, SM 2320B
710004	Ash Free Weight, SM 10300 C, Modified
710007	Biochemical Oxygen Demand Using the Dissolved Oxygen Probe EPA Method 415.1
710008	Fluoride/Chloride/Sulfate by Ion Chromatography, EPA Method 300.0
710009	Conductivity, SM 2510B
710012	Fluorometric Determination of Chlorophyll *a* in Saltwater and Freshwater Samples, Standard Method 10200 H, Modified
710028	Total Organic Carbon and Dissolved Organic Carbon EPA Method 415.1 (Combustion and NDIR Detection)
710029	Ammonia (phenolate) Method by Colorimetric Flow Injection Analysis, Standard Methods 4500-NH3 H
710030	Nitrogen, Nitrate-Nitrite, SM 4500-NO3 I, Modified (Colorimetric, Automated, Cadmium Reduction)
710031	Nitrogen, Nitrite, SM 4500-NO_3 I, Modified (Colorimetric, Automated)
710032	Oil and Grease EPA Method 1664: N-Hexane Extractable Material (HEM; Oil and Grease), by extraction and Gravimetry, Modified
710033	Orthophosphate in Waters by Colorimetric Flow Injection Analysis, SM 4500 P G
710034	pH (Electrometric), EPA Method 150.1
710038	Settleable Solids (Settleable Matter), SM 2540 F
710043	Total Dissolved Solids (Residue, Filterable), SM 2540 G
710045	Total Non-Volatile Solids and Percent Total Volatile Solids, SM 2540E, Modified
710046	Total Non-Volatile Suspended Solids (Residue, Volatile), SM 2540E, Modified
710047	Total Solids and Total Percent Solids (Total Residue, Sediment or Water Samples), SM 2540B
710048	Total Nitrogen in Waters by Colorimetric Flow Injection Analysis, Standard Method 4500-N B.
710050	Total Phosphorus, SM 4500 P I, Modified (Colorimetric, Automated, Ascorbic Acid Two Reagent)
710052	Total Suspended Solids (Residue, Non-Filterable), SM 2540D, Modified

Index Number	SOP Title
710054	Turbidity, SM 2130 B, Modified
710055	Ultimate Biochemical Oxygen Demand (UBOD)
710056	Analysis of Bulk Asbestos, Federal Register, 40 CFR 763, Appendix A to Subpart F, Modified
710057	Asbestos Fiber Counting by the NIOSH 7400 Method, Modified
710058	Gravimetric Analysis of High Volume Air Filters, Federal Register, 40 CFR 50, Appendix J, Modified
710059	Metal Analysis of Air Filters, Federal Register, 40 CFR 50, Appendix G, Modified
710060	Spiking Filter Strips with Lead
710068	Soil and Waste pH Electrometric SW846 Method 9045C
710070	Total Organic Carbon in Soil/Sediment, PSEP-TOC
710071	Determination of Salinity by Refractometer
710074	Low level Total Phosphorus by Manual Digestion and Lachat
710078	Gravimetric Analysis of $PM_{2.5}$ Fine Particulate Air Filters, Federal Register, 40 CFR 50, Appendix L, Modified
710080	Percent Total Solids for TOC PSEP samples at 70 °C and 104 °C
710085	Suspended Sediment Concentration; ASTM Method D3977-97 (re-approved 2002), Test Method B - Filtration
710086	Alkalinity in Seawater; Fisheries Research Board of Canada; Bulletin 167, Second Edition, I.4.I.2
Metals	
720002	Metals Water Sample Preparation, EPA Method 200.2
720004	ICP: TJA Solutions IRIS Advantage, EPA Method 200.7
720009	Determination of Mercury in Water by Cold Vapor Atomic Absorbance, EPA Methods 245.1, Modified and SW846 7470, Modified
720011	Metals Low Level Cold Vapor Mercury Analysis of Water Samples Using Bromine Oxidation, U.S. EPA Method 245.7, Modified
720012	Metals Sediment Sample Preparation by Hotblock Digestion, SW846 Method 3050B, Modified
720013	Metals Water Sample Preparation, EPA method 200.2
720015	Sediment Preparation by Microwave Digestion, SW846 Method 3051
720016	Toxicity Characteristic Leaching Procedure for Metals SW846 Method 1311
720017	Metals Data Review
720018	ICP Mass Spectrometer VG PQ ExCell, EPA Method 200.8
720021	Determination of Mercury by Cold Vapor Atomic Absorbance in Sediment, SW846 7471 Modified, and EPA Method 245.5, Modified
720022	Solid Preparation by Microwave Digestion, SW846 Method 3052
720024	Low Level Phosphorus by ICP-MS, EPA Method 200.8
720025	Metals Water Sample Preparation, EPA method 3010A
720026	Metals Water and Aqueous Waste Sample Preparation for Analysis by ICP/MS, EPA SW-846 Method 3020
720027	Determination of Mercury by Cold Vapor Atomic Absorbance in Tissues by EPA SW-846 Method 7471B, Modified, and EPA Method 245.6, Modified

Index Number	SOP Title
Organics	
730002	Analysis of Water/Soil/Sediment/Fish Tissue Samples for Organochlorine Pesticides and Polychlorinated Biphenyls by GC/ECD SW846, Methods 8081 and 8082
730003	Analysis of EDB (Ethylene Dibromide), DBCP (Dibromochloropropane) and Trichloropropane in Drinking Water and Waste Water by Liquid/Liquid Extraction, EPA 504 and 504.1, Modified
730005	Butyltin Analysis
730009	Determination of Percent Lipids in Tissue
730011	Extraction of Semivolatile Organic Analytes (BNAs), Dinoseb and PCP in Water
730012	Extraction of BNAs/Pesticides/PCBs/Op-Pesticides in Soils, Sediments and Sludges, SW-846 Method 3540
730013	Analysis of Chlorinated Acid Herbicides from Soils and Sediments (EPA Method 8151B)
730018	Florisil® Column Cleanup
730021	Semivolatile Base/Neutral/Acid (BNA) Organic Compounds by Gas Chromatograph Mass Spectrometer (GC/MS): Capillary Column
730022	GC/MS Data Final Review
730024	Gel Permeation Chromatography Treatment
730028	Hydrocarbon Identification
730049	Silica Gel Column Cleanup (SW846 Method 3630B)
730061	Volatile Organic Analysis - Method 8260A
730065	Water, Sludge, Sediment, Soil WTPH-D_x Extraction, Oil Preparation Methods [Total Petroleum Hydrocarbons as Diesel in Soil]
730066	Analysis of WTPH-D_x Semivolatile Petroleum Products in Environmental Soil, Sediment and Water Extracts
730067	Analysis of NWTPH-G_x and BTEX Analysis Methods for Soil and Water
730069	Water, sludge, Sediment, Soil NWTPH-HCID Analysis Methods
730070	Polynuclear Aromatic Hydrocarbons (PAH) by Gas Chromatography/Selective Ion Monitoring Mass Spectroscopy (GC/SIM-MS)
730072	Extraction of Fish Tissue for Semi-Volatile Analytes, including Pesticides, PCBs and BNAs by GC/AED, GC/ECD and/or GC/MS
730073	Fish Tissue Florisil Column and Acetonitrile Back Extraction Cleanup (Macro)
730080	Extraction and GC/MS Analysis of 1-Naphthol and Carbaryl in Soil/Sediment
730081	Accelerated Solvent Extraction of Solid Samples
730082	Determining Flash Point by Pensky – Martens Closed Cup Tester
730083	Isotopic Dilution Polynuclear Aromatic Hydrocarbons (PAH) by Gas Chromatography/Selective Ion Monitoring Mass Spectrometry (GC/ID-SIM-MS)
730085	Extraction of PAH only, Pesticides and/or PCBs in Water
730087	Butyltin in Tissue Analysis
730088	Sulfur Removal by SW-846 Method 3660B
730091	Micro-Florisil® Column Cleanup
730092	Micro-Florisil® Cleanup for Phthalate Esters, by Method 3620B
730093	Acid-Base Partition Cleanup, by Method 3650B

Index Number	SOP Title
730096	PBDE Tissue Analysis by GC/MS/MS
730097	Analyzing Chlorinated, Organophosphorus, and Nitrogenous Pesticides by GC/MS, Method 8270
730098	Methoprene by GC/MS, USGS Method O-2134-01
730095	Herbicide Analysis by Gas Chromatography/Mass Spectrometry (GC/MS)
730096	PBDE Tissue Analysis by GC/MS/MS
730097	Analyzing Chlorinated, Organophosphorus, and Nitrogenous Pesticides by GC/MS, Method 8270
730098	Methoprene by GC/MS, USGS Method O-2134-01
730099	Solid Phase Extraction (SPE) of Semi-Volatile Petroleum Products (NWTPH-Dx) in Water by EPA SW-846 Method 3535
730100	Solid Phase Extraction (SPE) of Herbicides in Water by EPA SW-846 Method 3535
730101	Extraction of BNA's/Pesticides/PCB's/Op-Pesticides in Soils, Sediments and Sludges by Soxtherm, SW 846 Method 3541
730102	Solid Phase Extraction of Carbamates for High Performance Liquid Chromatography Mass Spectrometer Analysis (HPLCMS), EPA SW 846 Method 3535M
730103	Micro-acetonitrile back extraction cleanup
730104	PBDE Analysis by GC/MS Selective ion Monitoring (SIM)
730105	Fish Tissue Florisil Column and Acetonitrile Back Extraction Cleanup (Micro)
730106	Carbamate Analysis by EPA Method 8321A, Modified
730107	Solid Phase Extraction (SPE) of Pesticides in Water by EPA SW-846 Method 3535
730108	Solid Phase Extraction (SPE) of PBDEs in Water by EPA SW-846 Method 3535
Sample and Data Management	
770001	Sample Check-In
770003	Purchasing Analytical Services
770005	Reviewing Contract Laboratory Data
770009	Filling Sample Container Orders
770014	Processing Purchases for Payment
770016	Radiation Screening of Samples Entering the Manchester Laboratory
770017	Sample Data Filing System
770018	Documentation of Administrative Standard Operating Procedures
770019	Documentation of Analytical Standard Operating Procedures
770020	Use of the OHS Material Safety Data Sheets on CD/ROM Software
770023	Waste Collection, Storage and Pickup
770026	Sample Disposal
770027	Construction and Use of Precision Control Charts
770028	LIMS Log in of Samples
770029	Cleaning Sample Containers with a Laboratory-Grade Dishwasher
770030	Laboratory Balances in the General Chemistry Section

SM = Standard Method (APHA, 2005).

5. Hazardous Waste and Toxics Reduction Program

None

6. Nuclear Waste Program

SOP Title
Shipping samples to NWP Contracted Analytical Labs Draft

7. Shorelands and Environmental Assistance Program

None

8. Solid Waste and Financial Assistance Program

None

9. Spills Program

SOP Title
Spill Response Procedures Draft

10. Toxics Cleanup Program

None

11. Water Quality Program

None

12. Water Resources Program

None

Appendix D. Ecology Internal and External Laboratory Audits

Methods audited at Manchester Environmental Laboratory (2006-2009)

- Turbidity
- Chlorophyll
- Sample receiving
- pH
- Total Persulfate Nitrogen
- Nitrate/Nitrite
- Volatile Organics Analysis (VOA)
- Solids (TS, % solids, TDS, TVS, TNVS, TSS, TNVSS, SSC)
- Mercury
- PBDE
- Inductively Coupled Plasma (ICP)

Example MEL Internal Audit Report

Parameter: Metals analysis by ICP

Date of interview: 2/18/2009

Date of report: 3/3/2009

Auditor: Karin Feddersen

Person(s) interviewed: Rebecca Wood

The analyst is obviously knowledgeable, conscientious and strongly committed to quality. The analysis SOP, 720004, was last updated 5/7/2007. It is currently in draft and is expected to be completed by the end of March.

The SOP for TCLP metals was revised by the previous analyst (no longer working for Ecology). The current ICP analyst has agreed to review it so that it may be finalized soon.

Several of the SOP copies kept in the laboratory were out of date. When this was pointed out the analyst immediately replaced them with the most current versions.

Samples are held at above freezing and below 6 °C from collection until preparation (or until analysis in the case of dissolved metals analysis). A Laboratory Control Sample (LCS) is prepared and analyzed with every batch of 20 samples.

Preparation and actual concentrations are recorded in the standards logbook.
There are balances in room 115 and 117. Each one has its calibration verified each day of use with check weights. These check weights are calibrated annually against ASTM Class 2 weights. They were last calibrated on 2/23/2009.

Water samples are preserved with HNO3 to pH<2. The sample coordinator checks the pH of metals samples upon arrival at the laboratory. If the samples have not been preserved in the field, they are preserved in the lab upon receipt, except for dissolved metals, which are filtered before being preserved. Samples must be filtered within 15 minutes of collection, and preserved 24 hours before analysis. If the samples are not filtered in time and properly preserved, the results are qualified as estimates.

Training records are available for Rebecca Wood.
IDCs were performed by Rebecca for ICP analysis (EPA Method 200.7) in May, 2008 and for sediment preparation (EPA SW 846 method 3050) in June, 2008.
Data are on file at the laboratory.

MDL studies were performed May and December of 2008.
Data are on file at the laboratory.

No control charts are currently maintained for this parameter. Manchester Lab's current mean value for Magnesium by ICP, Method 200.7, in water LCSs is 101 %. The Standard deviation is 10.8 %. Using the lab's most recent 20 values for an LCS, the mean recovery was 102 % at the time of the lab assessment, with a standard deviation of 2.2 %.

Laboratories audited by Ecology's Lab Accreditation Unit (2006-2009)

Laboratory Name
AAA Laboratory
Aberdeen Wastewater Treatment Plant Laboratory
Accurate Testing Labs L.L.C.
Addy Lab of Southwest Washington
Albion Wastewater Laboratory
Albion Wastewater Laboratory
Alcoa Intalco Works Laboratory
Alcoa Wenatchee Works Laboratory
Alderbrook Inn Water Treatment Plant Laboratory
American Analytical Services
AmTest Laboratories
Anacortes Wastewater Treatment Plant Laboratory
Anacortes Water Treatment Lab
Analytical Chemistry Inc.
Anatek Labs, Inc. - Spokane
Anatek Labs, Incorporated
Apex Laboratories, LLC
Aqua Test, Incorporated
Aquatic Research, Inc.
Archer Analytical
AREVA NP Inc.
ATL 222-S
AV Labs, Inc.
Avocet Environmental Testing
B & P Laboratories, Incorporated
Bainbridge Is Dept of Public Works Lab
Battelle Marine Sciences Laboratory
Bellingham Wastewater Treatment Plant
Bellingham Water Filtration Plant Lab
Boeing IDS EHS Env Analysis Lab MC 8Y-55
Boston Harbor Wastewater Treatment Plant Lab
BP Quality Administration - NW
Bremerton Wastewater Treatment Plant Lab
Brewster Wastewater Laboratory
Bridgeport Wastewater Laboratory
Brooks Rand Labs
Burlington Wastewater Treatment Plant Laboratory
Camp Korey at Carnation Farms

Laboratory Name
Camp Korey at Carnation Farms
Carbonado Wastewater Treatment Plant Laboratory
Carnation Wastewater Treatment Plant Lab
Cascade Analytical Inc. - Yakima
Cascade Analytical, Inc. - Wenatchee
CCI - ALS Laboratory Group
Center for Laboratory Sciences
Central Kitsap Treatment Plant Laboratory
Centralia Wastewater Treatment Plant Laboratory
CH2M Hill Applied Sciences Laboratory - Corvallis
Chambers Creek Wastewater Treatment Plant Lab
Chehalis Regional Water Reclamation Facility Lab
Chelan Wastewater Treatment Plant Laboratory
Chelan-Douglas Health District
Cheney Wastewater Laboratory
Cherrywood Mobile Home Manor WWTP Lab
Chewelah Wastewater Laboratory
Chinook Ventures, LLC
Clallam Bay Corrections Center Laboratory
Clallam Bay/Sekiu Water Treatment Plant Lab
Clark PUD River Road Generating Plant Laboratory
Colfax Regional Laboratory
College Place Wastewater Treatment Plant Lab
Colton Wastewater Laboratory
Columbia Inspection, Inc.
Colville National Forest Water Lab
ConAgra Lamb Weston
ConocoPhillips Ferndale Refinery Laboratory
Coupeville Wastewater Treatment Plant Laboratory
Cowiche Wastewater Treatment Plant Lab
Crescent Bar Wastewater Laboratory
Crystal Mountain Wastewater Treatment Plant Lab
Cusick Wastewater Laboratory
CWU Chemistry Department Environmental Testing Lab
Dayton Wastewater Treatment Plant Lab
Department of Ecology Marine Waters Lab
Department of Fish and Wildlife WQ Lab
Des Moines Creek WTP - Midway S.D. Lab
Douglas County Sewer District #1 Laboratory
Dragon Analytical Laboratory
Duvall Wastewater Treatment Plant

Laboratory Name
Eastsound Wastewater Treatment Plant Laboratory
Eatonville Wastewater Treatment Plant Lab
Edge Analytical Inc. - Bellingham
Edge Analytical, Incorporated
Edmonds Wastewater Treatment Plant Laboratory
Eka Chemicals, Inc. Laboratory
Ellensburg Wastewater Laboratory
Elma Wastewater Treatment Plant Laboratory
Emerald Kalama Chemical, LLC
Emerald Recycling Laboratory
Endicott Wastewater Laboratory
Energy Northwest Environmental Services Lab
Entiat Wastewater Treatment Plant Laboratory
Enumclaw Wastewater Treatment Plant Laboratory
Ephrata Water Reclamation Facility Laboratory
Everett Environmental Laboratory
Everett Water Filtration Plant Lab
Evergreen Sanitation Testing Laboratory
Fisherman Bay Sewer Dist Laboratory
Forks Wastewater Treatment Plant Laboratory
Fremont Analytical, Inc.
Friday Harbor Wastewater Treatment Plant Lab
Friedman & Bruya
General Chemical Corporation Laboratory
Georgia Pacific Consumer Products (Camas) LLC
Gig Harbor Wastewater Treatment Plant Laboratory
Goldendale Wastewater Laboratory
Golder Associates North Vancouver Toxicology Lab
Grand Coulee-Electric City Wastewater Laboratory
Grand Mound Wastewater Plant Laboratory
Granite Falls Wastewater Treatment Plant Lab
Grays Harbor County Water Testing Lab
Grays Harbor Paper, L.P. Laboratory
Grays Harbor PDA Environmental Lab
Hallmark Refining Corporation Analytical Lab
Harstene Pointe Wastewater Treatment Plant Lab
Holmes Harbor Water Reclamation Plant Lab
Holroyd Company Laboratory
Hoquiam Wastewater Treatment Plant Laboratory
Hytek Finishes Company Laboratory
Ilwaco Water Treatment Plant Lab

Laboratory Name
Inland Empire Paper Co. Laboratory
Institute for Watershed Studies
Ione Wastewater Laboratory
JACO Analytical Laboratory, Inc.
Kaiser Aluminum Trentwood Laboratory
Kennewick Wastewater Plant Laboratory
King County Environmental Laboratory
King County South Plant Process Control Lab
King County South Plant Process Control Lab
King County Wastewater Div S - Vashon Lab
King County West Point Process Lab
Kitsap County Sewer District #7 Laboratory
Kittitas Co Water Purveyors Laboratory
Kuo Testing Labs, Inc.
La Center Wastewater Treatment Plant
La Conner Wastewater Treatment Plant Laboratory
Lab/Cor, Inc.
Lake Stevens Wastewater Treatment Plant Laboratory
Lakota Wastewater Treatment Plant Laboratory
Langley Wastewater Treatment Plant Laboratory
Larch Corrections Center Laboratory
Lewis County Environmental Health Laboratory
Liberty Lake Wastewater Laboratory
Lincoln County Environmental Health Lab
Lind Wastewater Laboratory
Longview Fibre Company
Longview Regional Water Treatment Plant Lab
LOTT Water Quality Laboratory
Lynden Wastewater Treatment Plant Laboratory
Lynnwood Wastewater Treatment Plant Laboratory
Mabton Wastewater Treatment Plant Laboratory
Manchester Environmental Lab
Marysville Wastewater Treatment Plant Laboratory
Mason County Public Health Laboratory
Maxxam Analytics Inc. - Burnaby
McCleary Wastewater Treatment Plant Laboratory
McNeil Island Correction Center WWTP Lab
Medical Lake Wastewater Laboratory
Messenger House Care Center Laboratory
Miller Creek Wastewater Treatment Plant Lab
Missoula Wastewater Division Lab

Laboratory Name
Monroe Correctional Facility WWTP Lab
Monroe Water Quality Laboratory
Montesano Wastewater Treatment Plant Laboratory
Morse Creek Water Treatment Plant
Moses Lake Dunes Wastewater Laboratory
Mount Vernon Wastewater Treatment Plant Laboratory
Mukang Labs, Inc.
Mukilteo Water and Wastewater District
Naselle Youth Camp Laboratory (DSHS)
National Food Corporation Laboratory
Naval Undersea Warfare Center Lab - Keyport
Nippon Paper Industries USA Co., Ltd. Env Lab
Nisqually Env Sampling & Consulting Laboratory
North Bay Water Reclamation Facility Lab
North Bend Wastewater Treatment Plant Lab
North Bonneville Wastewater Treatment Plant Lab
Northwest Agricultural Consultants, Inc.
Northwestern Aquatic Sciences
NVL Laboratories, Inc.
NW Indian College WQ Lab
Oak Harbor Wastewater Treatment Plant Lab
Ocean Spray Cranberries - Aberdeen Laboratory
Okanogan County Public Health Laboratory
Okanogan Wastewater Laboratory
Olin Processing Dept Lab
Olympic Correction Center Laboratory
Olympic Scientific Lab, Incorporated
Olympic Water and Sewer, Inc. Laboratory
Omak Wastewater Laboratory
OMI Laboratory - Hood River
OMI Laboratory - The Dalles
Onalaska Wastewater Laboratory
Oroville Wastewater Laboratory
Orting Wastewater Treatment Plant Laboratory
Othello Wastewater Laboratory
Pace Analytical Services, Inc. - Seattle
Pacific Agricultural Laboratory
Pacific Beach Wastewater Treatment Plant Lab
Pacific County DCD WQ Laboratory
Pacific EcoRisk
Pacific EcoRisk

Laboratory Name
Parametrix, Inc.
Pasco Wastewater Treatment Plant Laboratory
Pateros Wastewater Treatment Plant
Pe Ell Wastewater Laboratory
Penn Cove Water and Sewer District Laboratory
Peshastin Wastewater Treatment Plant Laboratory
Ponderay Newsprint Co. Laboratory
Port Angeles Wastewater Treatment Plant Lab
Port of Kalama Wastewater Laboratory
Port of Sunnyside Industrial Wastewater Laboratory
Port Townsend Paper Corporation Laboratory
Potlatch Corporation Environmental Laboratory
Prosser Wastewater Treatment Plant Laboratory
Pullman Wastewater Laboratory
Pullman Wastewater Laboratory
Quincy Wastewater Laboratory
Rainier State School WWTP Lab
Raymond Wastewater Treatment Plant Laboratory
Reardan Wastewater Laboratory
REC Solar Grade Silicon Wastewater Laboratory
Richland WWTF Laboratory
Ridgefield Wastewater Treatment Plant
Rinker Materials Technical Services Analytical Lab
Roche Harbor Wastewater Treatment Plant Lab
Rohm and Haas Chemicals LLC Quality Control Lab
Royal City Water Reclamation Facility Laboratory
Roza-Sunnyside Board of Joint Control WQ Lab
Ryderwood Wastewater Treatment Plant Lab
Saint John Wastewater Laboratory
Salmon Creek Treatment Plant Lab - Vancouver
Salmon Creek Wastewater Treatment Plant Lab - Seattle
Seattle City Light - Diablo Laboratory
Seattle City Light - Newhalem Laboratory
Seattle Public Utilities Water Quality Lab
Seattle-King County Dept of Public Health Lab
Sedro Woolley Wastewater Treatment Plant Lab
SEH America, Inc. Laboratory
Selkirk Regional Environmental Lab
Sequim Wastewater Treatment Plant Laboratory
Shell Oil Products US - Puget Sound Refining Lab
Shelter Bay Wastewater Treatment Plant Lab

Laboratory Name
Shelton Wastewater Treatment Plant Laboratory
Simpson Tacoma Kraft Company Environmental Lab
Skagit Co SD #2 - Big Lake WTP Laboratory
Skagit County Public Health Dept. Water Laboratory
Snohomish Wastewater Treatment Plant Lab
Snokist Growers Waste Control Laboratory
Soap Lake Wastewater Laboratory
Soiltest Farm Consultants, Inc. Laboratory
Sonoco Products Company Laboratory
South Bend Wastewater Treatment Plant Laboratory
South Prairie Wastewater Treatment Plant Lab
Specialty Minerals, Inc. Laboratory - Camas
Specialty Minerals, Inc. Laboratory - Longview
Spectra Laboratories
Spokane Regional Health District Laboratory
Spokane Tribal Laboratories
Spokane Water Laboratory
Stanwood Wastewater Treatment Plant Laboratory
Sultan Wastewater Treatment Plant Laboratory
Sumner Wastewater Treatment Plant Laboratory
Sunland Water District STP Laboratory
Sunland Water District STP Laboratory
Tacoma Environmental Services Laboratory
Tacoma North End - STP #3 Laboratory
Taylor Bay Wastewater Treatment Plant Laboratory
Tekoa Wastewater Treatment Plant
Tenaska Ferndale Cogeneration Station Laboratory
Tesoro Anacortes Quality Assurance Laboratory
TestAmerica Richland
TestAmerica Seattle
TestAmerica Tacoma
Three Rivers Regional Wastewater Plant Lab
Thurston County Health Department Laboratory
Toutle Wastewater Treatment Plant Laboratory
TransAlta Centralia Generation Lab
Tulalip Tribes Water Quality Laboratory
Twisp Wastewater Treatment Plant Laboratory
Twiss Analytical Laboratories, Inc.
U of W Analytical Services Laboratory
U.S. Oil & Refining Company Laboratory
USAg Analytical Services

Laboratory Name
USN NAVIMFAC PACNORWEST, Code 442
UW Oceanography Marine Chemistry Lab
Valley Environmental Laboratory
Vancouver Westside WWTP Laboratory
Vantage Wastewater Laboratory
Veolia Water Laboratory - Gresham
Wahkiakum County Health Dept Laboratory
Warm Beach Campground WTP Laboratory
Washougal Wastewater Treatment Plant Laboratory
Waste Sampling and Characterization Facility
Water Management Laboratories, Inc.
Wenatchee Drinking Water Lab
Wenatchee Wastewater Treatment Plant Laboratory
West Sound Utility District Laboratory
Westport Wastewater Treatment Plant Laboratory
Weyerhaeuser Analysis & Testing
Weyerhaeuser NR Co - Cosmopolis Pulp Mill Lab
Wilbur Wastewater Laboratory
Wilkeson Wastewater Treatment Facility Lab
Willapa Valley Water Treatment Plant Lab
Woodbrook Wastewater Treatment Plant Lab
Woodland Wastewater Treatment Plant Laboratory
Wy'East Environmental Sciences, Inc.
Yelm Water Reclamation Facility Laboratory
Zillah Wastewater Treatment Plant Laboratory

WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL ASSESSMENT PROGRAM
LABORATORY ACCREDITATION UNIT

AUDIT REPORT

April 3, 2007

LABORATORY:	Manchester Environmental Laboratory Manchester, WA	
DATE OF AUDIT:	February 13 & 14, 2007	
AUDITORS:	Stewart Lombard	General Chemistry
	Dennis Julvezan	Trace Metals
	Alan Rue	Organics
	Aimee Bennett	Microbiology
PERSONNEL INTERVIEWED:	Stuart Magoon	Laboratory Director
	Karin Feddersen	QA Officer
	Dean Momohara	Inorganics Unit Supervisor
	John Weakland	Organics Unit Supervisor
	Michelle Aylward	General Chemistry
	Aileen Richmond	General Chemistry
	Susan Davis	General Chemistry & Micro
	Sally Cull	General Chemistry
	Daniel Baker	General Chemistry
	Kamilee Ginder	General Chemistry
	Katie Curl	General Chemistry
	Nancy Jensen	Microbiology & Gen Chem
	Sara Sekerak	Metals Analyst
	Meredith Jones	Metals Analyst
	Bob Carrell	Organics Analyst
	Dickey Huntamer	Organics Analyst
	Delores Montgomery	Organics Analyst
	Myrna Mandjikov	Organics Analyst
	Jeff Westerlund	Organics Analyst
	Kelley Donegan	Organic Extractions
	Cherlyn Milne	Organic Extractions

AUTHENTICATION:

_____
Stewart Lombard

_____
Dennis Julvezan

_____
Alan Rue

_____
Aimee Bennett

INTRODUCTION

A system audit was conducted at Manchester Environmental Laboratory, Manchester, Washington, on February 13 & 14, 2007 pursuant to Chapter 173-50-130, Washington Administrative Code. The original audit of this lab was conducted in 1990 and the most recent audit in 2004. The purpose of the audit was to verify laboratory capabilities and to review analytical and quality control data. Audit findings of deficiencies requiring corrective action are listed first in **bold type** and recommendations for improvement of procedures are documented in the text of this report in ***bold italics.***

FINDINGS

1. Lab staff questioned the need for MDL studies. EPA has convened a committee of experts to review the use and utility of MDL data. Pending a decision by EPA on this matter, **we will continue to require results of current MDL studies when the method calls for them.**

GENERAL CHEMISTRY

2. Through a misunderstanding in the wording of the SOP, alkalinity was being determined on samples before they had time to reach room temperature. **The method requires that samples be at room temp during titration. The lab must ensure that the SOP reflects this requirement clearly and that the analyst is familiar with it.**

3. The lab determines salinity by measuring the refractive index. This procedure is not described in SM 2520 and **accreditation for this parameter is denied.** The lab may apply for accreditation by the method actually used by providing us with a copy of that method.

METALS

4. Both EPA Method 200.7 and EPA Method 200.8 state: "MDLs should be determined annually, when a new operator begins work or whenever, in the judgment of the analyst, a change in analytical performance caused by either a change in instrument hardware or operating conditions would dictate they be re-determined." **We require MDL studies for these methods by each analyst who has not yet performed one. The MDL studies should be submitted to us within 30 days of the date of this report**.

ORGANICS

5. For EDB & DBCP by EPA 8011, the lab's MDLs (0.9 µg/L) and lowest calibration standard (1 µg/L) do not support quantitation at the level needed for the required check standard run at 0.25 µg/L with every batch or the required weekly QC reference sample at 0.10 µg/L as specified in sections 8.3 and 8.4 of the method. **Accreditation is withheld for this parameter, pending demonstration of capability to meet reporting limits at or below 0.10 µg/L.**

RECOMMENDATIONS

1.0 Personnel

1.1 General Chemistry

Michelle Aylward performs the analyses for ammonia and orthophosphate by flow injection analysis and for Total Organic Carbon. Aileen Richmond performs the analyses for anions by ion chromatography as well as the TS and TVS determinations. Susan Davis performs the HEM analyses for oil and grease. Sally Cull performs the turbidity analyses. Daniel Baker performs the alkalinity, BOD, pH and TDS determinations. Kamilee Ginder performs the Total Persulfate Nitrogen, Nitrite and Nitrate analyses using the auto-analyzer. Nancy Jensen performs the specific conductance determinations. Katie Curl performs the TSS determinations.

All analysts interviewed are obviously knowledgeable, conscientious and strongly committed to quality.

Some of the analysts using complex equipment such as the ion chromatograph have not received training from the instrument manufacturers. ***We recommend that analysts receive training by the manufacturer on all specialized analytical instrumentation.***

1.2 Trace Metals

Sara Sekerak performs trace metals analyses by ICP-AES, mercury analyses by CVAA and total phosphorus analyses by ICP-MS. Meredith Jones performs trace metals analyses by ICP-MS.

Both analysts are knowledgeable and committed to producing quality data.

1.3 Organics

Bob Carrell performs analyses for Fuels, BNAs, Herbicides and Butyl-tins. Dickey Huntamer performs analyses for PAHs and Carbamates. Delores Montgomery performs analyses for Volatiles and PBDEs. Myrna Mandijikov performs analyses for Pesticides/PCBs by GC. Jeff Westerlund performs analyses for Pesticides by GC-MS and EDB & DBCP by GC.

All the analysts are knowledgeable, conscientious and strongly committed to quality.

1.4 Microbiology

Nancy Jensen is the lead and primary microbiology analyst. She has worked at this facility for over 20 years and is very knowledgeable and proficient in all methods of analysis performed. Both membrane filtration and multiple tube fermentation techniques are used to quantify bacterial contaminants for ambient and effluent water quality monitoring and investigations. Nancy routinely performs the bulk of analysis independently, but at the time of the audit, Susan Davis was in-training as assistant analyst.

2.0 Facility

The laboratory facility remains essentially as it was during the previous audit. A portion of the north wing is being remodeled and the functions conducted in that area have been moved to other areas temporarily. In some cases, space is limited but adequate.

The organics assessor noted gross interfering contamination in blank data for herbicides, which the lab explained had come from gas supply lines, and had since installed a filter to trap the contamination. However, the analyst reported that some contamination is still getting through. The contamination appears to be petroleum hydrocarbons. ***The assessor recommended flushing the gas lines with solvent followed by compressed air in an attempt to eliminate the source of the contamination.***

The microbiology recommendations from the previous audit have all been implemented.

3.0 Equipment and Supplies

The lab has an extensive inventory of analytical equipment, all of which is clean and well maintained. All areas are generously stocked with fresh supplies.

The lab has purchased several pieces of equipment used in microbiology analysis since the previous audit. A Mettler Toledo AL204 balance used in media preparation was brought into service September of 2006. A new water bath was received the week before the on-site and appears to be performing well. The lab maintains a considerable amount of out-dated dehydrated media in the media storage cupboards, though none of the media used for accredited testing appeared to be expired.

No deficiencies were noted with equipment or supplies.

4.0 Sample Management

The sample receiving area is spacious and clean. The condition of samples is checked on receipt, associated paperwork is reviewed and chain-of-custody is documented. Samples are logged into the LIMS and stored or delivered to the appropriate analysts. Microbiology samples are delivered immediately to the micro analysis lab where analysis begins soon afterward.

Ecology samples are stored in one of two walk-in coolers, #56 and #62. The temperatures in both are monitored continuously by automated recording systems with alarms. The temperature is also read from calibrated thermometers and recorded daily. The temperature in both coolers was between 2 and 6 ºC during the audit.

No deficiencies were noted in sample management.

5.0 Data Management and Record Keeping.

The LIMS is used to store and report all data and the lab is working toward automating the transfer of data from analytical instruments directly to the LIMS to reduce the possibility of transcription errors.

5.1 General Chemistry

In most cases, analysts currently enter their data into the LIMS by hand. Data entry is checked by the unit supervisor.

5.2 Trace Metals.

The laboratory does an excellent job with regard to data management and record keeping. Maintenance logs are kept for each instrument, and standards logs are maintained for each analytical method. For EPA Method 200.7, inter-element correction (IEC) checks are performed at least annually and logs maintained for these.

5.3 Organics

Records and data are arranged in an efficient and well-organized manner, readily retrieved and easily understood. The organic data packages reviewed were complete. We commend the lab for its detailed and thorough case narratives, which provide clear information to clients. The lab appears to be handling and safeguarding its data adequately.
The instrument run/maintenance logs in the organics area are very well documented and complete. Instrument maintenance for pesticides by GC-MS was being recorded on sequence hard copies in lieu of a log. ***We recommend initiating a hard-bound maintenance log for this instrument, like the logs used for the other instruments in the organics area.***

Standards logs are also very well documented; however, the lab's format/convention was not consistent for all logs. The log for pesticides (GC) and PBDEs used an ID number based on the Julian date on which the standard was prepared/logged. In other logs, the ID number is based on the page and line number of the logbook. ***We recommend applying a single format/convention for all standards logs, for consistency and uniformity throughout the lab.*** The page/line number format is preferred because it is easier to trace standards with this system than the Julian date system. Electronic standards records as part of the LIMS would be an acceptable alternative.

For pesticides by GC, the chemist had discontinued logging working standards. ***We recommend documenting this information in the working standards log, or incorporating it into the working/internal standards log book.***

Certificates of Analysis are on file, and they are cross-referenced with standard ID numbers, as recommended in the previous assessment.

The herbicides standards log was missing three pre-numbered pages and a chemist had renumbered the remaining pages. The lab acknowledged this is unacceptable and is archiving this log.

The lab's sample preparation notebooks/extraction logs are well documented.

The lab is monitoring refrigerator temperatures continuously and checking and logging the temperatures routinely.

5.4 Microbiology

Microbiology data is organized and maintained by project and type of analysis in the lab record. Sample information is manually transferred to bench sheets which are then stored in notebooks in the lab area. A majority of samples exceed the recommended 8 hour hold time upon arrival at the lab, but only samples exceeding a 24 hour hold time are flagged in the lab record. ***We strongly recommend that the lab notify new and prospective clients of this deviation from the method hold time recommendations.***

Because a majority of the samples processed and analyzed at this lab are pre-scheduled and are collected at established and consistent collection sites, ***we recommend that the lab evaluate implementing bar-coding system for sample collection and analysis data management.*** A bar-coding system would help minimize transcribing and number transposing errors inherent to manual data recording systems including the one used in this lab.

6.0 Proficiency Testing (PT) Samples

6.1 General Chemistry

The lab has participated in all required PT studies for general chemistry parameters and all results for the past two years have been satisfactory.

6.2 Trace Metals

The laboratory has had excellent performance with regard to trace metals PT Studies. Results for all applicable metals were acceptable for the two most recent PT Studies.

6.3 Organics

The lab has participated in all required PT studies for organics parameters and all results for the past two years have been satisfactory.

6.4 Microbiology

Microbiology proficiency testing participation is currently not required for non-potable water compliance testing accreditation. To its credit, the Manchester Environmental Lab regularly participates in external microbiology proficiency testing as an in-house QA/QC monitor. PT results were not reviewed at the audit, but were reported to be acceptable.

7.0 Quality Assurance and Procedures.

Few, if any, control charts are being used at the bench. ***We recommend that analysts maintain control charts at the bench to document method performance, detect trends that might be leading to an "out-of-control" condition and establish the required in-house acceptance limits for QC samples.*** The lab could start with check standard results and add charts for duplicates later.

7.1 General Chemistry

Ms. Feddersen provided the auditors with copies of internal audits which she conducted recently. These provided accurate assessments of the procedures used at the lab.

The lab includes at least one method blank, check standard, matrix spike and analytical duplicate with each batch of samples, as appropriate. An LCS at the reporting limit is analyzed with each batch of samples for some determinations.

7.1.1 Alkalinity [SM 2320 B(4b) & (4d)]

The lab uses a SCHOTT Model TR250 automatic titrator. The pH meter is calibrated with buffers at pH 4, 7 and 10. Samples are titrated with 0.02N sulfuric acid to pH 4.5. This is the procedure described in SM 2320 B(4c) and **the scope is changed to reflect this.**

See **FINDINGS** above.

7.1.2 Ammonia [SM 4500-NH3 H]

This method uses the phenate color chemistry in a flow injection analyzer. Distillation is not necessary for typical water samples. The method is adopted in the 21st edition of Standard Methods.

The instrument is calibrated with four standards.

The latest MDL study was done in 2004 by another analyst. The result was 0.004 mg/L. The reporting limit is 0.01 mg/L. ***We recommend that the current analyst perform an MDL study as soon as possible.***

An ICV and CCV are analyzed every 10 samples. Mean recovery for recent LCS analyses was 98% with a standard deviation of 1.4% indicating very low bias and excellent precision.

7.1.3 Anions by Ion Chromatography [EPA 300.0]

The lab determines chloride, fluoride and sulfate on a DIONEX Model DX 120 Ion Chromatograph. The lab has requested accreditation for nitrite and nitrate as well. <u>Accreditation for these parameters is warranted upon receipt of satisfactory PT sample results.</u>

The instrument is calibrated with eight standards using a quadratic formula. Calibration is checked with a standard and blank every 10 samples.

The resolution and shape of the five peaks used for quantitation is excellent.

Recent LCS recoveries have averaged 99 - 100% with standard deviations of 1.2 - 3.3% indicating virtually no bias and excellent precision. ***We request LCS recovery data for nitrite and nitrate as soon as it is available.***

No deficiencies were noted for this procedure.

7.1.4 BOD [SM 5210 B]

The lab uses a YSI Model 5100 DO meter that is calibrated against water-saturated air.

Buffers are added directly to the individual bottles.

The temperature in the incubator was 19.7 ºC.

The mean of the results for the glucose/glutamic acid check standard is 184 mg/L with a standard deviation of 19 mg/L. This indicates minimal bias and acceptable precision.

No deficiencies were noted for this procedure.

7.1.5 Chlorophyll [SM 10200 H(3)]

The lab filters water samples in the dark through glass fiber filters. The filters are stored in 90% acetone in the dark at - 20 ºC.

Chlorophyll a is measured with a fluorometer calibrated with a single solid standard. A blank is analyzed with each batch of samples.

No deficiencies were noted for this procedure.

7.1.6 Hexane Extractable Material [EPA 1664]

The lab uses Solid Phase Extraction discs to collect he oil and grease from the samples. Sample volume is measured by weight and the hexane is dried with sodium sulfate before it is evaporated in a hood at room temperature.
The current MDL is 1.4 mg/L which meets method requirements. Production of the 85% hexane currently in use has ceased. The lab will convert to 95% hexane in the near future. ***We recommend that the lab conduct a new MDL study when this new solvent is introduced.***

The mean of recent check standard results is 95% recovery with a standard deviation of 5% indicating only slight bias and excellent precision.

No deficiencies were noted for this procedure.

7.1.7 Nitrate and Nitrite [SM 4500-NO_3 I]

The lab analyzes water samples for nitrate and nitrite using cadmium reduction followed by the sulfanilamide chemistry on a LACHAT Model QC 8000 Flow Injection Analyzer. The method is adopted in the 21st edition of Standard Methods.

The instrument is calibrated with a blank and four standards ranging up to 1.5 mg/L. The lowest standard is at the reporting limit of 0.01 mg/L. The calibration is verified with an ICV and CCVs with each batch of samples.

The MDL for nitrate + nitrite in December 2004 was 0.001 mg/L.

The mean recovery for recent nitrate + nitrite LCSs is 100% with a standard deviation of 3.8% indicating no bias and excellent precision.

Data from this analytical system is transferred directly to the LIMS.

No deficiencies were noted for this procedure.

7.1.8 Total Persulfate Nitrogen [SM 4500-N B]

The method is adopted in the 21st edition of Standard Methods.

The MDL for TPN in January 2005 was 0.005 mg/L.

The mean recovery for recent TPN LCSs is 101% with a standard deviation of 5.8% indicating virtually no bias and excellent precision.

No deficiencies were noted for this procedure.

7.1.9 Orthophosphate [SM 4500-P G]

The lab analyses water samples for orthophosphate by the ascorbic acid color process on a Lachat Qwik Chemflow injection analyzer at 880 nm. The instrument is calibrated with three standards.

The method is adopted in the 21st edition of Standard Methods.

A CCV standard is used to verify the calibration every 10 samples.

The reporting limit is 0.003 mg/L.

7.1.10 pH [EPA 150.1]

The lab uses a DENVER INSTRUMENTS Model 250 pH meter. The instrument is calibrated with buffers at pH 4, 7 and 10 each day of use.

Calibration is checked with a fourth buffer at pH 6.8 with each batch of samples.

No deficiencies were noted for this procedure.

7.1.11 Solids, Total [SM 2540 B]
Total Dissolved [SM 2540 C]
Total Suspended [SM 2540 D]
Total Volatile [SM 2540 E]

The lab uses a METLER Model AE200 balance for solids determinations. The balance was clean and in good condition. A 100 mg Class I weight produced a reading of 0.1000 g.

The lab uses the required glass fiber filters for TDS and TSS determinations.

The thermometer in the oven used for drying TSS filters read 104 ºC. Our reference thermometer indicated 105.8 ºC during the audit. The material escaping from the solids residues can damage the oven thermostat over time. ***We recommend that the analyst monitor the temperature extremes of the oven with a bare thermometer.*** If the thermostat can not maintain the instantaneous temperature in the oven within 104 ± 4 ºC, the oven should be repaired or replaced.

TSS residues weigh anywhere from 1.0 to 200 mg. The method requires that residues weigh a minimum of 2.5 mg to ensure reasonable accuracy of low results. ***We recommend that the lab qualify as estimates results of one-liter samples when the dry residue weighs between 1.0 and 2.5 mg.***

The mean recovery for recent TDS check standards is 102% with a standard deviation of 4.8% indicating that the analytical system has no bias and excellent precision.

The mean recovery for recent TSS check standards is 93% with a standard deviation of 4.5% indicating that the analytical system has a slight negative bias with excellent precision.

7.1.12 Specific Conductance [SM 2510 B]

The lab uses a RADIOMETER/COPENHAGEN Model CDM 83 conductivity meter. With each batch of samples, the cell constant is checked with KCl solutions whose conductivities bracket the sample values. The calibration is checked with an independent commercial standard as well. No deficiencies were noted for this procedure.

7.1.13 Total Organic Carbon [EPA 415.1]

The lab uses a Shimadzu brand analyzer.

The inorganic carbon content of typical samples is not significant.

The MDL is 0.086 mg/L.

For the last 20 LCS results, the mean recovery was 101% with a standard deviation of 2.3% indicating little or no bias and excellent precision.

No deficiencies were noted for this procedure.

7.1.14 Turbidity [SM 2130 B]

The lab uses a HACH Model 2100 N Turbidimeter which is calibrated with HACH formazin standards at 20, 200, 1000, 4000 NTUs every three months. The calibration is checked with a GELEX secondary standard before each use.

No deficiencies were noted for this procedure.

7.2 Trace Metals

The laboratory does an excellent job with regard to quality assurance and quality control. All of the required method QC is performed for each trace metals method and analytical quality control charts are maintained for some elements, e.g., magnesium by EPA Method 200.7 and copper by EPA Method 200.8.

The SOP for ICP-AES (EPA Methods 200.7 & 6010) was in the process of being revised at the time of the on-site assessment. ***We request that the revised SOP be submitted within 30 days***.

A current Manchester Laboratory policy for trace metals methods is not to perform method detection limit (MDL) studies for current instruments unless there is a significant instrument change or a lower reporting limit is going to be used. Rather low-level method reporting limit (MRL) checks are performed with each analytical run for each element. The MRL checks are a very good laboratory practice; however, both method 200.7 and method 200.8 require Initial Demonstration of Performance (IDP) Studies, which include MDL Studies.

See **FINDINGS** above.

7.3 Organics

Much to the credit of the lab, quality control (QC) tests such as method blanks, surrogates, calibration verification standards, and Laboratory Control Standards (LCSs) are run routinely; and duplicates are run routinely when possible (i.e. if sufficient sample is provided). Matrix spikes (MS's) are run when requested.

The lab has control charts for most organic methods for selected target and surrogate compound recoveries. Statistics were out of date for butyltins, volatiles, and pesticides (8081). Charts had been updated within the last six months for other control charted methods. ***The assessor recommended entering control chart data daily in order to monitor trends. The assessor also recommends control charting for PCBs and organonitrogen pesticides.***

7.3.1 Control Limits

The lab's practice is to qualify sample data associated with an analytical batch in which QC sample recoveries fall outside of self imposed fixed limits. The limits are based on reasonable recoveries, which in some cases are more restrictive than statistically based limits historically achieved in the environmental lab industry. This practice is commendable and conservative from the lab's standpoint. However, from a data user's standpoint, some qualified data may not need qualification based on generally accepted criteria. ***We recommend qualifying data using statistically based limits, provided the limits are not less restrictive than guidance limits in the reference methods.***

7.3.2 MDL Studies

The lab has completed Method Detection Limit studies within the last three years for EDB/DBCP (8011), carbamates, herbicides, pesticides (8270), volatiles (8260), PAHs, PBDEs, butyltins, and pesticides/PCBs (8081/8082). There was no date on the study for BNAs. The lab did not have an MDL study on file for BTEX (8021). ***The lab should perform an MDL study at least once for this parameter.*** The lab has completed Method Detection Limit studies for all other organics methods within the last year. For carbamates, the lab had applied the concentration factor after calculating the standard deviations. ***To calculate the MDLs correctly, the lab should apply the concentration factor before calculating the standard deviations.*** This will result in slightly higher calculated MDLs.

7.3.3 SOPs

The assessor reviewed the lab's organic method Standard Operating Procedures (SOPs). The SOP provided for Method 8011 was out of date, but the lab reported that it had just been updated. ***We request a copy of the updated 8011 SOP for review.*** The SOP for Method 8321 was updated in November 2006, but the lab has made modifications since then. ***The lab should update the 8321 SOP and submit it to the Lab Accreditation Unit for review.*** The lab had current SOPs available for all other organic methods.

7.3.4 N-Methylcarbamates [EPA 8321 (Mod)]

The lab uses a silica gel base Solid Phase Extraction (SPE) to achieve a 100-fold concentration of samples.

The lab performs a tune check of the mass spectrometer with every run using the manufacturer recommended phosphazines mix. The lab uses electrospray positive ionization mode. The lab runs a water/methanol gradient through a C18 column at 0.25 mL/min and runs the mass spectrometer in Selected Ion Monitoring (SIM) mode.

The lab performs a 7-point initial calibration daily. The lab uses average response factors if the RSD < 15%. Otherwise, a linear or quadratic fit with $r^2 > 0.99$ is applied. The lab runs a second-source standard to verify new calibration standards.

The lab runs a calibration check every ten samples and monitors the recovery of carbaryl-C13 surrogate standard to be within 50 – 100%.

Procedures were satisfactory and no deficiencies were noted.

7.3.5 Volatile Organic Compounds [EPA 8260]

The lab uses average response factors based on 7 initial calibration standards with RSDs < 15%. The tuning of the mass spectrometer is checked with BFB, and the calibration is verified every 12 hours to be within 20 % of the initial calibration. The lab checks that the SPCC response factors against method criteria.

The lab runs a blank every 12 hours and as needed after high level contaminated samples. Solvent contamination is below the lab's reporting limit.

A 60-m x 0.32-mm column is being used. The lab uses a Supelco "C" trap. A dry purge was being done. ***Since a "C" trap contains Silica Gel, which retains water, a dry purge is not effective and need not be done.***

7.3.6 BTEX and Gasoline [EPA 8021 & NWTPH-Gx]

The lab has a new autosampler since the previous on-site assessment that is capable of handling water samples and methanol soil extracts. The lab was using an RTX 502.2 30-m x 0.53-mm column with PID (BTEX) and FID (gasoline) detectors.
The lab calibrates with 8–9 standards, and checks that the correlation coefficient is > 0.990 and that each point is within 15 % of the true value, as required by the method. The calibration is also checked at the beginning and end of the run to be within 15 % of the initial calibration. Duplicates are run every 10 samples, if sufficient sample is provided.

The lab checks surrogate recoveries to be within the method limits of 50 – 150%.

Procedures were satisfactory and no deficiencies were noted.

7.3.7 Diesel [NWTPH-Dx]

The lab uses a DB-5 30-m x 0.32-mm column. The lab calibrates with 7 standards, and checks that the correlation coefficient is > 0.990 and that each point is within 15 % of the true value, as required by the method. The calibration is checked to be within 15 % difference from the initial calibration at the beginning and end of the run. Duplicates are run every 10 samples, if sufficient sample is provided.

The lab checks surrogate recoveries to be within the method limits of 50 – 150%.

Heavy fuel oil standards are processed through the cleanup procedure, if sample extracts containing heavy fuel oil are cleaned up.

Procedures were satisfactory and no deficiencies were noted.

7.3.8 Organochlorine Pesticides and PCB's [EPA 8081 & 8082]

The lab uses Large Volume Injection (LVI) of 30 µL. The lab uses primary (RTX CLPest-1) and confirmation (RTX CLPest-2) columns, and dual ECD detectors. At least six concentration levels are used in the initial calibration. The calibration is verified every 10 – 20 samples to be within 15 % of the initial calibration.

The lab checks breakdown of DDT and Endrin every 12 hours to be < 15 %, as specified in the method.

Florisil, tetrabutylammonium (TBA) sulfite, and/or sulfuric acid are used for cleanup of sample extracts.

The lab runs NIST SRM 1946 as a check on the fish tissue procedure.

Procedures were satisfactory and no deficiencies were noted.

7.3.9 PBDEs [EPA 8270 Modified]

The lab uses LVI and SIM for improved detection. A 15-m STX CLPesticides column is being used. The lab checks the mass spectrometer tune with DFTPP.

The instrument is calibrated at nine concentration levels using hexabromobenzene as an internal standard. The lab uses average response factors if the RSD < 15%. Otherwise, a linear fit with r > 0.995 is applied. The calibration is being verified every 12 hours to be within 20 % of the initial calibration.

Tissue extracts are being cleaned up with Florisil and Sulfuric Acid. The lab runs NIST SRM 1946 as a check on the procedure.

Procedures were satisfactory and no deficiencies were noted.

7.3.10 Butyltin in Sediment [MEL 730005] & Butyltin in Tissue [MEL 730087]

The lab checks the mass spectrometer tune with DFTPP. The instrument is calibrated at nine concentration levels. Tetrapentyltin is used as an internal standard and tripentyltin chloride and tripropyltin are used as surrogate standards. The lab uses average response factors with the RSDs < 15%. The calibration is being verified daily to be within 20 % difference from the initial calibration.

Procedures were satisfactory and no deficiencies were noted.

7.3.11 Semivolatile Organic Compounds and PAHs [EPA 8270 Modified]

The lab uses isotope dilution and SIM for the PAHs. Eight or nine concentration levels are used in the initial calibration and the calibration is verified every batch. A DB-5MS 30-meter 0.25 mm ID column is used.

The lab checks the tuning of the mass spec daily with DFTPP and checks peak tailing of pentachlorophenol.

Procedures were satisfactory and no deficiencies were noted.

7.3.12 Chlorinated Herbicides [EPA 8270]

The lab uses a DB-5 30-m x 0.25-mm column. A linear or quadratic calibration based on 8 – 10 points is done using DBOB as an internal standard. The calibration is verified daily.

Procedures were satisfactory and no deficiencies were noted.

7.3.13 Organochlorine, Organophosphorus & Nitrogen-Containing Pesticides [EPA 8270]

The lab performs a 7-point initial calibration. The lab uses average response factors if the RSD < 20%. Otherwise, a curve fit with $r^2 > 0.99$ is applied. The lab uses two deuterated PAHs as internal standards, but is planning to try DBOB and a deuterated pesticide. The calibration is verified every 12 hours to be within 20 % of the initial calibration.

The lab checks the mass spectrometer tune with DFTPP and checks peak tailing of pentachlorophenol and benzidine. The lab also checks breakdown of DDT and endrin.

The lab monitors the recoveries of 5 surrogate standards, two of which are deuterated compounds.

Procedures were satisfactory and no deficiencies were noted.

7.3.14 EDB and DBCP [EPA 8011]

The lab uses primary (RTX CLPest-1) and confirmation (RTX CLPest-2) columns, and dual ECD detectors. Six concentration levels are used in the initial calibration, which is verified every batch. The lab monitors the recovery of the 4-chlorfluorobenzene surrogate standard.

See **FINDINGS** above.

7.3.15 Extractions

The lab does not generally use separatory funnel or continuous liquid-liquid extractions for water samples, but has developed a “stir bar” extraction method that is being used. However, the

assessor commends the lab for moving increasingly to Solid Phase Extraction (SPE), which requires far less solvent, resulting in materials and labor savings and less waste.

7.4 Microbiology

For the most part, significant recommendations from the previous audit have been implemented and the lab is doing a good job in microbiology analyses. The lab more equitably shares and tracks QA/QC performance and documentation responsibilities with EPA co-workers since the last audit.

7.4.1

Several minor SOP corrections are needed.

7.4.1.1

Some SOPs state the lower limit of detection is 1 and some say <1. ***They should be consistent at <1***.

7.4.1.2

SOP #710019 is titled "Fecal Coliforms by SM 9221 E1," but ***the procedure describes Total Coliforms by SM 9221 B***.

7.4.1.3

The sentence "Heavily turbid samples, unless they have very high counts, should be done by the most probable number (MPN) method.", is used in several SOPs and requires rewording for clarity. Since counts are not known until after analysis, I'm guessing the intent involves turbid samples with expected high counts should be analyzed using MPN, unless extra sample dilutions will be performed to facilitate the use of MF.

7.4.2

The lab is training additional staff to perform the routine microbiology analyses when Nancy is unavailable.

7.4.2.1

Several product manufacturers have written and video training aids available. These aids commonly emphasize method performance techniques especially valuable to staff lacking formal microbiology training. ***We recommend that these training aids be acquired and used as needed in analyst training.*** The accreditation office can probably arrange for loaning of several of these.

7.4.2.2 ***We strongly recommend that the lab develop and implement an internal proficiency testing program to document the initial capability of new analysts and the continuing capability of those who do not routinely perform analyses.***

8. Accreditation Actions

8.1 General Chemistry

Accreditation for alkalinity is changed to SM 2320 B(4c).

Accreditation for salinity by SM 2520 (Mod) is denied.

Full accreditation is warranted for Ignitability by ASTM D 93-02 based on this audit.

8.2 Trace Metals

Full accreditation is warranted for Mercury in Tissue by EPA 245.6 and for Mercury, Solid Waste by EPA 7471 based on this audit.

8.3 Organics

Accreditation is withheld for Method 8011.

Full accreditation is warranted for Butyltin in Sediment by MEL 730005, for Butyltin in Tissue by MEL 730087 and for Polycyclic Aromatic Hydrocarbons by EPA 8270 (Mod) based on this audit.

Accreditation for Volatile Aromatics by EPA 8021 is changed to BTEX by EPA 8021 to match the lab's procedure.

8.4 Microbiology

Based on the observations of this audit, the following change to current microbiology accreditation is warranted. **The lab was accredited for E.coli using mTec by 1603, but is actually performing the analysis using modified mTec by method 1103.1.**

Appendix E. Revoking Accreditation of an Environmental Laboratory

Ecology's Laboratory Accreditation Unit (LAU) occasionally discovers that an accredited laboratory is using procedures that are not consistent with the production of credible data. Therefore, LAU must determine whether to revoke accreditation for specific parameters (analytes and methods). Some examples of these procedures would be (1) altering output of analytical instrumentation to meet QC requirements, (2) falsification of results or their supporting documentation, or (3) assigning staff to duties for which they are not qualified.

When an on-site audit of a laboratory is conducted, LAU staff gather information by reviewing a variety of documents related to receipt, storage, and analysis of environmental samples as well as reporting of the analytical results. LAU staff interview the analysts responsible for each procedure and their supervisors and QA officers. Finally, LAU staff inspect the facility, equipment, and supplies available to the laboratory staff. At the conclusion of the audit, LAU staff conduct an exit interview with key staff in which significant findings are briefly described and recommendations made for correcting serious deficiencies immediately.

If there is sufficient information to warrant revocation of accreditation for specific parameters, the situation observed is described and lab management is informed of the intent to revoke accreditation for those parameters at the exit interview. In some cases, additional documentation of lab procedures is requested which is examined after the on-site audit. If this further documentation reveals that accreditation for any parameter should be revoked, the lab is informed as soon as there is sufficient information to make an informed decision.

A detailed report is prepared within 30 days of the on-site audit describing the findings and the corrective actions required for the lab to retain or restore accreditation for each parameter. After the lab demonstrates compliance with Laboratory Accreditation requirements, accreditation is reinstated if necessary.

Appendix F. Recent QA Training Provided at Ecology

2005

Systematic Planning, presented by John Warren of EPA.

2006

E-Quest QA training, in October 2006. This was quality system training for in-house staff and external data submitters.

2007

- EIM data entry training.
- Water Quality Program grant manager training on QA issues in grant management.
- Presentation to EA Program retreat, "The Pursuit of Quality".

2008

- Presentation by Ecology's Bill Kammin, Chris Neumiller, and Chad Brown to the EPA quality conference in Seattle, WA. Presentation detailed Ecology's quality system, EIM database, and water quality applications built on the quality system and resident data.
- Presentation to WQ Program's TMDL conference, on data quality for regulatory uses.
- Treatment of non-detects – Dr. Leroy Helsel spoke to Ecology on the use of censored data, and the concomitant treatment of data less than detection or reporting limits.
- EIM data entry training for internal staff and external data submitters.
- SEA Program training on QA requirements, for SEA program staff on the QA committee.
- WQ Program grant manager training on QA issues in grant management.

2009

- EIM data entry training.
- Presentation to Washington Conservation District on QAPPs and EIM.

Appendix G. History of QA at Ecology

1979
EPA makes their QA requirements mandatory for "all EPA grants, contracts, cooperative agreements and interagency agreements that involve environmental measurements."

1983
Ecology prepares first *Quality Management Plan.*

1987
Cliff Kirchmer hired as MEL Quality Assurance Officer.

1988
Legislature enacts RCW for Lab Accreditation at request of WQ Program.

1988 - March
Quality Assurance Section formed with Cliff Kirchmer as section head

- Assigned to implement RCW.
- Moves to Beautiful Downtown Manchester.
- Hires Perry Brake.
- Writes WAC 173-50.

1988 - October
Element L-4 of Puget Sound Water *Quality Management Plan* requires QA plan for Ecology data activities.

1989 - February
Cliff Kirchmer hires Connie Schreiber for administrative support.

1989 - March
Cliff Kirchmer hires Stew Lombard to help him meet requirements of Lab Accreditation.

1989 – April
EPA informs Ecology they will not accept a project plan until it is approved by the QA Officer.

1989 – April-July
Cliff Kirchmer and Stew Lombard hold 27 meetings with 93 Ecology staff to evaluate QA effort and assess future needs.

1989 - August
Draft revision of 1983 *Quality Management Plan* sent to the Executive Management Team for review and approval.

1990
WAC 173-50 finalized and implemented

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

1991
Cliff Kirchmer wrote QAPP guidance.

- Tailored to type and scale of Ecology projects.
- EPA's guidance was for bigger projects.

1992
EPA Region X QA Manager requests updated *Quality Management Plan* from Ecology.

1993 - February
Quality Management Plan still not approved by Ecology Programs.

1993 - August
Ecology adopts Executive Policy 1-21.

- Program managers designate QA Coordinators.
- QA Project Plans required for environmental studies.
- QA Project Plans approved per program manager before data collection.

1993 - December
Revised *Quality Management Plan* finally approved more than 4 years after submission to the Executive Management Team.

1995 - April
Quality Report to Management.

1997
Quality Report to Management.

1998
Cliff Kirchmer becomes full-time QA Officer and moves to HQ. Perry Brake replaces Cliff as Lab Accreditation section manager.

1999 - January
Quality Report to Management.

2000 - June
Ecology revises *Quality Management Plan*.

2000 - August
EPA Region X approves *Quality Management Plan*.

2001
First revision of QA Project Plan guidance, in response to EPA's revised guidance (QAlG5)

2002 - November
WAC 173-50 revised to include Drinking Water Certification.

2003 - May
Fourth *Quality Report to Management* issued.

2003 - November
EPA Region X conducts first Ecology Quality System Review.
- EPA found no major deficiencies.
- *Quality Report to Management* was an excellent assessment of Ecology's quality system.
- The recommendations in that report should be implemented.

2004
Cliff Kirchmer and Stew Lombard revised the QAPP guidance.

2005
- *Quality Management Plan* revised.
- Bill Kammin designated Ecology QA Officer.
- Fifth *Quality Report to Management* completed and issued to management.

2006
- EA Program SOP Policy established. Work on sampling and field analytical SOPs begins.
- Perry Brake retires, and Stew Lombard becomes Lab Accreditation Unit supervisor.
- State-wide QA training presented by Bill Kammin and friends.
- Sixth *Quality Report to Management* completed and issued to management.
- Quality system review conducted by EPA; no findings noted by EPA.

2007
Cliff Kirchmer retires.

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

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

This page is purposely left blank

Appendix H: QA for Data Entry, Agreement, 2007

This memorandum of understanding serves to document roles and responsibilities for data evaluation and data entry into the EIM system. It also establishes QA processes for EIM data entry.

Memorandum of Understanding

EIM Data Coordinator and QA Officer Roles and Responsibilities

July 30, 2007 (updated March 4, 2008)

The vision of the Environmental Information Management (EIM) System is to provide a central repository for Ecology and Ecology-affiliate environmental data, make it easily accessible to Ecology, affiliates, and the general public, and ensure that it contains the necessary elements to provide and gauge data credibility. This system serves a major support function within the agency and for agency affiliates. EIM has grown considerably in size, complexity, and usage with the addition of new functionality and data submittal requirements for all upland and sediment cleanup sites, water quality grant and loan recipients, and 303(d) data submitters.

There is also a growing need to ensure that the quality of the data in EIM can be accurately gauged for use in data analyses and rule-making. As a result, the need for collaboration with and support from Ecology's environmental programs and quality assurance (QA) officer is imperative. The program EIM data coordinators serve an essential function, working integrally with the agency EIM data coordinator to ensure the smooth flow of data into EIM. The QA officer helps ensure that the EIM protocols are in line with agency standards. This document describes the roles, responsibilities and collaboration of the EIM data coordinators and the advisory function of the agency quality assurance officer on EIM policies and procedures.

Agency EIM Data Coordinator

This position resides within Ecology's Applications and Data Services section, reporting to the Environmental Systems Support Unit supervisor. This position serves as the agency EIM data coordinator, user support lead, and business lead.

As the agency data coordinator,

- Provides mentoring, training, and technical direction to data coordinators in Ecology programs.
- Serves as lead for oversight of agency affiliate data submittal activities.
- Coordinates with program data coordinators on data submittal and QA issues, assuring that such issues are addressed in a timely manner and that the resolution is understood by and, for major issues, acceptable to all data coordinators and the agency QA officer.

- Works with Ecology environmental programs to migrate legacy data and other datasets into EIM.
- Functions as technical expert in environmental data management.
- Provides cross-program and agency affiliate technical peer review and coordination of environmental data management activities.
- Has lead responsibility for monitoring incoming Manchester Laboratory Information System (LIMS) batches to minimize backlog.

As the user support and business lead,

- Acts as liaison between the EIM development team and Ecology scientists/hydrogeologists and external system users.
- Coordinates with EIM project manager on work load planning and priorities, etc.
- Works integrally with the EIM User's Group and data coordinators on database issues.
- Has lead responsibility for development and implementation of technical user procedures, guidelines and training relating to EIM and environmental data management. Includes maintenance of online help, data dictionaries, and user's manuals. Assists program data coordinators and others with training activities.
- Supports EIM maintenance, enhancement, and new development activities by participating in requirements gathering, usability and user interface design, application testing, and working with programs to develop and/or update business rules.
- Has lead responsibility for tracking and prioritizing bug fixes and enhancement requests through Ecology's Bug and Enhancement Reporting System (BERS).
- Serves as primary contact for environmental laboratories concerning EIM data submittals, electronic data deliverable format requirements, and reference table issues.
- Serves on the EIM Steering Committee, reporting status and/or results of environmental data issues.
- Performs as lead for system demonstrations and marketing.
- Maintains EIM reference tables.
- Identifies, facilitates, and participates in data cleaning.
- Administrates the EIM Intranet and Internet static Web sites.
- Writes custom queries for data extraction, data cleaning, and/or reporting.

Program EIM Data Coordinators

The program EIM data coordinator positions reside within Ecology's environmental programs, including the Environmental Assessment Program as contract employees to the Toxics Cleanup and Hazardous Waste programs. The program data coordinators play a crucial role in developing accessible relationships with program staff and external clients where applicable, assisting them with all aspects of EIM data submittal. They also perform QA checks on data

submittals and upload the data into EIM. Additionally, they act as program resources for EIM questions and issues. The program EIM data coordinators work closely with the agency EIM data coordinator to direct and review the work of other staff assisting them. Specific duties are as follows:

- Act as the first point of contact and lead on assisting external clients and/or program staff with EIM data submittal requirements and process. Where applicable, help external clients with questions and issues concerning the EIM Import Module submittal process. Includes use of online software and spreadsheets. Primarily involves phone assistance.
- Respond promptly to requests or questions about data submittals from external clients and/or program staff. Use available staff and electronic resources. Includes familiarity with all EIM systems and resources as well as applicable associated program resources, such as the Toxics Cleanup Program's ISIS database.
- Prioritize tasks based on interactions with program staff, EIM staff, and the order data submittals are received. Includes design and maintenance of organizational systems such as email, electronic filing, and checklists to track EIM data submittal tasks and activities.
- Train and mentor interns and/or staff in EIM data management techniques. Includes EIM data loading.
- Process and load datasets received through the EIM Import Module. Specifics include:
    - Setting up the study, including making any necessary changes or additions.
    - Submitting bibliographic information to the appropriate publications coordinator.
    - QA'ing, loading, and verifying Location data. Use EIM Database Search or GIS to verify Locations.
    - QA'ing and loading Result data. Data quality will be determined through review prior to loading into EIM. An established process for data review will be followed that includes examination of data content in prepared spreadsheets for correctness of transcription into electronic form and comparison to EIM data acceptance protocols. Additionally, validation based on Data Quality Objectives described in the QA Project Plan or Sampling and Analysis Plan (SAP) *may* be performed. Any documentation describing the data collection procedure developed by the contractor may be examined in order to complete data review requirements.
    - Inventory and tracking of external data submittals shall be performed by using the data submittal tracking spreadsheet. Other methods of organization may be used in addition as described above.
    - Interacting with program staff and data submitters as necessary to clear up any issues surrounding the submittal.
    - Sending notification email to program staff and data submitters when the submittal process is complete.
- If applicable, process and load applicable LIMS (Laboratory Information Management System), contract lab, and/or field data batches in a similar fashion.
- Assist agency data coordinator in maintaining data dictionaries, the on-line help system, standard glossary of terms, and user instructions.

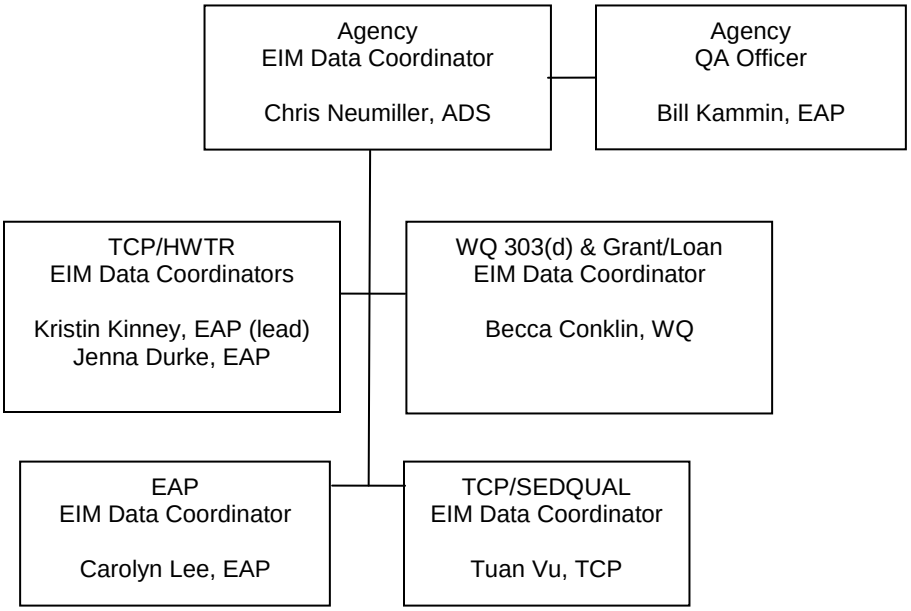
- Work with the agency EIM data coordinator and QA officer to develop and refine QA protocols for internal data and data acceptance protocols for QA'ing external data.
- For external data, run monthly comparative analyses between the EIM tracking system and program databases such as the TCP ISIS or Grantee database.
- Perform bi-yearly assessments of program LIMS batches to see if they should be processed or deleted.
- Assist and/or lead training or workshops on the EIM system for program staff and external data submitters.
- Work with program staff and agency data coordinator to migrate legacy datasets or historical data into EIM.
- Represent program interests in future EIM development activities (new software and improvements to existing software) as requested.
- Represent program interests in EIM User's Group (once monthly or less – primarily business issues).

Agency QA Officer

This position resides in the Environmental Assessment Program. The agency QA officer plays an important advisory role in the EIM system. The agency QA officer works with the agency and program data coordinators in the following areas:

- Helps craft the language for the QA planning and assessment levels at the study level, ensuring that it reflects current agency policies and standards.
- Ensures essential metadata is captured to be able to adequately assess and support data quality.
- Reviews data acceptance protocols to make sure they comply with the agency QA policies and standards.
- Serves as overall advisor with respect to EIM data management practices.
- Serves on the EIM Steering Committee.

Data Coordinator Organizational Structure



EIM (Applications and Data Services)

Chris Neumiller, Agency Data Coordinator

Balaji Narayanan, Supervisor

Debbie Stewart, Application and Data Services (ADS) Section Manager

Agency Quality Assurance

Bill Kammin, Agency QA Officer

Robert Duff, EAP Program Manager

Water Quality 303(d) / Grant and Loan

Becca Conklin, Data Coordinator

Susan Braley, Supervisor

Dave Peeler, Program Manager

Toxics Cleanup, Sediments

Tuan Vu, Data Coordinator

Chance Asher, Supervisor

Jim Pendowski, Program Manager

Environmental Assessment

Carolyn Lee, Data Coordinator

Karol Erickson, Supervisor

Robert Duff, Program Manager

Gary Arnold, Supervisor

Toxics Cleanup/Hazardous Waste

Kristin Kinney, Data Coordinator (lead)

Jenna Durke, Data Coordinator

Appendix I: Side-by-Side Monitoring Fact Sheet

This fact sheet for side-by-side monitoring is an example of new and innovative approaches for QA related to generators of data external to Ecology. It is available to Ecology grantees and other data submitters.

This document can be found at:

www.ecy.wa.gov/biblio/0803028.html.

This page is purposely left blank

Appendix J: EPA Audits of Ecology's Quality System Report, April and June 2009

EPA audits Ecology's quality system on a periodic basis. Following are reports from two recent audits. These audits are required as part of Ecology's participation in the EPA quality system.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

April 21, 2009

Reply To
Attn Of: OEA-095

Jay Manning, Director
Washington State Department of Ecology
300 Desmond Drive, P.O. Box 47600
Olympia, WA 98504-7600

Dear Mr. Manning:

Attached is the Final Report which contains the summary of the results for the assessment of the Washington State Department of Ecology (WDOE) Quality System conducted on March 23-25, 2009. The Final Report does not identify any findings of deficiencies in the WDOE Quality System. A response in the form of a corrective action plan is not required. The process for this assessment is considered closed.

We appreciate the cooperation and assistance of WDOE's staff who took time away from their busy schedules to participate in this assessment. We look forward to a continued close working relationship with William Kammin, WDOE's Quality Assurance Officer, in his efforts to strengthen your Quality System. If you have any questions about this Final Report, please call me at (206) 553-1632 or e-mail me at grepo-grove.gina@epa.gov.

Sincerely,

Ginna Grepo-Grove, Regional Quality Assurance Manager
EPA Region 10, Office of Environmental Assessment

Attachment

CC: Rob Duff, Program Manager, WDOE Environmental Assessment
William Kammin, WDOE Quality Assurance Officer
Stuart Magoon, Director, WDOE Environmental Laboratory
Thomas Eaton, US EPA, WOO Director
Joyce Kelly, US EPA, OEA Director

QUALITY SYSTEMS ASSESSMENT REPORT

For

Washington State Department of Ecology

By

Quality Staff
Office of Environmental Assessment
US EPA Region 10
1200 Sixth Avenue
Seattle, WA 98101

April 21, 2009

Table of Contents

I. Introduction 3
II. Objective 3
III. Approach 3
A. Participating Management & Staff 3
B. Documents Reviewed 4
IV. Assessment Results 5
V. Completion of the Assessment Process 5

I. Introduction

Pursuant to U.S. EPA Region 10 responsibility to oversee and assess the implementation of Quality Systems required of EPA assistance agreement recipients through EPA Grant and Cooperative Agreement regulations (40 CFR Parts 31 and 35), the Office of Environmental Assessment (OEA) Quality Staff conducted a Quality System assessment of the Washington State Department of Ecology's (Ecology) quality system on March 23-25, 2009.

II. Objective

The primary objectives of the Quality Systems assessment were to address:

- conformance of the Ecology quality system to their Quality Management Plan and Laboratory Quality Assurance Manual
- suitability and effectiveness of the practices implemented by the Ecology through their Quality Management Plan and Laboratory Quality Assurance Manual

III. Approach

The assessment was conducted to review the Quality Assurance (QA) policies and procedures utilized to ensure that data of known and documented quality are being generated. The QA policies and requirements set forth in the Quality Management Plan (QMP), Laboratory Quality Assurance Manual (QAM) and other supporting QA documents were used as the basis for the assessment. Interviews with managers and staff were used to evaluate the implementation and conformance to the QMP.

The assessment team consisted of Don Matheny and Raymond Wu from the USEPA Region 10 Office of Environmental Assessment. Interviews focused on the Water Quality, Air Quality, Toxics Cleanup, Shorelands & Assistance, Hazardous Waste & Toxics Reduction, Nuclear Waste and Environmental Assessment Programs, including both the Manchester Environmental Laboratory and the Laboratory Accreditation Unit.

A. Participating Management & Staff

Ecology Main Office

Bill Kammin – Ecology Quality Assurance Officer
Rob Duff – Program Manager, Environmental Assessment Program
Will Kendra – Section Manager, Environmental Assessment Program
Bob Cusimano – Section Manager, Environmental Assessment Program
Tom Hruby – QAC, Shorelands & Environmental Assistance
Mike Herold – QA Coordinator, Water Quality Program
Samuel Iwenofu – QA Coordinator, Hazardous Waste & Toxics Red. Program
David Sternberg – QA Coordinator, Toxics Cleanup Program
Stan Rauh – QA Coordinator, Air Quality Program
Jeff Nejedly – Supervisor, Water Quality Grant Unit
Jerry Yokel – QA Coordinator, Nuclear Waste Program

Ecology Manchester Environmental Laboratory and Lab Accreditation Unit

Bill Kammin – Ecology Quality Assurance Officer
Stuart Magoon – Director, Manchester Environmental Laboratory
Karin Feddersen – QA Coordinator
Dean Momohara – Unit Supervisor, Inorganic & Organic (acting) Units
Stew Lombard – Unit Supervisor, Lab Accreditation Unit

B. Documents Reviewed

Pre-site visit

QMP, Agency Plan to Implement, Document, and Assess the Effectiveness of the Quality System Supporting Environmental Data Operations, Sep-2005
Manchester Environmental Laboratory QA Manual Version 2.2, Aug-2007
Washington State Department of Ecology's Quality System for Fiscal Year 2006, System Structure, Activities, and Assessment, May-2007

On-site visit

SOP for Metals Water Sample Preparation, Method 200.2, Mar-2009
GCMS Data Review Checklist, 12-08 (example copy for method 8260)
Supplemental Guidance for the Determination of Biochemical Oxygen Demand (BOD_5) and Carbonaceous BOD ($CBOD_5$) in Water and Wastewater, Mar-1998
Procedural Manual for the Environmental Laboratory Accreditation Program, Nov-2002
Example Laboratory Audit Report (Accreditation Unit), Mar-09
Contract Information for Analytical Laboratory Services, Washington Department of General Administration (HTWR), Aug-2007
Summary of QAPP Template Development Need for Shorelands & Environmental Assistance Activities (current)
South Puget Sound Dissolved Study, Interim Data Report, Dec-2008
Status and Trends Monitoring for Watershed Health and Salmon Recovery: Quality Assurance Monitoring Plan, Dec-2006
Status and Trends Monitoring for Watershed Health and Salmon Recovery: Data Collection Protocol, Mar-2009 (Draft)
Funding Guidelines FY 2010 – 2011, Water Quality Financial Assistance Guidelines, Centennial Clean Water Program, Aug-2008
Grant Agreement Boilerplate Language, Water Quality Monitoring (QAPP requirements)
QAPP Review Router & Checklist for Water Quality Grant & Loan Projects, Mar-2007
TMDL Technical Peer Review Form, Sep-2008
Report Template for TMDL Effectiveness Monitoring, Nov-2008
Non- TMDL Technical Peer Review Form, Sep-2008
Template for all EAP Reports (Except TMDLs-Draft), Mar-2009
How to get your Report Reviewed, Published and Distributed Painlessly, Jan-2009
EAP Policy on Development, Adoption, Use, & Revision of Technical SOPs (1-08)
SOP for the Collection and Field Processing of Metals Samples, May-2007
EAP Procedure 1-04, Preparation, Review & Approval of QAPPs, Apr-2005
EAP Policy 4-01, Peer Review Requirements for Program Publications, June-2007
Guidelines for Preparing QAPPs, EAP, Mar-2009

IV. Assessment Results

This report contains the findings of fact on the implementation and effectiveness of the Ecology Quality System.

This report focuses on those areas in Ecology operations that in the opinion of the review team merit attention to ensure that Ecology continue to generate environmental data of known and documented quality. We would also like to acknowledge the cooperation and assistance of the managers and staff who took time from their busy schedules to participate in the assessment.

For the purposes of this report, assessment results are classified as follows:

- **Findings** – *An assessment conclusion that identifies deficiencies in implementing the Quality Systems.*
- **Observations** – *An opportunity for operational improvement (a non-critical discrepancy where no corrective action is required) or a noteworthy practice of benefit to the organization.*
- **Recommendations** – *An opinion expressed by the review team that is considered to be a best practice. It is usually offered to help the organization address a corrective action and develop a plan for that action.*

There are no findings or observations for this report. Ecology has shown continued progress in the implementation of its Quality System as illustrated by the elevated awareness of the management and staff who were interviewed and the addition of policies and/or procedures that address the planning, collection and assessment of environmental data. The following is provided to clarify the status of the overall program. A draft of the most current Washington State Department of Ecology Quality Report to Management (November 2006 – June 2009) had been assembled at the time of this review. A revision of the Department's Quality Management Plan is expected to be drafted sometime in 2010.

V. Completion of the Assessment Process

As there are no findings, this assessment does not require a formal response by Ecology.

QUALITY FILE AUDIT REPORT

For

Washington State Department of Ecology

Nuclear Waste Program

By

Quality Staff
Office of Environmental Assessment
US EPA Region 10
1200 Sixth Avenue
Seattle, WA 98101

June 10, 2009

Table of Contents

I. Introduction 3
II. Objective 3
III. Approach 3
A. Participating Management & Staff 3
B. Documents Reviewed 3
IV. Assessment Results 4
V. Completion of the Assessment Process 5

I. Introduction

Pursuant to U.S. EPA Region 10 responsibility to oversee and assess the implementation of Quality Systems required of EPA assistance agreement recipients through EPA Grant and Cooperative Agreement regulations (40 CFR Parts 31 and 35), the Office of Environmental Assessment (OEA) Quality Staff conducted a Quality System assessment of the Washington State Department of Ecology's quality system every three years. The last audit took place on March 23-25, of 2009. As a follow-up, an additional file audit assessment, of the Washington State Department of Ecology (WSDOE) Hanford Nuclear Waste Program (NWP), was conducted on May 14, 2009.

II. Objective

The primary objectives of the file audit assessment were to address:

- Conformance of the WSDOE NWP quality system to its Quality Management Plan (QMP)
- Suitability and effectiveness of the practices implemented by WSDOE NWP through its Quality Management Plan

III. Approach

The assessment was conducted to verify the existence of quality-related documents onsite, to validate the security of the data and data systems, and to confirm the effectiveness of quality assurance / quality control related processes and procedures. Interviews with NWP Quality Assurance Coordinator (QAC) and staff members & onsite QA documents were used for the evaluation. The assessment was conducted by a subject specialist, Raymond Wu, from the USEPA Region 10 Office of Environmental Assessment.

A. Participating Management & Staff

Ecology Hanford Office

Jerry Yokel	– QAC
Mike Barnes	– Chemist, Cleanup Section
Noel Smith-Jackson	– Chemist, Cleanup Section
Jacqueline Shea	– Hydrogeologist, Cleanup Section
Jeff Lyon	– Project Manager, Cleanup Section
Valerie Peery	– Library & Archive Paraprofessional, Program Admin Section
Adam Palomarez	– Network Administrator, Program Admin Section
Eric Van Mason	– Environmental Specialist Inspector, Waste Management Section

B. Documents Reviewed

Pre-site visit

- *QMP, Agency Plan to Implement, Document, and Assess the Effectiveness of the*

Quality System Supporting Environmental Data Operations, Sep-2005

- *Washington State Department of Ecology's Quality System for Fiscal Year 2006, System Structure, Activities, and Assessment, May-2007*

On-site visit

- *Guidance for Preparing Waste Sampling and Analysis Documents and QA/QC Requirements at Nuclear Waste Sites*
- *WSDOE Current Hanford Operations Office Organization Chart*
- *WSDOE SOP(Standard Operation Procedures) for shipping samples to the Nuclear Waste Program*
- *QAPP(Quality Assurance Project Plan) for WSDOE and TRAC Hanford Reach Sediment Sampling*
- *QAPP for Columbia River Sediment Sampling and Analysis for Thorium*
- *Sampling and Analysis Plan for the Washington State Department of Ecology Comparison of Discrete and Multi-Incremental Sampling for Site Characterization and Cleanup*
- *Sampling and Analysis Plan for Waste Solids in Tank 241-C-108*
- *Final Report for Tank 241-C-103 Solid Samples in Support Of The Single-Shell Tank Component Closure Program*
- *Sampling and Analysis Plan for Single-Shell Tanks Component Closure*
- *Analytical Data Package Prepared for WSDOE 100-D-100 Site by TestAmerica*
- *Partial SAP(Sampling Analysis Plan) for Cleanup Verification Package/Clean Closure Report for the Soil Column of the 116-N-3 Trench, Crib, and 100-N-63:1 Pipeline*
- *Sampling and Analysis Plan for Supplemental Remedial Investigation Activities at Model Group 5, Large-Area Ponds, Waste Sites Located Within the 200-CW-1 Operable Unit*
- *Access to Hanford Environmental Data*

IV. Assessment Results

This report contains the findings of fact on the existence, implementation, effectiveness and security of the Ecology Quality and Filing System within the Nuclear Waste Program. We would also like to acknowledge the cooperation and assistance of the staff members who took time from their busy schedules to participate in the assessment.

For the purposes of this report, assessment results are classified as follows:

- **Findings** – *An assessment conclusion that identifies deficiencies in implementing the Quality Systems.*
- **Observations** – *An opportunity for operational improvement (a non-critical discrepancy where no corrective action is required) or a noteworthy practice of benefit to the organization.*
- **Recommendations** – *An opinion expressed by the review team that is considered to be a best practice. It is usually offered to help the organization address a corrective action*

and develop a plan for that action.

There are no findings or observations for this report. However, the reviewer highly recommends WSDOE conducting annual re-visits to its quality documents so that they are up-to-date.

V. Completion of the Assessment Process

As there are no findings, this assessment does not require a formal response by the Ecology.