

## Developing and Implementing Tier 2 Monitoring Plans

This frequently asked questions document is intended to help permittees develop and implement monitoring plans to collect the necessary characterization data to determine if there is a potential for a facility to exceed water quality criterion and establish the necessary protective effluent limits. It is not meant to be an exhaustive source of information on monitoring, and instead addresses some of the more common issues. In particular, it does not cover continuous monitoring nor the use of auto-samplers. Additional information on the subject may be found in the department's "[Water Monitoring and Assessment Mode of Operations Manual](#)".

### Q: When do permittees need to conduct Tier 2 sampling?

A: When the Department of Environmental Quality (DEQ) determines that there are effluent pollutant concentrations in excess of water quality criteria as the effluent leaves the treatment facility (Tier 1 Monitoring), DEQ will send a Monitoring Action Letter (letter) requiring the permittee to undertake additional characterization monitoring (Tier 2 Monitoring) to characterize the receiving water for the applicable parameters and, if necessary, provide additional effluent monitoring. The resulting information will then be used by DEQ to determine whether the discharge has a reasonable potential to exceed water quality criteria in the receiving water body at the edge of a mixing zone. If there is reasonable potential, DEQ will use the data to develop Water Quality Based Effluent Limits (WQBELs).

### Q: What should monitoring plans cover?

A: According to DEQ's "Water Monitoring and Assessment Mode of Operations Manual" the following outline should be used when developing a Sampling and Analysis Plan:

- A. Project Management Elements:
  1. Title and Approval Sheet
  2. Table of Contents
  3. Project/Task Organization
  4. Problem Definition/Background
  5. Project/Task Description
  6. Quality Objectives and Criteria
  7. Special Training/Certification
  8. Documents and Records
- B. Data Generation and Acquisition Elements:
  1. Sampling Process Design
  2. Sampling Methods
  3. Sample Handling and Custody
  4. Analytical Methods
  5. Quality Control
  6. Instrument/Equipment testing, Inspection, and Maintenance
  7. Instrument/Equipment Calibration and Frequency
  8. Inspection/Acceptance of Supplies and Consumables
  9. Data Management
- C. Assessment and Oversight Elements:
  1. Assessments and Response Actions
  2. Reports to Management
- D. Data Validation and Usability Elements:
  1. Data Review, Verification, and Validation
  2. Reconciliation with User Requirements



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restoring, maintaining and  
enhancing the quality of  
Oregon's air, land and  
water.*

## E. Reporting Results

### 1. [Electronic Data Delivery Process](#)

#### **Q: Where should ambient samples be collected?**

A: The ambient monitoring site should be upstream of the outfall. According to DEQ's "Water Monitoring and Assessment Mode of Operations Manual" the following elements should be considered when selecting a site:

- A. The site is sufficiently far upstream of the outfall that samples do not include effluent. If the receiving stream is stagnant or suffers from tidal reflux or eddy conditions, introduction of dye into the effluent may help identify the effluent plume so that sampling within the plume is avoided.
- B. The site is located near the center of the stream and water column, in a well-mixed area away from back eddies or stratified areas. Ideally, it should be located downstream of turbulent reaches such as riffles.
- C. The site is not located near a stormwater outfall or other source of nonpoint source pollution such as eroding banks.
- D. The site is not located near roadways, metal supports, wires or treated lumber as these may introduce contamination.
- E. Ideally the site can be sampled from the shore using a sample container fastened to an extending pole. If this is not possible, other options for collecting samples are as follows, in order of most to least preferable:
  - 1. From a boat with sample container fastened to an extending pole. Sample should be collected from the bow with the boat pointed upstream.
  - 2. Instream via wading. Wader should collect sample upstream of where standing with sample container fastened to an extending pole.
  - 3. From a bridge with sample containers placed inside a bucket.
  - 4. (In the case of high bridges) via peristaltic pump.
- F. If samples must be collected from a bridge, the following measures will help limit the possibility of contamination:
  - 1. Schedule sampling events during periods of low traffic.
  - 2. Avoid disturbing debris on bridges when raising and lowering sampling apparatus.

#### **Q: How should the sampling location be documented?**

A: The final report on the results of ambient sampling should include a description of the sampling location as well as the latitude/longitude associated with the sampling site on a map. Latitude and longitude should be expressed to the nearest second. Photographs are also helpful.

#### **Q: What are some recommended sampling practices?**

A: According to DEQ's "Water Monitoring and Assessment Mode of Operations Manual" use the following sampling practices:

- A. If sampling from a bridge, samples may be more easily collected by placing the sample bottles in a bucket. Other considerations when using buckets are as follows:
  - 1. If sampling for metals, avoid using a metal bucket. A plastic bucket or trace metal sampling device should be used.
  - 2. If sampling for toxics other than metals, the bucket should be made of stainless steel.
  - 3. If sampling for conventional parameters (BOD, TSS, oil and grease, bacteria and pH) and nonconventional parameters (ammonia, nitrate-nitrite, phosphorus and dissolved orthophosphate), a plastic bucket may be used.
  - 4. Collect the sample by submerging the bottles (plus bucket if using one to hold the sample bottles) well below the water's surface. This will help prevent boundary layer contamination.

- B. The following practices will help reduce the possibility of contamination:
  1. Keep sampling equipment and workstation area clean.
  2. Wear non-powdered gloves when collecting samples.
  3. Prior to collecting a sample, field-clean sample bottles by submerging them into the river and emptying again.
  4. When sampling from a boat, position the boat so it faces upstream and collect samples from the bow.
- C. The following practices apply when sampling for dissolved metals:
  1. If collecting samples in bottles, transport the sample bottle to the workstation and decant 250 mL of the sample and filter using a certified trace metal clean filter.
  2. If using a peristaltic pump, place the suction line from the pump into the collection bottle.
- D. Other considerations:
  1. Add the appropriate preservative, if required.
  2. Place samples on ice as soon as they are collected and store in a secure location to preclude conditions which could alter the properties of the sample.
  3. Fill out the chain of custody form.

**Q: Does DEQ recommend the use of blanks and duplicates?**

A: Yes, according to DEQ’s “Field Sampling Reference Guide”, DEQ uses blanks and duplicates in the following situations:

- A. Trip/transport blank – used when testing for VOCs. A trip/transport blank is a bottle of lab water that is brought to the field and returned unopened to the lab and test in the same fashion as field samples. If the trip/transport blank is found to contain VOCs, the lab water may be contaminated.
- B. Equipment blank – an equipment blank is a blank collected by running laboratory de-ionized water through the sampling equipment and collecting as a sample. This type of blank is used to determine if the intermediate sampling equipment (such as a bucket or filter) may be introducing contamination into the sample. This can be important for metals, especially dissolved.
- C. Field blanks – A field blank is a sample of water that is brought from the lab to the field and is treated the same way that samples are treated. If contaminants are detected in the field blank, there may be atmospheric contamination.
- D. Duplicates – duplicates are samples that are collected at the same time and tested for the same parameters. They are used to confirm that sampling procedures give the same result each time.
- E. It is in the best interest of the permittee to use/collect blanks and duplicates especially when monitoring for pollutant parameters commonly associated with cross contamination such as mercury, elastomers, Bis-phenols, VOCs, etc..

**Q: What about chain-of-custody procedures?**

A: Chain-of-custody procedures help ensure the integrity of samples from collection to disposition. According to DEQ’s “[Field Sampling Reference Guide](#)”, DEQ uses the following chain-of-custody procedures:

- A. Field sampling events are documented in a bound logbook.
- B. Samples are shipped in conformance with U.S. Department of Transportation (DOT) rules of shipment. See the following for more information:
  1. Title 49 of the Code of Federal Regulations (49 CFR parts 171 to 179)
  2. International Air Transportation Association (IATA) hazardous materials shipping requirements. These may be found in the current edition of IATA’s Dangerous Goods Regulations.



- C. All shipping documents, such as air bills, bills of lading, etc., are stored in a secure place.

**Q: Do I need to have my Sampling Plan approved by DEQ?**

A: Yes, you will need to submit your Tier 2 Sampling Plan to your DEQ permit writer as detailed in either the permit language or the Monitoring Action Letter sent to you by DEQ.

**Q: How should the results be reported to DEQ?**

A: Results should be reported using DEQ's Electronic Data Delivery system. For more information, go to the following webpage:

<http://www.oregon.gov/deq/WQ/Pages/toxics/eddtoxics.aspx>

If the permittee wishes to submit data for use by DEQ in updating the 303(d) list, instructions for doing so may be found on DEQ's volunteer monitoring webpage at:

<http://www.deq.state.or.us/lab/wqm/volmonitoring.htm>

**Q: What are some other references on monitoring that may be helpful?**

A: For additional information, consult the following:

[Surface Water Sampling SOP - EPA Region 4](#)

[USGS National Field Manual for Water-Quality Data](#)      [\(Errata Sheet\)](#)

[Surface Water Sampling SOP – EPA Region 8](#)

[Surface Water Sample and Data Collection – USDA, Forest Service](#)

[Field sampling Reference Guide – OR DEQ](#)

Note: these documents were written by different parties at different times and for different needs and there may therefore be instances in which they contradict each other. Permittees with questions may also contact the DEQ Lab (503-693-5700).

**Q: How does DEQ collect water samples?**

A: DEQ uses different Manuals and guides depending on the type of sampling:

[Water Monitoring and Assessment Mode of Operations Manual](#)

[Field Sampling Reference Guide](#)

[Sampling Ambient Water for Trace Metals at EPA Water Quality Criterion Levels](#)

**Q: Is there just one document that I can use?**

A: DEQ is in the process of developing Tier 2 Sampling Template. This document is scheduled for completion in spring 2017.

**Q: Does DEQ have example Sampling Plan I can use for reference?**

A: DEQ has used the following sampling plans in the course of its work:

[SB 737 Implementation](#)



## **Accessibility**

Documents can be provided upon request in an alternate format for individuals with disabilities or in a language other than English for people with limited English skills. To request a document in another format or language, call DEQ in Portland at 503-229-5696, or toll-free in Oregon at 1-800-452-4011, ext. 5696; or email [deqinfo@deq.state.or.us](mailto:deqinfo@deq.state.or.us).

