

BRIDGE MAINTENANCE WASHING AND CLEANING MONITORING PROTOCOLS

MARCH 2010 - FINAL

APPROACH

Bridges in Washington are inspected on a routine basis by WSDOT and are periodically washed to allow for visual inspection and to maintain structural integrity. Maintenance washing and cleaning of bridges is typically performed by WSDOT crews, while washing and cleaning in preparation for painting is completed by contractors. This protocol is specific to maintenance washing and cleaning of bridges by WSDOT crews.

The water that comes into contact with the bridge paint and roadway substances can pick up contaminants that have the potential to affect the quality of receiving waters. WSDOT's NPDES Waste Discharge Permit (#0039039) stipulates that discharge from maintenance washing of one bridge each year be tested to evaluate whether the discharge of bridge wash water represents a reasonable potential to exceed water quality standards. To meet the NPDES permit requirements, bridge maintenance wash projects must occur during the following times: west of the Cascade Mountain Crest - November 1 to May 31, east of the Cascade Mountain Crest - December 1 to June 30. The bridge to be monitored is selected by WSDOT's ESO and Maintenance Offices, with input from regional bridge maintenance supervisors. The bridge selection should occur as early as possible for the upcoming year to ensure that monitoring requirements of the NPDES permit are.

Wastewater is generated by two separate actions during the washing effort. The first is generated during the scraping and vacuuming (dry cleaning) of debris. Only a small amount of water is discharged during this part of the process because most is vacuumed directly into the vac truck. The second source of wastewater is from rinsing the bridge after the scraping and vacuuming. This represents almost all of the wastewater that enters the receiving water. Due to the lack of water generated during the first cleaning step, it is not practical or necessary to collect separate samples of these sources. As will be described below, the samples finally collected will be a mix of both parts of the cleaning process.

The basic procedure laid out in this protocol is to collect three samples from different locations along the bridge. Samples will be collected by lowering the sample container(s) over the bridge before cleaning begins, tying it off, and leaving it there during the washing. In some cases it may be possible to place the bucket on the structure below the area being washed to collect wash water samples. The only potential difficulty related to this sampling is ensuring an adequate volume of water is collected at each of the three locations. Therefore it is recommended that the sample container used has a large opening (e.g., a five-gallon bucket) and that two buckets are hung off the bridge at each of the three locations. If two containers are used per location, they should be hung next to each other and at the same elevation from the bridge. Try to locate the sampling containers under structural connection points where debris will have built up and under vertical support structures that would concentrate effluent into a single stream. Selecting three locations along the bridge and collecting separate samples (i.e. field replicates) is recommended as a means of accounting for field variability in pollutant concentrations. If not enough water is collected or samples are spilled, etc., then just prepare one or two samples that are a blend of all the water collected.)

After washing is completed, collect both of the buckets from each of the three locations and pour the two together and swirl them until they are well mixed. (This should result in a final count of three containers; one for each location along the bridge.) The contents from these three containers (buckets) should then be poured into labeled sample bottles for delivery to the laboratory.

In addition, a sampling of the receiving water (background) is also required. This process involves taking a grab sample approximately 100 feet upstream from the bridge structure and away from the shoreline where any culverts or outfalls may be located for collecting samples from the receiving water. The sample should be taken on the same day that the wash water collection is being performed. The grab sample may be taken by securing the sample bottle on the end of a plastic rod, wading into the stream, or from a boat. If the sample is taken by wading, it is important to wait until the water is clear of any sediment that may have been stirred up and that the sample is taken upstream of your location. If the sampling is taken from a boat, insure the sample is taken up stream of the boat motor. Although follow the sampling procedures of EPA Method 1669 (clean hands/dirty hands) is not required for background sampling, it should be considered when practicable to minimize any potential contamination.

The samples will be analyzed for hardness, and for total and dissolved copper, lead, and zinc.

The following sections describe specific steps for collecting samples in more detail.

FIELD PREPARATION

Select and order supplies from an accredited laboratory under contract with WSDOT to perform environmental analytical laboratory services. It is important that you explain to the lab the tests and testing limits that are required under this process (see Table 1). This may affect how much sample material needs to be collected and whether or not the samples need to be preserved or filtered in the field. A list of these laboratories is shown at: <https://fortress.wa.gov/ga/apps/ContractSearch/ContractSummary.aspx?c=01807>

- The order should include (assumes three sample locations, one bottle for background (receiving water), and one extra bottle for backup/field duplicate):
 1. Five (5) - 500 ml bottles preserved with H_2SO_4 if required by the lab for hardness.
 2. Five (5) - 500 ml bottles preserved with HNO_3 if required by the lab for total copper, lead, and zinc.
 3. Five (5) - 500 ml bottles without preservative
 4. Labels for bottles and chain of custody forms
 5. Dilute (10%) HCl in a squirt bottle (for container washing)
 6. Deionized distilled water in a squirt bottle (for container washing)
- Collect the following equipment:
 - Six cleaned five-gallon buckets with lids and handles
 - Rope cut into appropriate lengths for hanging the buckets. (Note: Confirm length through a quick trip to the bridge site or with photos. In most cases, hang the buckets from the lowest horizontal support directly under the bridge deck)
 - Field notebook
 - Sharpie/pencils
 - Pre-labeled sample bottles

- Small funnel for filling sample bottles
- Cooler(s) with ice
- Bubble wrap
- Safety equipment (gloves, goggles, reflective clothing, hardhat, earplugs, work boots, flashlight)
- Put on safety goggle and gloves, and rinse sample buckets with a 10% HCl solution and then rinse with deionized water, and cover with plastic lids to prevent contamination. (Note: Use new buckets or clean and scrub the buckets with soap and hot water before rinsing with 10% HCl solution). The rinsate may be disposed of in a sink.
- Sample bottles should be organized and labeled (for example, Skookumchuck Bridge, Site #1, date, analytes). It may also help to write numbers on the sample buckets to correspond to the sampling locations.
- Call the contracted laboratory and coordinate sample pick-up or delivery. Samples should be received by the laboratory within 36 hours after collection.

Sample Collection

The following procedure should be implemented during bridge washing activities:

Background (Receiving water)

- Collect sample 100 feet upstream from the bridge immediately prior to bridge washing activities using the Grab Sample method. If a boat is used or the receiving water is “wadeable”, or long plastic rod is used, use a “dip-and-take” method to directly fill each sample bottle. Using this method, simply submerge the sample bottle below the surface of the water until the bottle is full. Place lid on bucket to prevent contamination. If in a boat with a motor, do not collect your sample downstream of the motor.

Wash Water

- Select at least three monitoring locations for sample collection. They should be in areas likely to receive a significant amount of rinse water (e.g. directly under vertical support structures or in areas with heavy buildup of debris)
- Use nylon rope to lower at least two sample buckets over the bridge deck for each monitoring location. Using two buckets per location should ensure that an adequate amount of water is collected.
- Upon completion of the washing effort in the sample collection areas, raise up the sample buckets at each location to the bridge deck. The rinse water collected in the buckets should be mixed together (i.e. “composited”) for each location.

Sample Preparation

The following procedures can be completed on-site or at a more convenient location:

Receiving Water

1. One (1) 500 ml bottle preserved with H₂SO₄ (for hardness). Preservative only necessary if lab requires for testing.
2. One (1) 500 ml bottle with no preservative (for dissolved copper, lead, and zinc). Filtering of water only necessary if lab requires for testing.

3. One (1) 500 ml bottle preserved with HNO₃ (for total copper, lead, and zinc). Preservative only necessary if lab requires for testing.
- Wrap sample bottles in bubble wrap and place in cooler(s) with ice (i.e., maintained at 4°C).
 - Fill out a chain-of-custody form (see example attached to this appendix)
 - Ship sample bottles and chain-of-custody form to laboratory. Include chain-of-custody form with cooler(s).
 - Record additional notes, observations, etc.

Wash Water

- Select the 1st sample bucket and swirl gently to ensure sample is well-mixed.
- Using a small funnel, carefully pour water from the bucket into the sample bottles. Fill to approximately the “shoulder” of the sample bottle. DO NOT OVERFILL. Fill pre-labeled sample bottles as follows:
 1. One (1) 500 ml bottle preserved with H₂SO₄ (for hardness)
 2. One (1) 500 ml bottle with no preservative (for dissolved copper, lead, and zinc)
 3. One (1) 500 ml bottle preserved with HNO₃ (for total copper, lead, and zinc)
- Repeat above steps for the remaining samples.
- If possible, fill an additional set of sample bottles from one of the composite samples. This will serve as a field duplicate.
- Wrap sample bottles in bubble wrap and place in cooler(s) with ice (i.e., maintained at 4°C).
- Fill out a chain-of-custody form (see example attached to this appendix)
- Ship sample bottles and chain-of-custody form to laboratory. Include chain-of-custody form with cooler(s).
- Record additional notes, observations, etc.

Laboratory Procedures

Analytical parameters and methods, detection limits, preservation methods, and holding times for samples collected during monitoring are summarized in Table 1. It is important that this information be provided to the lab so the appropriate tests will be performed, including the required detection limits. The laboratory selected must be accredited under the provisions of Accreditation of Environmental Laboratories, Chapter 173-50 WAC, and also should be under contract with WSDOT). The laboratory will also be responsible for internal QA checks.

The lab data package should include, but not be limited to:

- A case narrative including date samples collected, received, extracted, and analyzed,
- Practical quantitation limits and sample results,
- Methods blanks,
- Spike levels, blanks, and percent recovery, and
- Laboratory duplicates and relative percent difference between duplicates.

TABLE 1. PARAMETERS AND SAMPLE ANALYTICAL METHODS (Freshwater).				
Parameter	Method Type	Method Number	Detection Limit ⁽¹⁾	Holding Time
Total Hardness	Color/auto or Titr/EDTA	EPA 130.1 or 130.2	2 mg/L	6 months
Total and Dissolved Copper	ICP/Mass Spectrometry	200.8 ⁽³⁾	0.4 µg/L	6 months
Total and Dissolved Lead			0.1 µg/L	
Total and Dissolved Zinc			0.5 µg/L	
<p>(1) mg/L = milligrams/liter µg/L = micrograms/liter</p> <p>(2) APHA Standard Methods, 1992.</p> <p>(3) U.S. Environmental Protection Agency (EPA) Publication EPA/600/R-94-111.</p>				

Final Monitoring Report

Submit monitoring report, including test results, to the Statewide Permit Coordinator at ESO upon completion of the monitoring effort. The Statewide Permit Coordinator will be responsible for submitting the report to the Department of Ecology.

Reports for maintenance washing shall include the applicable items listed in the NPDES permit under Section S2.A.1 which include:

- The date, including year, and time of day samples were collected
- The location where sample was collected (both effluent and background samples)
- The river flow at the time of the project, reported in cubic feet per second (cfs)
- The total volume of water discharged to surface waters, reported in gallons
- The number of hours spent actually washing the structure
- The specific detection limits provided to the lab for analysis (provided in table above)
- Copies of any field notes

The attached monitoring form can be used in the field to insure all the necessary information is collected and documented.

Consider For All Reports:

Include an aerial photograph showing the location of the terminal, painting locations, and sampling locations if at all possible. Consider taking photographs of the work area, wash water collection process, and any BMPs used. These photographs are very beneficial when included in the report and will provide Ecology and ESO with a clear understanding of the work/monitoring performed under this permit.

BRIDGE MAINTENANCE WASHING –MONITORING FORM

Bridge Name & Number:
Name of Waterbody:
County & WRIA:
Project Date (month and year):
Sampling Date(s) & Time of Day:
Number of pressure washer used:
Total number of man hours spent washing the bridge:
Total volume of wash water discharged into the waterbody:
River flow in cubic feet per second (cfs):
Receiving water (background) sample taken for: <ul style="list-style-type: none"><input type="checkbox"/> Copper – total & dissolved:<input type="checkbox"/> Lead – total & dissolved:<input type="checkbox"/> Zinc – total & dissolved:<input type="checkbox"/> Hardness
Location where the receiving water sample was taken (include distance from the bridge):
Effluent (wash water) samples taken for: <ul style="list-style-type: none"><input type="checkbox"/> Copper – total recoverable & dissolved:<input type="checkbox"/> Lead – total recoverable & dissolved:<input type="checkbox"/> Zinc – total recoverable & dissolved:<input type="checkbox"/> Hardness
Locations where the effluent samples were taken:
Field notes taken? If YES, attach copy to Monitoring Report.
Is Lab(s) Accredited?
EPA Approved Methods for sample the Lab will use?
Detection limits requirements provided to lab?
NOTES: