

**EWEB STORM EVENT SAMPLING PROCEDURES**  
**Step-By-Step Description of Sampling Protocol**  
**For Non-Pesticide Sampling Events**  
**February 25, 2003**

The following sampling protocol were developed based on the USGS *National Field Manual for the Collection of Water-Quality Data (September 1999)*, *EWEB Lower McKenzie River Watershed, Stormwater and Urban Runoff Monitoring Plan (November 2001)*, *EWEB Revised Proposal for Storm Event Pesticide Monitoring (August 2002)*; and personal communication with Chauncey Anderson (USGS, Portland Office).

**Scope**

A total of eleven locations will be sampled as part of the first flush storm monitoring effort. Water sample aliquots will be collected over the rise of the hydrograph. These aliquots will be composited to represent the initial flush associated with a storm. Table 1 summarizes the equipment type and other information associated with each monitoring site.

**Table 1**  
**Summary of Monitoring Sites**

<b>Monitoring Site</b>	<b>Auto Sampler</b>	<b>Flow Meter</b>	<b>WQ Sonde<sup>4</sup></b>	<b>Turbidity Meter<sup>4</sup></b>	<b>Additional Samples</b>
72 <sup>nd</sup> Street	Yes <sup>1</sup>	Yes <sup>3</sup>	No	Yes	No
69 <sup>th</sup> Street	Yes <sup>1</sup>	Yes <sup>3</sup>	Yes	No	No
64 <sup>th</sup> Street	Yes <sup>1</sup>	Yes <sup>3</sup>	Yes	No	No
52 <sup>nd</sup> Street	Yes <sup>1</sup>	Yes <sup>3</sup>	Yes	No	No
42 <sup>nd</sup> Street	Yes <sup>1</sup>	Yes <sup>3</sup>	Yes	No	No
Cedar Cr-Saunders	Yes <sup>2</sup> (w/Rain Gauge)	USGS Gauging Station	Yes	No	No
Cedar Cr-Billings	Yes <sup>1</sup>	Yes <sup>3</sup>	No	Yes	No
Keizer Slough	Yes <sup>1</sup>	Yes <sup>3</sup>	No	Yes	No
Camp Creek	Yes <sup>1</sup>	Yes <sup>3</sup>	Yes	No	No
McKenzie R.-Hendricks	No	No	No	No	Duplicate
McKenzie R.-EWEB Intake	No-Operator Collected	EWEB River Level	EWEB Intake Sensors	EWEB Intake Sensors	MS/MSD

<sup>1</sup> – Automated samplers will be set up at these monitoring sites prior to storm event.

<sup>2</sup> - Timed sample collection (e.g., every 5 minutes sampler collects an aliquot).

<sup>3</sup> – Area/Velocity flow meters will be set up at these monitoring sites prior to the storm event.

<sup>4</sup> – Water quality Sonde or turbidity meter will be set up at this site prior to storm event.

As indicated in Table 1, each monitoring station will have an assortment of equipment. EWEB anticipates that prior to the storm event the equipment will be cleaned, calibrated, pre-positioned, programmed, and ready to initiate sampling at a majority of the monitoring sites.

The Cedar Creek Saunders Bridge monitoring station will use an automated sampler (equipped with a rain gauge) that will be programmed to collect samples based on time. At the McKenzie River Hendricks Park location a water sample will be collected manually using a peristaltic pump. EWEB’s Hayden Bridge treatment plant operator or one of the sampling crew will collect samples manually from the raw water sampling port.

**Sample Teams**

*Storm Prediction/Notice*

EWEB will be monitoring the 10-day and long term forecasts published on the National Weather Service’s secured website. The NWS is able to predict rainfall amounts associated with the storm. If a storm is predicted in the 7-10 day forecast to have significant rainfall (0.35+ inches), team members will be notified that this storm will be targeted for monitoring and will be updated daily as the front approaches. On the day of the storm, team members will be asked to meet at the equipment staging area (EWEB’s OrAqua site near Hayden Bridge) at a certain time.

*Sampling Teams*

It is anticipated that there will be three sampling teams (two people per team). The following table assigns monitoring locations for each sampling team.

**Table 2  
Three Team Sample Location Assignments**

<b>Team 1</b>	<b>Team 2</b>	<b>Team 3</b>
42 <sup>nd</sup> Street Stormwater	64 <sup>th</sup> Street Stormwater	Cedar Creek @ Billings Ln Brdg
52 <sup>nd</sup> Street Stormwater	69 <sup>th</sup> Street Stormwater	Camp Creek @ Bridge
Keizer Sbugh	72 <sup>nd</sup> Street Stormwater	McKenzie River @ Hendricks Pk
	Cedar Creek @ Saunders Bridge	
		(Duplicate)

**Sample Collection Methods**

Each sampling team will wear disposable surgical gloves during sampling and sample processing and change gloves between sample locations. The teams should try to practice “clean hands/dirty hands” sample collection techniques as much as possible. Basically one person in the team will be designated as clean hands (CH) and handles all equipment that comes in contact with the sample (i.e., sample bottles, discharge end of tubing, auto sampler bottle chamber, field documentation). The other person is designated as dirty hands (DH) and handles all equipment that comes into contact with potential sources of contamination (i.e., intake tubing, opening sample vaults, removing auto sampler from vaults, drives vehicle, uses tools, runs pumps).

An equipment rinseate sample will be collected from the clean equipment prior to using the equipment in the field. The rinseate sample will be collected by pouring or pumping organic free DI water through/over a representative sample of all the different types of equipment being utilized in the storm event sampling (i.e., intake tubing, interior peristaltic pump tubing, glass jars, plastic churn-splitter, sample filtration equipment, plastic buckets, etc.).

*Automated Samplers (\* - already done prior to sampling effort, crews do not need to do these tasks)*

At each monitoring station with automated samplers the following tasks should be performed:

1. \*Install WQ sonde in creek or channel (DH).
2. \*Pull auto sampler from vault (if in vault) (DH).
3. \*Check battery, intake tubing attachment, & flow meter connection (CH).
4. \*Place intake tubing into creek or channel at center of flow (DH).
5. \*Remove sampler top and hold (DH) while other team member (CH) operates in manual pump mode to rinse with native water from creek or channel into waste bottle or plastic bucket.
6. \*Remove bottle lids (place in clean ziplock bag), check to make sure bottle labels match sampling location (CH).
7. \*Replace auto sampler top and place back into vault (DH).
8. \*Review sampler program (per attachment) and enter flow weighted sampling criteria (CH).
9. \*Initiate auto sampler program (CH).
10. \*Close vault lid (DH).
11. Fill out field documentation form (as much as possible), note sampler start time (CH).
12. Collect approximately 3-gallons of native water in 5-gallon plastic bucket (marked "native H<sub>2</sub>O rinse") for later native water rinses, place lid on bucket (DH).
13. Revisit site periodically (approximately every 20-25 minutes), remove protective cover (DH), review sample progress (CH) by pressing (from main menu) "Display Data" then "Sample History". This will allow you to assess if bottles are nearly full (there are 8 bottles per sampler). If nearly full a new set of bottles should be installed. Also use "Display Data" to look at level data and determine if sampler is still on the rise in the hydrograph.
14. Label bottle lids and/or carousel with sample location and the sample set number (i.e., if the first or second set from that location). Leave bottles in carousel so we know what number the bottles are in the sample collection process and place bag of ice in middle of carousel.
15. To install new set of bottles:
  - a. Press the "run/stop" button (twice) and remove sampler from vault (if in vault) (DH).
  - b. Remove top and check sample bottles to make sure sampler filled bottles as desired. Place lids on bottles (CH), dump excess water from bottom (DH), and place bag of ice in middle of carousel.
  - c. Replace with new set of bottles, remove lids and place lids in clean ziplock bag (CH).
  - d. Replace top on sampler and hookup computer cable from hand held data transfer unit (DTU) to the RS232 port on the sampler (once plugged in the DTU will turn on).
  - e. Select a data cell that is not already full of data. To do this press the "Data Cell" button on the DTU unit and it will scroll thru each data cell (data cells # 1 thru 20), a red light in lower left corner of the DTU indicates data cell is already full.
  - f. Press "Data Transfer" button on the DTU and this will initiate downloading of data from the sampler to the DTU. When data is being transferred, the DTU will flash "percent complete" on the display. Upon completion, unhook cables.
  - g. Press "run/stop" button to restart sampler program. It will ask you to "resume" or "Start at Beginning". Select to start at beginning. It will then say that you will lose all your data (that is ok, because you downloaded it), hit Start at Beginning again. Make sure you start the program (you need to press any key) and see that it is running.
  - h. Replace protective cover, and place back in vault.
16. When sampling is complete (when rain fall decreases and flow drops off OR three hours elapse), press "off" and remove sampler from vault (if in a vault) and detach flow meter cable and intake tubing (DH) (and turbidity cable or rain gauge cable if applicable). Remove top (DH) and place lids on bottles (CH). Dump excess water out of sample base (DH) and place bag of ice in middle

of carousel and replace sampler top. Place entire auto sampler (w/samples and ice in base) into vehicle. If turbidity meter is attached to sampler please take this with you and place in vehicle (be gentle with turbidity probe).

17. Leave sample tubing and flow meter in place (EWEB will pickup later). Please put tape over connection fitting at end of flow meter cable (to keep dry) and hide in brush or put back in vault.
18. Leave WQ sondes in water (EWEB will pickup later).
19. Complete sample documentation, note time sampling ceased (CH).

#### *Manual Sampling (\* - already done prior to sampling effort, crews do not need to do these tasks)*

At the McKenzie River @Hendricks Park Boat Ramp sample location a manual grab sample will be collected. A peristaltic pump will be used to collect the grab sample from the McKenzie River.

1. \*Put new tubing in peristaltic pump (if not already done). Measure and cut new intake tubing and attach to pump (CH).
2. Place intake tubing as far into the river as possible using length(s) of pipe provided (i.e., attach tubing to pipe sections via tape) and pump native water through tubing and into a clean churn-splitter. Rinse churn-splitter well with native water and dump out (DH).
3. Record time on field sheet (and other sample information) and collect approximately 3.5 to 4 gallons of water into the clean plastic churn-splitter properly labeled for the site. Also continue to collect approximately 3-gallons of native water (for later rinse during sample processing) into a clean plastic bucket (marked "native H<sub>2</sub>O rinse"). Place lid on "native H<sub>2</sub>O rinse" bucket.
4. Place secured churn-splitter in trash bag with ice.
5. Record sample completion time and complete field documentation form.
6. Change out tubing in peristaltic pump and put pump in clean bag (DH).

#### *Duplicate Sample*

At the McKenzie River-Hendricks Park site, a duplicate sample will be collected (double volume) while collecting the grab sample. The sample volume will be increased to allow for collection of a duplicate sample. The sample will be processed as normal except two samples will be extracted from the churn-splitter instead of one (see Sample Processing section).

#### *Matrix Spike/Matrix Spike Duplicate*

At the Hayden Bridge treatment plant, the shift operator will collect aliquots every 3 minutes for 45 minutes of the raw water. This sample will be processed as normal, except extra sample volume will be sent to the labs for them to spike. Organics will require triple volume and inorganics double volume.

#### *Rinseate Blank Samples*

Rinseate blanks will be used to determine if decontamination procedures were adequate and to determine if cross contamination has occurred during sampling. A rinseate sample will be collected by pouring or pumping Organic free DI water through clean equipment and collecting the rinse water into the appropriate laboratory containers for analysis. A rinseate sample will be collected from the following equipment:

- ? Clean Teflon-lined 1-liter glass bottles, intake tubing, internal peristaltic pump tubing, and plastic churn-splitter.

#### **Sample Processing**

After completing sample collection, the crews will drive to the EWEB Hayden Bridge treatment plant for processing, labeling, and preparing samples for shipment to labs. The best approach is to setup an

assembly line type operation to move samples through quickly and efficiently. Decontamination of the processing equipment is critical to avoid cross-contamination. Table 3 summarizes analytical requirements and appropriate lab containers for this monitoring effort.

*First Flush Samples*

1. Start with samples from the cleanest monitoring locations first. Label and tape laboratory sample bottles for sample being processed (EWEB will have pre-printed labels).
2. Download data from data transfer unit(s) and/or autosampler to laptop. Evaluate hydrograph for that sample location and select appropriate sample bottles that correspond to the rise in the hydrograph. Sample bottles will be removed from the sampler and passed along for homogenization in the churn-splitter.
3. Rinse the churn-splitter with native water from that sample location (collected in the clean plastic bucket labeled “native H<sub>2</sub>O rinse”).
4. Sample bottles will be gently shaken to mobilize sediment and dumped into the churn-splitter.
5. Churn-splitter will be operated by using smooth strokes up and down (not vigorous) without breaking the plane of the water. This will be done for at least one minute. As you slowly churn the water use the spigot near the bottom of the churn to fill whole water sample bottles. Make sure sample bottles are properly labeled for the monitoring site being processed.
6. After filling all the whole water sample containers, use the remaining water for the filtered sample container (for dissolved metals). Insert the intake tubing from the peristaltic pump fitted with a filter cartridge into the churn splitter. Pump some water through the tubing and filter into a waste bottle (50-100ml) prior filling one 250ml plastic bottle for dissolved metals analysis (preserved with HNO<sub>3</sub>).
7. Decontaminate the churn-splitter and change out tubing in the peristaltic pump with a new filter unit (see Decontamination Procedures section).

**Table 3**  
**Analytical requirements**

<b>Analysis</b>	<b>Container Type</b>	<b>EPA Method</b>	<b>Preservative</b>	<b>Holding Time</b>
Total Metals	250ml Plastic	200 Series	HNO <sub>3</sub> & Ice	6 Months
Dissolved Metals	250ml Plastic	200 Series	HNO <sub>3</sub> & Ice	6 Months
Nitrate, Nitrite, & TSS	1-Liter Plastic	300 & 160.2	Ice	28 Days 7 Days (TSS)
Total Phosphorus, TKN, Ammonia, TOC, & COD	500ml Plastic	365.1, 365.3, 351.3, 351.4, 350, 410.4	H <sub>2</sub> SO <sub>4</sub> & Ice	28 Days
Fecal Coliform	150ml Plastic	SM 9222	Ice	30 Hours
Fecal Streptococcus	150ml Plastic	SM 9230B	Ice	30 Hours
Enterococci	150ml Plastic	SM 9230B	Ice	30 Hours
E. Coli	150ml Plastic	SM 9222	Ice	30 Hours

**Decontamination Procedures**

1. Rinse with tap water to remove large material (sediment).
2. Wash with 2%alconox solution.
3. Rinse with hot tap water.
4. Rinse with Hayden Bridge lab DI water.

## **Sample Shipment**

A commercial lab (North Creek Analytical) will be used to analyze samples for metals, nutrients, bacteria, TOC, COD, and TSS.

1. Glass sample containers should be wrapped in bubble wrap and bubble wrap placed on the bottom of the cooler.
2. Double bag ice and place on top of samples.
3. Place completed Chain of Custody form for the sample shipment in a large zip lock bag and taped to the top of one of the coolers for that lab.
4. Use strapping tape to seal coolers closed.
5. Place pre-printed shipping labels on coolers.