Memorandum

To: Chauncey Anderson, USGS
From: Karl Morgenstern, EWEB
Date: March 31, 2004
Subject: Revised Proposal for Storm Event Pesticide Monitoring

Background

The McKenzie River is the sole source of drinking water for over 200,000 people in the Eugene area. To protect this critical resource, EWEB developed a Drinking Water Source Protection Plan in October 2000 and began implementation of this plan in April 2001. As part of the drinking water source protection program, EWEB began implementation of a stormwater and urban runoff monitoring program in the winter of 2001/2002 for the lower McKenzie River watershed. The purpose of this monitoring program is to evaluate pollution loadings associated with storm runoff upstream of our intake and to use the data to identify hot spots of pollution runoff to focus education, outreach, and mitigation efforts. Understanding pesticide and herbicide runoff during storm events is critical to the source protection program due to the difficulty of treating raw water for these dissolved contaminants. EWEB has partnered with the USGS since August 2002 to coordinate pesticide sample collection and use the USGS Denver laboratory for pesticide analysis. This proposal is a continuation of this effort.

The reason for conducting storm event monitoring is that stormwater and urban runoff contains elevated concentrations of fecal coliform bacteria, petroleum hydrocarbons, sediment, metals, nutrients, pesticides and herbicides, chlorides, poly aromatic hydrocarbons, and other organic compounds. These pollutants tend to become mobilized during flushing actions from major storm events. A number of studies have demonstrated that 70-90% of annual contaminant loading to receiving streams from urban runoff occurs during the flushing action of major storm events following periods of dry weather.

Sampling Approach

This section provides an overview of the proposed sampling approach for storm event monitoring. Please refer to EWEB's *Lower McKenzie River Watershed, Stormwater and Urban Runoff Monitoring Plan (November 2001)* for additional detail on the sampling approach and other aspects of this monitoring program.

EWEB will use American Sigma 900MAX automated samplers and area/velocity flow meters to collect flow weighted samples at various monitoring locations in the lower McKenzie River watershed. In addition, YSI 6920 multi-parameter water quality sondes will be deployed at each monitoring location to log turbidity, conductivity, dissolved oxygen, temperature, and pH at five-minute intervals. The initial stage of the runoff event will be targeted for sample collection (i.e., from the start of the runoff event to the peak of the hydrograph).

The automated samplers are programmable to be triggered with a rise in water level or increase in flow to start collecting sample aliquots based on flow (e.g., a 100ml aliquot is collected every 50,000 gallons of flow). The sampler vinyl intake tubing, with a stainless steel strainer attached to the end, will be positioned in the creek or stormwater channel to collect samples from the centroid of flow. The sampler will be programmed to include a field rinse prior to each aliquot collection. Sample aliquots are pumped via a peristaltic pump into eight 1-liter Teflon-lined glass bottles. Additional 8-bottle sets are available to switch out for each automated sampler in the event that the first eight-bottle set is filled during an extended runoff event. Flow-weighted sampling will continue until the runoff event subsides or three hours, which ever comes first.

Upon completion of the sampling event, the hydrograph data will be reviewed for each monitoring station to determine the time when the hydrograph peaked. The sample log will then be reviewed to determine which bottles to include in the composite sample that represent the initial stage of the hydrograph (i.e., from the start of the runoff event to the peak of the hydrograph). For selected sites, two samples will be collected, one from the initial stage of the hydrograph and a second sample that is composited over the tail of the hydrograph.

Once the sampling is complete, the Teflon-lined 1-liter glass bottles are composited via a churn-splitter into the appropriate laboratory containers for analysis. Samples that require filtration (i.e., metals and pesticide/herbicides) will be composited via a churn-splitter into clean Teflon-lined 1-liter glass bottles and then filtered into the appropriate lab container for analysis. Filtration of samples for pesticide analysis will be accomplished using baked glass fiber filters, a stainless steel filtration unit, and ceramic piston metering pump with Teflon tubing, cleaned according to USGS protocols.

Samples collected from the main stem of the McKenzie River will not be conducted using automated samplers. Instead these samples will be collected from Hendricks Bridge using a portable peristaltic pump and from EWEB's Hayden Bridge intake via manual methods. These samples will be collected as grab samples directly into amber glass 1-liter bottles (baked) and then filtered into a second set of clean glass amber 1-liter bottles (baked) for transport to the USGS laboratory for analysis.

All storm event samples will be analyzed by a commercial laboratory for the following:

- ? Total and dissolved metals (arsenic, cadmium, chromium, copper, mercury, nickel, lead, and zinc);
- ? Nutrients (nitrate-nitrogen, nitrite-nitrogen, ammonia, total kjeldahl nitrogen, and total phosphorus);
- ? Bacteria (fecal coliform, E. coli, fecal streptococci, and enterococci);
- ? Total petroleum hydrocarbons and hydrocarbon identification;
- ? Semi-volatile organic compounds;
- ? Total suspended solids;
- ? Total organic carbon; and,
- ? Chemical oxygen demand;

All storm event samples for pesticides will be analyzed by the USGS Denver laboratory for the following:

- ? Pesticides USGS Schedule 2001; and,
- ? HPLC/S-SPE Polar Pesticides USGS Schedule 2060.

Sample Number, Type, and Location

A total of eleven monitoring stations will be sampled during the spring runoff storm event in April/May 2004 (see Attached Figures). These monitoring stations include:

- ? Five City of Springfield stormwater outfalls;
- ? Two Cedar Creek locations (upstream and downstream of stormwater outfalls);
- ? One Camp Creek location near the confluence with the McKenzie River;
- ? One Keizer Slough location; and,
- ? Two McKenzie River locations (upstream and downstream of confluences with Cedar Creek, Camp Creek, and Keizer Slough)

One flow-weighted composite sample will be collected over the rise of the storm hydrograph at each monitoring stations (11 water samples). In addition, a pre-storm composite sample will be collected at one stormwater location to assess conditions prior to the storm runoff event (1 water sample). At two stormwater monitoring stations a flow-weighted composite sample will also be collected over the fall in the hydrograph (2 water samples). A total of fourteen surface water samples (excluding QA/QC samples) will be collected for analysis by a commercial laboratory and by the USGS Denver laboratory.

Decontamination Procedures

All equipment will be properly cleaned prior to conducting the sampling effort. This includes all Teflon-lined glass bottles, the automated sampler base, churn-splitter, stainless steel strainers, stainless steel filtration unit, Teflon tubing, and any other miscellaneous equipment. All sample intake tubing and peristaltic pump internal tubing will be new material dedicated to each monitoring location for this sampling event. It is anticipated that the only pieces of equipment that will need to be decontaminated between sample sites are the churn-splitter and filtration unit (with Teflon tubing). Decontamination protocol includes:

- ? Tap water rinse to remove sediment or other large material;
- ? Alconox/water solution wash using appropriate brushes;
- ? Tap water rinse;
- ? DI water rinse
- ? Methanol rinse; and,

Quality Assurance/Quality Control Samples

The quality assurance (QA) objectives for this project are to develop and implement procedures that will ensure the collection of representative physical and chemical data of known and acceptable quality. Please refer to EWEB's *Lower McKenzie River Watershed, Stormwater and Urban Runoff Monitoring Plan (November 2001)* for additional detail on the quality assurance/quality control

project plan (Section 7.0).

A total of ten quality control (QC) samples will be collected during this sampling event to assist in identifying potential problems resulting from sample collection or sample processing in the field. QC samples will include matrix spike/matrix spike duplicates (MS/MSD), field duplicates, equipment rinseate samples, and side-by-side grab samples that assess pesticide adsorption onto plastic sampling materials (i.e., auto-sampler tubing and churn splitter).

Matrix Spike/Matrix Spike Duplicate
Matrix spike samples will be collected from one location where collection of extra sample volume is not a problem (i.e., McKenzie River sites). One matrix spike and matrix spike duplicate (a total of two samples) will be collected to evaluate laboratory analyte recovery rates and precision. The samples will be shipped to the laboratory with instructions to spike.

Duplicate Samples
On the basis of previous QC sample results, precision of analytical results from the USGS lab appear to be acceptable. Therefore the number of field duplicate samples collected and submitted for analysis will be reduced to one. It will be collected via the churn-splitter to match as closely as possible to the original sample.

Equipment Rinseate Samples
Equipment rinseate blanks will be used to determine if decontamination procedures were adequate and to determine if cross contamination occurred during sampling. Results from previous rinseate blanks have all been negative, indicating that cross contamination following cleaning of equipment has not been a problem. A rinseate sample will be collected by pouring or pumping DI water through clean equipment and collecting the rinse water into the appropriate laboratory containers for analysis. A rinseate samples will be processed through the decontaminated churn-splitter, stainless steel filtration unit, and Teflon tubing between samples.

Pesticide Sampling Procedures QA Samples
Grab samples will be collected at three stormwater locations during the storm event to assess potential attenuation of dissolved pesticides due to sorption to plastic tubing and the plastic churn splitter. To accomplish this, a grab sample will be collected directly into glass amber 1-litter bottles (baked) at the same time (or as close to same time as practical) that a grab sample is collected using an auto sampler with plastic tubing to minimize any variations in stream chemistry that might obscure the test of the different sampling procedures. A total of six grab samples will be collected (two samples from three locations) and submitted to the USGS Denver laboratory for pesticide analysis. Analysis of these samples is being provided by USGS research-chemist Mark Sandstrom as an in-kind service.

Schedule
The following is a tentative schedule for preparing for and implementing the first flush storm event monitoring effort:

Complete Storm Event Pesticide Proposal	March 22, 2004
Order Necessary Equipment for Pesticide Sampling	March 24, 2004
Complete Draft Interagency Agreement	March 31, 2004
Finalize and Obtain Signatures on Agreement	April 2, 2004
Sample Spring Runoff Storm Event	April/May 2004

Cost

The following are the anticipated costs associated with use of the USGS Denver laboratory for pesticide analysis. Total number of samples that will be submitted for USGS Schedule 2001 and 2060 analysis is 24 water samples (14 storm runoff samples plus 10 QC samples).

Analytical Cost Per Samples (USGS Schedule 2001 and 2060) is $795 x 24 Samples = $**19,100**

Oregon USGS Cost for Sample Tracking, QA Interpretation, and Consultation (2.25 hours/sample) is $210 per sample x 24 samples = **$5,025**

Oregon USGS cost for consultations on discharge in storm flow with USGS Surface Water Specialist (3 days x $945/day = $**2,850**)

Equipment Purchases (GSS filters, bottles, filtration unit, pump, etc.) = **$3,420**

Total Costs = **$30,400**

Under this proposal the USGS would provide in-kind service for approximately 12 native water and QC samples, totaling $9,400, with EWEB funding the balance of $21,000.