# WATER-QUALITY AND FLOW DATA FOR THE JOHNSON CREEK BASIN, OREGON, APRIL 1988 TO JANUARY 1990

By Thomas K. Edwards

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# WATER-QUALITY AND FLOW DATA FOR THE JOHNSON CREEK BASIN, OREGON, APRIL 1988 TO JANUARY 1990

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## ABSTRACT

Bottom-material and surface-water samples, and associated on-site , measurements, were obtained from sites in the Johnson Creek basin from April 1988 to January 1990 as part of a cooperative effort by the U.S. Geological Survey and the City of Portland, Bureau of Environmental Services, to characterize and assess the quality of water in the basin. Bottom-material samples were analyzed for trace elements and selected manmade organic compounds. Surface-water samples were analyzed for nutrients, trace elements, selected manmade organic compounds, suspended-sediment concentration and particle size. Field determinations made during low flow included water temperature, pH, alkalinity, specific conductance, fecal coliform and fecal streptococcal bacteria, dissolved oxygen, and turbidity.

Reconnaissance bottom-material and surface-water samples were collected from Johnson Creek in August 1988 to evaluate chemical characteristics of the resident sediment and to determine constituents of greatest concern for further study. Low-flow water samples were taken from August to October 1989 at eight Johnson Creek sites and two tributary sites to establish background levels for comparison. Storm-runoff samples were obtained at eight Johnson Creek sites, two tributary and two storm-drain, outfall sites over part of the storm-runoff events of December 4, 1989, and January 25, 1990. Water temperature, specific conductance, and turbidity data were collected during storm runoff in April 1988. Discharge measurements were made during low-flow sampling and at selected stream-stage conditions during storm flow.

## INTRODUCTION

The U.S. Geological Survey (USGS), in cooperation with the City of Portland, Bureau of Environmental Services (PBES), collected discharge, physical, and chemical data from Johnson Creek and selected tributaries and outfalls to Johnson Creek during selected low-flow periods and storm-runoff events from April 1988 to January 1990. The purpose of this report is to present those data.

Documentation of methods used for the water-quality and associated sampling and analyses are as follows: determination of stream discharge (Buchanan and Somers, 1969; Buchanan and Somers, 1968; and Dalrymple and Benson, 1967), water temperature, pH, alkalinity, specific conductance, turbidity, dissolved oxygen, dissolved and suspended organic carbon (Skougstad and others, 1979; and Wershaw and others, 1987), suspended-sediment concentration and particle size (Guy, 1969), fecal coliform and fecal streptococcal bacteria (American Public Health Association and others, 1976), nutrients, trace elements (Skougstad and others, 1979), and selected manmade-organic compounds (Wershaw and others, 1987).

Bottom material collected during a low-flow reconnaissance survey was analyzed for total trace elements (Horowitz, 1985) and selected manmade-organic compounds (Wershaw and others, 1987) sorbed to sediment particles greater than 63 μm (micrometers) and less than 63 μm in size.


## Acknowledgments

Special thanks to James Soli, and other members of PBES for assistance in reconnaissance, and water-quality sample collection during storm-runoff periods; and the Organics Section of the Oregon Department of Environmental Quality (DEQ) Laboratory, Portland, Oregon, for determination of manmade organic-compound concentrations in low-flow bottom-material samples.


## Physiographic Setting

Johnson Creek flows in a westerly direction over its 24-mile length, through a heterogeneous mixture of land uses from a predominantly agricultural headwater area southeast of Gresham, Oregon, through the cities of Gresham, Portland and Milwaukie, where it discharges to the Willamette River (fig. 1). Johnson Creek drains an area of approximately 51 square miles and displays a hydrograph configuration typical of the local area with summer low flows graduating into high flows during winter rainstorm events, and flows between storms receding steadily until the next storm event.

The banks of Johnson Creek have been stablized with hand-placed stone work throughout most of its length through the City of Portland. The stream slope varies markedly over its length, from approximately 14 ft/mi (feet per mile) in the upper basin, to 7 ft/mi in the mid-basin, and 31 ft/mi in the lowest 6-mile reach (fig. 2). The distribution of stream bottom-material particle sizes correlates with the channel slope and adjacent land use in this geomorphologically inverted basin, with finer bottom-material sizes in the upper basin reach and larger (large gravel and cobble size) material in the lower reach. Johnson Creek's bottom-material distribution is atypical; stream-channel bottom material is usually coarser in the headwater reaches grading to finer grained material in the lower reaches (Leopold, Wolman, and Miller, 1964), because most streams trend from steeper headwaters to less steep mouths.

# METHODS OF SAMPLING AND ANALYSIS

Methods of sample collection and analysis for the physical characteristics and chemical constituents are documented in this section. Sample collection, preparation, and analysis followed standard USGS methods (Edwards and Glysson, 1986; Skougstad and others, 1979; Greeson and others, 1977; Guy, 1969; and American Public Health Association and others, 1976). Sampling site locations are shown in figure 1 and described in table 1. Analytical results of samples collected are listed in tables 2 through 16.

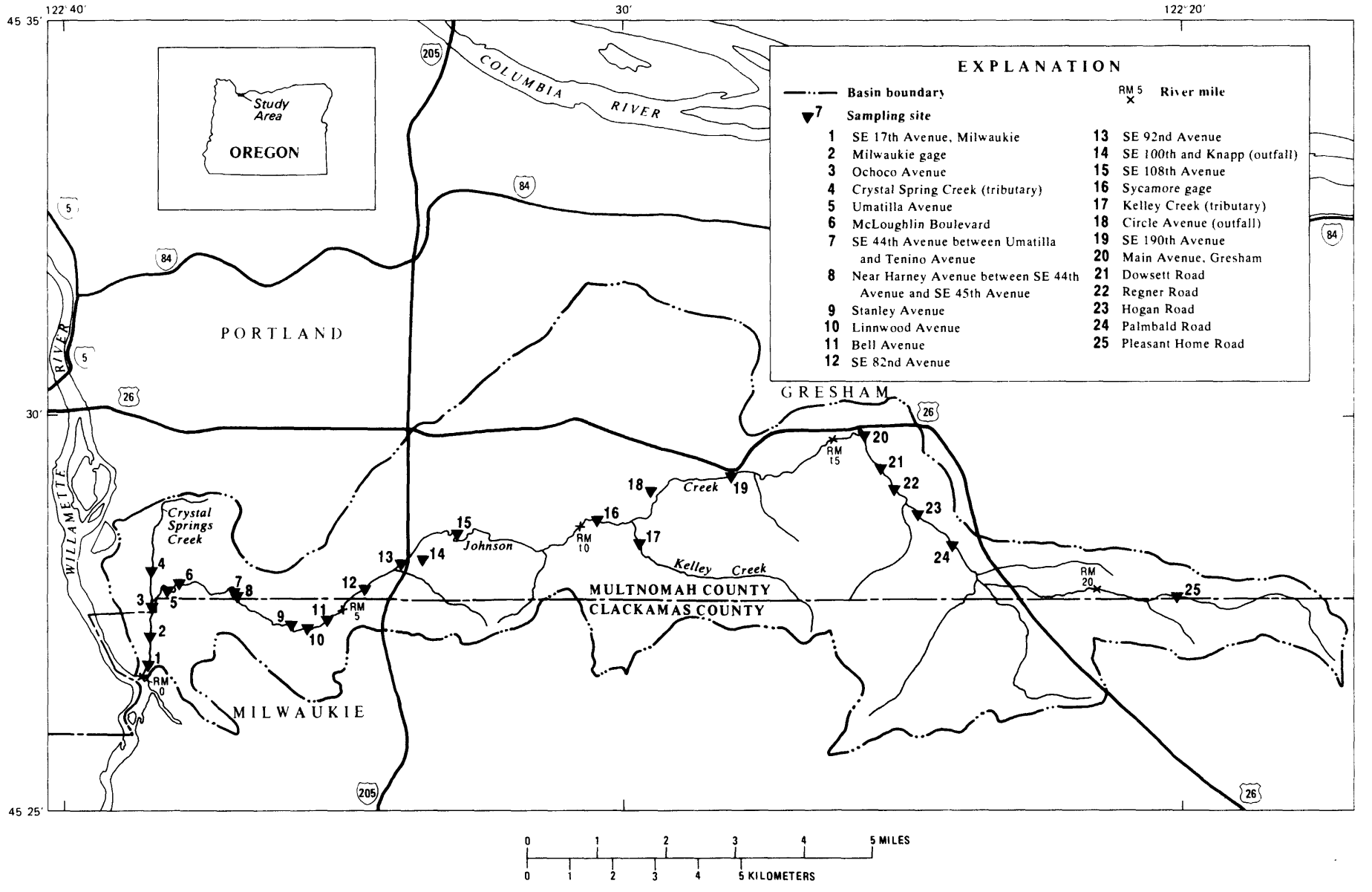


Figure 1.--Location of sampling sites in the Johnson Creek basin.

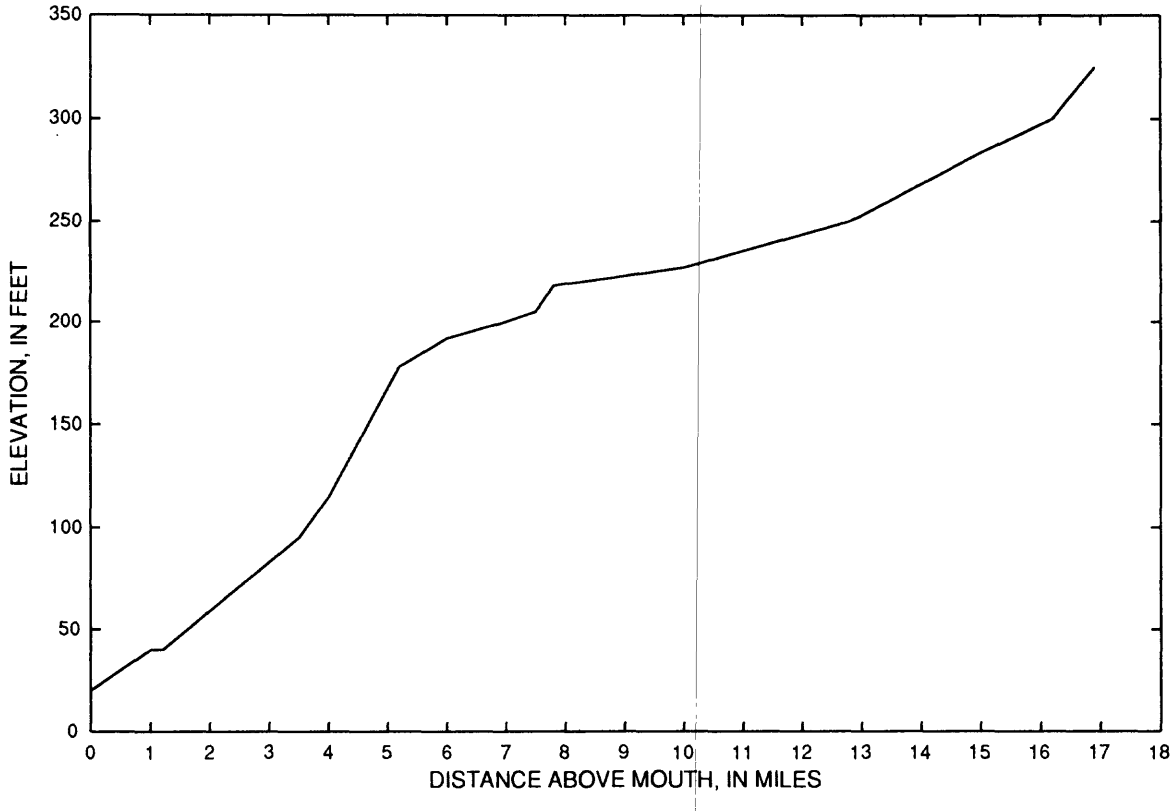


Figure 2.--Johnson Creek channel slope.

## Physical and Chemical Water-quality Data

Water temperatures were measured in the field, using a mercury thermometer calibrated to an American Standard Thermometer[1]. Field pH measurements were made using a Beckman model 11 pH meter and probe. All alkalinity determinations were made by incremental titration. Specific conductance was measured using a Yellow Springs Instrument Company (YSI) model 3000 conductance meter; readings were corrected to 25°C (25 degrees Celsius). Turbidity was measured using a Hach Turbidimeter, model 16800. Dissolved oxygen measurements were made with a YSI model 57 dissolved-oxygen meter.

Bottom-material subsamples were collected at 10 to 20 randomly selected points at each of nine sites in the main stem. At each site, subsamples were composited in large containers in the field, obtaining one composite per site. A glass beaker and watch glass were used to scoop a subsample from the top few centimeters of the streambed. Subsamples to be analyzed for trace elements were composited in plastic tubs while subsamples for organic analysis were composited in stainless-steel pans.

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[1] Use of brand names in this report is for identification purposes only and does not constitute an endorsement by the U.S. Geological Survey.

Table 1.--Johnson Creek basin sampling sites

[b = bottom-material at low-flow site August 1988; s = surface water and suspended-sediment low-flow site August through October 1989; r = storm-runoff site December 1989 and January 1990; e = extra site storm runoff January 1990; q = quality-assurance and control sites; t = storm-reconnaissance site during storm April 1988; and d = low-flow dissolved-oxygen site October 1989]

| Site number | Station number | Station name | Distance above mouth (miles) | Sample site type |
|---|---|---|---|---|
| 1 | 452649122383000 | SE 17th Avenue, Milwaukie | 0.30 | t |
| 2 | 14211550 | Milwaukie gage | .60 | srdq |
| 3 | 452735122382600 | Ochoco Avenue | 1.05 | b |
| 4 | 452746122382800 | Crystal Spring Creek (tributary) | 1.20 | srd |
| 5 | 452746122381700 | Umatilla Avenue | 1.37 | b |
| 6 | 452751122381400 | McLloughlin Boulevard | 1.50 | srd |
| 7 | 452750122370000 | SE 44th Avenue between Umatilla Avenue and Tenino Avenue | 2.60 | bet |
| 8 | 452744122370000 | Near Harney Avenue between SE 44th Avenue and SE 45th Avenue | 2.70 | b |
| 9 | 452722122361100 | Stanley Avenue | 3.60 | srd |
| 10 | 452717122355200 | Linnwood Avenue | 3.85 | b |
| 11 | 452731122353000 | Bell Avenue | 4.20 | srd |
| 12 | 452717122344000 | SE 82nd Avenue | 5.5 | bsrd |
| 13 | 452806122340300 | SE 92nd Avenue | 5.82 | b |
| 14 | 452911122291200 | SE 100th and Knapp (outfall) | 6.25 | r |
| 15 | 452804122330300 | SE 108th Avenue | 7.10 | td |
| 16 | 14211500 | Sycamore gage | 10.25 | bsrtdq |
| 17 | 452837122295000 | Kelley Creek (tributary) | 10.70 | srd |
| 18 | 452810122332700 | Circle Avenue (outfall) | 11.60 | r |
| 19 | 452917122275700 | SE 190th Avenue | 12.60 | srtd |
| 20 | 452945122254700 | Main Avenue, Gresham | 15.45 | t |
| 21 | 452941122253800 | Dowsett Road | 16.15 | t |
| 22 | 452910122251500 | Regner Road | 16.30 | srd |
| 23 | 452847122244500 | Hogan Road | 17.40 | bt |
| 24 | 452823122240900 | Palmbald Road | 18.25 | t |
| 25 | 452725122200800 | Pleasant Home Road | 22.55 | t |

Water-column samples were collected by the equal-width-increment (EWI) method (Edwards and Glysson, 1986). Samples for nutrient, trace element, and suspended-sediment determinations were obtained using an epoxy-coated sampler fitted with a nylon nozzle, and acid-rinsed glass or plastic bottles. Samples for organic-constituent determinations were collected using a standard sampler not coated with epoxy, and fitted with a brass nozzle and baked glass bottle.

Turbidity samples were diluted as necessary to obtain midrange readings on the turbidimeter; correct turbidity values were computed using a dilution factor. The turbidimeter was checked for calibration using nephalometeric turbidity unit (NTU) standards prior to each sample reading.

The pH meter was calibrated with standard pH buffers reading 4.0, 7.0, and 10.0. Meter calibration was done at each sampled site prior to measuring the stream pH and performing the alkalinity titration.

The specific conductance meter was checked for calibration against known specific conductance standards that bracketed the expected field specific conductance. All specific conductance readings were then temperature corrected to obtain specific conductance.

The dissolved oxygen (DO) meter was calibrated to 100 percent DO saturation by measuring the water temperature, reading the barometric pressure, interpolating the DO concentration at 100-percent saturation from the appropriate calibration table, and setting the meter to the calibration concentration while the probe is held in a calibration chamber at stream temperature and local barometric pressure. DO meter calibration was done at the beginning of each field day with intermediate calibration checks during the course of the day.

Samples for fecal coliform and fecal streptococcal bacteria determinations were obtained by dipping a sterile (autoclaved) bottle at midstream, immediately capping it, and placing it in an ice chest until filtering could be accomplished (usually within an hour of sample collection). Four to five subsamples of varying volumes were then filtered through a 0.45 $\mu$m pore-size membrane filter for each sample site. After filtering each subsample, the membrane was removed from the filter unit and placed in a petri dish with the proper sample media. The petri dishes were, in turn, placed in aluminum-block incubators set at either 35.0°C or 44.5°C and left for 24 to 48 hours, depending on whether fecal coliform or fecal streptoccocii bacteria were to be grown. After the proper incubation period, the number of colonies on each plate were counted and recorded with the subsample volume filtered. The number of colonies per 100 ml (milliliter) of subsample were then computed.

Samples for dissolved organic carbon (DOC) and suspended organic carbon (SOC) analysis were prepared according to standard methods (Wershaw and others, 1987). Sample volumes of 100 ml were placed in a stainless-steel filter unit fitted with a 0.45 $\mu$m pore-size silver-membrane filter. The stainless-steel unit was then connected to a regulated, pressurized, nitrogen tank and the nitrogen released at approximately 30 psi (pounds per square inch) to push the sample through

the silver-membrane filter and into a DOC bottle. The silver-membrane containing the SOC sample was removed from the stainless-steel unit and folded over inside a petri dish to keep the sample side of the silver-membrane filter from contacting the plastic of the petri dish. Both samples were then preserved for analysis at 4°C.

## Sample Preparation for Analysis

### Reconnaissance Samples

Bottom-material samples were sieved with a screen of 63 μm mesh size, and separate analyses were performed on the resultant size fractions of greater than 63 μm and less than 63 μm. Samples to be analyzed for trace elements were sieved through a nylon mesh screen; samples to be analyzed for organic compounds were sieved using a stainless-steel mesh screen crimped to the casing barrel (rather than attached using solder which is a potential source of sample bias). Native water was obtained from each sample site during bottom-material sampling to perform the wet-sieve separation.

Bottom-material trace-element determinations were analyzed by Dr. Arthur J. Horowitz at a U.S. Geological Survey research laboratory in Atlanta, Georgia. Organic compounds were determined by the Organics Section of the DEQ laboratory at Portland State University in Portland, Oregon.

Water samples taken during the bottom-material sampling also were submitted to the DEQ laboratory for selected organic-compound determinations.

### Low-flow Samples

Samples taken during the low flow period August to October 1989 were prepared for determination of dissolved and total nutrients, dissolved trace elements, total recoverable organochlorine pesticides and polychlorinated byphenyls (PCBs), suspended sediment, and particle size. Separate sample composites were obtained for inorganic and organic-compound determinations. Whole-water samples to be analyzed for total or total recoverable constituents were subsampled from the appropriate whole-water-sample composite prior to removal of a subsample for dissolved constituent determination. Samples were preserved as prescribed in the U.S. Geological Survey, National Water Quality Laboratory, Services Catalog (1985). Samples to be analyzed for dissolved constituents were filtered through a 0.45 μm pore size membrane filter and preserved as prescribed in the U.S. Geological Survey, National Water Quality Laboratory, Services Catalog (1985). Suspended sediment for total trace-element determination was removed from each composite using an International Equipment Company Centra-8 centrifuge, to simulate particle settling according to Stoke's Law by computing the centrifuge spin rate and time required to settle all particles greater than 0.45 μm in size through a 4-inch water column. Suspended sediment from each of the two low-flow sampling periods were composited site by site to obtain the required sample mass for total trace-element determinations.

## Storm-runoff Samples

Subsamples obtained during each of the two storm-runoff events were composited. At three sites, subsamples were composited to represent the storm hydrograph's rise, peak, and recession. Subsamples were composited proportional to percent of the total sample weight represented by each subsample. Subsamples representing the rise, peak and recession of the storm hydrographs were selected on the basis of turbidity, specific conductance, and timing relative to the hydrograph plot and were composited in the same manner as previously described. After representative composites were obtained, the samples were handled and preserved as described for the low-flow samples. Water samples were obtained for determination of total and dissolved nutrients, dissolved trace elements, total recoverable organochlorine pesticides and PCBs, suspended sediment and particle size.

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ADDITIONAL DATA

Table 2.--Field data obtained during low-flow sampling, August 15-18, 1988

[°C = degrees Celsius; $CaCO_3$ = calcium carbonate; mg/L = milligrams per liter; µS/cm = microsiemens per centimeter at 25 degrees Celsius; mm = millimeters; mL = milliliters; K = results based on colony counts outside the acceptable range (non-ideal colony count; and > = greater than because results are based on estimated count from densely populated colony growths; µm-mf = micrometer-membrane filter]

| Station name | River mile | Date | Time | Temperature (°C) | pH (standard units) | Alkalinity (mg/L as $CaCO_3$) | Specific conductance (µS/cm) | Barometric pressure (mm mercury) | Dissolved oxygen (mg/L) | Dissolved oxygen (percent saturation) | Coliform, fecal, µm-mf (colonies per 100 mL) | Streptococci fecal, KF Agar (colonies per 100 mL) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ochoco Ave. | 1.05 | 8/18 | 1430 | 19.5 | 7.4 | 57 | 206 | 767 | 12.4 | 131 | 510 | 1200 |
| Umatilla Ave. | 1.37 | 8/18 | 1330 | 17.5 | 7.7 | 53 | 178 | 768 | 11.3 | 115 | K130 | K100 |
| S.E. 44th at Umatilla below fish ladder | 2.60 | 8/17 | 1515 | 17.0 | 6.6 | 59 | 220 | 763 | 9.5 | 97 | 3700 | K280 |
| S.E. 44th near Harney above fish ladder | 2.70 | 8/17 | 1120 | 16.5 | 6.9 | 52 | 181 | 763 | 9.1 | 93 | 930 | 430 |
| Linnwood Ave. | 3.85 | 8/16 | 1500 | 20.0 | 7.5 | 24 | 63 | 758 | 9.8 | 107 | >6000 | 1200 |
| S.E. 82nd Ave. | 5.15 | 8/16 | 1000 | 17.0 | 7.3 | 23 | 57 | 758 | 9.1 | 95 | 890 | 870 |
| S.E. 92nd Ave. | 5.82 | 8/15 | 1430 | 17.0 | 7.1 | 18 | 48 | 758 | 9.8 | 102 | 1200 | 780 |
| Sycamore gage | 10.25 | 8/19 | 1245 | 17.0 | 6.7 | 67 | 159 | 757 | 9.2 | 96 | 340 | 630 |
| Hogan Rd. | 17.40 | 8/19 | 1630 | 19.5 | 7.1 | 47 | 132 | 754 | 9.2 | 99 | 300 | K240 |

Table 3.--Trace-element concentrations in Johnson Creek bottom materials, August 1988

[µm = micrometer; ppm = parts per million; WT% = weight percent (1.0 WT% = 10,000 ppm); m2/g = square meters per gram; TOC = total organic carbon; > = greater than; and < = less than]

| Sample site | River mile | Date | Size (µm) | Copper (ppm) | Lead (ppm) | Zinc (ppm) | Nickel (ppm) | Cobalt (ppm) | Cadmium (ppm) | Chromium (ppm) | Aluminum (WT%) | Iron (WT%) | Manganese (WT%) | Titanium (WT%) | Mercury (ppm) | Selenium (ppm) | Antimony (ppm) | Arsenic (ppm) | TOC (WT%) | Surface area (m2/g) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ochoco Avenue | 1.05 | 8/18 | >63 | 27 | 47 | 147 | 30 | 24 | <0.5 | 52 | 6.9 | 6.0 | 0.10 | 1.04 | 0.02 | <0.1 | 4.1 | 3.5 | 0.4 | 15.1 |
| | | | <63 | 40 | 71 | 195 | 42 | 18 | < .5 | 80 | 8.0 | 4.6 | .08 | .77 | .14 | .2 | 1.0 | 3.6 | 2.4 | 15.4 |
| Umatilla Avenue | 1.37 | 8/18 | >63 | 29 | 51 | 170 | 36 | 22 | < .5 | 63 | 8.8 | 5.8 | .10 | .71 | <.01 | < .1 | 1.5 | 2.3 | .8 | 14.9 |
| | | | <63 | 71 | 110 | 350 | 96 | 23 | 1.5 | 145 | 7.1 | 4.7 | .10 | .73 | .11 | .1 | 1.1 | 4.1 | 4.2 | 17.5 |
| S.E. 44th at Umatilla | 2.60 | 8/17 | >63 | 34 | 48 | 300 | 350 | 34 | < .5 | 230 | 7.3 | 5.2 | .08 | .99 | <.01 | < .1 | .7 | 2.1 | .6 | 13.2 |
| | | | <63 | 140 | 150 | 640 | 1300 | 83 | 1.2 | 810 | 7.3 | 5.3 | .12 | .94 | 0.20 | 0.3 | 2.0 | 4.1 | 4.9 | 13.6 |
| S.E. 44th above Harney | 2.70 | 8/17 | >63 | 40 | 62 | 175 | 43 | 20 | < .5 | 72 | 7.3 | 4.0 | .10 | .57 | .08 | < .1 | .5 | 1.6 | 4.4 | 10.9 |
| | | | <63 | 41 | 86 | 290 | 55 | 19 | 1.2 | 90 | 7.5 | 4.3 | .10 | .62 | .07 | < .1 | .8 | 3.1 | 3.8 | 13.9 |
| Linnwood Avenue | 3.85 | 8/16 | >63 | 24 | 82 | 150 | 25 | 23 | < .5 | 48 | 7.1 | 5.6 | .10 | .74 | <.01 | < .1 | .5 | 1.5 | .7 | 6.6 |
| | | | <63 | 54 | 325 | 430 | 45 | 26 | 2.2 | 91 | 7.0 | 4.9 | .20 | .66 | .20 | .1 | 1.3 | 3.5 | 4.5 | 12.9 |
| S.E. 82nd Avenue | 5.15 | 8/16 | >63 | 20 | 19 | 170 | 30 | 29 | < .5 | 62 | 8.5 | 6.9 | .20 | .77 | .02 | .1 | .4 | 4.1 | .4 | 32.5 |
| | | | <63 | 50 | 105 | 340 | 42 | 32 | 1.9 | 93 | 8.4 | 6.1 | .30 | .71 | .15 | .1 | 1.0 | 2.4 | 3.5 | 21.2 |
| S.E. 92nd Avenue | 5.82 | 8/15 | >63 | 30 | 100 | 200 | 29 | 23 | < .5 | 58 | 7.0 | 5.0 | .11 | .83 | .04 | .1 | .8 | 2.6 | 3.7 | 8.1 |
| | | | <63 | 42 | 105 | 235 | 30 | 20 | < .5 | 80 | 8.6 | 4.6 | .11 | .66 | .09 | .2 | 1.0 | 3.0 | 3.2 | 15.0 |
| Sycamore gage | 10.25 | 8/19 | >63 | 17 | 13 | 125 | 23 | 21 | < .5 | 51 | 8.5 | 4.9 | .12 | .48 | .17 | .1 | .4 | 3.2 | .9 | 21.5 |
| | | | <63 | 25 | 23 | 150 | 25 | 17 | .7 | 75 | 7.0 | 4.0 | .12 | .68 | 1.20 | < .1 | .6 | 3.0 | 2.2 | 14.6 |
| Hogan Road | 17.40 | 8/19 | >63 | 16 | 10 | 83 | 21 | 20 | < .5 | 42 | 8.3 | 4.4 | .09 | .56 | .04 | .1 | .4 | 2.0 | 1.9 | 16.7 |
| | | | <63 | 21 | 21 | 115 | 22 | 17 | < .5 | 67 | 7.2 | 3.4 | .08 | .62 | .05 | .2 | .6 | 2.1 | 1.8 | 15.9 |
| Sycamore Replicate | 10.25 | 8/19 | >63 | 16 | 12 | 105 | 25 | 19 | < .5 | 45 | 8.2 | 4.5 | .11 | .47 | .17 | < .1 | .3 | 3.6 | 1.1 | 13.5 |
| | | | <63 | 23 | 31 | 140 | 21 | 17 | < .5 | 73 | 6.7 | 3.7 | .12 | .67 | 1.10 | .2 | .6 | 2.4 | 2.1 | 13.9 |

Table 4.--Organochlorine pesticides plus polychlorinated biphenyls in bottom material during low flow, August 1988

[ppm = parts per million; um = micrometer; > = greater than; < = less than; LD = less than analytical detection (detection limit is at 0.005 ppm for all constituents except chlordane and PCB arochlor groups 4 and 5 at 0.05 ppm, and total polychlorinated biphenyl (PCB) at 0.10 ppm); BHC = benzene hexachloride; DDD = dichlorodiphenyldichloroethane; DDE = dichlorodiphenyldichloroethylene; and DDT = dichlorodiphenyltrichloroethane]

| Sample site | River mile | Date | Size (um) | Alpha-BHC | Beta-BHC | Lindane | Heptachlor | Aldrin | Heptachlor epoxide | P,P'DDE | Endrin | P,P'DDD | P,P'DDT | P,P'methoxychlor | Dieldrin | Chlordane | PCB arochlors Group 4 | PCB arochlors Group 5 | PCB arochlors Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (ppm) | | | | | | | | | | | | | | | |
| Ochoco Avenue | 1.05 | 8/18 | >63 | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | 0.29 | 0.29 | 0.09 | 0.38 |
| | | | <63 | 0.011 | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD |
| Umatilla Avenue | 1.37 | 8/18 | >63 | LD | LD | LD | LD | LD | LD | 0.012 | LD | 0.016 | 0.015 | 0.02 | LD | LD | .40 | LD | .40 |
| | | | <63 | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | .016 | LD | LD | LD | .25 | .25 |
| S.E. 44th at Umatilla | 2.60 | 8/17 | >63 | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | .29 | LD | .29 |
| | | | <63 | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | .42 | LD | .42 |
| S.E. 44th above Harney | 2.70 | 8/17 | >63 | LD | 0.013 | 0.006 | 0.007 | 0.008 | LD | .009 | LD | 0.010 | LD | LD | LD | LD | LD | .10 | .10 |
| | | | <63 | LD | LD | LD | LD | LD | LD | .005 | 0.006 | .006 | .007 | .15 | 0.009 | LD | LD | LD | LD |
| Linnwood Avenue | 3.85 | 8/16 | >63 | .009 | LD | .005 | LD | LD | 0.005 | .005 | .006 | LD | .007 | .015 | LD | LD | LD | LD | LD |
| | | | <63 | LD | LD | LD | LD | LD | .005 | .008 | LD | .008 | .007 | LD | LD | LD | LD | LD | LD |
| S.E. 82nd | 5.15 | 8/16 | >63 | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | .011 | LD | LD | LD | LD | LD |
| | | | <63 | LD | LD | LD | LD | LD | LD | .008 | LD | .007 | LD | LD | LD | LD | LD | LD | LD |
| S.E. 92nd | 5.82 | 8/15 | >63 | LD | .008 | LD | LD | .006 | LD | .01 | LD | .015 | .009 | .016 | LD | LD | LD | LD | LD |
| | | | <63 | .007 | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD | LD |
| Sycamore gage | 10.25 | 8/19 | >63 | .006 | LD | LD | LD | LD | LD | .007 | LD | .008 | .006 | .012 | LD | LD | LD | LD | LD |
| | | | <63 | LD | LD | LD | LD | LD | LD | .011 | LD | .013 | .007 | LD | LD | LD | LD | LD | LD |
| Hogan Road | 17.40 | 8/19 | >63 | LD | LD | LD | LD | LD | LD | .062 | 0.005 | .092 | .144 | LD | LD | .128 | .48 | .15 | .63 |
| | | | <63 | LD | LD | LD | LD | LD | LD | .388 | LD | .568 | .226 | .366 | LD | LD | LD | .23 | .23 |
| Sycamore gage | 10.25 | 8/19 | >63 | LD | LD | LD | LD | LD | LD | .009 | LD | .011 | .009 | .022 | LD | LD | LD | LD | LD |
| Quality assurance replicate | | | <63 | LD | LD | LD | LD | LD | LD | .012 | LD | .015 | .009 | .017 | LD | LD | LD | LD | LD |

Table 5.--Acid-base/neutral extractable compounds in bottom material sampled during low flow, August 1988

[ppm = parts per million; μm = micrometers; > = greater than; < = less than; and LD = less than analytical detection (detection limit for all constituents is at 0.10 ppm)]

| Sample site | River mile | Date | Size (μm) | Phenanthrene | Di-N-butylphthalate | Fluoranthene | Pyrene | Benzo(A)anthracene | Chrysene | Benzo(B)fluoranthene | Bis-(2-ethylhexyl)-phthalate |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (ppm) | | | | | | | |
| Ochoco Avenue | 1.05 | 8/18 | >63 | LD | LD | LD | LD | LD | LD | LD | LD |
| | | | <63 | LD | 0.3 | LD | LD | LD | LD | LD | LD |
| Umatilla Avenue | 1.37 | 8/18 | >63 | 0.6 | LD | 1.0 | 0.9 | 0.4 | 0.7 | 0.4 | LD |
| | | | <63 | LD | LD | LD | LD | LD | LD | LD | LD |
| S.E. 44th Umatilla | 2.60 | 8/17 | >63 | LD | LD | LD | LD | LD | LD | LD | LD |
| | | | <63 | LD | LD | LD | LD | LD | LD | LD | LD |
| S.E. 44th above Harney | 2.70 | 8/17 | >63 | LD | .3 | LD | LD | LD | LD | LD | LD |
| | | | <63 | LD | .3 | LD | LD | LD | LD | LD | LD |
| Linnwood Avenue | 3.85 | 8/16 | >63 | LD | LD | LD | LD | LD | LD | LD | LD |
| | | | <63 | LD | LD | LD | LD | LD | LD | LD | LD |
| S.E. 82nd | 5.15 | 8/16 | >63 | LD | LD | LD | LD | LD | LD | LD | LD |
| | | | <63 | LD | LD | LD | LD | LD | LD | LD | LD |
| S.E. 92nd | 5.82 | 8/15 | >63 | LD | LD | LD | LD | LD | LD | LD | LD |
| | | | <63 | LD | LD | LD | LD | LD | LD | LD | LD |
| Sycamore gage | 10.25 | 8/19 | >63 | .1 | .2 | .1 | .1 | .1 | .1 | LD | 0.3 |
| | | | <63 | LD | LD | LD | LD | LD | LD | LD | LD |
| Hogan Road | 17.40 | 8/19 | >63 | LD | LD | LD | LD | LD | LD | LD | LD |
| | | | <63 | LD | LD | LD | LD | LD | LD | LD | LD |
| Sycamore gage Quality assurance replicate | 10.25 | 8/19 | >63 | LD | LD | LD | LD | LD | LD | LD | LD |
| | | | <63 | LD | LD | LD | LD | LD | LD | LD | LD |

Table 6.--Organic compounds in water during low flow, August 1988

[mg/L = milligrams per liter; μg/L = micrograms per liter; and LD = less than analytical detection (detection limit for acid-base/neutral extractables ranges from 0.001 to 0.005 mg/L depending on the constituent identified)]

| Sample site | River mile | Date | Volatile organics (1,1,2,2-Tetrachloroethylene, in, mg/L) | Acid-base/neutral extractable organics (all constituents, in mg/L) | Herbicides (all constituents, in mg/L) | Carbamate insecticides (carbaryl, in μg/L) | Organic carbon Dissolved (mg/L) | Organic carbon Suspended (mg/L) |
|---|---|---|---|---|---|---|---|---|
| S.E. 44th at Umatilla | 2.60 | 8/17 | 0.002 | LD | <0.002 | 0.031 | 2.6 | 0.3 |
| S.E. 82nd Avenue | 5.15 | 8/16 | <.001 | LD | <.002 | .026 | 2.3 | .9 |
| Sycamore gage | 10.25 | 8/19 | <.001 | LD | <.002 | .022 | 4.3 | .8 |

Table 7.--Total trace-element concentrations on suspended-sediment particles less than 63 micrometers in size, during low flow, August 1989

[$ft^3/s$ = cubic feet per second; $m^2/g$ = square meters per gram; ppm = parts per million; WT.% = percent by weight (1.0 WT.% = 10,000 ppm); mg/L = milligrams per liter; ND = not determined due to lack of sample mass; DOC = dissolved organic carbon; and SOC = suspended organic carbon; Blvd. = boulevard]

| Station name | Stream Discharge ($ft^3/s$) | Surface area ($m^2/g$) | Sediment concentration (mg/L) | Copper (ppm) | Lead (ppm) | Zinc (ppm) | Nickel (ppm) | Cobalt (ppm) | Cadmium (ppm) | Chromium (ppm) | Mercury (ppm) | Arsenic (ppm) | Antimony (ppm) | Selenium (ppm) | Iron (WT.%) | Manganese (WT.%) | Aluminum (WT.%) | Titanium (WT.%) | DOC plus SOC (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Milwaukie gage | 17.0 | 10.8 | 10 | 160 | < 10 | 350 | 50 | 20 | < 5 | 110 | ND | 4 | < 1 | < 1 | 4.2 | 0.19 | 5.1 | 0.60 | 2.5 |
| McLoughlin Blvd. | 4.2 | 18.3 | 21 | 180 | 10 | 580 | 140 | 20 | 14 | 220 | ND | 6 | < 1 | < 1 | 6.1 | .32 | 3.2 | .60 | 3.2 |
| Stanley Avenue | 1.9 | 20.2 | 14 | 130 | 100 | 580 | 50 | 40 | < 5 | 80 | ND | 8 | < 1 | < 1 | 6.4 | .55 | 5.9 | .60 | 4.4 |
| Bell Avenue | 1.8 | 24.3 | 9 | 170 | 130 | 430 | 40 | 40 | < 5 | 70 | ND | 10 | < 1 | < 1 | 7.6 | .62 | 6.8 | .60 | 4.9 |
| SE 82nd Avenue | 1.6 | 21.2 | 13 | 100 | 130 | 430 | 40 | 40 | < 5 | 80 | ND | 9 | < 1 | < 1 | 7.2 | .70 | 7.2 | .80 | 5.8 |
| Sycamore gage | 1.1 | 21.7 | 24 | 60 | 20 | 240 | 40 | 30 | < 5 | 70 | .30 | 6 | < 1 | < 1 | 5.8 | .58 | 6.9 | .60 | 5.4 |
| S.E. 190th Avenue | 1.3 | 33.2 | 12 | 160 | < 10 | 300 | 30 | 50 | < 5 | 70 | ND | 10 | < 1 | < 1 | 8.4 | 1.25 | 7.2 | .60 | 6.8 |
| Regner Road | .55 | 23.4 | 10 | 90 | 160 | 310 | 50 | 30 | < 5 | 90 | ND | 6 | < 1 | < 1 | 6.0 | .40 | 7.8 | .70 | 5.6 |
| Crystal Spring | 13.0 | 12.7 | 9 | 160 | 60 | 210 | 40 | 10 | < 5 | 60 | ND | 4 | < 1 | < 1 | 4.3 | .09 | 4.6 | .50 | 1.6 |
| Kelley Creek | .25 | 30.7 | 9 | 90 | 20 | 390 | 40 | 40 | 10 | 60 | ND | 10 | < 1 | < 1 | 8.5 | 1.07 | 5.2 | .50 | 3.6 |

Table 8.--Total trace-element concentrations on suspended-sediment particles greater than 0.45 micrometers in size, during storm runoff, December 1989

[ND = not detected; -- = no data; um = micrometers; $ft^3/s$ = cubic feet per second; m /g = square meters per gram; ppm = parts per million; WT.% = weight percent (1.0 WT.% = 10,00 PPM); mg/L = milligrams per liter; Rise = rising limb of the storm hydrograph; Peak = peak of the storm hydrograph; Recession = falling limb of the storm hydrograph; Storm * = the storm sample broken into the various particle-size fractions; Storm = the sample representing the entire storm runoff; < = less than analytical detection (variable detection limits reported for a given constituent result from analysis of inadequate sample mass of particle-size fractions); and > = greater than; QA = quality assurance]

| Station name | Sample represents | Particle size (um) | Stream discharge ($ft^3/s$) | Surface area ($m^2/g$) | Copper | Lead | Zinc | Nickel | Cobalt | Cadmium | Chromium | Mercury | Arsenic | Antimony | Selenium | Iron | Manganese | Aluminum | Titanium | TOC | Sediment concentration | Particle size, in micrometers 500 | 250 | 62 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | (ppm) | | | | | | | | | | | (WT.%) | (WT.%) | (WT.%) | (WT.%) | (WT.%) | (mg/L) | (percent finer) | | | |
| Milwaukie gage | Rise | > 63 | 630 | 14.6 | 62 | 92 | 240 | 68 | 18 | 1.0 | 88 | 0.20 | 5.0 | 1.6 | 0.4 | 4.2 | D.15 | 7.2 | D.54 | 5.8 | ND | ND | ND | ND | ND |
| | Rise | 16 - 63 | -- | 23.7 | 56 | 76 | 245 | 52 | 22 | .8 | 90 | .15 | 7.9 | 1.2 | .4 | 4.8 | .18 | 8.2 | .68 | 3.1 | ND | ND | ND | ND | ND |
| | Rise | .45 - 16 | -- | 28.8 | 90 | 110 | 350 | 50 | 30 | < 5 | 100 | ND | 13.0 | 1.0 | <1 | 8.8 | .16 | 12.5 | .80 | ND | ND | ND | ND | ND | ND |
| | Peak | > 63 | 850 | 9.8 | 95 | 75 | 160 | 45 | 20 | 3.0 | 70 | ND | 4.0 | 1.5 | < .5 | 4.D | .10 | 7.6 | .5D | ND | ND | ND | ND | ND | ND |
| | Peak | 16 - 63 | -- | 26.0 | 120 | 66 | 230 | 42 | 24 | 1.8 | 84 | .18 | 7.2 | 1.2 | < .2 | 5.3 | .18 | 9.2 | .72 | 3.3 | ND | ND | ND | ND | ND |
| | Peak | .45 - 16 | -- | 23.8 | 137 | 98 | 330 | 39 | 39 | <15 | 98 | ND | 14.0 | 2.0 | <2 | 8.0 | .14 | 13.5 | .78 | ND | ND | ND | ND | ND | ND |
| | Storm* | > 63 | 740 | 24.4 | 75 | 85 | 208 | 59 | 19 | 1.8 | 81 | ND | 4.6 | 1.6 | <1 | 4.1 | .13 | 7.4 | .52 | ND | ND | ND | ND | ND | ND |
| | Storm* | 16 - 63 | -- | 49.7 | 89 | 71 | 237 | 47 | 23 | 1.3 | 87 | .17 | 7.5 | 1.2 | < .5 | 5.1 | .18 | 8.7 | .70 | 3.2 | ND | ND | ND | ND | ND |
| | Storm | .45 - 16 | -- | 52.6 | 111 | 105 | 341 | 45 | 34 | <10 | 99 | ND | 13.4 | 1.4 | <2 | 8.4 | .15 | 13.0 | .79 | ND | ND | ND | ND | ND | ND |
| | Storm | > .45 | 740 | 123.7 | 98 | 89 | 280 | 49 | 27 | < 5 | 90 | ND | 9.3 | 1.3 | <2 | 6.2 | .16 | 10.1 | .70 | ND | 1077 | 1DD | 99 | 97 | 38 |
| McLoughlin Blvd. | Storm | > .45 | 740 | 25.5 | 54 | 70 | 240 | 47 | 22 | 1.5 | 87 | .10 | 8.9 | .9 | .4 | 5.0 | .18 | 8.4 | .64 | 3.8 | 615 | -- | -- | -- | -- |
| Stanley Avenue | Storm | > .45 | 750 | 25.4 | 64 | 70 | 230 | 36 | 22 | 3.1 | 83 | .15 | 9.3 | .9 | .4 | 4.9 | .18 | 8.8 | .65 | 3.8 | 592 | -- | -- | -- | -- |
| Bell Avenue | Storm | > .45 | 750 | 25.6 | 51 | 63 | 212 | 34 | 20 | < .5 | 82 | .13 | 7.8 | .9 | .4 | 4.9 | .18 | 8.5 | .65 | 3.7 | 595 | -- | -- | -- | -- |
| S.E. 82nd Avenue | Storm | > .45 | 750 | 22.8 | 89 | 155 | 220 | 32 | 18 | < .5 | 88 | .13 | 7.8 | .6 | .3 | 4.7 | .17 | 8.4 | .62 | 3.5 | 555 | -- | -- | -- | -- |
| Sycamore gage | Rise | > 63 | 570 | 14.7 | 40 | 30 | 160 | 22 | 14 | < 1 | 58 | .13 | 4.6 | .6 | .2 | 3.8 | .15 | 7.3 | .50 | 4.4 | ND | ND | ND | ND | ND |
| | Rise | 16 - 63 | -- | 31.D | 95 | 50 | 290 | 45 | 15 | < 2.5 | 100 | ND | 13.0 | 1.0 | < .5 | 7.9 | .11 | 12.4 | .75 | ND | ND | ND | ND | ND | ND |
| | Rise | .45 - 16 | -- | 23.9 | 46 | 40 | 182 | 31 | 17 | < .5 | 81 | .14 | 7.0 | .8 | .3 | 4.4 | .13 | 8.2 | .62 | 2.6 | ND | ND | ND | ND | ND |
| | Peak | > 63 | 820 | 11.8 | 35 | 25 | 140 | < 10 | 10 | < 2.5 | 55 | .10 | 3.5 | .5 | < .5 | 3.8 | .13 | 7.8 | .50 | ND | ND | ND | ND | ND | ND |
| | Peak | 16 - 63 | -- | 26.7 | 50 | 43 | 190 | 33 | 18 | < .5 | 83 | .06 | 6.9 | .7 | .4 | 4.6 | .14 | 8.6 | .63 | 3.1 | ND | ND | ND | ND | ND |
| | Peak | .45 - 16 | -- | 10.6 | 35 | 15 | 95 | 15 | < 5 | < .5 | 50 | ND | 3.0 | .5 | < .5 | 3.5 | .07 | 7.9 | .50 | ND | ND | ND | ND | ND | ND |
| Recession | > 63 | 820 | 24.9 | 70 | 30 | 260 | 40 | < 10 | < 5 | 100 | ND | 9.0 | 1.0 | <1 | 7.2 | .11 | 12.3 | .08 | ND | ND | ND | ND | ND | ND |
| Recession | 16 - 63 | -- | 26.0 | 60 | 25 | 160 | 35 | 15 | < 2.5 | 90 | .10 | 6.0 | 1.0 | < .5 | 5.5 | .15 | 10.5 | .75 | 3.2 | ND | ND | ND | ND | ND |
| Recession | .45 - 16 | -- | 21.0 | 74 | < 20 | 260 | 56 | < 20 | <10 | 92 | ND | 9.2 | 1.8 | <2 | 6.5 | .11 | 12.2 | .74 | ND | ND | ND | ND | ND | ND |
| | Storm* | > 63 | 740 | 51.4 | 53 | 29 | 203 | < 25 | < 15 | < 5 | 77 | ND | 6.5 | .8 | <1 | 5.4 | .13 | 9.8 | .30 | ND | ND | ND | ND | ND | ND |
| | Storm* | 16 - 63 | -- | 83.7 | 70 | 40 | 218 | 38 | 16 | < 2.5 | 91 | ND | 8.9 | .9 | < .5 | 6.1 | .13 | 10.6 | .71 | ND | ND | ND | ND | ND | ND |
| | Storm* | .45 - 16 | -- | 55.5 | 55 | < 30 | 195 | 34 | < 15 | < 5 | 79 | ND | 7.1 | 1.1 | <1 | 5.0 | .11 | 9.7 | .64 | ND | ND | ND | ND | ND | ND |
| | Storm | > .45 | 74D | 190.6 | 61 | < 35 | 207 | < 35 | < 15 | < 5 | 84 | ND | 7.7 | .9 | <1 | 5.6 | .12 | 10.1 | .58 | ND | 1160 | 100 | 1DD | 98 | 33 |
| S.E. 190th Avenue | Storm | > .45 | 660 | 22.5 | 45 | 49 | 200 | 33 | 17 | < .5 | 82 | .26 | 6.8 | .7 | .4 | 4.3 | .14 | 8.5 | .62 | 3.3 | 625 | -- | -- | -- | -- |
| Regner Road | Rise | > 63 | 437 | 17.4 | 4D | 10 | 150 | 25 | 15 | < 2.5 | 60 | .20 | 3.5 | .5 | < .5 | 4.1 | .19 | 8.4 | .50 | 3.4 | ND | ND | ND | ND | ND |
| | Rise | 16 - 63 | -- | 21.0 | 32 | 27 | 145 | 28 | 15 | < .5 | 76 | .10 | 5.0 | .6 | .4 | 4.D | .12 | 8.0 | .62 | 2.4 | ND | ND | ND | ND | ND |
| | Rise | .45 - 16 | -- | 27.0 | 66 | < 25 | 290 | < 20 | < 25 | <1D | 111 | ND | 8.8 | <2 | <2 | 7.7 | .13 | 13.9 | .66 | ND | ND | ND | ND | ND | ND |
| | Peak | > 63 | 624 | 15.4 | 60 | 25 | 135 | 20 | 10 | < 2.5 | 55 | .30 | 2.5 | .5 | < .5 | 3.4 | .15 | 8.0 | .50 | ND | ND | ND | ND | ND | ND |
| | Peak | 16 - 63 | -- | 27.3 | 55 | 46 | 180 | 34 | 15 | < .5 | 85 | .17 | 6.6 | .6 | .5 | 4.4 | .14 | 8.8 | .67 | 2.7 | ND | ND | ND | ND | ND |
| | Peak | .45 - 16 | -- | 24.5 | 80 | < 16 | 290 | 64 | < 16 | < 8 | 128 | ND | 11.0 | <2 | <2 | 7.8 | .13 | 13.7 | .80 | ND | ND | ND | ND | ND | ND |
| Recession | > 63 | 443 | 13.4 | 55 | 20 | 130 | 30 | 15 | < 2.5 | 45 | .25 | 3.0 | .5 | < .5 | 3.5 | .17 | 8.2 | .50 | ND | ND | ND | ND | ND | ND | ND |
| Recession | 16 - 63 | -- | 26.7 | 54 | 30 | 180 | 36 | 20 | < 1 | 62 | ND | 6.6 | .6 | .2 | 4.9 | .18 | 9.4 | .68 | 2.8 | ND | ND | ND | ND | ND | ND |
| Recession | .45 - 16 | -- | 26.8 | 80 | < 10 | 260 | 60 | 20 | < 5 | 100 | ND | 11.0 | 1.0 | <1 | 7.4 | .14 | 13.7 | .80 | ND | ND | ND | ND | ND | ND | ND |
| | Storm* | > 63 | 5D0 | 46.2 | 51 | 18 | 139 | 25 | 13 | < 2.5 | 54 | .25 | 3.D | .5 | < .5 | 3.7 | .17 | 8.2 | .50 | ND | ND | ND | ND | ND | ND | ND |
| | Storm* | 16 - 63 | -- | 75.0 | 48 | 35 | 170 | 33 | 17 | < 1 | 74 | ND | 6.2 | .6 | .4 | 4.5 | .15 | 8.8 | .66 | 2.7 | ND | ND | ND | ND | ND | ND |
| | Storm* | .45 - 16 | -- | 78.3 | 55 | < 20 | 277 | < 50 | < 25 | < 8 | 111 | ND | 10.1 | <2 | <2 | 7.6 | .13 | 13.6 | .74 | ND | ND | ND | ND | ND | ND | ND |
| | Storm | > .45 | 500 | 199.5 | 51 | < 25 | 2D5 | < 40 | < 20 | < 5 | 84 | ND | 7.0 | <2 | <1 | 5.5 | .15 | 10.5 | .65 | ND | 1289 | 100 | 100 | 97 | 21 |
| Crystal Spring | Storm | > .45 | 12.4 | 13.6 | 250 | 720 | 340 | 30 | 20 | 5.0 | 70 | ND | 12.0 | 16.0 | <1 | 4.8 | .11 | 6.3 | .50 | ND | 29 | -- | -- | -- | -- |
| Kelley Creek | Storm | > .45 | 260 | 19.7 | 38 | 28 | 142 | 29 | 17 | < .5 | 73 | .06 | 6.4 | .6 | .3 | 4.2 | .14 | 7.8 | .64 | 3.2 | 871 | -- | -- | -- | -- |
| S.E. 100th/Knapp | Storm | > .45 | 11.0 | 18.8 | 31 | 36 | 144 | 30 | 18 | < .5 | 74 | .07 | 4.5 | .7 | .2 | 4.0 | .13 | 7.5 | .59 | 2.6 | 884 | -- | -- | -- | -- |
| Sycamore gage (QA Replicate) | Storm* | > 63 | 740 | 20.7 | 112 | 72 | 215 | 30 | 17 | < .5 | 74 | .13 | 6.3 | .8 | .3 | 4.4 | .14 | 7.8 | .62 | 3.1 | ND | ND | ND | ND | ND |
| | Storm* | 16 - 63 | -- | 21.0 | 100 | 5D | 24D | 40 | < 10 | < 5 | 80 | .18 | 6.0 | 1.0 | <1 | 5.3 | .15 | 9.9 | .70 | 3.5 | ND | ND | ND | ND | ND |
| | Storm* | .45 - 16 | -- | 10.7 | 90 | 6D | 210 | 50 | 20 | < 5 | 7D | .25 | 5.0 | 2.0 | <1 | 4.9 | .D7 | 9.5 | .70 | ND | ND | ND | ND | ND | ND |
| | Storm | > .45 | 740 | 52.4 | 103 | 61 | 224 | 38 | < 20 | < 5 | 76 | .17 | 5.9 | 1.1 | <1 | 4.9 | .13 | 9.0 | .67 | ND | 1160 | 100 | 100 | 98 | 33 |
| Circle Avenue | Storm | > .45 | 3.3 | 28.6 | 62 | 42 | 210 | 30 | 22 | < 1 | 66 | .10 | 6.0 | 1.2 | < .2 | 6.6 | .10 | 9.5 | .76 | 2.2 | 269 | -- | -- | -- | -- |

Table 9.--Total trace-element concentrations on suspended-sediment particles greater than 0.45 micrometers in size, during storm-runoff, January 1990

[ND not detected; -- = no data; um = micrometers; $ft^3/s$ = cubic feet per second; $m^2/g$ = square meters per gram; ppm = parts per million; WT.% = weight percent (1.0 WT.% = 10,00 PPM); mg/L = milligrams per liter; Storm * = the storm sample broken into the various particle-size fractions; Storm = the sample representing the entire storm runoff; < = less than analytical detection (variable detection limits reported for a given constituent result from analysis of inadequate sample mass of particle-size fractions); and > = greater than]

| Station name | Sample represents | Particle size (um) | Stream discharge ($ft^3/s$) | Surface area ($m^2/g$) | Copper | Lead | Zinc | Nickel | Cobalt | Cadmium | Chromium | Mercury | Arsenic | Antimony | Selenium | Iron | Manganese | Aluminum | Titanium | TOC | Sediment concentration | Particle size, in micrometers: 250 | 62 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | (ppm) | | | | | | | | | | | (WT.%) | (WT.%) | (WT.%) | (WT.%) | (WT.%) | (MG/L) | (percent finer) | |
| Milwaukie gage | Storm* | > 63 | 380 | 8.57 | 45 | 80 | 210 | 35 | 15 | <2.5 | 75 | 0.40 | 4.0 | 1.0 | <0.5 | 4.7 | 0.14 | 7.6 | 0.55 | 7.0 | ND | ND | ND |
| | Storm* | 16 - 63 | -- | 18.87 | 40 | 57 | 218 | 38 | 22 | .5 | 84 | .18 | 7.4 | 1.2 | .2 | 4.6 | .12 | 8.7 | .62 | 3.4 | ND | ND | ND |
| | Storm* | .45 - 16 | -- | 22.93 | 60 | 60 | 310 | 40 | 20 | <5 | 80 | .33 | 11.0 | 1.0 | <1 | 8.2 | .13 | 10.8 | .70 | ND | ND | ND | ND |
| | Storm | > .45 | 380 | 50.37 | 50 | 63 | 261 | 39 | 20 | <5 | 81 | .29 | 8.6 | 1.1 | <1 | 6.3 | .13 | 9.6 | .65 | ND | 175 | 100 | 98 |
| McLoughlin Blvd. | Storm | > .45 | 390 | 22.93 | 40 | 55 | 207 | 38 | 21 | .4 | 85 | .12 | 7.3 | 1.1 | .2 | 4.6 | .12 | 8.8 | .62 | 3.6 | 172 | -- | -- |
| Stanley Avenue | Storm | > .45 | 400 | 25.19 | 37 | 41 | 187 | 33 | 20 | < .5 | 84 | .14 | 7.8 | .9 | .1 | 4.4 | .12 | 8.9 | .61 | 3.5 | 174 | -- | -- |
| Bell Avenue | Storm | > .45 | 305 | 24.98 | 38 | 46 | 198 | 50 | 22 | < .5 | 154 | .11 | 7.6 | 1.0 | .2 | 4.5 | .11 | 9.3 | .62 | 3.4 | 170 | -- | -- |
| S.E. 82nd Avenue | Storm | > .45 | 360 | 24.16 | 39 | 38 | 198 | 47 | 21 | .6 | 126 | .17 | 7.8 | 1.1 | .2 | 4.5 | .12 | 9.3 | .65 | 3.5 | 145 | -- | -- |
| Sycamore gage | Storm* | > 63 | 360 | 9.17 | 35 | 25 | 160 | 25 | 15 | 2.0 | 40 | .35 | 3.0 | .5 | < .5 | 3.9 | .13 | 7.7 | .45 | 5.1 | ND | ND | ND |
| | Storm* | 16 - 63 | -- | 18.52 | 50 | 33 | 177 | 32 | 18 | .4 | 82 | .15 | 6.6 | .9 | .4 | 4.3 | .11 | 8.7 | .57 | 3.2 | ND | ND | ND |
| | Storm* | .45 - 16 | -- | 20.17 | 60 | 30 | 260 | 40 | 10 | <5 | 90 | .35 | 9.0 | 1.0 | <1 | 7.5 | .13 | 11.5 | .70 | ND | ND | ND | ND |
| | Storm | > .45 | 360 | 47.86 | 51 | 30 | 209 | 34 | 14 | <2.5 | 77 | .27 | 6.9 | .6 | <1 | 5.6 | .12 | 9.7 | .60 | ND | 216 | 100 | 97 |
| SE 190th Avenue | Storm | > .45 | 330 | 24.51 | 35 | 30 | 184 | 29 | 18 | < .5 | 83 | .17 | 7.1 | .9 | .4 | 4.1 | .11 | 8.8 | .56 | ND | 155 | -- | -- |
| Regner Road | Storm* | > 63 | 105 | 9.84 | 45 | 20 | 130 | 25 | 10 | <2.5 | 50 | .50 | 3.5 | .5 | < .5 | 3.8 | .13 | 7.8 | .40 | ND | ND | ND | ND |
| | Storm* | 16 - 63 | -- | 21.72 | 48 | 28 | 188 | 32 | 18 | .8 | 87 | .19 | 7.7 | .8 | .4 | 4.2 | .11 | 9.4 | .57 | 3.5 | ND | ND | ND |
| | Storm* | .45 - 16 | -- | 18.96 | 70 | 40 | 290 | 30 | 10 | 2.0 | 80 | ND | 0.9 | 1.0 | <1 | 6.9 | .13 | 11.8 | .70 | ND | ND | ND | ND |
| | Storm | > .45 | 105 | 50.52 | 56 | 31 | 216 | 30 | 13 | <2 | 77 | ND | 4.3 | .8 | <1 | 5.2 | .12 | 10.0 | .59 | ND | 176 | 100 | 98 |
| Crystal Spring | Storm | > .45 | 12.4 | 11.02 | 65 | 115 | 275 | 20 | 10 | 9.0 | 65 | ND | 10.5 | 1.5 | < .5 | 5.3 | 0.15 | 6.2 | 0.50 | ND | 25 | -- | -- |
| Kelley Creek | Storm | > .45 | 85 | 22.19 | 35 | 26 | 164 | 30 | 20 | .6 | 76 | .10 | 7.4 | .7 | .2 | 4.3 | .11 | 9.0 | .59 | 3.2 | 303 | -- | -- |
| SE 100th/Knapp | Storm | > .45 | 2.9 | 26.68 | 29 | 38 | 166 | 31 | 29 | < .1 | 81 | .18 | 5.5 | .8 | .1 | 4.7 | .13 | 8.1 | .55 | 2.7 | 392 | -- | -- |
| Sycamore gage (QA Replicate) | Storm | > .45 | 105 | 25.56 | 42 | 61 | 223 | 38 | 21 | .9 | 95 | .17 | 7.5 | 1.1 | .4 | 4.4 | .12 | 8.7 | .54 | 3.4 | 176 | 100 | 98 |
| | Storm | > .45 | 330 | 21.32 | 36 | 38 | 191 | 34 | 21 | < .5 | 83 | .14 | 6.4 | 1.0 | .3 | 4.1 | .11 | 9.0 | .59 | 3.5 | 155 | -- | -- |
| Circle Avenue | Storm | > .45 | 1.7 | 20.51 | 32 | 63 | 209 | 28 | 24 | < .1 | 58 | .10 | 4.0 | 1.1 | < .1 | 4.8 | .10 | 8.0 | .56 | 2.4 | 494 | -- | -- |

Table 10.--Dissolved oxygen and temperature measurements, October 5, 1989

[°C = degrees Celsius; mm Hg = millimeters mercury; mg/L = milligrams per liter; % = percent]

| Station name | Time | Water temperature (°C) | Barometric pressure (mm Hg) | Dissolved oxygen reading (mg/L) | Percent of saturation |
|---|---|---|---|---|---|
| Milwaukie gage | 0548 | 14.0 | 765 | 10.4 | 100.4 |
| | 1308 | 15.5 | 763 | 10.0 | 99.4 |
| | 2036 | 16.5 | 762 | 9.8 | 100.1 |
| McLoughlin Blvd. | 0604 | 14.0 | 763 | 10.0 | 96.8 |
| | 1253 | 15.5 | 762 | 10.4 | 104.8 |
| | 2023 | 15.5 | 761 | 9.4 | 95.1 |
| Stanley Avenue | 0617 | 13.5 | 762 | 8.5 | 81.9 |
| | 1242 | 14.5 | 760 | 9.6 | 94.4 |
| | 2011 | 16.5 | 759 | 8.7 | 89.0 |
| Bell Avenue | 0625 | 13.5 | 761 | 9.2 | 88.0 |
| | 1235 | 14.5 | 759 | 10.0 | 98.0 |
| | 2004 | 15.5 | 759 | 9.9 | 99.8 |
| S.E. 82nd Avenue | 0634 | 13.5 | 760 | 8.3 | 79.8 |
| | 1226 | 14.5 | 758 | 8.8 | 86.8 |
| | 1956 | 15.5 | 758 | 9.6 | 96.5 |
| S.E. 108th Avenue | 0647 | 12.5 | 759 | 7.7 | 72.2 |
| | 1213 | 12.5 | 757 | 7.9 | 74.7 |
| | 1943 | 14.0 | 757 | 8.4 | 81.3 |
| Sycamore gage | 0656 | 12.0 | 758 | 10.2 | 96.0 |
| | 1203 | 12.5 | 757 | 8.6 | 80.9 |
| | 1848 | 13.5 | 757 | 9.5 | 91.5 |
| S.E. 190th Avenue | 0717 | 12.0 | 757 | 7.7 | 72.0 |
| | 1137 | 12.5 | 757 | 8.2 | 77.1 |
| | 1907 | 13.5 | 755 | 8.6 | 83.0 |
| Regner Road | 0733 | 11.5 | 756 | 9.6 | 88.2 |
| | 1120 | 11.5 | 756 | 10.8 | 99.5 |
| | 1920 | 13.0 | 754 | 9.8 | 94.6 |
| Crystal Spring | 0556 | 14.0 | 765 | 9.4 | 90.7 |
| | 1300 | 15.0 | 762 | 10.6 | 104.8 |
| | 2029 | 16.0 | 761 | 11.0 | 112.0 |
| Kelley Creek | 0705 | 13.5 | 757 | 8.6 | 82.6 |
| | 1156 | 14.0 | 758 | 9.2 | 77.1 |
| | 1856 | 15.0 | 757 | 9.1 | 91.0 |

Start date: 10-05-89; Start time: 0540
End date: 10-05-89; End time: 2036
Sunrise: 0725 (Sun not on Regner Rd. site at 0732.); Sunset: 1815

Initial calibration: Barometric Pressure = 765 mm Hg; Mercury thermometer water temperature = 14.0 °C; Dissolved oxygen meter water temperature = 12.9 °C; and 100% dissolved oxygen saturation = 10.4 mg/L. Meter reading 10.6 mg/L, meter correction = -0.2 mg/L. Subsequent calibrations were checked prior to each measurement over the course of the dissolved oxygen readings throughout the basin.

Table 11.--Nutrient concentrations during low flow and storm runoff from August 1989 through January 1990

[N = nitrogen, P = phosphorus, QA = quality assurance, ND = not detected]

| Station name | Date | Time | Nitrogen, organic total (mg/L as N) | Nitrogen, ammonia dissolved (mg/L as N) | Nitrogen, ammonia total (mg/L as N) | Nitrogen, nitrite dissolved (mg/L as N) | Nitrogen, ammonia plus organic total (mg/L as N) | Nitrogen, $NO_2+NO_3$ dissolved (mg/L as N) | Phosphorus total (mg/L as P) | Phosphorus dissolved (mg/L as P) | Phosphorus ortho, dissolved (mg/L as P) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Milwaukie gage | 09-06-89 | 1345 | 0.38 | 0.05 | 0.02 | 0.05 | 0.4 | 4.70 | 0.09 | 0.08 | 0.08 |
| | 10-02-89 | 1100 | .26 | .05 | .04 | .02 | .3 | 4.60 | .11 | .09 | .09 |
| | 12-04-89 | 2015 | 1.9 | .02 | .06 | < .01 | 2.0 | 2.40 | .60 | .02 | .03 |
| | 12-05-89 | 0130 | 1.7 | .02 | .05 | < .01 | 1.7 | 2.80 | .37 | .03 | .03 |
| | 01-25-90 | 2100 | 1.1 | .03 | .07 | .01 | 1.2 | 2.10 | .24 | .03 | .03 |
| | 01-26-90 | 0155 | .44 | .03 | .06 | .01 | .5 | 1.70 | .28 | .03 | .03 |
| | 01-26-90 | 0815 | 1.1 | .04 | .08 | .02 | 1.2 | 2.20 | .24 | .03 | .03 |
| McLoughlin Boulevard | 09-05-89 | 1500 | .67 | .06 | .03 | .02 | .7 | 4.80 | .08 | .07 | .07 |
| | 10-03-89 | 1430 | .37 | .02 | .03 | < .01 | .4 | 4.20 | .09 | .05 | .03 |
| | 12-04-89 | 2400 | 1.4 | .04 | .10 | < .01 | 1.5 | 2.50 | .43 | .02 | .02 |
| | 01-25-90 | 2130 | 1.3 | .03 | .11 | .02 | 1.4 | 1.80 | .39 | .03 | .03 |
| Stanley Avenue | 09-05-89 | 1200 | .37 | .07 | .03 | .03 | .4 | 1.50 | .05 | .04 | .04 |
| | 10-04-89 | 1100 | .67 | .03 | .03 | < .01 | .7 | 1.40 | .07 | .04 | < .01 |
| | 12-04-89 | 2400 | 2.2 | .07 | .07 | .01 | 2.3 | 2.50 | 1.20 | .02 | .03 |
| | 01-25-90 | 2215 | .96 | .06 | .14 | .01 | 1.1 | 1.70 | .41 | .05 | .03 |
| Bell Avenue | 09-05-89 | 0945 | .27 | .05 | .03 | .04 | .3 | .92 | .05 | .03 | .03 |
| | 10-04-89 | 1430 | .58 | .02 | .02 | < .01 | .6 | .65 | .07 | .03 | .04 |
| | 12-04-89 | 2300 | 2.2 | .07 | .07 | .01 | 2.3 | 2.50 | .95 | .03 | .03 |
| | 01-25-90 | 2210 | .72 | .04 | .08 | .01 | .8 | 1.70 | .19 | .02 | .02 |
| S.E. 82nd Avenue | 09-01-89 | 1400 | .53 | .09 | .07 | .02 | .6 | .41 | .08 | .05 | .04 |
| | 10-06-89 | 1100 | .45 | .06 | .05 | .01 | .5 | .38 | .07 | .06 | .04 |
| | 12-04-89 | 2215 | 2.1 | .05 | .08 | .02 | 2.2 | 2.60 | 1.00 | .04 | .03 |
| | 01-25-90 | 2210 | .61 | .04 | .29 | .01 | .9 | 1.80 | .35 | .02 | .02 |
| Sycamore gage | 08-31-89 | 1400 | .46 | .07 | .04 | .02 | .5 | .86 | .08 | .04 | .04 |
| | 10-05-89 | 1815 | .46 | .05 | .04 | .01 | .5 | .63 | .10 | .03 | .03 |
| | 12-04-89 | 1800 | 3.2 | .02 | .07 | < .01 | 3.3 | 2.20 | 1.40 | .04 | .05 |
| | 12-04-89 | 2125 | 2.3 | .02 | .04 | .01 | 2.3 | 2.60 | .89 | .04 | .03 |
| | 12-04-89 | 2400 | 1.7 | .03 | .07 | .03 | 1.8 | 3.20 | .47 | .04 | .05 |
| | 01-25-90 | 1815 | .62 | .06 | .08 | .01 | .7 | 1.70 | .30 | .05 | .04 |
| | 01-25-90 | 2230 | .84 | .07 | .16 | .02 | 1.0 | 1.60 | .42 | .04 | .04 |
| | 01-26-90 | 0156 | .94 | .08 | .16 | .01 | 1.1 | 1.90 | .48 | .05 | .04 |
| S.E. 190th Avenue | 08-31-89 | 1000 | .44 | .08 | .06 | .02 | .5 | .95 | .09 | .04 | .03 |
| | 10-05-89 | 1500 | .65 | .05 | .05 | .01 | .7 | .77 | .11 | .06 | .06 |
| | 12-04-89 | 2130 | 2.3 | .06 | .08 | .01 | 2.4 | 2.90 | .89 | .02 | .03 |
| | 01-25-90 | 2030 | .6 | .05 | .10 | .01 | .7 | 1.90 | .33 | .03 | .03 |
| Regner Road | 08-30-89 | 1200 | .47 | .07 | .03 | < .01 | .5 | .84 | .09 | .06 | .05 |
| | 10-05-89 | 0945 | .87 | .04 | .03 | < .01 | .9 | 1.00 | .10 | .05 | .06 |
| | 12-04-89 | 1730 | 3.5 | .02 | .05 | < .01 | 3.5 | 2.70 | 2.00 | .06 | .04 |
| | 12-04-89 | 2100 | 2.6 | .05 | .10 | .02 | 2.7 | 3.50 | .65 | .03 | .04 |
| | 12-04-89 | 2350 | 1.4 | .04 | .07 | .03 | 1.5 | 4.40 | .52 | .05 | .04 |
| | 01-25-90 | 1650 | .62 | .03 | .08 | .01 | .7 | 2.40 | .27 | .02 | .02 |
| | 01-25-90 | 2145 | 1.4 | .10 | .14 | .02 | 1.5 | 2.20 | .35 | .05 | .04 |
| | 01-26-90 | 0115 | 1.0 | .14 | .17 | .01 | 1.2 | 2.80 | .28 | .03 | .03 |
| Crystal Spring | 09-06-89 | 1000 | .36 | .06 | .04 | .04 | .4 | 5.60 | .12 | .09 | .08 |
| | 10-03-89 | 1030 | .14 | .08 | .06 | .04 | .2 | 5.50 | .12 | .13 | .10 |
| | 12-04-89 | 2400 | .41 | .07 | .09 | .02 | .5 | 5.20 | .19 | .14 | .12 |
| | 01-25-90 | 2245 | .35 | .04 | .05 | .02 | .4 | 5.50 | .12 | .08 | .10 |
| Kelley Creek | 09-01-89 | 1030 | .69 | .36 | .31 | .04 | 1.0 | .54 | .19 | .06 | .06 |
| | 10-06-89 | 1330 | .07 | .15 | .13 | .02 | .2 | .38 | .07 | .04 | .04 |
| | 12-04-89 | 2030 | 2.9 | .05 | .09 | .01 | 3.0 | 2.90 | 1.70 | .07 | .07 |
| | 01-25-90 | 2105 | .79 | .07 | .11 | .01 | .9 | 1.30 | .42 | .08 | .07 |
| Circle Avenue | 12-04-89 | 1730 | .77 | .01 | .03 | < .01 | .8 | .39 | .44 | .02 | .03 |
| | 01-25-90 | 1810 | .48 | .01 | .12 | < .01 | .6 | .40 | .24 | .02 | .02 |
| S.E. 100th and Knapp | 12-04-89 | 1900 | 1.6 | .04 | .06 | < .01 | 1.7 | 1.30 | .68 | .06 | .06 |
| | 01-25-90 | 2000 | 1.3 | .03 | .06 | < .01 | 1.4 | .56 | .26 | .08 | .05 |
| Milwaukie gage (QA Replicate) | 01-25-90 | 2100 | 1.2 | .03 | .07 | .02 | 1.3 | 2.20 | .37 | .02 | .03 |
| | 01-26-90 | 0155 | .72 | .03 | .08 | .02 | .8 | 1.70 | .43 | .03 | .03 |
| | 01-26-90 | 0815 | .28 | .04 | .12 | .02 | .4 | 2.20 | .28 | .03 | .03 |
| S.E. 44th at Umatilla below fish ladder (single sample) | 01-25-90 | 2315 | ND | < .01 | < .01 | .01 | .7 | 5.60 | .08 | .04 | .05 |

Table 12.--Major ions and dissolved trace-element concentrations during low flow and storm runoff, August 1989 through January 1990

[ -- = not determined; < = less than; and > = greater than ]

| Station name | Date | Time | Hardness total (mg/L as $CaCO_3$) | Calcium dissolved (mg/L as Ca) | Magnesium, dissolved (mg/L as Mg) | Sodium, dissolved (mg/L as Na) | Sodium adsorption ratio | Silica, dissolved (mg/L as $SiO_2$) | Barium dissolved (µg/L as Ba) |
|---|---|---|---|---|---|---|---|---|---|
| Milwaukie gage | 09-06-89 | 1345 | 84 | 19 | 8.8 | 7.4 | 0.4 | 55 | 12 |
| | 10-02-89 | 1100 | 75 | 17 | 7.8 | 6.6 | .3 | 50 | 15 |
| | 12-04-89 | 2015 | 26 | 6.4 | 2.3 | 3.4 | .3 | 11 | 25 |
| | 12-05-89 | 0130 | 23 | 5.7 | 2.1 | 3.2 | .3 | 9.9 | 24 |
| | 01-25-90 | 2100 | -- | .5 | 2.3 | 3.4 | -- | 13 | 16 |
| | 01-26-90 | 0155 | -- | 5.5 | 2.0 | 3.1 | -- | 10 | 16 |
| | 01-26-90 | 0815 | -- | 6.2 | 2.4 | 3.5 | -- | 12 | 19 |
| McLoughlin Boulevard | 09-05-89 | 1500 | 78 | 18 | 8.0 | 8.0 | .4 | 40 | 21 |
| | 10-03-89 | 1430 | 69 | 16 | 7.1 | 6.6 | .3 | 37 | 21 |
| | 12-04-89 | 2400 | 21 | 5.4 | 1.9 | 3.1 | .3 | 8.9 | 23 |
| | 01-25-90 | 2130 | 23 | 5.7 | 2.0 | 3.2 | .3 | 9.8 | 17 |
| Stanley Avenue | 09-05-89 | 1200 | 52 | 12 | 5.4 | 6.7 | .4 | 23 | 23 |
| | 10-04-89 | 1100 | 52 | 12 | 5.2 | 5.7 | .3 | 21 | 24 |
| | 12-04-89 | 2400 | 21 | 5.4 | 1.9 | 3.2 | .3 | 8.7 | 23 |
| | 01-25-90 | 2215 | 21 | 5.3 | 1.9 | 3.1 | .3 | 9.3 | 19 |
| Bell Avenue | 09-05-89 | 0945 | 41 | 9.5 | 4.1 | 5.9 | .4 | 18 | 23 |
| | 10-04-89 | 1430 | 37 | 9.0 | 3.6 | 4.8 | .3 | 15 | 20 |
| | 12-04-89 | 2300 | 21 | 5.3 | 1.9 | 3.2 | .3 | 8.5 | 22 |
| | 01-25-90 | 2210 | -- | 5.3 | 1.8 | 3.0 | -- | 9.2 | 19 |
| S.E. 82nd Avenue | 09-01-89 | 1400 | 38 | 8.9 | 3.8 | 4.9 | .3 | 16 | 19 |
| | 10-06-89 | 1100 | 36 | 8.5 | 3.5 | 4.2 | .3 | 14 | 21 |
| | 12-04-89 | 2215 | 21 | 5.2 | 1.9 | 3.2 | .3 | 8.3 | 20 |
| | 01-25-90 | 2210 | -- | 5.3 | 1.9 | 3.2 | -- | 9.5 | 17 |
| Sycamore gage | 08-31-89 | 1400 | 44 | 10 | 4.5 | 6.2 | .4 | 21 | 22 |
| | 10-05-89 | 1815 | 43 | 10 | 4.3 | 5.6 | .4 | 20 | 22 |
| | 12-04-89 | 1800 | 20 | 5.0 | 1.8 | 3.0 | .3 | 8.1 | 21 |
| | 12-04-89 | 2125 | 21 | 5.1 | 1.9 | 2.9 | .3 | 8.1 | 26 |
| | 12-04-89 | 2400 | 21 | 5.2 | 2.0 | 3.0 | .3 | 8.4 | 29 |
| | 01-25-90 | 1815 | 19 | 4.8 | 1.7 | 3.0 | .3 | 8.7 | 16 |
| | 01-25-90 | 2230 | 19 | 4.7 | 1.7 | 2.9 | .3 | 8.4 | 19 |
| | 01-26-90 | 0156 | 20 | 5.0 | 1.8 | 3.1 | .3 | 9.4 | 20 |
| S.E. 190th Avenue | 08-31-89 | 1000 | 54 | 12 | 5.7 | 7.5 | .4 | 24 | 32 |
| | 10-05-89 | 1500 | 55 | 12 | 6.1 | 7.5 | .4 | 24 | 35 |
| | 12-04-89 | 2130 | 20 | 5.0 | 1.9 | 2.9 | .3 | 7.9 | 25 |
| | 01-25-90 | 2030 | -- | 4.5 | 1.6 | 2.7 | -- | 8.3 | 18 |
| Regner Road | 08-30-89 | 1200 | 42 | 8.7 | 5.0 | 7.3 | .5 | 23 | 30 |
| | 10-05-89 | 0945 | 46 | 9.6 | 5.4 | 7.3 | .5 | 24 | 35 |
| | 12-04-89 | 1730 | 20 | 4.8 | 1.9 | 3.0 | .3 | 7.8 | 27 |
| | 12-04-89 | 2100 | 21 | 5.0 | 2.0 | 3.0 | .3 | 7.7 | 31 |
| | 12-04-89 | 2350 | 24 | 5.9 | 2.3 | 3.4 | .3 | 8.5 | 36 |
| | 01-25-90 | 1650 | -- | 4.6 | 1.8 | 3.2 | -- | 8.8 | 18 |
| | 01-25-90 | 2145 | -- | 4.3 | 1.7 | 3.0 | -- | 7.8 | 19 |
| | 01-26-90 | 0115 | -- | 4.9 | 1.9 | 3.3 | -- | 9.1 | 25 |
| Crystal Spring | 09-06-89 | 1000 | 83 | 19 | 8.7 | 7.1 | .3 | 59 | 10 |
| | 10-03-89 | 1030 | 83 | 19 | 8.7 | 6.9 | .3 | 59 | 13 |
| | 12-04-89 | 2400 | 73 | 17 | 7.5 | 6.4 | .3 | 49 | 18 |
| | 01-25-90 | 2245 | 74 | 17 | 7.7 | 6.4 | .3 | 53 | 12 |
| Kelley Creek | 09-01-89 | 1030 | 51 | 12 | 5.0 | 7.1 | .4 | 20 | 44 |
| | 10-06-89 | 1330 | 51 | 12 | 5.0 | 6.8 | .4 | 19 | 21 |
| | 12-04-89 | 2030 | 24 | 6.1 | 2.2 | 3.6 | .3 | 9.1 | 22 |
| | 01-25-90 | 2105 | 20 | 5.1 | 1.7 | 3.4 | .3 | 9.1 | 16 |
| Circle Avenue | 12-04-89 | 1730 | 6 | 1.7 | 0.4 | .9 | .2 | 3.4 | 3 |
| | 01-25-90 | 1810 | 11 | 3.0 | 0.8 | 1.3 | .2 | 6.4 | 7 |
| S.E. 100th/Knapp | 12-04-89 | 1900 | 32 | 8.5 | 2.6 | 3.5 | .3 | 9.6 | 16 |
| | 01-25-90 | 2000 | -- | 7.7 | 2.2 | 2.9 | -- | 8.8 | 15 |
| Milwaukie gage (QA Replicate) | 01-25-90 | 2100 | -- | 6.6 | 2.4 | 3.4 | -- | 13 | 16 |
| | 01-26-90 | 0155 | -- | 5.4 | 2.0 | 3.1 | -- | 10 | 15 |
| | 01-26-90 | 0815 | -- | 6.4 | 2.3 | 3.4 | -- | 13 | 19 |
| S.E. 44th at Umatilla below fish ladder (single sample) | 01-25-90 | 2315 | -- | 17 | 7.9 | 6.1 | -- | 44 | 8 |

Table 12.--Major ions and dissolved trace-element concentrations during low flow and storm runoff, August 1989 through January 1990--Continued

| Station name | Date | Beryllium, dissolved (µg/L as Be) | Cadmium dissolved (µg/L as Cd) | Chromium, dissolved (µg/L as Cr) | Cobalt, dissolved (µg/L as Co) | Copper, dissolved (µg/L as Cu) | Iron, dissolved (µg/L as Fe) | Lead, dissolved (µg/L as Pb) | Mercury, dissolved (µg/L as Hg) | Manganese, dissolved (µg/L as Mn) |
|---|---|---|---|---|---|---|---|---|---|---|
| Milwaukie gage | 09-06-89 | < 0.5 | < 1 | < 5 | < 3 | < 10 | 93 | < 10 | < 0.1 | 22 |
| | 10-02-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 120 | < 10 | < .1 | 9 |
| | 12-04-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 190 | < 10 | .3 | 3 |
| | 12-05-89 | < .5 | < 1 | < 5 | < 3 | 10 | 170 | < 10 | .3 | 2 |
| | 01-25-90 | 1 | 1 | < 5 | < 3 | < 10 | 66 | < 10 | < .1 | 1 |
| | 01-26-90 | < .5 | < 1 | < 5 | < 3 | < 10 | 82 | < 10 | .1 | 1 |
| | 01-26-90 | < .5 | < 1 | < 5 | < 3 | < 10 | 95 | < 10 | < .1 | < 1 |
| McLoughlin Boulevard | 09-05-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 130 | < 10 | < .1 | 13 |
| | 10-03-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 190 | < 10 | < .1 | 10 |
| | 12-04-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 210 | < 10 | .6 | 7 |
| | 01-25-90 | < .5 | < 1 | < 5 | < 3 | < 10 | 58 | < 10 | .1 | < 1 |
| Stanley Avenue | 09-05-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 260 | < 10 | < .1 | 28 |
| | 10-04-89 | < .5 | 1 | < 5 | < 3 | < 10 | 340 | < 10 | .1 | 25 |
| | 12-04-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 150 | < 10 | .5 | 9 |
| | 01-25-90 | < .5 | < 1 | < 5 | < 3 | < 10 | 100 | < 10 | .1 | 2 |
| Bell Avenue | 09-05-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 320 | < 10 | < .1 | 27 |
| | 10-04-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 410 | < 10 | .1 | 20 |
| | 12-04-89 | < .5 | < 1 | < 5 | < 3 | 20 | 110 | < 10 | .5 | 7 |
| | 01-25-90 | 1 | < 1 | < 5 | < 3 | < 10 | 160 | < 10 | .1 | 14 |
| S.E. 82nd Avenue | 09-01-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 450 | < 10 | < .1 | 63 |
| | 10-06-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 480 | < 10 | < .1 | 50 |
| | 12-04-89 | < .5 | < 1 | < 5 | < 3 | 10 | 67 | < 10 | .5 | 7 |
| | 01-25-90 | < .5 | 1 | < 5 | < 3 | < 10 | 110 | < 10 | .1 | 8 |
| Sycamore gage | 08-31-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 560 | < 10 | < .1 | 67 |
| | 10-05-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 180 | < 10 | .2 | 60 |
| | 12-04-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 130 | < 10 | .2 | 2 |
| | 12-04-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 99 | < 10 | .3 | 2 |
| | 12-04-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 160 | < 10 | .2 | 4 |
| | 01-25-90 | < .5 | 2 | < 5 | < 3 | < 10 | 130 | < 10 | < .1 | < 1 |
| | 01-25-90 | < .5 | < 1 | < 5 | < 3 | < 10 | 150 | < 10 | .1 | 3 |
| | 01-26-90 | 1 | < 1 | < 5 | < 3 | < 10 | 140 | < 10 | .1 | 4 |
| S.E. 190th Avenue | 08-31-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 660 | < 10 | < .1 | 200 |
| | 10-05-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 1100 | < 10 | < .1 | 190 |
| | 12-04-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 95 | < 10 | .5 | 19 |
| | 01-25-90 | .8 | < 1 | < 5 | < 3 | < 10 | 110 | < 10 | .1 | 2 |
| Regner Road | 08-30-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 440 | < 10 | < .1 | 22 |
| | 10-05-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 570 | < 10 | .1 | 23 |
| | 12-04-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 110 | < 10 | .3 | 2 |
| | 12-04-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 120 | < 10 | .3 | 5 |
| | 12-04-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 110 | < 10 | .2 | 5 |
| | 01-25-90 | 1 | < 1 | < 5 | < 3 | < 10 | 65 | < 10 | < .1 | 1 |
| | 01-25-90 | < .5 | 2 | < 5 | < 3 | < 10 | 70 | < 10 | .1 | 1 |
| | 01-26-90 | < .5 | 3 | < 5 | < 3 | < 10 | 110 | < 10 | .1 | 5 |
| Crystal Spring | 09-06-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 53 | < 10 | < .1 | 8 |
| | 10-03-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 38 | < 10 | < .1 | 7 |
| | 12-04-89 | < .5 | < 1 | < 5 | < 3 | 10 | 50 | 10 | .2 | 7 |
| | 01-25-90 | < .5 | < 1 | < 5 | < 3 | < 10 | 22 | < 10 | .1 | < 1 |
| Kelley Creek | 09-01-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 390 | 20 | < .1 | 150 |
| | 10-06-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 540 | < 10 | < .1 | 110 |
| | 12-04-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 94 | < 10 | .4 | 6 |
| | 01-25-90 | < .5 | < 1 | < 5 | < 3 | < 10 | 190 | < 10 | .1 | 2 |
| Circle Avenue | 12-04-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 37 | < 10 | .2 | 1 |
| | 01-25-90 | < .5 | 2 | < 5 | < 3 | < 10 | 300 | < 10 | .1 | 5 |
| S.E. 100th/Knapp | 12-04-89 | < .5 | < 1 | < 5 | < 3 | < 10 | 100 | < 10 | .4 | 8 |
| | 01-25-90 | < .5 | 4 | < 5 | < 3 | < 10 | 220 | < 10 | .1 | 4 |
| Milwaukie gage (QA Replicate) | 01-25-90 | < .5 | 2 | < 5 | < 3 | < 10 | 41 | < 10 | .1 | < 1 |
| | 01-26-90 | < .5 | < 1 | < 5 | < 3 | < 10 | 83 | < 10 | < .1 | 1 |
| | 01-26-90 | < .5 | 2 | < 5 | < 3 | < 10 | 120 | < 10 | < .1 | 2 |
| S.E. 44th at Umatilla below fish ladder (single sample) | 01-25-90 | < .5 | 2 | < 5 | < 3 | < 10 | 45 | 20 | .1 | 8 |

Table 12.--Major ions and dissolved trace-element concentrations during low flow and storm runoff, August 1989 through January 1990--Continued

| Station name | Date | Molybdenum, dissolved (µg/L as Mo) | Nickel, dissolved (µg/L as Ni) | Silver, dissolved (µg/L as Ag) | Strontium, dissolved (µg/L as Sr) | Vanadium, dissolved (µg/L as V) | Zinc, dissolved (µg/L as Zn) | Lithium dissolved (µg/L as Li) | Carbon, organic dissolved (Mg/L as C) | Carbon, organic suspended total (Mg/L as C) |
|---|---|---|---|---|---|---|---|---|---|---|
| Milwaukie gage | 09-06-89 | < 10 | < 10 | < 1 | 88 | < 6 | 13 | < 4 | 2.0 | 0.3 |
| | 10-02-89 | < 10 | < 10 | < 1 | 86 | < 6 | 17 | < 4 | 2.3 | .4 |
| | 12-04-89 | < 10 | < 10 | < 1 | 54 | < 6 | 13 | < 4 | 4.7 | > 5 |
| | 12-05-89 | < 10 | < 10 | < 1 | 49 | < 6 | 14 | < 4 | 4.8 | > 5 |
| | 01-25-90 | < 10 | < 10 | < 1 | 57 | < 6 | 14 | < 4 | 2.5 | > 5 |
| | 01-26-90 | < 10 | < 10 | < 1 | 49 | < 6 | 14 | < 4 | 2.9 | > 5 |
| | 01-26-90 | < 10 | < 10 | < 1 | 56 | < 6 | < 3 | < 4 | 3.2 | 4.4 |
| McLoughlin Boulevard | 09-05-89 | < 10 | < 10 | < 1 | 110 | < 6 | 19 | < 4 | 2.7 | .2 |
| | 10-03-89 | 10 | < 10 | < 1 | 99 | < 6 | 12 | < 4 | 3.1 | .3 |
| | 12-04-89 | < 10 | < 10 | < 1 | 50 | < 6 | 14 | < 4 | 4.8 | > 5 |
| | 01-25-90 | < 10 | < 10 | < 1 | 52 | < 6 | 9 | < 4 | 2.8 | > 5 |
| Stanley Avenue | 09-05-89 | < 10 | < 10 | < 1 | 98 | < 6 | 10 | < 4 | 3.6 | .3 |
| | 10-04-89 | < 10 | < 10 | < 1 | 94 | < 6 | 28 | < 4 | 4.5 | .3 |
| | 12-04-89 | < 10 | < 10 | < 1 | 51 | < 6 | 11 | < 4 | 4.8 | > 5 |
| | 01-25-90 | < 10 | < 10 | < 1 | 51 | < 6 | 11 | < 4 | 2.8 | > 5 |
| Bell Avenue | 09-05-89 | < 10 | < 10 | < 1 | 87 | < 6 | 10 | < 4 | 3.7 | .3 |
| | 10-04-89 | < 10 | < 10 | < 1 | 81 | < 6 | 6 | < 4 | 5.5 | .3 |
| | 12-04-89 | < 10 | < 10 | < 1 | 50 | < 6 | 10 | < 4 | 4.5 | > 5 |
| | 01-25-90 | < 10 | < 10 | < 1 | 51 | < 6 | 12 | < 4 | 2.9 | > 5 |
| S.E. 82nd Avenue | 09-01-89 | < 10 | < 10 | < 1 | 87 | < 6 | 11 | < 4 | 5.4 | .4 |
| | 10-06-89 | < 10 | < 10 | < 1 | 80 | < 6 | 8 | < 4 | 5.3 | .4 |
| | 12-04-89 | < 10 | < 10 | < 1 | 49 | < 6 | 6 | < 4 | 4.5 | > 5 |
| | 01-25-90 | < 10 | 10 | < 1 | 52 | < 6 | < 3 | < 4 | 3.0 | > 5 |
| Sycamore gage | 08-31-89 | 10 | < 10 | < 1 | 95 | < 6 | 13 | < 4 | 4.2 | .4 |
| | 10-05-89 | < 10 | < 10 | 1 | 92 | < 6 | 9 | < 4 | 5.6 | .6 |
| | 12-04-89 | < 10 | < 10 | < 1 | 47 | < 6 | 11 | < 4 | 3.9 | > 5 |
| | 12-04-89 | < 10 | < 10 | < 1 | 49 | < 6 | 9 | < 4 | 4.5 | > 5 |
| | 12-04-89 | < 10 | < 10 | < 1 | 52 | < 6 | 7 | < 4 | 4.6 | > 5 |
| | 01-25-90 | < 10 | 10 | < 1 | 45 | < 6 | 3 | < 4 | 2.3 | > 5 |
| | 01-25-90 | < 10 | < 10 | < 1 | 45 | < 6 | < 3 | < 4 | 2.9 | > 5 |
| | 01-26-90 | < 10 | < 10 | < 1 | 49 | < 6 | 23 | < 4 | 3.1 | > 5 |
| S.E. 190th Avenue | 08-31-89 | < 10 | < 10 | 1 | 110 | < 6 | 10 | < 4 | 5.1 | .6 |
| | 10-05-89 | < 10 | < 10 | < 1 | 110 | < 6 | 16 | < 4 | 7.4 | .4 |
| | 12-04-89 | < 10 | < 10 | < 1 | 50 | < 6 | 4 | < 4 | 4.2 | > 5 |
| | 01-25-90 | < 10 | < 10 | < 1 | 45 | < 6 | 7 | < 4 | 2.6 | > 5 |
| Regner Road | 08-30-89 | 10 | < 10 | 2 | 96 | < 6 | 16 | < 4 | 4.3 | .5 |
| | 10-05-89 | < 10 | < 10 | < 1 | 100 | < 6 | < 3 | < 4 | 6.1 | .3 |
| | 12-04-89 | < 10 | < 10 | < 1 | 49 | < 6 | 8 | < 4 | 5.3 | > 5 |
| | 12-04-89 | < 10 | < 10 | < 1 | 53 | < 6 | 17 | < 4 | 4.6 | > 5 |
| | 12-04-89 | < 10 | < 10 | < 1 | 64 | < 6 | 14 | < 4 | 4.4 | -- |
| | 01-25-90 | < 10 | < 10 | < 1 | 51 | < 6 | 4 | < 4 | 2.1 | > 5 |
| | 01-25-90 | < 10 | < 10 | < 1 | 46 | < 6 | 16 | < 4 | 2.8 | > 5 |
| | 01-26-90 | < 10 | < 10 | < 1 | 52 | < 6 | < 3 | < 4 | 2.5 | 2.7 |
| Crystal Spring | 09-06-89 | < 10 | < 10 | < 1 | 84 | 9 | 11 | < 4 | 1.3 | .3 |
| | 10-03-89 | < 10 | < 10 | 3 | 83 | 8 | 11 | < 4 | 1.3 | .3 |
| | 12-04-89 | < 10 | < 10 | 1 | 79 | 7 | 61 | < 4 | 2.3 | 1.0 |
| | 01-25-90 | < 10 | 20 | < 1 | 76 | < 6 | < 3 | < 4 | 1.2 | .7 |
| Kelley Creek | 09-01-89 | < 10 | < 10 | < 1 | 100 | < 6 | 17 | < 4 | 3.2 | .5 |
| | 10-06-89 | < 10 | < 10 | < 1 | 100 | < 6 | 16 | < 4 | 3.2 | .2 |
| | 12-04-89 | < 10 | < 10 | 1 | 55 | < 6 | < 3 | < 4 | 5.9 | > 5 |
| | 01-25-90 | < 10 | 10 | < 1 | 46 | < 6 | < 3 | < 4 | 3.7 | > 5 |
| Circle Avenue | 12-04-89 | < 10 | < 10 | < 1 | 16 | < 6 | 12 | < 4 | 1.3 | 2.6 |
| | 01-25-90 | < 10 | < 10 | < 1 | 22 | < 6 | 18 | < 4 | 1.1 | 3.0 |
| S.E. 100th/Knapp | 12-04-89 | < 10 | < 10 | < 1 | 56 | < 6 | 7 | < 4 | 5.1 | > 5 |
| | 01-25-90 | < 10 | < 10 | < 1 | 50 | < 6 | 5 | < 4 | 4.4 | 4.3 |
| Milwaukie gage (QA Replicate) | 01-25-90 | < 10 | < 10 | < 1 | 56 | < 6 | < 3 | < 4 | 2.6 | > 5 |
| | 01-26-90 | < 10 | < 10 | < 1 | 46 | < 6 | < 3 | < 4 | 3.2 | > 5 |
| | 01-26-90 | < 10 | < 10 | < 1 | 56 | < 6 | 11 | < 4 | 3.3 | 4.0 |
| S.E. 44th at Umatilla below fish ladder (single sample) | 01-25-90 | < 10 | < 10 | < 1 | 81 | < 6 | 63 | < 4 | 1.6 | .6 |

Table 13.--Total recoverable organochlorine pesticide and polychlorinated biphenyl concentrations in water during low flow and storm runoff, August 1989 through January 1990

[DEF = S,S,S-tributylphosphorotrithioate, DDD = dichlorodiphenyldichloroethane, DDE = dichlorodiphenyldichloroethylene, and DDT = dichlorodiphenyltrichloroethane. All concentrations are reported in micrograms per liter]

| Station name | Date | Time | Perthane | DEF | Naphthalenes, polychlor | Aldrin, | Lindane | Chlordane | DDD | DDE | DDT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Milwaukie gage | 09-06-89 | 1345 | <0.1 | <0.01 | <0.1 | <0.01 | <0.01 | <0.1 | <0.01 | <0.01 | <0.01 |
| | 10-02-89 | 1100 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 12-04-89 | 2015 | < .1 | < .01 | < .1 | < .01 | < .01 | 1.9 | .01 | .03 | .07 |
| | 12-05-89 | 0130 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | .01 | .04 | .11 |
| | 01-25-90 | 2100 | < .1 | < .01 | < .1 | < .001 | .001 | < .1 | .01 | .013 | .025 |
| | 01-26-90 | 0155 | < .1 | < .01 | < .1 | < .001 | .001 | < .1 | .015 | .018 | .048 |
| | 01-26-90 | 0815 | < .1 | < .01 | < .1 | < .001 | .001 | < .1 | .011 | .011 | .028 |
| McLoughlin Boulevard | 09-05-89 | 1500 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 10-03-89 | 1430 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 12-04-89 | 2400 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | .01 | .03 | .07 |
| | 01-25-90 | 2130 | < .1 | < .01 | < .1 | < .001 | .001 | < .1 | .009 | .014 | .030 |
| Stanley Avenue | 09-05-89 | 1200 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 10-04-89 | 1100 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 12-04-89 | 2400 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | .01 | .04 | .10 |
| | 01-25-90 | 2215 | < .1 | < .01 | < .1 | < .001 | .001 | < .1 | .012 | .020 | .040 |
| Bell Avenue | 09-05-89 | 0945 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 10-04-89 | 1430 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 12-04-89 | 2300 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | .01 | .03 | .25 |
| | 01-25-90 | 2210 | < .1 | < .01 | < .1 | < .001 | .001 | < .1 | .011 | .020 | .042 |
| S.E. 82nd Avenue | 09-01-89 | 1400 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 10-06-89 | 1100 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 12-04-89 | 2215 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | .01 | .02 | .04 |
| | 01-25-90 | 2210 | < .1 | < .01 | < .1 | < .001 | .001 | < .1 | .011 | .020 | .042 |
| Sycamore gage | 08-31-89 | 1400 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 10-05-89 | 1815 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 12-04-89 | 1800 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | .01 | .01 | .10 |
| | 12-04-89 | 2125 | < .1 | < .01 | < .1 | < .01 | < .01 | .1 | .05 | .06 | .17 |
| | 12-04-89 | 2400 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | .01 | .03 | .08 |
| | 01-25-90 | 1815 | < .1 | < .01 | < .1 | < .001 | .001 | < .1 | .011 | .026 | .045 |
| | 01-25-90 | 2230 | < .1 | < .01 | < .1 | < .001 | .001 | < .1 | .017 | .028 | .066 |
| | 01-26-90 | 0156 | < .1 | < .01 | < .1 | < .001 | .002 | < .1 | .014 | .021 | .047 |
| S.E. 190th Avenue | 08-31-89 | 1000 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 10-05-89 | 1500 | < .1 | < .01 | < .1 | < .01 | .01 | < .1 | < .01 | < .01 | < .01 |
| | 12-04-89 | 2130 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | .02 | .07 | .19 |
| | 01-25-90 | 2030 | < .1 | < .01 | < .1 | < .001 | .003 | .1 | .018 | .023 | .056 |
| Regner Road | 08-30-89 | 1200 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 10-05-89 | 0945 | < .1 | < .01 | < .1 | < .01 | .04 | < .1 | < .01 | < .01 | < .01 |
| | 12-04-89 | 1730 | < .1 | < .01 | < .1 | < .01 | < .01 | .1 | .07 | .16 | .63 |
| | 12-04-89 | 2100 | < .1 | < .01 | < .1 | < .01 | < .01 | .1 | .02 | .06 | .15 |
| | 12-04-89 | 2350 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | .01 | .02 | .04 |
| | 01-25-90 | 1650 | < .1 | < .01 | < .1 | < .001 | .002 | .1 | .033 | .042 | .180 |
| | 01-25-90 | 2145 | < .1 | < .01 | < .1 | < .001 | .002 | .1 | .020 | .034 | .085 |
| | 01-26-90 | 0115 | < .1 | < .01 | < .1 | < .001 | .002 | < .1 | .013 | .019 | .042 |
| Crystal Spring | 09-06-89 | 1000 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 10-03-89 | 1030 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 12-04-89 | 2400 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 01-25-90 | 2245 | < .1 | < .01 | < .1 | < .001 | < .001 | < .1 | < .001 | < .001 | < .001 |
| Kelley Creek | 09-01-89 | 1030 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 10-06-89 | 1330 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 12-04-89 | 2030 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | .01 | .05 | .08 |
| | 01-25-90 | 2105 | < .1 | < .01 | < .1 | < .001 | < .001 | < .1 | .011 | .029 | .044 |
| Circle Avenue | 12-04-89 | 1730 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 01-25-90 | 1810 | < .1 | < .01 | < .1 | < .001 | .001 | < .1 | < .001 | .001 | .001 |
| S.E. 100th/Knapp | 12-04-89 | 1900 | < .1 | < .01 | < .1 | < .01 | < .01 | < .1 | < .01 | < .01 | < .01 |
| | 01-25-90 | 2000 | < .1 | < .01 | < .1 | < .001 | .003 | < .1 | .007 | .006 | .002 |
| Milwaukie gage (QA Replicate) | 01-25-90 | 2100 | < .1 | < .01 | < .1 | < .001 | .001 | < .1 | .007 | .019 | .033 |
| | 01-26-90 | 0155 | < .1 | < .01 | < .1 | < .001 | .001 | < .1 | .015 | .020 | .050 |
| | 01-26-90 | 0815 | < .1 | < .01 | < .1 | < .001 | .001 | < .1 | .013 | .016 | .042 |
| S.E. 44th at Umatilla below fish ladder (single sample) | 01-25-90 | 2315 | < .1 | < .01 | < .1 | < .001 | < .001 | < .1 | .090 | .010 | .060 |

Table 13.--Total recoverable organochlorine pesticide and polychlorinated biphenyl concentrations in water during low flow and storm runoff, August 1989 through January 1990--Continued

| Station name | Date | Di-eldrin | Endo-sulfan | Endrin | Tox-aphene | Hepta-chlor | Hepta-chlor epoxide | Meth-oxy-chlor | Poly-chlor-inated-bi-phenyls | Mirex |
|---|---|---|---|---|---|---|---|---|---|---|
| Milwaukie gage | 09-06-89 | <0.01 | <0.01 | <0.01 | < 1 | <0.01 | <0.01 | <0.01 | <0.1 | <0.01 |
| | 10-02-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 12-04-89 | .02 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 12-05-89 | .03 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 01-25-90 | .012 | < .001 | < .001 | < 1 | < .001 | < .001 | < .01 | < .1 | < .01 |
| | 01-26-90 | .015 | < .001 | < .001 | < 1 | < .001 | < .001 | < .01 | < .1 | < .01 |
| | 01-26-90 | .013 | < .001 | < .001 | < 1 | < .001 | < .001 | .01 | < .1 | < .01 |
| McLoughlin Boulevard | 09-05-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 10-03-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 12-04-89 | .02 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 01-25-90 | .012 | < .001 | < .001 | < 1 | < .001 | .001 | < .01 | < .1 | < .01 |
| Stanley Avenue | 09-05-89 | .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 10-04-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 12-04-89 | .03 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 01-25-90 | .016 | < .001 | < .001 | < 1 | < .001 | .001 | < .01 | < .1 | < .01 |
| Bell Avenue | 09-05-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 10-04-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 12-04-89 | .02 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 01-25-90 | .016 | < .001 | < .001 | < 1 | < .001 | .001 | < .01 | < .1 | < .01 |
| S.E. 82nd Avenue | 09-01-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 10-06-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 12-04-89 | .02 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 01-25-90 | .017 | < .001 | < .001 | < 1 | < .001 | .001 | < .01 | < .1 | < .01 |
| Sycamore gage | 08-31-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 10-05-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 12-04-89 | .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 12-04-89 | .04 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 12-04-89 | .03 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 01-25-90 | .020 | < .001 | < .001 | < 1 | < .001 | .001 | < .01 | < .1 | < .01 |
| | 01-25-90 | .018 | < .001 | < .001 | < 1 | < .001 | .001 | < .01 | < .1 | < .01 |
| | 01-26-90 | .025 | < .001 | < .001 | < 1 | < .001 | .001 | < .01 | < .1 | < .01 |
| S.E. 190th Avenue | 08-31-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 10-05-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 12-04-89 | .04 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 01-25-90 | .020 | < .001 | < .001 | < 1 | < .001 | .004 | < .01 | < .1 | < .01 |
| Regner Road | 08-30-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 10-05-89 | .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 12-04-89 | .06 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 12-04-89 | .03 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 12-04-89 | .02 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 01-25-90 | .020 | < .001 | < .001 | < 1 | < .001 | < .001 | < .01 | < .1 | < .01 |
| | 01-25-90 | .035 | < .001 | < .001 | < 1 | < .001 | .002 | < .01 | < .1 | < .01 |
| | 01-26-90 | .029 | < .001 | < .001 | < 1 | < .001 | .002 | < .01 | < .1 | < .01 |
| Crystal Spring | 09-06-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 10-03-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 12-04-89 | .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 01-25-90 | .006 | < .001 | < .001 | < 1 | < .001 | < .001 | < .01 | < .1 | < .01 |
| Kelley Creek | 09-01-89 | .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 10-06-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 12-04-89 | .05 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 01-25-90 | .028 | < .001 | < .001 | < 1 | < .001 | < .001 | < .01 | < .1 | < .01 |
| Circle Avenue | 12-04-89 | < .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 01-25-90 | .001 | < .001 | < .001 | < 1 | < .001 | < .001 | < .01 | < .1 | < .01 |
| S.E. 100th/Knapp | 12-04-89 | .01 | < .01 | < .01 | < 1 | < .01 | < .01 | < .01 | < .1 | < .01 |
| | 01-25-90 | .018 | < .001 | < .001 | < 1 | < .001 | < .001 | < .01 | < .1 | < .01 |
| Milwaukie gage (QA Replicate) | 01-25-90 | .016 | < .001 | < .001 | < 1 | < .001 | .001 | < .01 | < .1 | < .01 |
| | 01-26-90 | .016 | < .001 | < .001 | < 1 | < .001 | .001 | < .01 | < .1 | < .01 |
| | 01-26-90 | .016 | < .001 | < .001 | < 1 | < .001 | .001 | < .01 | < .1 | < .01 |
| S.E. 44th at Umatilla below fish ladder (single sample) | 01-25-90 | .010 | < .001 | < .001 | < 1 | < .001 | < .001 | < .01 | < .1 | < .01 |

Table 14.--Specific conductance, temperature, and turbidity measurements during storm runoff, April 21, 1988

[μS/cm = microsiemens per centimeter at 25 degrees Celsius; °C = degrees Celsius; and NTU = nephelometric turbidity units]

| Station location | River mile | Specific conductance (μS/cm) | Temperature (°C) | Turbidity (NTU) |
|---|---|---|---|---|
| S.E. 17th Avenue | 0.30 | 70 | 10.5 | 126.0 |
| S.E. 44th Ave between Umatilla and Tenino | 2.60 | 67 | 10.5 | 153.0 |
| S.E. 108th Avenue | 7.10 | 69 | 10.5 | 182.0 |
| Sycamore gage | 10.25 | 70 | 10.5 | 144.0 |
| S.E. 190th Avenue | 12.60 | 69 | 10.5 | 147.0 |
| Main Avenue | 15.45 | 67 | 10.5 | 159.0 |
| Dowsett Avenue | 16.15 | 69 | 10.0 | 216.0 |
| Hogan Road | 17.40 | 68 | 10.0 | 171.0 |
| Palmbald Road | 18.25 | 64 | 10.5 | 183.0 |
| Pleasant Home Road | 22.55 | 63 | 10.5 | 95.5 |

Table 15.--Specific conductance and turbidity measurements during storm runoff, December 4-5, 1989

[μS/cm = microsiemens per centimeter at 25 degrees Celsius); and NTU = nephelometric turbidity units]

| Station name | Date | Time | River mile | Specific conductance (μS/cm) | Turbidity (NTU) |
|---|---|---|---|---|---|
| | | Main Stream Sites | | | |
| Milwaukie gage | 12-4-89 | 1835 | 0.60 | 80 | 304 |
| | 12-4-89 | 2015 | | 76 | 520 |
| | 12-4-89 | 2250 | | 68 | 500 |
| | 12-5-89 | 0050 | | 71 | 440 |
| | 12-5-89 | 0250 | | 74 | 400 |
| McLoughlin Boulevard | 12-4-89 | 1800 | 1.50 | 74 | 304 |
| | 12-4-89 | 1945 | | 72 | 520 |
| | 12-4-89 | 2145 | | 65 | 560 |
| | 12-4-89 | 2315 | | 65 | 440 |
| | 12-5-89 | 0030 | | 68 | 440 |
| | 12-5-89 | 0145 | | 69 | 420 |
| | 12-5-89 | 0315 | | 73 | 400 |
| | 12-5-89 | 0500 | | 76 | 370 |
| Stanley Avenue | 12-4-89 | 1700 | 3.60 | 74 | 320 |
| | 12-4-89 | 1850 | | 68 | 432 |
| | 12-4-89 | 2055 | | 64 | 600 |
| | 12-4-89 | 2215 | | 64 | 440 |
| | 12-4-89 | 2345 | | 64 | 420 |
| | 12-5-89 | 0100 | | 68 | 400 |
| | 12-5-89 | 0215 | | 72 | 400 |
| | 12-5-89 | 0430 | | 76 | 360 |
| Bell Avenue | 12-4-89 | 1730 | 4.20 | 72 | 400 |
| | 12-4-89 | 1900 | | 68 | 464 |
| | 12-4-89 | 2045 | | 63 | 352 |
| | 12-4-89 | 2200 | | 64 | 336 |
| | 12-4-89 | 2330 | | 66 | 420 |
| | 12-5-89 | 0100 | | 69 | 400 |
| | 12-5-89 | 0230 | | 72 | 400 |
| | 12-5-89 | 0430 | | 76 | 350 |
| S.E. 82nd Avenue | 12-4-89 | 1640 | 5.15 | 77 | 256 |
| | 12-4-89 | 1830 | | 70 | 432 |
| | 12-4-89 | 2000 | | 63 | 512 |
| | 12-4-89 | 2130 | | 63 | 320 |
| | 12-4-89 | 2300 | | 66 | 410 |
| | 12-5-89 | 0030 | | 68 | 400 |
| | 12-5-89 | 0200 | | 71 | 380 |
| | 12-5-89 | 0400 | | 76 | 360 |
| Sycamore gage | 12-4-89 | 1640 | 10.25 | 65 | 400 |
| | 12-4-89 | 1725 | | 63 | 624 |
| | 12-4-89 | 1830 | | 62 | 520 |
| | 12-4-89 | 1925 | | 62 | 384 |
| | 12-4-89 | 2020 | | 66 | 400 |
| | 12-4-89 | 2125 | | 66 | 320 |
| | 12-4-89 | 2225 | | 69 | 420 |
| | 12-4-89 | 2335 | | 71 | 380 |
| | 12-5-89 | 0025 | | 73 | 400 |
| S.E. 190th Avenue | 12-4-89 | 1610 | 12.60 | 57 | 336 |
| | 12-4-89 | 1750 | | 58 | 480 |
| | 12-4-89 | 1950 | | 63 | 540 |
| | 12-4-89 | 2050 | | 66 | 500 |
| | 12-4-89 | 2210 | | 70 | 460 |
| | 12-4-89 | 2320 | | 73 | 460 |
| | 12-5-89 | 0020 | | 78 | 350 |
| | 12-5-89 | 0130 | | 82 | 280 |
| Regner Road | 12-4-89 | 1650 | 16.30 | 64 | 688 |
| | 12-4-89 | 1845 | | 66 | 512 |
| | 12-4-89 | 2020 | | 70 | 580 |
| | 12-4-89 | 2140 | | 74 | 480 |
| | 12-4-89 | 2250 | | 79 | 350 |
| | 12-4-89 | 2350 | | 83 | 290 |
| | 12-5-89 | 0100 | | 87 | 250 |

Table 15.--Specific conductance and turbidity measurements during storm runoff, December 4-5, 1989--Continued

| Station name | Date | Time | River mile | Specific conductance (µS/cm) | Turbidity (NTU) |
|---|---|---|---|---|---|
| | | | Tributary and Outfall Sites | | |
| Crystal Spring Creek | 12-4-89 | 1925 | 1.20 | 184 | 40 |
| | 12-4-89 | 2150 | | 194 | 30 |
| | 12-4-89 | 2355 | | 201 | 20 |
| | 12-5-89 | 0205 | | 206 | 15 |
| | 12-5-89 | 0400 | | 207 | 20 |
| S.E. 100th and Knapp | 12-4-89 | 1450 | 6.25 | 48 | 992 |
| | 12-4-89 | 1600 | | 50 | 720 |
| | 12-4-89 | 1700 | | 68 | 420 |
| | 12-4-89 | 1800 | | 68 | 250 |
| | 12-4-89 | 1900 | | 67 | 310 |
| | 12-4-89 | 2000 | | 94 | 180 |
| | 12-4-89 | 2100 | | 120 | 130 |
| | 12-4-89 | 2200 | | 128 | 85 |
| | 12-4-89 | 2300 | | 136 | 65 |
| Kelley Creek | 12-4-89 | 1555 | 10.70 | 80 | 704 |
| | 12-4-89 | 1700 | | 78 | 992 |
| | 12-4-89 | 1755 | | 75 | 700 |
| | 12-4-89 | 1800 | | 73 | 440 |
| | 12-4-89 | 1955 | | 75 | 272 |
| | 12-4-89 | 2055 | | 79 | 240 |
| | 12-4-89 | 2155 | | 82 | 176 |
| | 12-4-89 | 2310 | | 88 | 140 |
| | 12-4-89 | 2338 | | 91 | 125 |
| Circle Avenue | 12-4-89 | 1415 | 11.60 | 9.2 | 248 |
| | 12-4-89 | 1530 | | 5.4 | 112 |
| | 12-4-89 | 1630 | | 9.2 | 280 |
| | 12-4-89 | 1730 | | 14 | 210 |
| | 12-4-89 | 1830 | | 11 | 200 |
| | 12-4-89 | 1930 | | 18 | 160 |
| | 12-4-89 | 2030 | | 51 | 140 |

Table 16.--Specific conductance and turbidity measurements during storm runoff, January 25-26, 1990

[μS/cm = microsiemens per centimeter at 25 degrees Celsius); and NTU = nephelometric turbidity units]

| Station name | Date | Time | mile | Specific conductance (μS/cm) | Turbidity (NTU) |
|---|---|---|---|---|---|
| | | | Main Stream Sites | | |
| Milwaukie gage | 1-25-90 | 1524 | 0.60 | 100 | 50 |
| | 1-25-90 | 1609 | | 97 | 90 |
| | 1-25-90 | 1738 | | 87 | 110 |
| | 1-25-90 | 1840 | | 82 | 135 |
| | 1-25-90 | 2100 | | 72 | 190 |
| | 1-25-90 | 2130 | | 70 | 240 |
| | 1-25-90 | 2220 | | 65 | 290 |
| | 1-25-90 | 2310 | | 65 | 260 |
| | 1-25-90 | 2400 | | 65 | 250 |
| | 1-26-90 | 0055 | | 66 | 225 |
| | 1-26-90 | 0155 | | 66 | 200 |
| | 1-26-90 | 0235 | | 66 | 190 |
| | 1-26-90 | 0345 | | 69 | 190 |
| | 1-26-90 | 1250 | | 88 | 100 |
| McLoughlin Boulevard | 1-25-90 | 1545 | 1.50 | 82 | 105 |
| | 1-25-90 | 1800 | | 80 | 125 |
| | 1-25-90 | 1930 | | 71 | 180 |
| | 1-25-90 | 2100 | | 64 | 230 |
| | 1-25-90 | 2225 | | 58 | 310 |
| | 1-26-90 | 0015 | | 61 | 210 |
| | 1-26-90 | 0125 | | 61 | 190 |
| | 1-26-90 | 0300 | | 62 | 200 |
| Stanley Avenue | 1-25-90 | 1700 | 3.60 | 78 | 120 |
| | 1-25-90 | 1845 | | 70 | 170 |
| | 1-25-90 | 2015 | | 62 | 240 |
| | 1-25-90 | 2125 | | 57 | 320 |
| | 1-25-90 | 2255 | | 59 | 215 |
| | 1-26-90 | 0030 | | 60 | 220 |
| | 1-26-90 | 0200 | | 61 | 200 |
| | 1-26-90 | 0345 | | 64 | 205 |
| Bell Avenue | 1-25-90 | 1630 | 4.20 | 80 | 80 |
| | 1-25-90 | 1915 | | 66 | 205 |
| | 1-25-90 | 2110 | | 57 | 280 |
| | 1-25-90 | 2310 | | 59 | 270 |
| | 1-26-90 | 0100 | | 60 | 165 |
| | 1-26-90 | 0310 | | 63 | 175 |
| S.E. 82nd Avenue | 1-25-90 | 1530 | 5.15 | 85 | 44 |
| | 1-25-90 | 1740 | | 76 | 117 |
| | 1-25-90 | 2015 | | 51 | 205 |
| | 1-25-90 | 2210 | | 58 | 190 |
| | 1-26-90 | 0010 | | 59 | 195 |
| | 1-26-90 | 0215 | | 61 | 200 |
| | 1-26-90 | 0410 | | 64 | 235 |
| Sycamore gage | 1-25-90 | 1515 | 10.25 | 69 | 160 |
| | 1-25-90 | 1725 | | 58 | 235 |
| | 1-25-90 | 1915 | | 57 | 210 |
| | 1-25-90 | 2025 | | 57 | 210 |
| | 1-25-90 | 2150 | | 57 | 210 |
| | 1-25-90 | 2319 | | 60 | 205 |
| | 1-26-90 | 0045 | | 62 | 250 |
| | 1-26-90 | 0156 | | -- | -- |
| | 1-26-90 | 0245 | | -- | -- |
| S.E. 190th Avenue | 1-25-90 | 1445 | 12.60 | 55 | 84 |
| | 1-25-90 | 1615 | | 55 | 88 |
| | 1-25-90 | 1730 | | 56 | 102 |
| | 1-25-90 | 1900 | | 56 | 180 |
| | 1-25-90 | 2030 | | 56 | 200 |
| | 1-25-90 | 2135 | | 60 | 250 |
| | 1-25-90 | 2300 | | 60 | 340 |
| | 1-26-90 | 0020 | | 64 | 320 |
| | 1-26-90 | 0210 | | 68 | 225 |
| Regner Road | 1-25-90 | 1530 | 16.30 | 67 | 105 |
| | 1-25-90 | 1650 | | 63 | 155 |
| | 1-25-90 | 1815 | | 58 | 240 |
| | 1-25-90 | 1945 | | 59 | 250 |
| | 1-25-90 | 2100 | | 58 | 410 |
| | 1-25-90 | 2230 | | 60 | 390 |
| | 1-25-90 | 2350 | | 63 | 260 |
| | 1-26-90 | 0115 | | 67 | 160 |

Table 16.--Specific conductance and turbidity measurements during storm runoff, January 25-26, 1990--Continued

| Station name | Date | Time | mile | Specific conductance (μS/cm) | Turbidity (NTU) |
|---|---|---|---|---|---|
| | | | Tributary and Outfall Sites | | |
| Crystal Spring Creek | 1-25-90 | 1646 | 1.20 | 203 | 12 |
| | 1-25-90 | 1910 | | 196 | 15 |
| | 1-25-90 | 2150 | | 200 | 16 |
| | 1-25-90 | 2335 | | 197 | 15 |
| | 1-26-90 | 0115 | | 200 | 10 |
| | 1-26-90 | 0305 | | 207 | 12 |
| S.E. 100th and Knapp | 1-25-90 | 1600 | 6.25 | 52 | 175 |
| | 1-25-90 | 1700 | | 55 | 200 |
| | 1-25-90 | 1815 | | 56 | 290 |
| | 1-25-90 | 1900 | | 60 | 200 |
| | 1-25-90 | 2000 | | 68 | 120 |
| | 1-25-90 | 2100 | | 74 | 105 |
| | 1-25-90 | 2230 | | 96 | 72 |
| | 1-25-90 | 2330 | | 102 | 58 |
| | 1-26-90 | 0030 | | 106 | 52 |
| Kelley Creek | 1-25-90 | 1600 | 10.70 | 75 | 230 |
| | 1-25-90 | 1745 | | 63 | 470 |
| | 1-25-90 | 1945 | | 59 | 300 |
| | 1-25-90 | 2105 | | 58 | 190 |
| | 1-25-90 | 2225 | | 61 | 116 |
| | 1-25-90 | 2355 | | 64 | 78 |
| | 1-26-90 | 0105 | | 68 | 60 |
| Circle Avenue | 1-25-90 | 1420 | 11.60 | 48 | 210 |
| | 1-25-90 | 1500 | | 11.4 | 84 |
| | 1-25-90 | 1615 | | 15.5 | 135 |
| | 1-25-90 | 1745 | | 16 | 112 |
| | 1-25-90 | 1830 | | 15 | 100 |
| | 1-25-90 | 1930 | | 32 | 116 |
| | 1-25-90 | 2030 | | 35 | 60 |
| | 1-25-90 | 2200 | | 61 | 52 |