National Pollutant Discharge Elimination System (NPDES)
Municipal Storm Water System Annual Report

I, the undersigned, hereby submit this National Pollutant Discharge Elimination System (NPDES) Municipal Storm Water System Annual Report in accordance with NPDES Permit Number 101348. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person, or persons, who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for known violations.

10/1/09

Name: Gary Parkin
Title: Engineering Director
City of Milwaukie

1.0 Introduction and Permit Background

The Oregon Department of Environmental Quality (DEQ) regulates storm water runoff from the City of Milwaukie through the Municipal Separate Storm Sewer System Discharge Permit No. 101348 (MS4 Permit), issued to Clackamas County and its co-permittees. Clackamas County co-permittees include the City of Milwaukie along with a number of other smaller jurisdictions including the cities of Lake Oswego, Oregon City, West Linn, Gladstone, Wilsonville, Happy Valley, Johnson City, Rivergrove, and the Oak Lodge Sanitary District. Each co-permittee is a relatively small community, most having populations between 15,000 and 25,000 with some (Johnson City, Rivergrove) having populations significantly smaller.

As required under Schedule B(2)(a) of the MS4 Permit, each co-permittee must submit an annual report, summarizing accomplishments and implementation of the Municipal Storm Water Management Plan (SWMP). This annual report is for permit year 14 (or permit year 5 under the renewed permit dated 2004) documents activities from July 1, 2008 to June 30, 2009 as related to the City of Milwaukie's storm water management efforts under their MS4 Permit and associated SWMP.

With respect to annual reporting requirements, this annual report contains the following items per Schedule B(2)(a) of the MS4 permit:

i) *The status of implementing components of the storm water management program;*

See Section 2.0 for a summary of the performance measures and program monitoring requirements as documented in the City's current SWMP.

ii) *Proposed changes to the SWMP components, including new BMPs identified through implementing adaptive management. A timeline for implementation of new BMPs must also be included in the report;*

See Section 2.0 for a summary of the City's current SWMP, which was approved by DEQ July 31, 2006. This recently updated SWMP contains the most current changes to BMPs as a result of adaptive management. Thus, no additional changes are proposed for BMPs at this time.

iii) *A summary of total storm water program expenditures and funding sources over the reporting fiscal year, and those anticipated in the next fiscal year;*

See Section 3.1 for a summary of storm water related expenditures.

iv) *A summary of data, including monitoring data that is accumulated throughout the reporting year;*

See Section 2.0 for a summary of the program monitoring results. See Section 4.2 for a summary of the environmental monitoring data collected.

v) *A summary describing the number and nature of enforcement actions, inspections, and public education programs;*

See Section 2.0 for a summary of the program monitoring activities.

2.0 Implementation of the City of Milwaukie's SWMP

Tables 2-1 through 2-5 summarize the performance measures and program monitoring activities associated with the City of Milwaukie's BMPs, in accordance with each of the required components of a SWMP. The five SWMP components are as follows:

Component #1:	Structural and Source Control BMPs to Reduce Pollutants from Commercial and Residential Areas
Component #2:	A Program to Detect and Remove Illicit Discharges and Improper Disposal Into the Storm Sewer System
Component #3:	A Program to Monitor and Control Pollutants from Industrial Facilities
Component #4:	A Program to Reduce Pollutants in Storm Water Discharges from Construction Sites
Component #5:	Public Education, Coordination, and Public Involvement BMPs

BMP Implementation Summary	Annual Performance Measures	SWMP Implementation		
BMP – Conduct Catch basin Cleaning and Maintenance				
BMP Owner: City of Milwaukie Public Works Department **Permit Year:** Ongoing **Implementation Activities:** The City of Milwaukie cleans all public catch basins once every two years, more frequently if needed.	(1) Track the number of catch basins maintained. (2) Track the volume of debris removed during cleaning activities.	**2006/2007** (1) During permit year 12, twelve catch basins were maintained/repaired. There were 440 catch basins cleaned. (2) The following volume of debris was removed during catch basin cleaning activities: • Catch basins = 42 cub. yds.	**2007/2008** (1) During permit year 13, twelve catch basins were repaired. There were 512 catch basins cleaned. (2) The following volume of debris was removed during catch basin cleaning activities: • Catch basins = 27 cub. yds.	**2008/2009** (1) During permit year 14, 18 catch basins were repaired. There were 321 catch basins cleaned. (2) The following volume of debris was removed during catch basin cleaning activities: • Catch basins = 18.2 cub. yds.
BMP – Conduct Structural Control Facility Cleaning and Maintenance				
BMP Owner: City of Milwaukie Public Works Department **Permit Year:** Ongoing **Implementation Activities:** The City of Milwaukie inspects public structural water quality facilities annually on average. Facility maintenance is conducted every two years.	(1) Track the number of structural facilities inspected and maintained. (2) Track the volume of debris removed during cleaning activities.	**2006/2007** (1 & 2) The following maintenance/ repairs were conducted during permit year 12: • 1 pond was cleaned, lots of sticks in the bottom of the pond. • 2 vaults were cleaned – 4.5 cubic yards • 1 weir was cleaned- removed approx 1.5 yds. of debris	**2007/2008** (1 & 2) The following maintenance/ repairs were conducted during permit year 13: • 1 detention pond has been maintained due to wildlife issue, approximately 10 yards of debris have been removed at this time with more to follow (beaver), this problem is being addressed at this time • 2 vaults were cleaned for a total of 1.9 yards of debris. • 1 weir was cleaned for approx 1.0 yard of debris	**2008/2009** (1 & 2) The following maintenance/ repairs were conducted during permit year 14: • 21 vaults were cleaned and 6.52 cubic yards of debris removed. • 10,697.49 feet of storm main line was video inspected. • 5 detention ponds were inspected and maintained. • The weir was inspected 251 times. • 766 drywell inspections were completed.

BMP Implementation Summary	Annual Performance Measures	SWMP Implementation		
BMP – Implement Municipal Development Codes				
BMP Owner: City of Milwaukie Engineering Department **Permit Year:** Ongoing **Implementation Activities:** The City of Milwaukie reviews all new and redevelopment plans through the building permit process. The City is currently reviewing various jurisdictions (City of Oregon City, Clackamas County) stormwater design standards in order to add more specific design criteria into the Development Code, as related to stormwater facility design (for both treatment and detention), water quality design storms, and approved facilities for stormwater treatment.	(1) Track the number of development applications reviewed and approved for compliance with the stormwater regulations. (2) Track any code modifications by ordinance.	**2006/2007** (1) Development applications including drainage reports are routinely reviewed for proper compliance with storm water regulations. The following number of applications were reviewed during permit year 12: • Commercial (New) = 1 • Commercial (Additions) = 2 • Residential (New) = 15 • Residential (Additions) = 7 (2) The City of Milwaukie has strengthened its stormwater design standards, including adoption by reference of the City of Portland Storm Water Manual. Revisions will be made on an annual basis or as needed as storm water management is considered to be a continual "work in progress."	**2007/2008** (1) Development applications including drainage reports are routinely reviewed for proper compliance with storm water regulations. The following number of applications were reviewed during permit year 13: • Commercial (New) = 1 • Commercial (Additions) = 1 • Residential (New) = 6 • Residential (Additions) = 11 (2) The City of Milwaukie has strengthened its stormwater design standards, including adoption by reference of the City of Portland Storm Water Manual. Revisions will be made on an annual basis or as needed as storm water management is considered to be a continual "work in progress."	**2008/2009** (1) Development applications including drainage reports are routinely reviewed for proper compliance with storm water regulations. The following number of applications were reviewed during permit year 14: • Commercial (New) = 4 • Commercial (Additions) = 4 • Residential (New) = 3 • Residential (Additions) = 22 (2) The City of Milwaukie has strengthened its stormwater design standards, including adoption by reference of the City of Portland Storm Water Manual. Revisions will be made on an annual basis or as needed as storm water management is considered to be a continual "work in progress."

BMP Implementation Summary	Annual Performance Measures	SWMP Implementation		
NPDES Permit Requirement – *(5) A program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste. The description must identify priorities and procedures for inspections and establishing and implementing control measures for such discharges (this program can be coordinated with the program developed under Schedule D (2)(c)(iii)).*				
NA				
There are no open or closed landfills or other municipal waste handling facilities within the City of Milwaukie.	NA	**2006/2007** NA	**2007/2008** NA	**2008/2009** NA
NPDES Permit Requirement – *(6) A program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides and fertilizer that will include, as appropriate, controls such as educational activities, permits, certifications and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities.*				
BMP – Minimize Water Quality Impacts Associated with Landscape Maintenance Practices				
BMP Owner: City of Milwaukie Public Works Department and North Clackamas Parks & Rec **Permit Year:** Ongoing **Implementation Activities:** The City of Milwaukie conducts a variety of activities to minimize water quality impacts associated with conducting pest management activities on public properties.	(1) Track any policy and/or procedural changes associated with pest management activities within the City.	**2006/2007** (1) There have been no policy or procedural changes regarding pest management activities during permit year 12.	**2007/2008** (1) There have been no policy or procedural changes regarding pest management activities during permit year 13.	**2008/2009** (1) There have been no policy or procedural changes regarding pest management activities during permit year 14.

BMP Implementation Summary	Annual Performance Measures	SWMP Implementation		
BMP – Minimize Water Quality Impacts Related to Water Line Flushing				
BMP Owner: City of Milwaukie Public Works Department **Permit Year:** Ongoing **Implementation Activities:** The City of Milwaukie conducts periodic water line flushing throughout the City to ensure the quality of the water system. The City of Milwaukie requires all chlorinated water associated with the flushing of new and existing waterlines to be dechlorinated to a maximum allowable residual chlorine concentration of 0.1 mg/L or less, in accordance with DEQs requirements for discharge.	No performance measures were proposed for reporting for this BMP.	**2006/2007** NA	**2007/2008** NA	**2008/2009** NA

BMP Implementation Summary	Annual Performance Measures	SWMP Implementation		
BMP – Implement the Spill Response Program (continued)				
				2008/2009 (continued) • **5/13/2009**-City operations reported roll over car accident at 46th & King Rd. Approx ½ gallon of washer fluid. No evidence of fluid in storm system. Spill was contained and City responders cleaned up. • **5/21/2009**-City PD reported TriMet bus leaking coolant @ 21st & Harrison. Approx 10 gallons. No evidence of coolant in storm system. City responders cleaned up fluid with help of TriMet. • **6/10/2009**-City operations reported hydraulic spill at Stanley Ave. Approx 15-20 gallons. No evidence of fluid in storm system. Spill was contained and City responders cleaned up. • **6-22-2009**-City operations reported spill @ 31st & Washington. Approx ½ pint unknown fluid. No evidence of fluid in storm system. Spill was contained and City responders cleaned up.
NPDES Permit Requirement – *(5) A program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers*				
A Description of the City's Public Reporting Program including performance measures is included in Component #5, Table 2-5.				
NPDES Permit Requirement – *(6) Educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials.*				
A Description of the City's Public Informational Activities regarding management of hazardous materials including performance measures is included in Component #5, Table 2-5.				

Table 2-3 A Program to Monitor and C[illegible]rol Pollutants from Industrial Facilities

BMP Implementation Summary	Annual Performance Measures	SWMP Implementation		
NPDES Permit Requirement – *(1) Identify priorities and procedures for inspections and establishing and implementing control measures for such discharges.*				
NPDES Permit Requirement – *(2) Describe a monitoring program for storm water discharges associated with the industrial facilities identified in Schedule D(2)(c)(iii), to be implemented during the term of the permit, including, at a minimum, the submission of quantitative data on the pollutant parameters included in the Department's NPDES 1200-Z industrial general stormwater permit.*				
BMP – Conduct Industrial Inspections and Enforcement				
BMP Owner: City of Milwaukie Public Works Department **Permit Year:** Ongoing **Implementation Activities:** The City of Milwaukie will update and maintain an inventory of all industrial facilities in the permit area that are covered by a 1200-Z permit. Onsite industrial inspections occur annually at selected facilities discharging directly to the City's municipal stormwater system through the City's Pretreatment Program (via an IGA with Clackamas County Service District No 1), and through the City's illicit discharge program. The City may potentially conduct periodic inspections of other high priority facilities not previously inspected under the other above-mentioned programs if specific concerns arise or are reported through citizen complaints.	(1) Track the number of permitted (1200-Z) industrial facilities within the City. (2) Note any water quality concerns identified during the review of 1200-Z monitoring data. (3) Track the number of industrial inspections conducted. (4) Report status and abatement measures required for any industry found to be inappropriately discharging to the municipal stormwater system.	**2006/2007** (1) The City of Milwaukie queried the active 1200-Z permits within the city limits from DEQs website. There are currently 5 active 1200-Z permits within the City's MS4 permit boundary. (2) Monitoring data has been backlogged until mid November. DEQ referred the City to see DEQ NW Region Program for further information. (3) During permit year 12, the City conducted 4 inspections of 1200-Z permit holders ensuring all were in compliance of 1200-Z storm water permit. (4) All 1200-Z permit holders were found to be in compliance of all regulations.	**2007/2008** (1) The City of Milwaukie queried the active 1200-Z permits within the city limits from DEQ's website. There are currently 5 active 1200-Z permits within the City's MS4 permit boundary. (2) Monitoring data has been backlogged until mid November. DEQ referred the City to see DEQ NW Region Program for further information. (3) During permit year 13, the City conducted 5 inspections of 1200-Z permit holders ensuring all were in compliance of 1200-Z storm water permit. (4) 1200-Z permit holders were found to be in compliance. One of the permit holders was not in compliance at the time; protection of a catch basin was needed at a loading dock. Second inspection on this company revealed that the company had come into compliance after the initial inspection.	**2008/2009** (1) The City of Milwaukie queried the active 1200-Z permits within the city limits from DEQ's website. There are currently 6 active 1200-Z permits within the City's MS4 permit boundary. (2) No inspections were completed for permit year 14, due to lack of personnel. (3) During permit year 14, the City conducted 0 inspections of 1200-Z permit holders ensuring all were in compliance of 1200-Z storm water permit. (4) Due to the lack of personnel during the last fiscal year, the City of Milwaukie was unable to complete the 1200Z inspections. The City has filled the position and will meet the requirements next fiscal year. The City will perform searches of DEQ's website database to ascertain an accurate list of 1200-Z permit holders at least twice per year.

BMP Implementation Summary	Annual Performance Measures	SWMP Implementation		
NPDES Permit Requirement – *(3) Procedures for identifying priorities for inspecting sites and enforcing control measures that considers the nature of the construction activity, topography, and the characteristics of soils and receiving water quality.*				
BMP – Conduct Erosion Control Inspections				
BMP Owner: City of Milwaukie Public Works Department **Permit Year:** Ongoing **Implementation Activities:** The City of Milwaukie's Stormwater Specialist initially inspects all new and redevelopment sites for proper implementation of erosion control measures.	(1) Record the number of erosion control inspections conducted annually. (2) Report the number of notices of non-compliance issued during inspections and the number of stop work orders issued annually.	**2006/2007** (1) There were 107 erosion control inspections conducted during permit year 12. (2) There were 56 non-compliance notices issued during permit year 12.	**2007/2008** (1) There were 82 erosion control inspections conducted during permit year 13. (2) There were 47 non-compliance notices issued during permit year 13.	**2008/2009** (1) There were 163 erosion control inspections conducted during permit year 14. (2) There were 63 non-compliance notices issued during permit year 14.
NPDES Permit Requirement – *(4) Appropriate educational and training measures for construction site operators.*				
BMP – A Description of the City's Educational Program for Construction Site Operators is included in Component #5, Table 2-5				

BMP Implementation Summary	Annual Performance Measures	SWMP Implementation		
BMP – Provide Public Education and Outreach Materials regarding Storm water Management (continued)				
	(2) Indicate any large-scale public educational campaigns. (3) Track coordinated public outreach activities with local co-permittees. (4) Record the number of catch basins stenciled in a given year. (5) Record the number of storm manhole lids that have been retrofit annually.	**2006/2007 (continued)** (2 & 3) The City of Milwaukie is actively partnered with a number of other jurisdictions to form the Regional Coalition for Clean Rivers and Streams, in order to develop regional advertising campaigns to promote healthy streams. In addition, during permit year 12, the City of Milwaukie conducted its 2nd annual "Leaf Drop" program. This program allowed citizens to dispose of their leaves at a central location for no disposal fee. This program encouraged citizens to maintain and clean their lawns, thus minimizing the amount of debris entering the storm system and reducing the risk of flooding due to debris clogging catch basins. (4) Approximately 1600 catch basins have been stenciled to date. (5) During permit year 12, 68 storm manhole lids have been retrofit with "Dump no Waste to Streams" lids.	**2007/2008 (continued)** (2 & 3) The City of Milwaukie is actively partnered with a number of other jurisdictions to form the Regional Coalition for Clean Rivers and Streams, in order to develop regional advertising campaigns to promote healthy streams. In addition, during permit year 13, the City of Milwaukie, conducted its 3rd annual "Leaf Drop". (4) Approximately 14 catch basins have been marked " Dump no waste drains to stream" with fish logo, by use of a product called a "burn down". Burn downs, are used in high traffic areas because there is minimal wear and tear on them. 721 catch basins were stenciled " Dump no waste drains to stream" with a bright blue background with white lettering. (5) During permit year 13, 67 storm manhole lids have been retrofit with "Dump no Waste to Streams" lids.	**2008/2009 (continued)** (2 & 3) The City of Milwaukie is actively partnered with a number of other jurisdictions to form the Regional Coalition for Clean Rivers and Streams, in order to develop regional advertising campaigns to promote healthy streams. In addition, during permit year 14, the City of Milwaukie, conducted its 4th annual "Leaf Drop Program". This program allows residents to dispose of their leaves at our facility, 5 Saturdays per year, during heavy leaf season, at no charge to the resident. (4) 1628 catch basins were stenciled "Dump no waste drains to stream" or "Protect our groundwater" with a bright blue background with white lettering. (5) During permit year 14, 36 storm lids have been retrofit with "Dump no Waste, Drains to Streams" lids on our conveyance system manholes.

BMP Implementation Summary	Annual Performance Measures	SWMP Implementation		
NPDES Permit Requirement, Component 4 – *(4) Appropriate educational and training measures for construction site operators.*				
BMP – Provide Educational Information to Construction Site Operators				
BMP Owner: City of Milwaukie Public Works Department **Permit Year:** Ongoing **Implementation Activities:** The City of Milwaukie makes available their technical guidance manual, the *Clackamas County Erosion Prevention and Sediment Control Planning and Design Manual* (revised Dec. 2000) to engineers, contractors, and the general public. The City of Milwaukie continues to partner with Clackamas County Water Environment Services (WES), the City of Oregon City, and the Homebuilders Association of Portland to provide the Erosion Control Certification program, which includes a four-hour course in erosion control fundamentals and biannual refresher courses for contractors.	(1) Track the number of contractors receiving a discount on erosion control permit fees.	**2006/2007** (1) During permit year 12, 2 contractors applied for this discount.	**2007/2008** (1) During permit year 13, no contractors applied for this discount. Currently the City of Milwaukie and other jurisdictions are involved in revamping the Regional Erosion Prevention Awards Program (REPA), this program includes erosion control training, as well as incentives to practice proper erosion control at the job site.	**2008/2009** (1) During permit year 14, no contractors applied for this discount. Currently the City of Milwaukie and other jurisdictions are involved in revamping the Regional Erosion Prevention Awards Program (REPA), this program includes erosion control training, as well as incentives to practice proper erosion control at the job site. No updates from last fiscal year.

3.0 Additional Annual Report Requirements

3.1 Summary of Expenditures

The following summary outlines total storm water expenditures for permit year 13 (2007-2008) and projected expenditures for permit year 14 (2008-2009).

2007/2008	
Personnel Services / 5.25 FTEs	316,040
Materials and Services	670,373
Capital Outlay	10,000
Transfers	486,040
Contingency	97,714
Total	$1,580,167

2008/2009	
Personnel Services / 5.25 FTEs	*343,928
Materials and Services	*752,910
Capital Outlay	10,000
Transfers	479,839
Contingency	148,592
Total	*$1,735,269

* These numbers are estimated, not audited

Capital Improvement Projects are being designed with green storm water practices in mind. The Logus Road Sidewalk Project will include several BMPs including pretreatment for existing drywells, pervious pavement, and rain gardens. A piped system that moves water offsite is not being considered.

The City of Milwaukie lies entirely within the UGB and any City expansion will not encroach upon the UGB due to the City being surrounded by other jurisdictions within the UGB. Any annexations will include properties already within the UGB. Recent annexation efforts have focused on properties that lie within or near the Johnson Creek floodplain, especially those properties that have on-site sewage disposal systems. City code requires hookup to public sewer upon annexation.

An audit of City utility records in 2006 identified fifteen properties not connected to the City sanitary sewer, a violation of the Milwaukie Municipal Code. As of report year 2008/2009 all properties have been connected to City sewers.

Table 4-1 Environmental Monitoring Results—Minthorn Springs at Harmony Road						
ML_65015_C & ML_65015_G					Limits	
Sample Date	**10/3/2008**	**3/15/2009**	**6/4/2009**	**6/18/2009**	**S>E**	**Else**
	mg/l	**mg/l**	**mg/l**	**mg/l**	***mg/l***	***mg/l***
COLILERT	>2419	548	1046	1120	*460 Col/100ml*	*460 Col/100ml*
HARDNESS	33	39	114	121	*none*	*none*
NITRATE-NITRITE	0.25	0.26	0.22	0.24	*none*	*none*
ORTHOPHOSPHATE	0.046	0.02	0.15	0.09	*none*	*none*
TOTAL PHOSPHATE	0.24	0.10	0.24	0.18	*Tualatin: .07*	*Tualatin: .07*
COPPER	0.010	0.0032	0.0011	0.0019	*0.018*	*0.018*
LEAD	0.00426	0.00163	0.00005	0.00110	*.082**	*.082**
ZINC	0.0539	0.0214	0.0051	0.0091	*.12**	*.12**
TSS	51	73	8	19	*?*	*?*
AMMONIA	<0.10	<0.05	0.12	0.06	*?*	*?*
Field Test						
Temperature	17.1 C	9.9 C	19.3 C	17.9 C	12.8	17.8
pH	6.9 SU	6.7 SU	6.8	6.8	6.5-8.5	6.5-8.5
DO-mg/l	7.54	9.9	5.6	6.2	11	8
Conductivity	65mS	67mS	180.5	269	?	?

S>E=To to period between spawning to emergence of fry.
N.M.= No measurable amount
Else= Time period other than S>E
? = Parameters not set at this time
* = Hardness Dependant

Table 4-2 Environmental Monitoring Results—Roswell Outfall					
ML_23003_C				Limits	
Sample Date	**10/3/2008**	**3/15/2009**	**5/6/2009**	**S>E**	**Else**
	mg/l	**mg/l**	**mg/l**	***mg/l***	***mg/l***
COLILERT	>2419	1203	1733	*460 Col/100ml*	*460 Col/100ml*
HARDNESS	16	19	40	*none*	*none*
NITRATE-NITRITE	0.06	0.13	0.14	*none*	*none*
ORTHOPHOSPHATE	0.103	0.02	0.02	*none*	*none*
TOTAL PHOSPHATE	0.23	0.07	0.10	*Tualatin: .07*	*Tualatin: .07*
COPPER	0.0145	0.0034	0.0063	*0.018*	*0.018*
LEAD	0.00419	0.00151	0.00229	*.082**	*.082**
ZINC	0.0605	0.0175	0.0233	*.12**	*.12**
TSS	10.8	6	6	*?*	*?*
AMMONIA	<0.10	<0.05	<0.05	*?*	*?*
Field Test					
Temperature	18.2 C	9.1 C	12.3 C	12.8	17.8
pH	7.1 SU	6.8 SU	7.3	6.5-8.5	6.5-8.5
DO-mg/l	5.75	10.7	9.6	11	8
Conductivity	37.6	13	160.1		

S>E=To to period between spawning to emergence of fry.
N.M.= No measurable amount
Else= Time period other than S>E
? = Parameters not set at this time
* = Hardness Dependant

Table 4-3

USGS 14211550 Johnson Creek at Milwaukie, OR

ɔcation: Lat 45 degrees 27'11", Long 122 Degrees 38' 31", in NE ¼ SE ¼ SEC. 26, T. 1 S., R 1 E.
ackamas County, Hydrologic Unit 17090012, on the right bank upstream side of the Milport Rd. Bridge,
ın the city limits of Milwaukie, at mile 0.7

Date	Discharge, cfs (Mean)	Gauge height, feet (Mean)	Tempera-ture, water, deg C (Maximum)	Tempera-ture, water, deg C (Minimum)	Tempera-ture, water, deg C (Mean)	Turbidity, IR LED light, det ang 90 deg, FNU (Maximum)	Turbidity, IR LED light, det ang 90 deg, FNU (Minimum)	Turbidity, IR LED light, det ang 90 deg, FNU (Median)
07/01/2008	21 [A]	24.15 [A]	22.0 [A]	17.8 [A]	20.0 [A]	11.3 [P]	3.2 [P]	5.6 [P]
07/02/2008	19 [A]	24.12 [A]	21.6 [A]	18.2 [A]	20.0 [A]	24.0 [P]	3.7 [P]	5.8 [P]
07/03/2008	23 [A]	24.18 [A]	22.5 [A]	18.4 [A]	20.3 [A]	17.8 [P]	3.8 [P]	8.5 [P]
07/04/2008	21 [A]	24.15 [A]	20.4 [A]	18.4 [A]	19.2 [A]	15.2 [P]	4.2 [P]	5.8 [P]
07/05/2008	20 [A]	24.14 [A]	18.7 [A]	17.3 [A]	18.0 [A]	6.0 [P]	3.1 [P]	4.0 [P]
07/06/2008	19 [A]	24.13 [A]	20.1 [A]	16.2 [A]	18.0 [A]	5.0 [P]	2.8 [P]	4.0 [P]
07/07/2008	19 [A]	24.12 [A]	21.1 [A]	16.3 [A]	18.5 [A]	5.4 [P]	3.4 [P]	4.0 [P]
07/08/2008	18 [A]	24.11 [A]	22.4 [A]	17.2 [A]	19.6 [A]	7.6 [P]	3.3 [P]	4.3 [P]
07/09/2008	18 [A]	24.11 [A]	23.3 [A]	18.2 [A]	20.7 [A]	6.6 [P]	3.1 [P]	4.5 [P]
07/10/2008	18 [A]	24.10 [A]	21.9 [A]	17.9 [A]	19.9 [A]	6.4 [P]	3.1 [P]	4.4 [P]
˙/11/2008	17 [A]	24.09 [A]	21.6 [A]	16.2 [A]	18.9 [A]	6.1 [P]	3.1 [P]	4.5 [P]
07/12/2008	17 [A]	24.09 [A]	22.6 [A]	17.1 [A]	19.8 [A]	4.7 [P]	2.2 [P]	3.0 [P]
07/13/2008	17 [A]	24.09 [A]	23.4 [A]	18.1 [A]	20.6 [A]	4.6 [P]	2.4 [P]	3.1 [P]
07/14/2008	18 [A]	24.11 [A]	22.6 [A]	18.2 [A]	20.4 [A]	8.5 [P]	2.6 [P]	3.3 [P]
07/15/2008	17 [A]	24.09 [A]	23.2 [A]	18.2 [A]	20.5 [A]	4.6 [P]	3.0 [P]	3.6 [P]
07/16/2008	16 [A]	24.07 [A]	22.6 [A]	17.8 [A]	20.2 [A]	4.6 [P]	2.5 [P]	3.6 [P]
07/17/2008	16 [A]	24.08 [A]	21.8 [A]	17.3 [A]	19.5 [A]	7.1 [P]	2.6 [P]	3.7 [P]
07/18/2008	18 [A]	24.11 [A]	19.9 [A]	17.0 [A]	18.4 [A]	5.5 [P]	2.9 [P]	3.6 [P]
07/19/2008	17 [A]	24.09 [A]	19.3 [A]	16.2 [A]	17.6 [A]	8.3 [P]	2.5 [P]	3.3 [P]
07/20/2008	17 [A]	24.08 [A]	21.3 [A]	16.2 [A]	18.7 [A]			
07/21/2008	18 [A]	24.11 [A]	21.7 [A]	17.2 [A]	19.4 [A]			
07/22/2008	18 [A]	24.11 [A]	19.2 [A]	16.8 [A]	17.5 [A]			
07/23/2008	18 [A]	24.10 [A]	18.5 [A]	15.5 [A]	16.8 [A]			
07/24/2008	18 [A]	24.10 [A]	20.5 [A]	15.1 [A]	17.7 [A]			
07/25/2008	17 [A]	24.09 [A]	21.5 [A]	17.0 [A]	19.2 [A]			
07/26/2008	17 [A]	24.09 [A]	21.3 [A]	16.8 [A]	19.1 [A]			
07/27/2008	17 [A]	24.09 [A]	20.0 [A]	17.8 [A]	18.8 [A]			
/28/2008	16 [A]	24.08 [A]	21.1 [A]	16.0 [A]	18.6 [A]			
07/29/2008	16 [A]	24.08 [A]	19.4 [A]	17.0 [A]	17.7 [A]			

Date	Discharge, cfs (Mean)	Gauge height, feet (Mean)	Temperature, water, deg C (Maximum)	Temperature, water, deg C (Minimum)	Temperature, water, deg C (Mean)	Turbidity, IR LED light, det ang 90 deg, FNU (Maximum)	Turbidity, IR LED light, det ang 90 deg, FNU (Minimum)	Turbidity, IR LED light, det ang 90 deg, FNU (Median)
09/02/2008	18 [A]	24.10 [A]	17.6 [A]	13.8 [A]	15.6 [A]	6.6 [P]	3.6 [P]	4.7 [P]
09/03/2008	16 [A]	24.08 [A]	18.1 [A]	14.3 [A]	16.2 [A]	7.1 [P]	3.6 [P]	4.9 [P]
09/04/2008	16 [A]	24.07 [A]	18.8 [A]	14.9 [A]	16.8 [A]	7.7 [P]	3.6 [P]	4.8 [P]
09/05/2008	16 [A]	24.07 [A]	19.3 [A]	15.4 [A]	17.3 [A]	7.2 [P]	4.1 [P]	4.8 [P]
09/06/2008	16 [A]	24.07 [A]	19.0 [A]	16.3 [A]	17.4 [A]	8.1 [P]	3.9 [P]	5.4 [P]
09/07/2008	16 [A]	24.07 [A]	19.8 [A]	16.0 [A]	17.8 [A]	7.5 [P]	4.3 [P]	5.4 [P]
09/08/2008	16 [A]	24.07 [A]	19.8 [A]	16.2 [A]	18.0 [A]	8.6 [P]	4.2 [P]	5.4 [P]
09/09/2008	15 [A]	24.06 [A]	19.9 [A]	16.2 [A]	17.8 [A]	10.1 [P]	4.5 [P]	6.0 [P]
09/10/2008	15 [A]	24.06 [A]	18.5 [A]	14.8 [A]	16.7 [A]	10.1 [P]	4.8 [P]	6.7 [P]
09/11/2008	15 [A]	24.05 [A]	19.3 [A]	15.2 [A]	17.1 [A]	9.5 [P]	5.2 [P]	6.7 [P]
09/12/2008	15 [A]	24.06 [A]	19.5 [A]	15.8 [A]	17.6 [A]	9.8 [P]	5.6 [P]	7.0 [P]
09/13/2008	15 [A]	24.06 [A]	18.8 [A]	15.4 [A]	17.0 [A]	11.5 [P]	6.0 [P]	7.3 [P]
09/14/2008	15 [A]	24.06 [A]	19.4 [A]	15.4 [A]	17.3 [A]	11.1 [P]	4.7 [P]	6.0 [P]
09/15/2008	15 [A]	24.05 [A]	19.6 [A]	16.0 [A]	17.7 [A]	7.2 [P]	5.1 [P]	6.1 [P]
09/16/2008	15 [A]	24.05 [A]	19.8 [A]	16.1 [A]	17.8 [A]	9.6 [P]	5.6 [P]	6.7 [P]
)/17/2008	15 [A]	24.05 [A]	19.5 [A]	16.4 [A]	17.8 [A]	10.2 [P]	6.1 [P]	7.4 [P]
09/18/2008	15 [A]	24.06 [A]	17.4 [A]	15.5 [A]	16.1 [A]	11.8 [P]	5.2 [P]	7.7 [P]
09/19/2008	15 [A]	24.06 [A]	17.1 [A]	14.9 [A]	15.8 [A]	11.6 [P]	6.0 [P]	8.1 [P]
09/20/2008	16 [A]	24.07 [A]	15.8 [A]	14.8 [A]	15.2 [A]	8.0 [P]	4.7 [P]	6.8 [P]
09/21/2008	20 [A]	24.12 [A]	17.6 [A]	14.2 [A]	15.1 [A]	72.1 [P]	4.8 [P]	6.7 [P]
09/22/2008	25 [A]	24.20 [A]	16.1 [A]	14.4 [A]	15.2 [A]	58.8 [P]	11.5 [P]	15.5 [P]
09/23/2008	19 [A]	24.12 [A]	15.9 [A]	12.9 [A]	14.4 [A]	15.0 [P]	6.7 [P]	11.1 [P]
09/24/2008	18 [A]	24.10 [A]	15.2 [A]	13.4 [A]	14.4 [A]	9.1 [P]	4.9 [P]	6.7 [P]
09/25/2008	17 [A]	24.09 [A]	16.3 [A]	14.3 [A]	15.2 [A]	7.4 [P]	4.5 [P]	6.0 [P]
09/26/2008	18 [A]	24.10 [A]	16.0 [A]	13.6 [A]	14.8 [A]	7.9 [P]	4.8 [P]	6.2 [P]
09/27/2008	18 [A]	24.10 [A]	16.6 [A]	13,6 [A]	15.0 [A]	9.2 [P]	5.8 [P]	7.3 [P]
09/28/2008	17 [A]	24.09 [A]	17.1 [A]	13.8 [A]	15.3 [A]	10.3 [P]	5.8 [P]	7.4 [P]
09/29/2008	16 [A]	24.08 [A]	17.6 [A]	14.4 [A]	15.9 [A]	8.1 [P]	4.9 [P]	6.6 [P]
09/30/2008	16 [A]	24.07 [A]	17.1 [A]	15.2 [A]	16.1 [A]	10.1 [P]	5.9 [P]	7.3 [P]
10/01/2008	16 [P]	24.07 [P]	16.7 [P]	14.5 [P]	15.7 [P]	9.8 [P]	5.8 [P]	7.3 [P]
10/02/2008	16 [P]	24.07 [P]	17.3 [P]	15.0 [P]	15.6 [P]	15.5 [P]	6.0 [P]	8.0 [P]
10/03/2008	23 [P]	24.16 [P]	15.5 [P]	14.7 [P]	15.1 [P]	51.6 [P]	6.6 [P]	11.4 [P]
/04/2008	52 [P]	24.47 [P]	15.9 [P]	14.9 [P]	15.3 [P]	61.8 [P]	11.0 [P]	20.4 [P]
10/05/2008	27 [P]	24.23 [P]	14.9 [P]	13.9 [P]	14.4 [P]	17.7 [P]	7.4 [P]	9.8 [P]

Date	Discharge, cfs (Mean)	Gauge height, feet (Mean)	Temperature, water, deg C (Maximum)	Temperature, water, deg C (Minimum)	Temperature, water, deg C (Mean)	Turbidity, IR LED light, det ang 90 deg, FNU (Maximum)	Turbidity, IR LED light, det ang 90 deg, FNU (Minimum)	Turbidity, IR LED light, det ang 90 deg, FNU (Median)
11/09/2008	42 P	24.38 P	12.3 P	11.8 P	12.0 P	21.1 P	7.6 P	10.8 P
11/10/2008	38 P	24.34 P	12.1 P	11.4 P	11.7 P	9.7 P	7.2 P	7.8 P
11/11/2008	72 P	24.65 P	11.7 P	10.8 P	11.2 P	48.6 P	7.0 P	18.5 P
11/12/2008	164 P	25.28 P	13.9 P	11.7 P	12.8 P	290 P	26.0 P	37.6 P
11/13/2008	355 P	26.27 P	13.8 P	11.3 P	12.8 P			
11/14/2008	97 P	24.87 P	11.3 P	10.1 P	10.8 P			
11/15/2008	65 P	24.60 P	10.8 P	9.4 P	10.1 P	20.6 P	12.3 P	15.3 P
11/16/2008	51 P	24.48 P	10.4 P	8.9 P	9.7 P	17.5 P	8.7 P	10.9 P
11/17/2008	44 P	24.40 P	10.7 P	9.2 P	9.9 P	13.2 P	7.1 P	8.9 P
11/18/2008	38 P	24.34 P	10.4 P	9.1 P	9.8 P	10.2 P	6.2 P	7.1 P
11/19/2008	34 P	24.30 P	10.7 P	9.6 P	10.2 P	7.4 P	5.6 P	6.2 P
11/20/2008	62 P	24.56 P	10.3 P	9.0 P	9.7 P	91.2 P	5.3 P	11.6 P
11/21/2008	53 P	24.49 P	9.7 P	8.4 P	9.1 P	30.6 P	11.1 P	13.4 P
11/22/2008	45 P	24.41 P	9.5 P	8.6 P	9.1 P	18.2 P	9.4 P	12.7 P
11/23/2008	37 P	24.33 P	8.8 P	7.7 P	8.3 P	14.5 P	6.9 P	8.7 P
11/24/2008	33 P	24.29 P	8.4 P	7.1 P	7.8 P	7.7 P	6.0 P	6.7 P
11/25/2008	33 P	24.29 P	7.8 P	7.0 P	7.4 P	9.6 P	5.5 P	6.8 P
11/26/2008	36 P	24.32 P	8.3 P	7.3 P	7.7 P	23.6 P	5.1 P	6.2 P
11/27/2008	30 P	24.26 P	8.2 P	6.4 P	7.2 P	6.6 P	4.4 P	5.6 P
11/28/2008	29 P	24.25 P	9.5 P	8.2 P	8.9 P	6.5 P	4.3 P	5.0 P
11/29/2008	28 P	24.24 P	11.1 P	9.5 P	10.4 P	7.4 P	4.5 P	5.7 P
11/30/2008	29 P	24.24 P	11.4 P	10.4 P	10.8 P	6.7 P	4.4 P	5.4 P
12/01/2008	28 P	24.24 P	11.4 P	10.7 P	11.0 P	14.4 P	4.5 P	5.8 P
12/02/2008	43 P	24.39 P	11.4 P	10.6 P	11.0 P	18.0 P	5.7 P	9.5 P
12/03/2008	36 P	24.32 P	11.2 P	10.0 P	10.6 P	17.2 P	6.4 P	8.4 P
12/04/2008	31 P	24.27 P	10.0 P	7.2 P	8.5 P	22.8 P	6.8 P	9.0 P
12/05/2008	29 P	24.24 P	8.0 P	6.5 P	7.2 P	23.3 P	8.2 P	11.6 P
12/06/2008	27 P	24.23 P	7.3 P	6.0 P	6.8 P			
12/07/2008	32 P	24.28 P	8.6 P	7.1 P	7.7 P			
12/08/2008	43 P	24.39 P	8.3 P	7.1 P	7.7 P			
12/09/2008	33 P	24.29 P	8.0 P	6.9 P	7.6 P			
12/10/2008	30 P	24.26 P	9.0 P	7.8 P	8.3 P			
12/11/2008	28 P	24.24 P	9.2 P	8.0 P	8.7 P			
12/12/2008	35 P	24.31 P	8.0 P	6.7 P	7.5 P	20.3 P	4.4 P	6.9 P

Date	Discharge, cfs (Mean)	Gauge height, feet (Mean)	Tempera-ture, water, deg C (Maximum)	Tempera-ture, water, deg C (Minimum)	Tempera-ture, water, deg C (Mean)	Turbidity, IR LED light, det ang 90 deg, FNU (Maximum)	Turbidity, IR LED light, det ang 90 deg, FNU (Minimum)	Turbidity, IR LED light, det ang 90 deg, FNU (Median)
01/16/2009	71 P	24.60 P	6.2 P	5.0 P	5.6 P	16.7 P	8.0 P	9.2 P
01/17/2009	62 P	24.52 P	5.0 P	3.9 P	4.5 P	19.7 P	8.0 P	8.9 P
01/18/2009	55 P	24.46 P	4.5 P	3.4 P	3.9 P	14.9 P	7.0 P	8.3 P
01/19/2009	50 P	24.42 P	4.4 P	3.0 P	3.6 P	11.6 P	7.0 P	8.4 P
01/20/2009	50 P	24.41 P	4.7 P	3.0 P	3.7 P	13.7 P	7.4 P	8.9 P
01/21/2009	46 P	24.37 P	4.5 P	2.9 P	3.7 P	10.1 P	7.1 P	8.1 P
01/22/2009	43 P	24.34 P	5.5 P	3.8 P	4.6 P	9.0 P	6.5 P	7.5 P
01/23/2009	42 P	24.34 P	5.8 P	4.2 P	5.0 P	8.6 P	6.0 P	7.0 P
01/24/2009	39 P	24.30 P	5.9 P	4.6 P	5.2 P	16.6 P	5.5 P	6.4 P
01/25/2009	41 P	24.32 P	5.5 P	4.3 P	5.0 P	8.4 P	5.5 P	6.9 P
01/26/2009	39 P	24.30 P	4.3 P	3.1 P	3.7 P	7.3 P	5.3 P	6.4 P
01/27/2009	37 P	24.29 P	5.2 P	3.4 P	4.2 P	13.3 P	5.3 P	7.1 P
01/28/2009	45 P	24.36 P	6.6 P	4.9 P	5.7 P	10.1 P	6.4 P	7.1 P
01/29/2009	40 P	24.32 P	6.4 P	5.2 P	5.8 P	7.9 P	5.6 P	7.0 P
01/30/2009	38 P	24.29 P	6.4 P	5.3 P	5.8 P	7.0 P	4.9 P	5.8 P
/31/2009	37 P	24.28 P	6.9 P	5.6 P	6.2 P	6.5 P	4.8 P	5.6 P
02/01/2009	35 P	24.26 P	6.7 P	5.6 P	6.1 P	11.2 P	4.5 P	5.1 P
02/02/2009	34 P	24.25 P	7.3 P	5.4 P	6.3 P	6.7 P	4.4 P	5.3 P
02/03/2009	33 P	24.24 P	7.5 P	5.1 P	6.3 P	6.6 P	4.2 P	5.3 P
02/04/2009	33 P	24.24 P	8.3 P	6.0 P	7.2 P	7.1 P	4.4 P	5.5 P
02/05/2009	32 P	24.23 P	7.8 P	6.6 P	7.2 P	7.1 P	4.6 P	5.1 P
02/06/2009	37 P	24.28 P	8.6 P	7.0 P	7.7 P	9.2 P	5.0 P	6.4 P
02/07/2009	36 P	24.27 P	9.1 P	7.3 P	8.1 P	7.8 P	4.9 P	5.6 P
02/08/2009	33 P	24.24 P	7.9 P	6.7 P	7.3 P	35.1 P	4.7 P	5.9 P
02/09/2009	33 P	24.24 P	7.7 P	6.4 P	7.1 P	11.2 P	5.0 P	6.2 P
02/10/2009	43 P	24.33 P	6.8 P	5.3 P	6.0 P	58.7 P	5.7 P	8.7 P
02/11/2009	57 P	24.47 P	6.9 P	4.9 P	5.7 P	59.3 P	11.5 P	13.9 P
02/12/2009	42 P	24.33 P	6.2 P	4.4 P	5.4 P	13.4 P	7.2 P	10.0 P
02/13/2009	39 P	24.30 P	6.5 P	5.7 P	6.0 P	13.3 P	7.2 P	8.1 P
02/14/2009	37 P	24.28 P	7.1 P	5.2 P	6.1 P	11.6 P	6.1 P	8.7 P
02/15/2009	41 P	24.32 P	7.5 P	5.6 P	6.4 P	11.1 P	5.8 P	7.2 P
02/16/2009	39 P	24.30 P	7.2 P	5.4 P	6.4 P	9.4 P	5.5 P	6.5 P
/17/2009	36 P	24.27 P	8.6 P	6.6 P	7.4 P	8.6 P	5.1 P	6.2 P
02/18/2009	35 P	24.26 P	9.0 P	6.2 P	7.6 P	16.9 P	5.5 P	6.3 P

Date	Discharge, cfs (Mean)	Gauge height, feet (Mean)	Tempera-ture, water, deg C (Maximum)	Tempera-ture, water, deg C (Minimum)	Tempera-ture, water, deg C (Mean)	Turbidity, IR LED light, det ang 90 deg, FNU (Maximum)	Turbidity, IR LED light, det ang 90 deg, FNU (Minimum)	Turbidity, IR LED light, det ang 90 deg, FNU (Median)
03/25/2009	146 P	25.12 P	9.0 P	8.0 P	8.6 P	59.8 P	11.3 P	16.6 P
03/26/2009	138 P	25.08 P	9.8 P	7.3 P	8.5 P	60.7 P	19.2 P	38.9 P
03/27/2009	103 P	24.84 P	10.0 P	8.3 P	9.0 P	23.7 P	10.1 P	12.1 P
03/28/2009	160 P	25.19 P	9.2 P	8.2 P	8.8 P	138 P	9.1 P	13.0 P
03/29/2009	220 P	25.58 P	8.5 P	7.5 P	7.9 P	145 P	37.7 P	96.5 P
03/30/2009	136 P	25.07 P	8.6 P	7.1 P	7.8 P	38.0 P	14.9 P	24.8 P
03/31/2009	115 P	24.93 P	9.1 P	8.0 P	8.4 P	44.8 P	9.8 P	16.2 P
04/01/2009	121 P	24.97 P	8.2 P	7.7 P	7.9 P	40.4 P	11.9 P	17.1 P
04/02/2009	178 P	25.34 P	9.6 P	7.9 P	8.5 P	51.9 P	26.3 P	39.1 P
04/03/2009	149 P	25.16 P	9.6 P	8.1 P	8.6 P			
04/04/2009	123 P	24.98 P	10.5 P	7.3 P	8.8 P	40.3 P	12.6 P	19.6 P
04/05/2009	97 P	24.80 P	12.8 P	8.6 P	10.4 P	22.7 P	9.0 P	10.0 P
04/06/2009	80 P	24.67 P	14.3 P	9.8 P	11.8 P	11.2 P	7.0 P	7.9 P
04/07/2009	69 P	24.58 P	14.5 P	10.7 P	12.5 P	15.4 P	6.2 P	7.3 P
04/08/2009	60 P	24.51 P	13.0 P	11.7 P	12.3 P	18.7 P	5.7 P	6.8 P
4/09/2009	58 P	24.49 P	13.1 P	11.0 P	11.9 P	12.6 P	5.4 P	6.5 P
04/10/2009	102 P	24.83 P	12.0 P	10.5 P	11.2 P	35.3 P	11.4 P	13.7 P
04/11/2009	65 P	24.55 P	12.0 P	10.2 P	11.0 P	13.7 P	8.2 P	11.3 P
04/12/2009	64 P	24.54 P	12.4 P	10.9 P	11.4 P	42.1 P	6.2 P	7.8 P
04/13/2009	111 P	24.90 P	11.5 P	9.8 P	10.6 P	44.7 P	17.4 P	25.2 P
04/14/2009	114 P	24.92 P	10.3 P	8.5 P	9.4 P	45.0 P	21.1 P	29.2 P
04/15/2009	87 P	24.73 P	10.5 P	8.4 P	9.3 P	33.6 P	11.7 P	15.5 P
04/16/2009	74 P	24.62 P	12.6 P	8.3 P	10.4 P	16.0 P	8.5 P	10.2 P
04/17/2009	87 P	24.72 P	12.9 P	10.8 P	11.7 P	18.1 P	8.4 P	10.9 P
04/18/2009	74 P	24.62 P	13.7 P	10.2 P	11.8 P	12.8 P	8.7 P	10.2 P
04/19/2009	62 P	24.52 P	15.8 P	10.6 P	13.1 P	13.5 P	7.5 P	8.4 P
04/20/2009	55 P	24.46 P	17.4 P	12.4 P	14.8 P			
04/21/2009	50 P	24.41 P	18.2 P	13.4 P	15.8 P			
04/22/2009	45 P	24.37 P	16.2 P	13.2 P	14.6 P			
04/23/2009	42 P	24.33 P	13.8 P	11.3 P	12.5 P			
04/24/2009	40 P	24.31 P	15.2 P	10.5 P	12.7 P	20.1 P	5.7 P	7.5 P
04/25/2009	37 P	24.28 P	13.4 P	11.2 P	12.3 P	10.0 P	5.0 P	5.9 P
/26/2009	36 P	24.27 P	13.7 P	10.9 P	12.3 P	15.8 P	6.0 P	7.9 P
04/27/2009	40 P	24.31 P	13.9 P	10.8 P	12.1 P	29.4 P	6.8 P	9.4 P

Date	Discharge, cfs (Mean)	Gauge height, feet (Mean)	Temperature, water, deg C (Maximum)	Temperature, water, deg C (Minimum)	Temperature, water, deg C (Mean)	Turbidity, IR LED light, det ang 90 deg, FNU (Maximum)	Turbidity, IR LED light, det ang 90 deg, FNU (Minimum)	Turbidity, IR LED light, det ang 90 deg, FNU (Median)
06/01/2009	22 P	24.11 P	22.2 P	18.5 P	20.4 P	8.3 P	5.7 P	6.6 P
06/02/2009	22 P	24.11 P	20.2 P	18.4 P	19.0 P	8.3 P	5.7 P	6.7 P
06/03/2009	21 P	24.10 P	22.1 P	17.2 P	19.5 P	12.8 P	5.6 P	6.5 P
06/04/2009	23 P	24.12 P	21.8 P	18.6 P	19.7 P	279 P	5.1 P	6.7 P
06/05/2009	37 P	24.28 P	19.0 P	17.1 P	17.8 P	23.7 P	7.8 P	8.9 P
06/06/2009	29 P	24.20 P	17.5 P	16.0 P	16.8 P	8.9 P	6.0 P	6.8 P
06/07/2009	24 P	24.14 P	17.1 P	15.7 P	16.4 P	9.0 P	5.5 P	6.1 P
06/08/2009	23 P	24.12 P	19.4 P	15.3 P	17.1 P	9.5 P	6.0 P	7.0 P
06/09/2009	22 P	24.11 P	20.5 P	15.8 P	18.1 P	7.8 P	5.5 P	6.7 P
06/10/2009	21 P	24.10 P	18.9 P	16.8 P	17.8 P	50.1 P	5.9 P	7.3 P
06/11/2009	21 P	24.10 P	19.0 P	16.7 P	17.8 P	9.9 P	5.3 P	6.1 P
06/12/2009	20 P	24.09 P	20.4 P	16.4 P	18.2 P	7.6 P	5.1 P	5.9 P
06/13/2009	19 P	24.08 P	19.3 P	17.1 P	18.2 P	6.6 P	4.9 P	5.6 P
06/14/2009	19 P	24.08 P	18.4 P	16.5 P	17.4 P	8.9 P	5.2 P	5.9 P
06/15/2009	20 P	24.09 P	21.1 P	16.0 P	18.5 P	7.8 P	5.1 P	6.5 P
06/16/2009	19 P	24.07 P	19.9 P	17.0 P	18.5 P	7.6 P	5.0 P	6.2 P
06/17/2009	18 P	24.06 P	19.8 P	17.2 P	18.4 P	7.4 P	5.3 P	5.9 P
06/18/2009	19 P	24.07 P	21.1 P	17.0 P	19.0 P	7.1 P	5.4 P	6.1 P
06/19/2009	44 P	24.30 P	20.9 P	17.2 P	18.8 P	294 P	4.7 P	6.8 P
06/20/2009	65 P	24.53 P	18.4 P	16.6 P	17.6 P	228 P	14.7 P	27.8 P
06/21/2009	29 P	24.19 P	18.3 P	15.2 P	16.6 P	15.4 P	7.4 P	9.2 P
06/22/2009	24 P	24.14 P	19.1 P	15.1 P	17.0 P	8.7 P	6.4 P	7.4 P
06/23/2009	22 P	24.11 P	20.6 P	15.1 P	17.8 P	8.9 P	4.8 P	6.2 P
06/24/2009	21 P	24.09 P	21.7 P	16.6 P	19.1 P	9.4 P	5.2 P	6.3 P
06/25/2009	19 P	24.07 P	19.6 P	17.3 P	18.3 P	23.2 P	5.7 P	8.5 P
06/26/2009	19 P	24.07 P	20.4 P	15.3 P	17.9 P	159 P	9.0 P	17.8 P
06/27/2009	18 P	24.06 P	21.6 P	15.7 P	18.6 P	607 P	18.2 P	89.5 P
06/28/2009	18 P	24.05 P	21.8 P	17.0 P	19.3 P	475 P	17.1 P	61.5 P
06/29/2009	18 P	24.05 P	21.3 P	16.2 P	18.8 P	233 P	5.2 P	32.5 P
06/30/2009	17 P	24.05 P	21.4 P	16.0 P	18.7 P	5.8 P	4.0 P	4.9 P

Explanation

EQP	Equipment malfunction
A	Approved for publication—processing and review completed.
P	Provisional data subject to revision.

Sample Date/Time	Sample Type	Result Qualifier	Result Value	Analyte Units	Analyte Name	Location Name
8/3/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/4/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/5/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/6/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/7/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/8/2008 0:00	Observed		0.03	Inches	Rain	Kellogg Plant-Process
8/9/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/10/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/11/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/12/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/13/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/14/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/15/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/16/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/17/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/18/2008 0:00	Observed		0.15	Inches	Rain	Kellogg Plant-Process
8/19/2008 0:00	Observed		0.26	Inches	Rain	Kellogg Plant-Process
8/20/2008 0:00	Observed		0.23	Inches	Rain	Kellogg Plant-Process
8/21/2008 0:00	Observed		0.02	Inches	Rain	Kellogg Plant-Process
8/22/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/23/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/24/2008 0:00	Observed		0.38	Inches	Rain	Kellogg Plant-Process
8/25/2008 0:00	Observed		0.03	Inches	Rain	Kellogg Plant-Process
8/26/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/27/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/28/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/29/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/30/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
8/31/2008 0:00	Observed		0.17	Inches	Rain	Kellogg Plant-Process
9/1/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
9/2/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
9/3/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
9/4/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
9/5/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
9/6/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
9/7/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
9/8/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process

Sample Date/Time	Sample Type	Result Qualifier	Result Value	Analyte Units	Analyte Name	Location Name
10/16/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
10/17/2008 0:00	Observed		0.04	Inches	Rain	Kellogg Plant-Process
10/18/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
10/19/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
10/20/2008 0:00	Observed		0.23	Inches	Rain	Kellogg Plant-Process
10/21/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
10/22/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
10/23/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
10/24/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
10/25/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
10/26/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
10/27/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
10/28/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
10/29/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
10/30/2008 0:00	Observed		0.04	Inches	Rain	Kellogg Plant-Process
10/31/2008 0:00	Observed		0.19	Inches	Rain	Kellogg Plant-Process
11/1/2008 0:00	Observed		0.50	Inches	Rain	Kellogg Plant-Process
11/2/2008 0:00	Observed		0.35	Inches	Rain	Kellogg Plant-Process
11/3/2008 0:00	Observed		1.25	Inches	Rain	Kellogg Plant-Process
11/4/2008 0:00	Observed		0.07	Inches	Rain	Kellogg Plant-Process
11/5/2008 0:00	Observed		0.70	Inches	Rain	Kellogg Plant-Process
11/6/2008 0:00	Observed		0.14	Inches	Rain	Kellogg Plant-Process
11/7/2008 0:00	Observed		0.08	Inches	Rain	Kellogg Plant-Process
11/8/2008 0:00	Observed		0.14	Inches	Rain	Kellogg Plant-Process
11/9/2008 0:00	Observed		0.02	Inches	Rain	Kellogg Plant-Process
11/10/2008 0:00	Observed		0.25	Inches	Rain	Kellogg Plant-Process
11/11/2008 0:00	Observed		0.42	Inches	Rain	Kellogg Plant-Process
11/12/2008 0:00	Observed		1.35	Inches	Rain	Kellogg Plant-Process
11/13/2008 0:00	Observed		0.01	Inches	Rain	Kellogg Plant-Process
11/14/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
11/15/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
11/16/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
11/17/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
11/18/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
11/19/2008 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
11/20/2008 0:00	Observed		0.08	Inches	Rain	Kellogg Plant-Process
11/21/2008 0:00	Observed		0.04	Inches	Rain	Kellogg Plant-Process

Sample Date/Time	Sample Type	Result Qualifier	Result Value	Analyte Units	Analyte Name	Location Name
12/29/2008 0:00	Observed		0.71	Inches	Rain	Kellogg Plant-Process
12/30/2008 0:00	Observed		0.27	Inches	Rain	Kellogg Plant-Process
12/31/2008 0:00	Observed		0.38	Inches	Rain	Kellogg Plant-Process
1/1/2009 0:00	Observed		0.32	Inches	Rain	Kellogg Plant-Process
1/2/2009 0:00	Observed		0.05	Inches	Rain	Kellogg Plant-Process
1/3/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
1/4/2009 0:00	Observed		0.48	Inches	Rain	Kellogg Plant-Process
1/5/2009 0:00	Observed		0.12	Inches	Rain	Kellogg Plant-Process
1/6/2009 0:00	Observed		0.12	Inches	Rain	Kellogg Plant-Process
1/7/2009 0:00	Observed		0.62	Inches	Rain	Kellogg Plant-Process
1/8/2009 0:00	Observed		0.02	Inches	Rain	Kellogg Plant-Process
1/9/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
1/10/2009 0:00	Observed		0.10	Inches	Rain	Kellogg Plant-Process
1/11/2009 0:00	Observed		0.07	Inches	Rain	Kellogg Plant-Process
1/12/2009 0:00	Observed		0.03	Inches	Rain	Kellogg Plant-Process
1/13/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
1/14/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
1/15/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
1/16/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
1/17/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
1/18/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
1/19/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
1/20/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
1/21/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
1/22/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
1/23/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
1/24/2009 0:00	Observed		0.18	Inches	Rain	Kellogg Plant-Process
1/25/2009 0:00	Observed		0.03	Inches	Rain	Kellogg Plant-Process
1/26/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
1/27/2009 0:00	Observed		0.15	Inches	Rain	Kellogg Plant-Process
1/28/2009 0:00	Observed		0.03	Inches	Rain	Kellogg Plant-Process
1/29/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
1/30/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
1/31/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
2/1/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
2/2/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
2/3/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process

Sample Date/Time	Sample Type	Result Qualifier	Result Value	Analyte Units	Analyte Name	Location Name
3/12/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
3/13/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
3/14/2009 0:00	Observed		1.03	Inches	Rain	Kellogg Plant-Process
3/15/2009 0:00	Observed		0.31	Inches	Rain	Kellogg Plant-Process
3/16/2009 0:00	Observed		0.23	Inches	Rain	Kellogg Plant-Process
3/17/2009 0:00	Observed		0.05	Inches	Rain	Kellogg Plant-Process
3/18/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
3/19/2009 0:00	Observed		0.04	Inches	Rain	Kellogg Plant-Process
3/20/2009 0:00	Observed		0.02	Inches	Rain	Kellogg Plant-Process
3/21/2009 0:00	Observed		0.03	Inches	Rain	Kellogg Plant-Process
3/22/2009 0:00	Observed		0.18	Inches	Rain	Kellogg Plant-Process
3/23/2009 0:00	Observed		0.13	Inches	Rain	Kellogg Plant-Process
3/24/2009 0:00	Observed		0.10	Inches	Rain	Kellogg Plant-Process
3/25/2009 0:00	Observed		0.20	Inches	Rain	Kellogg Plant-Process
3/26/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
3/27/2009 0:00	Observed		0.04	Inches	Rain	Kellogg Plant-Process
3/28/2009 0:00	Observed		0.56	Inches	Rain	Kellogg Plant-Process
3/29/2009 0:00	Observed		0.02	Inches	Rain	Kellogg Plant-Process
3/30/2009 0:00	Observed		0.04	Inches	Rain	Kellogg Plant-Process
3/31/2009 0:00	Observed		0.04	Inches	Rain	Kellogg Plant-Process
4/1/2009 0:00	Observed		0.44	Inches	Rain	Kellogg Plant-Process
4/2/2009 0:00	Observed		0.05	Inches	Rain	Kellogg Plant-Process
4/3/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
4/4/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
4/5/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
4/6/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
4/7/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
4/8/2009 0:00	Observed		0.04	Inches	Rain	Kellogg Plant-Process
4/9/2009 0:00	Observed		0.28	Inches	Rain	Kellogg Plant-Process
4/10/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
4/11/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
4/12/2009 0:00	Observed		0.48	Inches	Rain	Kellogg Plant-Process
4/13/2009 0:00	Observed		0.17	Inches	Rain	Kellogg Plant-Process
4/14/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
4/15/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
4/16/2009 0:00	Observed		0.18	Inches	Rain	Kellogg Plant-Process
4/17/2009 0:00	Observed		0.12	Inches	Rain	Kellogg Plant-Process

Sample Date/Time	Sample Type	Result Qualifier	Result Value	Analyte Units	Analyte Name	Location Name
5/25/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
5/26/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
5/27/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
5/28/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
5/29/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
5/30/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
5/31/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/1/2009 0:00	Observed		0.03	Inches	Rain	Kellogg Plant-Process
6/2/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/3/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/4/2009 0:00	Observed		0.52	Inches	Rain	Kellogg Plant-Process
6/5/2009 0:00	Observed		0.02	Inches	Rain	Kellogg Plant-Process
6/6/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/7/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/8/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/9/2009 0:00	Observed		0.01	Inches	Rain	Kellogg Plant-Process
6/10/2009 0:00	Observed		0.11	Inches	Rain	Kellogg Plant-Process
6/11/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/12/2009 0:00	Observed		0.05	Inches	Rain	Kellogg Plant-Process
6/13/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/14/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/15/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/16/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/17/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/18/2009 0:00	Observed		0.07	Inches	Rain	Kellogg Plant-Process
6/19/2009 0:00	Observed		0.48	Inches	Rain	Kellogg Plant-Process
6/20/2009 0:00	Observed		0.04	Inches	Rain	Kellogg Plant-Process
6/21/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/22/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/23/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/24/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/25/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/26/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/27/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/28/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/29/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process
6/30/2009 0:00	Observed		0	Inches	Rain	Kellogg Plant-Process

ID #	Dia.	Address		
65001	12.00	10890	SE	OAK
65002	24.00	10890	SE	OAK
65003	24.00	10890	SE	OAK
65004	12.00	11400	SE	37TH
65005	18.00	4141	SE	RAILROAD
65019	24.00	4243	SE	INTERNATIONAL
65029	54.00	4700	SE	INTERNATIONAL
65031	0.00	4700	SE	INTERNATIONAL
65032	48.00	4700	SE	INTERNATIONAL
25262	48.00	4539	SE	BROOKSIDE
25244	0.00	9301	SE	WICHITA
25261	8.00	5015	SE	BROOKSIDE
25264	24.00	5110	SE	JOHNSON CREEK
25266	12.00	5543	SE	TAMBARA
25267	10.00	5249	SE	BROOKSIDE
25274	12.00	4708	SE	JOHNSON CREEK
25275	10.00	5145	SE	BROOKSIDE
25333	18.00	9000	SE	MCBROD
25225	18.00	9800	SE	MCBROD
25226	36.00	9501	SE	MCLOUGHLIN
25227	21.00	9501	SE	MCLOUGHLIN
25228	24.00	9701	SE	MCLOUGHLIN
25232	18.00	2808	SE	BALFOUR
45006	12.00	12374	SE	OATFIELD
45007	10.00	12368	SE	OATFIELD
65011	0.00	12045	SE	STANLEY
65012	10.00	121396	SE	MAPLE
65013	15.00	12425	SE	ASH
65014	10.00	12476	SE	GROVE
65020	12.00	5124	SE	APPENINE
65021	0.00	11880	SE	HOME
65022	12.00	12015	SE	VIVALDI
65023	24.00	12172	SE	BECKMAN
65028	0.00	12045	SE	STANLEY

64 outfalls that are inspected annually

Appendix C
B-1 & B-2 Monitoring Tables
for City of Milwaukie

Table B-1: Milwaukie Sampling Types and Locations			
Sampling Type	**Location(s)**	**Minimum Sample Frequency**	**Responsible Co-Permittee**
MS4 Discharge Monitoring	One outfall in the city of Milwaukie	Three storm events per July 1 to June 30 reporting period	City of Milwaukie
In Stream	One Creek in the city of Milwaukie	Four visits per July 1 to June 30 reporting period	City of Milwaukie
In Stream Johnson Creek	Continuous Monitoring Station	Continuous	US Geological Survey (Portland)

Table B-2: Milwaukie Analytical Parameters MS4 Discharge Monitoring and In Stream Monitoring	
FIELD PARAMETERS	Conductivity pH Dissolved Oxygen Water Temperature
TOTAL METALS	Copper Lead Zinc
OTHER	Total Suspended Solids, Hardness
NUTRIENTS	Nitrate Ammonia Orthophosphate Total Phosphorus
BIOLOGICAL	Ecoli