City of Salem's Dry Weather Outfall and Illicit Discharge Screening Plan

City of Salem
National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4)

June 25, 2012

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1.0 Introduction

This plan, which fulfills requirements identified in Schedule A.4.a.iii-vi and xi-xii of the City of Salem's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit, describes dry weather inspection activities and pollutant parameter action levels the City will implement. This plan supports the City's Illicit Discharge Detection and Elimination (IDDE) Program, thereby limiting pollutants entering receiving water bodies from the MS4 system to the maximum extent practicable.

The City has been conducting dry weather outfall screening as part of its IDDE Program since it received its first NPDES MS4 Permit in 1997. However, the City's current NPDES MS4 Permit has additional procedural and documentation requirements. Activities discussed in this plan meet the new requirements and will be implemented for the remainder of the current permit cycle.

2.0 Adaptive Management

By adaptively managing (e.g., implementing, evaluating, and adjusting) its stormwater management program, the City of Salem continues to reduce the discharge of pollutants from its MS4 system to the maximum extent practicable.

Data collected through implementation of this plan will contribute to the identification and elimination of the illicit discharges into the City's MS4 system. Modifications to the tasks identified in this plan may be necessary to improve the effectiveness of the City's IDDE Program. Modifications may include, but are not limited to: 1) addition of priority outfall locations based on notifications of potential illicit discharges, variations in in-stream data, personnel safety, or other factors identified by the City, 2) unusual weather conditions that inhibit dry weather (72 hour antecedent dry period) inspections, and 3) changes to pollutant parameter action levels. Significant modifications to this plan during the course of the permit cycle will be submitted to the DEQ as part of the annual reporting process.

3.0 Illicit Discharge Screening and Tracking Activities

3.1 Project / Task Organization

The City's Stormwater Services and Environmental Services staff works collaboratively to perform dry weather screening and tracking activities. Stormwater Services is responsible for performing all dry weather screening at prioritized outfall/manhole locations (see section 4.0), and maintenance of the continuous in-stream monitoring water quality alarm system. Additionally, Stormwater Services employs a crew of seasonal interns to walk Salem streams during the summer months, which along with duties of removing trash and debris are trained in the visual identification and response procedures for suspected illicit discharges. Environmental Services performs all in-field source tracking and enforcement of suspected and/or determined illicit discharges. Environmental Services activities are initiated by citizen notification, City staff notifications, continuous water quality alarm notification, and notifications from adjoining jurisdictions of suspected and/or determined illicit discharges.

3.2 Notification Driven Tracking Activities

All notifications of suspected and/or determined illicit discharges within the City's jurisdiction are routed through the City's Public Works Dispatch Communications Center and a Service Request (SR) is generated by use of the Hansen Information System. The SR prompts immediate investigation by the Environmental Services Division. As part of this investigation, Environmental Services staff, whenever feasible, will collect a water sample of the suspected flow. If the source of the suspected flow cannot be identified in the field, the sample will be transported to the City's Willow Lake Laboratory for analysis (see section 5.3 for laboratory analysis). Figure 1 provides a process overview (flow chart) of notification driven tracking activities.

When recurrent alarms are generated by the continuous in-stream water quality monitoring system, but the outfall (or sub-catchment) has not been identified, a portable sampler can be placed at the site. Future alarms would trigger collection of a sample, which would be sent to Willow Lake Laboratory to conduct analyses on parameters identified in Table 3. The intent of these analyses is to help identify the potential source to aid in tracking activities.

4.0 Priority Dry Weather Screening Locations

4.1 Prioritization Process

The City has over 1300 City-owned outfalls within its jurisdiction. Through a prioritization process, the City has identified 35 City-owned outfall and manhole locations that will have screening performed on them at least once per calendar year. These outfalls/manholes were identified by following the prioritization process discussed below:

- Drainage Area: To ensure a large drainage area, outfalls greater than or equal to 30 inches in diameter were identified, resulting in a total of 139 outfalls;
- Land use type(s): Greater than or equal to 30 inch diameter outfalls that drained a portion of industrial land use were given higher priority. 25 of the 35 prioritized outfalls had at least some portion of the land use draining industrial land use;
- Accessibility: Outfall location accessibility was reviewed from previous dry weather outfall inspections. Areas where accessibility proved to be an issue were managed by identifying the first upstream manhole as the priority location;
- Storm Sewer Age: Storm sewer age was determined using storm sewer as-builts and the relative age of buildings in the catchment area with older storm sewers being prioritized over more recent storm sewers;
- Condition of Sanitary Sewer: Storm sub-basin catchments with known sanitary sewer infiltration concerns were prioritized over catchments with relatively little infiltration concerns;
- Historical Notifications of Suspected Illicit Discharges: Discussion with Environmental Services Staff identified a number of outfalls based on historical complaints that were added to the prioritized outfall/manhole list regardless of any of the above considerations.

Table 1 below provides the Site ID, receiving stream, and land use type(s) for each prioritized outfall/manhole location. Figures 2 through 4 identify the location and pipeshed for each priority outfall/manhole.

Table 1: Priority Outfall/Manhole Locations

Outfall/ Manhole ID	Diameter	Creek	Land Use
West Salem			
D30470203	36"	Willamette River (West)	Industrial, Residential
D36472203	30"	Willamette River (West)	Residential, Commercial
D39476233(MH)	30"	Willamette River (West)	Industrial, Commercial
D39478271	60"	Unnamed West Salem Creek	Industrial, Residential, Commercial
South Salem			
D39460252	30"	Clark Creek	Residential
D42466227 (MH)	15"	Clark Creek	Residential
D42468244	48"	Clark Creek	Residential, Commercial
D42468232	36"	Clark Creek	Residential, Public Education
D39456229	30"	West Fork Pringle Creek	Residential, Commercial
D42456216	30"	West Fork Pringle Creek	Commercial, Residential
D45464207	42"	West Fork Pringle Creek	Residential, Industrial
D42468235	38"	Pringle Creek	Industrial, Commercial, Residential
D48460229	30"	West Middle Fork of Pringle	Industrial
D45466212	60"	East Fork Pringle Creek	Industrial
D48464203	30"	East Fork Pringle Creek	Industrial
D48464249	30"	East Fork Pringle Creek	Industrial
D45468241	80"	Shelton Ditch	Industrial, Commercial, Residential
North Salem			
D45476207	42" x 42"	Mill Creek	Residential, Public Education
D45476217	21"	Mill Creek	Public (State Building)
D42476203	24"	Mill Creek	Commercial, Public
D51470205	54"	Mill Creek	Industrial, Commercial
D54470205	60"	Geer Park (into Mill)	Residential, Industrial
D51486201	60"	Claggett Creek	Industrial, Commercial, Residential
D48486207	60"	Claggett Creek	Industrial, Commercial, Residential
D51488203	30"	Claggett Creek	Industrial
D51488236	30"	Claggett Creek	Industrial
D51486216	60"	Claggett Creek	Residential, Commercial, Industrial
D54486217	66"	Claggett Creek	Residential, Commercial, Industrial
D54494201	48"	South Labish Ditch	Industrial
D42482211 (MH)	36"	Willamette River (East)	Residential, Commercial, Industrial
D42480205	30"	Willamette River (East)	Residential, Commercial, Industrial
D42480215	36"	Willamette River (East)	Residential, Commercial, Industrial
D42480223	36"	Willamette River (East)	Residential, Commercial, Industrial
D42482212	30"	Willamette River (East)	Residential, Commercial, Industrial
D42482223	42"	Willamete River (East)	Residential, Commercial, Industrial

5.0 Dry Weather Field Screening Procedures

Dry weather field screening of priority outfalls/manholes will occur after an antecedent dry period of at least 72 hours. The screening activities will be completed each calendar year during the dry season, more specifically July-September.

5.1 Field Screening Procedures (Observations)

A priority outfall inspection filed sheet will be filled out for each prioritized outfall/manhole (see Attachment 1). If field screening observations give reason to believe that the location might receive intermittent illicit discharges and no flow is observed during the initial screening process, caulk dams will be placed during a dry period in an attempt to pool water so that field screening measurements can be performed.

5.2 Field Screening Procedures (Measurements)

In the case of flow being present at a priority outfall/manhole location, a number of field screening measurements will be collected, including the following:

- temperature
- pH
- turbidity
- specific conductivity
- and total chlorine

Each of these pollutants has pollutant parameter action levels (and rationale) associated with them, as described in Table 2.

If any exceedances of field screening pollutant parameter action levels and/or field observations indicate the potential of an illicit discharge, the Public Works Dispatch Communications Center will be contacted and a SR will be created for the City's Environmental Services staff to respond. Environmental Services staff will perform a reconnaissance of the catchment area. If reconnaissance of the catchment area is unable to identify a source for the suspected illicit discharge, water samples will be taken to Willow Lake Laboratory for analysis. Figure 5 provides an overview (flow chart) of this process.

Calibration and accuracy verification forms for field screening measurement activities will be filled out for each day that screening is performed (see Attachment 2).

Table 2: Field Screening Pollutant Parameter Action Levels

Parameter	Reporting Limit	Suggested Action Level	Units	Method	Bottle Type	Hold Time	Rationale for Action Level
Field Screening Measurements							
Temperature	NA	> 3° C above receiving stream	Celsius	NIST traceable	In-situ	NA	A temperature reading > 3° C above receiving stream temperature will serve as an indicator of a heated water source, while still allowing for variation of groundwater to stream water temperature on days with a relative cool ambient air temperature.
pH	NA	<6.0, > 8.5	S.U.	EPA-NERL 150.1	In-situ	NA	pH values falling outside the <6.0, > 8.5 range necessitate the need for increased analysis and will prompt a catchment reconnaissance.
Turbidity	0.1	> 15 NTU	NTU	EPA 180.1	Glass	NA	Turbidity values > 15 NTU indicate something other than a natural source, thus necessitating the need for increased analysis and will prompt a catchment reconnaissance.
Specific Conductivity	1	> 250 µS/cm	µS/cm	EPA 120.1	In-situ	NA	Historical dry weather outfall inspections data show a specific conductivity ranging 30-200 µS/cm. A Specific conductivity > 250 µS/cm indicates something other than a natural source thus necessitating the need for increased analysis and will prompt a catchment reconnaissance.
Total Chlorine	range 0.0 to 5.0 mg/L	Any presence	mg/L	Test Strip	in-Situ	NA	Any presence of chlorine indicates a probable City drinking water source, thus necessitating the need for increased analysis and will prompt a catchment reconnaissance.

5.3 Laboratory Analysis

Unless unforeseen circumstances arise, the City's Willow Lake Laboratory will perform all laboratory analysis.

Laboratory analysis will be performed on water samples when field screening observations and/or measurements indicate the potential of an illicit discharge and the source was not identified. Laboratory analysis action levels are used as additional confirmation of a suspected illicit discharge as well as to help identify the potential source, e.g., industrial/commercial waste water, sanitary cross connection, wash water, or a natural water source. Laboratory analysis will include testing for fluoride, ammonia, sodium, potassium, and detergents.

Laboratory analysis parameter action levels are included in Table 3. Analytical results that exceed action levels will prompt additional tracking methods, as identified in the City's Illicit Discharge Enforcement Response Plan. Additional analyses may also be warranted (e.g., metals, bacteria, nutrients, or hydrocarbons).

For the 2012 dry weather screening process, any flowing water at a priority outfall/manhole locations, regardless of field screening observations and measurements, will have a sample taken to Willow Lake Laboratory for a fluoride screen. If fluoride is above the 0.1 mg/L action level analysis for, ammonia, sodium, potassium, and detergents will also be conducted. If fluoride is absent and there are no other indicators pointing to a potential illicit discharge, the

outfall/manhole location will be noted as conveying a natural water source. All sites noted as conveying a natural water source will continue to be screened in subsequent years.

Willow Lake Laboratory protocol for processing samples is as follows:

1) Samples are placed in the sample receiving room
2) Chain of Custodies are signed to preserve a continuous record of possession
3) Samples are logged into the Laboratory Information Management System (LIMS)
4) Samples are preserved, if applicable
5) Samples are placed in appropriate storage (cooler, metals room, etc.)
6) Samples are analyzed by certified methods using appropriate quality control (ICV, duplicate, spike, etc.)
7) Data are entered into LIMS by the analyst
8) Data are validated by a Lab Technician II (data entered into LIMS cannot be validated by the original analyst)
9) Data are approved by the Laboratory Manager
10) A report is generated, if applicable, and sent to the appropriate internal stakeholder(s)
11) Samples are held for 30 days before disposal

Table 3: Laboratory Analysis Action Levels

Parameter	Reporting Limit	Suggested Action Level	Units	Method	Bottle Type	Hold Time	Rationale for Action Level
Laboratory Analysis							
Fluoride	0.1	0.1	mg/L	SM 4500-F^- C	Plastic	28 Days	Any presence of fluoride indicates a probable City drinking water source. Thus the level was set at the reporting limit. City water fluoride concentration is about 0.7, so a level of 0.1 allows for possible detection even with significant dilution.
Detergents/ surfactants	0.25	0.25	mg/L	SM 5540 C	Plastic	48 hours	The City is limited on background data for detergents. However, tap water, groundwater, and irrigation is expected to be void of detergents. An action level of 0.25 will serve as an indicator of an illicit discharge. *(Detergents serve as a strong indicator of sewage or washwater.* [1] *)*
Potassium	0.5	5	mg/L	SM 3111 B or EPA 200.7*	Plastic	6 Months	Stormwater and in-stream sampling data history show potassium levels ranging 0.5-2.5 mg/L. Wastewater and industrial levels range 5-150 mg/L. Action level at 5 mg/L allows for slight variance above normal, but is low enough to detect a possible illicit discharge. *(Potassium helps to determine potential industrial or commercial liquid wastes.)*
Ammonia	0.05	0.5	mg/L	SM 4500-NH_3- D or Hach 10023	Plastic	28 Days	Ammonia levels in City wastewater range 10-20 mg/L, closer to 20 mg/L during the dry season. Action level at 0.5 allows for detection even with significant dilution. *(Ammonia helps to determine if the source is derived from sewage or wash water using a ammonia to potassium ratio. If the ratio is greater than 1 it suggests sewage contamination.* [1] *)*
Sodium	0.25	15	mg/L	SM 3111 B or EPA 200.7*	Plastic	6 Months	Stormwater and in-stream sampling data history show sodium levels ranging 1.5-4.0 mg/L. Wastewater and industrial levels range 20-6000 mg/L. Action level at 15 mg/L allows for slight variance above normal, but is low enough to detect possible illicit discharge. *(Sodium helps to further identify a potential industrial or commercial liquid waste discharge)*

* Method used depends on current testing already being done in laboratory at time of receiving samples.

[1] http://www.epa.gov/npdes/pubs/idde_chapter-12.pdf

6.0 Documentation and Reporting

At the conclusion of each dry weather outfall inspection season, a report of findings will be produced. These findings will be summarized in the MS4 Annual Report, along with additional IDDE Program information and reporting.

City of Salem
Priority Outfall Inspection Field Sheet

Section 1: Background Data

Subwatershed:		Site ID:	
Today's date:		Time (Military):	
Investigators:		Form completed by:	
Rainfall (in.) in last 72 hours?: yes no	Camera:	Photo #s:	
Latitude:	Longitude:	GPS Unit:	GPS LMK #:

Land Use in Drainage Area (Check all that apply):

☐ Industrial
☐ Ultra-Urban Residential
☐ Suburban Residential
☐ Commercial
☐ Open Space
☐ Insitutional
Known Industries: _____
Other: _____

Notes (e.g., origin of outfall, if known):

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ **Closed Pipe**	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☐ Circular ☐ Eliptical ☐ Box ☐ Other: _____	☐ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: _____	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☐ **Open drainage**	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: _____	☐ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: _____ Top Width: _____ Bottom Width: _____	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☐ No	***If No, Skip to Section 5***			
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS					
PARAMETER		**RESULT**	**ACTION LEVELS**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume			Liter	Bottle
	Time to fill			Sec	
☐Flow #2	Flow depth			In	Tape measure
	Flow width	____' ____"		Ft, In	Tape measure
	Measured length	____' ____"		Ft, In	Tape measure
	Time of travel			S	Stop watch
Temperature			> 3° C	°C	Thermometer
pH			<6.0, >8.5	pH Units	Probe
Specific Conductivity			>300	µS/cm	Probe
Chlorine (Total)			present	mg/L	test strip
Turbidity			> 15	NTU	Turbidimeter

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Environmental Services notified of Potential Discharge?: Yes NO Responder:

Section 7: Data Collection

1.	Sample for the lab?	☐ Yes	☐ No	
2.	If yes, collected from:	☐ Flow	☐ Pool	
3.	Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

Attachment 2

City of Salem
Dry Weather Inspection
Calibration and Accuracy Verification Form

Date_____ Quarter: _____Tech_____

Turbidity Hach Turbidimeter Calibration Criteria: +/- 5% or 2 NTU, (whichever is >)					Post-calibration	
	Lot #	Exp. Date	Reading	Error	Reading	Error
0 Std.						
20 NTU						
100 NTU						
800 NTU						
Comments:						

SPECIFIC CONDUCTANCE YSI 85 Calibration Criteria: +/- 7% of standard value				Calibration Check			After Re-calibration		
Value	Std. Lot #	KCL; NaCl	Exp. Date	Temp.	SC Rdg.	Error %	Temp.	SC Rdg.	
84 µS/cm		KCL							
Comments:									

pH YSI 60 Calibration Criteria: +/- 0.1 pH units					Post-Calibration Check Time_____		
pH Buffer	Buffer Lot #	Buffer Exp. Date	Slope mV/pH	Temp	pH Rdg.	Temp Adjusted Table Value	Error
pH 4.01							
pH 7.0							
pH 10.01							
Comments:							