

TECHNICAL MEMORANDUM No. OFM2-1

City Outfall Basin M-2 Dry-Weather Flow Sampling

TO:	Tom Roick, DEQ, Northwest Region Cleanup & Portland Harbor Section
FROM:	Dawn Sanders, City of Portland, Bureau of Environmental Services Linda Scheffler, City of Portland, Bureau of Environmental Services
COPIES:	Kristine Koch, EPA, Office of Environmental Cleanup Bruce Brody-Heine, GSI
DATE:	June 28, 2006
SUBJECT:	Portland Harbor Source Control Investigation

Introduction

This technical memorandum summarizes the results of the City of Portland (City) Bureau of Environmental Services' (BES) investigation of dry-weather flow entering the City Outfall Basin M-2 stormwater conveyance system. Outfall Basin M-2 collects stormwater from N. Cutter Circle, N. Leverman Street, N. Basin Avenue, and portions of adjoining properties. This investigation, conducted in July 2005, is part of the City's ongoing source control program associated with the Portland Harbor City of Portland Outfalls Project. The City is submitting these investigation results pursuant to the August 13, 2003, Intergovernmental Agreement (IGA) between the Oregon Department of Environmental Quality (DEQ) and the City.

Purpose and Objectives

The purpose of this source control investigation is to evaluate whether dry-weather flow discharged into the City's stormwater conveyance system is a potential source of zinc contamination in the Willamette River. The objective is to identify potential sources of zinc detected during the Illicit Discharge Elimination Program (IDEP) dry-weather flow sampling conducted at Outfall M-2 in September 2002. Based on the IDEP results, the City collected dry-weather flow samples in August 2005 to identify subbasins that may include a source for the observed zinc concentration.

Background

The City IDEP program collected a dry-weather flow sample from Outfall M-2 in September 2002 in support of the City's MS4 National Pollutant Discharge Elimination System (NPDES) stormwater permit. The sample had a total zinc concentration of 71.4 micrograms per liter

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(μ g/L), which exceeded the DEQ Freshwater Acute Ambient Water Quality Criterion (AWQC) of 65 μ g/L. These criteria preceded the DEQ/EPA Joint Source Control Strategy (JSCS) screening level values (SLVs) established in 2005 (DEQ/EPA, 2005).¹ The results of IDEP sampling are summarized below.

			JSCS Screening (Ecological R	Level Values eceptors)
Total Metals (μg/L)	OF M-2 Sept. 19, 2002	DEQ Freshwater AWQC (Acute) ¹	EPA's 2004 NRWQC (Chronic) ²	DEQ's 2004 AWQC (Chronic)
Arsenic	11.3	850	150	
Cadmium	0.14	1.8	0.0969	0.38
Chromium	0.47	984	27.7	11
Copper	3.77	9	2.85	3.6
Lead	0.19	34	0.545	0.54
Mercury	<0.01	2.4	0.77	0.012
Nickel	0.28	789	16.1	49
Zinc	71.4	65	37	33

¹With the exception of arsenic and mercury, criteria are hardness dependent (50 mg/L used).

²All values shown, with the exception of arsenic and mercury, have been converted from EPA's Chronic National Recommended Water Quality Criteria (NRWQC) for dissolved metals, based on EPA guidance.

Figure 1 shows the location of the City Outfall M-2 stormwater conveyance system. The system consists of three branches and associated catchment systems that drain to a 64-inch-diameter concrete pipe main. The main extends from N. Basin Avenue (manhole AAM169) to Outfall M-2. Three lines enter the 64-inch-diameter main at manhole AAM169: a 21-inch-diameter pipe that drains the northern portion of the outfall basin, a 63-inch by 53-inch oblong pipe that drains the eastern area, and a 27-inch-diameter pipe that drains the southern portion of the basin. No flow was observed in the 21-inch-diameter pipe during the time of sampling. The eastern subbasin is substantially larger than either the northern or southern subbasins.

A majority of the properties in the basin are used for trucking and transportation operations. According to the DEQ Environmental Cleanup Site Information (ECSI) database, there are no DEQ cleanup sites located within the basin (DEQ, 2006). There a number of facilities in the basin with NPDES 1200-Z stormwater permits, and at least one permitted discharger of dry-weather flow within Outfall Basin M-2.

Based on the IDEP sample results, the City conducted the sampling summarized in this document.

Field Activities

The City coordinated with DEQ regarding this source control investigation before conducting this work. The dry-weather flow sampling locations are shown in Figure 1. The City sampling team obtained three dry-weather flow samples between approximately 9:30 and 10:15 a.m. on August 3, 2005. No measurable precipitation occurred at the site on the sampling day or during the previous 11 days.

¹ For the purposes of evaluating inline dry-weather flow data, the JSCS Ecological Receptors SLVs were determined to be the most relevant for comparison. Detected inline concentrations may also exceed JSCS Human Health SLVs.

The sampling team accessed the sampling locations for two of the three water samples through stormwater manhole AAM169. At this manhole, samples were collected from the 64-inch-diameter pipe to the east and the 27-inch-diameter pipe to the south -- each sample representing the corresponding subbasin. Samples were collected by filling a bottle directly from water flowing in the line. The field crew noted that the samples were slightly turbid, although both samples were free of color and odor. The third sample was collected at Outfall M-2, by filling a bottle directly with water flowing from the pipe outlet. The sampling crew noted that this sample also was slightly turbid, and free of color and odor. Photographs of manhole AAM169 are included in Attachment A. Field notes recorded during sampling activities are provided in Attachment B.

Summary of Results

The dry-weather flow samples were analyzed for total zinc (Table 1). Analytical results were compared to JSCS SLVs for Ecological Receptors. Use of these SLVs provides a conservative screening of sample results because it is unlikely that receptors would be living in the stormwater pipes and therefore be directly exposed to the concentrations of contaminants detected in the dry-weather flow samples. An ecological receptor in the river system near the outfall potentially would be exposed to a mixture of dry-weather flow and river water.

The results of the Outfall M-2 basin investigation indicate that the sample collected from the southern subbasin exceeded the JSCS SLV for zinc. The sample representing the eastern subbasin and the outfall sample had concentrations of zinc below the JSCS SLV.

The chemical analytical results are presented in Figure 1.

Conclusions and Recommendations

The analytical results for Outfall Basin M-2 suggest that the greatest dry-weather flow contribution of zinc to the conveyance system is in the southern subbasin. The concentration detected in dry-weather flow from the eastern subbasin, the largest of the three subbasins, is consistent with concentrations of zinc observed in stormwater lines in the Mocks Bottom area during similar source investigations (COP, 2006a and 2006b). The eastern basin also has at least one facility with an authorized non-stormwater discharge. Although the sample from the southern subbasin exceeded the JSCS SLV for zinc, the result was within an order-of-magnitude of the SLV and met the NPDES industrial stormwater benchmark. The concentration of zinc in dry-weather flow at the outfall can be interpreted as a mixture of the elevated zinc concentration from the southern subbasin mixing with the lower concentration of the eastern subbasin.

Of the three samples collected, only the sample collected from the southern subbasin exceeded the JSCS SLV. In response to this investigation, the BES Industrial Stormwater program will be asked to look for sources of non-stormwater discharges to the collection system as part of routine inspection activities.

References

COP. 2006a. Technical Memorandum No. OF M1-1. *City Outfall Basin M-1 Dry-Weather Flow Sampling*. Prepared by the City of Portland, Bureau of Environmental Services. April 3, 2006.

COP. 2006b. Technical Memorandum No. OF M3-1. *City Outfall Basin M-3 Dry-Weather Flow Sampling*. Prepared by the City of Portland, Bureau of Environmental Services. June 16, 2006.

DEQ. 2006. DEQ Environmental Cleanup Site Information Database (ECSI). Accessed June 2006. www.deq.state.or.us/wmc/ecsi.

DEQ/EPA. 2005. Portland Harbor Joint Source Control Strategy, Final, dated December 2005.

Tables

 Table 1 – Summary of Chemical Analytical Results, Dry-Weather Flow Sampling

Figures

Figure 1 – Outfall M-2 Dry-Weather Flow Sampling, Total Zinc

Attachments

Attachment A – *Field Photographs* Attachment B – *Field Notes* Attachment C – *Laboratory Results*

Table 1Summary of Chemical Analytical ResultsDry-Weather Flow SamplingCity Outfall Basin M-2

		Eastern Subbasin	Southern Subbasin	Outfall		
		AAM169 (E)	AAM169 (S)	AAM193	JSC	S
		IL-M2-AAM169-0805-E	IL-M2-AAM169-0805-S	IL-M2-AAM193-0805	Screening Le	evel Values
Class Analyte	Units	8/3/2005	8/3/2005	8/3/2005	(Ecological l	Receptors)
					EPA's 2004	DEQ's 2004
					NRWQC	AWQC
Total Metals (EPA 200.8)					(chronic) ¹	(chronic) ²
Zinc	µg/L	15.3	53.8	19.4	37	33

Notes:

All units in micrograms per liter (μ g/L).

JSCS - Portland Harbor Joint Source Control Strategy (DEQ/EPA Final December 2005).

¹The value shown has been converted from EPA's Chronic National Recommended Water Quality Criteria (NRWQC) for dissolved metals, based on EPA guidan

²DEQ's 2004 AWQC Screening Levels for total recoverable metals.

See Attachment C for laboratory sheets.



Attachment A Field Photographs



Photo 1 (August, 2005). Dry-weather flow present at manhole AAM193 in August 2005. A sample was collected from this 63" by 53" line just upstream from (and to the east of) the manhole. The line on the upper left is a 21-inch-diameter line from the north, which did not have flow at this time, although the sampling crew noted that it was slightly wet.



Photo 2 (August, 2005). A sample was collected from this 27-inch-diameter line, which enters manhole AAM193 from the south.

Attachment B Field Notes

City of Portland Environmental Services

DAILY FIELD REPORT



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Are sample-able quantities of sediments present in the line?	Mar Prosascy
Describe lateral extent of sample-able sediments present in the line:	NA

SITE DIAGRAM: Include street intersections/laterals/MH's/driveways cuts and extent of solids accumulation



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Samples placed in chilled cooler?				
Samples delivered to lab?		Lab ID Number:		
Describe any deviations from standard pro	cedures:			×

Attachment C Laboratory Results



Groundwater Solutions, Inc.

55 SW Yamhill Street, Suite 400 Portland, Oregon 97204 ph: 503.239.8799 fx: 503.239.8940 e: groundwatersolutions.com

# Laboratory Data QA/QC Review Upland Source Control Investigation City Outfall Basin M2

То:	File
From:	Robyn Cook, GSI
	Walter Burt, RG – GSI
Date:	December 7, 2005

This memorandum presents a quality assurance/quality control (QA/QC) review of the laboratory data generated during source control investigation sampling and analyses recently conducted by the City of Portland (City) in Outfall Basin M2. The results of the sampling and analysis are presented in Technical Memorandum No. OF M2-1.

The laboratory analysis for these source control program samples were completed by the City's BES laboratory. The Water Pollution Control Laboratory (WPCL) analyzed the dry-weather flow samples for total metals using EPA Method 200.8.

Attachment C of the Technical Memorandum No. OF M2-1 presents the BES laboratory LIMS summary report for the analyses associated with this Outfall Basin.

This QA/QC review is based upon the available documentation supplied from the BES laboratory. The QA/QC review of the analytical data consisted of reviewing the following for the WPCL laboratory report:

- Chain-of-custody complete and correct
- Analysis within holding times
- Chemicals of interest in method blanks
- Laboratory duplicates within analytical accuracy control limits
- Matrix spike recoveries within accuracy control limits

The results of the laboratory report QA/QC review are presented below.

# **Chain-of-Custody**

The chain-of-custody forms showed continuous custody of the samples. The chain-of-custody procedures were adequate and sample integrity was maintained through the sample collection and delivery process.

### **Analysis Holding Times**

### **Metals Analyses**

All samples were extracted and analyzed within the required holding times at both laboratories.

### **Method Blanks**

Method blanks were processed during the laboratory analyses of metals. No chemicals were detected in the method blanks.

### **Matrix Spike Recoveries**

Matrix spike recoveries were within the laboratory control limits.

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Water Pollution Control Lat 6543 N. Burlington Ave. Portland, Oregon 97203-4552 (503) 823-5696	boratory			Ē	Chai ureau of	in-of-Custody Environmental Servi			M	Collected By:	of 1 1 DJN
Project Name: PORTL	AND HARBOR INL	INE SAN						Ban	acted <b>A</b>		
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### City of Portland Water Pollution Control Laboratory Laboratory Analysis Report



Sample Date/Time 8/	/3/2005	10:10	System ID	AJ07415	Sample ID	FO050818
Proj./Company Name: Address/Location:	: PORTLANI IL-M2-AAN 5949 N BA	D HARBC 169-0805 SIN AVE	)r Inline S/ 5-e	AMP	Page: Date Received: Sample Status:	1 8/3/2005 COMPLETE AND VALIDATED
Proj Subcategory:REGULATORY PLAN & EVALSample Type:GRABSample Point Code:M2_2WSample Matrix:OTHERIMS File/Invoice #:1020.001Collected By:MJH/DJH/RJS						

**Comments:** QAVQC: Unless otherwise noted, an analytical QAVQC criteria were met for this sample including notiong times, calibration, method blanks, laboratory control sample recoveries, duplicate precision, matrix spike recoveries, and surrogate recoveries, as applicable.

Test Parameter	Result	Units	MRL	Method
METALS BY ICP-MS (TOTAL) - 1				
ZINC	15.3	µg/L	0.5	EPA 200.8
End of Report for Sample ID: E0050818				

End of Report for Sample ID: FO050818



### **City of Portland** Water Pollution Control Laboratory Laboratory Analysis Report



Sample Date/Time 8/	3/2005	10:14	System ID	AJ07416	Sample ID	FO050819
Proj./Company Name: Address/Location:	: PORTLANI IL-M2-AAM	D HARBC	)R INLINE S/ 5-S	AMP	Page: Date Received: Sample Status:	1 8/3/2005 COMPLETE AND VALIDATED
Proj Subcategory: Sample Point Code: IMS File/Invoice #:	5949 N BA REGULAT M2_3W 1020.001	SIN AVE ORY PLA	N & EVAL		Sample Type: Sample Matrix: Collected By:	GRAB OTHER MJH/DJH/RJS

**Comments:** QA/QC: Unless otherwise noted, all analytical QA/QC criteria were met for this sample including holding times, calibration, method blanks, laboratory control sample recoveries, duplicate precision, matrix spike recoveries, and surrogate recoveries, as applicable.

Test Parameter	Result	Units	MRL	Method
METALS BY ICP-MS (TOTAL) - 1				<b></b>
ZINC	53.8	µg/L	0.5	EPA 200.8
End of Report for Sample ID: E0050819				

End of Report for Sample ID: FO050819



### City of Portland Water Pollution Control Laboratory Laboratory Analysis Report



Sample Date/Time 8	/3/2005	9:30	System ID	AJ07417	Sample ID	FO050820
Proj./Company Name Address/Location:	: PORTLAN IL-M2-AAI OUTFALL	ID HARB( M193-080 M-2	OR INLINE S/ 5	AMP	Page: Date Received: Sample Status:	1 8/3/2005 COMPLETE AND VALIDATED
Proj Subcategory:REGULATORY PLAN & EVALSample Type:GRABSample Point Code:M2_4WSample Matrix:OTHERIMS File/Invoice #:1020.001Collected By:MJH/DJH/RJS					GRAB OTHER MJH/DJH/RJS	
Comments QA/QC: Un	less otherwise r	noted, all ana	alvtical QA/QC cr	iteria were me	t for this sample includ	lina holdina times.

**Comments:** QAVQC: Unless otherwise noted, an analytical QAVQC criteria were met for this sample including notiong times, calibration, method blanks, laboratory control sample recoveries, duplicate precision, matrix spike recoveries, and surrogate recoveries, as applicable.

Test Parameter	Result	Units	MRL	Method
METALS BY ICP-MS (TOTAL) - 1				
ZINC	19.4	µg/L	0.5	EPA 200.8
End of Report for Sample ID: FO050820				

6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656