#28

PRIVILEGED AND CONFIDENTIAL
ATTORNEY/CLIENT COMMUNICATION

DRAFT MEMORANDUM

To: Port of Seattle project files October 5, 2001

From: Todd Pollard / Linda Logan 556-2625-002 (01/01)

Subject: Summary of analytical results from 1-14-99 storm water sampling

This memorandum summarizes the results of chemical analysis conducted on STIA receiving stream samples collected January 14, 1999. The primary objective of the January 14th sampling was to evaluate the toxicity of STIA receiving streams through screening level bioassays conducted by Parametrix, Inc.. Results of the screening level bioassays can be found in Parametrix 1999.

Sampling

Samples were collected from 8 locations during a storm event (as defined in the *POS Procedure Manual for Stormwater Monitoring*) on the morning of 14 January 1999. The antecedent dry period preceding this storm was 86 hours. Precipitation started at 1600 on 13 January and ended at 1600 on 14 January 1999; samples were taken from approximately 0700 to 1000 on 14 January. Approximately 1.18 inches of rain fell at STIA during this 24-hour storm.

Parametrix staff collected two-liter grab samples at 15-minute intervals over a three-hour period from seven of the eight sampling sites. Samples were placed on ice immediately after collection, and delivered to the Parametrix laboratory shortly after collection of the last grab sample at each location. Within 4 hours of receipt by the laboratory, all grab samples were flow-weight-composited into a 10-liter cubitainer based on flow estimates. Flow at each location was estimated by entering stage measurements into the Manning or empirical stage-discharge equations. POS staff collected samples at the eighth location (SDS-3), with an ISCO sampler programmed to take flow-weighted composite samples. Additionally, subsamples of SDS-3 were mixed with sample water from Miller Creek Downstream and Walker Creek sites to represent possible future ratios of Third Runway stormwater to receiving water.

Subsamples for analytical chemistry were decanted from the ten composited samples into clean bottles provided by Aquatic Research (samples volumes for dissolved analyses were filtered through a 0.45 μm filter), immediately after compositing and mixing. The subsamples were delivered to Aquatic Research with completed chain-of-custody forms on 15 January at 1300, approximately 30 hours after collection.

Quality assurance and quality control elements were followed according to the Port's Procedure Manual for Stormwater Monitoring.

Analysis

these data are summarized in

STIA storm water samples were analyzed for total and dissolved concentrations of copper, lead, and zinc, as well as total organic carbon, dissolved organic carbon, total hardness, and total suspended solids. ~~Reported below in~~ Table 1 ~~are the concentrations of total and dissolved metals measured in storm water samples?~~ Table 2 calculates the in-stream hardness dependant Water Quality Standard (WAC 173-201A-040) for each metal ~~at each sampling station.~~

In summary, metals concentrations in all samples fell below their respective in-stream hardness corrected water quality standards.

PRIVILEGED AND CONFIDENTIAL
ATTORNEY/CLIENT COMMUNICATION

Table 1. Total and dissolved metals concentrations, total hardness, and auxiliary parameters of STIA receiving stream samples collected January 14, 1999.

Sample	Copper (µg/L)		Lead (µg/L)		Zinc (µg/L)		Hardness	TOC	DOC	TSS
	Total	Dissolved	Total	Dissolved	Total	Dissolved	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MC up	2.2	<2.0	<2.0	<2.0	18.0	<5.0	56 [1]	5	4.6	9.8
MC down	<2.0	<2.0	<2.0	<2.0	<5.0	<5.0	32 [1]	6.92	6.19	60
WC	<2.0	<2.0	<2.0	<2.0	<5.0	<5.0	50 [1]	9.04	8.22	14
DMC-W	<2.0	3.6	<2.0	<2.0	<5.0	<5.0	60 [1]	7.7	7.36	3.1
DMC-E	3.3	<2.0	<2.0	<2.0	20.0	<5.0	38 [1]	3.91	3.08	22
LR	<2.0	<2.0	<2.0	<2.0	<5.0	<5.0	112 [1]	6.64	6.18	20
SDS-3	3.6	<2.0	<2.0	<2.0	<5.0	5.0	20 [1]	6.25	8.49	18
STO	2	<2.0	<2.0	<2.0	16.0	5.0	28 [1]	5.14	4.89	9
SDS-3/ MCdown	<2.0	3.1	<2.0	<2.0	<5.0	<5.0	44 [1]	6.51	6.5	NR
SDS-3/WC	2.5	2.4	<2.0	<2.0	<5.0	7.0	26 [1]	6.75	6.62	NR

1 - Hardness analyzed at Parametrix, Kirkland, WA.
NR - Not Reported

8-3

PRIVILEGED AND CONFIDENTIAL ATTORNEY/CLIENT COMMUNICATION

Table 2. Acute hardness corrected water quality standards for STIA stormwater samples collected January 14, 1999.

	Copper (µg/L)		Lead (µg/L)		Zinc (µg/L)	
Sample	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**
MC up	10.26	9.85	39.03	34.17	71.60	70.02
MC down	6.06	5.82	19.14	18.32	44.56	43.58
WC	9.22	8.86	33.78	30.14	65.04	63.61
DMC-W	10.95	10.52	42.61	36.88	75.91	74.24
DMC-E	7.12	6.84	23.82	22.20	51.55	50.41
LR	19.72	18.93	94.32	73.05	128.82	125.98
~~**SDS-3**~~	~~3.89~~	~~3.74~~	~~10.52~~	~~10.79~~	~~29.92~~	~~29.27~~
~~**STO**~~	~~5.34~~	~~5.13~~	~~16.15~~	~~15.77~~	~~39.80~~	~~38.92~~
SDS3/ MCdown	8.18	7.85	28.71	26.14	58.37	57.08
SDS3/WC	4.98	4.78	14.70	14.51	37.37	36.55

REFERENCES

Parametrix, Inc. 1999. Water-effect ratio screening study at Seattle-Tacoma International Airport: Toxicity evaluation of site water. Prepared for the Port of Seattle, February 1999.

Port of Seattle 1998. Procedure Manual for Stormwater Monitoring. Port of Seattle, May 21, 1998.

Inappropriate to make this calc:
a) not receiving stream, and
b) hardness < 25 mg/L

PRIVILEGED AND CONFIDENTIAL ATTORNEY/CLIENT COMMUNICATION

Parametrix, Inc. *Consultants in Engineering and Environmental Sciences*

5808 Lake Washington Blvd. NE, Suite 200, Kirkland, WA 98033-7350
425-822-8880 • Fax: 425-889-8808

MEMORANDUM

Date: **March 26, 2001**

To: **Linda Logan, John Brooker**

From: **Jim Laughlin, Manager, Environmental Toxicology Laboratory**

Subject: **Update on WADOE's Position on Low Hardness Toxicity and Hardness Adjustment**

cc: **Scott Tobiason**

This memorandum summarizes a phone conversation I had with Randall Marshall of the Washington State Department of Ecology (WADOE) regarding possible toxicity due to low hardness and whether to adjust the hardness of lab water to match the site water.

Randy recalled a study conducted by Mike Stanaway of CH2MHill that may have addressed this issue. I talked to Mike and it would appear they saw no acute toxicity with *C. dubia* down to about 10 mg/L as $CaCO_3$, but did see chronic (reproductive) effects; there were no real chronic effects with *P. promelas* test.

Regarding adjusting the hardness of the lab water to match the site water, Randy stated clearly that he is against such adjustments. The WER studies are designed to be tested against moderately hard synthetic lab water and the site waters tested as they arrive. For storm water samples the hardness is typically very low. However, the hardness of the storm water runoff should not be targeted but rather the hardness of the receiving water, which is typically 40 – 60 mg/L as $CaCO_3$ or higher. Randy stated that if we wanted to test for a possible hardness effect that we should conduct a series of tests over a gradient of hardness values with the hardness of the receiving water being the lower limit of the gradient.