WA-10-0020

95-211

DEPARTMENT OF ECOLOGY

June 21, 1995

To: Dom Reale, Southwest Regional Office

From: Dale Norton, DN. Toxics Investigations Section

Subject: Results of Intertidal Sediment Sampling at the J.M. Martinac Facility on Thea Foss Waterway.

This memorandum reports the results of our February 21 intertidal sediment sampling effort at the J.M. Martinac Shipbuilding facility on Thea Foss Waterway. The following items are attached for your information:

- Figure 1: Locations of samples collected during the survey
- Table 1: Summary of samples collected and analytical methods
- Table 2: Summary of conventionals, metals, butyltins analysis of intertidal sediments (blasting grit) from the facility
- Table 3: Summary of metals analysis of elutriate samples using blasting grit and water from Thea Foss Waterway
- Original Field Notes
- Tidal Information for the day of sample collection
- Sample tracking sheet
- Case Narratives and quality assurance reviews for all analyses
- Raw data for conventionals, metals, and butyltin analyses

To summarize the effort, shallow cores were collected at three locations to a depth of 3' from the intertidal area adjacent to the facility. This area is covered with a black sand blasting grit and is commonly referred to as the black sand beach. All of the cores were collected using a stainless steel bucket auger. Each of the cores where divided into two intervals for analysis. The surface interval consisted of material collected between 0-1', and the bottom section was a composite of material collected from 1'-3'. In addition to the sediment cores, four gallons of seawater was also collected from Foss Waterway for use in the standard elutriate test. Water samples were collected directly into priority pollutant cleaned one-gallon glass jars with teflon-septa. The water samples were collected from a point located approximately 6" below the surface. Sample locations and analytical methods are detailed in Figure 1, and Table 1, respectively.

The results of conventionals, metals, and butyltins analyses of sand blasting grit covering a portion of the intertidal area at the facility is summarized in Table 2. Blasting material was

present in a fairly homogeneous layer from the surface to the limit of sampling (3"). Native sediments were not reached at the lower limit of sampling (3'). The blasting material sampled can be characterized as a fairly homogeneous course angular sand with a very low total organic carbon (TOC) content. Grain size analysis indicated that >95% of the material was retained in the 2mm to 62um size range. TOC values were extremely low ranging from 0.047% to 0.087% on a dry weight basis. Metals analysis indicated that fairly high concentrations of copper (1700 to 2000 mg/kg, dry weight) and zinc (420 to 770, mg/kg, dry) are present in the material. Substantially lower concentrations of arsenic (8.3 to 190 mg/kg, dry weight) and lead (22 to 150 mg/kg, dry weight) were present in the grit. Copper concentrations were fairly consistent both horizontally and vertically within the area sampled. The lowest concentrations for the other metals typically occurred in the lower interval (1'-3'). Copper and zinc concentrations in all samples exceeded the Commencement Bay sediment quality objectives (SQOs). Sixty-seven percent of the values for arsenic also exceeded the SQOs. No exceedances were observed for lead.

Concentrations of butyltins in the 0-1' interval were fairly low in all samples. Tributyltin (TBT), the most toxic of butyltins, ranged from 11 to 24 ug/kg, dry weight. No SQO has been established for TBT. The Puget Sound Dredge Disposal Analysis (PSDDA) has adopted a interim screening level of 30 ug/kg, dry weight for TBT (PSDDA, 1989). Sediments with TBT concentrations above this level are required to undergo biological testing. None of the concentrations found in the blasting grit exceeded the interim screening level.

Table 3 summarizes the results of metals analysis of elutriates prepared from the sand blasting grit collected from the 0-1' interval of the cores with seawater collected from Thea Foss Waterway. Briefly, the elutriate procedure involves agitating the blasting grit with seawater in a ratio of 1:4 for a period of 30 minutes. The samples are then allowed to settle and the resulting supernatant is filtered through a 0.4um filter. The filtrate is then analyzed for metals. The elutriate procedure is designed to simulate what might be released to the water column from a solid material during a dredging operation. It should be noted that some analytical problems were initially encountered with the metals analysis of the filtrates due to seawater interferences. The filtrates were re-analyzed using more appropriate methods after the initial run. The results of the second run are considered acceptable for use with the qualifiers noted in Table 3. A more detailed explanation of the analytical problems is included in the case narrative for the metals data set dated May 4.

Examination of the data in Table 3 indicates very little availability of arsenic and lead from the blasting grit to the water column. In contrast, copper and zinc concentrations increased by greater than an order of magnitude in the post-elutriate samples. In addition, concentrations of copper and zinc in all post-elutriate samples were in excess of marine water quality criteria.

In summary this preliminary investigation suggests that relatively high concentrations of copper and zinc are present in the blasting grit we sampled. Results of the standard elutriate test also indicate that copper and zinc are also leachable from this material.

I hope this information is helpful in evaluating options for dealing with this material. Please do not hesitate to call me if you have any questions.

DN:jl
Attachments

References Cited

Ecology, 1991. Sediment Management Standards. WAC 173-204. Washington State Department of Ecology, Olympia, WA.

EPA, 1986. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. 3rd ed. Office of Solid Waste and Emergency Response, Washington, DC.

EPA, 1989a. Commencement Bay Nearshore/Tideflats: Record of Decision. U.S. Environmental Protection Agency Region 10, Seattle, WA.

Plumb, 1981. Procedures for Handling and Chemical Analysis of Sediment and Water Samples. Technical Report EPA/CE-81-1. Prepared for the EPA/ACOE by the USACOE Waterways Experiment Station, Vicksbury, Mississippi.

PSDDA, 1989. PSDDA Management Plan Report: Unconfined Open Water Disposal of Dredged Material, Phase II. Joint Report by the ACOE, EPA, Wash. St. Dept. of Natural Resources, and Wash. St. Dept. of Ecology.

PSEP, 1986. Recommended Protocols for Measuring Selected Environmental Variables in Puget Sound. Prepared for the Puget Sound Estuary Program by Tetra Tech, Inc. Final Report No. TC-3991-04.

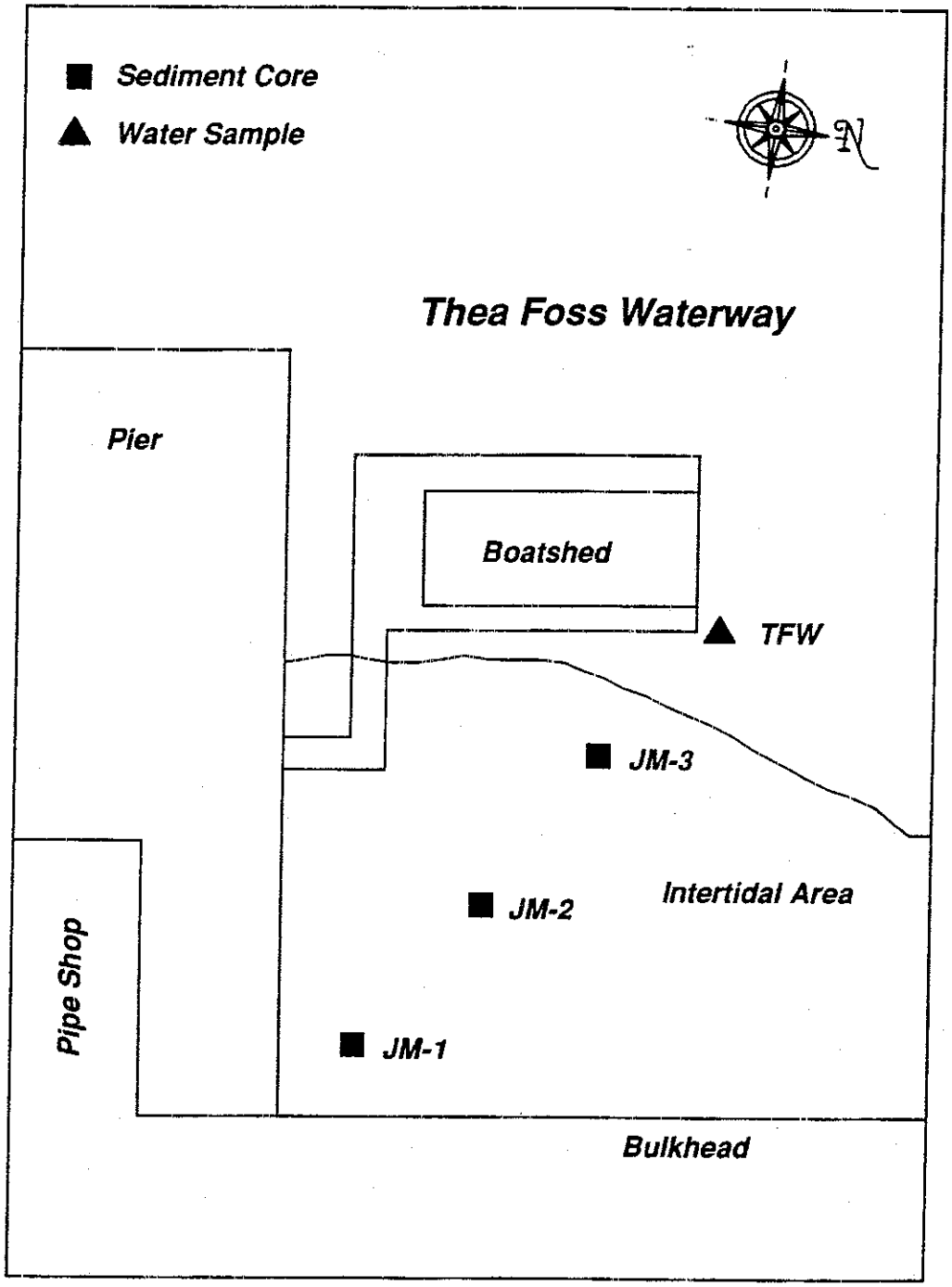

Figure 1: Sample locations for the J.M. Martinac intertidal sediment survey, February 21, 1995.

Table 1: Summary of sampling and analysis for intertidal sediment survey at the J.M. Martinac Facility on Thea Foss Waterway.

I. Samples Collected

Analyte	0-1'	1-3'
Sediment		
%solids	X	X
Grain Size	X	X
Total Organic Carbon	X	X
Total Metals*	X	X
Butyltins	X	
Water	Pre-Elutriate	Post-Elutriate
Salinity	X	
Dissolved Metals*	X	X

*=Metals As, Cu, Pb, and Zn

II. Analytical Methods

Analyte	Method	Reference
Sediment		
%solids	Dry 104°C	PSEP, 1986
Grain Size	Seive and Pipet	PSEP, 1986
Total Organic Carbon	Combustion/CO2 Measurement	PSDDA, 1993
Metals*		
As	GFAA	EPA, 1986
Cu, Pb, Zn	ICP	EPA, 1986
Butyltins	GC/MS-SIM	PSEP, 1986
Water		
Salinity	Refractometer	Field
Elutriate	1/4 ratio	Plumb, 1981
Metals*		
As, Cu, Pb	GFAA	EPA, 1986
Zn	ICP	EPA, 1986

*=Metals As, Cu, Pb, and Zn

Table 2: Results of conventionals, metals, and butyltins analyses of intertidal sand blasting material from the J.M. Martinac Facility on Thea Foss Waterway.

Location	Upper Beach		Middle Beach		Lower Beach					
Station	JM-1		JM-2		JM-3					
Interval (ft)	0-1	1-3	0-1	1-3	0-1	1-3	Sediment Quality Values			
Sample No. 08-	8105	8106	8107	8108	8109	8110	SQO	SQS	CSL	ISL
Conventionals										
Solids (%)	87	86	86	87	86	87	-	-	-	-
TOC (%)	0.058	0.064	0.087	0.041	0.052	0.047	-	-	-	-
Grain Size										
Gravel (>2mm)	0	1	1	0	0	2	-	-	-	-
Sand (2mm-62um)	96	95	95	97	98	95	-	-	-	-
Silt (62-4um)	3	4	4	2	1	2	-	-	-	-
Clay (<4um)	1	0	0	1	1	1	-	-	-	-
Total Metals (mg/kg, dry)										
Arsenic	38	8.3	190	81	130	94	57	57	93	-
Copper	1800	1700	1900	1700	2000	2000	390	390	390	-
Lead	22 j	39 j	150 j	49 j	100 j	55 j	450	450	530	-
Zinc	420	430	770	450	1100	620	410	410	960	-
Butyltins (ug/kg, dry)										
Monobutyltin Chloride	12 j	-	8.3 j	-	18 j	-	-	-	-	-
Dibutyltin Chloride	10 uj	-	17 j	-	31 j	-	-	-	-	-
Tributyltin Chloride	14	-	24	-	11	-	-	-	-	30

j=Estimated value

uj=Estimated detection limit

SQO=Sediment Quality Objectives (EPA, 1989)

SQS=Sediment Quality Standards (Ecology, 1991)

CSL=Cleanup Screening Levels (Ecology, 1991)

ISL=Interim Screening Level (PSDDA, 1989)

=Exceeds Commencement Bay Sediment Quality Objective, based on Environmental Risks (EPA, 1989).

Table 3: Results of metals* analysis of blasting material elutriates from J.M. Martinac Facility (ug/l)

Location	Thea Foss Waterway	Upper Beach	Middle Beach	Lower Beach	Marine Water Quality Criteria	
Station	TFW	JM-1	JM-2	JM-3		
Interval (ft)	-	0-1	0-1	0-1		
Sample No. 08-	8113	8105	8107	8109	Acute	Chronic
Salinity (o/oo)	23	-	-	-	-	-
Arsenic						
Pre-elutriate	3 u	3 u	3 u	3 u	69	36
Post-elutriate	-	3 u	3 u	3 u		
Copper						
Pre-elutriate	2.9 j	3.4 j	3.3 j	3.4 j	2.5	-
Post-elutriate	-	72 j	63 j	41 j		
Lead						
Pre-elutriate	5 uj	7 uj	10 uj	13 uj	151.1	5.8
Post-elutriate	-	5 uj	4 uj	4 uj		
Zinc						
Pre-elutriate	27 j	20 u	20 u	20 j	84.6	76.6
Post-elutriate	-	280	210	150 j		

*=Dissolved metals

u= Not detected at detection limit shown

uj= Estimated detection limit

j= Estimated concentration

=Exceeds WQ Criteria: "Quality Criteria for Water", EPA, 1986.