



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 1
JOHN F. KENNEDY FEDERAL BUILDING
BOSTON, MASSACHUSETTS 02203-0001

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NSY PORTSMOUTH
5090.3a

June 30, 1998

Mr. Fred Evans
Department of the Navy
Northern Division
Naval Facilities Engineering Command
10 Industrial Hwy., Mail Stop #82

Re: Seep and Sediment Data Package for Rounds 7-10
Portsmouth Naval Shipyard
Kittery, Maine

Dear Fred:

The United States Environmental Protection Agency (EPA) has reviewed the above-referenced document. EPA's review consisted of an evaluation of the Round 10 data to identify contaminant concentrations that exceed Ambient Water Quality Criteria (AWQC) for seeps and National Oceanic and Atmospheric Administration (NOAA) Effect Range Low (ER-L) and Effect Range Median (ER-M) values for sediment. In addition, contaminant concentrations from earlier sampling rounds were also compared and contrasted to Round 10 results.

If you have any questions regarding the information provided in Attachment I to this letter, please contact me at (617)573-5785.

Sincerely,

A handwritten signature in cursive script that reads "Meghan F. Cassidy".

Meghan F. Cassidy
Remedial Project Manager

Enclosure

cc: Marty Raymond/PNS
Iver McLeod/ME DEP
Carolyn Lepage/Lepage Environmental
Ken Finklestein/NOAA
Ken Munney/U.S. Fish and Wildlife Service
Patti Tyler/EPA
RAB Members

ATTACHMENT I

The following are EPA's comments on the Seep and Sediment Data Package for Rounds 7-10, for the Portsmouth Naval Shipyard in Kittery, Maine.

Seep and Sediment Data Package for Rounds 7-10, Portsmouth Naval Shipyard, Kittery, Maine

1.0 INTRODUCTION

The objective of this review was to evaluate the seep and sediment data and to identify contaminant concentrations in exceedance of benchmark criteria. The sediment data was evaluated against National Oceanic and Atmospheric Administration (NOAA) Effect Range Low (ER-L) and Effect Range Median (ER-M) values. Seep data were evaluated for surface water contaminant levels in exceedance of total Fresh Water Chronic and Acute Ambient Water Quality Criteria (AWQC). Additionally the analytical results obtained in Round 10 were compared with results previously obtained in Rounds 7 through 9.

2.0 GENERAL COMMENTS

2.1 Field Sampling Activities and Analytical Results

The data represents findings resulting from the Round 10 sampling event that took place in November, 1997. A total of 14 seep and 13 sediment samples were collected from various locations. Seep samples were analyzed for semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs) and total and dissolved metals. Miscellaneous parameters for seep analyses also included biological oxygen demand (BOD), bromide, carbonate alkalinity, chloride, nitrate as nitrogen, pH, total dissolved and total suspended solids, sulfates and total organic carbon. Sediment samples were analyzed for SVOCs, pesticides/PCBs, metals, AVS/SEM (acid volatile sulfide/ simultaneously extracted metals), pH, total organic carbon and total organic material. Tables 1 and 2, which can be found in Appendix A, present the sediment and seep analytical results, compared with medium-specific ecological benchmarks.

3.0 DATA ANALYSIS

3.1 Seeps

3.1.1 Round 10

Seep results for SVOCs, total metals, dissolved metals and pesticides/PCBs were compared to literature values reported in the Freshwater Acute and Chronic Ambient Water Quality Criteria (AWQC). Seven metals included in AWQC are hardness dependent, and should be adjusted accordingly.

However, hardness was not included as a measured parameter, either by titration, or calculation, through calcium, magnesium analysis. Therefore the metals with hardness-dependent AWQC, which include cadmium, chromium, copper, lead, nickel, silver and zinc, have all been evaluated using an assumed hardness of 100 mg/L as CaCO₃.

Evaluation of Pesticide/PCB and SVOC data did not indicate contaminant levels above available AWQC. Results for these parameters were nearly all nondetected.

Seep samples were analyzed for total and filtered (dissolved) metals. According to a memorandum on *Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria* (1993) and *Revised Aquatic Life metals Criteria in EPA's National Toxics Rule* (1995), concentrations of dissolved metal rather than total metal, should be used to set and measure compliance with water quality standards, because dissolved metal concentrations more closely approximate the bioavailable fraction of metal in the water column. Total metals are also evaluated in this report, because they are of interest from a fate and transport standpoint. The chemicals that were found to exceed their respective benchmarks in seep samples include total and dissolved metals, including copper, lead, zinc, cadmium, aluminum and cyanide. (See Appendix A).

3.1.2 Rounds 10 versus 7-9

The data generated for this site during sampling round (10), when compared to results obtained from previous rounds, indicate what appears to be a downward trend of analyte concentrations. However, the following exceptions were noted: dissolved metals appear to have increased concentrations at some of the Back Channel sites; BC-1005, 1006, 1012, 1016 and 1018. Increased concentrations of dissolved zinc are the most prevalent. Also noted were iron and manganese and isolated instances of chromium, copper, lead, arsenic and nickel above their respective AWQC. Sample sites CC-1004.4 and CC-1004.5, in the area of Clark's Cove, have elevated levels of dissolved copper, lead, zinc, manganese and nickel. Although a review of organic compound data reveals a prevalence of nondetected results, there are no noteworthy increases in the concentrations of detected compounds.

Total metals appear to have increased concentrations with the majority occurring at Back Channel sites; BC-1005, 1006, 1012, 1016, 1018, and 1020, compared with earlier rounds. Metals with increased concentrations most frequently include lead, zinc, copper, nickel and manganese. In isolated instances, cadmium, chromium and iron increased from concentrations measured in previous sampling rounds.

Total cyanide was elevated at one Clark's Cove site, CC-1004.5. Additionally, two chemical categories comprising "sum" values, in particular, polyaromatic hydrocarbons (PAHs) and PCBs, have elevated concentrations at sites BC-1005, 1006, 1017 and 1018. Site CC-1004.5 has increased levels of SVOCs, in particular the sum of high and low molecular weight PAHs, total PAHs, phenanthrene and pyrene.

3.2 Sediments

3.2.1 Round 10

Sediment results for SVOCs, metals and Pest/PCBs were compared to literature values from Long et al. (1995). Note that the NOAA reference utilized in the subject document has not been specified.

The NOAA ER-L and ER-M benchmark values listed in the document for 4,4'-DDT, 4,4'-DDD and 2,4'-DDT, appear to correspond with benchmark criteria listed in a NOAA Technical Memorandum, Long and Morgan, (1991). The remainder of the benchmark criteria used for purposes of comparison appear to have been taken from Long et al. (1995). When benchmark criteria are used as a basis for comparison for any purpose within the text, the specific document should be included as a reference. Additionally, available benchmark criteria are frequently updated: It is customary to utilize the most recent data references that are available.

SVOC analyses reveal a number of detected concentrations, most of which fall below ER-L guidelines. Values in exceedance of ER-L criteria remain below ER-M levels.

Pesticide/PCB analyses reveals results which exceeds benchmark values in the "sum of PCBs" as well as, the DDT associated congeners at some of the sites sampled. Samples with values above ER-M levels are noted in Appendix A.

Metals analyses reveal detectable concentrations of metals at all sites sampled, however, none exceeded benchmark criteria.

AVS/SEM analyses are indicated on the chains of custody, however, within the data set, the results designated as "AVS/Simultaneously Extracted Metals", list only the measured metals concentrations, not the acid volatile sulfides data. Results for AVS/SEM analyses are a ratio, obtained by comparison of both results, AVS and SEM. Therefore, in order to verify the ratio within the data set, both values are needed.

Ultimately these analyses can be used to predict the bioavailability of divalent metals (lead, cadmium, copper, nickel and zinc) in the sediment, through analysis of both AVS and SEM. The potential for toxicity is thought to be in evidence if there is an excess of SEM over AVS.

3.2.2 Round 10 versus 7-9

The data generated for this site during the most recent sampling round, when compared to results obtained from previous rounds, indicates a general downward trend of analyte concentrations, with the following exceptions: metals appear to have increased concentrations, with the following exceptions: metals appear to have increased concentrations at some of the Back Channel sites: BC-1005, 1006, 1012, 1016. Increased concentrations of chromium and manganese, are the most prevalent, along with instances of arsenic, copper and one instance of increased aluminum.

4.0 CONCLUSIONS

Examination of the historical sediment data, versus the data obtained in the present round, indicate what appears to be a general downward trend of analyte concentrations. However, total chromium, manganese, arsenic and copper appeared as increased concentrations at some of the Back Channel sites. Additionally, increased concentrations of SVOCs, the "sum" values for PAH, phenanthrene and pyrene were also in evidence at three Back Channel sites. The "sum of PCBs" is increased at BC-1017 and 1018. This condition is also occurring at sites SP-1001 and SP-1003.

The sediment data for Round 10 indicates ER-M exceeding criteria of PCBs at sites; BC-1016, BC-1017, BC-1018 and BC-1020, that are located off the Topeka Pier in the Back Channel. Additionally, exceeded criteria have been noted for some of the DDT congeners at sites SP-1001, SP-1002 and SP-1003.

The sample set for AVS/Simultaneously Extracted Metal lists only the measured metals concentrations. The results of the acid volatile sulfides analysis are required in order to obtain the AVS/SEM ratio that will indicate bioavailability of metals in the sediment.

Examination of the historical seep data, versus the data obtained in the present round, indicate what appears to be a general downward trend of analyte concentrations. However, total and dissolved metals have increased concentrations at sites throughout the area, with the predominant locations occurring in some of the Back Channel sites, when compared to the data from previous rounds. Increased concentrations of total and filtered lead and zinc are the most prevalent. Also noted were iron, manganese and isolated instances of chromium, copper, lead, arsenic and nickel. Sample sites in the area of Clarks's Cove, also have increasing levels of filtered copper, lead, zinc, manganese and nickel. One site in this area, CC-1004.5, has exceeded for total cyanide.

Additionally the SVOCs that are "sum" values, in particular polyaromatic hydrocarbons (PAH) and PCBs, are also increasing at four Back Channel sites. Site CC-1004.5 has increased levels of SVOCs, in particular the sum of high and low molecular weight PAH's, total PAHS, phenanthrene and pyrene.

The existing data in the subject document indicate that sites located in the Back Channel, have the greatest number of chemical concentrations that exceed ecological benchmarks, as well as increasing analyte concentrations. It would appear that the potential for ecological risk is relatively high in this location compared with other locations sampled.

REFERENCES

Long, Edward R., Donald D. MacDonald, Sherri L. Smith and Fred Calder. 1995. *Incidence of Adverse Biological Effects within Ranges of Chemical Concentrations in Marine and Estuarine Sediments*. Environmental Management. 19: 81-97.

Code of Federal Regulations (CFR), Title 40, Chapter 1, Subchapter D, Part 131, *Water Quality Standards*. As amended through December 22, 1992, FR 60910.

APPENDIX A

Table 1
Contaminants of Potential
Ecological Concern-Sediments

LOCATION	ANALYTE	RESULT	NOAA ER-M ¹
Organic compounds (ppb)			
CC-1004.5	4,4' DDE	38.3	27
BC-1016 SP-1002	4,4'DDT	70.3 70.2	46.1
BC-1017 BC-1018 BC-1020	Sum of PCBs	393 451 218	180
Inorganic Analytes (ppm)			
BC-1016	Copper	566 (J)	270
BC-1005 BC-1012 BC-1016	Mercury	1.1 0.77 (J) 1.43 (J)	0.71
CC-1004.5	Zinc	536 (J)	410

¹ ERM= Effects Range-Median, from: Long, Edward R., Donald D. MacDonald, Sherri L. Smith and Fred Calder. 1995. *Incidence of Adverse Biological Effects within Ranges of Chemical Concentrations in Marine and Estuarine Sediments*. Environmental Management.19: 81-97.

(J) denotes estimated value

Table 2
Contaminants of Potential
Ecological Concern-Seeps
Dissolved Metals

LOCATION	ANALYTE	RESULT (ppb)	AWQC ¹ Freshwater	Chronic	Saltwater
BC-1005 BC-1016 BC-1020 CC-1004.5	Copper	16.3 (J) 22 (J) 21.0 (J) 23.4 (J)	10.56 ppb	11 ppb	2.4
BC-1005 BC-1012 BC-1016 BC-1020 SP-1001 SP-1002 SP-1003	Lead	8.3 (J) 3.8 (J) 19.05 (J) 3.2 (J) 4.0 (J) 4.95 (J) 4.3 (J)	1.98 ppb	2.5 ppb	8.1
BC-1005 BC-1006 BC-1012 BC-1016 BC-1018 BC-1020 CC-1004.3 CC-1004.4 CC-1004.5 SP-1003	Zinc	199 (J) 113 (J) 204 (J) 130 (J) 170 (J) 125 (J) 128 (J) 113 (J) 177 (J) 141 (J)	98.6 ppb	100 ppb	81
CC-1004.5	Cadmium	1.6 ppb (J)	0.909 ppb	1.0	9.3

¹AWQC= Ambient Water Quality Criteria, from Code of Federal Regulations (CFR), Title 40, Chapter 1, Subchapter D, Part 131, *Water Quality Standards*. As amended through December 22, 1992, FR 60910.

(J) denotes estimated value

Table 2
Contaminants of Potential
Ecological Concern-Seeps
Total Metals

Saltwater

LOCATION	ANALYTE	RESULT (ppb)	AWQC ¹	Acute
BC-1012 CC-1004.5	Aluminum	293 (J) 141 (J)	87.0 ppb	
CC-1004.5	Cadmium	1.5	1.10 ppb	3.7 ppb
CC-1004.5	Cyanide	60	5.2 ppb	22 ppb
BC-1005 BC-1016 BC-1017 BC-1018 BC-1020 CC-1004.3 CC-1004.5 SP-1002 SP-1003	Copper	109 (J) 566 (J) 98 (J) 158 (J) 253 (J) 77.2 (J) 192 (J) 36.45 (J) 43.5 (J)	12.0 ppb	17 ppb
BC-1005 BC-1012 BC-1018 BC-1020 CC-1004.3 CC-1004.5 SP-1001 SP-1003	Zinc	175 (J) 114 (J) 143 (J) 125 (J) 168 (J) 178 (J) 178 (J) 159 (J)	110 ppb	110 ppb

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¹ AWQC= Ambient Water Quality Criteria, from Code of Federal Regulations (CFR), Title 40, Chapter 1, Subchapter D, Part 131, *Water Quality Standards*. As amended through December 22, 1992, FR 60910.

(J) denotes estimated value