CENPP-PL-CH (1105-2-10a) 27 April 1990

MEMORANDUM FOR Chief, Operations Division; ATTN: CENPP-OP-NW

SUBJECT: Supplement to Sediment Evaluation Report Titled - "Results of 1989 U.S. Moorings Sediment Quality Evaluation"

1. Enclosed are the results of additional chemical tests for dioxin/furans of sediments collected in October 1989 from the U.S. Moorings.

2. Please contact Jim Britton at ext. 6463, if you require further information regarding this subject.

Encl
as

LAUREN J. AIMENETTO
Chief, Planning Division

CF:
CENPP-OP-NW (CARRUBA)

CENPP-PL-CH 19 APRIL 1990

SUPPLEMENT TO SEDIMENT EVALUATION REPORT TITLED
"RESULTS OF 1989 U. S. MOORINGS SEDIMENT QUALITY EVALUATION"

Summary of Additional Testing:

1. Because of TIER II evaluation concerns over the high levels of organic contamination in the sediments collected at the U. S. Moorings and increasing concern over possible dioxin contamination, a composite of samples M-1, M-2, & M-3 was analyzed for dioxins and furans for USACE, Portland District by Battelle's Pacific Northwest Laboratory. The sediment composite was analyzed using U. S. EPA method 8290 which includes solvent extraction and quantification by high resolution GC/MS.

CHEMICAL RESULTS:

2. The chemical results are enclosed. Several dioxins and furans were detected but 2,3,7,8 TCDD, the dioxin considered most toxic, was not detected at a limit of 0.71ng/kg. The concentrations of the congeners detected is expressed in ng/kg on the enclosed data sheet. One way to express the toxicity of a mixture of dioxin/furans is to convert their individual toxicities into a 2,3,7,8-TCDD equivalent toxicity. To do this Their concentrations were multiplied by their respective 2,3,7,8-TCDD Toxic Equivalence Factors (EPA-TEFs/87) and then summed to yield a total 2,3,7,8-TCDD toxic equivalence concentration (TEC). For the U. S. Moorings the 2,3,7,8-TCDD toxic equivalence was 7.7640 ng/kg. Three congeners contributed to 83% of this equivalence--they were 2,3,7,8-TCDF (33%), 1,2,3,7,8-PeCDF (28%) and 2,3,4,7,8-PeCDF (22%). These congeners are considered to be from 0.01 to 0.1 as toxic as 2,3,7,8 TCDD.

3. Recoveries of internal standards were in the range of 17-65%. The recoveries of standards for the three major congeners mentioned above were 46,48 and 54% respectively, which were within the acceptable recommended range of 40-120%. The recovery for the highly toxic 2,3,7,8 TCDD was acceptable (49%) but the congener was not detected in the sediment. About half of the internal standards were recovered below the recommended range of 40-120%. The low recoveries of these congener standards may have been due to the high concentrations of hydrocarbons in the sediment. There were 5 congeners detected in the sediment that had unacceptable percent recoveries for their respective internal standards. However, these congeners have a low toxicity relative to 2,3,7,8-TCDD (0.001 to 0.01 as toxic) and only contributed to 17% of the 2,3,7,8-TCDD TEC.

4. The levels of dioxin/furans reported here might be of concern. Currently very little is known about the relationship between concentrations in sediment and effects in the water

column and food chain. CENPD-PL-ER is in the process of drafting "Guidance for Evaluating the Suitability of Dioxin Contaminated Sediments for Open Water Disposal". At the present time the unconfined in-water disposal of U. S. Moorings sediments is not recommended until this draft guidance and perhaps further testing is completed.

5. This supplemental report was prepared by Jim Britton, CENPP-PL-CH ext 6463.

Battelle
Pacific Northwest Division
Marine Sciences Laboratory
439 West Sequim Bay Road
Sequim, Washington 98382
(206) 683-4151

April 16, 1990

Mr. Mark Siipola
U.S. Army Corps of Engineers
P.O. Box 2946, Attn: PL-AP
Portland, Oregon 97208

Dear Mark:

Recently Pacific Northwest Laboratory (Battelle-Northwest) conducted chemical analyses of a sediment composite (M 1+2+3) for dioxins and furans for the Portland District Moorings project. The sediment composite was analyzed by U.S. EPA (1987) Method 8290, which includes solvent extraction and quantification by high resolution GC/MS. The recoveries of internal standards were in the range of 17% to 65%.

The chemical results are presented in the enclosed table. Approximately two-thirds of the compounds were detected, but 2378-TCDD was below the DL of 0.71 ng/kg. The total 2378 TCDD equivalence was 7.76 ng/kg, which is a level that might be of concern. The recoveries of internal standards were in the range of 17% to 65%. Almost half were below the recommended range of 40% to 120%. The low recoveries may be due to the relatively high concentration of hydrocarbons in the sediment. The major isomers that contribute to the TCDD equivalence were 2378-TCDF, 12378-PeCDF and 23478-PeCDF. The recoveries of these three internal standards were acceptable.

If you have questions, please call me at 206/683-4151.

Sincerely,

E. A. Crecelius
Senior Research Scientist

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Enclosure

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*TWIN CITY TESTING CORPORATION*
* PCDF/PCDD ANALYSIS RESULTS *
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Client....BATTELLE

Sample ID (Client's#)....M-1,M-2,M-3
Sample ID (TCT#).....178768
Analysis Date.....3-20-90
Filename.....S00320K
Analyst.....SWH
Sample Amount.....0.0078 kg
ICAL Date.....1-10-90
CCAL Filename.....V00320C

| NATIVE ISOMERS | CONC. ng/kg | DL ng/kg |
|---|---|---|
| 2378-TCDF | 26.0 | ----- |
| TOTAL TCDF | 57.0 | ----- |
| 2378-TCDD | nd | 0.71 |
| TOTAL TCDD | 11.0 | ----- |
| 12378-PeCDF | 22.0 | ----- |
| 23478-PeCDF | 17.0 | ----- |
| TOTAL PeCDF | 98.0 | ----- |
| 12378-PeCDD | nd | 1.50 |
| TOTAL PeCDD | nd | ----- |
| 123478-HxCDF | 33.0 | ----- |
| 123678-HxCDF | 11.0 | ----- |
| 123789-HxCDF | 5.8 | ----- |
| 234678-HxCDF | nd | 1.90 |
| TOTAL HxCDF | 130.0 | ----- |
| 123478-HxCDD | nd | 2.80 |
| 123678-HxCDD | nd | 14.00 |
| 123789-HxCDD | nd | 13.00 |
| TOTAL HxCDD | 120.0 | ----- |
| 1234678-HpCDF | 140.0 | ----- |
| 1234789-HpCDF | 7.8 | ----- |
| TOTAL HpCDF | 440.0 | ----- |
| 1234678-HpCDD | 320.0 | ----- |
| TOTAL HpCDD | 740.0 | ----- |
| OCDF | 570.0 | ----- |
| OCDD | 3400.0 | ----- |

| INTERNAL STANDARDS | ng's ADDED | PERCENT RECOVERY |
|---|---|---|
| 2378-TCDF-C13.... | 2.00 | 54 |
| 2378-TCDD-C13.... | 2.00 | 49 |
| 12378-PeCDF-C13.. | 2.00 | 48 |
| 23478-PeCDF-C13.. | 2.00 | 46 |
| 12378-PeCDD-C13.. | 2.00 | 51 |
| 123478-HxCDF-C13. | 2.00 | 56 |
| 123678-HxCDF-C13. | 2.00 | 65 |
| 123789-HxCDF-C13. | 2.00 | 27 |
| 234678-HxCDF-C13. | 2.00 | 56 |
| 123478-HxCDD-C13. | 2.00 | 31 |
| 123678-HxCDD-C13. | 2.00 | 17 |
| 1234678-HpCDF-C13 | 2.00 | 35 |
| 1234789-HpCDF-C13 | 2.00 | 38 |
| 1234678-HpCDD-C13 | 2.00 | 36 |
| OCDD-C13..... | 4.00 | 26 |
| 1234-TCDD-C13.... | 2.00 | na |
| 123789-HxCDD-C13. | 2.00 | na |
| 2378-TCDD-C137... | 0.80 | 50 |

Total 2378-TCDD
Equivalence = 7.7640 ng/kg
( Using EPA 8290 Factors )

CONC= Concentrations, calculated as described in EPA method 8290.

DL= Detection limits, calculated as described in EPA method 8290.

na= not applicable

nd= not detected

TCT Invoice Number....4410 90-3092