

CENPP-PL-CH (1105-2-10a)

24 March 1989

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

SUBJECT: Depoe Bay Sediment Quality Evaluation, 1989

1. The results of the 1989, Sediment Quality Evaluation of sediments collected and tested due to the scheduled FY 89 Depoe Bay maintenance dredging are enclosed.
2. Please contact Mark D. Siipola at ext. 6463, if you require further information regarding this subject.

Encl

LAUREN J. AIMONETTO  
Chief, Planning Division

CF:  
CENPP-OP-NW (BRAUN)

RESULTS OF 1989 DEPOE BAY SEDIMENT QUALITY EVALUATION

Project

1. Depoe Bay is situated on the Oregon Coast approximately 100 miles south of the mouth of the Columbia River (ATTACHMENT 1). The outer bay consists of a shallow indentation in the shoreline and adjoins an almost landlocked inner bay. The inner bay is fed by two small streams, North and South Depoe Bay Creek. South Depoe Bay Creek is dammed a few hundred feet above its confluence with the bay. These creeks have relatively low flows. As a result, currents and water quality within the inner bay are influenced most by ocean surges and tides.
2. The access channel to the inner bay is 50 feet in width. A 390-by-750 foot boat basin is located within this bay. Both the boat basin and the channel are federally authorized for a depth of 8-foot which is maintained by the U. S. Army Corps of Engineers (USACE).
3. Between 1939-1950 a total of 56,143 cubic yards of sediment was removed from the inner bay, between 1951-1970 a total of 39,336 cubic yards and since 1971 a total of 46,707 cubic yards. Of this 46,707 cubic yards, a total of 8,367 cubic yards has been mechanically removed by backhoe (1981) or crane (1971) and deposited upland. The majority of the material has been hydraulically removed with the discharge point located on the rocky intertidal shoreline of the outer bay, approximately 200 feet south of the entrance to the inner bay.
4. The inner bay is scheduled for maintenance dredging of approximately 13,000 cubic yards in 1989. It is proposed that sediments removed at that time be placed either at an ocean site and/or upland.
5. Chemical and physical testing of the potential dredge material was conducted to provide a technical evaluation of the material as required by Sections 401 and 404 of the Clean Water Act. Current procedures in the USACE Portland District are to evaluate sediment quality prior to dredging to determine if significant physical, chemical or biological impacts will result from dredging operations.

Previous Studies

6. The proposed site for ocean disposal of the dredged material is located at the point on the rocky intertidal shoreline of the outer bay as mentioned in paragraph #3 above. The impact of the discharge of dredge material at this site was the subject of a detailed study conducted in 1976 (USACE,1978). The overall conclusion reached by the study was that the amount of damage inflicted to the rocky intertidal and subtidal ecosystem was probably not particularly significant.

7. Previous sampling for subsequent physical and chemical analysis was performed by the USACE in April 1980. At that time 5 sediment samples and one receiving water sample were collected for bulk and elutriate chemical analysis. A sixth sediment sample was collected for physical analysis only. CH2M Hill performed five elutriate, one receiving water (ocean) analyses and one bulk chemical analysis. In addition, the USACE North Pacific Divisions Materials Testing (NPDMT) Lab performed physical analyses of four of the sediment samples.

8. The elutriate analyses found concentrations of manganese, ammonia, phenol and iron at levels exceeding applicable water quality criteria as promulgated in the EPA publication, "Quality Criteria for Water, 1976" (USEPA,1976). It was noted that ammonia, manganese and phenol were recognized as being readily released from sediments during elutriate testing but were not of concern in terms of toxic or bioaccumulative effects at the level detected. Manganese was not detected at excessive levels during the bulk analyses.

9. The bulk sediment analysis for zinc indicated a concentration at the low end of the moderately contaminated range. However, since discharge would be in the well oxygenated surf zone and since zinc's toxicity is inversely related to the level of oxygen in the water, zinc was not of particular concern. Also, zinc is not of particular concern in reference to bioaccumulative effects at levels which are nontoxic.

10. Physical analysis of material above the South Depoe Bay Creek check dam showed the material to be a silty sand mixed with a high percentage of organic material. The sample from the middle of the boat basin indicated that the sediments were composed of near 80% fine sand.

#### Present Study

11. Bulk chemical and physical analyses were conducted on sediment samples collected by USACE personnel on January 26, 1989. A total of 10 samples were collected. Two samples (SDBC-1&2) were collected above the South Depoe Bay Creek check dam using a 1 1/2 inch PVC pipe approximately 12 inches long. Two gravity core samples (DB-GC-1&2) were collected using a crane situated on top of the parking area retaining wall. Samples DB-P-3 through 10 were taken with a Ponar grab sampler from a small boat.(see ATTACHMENT 1 for sample locations)

12. Samples for chemical analysis were placed in 8oz. I-Chem Specialty Cleaned Containers with teflon lined lids. Samples for physical analysis were placed in ziplock freezer bags. All samples were placed in an ice chest with ice for transport to the USACE NPDMT Lab for further processing.

13. Samples SDBC-1&2 were composited as were DB-GC-1&2 (a.k.a.DB-1&2) and DB-P-3(a.k.a. DB-3), 4, 5 and 6 respectively by the NPDMT Lab prior to chemical analysis. Due to the character of samples DB-P-7 and 8, only physical analyses were performed on these two samples. The three composites were split and chemical analyses were performed by both the NPDMT Lab, Troutdale and Battelle NW Marine Lab, Sequim.

14. NPDMT Lab performed the physical analyses of the 10 sediment samples collected.

These analyses included grain size, total volatile solids and "Dredge Analysis" for each of the 10 samples. (see Appendix 4)

15. Chemical analyses for metal and pesticides/PCB's were performed by the NPDMT Lab while Battelle analyses included metal, pesticides/PCB's, oil and grease, ammonia, TOC, organotin and PAH's. In addition to the QA/QC procedures described in the reports from each lab, duplicate tests were run. Both labs tested Composite 2 for metals and pesticides/PCB's thereby providing a cross lab reference. Composites 3 and 4 analyzed by Battelle were identical samples submitted as blind duplicates.

#### Discussion

16. Physical Data: The sediment above the dam consists of light brown silty sand with percent volatile solids ranging from 6.9% to 10.1%. Detrital material (leaves, twigs, etc.) were noted in both samples taken in this area. Gas was noted escaping from the sediments when sampled or walk upon.

17. The two gravity core samples taken near the retaining wall show the material in this area to be a black to brown-black clayey sandy silt with a high organic content. A live shrimp approximately 2-inches long was captured in good condition with sample core number DB-CG-1 (a.k.a. DB-1). This sample also contained complete clam shells up to 1-inch in length.

18. Ponar grab samples DB-P-3 (a.k.a. DB-3) through DB-P-6 show the material in these areas to be highly organic, up to 20.5% volatile solids, clayey sandy silt. Grain size generally increased toward the mouth of South Depoe Bay Creek. A live clam was retrieved with sample DB-P-4.

19. Sample DB-P-7 was taken toward the mouth of Depoe Bay and appeared to be derived from material moving into the inner bay through the mouth. The sample consisted of 90.5% sand and 9.5% fines, only 5.1% of the sample passed the No. 230 sieve. A high percentage of the material consisted of fine shell hash.

18. Sample DB-P-8 was taken from near the mouth of North Depoe Bay Creek and consists of a clayey silty sand. The organic content (6.2% volatile solids) is the lowest of those samples collected except for DB-P-7.

19. Chemical data: Except for DDE (7.7ppb) in Composite 2 no pesticides/PCB's were detected in the analyses performed by the NPDMT Lab at the detection limits requested and reported. Battelle reported Gamma BHC (1.2ppb), Dieldrin (1.4ppb), DDE (1.1ppb), DDD (0.98), and the PCB Aroclor 1245 (11ppb) to be present in Composite 2 in these trace amounts. All of these are below the normal detection limits requested.

20. Analysis for trace metals show that except for chromium all concentrations were below the levels of concern which would require Tier III bioassay testing. With regard to chromium a concern range of 20-300 has been established due to the lack of knowledge regarding the toxicity of this metal in the marine environment. It should be noted that the average crustal abundance for chromium in shale and basalt soils throughout the world is 100 and 200 respectively (Krauskopf, 1967). The levels of chromium found are similar to those found in clean estuarine sediments elsewhere in the state. As part of the QC/QA program at the NPDMT Lab two inorganic chemical

analyses for metals were run for Composite 1. The relative percent difference between the two analyses for cadmium is 99%. The higher level of cadmium (1.09ppb) is slightly above the level for Tier III testing (1.0ppb) for this element. However this analyses is suspect as the 0.37ppb level of concentration in the duplicate analysis is in the same range as all the other analyses for cadmium preformed by both NPDMT Lab and Battelle for this element. This sample was collected upstream of the South Depoe Bay Creek retention dam, further testing is not deemed necessary.

21. Samples DB-GC-1&2 (Composite 2) and samples DB-P-3 through 6 (Composite 3 & 4) were analyzed for 17 different PAH's by Battelle NW Marine Research Laboratory. No levels of significant contamination was found in Composite 2. The difference in values for a number of constituents in the original analyses for Composites 3 & 4 raised questions of the validity of the analyses. It was therefore decided that the analyses should be rerun for these two subsamples of the composited samples DB-P-3 through DB-P-6. The results of the retesting indicate that the levels of PAH's are below known levels of toxicity. The discrepancy was postulated by Battelle to be due to the non-homogeneity of Composite 4, it contained some pieces of wood.

22. Composite 2, 3, and 4 were analyzed for butyltin (tri, di and mono). Tributyltin is currently used as an active ingredient in antifouling paint formulations to prevent or retard the attachment and growth of undesirable organisms on boat hulls. Due to the concern over the effect of these compounds on the marine environment, even in minute quantities, and the geomorphology of Depoe Bay it was decided to test for the presence of these compounds. The concentrations found at Depoe Bay are typical of sediments which do not exhibit effect when tested by the amphipod sediment bioassays. The Oregon Department of Environmental Quality (DEQ) is presently conducting studies designed to determine the effect of these compounds in and near South Slough Estuarine Sanctuary in Coos Bay, Oregon (Wolniakowski, 1987).

#### CONCLUSION

23. Pesticide and PCB concentrations are below or near detection limits and thus well below levels of concern. Metal concentrations are similar to clean estuarine sediments found in other areas of the state and below levels of concern except for chromium as discussed above. Most of the PAH's were quantified as well as all of the butyltin compounds. However, these concentrations are typical of sediments which do not exhibit effect when tested by the amphipod sediment bioassays.

24. The grain size analyses of the bay sediments show the percent fines to range from a minimum of 42.1% to a maximum of 69.1%, excluding DB-P-7 which had 9.5% fines. Grain size increases towards the mouth of the bay probably due to the reworking of the sediments by wave or tidal currents. Another explanation would be that the sediment in this area is derived from material moving up through the inlet from the outer bay. This is further evidenced by the large percentage of shell noted in sample DB-P-7. The bulk of the sediment is believed to be derived from sediments washed into the bay by North and South Depoe Bay Creek.

25. Because of the outer bay's extreme hydrographic regime and the character of the bulk of the sediments to be dredged, material discharged at the disposal site is quickly removed and dissipated. The majority of which is expected to move offshore beyond the reefs which extend from the arms of the bay. Elutriation and further

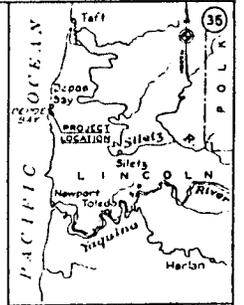
dilution of contaminants by the ocean currents can be expected. Therefore no significant biological impacts are anticipated due to the presence of chemical contamination at the levels detected.

26. This sediment quality evaluation was completed by Mr. Mark D. Siipola of the Coastal and Flood Plain Management Branch, Planning Division, USACE Portland District. Comprehensive analytical data will be provided upon request.

## LITERATURE CITATION

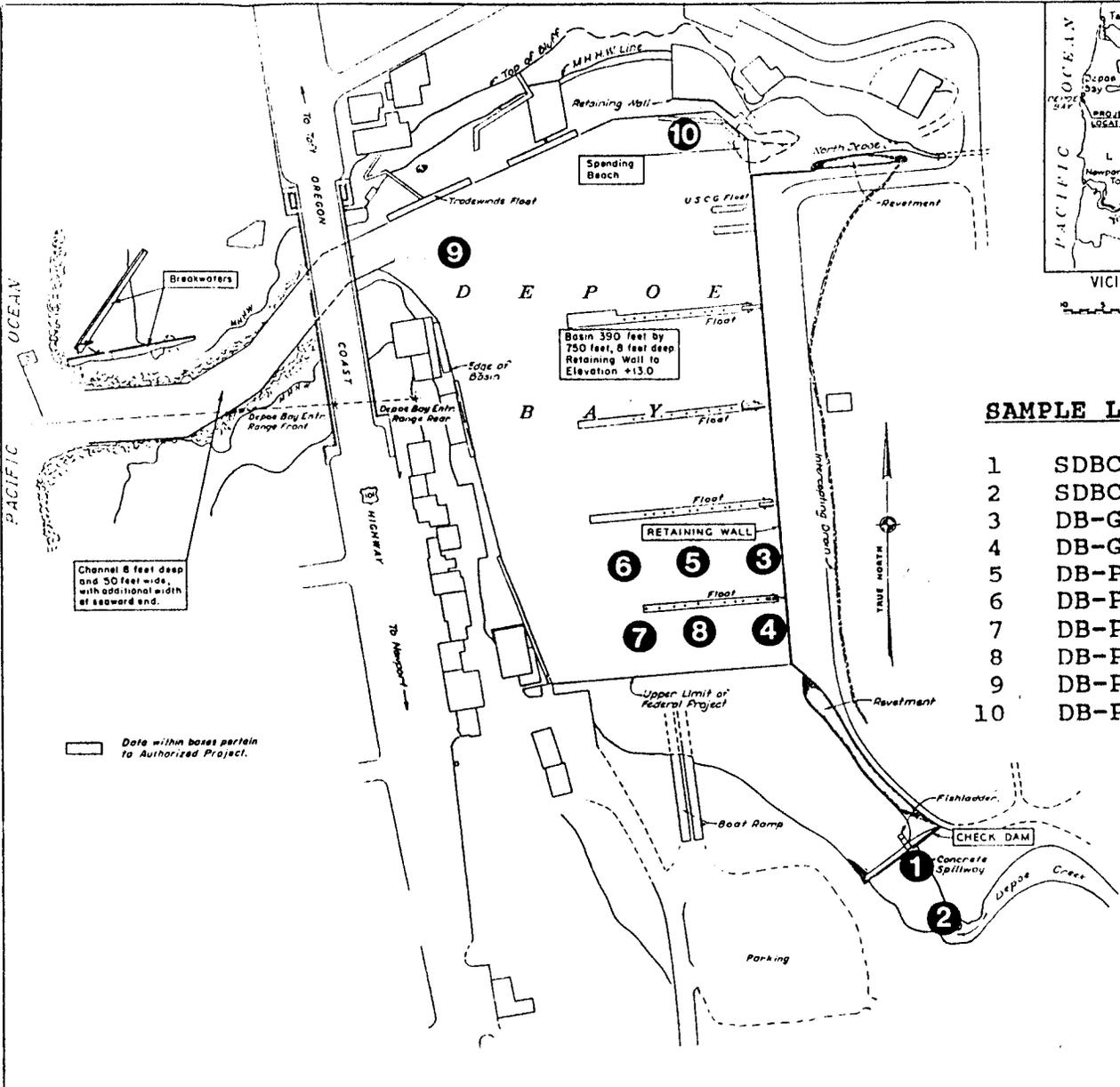
1. U.S. Army Corps of Engineers; "Intertidal Disposal of Dredged Materials at Depoe Bay, Oregon," U.S. Army Engineer District Portland, October 1978.
2. U.S. Environmental Protection Agency; "Quality Criteria for Water," USEPA 440/9-76-023, Washington, D.C., 1976.
3. Krauskopf, K.; "Introduction to Geochemistry", McGraw-Hill, New York, 1967.
4. Wolniakowski, Krystyna,(et al); "Tributyltin Concentrations and Pacific Oyster Deformations in Coos Bay, Oregon", 1987.

ATTACHMENT 1



VICINITY MAP

0 10  
MILES



**SAMPLE LIST**

- 1 SDBC-1
- 2 SDBC-2
- 3 DB-GC-1
- 4 DB-GC-2
- 5 DB-P-3
- 6 DB-P-4
- 7 DB-P-5
- 8 DB-P-6
- 9 DB-P-7
- 10 DB-P-8

□ Data within boxes pertain to Authorized Project.

PLAN  
SCALE IN FEET  
100 200 0 100 200

**DEPOE BAY, OREGON**

SCALES AS SHOWN  
U. S. ARMY ENGINEER DISTRICT, PORTLAND

# DISPOSITION FORM

WM *[Signature]*

For use of this form, see AR 340-15, the proponent agency is TAGCEN.

REFERENCE OR OFFICE SYMBOL

SUBJECT

NPPEN-PL-2

Depoe Bay Sediment Quality

TO Ch, Navigation Division

FROM Act Ch, Engineering Div

DATE 11 Jun 80

CMT 1

Moore/6479/par

1. As requested by telephone by Jack Bechley, NPPND-WM, on 5 June 1980, attached is the preliminary report of data on sediments obtained at Depoe Bay on 7 April 1980. The last column on the chart lists appropriate EPA water quality criteria. Levels detected above these criteria are circled in red.
2. The only sediment of any concern is that obtained from upstream of the dredging area; but even this sediment would have negligible impact because the four parameters detected at levels exceeding criteria (iron, maganese, ammonia, and phend) are of little concern when deposited in aerobic marine waters. The remaining parameter, zinc, is not one of particular concern in terms of toxic effects to humans from bioaccumulation in edible aquatic organisms and the impact of it on aquatic organisms cannot be readily assessed without a bioassay. As only one sample had a level higher than criteria, and even that level was not extreme, the expense involved in a bioassay is not justified. Especially since the sample did not come from the dredging area.
3. CH2M Hill is still performing analyses for herbicides and insecticides. The results of these analyses will be forwarded when received.
4. Please do not forward the bulk sediment chemical analysis to EPA or other resource agencies. It is not required by P.L. 92-500 and could confuse issues.

2 Incls  
as

*Patrick J. Keough*  
PATRICK J. KEOUGH  
Acting Chief, Engineering Division

DEPOE BAY SEDIMENT SAMPLING  
7 April 1980

Station	Location
1	Downstream of Dam
3	Upstream of Dam
4	North side of Harbor
5	Northend of Boat basin
6	South end of Basin
7	Middle part of Basin
8	South, oceanward side of entrance channel (Receiving Water Sample Location)

Elutriate Analyses

Parameter as mg/l	6	7	5	1	3		
Arsenic, As	0.006	0.002	0.006	<0.002	<0.002	<0.002	.05
Barium, Ba	<1	<1	<1	<1	<1	<1	50.0
Beryllium, Be	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	.01
Cadmium, Cd	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	.005
Chromium, Cr	<0.05	<0.05	<0.05	<0.05	<0.05	0.16	.1
Copper, Cu	0.05	0.05	0.05	0.05	0.05	0.05	
Iron, Fe	0.82	0.20	0.20	1.55	118	0.30	1.0
Lead, Pb	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Manganese, Mn	0.19	0.19	0.32	1.40	18.8	0.04	.1
Mercury, Hg	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0001
Nickle, Ni	<0.01	0.01	<0.01	<0.01	0.08	<0.01	
Zinc, Zn	0.090	0.020	0.032	0.310	0.067	<0.005	.06
Cyanide, CN	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	.001
Sulfide, S	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	.002
Ammonia, N	1.40	0.96	0.61	2.29	3.69	0.05	1.8
Total Kjeldahl Nitrogen, N	1.64	1.51	1.21	2.62	4.07	0.13	
Orthophosphate, P	<0.02	0.04	0.06	<0.02	<0.02	<0.02	
Phosphate, Total P	0.03	0.05	0.07	<0.02	0.09	0.03	0.1
Phenols	0.075	0.068	0.083	0.331 <sup>v</sup>	0.095	0.048	0.1
Total Organic Carbon	1.4	0.9	0.7	3.5	0.5 <sup>*</sup>	0.7	

\*Results are suspected to be low due to sulfur interference.

## Bulk Sediment Analysis

Page 2 of 2

Parameter as mg/kg	As Received	<u>6</u>	District Criteria (Dry)
		Dry	
Arsenic, As	4.90	13.2	8.0
Barium, Ba	<7	<20	60.0
Beryllium, Be	<0.07	<0.19	
Cadmium, Cd	<0.4	<1	6.0
Chromium, Cr	10.4	28.0	75.0
Copper, Cu	12.7	34.4	50.0
Iron, Fe	7,760	20,980	25,000.0
Lead, Pb	3.50	9.45	60.0
Manganese, Mn	51.0	138	500.0
Mercury, Hg	0.108	0.291	1.0
Nickel, Ni	9.65	26.1	50.0
Zinc, Zn	40.9	111	200.0
Cyanide, CN	<0.035	<0.095	.25
Sulfide, S	584	1,578	
Total Kjeldahl Nitrogen, N	8,600	23,300	2,000.0
Phosphate, Total P	1,220	3,310	650.0
Phenols	1.74	4.69	

< Indicates "less than"

All tests are performed in accordance with current Environmental Protection Agency guidelines as published in the Federal Register.

The information shown on this sheet is test data only and no analysis or interpretation is intended or implied.

Samples will be retained 30 days unless otherwise requested.

Reported by: Mary E. Player  
Mary E. Player

mn/4824

## FIELD REPORT

Depoe Bay

Purpose of Sampling Section 103 - At request of EPA's Jim WoodsDate 4/7/80 Wind Variable within harborWater Conditions (Wave heights & Direction, Tides, Currents) Surges from ocean wavesWeather Foul! It drizzled/rained all day Sampling Vessel Used Coast Guard Zodiac<sup>regular</sup> vesselSampling Personnel Bob Ellard, Pam Moore, Ken EspenelSampling Gear Ponar, Ellard, & handdriven coreAnalytical Laboratory CH2M HILLComments (Wildlife, Sampling Difficulties, etc.) Too rocky to sample easily, needed more time, did not have a chance to use hydrolab.

Station	Depth	Sampling Time	Sampling Methodology	Sampling Description
1	≈ 4" of sediment	11:30	Handsampled using a plastic core. Drove same corner repeatedly into a "one square foot" area	Gray Clay - Many rocks on Surface and through clay made sampling difficult. One full core and 1/4 of a gallon jar were taken (labeled 1 of 2 and 2 of 2) - was odorless. Was located 1/2 of distance from dam to harbor on West end of low tide.
2	≈ 1 1/2" of sediment	11:35	Handsampled	Sand & rocks - was obtained from below dam at Low tide. To be used for grainsize
	≈ 1" of water			
3	2' of water	11:50	Ponar	Immediately upstream of dam sampled from SW side of dam. Brown-black mud. High organic content. Single sample.

ions (Is sampling completed? Was sampling method adequate? Considerations for future sampling at the project)

FIELD REPORT

Depoe Bay

2 of 3

Purpose of Sampling Sect. No 3

Date 4/7/80 Wind \_\_\_\_\_

Water Conditions (Wave heights & Direction, Tides, Currents) \_\_\_\_\_

Weather \_\_\_\_\_ Sampling Vessel \_\_\_\_\_

Sampling Personnel \_\_\_\_\_ Sampling Gear \_\_\_\_\_

Analytical Laboratory \_\_\_\_\_

Comments (Wildlife, Sampling Difficulties, etc.) \_\_\_\_\_

Station	Depth	Sampling Time	Sampling Methodology	Sampling Description
4	≈ 6'	≈ 1:00	Ponar from Coast Guard Zodiac	Dropped ponar 3 times to get sample but did not get enough to use for chemical analysis. North side of Harbor Mouth.
5	≈ 6'	1:45	Ellard from Coast Guard vessel.	Dragged on east/west transect in northernmost part of boat basin. Sand and clay. Did 3 drags to get enough sediment. Hand nematode in it.
6	≈ 9'	2:00	"	Dragged on north/south transect at southernmost end of boat basin, Did 3 drags to get enough sediment. Black silty material.

ions (Is sampling completed? Was sampling method adequate? Considerations for future sampling at the project)  
 varied widely in quality in different areas. Sediments immediately below dam were too rocky to sample as were  
 in the boat basin. Sediments appeared to be contaminated by oil.

FIELD REPORT

Depoe Bay

Purpose of Sampling Sect. 103

Date 4/7/80 Wind \_\_\_\_\_

Water Conditions (Wave heights & Direction, Tides, Currents) \_\_\_\_\_

Weather \_\_\_\_\_ Sampling Vessel \_\_\_\_\_

Sampling Personnel \_\_\_\_\_ Sampling Gear \_\_\_\_\_

Analytical Laboratory \_\_\_\_\_

Comments (Wildlife, Sampling Difficulties, etc.) \_\_\_\_\_

Station	Depth	Sampling Time	Sampling Methodology	Sampling Description
7	10'	2:15	Ellard from coast guard vessel.	Dragged on north/south transect in middle section of boat basin. Black, silty sediment
				Had piece of old cloth in it (which was disgarded). Did one drag and got large amounts of material.
4A				Also tried to sample with Ponar on north side of mouth of boat basin but was rock.
Reg water		3:00	Used bucket from shore. Caught stuff	On south oceanward side of channel. Some detrital material from brown plants in intertidal area.

(Is sampling completed? Was sampling method adequate? Considerations for future sampling at the project)  
 time to adequately sample. Also needed a small boat which could be equipped with handwinch and a boat which  
 receiving water. The Coast Guard would not take us into the ocean that day because of surf action.

## DEPOE BAY SEDIMENT QUALITY STUDY

7 April 1980

1. Depoe Bay is situated on the Oregon Coast approximately 100 miles south of the mouth of Columbia River (figure 1). The bay consists of a shallow indentation in the shoreline and adjoins an almost landlocked inner bay. The inner bay is fed by a small stream, Depoe Creek, which is dammed a few hundred feet above its confluence with the bay. This creek has a low flow. As a result, currents and water quality within the inner bay are dominated by ocean surges and tides.
2. The access channel to the inner bay is 50 feet in width. A 390-by-750-foot boat basin is located within this bay. Both the boat basin and channel are federally authorized for an 8-foot depth which is maintained by the U.S. Army Corps of Engineers.
3. Since 1950, a total of 63,100 cubic yards of sediments have been removed from the harbor by the Corps. Of that total, 19,100 cubic yards have been discharged into upland disposal sites and 44,000 cubic yards have been disposed at an ocean disposal site, which is located on the rocky, intertidal shoreline of the outer bay, approximately 200 feet south of the harbor entrance.
4. The harbor is scheduled for maintenance dredging in 1981. It is proposed that sediments removed at that time be placed at the ocean disposal site. This site is precipitous and violently wave washed. As a result, little foot traffic takes place on it. A detailed discussion of the flora and fauna of the site and impacts to them from past disposal activities is available in the Corps' publication, "Intertidal Disposal of Dredged Materials at Depoe Bay, Oregon."<sup>1</sup>
5. Disposal of dredged material at ocean disposal sites is regulated by Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA). Final revisions of the regulations and criteria governing this type

(attachment 3 contains results). In addition, the Corps' Division Materials Laboratory performed physical analyses on three of these sediment samples and on a fourth sample obtained from immediately below the Depoe Creek dam (station 7) (Attachment 4). The data provided by the two laboratories is discussed below.

## DISCUSSION

10. Chemical Data. Of the 27 parameters for which the elutriate samples were analyzed, only four were present at levels exceeding applicable water quality criteria as promulgated in the EPA publication, "Quality Criteria for Water."<sup>2</sup> These were manganese, ammonia, phenols, and iron. The last was found at excessive levels only in samples from stations located in the dam apron and upstream of the dam and, therefore, is not of particular concern in terms of dredged material disposal impacts.

11. The remaining three parameters, ammonia, manganese, and phenol, are generally recognized as being readily released from sediments during elutriate testing.<sup>3</sup> Fortunately, they are not of concern in terms of toxic or bioaccumulative effects at the levels detected during this study. Also, manganese was not detected at excessive levels during the bulk sediment analysis.

12. It is expected that the comparatively high levels of both manganese and ammonia in the elutriate samples were due to their tendency to elutriate under anaerobic conditions (such as occur during elutriate sample preparation) rather than the presence of excessive levels of them in the sediments. Neither parameter is expected to exert a long-term impact on water quality at the disposal site.<sup>3</sup>

13. In addition to the four parameters discussed above, zinc was detected at levels considerably in excess of those found in the receiving water sample. However, the bulk sediment analysis of the station 1 sediment sample indicated that the level present was at the low end of the moderately polluted range

19. The sediment obtained from station 2 in the boat basin was more similar in appearance and grain size to that which was sampled above the dam than to that which came from the dam apron. It consisted of fine sand with a high percentage of organic material (9.51 percent), though not nearly as much as station 5.

20. The Mayor of Depoe Bay told the sampling crew that the lower spillway of the dam released large quantities of sediments such as were found in the wetland when it was opened. It appears likely that this material made its way to the boat basin where it settled. Boat basin sediments from near the access channel appeared to have a higher sand content than the others and was of a lighter color.

#### CONCLUSION

21. Sediment from immediately upstream of the Depoe Creek dam contained a higher percentage of the parameters measured than did any of the other sediments which were tested. Since this sediment is being released in significant quantities from the dam, it is expected that it is the major source of contaminants in the sediments to be dredged.

22. The sediments generally improve in quality the closer they are to the harbor's entrance channel. Elutriation and subsequent removal of contaminants by the ocean currents is probably responsible for the improvement.

23. The grain size analysis of the sample from the middle of the boat basin indicated that the sediments were composed of near 80 percent fine sand. This type of material has been quickly removed from the disposal site upon discharge in the past and, given the strong wave action and undertow in the outer embayment, the majority is expected to move beyond the reefs which extend from the arms of the bay.

24. Because of the outer bay's extreme hydrographic regime for the majority of the year and the lack of adequate bathymetry data outside the channel area

LITERATURE REFERENCE LIST

1. U.S. Army Corps of Engineers. "Intertidal Disposal of Dredged Materials at Depoe Bay, Oregon," U.S. Army Engineer District Portland, October 1978.
2. U.S. Environmental Protection Agency. "Quality Criteria for Water," USEPA 440/9-76-023, Washington, D.C., 1976.
3. Environmental Effects Laboratory. "Long-term Release of Contaminants from Dredged Material," Technical Report D-78-49, U.S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Mississippi, August 1978.
4. U.S. Environmental Protection Agency. "Guidelines for the Pollutational Classification of Great Lakes Harbor Sediments," USEPA, Region V, Chicago, Illinois, April 1977.

U.S. ENVIRONMENTAL PROTECTION AGENCY  
REGION X

1200 SIXTH AVENUE  
SEATTLE, WASHINGTON 98101



REPLY TO  
ATTN OF: MS 521

MAR 21 1980

Mr. A. J. Heineman  
Chief, Navigation Division  
Portland District, C/E  
P. O. Box 2946  
Portland, Oregon 97208

RE: NPPND-079, Corps of Engineers, January 16, 1980

Dear Mr. Heineman:

We have reviewed the above referenced project for maintenance dredging of Depoe Bay and the U. S. Army Engineer report "Intertidal Disposal of Dredged Materials at Depoe Bay, Oregon" (October 1978). The U. S. Army Engineer report makes several references to the possible toxic effects of the materials that are deposited within the intertidal disposal site but never properly evaluates these effects. Instead of dealing with the possible effects the report recommends the continued use of the intertidal disposal area on the grounds that it "appears to be environmentally acceptable and economically justified".

It is the opinion of this agency that a statement of the environmental acceptability and economic justification of the use of an intertidal disposal site should be withheld until the possible toxic effects of the material to be disposed of can be properly evaluated. Such an evaluation should address two basic questions. First, are the observed contaminants from a natural source or are they a result of activities associated with the Depoe Bay boat basin? Second, are the contaminants that are deposited with the dredge material in the intertidal disposal site collecting in subtidal areas within the outer embayment?

A study designed to answer these questions should include the following:

1. Sediment samples should be taken from Depoe Creek and along a transect from the dam at Depoe Creek to the northern shore of the boat basin. An elutriate test should be used to determine the concentrations of lead, zinc, copper, cadmium, arsenic, and

## FIELD REPORT

Depoe Bay

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Purpose of Sampling Section 103- At request of EPA - Jim WoodsDate 4/7/80 Wind Variable within harborWater Conditions (Wave heights & Direction, Tides, Currents) Surges from ocean wavesWeather Foul! It drizzled/rained all daySampling Vessel Used Coast Guard Zodiac & regular vesselSampling Personnel Bob Ellard, Pam Moore, Ken SepenelSampling Gear Ponar, Ellard, & handdriven coreAnalytical Laboratory CH<sub>2</sub>M HillComments (Wildlife, Sampling Difficulties, etc.) Too rocky to sample easily, needed more time, Did not have a chance or time to use hydrolab.

Station	Depth	Sampling Time	Sampling Methodology	Sampling Description
1	9'	2:00	Ellard from Coast Guard vessel	Dragged on north/south transect at southernmost end of boat basin. Did 3 drags to get enough sediment. Black silty material.
2	10'	2:15	Ellard from Coast Guard vessel	Dragged on north/south transect in middle section of boat basin. Black, silty sediment. Had piece of old cloth in it (which was discarded. Did one drag & got large amounts of material.
3	6'	1:45	Ellard from Coast Guard vessel	Dragged on east/west transect in northernmost part of boat basin. Sand & clay. Did 3 drags to get enough sediment. Had nematode in it.
4	4' of sediment 1" of water	11:30	Handsamped using a plastic core. Drove same corner repeatedly into a one square foot area.	Gray clay - Many rocks on surface & through clay made sampling difficult. One full core & 1/4 a gallon jar were taken (labeled 1 of 2 and 2 of 2) - was odorless. Was located 1/2 of

Conclusions (Is sampling completed? Was sampling method adequate? Considerations for future sampling at the project)  
Sediments varied widely in quality in different areas. Sediments immediately below dam were too rocky to sample as were some areas in the boat basin. Sediments appeared to be contaminated by oil.



Table 1 (continued)  
 DEPOE BAY  
 Elutriate Test Results  
 7 April 1980

Parameter	Analytical Methods <sup>1</sup>	Water Quality Criteria <sup>2</sup>						
		1	2	3	4	5	6	
Organochlorine								
Insecticides, µg/l	C							
Aldrin		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Dieldrin		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
DDT		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Endrin		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Toxaphene		<1	<1	<1	<1	<1	<1	
Chlorophenoxy								
Herbicides, µg/l	C							
2, 4-D		<1	<1	<1	<1	<1	<1	
Silvex		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Sulfides, mg/l	B 503-505	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	.002
Total Organic Carbon, mg/l	A 415.1	1.4	0.9	0.7	3.5	0.5 <sup>3</sup>	0.7	

< Indicates "less than"

<sup>1</sup>See Key

<sup>2</sup>Obtained from USEPA, "Quality Criteria for Water," U.S. Environmental Protection Agency, Washington, DC (July 1976).

<sup>3</sup>Results are suspected to be low due to sulfur interference.

Sample Designations

- 1 South Basin
- 2 Middle Basin
- 3 North Basin
- 4 Core Sample, Downstream from Dam
- 5 Upstream from Dam
- 6 Site Water

\* - Criteria for freshwater only.

TABLE 2 - continued  
 DEPOE BAY, STATION 1  
 Bulk Sediment Analysis  
 7 April 1980

Parameter	Analytical Methods <sup>1</sup>		
		Wet Weight	Dry Weight
Organochlorine			
Insecticides, mg/Kg	C		
Aldrin		<0.003	<0.009
Dieldrin		<0.003	<0.009
DDT		<0.003	<0.009
Endrin		<0.003	<0.009
Toxaphene		<0.032	<0.085
Chlorophenoxy			
Herbicides, mg/Kg	C		
2, 4-D		<0.002	<0.005
Silvex		<0.0002	<0.0005
Sulfides, mg/Kg	B 505-506	585	1,580
Total Organic			
Carbon, mg/Kg	A 415.1	2.3%	6.2%

< Indicates "less than"

<sup>1</sup>See Key

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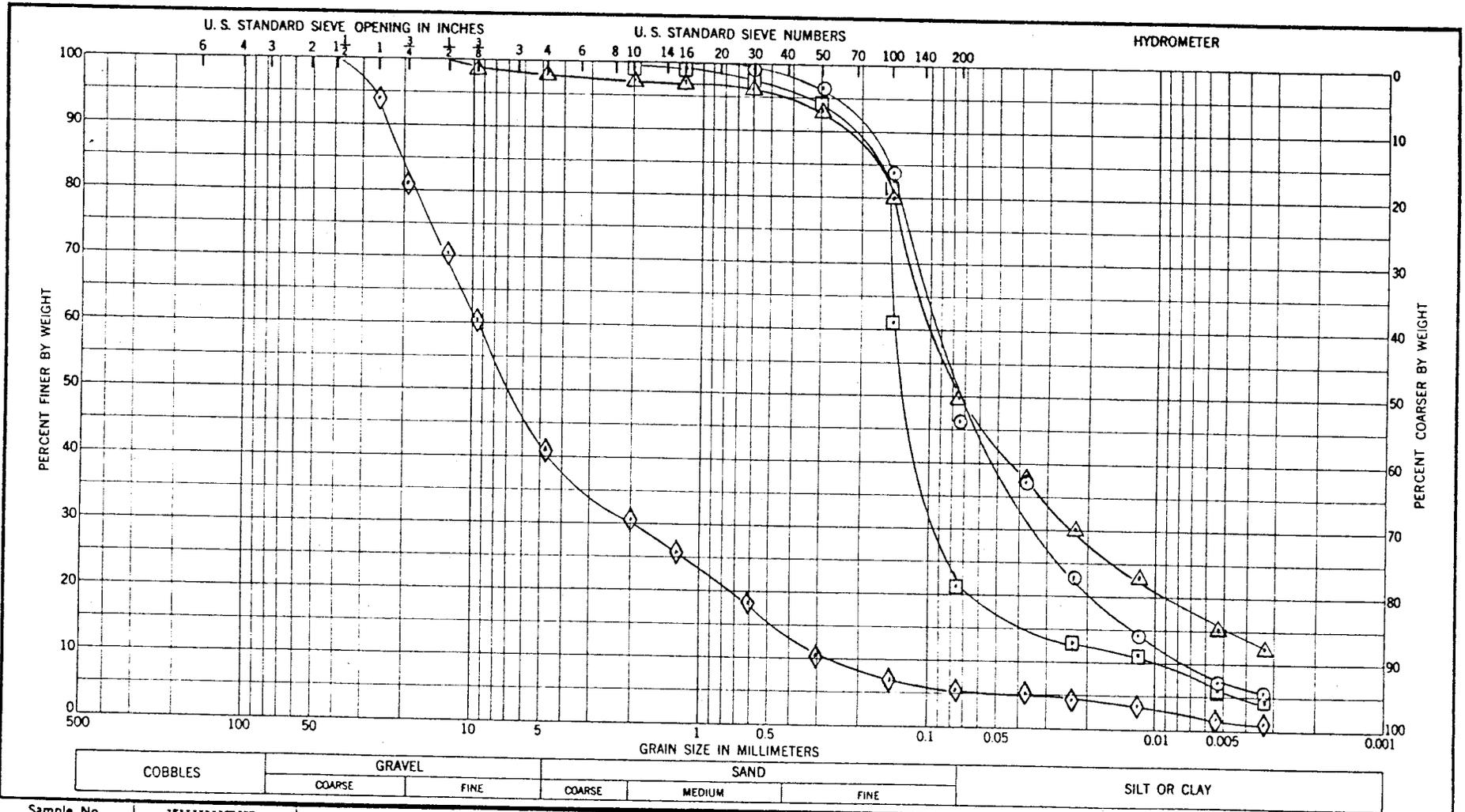
\* - Highly toxic trivalent inorganic arsenic is converted to pentavalent arsenic in bottom sediments. The latter is from 10 to 15 times less toxic than the former and should be safe for typical benthic organisms at levels as high as 1,920 mg/kg. (Lueschow, L.A.; 1964)

Table 3 (continued)

<u>Other Chemical</u>	<u>Detection Limit Liquid</u>	<u>± Error</u>
Organochlorine		
Insecticides, µg/l		
Aldrin	0.2	0.2
Dieldrin	0.2	0.2
DDT	0.2	0.2
Endrin	0.1	0.1
Toxaphene	1	1
Chlorophenoxy		
Herbicides, µg/l		
2, 4-D	1	1
Silvex	0.1	0.1

Notes: 1. Detection limits for sediment are higher due to smaller extracted sample weight.

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Sample No.	Classification	Nat w %	LL	PL	PI	Project
Station 5	Organic Silty SAND (SM)					DEPOE BAY
Station 4	Organic Silty SAND (SM)					
Station 2	Organic Silty SAND (SM)					
Station 7	Silty Sand GRAVEL (GW-GM)					
Samples obtained on 7 April 1980						Area
GRADATION CURVES						Boring No.
						Date 16 May 80
						80-S-649

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