FACTUAL DETERMINATIONS
DREDGED MATERIAL DISPOSAL OPERATIONS
COOS RIVER FEDERAL NAVIGATION PROJECT

SEPTEMBER 1980

1. Synopsis. Sediment samples were obtained for elutriate, bulk sediment, chemical, benthic, and physical analyses from the Coos River navigation channel at river mile (RM) 0 of its main stem and RM 7.5 on South Fork Coos River on 25 September 1980. Water from the same locations was collected for use in performing tests and was chemically analyzed for comparison with the elutriate data. This data was evaluated in accordance with 40 CFR 230 guideline to evaluate potential impacts due to dredged material disposal operations.

BACKGROUND

2. The mouth of the Coos River is located at the southeast end of Coos Bay, Oregon. A Federal navigation channel is authorized for this river and extends into its two main branches at RM 5.5, the Millicoma River and South Fork Coos River (figure 1). The channel is 5 feet deep and 50 feet wide from the mouth of the river to RM 8.3 on the Millicoma and RM 8.8 on the south fork. The channel is further maintained from RM 8.8 to RM 9.3 to a depth of 3 feet and a width of 50 feet on the south fork to facilitate log rafting. The navigation channels were completed in 1966. An average of 22,000 cubic yards (cy) of maintenance dredging has been performed annually since that time with clamshell, bucket, or hydraulic dredges. In the past, dredged materials have been placed upland.[5] Future disposal is proposed for the ocean or estuary as well.

3. Dredging times are scheduled to avoid conflicts with aquatic organisms' breeding and migration patterns and disruption of waterborne traffic.[4] Potential impacts from disposal operations are mitigated by coordinating activities with various Federal, State, and local agencies and concerned individuals. Upland sites are shaped and vegetated as deemed appropriate.

Turbidity is controlled by dikes, berms, and settling basins. Archeological surveys on all disposal sites are performed prior to discharging dredged sediments.[4]

4. In the past, sediments from the rivers have been classified as silty sands with median solids densities, ranging from approximately 2,500 to 2,700 gms/liter.[5] Portland District, Corps' guidelines specify that dredged sediments must undergo chemical analysis to determine pollution potential if the sediments consist of more than 20 percent by weight of particle sizes smaller than sand.[6] If silty sediments are to be discharged at an open-water site, the sediments and water at the disposal site must also undergo chemical analysis to assess the impact of the discharge. Pursuant to these guidelines, samples for physical and chemical analysis were collected in September 1980 from South Fork Coos River and from the mouth of Coos River. Potential disposal sites in the estuary and ocean were not sampled since they are being evaluated as part of the Coos Bay Offshore Disposal Study, which is currently being performed by Portland District.[7] The parameters which were analyzed were those with which sediments may have been contaminated given the point and nonpoint contaminant sources for the area.

5. Approximately 87 percent of Coos County is forest land. Wood processing and harvesting are a major industry in the watershed. Water quality degradation occurs in the Coos River and its tributaries primarily from log rafting, timberland management, and farming. In addition, a lumber mill is located on RM 8.0 of South Fork Coos River. The estuary is subject to a variety of contaminant sources including municipal wastes, wood products plants, fishery processing activities, and shipping.

6. The Coos River drainage basin is 415 square miles in area. The Millicoma River drains 151 square miles and the South Fork Coos River, 254 square miles. The mean average monthy flow at the mouths of the Coos, Millicoma, and South Fork Coos River are 2,200, 1,300, and 870 cfs, respectively.[3] Tidal effects extend up to RM 9 on both South Fork Coos River and Millicoma.[2] The salinity intrusion extends to at least RM 5 on Coos River. Salinity intrusion was not found further upstream.[3] Riverflow reversal from tidal action was observed at RM 7.5 on the south fork during sampling in September 1980.

7. Section 404 of Public Law 92-500[8] [9] requires evaluation of disposal impacts to municipal and private water supply intakes, wildlife sanctuaries and refuges, wetlands, mudflats, vegetated shallows, parks, national and historic monuments, national seashores, wilderness areas, recreational and commercial fisheries, water-related recreation, and research sites in the vicinity of any of the proposed dredged material disposal sites. The Coos Bay estuary and the ocean near its mouth contain all of these human use characteristics and special aquatic sites at various locations. They must be evaluated upon the designation of specific disposal sites. However, this report will be limited to discussing the general sediment quality in the Coos River. The discussion may be incorporated into future Findings of Compliance and Factual Determinations on specific disposal operations at which time the human use and aquatic characteristics can be evaluated in detail.

8. The Coos and Millicoma Rivers themselves contain choice shad and striped bass sport fisheries. Additionally, adult salmon and steelhead migrate through the lower rivers and juvenile salmonids, bass, and shad utilize the rivers as rearing areas.

SAMPLING LOCATIONS AND METHODS

9. Sediment samples collected for physical and chemical analyses were obtained using the Corps' 22-foot trihull, FORT STEVENS. Sediment samples collected for chemical analyses underwent elutriate and bulk sediment analyses. Water samples from the river were used in performing elutriate tests and were analyzed to provide background data on water quality.

10. Sediments to be chemically analyzed at RM 7 on South Fork Coos River were initially collected with a 220-pound, 9-foot-long gravity corer. This corer was equipped to obtain 2-foot cores in detachable, 2-5/8 inch diameter, acid-cleaned core liners. Unfortunately, the corer broke so sampling was completed at this station by driving the core liners into the sediment by hand. The core liners were made of transparent cellulose butyrate acetate and were sealed with polyethylene caps. Field notes are presented in table 1.

11. An acid-cleaned, stainless-steel core catcher was attached to the mouth of each core liner to facilitate retention of the sediment sample during retrieval of the corer. The core catchers were removed before storing samples with ice for transport to the analytical laboratory. Upon reaching the laboratory, the samples were extruded, composited, and subsampled for elutriate, bulk chemical, and/or physical analyses.

12. A 9- by 9-inch, 45-pound Ponar Grab sampler was used to obtain benthic samples. It was also used to sample for chemical analysis at mouth of the river. A small Ellard sampler was used to obtain a sample for physical analysis from the same location. The benthic samples were sieved through 30 mesh wire. The retained fraction was then preserved with formaldehyde and stored for future analysis. The benthic data are not presented here. The water samples were obtained with an 8-liter, Van Dorn water sampler.

ANALYTICAL METHODS

13. The majority of the elutriate and all of the bulk sediment analyses were performed by U.S. Geological Survey (USGS) following the procedures discussed in the USGS publication, "Native Water, Bottom Material, and Elutriate Analyses of Selected Estuaries and Rivers in Western Oregon."[13] The exceptions to this were cyanide, phenolics, orthophosphate, and phosphate elutriate analyses. These were performed by the Corps' North Pacific Division Materials Laboratory on eluate provided by USGS. Methods were those described in the 14th Edition of Standard Methods for Examination of Water and Wastewater.[14] All chemical methods used have been coordinated with and approved by the Environmental Protection Agency (EPA). The physical analyses were also performed by the Division Materials Laboratory.

14. A Hydrolab 8000 water quality testing system was used to measure dissolved oxygen (DO), pH, oxidation reduction potential (ORP), conductivity, and temperature at various sites in the river (table 2).

EVALUATION PROCEDURE

15. Elutriate data on the navigation channel sediments are compared to Corps guidelines and to the analytical data on the water samples to estimate the water quality impacts of discharging dredged materials. The majority of the guidelines were promulgated in the EPA publication, Quality Criteria for Water,[8] and updated in the 28 November 1980 Federal Register,[9] and provide for the protection and propagation of fish and other aquatic life and for recreation in and on the water in accord with the 1983 goals of Public Law (PL) 92-500. The criteria were established primarily as a tool for evaluating long-term discharges from industrial point sources, not for assessing intermittent releases from dredged material discharge operations or long-term releases from discharged sediments. However, they provide a protective set of guidelines for use in assessing the discharge impacts. Parameters without specific EPA criterion were assigned guideline values based on available literature and/or State standards.[15]

16. If a parameter was present at greater levels in the elutriate analyses than in the guidelines and receiving water, dredged material disposal may negatively impact water quality at the disposal site. The mixing zone and environmental characteristics at the disposal site must be taken into consideration to determine the magnitude of the impact.

17. Elutriate and bulk sediment chemical data on the disposal site sediments should be compared to guidelines and navigation channel sediments to determine if there are significant differences in levels of potential contaminants. Those parameters which are readily bioaccumulated, such as certain toxic organic substances, mercury, and lead, are of particular concern during the bulk sediment analyses. The bulk sediment chemical data on any station can also be used to aid in interpretation of elutriate data since certain parameters may be released at high or low levels during an elutriate test even though they are not present in a sediment at such levels. When interpreting the bulk sediment data, it must be remembered that they are representative of the total amounts of the parameters present in the sediment including those bound mineralogically. They are not necessarily a measurement of the amounts which are readily available for chemical reaction and

biological uptake. The elutriate and background data help in predicting these latter potentials.

18. Sediment physical analyses were performed to determine if the sediments met the exclusion criteria set up in Section 227.13(b) of the ocean dumping regulations[16] and Section 230.4-1(b)(1) of the Section 404 regulations.[1] The criteria specify that dredged materials which are composed predominantly of particles of sedimentary material with grain sizes larger than silt do not have to undergo an evaluation of chemical-biological interactive effects. The Portland District, Corps of Engineers, conservatively defines such sediments as those in which at least 80 percent by weight of the particles are larger than silt and in which less than 6 percent organics or volatile solids are present.

19. The grain size of sediments is important in determining both physical and chemical impacts of discharge operations. Fine-grained materials, in comparison to larger grained, tend to adsorb more contaminants; suspend more readily, thus influencing turbidity levels; form fluid mud layers, thus providing unstable benthic habitats; and spread further upon discharge, thus increasing the size of the area initially impacted. Also, deposits of sediments of grain sizes different from those at the receiving site can result in a greatly altered benthic population which may or may not be more productive than the former.

RESULTS AND DISCUSSION

20. Physical Data. Sediments from the navigation channel ranged from sand to silty sand and contained low to moderate levels of volatile solids (figure 2 and table 3).

21. Sediment Chemical Data. The two sediment samples collected underwent analysis for 51 elutriate analyses (table 4) and 40 bulk sediment chemical analyses (table 5). Data obtained on the sediments did not exceed Corps guidelines for either elutriate or bulk sediment analyses. Significant water quality impacts from discharge of the sediments are not expected. Long-term

toxic or bioaccumulative impacts should not occur because the contaminant, silt, and organic content of the sediments are low.

22. Water Quality Data. The DO concentration and temperatures measured at all sites were suitable for survival of adult salmonids. However, DO was present at levels which were considerably below saturation (5.6 versus 9.6 ppm). The ORP data indicated the absence of strongly reducing or oxidizing chemical species. The pH and moderately high ORP levels indicated that water will readily oxidize and precipitate iron and manganese if the parameters are released upon dredged material disposal operations.[10] The pH at all stations fell within the range which was suitable for the survival of both freshwater and marine aquatic life.[8] Turbidity measurements were made with a YSI turbidometer. The data indicated moderately high suspended solids levels which were attributed to the upland disposal facility discharge. Conductivity data indicate that RM 7.5 water was fresh, while RM 0 had a high salt content. The conductivity probe which was used was calibrated to measure saltwater systems. For this reason, RM 7.5 values all measured .001. This is not expected to be an accurate reading.

CONCLUSIONS

23. The sediments in the Coos River navigation channel met the Portland District guidelines which exclude them from requiring a chemical-biological evaluation pursuant to 40 CFR 230.[1] They were composed of less than 20 percent silt and 6 percent volatile solids.

24. Sediments also complied with exemption criteria of Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (PL 92-532) and do not require bioassay/bioaccumulation testing prior to ocean disposal. Use of the sediments for beach nourishment would generally be acceptable since most beach nourishment sites are composed of similar material. Upland disposal site overflows could cause some water quality problems in the receiving water; particularly if the overflow contains high turbidity or low DO and pH levels. Monitoring and management of the disposal facility to prevent the discharge from impacting receiving water must be performed.

25. Of probable greatest importance to the inwater disposal sites ecosystem is the physical impact to benthos which can occur by discharging sediments. There is an immediate, lethal effect on benthos in an area receiving sediments, although various organisms have shown considerable ability to vertically migrate through and survive discharges.[11] This ability is often improved if the sediments discharged are similar to those at the receiving site. The extent of impacts on benthos cannot be determined without an extensive, costly benthic sampling program and test dumps. Given the extent of the impacts expected and the relatively small volume of discharge material, such sampling is not considered economically justified.

26. Both upland and inwater disposal operations may cause negative esthetic impacts by increasing turbidity levels. At an upland disposal site, turbidity can be prevented by using a flocculant or appropriate management techniques and disposal facility designs to decrease the suspended solids levels. Impacts from turbidity at the inwater disposal sites are expected to be minimal and short-term.

27. Potential impacts to municipal water supplies, flow patterns, wildlife sanctuaries or refuges, wetlands, mudflats, vegetated shallows or human use characteristics must be evaluated for each inwater and upland disposal site.

RECOMMENDATIONS

28. The "Guidelines for Specification of Disposal Sites for Dredged or Fill Material," as discussed in 40 CFR 230[1] [12] requires that both Factual Determination and Finding of Compliance documents be prepared for the chemical/biological and physical impacts of dredged material discharge operations. A recommendation for a Finding of Compliance is made for the biological/chemical impacts of discharging sediments dredged from Coos River navigation channel, RM 0 on Coos River to RM 8.0 on South Fork Coos River at designated inwater, upland, and ocean disposal sites. Beach nourishment sites may be used provided that sediments at the sites physically resemble those from the navigation channel. The various disposal operations are subject to the following monitoring, management, and documentation requirements.

29. Dredged sediment discharged at authorized upland sites comply with guidelines provided the disposal facility is managed and monitored to assure that overflow will meet the following water quality requirements:

a. Dissolved oxygen must be a minimum of 5 mg/l and pH must range from 6.5 to 9.0 within an appropriate mixing zone (estimated at 100 feet downstream of the overflow).

b. Turbidity levels in the overflow should not exceed the upstream ambient by more than 50 JTU.

30. Specific disposal sites must undergo a Factual Determination and a Finding of Compliance prior to designation to assure that unacceptable physical impacts from proposed discharge operations will not occur. Additional biological/chemical evaluations may not be necessary unless specific, as yet unidentified, concerns become evident. All disposal sites, and particularly proposed upland areas, must be coordinated with the Oregon State Historic Preservation Officer, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, Oregon Department of Environmental Quality, and any other private or public agency which has expressed interest in such operations.

COOS RIVER NAVIGATION CHANNEL

BIBLIOGRAPHY

1. Federal Register, "Navigable Waters - Discharge of Dredged or Fill Material," Volume 40, Number 173 (Friday, September 5, 1975).

2. U. S. Army Engineer District, "Coos Bay, EIS Supplement," Portland District, U. S. Army Corps of Engineers, Portland, OR (July 1975).

3. Percy, K.L., C. Sutterlin, P.C. Klingeman, and K.L. Percy, Descriptions and Information Sources for Oregon Estuaries, Sea Grant College Program, Oregon State Univ., Corvallis, OR (May 1974).

4. U. S. Army Engineer District, "Channel Maintenance Dredging, Coos Bay Final EIS," Portland District, U. S. Army Corps of Engineers, Portland, OR (August 1976).

5. U. S. Army Engineer District, "Public Notice, NPPND-073, Maintenance Dredging of Coos and Millicoma Rivers, Oregon," Army Corps of Engineers, Portland, OR (20 April 1979).

6. U. S. Army Engineer District, "Supplemental, Interim Procedures for Evaluating and Testing Discharges of Dredged Material," Portland District, U. S. Army Corps of Engineers, Portland, OR (February 1980).

7. U. S. Army Engineer District, "Coos Bay Offshore Disposal Study," Portland District, U. S. Army Corps of Engineers (In Preparation).

8. U. S. Environmental Protection Agency, "Quality Criteria for Water," Washington D.C. (1976).

9. U. S. Environmental Protection Agency, "Quality Criteria Documents: Availability, "Federal Register, Vol. 45, No. 231 (Friday, November 28, 1980).

10. Collins, J.F., and S.W. Buol, "Effects of Fluctuations in the Eh-pH Environment on Iron and/or Manganese Equilibria," Soil Science, Vol. 110, No. 2 (1970).

11. Maurer, D.L., R.T. Keck, J.C. Tinsman, W.A. Leathem, C.A. Wethe, M. Huntzinger, C. Lord, and T.M. Church, "Vertical Migration of Benthos in Simulated Dredged Material Overburdens," U.S. Army Engineers Waterways Experiment Station, Tech. Rpt. D-78-35, Vicksburg, MS (June 1978).

12. Federal Register, "Guidelines for Specification of Disposal Sites for Dredged or Fill Material," Vol. 40, No. 249 (Wednesday, December 24, 1980).

13. Rinella, Frank A. and Greg Fuhrer, "Native Water, Bottom Material, and Elutriate Analyses of Selected Estuaries and Rivers in Western Oregon and Washington," U.S. Geological Survey, Open File Report 81- (In Review).

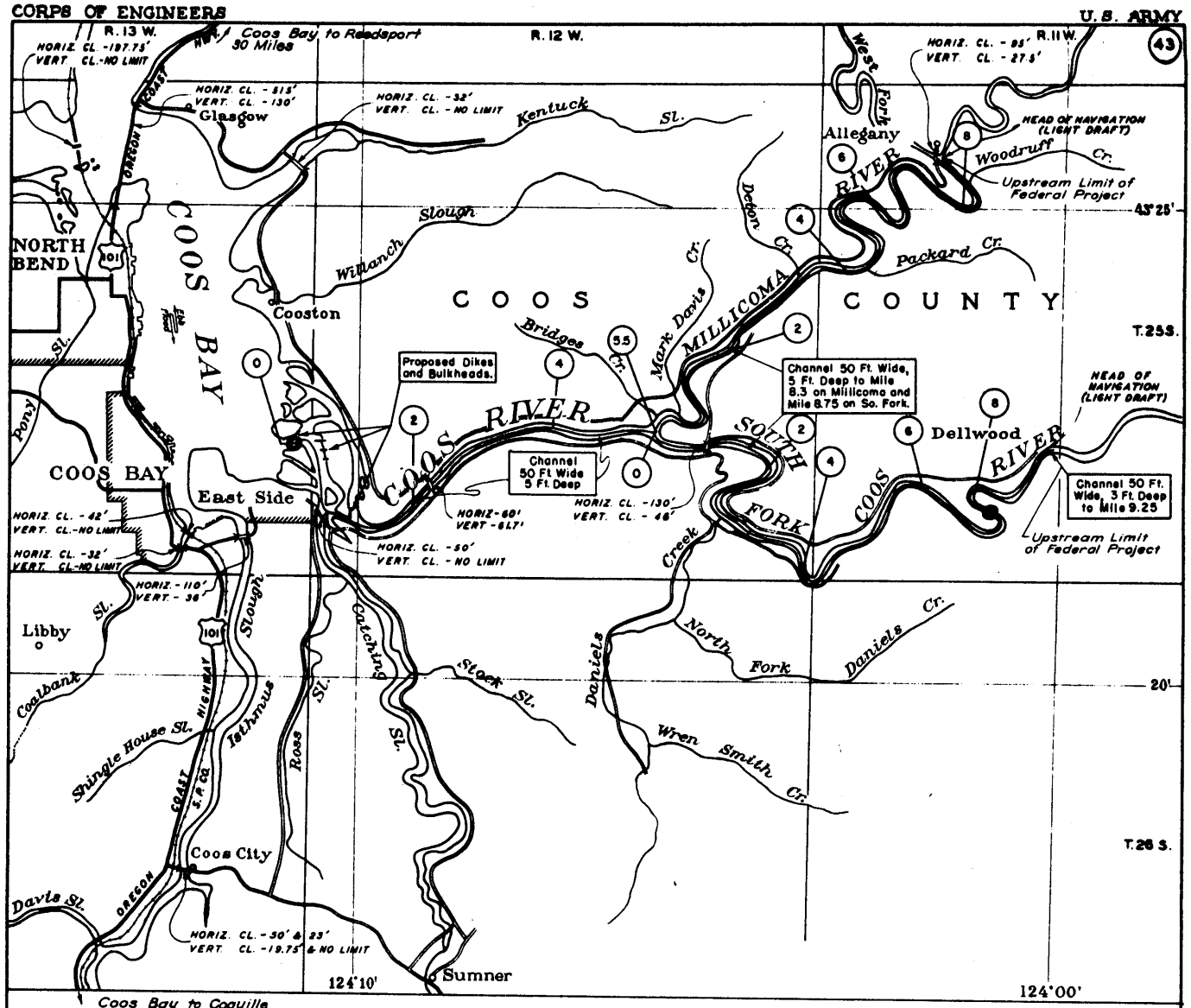
14. American Public Health Association, American Water Works Association, and Water Pollution Control Federation, Standard Methods for the Examination of Water and Wastewater, 14th Edition, American Public Health Association, Washington, D.C. (1976).

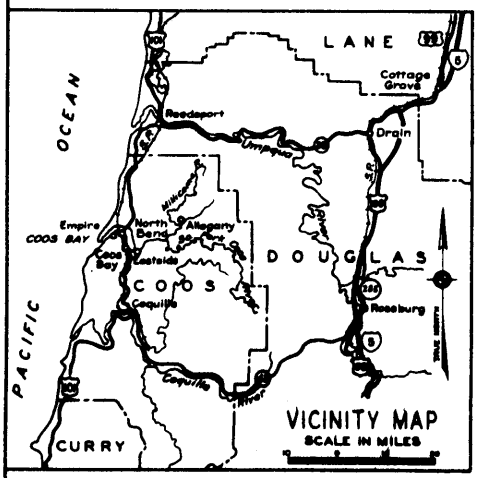
15. Department of Environmental Quality, "Regulations Relating to Water Quality Control in Oregon," Sections from Oregon Administrative Rules, Chapter 340, State of Oregon (Current as of September 15, 1977).

16. U.S. Environmental Protection Agency and U.S. Army Corps of Engineers, "Ecological Evaluation of Proposed Discharge of Dredged Material into Ocean Water," U.S. Army Engineers Waterways Experiment Station, Vicksburg, MS (July 1977).

CORPS OF ENGINEERS

U.S. ARMY





TRUE NORTH

Data within boxes pertain to Authorized Project.

Mile 0 of Coos River is approximately 14 miles upstream from Coos Bay entrance. Mile 5.5 of Coos River is Mile 0 of Millicoma and South Fork Coos River.

LEGEND

Receiving Water and Sediment Sampling Locations

COOS AND MILLICOMA RIVERS, OREGON

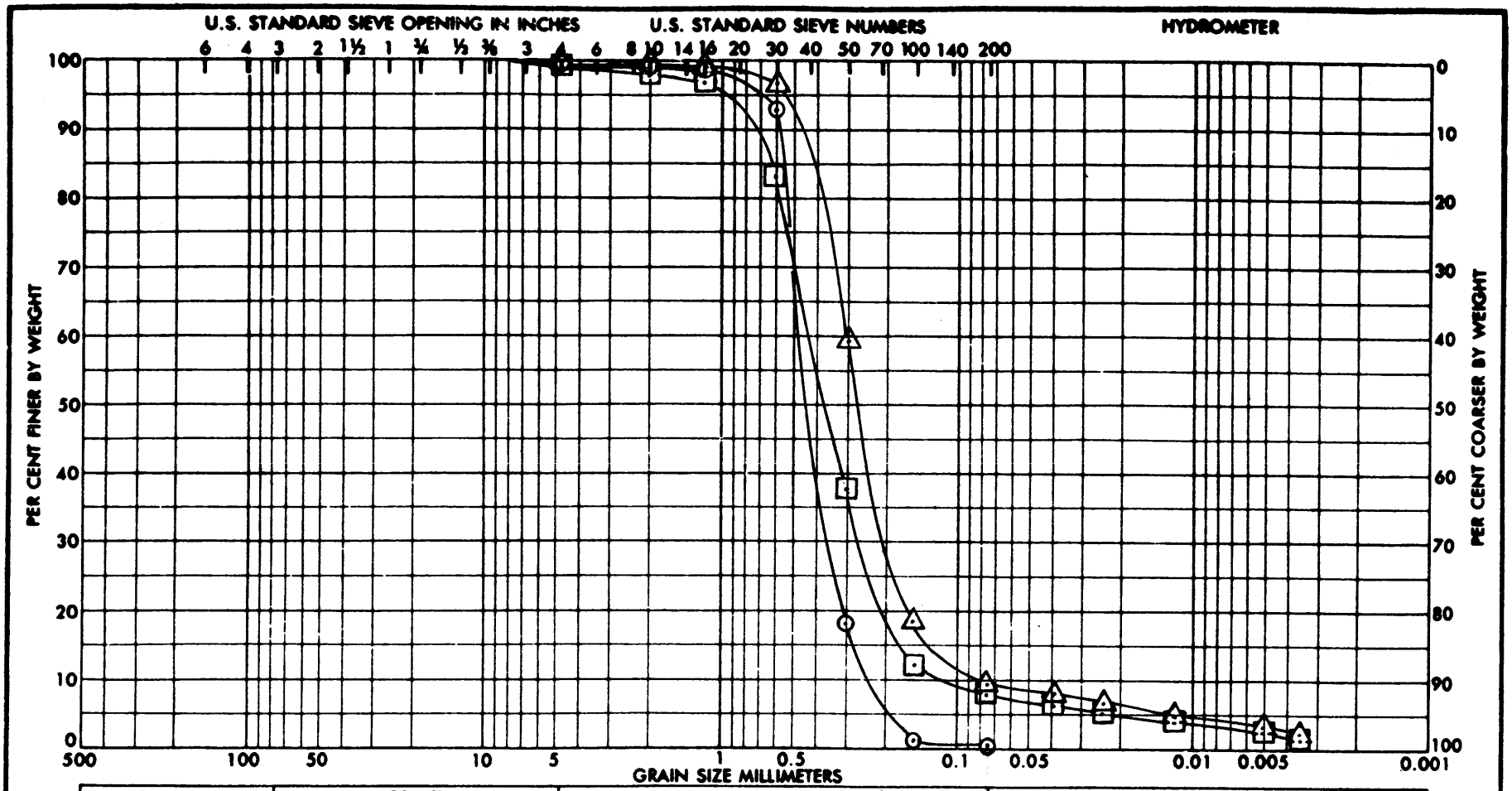
SCALE IN MILES

0 1 2 3

U.S. ARMY ENGINEER DISTRICT, PORTLAND

DRAWN BY C.S. REVISED NOV. 1976

FIGURE 1



	SAMPLE NO.	[illegible]	CLASSIFICATION	NAT W%	LL	PL	PI
⊙	Mouth	25 Sep 80	(1445) SAND (SP)				
△	RM-7	25 Sep 80	(1200 Si. SAND (SP-SM)				
□	RM-7.5	25 Sep 80	Si. SAND (SP-SM)				

GRADATION CURVES NPD

PROJECT RIVER/COASTAL SEDIMENT ANALYSIS

AREA Coos River

BORING NO.

DATE 28 Jan 81 (81-S-816)

ENG FORM 2087
1 MAY 63

REPLACES WES FORM NO. 1241, SEP 1962, WHICH IS OBSOLETE.

U.S. GOVERNMENT PRINTING OFFICE : 1963 O—700-126

FIGURE 2

TABLE 1

Coos River Navigation Channel

Purpose of Sampling 404

Date September 25, 1980 Wind 0 - 15 mph from NW

Water Conditions (Wave heights & Direction, Tides, Currents) Smooth

Weather Cloudless, 75° Sampling Vessel Fort Stevens

Sampling Personnel Pam Moore, Bob Christensen, Phil Livingstone, Art Sampling Gear Corer, Ponar Ellard

Analytical Laboratory USGS - Portland and Denver

Comments (Wildlife, Sampling Difficulties, etc.) Got numerous turbidity around weir discharge. Water from both was connected with 8L Van Dorn

Station	Depth	Sampling Time	Sampling Methodology	Sampling Description
RM 7	3-4'	1100	Corer	- 1/2 core & then core sleeve broke
(opposite				
upland dis-				
posal site)		1150	Hand cored	Hammered core in at 1 1/2' depth
	2'		Van Dorn (8 liter)	Water Sample
Mouth	18'	1500	Ponar	Used Ponar for chemical sample
			Ellard	Used small Ellard for grain size
	15'		Van Dorn (8 liter)	Water Sample

TABLE 2

WATER QUALITY DATA
Coos River Navigation Channel, River Mile 7

DATE: 25 Sep 80 SAMPLING PERSONNEL: Pam Moore, Bob Christensen
Phil Livingstone

WEATHER CONDITIONS: Cloudless, 75° F

COMMENTS: (Wildlife, vessel traffic, completion status of training jetty, sampling gear difficulties, sampling vessel, etc.): Testing was done during hydraulic dredging operation. Overflow and ambient conditions were tested. Turbidity of discharge was monitored.

Parameter	Upstream of Dredge RM 7	Weir	Opposite Weir	Transect across river from discharge 4'	15'	20'	35'	40'	50'	Downstream of discharge 500'-midstream
Depth, meters	Surface	In Out-flow	Bottom 2.7 m	Surface	Surface	Surface	Surface	Surface	Surface	
Dissolved Oxygen, mg/l	5.77	5.81	5.33							
Conductivity, mmho/cm	.001	.001	.001							
ORP	159	210	213							
Temperature, 0° C.	17.3	17.8	17.6							
pH	6.62	6.58	6.56							
Turbidity, NTU	43			170	30	42	38	31	33	52*
Time	1245									

* During hightide. Flow went upstream.

TABLE 2 (cont.)

WATER QUALITY DATA
Coos River Navigation Channel, Mouth

DATE: 25 Sep 80 SAMPLING PERSONNEL: Pam Moore, Bob Christensen
Phil Livingstone

WEATHER CONDITIONS: Cloudless

COMMENTS: (Wildlife, vessel traffic, completion status of training jetty, sampling gear difficulties, sampling vessel, etc.):

Parameter	STATION	
Depth, meters	Surface	Bottom 18'
Dissolved Oxygen, mg/l	8.09	9.72
Conductivity, mmho/cm	.489	.495
ORP	246	243
Temperature, °C.	16.4	16.0
pH	7.78	7.82
Turbidity, NTU		6
Time	1500	1505

TABLE 3

PHYSICAL SEDIMENT ANALYSIS
Coos River Navigation Channel

Sample Identification	Specific Gravity of Water	Density of Matl. in place gms/liter	Density of Median Solids gms/liter	Void Ratio	% Volatile Solids	Roundness Grade
Coos River Mouth 25 September 1980 (1445)	*1.000	1937	2663	0.77	1.45	Subangular to Subrounded
Coos River R.M. 7 25 September 1980 (1200)	*1.000	1842	2655	0.96	2.19	Subangular to Subrounded
Coos River R.M. 7.5 25 September 1980	*1.000	1682	2546	1.27	8.79	Subangular to Subrounded

* Distilled water used to saturate sample.

TABLE 4
Elutriate and Receiving Water Chemical Data
Coos River Federal Navigation Channel
September 1980

PARAMETERS	RM 0* RW	RM 0* SWE	RM 7.5** RW	RM 7.5** FWE	FWE/SWE GUIDELINES
Arsenic, ug/l	1	1	1	1	440/508
Barium, ug/l	100	200	10	30	
Beryllium, ug/l	10	10	1	1	130/
Cadmium, ug/l	0	2	2	1	1.5/59
Carbon, Organic, mg/l	2.2	3.1	2.8	3.2	
Chromium, ug/l	1	0	0	0	2200/
Copper, ug/l	3	2	2	1	12/
Cyanide, ug/l	1	1	1	1	52/30
Iron, ug/l	150	140	110	30	1,000/
Lead, ug/l	4	0	4	1	74/668
Manganese, ug/l	50	50	20	350	/100
Mercury, ug/l	.2	.1	0.0	0.0	4.1/3.7
Nickel, ug/l	0	11	0	0	1,100/140
Nitrogen, Ammonia mg/l	.15	.17	.01	.13	
Nitrogen, Organic mg/l	.34	.87	.32	.43	
Ammonia, Unionized mg/l	*** .02	.02	.001	.002	.02
Phenolics, ug/l	6	13	3	118	10,200/5,800****
Phosphorus, Total ug/l	88	93	45	52	100/
Orthophosphate, ug/l	80	67	30	30	
Zinc, ug/l	60	40	10	9	180/170
Aldrin, ug/l	0.00	0.00	0.00	0.00	3.0/1.3
Ametryne, ug/l	0.0	0.0	0.0	0.0	
Atratone, ug/l	0.0	0.0	0.0	0.0	
Atrazine, ug/l	0.0	0.0	0.0	0.0	
Chlordane, ug/l	0.0	0.0	0.0	0.0	2.4/.09
Cyanazine, ug/l	0.0	0.0	0.0	0.0	
Cyprazine, ug/l	0.0	0.0	0.0	0.0	
DDD, ug/l	0.00	0.00	0.00	0.00	
DDE, ug/l	0.00	0.00	0.00	0.00	1,050/14.0
DDT, ug/l	0.00	0.00	0.00	0.00	1.1/.13
Dieldrin, ug/l	0.00	0.00	0.00	0.00	2.5/.71
Endosulfan, ug/l	0.00	0.00	0.00	0.00	.22/.034
Endrin, ug/l	0.00	0.00	0.00	0.00	.18/.037
Hept Epox, ug/l	0.00	0.00	0.00	0.00	
Heptachlor, ug/l	0.00	0.00	0.00	0.00	.50/.053
Lindane, ug/l	0.00	0.00	0.00	0.00	2.0/.004
Methoxychlor, ug/l	0.00	0.00	0.00	0.00	.03/.03
Mirex, ug/l	0.00	0.00	0.00	0.00	.001/.001
PCB, ug/l	0.0	0.0	0.0	0.0	2.0/10.0
PCN, ug/l	0.0	0.0	0.0	0.0	
Perthane, ug/l	0.00	0.00	0.00	0.00	
Prometone, ug/l	0.0	0.0	0.0	0.0	
Prometryne, ug/l	0.0	0.0	0.0	0.0	
Propazine, ug/l	0.0	0.0	0.0	0.0	
Silvex, ug/l	0.00	0.00	0.00	0.00	
Simazine, ug/l	0.0	0.0	0.0	0.0	
Simetone, ug/l	0.0	0.0	0.0	0.0	
Simetryne, ug/l	0.0	0.0	0.0	0.0	
Toxaphene, ug/l	0.0	0.0	0.0	0.0	1.6/.07
2, 4-D, ug/l	0.00	0.00	0.00	0.00	
2, 4-DP, ug/l	0.00	0.00	0.00	0.00	
2, 4, 5-T, ug/l	0.00	0.00	0.00	0.00	

* - RM 0 on Coos River

** - RM 7.5 on South Branch Coos River

*** - Rough estimates extrapolated from tables in EPA's "Quality Criteria for Water."[5]

**** - These criteria for phenolics were established for phenol. However, the phenolics analysis also measures larger compounds which contain phenol.

RW - Receiving Water

ug/l = micrograms per liter

mg/l = milligrams per liter

FWE - Elutriate performed using fresh water from South Branch Coos River

SWE - Elutriate performed using saltwater from RM 0, Coos River

TABLE 5
Bulk Sediment Chemical Analyses
Coos River Federal Navigation Channel
September 1980

	RM 7.5	RM 1	Corps Guidelines
Aldrin, ug/kg	0.0	0.0	10,000
Arsenic, ug/g	1	0	3-8
Barium, ug/g	30	15	20-60
Beryllium, ug/g	0	0	10
Cadmium, ug/g	0	1	6
Carbon, In. g/kg	0.0	0.0	
Carbon, Org. g/kg	5.8	2.3	60
Carbon, Tot., g/kg	5.8	2.3	60
Chlordane, ug/kg	0	0	10,000
Chromium, Tot. ug/g	22	14	25-75
Copper, ug/g	7	4	25-50
Cyanide, ug/g	0	0	.25
DDD, ug/kg	0.0	0.0	10,000
DDE, ug/kg	0.0	0.0	10,000
DDT, ug/kg	0.0	0.0	10,000
Dieldrin, ug/kg	0.0	0.0	10,000
Endosulfan, ug/kg	0.0	0.0	10,000
Endrin, ug/kg	0.0	0.0	10,000
Hept Epox, ug/kg	0.0	0.0	10,000
Heptachlor, ug/kg	0.0	0.0	10,000
Iron, ug/g	12000	6300	17,000-25,000
Lead, ug/g	10	10	40-60
Lindane, ug/kg	0.0	0.0	
Manganese, ug/g	110	130	300-500
Mercury, ug/g	0.01	0.03	1
Mirex, ug/kg	0.0	0.0	10,000
Methoxychlor, ug/kg	0.0	0.0	10,000
Nickel, ug/g	10	10	20-50
Nitrogen, NH_4 AS N mg/kg	0.0	0.0	
Nitrogen, NH_4+Org -N mg/kg	180	90	1,000-2,000
PCB, ug/kg	0	0	10,000
PCN, ug/kg	0	0	10,000
Perthane, ug/kg	0.0	0.0	10,000
Phosphorus, Tot-P mg/kg	420	300	420-650
Silvex, ug/kg	0	0	10,000
Toxaphene, ug/kg	0	0	10,000
Zinc, ug/g	37	24	90-200
2, 4-D, ug/kg	0	0	10,000
2, 4-DP, ug/kg	0	0	10,000
2, 4, 5-T, ug/kg	0	0	10,000