

CENPS-OP-DMMO

MEMORANDUM FOR RECORD

10 June 1996

SUBJECT: DETERMINATION ON THE SUITABILITY OF DREDGED MATERIAL TESTED FOR THE INNER CHANNEL OF GRAYS HARBOR OPERATION AND MAINTENANCE DREDGING PROJECT (PN: CENPS-OP-NP-71, DATED 15 OCTOBER 1990) FOR DISPOSAL AT EITHER THE SOUTH JETTY OR POINT CHEHALIS ESTUARINE OPEN WATER DISPOSAL SITES, OR AT THE 3.9-MILE OCEAN DISPOSAL SITE.

1. The following summary reflects the consensus determination of the Agencies (U.S. Army Corps of Engineers, Department of Ecology, Department of Natural Resources, and the Environmental Protection Agency) with jurisdiction over dredging and disposal on the suitability of the estimated 2,120,000 cubic yards of material scheduled for maintenance dredging from the federally maintained inner channel, Grays Harbor, Washington, for disposal at either the South Jetty or Point Chehalis estuarine disposal sites, or at the 3.9-mile ocean disposal site. The determination of suitability is based on the acceptability of the sampling plan and all relevant test data contained in the 31 May 1996 SAIC Data Summary Report.

2. The Agencies' approved sampling and analysis plan for testing the inner harbor dredging area was followed, and quality assurance/quality control guidelines specified by the Grays Harbor/Willapa Bay dredged material management plan sampling and testing guidelines were generally complied with. The data gathered were deemed sufficient and acceptable for decision-making by the Agencies based on best professional judgement.

Table 1. Regulatory Tracking Dates

SAP Approval date	February 15, 1996
Sampling date(s)	February 13, 1996
Data report submittal date	May 31, 1996
Recency Determination Dates:	
Federal O&M: Low Rank (6 years)	February 2002

2. Previous testing in 1992 and 1994 from eight and nine composited analyses, respectively, stratified within shoaled areas from all five inner channel reaches in 1992 and three of the five reaches (excluding Elliott Slough Turning Basin and Crossover) in 1994, showed the O&M material to be suitable for unconfined open-water disposal. Chemical testing data from 1992 analyses showed that only two of the eight DMMU had minor detected chemical exceedances of PSDDA screening level (SL) guidelines (1992 SDM), and none of the nine DMMU in 1994 had any detected or undetected exceedances of screening levels for chemicals of concern.

Table 2. Summary of Sampling and Compositing, Dredging and Disposal Alternatives within each Inner Channel Reach for the Grays Harbor O&M Project.

Channel Reach	Estimated Volume (cubic yards)	Samples no. ID	Composite ID	Dredge Method / Disposal Alternative
Bar	250,000	none	no test ¹	Government Hopper / South Beach berm/ 3.9 mile ocean site
Entrance	150,000	none	no test ¹	Government Hopper / Halfmoon Bay berm or gully, South Jetty
Inner South Reach	150,000	none	no test ¹	Clam Shell/Point Chehalis
Outer South Reach	250,000	none	no test ¹	Clam Shell / Beach fill
Crossover	150,000 (total: 300,000)	51 - 69	C7, C8, C9	Clam Shell / Pt. Chehalis
North Channel	200,000	not sampled	not sampled	Clam Shell / South Jetty, Pt. Chehalis
Hoquiam	100,000	not sampled	not sampled	Clam Shell / South Jetty, Pt. Chehalis
Cow Point	325,000 (total: 650,000)	1 - 41	C2, C3, C4, C5, C6	Clam Shell / South Jetty, Pt. Chehalis
Elliott Slough Turning Basin	70,000	42 - 50	C1	Clam Shell / South Jetty, Pt. Chehalis
TOTALS	2,120,000	69	9	

¹/meets exclusionary criteria outlined in 40 CFR 230.60(a),(b),(c), and (d) of the Clean Water Act (CWA).

3. The 1996 sampling and compositing strategy (Table 2) consisted of targeting shoaled upstream areas within each of the dredging areas excluding areas previously sampled during 1994 consistent with the approach outlined in the 1995 Grays Harbor/Willapa Bay dredged material management plan. The sampling targeted approximately one-third of the total dredging volume (total = 1.32 million cubic yards) from shoaled areas to be dredged within the five reaches of the inner channel (total characterized volume = 545,00 cubic yards). A total dredging volume of 2.12 million cubic yards is estimated when including the material from the bar, entrance channel, and inner and outer reaches.

4. Sampling in 1996 consisted of compositing 69 samples for nine analyses within shoaled areas within Cow Point, Elliott Slough Turning basin, and Crossover as depicted in Table 2 and Figures 1-2. In addition to the 56 chemicals of concern routinely analyzed under the Grays

Harbor/Willapa Bay DMMP (dredged material management plan), congeners of dioxin including 2,3,7,8-TCDD were quantified.

5. Sediment conventional parameters for each of the nine composited analyses are depicted in Table 3. Chemical analyses conducted on the nine composited samples indicated that there were no detected or undetected exceedances of screening levels for all 56 chemicals of concern. Grays Harbor SL's are used to establish a concern for biological effects, where chemicals below the SL have a low level of concern.

Table 3. Sediment Conventional Parameters for all nine dredged material management units and reference sediment.

Parameter	Elliott Slough Turning Basin	Cow Point Reach					Crossover Reach			Reference GHS7
	C1	C2	C3	C4	C5	C6	C7	C8	C9	
GrainSize:										
% Gravel	0.6	0.6	0	0.2	0.4	0.7	1.2	0.6	0.7	0.4
% Sand	49.6	48.0	23.3	22.7	24.8	21.2	63.8	55.4	60.5	53.0
% Silt	36.8	39.9	58.5	61.0	57.9	61.8	25.3	31.0	27.7	33.4
% Clay	13.1	11.4	18.2	16.1	16.8	16.3	9.9	12.9	11.1	13.2
% Fines	49.9	51.3	76.7	77.1	74.7	78.1	35.2	43.9	38.8	46.6
% Fines (wet sieve)	63	56	78	79	75	69.5	43	53	49	63/54
Total Solids, %	53.8	48.9	42.2	44.9	44.8	40.6	55.0	52.9	57.4	53.4
Volatile Solids, %	5.7	6.6	7.3	6.8	7.2	8.6	5.0	4.9	4.2	4.7
Total Organic Carbon, %	1.6	1.7	2.1	1.9	1.9	2.5	1.4	1.2	1.3	1.2
Total Sulfides, mg/kg	43	2.2u	5.2	7.1	65	5.7	4.7	6.6	4.0	5.8
Total Ammonia, mg/kg	52	22	33	29	27	21	20	16	13	6.4

6. Nine composited sediment samples were also analyzed for dioxins by Maxim Technologies, Inc., utilizing EPA method 8290. These data are summarized in Table 4. Results indicated that 2,3,7,8-TCDD (Tetrachloro-Dibenzo-p-Dioxin) was detected in all nine samples ranging from a low of 1.2 to a high of 3.6 ppt (parts per trillion). This congener is regarded by the EPA as the most toxic form of dioxin. A few other less toxic dioxin congeners were detected at low parts per trillion concentrations. In the following table, the toxicity equivalence in terms of 2,3,7,8-TCDD is shown for the nine most toxic congeners of furan and dioxin ('u' expresses the detection limit for congeners that could not be quantified).

7. One way to summarize potential toxicity for mammals is to calculate the toxicity equivalent concentrations (TEC) measured in tissue. Total TEC is calculated by multiplying the toxicity equivalent factor (TEF) by the congener-specific concentration and summing the TEC's for all congeners. Total TEC comparisons are usually used for food ingestion, and have limited applicability to sediment because TEC does *not* consider the relative bioavailability of the congeners. Accordingly, TEC overstates toxicity to mammals when applied to sediments. TEC as a toxicity measure does not apply to fish, shellfish or birds. For comparison purposes only, the TEC's ranged from a low of 3.7 to a high of 9.4 pptr.

8. Based on the Agencies' present best professional judgment, these low concentrations are unlikely to be environmentally harmful for this project. The Agencies' consensus is that the material is suitable for either estuarine or ocean unconfined open-water disposal relative to these dioxin test results.

9. Two DMMU, C3 and C4, underwent biological testing after chemical analyses were completed and reviewed by the Agencies. Chemical analyses for these two DMMU showed no chemical guideline exceedances, and the two DMMU were selected by the Dredged Material Management Office in consultation with the Agencies for biological testing based on the conceptual sampling and analysis plan for confirmatory analyses. The results of these analyses are summarized in Table 5 below. The results showed that for the two DMMU tested, biological testing results passed Grays Harbor disposal site interpretation guidelines for dispersive sites for the echinoderm sediment larval test, amphipod test, and the *Neanthes* 20-day growth test. Based on the results of the amphipod, echinoderm and *Neanthes* bioassays, these two DMMU passed Grays Harbor open-water dispersive disposal guidelines.

10. Based on the chemistry and biological testing results described above, no bioassay or bioaccumulation testing were required for the remaining seven DMMU.

11. The Agencies concluded, based on the above discussion and summary of sediment chemical and biological characterization results for the inner harbor of the Grays Harbor Operations and Maintenance Project, that all the dredged material tested (545,000 cubic yards) is suitable for disposal at either the South Jetty or Point Chehalis estuarine disposal sites, or at the 3.9-mile ocean disposal site.

Table 4. Native congeners of Dioxin quantitated in Grays Harbor O&M sediments.

NATIVE CONGENERS ¹ (ppt)	TEF ²	C1 (TEC)	C2 (TEC)	C3 (TEC)	C4 (TEC)	C5 (TEC)	C6 (TEC)	C7 (TEC)	C8 (TEC)	C9 (TEC)
2,3,7,8-TCDD	1	1.6	2.0	2.6	3.6	2.3	1.8	1.2	1.3	1.2
1,2,3,7,8-PeCDD	0.5	2.5 (1.25)	3.3 (1.65)	4.3 (2.15)	5.2 (2.6)	4.1 (2.05)	4.08 (2.04)	1.8 (0.9)	2.2 (1.1)	1.6 (0.8)
1,2,3,7,8-HxCDD	0.1	7.7 (0.77)	10.08 (1.0)	14.09 (1.4)	17.07 (1.7)	14.0 (1.4)	10.26 (1.03)	6.26 (0.626)	7.1 (0.71)	5.6 (0.56)
1,2,3,4,7,8-HpCDD	0.01	29.0 (0.29)	27.0 (0.27)	49.0 (0.49)	40.0 (0.4)	36.0 (0.36)	26.0 (0.26)	16.0 (0.16)	23.0 (0.23)	19.0 (0.19)
OCDD	0.001	220 (0.22)	170 (0.17)	490 (0.49)	240 (0.24)	230 (0.23)	170 (0.17)	100 (0.10)	120 (0.12)	120 (0.12)
2,3,7,8-TCDF	0.1	1.1 (0.11)	0.69 (0.069)	1.2 (0.12)	1.0 (0.1)	0.99 (0.099)	0.88 (0.088)	0.96 (0.096)	0.85 (.085)	0.96 (.096)
1,2,3,7,8-PeCDF	0.05	5.1u (0.127)	7.2u (0.18)	7.7u (0.19)	7.1u (0.177)	7.9u (0.197)	6.9u (0.173)	5.5u (0.137)	0.49u (0.01)	5.0u (0.125)
2,3,4,7,8-PeCDF	0.5	1.9u (0.475)	0.46u (0.115)	0.65 (0.325)	0.98u (0.245)	1.2u (0.3)	0.63 (0.315)	0.89u (0.222)	1.5u (0.375)	1.6u (0.5)
1,2,3,7,8-HxCDF	0.1	2.93 (0.293)	2.05 (0.205)	2.47 (0.247)	2.76 (0.276)	2.55 (0.255)	1.89 (0.189)	1.99 (0.199)	2.6 (0.26)	5.6u (0.28)
1,2,3,7,8-HpCDF	0.01	10.9 (0.109)	7.75 (0.078)	11.38 (0.114)	9.17 (0.09)	9.55 (0.095)	7.9 (0.79)	6.15 (0.061)	6.3 (0.063)	6.3 (0.03)
OCDF	0.001	14 (0.014)	11 (0.011)	38 (0.038)	17 (0.017)	18 (0.018)	13 (0.013)	7.7 (0.008)	11 (0.01)	10 (0.01)
TOTALS:		5.3	5.7	8.2	9.4	7.3	6.9	3.7	4.26	3.9

¹ TCDD = Tetrachlorodibenzodioxin TCDF = Tetrachlorodibenzofuran
 PeCDD = Pentachlorodibenzodioxin PeCDF = Pentachlorodibenzofuran
 HxCDD = Hexachlorodibenzodioxin HxCDF = Hexachlorodibenzofuran
 HpCDD = Heptachlorodibenzodioxin HpCDF = Heptachlorodibenzofuran
 OCDD = Octachlorodibenzodioxin OCDF = Octachlorodibenzofuran

² Toxicity Equivalent Factor

Table 5. Biological Testing Summary.

STATION	Amphipod Mortality (%)	Echinoderm		20-day <i>Neanthes</i> Growth		
		Mort.+Abnorm. (%)	Abnormality (%)	Mortality (%)	Growth (mg/ind/day, dry wgt.)	Growth % of reference
Control	10	20.7	12.7	0.0	0.7 mg, initial wgt 1.0	124.8
GHS7 Reference	20	31.4	5.7	0.0	0.83	-
C3	12	25.1	4.6	0.0	0.96	115.7
C4	20	30.6	9.2	0.0	0.97	116.9
Reference toxicant Lab Performance and/or DAIS (Mean ± SD)	96 hr LC50 0.56 mg/l Cd (DAIS: Cd 0.49 ± 0.42 mg/L)	72 hr EC50 = 5.24 mg/l Cd 11.7 ± 4.75 µg/L EC50 (Mean Lab Performance)		96 hr LC50 = 17.7 mg/l Cd 6.18 ± 1.95 mg/L Cd (Mean Lab Performance)		

* Significantly different from reference sediment ($p \leq 0.05$).

15. This memorandum documents the suitability of proposed dredged sediments for unconfined open-water disposal at either a DNR estuarine disposal or EPA ocean disposal site. This memorandum also documents agency determinations on the suitability of dredged sediments from the outer harbor for placement at the Westport, Washington breached spit site. It does not constitute final agency approval of the project. During the public comment period, which follows this public notice, the resource agencies will provide input on the overall federal project. A final decision will be made after full consideration of agency input, and after an alternatives analysis is done under Section 404 (b)(1) of the Clean Water Act.

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Concur:

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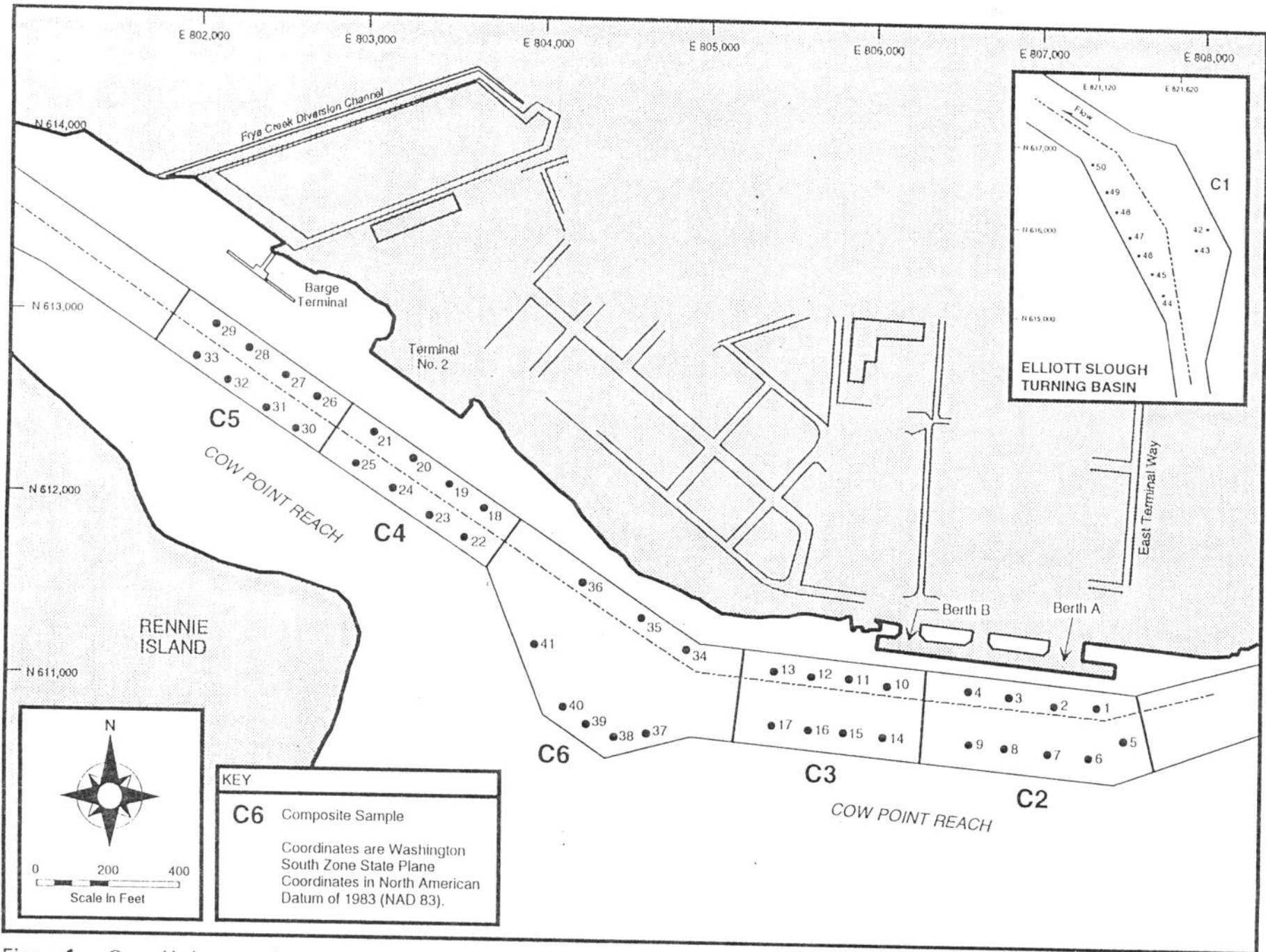


Figure 1. Grays Harbor sampling locations and corresponding composites in Cow Point Reach.

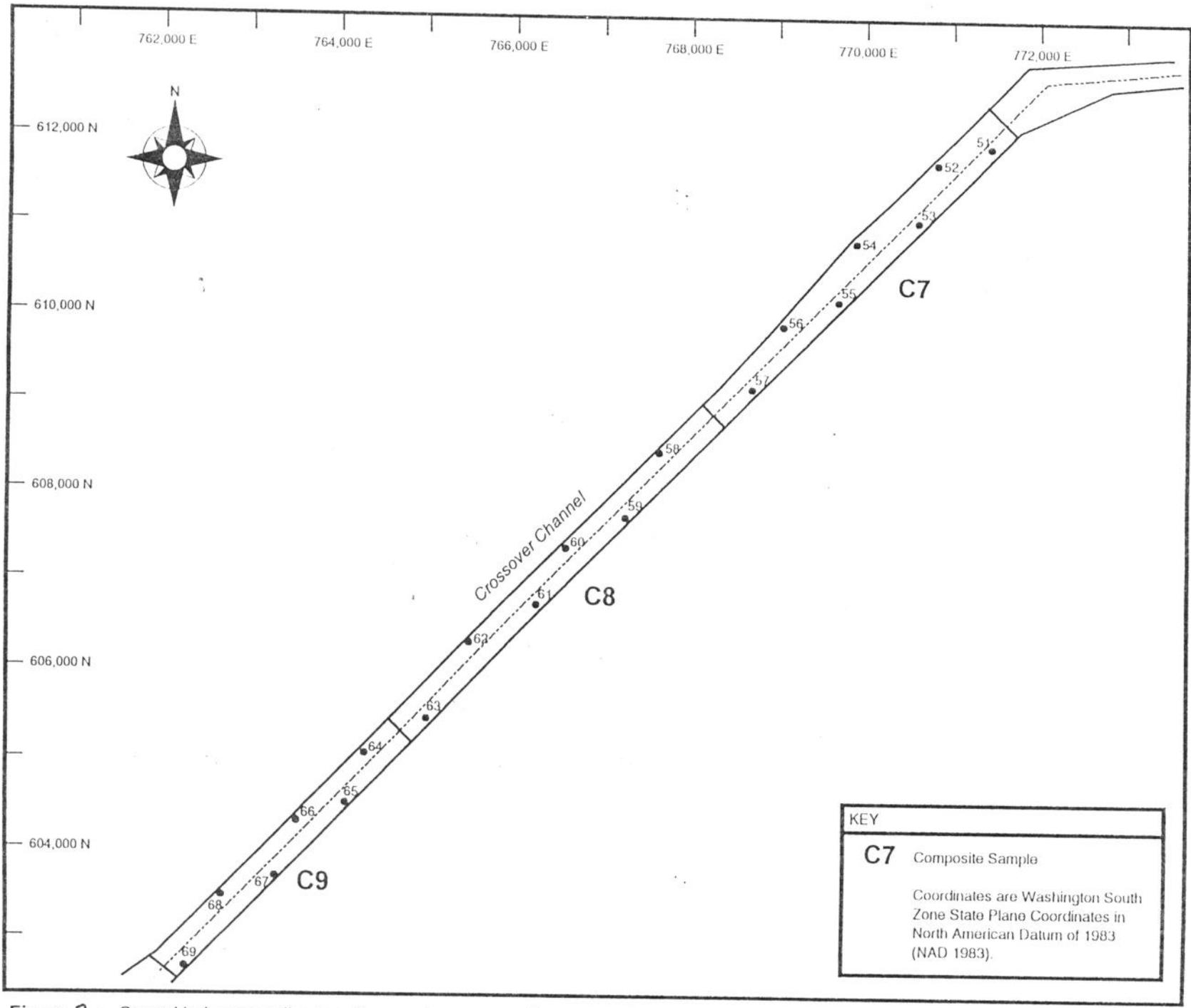


Figure 2. Grays Harbor sampling locations and corresponding composites in Crossover Reach.