



**US Army Corps
of Engineers®**
Portland District

**UMPQUA FEDERAL CHANNEL,
WINCHESTER BAY and
GARDINER CHANNEL
SEDIMENT QUALITY EVALUATION
REPORT**



August 2006

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UMPQUA FEDERAL CHANNEL SEDIMENT QUALITY EVALUATION

Sampled August 29-30, 2006

EPA	Environmental Protection Agency
USACE	U.S. Army Corps of Engineers
ODEQ	Oregon Department of Environmental Quality
DMEF	Dredge Material Evaluation Framework
NES	Newly Exposed Surface
QA/QC	Quality Assurance/Quality Control
TOC	Total Organic Carbon
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
MDL	Method Detection Limit
PQL	Practical Quantitation Limit
MRL	Method Reporting Limit
TVS	Total Volatile Solids
ND	non-detect
ppm	parts per million – mg/kg
ppb	parts per billion – ug/kg & ug/L
pptr	parts per trillion – ng/kg
SL	Screening level
As	Arsenic
Cd	Cadmium
Ni	Nickel
Cu	Copper
Sb	Thallium
Cr	Chromium
Pb	Lead
Hg	Mercury
Ni	Nickel
Ag	Silver
Zn	Zinc
ID	Identification Number
P	Ponar (sediment surface grab sampler)
HC	Hand Core (hand push tube sediment sampler)
BC	Boxcore sediment sampler (surface)
VC	Vibra-core sediment sampler
GC	Gravity-core sediment sampler
RMT	Regional Management Team (Corps-NWP, EPA, ODEQ)
NWP	US Army Corps of Engineers, North Western (Division) Portland District
SEF	Sediment Evaluation Framework

Note: This Umpqua River Sediment Quality Evaluation Report was reviewed by the Regional Sediment Evaluation Team (RSET) in accordance with the DMEF (1998) and the SEF (2006). The RSET consists of Portland District Corps of Engineers, EPA, NMFS, USF&W and ODEQ personnel. All comments received have been incorporated into the report and will be considered final at the end of the review period, February 2007.



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ABSTRACT

This evaluation was conducted following procedures set forth in the Upland Testing Manual Ocean Testing Manual and Inland Testing Manual, developed jointly by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency to assess dredged material. Guidelines used are those developed to implement the Clean Water Act and Marine Protection, Research and Sanctuaries Act. These national guidelines and associated local screening levels are those adopted for use in the regional Dredge Material Evaluation Framework (DMEF), November 1998. Also included for reference are screening levels from the Sediment Evaluation Framework 2006.

On August 29-30, 2006 a total of eighteen (18) samples were collected from the Umpqua River Main Channel, Winchester Bay and Gardiner Channel. All eighteen (18) samples were submitted for physical analyses including total volatile solids. Seven (7) of the eighteen (18) samples were, also, analyzed for metals (9 inorganic), total organic carbon, pesticides and polychlorinated biphenyls, phenols, phthalates, miscellaneous extractables, polynuclear aromatic hydrocarbon, with six (6) samples selected for both total sediment (bulk) and pore-water organotin, although only bulk analyses were conducted due to lack of pore-water volume.

The physical analyses resulted in mean values of 0.37% gravel (shell hash - 0.0%-1.2% range), 76.0% sand (15.0%-98.4% range), and 23.7% silt/clay (1.3%-84.9% range), with 6.82% volatile solids (1.67%-13.2% range only measured on ten (10) of the eighteen (18) samples.

The chemical analyses indicated only very low levels of contamination in any of the samples, with all levels below their respective DMEF and SEF screening levels (SLs). No PCBs or chlorinated hydrocarbons were found at the MDL in any of the samples. Several metals, organotins, pesticides, phthalates, miscellaneous extractables, phenols and low and high molecular weight PAHs were detected but at low levels. Detection levels were sufficient to evaluate material proposed for dredging. The analytical results of this characterization are consistent with historical data. Material represented by all samples in this sampling event are determined to be suitable for unconfined, in-water placement without further characterization.



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INTRODUCTION

The mouth of the Umpqua River is located 180 miles south of the Columbia River in Oregon's mid coastal region. The Umpqua drainage system covers 4,560 square miles. The river originates in the Cascade Mountains and delivers 6,700,000 acre-feet annually to the Pacific Ocean. The estuary of the Umpqua covers approximately 6,430 acres and is the third largest in Oregon. Tidal water can extend up the river to the town of Scottsburg at River Mile (RM) 27.5.

The existing project at Umpqua River includes: A jetty on the north side of the entrance about 8,000 feet long; a south jetty 4,200 feet long extending to a point 1,800 feet south of the outer end of the north jetty; and a training jetty on the south paralleling the north jetty; an entrance channel 26 feet deep of useable width, and a river channel 22 feet deep and 200 feet wide from the mouth to Reedsport (at river mile 12) with a turning basin at Reedsport (1,000 feet long, 600 feet wide, and 22 feet deep); two entrance channels at Winchester Bay near river mile 1.5, an East Basin channel 16 feet deep by 100 feet wide for 3,100 feet, 16 feet deep by 100 feet wide for 500 feet, and 12 feet deep by 75 feet wide for 950 feet, and a West Basin 16 feet deep by 100 feet wide for 4,300 feet; a side channel to Gardiner near river mile 8, 22 feet deep by 200 feet wide to a turning basin 22 feet deep by 500 feet wide by 800 feet long; a channel in Scholfield River near river mile 10.8 is currently inactive; a related project in the Smith River at Reedsport is currently not maintained.

The most recent hydrographic survey maps, February and June 2006, indicated limited shoaling from the entrance through RM 7, with a 2' accumulation at RM -0.75 to -0.95, RM 4.2 to 4.5 and 5.57 to 5.76. There is a 3' accumulation from RM 7.75 to 8.57 and RM 10.0 to 10.47. At Reedsport, RM 11.2 to 11.75, the shoaling is 3' to 9'. Within Winchester Bay the shoaling reaches 3' in depth.

The sampling and analysis objectives are stated in the Sampling and Analysis Plan (SAP August 2006), and are, also, listed below. This report will characterize the sediment to be dredged and outline the procedures used to accomplish these objectives.

Sampling and Analysis Objectives

- To characterize sediments in accordance with the regional dredge material testing manual protocols, the *Dredge Material Evaluation Framework (DMEF)*, 1998, as well as the *Evaluation of Dredged Material Proposed for Disposal at Island, Nearshore, or Upland Confined Disposal Facilities – Testing manual (Upland Testing Manual)*.
- Collect, handle and analyze representative sediment from Umpqua River Federally maintained channels in accordance with protocols and Quality Assurance/Quality Control (QA/QC) requirements.
- Analyze all samples for full suite of physical parameters as outlined in the DMEF (1998) Tier II a and all samples containing high percentage of fine-grained material for Tier II b, chemical analyses. The DMEF – Table 8.1 contains the list of analytes and methods of analysis (see pgs. 22-25).



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PREVIOUS STUDIES

Portland District routinely evaluates sediment from its projects on a 5-year rotation. Physical and chemical evaluation sampling was performed at Umpqua River and Winchester Bay in 1970-71, 1979, 1980, 1987-88, 1989, 1992, 1996, and 2001 with a 1992 study of Winchester Bay. The results of these studies revealed the sediment, especially in Federal channel areas, to be predominately fine-grained sands with a low organic content. Sediments from the access channels into Winchester Bay grade from fine sands in the entrance areas in each channel to sediments high in fines, clay and organic content in the dock areas. Gardiner Channel sediments are fine-grained sand, low in organic content. Most sediment from the previous studies was determined to be suitable for in-water disposal. Historically, approximately 100,000 CYs of material is dredged annually from the Umpqua River system for ocean disposal.

The 1979 solid phase bioassay on Winchester Bay sediments had one failure thought to be due to grain-size difference between the reference and failing sample. The disposal area for Winchester Bay was sampled in 1987-88 and showed an increase of benthic invertebrates after disposal.

During dredging to the authorized depth of 22 feet in 1991, in the federal channel off the fueling dock (RM 8.4), weathered Bunker C oil was observed rising to the water surface. Since 1991 dredging has been limited to 18 feet, with no reoccurrence of oil sheen.

In 1996, nine (9) samples were collected and analyzed. Areas sampled included the federal channel from RM 0.5 to Reedsport and Gardiner Channel. Sediment was determined to be acceptable for in-water placement without further characterization.

The last study was completed in 2001, when 8 samples and one duplicate were collected in the Umpqua River and 6 samples from Winchester Bay. One sediment sample exceeded the Tier II guidelines screening level for benzoic acid at 1.2 times the DMEF screening level. Because benzoic acid is found in many natural forms, and because there was no known source in either Winchester Bay or the area of the sample, the exceedance was thought to be an isolated, most likely natural source. Therefore, all sediment was determined to be suitable for open, unconfined, in-water placement without further characterization. The table below shows the grain-size distribution for the 2001 samples.



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Table 1. Grain-Size Distribution for 2001

Sample ID	Grain Size (in mm)		Percent		
	Median	Mean	Gravel	Sand	Silt/Clay
WB-BC-01 (Winchester Bay)	0.030	0.0643	0.00	25.01	74.99
WB-BC-02 (Winchester Bay)	0.044	0.0630	0.00	40.56	59.44
WB-BC-03 (Winchester Bay)	0.095	0.1004	0.00	73.64	26.36
WB-BC-04 (Winchester Bay)	0.320	0.2663	0.00	99.34	0.66
WB-BC-05 (Winchester Bay)	0.059	0.0664	0.00	46.52	53.48
WB-BC-06 (Winchester Bay)	0.024	0.0516	0.00	21.50	78.50
Mean			0.00	51.10	48.91
UR-BC-01 (Gardiner Channel)	0.140	0.1096	0.00	90.75	9.25
UR-BC-02 (Main Channel)	0.300	0.2670	0.39	98.34	1.27
UR-BC-03 (Main Channel)	0.330	0.2881	0.24	98.48	1.28
UR-BC-04 (Main Channel)	0.180	0.1406	0.00	96.63	3.37
UR-BC-05 (Main Channel)	0.040	0.2694	0.00	98.18	1.82
UR-BC-06 (Main Channel)	0.053	0.1687	0.00	99.06	0.94
UR-BC-07 (Main Channel)	0.390	0.3658	0.76	99.17	0.07
UR-BC-08 (Main Channel)	0.300	0.2735	0.89	98.25	0.86
UR-BC-08 (DUP)	0.300	0.2288	0.00	100.00	0.00
Mean			0.25	97.65	2.10

CURRENT SAMPLING EVENT/DISCUSSION

On August 29-30, 2006 a total of eighteen (18) samples were collected from the Umpqua River Main Channel, Winchester Bay and Gardiner Channel. See Figures 2 - 8 for sampling locations. All eighteen (18) samples were submitted for physical analyses including total volatile solids. Seven (7) of the eighteen (18) samples were, also, analyzed for metals (9 inorganic), total organic carbon, pesticides and polychlorinated biphenyls, phenols, phthalates, miscellaneous extractables, polynuclear aromatic hydrocarbon, with six (6) samples selected for both total sediment (bulk) and pore-water organotin, although only bulk analyses were conducted due to lack of pore-water volume.



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Table 2: Umpqua Federal Channel Sampling Station Coordinates

(NAD 83, Oregon State Plane North)

Sample ID	Latitude	Longitude
082906URGC-BC-01	43°44'35.5"	124°07'17.0"
082906URGC-BC-02	43°44'11.6"	124°06'44.4"
082906URMC-BC-01	43°44'40.9"	124°07'52.1"
082906URMC-BC-02	43°44'5.1"	124°07'45.1"
082906URMC-BC-03	43°42'55.5"	124°06'57.1"
082906URMC-BC-04	43°42'17.7"	124°05'41.9"
082906URMC-BC-05	43°42'26.9"	124°05'55.0"
082906URMC-BC-06	43°44'05.8"	124°09'47.8"
082906URMC-BC-07	43°42'59.8"	124°09'22.2"
082906URMC-BC-08	43°41'49.4"	124°09'47.1"
083006URMC-BC-09	43°40'03.3"	124°13'03.3"
083006URMC-BC-10	43°40'59.0"	124°11'27.6"
083006WBWC-BC-01	43°40'59.7"	124°11'07.4"
083006WBWC-GC-02	43°40'45.9"	124°10'58.7"
083006WBWC-GC-03	43°40'39.8"	124°10'54.9"
083006WBEC-GC-04	43°40'52.2"	124°10'44.5"
083006WBEC-GC-05	43°40'46.8"	124°10'41.8"
083006WBEC-GC-06	43°40'34.3"	124°10'42.1"

Table 3, Planning & Sampling Team with Responsibilities

Task/Responsibility	CENWP Tim Sherman	CENWP Donna Ebner	CENWP Ruth Abney	CENWP Mark Siipola	A/E Boat Operator
Overall Project Management	X				
Sampling Plan Development	X	X			
Agency Coordination	X				
Positioning/Log Record	X	X			X
Sediment Sampling	X	X		X	
Physical Analysis	X				
Chemical Analysis	X				
Final Report			X		
Technical Review	X			X	
Boat & Operator					X

RESULTS

Physical and Volatile Solids (ASTM methods)

Eighteen (18) samples were submitted for testing, with data presented in Table 3. The physical analyses resulted in mean values of 0.37% gravel (shell hash - 0.0%-1.2% range), 76.0% sand (15.0%-98.4% range), and 23.7% silt/clay (1.3%-84.9% range), with 6.82% volatile solids (1.67%-13.2% range only measured on ten (10) of the eighteen (18) samples). This material is classified as: silty sand in Gardiner Channel and Umpqua River Main Channel and sandy silt in Winchester Bay.

Metals (EPA method 6010/7471), Total Organic Carbon (EPA method 9060)

Seven (7) samples were submitted for metals testing, with data presented in Table 5. All eighteen (18) samples were analyzed for TOC which ranged from: 0.78 to 2.17% in Gardiner Channel; 0.02 to 1.81% in the Umpqua River main channel; and 2.5 to 4.86% in Winchester Bay.

Low levels of all metals were detected in all three sampling areas. No sample concentrations approached their respective DMEF or SEF screening criteria.

Tributyltin [Total (Bulk) & Pore-Water]

Six (6) samples were submitted for testing of bulk and pore-water organotin compounds. Due to insufficient pore-water recovery, only bulk analyses were performed. The data for the organotin analyses is presented in Table 6. Tetrabutyltin was not detected above detection limits in any samples. Mono-, di- and tri-butyltins were detected at less than 5 ppb, substantially below screening levels.



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Pesticides/PCBs (EPA method 8080), Phenols, Phthalates, Miscellaneous Extractables, Chlorinated Hydrocarbons and Phenols (EPA method 8270)

Seven (7) samples were submitted for testing, with data presented in Table 7. No PCBs were found at the MDL in any of the samples. Most pesticides were not detected above method detection limits in any of the samples. 4,4'-DDD and 4,4'-DDT were detected in 4 samples at estimated levels below laboratory reporting limits and below DMEF and SEF screening levels. Di-n-butyl phthalate and bis(2-ethylhexyl) phthalate were detected in 6 samples at estimated levels below laboratory reporting limits. Di-n-butyl phthalate was detected above laboratory reporting limits in one sample. All phthalate concentrations were orders of magnitude below the DMEF and SEF screening levels. Of the miscellaneous extractable compounds, only dibenzofuran was detected at estimated levels in one sample. The concentration was well below DMEF and SEF screening levels. No chlorinated hydrocarbons were found at the MDL in any samples. 4-methylphenol and phenol were each detected above laboratory reporting limits in separate samples. Phenol was detected at estimated levels in all other samples. All concentrations of phenols detected were below DMEF and SEF screening levels.

Polynuclear Aromatic Hydrocarbons (EPA method 8270C)

Seven (7) samples were submitted for testing, with data presented in Table 8. Most samples contained estimated low levels of some of the "low molecular weight" PAHs and "High molecular weight" PAHs. Three (3) of the samples from Winchester Bay contained measurable quantities of chrysene, pyrene and fluoranthene. The highest concentration of any high molecular weight PAH in any samples was 33 ug/kg. All PAH concentrations were well below DMEF and SEF screening levels.



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CONCLUSION

This evaluation was conducted following procedures set forth in the Upland Testing Manual Ocean Testing Manual and Inland Testing Manual, developed jointly by the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency to assess dredged material. Guidelines used are those developed to implement the Clean Water Act and Marine Protection, Research and Sanctuaries Act. These national guidelines and associated local screening levels are those adopted for use in the regional Dredge Material Evaluation Framework (DMEF), November 1998. Also included for reference are screening levels from the Sediment Evaluation Framework 2006.

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The chemical analyses indicated only very low levels of contamination in any of the samples, with all levels below their respective DMEF and SEF screening levels (SLs). No PCBs or chlorinated hydrocarbons were found at the MDL in any of the samples. Several metals, organotins, pesticides, phthalates, miscellaneous extractables, phenols and low and high molecular weight PAHs were detected but at low levels. Detection levels were sufficient to evaluate material proposed for dredging. The analytical results of this characterization are consistent with historical data. Material represented by all samples in this sampling event are determined to be suitable for unconfined, in-water placement without further characterization.



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Table 4: Physical Analysis and Volatile Solids

Sample I.D.	Percent (%)			
	Gravel	Sand	Silt/Clay	Volatile Solids
082906URGC-BC-01	0.0	86.7	13.3	3.59
082906URGC-BC-02	1.0	93.0	6.0	8.51
082906URMC-BC-01	0.0	75.7	24.3	--
082906URMC-BC-02	0.2	96.2	3.6	--
082906URMC-BC-03	0.2	87.6	12.2	--
082906URMC-BC-04	0	93.9	6.1	2.54
082906URMC-BC-05	0.1	96.3	3.6	1.67
082906URMC-BC-06	0.9	96.3	2.8	--
082906URMC-BC-07	0.1	95.4	4.5	--
082906URMC-BC-08	0.3	96.2	3.5	--
083006URMC-BC-09	1.2	97.5	1.3	--
083006URMC-BC-10	0.1	98.4	1.5	--
083006WBWC-BC-01	0.1	82.5	17.4	4.84
083006WBWC-GC-02	0.0	30.3	69.7	9.57
083006WBWC-GC-03	0.7	17.1	82.2	8.55
083006WBEC-GC-04	1.1	62.5	36.4	4.76
083006WBEC-GC-05	0.6	46.9	53.5	13.2
083006WBEC-GC-06	0.1	15.0	84.9	11.0



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Table 5: Inorganic Metals and TOC (mg/kg)

Sample I.D.	Sb	As	Cd	Cr	Cu	Pb	Ni	Ag	Zn	Hg	Sulfide	TOC (%)
082906URGC-BC-01	0.09	4.56	0.07	35.6	16.4	5.37	32.3	0.05	49.3	0.025	1.6	0.78
082906URGC-BC-02	0.1	6.68	0.1	18.7	9.67	3.89	20.8	0.027	27.9	0.02	4.0	2.17
082906URMC-BC-01	--	--	--	--	--	--	--	--	--	--	3.3	0.89
082906URMC-BC-02	--	--	--	--	--	--	--	--	--	--	<0.5	0.10
082906URMC-BC-03	--	--	--	--	--	--	--	--	--	--	<0.5	0.35
082906URMC-BC-04	--	--	--	--	--	--	--	--	--	--	<0.5	0.31
082906URMC-BC-05	--	--	--	--	--	--	--	--	--	--	<0.5	0.12
082906URMC-BC-06	--	--	--	--	--	--	--	--	--	--	<0.5	0.06
082906URMC-BC-07	--	--	--	--	--	--	--	--	--	--	<0.5	0.14
082906URMC-BC-08	--	--	--	--	--	--	--	--	--	--	<0.5	0.05
083006URMC-BC-09	--	--	--	--	--	--	--	--	--	--	<0.5	<0.02
083006URMC-BC-10	--	--	--	--	--	--	--	--	--	--	0.80 J	0.02 J



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Sample I.D.	Sb	As	Cd	Cr	Cu	Pb	Ni	Ag	Zn	Hg	Sulfide	TOC (%)
083006WBWC-BC-01	--	--	--	--	--	--	--	--	--	--	300	1.81
083006WBWC-GC-02	0.09	6.1	0.27	52.7	29.8	7.74	50.5	0.095	61.4	0.072	996	2.95
083006WBWC-GC-03	0.11	6.19	0.28	64.2	36.2	9.90	62.5	0.15	70.1	0.075	1790	2.50
083006WBEC-GC-04	0.06	4.58	0.26	40.9	21.8	6.25	40.9	0.061	44.1	0.055	308	3.79
083006WBEC-GC-05	0.07	5.32	0.30	43.0	21.3	6.31	38.8	0.07	47.7	0.062	2250	4.86
083006WBEC-GC-06	0.06	6.09	0.27	53.6	32.5	9.42	50.7	0.113	66.9	0.069	2770	3.06
DMEF 1998 Screening level/SEF 2006	150/150	57/57	5.1/5.1	/260	390/390	450/450	140/---	6.1/6.1	410/410	0.41/0.41		NA

-- = Parameter not analyzed for this sample
 Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit).



UMPQUA FEDERAL CHANNEL SEDIMENT QUALITY EVALUATION
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Table 6: Total Organotin

Organotin				
	Total (Bulk) ug/kg			
Sample I.D.	Monobutyltin	Dibutyltin	Tributyltin	Tetrabutyltin
082906URGC-BC-01	0.24 J	<0.19	<0.087	<0.11
083006WBWC-GC-02	1.6 J	2.1 P	4.9	<0.13
083006WBWC-GC-03	1.9	2.5	2.2	<0.14
083006WBEC-GC-04	0.24 J	0.54 JP	<0.28	<0.11
083006WBEC-GC-05	1.7 J	1.9 J	2.6	<0.16
083006WBEC-GC-06	1.9 J	1.9 J	1.9 J	<0.16
Screening Level DMEF 1998/ SEF 2006	75/---			
Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit).				



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Table 7: PCBs (ug/kg)

Sample I.D.	PCBs Aroclors								
	1016	1221	1232	1242	1248	1254	1260	Sum	
082906URGC-BC-01	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	
082906URGC-BC-02	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2	
083006WBWC-GC-02	<15	<28	<10	<3.2	<3.2	<3.8	<3.2	<28	
083006WBWC-GC-03	<5.6	<32	<13	<7.0	<9.2	<8.5	<3.3	<32	
083006WBEC-GC-04	<10	<26	<2.6	<2.6	<2.6	<2.6	<2.6	<26	
083006WBEC-GC-05	<27	<84	<120	<120	<10	<7.4	<3.8	<120	
083006WBEC-GC-06	<3.7	<14	<3.7	<3.7	<3.7	<6.4	<5.1	<14	
DMEF 1998 Screening levels								Total	130/130

Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit).



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Table 7 (con't): Pesticides (ug/kg)

Sample I.D.	Pesticides								
	Aldrin	Chlordane	Dieldrin	Heptachlor	Gamma-BHC (Lindane)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Sum DDTs
082906URGC-BC-01	<0.24	<8.3	<0.45	<1.1	<1.0	<0.19	<0.65	0.51 J	0.51
082906URGC-BC-02	<0.28	<5.2	<0.54	<0.15	<0.28	<0.22	<0.19	0.44 J	0.44
083006WBWC-GC-02	<1.4	<16	<2.7	<0.74	<1.4	<1.3	<0.92	<0.59	<1.3
083006WBWC-GC-03	<1.5	<41	<2.8	<0.76	<1.5	2.2 JD	<0.95	<0.61	2.2
083006WBEC-GC-04	<1.2	<19	<2.2	<1.1	<1.2	<0.9	<0.75	<0.49	<0.9
083006WBEC-GC-05	<1.7	<39	<3.3	<0.89	<1.7	<1.4	<1.2	2.9 JPD	2.9
083006WBEC-GC-06	<1.7	<28	<3.2	<1.4	<1.7	<1.4	<1.1	<0.7	<1.4
Screening Levels DMEF 1998 / SEF 2006	10/9.5	10/2.8	10/1.9	10/1.5	10/--	--/16	--/9.0	--/12	6.9/--

Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit).
 i = The MRL/MDL has been elevated due to matrix interference.



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Table 7 (con't): Chlorinated Hydrocarbons (ug/kg)

Sample I.D.	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,2-Dichlorobenzene	1,2,4-Trichlorobenzene	Hexachlorobenzene
082906URGC-BC-01	<2.5	<3.0	<2.0	<2.4	<3.3
082906URGC-BC-02	<3.0	<3.5	<2.4	<2.8	<3.9
083006WBWC-GC-02	<3.0	<3.5	<2.4	<2.8	<3.9
083006WBWC-GC-03	<3.1	<3.6	<2.5	<2.9	<4.0
083006WBEC-GC-04	<2.4	<2.9	<2.0	<2.3	<3.2
083006WBEC-GC-05	<3.6	<4.2	<2.9	<3.4	<4.7
083006WBEC-GC-06	<3.5	<4.2	<2.9	<3.3	<4.6
Screening Levels DMEF 1998 / SEF 2006	170/--	110/110	35/35	31/31	22/22

Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit).



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Table 7 (con't): Miscellaneous Extractables (ug/kg)

Sample I.D.	Benzyl alcohol	Benzoic Acid	Dibenzofuran	Hexachloroethane	Hexachloro-butadiene	N-Nitroso diphenylamine
082906URGC-BC-01	<5.7	<150	<2.0	<3.4	<2.2	<3.4
082906URGC-BC-02	<6.8	<180	<2.4	<4.1	<2.6	<4.1
083006WBWC-GC-02	<6.9	<1180	<2.4	<4.1	<2.6	<4.1
083006WBWC-GC-03	<7.1	<190	<2.5	<4.2	<2.7	<4.2
083006WBEC-GC-04	<5.6	<150	<2.0	<3.3	<2.1	<3.3
083006WBEC-GC-05	<8.2	<220	<2.9	<4.9	<3.1	<4.9
083006WBEC-GC-06	<8.1	<210	3.1 J	<4.8	<3.1	<4.8
Screening Levels DMEF 1998 / SEF 2006	57/57	650/650	540/540	1400/--	29/11	28/28

Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit).



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Table 7 (con't): Phthalates (ug/kg)

Sample I.D.	Phthalates					
	Dimethyl Phthalate	Diethyl Phthalate	Di-n-butyl phthalate	Butyl benzyl phthalate	Bis(2-ethylhexyl) phthalate	Di-n-octyl phthalate
082906URGC-BC-01	<2.8	<5.4	<4.0	<2.4	3.3 J	<1.9
082906URGC-BC-02	<3.3	<6.4	10	<2.8	<3.2	<2.2
083006WBWC-GC-02	<3.4	<6.5	7.6 J	<2.8	12 J	<2.3
083006WBWC-GC-03	<3.5	<6.7	8 J	<2.9	12 J	<2.3
083006WBEC-GC-04	<2.7	<5.3	4.1 J	<2.3	3.5 J	<1.8
083006WBEC-GC-05	<4	<7.8	11 J	<3.4	8.6 J	<2.7
083006WBEC-GC-06	<4	<7.7	8.6 J	<3.3	8 J	<2.7
Screening Levels DMEF 1998 / SEF 2006	1400/71	1200/200	5100/1400	970/63	8300/1300	6200/6200

Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit).



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Table 7 (con't): Phenols (ug/kg)

Sample I.D.	Phenols				
	Phenol	2-Methylphenol	4-Methylphenol	2,4-Dimethylphenol	Pentachlorophenol
082906URGC-BC-01	20 J	<5.3	<4.5	<8.5	<14
082906URGC-BC-02	14 J	<6.3	<5.4	<11	<16
083006WBWC-GC-02	23 J	<6.3	<5.4	<11	<16
083006WBWC-GC-03	24 J	<6.5	<5.5	<11	<17
083006WBEC-GC-04	23 J	<5.1	<4.4	<8.3	<13
083006WBEC-GC-05	38	<7.6	<6.5	<13	<19
083006WBEC-GC-06	28 J	<7.4	20	<12	<19
Screening Levels DMEF 1998 / SEF 2006	420/420	63/63	670/670	29/29	400/400

Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit).



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Table 8: PAHs - Low Molecular Weight (ug/kg)

Sample I.D.	Acenaphthene	Ace naphthylene	Anthra cene	Fluorene	2-Methyl naphthalene	Naphtha lene	Phen- anthrene	Total Low PAHs
082906URGC-BC-01	<1.6	<2.2	<2.2	<2.7	<1.9	<2.0	<2.0	<2.7
082906URGC-BC-02	<1.9	<2.6	<2.6	<3.2	<2.2	<2.4	<2.4	<3.2
083006WBWC-GC-02	<1.9	<2.6	7.0 J	<3.2	2.3 J	<2.4	5.9 J	15.2
083006WBWC-GC-03	<1.9	<2.7	<2.7	<3.3	<2.3	2.7 J	4.2 J	6.9
083006WBEC-GC-04	<1.5	<2.1	<2.1	<2.6	2.6 J	5.4 J	6.9 J	14.9
083006WBEC-GC-05	<2.3	<3.1	<3.1	<3.8	<2.7	<2.9	5.0 J	5.0
083006WBEC-GC-06	2.4 J	<3.1	5.0 J	3.7 J	<2.7	4.6 J	6.7 J	22.4
Screening Levles DMEF 1998 / SEF 2006	500/500	560/560	960/960	540/540	670/670	2100/2100	1500/1500	5200/5200
Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit).								



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Table 8 (cont'd): PAHs - High Molecular Weight (ug/kg)

Sample I.D.	Benzo(a)-anthracene	Benzo-fluoranthenes	Benzo-(g,h,i)-perylene	Chrysene	Pyrene	Benzo(a)-pyrene	Indeno-(1,2,3-cd)-pyrene	Dibenzo(a,h)anthracene	Fluoranthene	Total High PAHs
082906URGC-BC-01	2.3 J	<3.9	<3.6	<2.2	4.8 J	<2.5	<3.0	<3.4	5.3 J	12.4
082906URGC-BC-02	<2.6	<4.6	<4.3	<2.6	<2.4	<3.0	<3.5	<4.1	<4.1	<4.1
083006WBWC-GC-02	3.7 J	7.9 J	<4.3	23	18	3.2 J	<3.5	<4.1	22	77.8
083006WBWC-GC-03	5.0 J	8.4 J	<4.4	10	14	4.5 J	<3.6	<4.2	13	62.9
083006WBEC-GC-04	2.8 J	<3.8	<3.5	3.9 J	8.7 J	<2.4	<2.9	<3.3	11	26.4
083006WBEC-GC-05	7.3 J	9.2 J	<5.1	9.8 J	22	<3.6	<4.2	<4.9	14	62.3
083006WBEC-GC-06	9.6 J	11 J	<5.0	15	25	<3.5	<4.2	<4.8	33	93.6
Screening Levels DMEF 1998 / SEF 2006	1300/1300	3200/3200	670/670	1400/1400	2600/2600	1600/1600	600/600	230/230	1700/1700	12000/12000

Symbol (<) = Non-detect (ND) at the value listed (Method Detection Limit).

Figure 2: Sediment Station Locations, Umpqua River Entrance

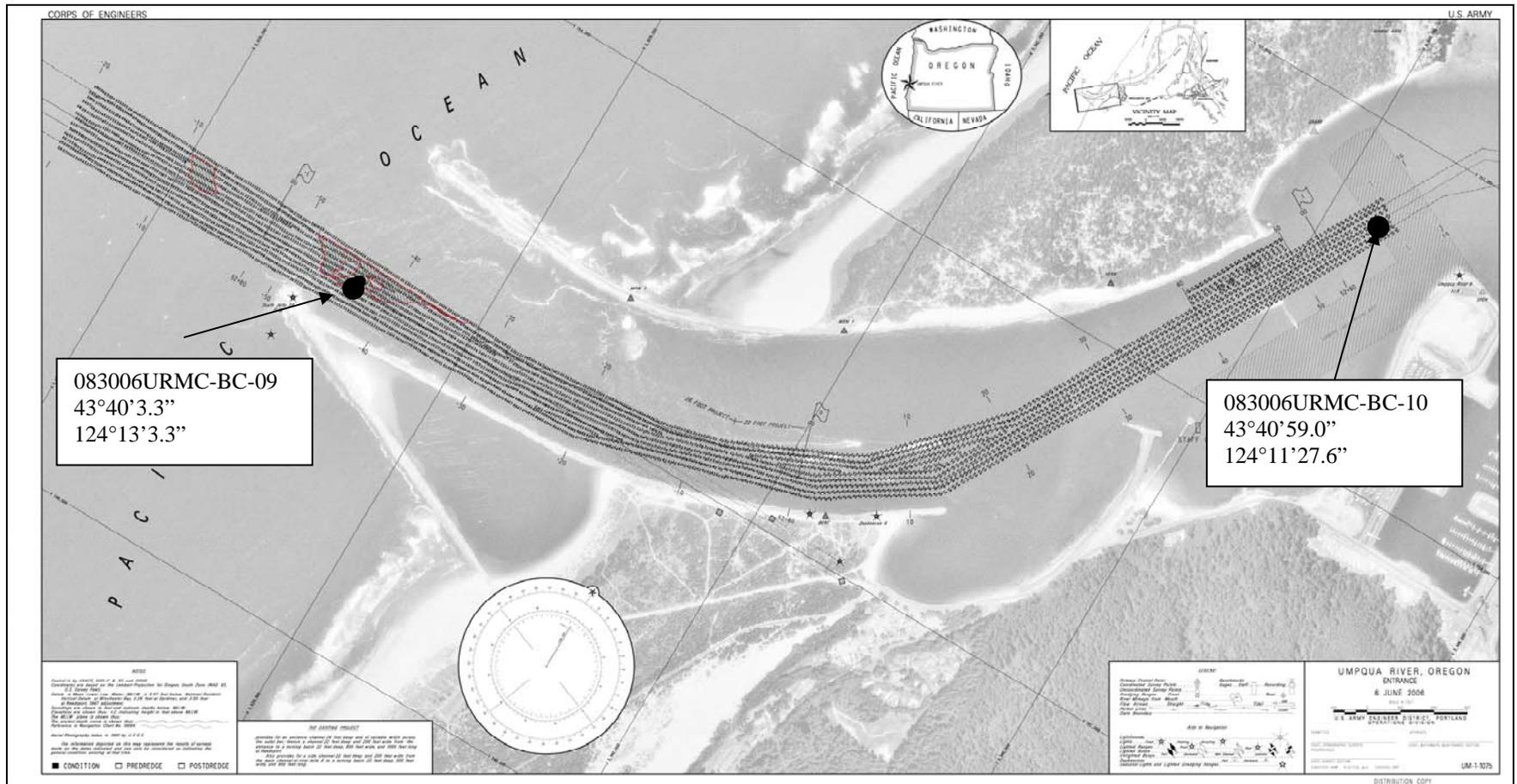


Figure 3: Sediment Station Locations, Umpqua River, Salmon Harbor Reach

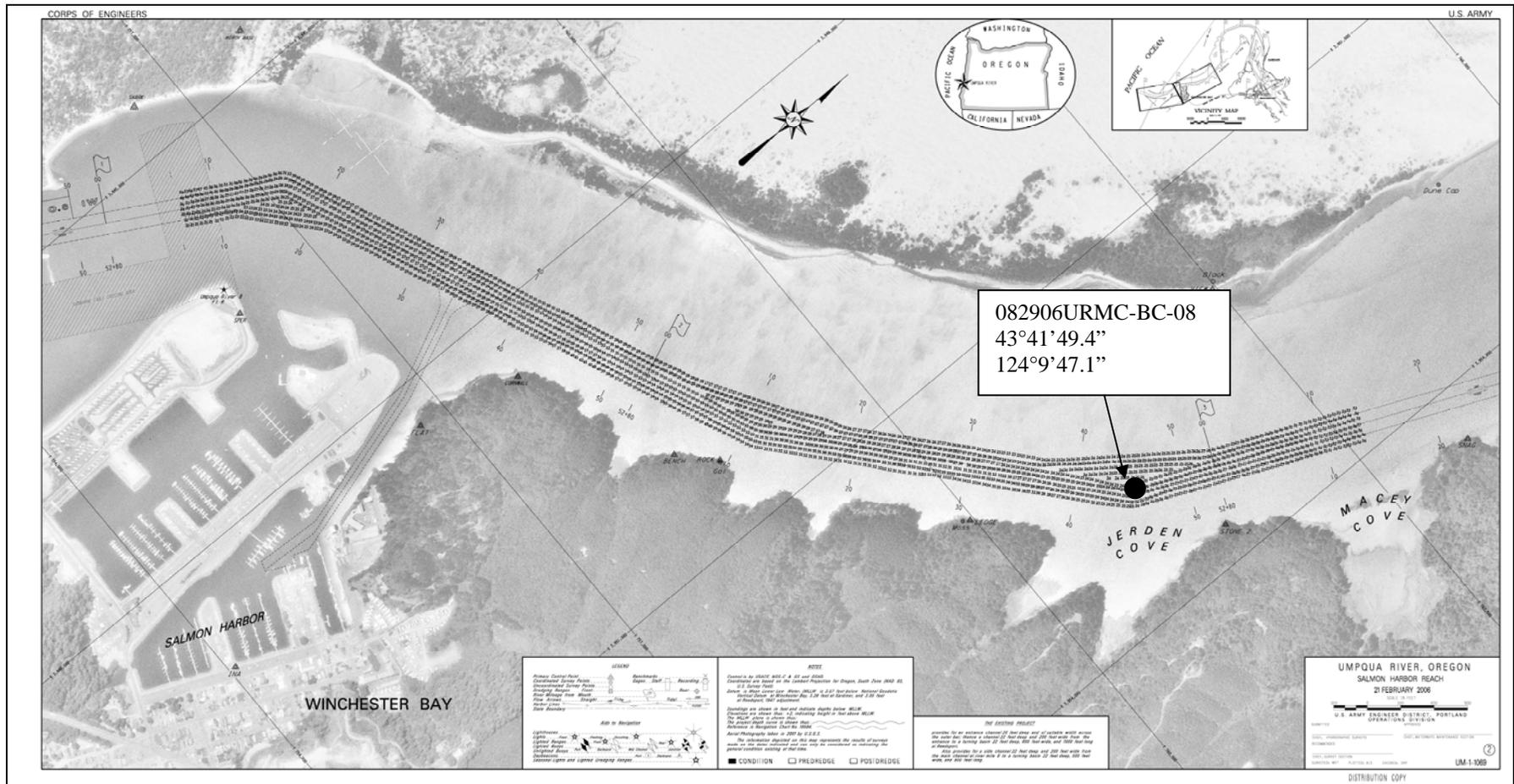
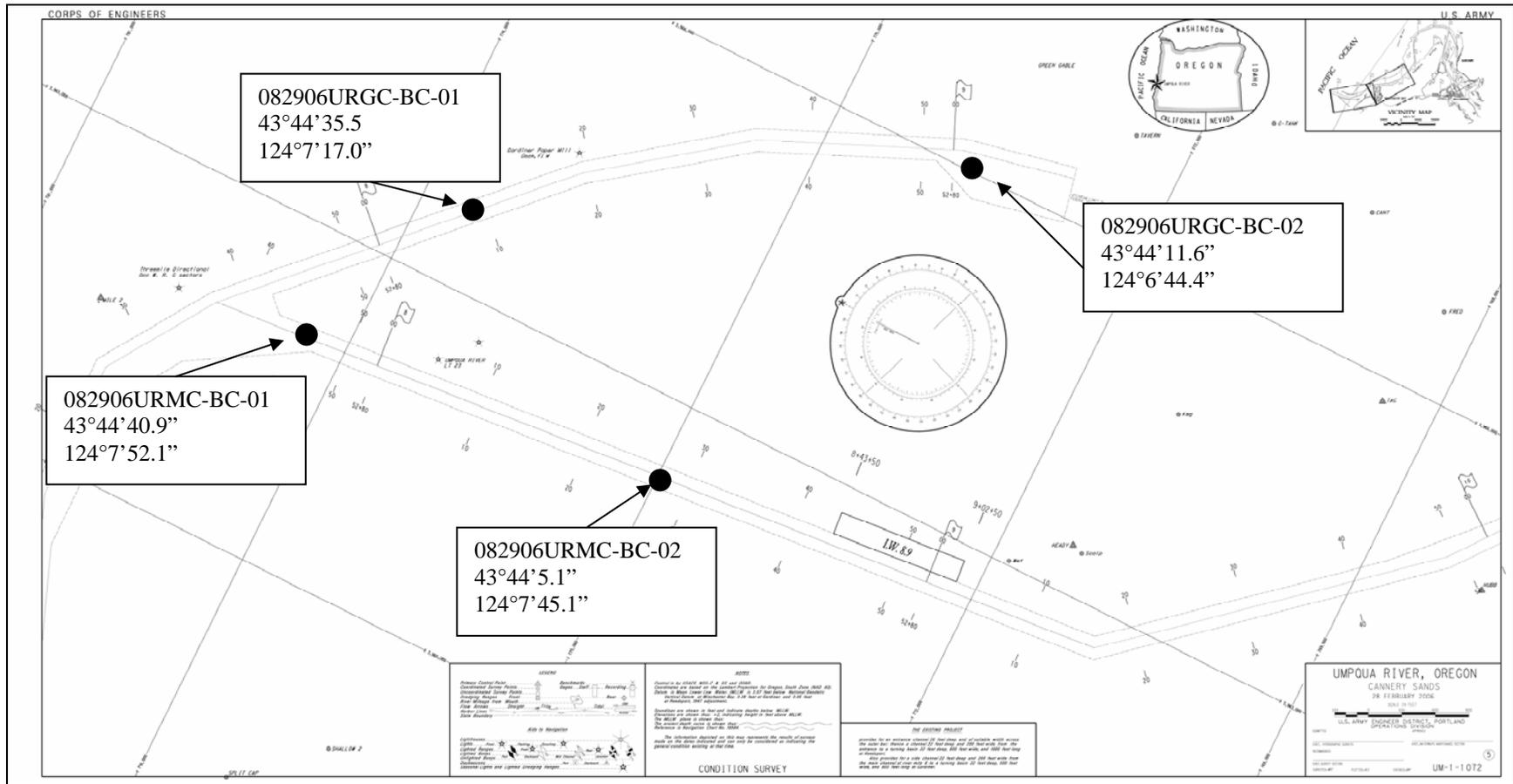


Figure 6: Sediment Station Locations, Umpqua River



UMPQUA FEDERAL CHANNEL SEDIMENT QUALITY EVALUATION
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Figure 8: Sediment Station Locations, Umpqua River

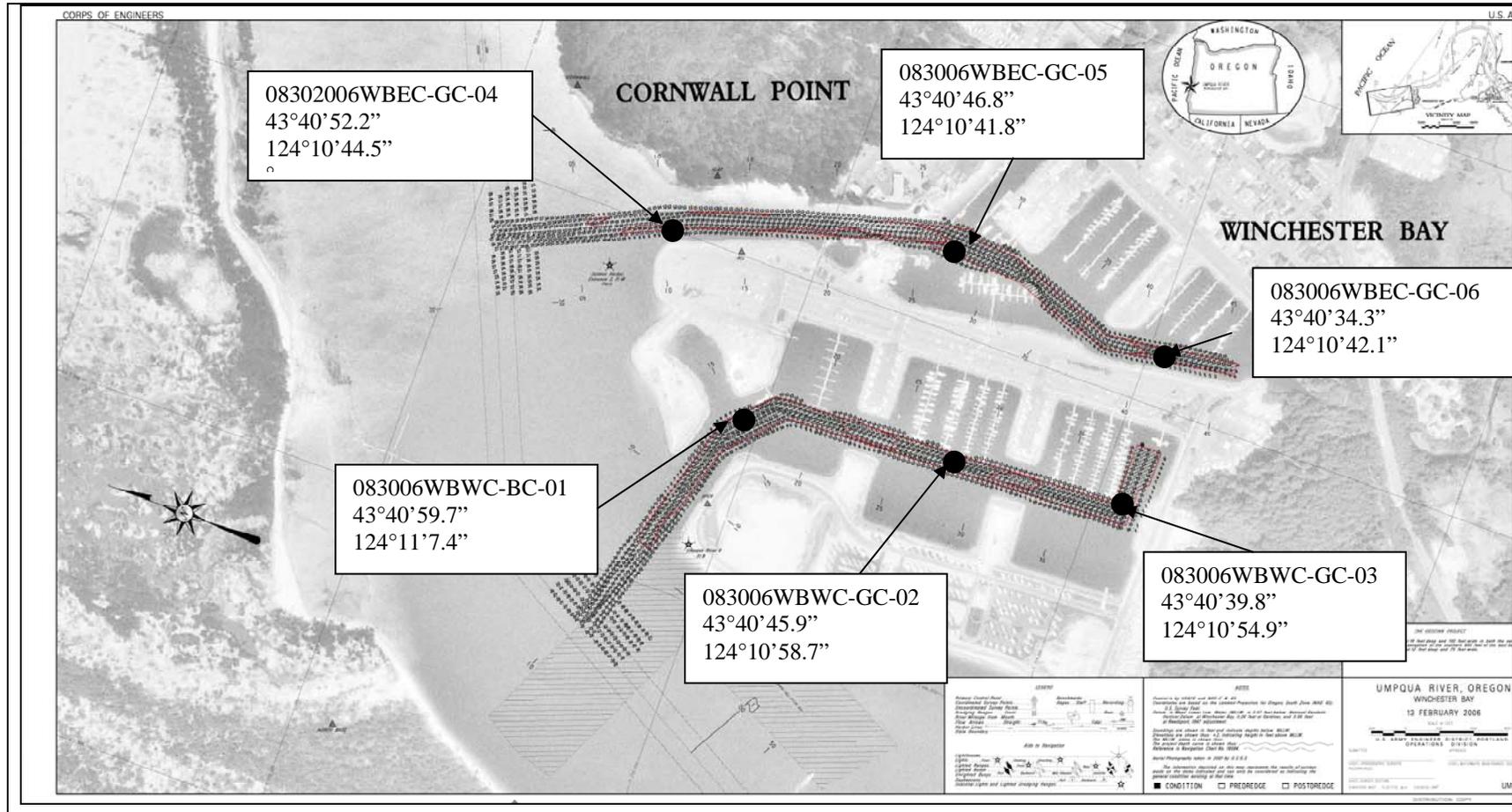


Figure 9: Sampling Equipment



Figure 10: Umpqua River Main Channel



Figure 11: Umpqua River Main Channel



Figure 12: Gardiner Channel



Figure 13: Winchester Bay West Channel

