BAKER BAY

Project Description

The authorized project is 16 feet deep, 150 to 200 feet wide, 3.2 miles long. The mooring basin is authorized to 10 feet deep and 650 feet wide (Figure 1).

The turnover of water at Baker Bay is influenced by both flows of the Columbia River and tides. The flows of the mouth is highly regulated by dams in the river 150k to 600k cfs. River flow reversal from the tide has been observed up to Prescott, Oregon.

Sediment

The sediment includes sand and silty sand with specific gravity from 2000 g/L at the channel entrance to 1350 g/L in the boat basin. The sediment dredged in the West Baker Bay channel in the past has been classified as fine to medium sand with less than 6 percent organic material. While at CM (channel mile) 2.0 to the mooring basin were classified as silt and clay.

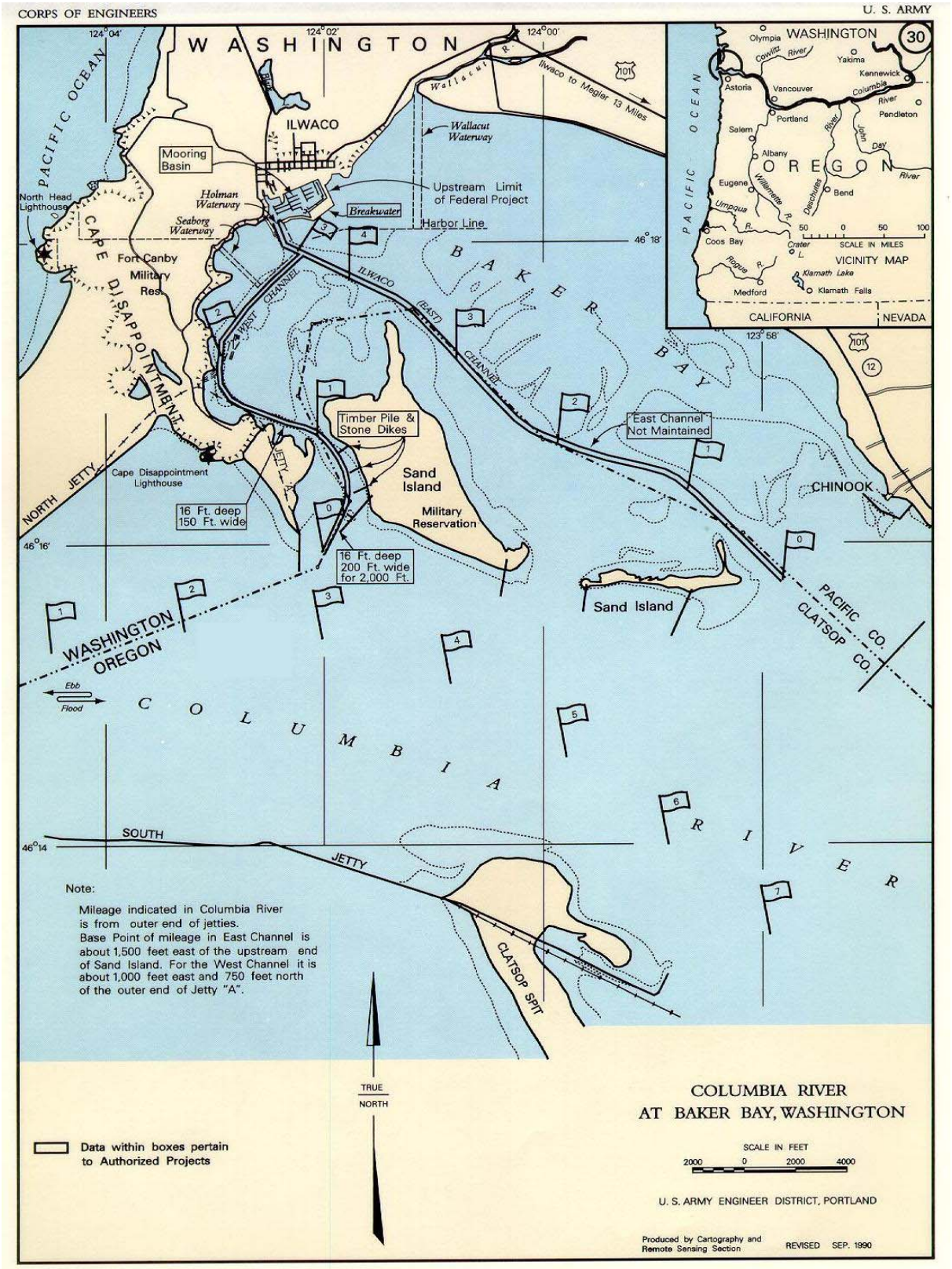

Figure 1. Baker Bay West Channel Vicinity Map

Sediment Quality

1973, physical analysis was performed on sediments.

1980 July and August, Sediment samples were obtained for elutriate, bulk sediment, chemical, benthic, and physical analysis.

Elutriates for ammonia and phosphorus were slightly above guidelines. Mercury and manganese elutriates were also detected. It was determined that they were are no long term impacts.

Bulk chemical analysis of sediment revealed that three parameters, arsenic, barium, and phosphorus were present. They were not expected to effect the sediment or water quality negatively at the disposal site.

Sediments are suitable for disposal at designated sites which include: Area D, Disposal site 1 and 2, West side of Sand Island, Area A, Area B, Area E, and Area F.

1981 June, Timber-pile and stone breakwaters were constructed near the mouth. Four sediment samples were collected to determine their physical characteristics and to evaluate the potential impacts during dredged sediment activities.

The concern would be the physical impact to the proposed disposal sites. Densities ranged form 2643 g/L to 2714 g/L. Physical analysis was performed on sediment samples and it was determined that fine sand was in the southern part of the channel (CW 1.3) and half silt/clay was in the northern area (CM 22.4).

Elutriate tests and bulk chemistry tests were conducted. Arsenic, barium and phosphorous were present in sediments at concentrations above those found in disposal site sediments and exceeded guidelines. Phosphorous exceeded the bulk and elutriate tests, but phosphorous is not expected to impact receiving water quality. Since other parameters found in the bulk sediment analysis were not released in excessive levels in elutriate tests, they should not adversely affect water quality during discharge activities. Sediments are suitable for in-water and upland disposal.

1983 July, the USGS in cooperation with USACE collected and analyzed bottom material form the Columbia River estuary in order to investigate trace metals associated with the bottom material that is expected to accumulate at the sediment/water interface of in-water disposal sites and thus impact benthic deposit feeders. The report is titled “Extractable Cadmium, Mercury, Copper, Lead, and Zinc in the Lower Columbia River Estuary, Oregon and Washington”. Sediment was acceptable for in-water and upland disposal.

1987 July, A gravity corer and Ponar grab sampler were used to collect sediment

samples. A grab sampler is for the sandy materials and a gravity sampler was used for fine grained materials.

Sediment testing included physical analysis, bulk chemistry and elutriates. Sediments between RM 1.39 and 3.1 contained high percentages of fine-grained material which are in contrast for the sediments between RM 0 and 1.39 (which were more coarse grained). In the past contaminate levels have been below the screening levels for "clean" sediments. Sediments at RM 3.1 showed cadmium and mercury values above Oregon background levels. The shoal should be re-sampled and tested for cadmium and mercury. Elutriates for metals were below the EPA water quality criteria while ammonia releases were above the criteria (chronic and acute) for RM 3.1 and 2.5. The highest concentration was at the entrance RM 3.1 (near the Mooring Basin).

It was determined that dredging material was acceptable for in-water and upland disposal. But since dissolved elutriate ammonia concentrations are a concern, disposal of in-water should be placed at a dispersive site during high flow conditions.

1992 March, Three samples were taken using a modified Gray O'Hara box corer. Physical analysis was performed on all three samples to evaluate the acceptability of disposal at Area D, Sand Island and, a new in water flow lane site at Columbia River Mile 2.5. The shoal at CM 2.9 was fine grained material, therefore chemical analysis was performed for contaminates. The concentrations were acceptable except phenol. However phenol was detected in the method blank solution and was determined not be a problem.

Disposal was acceptable for unconfined in-water and upland disposal since no adverse environmental effects were expected.

1997 July, Ilwaco Channel was sampled at six locations between the channel entrance RM 0.21and the mooring basin at RM 3.04. All six samples were analyzed for physical properties and three, which were fine-grained sediment, were also analyzed for chemicals of concern. Results show elevated levels of chromium, copper and mercury, but all were below concern levels. Organochlorine pesticides, including Heptachlor, DDE, DDD, and DDT, were found in concentrations only slightly above detection levels and well below levels of concern. No PCB's were detected. Levels of total PAH were well below concern also. Dredged material from West Channel is suitable for unconfined in-water disposal.

2004 June. A total of six (6) box-core surface grab sediment samples were collected along the length of the West Baker Bay Channel. All samples were submitted for physical analyses including total volatile solids and 3 samples were analyzed for metals (9 inorganic), total organic carbon, pesticides and polychlorinated biphenyls, phenols, phthalates, miscellaneous extractables, polynuclear aromatic hydrocarbon and both porewater and total sediment organotin.

Three (3) samples were classified as "elastic silt, and 3 samples as "poorly graded sand." Mean grain-size for all the samples was 0.15 mm (range 0.132mm to 0.289mm), with 1.37% gravel

(range 0.0% to 6.6%), 51.32% sand (range 2.0% to 98.8%), and 47.32% fines (range 1.0% to 97.6%). Volatile solids for all samples ranged from 0.3% to 4.6% with a mean value of 2.12%. The material represented by this sampling event has been determined suitable for unconfined in-water placement, with no anticipated adverse environmental impact.

2006 June, A total of four (4) Ponar surface grab sediment samples were collected along the outer reach of the West Baker Bay Channel June 28, 2006. Station 062806-BBWC-P-01 contained "clay balls" which were sampled and analyzed separately. All samples were submitted for physical and chemical analyses including total volatile solids, metals (9 inorganic), total organic carbon, pesticides and polychlorinated biphenyls, phenols, phthalates, miscellaneous extractables, and polynuclear aromatic hydrocarbon.

Mean grain-size, excluding the 062806-BBWC-01B (clay balls), for all the samples was 0.305 mm (range 0.260mm to 0.362mm) with sand percent ranging from 94.26 to 98.97%. The clay ball sample had a mean of 0.254 mm from a triplicate analysis of the sample, percent sand was 77.5 % with 22.5 % finds. Volatile solids ranged from 0.62 % to 2.08 % for the clay ball sample. Material from the outer three stations was more uniform.

The chemical data indicates low levels of metals present in all samples analyzed, but levels do not approach their respective DMEF/SEF screening levels. All total DDT, PCB, PAH, and phthalates reporting levels were low, with mostly non-detect (ND) results reported. Phenol was detected in all samples but was also detected in the method blank at very low levels. Material from Baker Bay has not historically had a problem with the presence of significant levels of chemicals of concern and the material was determined to be suitable for unconfined in-water placement without further characterization. This study further supports the 2004 determination that the material to be dredged is suitable for unconfined in-water disposal without further testing.

2009 July. A total of 9 samples were collected from 6 stations in the West Baker Bay Channel. Three (3) box-core (surface grab) samples were collected in the outer channel (approximately CM 0.3 up to 1.5) to verify previous results and to keep entire channel on the same sampling schedule. Three (3) gravity-core samples were collected in the fine-grained inner channel reach (approximately CM 2.75 to CM 3.15). The 3 gravity core samples were split vertically to represent the dredge prism (A) and the new surface material (Z).

The 3 box core samples (BC-01, 02, and 03) were analyzed for physical properties only. Each subsample from the gravity-cores (A and Z for each of GC-04, 05, and 06) was then submitted to the laboratory for physical and chemical analyses including total volatile solids, metals (9 inorganic), total organic carbon, pesticides and polychlorinated biphenyls, phenols, phthalates, miscellaneous extractables, and polynuclear aromatic hydrocarbons.

This evaluation was conducted following procedures set forth in the 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 Sediment Evaluation Framework (SEF), May, 2009.

Percent sand was greater in the outer channel than in the more quiescent inner channel with a mean of 95.6 percent sand and 4.3 percent fines (silt/clay). The inner channel had a mean percent sand of 12.3 in the dredge prism (89.7 percent fines) and a mean percent sand of 7.3 (92.7 percent fines) in the new surface material.

Although the percent fines is greater in the inner channel, the chemical data indicate low levels of metals present in all samples analyzed; concentrations do not approach their respective SEF screening levels. All concentrations of total DDT, PCB, phenol and phthalates were low, with mostly non-detect (ND) or estimated (J) concentrations reported. PAHs detected were at low concentrations, with LPAHs mostly non-detects or estimated and HPAHs at low concentrations.

This (2009) study confirms a ranking of “low” for sediments from Baker Bay – West Channel. Material dredged from this area is considered acceptable for unconfined in-water placement without further characterization, for a period of 7 years (2016).

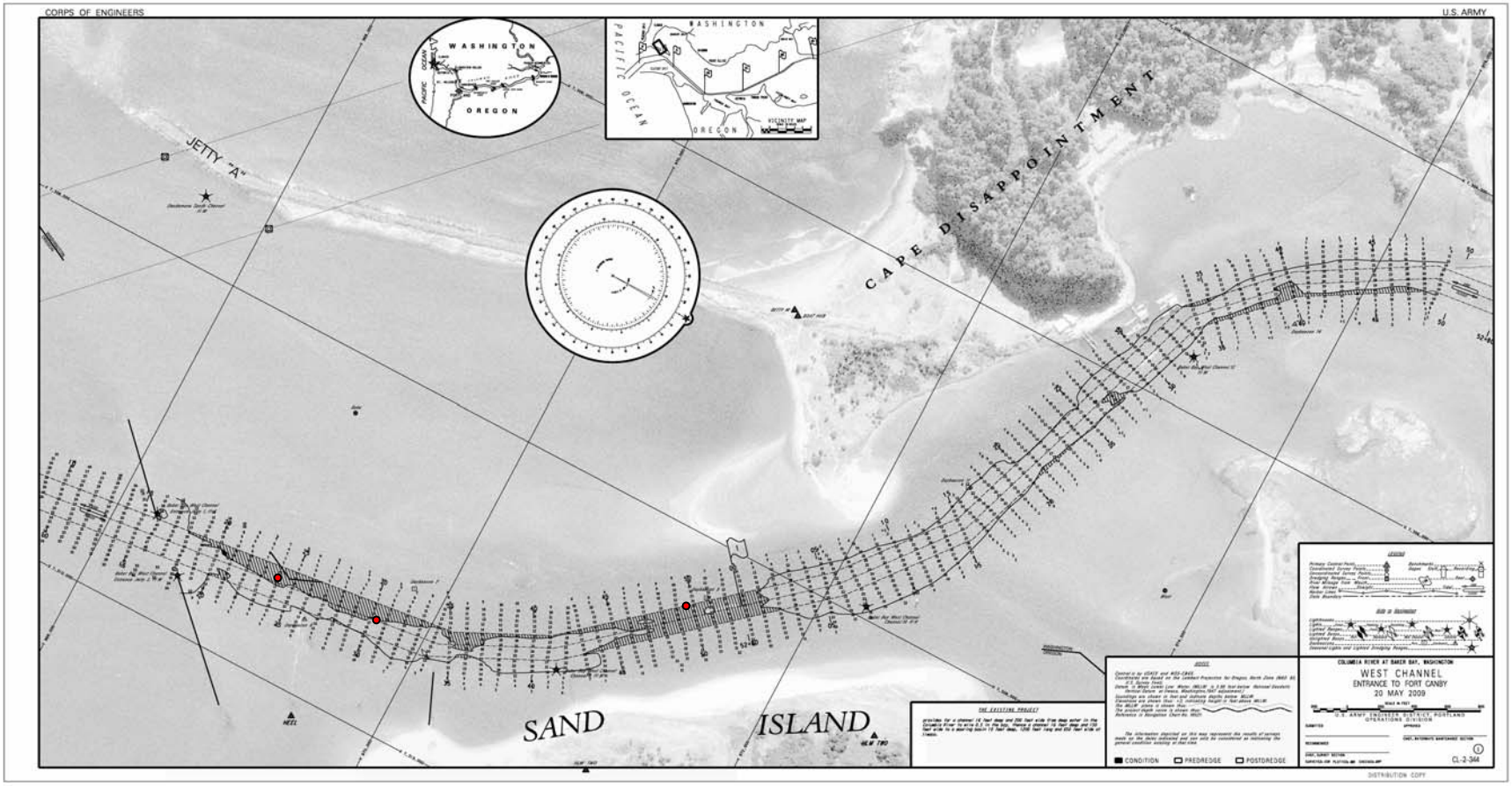

Figure 2. Sediment Sampling Locations, Baker Bay West Channel CM 0+10 to 1+50.

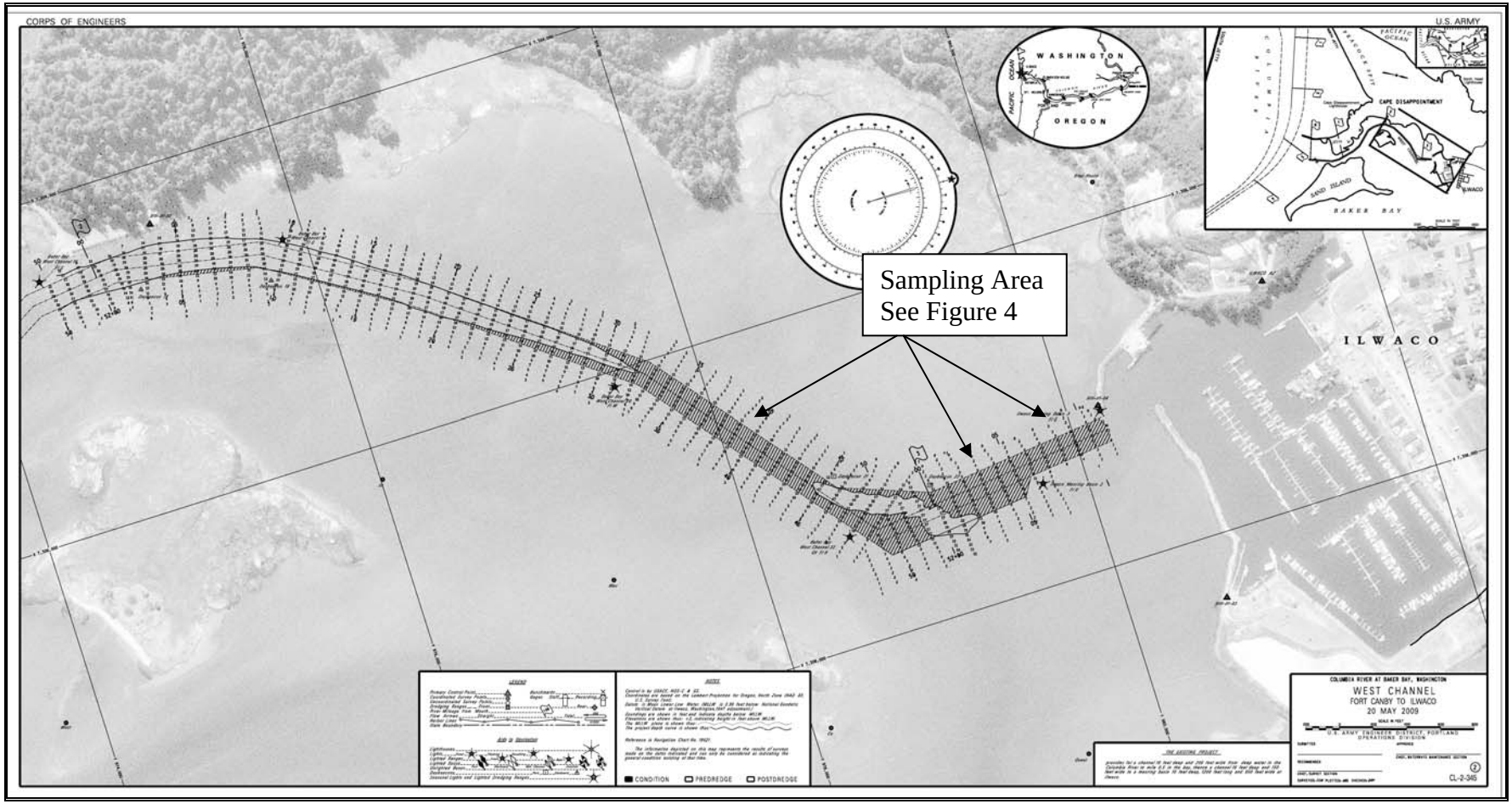

Figure 3. Sediment Sampling Locations, Baker Bay West Channel CM 1+50 to 3+10, July 7 2009.

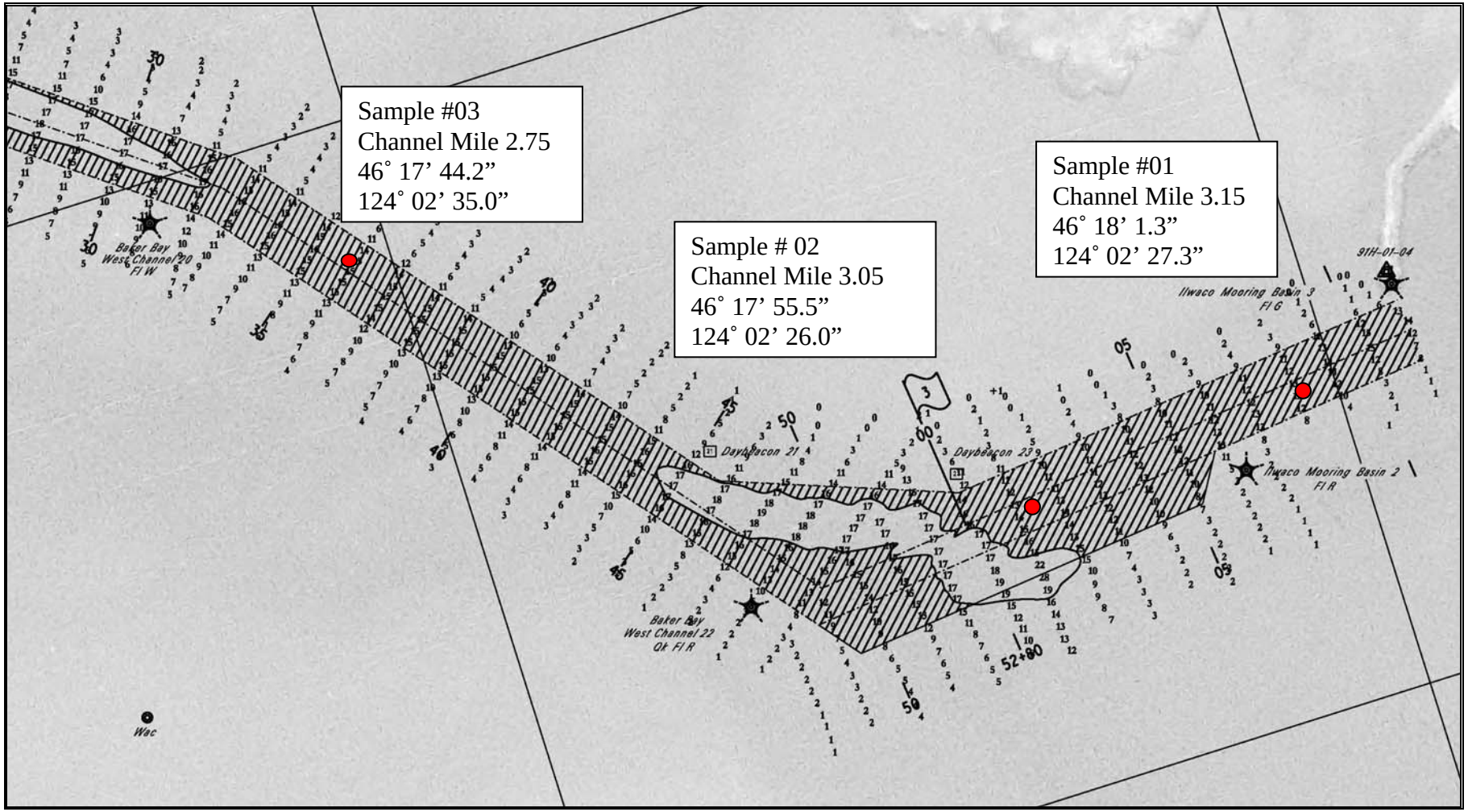

Figure 4. Detail of Sediment Sampling Locations, Baker Bay West Channel CM 1+50 to 3+10, July 7 2009.