SKIPANON RIVER

Project Description

The authorized project is 200 feet wide and 30 feet deep from the Columbia River channel to Skipanon River mile 2.0. This includes a 30 foot turning basin and a 12 foot deep mooring basin in Warrenton (Figure 1). Currently the channel requires maintenance to 16 feet. Shoaling and encroaching sands from the rivers mouth occurs at the upper harbor. Shoaled sediment is removed with agitation, pipeline, or hopper dredge.

Levees have been constructed along the lower portion of the river to protect adjacent lands and the city of Warrenton from tidal overflow.

Maintenance

The outer channel is maintained by a hopper dredge about every 3 out of 5 years and the inner channel is maintained 1 out of 5 years. Disposal has typically been at Area D or at up-land site on the Skipanon River. The average volume dredged from 1986, 88, 89, and 90 was 26,000 cy.

Sediment

The last formal sediment evaluation was in 1991. The sediment samples were analyzed and tested for chemical and physical characteristics. The average density of these sediment samples were 1,290 mg/L.

Sediment Evaluations

1976 and 1977, acute toxicity bioassays were performed by EPA. These bioassays reveled that no significant differences in mean survival of test organisms compared to controls.

1980 July, concentrations in bulk sediment (arsenic, cadmium, organic carbon, copper, nitrogen, phosphorus and zinc) exceeded Corps guidelines. Elutriate tests showed that organic carbon and nitrogen exceeded EPA water quality criteria. It was concluded that short term elevated levels of carbon and nitrogen (ammonia) would be lowered by mixing and dilution in receiving water.

Elutriate tests were performed at sample sites for dissolved chemicals, dissolved insecticides and herbicides. Total recoverable metals and total recoverable insecticides and herbicides in the bottom material were also included in testing. These were conducted by contract with the USGS.

Upland disposal was recommended providing the site was managed so that dissolved oxygen, ammonia, pH and turbidity of receiving water were within acceptable levels in the downstream mixing zone.

1984 September and October, a proposal to deepen the lower Columbia River for coal export channel prompted a study to evaluate the effects of dredging and disposal operations. This study was conducted by the USGS for the USACE, Portland District however the proposed coal channel was never dredged.

1986 September and October, an analysis of the river bottom conditions were conducted utilizing vibratory coring. This was conducted by Dames and Moore and Ocean Surveys, Inc. A part of the Columbia River Coal Channel. Sampling was conducted for volatile solids, PAH's, elutriates, and total phenols. No coal channel dredging was conducted.

1987 June & July, a technical report on the Coal Export Channel was completed. The report is a environmental studies report. Sampling occurred for grain size, volatile solids, total organic carbon, metals, pesticides, PAH's and, elutriates. Dredging of the proposed coal channel was not conducted.

1991 March, sediment samples were taken by gravity corer at 7 stations between the mouth of the Skipanon River and the end of the turning basin at river mile 1.8 for chemical and physical analysis. Channel sediments between the mouth and the turning basin appear to have lower concentrations of pollutants than turning basin sediments.

The level of cadmium and mercury in bulk sediment barely exceeded EPA and/or

CENPP screening levels. However, the level of cadmium/mercury in the Skipanon sediments is probably of low environmental impact to the water column. This is supported by earlier studies in 1980 and 1987 which showed that elutriates of Skipanon sediments, that had similar cadmium/mercury levels to current levels, did not exceed EPA water quality criteria for both fresh and salt water. And, elutriate tests of sediment from the west channel into Baker Bay, Chinook channel and Tongue Point, with similar fines and cadmium/mercury content as Skipanon samples, showed similar results. The effect on the water column would be expected to be minimal, especially in fast, water flow regimes, where rapid dilution of dissolved contaminants would take place.

The effect of the cadmium and mercury in sediment on benthic invertebrates is also expected to be minimal. Sediments from New York Harbor, which were very similar to Skipanon sediments in their sand, silt, clay and organic content, but 4 to 30 times higher in cadmium content, showed no significant bioaccumulation of cadmium, when compared to controls, over a 100 day period of exposure to three organisms. It was speculated that the lack of bioaccumulation was due to high organic content and sulfur content of the sediments. Skipanon sediment samples taken in 1986 showed considerable elemental sulfur. It is probable that Skipanon River sediments have considerable protective AVS which forms insoluble cadmium and mercury sulfides

Additional evidence that Skipanon River sediments will have little impact on benthic organisms comes from the result of a study conducted by EPA during 1976-77. The results of the study showed that when 5 estuarine organisms were exposed to sediment there was no significant difference from controls in the mean survival of any species. The Skipanon River sediments have changed very little over the years. They have similar fines, TOCs and metals. PAH's have recently been detected, probably because of improved detection limits. Levels of PCBs and pesticides have remained about the same. In addition to this EPA bioassay study, another study of similar sediment from Tongue Point, conducted by Battelle, Pacific NW Division, revealed no significant mortality to benthic organisms compared to controls.

Sediments from the Skipanon River were determined to be acceptable for disposal in-water at Tansy Point or Area D with little environmental impact expected except for local increases in turbidity and concentrations of contaminants, which will be rapidly diluted, and burial of bottom organisms. Because of the high energy, dispersive nature of the disposal sites, impacts are expected to be temporary. Disposal is acceptable upland providing receiving water is monitored for acceptable levels of metals, dissolved oxygen, ammonia and turbidity.

In-water disposal at an ODMDS, such as Area F off the mouth of the Columbia River, may be acceptable in the future. Site F was monitored between 1989 and 1992 for

the ecological impacts of disposal of fine grained material from Tongue Point. The Tongue Point sediments are very similar to Skipanon sediments in fines, metals and PAH's. If the results of the monitoring study show acceptable impacts then Skipanon sediments could also be disposed at Site F. The Tongue Point sediments have already undergone solid phase bioassays which showed no significant mortality from controls. As mentioned before, there is already evidence from an EPA bioassay study that significant mortality does not occur to benthic organisms exposed to Skipanon sediments.

1996 August, Nine gravity core samples were collected for physical and chemical analyses on August 7, 1996. Percent fines (silts and clays) ranged from 98% (SK-GC-1 & 2) to 39% (SK-GC-9). Volatile solids ranged from 3.1% to 8.4%, with all but 2 (SK-GC-7 & 8) above 5%. Cadmium (Cd) exceeded the screening level (SL) value of 0.96 ppm in 4 samples (SK-GC-1, 2, 3, & 7) with a high of 1.36 ppm (SK-GC-1 & 2). Cd appears enriched in the Columbia River system as similar values were found in the 1991 sampling effort when Cd concentrations ranged from 0.9 to 1.8 ppm with a mean of 1.3 ppm. Cd values in other areas of the Columbia River often fall within this range. Due to high sulfide levels (up to 2200 ppm), it is not likely that Cd is bioavailable. Zinc (Zn) is also elevated, but only SK-GC-1 at 169 ppm exceeds the SL (160 ppm). These levels for Zn are also similar to the 1991 levels. Maximum TBT level is 16 ppb in sample SK-GC-5, the SL is 73 ppb. DDT, DDE, and DDD were detected in the majority of the samples, however maximum levels were ≤ 1.0 ppb well below the SL. In earlier studies (1984 and 1991) DDT and its derivatives were found at higher levels (26 to 29.9 ppb). Bioassay and bioaccumulation studies had been budgeted and would have been conducted if these levels had been found during the 1996 evaluation effort. Based upon the 1996 chemical data biological testing was not deemed necessary and the budget was adjusted accordingly. The PCB Aroclor 1254 was detected in all samples while Aroclor 1248 was detected in 2 samples. Maximum values were 12 and 4 ppb respectively, well below the SL of 130 ppb total PCBs. All PAHs were below SLs. Based upon these results and previous studies, the material to be dredged, though slightly contaminated, was considered to be suitable for unconfined in-water disposal.

2001 September, On September 12, 2001 seven (7) sediment samples were collected from the Skipanon Channel and Boat Basin. All samples were submitted for physical analyses and the following chemical analyses, metals (9 inorganic), total organic carbon (TOC), pesticides/polychlorinated biphenyls (PCBs), phenols, phthalates, miscellaneous extractables and polynuclear aromatic hydrocarbons (PAHs). Five (5) samples were analyzed for organotin (TBT) pore water analysis. One (1) sample was selected for dioxin/furan analysis.

The pesticide DDT or its breakdown products DDE and DDD were found to be present in all samples analyzed. One sample (SKIP-GC-04) exceeded the 6.9 ug/kg DMEF screening level (SL) at 7.1 ug/kg. The shoaling represented this sample needs further characterization to determine suitability of material for unconfined in-water disposal. Sediment represented by all other samples has been determined to be suitable for unconfined, in-water placement.

June 24, 2003, The June 24, 2003 sampling event, at the Skipanon Federal Project, was a follow-up to detected levels of DDT above the Dredge Material Evaluation Framework (DMEF) screening levels (SLs) reported in data from the September 12, 2001 sampling event at Skipanon. In order to determine suitable disposal options for the material in question, Tier III DMEF bioassay analyses were conducted, in addition to chemical and physical analyses.

A total of five (5) sediment samples were collected along the Skipanon Federal channel and boat basin entrance channel June 24, 2003. All samples were submitted for physical analyses including total volatile solids and also were analyzed for metals (9 inorganic), total organic carbon, pesticides and polychlorinated biphenyls, phenols, phthalates, miscellaneous extractables and polynuclear aromatic hydrocarbon. In addition to physical and chemical analyses, all samples were submitted for DMEF Tier III bioassay analyses.

The physical analyses indicated mean values of 0.0% gravel, 23.9% sand (16.02%-31.80% range), and 76.1% silt/clay (68.20%-83.98% range), with 6.82% volatile solids (5.60%-7.75% range).

Chemical analyses indicated the DMEF screening level for Mercury (Hg) (0.41 mg/kg) was exceeded in one sample, SKIP-GC-04, at 0.564 mg/kg. The laboratory reported Hg in the method blank and because there has been no historical Hg at this project, it is considered a possible laboratory anomaly. The bioassay analyses for sample SKIP-GC-04 found the material, associated with this sample, suitable for in-water disposal. However, sample SKIP-GC-03, taken from the area where DDT exceeded DMEF screening levels in 2001(see attached figure), did not pass the bioassay larval test, *Mytilus Galloprovincialis.*

With exception of the material associated with sample SKIP-GC-03, which is not suitable for open in-water disposal; the balance of the material tested has been determined suitable for open in-water disposal.